SmartPlant P&ID

Setup and Customization Course Guide

Process, Power & Marine

INTERGRAPH

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Preface

This document is a course guide for the various SmartPlant Engineering Manager and P&ID User Guides. The content is the similar as the online Help delivered as part of the software with the exception of the Labs.

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Getting HELP in SmartPlant

The software's user assistance supplies command information as you perform tasks. You can access different kinds of information any time you are running the software. This information could include reference topics, narrative descriptions, or instructional material.

In addition, the software provides several learning tools that you can activate from the online **Help** menu.

The software offers the following important user-assistance features:

Online Help

• Complete command descriptions give you more information. When you click **Help** or press **Shift** + **F1**, the pointer changes to a northwest arrow with a question mark. You can then get context-sensitive Help for any command by clicking the toolbar button or by clicking the menu command at the top of the window.

• A structured table of contents, an index, and full-text search capabilities provide easy access to Help topics. Press **F1** any time you need online Help during a design session. When a command is active, the Help topic for that command appears. If no command is active, then the table of contents for the Help topics appear.

You can also access the table of contents by clicking **SmartPlant P&ID Help** on the **Help** menu.

Learning Tools

• You can use **About SmartPlant P&ID** on the **Help** menu to see your software version and license information.

User Interface Features

• ToolTips helps you find command names. When you pause the pointer on the command button on the toolbar, a yellow label displays the commands name.

• Brief command descriptions show you the basic function of a command. When you point the pointer at the command button on the toolbar, the description appears in the Status Bar at the bottom of the window. Also, messages that explain your actions for each step of the command appear in the Status Bar.

SmartPlant P&ID Help Command (Help Menu)

Displays the table of contents for the SmartPlant P&ID Help topics, which includes step-by-step instructions for using the software, reference information, examples of features, and technical support information. It also provides access to the Help index and full-text search.

About Command (Help Menu)

Displays information about your copy of the software, including the version number and the copyright, legal, and licensing notices.

Printable Guides Command (Help Menu)

Opens a page in your Internet browser that includes the links to the User's Guides in portable document format. Click on a link and the guide is opened in the appropriate application, from which you can print it. The User's Guides contain the same information as the online Help.

Upon installing SmartPlant Engineering Manager or P&ID, the printable guides (.pdf) may also be found on your disk at ~ \Program Files\SmartPlant\Engineering Manager\Program\resdlls\0009 or ~\Program Files\SmartPlant\P&ID Workstation\Program\resdlls\0009.

List of Printable Guides	
SmartPlant Engineering Managers User's Guide	SmartPlant Workshare Configuration and Reference Guide
SmartPlant Catalog Manager Users's Guide	SmartPlant P&ID User's Guide
SmartPlant Data Dictionary Manager Users's Guide	SmartPlant P&ID Drawing Manager User's Guide
SmartPlant Data Dictionary Template Comparison Utility Guide	SmartPlant P&ID Options Manager User's Guide
SmartPlant Filter Manager Users's Guide	SmartPlant P&ID Rule Manager User's Guide
SmartPlant Format Manager User's Guide	SmartPlant P&ID Insulation Specification Manager User's Guide
SmartPlant Line Style Editor Users's Guide	SmartPlant P&ID Symbol Libraries Reference Guide
SmartPlant Reference Data Synchronization Manager Guide	SmartPlant P&ID to PDS Piping Data Transfer Configuration and Reference Guide
SmartPlant Projects Configuration and Reference Guide	SmartPlant P&ID Installation & Upgrade Guide

Introduction

The Intergraph® SmartPlant® family of process industry solutions is an open line of discipline-specific software tools that provide an integrated solution for the entire plant life cycle. Knowledge-based, intuitive, easy-to-use, accessible, flexible, and data-driven, SmartPlant supports global workflows. The software enables users to create logical and physical definitions of the plant model and enables access to plant data from conceptual design to decommissioning.

SmartPlant is the fulfillment of the Intergraph vision to speed and improve the creation of information and to provide this data to multiple users at any moment in the appropriate form. Workflows are compressed, reducing production time, lowering costs, enhancing global execution, and extending the life and usability of plant information.

The successor to the Intergraph Plant Design System (PDS™), SmartPlant includes expanded functionality for front-end engineering and design (FEED), construction, operation, and maintenance phases.

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Introducing SmartPlant Engineering Manager

SmartPlant Engineering Manager provides all the tools you need to effectively set up and manage your SmartPlant work. SmartPlant Engineering Manager takes advantage of a client/server design that greatly enhances performance and lowers the cost of ownership. Because it is built on few Microsoft dependencies and is not web-based, SmartPlant Engineering Manager requires no web server. The intuitive user interface design, with its streamlined layout, allows you to easily manage user access and to share plant data.

Supporting SmartPlant P&ID, SmartPlant Electrical, and SmartPlant Instrumentation, SmartPlant Engineering Manager manages the plant structures while the applications themselves are responsible for manipulating the actual data (including creating, deleting, modifying, launching, and so forth). SmartPlant Engineering Manager allows you to view not only the data related to the whole site but also data related to individual plants and projects. You can create and maintain SmartPlant Engineering sites, plant structures and projects, in addition to adding plant group types, modifying plant attributes, creating and modifying hierarchies, and associating SmartPlant applications.

Introducing SmartPlant P&ID

SmartPlant P&ID creates intelligent P&IDs by populating the database with relevant plant data. This method provides valuable information throughout the plant life cycle. As a data-centric, rule-based solution for the P&ID life cycle, SmartPlant P&ID helps users improve design quality, data consistency, and standards compliance. With quick access to supporting engineering data, SmartPlant P&ID significantly cuts design and modification time and increases accuracy with its exclusive data-centric approach and use of design rules, automatic checks, and drag-and-drop capabilities.

SmartPlant P&ID is vastly different from graphic-driven P&ID solutions of today. All data from the P&ID is stored in the plant database and adheres to plant standards. The graphical representation of the P&ID is a view or a report of the data. The strong data import and export facilities of SmartPlant P&ID allow users to populate the system with relevant plant data, such as process data from process simulation databases based on Aspen Zyqad from Aspen Technologies, Inc. or equipment and line lists. You can then use this information in the SmartPlant P&ID Stockpile to design the P&ID.

The rule-based and automation capabilities of SmartPlant P&ID also differentiate it from other P&ID systems. SmartPlant P&ID features a comprehensive, user-definable rule-based system that assists the engineer during the design phase of the plant and subsequent life cycle phases. Data is entered directly into the database; rules are executed; and feedback is immediate. The design rule-base confirms data consistency and compliance with plant and engineering standards, allowing faster, more efficient design with less iteration.

SmartPlant P&ID incorporates the latest Microsoft technologies, such as OLE automation, to provide integration with existing data and other systems. Running on Microsoft Windows XP and Windows 2000, SmartPlant P&ID does not require a traditional, expensive CAD engine for P&ID creation. The open architecture of SmartPlant P&ID permits integration with other systems, such as Intergraph PDS, SmartPlant Instrumentation, and Aspen Zyqad, all of which allow users to share data with third-party software.

The Interactive Graphic commands supplied by the SP P&ID software support a wide range of schematic and 2D physical applications, which include:

- o Equipment commands

- o Piping commands

- o Instrumentation commands

- o Design Commands

- o Assemblies

The reference database (RDB) includes files such as symbols, report files, and templates, which support actions performed during the design creation task. The RDB supports the international engineering standards of the American National Standards Institute (ANSI), Desutsche Institut fur Normung (DIN), Process Industry Practices (PIP), ISO Plus (International Organization for Standardization)

With **SmartPlant P&ID**, you can easily perform the required tasks to create a detailed plant model. You can place components such as equipment, piping, and instrumentation from the **Catalog Explorer** or the **Stockpile** into graphical representations of your plant model in the drawing.

A key feature of SmartPlant P&ID is using catalogs to create instances of components within the plant model. Within this environment, you can drag and drop items from the catalog into appropriate model views.

SmartPlant P&ID uses a stockpile concept to store data that does not currently reside in the drawing. Examples of items that are stored in the **Stockpile** are items deleted from the drawing in which the Tag Required Flag = True has been set in Catalog Manager and Item Type has been added to Options Manager > Settings > Stockpileitems. Off-Page Connector mates, Loops, Packages, Test System, Safety Class and imported data are additional items that are placed in the stockpile vs. the Plant Model.

In the **Properties** window, you can add values for various properties of each item after you place it in your drawing. You can also annotate your drawing with labels as you design the drawing.

If you repeatedly place particular groups of items, you can save the group of items as an assembly. Assemblies appear as symbols in the **Catalog Explorer** list view so that you can place them exactly as you place other symbols in your drawing.

As you work on your drawing, you can monitor any inconsistencies in your design by reviewing the inconsistency indicators. These indicators appear in your drawing as soon as an inconsistency occurs in the design. You can resolve inconsistencies using hints from the **Consistency Check** dialog box.

At any time during the P&ID creation workflow, you can generate reports to help you keep track of information in the P&ID. After you finish the P&ID, you can generate MTOs for the components in the drawing, for example.

You can also print the drawing.

SmartPlant Engineering Manager Program Group

The SmartPlant Engineering Manager program group provides several utilities for managing your plant data.

SmartPlant Engineering Manager allows you to create the SmartPlant site and plants. You can create plant structures, plant groups, hierarchy templates, as well as define the access to plant data on many levels.

Catalog Manager allows you to create and modify symbols and labels.

Data Dictionary Manager allows you to add properties to SmartPlant database tables, define external programs, view relationships, and create and modify select lists.

Data Dictionary Template Comparison Utility allows you to compare two data dictionary templates at a time.

Filter Manager allows you to create and modify filters to discriminate on database data. Filters are used for displaying data in symbology, gapping, graphical views, reports, rules, and so forth.

Format Manager defines available formats for units of measure properties.

Reference Data Synchronization Manager allows you to synchronize reference data (including data dictionaries, rules, options, and symbols) between plants.

Upgrade Utility guides you through upgrading your SmartPlant Engineering data.

Refresh Site Roles Utility allows you to automatically refresh the roles in a site on a scheduled basis.

SmartPlant P&ID Program Group

SmartPlant P&ID provides multiple views of a central, unified data structure that represents the plant model. A view is a visual presentation of the data that composes the plant model and can be a schematic drawing or a table. The plant model is the computer representation of the conceptual design in its entirety, including all plant components and their relationships. By manipulating model views, you can organize the information within the plant model to better understand and maintain the data. SmartPlant has several programs and utilities for running and managing your plant data.

SmartPlant P&ID provides the design environment for SmartPlant.

Drawing Manager allows you to create and delete P&IDs and drawing versions and print multiple drawings. Drawing Manager allows you to perform Workshare and project-specific commands.

Insulation Specification Manager allows you to create and modify lookup tables for insulation specifications and thicknesses.

Options Manager defines plant-wide graphic standards for symbology, gapping, heat tracing, and formats. Options Manager also defines paths to SmartPlant files and directories.

Rule Manager defines rules for placement and property copying on placement.

SmartPlant Engineering Manager performs higher-level data management tasks, such as specifying user permissions, designing plant hierarchies, and so forth. For more information about SmartPlant Engineering Manager, see *SmartPlant Engineering Manager Help*, *SmartPlant P&ID Installation Guide*, or the *SmartPlant P&ID Upgrade Guide*.
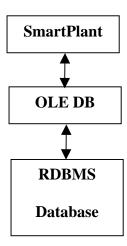
The SmartPlant Database

A database is a body of information, or data, specific to an application such as SmartPlant P&ID. The data may or may not be related, and it is usually stored in one or more data files or disk partitions in such a way that it can be recalled at any time in a variety of ways.

The software that performs the organization, storage, and manipulation of data in a database is called a Database Management System (DBMS). One DBMS may differ from another in many ways, the most important of which is in the way the data is organized. One of the most popular DBMSs is the Relational Database Management System (RDBMS).

The RDBMS controls access to a database through a concept known as the user. A database user is similar to an operating system user. That is, database users are recognized by their username and a password. Database users also have ownership of and access privileges to the data in the database.

A simplified model of SmartPlant and the database communication is shown in the following illustration:

```
┌──────────────────┐
│   SmartPlant     │
└──────────────────┘
          ↕
┌──────────────────┐
│    OLE DB        │
└──────────────────┘
          ↕
┌──────────────────┐
│    RDBMS         │
│                  │
│   Database       │
└──────────────────┘
```
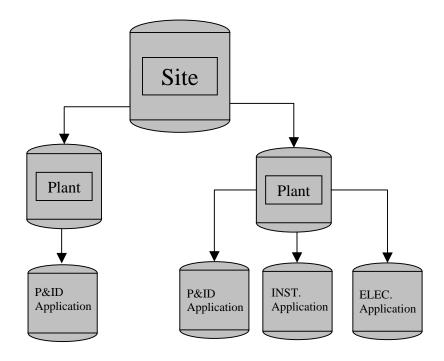
The SmartPlant data model is contained in the Data Dictionary, which is stored in the database. The data dictionary contains the structure for tables that are maintained in the database. Data Dictionary Manager displays the database tables and properties. An administrator can also add properties to tables and create or modify select lists (properties with pre-determined values) with **Data Dictionary Manager**.

Working with Database Schemas: An Overview
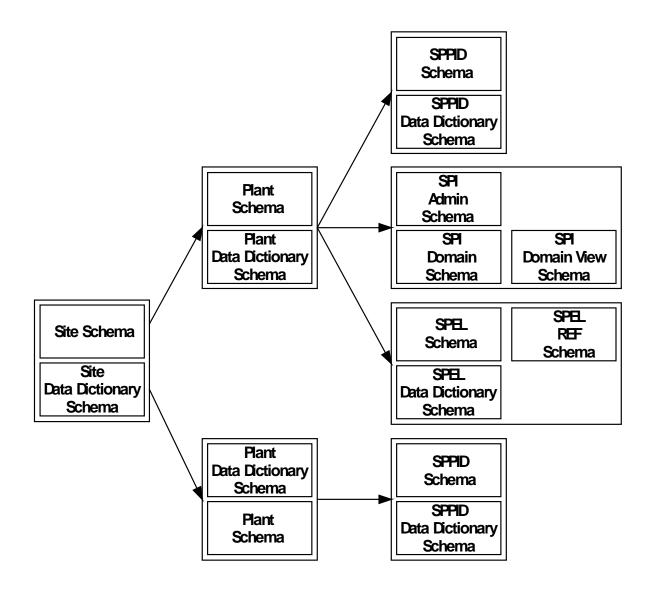
The SmartPlant schemas are configured to use separate data dictionaries for SmartPlant Engineering Manager and each engineering application. While each application sees only the reference data that applies to it, each application shares some common SmartPlant Engineering Manager data. This configuration supports the requirement for distributed management of the relational database, supports navigation across application tables for read-only access, and supports integration of data across applications.

A valid site with one plant consists of six database schemas when you use SmartPlant P&ID as your application, seven database schemas when you use SmartPlant Electrical, and nine database schemas if you use both applications concurrently. The plant structure schemas are shared between SmartPlant P&ID and SmartPlant Electrical.

For example, in the following figure, the site server contains two plants, one with only the SmartPlant P&ID application associated to it and the other with SmartPlant P&ID, SmartPlant Electrical and SmartPlant Instrumentation associated.

The figure below shows the schemas that would exist in the database for this configuration example, assuming that all applications are in the same database instance. On a given database server, we recommend putting all plants in one database instance.

SPPID
Schema

SPPID
Data Dictionary
Schema

Plant
Schema

Plant
Data Dictionary
Schema

SPI
Admin
Schema

SPI
Domain
Schema

SPI
Domain View
Schema

Site Schema

Site
Data Dictionary
Schema

SPEL
Schema

SPEL
REF
Schema

SPEL
Data Dictionary
Schema

Plant
Data Dictionary
Schema

Plant
Schema

SPPID
Schema

SPPID
Data Dictionary
Schema

The majority of database activity occurs in the application schemas since this is where the application data is stored. The plant schema contains the smallest amount of data compared with the other schemas.

SmartPlant P&ID Reference Data

The SmartPlant product is delivered with a set of Symbols (.sym format), Rules.rul, Format.txt, ProjectStyles.spp, InsulationSpec.isl, Templates (.pid format), Borders (.igr format), Report files (.xls format), ExportLayer.xls, Engineering Framework files that can serve as a starting point for P&ID creation. This example reference data is located in the **~\SmartPlant\P&ID Reference Data** directory. This data can be fully customized to meet a project's standards and should be modified with the appropriate Program Group, for example the rules.rul file is edited through Rule Manager.

Reference the printable guide of SmartPlant P&ID Symbol Libraries Reference Guide or the ~Program Files\SmartPlant\P&ID Workstation\Program\resdlls\0009\SymbolLibrariesRefGuide.pdf for a book of the delivered symbols.
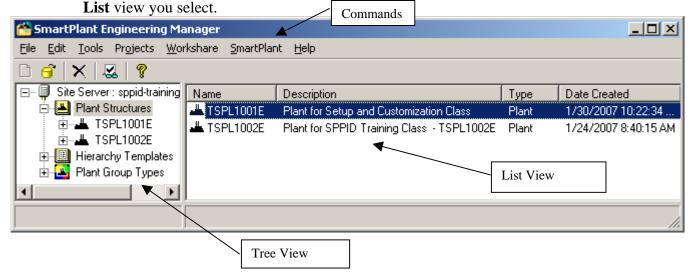
RDB supporting the engineering standards of Process Industry Practices (PIP) and ISOPlus are also available.

SPEM and SPPID Overview

The SmartPlant Engineering Manager user interface consists of three main areas. The **Menu**, **Tree** view on the left displays the plant hierarchy in a tree format. The **List** view on the right displays property data for the nodes in the selected branch in the tree.

The commands in SmartPlant Engineering Manager are node-specific, meaning that the availability of a command depends on which node in the **Tree** view or item in the **List** view you select.

Commands

Tree View

List View

Site Server Root

The **Site Server** node is the root directory for each site when opened in SmartPlant Engineering Manager. A site is a logical unit of data that is normally used to model a collection of physical plants. Every plant within a site has a unique identity.

In SmartPlant, you access a site by opening the smartplantv4.ini file, which contains the database type, connection alias, and the schema information for the site and the site data dictionary. The site schema basically keeps track of the plants in the site. You can place this .ini file in any location on any workstation and share it out to other users. Therefore, a site server or site is simply any workstation where the SmartPlantV4.ini file is stored.

For each plant structure, the **Site Server** node contains a **Plant Structure** node that contains its related **Plant Groups**, **Roles**, **Applications**, **Satellites**, and **Projects** nodes.

The three main root nodes are listed under the **Site Server** root

1. Plant Structures
2. Hierarchy Templates
3. Plant Group Types

The **Site Server** root also contains the **Hierarchy Templates** and **Plant Group Types** nodes, for use by members of the Site Administrators user access group.

📝 **Notes:**

- While you can connect to only one site at a time, you can have more than one site on any given computer.

The **Site Server Options** dialog box displays when you run SmartPlant Engineering Manager for the first time. This dialog box will display during future sessions only when **SmartPlant Engineering Manager** cannot find an active site server or the site connection information in the **SmartPlantV4.ini** is invalid.
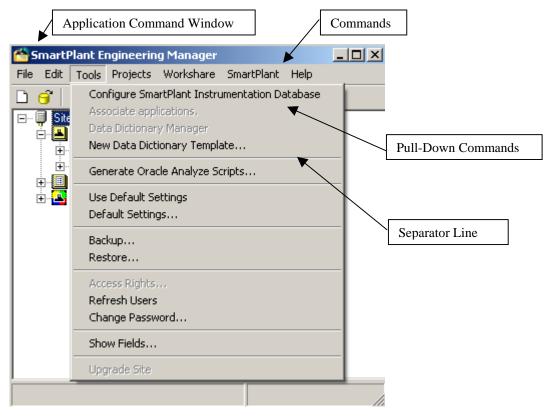
- Create a new site - Starts the New Site Server wizard, which steps you through creating the site server.

- Connect to an existing site - Allows you to browse to the location of an existing SmartPlantV4.ini file.

- Restore site from backup - Starts the Restore Site Server wizard.

📝 **Notes:**

- You cannot create a new site unless you log in using a domain account that has administrator privileges on the computer where you are running SmartPlant Engineering Manager.

- Before you can create a site server, you must create a database instance in Oracle and the database must be started. Select Start > Settings > Control Panel > Services to verify that the database is running.

Commands

Commands are your main source to interaction with the software application. Each application has its own command window. It is from this command window that you access all other pieces of the application's graphical interface.

Application Command Window   Commands

Pull-Down Commands

Separator Line

✎ **Notes:**
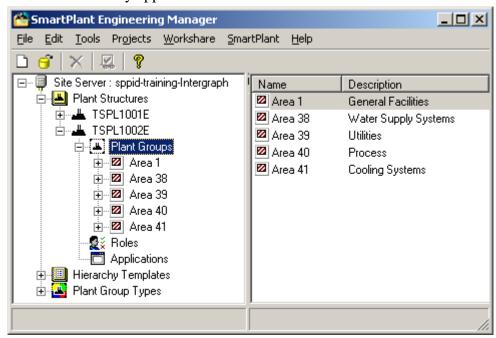
- During certain operations, the system dims some of the commands. For example, if a particular command is not applicable at a certain selection that command is disabled until it is applicable. This feature has been applied to commands to clarify the user interface.

Tree View

The Tree view displays plant groups in their plant structures. You define both the plant structure and the plant group types. At the base of the tree is the Site Server root. The Site Server root was created when the site administrator completed the **Create Site Schema Wizard.**

List View
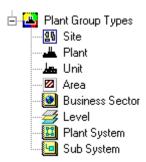
The **List** view displays property data for the children of the selected node in the tree. The **List** view sorts by the column heading that you click. You can use the **Tools** > **Show Fields** command to control which properties appear in the **List** view and the order in which they appear.

Plant Group Types Root: An Overview

The **Plant Group Types** root contains the building blocks that make up plant structures. Formerly known as hierarchy items, you use these plant group types to construct hierarchy templates that are in turn used to create your plant structures. The plant group types are stored in the site schema.

Eight plant group types are delivered by default and are displayed in the **Plant Group Types** root in the **Tree** view. When this root is selected, the list of all plant group types is displayed in the **List** view, along with an additional column indicating which plant group types are currently being used by a hierarchy template.

Site administrators can add new or modify existing plant group types. New plant group types are added to the data dictionary for the site and are available for use in editing hierarchy templates. You can view the attributes associated with a plant group type by using the **Properties** command.

✎ **Notes:**

- When selecting attribute names, be sure not to use any of the Oracle reserved keywords. For example, **address** is a reserved keyword in Oracle. Also, attributes beginning with numbers or special characters are not supported by Oracle.

- Use **Data Dictionary Manager** to add, delete and modify plant group type attributes.

Create a New Plant Group Type

1. Select the **Plant Group Type** root.

2. Right-click the **Plant Group Type** root and select the **New Type** command.

3. Type a **Name** and **Display Name** for the new plant group type.

   ✎ **Notes:**

   - You cannot delete a plant group type that is being used in a hierarchy template.

Hierarchy Templates Root: An Overview

The **Hierarchy Templates Root** shows the various hierarchy templates that can be used to generate the structure of a plant. A hierarchy is made up of a set of two or more plant group types (formerly called hierarchy items) that are arranged in a tree structure.

A hierarchy (also referred to as a work breakdown structure) is used as a template to create a plant structure and defines the available plant group items for a certain level of the tree. The hierarchy is essentially a set of rules that the plant structure must follow. For example, a plant structure using Hierarchy 1: Plant/Unit with the **Allow P&ID Drawings** option set on the Unit level allows you to create drawings only under a unit in that plant. Using this hierarchy, you can create a plant structure containing only one plant, then multiple units, and then multiple drawings under each unit.

✎ **Notes:**

- Drawings are not allowed in the top-most root item in a hierarchy. Therefore, **Allow P&ID Drawings** is not available at the root item level in a hierarchy.

- If you use a hierarchy in which **Allow P&ID Drawings** is not turned on for at least one level, the plant cannot be used in SmartPlant P&ID, but can be used in SmartPlant Electrical.

The plant structure hierarchy does not reference the hierarchy template after the plant structure is created. SmartPlant Engineering Manager writes a copy of the hierarchy template to the plant database when the new plant is created. This reduces the dependency on the site for the hierarchy definition and allows you to modify the hierarchy template independent of whether any plant structures used it during their creation. You cannot modify a plant structure hierarchy after the plant structure has been created.

During plant structure creation, you can choose to use one of the default hierarchy templates or use a custom hierarchy that you have previously defined. You cannot modify the selected hierarchy template during plant structure creation.

Using Custom Hierarchies

SmartPlant integration supports custom hierarchies, as long as they contain a minimum of three levels. By default, the delivered SPEMdatamap.xml file is compatible with the standard SmartPlant Plant > Area > Unit hierarchy.

- After registering, SmartPlant Engineering Manager cannot retrieve the PBS document if the plant and SmartPlant hierarchies are not compatible. To be compatible with the SmartPlant hierarchy, your plant hierarchy can contain less than or equal, but not more than the number of levels in the SmartPlant hierarchy.

- SmartPlant Engineering Manager retrieves from the SmartPlant hierarchy only the hierarchy levels it needs. For example, if your plant hierarchy contains 4 levels and the SmartPlant hierarchy contains 8 levels, only the top 4 levels of the SmartPlant hierarchy are retrieved.

- Hierarchy item names at the same level do not have to match. Hierarchies are mapped by depth (level), not by name.

Create a New Hierarchy Template

1. Select the Hierarchy Templates node.

2. Right-click the **Hierarchy Templates** node and select the **New Hierarchy Template** command.

3. Type a name for the hierarchy.

   i. The hierarchy name length is limited to 80 characters. You can use a space character in the hierarchy name but no other special characters.

4. Type a description for the hierarchy.

5. Select a plant group type from the **Root item plant group type** list.
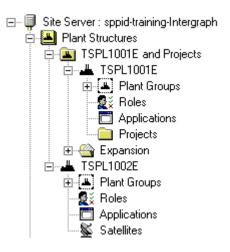
i. The first plant group type added to the hierarchy is the root of the tree. The software allows only one root for each tree.

6. Add more levels to the hierarchy template by right-clicking the last plant group type added and selecting **New Level**.

i. You can create as many hierarchical levels in a hierarchy template as you have total plant group types. For example, if you have 15 plant group types defined in the **Plant Group Types** node in your site, then a custom hierarchy in your site can have no more than 15 levels. Additionally, multiple plant group types at any one level is not supported.

Plant Structures Root: An Overview

The **Plant Structures** root contains all of the data related to each of the plant structures defined in the **Site Server** node. Each plant structure is displayed as a node in the **Plant Structures** root. The icon denotes a plant that is enabled for or contains projects.

The following nodes display inside each plant in the **Plant Structures** root:
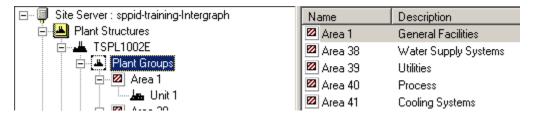
Plant Groups - Displays the plant breakdown structure (physical hierarchy) of the plant.

Roles - Displays the user access roles defined for the plant.

▢ **Applications** - Displays the applications associated with the plant.

📁 **Projects** - Displays the projects associated with the plant. This node appears only when the plant is enabled for projects. The 📨 project structures themselves are displayed at the plant structure level under the 🏭 Plant.

⚒ **Satellites** - Displays the satellite slots created in the plant. This node appears only when the plant is enabled for Workshare.

Plant Groups Node: An Overview

The **Plant Groups** node displays the actual physical components of the plant structure itself. This node shows each item created in the plant structure and displays its attributes in the **List** view.

Create a New Item in a Plant Group

1. Select the **Plant Groups** node.

2. Right-click the **Plant Groups** node, and select the **New** command. The actual command name changes based on the hierarchy defined for your plant.

3. Provide the information requested on the **New** dialog box.

   ✎ **Notes:**

   - The **Name** and **Description** fields are limited to 240 characters each. The **Name** field cannot contain any of the following special characters: ~ ! @ # $ % ^ & * ( ) - + = < > . , ? / \ | [ ] { } ' " : ;.

   - If you are adding a unit, the **Unit Code** field is limited to 40 characters. This limit is 3 characters if you plan to use the Piping Data Transfer to PDS 3D process.

   - The **Path** field is limited to 255 characters. This field cannot contain any spaces if you plan to use the Piping Data Transfer to PDS 3D process.

   - In a Workshare collaboration, new plant groups cannot be created by standalone satellite sites or by satellites hosted by a project.

Roles Node: An Overview

SmartPlant Engineering Manager uses roles to define and maintain user privileges and rights at the plant structure level. The **Roles** node displays the roles defined for the plant structure.

Each role is tied directly to a Windows or Novell user group and has exactly one group associated with it. The name and description of the role is the name and description of the group. Individual users cannot be added to a role, but are instead added to a user group, and then that group is added as a role in SmartPlant Engineering Manager.

Each application, including SmartPlant Engineering Manager, has its own categories and rights. The SmartPlant Engineering Manager rights pertain to plant structure and format access in general.

![icon] **Notes:**

- During site creation, you specified the group that you wanted to have site administrator privileges. Members of this group now possess a set of unique rights that cannot be granted to any other role. These rights include creating plant structures, creating and modifying hierarchies, creating and modifying plant group types, enabling projects, and so forth. Site administrators can see all plant structures in the site and have full access to them. Site administrator privileges do not extend to the engineering products. That is, a member of the group granted site administrator privileges does not automatically have full control privileges in SmartPlant P&ID or SmartPlant Electrical.

Creating a Plant Structure Wizard

The **New Plant Structure** wizard steps you through creating a plant structure. To start this wizard, select the **Plant Structures** root in the **Tree** view and then click **File > New**. You must provide the following information as you step through the wizard.

Data Dictionary Source - Specifies whether the data dictionary for the new plant will be built from a default template or a custom template. You must specify the path to the location of the seed files. Data dictionary templates are not database-specific. In other words, a given data dictionary template can be used in both Oracle and SQL Server environments. For more information about using data dictionary templates, see Working with Data Dictionaries: An Overview.

Hierarchy - Indicates the template for the plant breakdown structure of the plant. You can define your own hierarchy that you can then use in creating plant structures or you can use one of the several delivered hierarchies.

Root Item Attributes - Specifies the plant structure root item and the name that will appear in the **Plant Structures** node in the software.

Paths - Consists of UNC paths for the plant structure storage location, a backup storage location, and the location of the format.txt file.

Database Connection Information - Allows you to specify the alias and system password for the database instance that contains the plant data.

Plant Schema and Data Dictionary Schema Information - Allows you to specify user names and passwords for both schemas. All data needed to maintain the plant structure is written into the plant schema.

![icon] **Notes:**

- You can use the **Default Settings** commands on the **Tools** menu to specify default values to simplify the plant creation process. For more information, see Using Default Settings: An Overview.

- After creating your new plant structure, be sure to **associate applications** with your plant and to **assign user access** for the new plant structure.

Applications Node: An Overview

The **Applications** node displays the engineering applications (such as SmartPlant P&ID or SmartPlant Electrical) that are currently associated with your plant structure. Before you can use an application with your data, you must associate that application to the plant structure.

Associating Applications Wizard

Engineering applications (such as SmartPlant P&ID or SmartPlant Electrical) are used to access data within your plant structure. Before you can use an application with your data, you must associate that application to the plant structure.

To associate an application with your plant structure, use the **Tools > Associate Applications** command to launch the **Associate Applications** wizard that will help you step through creating the application schema and data dictionary. You must provide the following information as you step through the wizard.

Data Dictionary Source - Specifies whether the data dictionary for the associated application will be built from a default template or a custom template. You must specify the path to the location of the seed files. Data dictionary templates are not database-specific. In other words, a given data dictionary template can be used in both Oracle and SQL Server environments. For more information about using data dictionary templates, see Working with Data Dictionaries: An Overview.

Application Schema and Application Data Dictionary Schema Information - Allows you to specify user names and passwords for both schemas. All data needed to maintain the application association is written into the application schema.

Notes:

- You can use the **Default Settings** commands on the **Tools** menu to specify default values to simplify the application association process. For more information, see Using Default Settings: An Overview.

Using Default Settings: An Overview

SmartPlant Engineering Manager allows you to predefine values for creating sites, plant structures, projects, and associating application. Using these default settings simplifies the creation process and allows you to use the same settings across sites and plants.

 Notes:

- The values specified on the **Default Settings** dialog box are used by default only if you turn on the **Tools > Use Default Settings** command.

Projects Node: An Overview

The **Projects** node displays only after projects are enabled for the plant. When projects are enabled, the plant structure becomes the Plant, which is often referred to as the Master or As-Built plant. This node shows the active projects in the Plant and displays their attributes in the **List** view.

Satellites Node: An Overview

The **Satellites** node displays only after Workshare is enabled for the plant. This node contains each satellite slot created in the plant structure and displays their attributes in the **List** view. The **Users** column in the **List** view shows the number of users defined for each satellite slot.
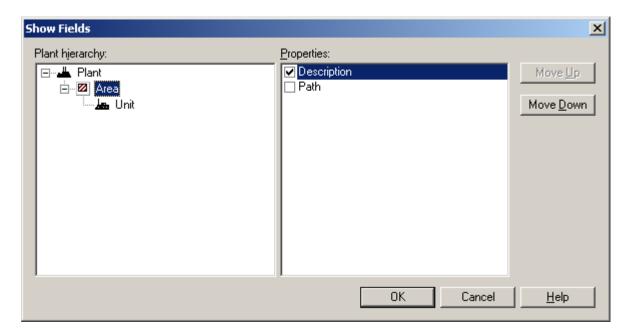
Tools > Upgrade Site Command

When you open a version 4.3 site using SmartPlant Engineering Manager 4.4, you are prompted to upgrade the site to version 4.4.

Use the **Upgrade Site** command to upgrade your version 4.3 site to version 4.4. This process removes the restriction in which projects with the same name cannot reside in the same plant and then updates the site data dictionary version number to 4.4.

Tools > Show Fields Command

The **Tools > Show Fields** command allows you to specify which properties display in the **List** view and the order in which they appear. The **List** view columns are the properties of the items in the **Tree** view.

Items - Lists the items available for display in the **List** view. Select an item from this list to display its properties in the **Properties** list.

Properties - Lists all available properties for the selected item. Properties that that are checked will display in the **List** view in SmartPlant Engineering Manager.

Move Up - Moves the selected property up in the list. The higher a property is in the list, the farther to the left the property appears in the **List** view.

Move Down - Moves the selected property down in the list. The lower a property is in the list, the farther to the right the property appears in the **List** view.

📝 **Notes:**

- To enable the **Show Fields** command, select the **Site Server** node, a **Plant** node or a **Project** node.

- **Show Fields** settings for the site server are stored in the SiteShowFields.cfg file in the C:\Documents and Settings*user profile* folder. This file contains all **Show Fields** settings except for the plant hierarchy information, which is stored in the plant schema.

- Projects use the **Show Fields** definitions of the parent plant.

User Access: An Overview

User access identifies the users allowed to work at specified access levels within the site and related plant structures. With user access, administrators can control access to data and thereby ensure the security of their project data.

SmartPlant Engineering Manager incorporates user access as an integral product feature by using roles to define and maintain user privileges and rights at the plant structure level, where each application has its own set of rights. Roles are the primary focus, with each role associated to a single Windows or Novell user group. Each role is then assigned specific rights for each engineering application and for SmartPlant Engineering Manager Rights.

Categories with radio-button options indicate that the rights contained within are mutually exclusive, meaning you can choose only one right in that category to apply to the role. In other categories, you can choose multiple rights, as denoted by check boxes.

Mutually-Exclusive Rights

- **None** - The user is not allowed to execute the application or utility for this plant structure.

- **Read-Only** - The user can execute the application or utility for this plant structure to view the data held within it.

- **Modify Settings** - The user can execute the application or utility for this plant structure to view the data held within it and to modify any custom settings.

- **Full Control** - The user can execute the application or utility for this plant structure and perform all commands and modifications.

Notes:

- To see the roles currently defined for a plant, click the **Roles** node under the plant node in the **Tree** view.

- To view the rights settings for a particular role, right-click the role in the **List** view and click **Properties**.

SmartPlant Engineering Manager provides roles templates to help you easily create new roles. Because the most labor-intensive part of a role creation is setting the values for the rights, you can create templates for specific roles and then use those templates multiple times. This feature is useful for defining a role template in one site and then reusing that same role template throughout all of your sites.

SmartPlant Engineering Manager Rights

SmartPlant Engineering Manager contains two sets of rights: site administrator rights and plant structure rights.

Site Administrator Rights

Site administrators, while not appearing in the **Roles** node in a plant structure, have a set of unique rights that cannot be granted to any other role. This group of users has privileges to create and modify plant structures, roles, hierarchies, and plant group types, to enable projects, and so forth.
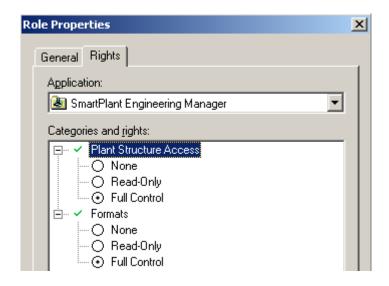
Only members of the user group specified as the Site Administrator User Group during site creation can see the **Hierarchy Templates** and **Plant Group Types** roots in the **Tree** view. Site administrators can see all plant structures and have full access to them.

📝 **Notes:**

- Site administrator privileges do not extend by default to full privileges in the engineering applications.

- Additional site administrators can be added to the Site Administrator User Group by using the administrative tools provided by Windows or Novell. Be sure that these users are granted network access rights to the computer where SmartPlant Engineering Manager is installed.

- You can change the user group assigned as the site administrator group after site creation. For more information, see Change the Site Administrator User Group in SmartPlant Engineering Manager Help.

- You can automatically include the site administrators group in each plant you create by selecting the **Add the site administrator group to each plant created** option on the **Site Properties > General** tab. Doing this saves you the step of creating a new role to grant these users access to the new plant Plant Structure Rights.

These rights are valid only within the plant structure with which the right is associated. To access the plant structure through SmartPlant Engineering Manager, the user must belong to a role that has at least read-only access to the plant structure.

The following rights are available to the **Plant Structure Access** category and are mutually exclusive.

Category	Right
	None - The user is not allowed to see any part of the plant structure, including the plant structure node.
Plant Structure Access	**Read-Only** - The plant structure is visible, but the user cannot create, modify, or delete any data within the plant structure.
	Full Control - The user can create plant groups, add applications and roles, and create projects and satellites, but cannot see the hierarchies or the plant group types. This right is valid only within the SmartPlant Engineering Manager software.
	None - The user is not allowed to launch Format Manager.
Formats	**Read-Only** - The user can launch Format Manager and view the format settings but cannot create, modify, or delete formats.
	Full Control - The user can launch Format Manager and can create, modify, or delete formats.

SmartPlant P&ID User Access Rights

Category	Right	Notes
		Controls the use of Catalog Manager.
	None	**None** prevents users from accessing Catalog Manager.
Catalog	**Read-Only**	**Read-Only** allows users to view symbols in Catalog Manager, but not make changes.
	Full Control	
		Full Control allows users to create new symbols and edit existing symbols. Full Control is disabled for Workshare satellites and projects.

		Controls the use of Filter Manager.
	None	**None** prevents users from accessing Filter Manager.
Plant Filters	**Read-Only**	**Read-Only** allows users to view existing filter definitions, but not make changes**.**
	Full Control	**Full Control** allows users to create new filters and edit existing filters. Full Control is disabled for Workshare satellites and projects.
	None	
Display Sets	**Read-Only**	Controls the ability to view, edit, and define display sets. Full Control is disabled for Workshare satellites.
	Full Control	
	None	
Default Views	**Read-Only**	Controls the ability to specify default filters and layouts for item types. Also controls setting the Brief/Bulk Lists associated with item types. Full Control is disabled for Workshare satellites and projects.
	Full Control	
		Controls access to plant reports definitions.
	None	**None** prevents users from accessing the plant reports.
Plant Reports	**Read-Only**	**Read-Only** allows users to view existing report definitions, but not make changes.
	Full Control	**Full Control** allows users to create new plant reports and edit existing reports. Full Control is disabled for Workshare satellites and projects.
		Controls access to SmartPlant P&ID Rule Manager.
	None	**None** prevents users from accessing Rule Manager.
Rules	**Read-Only**	**Read-Only** allows users to view existing rule definitions, but not make changes.
	Full Control	**Full Control** allows users to create new rules and edit existing rule definitions. Full Control is disabled for Workshare satellites and projects.
		Controls access to Data Dictionary Manager.
	None	**None** prevents users from accessing Data Dictionary Manager**.**
	Read-Only	**Read-Only** allows users to view settings in the data dictionary, but not make any changes.
Data Dictionary	**Modify Select Entry**	**Modify Select Entry** allows users to edit select lists.
	Full Control	**Full Control** allows users to add items and edit existing items in the data dictionary.
		Modify Select Entry and **Full Control** are disabled for Workshare satellites and for projects.

		Controls access to SmartPlant P&ID Options Manager.
	None	**None** prevents users from accessing Options Manager.
	Read-Only	**Read-Only** allows users to view option settings, but not make any changes.
Options	Modify Settings	**Modify Settings** allows users to to change reference data pointers.
	Full Control	**Full Control** allows users to add options and edit existing options. Full Control is disabled for Workshare satellites and for projects, but users must have at least Modify Settings level privileges to use Workshare.
		Controls access to SmartPlant P&ID Insulation Manager.
	None	**None** prevents users from accessing Insulation Manager.
Insulation Specifications	Read-Only	**Read-Only** allows users to view insulation settings, but not make any changes.
	Full Control	**Full Control**, disabled for Workshare satellites and projects, allows users to add settings and edit existing insulation settings.
	Create P&ID	**Create P&ID** allows users to execute the **New Drawing** command in Drawing Manager.
	Delete P&ID	**Delete P&ID** allows users to execute the **Delete** command in Drawing Manager.
	Refresh P&ID	**Refresh P&ID** allows users to execute the **Compare and Refresh** and **Validate** commands in SmartPlant P&ID. Users must also have Full Control permission for P&ID Objects before they can refresh a drawing.
	Create Version	**Create Version** allows users to execute the **Create Version** command in Drawing Manager.
	Delete Version	**Delete Version** allows users to execute the **Delete Version** command in Drawing Manager.
Drawing Management	Fetch Version	**Fetch Version** allows users to execute the **Fetch Version** command in Drawing Manager.
	Edit Import Map	**Edit Import Map** allows users to execute the **Edit Import Map** command in Drawing Manager.
	Update P&ID	**Update P&ID** allows users to execute the **Update P&ID** command in Drawing Manager to update existing drawings.
	Create Revision	**Create Revision** allows the user to create revision properties, modify revision properties, and associate revision properties with the revised drawing.
	DeleteRevision	**Delete Revision** allows the user to delete a revision and its associated version.

P&ID Objects	**None**	Controls access to objects in the SmartPlant P&ID Modeler environment.
	Read-Only	To **import**, user needs at least the **Modify Properties** right.
	Modify Properties	To refresh drawings in SmartPlant P&ID, users must have **Full Control** permission on P&ID Objects.
	Full Control	
Workshare		Controls access to Workshare management commands.
	Publish	**Publish** allows users to publish drawings to other satellites or back to the host.
	Get Latest Version	**Get Latest Version** allows users to obtain the latest published drawing from the host or satellite site.
	Assign Drawing Ownership	**Assign Drawing Ownership** allows users to specify which Workshare sites have read/write permission for published drawings.
	Synchronize Reference Data	**Synchronize Reference Data** allows users to update their reference data with the reference data at the host.
	Synchronize Shared Items	**Synchronize Shared Items** allows users to update their shared items with the shared items at the host.
Projects	**Check Out**	**Check Out** allows users to execute the **Check Out** and **Undo Check Out** commands in Drawing Manager.
	Check In	**Check In** allows users to execute the **Check In** command in Drawing Manager.
	Fetch	**Fetch** allows users to execute the **Fetch** command in Drawing Manager.
	Change Status	**Change Status** allows users to interact with the **Project Status** dialog box in Drawing Manager. If you are not granted this right, you can only view the project status, but cannot modify it.
	Claim	**Claim** allows users to execute the **Claim** and **Release Claim** commands in SmartPlant P&ID.
SmartPlant	**Publish**	Enables or disables the ability to publish to or retrieve from The Engineering Framework. Check the box to enable an option; uncheck to disable.
	Retrieve	

Notes:

- For examples for granting rights to common groups of users see the SmartPlant Engineering Manager on-line Help or the *SmartPlant Manager's Users Guide* (~:\Program Files\SmartPlant\Engineering Manager\Program\resdlls\0009\SPEMUsersGuide.pdf).

Role Templates: An Overview

SmartPlant Engineering Manager provides role templates to help you easily create new roles. Because the most labor-intensive part of a role creation is setting the values for the rights, you can now create templates for specific roles and then use the templates multiple times. This feature is useful for defining a role template in one site and then reusing that same role template throughout all of your sites.

SmartPlant Engineering Manager delivers three role templates by default:

None - Sets all access rights to **None**.

Read-Only - Sets all access rights for the role to **Read-Only**.

Full Control - Sets all access rights for the role to **Full Control**.

When you create a role template, the software creates a .rts file. The name of the template is the name you give this .rts file at creation. All role templates are stored in the folder specified during site creation.

Notes:

- Any role template files stored in a location other than the one specified during site creation will not appear in the **Template** list on the **New Roles** dialog box. You can modify the role template storage path using the **Site Properties** dialog box. To use a role template at another site, you can copy the the .rts file to the role template location for that site. Another way to easily reuse role templates is to have each site point to the same folder for all templates. This way any template created in one site would be available at the other sites.

- Site backups include role templates if the templates are stored in the **Role template location** specified on the **Site Properties** dialog box.

SmartPlant Engineering Manager does not allow you to interactively view the rights specified in a role template file. The only way to see the settings stored in a template is to create a role using that template and then examine the rights using the **Role Properties** dialog box.

When creating a role, the software does not remember the specific role template used to create the role. Thus, after you create a role using a specific template, you will not find that template listed in the role properties. Furthermore, if you create a role using a role template and then modify the rights settings in that role, the template remains unchanged. In other words, the modifications you make to the rights are not automatically updated in the role template. You can, however, overwrite the existing role template with the modified rights settings by saving the current role as a template and specify the original role template file name.

For satellites and projects, values for certain rights are restricted. If a chosen template for a role has a higher value than what is allowed, the value will be changed to the highest available level.

All templates are forward-compatible. If a right is no longer in the list of rights, this right is ignored. All rights that are added will be set to **None** by default, with the exception of the default templates.

Create a Role Template

1. Select the **Roles** node under the plant structure containing the role on which you want to base the template.

2. Right-click the role in the **List** view, and select the **Save As Template** command.

3. Specify a path and name for the template file. This name will appear in the **Templates** list on the **New Role** dialog box.

Introducing Drawing Manager

SmartPlant® P&ID Drawing Manager handles functionality having to do with the drawing files in SmartPlant P&ID. You do not modify the designs themselves in Drawing Manager, but you do create, open, modify, and delete drawings and drawing properties. Drawing Manager is also the interface for printing multiple drawings and for upgrading drawings to the current version of SmartPlant P&ID.

Drawing Manager includes versioning tools for creating, comparing, and recovering deleted drawing versions. These operations are carried out with commands on the **Versions** menu.

The Workshare capability of SmartPlant P&ID is carried out in Drawing Manager. These commands are on the **Workshare** menu in Drawing Manager. The actual host and satellite sites are specified and configured in SmartPlant Engineering Manager.

Working with Drawings: An Overview

Drawing Manager enables you to manage your process and instrumentation drawings by allowing you to create new drawings in your plant structure, open and view drawings, and delete drawings. The following commands are needed to carry out these activities.

New - Used to create a new drawing. For more information

Open - Opens a drawing in SmartPlant P&ID. Drawing Manager checks to make sure that you have the appropriate permissions for opening or modifying drawings.

Copy - Used to copy one or more drawings from within the same plant or same project. The copied drawing(s) can then be placed using the Paste command. To copy a drawing from one plant to another plant, refer to the Import Drawing command. Any graphics that have been band-aided should be deleted and replaced prior to using this command.

Paste - Places a copy of a drawing in the selected plant or project. Any graphics that have been band-aided should be deleted and replaced prior to using this command.

Show History - Displays the version history of a drawing, provides access to the **Compare** and **Compare With** commands for viewing changes between drawing versions, and the **View** command, which allows you to view a drawing as read-only without opening SmartPlant P&ID.

Delete - Used to remove drawings from the plant.

Navigating in Drawing Manager: An Overview

The main Drawing Manager interface is split into two main panes: the **Tree** view, where plant groups are arranged in nodes, and the **List** view, where lists of drawings appear.

You can control the display in the **List** view in many ways: add a filter so that only drawings that match specific criteria are displayed, display all drawings that reside under the selected node in the **Tree** view, and specify which and in what order drawing properties appear in the **List** view. The following commands are needed to carry out these activities.

Open Database - Used to open a site so that you can access a plant or project and its related drawings.

Customize Current View - Allows you to specify the drawing properties that you want to appear in the **List** view.

Include Subnodes - Controls the depth of display in the **List** view.

Select All - Selects all of the drawings in the **List** view.

Filter - Allows you to filter out drawings that you do not want displayed in the **List** view.

Clear Filter - Used to clear any filters applied to the **List** view.

Properties - Displays properties related to the selected plant group or drawing.

Exit - Used to close Drawing Manager.

Notes:

- You can drag-and-drop drawings from one plant group to another plant group, providing the P&IDs are in the same plant structure and the **Allow P&ID Drawings** option has been enabled in SmartPlant Engineering Manager.

Understanding the Drawing Icons

In the Drawing Manager **List** view, each drawing is accompanied by an icon that indicates the drawing status and ownership.

	New drawing in the Plant, not checked out to a project
	New drawing in a project of the Plant, belonging to that project
	New drawing that belongs to a different project as viewed from the Plant or as viewed from your project
	Drawing that has been fetched AND is owned by your project
	Drawing that has been fetched with read/write permissions AND is not owned by your project
	Drawing that has been fetched with read-only permissions OR is not owned by your project
	Drawing that has been checked out AND is owned by your project or non-Workshare plant or project
	Drawing that has been checked out AND is not owned by your project

On the **Check Out** dialog box in the Plant, fewer drawing states are needed.

	Drawing that is not checked out
	Drawing that is checked out to a project

⚠	The software indicates out-of-date drawings by displaying the icon in the **Out-of-Date Drawing Status** column.

To display the Out-Of-Date Drawing Status column, do the following:

1. Click **View** > **Customize Current View**.

2. On the **Customize Current View** dialog box, from the **Drawing properties** list, select **Out-of-Date Drawing Status**.

3. Click **Add** to copy this property to the **Selected properties** list.

Create a New Drawing

1. Select the node in the plant hierarchy in the tree view where you want to create a new drawing.

2. Click **File > New Drawing**.

3. On the **New Drawing** dialog box, fill in information that describes your new drawing.

4. Click **Create** to create the new drawing and add it to the plant node; the **New Drawing** dialog box remains open so that you can create more drawings under this node.

5. Click **OK** to create the new drawing, close the dialog box, and return to the main **Drawing Manager** interface.

6. You can open the new drawing in **SmartPlant P&ID** for modification if you want to.

   📝 **Notes:**

   - If the node you choose does not permit drawings to be created under it, the **New Drawing** command is not available.

   - You must have the Create privilege set to be able to create drawings in a given node as specified in the Roles in **SmartPlant Engineering Manager**.

Move a Drawing

1. In the Tree view, select the node in which the drawing resides.

2. In the List view, select the drawing that you want to move.

3. Drag and drop the selected drawing to the new location.

   📝 **Notes:**

   - You must have the appropriate permissions, specified in SmartPlant Engineering Manager, in order to copy drawings.

   - If you drag and drop the drawing, which contains data, to another unit, you will need to change the **Plant Group Name** for those items utilizing the **Engineering Data Editor** or the **Property Grid** in SmartPlant P&ID.
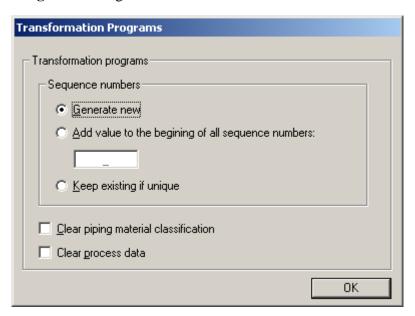
Copy/Paste a Drawing

The **Edit > Copy** command is used to copy one or more drawings from within the same plant or same project. The copied drawing(s) can then be placed using the **Edit > Paste** command. To copy a drawing from one plant to another plant, refer to the Import Drawing command.

1. In the **Tree** view, select the node in which the drawing resides.

2. In the **List** view, select the drawing that you want to copy.
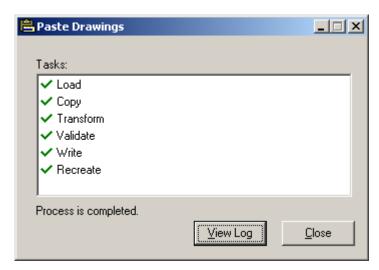
✎ **Notes:**

- Use the Ctrl or Shift key to select more than one drawing.

3. Click **Copy** 📋 on the main toolbar.

4. In the **Tree** view, select the node where the copy of the drawing will reside.

5. In the **List** view, select the location that you want to paste the copy of the drawing.

6. Click **Paste** on the main toolbar. The system displays the **Transformation Programs** dialog box.

- Click to select the **Generate new sequence numbers** if you would like new sequence numbers to be created. Selecting the option causes existing tag sequence numbers to be set to null for any item that has the property **TagSequenceNo**. The null sequence number triggers the creation of new sequence numbers during normal item tag validation. An exception to this is

that the tag sequence number for an instrument item is not set to null. Item tag validation does not generate a new sequence number for an instrument. Instrument tags will be duplicated at the target.

- Click to select the **Add value to the beginning of all sequence numbers** to use this option. Click in the provided field and enter the values you want to display at the beginning of all your sequence numbers.

- Click to select **Keep exiting if unique** to use this option.

- Click to place a check mark in the **Clear piping material classification** check box to use this option. Selecting this option removes any defined piping material class.

- Click to place a check mark in the **Clear process data** check box to turn on this option. Any values in the Process category will be removed.

- Click **OK**. The system displays the **Paste Drawings** dialog box.

7. When the processes complete, click **View Log** to view the report or click **Close** to dismiss the Paste Drawings dialog box.

Notes:

- You must have the appropriate permissions, specified in SmartPlant Engineering Manager, in order to paste drawings.

- For more information about creating a transformation program, see *Customizing the Sample Projects* in the *SmartPlant P&ID Programmer's Guide.*

- You can hold **Ctrl**, select a drawing, and drag it to a new location to make a copy. You can also drag it to the current list view to make a copy. If you drag and drop the drawing to another unit, you will need to select the

contents of the drawing using SmartPlant P&ID and set the **Plant Group Name** value in **Property** grid.

- A multi-rep model item is created at the target only once if the drawings that contain all the representations for it are selected for copy in one session. If the drawings are copied in separate sessions, the model item is re-created at the target for that session.

- Paired OPCs in a drawing that are not copied (for example, not in a select set) are placed in the plant stockpile. Paired OPCs in a copied drawing have their relationships maintained by the copy. Paired OPCs are not moved from the plant stockpile to a drawing by a subsequent copy session.

- A plant group item is created at the target only once if the drawings that contains all its members are selected for copy in one session. If the member drawings are copied in separate sessions, the plant item group is re-created at the target for each session.

Delete a Drawing

1. In the tree view, select the drawing that you want to delete.

2. Click **File > Delete**.

3. To confirm the drawing deletion, click **Yes** on the message box.

4. Click **View Log** on the **Deleting Drawings** dialog box to review notes from the drawing deletion process.

   Notes:

   - You must have the Delete privilege set to be able to create drawings in a given node as specified in the Roles in SmartPlant Engineering Manager.

   - If you have a saved version of a deleted drawing, you can retrieve the drawing as it was when you saved it. For more information, see Recover a Version of a Deleted Drawing.

   - If a plant group has no drawings or plant items belonging to it, you can delete that hierarchy item in SmartPlant Engineering Manager. Keep in mind, though, that if you have associated a plant item with a hierarchy item by using the Properties window in SmartPlant P&ID, then even though it can look as if no drawings are associated with that plant group, you cannot delete that hierarchy item in SmartPlant Engineering Manager.

- You can also delete saved versions of a drawing, without deleting the drawing itself. For more information, see Show the History of a Drawing and Its Versions.

Modify a Drawing

1. In the list view, select the drawing whose properties you want to modify.

2. Click **Edit > Properties**.

3. On the **Drawing Properties** dialog box, change or add values to the drawing properties.

4. Click **OK**.

✎ **Notes:**

- You can rename and renumber a drawing, but keep in mind possible naming conflicts that can arise when you retrieve a drawing under an older name. In particular a drawing which has been renamed will appear in the list of deleted drawings when you use the Tools > Recovery > Retrieve Deleted Drawings command even though it has not actually been deleted.

- Many drawing properties cannot be modified after the drawing is created.

Opening Drawings

You can open drawings from either Drawing Manager or from SmartPlant P&ID.

Open a Drawing from Drawing Manager
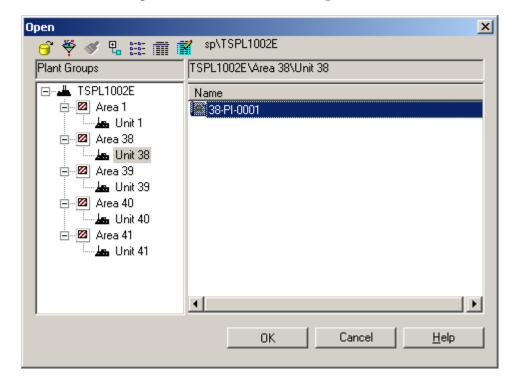
1. In the tree view, select the node where the drawing resides.

2. In the list view, click the drawing you want to open.

3. Click **File > Open Drawing**.

4. View or modify your drawing in **SmartPlant P&ID**.

✎ **Notes:**

- You may also use the Open Drawing command on the right-click menu. Or you can double-click a drawing in the list view.
- You must have the appropriate permissions, specified in SmartPlant Engineering Manager, in order to view or modify drawings.

Open Drawings from SmartPlant P&ID

1. Open SmartPlant P&ID by clicking **Start** > **Programs** > **Intergraph SmartPlant P&ID** > **SmartPlant P&ID**.

2. Click **File > Open**. The **Open** dialog box appears.

3. In the list, click a unit (or other plant group) to display the drawings it contains.

4. Click a drawing in the list, and then click **Open**.

5. SmartPlant P&ID opens and displays the selected drawing.

Open a Drawing in a Different Database

1. On the main menu bar, click **File > Open**.

2. On the **Open** dialog box, click the Open Database button: .

3. On the **Open Database** dialog box, click Site Server.

4. On **the Open Site Server** dialog box, select the correct SmartPlant initialization file and click **OK**.

5. Select the correct plant on the **Open Database** dialog box and click **OK**.

6. Navigate to the correct drawing in the **Open** dialog box and double-click it.

Importing Drawings: An Overview

The **Import Drawings** command allows you to copy drawings from another plant in the same site or a different site. An import map file is used to match attributes. The software uses a delivered map file to map any customized attributes, select list entries, and symbols between the target and source plants. Using the wizard, you can create and save your own map files. In order to be able to edit the import map file, you must have permission as assigned in SmartPlant Engineering Manager. Using the **Roles Properties** dialog box and the **Rights** tab, you must select the **Drawing Management** option **Edit Import Map** in order to be able to edit a map file.

There are several import drawing options also available in **Options Manager**. You can define the **Import Map Path** that defines where your map files will reside on the system. You can also define the **Import Transformation Program**. This program controls the depth of the data transformation. A transformation program is delivered with the software but you can copy and edit the program to fit your requirements. For example, you could edit the program to clean individual property values, categories of values, or you can flag values that are set during the copy process. Another import drawing option is **Copy Transformation Program**.

Notes

- Any graphics that have been band-aided should be deleted and replaced prior to using this command.

- If your target plant uses a shorter data string value than the source plant, the string will be truncated. For example, if the source plant has a maximum character value of 80 set for a field, and the target plant has a maximum character value of 40 set for the same field, only the first 40 characters of the field will be mapped.

- If your source drawings and target database use different languages, you are required to use a database created using the UTF-8 character set for unrestricted multilingual support. For example, if the source drawing name contains German characters, they will be converted to English during the import. When you try to open the drawing, the physical file will not be found and the product will try to re-create the drawing.

- When importing a symbol's representation properties, the representation properties are a pure copy of the source symbol. The representation properties of the target symbol are overwritten. The end result is that the object in the drawing may not agree with the target catalog item.

Import Drawings Wizard - Welcome
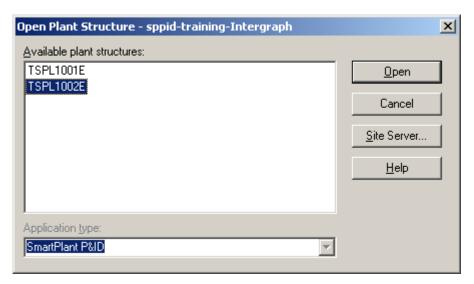
This screen provides an introduction to the **Import Drawings Wizard**.   The wizard screens prompt you for details about your source and target drawings.

Import Drawing Wizard - Select Source Plant

Allows you to select the plant that contains the drawings you want to import. Click ⊡ and use the **Open Plant Structure Dialog Box** to define the system location of the drawings.

Open Plant Structure Dialog Box
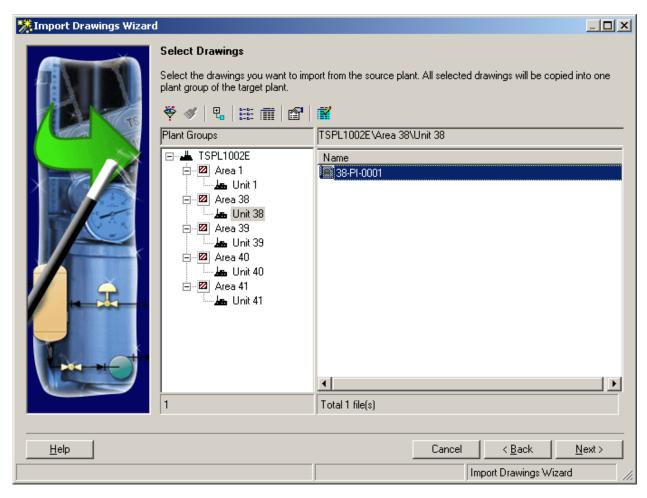
Sets options for connecting to a site and plant structure and passes user access information to the application. This dialog box opens when you click **File > Open Database** on the main menu bar.

- **Available plant structure** - Lists those plant structures found on the network. You can select only one item from this list at a time.

- **Open** - Connects you to the selected plant or project database. The **Open** command also checks to make sure you have the correct access privileges for the selected database and passes your access information back to Drawing Manager.

- **Site Server** - Opens the **Open Site Server** dialog box, allowing you to select the SmartPlant .INI file for the site you want to access. Plant structures contained in the site you selected display in the **Available plant structures** list.

- **Application Type** - Allows you to specify the application that you want to associate with this plant structure.

Import Drawing Wizard - Select Drawings

Displays a list of drawings available for importing and allows you to select the drawings to be imported.

$\overset{\Psi}{\mathbf{Y}}$ - Opens the **Filter** dialog box that allows you to specify the drawings that are displayed in the list.

$\overset{}{\mathbf{\mathscr{I}}}$ - Deactivates any filter you have applied to the list of drawings that appears in the List view.

$\overset{\boxed{}}{\mathbf{}}$ - Displays all the drawings and node names that reside in the currently selected node.

$\overset{\boxed{}}{\mathbf{}}$ - Displays a detailed view of the drawing properties. You can sort by the listed properties.

$\overset{\boxed{}}{\mathbf{}}$ - Displays a list of the drawings. One property per drawing is displayed.

▣ - Displays the properties for the selected item. These values display in the **Properties** dialog box.
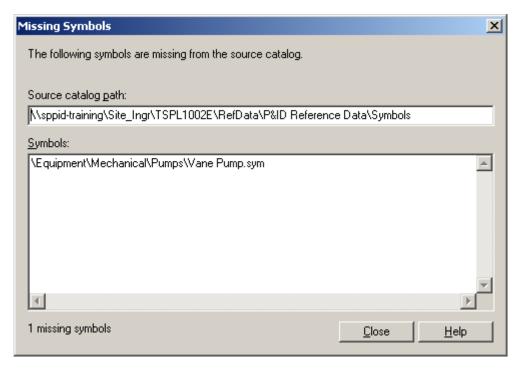
▣ - Opens the **Customize Current View** dialog box, which allows you to specify the information about each drawing that is displayed.

Missing Symbols Dialog Box

Displays a list of missing symbols. After you select your drawing(s) for import, the software performs an analysis of in-use data.   If there are any missing symbols, this dialog displays automatically.

Symbol maps are created for missing symbols but since the symbol is not found in the catalog, the information normally obtained from the symbol (Item Type, Type Value, Connect Point, and so forth) cannot be determined. Symbol maps for missing symbols are marked as **In Use**. The map status is set to **Incomplete**.

You must replace the missing symbol to resolve the error. To replace the missing symbol, locate a saved version of the missing symbol and copy it to the exact location of the missing symbol. When the symbol is replaced, select the **Import Drawings** command to start the command again.

Import Drawing Wizard - Complete Import Map

Displays the import map and allows you to define how data from the source plant is to be mapped into data in the target plant. SmartPlant P&ID allows you to customize a plant in various ways.. You can add new properties, select lists and select list values with the Data Dictionary Manager. You can also add new catalog items (symbols) with the Catalog Manager. Because you can customize different plants in different ways, you must be able to define how to map the data before you can import drawings from one plant to another. The import map provides the solution to this problem.

The Import Drawings wizard supports two different approaches to mapping. They are Just-In-Time Mapping and Proactive Mapping. Each of these approaches is valuable in different contexts. The approach you choose to adopt will depend on your needs and your own personal preferences.

With the just-in-time approach, you only define the mapping for the minimum number of items that are required to import the selected drawings. The software automatically identifies all of the properties, select lists and symbols that are used by the selected drawings. The filter commands (Show in Use and Show Incomplete) are turned on to help you to focus on the items that remain to be mapped before the drawings can be imported. The just-in-time approach is the default approach to mapping.
With the proactive approach, you can define a complete mapping of all select list values, symbols, and so forth. After a complete map is created, drawings can be imported at any time without any mapping activity required at all. The filter commands (Show in Use and Show Incomplete) can be turned off to allow the full map to be viewed. The Update From Source command can be used to fully populate the import map. The Auto Complete command can be used along with interactive mapping to complete the map. The proactive approach is an alternative approach to mapping.

All of the import map files for a plant are saved in the import map folder defined using Options Manager. This folder is normally setup on a server that is accessible to all client computers. One import map file is created for each source plant from which drawings are imported. The wizard automatically opens the import map file for the selected source plant. If you have imported drawings from a different source plant, you can copy that import map file using the Open command. The Save command always saves the current import map file to the standard name in the standard location.

The import map is displayed in a familiar Explorer view with a Tree view on the left and a list view on the right. You can select the nodes of the Tree view and see the related data in the list view. The Map Status column in the list view contains a value of Complete or Incomplete. A value of Complete indicates this item and all of the items below it have been mapped. A value of Incomplete indicates this value is not mapped or some value below it has not been mapped. You must expand the Tree view

to find the item that needs to be mapped. When you select the top-most node in the Tree view and the Map Status displays Complete for all three of its children, then you know that the import map is complete.

You must have the same size symbols available when importing. Imported parametric symbols will use existing parametric parameters.

□ - Creates a new import map file. If there are any unsaved changes in the current map file, you are prompted to save those changes if needed. The new map file is automatically updated with existing values that are in use by the selected drawing.

⬚ - Opens a new import map file. If there are any unsaved changes in the current map file, you are prompted to save those changes if needed. The import map file is validated against both the source and target plants. Map entries for items that do not exist in the current source and target plants are deleted. The map is automatically updated with the existing values in use by the selected drawings.

⬚ - Writes the current import map file to the disk using the standard naming convention.

⬚ - If selected, this command filters the display to show only the items being used by the selected drawing. By default, this option is selected. If not selected, the display is based on all items in the map.

⬚ - If selected, this command filters the display to show only the items displaying an incomplete map status. By default, this option is selected. If not selected, all items display.

⬚ - Reads data from the source plant and then populates the import map file. The import map is updated using the source plant data dictionary and catalog definitions. If you have the top node in the **Tree** selected, a complete update is performed. If any lower level node in the **Tree** is selected, a partial update is performed. This option fills in the source value for each created map object and automatically completes the mapping process by filling in the target value for certain objects. Properties in the source plant that match with identically named properties in the target plant are automatically mapped. Select list values and symbols are not automatically mapped. If you are doing a partial update (a lower level node in the **Tree** view is selected when using this command), select lists should be updated before item types or symbols. This will help to create the proper relationships between the items.

- Automatically maps source objects to the corresponding target objects where possible. If the target value is already defined, the target value is not changed. If you have the top node in the Tree selected, a full operation is performed. If any lower level node in the Tree is selected, a partial operation is performed. When applied to properties, the target property name and data type must match the source for it to be automatically mapped. When applied to select list values, you can use the Select List Options Dialog Box to match by text, match by index or match by text and index. When applied to symbols, the item type and the mapped type property must match for the symbol to be automatically mapped.

Piping components, instruments, nozzles, and OPCs can contain connect points. For symbols that contain connect points, the number and type of connect points in the target symbol must match those of the source symbol. For labels, the Label Type and the Labeled Item Type properties must match the values of the source symbol. If a single symbol is found in the target catalog that matches the source properties, it is used. If multiple matching symbols are found, and one of those has the same name as the source symbol, then it is used. Mapping of symbols depends on the catalog index.
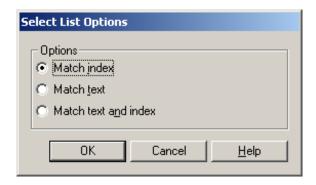
Interactive mapping of select lists is not supported. Mapping of select lists is always done through **Auto Complete** and is always driven by the mapping of the attributes that use them. To map a select list that is not in-use, you must first map an attribute that references it. Select Piping Component under Item Type Maps and invoke the Update From Source command. This brings in all of the attributes for Piping Component and internally calls **Auto Complete**. All of the attributes are mapped and the select lists that are referenced by those attributes are also mapped. Now, you can select **Action** under **Select List Maps** and run **Auto Complete**. This will complete the mapping of the select list values.

- Removes items from the import map that are not currently mapped to a target item. If you have the top node in the Tree selected, a full operation is performed. If any lower level node in the Tree view is selected, a partial operation is performed.

- Updates the catalog index to include the latest information about all symbols in the target catalog. The mapping of symbols depends on the catalog index. The catalog index should be updated after any changes are made to the symbols in the catalog. The catalog index is saved in the file named *CatalogIndex.xml* in the top level folder of the catalog.

Select List Options Dialog Box

Defines an option for resolving select list matching between the source and target plant. This dialog box displays when you click **Auto Complete** on the **Complete Import Map** wizard screen.

Match index - Matches index, or number, associated with each select list item. For example, you would use this option if your source plant contains English text values and the target plant contains German values. The values would be assigned according to the select list index (its numeric value).
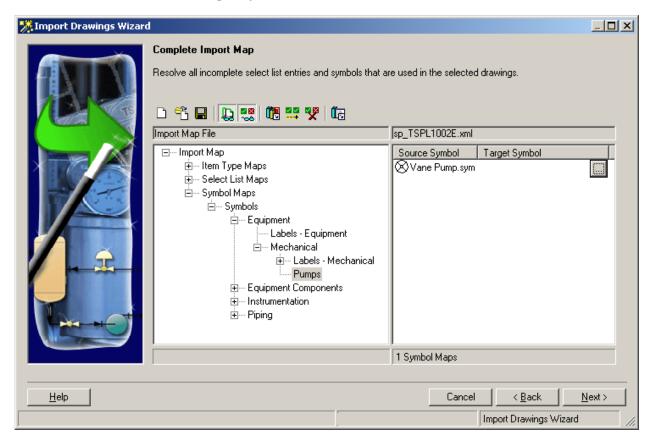
Match text - Matches the text, or string, associated with each select list item. For example, use this option if you have added entries to your select list. This option matches the text values and ignores the numeric values.

Match text and index - Matches the index and text associated with each select list item.
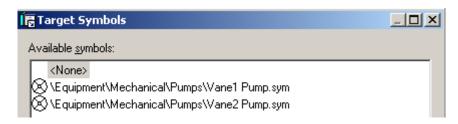
Import Drawing Wizard - Target Symbols Dialog Box

The **Target Symbols** dialog box allows you to select a target symbol file. The dialog box displays using the **Complete Import Map** wizard screen.

1. Click in the **Target Symbol** column.

2. Click the ellipse ... button to display the **Target Symbols** dialog box.

3. Click the symbol to use.

4. Select **OK**.

Import Drawing Wizard - Options

Allows you to select a template size for your drawing. You can also define a program that want to use during the transformation process. This program could contain any special instructions you want applied during the import. A transformation program is delivered with the software. You can use the delivered program as an example to create your own transformation programs.

Use source templates – Select to use the template associated with each drawing that you import from the source plant. The Source Template must exist in Target Plant in order for Import Drawings to be successful, otherwise a similar message to the below will be reported in the log file.

Status: Failed. Error: Error trying to get the new drawing template for 905-E-045 or template - CustomTempate.pid does not exist in the target plant. –

Template - Defines the sheet size for the drawings. Click the drop-down arrow to view all valid choices.

Apply default formats - Click to place a check mark in the check box to turn on the option. When set to on, attribute values from the source database are reformatted using the default format for each attribute at the target database. This applies to all attributes, but is most important for Unit of Measure (UOM) attributes such as temperatures and pressures. If a drawing is being imported from a source plant that shares the same locale as the target plant, typically this option should be turned off to prevent any loss of formatting during the import operation. For example, if pressure values are expressed in several different units of measure for different properties, these would all be imported exactly as they are in the source database. If a drawing is being imported from a source plant in one locale into a target plant in a different locale typically this option should be turned on. This ensures that locale dependent formatting is applied to all values. For example, if importing from a plant where the decimal symbol is a comma (,) to a plant where the decimal symbol is a period (.), attribute values should be reformatted using the default formats.
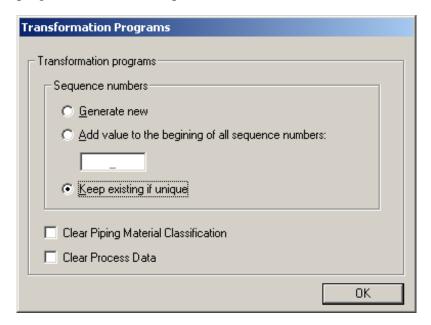
Import revisions – Select to include with the import all drawing revisions that were made in the source plant.

Use source drawing name and number – Select to keep the original name and number of the drawings without the addition of any prefix. Clear to specify new drawing names and numbers. When cleared, the software adds a prefix to the drawing name indicating the name of the source plant.

Do not recreate drawings – Select to skip recreation of the graphical drawings when importing the drawing data. This improves performance when you are importing a large number of drawings. If you select this option, you are prompted to recreate a drawing when you open it.

Transformation program - If the import map file already exists, this option displays the transformation program defined in the file. If the import map file is new, this option displays the transformation program defined by the option setting **Import Transformation Program**. This setting is defined using **Options Manager > Settings**. You can copy the delivered code and then create your own customized transformation program. Then, you can use this field to enter the name of your transformation program. You are not required to use a transformation program. For more information about creating a transformation program, see *Customizing the Sample Projects* in the *SmartPlant P&ID Programmer's Guide*.

Custom Options - If a transformation program is defined, this option displays the **Transformation Program** dialog box. It is used to define options for modifying property values during the import process. If the delivered import transformation program is used, these options are available.
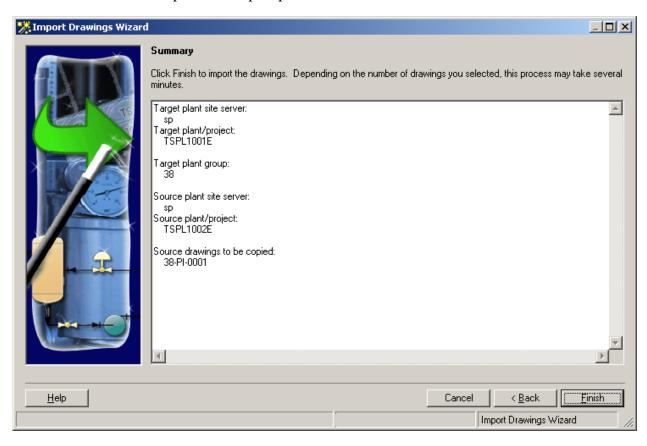
- **Generate new** - Selecting the option causes existing tag sequence numbers to be set to null for any item that has the property **TagSequenceNo**. The null sequence number triggers the creation of new sequence numbers during normal item tag validation. An exception to this is that the tag sequence number for an instrument item is not set to null. Item tag validation does not generate a new sequence number for an instrument. Instrument tags will be duplicated at the target.

- **Add value to the beginning of all sequence numbers** - Click to select this option. Click in the provided field and enter the values you want to display at the beginning of all your sequence numbers.

- **Keep existing if unique** - Creates new tag sequence numbers for items that do not currently have a tag sequence numbers. If an item has an existing unique tag sequence number, a new number is not created.

- **Clear piping material classification** - Click to place a check mark in the check box to use this option. Selecting this option removes any defined piping material class.

- **Clear process data** - Click to place a check mark in the check box to turn on this option. Any values in the Process category will be removed.

Import Drawing Wizard - Summary

Displays a summary of information about the imported drawing(s). You must click Finish to complete the import process.

Creating Drawing Templates: An Overview

The software includes several standard drawing templates. You usually create a new drawing based on one of these existing templates; however, it is possible to customize a drawing template to meet your particular needs. This task is accomplished inside the design software by using commands on the **File** menu. The pre-defined size choices for a new template are extensive.

The default storage location for templates is specified in Options Manager. When creating a new template save the file in the location specified in Options Manager in order to utilize the Template during creation of a drawing.

The software also includes a set of title block labels that fit the delivered drawing templates. If you create a new template, you can also create a new title block label that fits the title block of your template correctly and that contains the appropriate information. You create labels in Catalog Manager.

If you want to create custom border files for your drawing templates, use Intergraph SmartSketch. You can then embed your border file in the new templates you create in SmartPlant P&ID. Once you embed a border file into a drawing template and a drawing is created in Drawing Manager using that template, any changes to the border file are not reflected in drawings created prior to the change. If you link a border file, instead of embedding it, and then subsequently change that border in SmartSketch, changes are reflected automatically in your drawing.

✎ **Notes:**

- Title Block Labels may now be placed within a Template, previously the drawing would have to be opened and then the Title Block Label could be placed.

List of Delivered Templates

Metric Templates

Template File	Border File	Page Size
A0-Size.pid	A0border.igr	A0 Wide (1189mm x 841mm)
A1-Size.pid	A1border.igr	A1 Wide (841mm x 594mm)
A1 Wide (Metric).pid	A1 Wide (Metric).igr	A1 Wide (841mm x 594mm)
A1 Wide Note Area (Metric).pid	A1 Wide Note Area (Metric).igr	A1 Wide (841mm x 594mm)

A2-Size.pid	A2border.igr	A2 Wide (594mm x 420mm)
A2 Wide (Metric).pid	A2 Wide (Metric).igr	A2 Wide (594mm x 420mm)
A2 Wide Note Area (Metric).pid	A2 Wide Note Area (Metric).igr	A2 Wide (594mm x 420mm)
A3-Size.pid	A3border.igr	A3 Wide (420mm x 297mm)
A3 Wide (Metric).pid	A3 Wide (Metric).igr	A3 Wide (420mm x 297mm)
A4-Size.pid	A4border.igr	A4 Wide (297mm x 210mm)
A4 Wide (Metric).pid	A4 Wide (Metric).igr	A4 Wide (297mm x 210mm)
A5-Size.pid	A5border.igr	A5 Wide (210mm x 148mm)

English Templates

Template File	Border File	Page Size
A-Size.pid	A-Wide.igr	A Wide (11in x 8.5in)
A Wide (Imperial).pid	A Wide (Imperial).igr	A Wide (11in x 8.5in)
B-Size.pid	B-Wide.igr	B Wide (17in x 11in)
B Wide (Imperial).pid	B Wide (Imperial).igr	B Wide (17in x 11in)
C-Size.pid	C-Wide.igr	C Wide (22in x 17in)
C Wide (Imperial).pid	C Wide (Imperial).igr	C Wide (22in x 17in)
D-Size.pid	D-Wide.igr	D Wide (34in x 22in)
D Wide (Imperial).pid	D Wide (Imperial).igr	D Wide (34in x 22in)
D Wide Note Area (Imperial).pid	D Wide Note Area (Imperial).igr	D Wide (34in x 22in)
E-Size.pid	E-Wide.igr	E Wide (44in x 34in)

Create a Drawing Template

1. Select **Start** > **Programs** > **Intergraph SmartPlant P&ID** > **SmartPlant P&ID**.

2. On the main toolbar, click **New Template**

   OR

Select **File** > **New Template**

3. Select **File > Page Setup**.

   a. In the **Sheet size** box on the **Page Setup** dialog box, choose a standard size or define a custom size for this template.

   b. Select **OK**.

4. Select **File** > **Properties**.

   a. On the **Units** tab of the **File Properties** dialog box, specify the unit in the **Length**, **Angle**, and **Area readout** boxes in order to define default units of measurement.

   b. You can also add general identifying information on the **Summary** tab.

   c. Select **OK**.

5. Select **Edit** > **Insert** > **Object**.

   a. On the **Insert Object**[1] dialog box

      i. Check the **Link** option to link the border in the template.

         OR
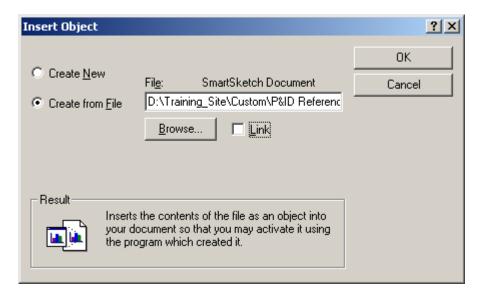
         Un-Check the **Link** option to embed the border in the template.

6. Select **Browse**, find the **border[2] file[3]** and select **Open**.

   a. ~\Training_site\Customer\P&ID Reference Data\Template Files\<select the appropriate .igr file>

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[1] You can also embed your border file in the drawing template if you want to. Once you embed a border file into a template and a drawing is created using that template, any changes to the border file are not reflected in drawings created prior to the change. If you link a border file, instead of embedding it, and then subsequently change that border in SmartSketch, changes are reflected automatically in your drawing.

[2] See SmartSketch Help for instructions on how to create a border

[3] If you want to create custom border files for your drawing templates, use Intergraph SmartSketch.
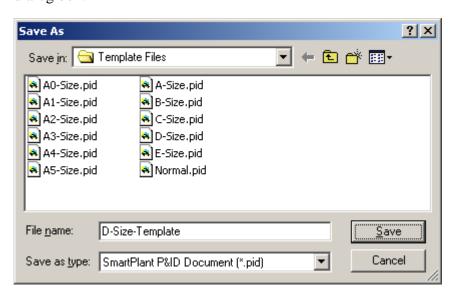
7. Select **OK**.

8. Select the **ESC** button.

    OR

    Select the Left Mouse button to position the Border File.

9. Select **File > Save As**[4] and specify a name for your template on the **Save As** dialog box.

10. **File** > **Exit** from **SmartPlant P&ID**.

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[4] The default storage location for templates is specified in Options Manager. Save it in this default location in order for it to be available for drawing creation.

Options for Templates

You may specify some P&ID environment settings in the template file. This will ensure that all users start with the same settings for the view properties, grid spacing and index, colors, and the behavior of OPC partner placement.

View > Properties

Display tab

You may select any of the checkboxes on this tab. By default, most are already selected. However, you may want to include **Prevent Selection of inserted objects.** This will prevent users from accidentally deleting the border file from their drawings. The user may deselect this later if needed.

Grid tab

You may want to specify a standard grid spacing and grid index for the users. The user at an individual level if needed may change this.

Tools > Options

Colors tab

You may want to specify a background color for the P&ID drawings.

Placement tab

If you click Place partner OPC in plant stockpile, the software will default to placing OPC mates in the plant stockpile rather than giving the user **the Set Stockpile Location of Partner OPC** dialog box.

 Notes:

- Make sure the units of measure for the border file (.igr file) and the **SPPID** template are the same. Look at **File** > **Properties** in **SmartSketch** and **SPPID** and compare both the unit and the precision for each readout.

- Do not use a dynamic grid when creating the border or template. A dynamic grid is not fixed and will not provide the degree of precision needed.

- When inserting the border into the template file in SPPID, you may need to select scale of 1:1 in on the **Tools** > **Options** > **Files** tab.

- When specifying fonts for border text in SmartSketch, make sure to place the fonts on end-user machines. Otherwise, the text on that user's machine will not appear correctly.

Using the SmartPlant Migration Wizard

The SmartPlant Migration Wizard is a *data* migration tool provided by SmartPlant P&ID for converting and importing process flow diagrams (PFDs) and preliminary process and instrumentation diagrams (P&IDs) from SmartSketch into SmartPlant P&ID. When migrating your SmartSketch file to SmartPlant P&ID, the SmartPlant Migration Wizard maintains graphic visual fidelity. During processing, the SmartPlant Migration Wizard scans the SmartSketch file and maps all the objects to SmartPlant P&ID equivalent objects. Any graphics that cannot be mapped are placed in a SmartSketch file that is then placed as an inserted object in the SmartPlant P&ID file. The *database* does not contain any information for these unmapped objects.

In order to import a SmartSketch drawing into SmartPlant P&ID, you must have SmartSketch installed on your computer.

You can determine if all the graphics in your file migrated correctly by viewing the GetSmart.log file in the Temp folder. This file contains information about the migration such as the file that was migrated, the time that the migration started and stopped, the symbols that were migrated, and any errors encountered during the migration.

Symbol Map

To start the SmartPlant Migration Wizard, click **File > Import > SmartSketch.**

Several criteria must be met before the symbol will migrate:

- The symbol must exist in both SmartSketch and SmartPlant.

- Both symbols should have the same origin location.

- They must have the same code. The SmartPlant Migration Wizard uses AABBCC codes to map the symbols. In SmartSketch, these are referenced as *Code*; in SmartPlant they are referenced as *AABBCC_code*. For example, the Pump.sym symbol in SmartSketch has a Code attribute of 1D4A01; the equivalent SmartPlant symbol has an AABBCC_code attribute of 1D4A01. The AABBCC code value can be any string as long as it is unique in both SmartSketch and SmartPlant.

The Code attribute is visible in SmartSketch for the SmartSketch symbol; the AABBCC code is visible for SmartPlant P&ID symbols in Catalog Manager. These attributes are not visible in Windows Explorer.

Delivered symbols with a matching AABBCC code are mapped intelligently to the equivalent SmartPlant P&ID symbol, or you can edit the symbol map file to equate

the symbol names between SmartSketch and SmartPlant P&ID. You can check the symbol map file, SymbolMap.csv, for duplicate codes.

When the SmartPlant Migration Wizard is executed, it creates a symbol map file. That map file is a listing of all SmartPlant symbols their location and their associated AABBCC_code. The file is located in **~Program Files\SmartPlant\P&ID Workstation\Program** and is called SymbolMap.csv. You can open the file in Excel to check for a duplicate code.

Notes:

- You do not have to draw two identical symbols, one for SmartSketch and one for SmartPlant P&ID. You can create the symbol in SmartSketch and define it as needed for glue, drag points, origin, and so forth. You can then copy that symbol to the SmartPlant directory of symbols, open it in the SmartPlant P&ID Catalog Manager, and define it in SmartPlant. In this way, you only need to create the graphics once.

Placement Order

After the SmartSketch file is scanned and all its objects are mapped to SmartPlant P&ID objects, the Migrator uses rules to determine the order in which to place the resulting symbols. Certain symbols cannot be placed unless a rule has been met. For example, a nozzle cannot be placed unless it is attached to a piece of equipment. SmartSketch does not have rule sets. To account for the rules in SmartPlant P&ID, the Migrator looks at the SmartSketch symbols to determine what the symbols are attached to. Symbol placement is performed in this order:

1. Stand-alone symbols

2. Symbols attached to stand-alone symbols

3. Connectors and pipes

4. Symbols attached to connectors or pipes

5. Symbols attached to symbols that are attached to a connector or pipe

6. Labels

7. SmartSketch graphics that are not recognized as symbols

Rule Considerations

Because the SmartPlant Migration Wizard cannot account for all the rule possibilities that are defined in the default SmartPlant P&ID rule set or a customized rule set, you must create your SmartSketch drawing with the SmartPlant P&ID rule set in mind.

Supported Templates - Intergraph Process Flow and P&ID symbols map to the SmartPlant P&ID reference data included with the software.

Symbols - Delivered symbols with a matching AABBCC code are mapped intelligently to the equivalent SmartPlant P&ID symbol, or you can edit a symbol map file to equate the symbol names between SmartSketch and SmartPlant P&ID. You can check the symbol map file, SymbolMap.csv, for duplicate codes. This file is created during the migration process and you can open this file by using Microsoft Excel.

Notes:

- The AABBCC code is not displayed in **Catalog Explorer** or the **Properties** window in SmartPlant P&ID. To view the code, you must open the item in Catalog Manager.

- Because SmartSketch is file-driven and SmartPlant P&ID is database-driven, both products have independent sets of symbols; therefore, symbol definitions and attributes migrated from a SmartSketch file are stored as properties in the SmartPlant P&ID database. SmartSketch symbol attributes are conditionally migrated; this means that the attribute must exist as a SmartPlant P&ID property for that symbol. SmartSketch has a default set of attributes for vessels, pumps, compressors, and shell and tube exchangers. These attributes are the same as the SmartPlant P&ID properties for the same items. All of those attributes, if given a value in SmartSketch, migrate to the SmartPlant P&ID property database. You can add your own unique attributes to a P&ID symbol in SmartSketch, and if that same symbol with same properties is available in SmartPlant P&ID, custom SmartSketch attributes can migrate into those properties. You define custom properties for SmartPlant P&ID symbols by using Catalog Manager.

Nozzles - Nozzles are required for connection of piping in SmartPlant P&ID. Nozzles are required in the SmartSketch document for connections to be established when converted to SmartPlant P&ID.

Non-Nozzle Connections - Piping linear objects not connected to nozzles are placed in SmartPlant P&ID, but are not connected. You have to make valid connections manually in SmartPlant P&ID.

Flow - Appropriate flow direction is established based on the terminator of the connector.

Properties - User-defined and default SmartSketch properties are mapped to an equivalent SmartPlant P&ID property.

SmartLabels - Item tags and other single property labels are maintained intelligently.

✎ **Notes:**

- Labels in SmartSketch files are migrated very much like symbols. Any label placed in SmartSketch must have an equivalent label in SmartPlant P&ID before it can migrate. SmartSketch does include a subset of the SmartPlant P&ID labels, and most of the common labels are smart labels, which are labels that are associated with one or more object properties. The properties of these smart labels are passed to the symbol to which they are attached and migrate to SmartPlant P&ID.

- In order to assign an AABBCC code to a SmartPlant P&ID label so that it matches a SmartSketch label, do the following.

    1. Open the P&ID label in Catalog Manager.

    2. Right-click the symbol page in order to open the **File Properties** dialog box, and click the **Symbol** tab.

    3. In the **Name** box, type **AABBCC_code**.

    4. In the **Type** box, select **Text**.

    5. In the **Value** box, enter the appropriate AABBCC code, for example, **1F6Y01**.

Unrecognized Graphics and Annotations - All unrecognized graphics are inserted in the SmartPlant P&ID drawing as embedded SmartSketch graphics. This rule maintains visual fidelity even if there are items that could not be mapped intelligently.

Limitations - The following list shows planned limitations of the Migrator:

- Multiple iterations are not supported

- Flow direction that is indicated by using symbols is not understood

- The primary goal is *not* to take fully developed P&IDs into a data-centric environment

- The SmartSketch Migrator converts entire files only. If you want to migrate only a portion of a file, select the geometry that you want to migrate and copy and paste it into another file. Then the file you just created can migrate

Files Used During the Migration

Three files in the ~Program Files\SmartPlant\P&ID Workstation\Program directory are used for migration:

- **SymbolMap.csv** is a symbol map of all the SmartPlant P&ID symbols and their corresponding AABBCC_codes.

- **RotationMap.csv** is a map to add angular rotation between SmartSketch and SmartPlant objects. The map is primarily for Nozzles and is used for auto-aligning symbols (SmartSketch and SmartPlant handle auto-alignment differently).

- **ConnectorMap.csv** is a map to make the connection between SmartSketch line styles and SmartPlant piping symbols.

  Notes:

  - This file needs to be edited if you add new line styles in SmartSketch and want to migrate.

Import a SmartSketch File

Notes:

- In order to import a SmartSketch drawing into SmartPlant P&ID, you must have SmartSketch installed on your computer.

- The SmartSketch Migrator converts entire files only. If you want to migrate only a portion of a file, select the geometry that you want to migrate and copy and paste it into another file in SmartSketch. Then the file you just created can migrate.

1. Open the drawing that you want to import the SmartSketch objects into.

2. Click **File > Import > SmartSketch**.

3. Follow the instructions in the SmartSketch Migrator.

Creating Symbols: An Overview

The Catalog Manager allows you to create and edit these symbols. Symbols are comprised of a drawing (graphical representation) of the item as well as the properties associated with that item. Some of the characteristics of a symbol might include the drawing of the item, heat tracing, labels, the icon that represents the item in the **Catalog Explorer**, and the properties associated with the item.

A symbol is stored as a document with a .sym extension. You can create a symbol by selecting the **New Item** command, when the bottom section is active, on the **Catalog Explorer > File** menu or with the **Create Symbol** 🔲 command on the Draw Toolbar. An origin ◎ is automatically inserted into the symbol upon opening of the symbol. After defining the sym, you can save the symbol with the **File** > **Save command**. When you create a new symbol, its pre-defined attributes and the graphic are stored in the .sym file.
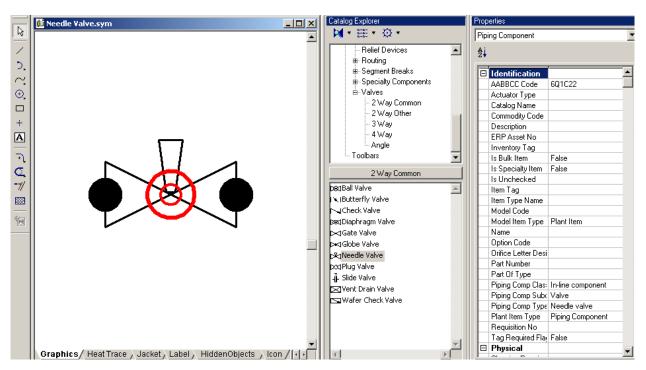
Creating new symbols is different from cloning existing symbols. When you create a new symbol, you must define all of the graphics and properties for the new symbol. When you clone a symbol, the software copies all of the graphics and associated properties for the original symbol to the new, cloned symbol. You can then modify the properties of the cloned symbol.

Catalog Manager View Window

The Catalog Manager view window is a design area that you use to display, edit, and create symbols for SmartPlant P&ID and SmartPlant Electrical. If the view window is empty, you can display items in the view window by dragging the item from the **Catalog Explorer List** view. You can also display items by using the **Open** command or by double-clicking a symbol in the **List** view.

The tabs at the bottom of the view window help to control the display of information in the window. The tabs provide quick access to the primary categories (**Graphics**, **Heat Trace**, **Jacket, Label**, **Hidden Objects**, and **Icon**) of symbol data.

You may not use all of these tabs for all symbols, depending upon the intended behavior of the symbol. To view two tabs at once, hold down the **Ctrl** key and select the second tab to be displayed. The tab name that appears in bold text is the tab you can modify.

The tabs at the bottom of the view window help to control the display of the following symbol components.

Graphics - Displays only the basic graphics associated with the symbol.

Heat Trace (P&ID only) - Displays the geometry of any heat tracing associated with the selected symbol. Line width and style are set in Options Manager. To draw the heat tracing geometry, view both the **Graphics** and **Heat Trace** layers, then draw the heat tracing on the **Heat Trace** layer.

Jacket (P&ID only) - Displays the geometry of any jacket associated with the selected symbol. Line width and style are set in Options Manager. To draw the jacket geometry, view both the **Graphics** and **Jacket** layers, then draw the jacket on the **Jacket** layer.

Label - Displays any label text associated with the selected symbol

Hidden Objects - Displays any hidden objects associated with the selected symbol in the View window. Hidden objects are objects that users do not need to see in drawings, but that the software needs to check property values, such as attribute break labels.

Icon - Displays the icon bitmap representation that displays in the Catalog Explorer. If you do not define a special icon for a symbol on the **Icon** layer, the software uses the graphics that you define on the **Graphics** tab as the icon for the symbol.

📝 Notes:

- To view two layers at once, hold down the **Ctrl** key and select the second tab of the layer to be displayed. The layer name appearing in bold text is the layer you can modify. Only the **Graphics**, **Heat Trace**, **Jacket** and **Label** layers can be displayed simultaneously.

- To switch between the displayed layers, click the other tab.

- To stop displaying a layer, press **Ctrl** and click the tab of the layer you want to stop displaying.

Catalog Tools Toolbar

The commands on the **Catalog Tools** toolbar provides different options for creating or editing a new catalog item. The **Catalog Tools** toolbar allows you to place and manipulate connect points, edit Smart Text labels, and edit symbol properties.

	Show Points Command
	Place Point Command
	Smart Text Editor Command
	Set Item Type Command
	Property Breaks
	Fit to Symbol Command
	Properties Command
	Catalog Explorer Command

Connect Points

A connect point is a specially designated active point item in a symbol. A connect point is a location at which you can connect lines, labels, and other components (using their connect points) to one another. The software will apply a relationship at this point. To place connect points on your symbol, you will use the Place Point command on the Catalog Tools toolbar.

Place Point Command

The **Place Point** command allows you to place connect points in the symbol that you are creating or editing.

 Notes:

- Use care when editing existing symbols. If you change the number or type of connect points for symbols that have already been placed in drawings, you must manually edit each drawing and replace each changed symbol.

- Depending on the change you made to the symbol, the symbol graphics may no longer match the graphics of the symbol as it currently exists in drawings. You will have to manually edit each drawing and replace each changed symbol.

- Be sure that Itemtype matches the PlantItemType property for the item. Such a mismatch can result in data loss in the plant structure.

Place Point Ribbon

The Place Point ribbon is available only after you click the **Place Point** command on the **Catalog Tools** toolbar.

Point type - Select the type of connect point you want to add to the drawing sheet. Choose from the following three types of connect points. You can also change the type of an existing connect point.

- **Piping Points** - Add these connect points to an equipment nozzle, piping component, or in-line instrument to connect a pipe run or another piping component, such as a nozzle and a flange or a reducer and a valve.
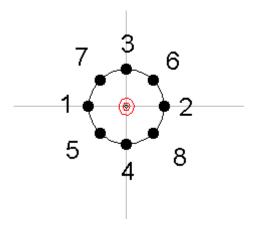
- **Signal Points** - Add these connect points to an equipment nozzle of an instrument connector or an off-line instrument to connect signal lines.

- **Auxiliary Points** - These connection points can be added to in-line instruments, off page connector or piping components. For in-line instruments, an auxiliary connect point in the middle of the component allows you to place an actuator on the instrument. For piping components, an auxiliary connect point(s) are utilized to place a jacket nozzle on the piping component.

Connect angle - Indicates the angle at which the pipe run, piping component, signal line, or actuator will attach to the component at that connect point. This field is populated automatically when you create a connect point, but you can alter the value in this field if necessary.

Number - Each connector point on a nozzle, piping component, or instrument is assigned a number at the time it was created. In this field you can see the number assigned to an existing connect point or assign a new number to a new or existing connect point.

✎ **Notes:**

- The software will use connect points 1 and 2 for placement purposes. In many symbols, those points should be collinear. See the notes in Symbol Guidelines for information on how to align the connect points for different types of new symbols. For connect points 3-n, the pair should be across from one another on the symbol. An example of correctly numbered points is shown in the figure below.

Show Points Command

The Show Points command turns the display of bolded connect points on or off. The software does not save bolding when you save the symbol.

Smart Text Editor Command

The **Smart Text Editor** command displays the **Smart Text Editor** dialog box, which allows you to create intelligent labels by building the labels from fields of information that the software fills in automatically when you place the label in your drawing.

Smart Text Editor Dialog Box

The **Smart Text Editor Dialog Box** allows you to create intelligent labels. You build the labels from static text and from fields of information that the software fills in automatically when you place the label in your drawing.

Item - Select the type of item you want to label from the list.

Property - Select the property you want to add to the label from the list.

Short value - Check this option to display the short value defined in Data Dictionary Manager. Only select-listed properties can be displayed in their short value form. In a few cases, the short value is longer than the regular value.

Format - Selects the format you want to apply to the **Property** from the list.

Value - Type the value you want to associate with the **Property**. This field is available only when the **Driving field** option is checked.
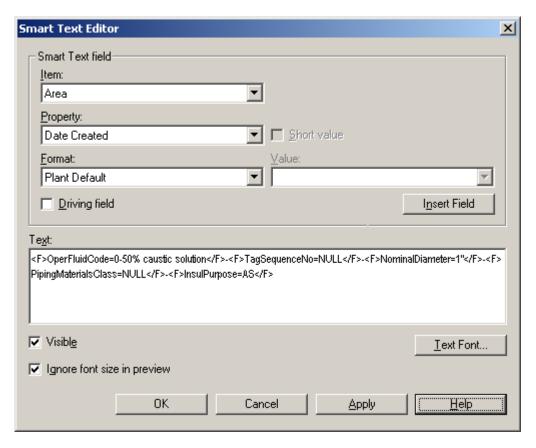
Driving field (only available in P&ID) - Check this option if you want the label to be a driving label, which means the specified value will overwrite the existing value for the object to which the label is attached in the drawing. Examples of driving labels include slope direction and mechanical driving labels. If you do not check this field, the label becomes a driven label, which allows users to specify the value when they place the label on a drawing. Examples of driven labels include line number labels, equipment name, and so forth.

Insert field - Click to add the Smart Text field to the label.

Text - Displays the Smart Text label as you create it. An <F> tag comes before each property definition, and a </F> tag ends each property definition. Click **Apply** to see your latest changes.

Visible - Check this option to display the field in the drawing when you place the label. If you do not check this option, you cannot see this label value when it is placed on a drawing. These hidden values are located on the **Hidden Objects** layer.

Text Font - Displays the Font dialog box, allowing you to change the font of the selected text

Ignore font size in preview - Displays the entered text, in the **Text** pane, in a font size that can be easily read without altering the font size set in the **Font Properties** dialog box. Use this feature when using very large or small font sizes.

- **Notes:**

    - If you use a font that does not exist on all machines used to view the symbol, undesirable font substitutions could result where the correct font is not installed.

    - For information about how to copy and paste symbols from the Character Map, see Pasting Unicode Characters into Smart Text Editor in Catalog Manager HELP.

Set Item Type Command

The **Set Item Type** ⁺🖳 command allows you to set the item type for labels you create with Catalog Manager.

Set Item Type

Item type for label:

Pipe Run

[OK]   [Cancel]   [Help]

Notes
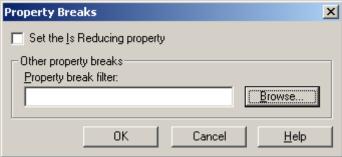
- This command is available only when you are creating a new label and you selected Label: Catalog Item from the list box at the top of the Properties list.

Property Breaks Command

The **Property Breaks** command displays the **Property Breaks** dialog box,

Property Breaks

☐ Set the Is Reducing property

Other property breaks

Property break filter:

[   ]   [Browse...]

[OK]   [Cancel]   [Help]

allowing you to define a catalog item as a break component, which allows properties to be different on the two sides of that item, suppresses the consistency checking, and limits the propagation of the properties that are broken. For example, reducers break the nominal diameter property, and pressure relief devices break the pressure property. A component can break properties of the connected runs.

Notes

- Currently, only the PipingComp, Instrument, and Nozzle items types can be defined as property breaks.

To create a break component, you must first create a special pipe run or signal run filter that includes the properties to be broken as criteria in the filter. The value and comparison operator for each property in the filter is not important. After creating this filter, open the component symbol in Catalog Manager and use the **Property Breaks** command to select the filter. When the resulting break component is placed into a drawing, it breaks the pipe run (or signal run) it is placed into. When a broken property value is changed on either side of the component, the break component limits the propagation of the changed value. For more information about consistency checking, properties, update drawing, and system editing, see the *SmartPlant P&ID User's Guide*.

Notes

- Changes in filter definitions are <u>not</u> automatically detected when those filters are used by break components. Also, the Update Drawing process does <u>not</u> update a symbol when the property definition of the symbol changes. For example, when you assign a filter to a symbol as part of creating a break component, the definition of what properties are being broken are assigned to the symbol at that time. If you later change the filter definition (even if you change only a property), changing the filter does not change the nature of that symbol. To have the filter changes reflected in the drawings, you must edit the symbol in Catalog Manager so that it must be saved. Once the symbol is saved, it is flagged as out-of-date in SmartPlant P&ID, allowing the Update Drawing process to make the changes.

- If you place a catalog item in a drawing and then change its definition to be a break component, you may encounter problems with certain commands in SmartPlant P&ID. For example, the **Replace** command does not allow a non-breaking component to be replaced with a break component. The **Update Drawings** command relies on the **Replace** command to replace out-of-date symbols. Therefore, **Update Drawings** does not update any symbol whose definition has been changed into a break component.

- The IsReducing property still works like it always has in that setting the IsReducing property to True causes the symbol to be a break component for Nominal Diameter. To create a break component for any other property, you must create a filter as described above.

Fit to Symbol Command

The **Fit to Symbol** ⊞ command fits the active view to the open symbol in Catalog Manager view window.

Properties Command

The **Properties** ⊞ command turns the display of the Properties Window on or off.
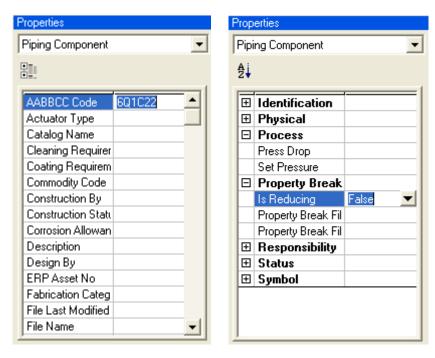
Catalog Explorer Command

The **Catalog Explorer** ⋈ command turns the display of the Catalog Explorer on or off.

Properties Window: An Overview

The Catalog Manager **Properties** window displays properties for selected symbols. Depending on your access privileges, properties can appear in either read-only or read/write mode. If the symbol displayed in the view window does not have any P&ID properties associated with it, the **Properties** window is blank.

The button located at the top of the **Properties** window allows you to sort properties either by category or alphabetically.

🖉 **Notes:**

- When you select an item in the **Catalog Explorer List** view but do not open the item, a short list of properties is displayed in the **Properties** window. You cannot edit properties in the short list. You must open the symbol in order to edit properties.

- When a symbol is open for editing, if you subsequently select the symbol in the **Catalog Explorer List** view, then the short list of properties is displayed in the **Properties** window even though the symbol is open. To see the entire properties list, click the symbol page again or select the open symbol from the **Window** menu. You can view the short list of properties for any symbol by selecting it in the **Catalog Explorer List** view, regardless of whether any symbols are open in the view window.

- If you clone a symbol, the item type is derived from the cloned item. If you create a new symbol, the default item type is the last item type selected in the **Properties** window.

- Reference **Glossaries** in **SmartPlant P&ID Help** concerning all of the Properties listed under the various categories.

Identification Category

The properties found in the Identification category of the Property Window are those used to give a symbol distinguishing characteristics, including the plant item type, AABBCC code, etc. Many of these properties are not visible while working in SmartPlant P&ID.

Below, you will find a list of properties that may be used when creating a new symbol but are not available when working in SmartPlant P&ID. Not all of these properties are available for all types of plant items. Also, not all of these properties should be modified when creating a new symbol. Two lists are given with the modifiable properties and those that should not be modified.

A user in Catalog Manager may modify the following properties for a symbol.

AABBCC code

The aabbcc_code property sets or returns a string providing a unique code for the item. This property is provided for compatibility with the legacy PDS P&ID software. It also provides compatibility with PDS 3D software when transferring from SmartPlant P&ID to PDS 3D and when migrating from SmartSketch to SmartPlant P&ID. This property is used for both data transfer and pipe specification validation. It is not used with SmartPlant 3D or The Engineering Framework.

Is Bulk Item

The **IsBulkItem** property sets or returns a Boolean, if **True**, specifies that the item is bulk. As delivered, the item validation code that checks for uniqueness of item tags ignores an item with **IsBulkItem** set to **True**.

Is Owner

The **IsOwner** property is a boolean whose true value is reserved for future use.

Is Shared

The IsShared property is utilized in a Workshare environment and can be set in Catalog Manager of within SPPID for the specific Plant Item Groups (instrument loop, package, safety class, and test system).

The **Is Shared** property is a Boolean value. If this property is set to **True**, for **Plant Item Groups** (instrument loop, package, safety class, and test system) they can be shared with another site.

Is Specialty Item

The **IsSpecialtyItem** property is a Boolean value. If this property is set to**True**, it indicates that the item is a specialty item.

It is available for piping components. If this property is set to true, the Piping Specification Validation is not looked up for this item. This value can be used for filtering or reporting.

Tag Required Flag

The **TagReqdFlag** property sets or returns a Boolean value specifying whether the item requires a tag.

Used in combination with the **In Stockpile** items setting in **Options Manager**, this property, if set to **True**, determines that an item will go to the stockpile if deleted from a drawing using the **Delete** command.

The following properties (**Part of Type** and **Is Unchecked**) are used by the software while working in **SmartPlant P&ID**. A brief definition is given for the properties. However, these should <u>not</u> be modified by a user in **Catalog Manager**.

Part of Type

The PartOfType property sets or returns an enumerated value specifying the type of "PartOf" relationship.

The value will be set to Implied if an item is placed based upon a rule that implies items. The value will be set to Composite in the case of a Tema End placed upon a Tema Shell. This value can be used for filtering or reporting.

Is Unchecked

Not used by the software or by users. Possibly reserved for future use.

Miscellaneous Category

The Connectors Zero Length is set when routing pipe runs or creating adjacent components. The value if set to True, by the system, indicates a zero length pipe run which can then be excluded from the EDE or Reports. The software does not publish pipe runs for which this parameter is set to 'true'.

Control Category

Control properties are instrumentation–specific. They contain case data such as control case pressure and quality as well as instrument function type and fail mode.

These properties are also found in the property grid while working in SmartPlant P&ID. Instrumentation will have this category available in Catalog Manager and SmartPlant P&ID.

Physical Category

Physical properties store physical data about a particular item. They may include cleaning requirements, coating requirements, insulation type, etc. These properties are also found in the property grid while working in SmartPlant P&ID. A variety of physical properties may be found on any plant item.

Is Inline

The **Is InLine** property is only application to Instruments. When the **Is InLine** property is set to **True** for **Instruments**, then a record will in the **T_InLineComp** table. Also, Offline Instruments, when Is InLine = false, will have a basic set of attributes whereas Inline Instruments, when Is InLine = True will have an extended set of attributes.

The **Is InLine** property for Piping Components in the Property Window of Catalog Manager is ignored by the software. It is assumed to have a value of True.

Process Category

Process properties store process case data. They contain design maximum and minimum properties as well as fluid system and flow rate. These properties are also found in the property grid while working in SmartPlant P&ID. Equipment, Pipe Runs, and Signal Runs will have this category available in Catalog Manager and SmartPlant P&ID.

Property Break Category

Is Reducing

The **IsReducing** property is a Boolean value designating whether the component supports more than one size. This is set to **True** for reducers.

Property Break Filter

The **PropertyBreakFilter** property contains the name of a filter that specifies the list of properties to be broken by this component.

Responsibility Category

The responsibility category holds properties that the user can use to store design responsibility, construction responsibility, etc. These properties are also found in the property grid while working in SmartPlant P&ID. A variety of responsibility properties may be found on any plant item.

Status Category

The status category holds properties that the user can use to store information about the condition or stage of a particular item. These include construction status, hold data, and design responsibility, construction responsibility, etc. These properties are also found in the property grid while working in SmartPlant P&ID. A variety of status properties may be found on any plant item.

Symbol Category

The symbol category holds properties used to specify the behavior of a symbol while working in SmartPlant P&ID. Most, if not all, of these properties are not visible while working in SmartPlant P&ID.

Below, you will find a list of properties that may be visible when creating a new symbol but are not available when working in SmartPlant P&ID. Not all of these properties may be available for all types of plant items. Also, not all of these properties should be modified when creating a new symbol. Two lists are given with the modifiable properties and those that should not be modified.

A user in Catalog Manager may modify the following properties for a symbol.

Is Mirrorable

Sets a Boolean. If True, specifies that the item can be mirrored.

Is Rotatable

Sets a Boolean. If True, specifies that the item can be rotated.

Is Scalable

Sets a Boolean. If True, specified that the item can be scaled.

The following properties are used by the software while working in SmartPlant P&ID. A brief definition is given for the properties. However, a user in Catalog Manager should not modify these.

File Last Modified Time

File Name

The **FileName** property sets or returns a String containing the full path to the file from which the item is derived.

Is Mirrored

The **IsMirrored** property sets or returns a Boolean. If the value is True, this specifies that the item is mirrored.

Param Bottom

The **ParamBottom** property sets or returns a value specifying the bottom parameter of the parametric symbol.

Param Left

The **ParamLeft** property sets or returns a value specifying the left parameter of the parametric symbol.

Param Top

The **ParamTop** property sets or returns a value specifying the top parameter of the parametric symbol.

Param Right

The **ParamRight** property sets or returns a value specifying the right parameter of the parametric symbol.

RAD Layer

The **RADLayer** property sets or returns a String identifying the layer the item is placed on within the environment of the development platform.

Rep Class

The **RepresentationClass** property sets or returns the class of the LMRepresentation object.

Rep Type

The **RepresentationType** property sets or returns an enumerated type indicating the type of LMRepresentation object. Some examples are: Connector, Label Persist, Symbol, and Bounded Shape.

Rotation angle

The **RotationAngle** property sets or returns a value specifying the symbol's rotation angle.

Scale factor

The **ScaleFactor** sets or returns a value specifying the scaling factor for a symbol.

Style

The **Style** property sets or returns a String specifying the style (which includes color, weight, and pattern) of the indicated graphic item.

X Coordinate

Indicates the **X coordinate** of the symbol origin for a particular instance of the symbol placed on the drawing.

Y Coordinate

Indicates the **Y coordinate** of the symbol origin for a particular instance of the symbol placed on the drawing.

Symbol Guidelines

Equipment

The graphical representation of a piece of equipment can often be described as consisting of outer graphics (which define the perimeter shape) and inner graphics (which are contained within the perimeter shape). The outer graphics should be drawn "in front" of the inner graphics. The Bring To Front command can be used for this purpose. The front most graphics are located first. With the outer graphics in front, nozzle placement works much better.

Piping Components

These are valves and fittings of various kinds. They typically have one or more Piping connect points. The location of the origin depends on the number of connect points is as follows:

- One Connect Point – An end of line terminator may have a single connect point. The origin must be at the same location as the connect point.

- Two Collinear Connect Points - A normal two-way gate valve has two collinear connect points. The origin must be midway between the two connect points.

- Two Non-Collinear Connect Points - A two-way angle valve is a good example of this. The origin must be at the intersection of the two connect point axes.

- More than Two Connect Points - The connect point axes should all intersect at a point. The origin must be at the intersection point. If there are additional connect points, whose axes do not intersect at that point, they will be ignored for placement purposes. However, you can still connect pipes to these points after it is placed.

Flow Oriented Components

This is a special category of piping components where the component has an inherent flow direction. The graphics within the symbol usually includes an arrow to indicate the flow direction. A check valve is a prime example of a flow-oriented component. Flow direction consistency checking is handled differently for this type of component.

- Must be drawn with the "natural" flow direction from left to right along a horizontal line.

- The **Flow Direction** property is set in the Catalog Manager. "**End 1 Is Upstream**" means the flow follows the natural direction. "**End 1 Is Downstream**" means the flow is reversed from the natural direction.

- The downstream (or outlet) connect point must be oriented along the positive x-axis. An ordinary check valve should be drawn with the natural flow direction from left to right along a horizontal line. An angle check valve should be drawn with the outlet oriented along the positive x-axis.

Reducers

Piping components that are used to change the nominal diameter of a pipe are referred to as reducers. Reducers have some special behavior when they are placed and modified. To get that special behavior, there are some special requirements placed on the reducer.

- The IsReducing property must be set to "True" in the Catalog Manager.

- The symbol must be drawn with the primary axis as a horizontal line. The large end of the reducer should be on the left and the small end on the right.

The reducer should have a connect point at each end. Connect point 1 must be on the left (at the large end). Connect point 2 must be on the right (at the small end).

Inline Instruments

The requirements for inline instruments (such as control valves) are the same as for piping components. Piping connect points are used to allow the inline instruments to be placed into pipes. For an inline instrument that can accept an actuator, you should place an auxiliary connect point at the location where the actuator will be attached.

Offline Instruments

Offline instruments are usually created with eight Signal connect points (one every 45 degrees) around the perimeter of the instrument. This type of instrument usually contains Smart Text that defines an embedded label.

Off Page Connectors

Each OPC should abide by the following rules:

- Each OPC should have two Auxiliary connect points - one at each end.

- The origin of the symbol must be midway between the two connect points.

An OPC normally contains one or more Smart Text boxes that define an embedded label. The OPC may be mirrored and/or rotated at placement time. In order to make the text readable, the Smart Label rotates each textbox about its own center point. To ensure that the textbox remains positioned correctly during this process, the textbox properties should be set so that the center of the textbox remains fixed regardless of how much text it contains. There are two ways to accomplish this:

- Set the alignment and justification to Center/Center.

- Set the width and height to Exactly.

Scalable symbols

Any symbol may be made scaleable by setting the Is Scalable property to true. By default, all delivered reference data symbols have the property set to False.

When in SPPID, you can use scale handles on a symbol to resize it. Four black scale handles are displayed on the corners of the range box of a symbol. Drag any of the four handles up or down.

Parametric Symbols

Parametric symbols contain geometry constrained together using relationships, with driving dimensions that are defined as adjustable parameters.

When in SPPID, yellow boxes in the middle of the range box lines represent standard parametric handles. You can drag a parametric handle to resize part of the symbol.

You can modify different parts of some symbols with parametric handles. Standard parameter handles represent up to four driving dimensions that have been applied to the graphics in a symbol. The four standard positions where parameter handles can appear are top center, bottom center, left center, and right center of a symbol's range box. Dragging a parameter handle changes the value of the dimension by the length readout precision set on the Units tab of the Properties dialog box when the symbol is created.

Create a Symbol w/ New Item Command (Catalog Explorer)

1. In the **Catalog Explorer**

   a. Select **File** > **New Item**

      OR

      Select **New Item** from the shortcut menu.

2. Rename the New Item symbol.

   a. Right-click on the **New Item** in the list.

   b. Select **Rename**.

3. Open the symbol for editing.

    a. Select the symbol in the **Catalog Explorer**

        i. Select **Open** on the shortcut menu.
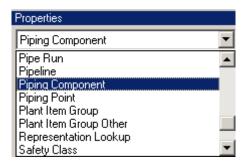
OR

Double click the symbol in the **Catalog Explorer**

OR

Drag the symbol into the **Catalog Manager View Window**

4. Assign an **Item Type** by choosing a selection in the list box at the top of the **Properties Window**.

5. From the Property Window, set values for the following properties

    a. **Type** (in this example the property is **Piping Comp Type**)

    b. **Class** (in this example the property is **Piping Comp Class**)

    c. **SubClass** (in this example the property is **Piping Comp Subclass**)

    d. AABBCC Code (only required if transferring to PDS 3D or migrating from SmartSketch into SPPID) (see on-line help for appropriate code)

6. Draw the new symbol.

    a. On the **Graphics** tab define the items, which the user will see, when the symbol is placed on the P&ID

        i. Lines
       ii. Connect Points

        iii. Origin

   b. On the **Heat Tracing** tab define the location of the Heat Tracing Graphics.

        i. Use the Ctrl key to select both the Graphics and Heat Tracing tab; the Heat Tracing tab should be active (**bold**) when defining the location of the Heat Tracing Graphics.
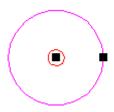
   c. If applicable, on the **Label** tab define the properties for the symbol.

        i. If this were a symbol with embedded labels, such as an Off-Line Instrument then you would have to define the properties on the label tab.

        ii. If this were a symbol, which is a label, such as a Line Number Label, then you would have to define the properties on the label tab.

        iii. Utilize the SmartText Editor dialog box to define the properties.

   d. If applicable, on the **HiddenObjects** tab define the properties.

        i. For examples see the **Attribute Break** or the **Slope** symbols.

   e. On the **Icon** tab define the graphics for the icon as it appears in the Catalog Explorer.

        i. If the **Icon** tab was empty prior to drawing items on the **Graphics** tab, then whatever is drawn on the **Graphics** tab will copy down to the **Icon** tab.

   f. Select **File** > **Save** As, and save the new symbol to a symbol file.

Create a Symbol w/ Create Symbol Command (Draw Toolbar)
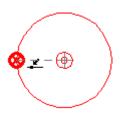
1. From the Catalog Explorer open an existing symbol, in this example you will select a Pump to open.

   a. Select the symbol

   b. Right mouse click

   c. Select **Open**
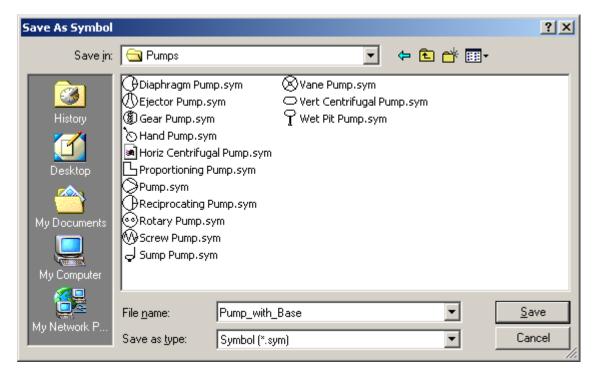
2. From the **Catalog Manager View Window** select the items to create a symbol of.

3. Select the **Create Symbol** command from the **Draw** toolbar.

   a. Click to define the symbol origin
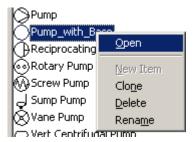
4. Save the symbol

   a. Set the **Save In** location

      1. **Pump**

   b. Enter a **FileName**

      1. **Pump_with_Base**

   c. Select **Save**

5. Close the symbol, which is open.

    a. Select **File** > **Close**

    b. Do you want to save changes to Horiz Centrifugal Pump.sym?

        1. Select **No**

6. Open the symbol previously created with the **Create Symbol** command.

    a. Draw the base on the pump and save the symbol.

Working with Labels: An Overview

As you work on a P&ID, labeling is an important step in producing the drawing. This text and graphical information completes the drawing and constitutes its intelligence to the reviewer.

SmartPlant P&ID labels may include graphics as well as text. A label is also a document with a .sym extension. You can create a label by selecting **New Item** on the **Catalog Explorer File** menu.

When you work with labels, you may use several tabs in **Catalog Manager** to define various parts of the label. Most commonly, you will use **Graphics**, **Label**, **Hidden Objects**, and **Icon**. You may not use all of these tabs for all labels, depending upon the intended purpose of the label. To view two tabs at once, hold down the **Ctrl** key and select the second tab to be displayed. The tab name that appears in bold text is the tab you can modify.

The textual part of a label may be a combination of user-defined text and attribute data from the database and is defined using the **Smart Text Editor** in Catalog Manager. Therefore, labels are a true reflection of information in the database. To allow you to maintain this data, you can also add and modify information as you place labels in a P&ID.

Visible and Hidden Labels

You can also divide labels in SmartPlant P&ID into two other categories: visible labels and hidden labels. A visible label is one that is visually represented in a P&ID. An example of a visible label is a line number label. A visible label is defined on the **Label** layer in Catalog Manager. The majority of labels in SmartPlant P&ID are visible.

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On the other hand, you cannot see hidden labels in a P&ID unless you drag the cursor over the label. Hidden labels can be used to define specific properties for items when you place the label in the P&ID. For example, the slope label is a driving label that sets the Slope and Slope Direction of a piping segment. The slope label has graphics and text, the Slope is a visible property and Slope Direction is a hidden property. A hidden property is defined by deselecting the **Visible** checkbox on the SmartText Editor properties dialog. This will place the property label textbox on the **Hidden Objects** layer in Catalog Manager and set the slope direction property of the line to a predefined value when you place the label.
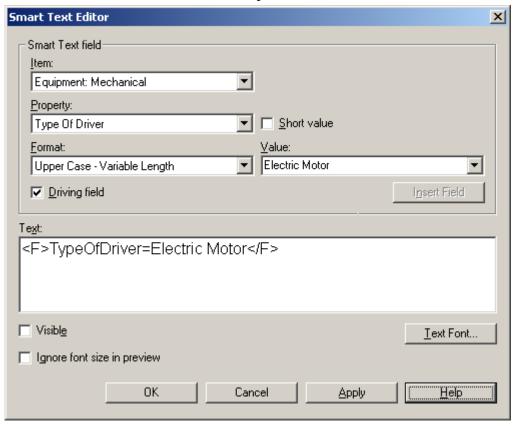
Driving and Driven Labels

Every label in SmartPlant P&ID is either a driving label or a driven label. A driving label is a label that specifically defines the properties of a symbol. For example, if you associate an electric driver motor label with a pump symbol and the motor label is a driving label, the pump becomes an electric driven pump.
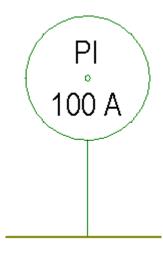
Driven labels are simply labels that display information about the object with which they are associated. For example, placing a nominal diameter label on a gate valve displays the size of the valve, but does not change any properties of the valve. The majority of the labels in SmartPlant P&ID are defined as driven labels.

To define whether a label is driving or driven, select the Driving Field option in the Smart Text Editor. You can clear this option to create a driven label.

Embedded Labels

Embedded labels are labels that use a combination of information defined on the **Graphics** layer, the **Label** layer, and perhaps the **Hidden Objects** layer. Symbols that contain embedded labels have both graphics and labels defined for them before they are placed in a P&ID. When you place a symbol with an embedded label, the label updates automatically. For example, the off-line instruments with implied components (Analyze, Flow, Level, Pressure) are made up of both graphics and embedded labels.
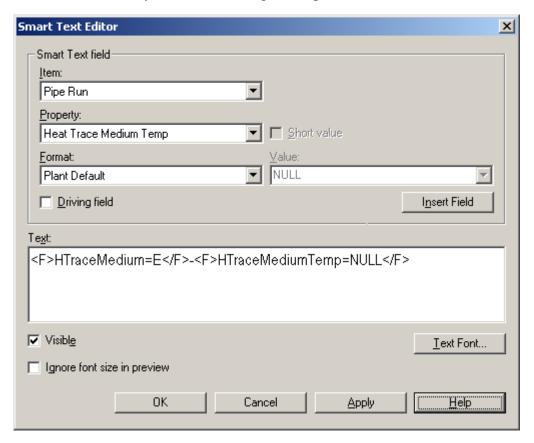
SmartText Editor

The **SmartText Editor** allows you to create intelligent labels. Clicking on the SmartText Editor command on the Catalog Tools toolbar will access it.

Smart Text Field

- **Item** - Select the type of item you want to label from the list.

- **Property** - Select the property you want to add to the label from the list.

- **Short value** - Check this option to display the short value defined in Data Dictionary Manager. Only select-listed properties can be displayed in their short value form. In a few cases, the short value is longer than the regular value.

- **Format** - Selects the format you want to apply to the Property from the list.

  o **Plant Default** will be reading the **Options Manager** > **Formats** value for the property selected.

o The other formats listed are reading the entries from **Format Manager** for the property selected.

- **Value** - Type the value you want to associate with the Property. This field is available only when the Driving field option is checked.

- **Driving field** - Check this option if you want the label to be a driving label, which means the specified value will overwrite the existing value for the object to which the label is attached in the drawing. Examples of driving labels include slope direction and mechanical driving labels. If you do not check this field, the label becomes a driven label, which allows users to specify the value when they place the label on a drawing. Examples of driven labels include line number labels, equipment name, and so forth.

- **Insert field** - Click to add the Smart Text field to the label.

Text Field

- **Text** - Displays the Smart Text label as you create it. An <F> tag comes before each property definition, and a </F> tag ends each property definition. Click Apply to see your latest changes. You can insert "dumb" text, such as a – or ' ' (space) between the <F> tag and </F> tags.
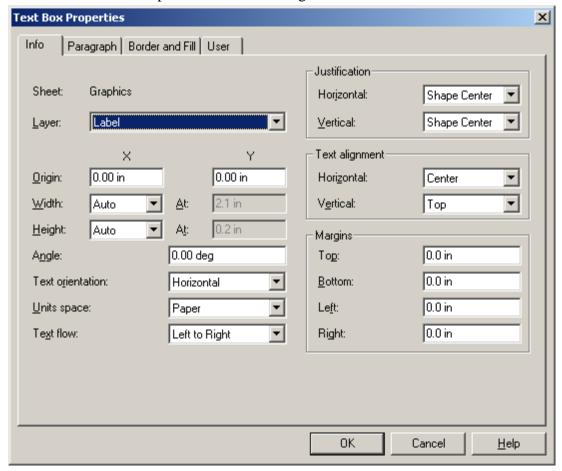
Visible - Check this option to display the field in the drawing when you place the label. If you do not check this option, you cannot see this label value when it is placed on a drawing. These hidden values are located on the Hidden Objects layer.

Ignore font size in preview - Displays the entered text, in the **Text** pane, in a font size that can be easily read without altering the font size set in the **Font Properties** dialog box. Use this feature when using very large or small font sizes.

Text Font - Displays the Font dialog box, allowing you to change the font of the selected text. Changing the Text Font will affect the size of the Text when the label is placed in SPPID.

Text Box Properties Dialog Box

The Text Box Properties dialog box formats the font, paragraph, borders, or shading of a text box. Choose options on the following tabs:
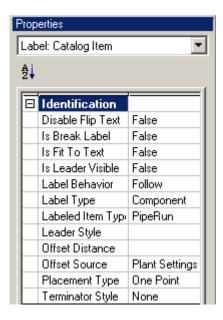
- **Info** Tab

- **Paragraph** Tab

- **Border and Fill** Tab

- **User** Tab

To define graphical properties on the label, right-click on the label and select Properties. The Text Box Properties dialog box allows you to set the width, orientation, justification, alignment, text color, font, font size, and colors for the label.

Label Properties and Guidelines

A label is defined in the catalog by a symbol definition. At placement time the symbol is converted into a Smart Label. A label symbol usually contains one or more Smart Text objects and may also contain other graphical elements. The property values assigned to the symbol define what type of label it will be and how it will behave.

Disable Flip Text

This property disables the flip text behavior of the smartlabel when set to true. The text box within the label flips when it is rotated more than 90 degrees or less than or equal 270 degrees. This is done so that the text can be read bottom to top. When the Disable Flip Text is set, it disables that behavior.

Is Break Label

This property determines whether the label will be an attribute break label. An attribute break label is a special type of label that is used to suppress an inconsistency indicator at the end point of a piping segment. Smart Text fields within the label define the properties for which the inconsistencies are to be suppressed. If you do not want the text to be visible, you can make it hidden text.

Is Fit To Text

If this property is set to true, the graphics around the textbox will resize as the dynamic textbox size grows.

Is Leader Visible

Set this to **True** if you want the label to be placed with a leader line. For special cases, you can always turn the leader line on or off using the shortcut menu on the label when in SPPID.

Label Behavior

Defines if and how the label moves when the labeled item is moved. **Fixed** means that the label does not move, **Follow** means that the label is transformed exactly the same as the labeled item and **Follow (no rotate)** means that the label is moved, but not rotated.

Label Type

(Required) Every label must have this property set. Available label types include **Component**, **Title Block**, **Flow Arrow**, and **Attribute Break** (also referred to as Segment Break labels).

Labeled Item Type

(Required) Every label must have this property set. To set it for new labels, you will use the **Set Item Type** command on the **Catalog Tools** toolbar. The software uses this to determine which set of database properties to make available for use with the label.

When you click the **Set Item Type** command, you will see the following dialog:

The following is the list of item types available:

- Drawing
- Equipment
- Equipment: Mechanical
- Equipment: Vessel
- Equipment: Other
- Equipment: Heat Transfer
- Equipment: Component
- Inline Component
- Instrument
- Model Item
- Nozzle
- OPC
- Pipe Run
- Piping Component
- Plant Item
- Signal Run

Leader Style

Enter the name of the line style to be used for the leader line. This line style must be an existing style in the plant style file, **ProjectStyles.spp**.

Offset Distance

You can define the distance by which the label should be offset from the labeled item. This is only used with **One Point** placement and when **Offset Source** is set to **Local**.

Offset Source

This property works with the **Offset Distance**. You can set this property to define if an offset is to be used for **One Point** placement, and if so, where the offset should come from. The possible values are: **None** (no offset), **Local** (use the offset distance defined for this label), and **Plant Settings** (use the offset distance defined in **Options Manager** > **Distances** > **Label Offset Distance**).

Placement Type

You must select either **One Point** or **Two Point** placement.

If you select **One Point**, the placement command automatically positions the label at an offset from the given point (Typically used for line labels.).

If you select Two Point, the placement command allows you to reposition the label after identifying the item to be labeled with the first click.

Terminator Style

You can select the type of terminator to be used on the end of the leader line. The choices are: **None**, **Solid Arrow**, **Solid Dot**, **Arrow**, **Ellipse** and **Use Default**. If you select **Use Default**, the terminator defined in **Options Manager** > **Settings > Terminator Style** will be used.

Special Case Guidelines

Title Block Labels

A special type of label used to display properties of the drawing itself. Use the following recommended property values for title block labels.

Property	Value
Label Type	Title Block
Labeled Item Type	Drawing
Placement Type	One Point
Label Behavior	Fixed

Defining a Title Block

You can customize any symbol as a title block by adding graphical elements of the desired dimensions according to the sheet size. To add labels to the title block for displaying various types of title block information such as plant data, revision data, date and time stamps, and display set data. A set of XML macros are available that display data entered in the tool itself or retrieved from SmartPlant Foundation.

Title Block Field Command (Insert Menu)

The **Title Block Field** command, from the **Insert** menu, opens the **Place Label Ribbon**, which allows you to insert dynamic title block labels into your document. These labels use XML code and provide a means of retrieving updatable data such as revision numbers.

Place Label Ribbon

Utilize the Place Label Ribbon to set options for displaying specific title block fields, as labels, on a specific symbol.

Label Set - Lists available label sets, select from this list the label set you require.

Field - Lists all fields for selected label set, select from this list the field you want displayed on your symbol drawing. For details of label sets and fields used with SmartPlant P&ID, see Place Label Ribbon - Options for SmartPlant P&ID.

Function, Operator, and Range of Values - These fields are only available when the **SPPID Revision** label set is selected, or when certain specific fields are selected from the **Issue** label set.

Function	Operator	Range of values	Description
Index	=	1 or higher	The index value represents the actual position of the revision in the list. The first revision created always has the lowest index (1), therefore as you add more revisions, the same index number displays the properties of progressively newer revisions.
First	+	0 or higher	The function specifies the position of the revision relative to the first (oldest) revision, for example, 'First + 2' means two revisions later than the first revision, that is, the third revision in the current order. If you delete a revision, the indexes of all later revisions to which the property applies change accordingly.
Last	-	0 or higher	The function specifies the position of the revision relative to the last (newest) revision, for example, 'Last - 1' means the revision immediately before the last revision. If you add a revision, the indexes of all the other revisions to which the property applies change accordingly; if you delete a revision, the indexes of all earlier revisions change.

Alternative Text Value - Type a text string that will appear if the software is unable to retrieve a value for the selected property.

Display Label Names 🔳 - Click to toggle the display between the macro source name and the label name.

More 🔳 - Click to display the **Text Box** ribbon, for more options used for formatting the label.

| Normal | ▼ | Arial | ▼ | 0.1 in | ▼ | | **B** | *I* | <u>U</u> | ≡ | Ⓐ | 1.0 in | | 0.2 in | |

Place Label Ribbon - Options for SmartPlant P&ID

Many of the label sets and fields that are available on the **Place Label** ribbon are used by the common title blocks for SmartPlant Enterprise products other than SmartPlant P&ID, for example, SmartPlant 3D and SmartPlant Foundation. This topic describes a number of labels that relate specifically to SmartPlant P&ID or are otherwise particularly useful.

The following label sets are used for displaying SmartPlant P&ID properties:

- **SPPID Drawing** — Displays properties from the Drawing table of the SmartPlant P&ID Data Dictionary, including any custom properties added by

the user to the Drawing table. The following list shows some examples of fields that appear in the Drawing table.

Field	Description
Revision	Drawing title block revision.
Version	Drawing title block version.
Name	Drawing name.
Description	Drawing description.
Title	Drawing title.
DateCreated	Drawing creation date.
DrawingNumber	Drawing number.
Template	Template used by the drawing.

- **SPPID Revision** — Displays properties from the Revision table of the SmartPlant P&ID Data Dictionary, including any custom properties added by the user to the Revision table. When adding revision properties, you need to select A function.

- **SPPID General** — Allows you to select the **DisplaySet** field, which reads the active display set. You can fill the display set value at print time. Note that you cannot add custom values to the **SPPID General** category.

- **Date and Time Stamp** — You can create a label that displays the current date or time. To do so, you select the **<default>** label set and then choose the **Current Time** or **Current Date** field.

  Notes:

    - Date and time displays use the current Windows format.

    - Some label sets are only relevant when you are working in an integrated environment, such as **Signature Area** and **Issue**. The field values for these label sets are only displayed in SmartPlant Foundation after publishing the drawings.

Editing XML Data of Title Block Label

The **Place Label** ribbon is used to create labels for symbols using properties and values taken from the title block label sets. The **Place Label** ribbon only supports downward growth of the title block labels, it is however possible to edit the .xml data of the label in the Catalog Manager SmartText Editor to achieve upward growth of the title block labels.

For example, a label with four rows of information to be displayed would look like this;

<?xml version="1.0"?><body><intstgxml stream="Revision" select="/Revision/RevisionRecord[last()-0]/MajorRev_ForRevise" alt=""/></body> <?xml version="1.0"?><body><intstgxml stream="Revision" select="/Revision/RevisionRecord[last()-1]/MajorRev_ForRevise" alt=""/></body> <?xml version="1.0"?><body><intstgxml stream="Revision" select="/Revision/RevisionRecord[last()-2]/MajorRev_ForRevise" alt=""/></body> <?xml version="1.0"?><body><intstgxml stream="Revision" select="/Revision/RevisionRecord[last()-3]/MajorRev_ForRevise" alt=""/></body>

To alter the label to achieve upward growth instead of downward growth the .xml data Last()-0, Last()-1, Last ()-2, and Last()-3 must be replaced with the .xml data:

[((last() > 4) and position() = (last() - 0)) or ((last() <=4) and position() = 4)]
[((last() > 4) and position() = (last() - 1)) or ((last() <=4) and position() = 3)]
[((last() > 4) and position() = (last() - 2)) or ((last() <=4) and position() = 2)]
[((last() > 4) and position() = (last() - 3)) or ((last() <=4) and position() = 1)]

Remembering that the "<" and ">" are special syntax symbols used by XML and should be replaced with the text "<" and > the new labels would look like this:

<?xml version="1.0"?><body><intstgxml stream="Revision" select="/Revision/RevisionRecord[((last() > 4) and position() = (last() - 0)) or ((last() < =4) and position() = 4)]/MajorRev_ForRevise" alt=""/></body>

<?xml version="1.0"?><body><intstgxml stream="Revision" select="/Revision/RevisionRecord[((last() > 4) and position() = (last() - 1)) or ((last() < =4) and position() = 3)]/MajorRev_ForRevise" alt=""/></body>

<?xml version="1.0"?><body><intstgxml stream="Revision" select="/Revision/RevisionRecord[((last() > 4) and position() = (last() - 2)) or ((last() < =4) and position() = 2)]/MajorRev_ForRevise" alt=""/></body>

<?xml version="1.0"?><body><intstgxml stream="Revision" select="/Revision/RevisionRecord[((last() > 4) and position() = (last() - 3)) or ((last() < =4) and position() = 1)]/MajorRev_ForRevise" alt=""/></body>

Flow Arrows

A special type of label used to indicate the flow direction in a pipe. The flow arrow symbol must be built so that it is pointing along the positive x-axis and the origin must be at the tip of the arrow. Placing Smart Text in a flow arrow label is not necessary. Use the following recommended property values for flow arrow labels.

Property	Value
Label Type	Flow Arrow
Labeled Item Type	Pipe Run
Placement Type	One Point
Label Behavior	Follow

Segment Breaks

The consistency criteria specified in the rules define the general behavior of the properties. Break labels provide a way to define exceptions to the general rules. A break label provides a visible and plottable symbol that signifies the end of one property value condition and the beginning of a new condition along a pipe. A changed property value is never propagated across a break label for that property. A break label also suppresses consistency checking for the property it breaks.

A break label can be created for any property or collection of properties of a pipe run. A break label is created in the Catalog Manager just like any other label, except that the Label Type property is set to **Attribute Break**. A SmartText field must be created for each property that is to be broken. In many cases the graphical shape of the label indicates which properties are broken. In these cases the Visible flag on the SmartText is set to False so that the text is not visible. It is also normal to turn the leader line on within the Catalog Manager so that it is automatically displayed at placement time. All of the symbols under Piping\Segment Breaks in the delivered catalog are break labels.

A break label can only be placed at the endpoint of a graphical pipe line where it connects to a component or a branch point. Furthermore, a break label can only be placed at a point where the specified properties are listed in the consistency criteria for the applicable rules. The break label stays attached to the point it was placed on and cannot be dragged away from it.

Property	Value
Label Type	Attribute Break
Labeled Item Type	Pipe Run
Placement Type	Two Point
Label Behavior	Follow (no rotate)

When creating a label with hidden text, scale the text box down and/or move it to a position so that it does not affect the range of the label. Some label placement modes make use of the label range and will produce unexpected results if the range is inflated by the hidden text.

Line Labels

This common type of label used for labeling pipes consists of a single Smart Text object. When the placement command sees this type of label, it does some special work to place the text box at the desired offset from the line. To accomplished this, set the vertical justification property on the text box at placement time. To get a good dynamic display during placement, we recommend that you set the Vertical Justification property on the text box to Center.

Working with Parametric Symbols

SmartPlant P&ID parametric symbols function just as other symbols with the exception that they allow the user to resize the symbol using handles. The user can resize the symbol differently depending upon the handle selected. For a scaled symbol, the user may only resize it uniformly.

Like other symbols, parametric symbols include a drawing of the item as well as the heat tracing, labels, properties associated with that item, and the icon that represents the item in the Catalog Explorer. A parametric symbol is a document with a .sym extension.

You can begin the creation of a parametric symbol by selecting New Item on the Catalog Explorer File menu. As with other symbols, you must define everything from the database properties such as item type (Equipment, Piping, Piping Component, and so forth) to the graphic and pre-defined properties for the symbol. The predefined attributes and the graphic are stored in the .sym file. In addition, a parametric symbol will require the use of relationships, dimensions, and variables to provide the handles used for resizing.

Using Relationships as You Draw: An Overview

You can use relationships to capture and remember your design intent as you draw. Make your drawings associative by applying those relationships, or sketch designs that do not use relationships.

How Relationships Affect a Drawing
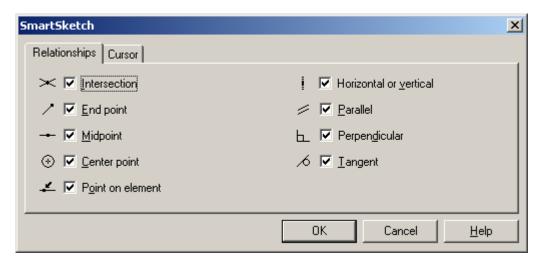
You can move and change an element that does not use relationships in various ways without affecting other parts of the design. For example, when no relationships exist between two lines, you can move and change each line without affecting the other.

When you modify a part of a drawing that has a relationship to another part of the drawing, the other part updates automatically. For example, if you apply a perpendicular relationship between two lines and move one line, the other line moves with it. The software remembers the relationship between these two elements and always maintains the perpendicular relationship between the lines. You can manipulate either of the two lines and the software will move or modify the line automatically to maintain the relationship.

Applying and maintaining relationships in the design simplifies changes to the design later. In the following drawing, all the relationships were automatically established as the design took shape on the drawing sheet. If you want to change the design, you simply modify one segment of it and all the relationships are maintained.

Applying and Maintaining Relationships

You can place elements that are related to each other as you draw. First, you need to select or clear the relationships that are recognized by the software as you draw. On the **Relationships** tab from the **Tools** > **SmartSketch** command is where you select or clear the relationships.
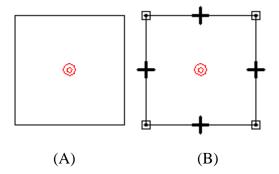
Second, you must set **Maintain Relationships** on the **Tools** menu. Then, as you click commands on the **Draw** toolbar and place lines, arcs, and circles, you should watch the relationship indicators that appear by the pointer. When a relationship indicator appears by the pointer, click to apply that relationship to the element you are drawing.

Visualizing Maintained Relationships

When you apply relationships, relationship handles appear on the related elements. The handles are symbols that show how elements are related. You can display or hide the relationship handles in your drawings by setting or clearing **Relationship Handles** on the **Tools** menu.

For example, the following four lines appear with relationship handles (A) turned off and with relationship handles (B) displayed.

(A)   (B)

Applying Relationships to Change Existing Elements: An Overview

You can apply relationships as you draw and place elements by using the relationship indicators that appear by the pointer. You can also apply relationships to elements that you have already placed on the drawing sheet.

Applying Relationships to Existing Elements

To apply relationships to elements you have already placed on the drawing sheet, click a button on the **Change** toolbar and then select the elements you want to relate. When you apply a relationship between elements, the elements are modified to reflect the relationship. If **Maintain Relationships** is set when you use the commands on the **Change** toolbar to add relationships to your drawing, the added relationships will be maintained.

For example, selecting **Equal** and clicking two circles makes the two circles equal in size.

If a line and arc are not tangent, applying a tangent relationship modifies one or both elements to make them tangent.

When you use commands on the **Change** toolbar, the software allows you to select only elements that are valid input for that command. For example, when you use **Concentric**, the command allows you to select only circles, arcs, and ellipses.

Perhaps you begin designing with a few key design parameters. You would usually draw known elements in relation to one another and then draw additional elements to fill in the blanks.

As you draw and add elements to the drawing, the relationships are maintained and additional relationships are applied.

Modifying Elements That Share Relationships

If two elements share a relationship, the relationship is maintained when you modify either one of the elements. For example, if you move a circle that has a tangent relationship with a line, the line also moves. The elements remain tangent.

If you move a circle that does not have a tangent relationship with a line, the line does not move.

Other elements that share relationships maintain them in the following ways:

- If a line and an arc share a **tangent relationship**, they remain tangent when either is modified.

- If a line and arc share a **connect relationship**, they remain connected when either is modified.

- If two lines are horizontal, they remain horizontal even if you change the position and length of one of the lines.

Deleting Relationships

You can delete a relationship as you would delete any other element. Select a **relationship handle**, and then click **Delete** ✕. Relationships are automatically deleted when their deletion is necessary to allow a modification to occur. For example, if you rotate an element that has a horizontal relationship applied to it, the relationship is automatically deleted.

If you want to change an element by adding or removing a relationship, and the element does not change the way you expect, it may be controlled by a driving dimension. Toggle the dimension from driving to driven, and then make the change.

Dimensioning Drawing Elements: An Overview

Dimensions supply information about the size, location, and orientation of elements, such as the length of a line, the distance between points, or the angle of a line. Dimensions are associative to the elements they refer to, so you can make design changes easily. Dimensions will be utilized when you create a parametric symbol. Variables will be created based upon these dimensions and will then control the sizing of the symbol as the user moves the handles. Dimensions should be placed on the dimension layer.

🖉 **Notes:**

- Do not create dimension off of origin symbol. The reason is, we delete the origin symbol during file save, and any dimensions created with respect to the origin symbol will be deleted as well.

- Move the origin symbol temporarily to the place where you are not going to be creating dimensions.

- After creating all the necessary dimensions for parametric, move back the origin symbol where it is appropriate.

You can use the commands on the **Labels** toolbar to place dimensions.

Dimension commands on the **Labels** toolbar have a ribbon that sets options for placing the dimension. When you select a dimension in the drawing, the same ribbon options appear. Use the options to change the selected dimension.

Placing Dimensions

To dimension elements, click a dimension command on the **Labels** toolbar, such as **Distance Between**, and then select the elements you want to dimension.

As you place dimensions, the software shows a temporary, dynamic display of the dimension you are placing. This temporary display shows what the new dimension will look like if you click at the current pointer position. The dimension orientation changes depending on where you move the pointer.

Using Dimensions to Drive Elements

You can place a dimension that controls the size or location of the element to which it refers. This type of dimension is known as a driving dimension. If you use the ribbon to change the dimensional value of a driving dimension, the element updates.

Dimensions that are not driving dimensions are called driven dimensions. The value of a driven dimension is controlled by the element it refers to. If the element changes, the dimensional value updates.

Because both driving and driven dimensions are associative to the element they refer to, you can change the design more easily without having to delete and re-apply elements or dimensions when you update the design.

If you want to create a driving dimension, you must first set **Maintain Relationships** on the **Tools** menu. When you are placing dimensions, an option on the ribbon allows you to specify whether a dimension is driving or driven. A driving dimension and a driven dimension are distinguished by color. There are different colors for driving dimensions and driven dimensions in a dimension style.

Using the Variable Table: An Overview

You can use the **Variable Table** to define and edit functional relationships between the dimensions of a design in a familiar spreadsheet format. The **Variable Table** is accessed with **Variables** on the **Tools** menu. The software uses two types of variables: dimensions displayed in the design and variables you create directly in the **Variable Table**. Dimension variables directly control elements of a design. A user variable must be set equal to a value or mathematical expression; for example, PI = 3.14159.

You can use variables to do the following:

- Drive a dimension with another dimension; Dimension A = Dimension B

- Define a constant; pi=3.14

- Drive a dimension with a formula; Dimension A = pi * 3.5

- Drive a dimension with a formula and another dimension; Dimension A = pi * Dimension B

- Drive a dimension with a formula that includes a function; Dimension A = Dimension B + cos(Dimension C)

- Drive a dimension with a value from a spreadsheet, such as a Microsoft Excel document, by copying the value from the spreadsheet into the **Variable Table**. Besides Excel, you can use any other spreadsheet software that can link or embed objects.

Define Variables and Parameter Handles for Parametric Symbols

To define parametric handles for parametric symbols, you must first decide which parameter handles you want to control your symbol. You can have, at most, four handles for a parametric symbol; these four handles include **Top**, **Bottom**, **Left**, and **Right**. These handles correspond to a variable and a dimension in your parametric symbol profile.

NOTE: the four handles of **Top**, **Bottom**, **Left**, and **Right** are case senstivite.

Accessing the Variable Table

Once you select **Variables** on the **Tools** menu, a table appears with the following columns: **Type**, **Name**, **Value**, and **Formula**. Each row of the table displays a variable.

Entering Data into the Variable Table

When you open the **Variable Table** in the document, all the dimensional values for the dimensions on the drawing sheet appear in the columns. The software automatically generates the name that appears in the Name column. You can change the name to something more logical if you want.

Restricting the Display of Variables

You can restrict the display of variables in the table using **Filter** on the **Variable Table** window:

- You can display only the variables for dimensions that the software created,
- You can display variables that are associated with elements in the current document or the active window, or
- You can display a set of elements that you have selected in the document.

Creating Expressions

The system provides a set of standard mathematical functions. The functions can be typed in with the proper syntax, or you can use the **Function Wizard** to select and define the function. The **Function Wizard** is convenient when you forget the proper syntax for a math function. Start the **Function Wizard** by clicking **Fx** in the **Variable Table**. The function is written in the **Formula** column of the selected row.

Common faults:
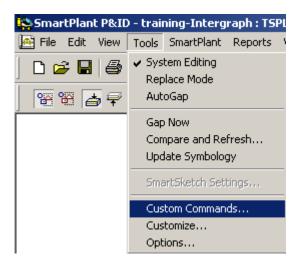
Symptom	Cause	Resolution
Elements in symbol distort on use of parametric function.	Relationship handles incorrect or missing	Use applicable handle where lines join shape elements
No parametric function	Elements not connected	Ensure that each element is connected to the adjoining element(s) e.g.
Parametric function works initially then symbol 'Freezes'	Two or more dimensions / relationship sets conflict when the value reaches a set point	Redesign the dimensions / relationship sets to avoid conflict.

Save a Drawing in a Different Format (.dwg) within SPPID

1. In Microsoft Excel, open **ExportLayer.xls**. The location of this Microsoft Excel workbook is specified in **Options Manager** > **Settings**.

2. Assign **level** or **layer** numbers between **10** and **63** to ensure that graphics appear in the designated levels or layers.

   📝 **Notes:**

   - You can choose more filters for the **Filter** column of this worksheet from filters in Filter Manager.

   - If you save your drawing to the AutoCAD format, you can name layers with any combination of alphanumeric characters.

3. Save **ExportLayer.xls**.

4. In the design software select **Tools** > **Custom Commands**.

5. When the **Custom Commands** dialog box opens, run the **ExportLayer.dll**

   a. This macro is delivered in **~\Program Files\SmartPlant\P&ID Workstation\Program** folder.

   b. When the macro finishes running, a message appears that tells you if all items were assigned layers successfully or if any items lacked the appropriate layer specification. You can edit the Microsoft Excel workbook again if you need to add filters and layers.

   c. Select **OK**

Setting ExportLayer Attribute Status

The ExportLayer attribute was set successfully on all items on the drawing.

OK

6. Select **File > Save As**.

   a. On the **Save As** dialog box, select the **drive** and **folder** for the new drawing.

   b. In the **File Name** box, type a new name for the drawing.

   c. In the **Save As Type** box, select the document format that you want to use.

   d. Select **Save**.
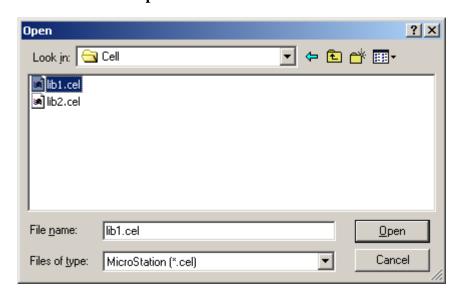
📝 **Notes:**

- Files in the ~\Program Files\SmartPlant\P&ID Workstation\Program folder used by the Save As command

   o For AutoCAD[5]

      ▪ PidAcad.dwg - Seed file used for the translation.

      ▪ PidAcad.ini - Used to map items during the Translation

   o For MicroStation

      ▪ PidMstn.dgn - Seed file used for the translation.

      ▪ PidMstn.ini - Used to map items during the Translation.

---

[5] PidCleanup for AutoCAD (AutoCAD only) – Loaded from the web under Freeware tools and Utilities. This is an unsupported program that was written to help cleanup files translated to AutoCAD. For best results this file should be ran for all files translated from SPPID to AutoCAD

Creating symbols in Catalog Manager from a different format (.cel)[6]
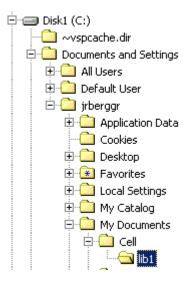
1. Start **Catalog Manager**

2. Open a MicroStation Cell Library

   a. Select **File** > **Open**

   b. **Browse** to the **Cell Library**.

      i. Select the Cell Library

      ii. Select **Open**

3. A sub-folder will be created in the location of the Cell Library.

---
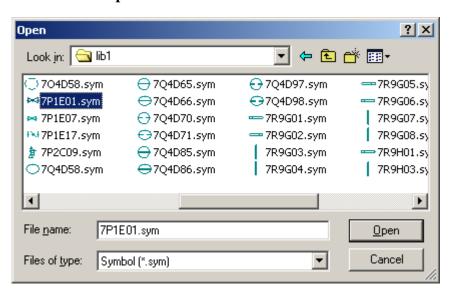
[6] The same steps could be followed for creating an AutoCAD block into a SPPID Symbol.

---

4. Each Cell from the Cell Library will have a symbol (.sym) created in this folder.
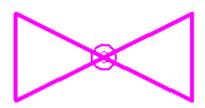
5. Open one of the symbols.

    a. Select **File** > **Open**

    b. Select the symbol

    c. Select **Open**
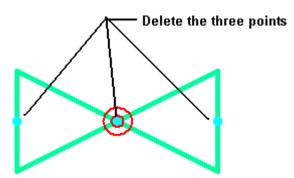
6. If you receive the below message upon opening the symbol see the below steps (a,b,c).

a. Encompass the symbol with a Select Set

b. Select the **Ungroup**[7] 🗇 command.

c. Select **Save**

d. **Delete** ✕ the three points, this symbol originated from the PDS 2D product; which had connect points on the .cel in PDS 2D.

7. Select **Fit** 🔲.

8. **Move** ✛ the symbol onto the sheet.

9. Set the **Item Type** in the **Property Window**

a. In this example it's an **Instrument**.

---

[7] The **Ungroup** command will dissolve the association for all elements which are grouped or nested together.

Properties

Instrument ▼

10. Set the **Instr Class** and **Instr Type** in the **Property Window**.

Expansion Qualifie	
Instr Class	**Control valves and regulators**
Instr Type	**Control valve**
Instr Type Modifie	

11. Ensure the lines are on the **Default** layer.

12. Add the connect points ◄| to the symbol

    a. 2 **Piping Points** Piping Point ▼ , on the ends of the symbol.

        i. Required since the item in placed on a **Pipe Line**

    b. 1 **Auxiliary Point** Auxiliary Point ▼ , at the center of the symbol.

        i. Required for placing a **Actuator**

13. Define the Heat Tracing location on the **Heat Tracing** tab for the symbol, and/or define the Jacketing on the **Jacket** tab.

Graphics / **Heat Trace** / Jacket / Label / HiddenObjects / Icon /

14. View the **Icon** tab and make any changes if required.

Graphics / Heat Trace / Jacket / Label / HiddenObjects / **Icon** /

15. **Exit** Catalog Manager

    a. **Save** the symbol

16. From **Windows Explorer**, move the symbol to the Plants Reference Data. For this example, see the below.

    a. **From**:

        i. C:\Documents and Settings\jrberggr\My Documents\Cell\lib1

    b. **To**:

        i. D:\Training_Site\Custom\P&ID Reference Data\Symbols\Instrumentation\In-Line\Valves\2 Way Common

17. **Open** a drawing.

    a. Place symbol in space.

i. Heat Trace the symbol

b. Place the symbol on a pipe line

Using Filters: An Overview

You can use filters in many ways throughout the software. The stand-alone filter management application is SmartPlant® Filter Manager.

You can apply filters to either drawing views or table views in the design software. For example, you could filter all pumps in a drawing view. After applying the filter, you see all pumps in the drawing as graphical symbols. You can then select all the pumps and edit their properties one-by-one or as a select set in the **Properties** window. That same filter applied to a table view displays a list of pumps and their characteristics in a tabular format, where you can also edit the properties of the pumps.

Filters can help you show different views of the same drawing and can make your workflow more efficient. For example, you can use a filter to display an "operational" drawing, or an "under construction" drawing. You can show all items added after a certain date or after a certain revision number. You can also use filters if you want to delete items of a certain type.

You can filter for certain components in a stockpile, such as instruments or pipes, leaving the remaining items available to place in the drawing or vice versa. For example, when you use filters with a stockpile, you can keep track of specific items that are needed for completing a particular drawing.

You can use filters when you create report templates to display only certain items on a report. You can also use filters in Rule Manager to define how items interact within a view. You can associate filters with the source or target properties in rules, and you can use filters to find and replace items as well.

Filters can also be used to control the display of hierarchy items in Drawing Manager. These filters are not saved to any folder in Filter Manager, but the methods of creating these filters are the same as those for creating filters saved in Filter Manager.

 Notes:

- If you are using a workshare environment and you are at a satellite site, Project Filters should not be created at a satellite site because when you synchronize reference data, you lose that information. However, you can always create My Filters in the Filter Manager environment.

Navigating in Filter Manager: An Overview

When you open Filter Manager, the main window opens. The **Tree** view in the main window shows the organizational structure of the filters. Filters appear either singly or grouped into compound filters. Folders contain all filters and compound filters.

You can create folders and nest folders. Nesting folders occurs when one folder contains another folder, which in turn contains filters and possibly still other folders.

All users working on a specific plant can access plant filters, which are stored in the Plant Folders directory. For instance, Rule Manager uses filters in the plant filters grouping. The My Folders header contains personal filters. These filters appear only when the owner is the current user. You can create new filters and compound filters in the My Folders header.

The Display Filters folder is a good place to organize the filters that you frequently use to control the display of the various views in the design software. It is a good idea to create new filters, copy filters, or add shortcuts to filters in this folder rather than moving original filters from, for instance, the Filters for Rules folder.

You can cut, copy, paste, and rename folders and filters. Double-clicking a filter in the **Tree** view displays the **Filter Properties** dialog box.

Managing Filters: An Overview

Filter Manager allows you to create and manage filters. Filters are used extensively throughout the SmartPlant engineering suite.

Two main types of filters exist in Filter Manager: simple and compound. You can nest one or more simple filters in compound filters to build a more complex collection of items. For example, if you have one filter that shows the secondary piping in the drawing, and another filter that shows the primary piping, you can combine these filters to show all of the piping without the hose. You can even nest compound filters for more complexity.

Filters can apply to an entire plant or to an individual user. Your plant administrator can create, edit, or delete the filters for the entire plant. The individual user can only view, select, and apply plant filters. However, you can create personal filters, saved on your local computer, which you can edit or delete.

Type of Filters
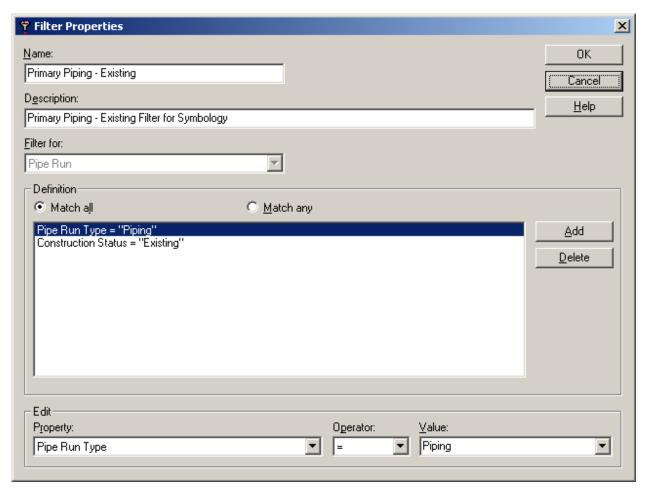
There are two basic types of filters in SmartPlant P&ID: **simple filters** and **compound filters**.

Simple Filters

A simple filter is a filter that only uses one criteria specification (either And or Or). There may be two or more properties defined in the filter, but all are using the same criteria.

Filter Properties Dialog Box

The Filter Properties dialog box specifies properties of a filter, including the name, description, and the other properties for which you want to filter. The dialog box will look different, depending upon whether you have selected a simple filter or compound filter. Each item type owns a set of properties. Examples of item types are Equipment, Instrument, and Pipe Run, and examples of properties for these item types are Equipment Type, Instr.Loop Part Number, and Estimated Length, respectively.

Name - Specifies the filter name. The name can be any combination of characters and has no length limit. Filter names within a plant must be unique. This name appears as the filter name on the Filter Manager interface.

Description - Allows you to specify a phrase or sentence about the filter. The description can be any combination of characters and has no length limit. The description appears as a ToolTip when you point to the filter name on the Filter Manager interface.

Filter for - Contains the top-level items from the data dictionary. This area allows you to specify available properties in the **Definition** grid.

Definition - Displays all defined criteria associated with a filter. To add to or modify the definition list, you must select a line in the list and then define or edit the property in the **Edit** group.

- **Match all** - Specifies that items matching ALL of the filtering criteria pass through the filter.

- **Match any** - Specifies that items matching any one or more of the filtering criteria pass through the filter. **Match any** is the default matching method.

- **Add** - Places a new entry at the end of the existing definition list and enables the options in the **Edit** group so you can edit the new entry.

- **Delete** - Removes the selected criterions from the definition list. This button is available only when you select a criterion in the definition list.

Edit - Allows you to define or edit a single line of filter definition criteria.

- **Property** - Displays a list of all properties for a certain item type. Examples of properties include **Equipment Type**, **Instr.Loop Part Number**, and **Estimated Length**. You define or modify filtering criteria by selecting a property, an operator, and a value.

- **Operator** - Specifies the relationship between the property and the specified value. Relationships include, for example, greater than (>), equal to (=), not equal to (<>), and so forth.

- **Value** - Lists appropriate values for the property specified in the **Property** column. If a list of attributes is not already associated with the **Value** box, you must type a value, which can be free text, or choose null. You can type a percent sign (**%**) as a wildcard character to find multiple characters, or type a question mark (**?**) as a wildcard character for a single character. Do not use an asterisk (*****) in the **Value** box.
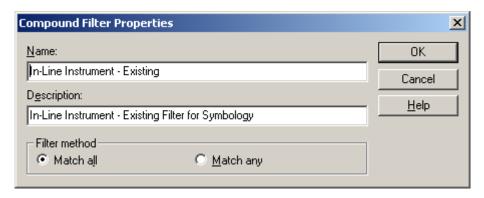
Compound Filters

A compound filter, on the other hand, is a filter that combines **Match All** and **Match Any** criteria (**And** and **Or**). A compound filter is comprised of two or more simple filters.

Compound Filter Properties Dialog Box

The **Compound Filter Properties** dialog box specifies properties of a compound filter, including the name, description, and whether to match all or any of the simple filter criteria. A compound filter consists of more than one simple filter. Simple filters are added to the compound filter either by dragging the simple filter to the compound

filter folder or by creating new simple filters under the compound filter in the filter hierarchy. Compound filters apply only to homogeneous item types.

Name - Specifies the filter name. The name can be any combination of characters and has no length limit. Filter names within a plant must be unique. This name appears as the filter name on the Filter Manager interface.

Description - Specifies a phrase or sentence about the filter. The description can be any combination of characters and has no length limit. The description appears as a ToolTip when you point to the filter name on the Filter Manager interface.

Filter Method - Allows you to decide whether items must meet all or only one criterion to pass through the filter.

- **Match all** - Specifies that items matching ALL of the filtering criteria pass through the filter.

- **Match any** - (Default) Specifies that items matching any one or more of the filtering criteria pass through the filter.

 Notes:

- All of the filters that make up the new compound filter need to be of the same item type, which appears in the **Filter for** list on the **Filter Properties** dialog box. For example, all of the simple filters making up a compound filter can be of type **Equipment: Mechanical**. You cannot mix **Equipment: Mechanical** with **Equipment: Heat Transfer** or any other item type.

- All of the simple filters under one compound filter must be of the same item type. Once one simple filter has been assigned to a compound filter, all simple filters created under that compound filter will have the same value in the **Filter for** field as the first.

Using SmartPlant P&ID Options Manager

SmartPlant® P&ID Options Manager controls the look and feel of the design software and controls much of the data used throughout the life of a plant. For example, you can define how particular drawing items appear in drawings by selecting colors, line styles, gapping styles and heat tracing styles for the plant.

Using Options Manager, you can identify the location of symbols, rules, and labels. You can also define symbology for graphics, default formats for data, and key distances that affect the behavior of the design software. You can also specify pipe diameter, standard jacket diameter and optional jacket diameters when utilizing Jacketed Piping.

 Any changes made using SmartPlant P&ID Options Manager apply to all drawings and well as Projects in the plant.

You can customize several different options.

Symbology - controls the look of items as they are placed in SPPID.

Gapping - controls the style of gaps used and which lines gap.

Heat Tracing - defines the available display for heat tracing.

Formatting - specifies default formats used throughout the plant.

Default Distances - specifies basic distances used throughout the plant.

Default Reference Settings - controls where and how reference data is stored.

Usually, an administrator sets these options when a plant is created. The administrator can later modify these options when plant requirements dictate a change.

Navigating in SmartPlant P&ID Options Manager

SmartPlant P&ID Options Manager is divided into six main functions, each of which is accessed by a command button on the left side of the main window:

Click one of these buttons to open a detailed view in the main window.

Various commands on the **Edit** menu and on the toolbar are available depending on the current selection in the main window.

For some cells in SmartPlant P&ID Options Manager, a calculation button appears when the cell is selected. Clicking this button opens a dialog box that enables you to specify the information required for that field. For instance, when you specify file locations in the **Settings** window, the **Open** dialog box appears so you can associate the correct file and path, or when you define gapping, the **Select Filter** dialog box opens.

The **File** menu also contains commands for saving changes to database definitions and closing a version of SmartPlant P&ID Options Manager.

Symbology

Symbology provides graphical clarity to a drawing by differentiating among various items by their appearance. Symbology refers to the color, line width, and style associated with items in a particular filter.

You can use color to differentiate among the different types of drawing items, such as equipment, piping, or instruments, while the software uses line widths and styles to represent various properties of those items. For example, you can define symbology to represent existing lines, future lines, and new lines by using filters that correspond to these in SmartPlant Filter Manager. You can also define symbology to represent lines carrying different fluids or items supplied by different manufacturers, if those properties exist for items in the data model.
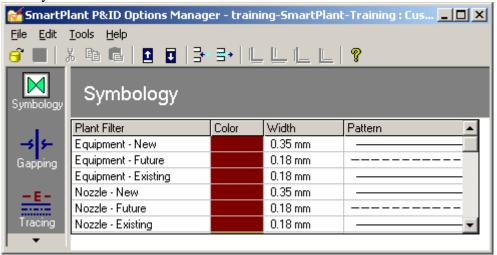
By default, the software offers a set of predefined symbology for instruments, nozzles, pipe runs, labels, and equipment. You can change the default symbology for any filter or define symbology for any other existing filters.

PDS 2D uses the **Context Display Domain** command to change the appearance of graphics for items with a particular attribute for package number. To view the same kind of information in your design software, you can define a filter for items containing the property you want and then define symbology for that filter using the Symbology option. For example, if you want to customize the symbology of items with a particular piping material class, you can define a filter containing items with

the piping material class, and then define the specific symbology you want to see in the drawing.

✎ **Notes:**

- The order of the options listed in the **Symbology** table indicates a priority when assigned to an item upon placement in a design. You can change the priority of symbology assignment by selecting the symbology row and clicking the **Move Item Up** ⬆ or **Move Item Down** ⬇ buttons. You can select only one row at a time when changing symbology priority.

- If a linestyle/pattern exists in the projectstyles.spp file with the same name as the filter specified in the Symbology view in Options manager, then that particular linestyle/pattern will be used. If the user wants to specify a different linestyle/pattern for the specified filter entry in Symbology, then he can choose from the pulldown list linestyle/pattern. This same information will apply to new linestyle/pattern and new filters that the user creates. If the user creates a new filter and creates it in the symbology view and then imports a new linestyle/pattern with the same name as the filter, then that linestyle/pattern is automatically assigned to the filter in the view. Also, the imported linestyles will not show up in the pulldown list of linestyle/pattern in the Symbology view if the names of the linestyle/pattern correspond to filters already listed.

SmartPlant P&ID Options Manager - training-SmartPlant-Training : Cus...

File Edit Tools Help

Symbology

Plant Filter	Color	Width	Pattern
Equipment - New		0.35 mm	
Equipment - Future		0.18 mm	
Equipment - Existing		0.18 mm	
Nozzle - New		0.35 mm	
Nozzle - Future		0.18 mm	
Nozzle - Existing		0.18 mm	

Gapping

Tracing

Plant Filter

Set of filters for the plant structure available in **Filter Manager**.

You may add a new filter by placing the cursor in the last row of the Plant Filter list, and click the three ellipses (…). This will bring up the Filter Manager interface and an existing filter can be selected or a new one can be created.

Color

Select a color for the items. This list is made up of the colors delivered with the operating system

Width

Select the line weight for the item

Pattern

Select a line pattern for the item, the patterns available come from the **projectstyles.spp** file. You may create a new pattern using the **Line Style Editor** available with **Catalog Manager** and then import the pattern into **Options Manager** using **Tools** > **Linear Patterns**.

Update Symbology Command

Changes in the symbology take effect only in those drawings that are created after those values are defined. To update the symbology of drawings that were created prior to the changes, you may open the drawing and run the **Tools > Update Symbology** command in SmartPlant P&ID. This utility will read the latest values in the Options Manager **Symbology** form and update the existing graphics in the drawing with the latest value, and allow newly placed graphics to have the new symbology.

Gapping

The **Gapping** options allow you to establish priorities and define symbols for displaying line intersections in drawings. In a drawing, when lines, hoses, capillaries, or other line routes intersect, you place gaps in the line with lower priority, while lines with higher priority remain unbroken.

You can define a priority list to handle such intersections. The placement of the connector type in the **Gapping** list indicates its gapping priority. For example, when you place two lines that appear to intersect in the drawing but do not intersect in the plant model, the design software automatically gaps the line that appears lower in the list. By default, piping lines gap signal lines, and primary lines gap secondary lines; however, an undefined gapping style receives the highest priority by default.
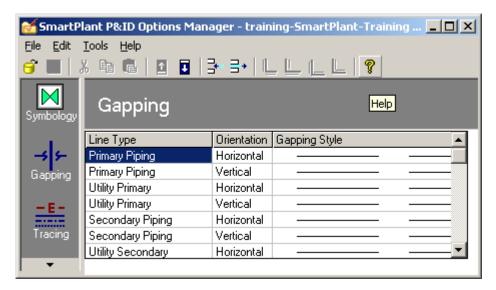
The gapping style dictates whether the software displays a jumper or a gap when two lines intersect in a drawing. When you define gapping options, you choose from the following gapping styles:

- **Plain Gap**: ———— ————
- **Jumper**: ————⌒————

- **Gap with Break Marks**: ──────⟩ ⟨──────

Options set for gapping in SmartPlant P&ID Options Manager apply only to automatically gapped lines. You can turn the automatic gapping of lines on and off with gapping commands in the design software.

As in Symbology, the **Move Item Up** and **Down** buttons can be used to change the order of the gapping (remember the higher in the list, the higher the precedence). You can select only one row at a time when changing symbology priority. To add new line type filters, scroll to the bottom of the list, place the cursor in the last **Line Type** field, and select the three ellipses (…). Also, the **Insert Item** button can be used to place a new definition anywhere in the list. **Delete Item** will delete the filter from the list only.

Line Type

Set of filters for the plant structure available in Filter Manager

Orientation

Refers to the orientation of the line routed in the drawing (Horizontal or Vertical)

Gapping Style

Refers to the gap style that will be applied

Gapping Lines in a Drawing
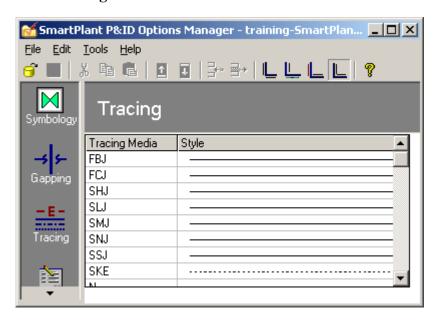
There are three options in SmartPlant P&ID to gap lines. Two of the options are set under the **Tools** menu. The first option is called **AutoGap**. This option will check every time a line is routed that fulfills the gapping filter for an intersection and perform the appropriate gapping procedure. **AutoGap** will also lower the performance of the software. The second option is called **Gap Now**. When selected,

this option will scan the drawing for crossed lines, and perform the correct gapping based on the fulfillment of the filter gapping criteria. The third option is to place a manual gap from the **Catalog Explorer** (**Symbols** > **Piping** > **Gaps**). Software-generated gaps will not override manual gaps in a drawing.

Tracing

Tracing options allow you to specify the default appearance and location of heat tracing symbology in drawings for a plant. You can define a variety of line styles to designate lines with heat tracing.

To configure for jacketed pipe (double heat tracing) use **Options Manager** > **Settings** and add the **Heat Tracing Media designated** as jacketed to the **Double Heat Tracing Medias** row Double Heat Tracing Medias   FAJ,SSJ

Tracing Media

The **Tracing Media** displays the values in the **Heat Trace Medium** Select List.

If the symbol was created to be eligible to be heat traced and the **Heat Tracing Media** property is defined for the symbol, the defined graphics will display around the item.

Style

The **Style** displays all available heat tracing line styles.

The patterns available come from the **projectstyles.spp** file. You may create a new pattern using the **Line Style Editor** available with **Catalog Manager** and then import the pattern into **Options Manager** using **Tools** > **Linear Patterns**. A style that may be used for heat tracing must contain "heat trace". For example, steam heat trace.

Add Heat Tracing Media

1. Modify the Select List (**Heat Trace Medium**) using **Data Dictionary Manager**. Refer to the *Modify a Select List Entry* topic in Data Dictionary Manager Help for details about modifying a select list.

2. After you add the new entry in the select list, open **Options Manager** and click **Tracing**. The new heat tracing medium you added displays in the **Tracing Media** list.

3. In the **Tracing Media** list, locate the new media and click the **Style** box.

4. Select a new heat tracing style from the list.

Select **Save**.

Tracing Position

The toolbar buttons on the dialog allows you to change the placement of Heat Tracing for lines in the Plant- The options in this list describe the default placement of heat tracing for both horizontal and vertical lines in the P&ID. The options are **Bottom Right**, **Bottom Left**, **Top Right**, and **Top Left**.

The **Heat Tracing Position** property applies to all types of heat tracing in the current Plant.

For This Option	Heat Tracing Appears	Tracing Position Button
BottomRight	Below horizontal lines and to the right of vertical lines.	
BottomLeft	Below horizontal lines and to the left of vertical lines.	
TopRight	Above horizontal lines and to the right of vertical lines.	
TopLeft	Above horizontal lines and to the left of vertical lines.	

Formats
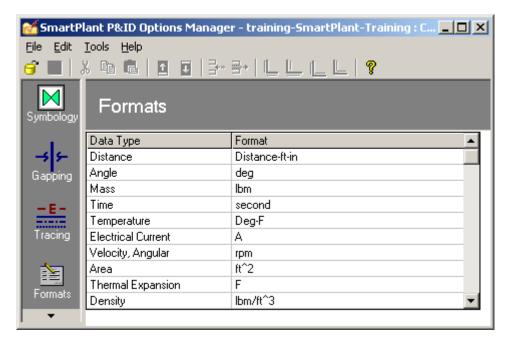
The **Formats** option controls the default formats associated with various data types in the application database. Some examples of data types include length, area, volume, pressure, angular velocity, thermal expansion, signal intensity, integer, and string.

These formats will be used in properties for a plant and in labels (depending upon how the labels are designed). The property grid works with these default formats so that when the user enters a value for a property, the software uses the plant format by default. The user can choose to enter data in some other format by first selecting the unit of measure format from the list in the properties grid and then entering a value. When a label has the format Plant Default specified, then it will use the format that you specify for the particular data type in Options Manager.

Data formats associated with data types control the length and type of specific information for the plant, such as text strings and numbers. Data formats also control the units associated with particular measurements in drawings and the placement of information in drawings. The formats assigned to these data types can change from plant to plant. You can use the default data type formats, or you can create new formats with SmartPlant Format Manager.

The formats assigned to these data types can change from plant to plant. You can use the default data type formats, or you can create new formats with Format Manager.

If you select millimeters as the default format for distances, distances appear in millimeters by default. If you selected feet or inches as the default units for distances, distances appear in inches by default.

Data Type
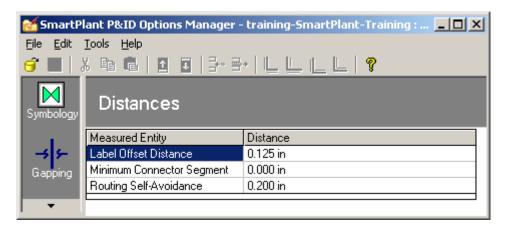
The Data **Type** specifies a list of data types available from **Format Manager**. Some examples of data types include length, area, volume, pressure, angular velocity, thermal expansion, signal intensity, integer, and string.

Format

The **Format** presents a list of available formats from **Format Manager** for the given data type. Formats may include different units of measure, precision, readout, etc.

Distances

The **Distances** option allows you to define minimum distances between objects in drawings and to define default lengths for various entities in drawings in a plant. If you selected meters as the default format for thickness with the **Formats** option, these values appear in millimeters by default. If you selected feet or inches as the default units for distances, these values appear in inches.

You can define default distances or lengths for each of the following values:

Label Offset Distance

The **Label Offset Distance** defines the default distance between a label and the component that it is annotating. You can override this distance with the **Offset Source** and **Offset Distance** values when you create the label in **Catalog Manager**.

Minimum Connector Segment

The **Minimum Connector Segment** defines the minimum length for connector segments. That is, the shortest length of pipe or signal run that can exist. However, the design software overrides this distance when you place piping components together. The line created between two touching components is zero-length. The greater of the **Minimum Connector Segment** and **Routing Self-Avoidance** settings governs the shortest line length when, for instance, routing a line from a nozzle.

Routing Self-Avoidance

The **Routing Self-Avoidance** defines the distance between a line route and an object that the line is avoiding. This setting also governs how long a segment must be in order to place an inline component into it. Once you place a line in your design, the self-avoidance setting is applied. If you later change this setting, it will only affect lines created subsequent to the change. The original self-avoidance distance remains a

characteristic of any line once it is created.. You can use the delivered utility, *ApplySettingsCmd.dll*, to update existing lines with the next value. For information about this utility, refer to the *SmartPlant P&ID Installation Guide*.

Defining Reference Data Settings: An Overview

The SmartPlant P&ID software requires that you specify various library, file, and path names for reference data. The reference data defines not only references to information used plant-wide but also where to find the data or where to store it. You must define the locations of most of these libraries, files, and directories for your plant before you can begin using SmartPlant P&ID. SmartPlant Engineering Manager creates most of these initial definitions during site and plant creation.

You can modify your default reference data settings for your plant using SmartPlant P&ID Options Manager. You can define the settings for each of the following default files: rules library, default template, default piping symbol file, default signal line symbol file, format reference file, and default terminator style, as well as various locations for PDS 3D files and passwords. You can define the following default styles and formats: default terminator style, pipeline name attributes, and signal name attributes.

You can define default paths for the following types of directories or drives: **Catalog Explorer** root directory, default P&ID template directory, default report template directory, and default drawing file directory.

🖉 **Notes:**

- The symbol path that is written to the database when you create an item in SmartPlant Catalog Manager and the data path in SmartPlant P&ID Options Manager must be the same. If the paths are different, the software displays the symbol as an unintelligent graphic. The symbol path serves as a pointer in SmartPlant P&ID Options Manager and is written to the database after you place a symbol; whereas, the data path is a general path to the reference data.

- When you are using projects inside SmartPlant P&ID, remember that the reference data belongs to the Plant and is used by projects of the Plant. You cannot change reference data, such as table layouts or formats or rules, at the project level.

Settings

The following reference data settings are defined using SmartPlant P&ID Options Manager to specify the location of particular types of data. You can specify various default settings used in creating P&IDs and sharing data with other applications, like PDS 3D.

Catalog Explorer Root Path

The **Catalog Explorer Root Path** specifies the node or server where the symbols for this plant are stored.

Claim Mode

Claim Mode allows you to choose the appropriate claim mode for your plant: **Exclusive** or **Shared**. This option can be changed only if the Claim Table is empty. If it is not empty, a message box appears. Additionally, if you are operating in a project, rather than the Plant, this option is always read-only. Only model items can be claimed. For more information about claiming items, see *SmartPlant P&ID Help*.

 Notes:

- The **Exclusive** option means that claimed items are wholly owned by the claiming project. The **Shared** option means that items can be owned simultaneously by more than one project.

Copy Transformation Program

The **Copy Transformation Program** specifies the transformation program to be used during the copying process. A transformation program is delivered with the software. You can copy this delivered code and then create your own customized transformation program. For more information about creating a transformation program, see *Customizing the Sample Projects* in the *SmartPlant P&ID Programmer's Guide*.

Default Assembly Path

The **Default Assembly Path** specifies the default directory where assembly files are stored. If you want users to store new assemblies in the Catalog Explorer by default, enter the path for a directory in the **Catalog Explorer** root path.

 Notes:

- In order to save an assembly, you must have write permission for this folder. Additionally, if you do not choose a folder that is in the reference data folder, along with the other symbols, your assemblies are not displayed in nor available for placement from the **Catalog Explorer**.

Default Pipe Symbol File

The **Default Pipe Symbol File** specifies the default symbol used to represent piping when two inline components are placed directly beside one another in a P&ID. For example, when two inline components, such as a nozzle and a valve, are placed so that they touch, the software highlights the shared connect point. If you define a default pipe symbol in SmartPlant P&ID Options Manager, the two items are automatically connected with a pipe segment. If no default pipe symbol is defined,

the software does not generate the connecting pipe segment. This path is a relative path based on the path defined for the **Catalog Explorer** root directory.

🖉 **Notes:**

- If you change this to a UNC path, once inside a P&ID, you cannot place two inline components adjacent to each other. For example, a valve adjacent to a nozzle.

Default Report Template Path

The **Default Report Template Path** specifies the directory where default report templates for this plant are stored, including the blank Excel template used for creating new templates. When a report template is created and added to the plant reports, the new template is also stored at this location.

Default Signal Line Symbol File

Specifies the default symbol used to represent signal lines when two offline instruments are placed directly beside one another in a P&ID. By default, this setting is blank. If no default signal line symbol is defined, the software does not generate a connecting signal line segment. For example, when two offline instruments are placed so that they touch, the software highlights the shared connect point. If a default signal line symbol is defined in SmartPlant P&ID Options Manager, the two items are automatically connected with a signal line segment. This path is a relative path based on the path defined for the **Catalog Explorer** root directory.

🖉 **Notes:**

- If you change this to a UNC path, once inside a P&ID, you cannot place two offline components adjacent to each other. For example, discrete offline instruments, like a pressure transmitter and a pressure indicator.

Delete key default behavior

 Specifies the default behavior when you select drawing items and press the Delete key or click Delete on the toolbar. The available options are:

Delete from model — Deletes the item from the database as well as from the drawing.

Delete to plant stockpile — Deletes the item from the drawing and sends it to the plant stockpile.

Delete to drawing stockpile — Deletes the item from the drawing and sends it to the drawing stockpile.

🖉 **Notes:** The last two options only take effect for item types that appear beside the **StockpileItems** property.

Display Undefined As

The **Display Undefined As** allows you to define how you want a null value to appear in the **Properties** window. When you select **Display Null** from the **Properties** window toolbar, you see this value for all properties that are null. Use the **null** setting definition if you are using the PipeSpec Commodity Code Lookup utility.

Heat tracing media - Double heat trace

Specifies a list of heat tracing media used to define which connectors are double heat traced. If a value already appears on the **Heat tracing media - Jacketed pipe** list, you are prompted before assigning it as double heat traced. These fields are comma-delimited, for example, FAJ, FBJ.

Heat tracing media - Jacketed pipe

Specifies a list of heat tracing media used to define which connectors are jacketed. If a value already appears on the **Heat tracing media - Double heat trace** list, you are prompted before assigning it as jacketed. These fields are comma-delimited, for example, FAJ, FBJ.

Drawing properties – Optional

Specifies the properties that appear on the **New Drawing** dialog box as optional when you create a new drawing in SmartPlant P&ID. If a value already appears on the **Drawing properties - Required** list, you are prompted before assigning it as optional. These fields are comma-delimited, for example: Version, Description.

Drawing properties – Required

Specifies the properties that appear on the **New Drawing** dialog box as required when you create a new drawing in SmartPlant P&ID. If a value already appears on the **Drawing properties - Optional** list, you are prompted before assigning it as optional. These fields are comma-delimited, for example: Version, Description.

Enable "Keep Checked Out" on Checkin

The **Enable "Keep Checked Out" on Checkin** allows you to check in a drawing but still keep the drawing checked out for further work. All claims are maintained.

Enable Piping Specification Validation

The **Enable Piping Specification Validation** invokes continuous service limits validation and automatic commodity code lookup if the **Use Piping Specification** setting is **PDS3D** or **SmartPlant 3D** and this setting is **Yes**. If the **Use Piping Specification** setting is **PDS3D** or **SmartPlant 3D** and this setting is **No**, service limits validation and commodity code lookup are not available. However, the

PipeSpec Commodity Code Lookup utility continues to provide other capabilities in SmartPlant P&ID. If you enter the applicable program IDs in SmartPlant Data Dictionary Manager, you enable the **Calc** ... button in the **Piping Material Class** property for a pipe run and in the **Commodity Code** property for a piping component.

Enable System Editing

The **Enable System Editing** specifies if system wide changes in item values can be made automatically while editing. If set to **Yes**, when you change a value on an item, the new value is propagated to other connected items. These changes take place based on any existing rule settings.

EquipNextSeqNo

The **EquipNextSeqNo** specifies the next number used to automatically generate a unique tag sequence number for equipment. If the tag sequence number property is left blank or a duplicate is entered, the software uses the value entered here as the tag sequence number for the piece of equipment. As tag sequence numbers are used, this value changes dynamically to the next consecutive number. This value also determines the first tag sequence number that you want to use for equipment in this plant. If you want to start with sequence numbers of more than three digits or with another value, you can modify the default value of 100 before you begin your design sessions.

Export to CAD Definition File

The **Export to CAD Definition File** specifies the Excel workbook used to associate filters in the design software with layer names in AutoCAD and level numbers in MicroStation. The software uses this definition file to tag items in a drawing with the layer name or level number on which the item should appear when the drawing is saved as an AutoCAD or MicroStation file. This definition file is only used when the ExportLayer.dll macro is run before the drawing is saved in a different file format.

Import Map Path

The **Import Map Path** defines where your map files reside on the system. An import map file is used to match attributes during the import process.

Import Transformation Program

The **Import Transformation Program** specifies the transformation program to be used during the import process. This program controls the depth of the data transformation. A transformation program is delivered with the software. You can copy this delivered code and then create your own customized transformation program. For more information about creating a transformation program, see *Customizing the Sample Projects* in the *SmartPlant P&ID Programmer's Guide*.

InstrLoopNextSeqNo

The **InstrLoopNextSeqNo** specifies the next number used to automatically generate a unique tag sequence number for instrument loops. If the tag sequence number property is left blank or a duplicate is entered, the design software uses the value entered here as the tag sequence number for the instrument loop. As tag sequence numbers are used, this value changes dynamically to the next consecutive number. This value also determines the first tag sequence number that you want to use for instrument loops in this plant. If you want to start with sequence numbers of more than three digits or with another value, you can modify the default value of 100 before you begin your design sessions.

Max-Temperature Unit in PDS3D

The **Max-Temperature Unit in PDS3D** specifies the units used for maximum temperature in PDS 3D. You can select **Deg-F**, **Deg-C**, **Deg-K**, or **Deg-R** from the list for this setting. The PipeSpec Commodity Code Lookup utility uses this setting.

OPCItemTag

The **OPCItemTag** specifies the next number used to automatically generate a unique tag sequence number for off-page connectors (OPCs). If the tag sequence number property is left blank or a duplicate is entered, the design software uses the value entered here as the tag sequence number for the OPC. As tag sequence numbers are used, this value changes dynamically to the next consecutive number. This value also determines the first tag sequence number that you want to use for OPCs in this plant. If you want to start with sequence numbers of more than three digits or with another value, you can modify the default value of 100 before you begin your design sessions.

PDS Approved Reference Database Schema Name

The **PDS Approved Reference Database Schema Name** type the user name created for the **ra** schema of the PDS 3D project.

PDS Approved Reference Database Schema Password

The **PDS Approved Reference Database Schema Password** type the password for the user created for the **ra** schema of the PDS 3D project.

PDS Database Name

The **PDS Database Name** type the name of the PDS database. This field is required for Microsoft SQL Server databases.

PDS Database Server/Alias

The **PDS Database Server/Alias** type the name of the PDS server or an alias. This server name is required for Microsoft SQL Server database. An **Alias** name on the client machine is required for an Oracle database.

PDS Database Type

The **PDS Database Type** sets the type of database PDS is utilizing. Valid options include Oracle or Microsoft SQL Server.

PDS Project Control Database Schema Name

The **PDS Project Control Database Schema Name** type the user name created for the **pd** schema of the PDS 3D project.

PDS Project Control Database Schema Password

The **PDS Project Control Database Schema Password** type the password for the user created for the **pd** schema of the PDS 3D project.

 Notes:

- This user must have access privileges in both the **ra** and **pd** database schemas.

PID Template Path

The **PID Template Path** specifies the storage location of templates used to create drawings in the design software. When a new template is created, the template is also stored in this directory by default.

Pipeline Name Attributes

The **Pipeline Name Attributes** specifies the common properties of lines that belong to the same pipe run. For example, if tag sequence number and fluid code are used to define a pipe run, all connected lines that have the same tag sequence number and fluid code belong to the pipe run. To modify the properties used to define a pipe run, type the new properties in the **Setting** column. The property name must be spelled exactly as it appears in the data dictionary.

PipeRunNextSeqNo

The **PipeRunNextSeqNo** specifies the next number used to automatically generate a unique tag sequence number for pipe runs. If the tag sequence number property is left blank or a duplicate is entered, the design software uses the value entered here as the tag sequence number for the pipe run. As tag sequence numbers are used, this value changes dynamically to the next consecutive number. This value also determines the first tag sequence number that you want to use for pipe runs in this plant. If you want to start with sequence numbers of more than three digits or with another value, you can modify the default value of 100 before you begin your design sessions.

Plant Insulation Specification File

The **Plant Insulation Specification File** specifies the storage location for the file that contains all the available insulation information for this plant. The plant insulation file is an .isl file.

Plant Style File

The **Plant Style File** specifies the storage location for the file that contains all the available symbology for this plant, such as line patterns and styles. The plant style file is an .spp file.

Rules Library

The **Rules Library** specifies the location of the rules library for this plant. The rules library contains rules that customize the interaction of model items when you place or manipulate these items. You can define and modify rules in Rules Manager. The rules library is a .rul file.

Signal Name Attributes

The **Signal Name Attributes** specifies the common properties, or attributes, of signal lines that belong to the same signal. To modify the properties used to define an instrument loop, type the new properties in the **Setting** column. The property name must be spelled exactly as it appears in the data dictionary.

SmartPlant 3D Plant Name

The **SmartPlant 3D Plant Name** specifies the name of the SmartPlant 3D database. The PipeSpec Commodity Code Lookup utility uses this setting if SmartPlant 3D is specified in the **Use Piping Spec** option.

SmartPlant 3D Server Name

The **SmartPlant 3D Server Name** specifies the server that contains the SmartPlant 3D database. The PipeSpec Commodity Code Lookup utility uses this setting if SmartPlant 3D is specified in the **Use Piping Spec** option.

SmartPlant Resources Path

The **SmartPlant Resources Path** specifies the path to the EFResources file for this plant or project.

SmartPlant Retrieve - Apply Default Formats

The **SmartPlant Retrieve - Apply Default Formats** is applicable when retrieving data, this option allows you to specify to use either the units defined in the source or the units defined in the target. If set to **No**, the retrieved property's preferred display UOM is mapped to the P&ID format. This value is used to reformat the retrieved UOM property value for display as the new value in the **To Do List**. If set to **Yes**, the

default format for the attribute is retrieved. This value is used to reformat the retrieved UOM property value for display as the new value in the **To Do List**.

StockpileItems

The **StockpileItems** specifies the item types that should appear in the stockpile when they are deleted from a drawing. Pipe runs appear in the stockpile by default when you delete them. For example, if you want only vessels, exchangers, and instruments (along with pipe runs) to appear in the stockpile when deleted from a drawing, type, **Vessel**, **Exchanger**, **Instrument** in the **Setting** column.

Terminator Style

The **Terminator Style** specifies the type of terminator used at the terminal end of all leader lines, such as an arrow, solid dot, solid arrow, or none.

To Do List Placement Zone

The **To Do List Placement Zone** controls the freestanding placement of items called when the **SmartPlant> To Do List** command in SmartPlant P&ID is selected. The items are placed in the area around the drawing border. Options include **Left**, **Right**, **Top**, **Bottom**, and **Pinwheel** (the default setting).
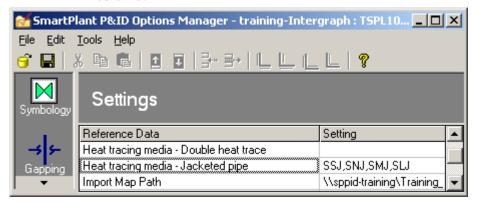
Use Piping Specification

The **Use Piping Specification** lists the choices for using the PipeSpec Commodity Code Lookup utility.
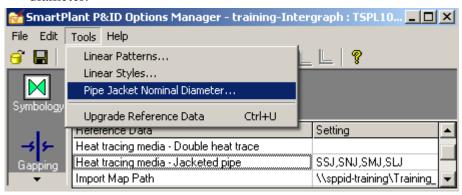
- **No** - No type of calculation or validation for PipeSpec.

- **PDS3D** - Specifies the PDS 3D database for piping specification. When specified, SmartPlant P&ID Options Manager checks corresponding settings to make sure that the PDS 3D database connections are defined.

- **SmartPlant 3D** - SmartPlant 3D database is used for piping specification. Once specified, SmartPlant P&ID Options Manager checks corresponding settings to make sure that the server and plant name are defined.

Configuring Jacketed Piping

1. Start **Options Manager**.

2. Select **Settings** and define which Heat Tracing Mediums will be utilized for Jacketed Piping.

   a. Reference Data = Heat Tracing Media – Jacketed Pipe

   b. Setting = utilize the drop down list to select the Heat Tracing Mediums.
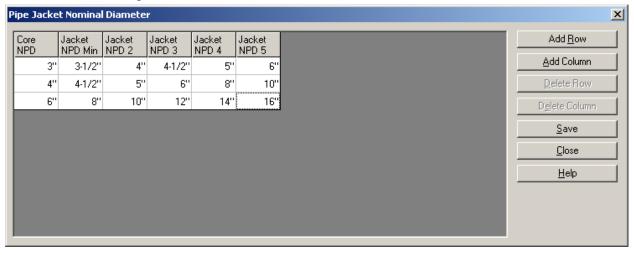
3. Select **Tools** > **Pipe Jacket Nominal Diameter…** and specify pipe and jacket diameter.

4. Select **Add Row** and enter values for the **Core NPD** and **Jacket NPDs**.

   - **Core NPD** — Specifies the core pipe diameter as set in Data Dictionary. Values in this column cannot be deleted. Within SPPID this is the value which will be validated when a value is set for Nominal Diameter.

   - **Jacket NPD Min** — Allows you to specify the minimum jacket diameter available for the core pipe. The value must always be greater than the corresponding core pipe value. Values in this column cannot be deleted. Within SPPID this is the J_Nominal Diameter value which will automatically be set based on the value defined for Nominal Diameter (Core NPD).

- **Jacket NPD 2**, **Jacket NPD 3**, and so forth — Allows you to add optional jacket sizes for a specific pipe. Click on an empty cell in the specific pipe row to add an optional jacket size.

- **Add Row** — Allows you to add a new row with a specific pipe diameter from the Data Dictionary. Click an empty cell for a list of available pipes. To delete a row, select a cell in the desired row and click **Delete Row**, or right-click a cell and on the shortcut menu, click **Delete Row**.

- **Add Column** — Allows you to add another column to the table. To delete a column, select a cell in the desired column and click **Delete Column**, or right-click a cell and on the shortcut menu, click **Delete Column**.

- **Delete Row** — Deletes the row for the currently selected cell.

- **Delete Column** — Deletes the column for the currently selected cell.

- **Save** — Sorts the data values in ascending order in each row and column and saves any changes made to the table in the XML file defined as the Jacket Pipe Nominal Diameter Configuration file in the Options Manager settings.

Core NPD	Jacket NPD Min	Jacket NPD 2	Jacket NPD 3	Jacket NPD 4	Jacket NPD 5
3"	3-1/2"	4"	4-1/2"	5"	6"
4"	4-1/2"	5"	6"	8"	10"
6"	8"	10"	12"	14"	16"

Pipe Jacket Nominal Diameter

Add Row
Add Column
Delete Row
Delete Column
Save
Close
Help

- **Notes:**

  - In SPPID the below dialog will appear when you have Nominal Pipe Diameter defined on a Pipe Run pipe, with a value which is not defined in the Core NPD, and you apply a Jacketed Heat Tracing Medium (SSJ, SNJ, SMJ, SLJ).

  - In SPPID the below dialog will appear when Jacketed Heat Tracing is set for a Pipe Run and the value for Nominal Pipe Diameter, which you are setting is, not equal to the Core NPD defined in Options Manager > Pipe Jacket Nominal Diameter.

Drawing Manager > Update Command

The **File** > **Out-of-Date Drawings** command from **Drawing Manager** allows reference data changes, i.e. symbology, to be applied to existing drawings without having to open the drawings. The **Tools** > **Out-of-Date Drawing Criteria command** from **Drawing Manager** can be used to establish a criteria for defining out-of-date drawings.
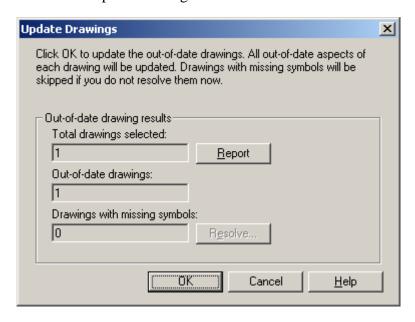
The **File** > **Out-of-Date Drawings** > **Update** command from **Drawing Manager** will display the **Update Drawings** dialog box. When you select this command, the selected drawings are analyzed based on the out-of-date criteria and the results display on the Update Drawings dialog box.

Update does not update any symbol whose definition has been changed into a break component. This situation occurs when you have a catalog item that has been placed in a drawing and then you change its definition to be a break component. The SmartPlant P&ID Replace command does not allow a non-breaking component to be replaced with a break component. The Update command relies on the SmartPlant P&ID Replace command to replace symbols that are out-of-date.

If you make a change in **Options Manager** > **Formats** and then run **Update Drawings** on existing drawings (drawings created before this change) then the Label is only affected, the Property Window will still display the older UOM.

📝 **Notes:**

- Intergraph recommends that you backup your work or create a version of your work prior to using this command.

Total drawings selected: - Displays the number of drawings selected.

Report - Generates a Microsoft Excel report describing the details of out-of-date drawing(s).

Out-of-date drawings: - Displays the number of drawings that are out-of-date based on the criteria selected using the **Out-of-Date Drawing Criteria** dialog box.

Resolve - Displays the **Resolve Missing Symbols** dialog box. Use this button to resolve any missing symbols.
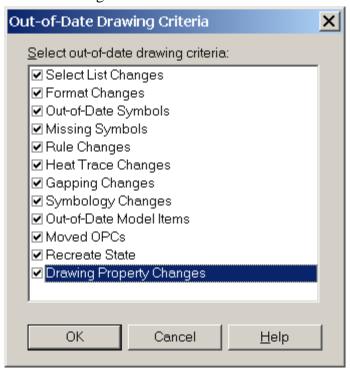
Drawings with missing symbols: - Displays the number of out-of-date drawings containing symbols that do not exist in the catalog.

Notes:

- If the path to your Rules file is set incorrectly in SmartPlant P&ID Options Manager, then the **Update Drawings** command will not work. For example, if the path is invalid, then all drawings in the project are in an out-of-date state but the software cannot update them. This error also occurs if the **Catalog Explorer Root Path** specified in SmartPlant P&ID Options Manager is invalid. An error message displays and the report displays **Drawings with a ? in the criteria column have missing or incorrect reference data**.

Out-of-Date Drawing Criteria Command

The **Tools > Out-of-Date Drawing Criteria** displays the **Out-of-Date Drawing Criteria** dialog box.

Items selected in this list define what criteria is used to search for out-of-date values when you use the **File > Out-of-Date Drawings** commands.

The analysis to determine a drawing is out-of-date is based on the following criteria:

Select List

- Data Dictionary Select List – Data dictionary select list GUID on the drawing item is not equivalent to select list GUID in Data Dictionary.

- PID Select List –PID select list GUID on the drawing item is not equivalent to the select list GUID in PID schema.

Formats

- Formats GUID on the drawing item is not equivalent to GUID from the Format file.

- Default Formats GUID on the drawing item is not equivalent to Default Formats GUID in Options Setting.

Out-of-Date Symbols

- File Last Modified Time Stamp on at least one representation in the drawing is not equivalent to the File Last Modified Time Stamp on the corresponding symbol definition file.

Missing Symbols

- Filename specified for at least one representation in the drawing does not have the corresponding symbol definition file available in the current catalog.

Rules File

- Rules GUID on the drawing item is not equivalent to the GUID from the Rules file.

Heat Trace

- Heat Trace GUID on the drawing is not equivalent to the Heat Trace GUID in Option Setting.

Gapping

- Gapping GUID on the drawing item is not equivalent to the Gapping GUID in Option Setting.

Symbology

- Symbology GUID on the drawing item is not equivalent to the Symbology GUID in Option Setting.

Out-of-Date Model Items

- SP_ModelItemTimeStamp for at least one representation in the drawing is not equivalent to the TimeStamp on the History Item of its Model Item. This criteria covers model items updated via Llama (Outside the drawing).

Moved OPC Mates

- MatingOPCPath (will have Drawing Id of its mate) on the OPC is not equivalent to the SP_DrawingId of its mate OPC. The OPC label is in a to-be-updated state as its mate has been moved.

Recreate

- The drawing is in a Recreate state.

Drawing Property Changes

- Property Changes GUID on the drawing item is not equivalent to Drawing Property Changes GUID on the drawing item. Drawing Property Changes GUID is set when drawing properties are modified from Drawing Manager.

Using SmartPlant P&ID Rule Manager: An Overview

SmartPlant® P&ID Rule Manager is the environment used to create, manipulate and manage sets of rules, or rule bases. These rules define how items within the model act and interact.

Rules are used in SmartPlant P&ID for the following reasons:

- Placement rules ensure that the correct relationships are created when you place a new item or move an item in a drawing.

- Rules govern how properties are copied from one item to another in a relationship, how properties are designated at placement, or when the **Reapply Rules** command is used.

- Rules check consistency.

- Implied items are defined in rules.

Rules provide the capability to customize how model items behave during placement and manipulation within a drawing. A rule can identify two items and define the placement behavior and the relationship between these items. The items can be catalog items or specified using a filter. When you place or modify an item within the model, the software evaluates that placement using the rules in SmartPlant P&ID Rule Manager.

The software tests applicable rules for the new or modified item against items located within the model. When a rule matches both items, the rule is carried out, and the software performs the associated actions. These actions can include the following:

- Geometric changes to the two items, such as moving a source item into place with respect to a target item.

- Graphical connections between items, such as ownership, fitting, or gluepoint.

- Creation of relationships between two items for the purpose of drawing consistency.

When an inconsistency is detected in the model, the software marks the location of the problem with an error or warning symbol. These inconsistencies are based on criteria defined in SmartPlant P&ID Rule Manager, which must be taken into account when correcting the inconsistencies. It is possible to override some rules while you are in the drawing software by approving inconsistencies.

By setting up typical or standard design rules that define the placement characteristics of items and how items interact with each other, you can quickly and easily place the required equipment, interconnecting piping, instrumentation, and other accessories and confirm that you are satisfying proper design criteria. All rules are applied while you create your drawing, not at some arbitrary later time.

You can generate a **Rules Summary Report** that displays a detailed list of your current rules. You can view the report in you default Web browser.

📝 **Notes:**

- Use **SmartPlant P&ID Options Manager** > **Setting**, **Rule Library**, to specify the default rule base for a plant or site.

Using Rules for Consistency Checking

The **Consistency** tab on the **Rule Properties** dialog box defines consistency check criteria and specifies the copying guidelines for property values between items when you create relationships. Each row defines one pair of properties to copy and compare. You can enter as many rows as necessary.

Inconsistency indicators display the results of Consistency Checking. If the items do not satisfy one or more of the consistency criteria, the inconsistency indicator changes to either a warning or an error symbol.

The software copies property values only when you create a relationship. You create relationships when you place an item on another item or connect items in a drawing. You can place items from **Catalog Explorer**, the **Engineering Data Editor**, or by moving a placed item into a new position. The software also compares property values whenever you change any property. This validation process can happen many times during the lifetime of an item.

📝 **Notes:**

- If you have already specified information on the **Consistency** tab before changing a filter on the **Items** tab, you lose all the information on the **Consistency** tab.

Navigating in SmartPlant P&ID Rule Manager: An Overview

When you open the SmartPlant P&ID Rule Manager software, the **Rule List** window displays all rule folders stored in your rule base. You can create folders in this window to help organize rules. Organize rules into folders does not affect rules

performance. The rules appear alphabetically in each folder and can be moved between folders using the **Cut**, **Copy**, and **Paste** commands.

The ⊘ symbol beside a rule indicates that the rule cannot be loaded, usual cause is the Filter utilized by a Rule had been changed. Upon opening Rule Manager the below dialog box will be displayed. See the Approve All Rules command.

Approve All Rules Command
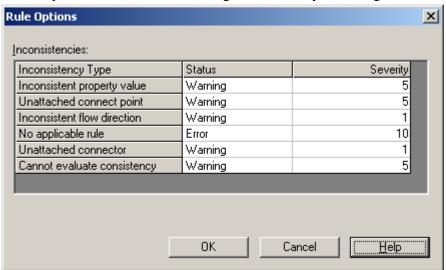
The **Edit > Approve All Rules** command automatically approves all of the rules that are in a disabled state because of modifications to the filters they depend on.

If you get a message stating **One or more rules did not load properly** when you open **Rule Manager**, this indicates that a filter used by a rule has been edited or deleted in **Filter Manager**. If this message box displays click **OK** to open **Rule Manager**. Then, expand the **Tree** views. Any rules that do not load properly display the **Disabled** ⊘ icon.

If you are sure all the changes to the filters are acceptable, you can use the **Approve All Rules.** You can also review and approve each individual disabled rule using the **Rule Properties** dialog box.

Rule Options Dialog Box

The **Rule Options** dialog box shows the inconsistency error types. You can select from any one of the cells and change the value by selecting from the displayed list.

Inconsistencies

Inconsistency Type — There are six inconsistency types on the **Rule Options** dialog box:

1. **Inconsistent property value** — When you add a new consistency criterion to a rule, the software uses the **Status** and **Severity** values you enter as defaults in the **Consistency Tab** of the **Rule Properties** dialog box. You can then modify these default values as desired.

2. **Inconsistent flow direction**— When you add a new consistency criterion to a rule, the software uses the **Status** and **Severity** values you enter as defaults in the **Consistency Tab** of the **Rule Properties** dialog box. You can then modify these default values as desired.

3. **Unattached connect point** — Allows you to specify the status and severity where the software finds an unconnected piping connect point on a piping component, instrument, or nozzle.

4. **Unattached connector** — Allows you to specify the status and severity where the software finds an unconnected end of a PipeRun or SignalRun.

5. **No applicable rules** — Allows you to specify the status and severity where the software finds two connected items for which there are no rules that allow the connection. This can happen, for example, when you work with two different plants that have two different sets of rules. When drawing data is copied from plant A to plant B, using **Assemblies** or **Import Drawings**, items that were legally connected in drawing A may not be legally connected in plant B. Also such an inconsistency may be generated if you edit a plant rule after drawings have been created based on that rule. If the drawings contain connected items and the rules that supported those connections are deleted, the result is connections that have no applicable rules.

6. **Cannot evaluate consistency** — When a PipeRun or SignalRun is attached to an **Off-Page Connector** (**OPC**) but there is no run attached to the mate **OPC** the consistency cannot be evaluated. This can happen when working in a project environment. Two drawings that contain an **OPC** and its mate may be complete in the AsBuilt plant. If only one of the drawings is fetched into the project, the consistency of the **OPC** connection cannot be evaluated because the other drawing does not exist in the project.

Status — This column has the following possible values:

- **Warning** — The status is used to alert you of a possible inconsistencies in your drawing. These inconsistencies are of a non-critical nature. When you select this option, a **Warning** symbol appears on the appropriate drawing object indicated with a blue forward slash. You can double-click the symbol to open the Consistency Check dialog box. In the **Consistency Check** dialog box you have the option to approve the inconsistency, and therefore leave it in your drawing, or you can correct the drawing and remove the inconsistency.

- **Error** — This status is used to alert you of critical inconsistencies within your drawing. These errors must be fixed within the drawing for the inconsistency

to be removed. When you select this option, an **Error** symbol appears on the appropriate drawing object indicated with a red X. You can double-click the symbol to open the Consistency Check dialog box for a more detailed view of the inconsistency.

Severity — This column can have numeric values from 1 to 10, with 10 being the highest severity. The software can be configured to show only those inconsistencies above a specific value. For more details, see View Properties Dialog Box within SmartPlant P&ID Help.

Generate Report Command

The **File** > **Generate Report** command compiles a rules summary report of all rules. The report displays in your web browser. If you need a printed copy, click Print in your web browser.

Creating and Modifying Rules: An Overview

In the course of your design work, you can create new rules to add to an existing rule base, or you can modify the rules delivered with SmartPlant P&ID Rule Manager. You can do something as simple as add a description to a rule or something as complicated as creating an entirely new rule to govern a special relationship between two very specific items in the reference data.

You must have appropriate use access privileges to copy rules, create new rules, and modify rules extensively before you can create an entirely new rule base.

Use the **Add Rule** command to create an entirely new rule, or use the **Properties** command to modify an existing rule.

 Notes:

- If you are using a Workshare environment, do not create, modify, or delete rules at a satellite site.

Understanding Priority and Relationships: An Overview

A rule's priority setting determines the order in which rules are applied. To assign priority to a rule, click **Edit > Properties** and select the **General** tab. If several rules apply to the source and target items, the software selects the rule with the highest priority to control placement. When you create a relationship, if several rules apply to the source and target items, the software instructs the highest priority rule to copy

property values first. Then, each of the other applicable rules copies unpopulated property values in order of priority.

Additionally, you can prevent the software from creating a relationship that a rule describes. For example, you can create an exception to a rule by specifying filters for **Item 1** and **Item 2** on the **Items** tab. Selecting the **Prohibit** check box on the **General** tab prohibits a relationship between the two items that you defined. The **Prohibit** check box works for freestanding placement as well as placement on a target.

Selecting Items: An Overview

The **Items** tab on the **Rule Properties** dialog box allows you to define information about the items to which a rule applies. You define **Item 1** and **Item 2** by selecting a filter or a catalog item for each. A filter allows you to specify an extensive class of items to which the rule applies. A catalog item allows you to specify a single, specific catalog item or symbol. For example, if you want a rule to apply between nozzles and vessels, define **Item 1** by using a filter for nozzles and **Item 2** by using a filter for vessels.

For each item, you can specify a connect point type. Some of the placement methods use connect points to calculate the placement geometry. For methods that use connect points, you must specify an appropriate **Connect point type**.

A rule can apply to a pair of items or a single item. For rules that apply to a single item, you must use **Item 1** to define the item and set **Item 2** to **Freestanding**. The software needs rules that apply to a single item to support placement of items in free space without relationships to other items. For example, if you want to place a vessel in free space, define **Item 1** by using a filter for vessels and **Item 2** as **Freestanding**.

For each item, you can specify a placement method that defines how to place the item relative to the other item. **Placement method** controls orientation of the geometry and relationships that the software creates when you place the item. For example, if you want to place nozzles on vessels, you can define a placement method for **Item 1**, the nozzle.

Using Implied Items

An implied item is an item in the database with no graphical representation in the drawing file. You can establish implied items by the existence of a single item, or by the existence of a relationship between two items.

A common example of a symbol with implied items is a vent drain detail. In the drawing, the vent drain detail is represented graphically by only one symbol.

However, when the symbol is placed, it represents a 1-inch secondary pipe, a 3/4-inch root valve, and a plug in the database.

Clicking **Edit > Properties** and selecting the **Implied Items** tab on the **Rule Properties** dialog box allows you to define the method for specifying implied items. The list shows all implied items for a rule. You can add or delete items by using the **Add** or **Delete** buttons beside the list.

If you associate implied items with a single item on the **Items** tab (**Item 2** is freestanding), then the software creates implied items for each instance of that item in the design. If you associate implied items with a pair of items, then the software creates implied items for each instance of the relationship between those two items.

When you delete an item, the software deletes all of the implied items that the item owns.

Because implied items are not graphical, you cannot see them in a drawing. However, you can display the items in the table view and in reports generated from the database.

Using Filters

You can use filters in many ways throughout the software and its standalone applications and utilities.

In SmartPlant P&ID Rule Manager, you use filters to define items in individual rules. Provided you have the correct user access permissions, designated in SmartPlant Engineering Manager, you have all the capabilities for handling filters in SmartPlant P&ID Rule Manager that you have in SmartPlant Filter Manager itself. Therefore, you can create, modify, and reorganize filters. You cannot create a compound filter(s) in SmartPlant Rule Manager, but you can view the properties of compound filters.

Understanding Placement Properties: An Overview

Under different circumstances with different catalog items, you want to control how that item is placed in a design and how it relates to other items nearby. Placement properties allow you to specify how items appear in the drawing and how they are related to other items.

You choose the type of placement in a rule when you choose the items involved in that rule. On the **Items** tab of the **Rule Properties** dialog box, you can specify the placement type and options for the placement type that you choose.

The following placement type options are available:

None

Using the **None** option for freestanding or non-existent items or for rules that do not pertain to the placement of an item. For example, a rule that prohibits the placement of an item can naturally use None for the placement type.

Geometric

Geometric placement type is frequently used for equipment and equipment components. You can specify rotation and mirroring with this placement type, making it the appropriate way to control how, for example, a nozzle behaves when you place it inside or outside of a piece of equipment. You can click Properties to define the options for this placement type on the Geometric Placement Properties dialog box.
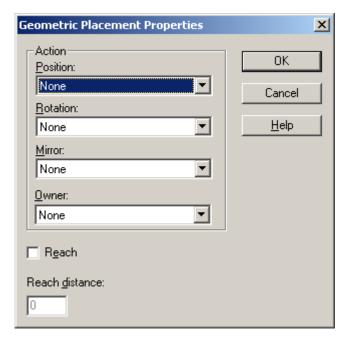
The Geometric placement method is designed to support placement of one item, the source, as a freestanding item or relative to an existing item, the target. The method assumes that the source item is a symbol and does not use connect points. You do not need to specify connect point types on the Items tab of the Rule Properties dialog box.

This placement method allows you to snap to the target, rotate perpendicular to the target, and mirror to the inside or the outside of the target.

Use this placement method to place freestanding items, such as equipment, and to place equipment components, such as nozzles and trays.

Geometric Placement Properties Dialog Box

Defines placement methods according to the geometry of the items that you are placing. You can select options that allow you to define snap placement (using connect points), orthogonal placement, mirroring, assign ownership of items, and so forth. Distances can be defined for items you are placing inside other items.

This dialog box opens when you click the **Properties** button next to the **Placement type** list when you select **Geometric** on the **Items** tab of the **Rule Properties** dialog box.

Position - Defines the action to take when positioning the target item. Choose from the following options:

- **None** - Allows you to place an item without it actually touching the item on which it is being placed.

- **Snap** - Allows you to actually place an item that automatically attaches to the geometry of the item on which you are placing it.

Rotation - Defines the action to take when rotating an item that you are placing. Choose from the following options:

- **None** - Indicates that no rotation applies.

- **Align** - Rotates the item that you are placing perpendicular to the geometry of the item on which you are placing it. You can place the item at any angle.

- **Orthogonal** - Sets the rotation to 90 degrees using the north, south, east, and west positions.

Mirror - Defines an action to take when mirroring an item. Choose from the following options:

- **Mirror to Cursor** - Mirrors the item according to location of the pointer. If the pointer is outside the item, then you can mirror and place your item there. If the pointer is inside the item, then you can mirror the item and place it.

- **Mirror to Outside** - Mirrors the item that you are placing outside of the geometry of the item already placed.

- **Mirror to Inside** - Mirrors the item that you are placing inside of the geometry of the item that you already placed.

- **None** - Does not allow mirroring of the item you are placing.

Owner - Defines the item that owns the item that you are placing. For example, if you are placing a nozzle on a pump, then the pump is defined as the owner of the nozzle. If the pump is moved later, then the nozzle moves with the pump. Choose from the following options:

- **None** - Implies items that you are placing are not associated and do not move with the item already placed.

- **Glue to Target** - Establishes an association with the item you are placing and the item already placed. If one of these items is moved, all associated items move also.

Reach - Allows you to place an item inside another item without touching the geometry of the item already placed.

Reach distance - Defines the effective distance between the source and target items for associated actions to exhibit their behavior. This distance is measured in meters.

In-Line

Use the **In-Line** option to control how an item is placed in relationship to a signal or pipe run. This placement type is used for inline piping and instrument components. Click Properties to define the options for this placement type on the In-Line Placement Properties dialog box.

Inline placement is designed to support placement of one item, the source, relative to an existing item, the target. The method assumes that the source item is a symbol and the target item is a line run. Inline placement uses connect point information in the

source item and calculates placement configurations with the geometry of the target line run. When you use this placement method, you specify the connect point type for the source item, but you do not specify connect point type for the target item.

You specify options for inline placement on the **In-Line Placement Properties** dialog box. This placement method works in two ways:

- If the **Rotate and mirror to fit** option is **True**, the software explores all possible combinations of rotation and mirroring to find the ways that the source can fit on the target geometry. The software can generate multiple configurations and display them by using the configuration tool in the design software.

- If the **Rotate and mirror to fit** option is **False**, the software finds the connect points on the source that match the target geometry. If a match is found, the software generates a single configuration with zero rotation.

Placement is available for both the endpoints and at any internal points within a line. If you place an item at an internal point, the line is broken into two runs, and the new item is inserted.

Use this placement method primarily to place instruments and piping components into pipes and signal lines. You can place off-page and utility connectors on end-points by using this method, too.

In-Line Placement Properties Dialog Box

Defines inline component placement methods. This dialog box opens when you click the **Properties** button next to the **Placement type** list when you select **InLine** on the **Items** tab of the **Rule Properties** dialog box.

- **Rotate and mirror to fit** - Enables mirroring and rotating to fit options.

- **Place only at end point** - Allows for inline placement only at an endpoint.

- **Add to line run** - Allows you to add items to a run. If you do not choose **Place only at end point**, this option is not available.

Label

 Specify **Label** placement type for rules governing the placement of a label on its target.

Snap-On

Use the **Snap-On** option to connect items without the geometric implications of the geometric placement type. It is used, for example, to connect an instrument to an instrument. Click Properties to define the options for this placement type on the Snap-On Placement Properties dialog box.

Snap-On placement supports placement of one item, the source, relative to an existing item, the target. The method assumes that symbols represent both the source and target items. Snap-on placement relies on connect points in both the source and target to define the placement configurations. When you use this placement method for an item, you specify the connect point types for both items.

You can use this placement method to place actuators on valves, TEMA ends on TEMA shells, and instrument functions on instruments. You can also use this method to place inline components, such as valves, directly on nozzles and other inline components.
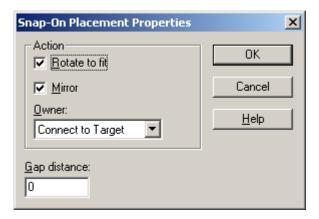
This placement method works in two ways:

- If the **Rotate To Fit** option is **True**, the software generates a configuration for each connect point in the source. Each configuration rotates the source by an angle to allow the source and target connect points to match.

- If the **Rotate To Fit** option is **False**, the software finds the one connect point on the source that matches with the target connect point. The software generates a single configuration with zero rotation.

Snap-On Placement Properties Dialog Box

Specifies placement options for the snap-on method. You can define the mirroring options, an owner for the item being placed, and a gap distance that defines the placement distance between items. This dialog box opens when you click the **Properties** button next to the **Placement type** list when you select **Snap-On** on the **Items** tab of the **Rule Properties** dialog box.

- **Rotate to fit** - Rotates the item being placed so that the connect points fit together. If not selected, the software locates the connect points and no rotation is applied.

- **Mirror** - Allows you to choose to mirror, or flip, the orientation of an item. For example, set this option if you want nozzles to always point out from the geometry of equipment.

- **Owner** - Defines how the item being placed is related to the target item. Choose from the following options:

  - **Glue To Target** - Implies items are kept together during a move. For example, when you move equipment, all components attached to it also move.

  - **Connect to Target** - Implies the item being placed is connected to the target item by means of a pipe run or a signal run.

  - **None** - Implies items you are placing are not associated and do not move with the item already placed.

- **Gap distance** - Defines the distance between your items. This distance is in meters.

Line Run

Use **Line Run** placement type for rules governing the placement of line or signal runs.

Line Run placement supports placement of one item, the source, relative to an existing item, the target. The method assumes that the source item is a line run and the target item is a symbol. Line run placement uses connect point information in the target item to calculate the placement configurations. When you use this placement method, you specify the connect point type for the target item. Do not specify connect point types for the source item.

The **Line Run Placement** method uses this placement method to attach piping and signal lines to instruments and piping components.
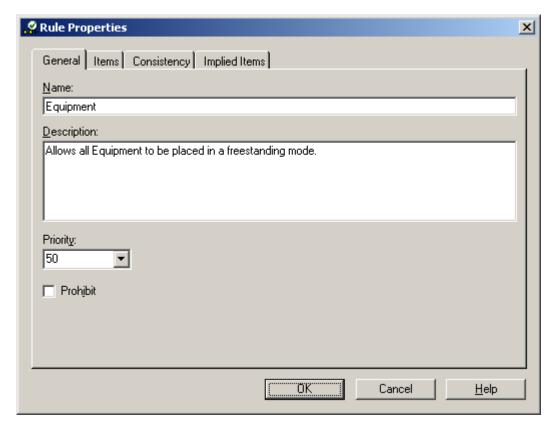
Rule Properties Dialog Box

The **Rule Properties Dialog Box** displays information about the active rule. This dialog box opens when you select a rule and click **Edit > Properties** on the menu bar or when you create a new rule. The components or properties that make up a rule are listing of the tabs **General**, **Items**, **Consistency** and **Implied Items**.

- o **General** Tab
- o **Items** Tab
- o **Consistency** Tab
- o **Implied Items** Tab

General Tab (Rule Properties Dialog Box)

Contains general information that controls the way you perform rule checking.

Name - Defines the name of the rule. If the name is blank, the software creates a new rule named **New Rule n**, where **n** is the next available number since the last new rule that you created. If you change the name of a rule, click **OK** and the new name appears in the **Rule** list.
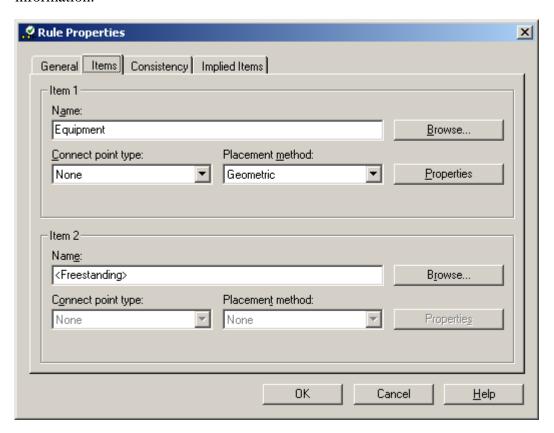
Description - Identifies the purpose or function of your rule. Rule names must be unique. In addition, you can create an Internet link by entering a URL address, which provides another way to include detailed information about a rule.

Priority - Determines which rule applies when rules conflict with each other. You can define a value from 1 to 100: 1 is the lowest priority. When you place items in a drawing, if several rules apply to the source and target items, the software selects the rule with the highest priority to control placement. When you create a relationship, if several rules apply to the source and target items, the highest priority rule copies property values first, and then each of the other applicable rules copies unpopulated property values in order. Assigning a priority is required.

Prohibit - Specifies whether to prohibit the relationship between the two items defined on the **Items** tab. When you check the **Prohibit** box, the relationship this rule describes cannot be created. If you need to, you can create an exception to a broad rule by specifying more specific filters or by using catalog items for **Item 1** and **Item 2** and checking **Prohibit**. This option works for freestanding placement as well as placement on a target.

Items Tab (Rule Properties Dialog Box)

Defines items to which a rule applies, including connect point and placement information.

Item 1 - Displays the following options for the first item involved in this rule.

Name (Item 1) - Displays either a filter or catalog item. For a new rule, the field initially appears as **<None>**. To choose an item name, click **Browse** and display the **Select Item** dialog box. **Name** is a required field.

Connect point type (Item 1) - Displays valid connect point types. This property defines the type of connect point to use when you connect one item with another. If the placement method is inline, only the connect point type for the item you are placing is valid. The **Label** and **Geometric** placement methods do not use connect point information.

Placement method (Item 1) - Defines the placement method to apply when placing an item to a target object.

Browse (Item 1) - Opens the **Select Item** dialog box. You can select a new item that is either defined by a filter or catalog item. You must specify this property for **Item 1**.

Properties (Item 1) - Displays the appropriate properties for your selected placement method. If a placement method does not have properties to specify, the **Properties** button is not available.

Item 2 - Displays the following options for the second item involved in this rule. There can be no second item, in other words, this item can be defined as freestanding.

Name (Item 2) - Appears either as a filter, catalog item, or freestanding. To select an item name, click **Browse** to display the **Select Item** dialog box.

Connect point type (Item 2) - Displays valid connect point types. This property defines the type of connect point to use when you connect one item with another. If the placement method is inline, only the connect point type for the item you are placing is valid. The **Label** and **Geometric** placement methods do not use connect point information, and this option is not available if you have not defined a second item.

Placement method (Item 2) - Defines the placement method to apply when placing an item to target object.

📝 **Notes:**
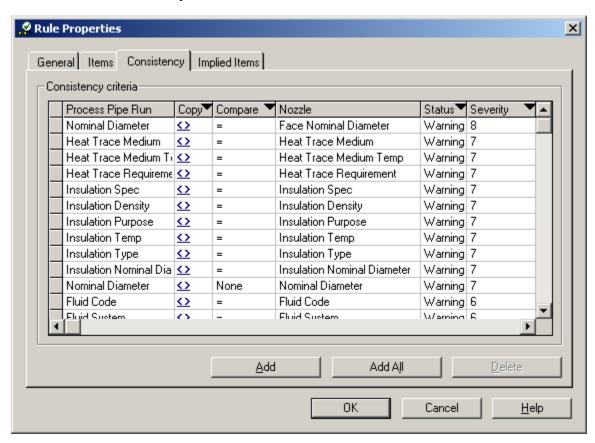
- Rules can be bi-directional. If a placement method exists for both **Item 1** and **Item 2**, then both rules are invoked when establishing such a relationship in the drawing.

Browse (Item 2) - Opens the **Select Item** dialog box, allowing you to select a new item that is either a filter, catalog item, or freestanding. Item selection is not required for **Item 2**.

Properties (Item 2) - Displays the appropriate properties for your selected placement method. If a placement method does not have properties to specify or you did not define a second item, the **Properties** button is not available.

Consistency Tab (Rule Properties Dialog Box)

Defines the consistency criteria for a rule.

Consistency Criteria - Lists the values for applying consistency criteria when items are placed in a drawing.

Property of Item 1 - Displays the name of a property from **Item 1** to be used for consistency checking and system editing.

Copy - The copy action to be performed is displayed in this column. This column controls how the property value is propagated when **System Editing** is turned on. The following table describes the possible values and their meanings.

Copy Action Symbol	Copy Action Name	At Property Modification
|	None	The property is not propagated across this relationship.
>	Copy 1 to 2 if Null	The value from Item 1 is copied to Item 2 during propagation but only if the current valued on Item 2 is Null.
<	Copy 2 to 1 if Null	The value from Item 2 is copied to Item 1 during propagation but only if the current value on Item 1 is Null.
<>	Copy Bi-directional if Null	The value can be copied in either direction during propagation but only if the current value on the target item is Null.

≥	Copy 1 to 2 Always	The value from Item 1 is copied to Item 2 during propagation.
≤	Copy 2 to 1 Always	The value from Item 2 is copied to Item 1 during propagation.
<>	Copy Bi-directional Always	The value can be

Compare - Displays how the property values from Items 1 and 2 are compared. The comparison occurs whenever any property on either item is changed. The following table describes the possible values and their meanings

Comparison Operator	Meaning
None	No comparison
=	Equal
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to
<>	Not equal

Property of Item 2 - Displays the name of a property from Item 2 to be used for consistency checking and **System Editing**.

Status - Defines the display status of the inconsistency marker when an inconsistency is generated. If this value is set to **Error**, the inconsistency marker appears as a red **X** in your drawing. If it is set to **Warning**, the marker displays a blue exclamation point. This list appears after you select the field.

Severity - Displays a list for you to specify the severity of the inconsistency. Severity displays as a number between 1 and 10.

The following columns appear when both **Item 1** and **Item 2** are used. For example, **Nominal Diameter** is frequently different in a branch as compared to the main run it connects to. Therefore you may want to set the value for **Non-colinear** to **None** for the **Nominal Diameter** property.

Colinear Copy - Defines the copy action to be used at a 3-way colinear branch. Values for this column as the same as the **Copy** column.

Colinear Compare - Defines the comparison operator to be used at a 3-way colinear branch. Values for this column are the same as the **Compare** column.

Non-colinear Copy - Defines the copy action to be performed at a 3-way non-colinear branch. Values for this column as the same as the **Copy** column.

Non-colinear Compare - Defines the comparison operator to be used at a 3-way non-colinear branch. Values for this column are the same as the **Compare** column.

The following commands can be used to add and delete rows in the **Consistency Criteria** table.

Add - Adds a new row to the bottom of the list of consistency criteria. You must select the name of the Item 1 property from the drop-down list in the first column. Default values for the remaining columns automatically displays.

Add All - Fills in the table with default values for all matching properties of **Item 1** and **Item 2**. For each matching pair, the **Compare** field is set to "=" by default, and the **Copy** field is set to **None**.
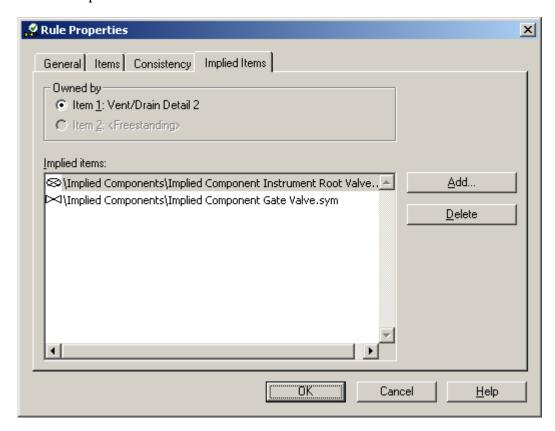
Delete - Removes the selected rows. It is enabled when one or more rows in the consistency criteria list is selected.

 Notes:

- It is possible that no matching properties can be found for the two items. If no match is found, defining consistency criteria for the two items is not possible.

- You can highlight one or several rows by clicking the row tab at the far left side. A row marker is shown to indicate the current row. Once a row or several rows are selected, you can delete the rows by pressing **Delete** or change the **Compare**, **Status**, **Severity**, and **Copy** values for selected rows by clicking on the appropriate heading and choosing from the list.

Implied Items Tab (Rule Properties Dialog Box)

Defines implied items for a rule.

Owned by - Defines the items that own the implied items you are defining.

Item 1 - Defines ownership of the implied item you are identifying.

Item 2 - Defines ownership of the implied item you are identifying. If you have not defined a value for a second item, or defined it as freestanding, this option is not available.

Implied items - Displays a list of the implied items to claim. A thumbnail icon appears beside the symbol name.

Add - Displays the **Select Implied Items** dialog box allowing you to select a catalog item, and it appears in the **Implied Items** list.

Delete - Removes the selected implied item from the list.

Using the Line Style Editor: An Introduction

The Symbology[8] page in the SmartPlant P&ID Options Manager[9] provides a specialized interface for defining the symbology to be used for drawing objects. It allows the user to select the color, line width and linear pattern to be used for items that pass certain user-defined filters. The user can select from a pre-defined set of linear patterns that are delivered with the product.

The predefined set of linear patterns is often adequate for P&ID drawing requirements. However, some customers have unique requirements for different linear patterns that are not available in the predefined set. Furthermore, some customers have a need to control less frequently used properties of linear styles that are not available on the Symbology page.

The Line Style Editor is a general purpose RAD component that provides a user interface for creating and modifying linear styles, linear patterns and point styles. This document describes how the Line Style Editor can be used to edit linear styles and linear patterns for use in P&ID.

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[8] The ProjectStyles.spp is a style file that is opened by Options Manager. Changes to the Symbology page result in changes to the styles contained in this file. This file is automatically attached to every P&ID drawing as a style resource file. The linear style definitions from the file are applied to the drawing objects that are created in the drawing. When a linear style is applied to a drawing object, it is copied from the style resource file into the drawing itself. If a single linear style is applied to multiple drawing objects, only one copy of that style is created in the drawing.

[9] Options Manager is the P&ID application that is used for defining the symbology (line styles) to be used for items in P&ID drawings. Options Manager starts an invisible RAD-based application in the background and uses it to edit the styles file.

Using the SmartPlant Line Style Editor: An Overview

All of the styles used by drawings in a P&ID plant are stored in the ProjectStyles.spp file. The Symbology page in the Options Manager is the primary user interface for working with those styles. In many cases, the user can obtain the desired graphic results by making changes directly in the Symbology page. However, if the user needs a new linear pattern or certain other advanced features that are not available on the Symbology page, the Line Style Editor can be employed to get the desired results.

The Line Style Editor is a general purpose tool for working with styles which is available from within Catalog Manager. This tool can be used to extend and customize the styles that are delivered with the product.

A special symbol file for working with styles must be created in Catalog Manager[10]. Existing styles from ProjectStyles.spp can be imported into that file. The Line Style Editor can be used to modify those styles and create totally new styles. The new and modified styles can be imported back into ProjectStyles.spp using commands in the Options Manager.

The SmartPlant Line Style Editor[11] add-in allows you to create and modify point styles, linear patterns, and linear styles through a user-friendly interface. You can create custom styles based on existing ones, modify the properties of existing styles, or delete styles that are not used or referenced by others.

Linear patterns and styles are defined by a series of strokes, called a stroke sequence. Each stroke appears either as a dash or a gap; however, point styles may be added to the stroke when necessary. The strokes, when used together in a stroke sequence, are placed in locations indicated by a stroke index, a number indicating the order in which the individual strokes appear in the sequence.

The Line Style Editor appears as a frame in the SmartSketch window. The **Line Style Editor** toolbar appears at the top of frame. A tree window displays line styles defined for the active document or within any applicable resource files, and a preview window at the bottom of the frame provides a graphic representation of selected styles.

Using the Line Style Editor, you can create the following custom tools, which are saved within the active symbol (.sym) file.

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[10] Catalog Manager is the P&ID application, based on RAD, that provides a graphical drawing environment. Used primarily for creating graphical symbols that can be placed into P&ID drawings as plant items and labels. Also used for creating and modifying line styles

[11] Line Style Editor is a RAD component that provides a user interface for creating and modifying line styles.

Point Styles - Holds graphical images used periodically throughout a line or as a terminator at the beginning or end of a line. Examples of common point styles might include arrowheads used at one end of a line or symbols drawn over a line to indicate what the line represents.

A Point Style is a RAD style component that defines a graphic symbol that can be displayed at a point. Point styles are used by linear patterns and linear styles.

Linear Patterns - Adds point styles, if applicable, to a series of dashes and gaps (strokes). When defining a linear pattern, you set the order in which dashes, gaps, and point styles appear, as well as the position of the point styles relative to the stroke.

A Linear Pattern is a RAD style component that defines a pattern of dashes and gaps. Graphical symbols defined by point styles can optionally be displayed at keypoints within the dashes and gaps. Linear patterns are used by linear styles.

Linear Styles - Provides point styles and linear patterns in a format that can be used in drawings. When you define a linear style, you provide width and color to linear patterns so they can be applied to linear geometry.

A Linear Style is a RAD style that can be applied to any linear geometry such as lines, circles, arcs, etc

📝 **Notes:**

- The SmartPlant Line Style Editor feature is available only after you install it through the Add-in Manager dialog box of the host application.

- If you are using a workshare environment, point styles, linear patterns, and linear styles should not be created at a satellite site.

- If you want to add a style to be imported into Options Manager and used for Heat Tracing, the name of the linear style should be of the form <style> Heat Trace. Otherwise, after import, the style will only be available in the Symbology view in Options Manager.

Add-Ins Included with the Software

Add-ins are commands or functions that add special capabilities to the software. To install an add-in, choose **Add-Ins** from the **Tools** menu. After you install an add-in, its commands or functions become an integrated part of the software until you remove the add-in.

Included Add-Ins

The following add-ins are included with the software and are located in the \Addins directory or one of its subdirectories. If you cannot locate the add-in on your hard

disk or network drive, select **Macro Library** or another add-in option in the **Setup** program to install these add-ins.

Add-in	Description
SmartPlant Line Style Editor	Creates custom point styles, linear patterns, and linear styles for use in the host application.

Importing Existing Styles
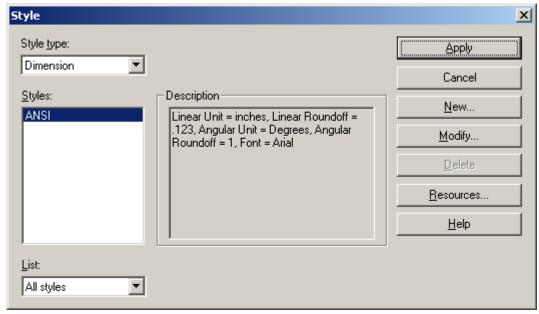
To modify one of the existing P&ID styles, the ProjectStyles.spp file should be attached to the active file as a style resource. After the resource file is attached, any of the styles from that file can be imported into the active document and edited.

Attach Style Resource File
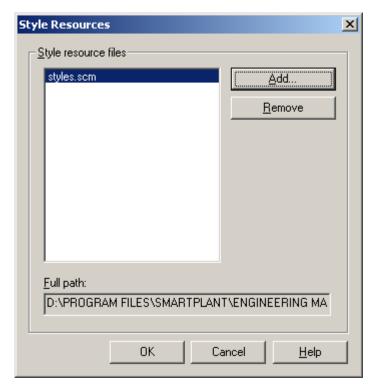
Display the Style dialog by clicking the **Style** command on the **Format** menu.

A style resource file can be attached to the active document using the **Resources** command on the **Style Resources Dialog Box**.
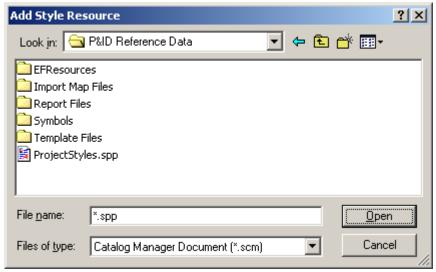
The current list of style resource files is shown in the list box. Use the **Add** button to attach a new style resource file.

Notes:

- Files with the .spp extension are not currently displayed as selectable file types. However, if you keyin the filename directly, you can attach the ProjectStyles.spp file.

- Be sure to attach the ProjectStyles.spp file for your Plant, refer to **Options Manager** > **Settings** for the path.

Style Resources Dialog Box

Lists style resource documents that are available to the current document. Resources can be any .igr document, MicroStation line style resource with an .RSC extension or SmartPlant P&ID Project Styles file. The styles in the style resource document are available for use in the current document.

Dialog Box Options
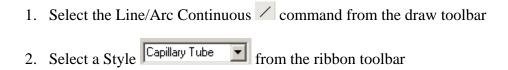
Style Resource Files - Lists the style resource documents that are attached to the current document. When you attach one of these documents to a template, the styles in the document appear on the **Style** dropdown list of the ribbon in the current document. A style is copied into the current document from the style resource document when you select this style on the ribbon. A style is also copied when you apply the style to an element or annotation on the drawing sheet. For example, if you attach DIMENSION.igr to the document, the dimension styles in DIMENSION.igr appear on the dropdown list when you select a dimension on the drawing sheet of the active document. You can then apply any of the styles to the dimension. The dimension style that you applied is then copied from DIMENSION.igr into the active document when you save it.

Add - Allows you to add a style resource document to the **Style Resource Files** list with the **Add Style Resource** dialog box. This dialog box allows you to select .RSC or .igr documents and add them to the **Style Resource Files** list on the **Style Resources** dialog box.

Remove - Removes a style resource document from the **Style Resource Files** list. You must first select a document in that list.
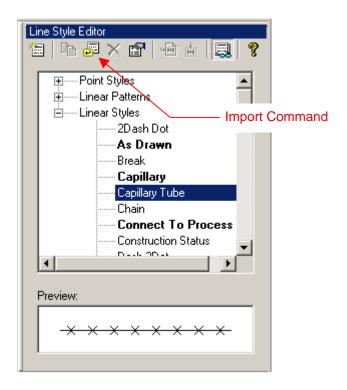
Import Styles

The styles in the active document are displayed in **bold** text within the Line Style Editor window. The styles in the resource files are displayed in normal text. Only the styles in the active document can be edited. All of the styles in the resource files are read-only. The Import command allows you to copy a style from a resource file into the active document. After a style has been imported into the active document, it is available for modification.

1. Select the Line/Arc Continuous ⟋ command from the draw toolbar

2. Select a Style Capillary Tube ▾ from the ribbon toolbar

Capillary Tube ▾ | ⟋ ⦚ ≡ | ⟵ ⟓ | Length: 0.00 in ▾ | Angle: 0.00 deg ▾

3. Import the style into the active document with the Import command.

Line Style Editor Toolbar

The following commands are available on the toolbar at the top of the Line Style Editor.

Create New Style - Creates a new point style, linear pattern, or linear style. Depending on what you have selected in the tree window of the Line Style Editor, clicking this button will open either the **Create New Linear Style**, **Create New Point Style**, or **Create New Linear Pattern** dialog box, from which you can define a new style.

Copy Style - Creates a copy of the style selected in the tree window of the Line Style Editor.

Import Style - Imports a selected style into the active document. This command is available only when you have selected a style object in a resource file.

Delete Style - Removes the selected style from the active document only if the style is not in use or referenced by another style as a base style or as a component of another style.

Properties - Opens the **Properties** dialog box for the selected style.

Place Point Style Graphics - Places the selected point style graphic into the active drawing so that it can be modified using the standard drawing tools. This command is available only if you have selected a point style in the tree.

⊞ **Define Point Style Graphics** - Defines the graphic for a point style from ordinary graphics in the active drawing. This command is available only when you have selected a point style in the tree and one or more objects are selected in the drawing.

⊞ **Show Styles in Resource Files** - Displays or hides styles from attached styles resource files in the tree window. Resource files are attached to a file using the host application.

✎ **Notes:**

- Styles that appear bolded in the tree are styles currently saved in the active document, while non-bolded styles are located in resource files.

Create Custom Point Styles
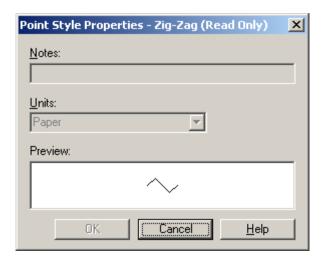
1. On the tree in the **SmartPlant Line Style Editor**, select **Point Styles**.

2. On the **Line Style Editor** toolbar, click **Create New Style** ⊞.

3. Name the new point style and add any applicable notes on the **Point Style Properties** dialog box.

4. Draw the image for the new point style in the drawing sheet.

5. Select the image using the **Select Tool** on the **Draw** menu.

6. On the **Line Style Editor** toolbar, click **Define Point Style Graphics**.

7. Click on the image to place the origin of the point style.

   ✎ **Notes:**

   - The SmartPlant Line Style Editor feature is available only after you install it through the **Add-in Manager** dialog box.

   - You can also access the **Create New Point Style** dialog box by right-clicking on **Point Styles** in the Line Style Editor tree and clicking **Add Style**.

   - Use the Redefining Point Styles procedure to define a new image for the point style or to reset the origin of the point style.

Point Style Properties Dialog Box

The **Point Style Properties Dialog Box** displays specific descriptive information and an image of the selected point style.

Notes - Enter a brief description or other useful information about the point style.

Units - Specifies the geometric definition for the point style. **World** units define the width of the point style in geometric space; **Paper** units define the width of the point style on paper. Changing the drawing scale has no effect on styles defined in **Paper** units; however, it does change styles defined in **World** units.

✎ **Notes:**

- When using the Line Style Editor to create new styles, if a linear style uses a linear pattern and/point style it is recommended that they all have the same units.

Preview - Displays the point style image.

Create Custom Linear Patterns

1. In the tree in the SmartPlant Line Style Editor, select **Linear Patterns**.

2. Click **Create New Style** 🗒 on the **Line Style Editor** toolbar.

3. On the **Create New Linear Pattern** dialog box, name the new linear pattern.

4. If applicable, select the existing linear pattern on which the new one should be based, and click **OK**.

5. Configure the settings on the **Linear Pattern Properties** dialog box as necessary.

Linear Pattern Properties Dialog Box

Displays specific descriptive information and attributes of the selected linear pattern.

Notes - Enter a brief description or other useful information about the linear pattern.

Based on - Displays the name of the pattern on which this linear pattern was based.

Units - Specifies the geometric definition for the linear pattern. World units define the width of the line in geometric space; Paper units define the width of the line on paper. Changing the drawing scale has no effect on styles defined in Paper units; however, it does change styles defined in World units.

Notes:

- When using the Line Style Editor to create new styles, if a linear style uses a linear pattern and/point style it is recommended that they all have the same units.

Phasing - Select how dashes will be displayed.

- **Normal** - Repeats the stroke sequence without altering the strokes between repetitions.

- **Auto-phasing** - Adjusts the length of stretchable strokes so that the line always starts and ends with a dash.

- **Single Stroke Sequence** - Scales the stroke sequence uniformly so that the first stroke sequence begins the line and the last stroke sequence appear at the end of the line.

Fraction of first dash(%) - Set the value, a numeric between 0 and 100, that represents the fraction of the first dash to be used as the last dash of a line when the phasing is set to Autophasing or Single Stroke sequence.

Display dashes - Indicates whether dashes in this pattern are visible.

Break on change in direction - Indicates that a break in the linear pattern occurs whenever the line changes direction.

Stroke index - Indicates the location within a stroke sequence where each stroke is displayed. Each stroke within a sequence appears as a gap or a dash. Information about the stroke located in a selected index location appears in the remaining fields in this section of the dialog box.

Dash length - Set the length of the current stroke.

- **Fixed length** - Indicates that the length of the stroke is definite and cannot be lengthened or shortened for phasing.

- **Dot** - Indicates that the stroke should be displayed as a dot.

  Notes:

  - Selecting the **Dot** option disables the **Dash length** field, as the length is set by the selection.

  - **Zero length** - Indicates that the active stroke has no length. A stoke with no length is often used as a placeholder for a point style or as the last stroke if no gap is wanted between cycles.

    Notes:

- Selecting the **Zero Length** option disables the **Dash length** field, as the length is set by the selection.

Name - Select a point style from this list box to apply to the active stroke.

Angle - Set the angle, which the point style should be rotated when it is displayed. This value is measured from the selected **Orientation**. This field is available only when you have selected an option from the **Name** list box.

Notes:

- The angle appears in the default units set in the host application; however, the field accepts any unit of measure applicable to an angle.

- A positive value in this field rotates the point style in counter-clockwise directions about its origin, while a negative value results in clockwise rotation.

Orientation - Specifies the reference from which rotation is measured, as specified in the **Angle** field. This reference may be the sheet or the line to which the point style is applied. This field is available only when you have selected an option from the **Name** list box.

- **Relative** - Indicates rotation should be calculated from the slope of the line.

- **Absolute** - Indicates rotation should be calculated relative to the sheet.

- **Always Up** - Indicates rotation should be calculated relative to the slope of the line, but that the x-axis of the point style is aligned with the line before the specified rotation is applied. In other words, if a line is horizontal, the top of the point style is aligned toward the top of the page, or if the line is vertical, the point style is aligned toward the left side of the page before the rotation is applied.

  Notes:

  - This setting allows you to ensure that text within a pattern is displayed so that it is readable from left to right or from bottom to top. Even if a line is drawn from right to left the images within the pattern are displayed as if the line was drawn from left to right.

Position along stroke(%) - Using a numeric value between 0 and 100, set the fraction into the stroke from which the X and Y offsets are measured. For example, if you set this value to 50, the offsets will be measured from the middle of the selected stroke. This field is available only when you have selected an option from the **Name** list box.

X offset - Distance along the stroke, at which the point style's origin is located. This distance is measured from the point specified in the **Position along stroke** field. This field is available only when you have selected an option from the **Name** list box.

Y offset - Distance perpendicular to the stroke at which the point style's origin is located. This distance is measured from the point specified in the **Position along stroke** field. This field is available only when you have selected an option from the **Name** list box.

Add stroke - Creates a new stroke. A new number will be added to the **Stroke index** list box, and the new stroke is made active in the dialog box.

Remove stroke - Removes the active stroke from the linear pattern. This button is available only when more than two strokes exist.

✎ **Notes:**

- You can use the **Tools** menu to toggle on/off the Line Style Editor.

- To create a solid line with superimposed point style images, create dashes and apply the point styles relative to those dashes. Then create gaps with zero length.

- When you turn off the **Display dashes** command on this dialog, point styles applied to the linear pattern are still displayed positioned relative to the invisible dashes.

Create Custom Linear Styles

1. In the tree in the SmartPlant Line Style Editor, select **Linear Styles**.

2. Click **Create New Style** on the **Line Style Editor** toolbar.

3. On the **Create New Linear Style** dialog box, name the new linear style.

4. If applicable, select the existing linear style on which the new one should be based, and click **OK**.

5. Configure the settings on the **Linear Style Properties** dialog box as necessary.

Linear Style Properties Dialog Box

Displays specific descriptive information, attributes, and an image of the selected linear style.

Notes - Enter a brief description or other useful information about the linear style.
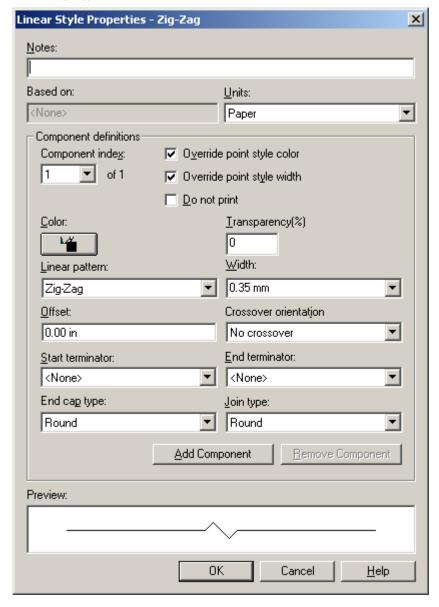
Based on - Displays the style on which this linear style was based.

Units - Specifies the geometric definition for the linear pattern. **World** units define the width of the line in geometric space; **Paper** units define the width of the line on

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paper. Changing the drawing scale has no effect on styles defined in **Paper** units; however, it does change styles defined in **World** units.

 Notes:

- When using the Line Style Editor to create new styles, if a linear style uses a linear pattern and/point style it is recommended that they all have the same units.

Component index - This list contains a number for each of the components within the linear style. Information about the component selected in this field is displayed in the remaining fields in this section of the dialog box.

Override point style color - Indicates that the color specified for this component will override the color defined for any point style used as the component.

Override point style width - Indicates that the width specified for this component will override the width defined for any point style used as the component.

Do not print - Displays objects using this linear style on screen but does print them. The option is applied per component. For example, a style can have two components, both of which will display but only one of which will print.

Color - Select the color to be used for the active component.

🖉 **Notes:**

- If the component you are defining is a point style, and the color you select is not the color with which the point style was defined, you should select the **Override point style color** check box.

Transparency (%) - Indicate how transparent the drawn line will be. Zero (percent) indicates that you will not be able to see through the line at all, while 100 (percent) indicates the line will not be visible, as it will be completely transparent.

Linear pattern - Select a defined linear pattern to use as the active component in the linear style.
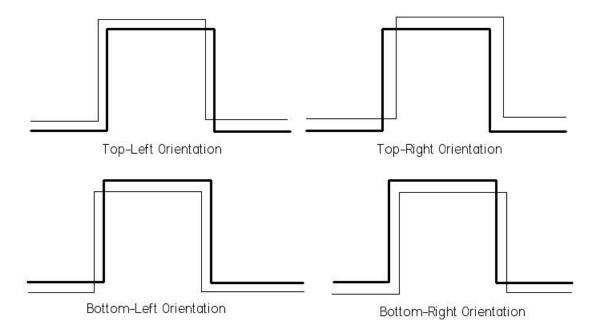
Width - Select the width to be used for the active component.

🖉 **Notes:**

- If the component you are defining is a point style, and the width you select is not the width with which the point style was defined, you should select the **Override point style width** check box.

Offset - Specify the distance the active component should be placed from the centerline of the linear style. The offset distance appears in the default length units set in the host application; however, the field accepts any distances in any unit of measure applicable to a distance.

Crossover orientation - Controls how the component with an offset crosses over the component without an offset. As such, this option is typically used on a style with two components, one of which has an offset and one which does not. In the following illustration, the darker line is the component without the offset, while the lighter line is the component with the offset and the Crossover orientation.

Top-Left Orientation   Top-Right Orientation

Bottom-Left Orientation   Bottom-Right Orientation
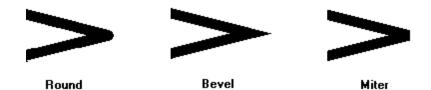
Start terminator - Select the point style with which you would like to start the line.

End terminator - Select the point style with which you would like to end the line.

End cap type - Indicate the type of cap you want to place at the end of the line. You can choose from a rounded, flat, squared, or triangular end. For examples of each type of end cap, see the following graphic.

Flat

Square

Triangle

Round

Join type - Select the kind of join you want to use for line strings and complex strings created through automation. You can choose from rounded, beveled, and mitered joints. For examples of each type of joint, see the graphic below.

Round   Bevel   Miter

📝 **Notes:**

- The selected type of joint is not applied to regular lines joined at the end point.

Add component - Creates a new component. A new number will be added to the **Component index** list box, and the new component is made active in the dialog box.

Remove component - Removes the active component from the linear style. This button is available only when more than one component exists.

Preview - Displays the linear style.

Importing and Deleting Linear Patterns

You can import new linear patterns to use in various ways in **Options Manager** > **Symbology** and delete patterns that you do not use.

Linear patterns are imported from symbol files. When you import a pattern, point styles referenced by that file are also imported. In order to assign a newly imported pattern in the **Symbology** table or heat tracing style in the **Tracing** table, you must close SmartPlant P&ID Options Manager and re-open it.

You can also delete patterns from the list of available patterns. However, if a style or pattern is in use in SmartPlant P&ID Options Manager, it cannot be deleted.

New linear patterns are created using the Line Style Editor, which is an add-on to SmartPlant Catalog Manager.

Notes:

- If you import a new pattern or style that has the same name as a pattern or style that is already listed on the **Linear Patterns** dialog box, the new information immediately overwrites the older pattern or style.

- As soon as you import linear patterns or styles, the new information is immediately written into the project styles file. There is no option to save the changes later.

- You can also import linear styles, which incorporate linear patterns, for heat tracing symbology. The words *heat trace* must appear in the name of the style in order for SmartPlant P&ID Options Manager to import the style.

Linear Patterns Command
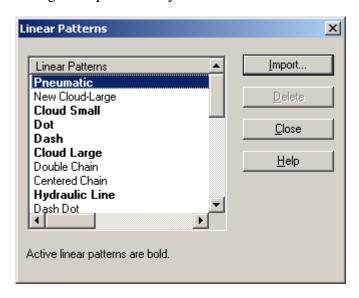
From **Options Manager**, the **Tools > Linear Patterns** opens the **Linear Patterns** dialog box, which allows you to import or delete linear patterns.

✎ **Notes:**

- You can also import linear styles, which incorporate linear patterns, for heat tracing symbology. The words *heat trace* must appear in the name of the style in order for SmartPlant P&ID Options Manager to import the style.

Linear Patterns Dialog Box

The **Linear Patterns Dialog Box** allows you to import or delete linear patterns. This dialog box opens when you click **Tools > Linear Patterns** on the menu bar.

Patterns - Lists all the available linear patterns. This list supports single entry selection only.
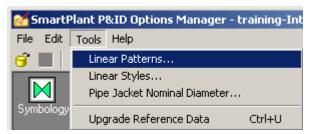
Import - Opens the **Import Linear Patterns From** dialog box, where you can browse to the file that is your linear style and import it. Linear patterns and styles are stored in symbol (.sym) files. When you import a linear pattern or heat tracing style, you must close the **Linear Patterns** dialog box and re-open it in order to see the newly imported information.

Delete - Deletes the pattern you have selected in the **Patterns** list. If a style is in use, it cannot be deleted.
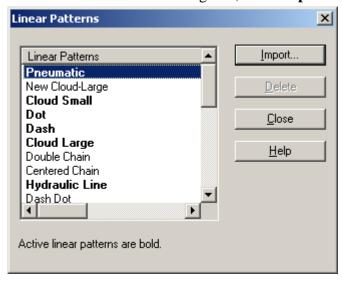
Import a Linear Pattern

🖉 **Notes:**

- If you import a new pattern or style that has the same name as a pattern or style that is already listed on the **Linear Patterns** dialog box, the new information immediately overwrites the older pattern or style.

- As soon as you import linear patterns or styles, the new information is immediately written into the project styles file. There is no option to save the changes later.

- Any supporting styles referenced by the pattern that you choose to import are also imported.

- You can also import linear styles, which incorporate linear patterns, for heat tracing symbology. The words *heat trace* must appear in the name of the style in order for SmartPlant P&ID Options Manager to import the style.

1. Click **Tools** > **Linear Patterns**.

2. On the **Linear Patterns** dialog box, click **Import**.

3. On the **Import Linear Patterns From** dialog box, browse to the **.sym** file that contains your linear pattern.

4. Click **Open**.

5. Click **Close** on the **Linear Patterns** dialog box.

Using Format Manager: An Overview

SmartPlant® Format Manager defines the characteristics and format for labels, report data, and formatted properties. Format Manager is a stand-alone manager for the plant administrator to create and edit formats. Only a plant administrator can use Format Manager.

The interface for Format Manager lets the plant administrator add or edit text properties on drawings and reports for all types of data:

Letters of the alphabet, Numbers, or Special characters, such as punctuation marks and symbols like !, @, #, %.

 Notes:

- The double-quote, ", is a special character and should not be used in format names.

Navigating in Format Manager: An Overview

You can create a new format or edit an existing format for an entire plant structure using Format Manager.

Data types are displayed at the base level on the **Tree** view as folders. Formats are displayed subordinate to the related data type. When you review the **Tree** view, notice the symbols to the left of the listed formats. A plus sign indicates that formats are stored under that data type. When you click the plus sign, the display expands to show all available formats. Conversely, in an expanded view, a minus sign appears to the left of the data type. When you click the minus sign, the display minimizes to show only the data type.

Right-clicking in the main window opens a shortcut menu where you can quickly access common commands.

The **Tree** view displays all of the available data types and formats. You can rename, edit or add a format, but you cannot add or remove a data type. Data types are pre-defined in the software. A data type is formatted data that represents text with strings; numbers with integers, fractions, decimals, and so forth; and measurements with inches, BTUs, ergs, ohms, and so forth. All data types contain formats that the design software can use.
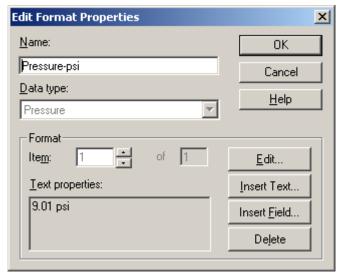
Editing Format Properties: An Overview

You use the **Format Properties** dialog box to create a new format or the **Edit Format Properties** dialog box to edit an existing format.

Format Manager supports compound formats. A compound format is a combination of format fields that make up a text format, such as **10 ft - 4 in**.

Edit Format Properties Dialog Box

Appears when you click **Properties** on the toolbar and allows the plant administrator to change an existing format for the entire plant. After the plant administrator edits a format, the Format Manager display is updated. Formats appear subordinate to the selected data type, or format folder, in the **Tree** view.

Name - Specifies the name of the format as it appears in the **Tree** view in the main window. This name must be unique and can be any combination of characters.

Data Type - Specifies the category of the format and determines where the format appears in the **Tree** view in the main window. The folder you select in the main window specifies the data type.

Delete - Removes the format definition. The software prompts you to confirm the deletion of a format.

Edit - Displays the **Field Properties** dialog box or **Text Properties** dialog box. You can use these dialog boxes to specify the properties for the selected field.

Format - Displays the format item that is currently active, lists all the format fields included for the selected text format, and contains the **Edit**, **Insert Text**, **Insert Field**, and **Delete** buttons needed to change format properties.

Item - Displays the numeric value that indicates the text format field that is currently active in **Text Properties**. You can use this list to select the portion of the format you want to edit. The scroll-up button increases the number in the **Item** list. The scroll-down button decreases the number in the **Item** list.

Notes:

- The **Item** list reflects the total number of formats and updates automatically when you add or delete text or fields.

Text Properties - Displays the format fields included in the selected text format.

Notes:

- You can create compound formats, which use a combination of fields to create a complete format. An example of a compound format is **10 ft. 4 in.** This example includes format fields for **10 ft.**, which defines the measurement in feet; and **4 in.**, which defines the measurement in inches.

Insert Text - Displays the **Text Properties** dialog box to add text to a format. This dialog box lets you append text to the text format string that is currently selected.

Insert Field - Displays the **Field Properties** dialog box to create a field. You can append a format field to the format that is currently selected.
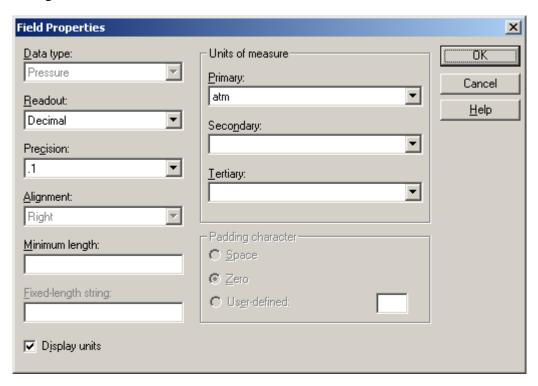
Text Properties Dialog Box

When you click **Insert Text** on the **Format Properties** dialog box or the **Edit Format Properties** dialog box, the **Text Properties** dialog box appears. If a text format is selected, this dialog box allows you to append text to the text string. If a string format is not active, the **Text Properties** dialog box allows you to append a text string. You can also use this dialog box when you are adding or editing a compound text format.

Field Properties Dialog Box

Appears when you click **Edit** on the **Format Properties** dialog box or the **Edit Format Properties** dialog box if you have selected a field in a format, as opposed to text. This dialog box also opens when you click **Insert Field** on either of the above dialog boxes.

Data type - Defines the overall category, such as **Energy** or **Length**, of the information associated with the format. Data types are delivered with Format Manager and correspond to folders in the main window. You cannot add or remove a data type.

Readout - Lists the types of characters appropriate for the format. The format changes for integers, upper case or lower case, numeric, fraction, decimal, and so forth. Choose the appropriate readout type from the list.

Precision - Lists the degrees of accuracy available that the text format uses when reporting numeric values. Choose the appropriate level of accuracy.

Alignment - Specifies the text alignment of the field. Selections are **left**, **right**, and **center**.

Minimum length - Quantifies the minimum number of characters that this field can contain. The **Padding Character** options are available if you specify a minimum length.

Fixed-length string - Defines the field as fixed in length. The **Padding Character** options are available if you specify a fixed length.

Display units - Indicates whether the unit of measure are displayed. Checking this checkbox removes the format from the Property Grid in the SmartPlant P&ID modeling environment, necessitating the modification of all labels using this new label. For example, if you want *50.00 psi* to appear as *50.00* in your label, you must create a Pressure format to display *50.00 psi* in the Property Grid and then create another Pressure format to display *50.00* in the label. The only difference between these two formats is that the **Display units** checkbox is checked for the former and not checked for the latter.

Units Of Measure - Displays the primary, secondary, and tertiary units that define the text format.

Primary - Defines the first unit of measurement that the software uses in the format.
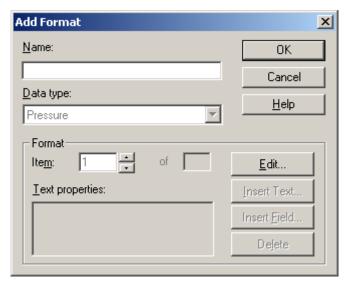
Secondary - Defines the second unit of measurement that the software uses in the format.

Tertiary - Defines the third unit of measurement that the software uses in the format.

Padding Character - Sets a filler character that constructs the remaining character in a fixed-length or minimum length string. Select the **Zero**, **Space**, or **User-defined** option to determine the padding character. This option is available only if you complete the **Fixed-length string** or **Minimum length** box.

Add Format Dialog Box

Appears when you click **Add Format** 📄 on the toolbar and allows the plant administrator to create a format for the entire plant. After the plant administrator creates the format, the Format Manager display is updated. Formats appear subordinate to the selected data type, or format folder, in the **Tree** view.

Editing Field Properties: An Overview

On the **Format Properties** dialog box or the **Edit Format Properties** dialog box, click **Edit**. For formats that have fields defined, the **Field Properties** dialog box appears and displays the characteristics of each field in the format. To change or add information, a field must be available.

Editing Text Properties: An Overview

You can add or append text to a format that you select in the main window. You can edit text properties only when you add or edit a text field.

Using Insulation: An Overview

The complex process plants of today require the use of extreme temperatures, both hot and cold, to manufacture the products that you need. To make the plants energy efficient and economical and to provide safety to workers, the use of insulation is required. Over the years, company standards have been developed that dictate the type and thickness of insulation based on temperature and other operating factors. These standards make it feasible for the design software to select the proper insulation required and automatically enter it into the database. This practice insures proper design and speeds up the design process by freeing users from the laborious and error-prone task of entering property data.

Detailed insulation thickness calculations are necessary for each pipeline and piece of equipment in a plant. However, since insulation typically comes in a standard thickness, companies commonly generate tables of data that match the thickness required versus temperature and diameter. Different tables are generated for different conditions, for example, personnel protection or energy conservation. SmartPlant® P&ID Insulation Specification Manager provides users with a way to enter their table data such that it is electronically stored so that the software can access the data as required. In other words, the software does the table look-ups for you, so you do not spend valuable time looking through stacks of insulation tables.

Navigating in SmartPlant P&ID Insulation Specification Manager: An Overview

SmartPlant P&ID Insulation Specification Manager displays a plant insulation specification file in a **Tree** view.

Folders organize specifications into insulation types: cork, glass wool, asbestos, and so forth. Within folders individual specifications are described. Open a folder by double-clicking it or by selecting the plus sign preceding the name. Review the properties of an individual specification by double-clicking it. The **Insulation Specification Properties** dialog box displays all the information about each specification.

The path to the active plant insulation specification file, which has the extension *.isl*, is defined in the reference data settings in SmartPlant P&ID Options Manager. You can change databases in SmartPlant P&ID Options Manager, open a different database in SmartPlant P&ID Insulation Specification Manager, create an entirely new plant specification file, or change the default path in SmartPlant P&ID Options Manager if you need to access a different plant file. You must have the appropriate permissions, granted in SmartPlant Engineering Manager, to open and modify plant files in SmartPlant P&ID Insulation Specification Manager.

Creating Plant Insulation Specification Files: An Overview

Each plant that you design can have different insulation specifications needs. You can create and edit plant insulation specification files with SmartPlant P&ID Insulation Specification Manager. Insulation specification files end with the extension *.isl*.

The **New** command prompts you to save the current file and then creates a new specification file. You can save insulation specification files with the other reference data, or wherever you want, by using the **Save As** command. The insulation file associated with a plant is defined in SmartPlant P&ID Options Manager in the reference data settings. You can switch between plants and specifications files by using the **Open Database** command.

You can also edit some of the properties that are associated with an entire specification file by using the **Options** command.

Creating and Editing Insulation Specifications: An Overview

Every plant has different insulation needs, and SmartPlant P&ID Insulation Specification Manager allows you to address those needs with customized insulation specifications. By creating and modifying specifications for the plant yourself, rather than using preset specifications, you ensure that the plant meets your criteria as closely as possible. This customization allows for safer, more energy- and time-efficient plant design.

By using the **Add Specification** command in SmartPlant P&ID Insulation Specification Manager, you can create custom specifications for a wide variety of uses from any standard insulating materials, with behaviors preset for use with both piping and equipment. Thickness options, layering, and exclusion filters let you create the necessary level of detail for your design. By setting up temperature and size ranges, you can create a specification that applies across a wide variety of piping systems and equipment. The temperature range refers to the operating range for the insulation specification only. It is not constrained to match any defined temperature for the item that you insulate in the design software.

By using the **Properties** command, you can modify any preset insulation specification to suit your plant design needs.

Add Specification Command

The **Edit > Add Specification** opens the **Insulation Specification Properties** dialog box so you can create a new insulation specification.

Insulation Specification Properties Dialog Box

Appears when you create a new insulation specification. You can name the specification, change temperature ranges, define equipment exclusions, and so forth. To open this dialog box without creating a new specification, select an existing specification and click **Edit > Properties**.

There are three tabs on the Insulation Specification Properties Dialog box of:

- **General Tab**
- **Piping Tab**
- **Equipment Tab**

General Tab (Insulation Specification Properties Dialog Box)

The **General Tab** sets naming options for the selected insulation specification. Additionally, this dialog box informs you if you choose options that match an existing specification.
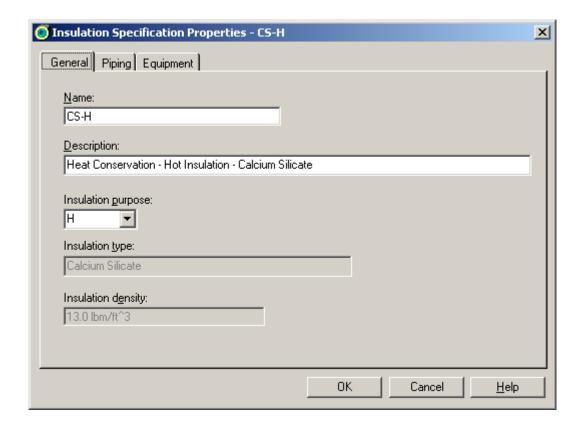
Name - Displays the name of the selected insulation specification.

Description - Allows you to enter a description of any length. This description is not required.

Insulation purpose - Lists the available insulation specifications purposes. You can choose one; if the insulation type and purpose match an existing insulation specification, you receive a warning. Insulation purposes are read from the insulation purpose select list, which you can modify by using SmartPlant Data Dictionary Manager.

Insulation type - Displays the insulation type of the selected insulation specification.

Insulation density - Displays the insulation density of the selected insulation specification.

Piping Tab (Insulation Specification Properties Dialog Box)

The **Piping Tab** allows you to specify the thickness of insulation required for a given temperature and nominal diameter range.
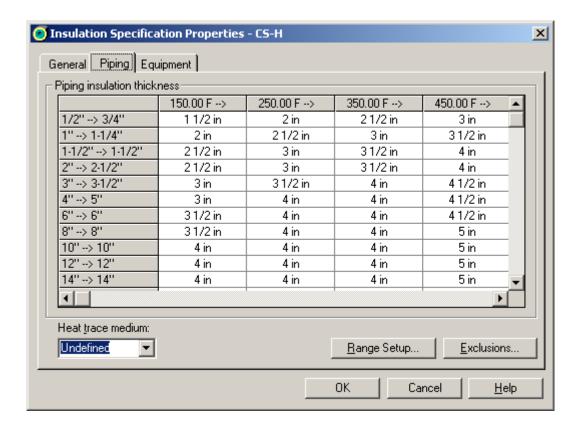
Piping insulation thickness - Displays the piping insulation thickness values based on temperature values you assign on the **Piping Range Setup** dialog box. Empty spaces are not allowed in this table.

Heat trace media - Allows you to choose the default heat trace media associated with this insulation specification.

- 'Undefined' indicates that the heat Tracing Medium is not defined or 'null'

- 'Ignore' option indicates that the software will not change or validate the Heat Tracing Medium for that Insulation Spec.

Range Setup - Opens the **Piping Range Setup** dialog box, allowing you to set up temperature ranges that appear in the top row of the **Piping insulation thickness** table and the diameter ranges that appear in the left-hand column.

Exclusions - Opens the **Insulation Specifications - Exclusions** dialog box, allowing you to apply filters to exclude the application of an insulation specification on a specific piping type.

Insulation Specification Properties - CS-H

General | Piping | Equipment

Piping insulation thickness

	150.00 F -->	250.00 F -->	350.00 F -->	450.00 F -->
1/2" --> 3/4"	1 1/2 in	2 in	2 1/2 in	3 in
1" --> 1-1/4"	2 in	2 1/2 in	3 in	3 1/2 in
1-1/2" --> 1-1/2"	2 1/2 in	3 in	3 1/2 in	4 in
2" --> 2-1/2"	2 1/2 in	3 in	3 1/2 in	4 in
3" --> 3-1/2"	3 in	3 1/2 in	4 in	4 1/2 in
4" --> 5"	3 in	4 in	4 in	4 1/2 in
6" --> 6"	3 1/2 in	4 in	4 in	4 1/2 in
8" --> 8"	3 1/2 in	4 in	4 in	5 in
10" --> 10"	4 in	4 in	4 in	5 in
12" --> 12"	4 in	4 in	4 in	5 in
14" --> 14"	4 in	4 in	4 in	5 in

Heat trace medium:

Undefined

Range Setup...   Exclusions...

OK   Cancel   Help

Piping Range Setup Dialog Box

Sets options for nominal diameter and temperature ranges for insulation when it is applied to a pipe run. You open this dialog box by clicking the **Range Setup** button on the **Piping** tab of the **Insulation Specification Properties** dialog box. This dialog box is similar to the **Equipment Range Setup** dialog box, but equipment does not require nominal diameter ranges.

Nominal diameter - Lists the available nominal diameters, which are specified in SmartPlant Data Dictionary Manager. This box also displays the ranges that result from your choices. Select values in the list, and click a value again to remove it from selection.

Temperature - Allows you to enter temperature values, constructs ranges from those values, and displays the **Resulting ranges**. Enter a temperature, and then enter another. Inspect the results.

Resulting ranges - Lists the results of your choices in diameters and temperatures.

Insulation Specification - Exclusions Dialog Box

The **Exclusions Dialog Box** allows you to define items that should not have insulation when this specification is used. This dialog box appears when you click the **Exclusions** button on either the **Piping** tab or the **Equipment** tab of the **Insulation Specification Properties** dialog box.
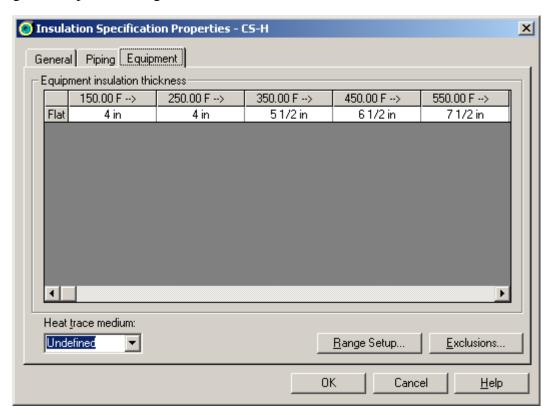
Filters - Displays the filters defining the items that cannot have this insulation specification applied.

Add Filter - Opens the **Exclusion Filters** dialog box, which allows you to select new filters to add to the **Filters** list or to view the properties of filters.

Remove Filter - Removes the selected filter from the **Filters** list.

Equipment Tab (Insulation Specification Properties Dialog Box)

The **Equipment Tab** allows you to specify the thickness of insulation required for a given temperature range.

Equipment insulation thickness - Displays the equipment insulation thickness values based on temperature values you assign on the **Equipment Range Setup** dialog box. All equipment is assumed to be flat; therefore, this tab requires only temperature values, not diameter values. Empty spaces are not allowed in this table.

Heat trace media - Allows you to choose the default heat trace media associated with this insulation specification (such as FAJ, I, SN, and so forth). Heat tracing media are defined in SmartPlant P&ID Options Manager.

Range Setup - Opens the **Equipment Range Setup** dialog box, allowing you to set up temperature ranges that appear in the top row of the **Equipment insulation thickness** table.

Exclusions - Open the **Insulation Specifications - Exclusions** dialog box allowing you to apply filters to exclude the application of an insulation specification on a specific equipment type.

Equipment Range Setup Dialog Box

Sets options and temperature ranges for insulation when it is applied to equipment. You access this dialog box by clicking **Range Setup** on the **Equipment** tab of the **Insulation Specification Properties** dialog box. This dialog box is similar to the **Piping Range Setup** dialog box, but equipment does not require nominal diameter ranges.

Equipment diameter - Allows you to specify the diameter of a piece of equipment. All equipment is assumed to be flat; therefore, this tab requires only temperature values, not diameter values.

Temperature - Allows you to define or modify the temperature range for the insulation specification.

Resulting ranges - Displays the results of the specifications that you enter in **Equipment diameter** and **Temperature**. You can delete inappropriate data from the list.

Importing Data into SmartPlant P&ID

Importing Using Spreadsheets

Currently supported Zyqad spreadsheets include the vessel equipment list, pump equipment list, and heat exchanger equipment list. You can also use the equipment list, pipe run list, and nozzle list reports from SmartPlant P&ID to create occurrences of items in the database and define properties. More SmartPlant reports will be added to the import list in the future.

The imported spreadsheet must be in a specific format. You can add other spreadsheet formats by customizing the SmartPlant P&ID Import Implementation project included with SmartPlant P&ID.

To import data select **File > Import > Data File.** SmartPlant P&ID looks for an item tag match in the SmartPlant P&ID database. If a match is found, the item is removed from the **Stockpile**, the item properties are updated in the database, and the change is reflected in the **Properties** window for the item. If no match is found, the data is written to the database, and you can place the item from the **Stockpile**.

File Format

The Zyqad spreadsheets and the SmartPlant P&ID reports that may be imported have hidden columns containing a relative path and symbol name to be placed in the stockpile when importing. Typically these columns are hidden in the spreadsheet. These hidden columns may be exposed in Excel by selecting the surrounding columns, right–clicking, and selecting Unhide.

Importing Using XML

SmartPlant P&ID supports importing Aspen Zyqad data using XML (Extensible Markup Language). Different item types can be imported in the same XML file, including PipeRun, Vessel, Exchanger, etc. You can specify as many attributes for those items as you wish.

Some beneficial characteristics of XML include that it is industry standard syntax, non-proprietary, and license free, and it is language and operating system independent. To exchange data between applications requires that those applications agree on the tags and their meanings. Zyqad formats its XML files with tags SmartPlant understands

To import data, select File>Import>Data File and select the xml file from the Windows Explorer so that it is imported into the Stockpile. The software looks at the

Item Type, Symbol Path, and attributes per Item Type. Just as with import using spreadsheets, an item is either created in the stockpile or updated on a drawing.

File Format

An XML document is composed of markup and content. Each item is enclosed in <**Item>** tags, and within those tags there are <**ItemAttribute>** tags that specify the different attribute values. In the <**Identification>** tag, there is a <**SymbolFile ...>** and a <**Classification** ...> tag that specifies the symbol file to use and the item type that is being imported.

The following is an excerpt of an XML import file that will import a vessel with an Item Tag of F-2, and define Operating Max Pressure and Liquid Level properties.

```
<?xml version="1.0"?>
<Packet>
  <Preamble>
    <Source Application="Zyqad"/>
    <Timestamp Stamp="01/14/2000 01:26:53 PM"/>
    <PreambleAttributes>
      <PreambleAttribute Name="PROJECT-NAME" Value="SPPID"/>
      <PreambleAttribute Name="WRITTEN BY" Value="flarkin"/>
    </PreambleAttributes>
  </Preamble>
  <Items>
    <Item>
      <Identification>
        <Classification ItemClassification="Vessel"/>
        <ContextSpecificIdentifier ContextId="F-2"/>
        <SymbolFile ItemSymbolFile="Equip\Vessels\Tower.sym"/>
      </Identification>
      <ItemAttributes>
         <ItemAttribute
           AttributeName="LIQUIDLEVELHIGH"
           AttributeValue="400.00000000000006"
           AttributeUnits="in"
         />
         <ItemAttribute
           AttributeName="ITEMTAG"
           AttributeValue="V-100"
         />
      </ItemAttributes>
    </Item>
  </Items>
</Packet>
```

XML Tags and Descriptions

Tag	Description

Tag	Description
<?xml version="1.0"?>	Identifies XML file & version used
<Preamble>	Preamble is ignored by SmartPlant P&ID
<Items>	Indicates beginning of the list of all item types and attributes to be imported. Must have corresponding </Items> tag
</Identification>	Defines Classification and Symbol File Classification – Database Item Type Symbol File – Path to symbol to be created in stockpile
<ContextSpecificIdentifier ContextId	This is ignored by SmartPlant P&ID.
<Item Attributes>	Indicates the beginning of the list of attributes to be imported for that item type
<Item Attribute>	Attribute to be imported for that item type AttributeName – Derived from DDM Property Name (not display name). Must be in double quotes Attribute Value – Must be in double quotes. Specify the actual value even for select listed values (do not use index number) AttributeUnits – Specify if attribute has units of measure. Must be a valid format. ITEMTAG attribute MUST be one of the attributes listed.

Generating Reports: An Overview

Reporting is the process of retrieving information from the database and displaying the information as formatted output. At any time during the design creation process, you can create a report. Each report consists of a Microsoft Excel workbook and a report definition, which describes the data to collect and how to organize the data in the workbook.

Each report that you create is based on an item type. This item type serves as the starting point for collecting data for your report. Examples of item types include equipment, nozzle, instrument, and pipe run. Several default report templates already exist; however, reports are fully customizable. You can create your own reports that contain the information that you want to see in a format you choose.

The relationships that exist between the various item types constitute additional available information for a report. For example, a nozzle is related to the equipment with which it is grouped. When creating your report, only items that have a relationship with your selected item type can be used as input. In order to discover how items and their properties are related, and thereby how you can map the properties that you want into your report templates, see the *Properties Glossary*, which is included in the glossaries attached to online Help.

Your report definition contains one or more report items organized in a tree hierarchy. Each report item is based on an item type. Each report contains at least one report item to define the item type of the report. For example, a report based on the equipment item type contains a report item named **Equipment**. This report item makes the properties associated with each piece of equipment available for inclusion in your report; however, you do not have to include every available property in your report if it is not appropriate. You can define additional report items to access more properties for more item types. For example, a nozzle report item can be added to access data about nozzles because nozzles and equipment are related.

The location of a report item in the tree hierarchy affects the properties that are collected for the associated item type. For example, if a nozzle is added as the top-level item in the tree, all nozzles in the database are collected for your report. If the nozzle is added as a child of **Equipment: Mechanical**, only the information about nozzles that are associated with pumps is collected.

You begin your reporting process by selecting a report template from the **Reports** menu and then selecting items in the drawing for inclusion in your report. Then the software performs the following tasks:

1. Microsoft Excel starts. The report template is copied to the report output folder, and then the Excel workbook opens.

2. Your report definition is retrieved from the Excel workbook.

3. Your data is retrieved based on the report item definitions of the report template.

4. Data prints to the Microsoft Excel workbook using the cell mapping data in your report definition.

Notes:

- You must have installed Microsoft Excel on your computer to display reports.

- The software stores the reports that you generate in your Windows directory under **\Profiles*username*\My Reports\Output** as defined in the smartplantpid.ini file.

Creating and Editing Report Templates: An Overview

Although the software includes several default report templates, such as Equipment List and Pipe Run List, you create your own custom report templates or modify the delivered templates in order to gather and display the specific information that you want. So the software allows you to define report templates in several different formats and with all manner of information from the design database.

You can create report templates in three different formats:

- Tabular
- Fixed
- Composite Format Report

The delivered report templates are all tabular format reports. Fixed format templates allow the greatest amount of freedom in formatting your report, and composite report templates combine tabular and fixed formatting.

Not only can you completely control the format of your report, but you can control the content of the template also. Each report is based on a unique item type, and the properties that are associated with that item type are readily available to include in your report. In addition, any item that is related in any way to the basic item type of your report makes its properties available to include in the definition of your template, too. For instance, the properties of inline components and instruments can be used in a pipe run report because inline components are related to their pipe runs. In order to discover how items and their properties are related, and thereby how you can map the properties that you want into your report templates, see the *Properties Glossary*, which is included in the glossaries attached to online Help.

Portable report templates

In previous versions of the software, when a property is mapped to a report template, the template file stores an internal identifier for that property; thus, that report template is tightly linked to the plant that creates the property. Now the property *name* is mapped into the report template; therefore, as long as all plants use the same property name, the same report template is valid.

Tabular Format Report

All the delivered report templates are tabular format reports. When the report is generated, all properties populate the report by using the same format defined for the first row. In other words, tabular format reports are row-based. The **Options** command on the **SmartPlant Reports** toolbar is important for setting aside space for the header and empty rows between lines in the report because the placement of report item properties is restricted in the tabular format report template.

For example, the report template for an Equipment List can appear like this:

Equipment Name	Equipment Description	Equipment Type
#Equipment::Name#	#Equipment::Description#	#Equipment::Type#

When the report is generated, the output appears like this:

Equipment Name	Equipment Description	Equipment Type
D-100	Horizontal Drum 100	Horizontal Drum
T-100	Potable Water Tank	Vertical Tank

Fixed Format Report

The fixed format report creates one Microsoft Excel worksheet for each item. When defining the report template, you only edit the first worksheet. When you generate your report, all fixed format worksheets, one for each item of the report item type, follow the format of the first Microsoft Excel worksheet. The **Options** button on the **SmartPlant Reports** toolbar is not available for editing a fixed format report template because you are free to place headers and data anywhere you want on your worksheet.

Composite Format Report

The composite format report template is a combination of fixed and tabular format reports. In your Microsoft Excel workbook the first sheet contains the fixed format report, and the second sheet contains the tabular format report. You choose your report format on the **Report Properties** dialog box.

Edit Command
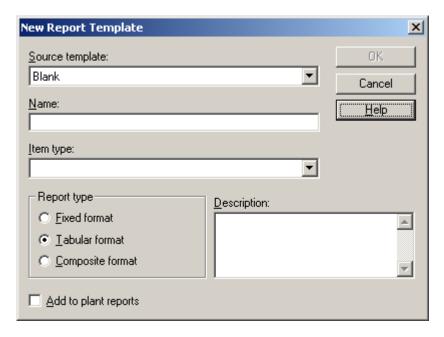
Opens the **Edit Report Template** dialog box. This dialog box lists all the available report templates. You can select a template and view its properties and edit it in Microsoft Excel.

New Command

The **Reports > New** command displays the **New Report Template** dialog box. This dialog box provides options for defining plant-level and user-level templates. You can assign source templates, names, formats, and descriptions for your report template and define the item type upon which you base your report. You do not have to edit the report template when you first create it.

New Report Template Dialog Box

The **New Report Template Dialog Box** displays options for creating plant-level and user-level report templates. This dialog box opens when you click **Reports > New** on the main menu bar.

Source template - Lists the names of all existing report templates and **Blank**. You select a user-level template, plant-level template, or **Blank**. The **Blank** option creates a Microsoft Excel workbook with no predetermined formatting information. If you chose **Blank**, you must specify an item type; whereas, if you do not chose **Blank**, the item type automatically displays the item type that corresponds to your source template. Templates in this list appear in alphabetical order.

Name - Allows you to enter a meaningful name to describe the report that you are creating. This name matches your Microsoft Excel workbook. The software appends .xls to the name when you save the Excel workbook.

Item type - Defines the item properties available in your report. If you do not select a **Blank** source template type, then the **Item type** option automatically displays the item type that corresponds to your source template.

Report Type - Specifies your report format. Available options include fixed, tabular, and composite. All delivered report templates are tabular format.

- **Fixed format** - Creates one Microsoft Excel worksheet for each item. You only edit the first worksheet, but all fixed format worksheets, one for each item of the report item type, follow the format of the first worksheet when you generate your report. The **Options** button on the **SmartPlant Reports** toolbar is not available for editing a fixed format report template because you are free to place headers and data anywhere you want on your worksheet.

- **Tabular format** - Formats your report in a table. That is, the properties of each item included in your report begin on a unique row, or the template format is row-based. All delivered reports are tabular format.

- **Composite format** - Formats your report in a combination of fixed and tabular formats. The first sheet in the workbook is **Fixed format**; the second sheet is **Tabular format**. Subsequent fixed format worksheets are created after sheet two for each item of your report item type when you generate your report.

Description - Describes the report type that this template produces. You can assign any description.

SmartPlant Reports Toolbar

The **SmartPlant Reports Toolbar** appears when you are editing or creating a report template in Microsoft Excel.

- Define
- Options
- Map Properties

✎ **Notes:**

- If the SmartPlant **Reports toolbar** is missing when editing report templates in Microsoft Excel, then click **Tools > Macro > Visual Basic Editor** in Excel and follow the steps below:

  1. Select **View** > **Immediate Window**.

  2. Type **Sheet1.Application.CommandBars("SmartPlant Reports").Delete** in the **Immediate** window.

  3. Quit Excel, and the toolbar is displayed the next time a report is edited.

Define Command

The **MS Excel > SmartPlant Reports Toolbar > Define** command opens the **Define Report Contents** dialog box, which allows you to define a report template specifying the layout and contents of your report. This template is a Microsoft Excel workbook that contains cells and worksheets. You map properties to the individual Microsoft Excel cells to define the content and layout of your report.

To create a report definition (a list of report item properties available to include in your template), use the **Define Report Items** dialog box, which opens when you click **Define** on the **Define Reports Contents** dialog box. A report definition describes how to collect the properties data and how to format it in a report. Each report item is based on an item type (equipment, nozzle, pipe run, instrument, and so forth) and controls how the properties of that item type, or item types related to it, are retrieved from the database.

Use the **Options** command on the **SmartPlant Reports** toolbar to designate space for your header and to specify the number of blank lines that you want between rows of data on your report. The **Options** command is not available for fixed format report templates because you are free to place headers and data anywhere you want on the worksheet.

In order to define the layout of the report item properties, you assign properties to particular cells. Select the cell and then select the property from the **Map Properties** menu on the **SmartPlant Reports** toolbar.

✎ **Notes:**

- In order to generate **From** and **To** data for all Microsoft Excel worksheets, click **Tools > Macro > Macros > PrintFromToDataForAllSheets** in Excel. Choose the **PrintFromToDataForActiveSheet** macro to generate this data for only the active worksheet.

Define Report Contents Dialog Box
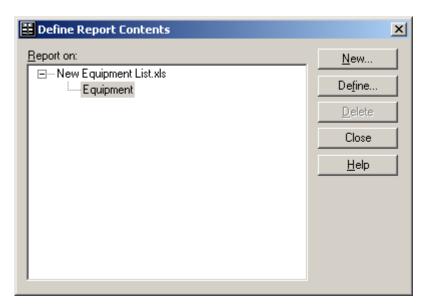
The **Define Report Contents Dialog Box** defines new items to include in your report and selects the cells to include for the new items. This dialog box opens when you click **Define** on the **SmartPlant Reports** toolbar.

Report on - Displays a tree view of item types available for inclusion in your report template. To include the properties, you must select an item from the **Report on** list and click **Define**. Then you can map the properties that you select to cells in your report template.

New - Displays the **New Items** dialog box. You use this dialog box to specify new item types to include in the **Report on** tree. If you add a new item type, its properties are available for inclusion in your report template.

Define - Displays the **Define Report Items** dialog box. For the selected item in the **Report on** tree, you define the properties that you want available for inclusion in your report template.

Delete - Removes an item from the tree view and from your report structure. Its properties are no longer available for your report template.

🖉 **Notes:**

- The level into which you add an item type affects the properties that you can access for your template. That is, a new item type added into the hierarchy under another item type does not give you access to the same properties that you have if the item type is higher in the hierarchy. For instance, if you add the equipment item type under nozzles, the equipment item type only reports on equipment associated with a nozzle, and equipment without nozzles is not reported.
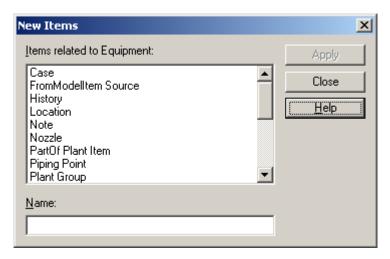
New Items Dialog Box

Opens when you click **New** on the **Define Report Contents** dialog box and displays a list of items that are related to the item that you selected there. Select an item type to make its properties available to include in your report.

Apply - Adds the selected item type to the **Report on** tree on the **Define Report Contents** dialog box. The software adds this item type as a child of the item type selected on the **Define Report Contents** dialog box.

Notes:

- The level into which you add an item type affects the properties that you can access for your template. That is, a new item type added into the hierarchy under another item type does not give you access to the same properties that you have if the item type is higher in the hierarchy. For instance, if you add the equipment item type under nozzles, the equipment item type only reports on equipment associated with a nozzle, and equipment without nozzles is not reported.

Items related to - Displays a list of item types related to the item type that you selected in the **Report on** tree on the **Define Report Contents** dialog box. Select item types from this list to include in your report template. The properties of the new item types are then available to use in your report.
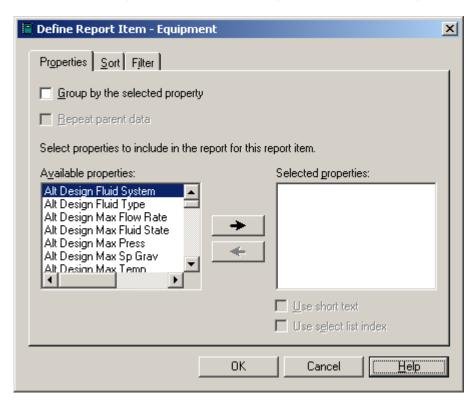
Name - Displays the name of the selected item type. You can rename the item. If you have duplicate item type names in your report item type hierarchy, the software prompts you to rename the new item type uniquely.

Properties Tab (Define Report Items Dialog Box)

The **Properties Tab** displays properties for a report item so you can select properties to use in your report template. This tab is part of the **Define Report Items** dialog box, which opens when you click **Define** on the **Define Report Contents** dialog box.

Group by the selected property - Automatically adds a special Report Item Group Total property to the Map Properties menu on the SmartPlant Reports toolbar. The Report Item Group Total property displays the number of items that have identical reported properties. If you want to tally similar items in this way, be sure not to map unique properties, such as item tags, onto your report. If you do, then items are never grouped together because a unique tag is a property that items never share. For

example, you can use this feature to give you the total numbers of valves with 1" nominal diameter, 1.5" nominal diameter, 2" nominal diameter, and so forth.

Repeat parent data - Displays the cells of parent item data in your report. For example, if your report contains Unit then Drawing as a child of Unit, selecting this option for Drawing causes repetition of Unit cells on any line containing Drawing cells.

Available properties - Displays all properties for the report item you specified on the **Define Report Contents** dialog box.

Selected properties - Lists the report item properties you have selected from the **Available properties** list that are consequently available for inclusion in your report.

Left Arrow - Moves the selected item in the **Selected properties** list to the **Available properties** list. You can select more than one item by using the **Shift** and **Ctrl** keys and then clicking the left arrow. Also, double-clicking an item in the **Selected properties** list moves it to the **Available properties** list.
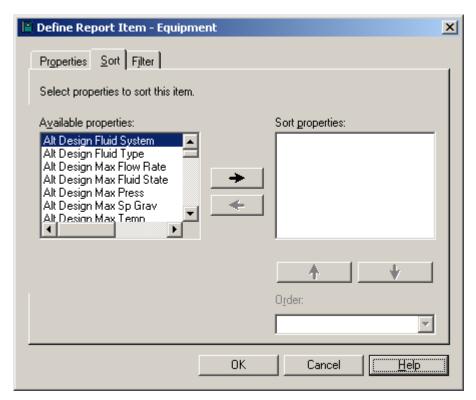
Right Arrow - Moves the selected item out of the **Available properties** list and into the **Selected properties** list. You can select more than one item by using the **Shift** and **Ctrl** keys and then clicking the right arrow. Also, double-clicking an item in the **Available properties** list moves it to the **Selected properties** list.

Use short text - Displays the short text value, which is defined in SmartPlant Data Dictionary Manager. Only select-listed properties can be displayed in their short value form. In a few cases, the short value is longer than the regular value.

Use select list index - Includes the numerical index of the select entry along with either the short value or select list value for that property. For more information about select lists and their values and indices, see *SmartPlant Data Dictionary Manager Help*.

Sort Tab (Define Report Items Dialog Box)

The **Sort Tab** defines the cells that you use to sort the report items and how. This tab is part of the **Define Report Items** dialog box, which opens when you click **Define** on the **Define Report Contents** dialog box, which, in turn, opens when you click **Define** on the **SmartPlant Reports** toolbar.

Available properties - Lists all the properties of your report item.

Down Arrow - Moves the selected item down in sorting priority.

Left Arrow - Moves the selected item in the **Sort properties** list to the **Available properties** list. You can select more than one item and then click this button. Also, double-clicking an item moves it to the **Available properties** list.

Order - Specifies the sorting order (ascending or descending) for the report data.
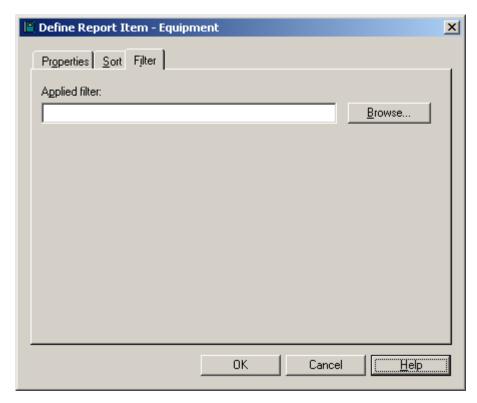
Right Arrow - Moves the selected item in the **Available properties** list to the **Sort properties** list. You can select more than one item and then click this button. Also, double-clicking an item moves it to the **Sort properties** list.

Sort properties - Displays the properties selected for sorting.

Up Arrow - Moves the selected item up in sorting priority.

Filter Tab (Define Report Items Dialog Box)

Defines the filter that you want to use for your report item. This tab is part of the **Define Report Items** dialog box, which opens when you click **Define** on the **Define Report Contents** dialog box, which, in turn, opens when you click **Define** on the **SmartPlant Reports** toolbar.

Applied filter - Displays your selected filter. To select a new filter, type a valid filter name or click **Browse** to locate a filter.

Browse - Displays the **Select Filter** dialog box, which allows you to choose or to further define item types for your report template.

Report Options Dialog Box

The **Report Options Dialog box** specifies the number of empty rows between items in your report and the number of rows in your report header. This dialog box opens when you click **Options** on the **SmartPlant Reports** toolbar in Microsoft Excel.

Skip lines between rows - Defines the number of blank lines between each row in your report. You can enter a value in the box or use the scroll buttons to select a value. The maximum value allowed is 1000.

Rows in report header - Specifies the number of rows in your report header.

✎ **Notes:**

- The **Options** command is available for tabular and composite format report templates only. It is not available for fixed format report templates because you are free to place captions and properties in any configuration that you want. In fixed format report templates, you are not constrained to have a header or rows at all.

Map Properties Command

The **MS Excel > SmartPlant Reports Toolbar > Map Properties** displays a menu of all properties associated with your report. This menu is populated with the items that you define with the **SmartPlant Reports** toolbar **Define** command. The **Map Properties** menu contains a subset of all the properties in the plant database.

You can select a cell in your report template and then assign a property from the **Map Properties** list. The software places the corresponding property in the selected cell. You do not have to map all the properties in the **Map Properties** menu, and you can add properties to the menu by using the **Define** command again.

Delete Command

The **Reports** > **Delete** command displays the **Delete Report Template** dialog box, which allows you to select and delete a report template.

Running Reports

You can run a report from the drawing view or the Engineering Data Editor (EDE). The EDE allows the display of data from multiple drawings or the whole project. If you want to run a report on drawing items, use the **Reports** menu; if you want to run a report on table items, use the **Engineering Data Editor View** menu.

Plant Reports Command

The **Reports > Plant Reports** command opens the **Plant Reports** dialog box, which displays a list of all plant-level reports associated with the current plant. This list is alphabetical. The location of these report templates is defined in Options Manager. Selecting a plant report from this list and specifying the items that you want to report on generates the associated report in Microsoft Excel.

This command is available on the **Reports** menu on the main toolbar and also on the **View** menu in the **Engineering Data Editor**. If you have a drawing in the **Design** window and you want to report on items in that drawing, use this command from the **Reports** menu. If you want to run a report based on items in your **Engineering Data Editor**, use this command from the **Engineering Data Editor View** menu.

Reporting from the Active Drawing

To run a report against an active drawing or group of selected items in a drawing, click **Reports>Plant Reports**. This will bring up the **Plant Reports** dialog box.

Plant Reports Dialog Box
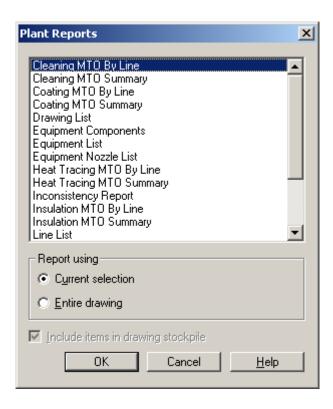
The **Plant Reports Dialog Box** allows you to choose a report and specify what items to report on.

This dialog box opens either when you click **Reports > Plant Reports** on the main toolbar or when you click **View > Plant Reports** on the **Engineering Data Editor** toolbar. If you want to run a report on drawing items, use the **Reports** menu; if you want to run a report on table items, use the **Engineering Data Editor View** menu.

Current Selection - Produces a report containing the items currently selected in your drawing or table. This option is not available if no drawing or table items are selected. You cannot choose the **Include items in drawing stockpile** option when you choose **Current Selection**.

Entire drawing - Produces a report containing the contents of the entire drawing. This option is available only when you use the **Reports** menu command.
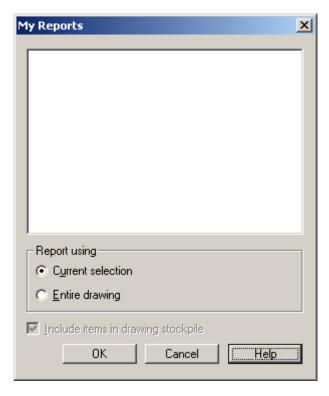
Include items in drawing stockpile - Allows you to specify whether or not you want items that reside in the drawing stockpile in your report. This option is available only when you use the **Reports** menu command.

My Reports Dialog Box

The **My Reports Dialog Box** allows you to choose one of your custom reports and to specify what items to report on.

This dialog box opens either when you click **Reports > My Reports** on the main toolbar or when you click **View > My Reports** on the **Engineering Data Editor** toolbar. If you want to run a report on drawing items, use the **Reports** menu; if you want to run a report on table items, use the **Engineering Data Editor** menu.

Report using - Displays options for specifying the scope of your report. The options that appear in this area depend on the view, Drawing view or **Engineering Data Editor**, that is active when you access this dialog box.

Current Selection - Produces a report containing the items currently selected in your drawing or table. This option is not available if no drawing or table items are selected. You cannot choose the **Include items in drawing stockpile** option when you choose **Current Selection**.

Entire drawing - Produces a report containing the contents of the entire drawing. This option is available only when you use the **Reports** menu command.

Include items in drawing stockpile - Allows you to specify whether or not you want items that reside in the drawing stockpile in your report. This option is available only when you use the **Reports** menu command, not the **Engineering Data Editor** command.

📝 **Notes:**

- To utilize a **My Report Template** as a **Plant Report Template** move the template into the folder for the **Plant Report Templates** as defined in **Options Manager** > **Settings** > **Default Report Template Path**. The location for the **My Report Template** location is defined by **Tools** > **Options** > **Files** from within **SPPID**.

SmartPlant Data Dictionary Manager: An Overview

SmartPlant® Data Dictionary Manager allows you to modify properties of the data model, including the database entries, select lists, and item types that form the underlying data structure. To open Data Dictionary Manager, click **Start > Programs > Intergraph SmartPlant P&ID > Data Dictionary Manager**.

Data Dictionary Manager Tasks:

- Add and change properties for specific database tables

- Create select lists

- Add entries to select lists

- Associate validation programs with various item types

Each task is essential for day-to-day operation of the software.

✎ **Notes:**

- Because your changes can affect the database for the entire plant, only system administrators and plant managers typically customize the database with Data Dictionary Manager.

- If you open and change your data dictionary from SmartPlant Engineering Manager, you must restart SmartPlant Engineering Manager for it to reflect any changes made in Data Dictionary Manager.

Navigating in Data Dictionary Manager: An Overview

SmartPlant Data Dictionary Manager is divided into four main functions, each of which is accessed by a command button on the left side of the main window:

- **Database Tables**

- **Database Item Types**

- **Select List**

- **Select Entry**

Click a command button to open a detailed view in the main window.

Commands on the **Edit** menu and on the toolbar have varying availability depending on the current selection in the main window. For each functionality and its corresponding detailed view in the main window, a shortcut menu opens when you right-click in the main window.

Because some of the specifications that you create for properties in Data Dictionary Manager require information about filters and formats, you can use special commands on the toolbar and the **Tools** menu that open SmartPlant Filter Manager and SmartPlant Format Manager.

You can save your changes and close a session of SmartPlant Data Dictionary Manager using commands on the **File** menu.

Managing Database Tables: An Overview

In Data Dictionary Manager, you can view and customize various groups, components, and properties that compose the drawing database. For each table in the database, you can define its properties or items. These tables make up the data model, and their properties can be unique or common in several tables in the database.

With Data Dictionary Manager, you can control the display, calculation, format, data type, and other properties for groups, such as equipment, nozzles, equipment components, instruments, pipelines, piping components, inline instruments, signal lines, and plant groups.

Managing Database Table Properties
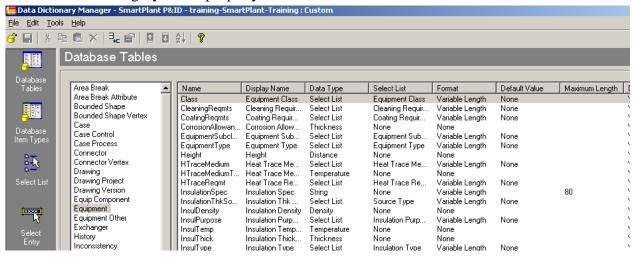
With database table properties, you can control various aspects of the database. These properties are characteristics or items in a particular database table.

You can define properties for items that you need to work with in drawings, as well as properties for items that you need in the background to run the software. You can also define class IDs of programs that validate and calculate specific properties.

You can define a combination of the following attributes for each property:

- Name (required)

- Display name used for the property in the Properties window, if it differs from the database name

- Type of data associated with the property

- Select list that defines possible choices for the property, if applicable

- Format for the property

- Default value of the property, if applicable

- Maximum length of values for the property, if the data type is a string

- Calculation or validation program ID associated with the property, if applicable

- Category of the property

You can also determine whether you want users to see each database property in the drawing software and whether you want users to see the property when creating filters in Filter Manager.

After you define properties, you cannot change the values for the name, data type, or maximum length of the property. You can make changes to the select list for the property if the selected data type has a select list associated with it. Changing the select list for a property can affect the integrity of previously saved data for that property. You can make changes to any other attributes of the property at any time.

✎ **Notes:**

- New properties do not require specification of the **Format** attribute in order to appear in the design software. However, properties with **Format** equal to none do not appear in the plant data dictionary when opened from SmartPlant Engineering Manager.

- We recommend using ASCII characters for internal names of added properties. When using the Data Dictionary Manager to add a new property, you must enter an internal name and a display name. It is possible to enter non-ASCII characters for both the internal name and the display name. (For example, on a Japanese client machine, it is possible to enter Japanese characters for these two names.) This works fine as long as the plant database is always accessed from client machines that are setup with the same locale. However, if the plant database is accessed from a client machine with a different locale setting, a failure may occur. (For example, using a client machine that is setup for American English to open a drawing in a plant that
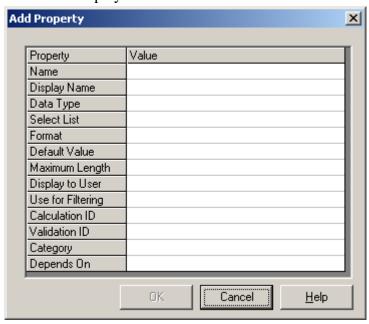
has had a Japanese property added will fail.) To avoid this potential failure, we recommend that all internal names for properties added through the Data Dictionary Manager are always entered using ASCII characters.

Add/Modify Property Dialog Box

The **Add/Modify Property Dialog Box** allows you to add and modify properties of database tables. When the main window displays the **Database Tables** view, the **Add Property** dialog box opens when you click **Edit > Add Property**, and the **Modify Property** dialog box opens when you double-click on a property.

![pencil icon] **Notes:**

- When you first create an item type, you use the **Database Tables** view. However, when modifying item type properties, be sure to use the **Modify Item Type Properties** dialog box accessed from the **Database Item Types** display, not in the **Modify Properties** dialog box accessed from the Database Tables display.

The **Value** column provides a place for you to enter or modify values for properties. After you save a property, you cannot change values for the name, display name, data type, or maximum length.

Name - Specifies the name used for the property in the database. You can select from a list of all existing property names or type a new name for the property. If you select an existing property name, the software automatically populates the following other fields: **Data Type**, **Select List**, **Format**, **Default Value**, and **Maximum length** property fields.

Notes:

- To avoid internal conflicts within the database, property names cannot begin with SP_. After you define a name for a property, you cannot change the name, but all properties must have a name defined for them.

- We recommend using ASCII characters for internal names of added properties to avoid potential failure if the plant database is accessed from a client machine with a different locale setting.

The **Display Name** is stored in three database tables: the data dictionary attributes table, uniqueatts table, and the ItemAttributions table. The entries in the ItemAttributions tables are the ones shown in user interfaces (that is, in the Properties window within SmartPlant P&ID). The uniqueatts display name is not used outside the data dictionary manager.

Notes:

- After you add an attribute/property to a table, changing the **Display Name** in Database Tables does nothing but update the text in the *DisplayName* column in the uniqueatts table. When adding an attribute to a table, the **Display Name** is propagated to all of its newly created occurrences in the Database Item Types. To make a change after creation, you must manually update the individual instances of the display name in the Database Item Types.

Data Type - Specifies the type of data associated with the selected property, such as string, number, or mass. Each unit of measure is also a data type. You can use only standard data types for properties. You cannot change the **Data Type** for a particular property after you save the property.

Select List - Specifies the select list that you want to associate with this property in the design software. If you select a list for this property, users choose a value for this property from the select list instead of typing a value for the property.

Notes:

- If the **Data Type** selected for the property can have a select list associated with it, you can select or change the list for the property at any time. However, changing the select list for a property after you use the property in the design software can affect the reliability of previously saved data.

Format - Specifies the format for the **Data Type** that you selected for this property. If you defined a plant-wide default format for the data type in the Options Manager, the default format appears here when you select a data type for the property. You can change the default format for this particular property in Data Dictionary Manager.

Default Value - Specifies the value that you want to appear by default for the selected property in the design software. The default value for a property must be consistent with the data type, select list, and format selected for the property. This

option is not available until you select a data type. The methods of entry and available options for this field vary, depending on the data type of the property. For example, if the **Data Type** defined for this property is a number, the **Default Value** must also be a number.

Maximum Length - Specifies the maximum number of characters that users can enter for the selected property. You can define maximum length only when the **Data Type** of the selected property is a string. This value must be a non-zero positive number.

Display to User - Specifies whether the selected property should appear to users in the design software, such as in the **Properties** window. Choose **Yes** when you want the property to appear in the software.

Use for Filtering - Specifies whether this property can be used for defining filters in Filter Manager. If this property is used for creating filters, all items in the database associated with this property appear when users select the filter in other software. Select **Yes** when you want the property to appear in the software.

Calculation ID - Specifies the program ID of the program that is used to calculate specific aspects of the property. For example, if you define a calculation ID for a particular property (such as nominal diameter), you can launch the associated program to calculate the nominal diameter of a piping line by specifying the program ID in Data Dictionary Manager.

Validation ID - Specifies the program ID of the outside program that you want to use to verify that the data entered for this property is correct, if such a program exists.

Category - Specifies the category that you want to use to group the selected property. You can use categories to group and display properties with similar characteristics by category, instead of alphabetically, in the categorized view of the **Properties** window. You can define additional categories by using the **Select Entry** option.

Depends on - Allows you to create a parent-child relationship between two select list properties. An example of this type of relationship is InstrumentClass and InstrumentType for Instruments. This relationship allows the software to automatically set InstrumentClass when InstrumentType is set since each item in the InstrumentType select list is related to a specific row in InstrumentClass.

This relationship is created by first relating the two select lists using the **Select List** task. In this case, the Instrument Component Type list is dependent on the Instrument Component Class list.

Then, using the **Database Tables** task, define the two properties using the two related select lists. Set **Depends on** for the property that uses the dependent select list.

Understanding Database Constraints

Database constraints improve the integrity of the data associated with your design.

The Foreign Key Constraint insures that the corresponding value (unless it is null) exists in the table referenced by the foreign key. This type of constraint is used to enforce logical relationships, such as the plant item to plant group relationship.

The Foreign Key Constraint in conjunction with the Not Null constraint is similar to the Foreign Key Constraint described above but in addition does not allow null values to persist. This type of constraint is used to enforce group relationships, such as the case to model item relationship.

The Foreign Key Constraint in conjunction with the Not Null and the Unique constraints is again similar to the Foreign Key Constraint described above but in addition does not allow null values to persist and requires all values are unique. This type of constraint is used to enforce all subclass and one-to-one relationships, such as the pairing of OPCs.

The constraints so far described serve to enforce relationship integrity. Since the relationship (the object and the foreign key it points to) already exists in the database or is created during your transaction, the constraints are satisfied without changing the scope of your transaction.

The Check constraint is useful for more complex data integrity controls. Conditions on multiple items are used by the Check constraint. For example, History records can pertain to either a drawing or the model. Either of these objects can be null, but not both of them. A Check constraint is defined to enforce this condition by using comparisons and exclusions. Another candidate for a Check constraint is the enforcement of certain values for one or more items. For example, invalid null or zeroes assigned to properties are tested against Check constraints.

Defining Item Type Properties: An Overview

By clicking the **Database Item Types** button, you can assign properties to appear in the **Properties** window of the drawing software. You can also modify the properties that have been assigned to items already. For example, you can change the display name of a property or change the category it is associated with in the categorized display of the **Properties** window. Additionally, these tables are where you view or modify the Read/Write aspect of a property.

From the **Database Item Types** table, you can see if an item type is subject to a validation or calculation program, or you can apply a program to an item type.
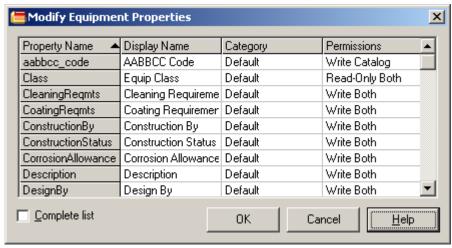
🖊 **Notes:**

- When you first create an item type, you use the **Database Tables** view. However, when modifying item type properties, be sure to use the **Modify Item Type Properties** dialog box accessed from the **Database Item Types** display, not in the **Modify Properties** dialog box accessed from the **Database Tables** display.

Modify Item Type Properties Dialog Box

The **Modify Item Type Properties Dialog Box** allows you to modify the data dictionary item type properties. This dialog box opens when you click **Edit** > **Properties** while the main window displays **Database Item Types**. The title of this properties dialog box changes depending on the item you selected. You can change the displayed name of the item type, group the properties, and assign permissions.

Property Name - Displays the item property name as it is defined in the database.

✎ **Notes:**

- When you first create an item type, you use the **Database Tables** view. However, when modifying item type properties, be sure to use the **Modify Item Type Properties** dialog box accessed from the **Database Item Types** display, not in the **Modify Properties** dialog box accessed from the **Database Tables** display.

Display Name - Specifies the name of the property that the user sees while interacting with the design. You should define display names for properties when you do not want users to see the database name of the property in drawings.

Notes:

- The **Display Name** is stored in three database tables: the data dictionary attributes table, uniqueatts table, and the ItemAttributions table. The entries in the ItemAttributions tables are the ones shown in user interfaces (that is, in the Properties window within SmartPlant P&ID). The uniqueatts display name is not used outside the data dictionary manager.

- After you add an attribute/property to a table, changing the **Display Name** in Database Tables does nothing but update the text in the *DisplayName* column in the Uniqueatts table. When adding an attribute to a table, the **Display Name** is propagated to all of its newly created occurrences in the Database Item Types. To make a change after creation, you must manually update the individual instances of the display name in the Database Item Types.

Category - Specifies the category that you want to use to group the selected property. You can use categories to group and display properties with similar characteristics by category, instead of alphabetically, in the **Categorized** view of the **Properties** window. You can define additional categories using the **Select Entry** option.

Permissions - Defines permissions for the selected item type. These permissions control where users are able to affect change on that property.

- **Read-Only Both** - Assign to properties that you do not want users modifying values for at all. System properties such as PlantItemType, SP_ModelItemID, and SP_ID are set to this by default because the system requires them. Serious data integrity problems can occur if you change these delivered system properties to something other than Read-Only Both.

- **Write P&ID** - Allows users to modify value only in SmartPlant P&ID. In other words, the property is read-only in Catalog Manager. For example, if Flow Rate is set to Write P&ID, then the user can set a value for this property when placing a pipe run in SmartPlant P&ID.

- **Write Catalog** - Allows users to modify value only in Catalog Manager. In other words, the property is read-only in SmartPlant P&ID. For example, if you are defining a piping component type, you want to be able to set the value
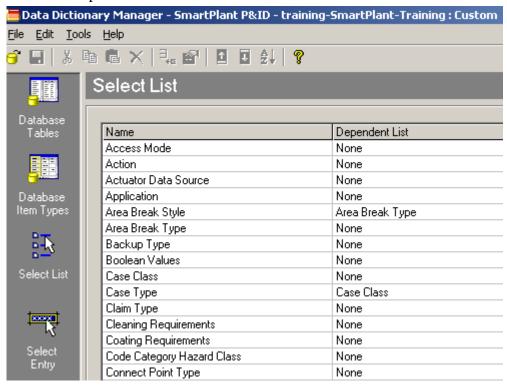
on the item symbol in Catalog Manager, but do not want a user changing the value when they place the item of this type in a drawing.

- **Write Both** - Assign this permission to properties for which you want to set a default value in Catalog Manager but still want SmartPlant P&ID users to be able to change when placing the item in a drawing. For example, use this setting for implied items so that you can provide default values that can be modified at placement.

Complete list - Displays all of the properties of related items.

Defining Select Lists: An Overview

Select lists are collections of values that perform the same functions as code lists in PDS 2D. Select lists are simply groups of related values that narrow the specification of various aspects of the data model.

Select lists allow users to select a value from a list for specific properties when creating drawings, filters, and symbols. For example, you can use select lists to

- Show applicable properties for equipment,
- List available units of measure for a property, or
- Show available signal lines.

When you define properties in Data Dictionary Manager, you can specify whether you want users to select property values from a select list or type the value directly into the **Properties** window.

Some select lists have dependent lists. These lists provide further descriptions for items in the original select lists. For example, if piping components are divided into classes and subclasses, the entries in the Piping Subclass select list further describe entries in the Piping Class list. In this example, Piping Class is a dependent list for Piping Subclass.

The amount of different select lists that you are allowed may vary. A column in the enumerations table determines whether you can add new entries to an existing select list. When the value in the DisplayUsage column is 1, you can modify only the text of existing entries. When the DisplayUsage column value is NULL, you have full access to edit or modify the select list.

Notes:

- The following are system select lists: do not customize any of the following system select lists. The ID numbers in the table represent the ID column in the enumerations table in your data dictionary schema.

System Select Lists	ID Numbers	System Select Lists	ID Numbers
AliasType	67	ModelItemType	40
Application	88	NamingType	155
AppSchemaType	89	NoOfPhases	139
AreaBreakType	77	NoteType	68
AttributeType	87	OffsetSource	58
Boolean	73	ParentType	81
CableCategory	134	PartOfType	82
CableSetType	346	PhaseArrangement	323
CaseClass	54	PipeRunClass	96
CaseType	34	PlacementType	57
CellFunction	108	PlantItemGroupClass	91
CellUsage	129	PlantItemGroupType	37
CircuitMode	340	PlantItemType	38
CircuitType	175	ProjectSettingType	74
ConductorArrangement	136	Quality	41
ConformityToStandard	128	RepresentationType	39
ConnectPointType	31	RestartFlag	110
ElectricalEquipmentClass	277	Routing	284
ElectricalEquipmentSubClass	278	SlopeDirection	85
EquipmentClass	24	SP_BackupType	63
FLACalculationFlag	325	StatusType	51
Frequency	114	SupplyAcDcFlag	176
HistoryType	46	SystemCableCategory	313
InconsistencyStatus	72	SystemOfUnits	76

InconsistencyType	71	TaskStatus	105
ItemStatus	70	TaskType	116
LabelBehavior	56	TerminatorStyle	78
LabelType	53	UnitsOfMeasureType	66

Defining Select Entries

The **Select Entry** table consists of four columns:

- **Disable,**

- **Value**,

- **Short Value**, and

- **Dependent Value**.

A blank in the **Disable** column indicates that the list entry is available in the drawing software. A check mark indicates that the entry is hidden from users.

You specify the name of the select list entry in the **Value** column. You can add select list entries by typing in the **Value** column of the last row in the **Select Entry** table. All entries in a particular select list must have unique values, and you cannot delete entries in select lists.
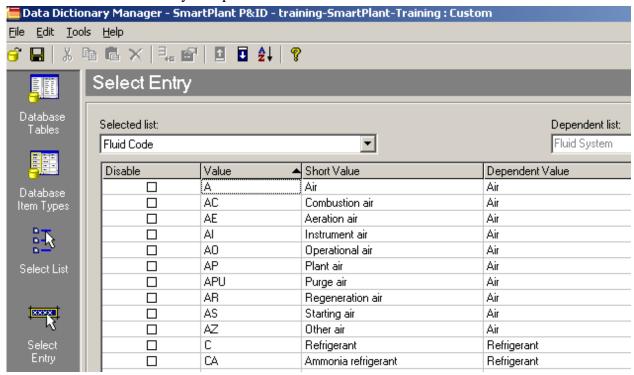
You specify a shortened name for the select list entry, if necessary, in the **Short Value** column. Short values are not required for list entries at this time. Other SmartPlant software uses the short value to define the contents of reports.

The dependent value provides a way to link related select lists. For example, **Equipment Type** is dependent on **Equipment Subclass**, which is in turn dependent on **Equipment Class**. So the range of values that you see in the **Properties** window is limited to values defined for a dependent list, if one is specified for the given property. For instance, if you were creating a new vessel in Catalog Manager, you would find your choice of properties for **Equipment Subclass** select-listed, even though you only specify the **Equipment Class** when you choose **Equipment: Vessel**. And then specifying the **Equipment Subclass** likewise appropriately select-lists the **Equipment Type**.

 Notes:

- You can change the dependent list associated with a select entry in the **Select List** table of Data Dictionary Manager.

- You cannot delete select list entries. However, you can hide the select list entry in the design software by clicking the check box in the **Disable** column for the entry.

- A dependent list is like a select list for a select listed property. Notice that the values available in the **Dependent Value** column are constrained much like select lists constrain the available properties of an item.

- Be careful when modifying delivered select set lists. Some, like **Option Code**, contain short values that correspond to indices in other products and are necessary for special functions.

Sort Command

The **Tools > Sort** opens the **Sort** dialog box. You can sort select entries based on entries in one or more column.

Using Drawing Versions: An Overview

Drawing versions allows you to create, compare, and recover versions of your drawings. Using drawing versioning is helpful in the following situations.

- Restoring a drawing after it has been deleted

- Restoring a drawing after items have been deleted from the drawing

- Restoring a drawing after making design errors

- Archiving a drawing before making major design changes

Notes:

- If utilizing As Built/Projects, when a drawing is checked in, all versions in the project are deleted.
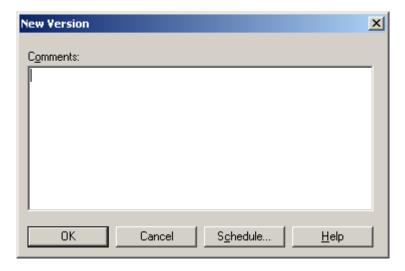
Creating a New Version of a Drawing: An Overview

The current state of a drawing and all associated data can be saved using the New Version command. Previously saved drawing versions are available to be viewed, compared, and fetched, if necessary. If drawing versions are saved on a regular basis, the sequence of drawing versions in a project becomes a sort of archive that shows the development of the drawing over the life of the project.

Each time a drawing is checked into the Plant database, a new version of the drawing is automatically created in the Plant and all versions of that drawing are deleted from the project. The drawing versions in the Plant show the changes to the drawing over the life of the Plant.

Save a Version of a Drawing
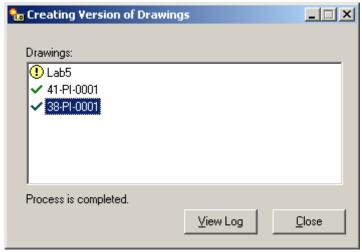
1. From **Drawing Manager**, in the List view, select a drawing.

2. Select **Revisions** > **New Version** or right click and select **New Version.**

3. On the **New Version** dialog box, enter any comments that you want to attach to the new version.

4. Select **OK** to create the version.

📝 **Notes:**

- Click **View Log** on the **Creating Version of Drawings** dialog box to open the log file and review notes on the version creation operation.

- **New Version** skips open drawings, notes them in the log, and then continues.

- Select **View Log**

************************* NewVersion *************************
04/29/2005 08:39:58 - INGRPPO\jrberggr Performed NewVersion.
    Operation : NewVersion
    Drawing : Lab5
    Status   : **Failed. Error:** Drawing may be currently opened or require a
recreate from database. Failed to create new version. Failed to create New
Version.

    Operation : NewVersion

```
           Drawing :  41-PI-0001
           Status    : Completed successfully.
           ---------------------------------------------------------------------------------

           Operation  : NewVersion
           Drawing :  38-PI-0001
           Status    : Completed successfully.
           ---------------------------------------------------------------------------------
```

- If no changes have been made to the drawing since the last version was created, no new version is created.

```
*********************** NewVersion ************************
04/29/2005 08:43:33 - INGRPPO\jrberggr Performed NewVersion.
           Operation  : NewVersion
           Drawing :  38-PI-0001
           Status    :Nothing to do.
```

- Use the Schedule button to create a task for creating drawing versions at a later time or on a regular interval. Follow the instructions on the Schedule Task Wizard.

- When a drawing is checked in to the Plant, all versions are deleted from the project.

Save Versions of All Drawings

1. In the Tree view, select the site, plant, or project containing the drawings you want to save versions of.

2. Select **Revisions** > **Incremental New Versions**.

3. Follow the steps and directions on the **Schedule Task Wizard**, and select **Finish** to schedule the operation at another time or on a regular interval.

   📝 **Notes:**

   - When saving versions of all drawings in a Plant that has projects, new versions of the drawings belonging to those projects are created also.

   - This procedure saves new versions of only those drawings whose time stamp shows that they have changed since the last version was saved.

Recovering Drawings: An Overview

The following areas require special consideration with regard to saving new drawing versions and how retrieving a drawing effects the actions that can occur in the Plant between saving a version and retrieving it. These actions have serious implications when recovering (using the Fetch Deleted Drawings command) a drawing. In all drawing recovery activities, a log file is created in which you can review notes on any recovery activity that you are undertaking.

Multiple Representations

After a drawing is recovered, there are situations where multiple representations of piping and equipment items can spontaneously occur. For example, you place a piece of equipment on drawing A and then you save a version of drawing A. After creating a version of drawing A, you move the equipment from drawing A to the Plant Stockpile and then to drawing B. When drawing A is retrieved, the following message is added to the log file:

```
Item (item tag ItemTag, internal ID SP_ID) is being restored as a
multiple representation because another representation of the same
item was found in drawing Drawing Name.
```

Encountering this situation does not cause the retrieval to fail; the retrieval process continues as normal.

If an equipment item already exists as a multiple representation in another drawing, the following message is added to the log file:

```
Restoring multi representation item (item tag ItemTag, internal ID
SP_ID).
```

Encountering this situation does not cause the retrieval to fail; the retrieval process continues as normal.

If other valid stockpile items are moved from drawing A to drawing B, the following message is added to the log file:

```
Error! Item (item tag ItemTag, internal ID SP_ID) has been moved to
drawing Drawing Name.
```

To resolve this conflict, you must either delete the indicated item or restore the indicated drawing first. If you delete the item, then the item can either be deleted to the Plant Stockpile or deleted from the model. This error message is created for each moved item, and the retrieval process quits without restoring the archive.

Off Page Connectors (OPCs)

If you save a new version of a drawing that includes an OPC, and its mate is deleted from the database afterward, both OPCs are restored to the drawing or drawing stockpile, as appropriate, when the drawing is retrieved.

For example, an OPC is placed on a drawing A, its mate is placed on drawing B, and both drawings saved in versions. When drawing A is retrieved, the OPC is restored to drawing A, and the mate is placed in the Plant Stockpile. The mated OPC has the same item tag as the OPC restored to drawing A. Once drawing B is retrieved, the OPC mate of the OPC in drawing A is placed in drawing B and removed from the Plant Stockpile.

Pipe and Signal Lines

If all the line runs belonging to a line are deleted from the model after a drawing version is saved, the line is restored back to the database after the drawing is recovered.

To restore a deleted line, Drawing Manager searches the database for a line that has the same key property values as the line that is being restored. If such a line is found, it is used as the line for the restored runs. If a suitable line is not found one is created for the restored runs.

Plant Group Joins

Plant Group Joins, which relate items in plant groups, are restored from a version only if the plant groups, such as the unit or area, exist in the current database.

For example, a piece of equipment belongs to a plant group and a drawing version is saved. If the plant group is deleted and then the drawing is recovered, the equipment is restored, but because the plant group does not exist, the Plant Group Join is not restored.

If the plant item group is found in the archived drawing, but the Plant Group Join does not exist in the current database, Drawing Manager restores the Plant Group Join.

Plant Item Groups

Plant Item Groups placed in the drawing stockpile are considered part of the drawing; therefore, Drawing Manager restores them to the drawing stockpile when the drawing is recovered.

Plant Item Groups that are moved to the Plant Stockpile after a drawing version has been saved are restored back to the drawing stockpile when the drawing is recovered. The software searches for the corresponding Plant Item Group in the saved stockpiles, and if it is not found there, searches in the active database for the same.

Plant Item Group Joins

A Plant Item Group Join is a relationship created when an plant item, such as an instrument or a piece of equipment, is linked to a Plant Item Group, such as an instrument loop, a package, or the like. Plant Item Group Joins are saved as part of the drawing version.

During a drawing recovery, if a Plant Item Group Join exists in the saved drawing version, the software searches for the corresponding Plant Item Group in the archived stockpiles. If the corresponding Plant Item Group is not found in those stockpiles, the database is also searched.

If the Plant Item Group is found in the saved version, and the Plant Item Group Join is not found in the database, then the Plant Item Group Join is restored. If the Plant Item Group is not found in the saved stockpiles, the Plant Item Group and the Plant Item Group Join are restored to the Plant Stockpile. If the Plant Item Group exists in the current drawing stockpile, Drawing Manager updates the database to reflect the archived Plant Item Group Join.

For example: An instrument is associated with a Loop, LP1, in the drawing stockpile and a version is saved. Afterward, a new Loop, LP2, is placed in the drawing stockpile and the instrument is associated with LP2. When the drawing is restored, the Plant Item Group Join indicates a relationship between the instrument and LP1. If LP1 has since been deleted from the drawing stockpile, it is restored to the drawing stockpile. If LP2 exists in the current Plant Stockpile at the time of drawing recovery, LP2 is left as is. However, if LP2 is in the drawing stockpile, Loop LP2 is deleted from the database along with any other corresponding representations and histories of Loop LP2.

Miscellaneous

If a drawing is deleted after a version is saved and a new drawing is created using the same name and drawing number as the deleted drawing, retrieval of the deleted drawing fails. Changing drawing properties, such as name, number, and so forth, after saving a version of a drawing result in the original values being restored when the drawing is recovered. If this situation occurs, the following message is added to the log file:

```
Warning! Drawing drawing name1 has been renamed to new drawing name2.
```

Drawing Manager changes the drawing back to its original name, *drawing name1*, in the database. The original .pid file *pathname\drawing name1* is also replaced. You must delete the .pid file for *pathname\drawing name2*.
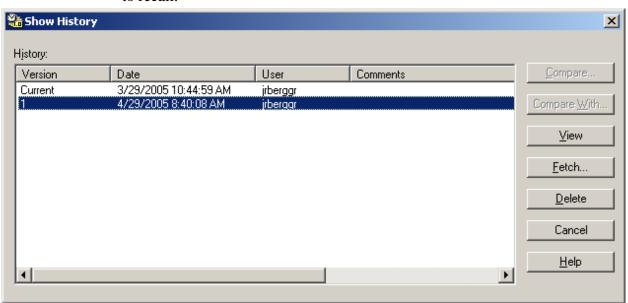
📝 **Notes:**

1. You must have either site administrator or modify privileges to save versions or recover drawings.

You cannot restore hierarchy items by using drawing recovery. For example, if a unit is deleted, an archived drawing belonging to that unit can never be retrieved

Recover a Version of a Drawing
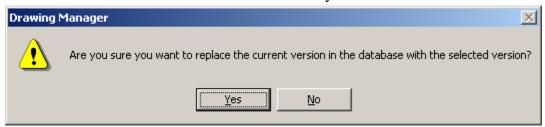
1. In the List view, select the drawing that you want to recover.

2. Select **Revisions** > **Show History** or click the **Show History** button.

3. On the **Show History** dialog box, select the version of the drawing you want to recall.
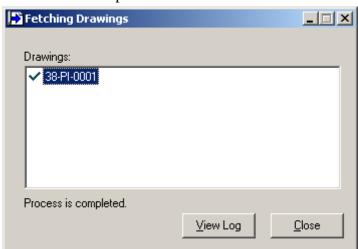
4. Select **Fetch** and enter comments on the **Fetch Comments** dialog box.

5. On the message box, select **Yes** to confirm that you want to overwrite the current version with the saved version you have selected.

6. Click **View Log** on the **Fetching Drawings** dialog box if you want to see notes about this operation.

***************** FetchVersionFromOtherProject *****************
04/29/2005 09:13:03 - INGRPPO\jrberggr Performed
FetchVersionFromOtherProject.
    Operation : FetchVersionFromOtherProject
    Drawing :   38-PI-0001
    Status   : Completed successfully.
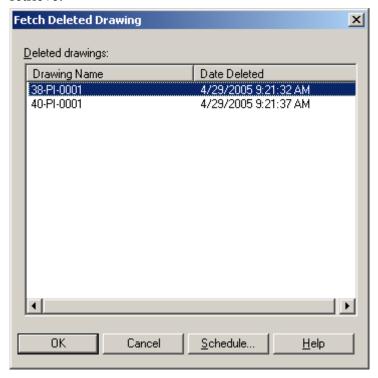
📝 **Notes:**

2. Be sure you are familiar with the ramifications of drawing recovery before you undertake the operation. For more information, see Recovering Drawings: An Overview.

3. You can also recover a version of a drawing by clicking Fetch. Using the Fetch command is particularly useful if you want to recover a version of your drawing that resides at the Plant or another project. For more information, see Fetch a Drawing.

Recover a Version of a Deleted Drawing

1. Select the appropriate plant level in the **Tree** view, and select **Revisions > Fetch Deleted Drawing**.

2. On the **Fetch Deleted Drawing** dialog box, select the drawing you want to retrieve.

3. Select **OK** to retrieve the drawing now or click **Schedule** to open the **Schedule Task Wizard**, which allows you to schedule retrieval at a later time or on a regular interval.

4. On the **Fetching Deleted Drawing Status** dialog box, select **View Log** to review notes about this retrieval process.

Notes:

- All the saved versions of the selected drawing are retrieved. You can view the various versions by selecting the drawing in the List view and selecting **Revisions** > **Show History**.

- If you retrieve a drawing that was new to your Plant or project, then the drawing icon for a new drawing will be applied; otherwise, the drawing icon for a fetched drawing is used in the **List** view.

Comparing Versions: An Overview

When more than one version of a drawing exists, the **Compare** command on the **Show History** dialog box allows you to view two versions side-by-side and examine their differences. You can compare two versions from inside your own Plant or project database, or you can compare a version in your database to a version in the Plant or another project database. Keep in mind that you can only compare a drawing against a version of itself; that is, you cannot compare one drawing to another drawing.

Differences between drawing versions are assigned to logical "change" groups, which are listed on the **Compare** dialog box.

Differences also belong to one of three possible categories:

- **Data** - Refers to a mismatch in the properties assigned to an item that exists in both drawings, namely a change, addition, or deletion of a property in the **Properties** window, in the **Engineering Data Editor** in SmartPlant P&ID, or through automation.

- **Graphic** - Refers to an item that has changed only in its graphical representation in the design (for example, the item is moved or otherwise graphically manipulated in the drawing).

The following differences are ignored: claim status, select list strings, linked or embedded objects, symbology, and inconsistency indicators.

Adding or deleting an item is also a connectivity change because the relationship between the item and the drawing has changed. Every change grouping and every changed item is assigned a category, and if more than one category applies (for instance, if you move an item and change one of its properties) then the highest priority category is displayed. The order of priority, from high to low, for the categories is connectivity then data then graphic.

The two versions are displayed in two **Drawing** views, described only as left and right. The relationship between the two views depends on whether you are comparing two versions in your own database or comparing your version to a version in another database.

- If the two versions are in the active database, then the left-hand view is the older version, and the right-hand view is the newer version. That is, they are displayed in time-order from left to right.

- If the two versions exist in different databases, you cannot be assured that time-order is the logical order to display the versions; therefore, the right-hand view is reserved for the version in your active Plant or project database, and the left-hand view belongs to the version in another database.

The **Compare** dialog box in Drawing Manager is useful reviewing differences between versions only. If you want to reconcile anything about the two versions you review, then you must do so inside SmartPlant P&ID. The **Compare and Refresh** command in SmartPlant P&ID exists for this purpose. If you started with the left-hand drawing version and applied every change listed on the **Compare** dialog box, then you would end with a drawing that is identical to the right drawing version.

Compare Versions of Drawings in Same Database

1. In the List view, select the drawing.

2. Select **Show History**.

3. In the drawing list on the **Show History** dialog box, select two versions of the drawing.

4. Select **Compare**. If you want to compare your drawing to a version in a different project or the Plant, see Compare Versions of Drawings in Separate Databases.

5. On the **Compare** dialog box, you can view the differences between the two versions, but you cannot make changes to the designs. To change the design, you must use SmartPlant P&ID.

    Notes:

    - You can manipulate the views and navigate through the listed changes by using the commands on the **Compare** dialog box toolbar. Each **Drawing** view also has its own shortcut menu, which includes manipulation commands that apply only to that view.

    - You can select an item in either **Drawing** view. The item is then located in the appropriate group in the **Change details** list. If you select an item in the **Change details** list, then you can use the **Find in Drawings** button on the toolbar to locate the item in one or both **Drawing** views.

- You can select an item in the **Drawing** view or in the **Change details** list. Properties for that item appear in the **Properties** window. Selecting multiple items is not possible on the **Compare** dialog box.

- The following differences are ignored: claim status, select list strings, linked or embedded objects, symbology, and inconsistency indicators.

- You can only compare a drawing against a version of itself; that is, you cannot compare one drawing to another drawing.

- You can also compare versions when you are checking in a drawing.

- If at any point you attempt to compare two versions that are actually identical to each other, the **Compare** dialog box does not open and a confirmation message alerts you as to why.

Compare Versions of Drawings in Separate Databases

1. In the **List** view, select the drawing.

2. Select **Show History**.

3. In the drawing list on the **Show History** dialog box, select the version in the active project that you want to compare against a version elsewhere.

4. Select **Compare With**.

5. On the **Compare With** dialog box, select the correct target project or the Plant database from the **Available Databases** list.

6. In the **History** list, choose the version of the drawing that you want to compare against your version and Select **OK**.

7. On the **Compare** dialog box, you can view the differences between the two versions, but you cannot make changes to the designs. To change the design, you must use SmartPlant P&ID.
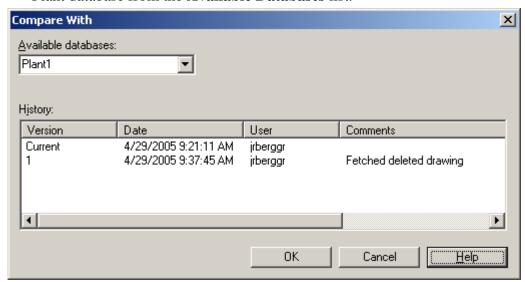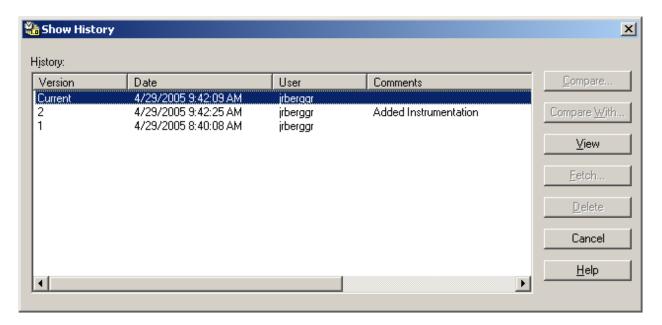
    📝 **Notes:**

    - You can manipulate the views and navigate through the listed changes by using the commands on the **Compare** dialog box toolbar. Each **Drawing** view also has its own shortcut menu, which includes manipulation commands that apply only to that view.

    - You can select an item in either **Drawing** view. The item is then located in the appropriate group in the **Change details** list. If you select an item in the **Change details** list, then you can use the **Find in Drawings** button on the toolbar to locate the item in one or both **Drawing** views.

    - You can select an item in the **Drawing** view or in the **Change details** list. Properties for that item appear in the **Properties** window. Selecting multiple items is not possible on the **Compare** dialog box.

    - The following differences are ignored: claim status, select list strings, linked or embedded objects, symbology, and inconsistency indicators.

    - You can only compare a drawing against a version of itself; that is, you cannot compare one drawing to another drawing.

    - You can also compare versions when you are checking in a drawing

    - If at any point you attempt to compare two versions that are actually identical to each other, the **Compare** dialog box does not open and a confirmation message alerts you as to why.

Show History Dialog Box

Lists all available versions of a drawing. You can compare two versions of the drawing, or view a version of the drawing without opening **SmartPlant P&ID**, or fetch a version from the list. You can open this dialog box by selecting **Revisions** > **Show History** or by selecting the **History** button on the **Fetch** dialog box.

History - Lists all the versions of the drawing in the current plant or project.

Compare - Opens the **Compare** dialog box, allowing you to compare two versions in the **History** list. This button is not available unless two versions are selected in the list or if you open this dialog box by clicking **History** on the **Fetch** dialog box. Use the **Compare With** button to compare one version in the active project to a version in another project or the Plant.

Compare with - Opens the **Compare With** dialog box, allowing you to find a drawing version in a different project or in the Plant to compare to the drawing version you select in the **History** list. The **Compare With** button is not available if you open this dialog box by clicking **History** on the **Fetch** dialog box.

View - Opens the **View** dialog box, which displays a read-only view of the selected drawing version without opening SmartPlant P&ID. You can manipulate the view or select drawing items and review their properties.

Fetch - Opens the **Fetch-Option** dialog box. This button is available only if you have selected one, and only one, version in the **History** list and that drawing is not the current version. The **Fetch** button is not available if you open this dialog box by clicking **History** on the **Fetch** dialog box.
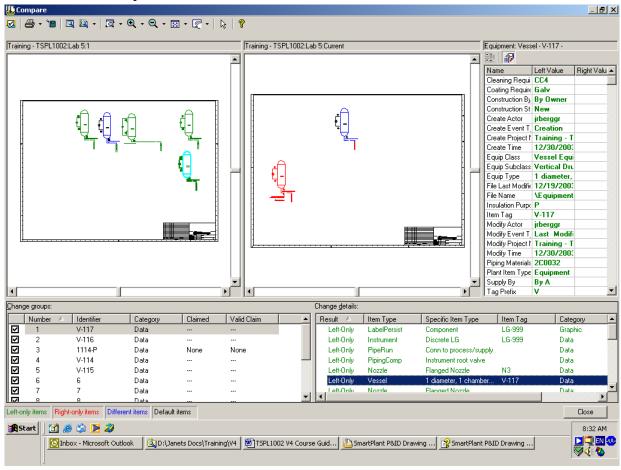
Delete - Removes the selected drawing version. You must have the appropriate permissions, assigned in SmartPlant Engineering Manager, to delete versions. You cannot delete the current version of a drawing by using this button. However, you can delete the current version of a drawing by using the **Delete** command on the **Edit** menu on the main menu bar.

Compare Dialog Box

Opens when you click **Compare** on the **Show History** dialog box, displaying two versions of the same drawing, and illuminating the differences between them. At the top of each **Drawing** view, the Plant or project, the name of the drawing, and the version is displayed explicitly. You can move the bars between the different views according to your needs. If you click on the divider between the left and right **Drawing** views, then the two views automatically same-size.

✎ **Notes:**

- You cannot do anything else in Drawing Manager while this dialog box is open.

Toolbar Commands - Apply to the **Drawing** views.

- **Compare Options** - 🔲 Opens the **Compare Options** dialog box, which allows you to customize the colors that the various comparison states are displayed in. That color-coding is then displayed in the status bar of the **Compare** dialog box as a static reminder.

- **Print** - 🖨 Prints the **Drawing** view or views.

- **Generate Report** - 📋 Opens Microsoft Excel and creates a report of the information contained in this comparing versions session. This report lists the same information that is displayed in the **Change Groups** and **Change Details** lists (change groups, item types, claim statuses, and so forth).

- **Find in List** - 🔍 Zooms to the **Change details** list entry that corresponds to an item you select in either **Drawing** view. Generally speaking, if you select a drawing item that exists in the list, then the list display automatically zooms to that entry.

- **Find in Drawings** - 🔍 Manipulates the **Drawing** views so that the selected element is listed in the **Change details** and the **Change groups** list is centered in the appropriate **Drawing** view.

- **Zoom Area** - 🔍 Enlarges the display of an area in one or both **Drawing** views by allowing you to draw a fence around that arbitrary area of the view.

- **Zoom In** - 🔍 Enlarges the display of items around a specified point in one or both **Drawing** views.

- **Zoom Out** - 🔍 Reduces the display of items around a specified point in one or both **Drawing** views.

- **Fit** - 🔲 Fits all visible items in one or both **Drawing** views.

- **Pan** - 🖐 Allows you to move the display in any direction from a specific point in one or both **Drawing** views in order to see other areas of the view by dragging the pointer across the display.

- **Select** - 🖱 Activates the select tool.

- **Help** - ❓ Opens Drawing Manager online Help.

Left Drawing View - Displays one version of your drawing. If you compare two versions from different projects, the version that belongs to the other project appears in the left-hand **Drawing** view. If you compare two versions from your active project, then the older version appears in the left-hand **Drawing** view.

Right Drawing View - Displays the other version of your drawing. If you compare two versions from different projects, the version that belongs to your active Drawing Manager project appears in the right-hand **Drawing** view. If you compare two versions from your active project, then the latest version appears in the right-hand **Drawing** view.

Properties Window - Displays two columns of properties for an item selected in a **Drawing** view or in the **Change details** list. The left-hand and right-hand column corresponds to the left-hand and right-hand **Drawing** views. If a deleted item is selected (the item exists in left-hand view, but not the right-hand), the properties for that item are listed in the left-hand column and the right-hand column is empty. If a modified item is selected, values from both versions show in their respective columns in the **Properties** window. If a new item is selected, that is, the item exists in right-hand view, but not the left-hand, the properties for that item are listed in the right-hand column and the left-hand column is empty.

Properties Commands - Allows you to customize the properties that are displayed in the **Properties** window.

- **Alphabetical** - Lists properties in alphabetical order. This button acts as a toggle and is available when properties are displayed categorically.

- **Categorized** - Displays properties grouped by specific categories. Categories are defined and properties are assigned to those categories in Data Dictionary Manager. This button acts as a toggle and is available when properties are displayed alphabetically.

Show Modified - Toggles the display of only those properties that are different between the properties that belong to a selected drawing item. This button applies only to modified items that exist in both versions; for added and deleted items, all properties are listed.

Change groups - Lists logical groupings of differences between the two versions. Each group contains the smallest number of items possible while preserving logic of the group. You can sort this list by clicking on any one of the following column headings.

- **Number** - Displays an arbitrary number that is assigned to a logical change group when this dialog box is opened. The number has no intrinsic meaning and may apply to a different group the next time you open this dialog box.

- **Identifier** - Lists item tags for the principal member of the change group, if an item tag is assigned to that object. For instance, if a change group centers on data differences for a vessel and its nozzles, then the item tag for the vessel is displayed in this column.

- **Category** - Displays the highest priority of categories that appear in the **Change details** list for this group. The possible categories are connectivity, data, and graphic, listed in highest to lowest priority.

- **Claim** - Displays an overview of the claim status of the individual items in the group. Possible values are all, some, or none.

Change details - Lists all the individual items that belong to the group that you select from the **Change groups** list. You can sort this list by clicking on any one of the following column headings.

- **Result** - Displays one of three possible values: Left-Only, Right-Only, and Different. Left-Only denotes an item that exists in the left-hand version only, implying that the item is deleted from the right-hand version. Right-Only denotes an item that exists in the right-hand version only, implying that the item was added to the right-hand version. Different denotes a difference between the properties, graphics, or connectivity of an item that exists in both versions.

- **Item Type** - Displays the item type of the individual item in question.

- **Item Tag** - Displays the item tag of the individual item in question if a tag has been assigned to the item.

- **Category** - Displays the highest priority category of change that applies. The possible categories are connectivity, data, and graphic, listed in highest to lowest priority. That is to say, that an item that is moved graphically (graphic category) but also includes a property change (data category) lists "data" in its category column.

- **Claimed** - Displays the claim status of the object: valid claim, invalid claim, and not claimed.

Status bar - Displays the currently defined colors for illustrating comparison status.

You can change the color scheme by clicking the **Compare Options** button on the toolbar and defining options on the **Compare Options** dialog box.

Compare Options Dialog Box
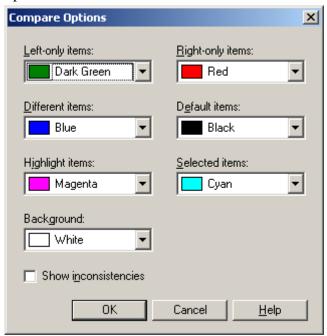
The **Compare Options Dialog Box** opens when you click **Compare Options** on the **Compare** dialog box toolbar and allows you to customize the colors that the various comparison states are displayed in. The active color scheme is displayed in the **Compare** dialog box status bar.

Left-only items - Allows you to choose a color for displaying objects that exist only in the left-hand Drawing view. Dark green is the default color for this option.

Right-only items - Allows you to choose a color for displaying objects that exist only in the right-hand Drawing view. Red is the default color for this option.

Different items - Allows you to choose a color for displaying items that exist in both views but differ from each other for any number of reasons (for example, modified

properties, changed connectivity, and so forth). Blue is the default color for this option.
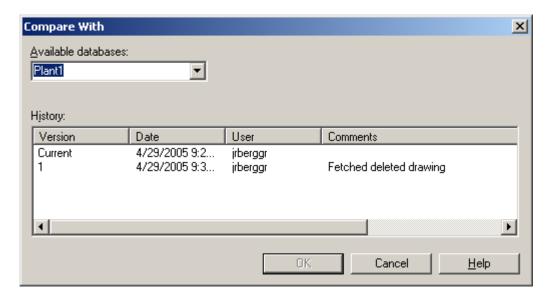
Default items - Allows you to choose a color for displaying drawing items that are identical in the two views. Black is the default color for this option.

Highlight items - Allows you to choose a color to denote that a drawing object is highlighted, for instance, when an item is within your locate zone.

Selected items - Allows you to choose a color to denote items that are selected in one or both of the **Drawing** views.

Compare With Dialog Box

Opens when you click **Compare With** on the **Show History** dialog box and allows you to select a drawing version from a database other than the current active database to compare against the version you choose on the **Show History** dialog box in the active database.

Available Databases - Lists all the different databases that currently have a version of the drawing you chose on the **Show History** dialog box.

History - Lists all the versions of the chosen drawing in the database you selected in the **Available Databases** list.

Compare and Refresh Command

The **Tools > Compare and Refresh** allows you to refresh the active drawing with data from another version of the drawing. The differences display in what is known as a change group. If you accept the changes, the drawing refreshes to display the changes.

To refresh a project drawing, you use the drawing in the plant. Change groups are marked if it affects items you have claimed. Be sure to refresh all of the changes that do not involve claimed items because these are the changes that have been checked in by other projects. You want to include these changes in your drawing so they will not be lost when you perform a check in.

Compare With Dialog Box

Opens when you click **Tools > Compare and Refresh** allowing you to select a drawing version to compare against the version that you currently have open and active.

Available Databases - Lists all the different databases that currently have a version of the drawing you chose on the **Show History** dialog box.

History - Lists all the versions of the chosen drawing in the database you named in the **Available Databases** list.

Compare and Refresh Dialog Box

Compare Options - Displays the **Compare Options** dialog box that allows you to customize the display colors for items that differ between the two drawings being compared.

Print - Prints the entire **Compare and Refresh** dialog box contents. You can also specify to print either the right or left view by using the drop-down arrow to select either **Right View** or **Left View**.

Generate Report - Displays a report in Microsoft Excel. The report contains the details of the compared drawings.

Find in List - Highlights the line in the **Change groups** and **Change details** areas. You must first select an item in a drawing.

Find in Drawing - Zooms to the selected item. You must first select an item in either the **Change groups** or **Change details** area.

Zoom Area - Enlarges the selected area by allowing you to draw a fence around the area.

Zoom In - Enlarges the selected area where you click.

Zoom Out - Reduces the display of the selected area where you click.

Pan - Allows you to move the display in any direction by dragging the pointer across the view.

Select - Changes the pointer to an arrow allowing you to select an item.

Alphabetic **Categorized** - Displays the properties in either an alphabetic list or by specific category.

Show Modified - Displays modified properties.

Change groups - Area that lists the changed items in groups. A listed item contains all the items this change effects.

> **Checkbox** column - Displays colors in the drawings as defined using **Compare Options**. If not selected, the **Default items** color displays.
>
> **Number** - Displays the number assigned to each change group.
>
> **Action** - Defines which action is to be taken involving the selected change. Options include:
>
> > **No Action** - Validates Invalid Claims for the selected group (no drawing changes are applied).

Refresh - Applies any drawing changes to the open drawing version; and **No Action** - performs no action on the selected drawing group.

Category - Displays the category of the change. Options include:

> **Data** - Indicates that a property value has changed (for example, a property value for a vessel).

> **Graphic** - Indicates that a change has been made to an item in the drawing (for example, a vessel has been moved).

Claimed - Indicates that the items in the group have been claimed.

Valid Claim - Indicates that the claimed item is a valid claim.

Change details - Area that lists the details of the item in each change group.

> **Result** - Defines the results of the compare. The column indicates any differences in the two versions and which version contains the change.

> **Change** - Describes what action is required to make the drawing in the right frame match the drawing in the left frame. Actions include:

>> **Add** - Adds the listed item to the version on the right.

>> **Delete** - Removes the listed item from the version on the right.

>> **Modify** - Changes the listed item in the version on the right.

> **Item Type** - Describes the type of item.

> **Specific Item Type** - Displays the specific type of item.

> **Item Tag** – Displays the value of the **Item Tag** property.

> **Category** - Displays the category of the change.

>> **Data** - Indicates that a property value has changed (for example, a property value for a vessel).

>> **Graphic** - indicates that a change has been made to an item in the drawing (for example, a vessel has been moved)**.**

> **Claimed** - Indicates if an item is a valid or invalid claim.

> **Source Representation Location** - Displays the source item location if the item exists in either the **Drawing** or the **Plant Stockpile**.

> **Target Representation Location** - Displays if the target item location if the item exists in either the **Drawing** or the **Plant Stockpile**.

Compare and Refresh Dialog Box Properties Window Toolbar

The **Properties Window** in the **Compare and Refresh Dialog Box** allows you to customize the properties that are displayed in the **Properties** window of the **Compare** dialog box.

Alphabetical - Lists properties in alphabetical order.

Categorized - Displays properties grouped by specific categories. Categories are defined and properties are assigned to those categories in Data Dictionary Manager.

Show Modified - Toggles the display of only those properties that are different between the properties that belong to a selected drawing item. This button only applies to modified items that exist in both versions; for added and deleted items, all properties are listed.

Compare Options Dialog Box

The **Compare Options Dialog Box** opens when you click **Compare Options** on the **Compare** dialog box toolbar and allows you to customize the colors that the various comparison states are displayed in. The active color scheme is displayed in the **Compare** dialog box status bar.

Left-only - Allows you to choose a color for the display of objects that exist in the left-hand Drawing view only. Dark green is the default color for this option.

Right-only - Allows you to choose a color for the display of objects that exist in the right-hand Drawing view only. Red is the default color for this option.

Different items - Allows you to choose a color for the display of items that exist in both views but differ from each other for any number of reasons (for example, modified properties). Blue is the default color for this option.

Identical items - Allows you to choose a color for the display of drawing items that are identical in the two views. Black is the default color for this option.

Highlight items - Allows you to choose a color to denote that a drawing object is highlighted, for instance, when an item is within your *locate zone*.

Selected items - Allows you to choose a color to denote items that are selected in one or both of the Drawing views.

Compare and Refresh Drawing Versions

1. Select **Tools > Compare** from Drawing Manager.

2. On the **Compare With** dialog box, select a database using the **Available databases** drop-down list box.

3. In the **History** list box, select the drawing you want to compare your current drawing with.

4. Select **OK**.

5. On the **Compare and Refresh** dialog box, review the information in the **Change groups** and **Change details** areas. Your current drawing displays on the right side of the screen. The version you are comparing it to displays on the left.

6. In the **Change groups** area, click in the **Action** column.

7. Using the drop-down list, select **No Action**, **Refresh**, or **Validate**. **Validate** will display as an option only if you have an **Invalid Claim**.

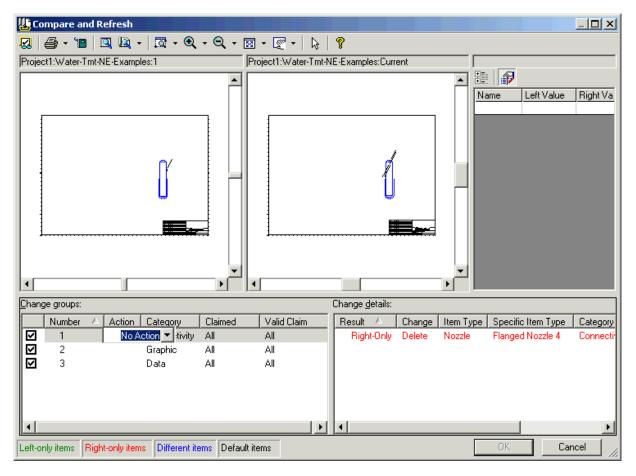8. Select **OK** to refresh the drawing and accept any changes or **Cancel** to dismiss the dialog box.

Compare and Refresh Examples

The following examples provide details for reconciling data and graphic differences between your current drawing and a previously created version of that drawing.

Data Example

In this example, a jacketed tower exists in the version to be selected for the compare. The current version contains the same jacketed tower but a change has been made to the **Cleaning Requirements** property. When the current version is compared to the selected version, a data change is found during the compare.
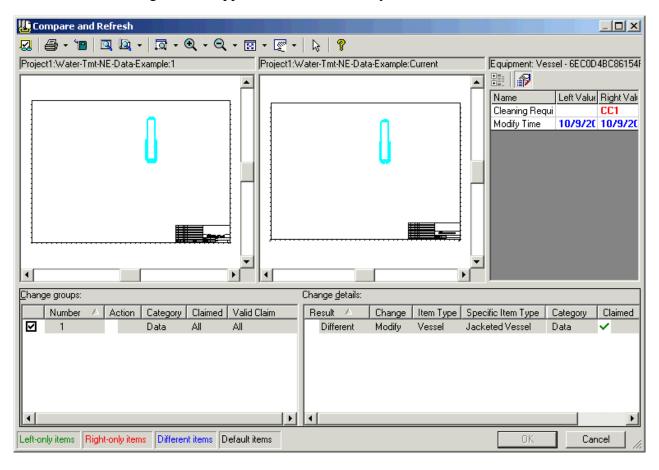
The current version appears on the right and the version it is compared to appears on the left. **A change group indicates** there is only one group and a data change was located. All items in the group are valid claims. **A change detail indicates** the compare located a different property value (**Cleaning Requirement**) in the current version. If you **Refresh** the version, the property value will be modified as shown in the **Change** column. Clicking in the **Action** column of the **Change groups** allows you to take no action or refresh (accept the new property value).

Graphic Example

In this example, a jacketed tower exists in the version to be selected for the compare. The current version contains the same jacketed tower but it has been moved to a new location. When the current version is compared to the selected version, a graphic change is found during the compare.

The current version appears on the right and the version it is compared to appears on the left. **A change group indicates** there is only one group and a graphic change was located. All items in the group are valid claims. **A change detail indicates** the compare located a graphic modification to a vessel (**Jacketed Vessel**) in the current version. If you **Refresh** the version, the graphic modification will be accepted as shown in the **Change** column. Clicking in the **Action** column of the **Change groups** allows you to take no action or refresh (accept the previous location of the vessel). The settings are not applied to a version until you click **OK**.

Backing Up and Restoring Your Data: An Overview

The Backup and Restore functionality allows you to backup all data on a site and/or plant structure basis, including application/engineering data, for means of disaster recovery.

Using the zip.exe and unzip.exe executables installed with SmartPlant Engineering Manager, backups are bundled into a zip files that are named using the top level object name and type contained within the backup. These zip files contain various files depending on the type of backup and options selected. All database schemas in each backup instance are saved into a single file. For plant backups, files in the plant structure paths are bundled into a zip file inside the main plant backup zip file. The reference data files are archived into individual zip files and added to the main plant backup zip file.

A manifest document describing the data included in the backup is included in the backup zip file. This manifest document provides the input necessary to restore the data at a later time.

You can schedule backups using the scheduling functionality provided in the Backup wizard. This scheduling functionality uses the Windows Task Scheduling system to list, delete or modify a backup schedule. Each backup schedule is stored in a control file in the \Engineering Manager\Schedules folder. The control file contents describe the type of backup and all other information needed in order to accomplish the scheduled backup.

Backup Options

Site Server - Includes the site schema and site data dictionary. You may choose to backup all plant structures or define a list of plant structures to be included in the **Site Server Backup**.

Plant Structure - You can choose to include or omit reference data from the **Plant Structure Backup**.

Scheduled Backups - Both site and plant structure backups may be **Scheduled** to run one time only, or on daily/weekly intervals.

Restore Options

Site Server - You can restore the site to the same computer from which it was backed up or you can restore it to another computer. If you restore the site to another computer, you must provide, during the **site restoration process**, the database alias and password information for the database instance on the new computer.

Plant Structure - You can restore a plant structure to the same site from which it was backed up or you can restore it to another site. If you restore the plant to another site, you must provide, during the **plant restoration process**, the database alias and password information used by the new site.

Notes:

- You must have **Site Administrator** privileges to use the backup and restore functionality.

- If you are using **Oracle**, we recommend running in **Archive Logging** mode.

- Do not mix Oracle versions when using Backup and Restore. Do not use an Oracle 8i Client to backup a an Oracle 9i site or plant. Do not try to restore a backup created from an Oracle 9i plant to a site using Oracle 8i.

- When using Backup and Restore functionality in a Workshare environment, we recommend doing a complete backup after you transfer data and after updating reference data.

Backup Command

The **Tools** > **Backup** allows you to backup the site and/or plant structure information, depending on which node you select in the **Tree** view before using the **Backup** command. To backup the site, select the **Site Server** node and then click **Tools > Backup**. To backup just a plant, select the plant under the **Plant Structures** node and then click **Tools > Backup**.

Notes:

- Only a site administrator can perform a restore.

- Backing up a Plant automatically includes all projects in the Plant.

- If you receive an error message about the character sets on the Oracle Client and Oracle Server not matching, you must set the **NLS_LANG** registry key on the Oracle client to the value of the **NLS_CHARACTERSET** parameter in the Oracle server database instance.

Back Up a Site Wizard

A site backup includes the site schema and the site data dictionary. Included in the site backup file is a manifest document describing the contents of the backup and all necessary information to restore the site. Also included in the backup file is a dump file containing all database user objects belonging to the site schema and site data dictionary.
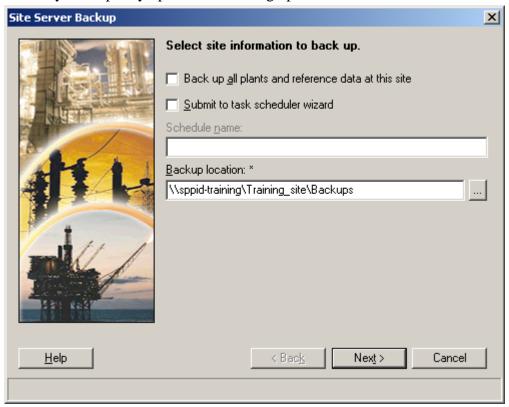
Backup zip files for a site use the following naming convention:

site name_s.zip

If a file exists in the backup location with the same name, the backup zip file name will contain a revision number: Site Server name_1_s.zip. There is no limit to the revision numbers.

Site Backup Wizard - Options

Allows you to specify options for backing up the site.

Back up all plants and reference data at this site - Allows you to include all plant structures in the site as well as the reference data for each associated application. This option is dynamic and obtains the list of plant structures directly from the site schema. A scheduled backup with this option selected will include any new plant structure and reference data added to the site schema at a later date. When a plant structure is included in a site server backup, the contents of the plant structure backup will be bundled into a separate backup zip file.

Submit to task scheduler wizard - Allows you to create a one time only or recurring backup schedule. If you select this options, two extra pages in the Site Backup wizard will display to allow you to input the scheduling information.

Schedule name - Defaults to the name of the site being backed up. You may edit this value. If a schedule with this name already exists, you will be prompted to enter a unique name for the schedule.

Backup location - Specifies where the zip file containing the site backup data is placed when the backup process finishes. By default, the backup path specified during site creation displays. You can change this path. This field is limited to 255 characters.

 Notes:

- If the backup location for your SQL Server site is located on a separate computer from your database, you must change the login information for the SQL Server services.

1. Click **Start > Settings > Control Panel**, then open **Administrative Tools**.

2. Double-click the **Services** icon.

3. In the **Services** list, double-click **MSSQLServer** to open the **MSSQLSERVER Properties** dialog box.

4. Select **This account**, and type the user name and password for the domain user who will be starting the MSSQLSERVER service.

5. Save your changes.

6. If the user specified in **This account** does not already have permissions to the share where backups are stored, grant the user read/write permissions to that share.

- A separate zip file containing all of the data necessary to restore the plant structure and associated information is created for each plant structure included in the site backup. These zip files are placed in the same backup location as the site backup. In this situation, the site backup location specified above overrides the plant backup location specified when the plant was created.

Site Backup Wizard - Plant Structures

The Site Backup Wizard - Plant Structures allows you to select the plant structures to be included in the site backup. This page appears only if there is at least one plant structure in the site and you did not select the **Back up all plants and reference data at this site** option on the previous page.

Plant structures - Lists the plant structures in the site. Check the box by each plant structure you want to include in the site backup. Reference data associated with each plant structure is automatically included in the backup unless you check the **No** check box. This plant structures list is a static list and will not include any new plant structures added to the site schema at a later date.

Site Backup Wizard - Finish

The **Site Backup Wizard** displays all the settings that you defined for backing up the site server. Review these settings carefully. If you are satisfied with the settings, click **Finish**. Otherwise, click **Back** to change one or more of the settings.

If you did not schedule the backup, the backup process begins when you click **Finish**. The status bar displays progress information as the backup proceeds. The wizard automatically exits after the backup process completes successfully.

If you chose to schedule the backup, clicking **Finish** creates a task in the Windows task scheduling system and then the wizard closes.

Details - Allows you to toggle the amount of information displayed.

Notes:

- Backup log information is available in the SpaBackups.log file in the Temp folder.

Back Up a Plant Wizard

A plant structure backup includes the plant schema, plant data dictionary, associated application schemas and data dictionaries, and all other information pertaining to that plant structure, including all project data if the plant includes projects. Included in the plant structure backup file is a manifest describing the contents of the backup and all necessary information to restore the plant structure and associated application schemas. Also included in the backup is a dump file containing all database user objects belonging to the schemas and data dictionaries for the plant structure and associated applications.

Backup zip files for a plant structure use the following naming convention:

- *RootItemName*_p.zip for non-Workshare plant structures

- *RootItemName*_m.zip for host plant structures

- *RootItemName*_w.zip for satellite plant structures

- *RootItemName*_a.zip for projects

If a file exists in the backup location with the same name, the backup zip file name will contain a revision number, for example, *RootItemName*_1_[pws].zip. There is no limit to the revision numbers.

Notes:

- Backups for remote satellite plant structures will not include the proxy user objects in the oracle export data. The proxy user objects must be restored by the host plant structure.

- Backups for same-instance satellite plant structures will include the proxy user objects in the oracle export data. The proxy user objects may be restored by the satellite import or by the host plant structure import.

- Backing up a Plant automatically includes all projects in the Plant.

Plant Structure Backup Wizard - Options

The **Plant Structure Backup Wizard** allows you to specify options for backing up the plant structure.

Include Reference Data - Select this option if you want to include the reference data for applications associated with the plant structure. For more information about backups and reference data files, please see the Backing Up Reference Data topic. This option is not available if the plant has no applications associated with it.

Submit to task scheduler wizard - Allows you to create a one time only or recurring backup schedule. If you select these options, two extra pages in the Plant Structure Backup wizard will display to allow you to input the scheduling information.

Schedule name - Defaults to the name of the plant structure being backed up. You may edit this value. If a schedule with this name already exists, you will be prompted to enter a unique name for the schedule.

Backup location - Specifies where the zip file containing the plant structure backup data will reside after the backup finishes. By default, the backup path specified during site creation displays. You can change this path. This field is limited to 255 characters.

Plant Structure Backup Wizard - Finish

Displays all the settings that you defined for backing up the plant structure. Review these settings carefully. If you are satisfied with the settings, click **Finish**. Otherwise, click **Back** to change one or more of the settings.

Details - Allows you to toggle the amount of information displayed.

 Notes:

- Backup log information is available in the SpaBackups.log file in the Temp folder.

Scheduling Options

The **Scheduling Options** allows you to specify options for scheduling the backup. This page appears only if you selected the **Submit to task scheduler wizard** on the previous page.

Task name - Displays the name of the backup being scheduled. You cannot edit this field.

User name - Type your system or domain login. You must have the necessary operating system permissions to create a task in the Windows task scheduling system. This user must also have database administrator privileges.

Password - Type your system or domain password.

Confirm password - Re-type your password.

Perform this task - Allows you to specify the frequency of the scheduled backup.

- **Daily** - Performs the scheduled backup every 24 hours.

- **Weekly** - Performs the scheduled backup once in every 7 days.

- **One time only** - Performs the scheduled backup once at the specified time.

📝 **Notes:**

- If you are scheduling a site backup task and you selected the **Back up all plants and reference data at this site** option, all plant structures added to the site after the task was created are automatically included in subsequent backup runs. If you did not use this option when creating the site backup task, you will have to create another site backup task to include the new plant structures.

- You cannot view the details of a previously scheduled backup task from within SmartPlant Engineering Manager. If you set up a scheduled event, such as backing up a particular plant at a given time, whether it be daily, weekly, or monthly, you cannot view that schedule within SmartPlant Engineering Manager. Use the **Control Panel > Administrative Tools > Scheduled Tasks** program to see what events are scheduled. However, Schedule Tasks indicates only that an event is scheduled, not what that event includes (such as whether it is backing up a plant or site).

- To reschedule an event, such as a daily plant backup, you must first end the scheduled task using Schedule Tasks, and then use the backup wizards in SmartPlant Engineering Manager to schedule a new task.

Backing up and Restoring Reference Data

Reference data is backed up as part of a **Plant Structure Backup**. To back up reference data you must back up a plant structure.

Reference data is restored as part of restoring a plant. However, you can restore just the reference data if the plant structure is already online (in the list of root items on the current site server) and the **Restore plant schemas** option in the **Restore Plant Structure** wizard is disabled.

If the reference data object is a path, all files and folders under this location will be archived into a single zip file and included in the overall plant structure zip file. If the reference data object is a file, it will be included in the overall plant structure zip file.

SmartPlant P&ID option setting SP_IDs:
- 680 Rules Library
- 681 Catalog Explorer Root Path
- 682 PID Template Path
- 683 Project Style File
- 684 Default Report Template Path
- 685 Default Assembly Path
- 703 Export to CAD Definition File
- 709 Project Insulation Specification File
- 710 Archive File Path
- 711 Plant Structure – Drawings
- 804 SmartPlant Resource Files
- 809 Import Map Files
- 824 Core Nominal Diameter and Jacket Nominal Diameter XML file.

SmartPlant Electrical option setting SP_IDs:
- 1001 Catalog Explorer Root Path
- 1002 Default Report Template Path
- 1004 Default SLD symbols Path
- 1005 Default Schematic Blocks Path
- 1007 Default Generated SLD Path
- 1008 Default Generated Schematic Path
- 1009 Default Generated PDB Layout Path
- 1010 Name of Template File for SLD
- 1011 Name of Template File for Schematic
- 1012 PDB Layout Reports Path
- 1013 Name of Title block File for SLD
- 1014 Name of Title block File for Schematic
- 1015 Name of Title block File for PDB layout
- 1018 Default Templates Path

Running Backups from the Command Line

You can run backups from the command line using the spabackup.exe program, which is delivered to the \Program Files\SmartPlant\Engineering Manager\Program folder during installation.

Argument	Description
-d [DbgLevel]	(Optional) Debug level. Defaults to 0 if you do not specify a debug level (0-3). If used, this argument must be the first argument in the command line call.
-c	Control File. Creates a control file that contains all the information needed to complete the backup process. Only the Debug argument (-d [DbgLevel]) can be used with this argument. You must use this argument with scheduled backups because the control file contains the minimal information needed to initiate the backup.
-s	(Optional) Site server INI file. Specifies the site server .ini file path. If you do not use -s, the backup process uses the site INI path found in the SmartPlantManager.ini file. If you use both the -s and -p arguments, the -s argument must precede -p.
-p [RItemName]	Includes the RItemName and reference data if you do not use the -NoRefData argument. Can be used as the first, second, or third argument.
-NoRefData	(Optional - valid only when used with the -p [RItemName] argument) Backup will not include any reference data.

Example Plant Backup Command Line Calls

```
spabackup.exe -d -s C:\temp\SmartPlantV4.ini -p PlantName

spabackup.exe -s C:\temp\SmartPlantV4.ini -p PlantName -NoRefData

spabackup.exe -p PlantName -NoRefData

spabackup.exe -p PlantName
```

Example Site Backup Command Line Calls

```
spabackup.exe -d -s C:\temp\SmartPlantV4.ini

spabackup.exe -s C:\temp\SmartPlantV4.ini
```
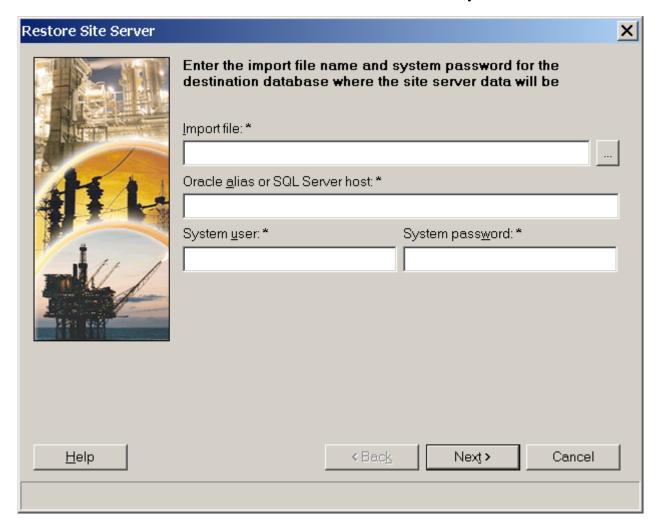
Restore Command

The **Tools** > **Restore** allows you to restore a site or plant structure from backup.

🖉 **Notes:**

- Only a site administrator can perform a restore.

- This command is enabled only when the Plant Structure node is selected. You can restore only a plant structure from within **SmartPlant Engineering Manager**. To restore a site, you must use the **Site Server Options** dialog box.

Restore a Site Wizard

You can restore a site from backup in one of two ways. From within SmartPlant Engineering Manager, you can select the **Site Server** node and then click **Tools > Restore**. This method launches the **Restore** wizard directly.

Or select the **Restore site from backup** option on the **Site Server Options** dialog box. The **Site Server Options** dialog is displayed if **SmartPlant Engineering**

Manager cannot find a valid site **SmartPlantV4.ini** file when starting **SmartPlant Engineering Manager**.

![Notes icon] **Notes:**

- Restoring a site does not automatically restore the plants backed up with the site. You must restore the plants separately.

- You do not have to restore a site before restoring a plant. However, you must restore the site to get the data dictionary templates.

Restore a Plant Wizard

To restore a plant structure from backup, select the **Plant Structure** node and click **Tools > Restore**.

![Notes icon] **Notes:**

- You do not have to restore the site before restoring a plant to its original site or to a new site.

Restore Site Wizard - Import From

The **Restore Site Wizard – Import From** allows you to browse to the site backup file you want to import.

Import file - Browse to the site backup file you want to import. This path must be in UNC format and contain no more than 255 characters.

Oracle alias or SQL Server host - Type the Oracle alias or SQL Server host name for the database the site will be imported into.

![Notes icon] **Notes:**

- If you leave the **Oracle alias or SQL Server host** box empty when you browse to the **Import file**, the software will display the value stored in the site backup file. However, if you are restoring the site to a different site server, you must type the Oracle alias or SQL Server host name for the database available to the computer on which you are restoring the site.

System user - Type a database system user name. This name does not have to be the database administrator user name, but this user must have system privileges.

System password - Type the database system password.

Notes:

- After you complete this page and click **Next**, the wizard obtains the database user names from the backup file and determines if they are existing users. If a database user exists, you will be asked if it is OK to drop tables and views from the database user table space before the restoration begins. Only conflicting tables and views will be dropped. You must OK the dropping of conflicting database user tables before being allowed to navigate to the next page.

- The Oracle instance on the computer to which you are restoring the site must contain matching tablespace names for all of the schema users included in the import file. If any of the permanent or temporary tablespace names in the import file do not exist in this Oracle instance, you must create the correct tablespace types and names before continuing the site restoration.
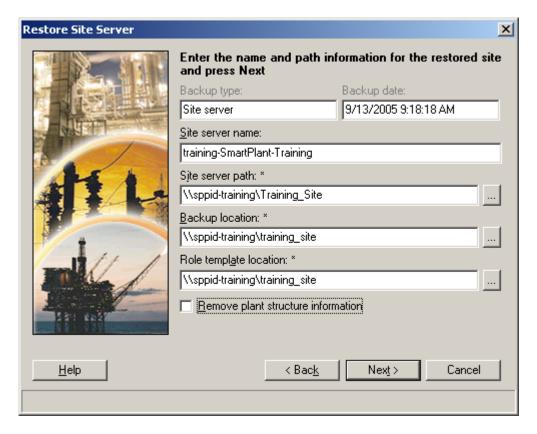
Restore Site Wizard - Site Server Information

The **Restore Site Wizard – Site Server Information** displays the type, name and date of the backup you have selected to restore and allows you to specify the path for the restored site.

Backup type - Displays the type of backup being restored. This field cannot be modified.

Backup date - Displays the date the site backup was created. This field cannot be modified.

Site server name - Displays the name of the site being restored.

Site server path - Allows you to browse to a new location for the site server path. Only the path can be modified. The .INI file name cannot be changed. This field is limited to 255 characters.

Backup location - Type or browse to the location where the site backup data is stored. This path was specified during the site backup process.

Role template location - Type or browse to the location where the role templates are stored. This path was specified during the site backup process.

Remove plant structure information - Check this option to remove all root item information from the restored site server. This option is useful for instances when you include a plant in a site backup and then delete the plant. If you try to restore the site after deleting the plant, an error message displays, indicating that the hierarchy information for the plant cannot be found. Use this option to avoid this situation.
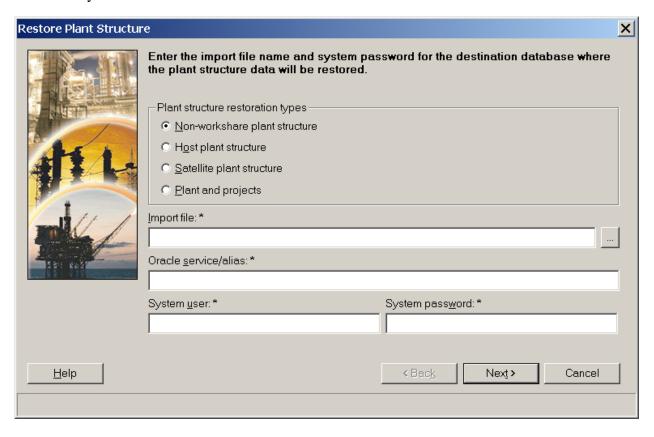
✎ **Notes:**

• We recommend selecting a backup location that has plenty of available space because the Restore process generates a temporary folder in this backup location while the site data is being restored. This folder is removed when the process finishes.

Restore Plant Structure Wizard - Import From

The **Restore Plant Structure Wizard – Import From** allows you to select the type of plant restoration and to browse to the plant structure backup file you want to import.

Plant structure restoration types - Allows you to select the type of plant structure you want to restore.

- **Non-Workshare plant structure** - Allows you to select a plant structure backup file ending in *_p.zip.

- **Host plant structure** - Allows you to select a host backup file ending in *_m.zip. When restoring host plant structure schemas, all the proxy user objects for the plant structure will be restored. Existing proxy user tables and views will be dropped and restored from the oracle export data. This is true for both remote and same-instance satellite proxy users.

- **Satellite plant structure** - Allows you to select a satellite backup file ending in *_s.zip. Because the backups for remote satellite plant structures do not include the proxy user objects in the oracle export data, the proxy user objects must be restored by the host plant structure. When restoring same-instance satellite plant structures, the proxy user objects may be restored by either the satellite restoration or by the host plant structure restoration because the proxy user objects were included in the backup file.

- **Plant and projects** - Allows you to select a plant backup file ending in *_a.zip.

Import file - Browse to the plant structure backup file you want to import. This path must be in UNC format and the backup file type must match the restoration type selected above. This field is limited to 255 characters.

Oracle alias - Type the Oracle alias for the database the plant structure will be imported into. This option appears only if the site is using Oracle.

SQL Server host - Type the SQL Server host name for the database the plant structure will be imported into. This option appears only if the site is using SQL Server.

🖉 **Notes:**

- If you leave the **Oracle alias** or **SQL Server host** boxes empty when you browse to the **Import file**, the software will display the value stored in the plant backup file. However, if you are restoring the plant to a different site server, you must type the Oracle alias or SQL Server host name for the database on the computer to which you are restoring the plant.

System user - Type a database system user name. This name does not have to be the database administrator user name, but this user must have system privileges.
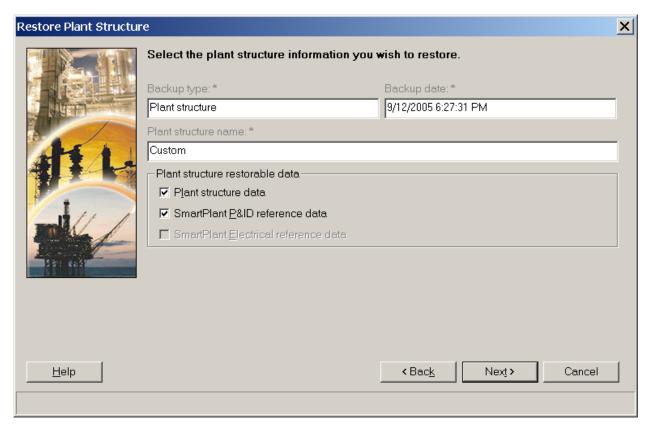
System password - Type the database system password.

🖉 **Notes:**

- After you complete this page and click **Next**, the wizard obtains the database user names from the backup file and determines if they are existing users. If a database user exists, you will be asked if it is OK to drop tables and views from the database user tablespace before the restoration begins. Only conflicting tables and views will be dropped. You must OK the dropping of conflicting database user tables before being allowed to navigate to the next page.

- The Oracle instance on the computer to which you are restoring the plant must contain matching tablespace names for all of the schema users included in the import file. If any of the permanent or temporary tablespace names in the import file do not exist in this Oracle instance, you must create the correct tablespace types and names before continuing the plant restoration.

Restore Plant Structure Wizard - Plant Structure Information

The **Restore Plant Structure Wizard** displays the type, name and date of the backup you have selected to restore and allows you to choose what data to restore.

Backup type - Displays the type of backup being restored. This field cannot be modified.

Backup date - Displays the date the backup was made. This field cannot be modified.

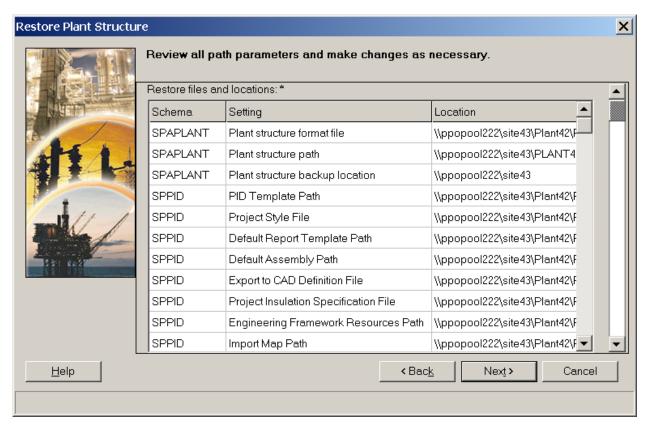**Plant structure name** - Displays the name of the plant structure being restored. This field cannot be modified.

Plant structure restorable data - Allows you to select what plant data to include in the restoration. You must select one of these options before you can move to the next page in the wizard.

- **Plant structure data** - Restores the plant schema, plant data dictionary and plant structure storage files, restores all schemas pertaining to applications associated with the plant structure at the time the backup was made, and updates the active site with the root item, database connection information and plant structure roles. For a host Workshare backup type, the satellite slots are updated.

- **SmartPlant P&ID reference data** - Restores the SmartPlant P&ID reference data that was backed up with the plant structure. This option is not available if no SmartPlant reference data was backed up with the plant structure.

- **SmartPlant Electrical reference data** - Restores the SmartPlant Electrical reference data that was backed up with the plant structure. This option is not

available if no SmartPlant Electrical reference data was backed up with the plant structure.

Restore Plant Structure Wizard - Paths

The **Restore Plant Structure Wizard – Paths** allows you to specify paths for the files being restored.

Restore files and locations - Displays the parameters and their current path settings as defined in the plant schema being restored. The items in the **Schema** and the **Setting** columns cannot be modified. To modify a value in the **Location** column, click the path, then type or browse to the path you want.

📝 **Notes:**

- We recommend selecting a backup location that has plenty of available space because the Restore process generates a temporary folder in this backup location while the plant data is being restored. This folder is removed when the process finishes.

Restore Plant Wizard - Finish

The **Restore Plant Wizard – Finish** displays all the settings that you have defined to restore the plant structure. Review these settings carefully. If you are satisfied with

the settings, click **Finish**. Otherwise, click **Back** to change one or more of the settings.

The status bar will display updated information as the restoration progresses. The wizard automatically closes after the restore process completes successfully.

Troubleshooting Backup and Restore

Problem	Solution
	Set the **NLS_LANG** registry key on the Oracle client to the value of the **NLS_CHARACTERSET** parameter in the Oracle server.
Oracle client and server character sets do not match.	1. To determine the current value of the **CHARACTERSET** parameter on the database server, log in to SQL Plus or SQLPlus Worksheet as the System User and run the following SQL statement: `Select value from nls_database_parameters where parameter = 'NLS_CHARACTERSET';` 2. On the client machine, modify the **NLS_LANG** registry key in the HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME0 folder to match the character set returned above. For example, if the query returns a **NLS_CHARACTERSET** value of `AL32UTF8`, then set the **NLS_LANG** registry key to `AMERICAN_AMERICA.AL32UTF8`.
If a plant exists in the site, it cannot be restored to the same site. The **Plant Structure** check box in the **Restore** wizard is disabled and only the **Reference Data** check box is enabled.	You cannot use the Backup and Restore functionality to "overwrite" an existing plant structure. Delete the plant from the site before trying to restore the plant.
The application dose not respond for some time (few seconds to few minutes) after clicking **Next** on the **Plant Backup** wizard. A message similar to the following displays in the Status bar: *Gathering File information (PlantName): for unknown application file id = 711.*	Wait. The application appears to not be responding because it is calculating the space requirement for all of the drawings. In plants with many P&IDs, this process may take several minutes to complete.
The backup .zip file contains earlier backups of the same plant and just keeps growing.	Change the backup location for the plant so that it is set to a folder not located under the plant structure path.
Scheduled backups fail to run or the following error messages appear during site or plant backups. • *Unable to determine a users <UserName> table space values: ORA-01017: invalid username/password logon denied system.* • *Adding table list to manifest for <PlantName>.*	The system user password has been changed in the Oracle database. The Backup process uses the System user password stored in the SPPID database to connect and run backups so that scheduled backups can run without user intervention. To remedy this situation, open the **Site Properties** dialog box and edit the **System password** on the **Database** tab.

Utilities

Check Item Paths Utility

The Check Item Paths utility (CheckFilePathCmd) checks the folder paths in the file names of all active plant items and reports paths that do not point to the current catalog. This macro, delivered to the **~\Program Files\SmartPlant\P&ID Workstation\Program** folder, creates a log file that details invalid paths; the log resides in the Temp folder.

How to Check Symbols file paths in a Plant

1. Open a drawing in **SmartPlant P&ID**.

2. Select **Tools** > **Custom Command**.

3. On the **Custom Command** dialog box, double-click **CheckFilePathCmd.dll**.

4. Review log file in the **Temp** folder called **CheckFilePathsFor_<PlantName>.log**.

Check Symbols Utility

The Check Symbol utility (CheckSymbolsCmd.dll) checks the specified plant catalog for symbols that contain:

- Graphics other than the following:
  igArc2d, igBalloon, igBoundary2d, igBsplineCurve2d, igCircle2d, igDimension, igEllipse2d, igEllipticalArc2d, igLeader, igLine2d, igLineString2d, igTextBox, and igPoint2d
- ConnectPoints with an incomplete connect point attribute set.
- Duplicate Connect Point Keys.
- Incorrectly ordered (not sequential) Connect Point Keys.
- Piping/Signal points (if the symbol is an OPC symbol).

You should run this utility at least once on all version 3.0 and 4.0 plants. After running this initial check, run this utility each time symbols are edited in Catalog Manager. Results are written to the log file named CheckSymbolsFor_*PlantName*.log in the Temp directory.

✎ **Notes:**
- This utility, delivered to the **~\Program Files\SmartPlant\P&ID Workstation\Program** folder, <u>must be</u> run in the **SPPIDAutomation.exe** environment.

How to Check Symbols in a Plant

1. Start **Drawing Manager**.

2. Select **File** > **Open Database**

   a. Select the Plant containing the reference data that you wish to check. Doing this sets the ActivePlant value for the utility.

   b. Select **Open**

3. Close **Drawing Manager**.

   a. Select **File** > **Exit**

4. Start the **SPP&ID Automation** application

   a. Double-click on the **SPPIDAutomation.exe** in the **~\Program Files\SmartPlant\P&ID Workstation\Program** folder.

✎ **Notes:**

- If the SPP&ID Automation application does not open a document by default, complete the following steps before proceeding:

  - Select **File** > **New**.

  - Select **Document** in the **Create new** group.

  - Select **Normal.spp** from the list of **templates**.

  - Select **OK** to open a new document.

5. Select **Tools** > **Custom Commands**

   a. Select **CheckSymbolsCmd.dll**.

   b. Select **Open**.

6. Select **OK** or view the log file for detailed information.

Clean Data Utility (DelOrpModItems.dll)

The Delete Orphan Model Item Utility is ran from within a SmartPlant P&ID drawing, the Delete Orphan Model Item Utility is used to clean up orphaned records that occur when drawings are upgraded. This utility, sometimes called Delete Orphan Model Items, can be used for the following tasks:

- **Database Report** - Generates a report, written to the **DBCleanup.txt** file in your Temp folder, that helps you decide if a manual cleanup alternative exists before using the **Entire Database** command to delete the problems from the database.

- **Entire Database** - Removes orphaned records from the plant database. Use this only after running Database Report, examining the report, and manually cleaning up as many items in the database as necessary.

- **Model Items** - Finds and deletes any model item in the database that does not have a corresponding entry in the T_Representation table. The utility works on an item type basis and repairs the following model item types: Vessel, Mechanical, Exchanger, Equipment: Other, Equipment Component, Instrument, Nozzle, Piping Component, Pipe Run, Signal Run, and OPC. Once the orphan model items for an item type are found, you can select any or all of the items and choose to delete them.

- **OPCs** - Finds and repairs off-page connectors (OPCs) that have lost their associations with the OPC with which they were originally paired. If one OPC has lost the identity of its mated OPC, but the mated OPC still has the identity of the first OPC, then the OPC is considered repairable. To repair the OPC, the utility updates the identity information for the first OPC. However, if both the OPC and its mated OPC have lost the identities of each other, then the OPCs are considered non-repairable, and you are given the option to delete them.

- **Gaps** - Repairs and updates gaps in the representation record with the proper item type. On rare occasions you will need to perform this operation if you have gapping problems in your drawings.

  📝 **Notes:**

  - We do not recommend using the **Gaps** command as part of your database constraint cleanup. If you find it necessary to run **Gaps**, you must be careful <u>not</u> to select Yes to a symbol that is not a gap. If you select Yes to any symbol other than a gap, you may corrupt your data set.

How to run the Clean Data (Delete Orphan Model Items) Utility

To avoid data corruption, complete the following steps in the sequence presented. The buttons on the utility are arranged in the proper sequence.
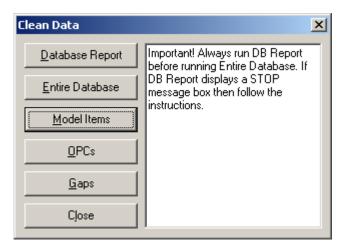
1. Run the following grants on your database. For more information, refer to your database documentation.

    connect pid user/pid user password;

    grant all on pid user.t_modelitem to plant user;

    grant all on pid user.t_representation to plant user;

2. Verify that the plant user has full permissions to the T_Representation and T_ModelItem tables. For information on setting table permissions, refer to your database documentation.

3. Open a drawing and click **Tools > Custom Commands** to open the **Custom Commands** dialog box.

4. Browse the drawing software program directory and open DelOrpModItems.dll. This macro is located by default in C:\Program Files\SmartPlant\P&ID Workstation\Program.
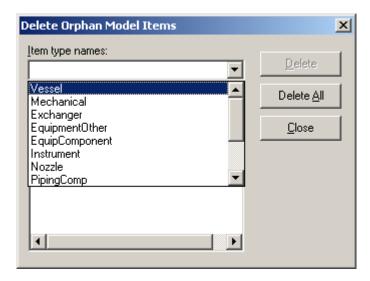
5. On the **Clean Data** dialog box, click **Database Report**. The results are written to the **DBCleanup.txt** file in your Temp folder. This report helps you decide if a manual cleanup alternative exists before using the **Entire Database** command to automatically delete the problems from the database.

6. After any manual database clean up, click **Entire Database** to automatically delete the problems from the database.

✎ **Notes:**

- Log messages generated when orphaned records are deleted from the plant database are written to the **DBCleanup.txt** file in the directory assigned to the TEMP environment variable.

7. Click **Model Items**.

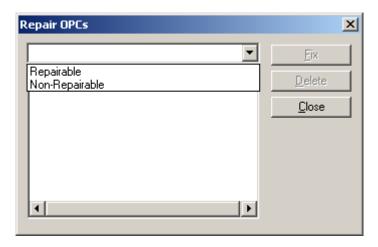8. On the **Delete Orphan Model Items** dialog box, select each model item type from **Item Type Names** list to see if any orphan items exist in the database.

9. In the **List** view, select the model orphan items to delete, and click **Delete**.
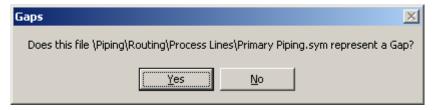
✎ **Notes:**

- You can also click **Delete All** to select and delete all the items in the list view.

- Log messages are placed in **SPDelOrpModItems.log** file in the directory assigned to the TEMP environment variable. The log file contains information about deleted items including the item type and SP_ID number.

10. Click **Close** to return to the **Clean Data** dialog box.

11. On the **Clean Data** dialog box, click **OPCs**.

12. On the **Repair OPCs** dialog box, chose either repairable or non-repairable from the **OPC Type** list. Repairable OPC pairs retain one link out of two between the mates. Non-repairable OPC pairs retain neither link.

13. Choose the OPC pair you are interested in from the **OPC** list, and click **Fix** if it is a repairable pair or **Delete** if it is non-repairable.

14. Click **Close** to return to the **Clean Data** dialog box.

15. On the **Clean Data** dialog box, click **Gaps** to find and repair gaps that do not have the correct representation in the database.

Does this file \Piping\Routing\Process Lines\Primary Piping.sym represent a Gap?

✎ **Notes:**

- We do not recommend using the **Gaps** command as part of your database constraint cleanup. If you find it necessary to run **Gaps**, you must be careful <u>not</u> to select Yes to a symbol that is not a gap. If you select Yes to any symbol other than a gap, you may corrupt your data set.

16. On the **Clean Data** dialog box, click **Close** to return to the design software.

SmartPlant Data Dictionary Template Comparison Utility

The SmartPlant Data Dictionary Template Comparison Utility allows you to determine the differences between two data dictionary template files or between one data dictionary template file and the corresponding data dictionary/schema from a plant. You cannot compare between two existing plants or between a site template and an existing site.

To run the utility select **Start** > **Programs** > **Intergraph SmartPlant Engineering Manager** > **Data Dictionary Template Comparison Utility**.

The comparison process is not a data model compare, but rather a database compare in which each template is compared table by table.

Notes:

- The source and target schema types must match.

- The source and target hierarchies must match.

- You can compare templates created in SmartPlant Engineering Manager version 4.2 with templates or plants created in SmartPlant Engineering Manager 4.2 or 4.3. This utility does not support templates created in versions earlier than 4.2.

The Data Dictionary Template Comparison Utility user interface consists of two main areas: one for selecting the source and target information, and the other for view in the comparison results.

Source Template path - Specify the path to the template you want to use as the source.

Schema type - Displays the type of schema based on the selected template.
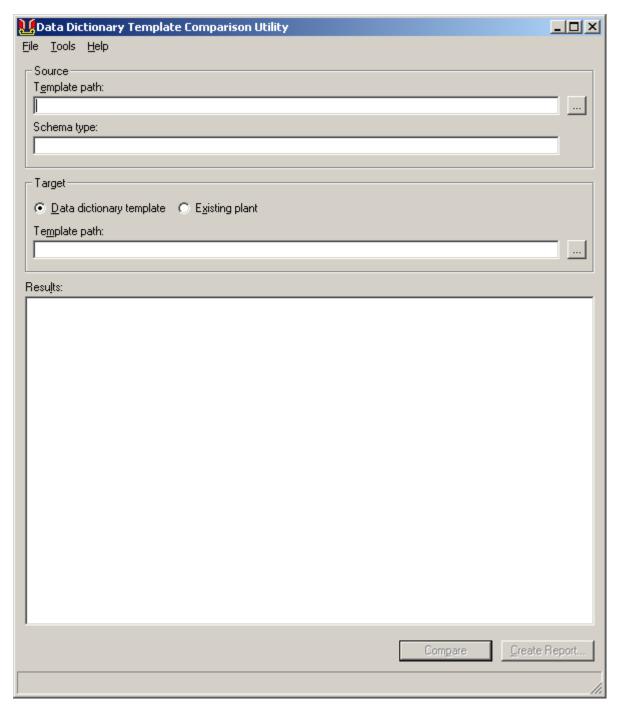
Data dictionary template - Select this option to compare the source template with another template.

Existing plant - Select this option to compare the source template with an existing plant's data dictionary.

Target Template path - Specify the path to the template you want to use as the target. This option is available only if you select the **Data dictionary template** option above.

Target Plant name - Select the plant you want to compare against the source template selected above. Use the **Browse** button to select the site .INI file containing

the plant you want to select. This option is available only if you select the **Existing plant** option above.

Results - Displays an overview of the differences between the source and target, categorized as follows:

- **Source Superset** - Items found in the source template and not in the target.

- **Target Superset** - Items found in the target but not in the source.

Mismatched Values - Items found in both the source and target, but with differing values.

Compare - Runs the comparison process.

Create Report - Exports the complete comparison results to a Microsoft Excel file. The standard **Save** dialog box allows you to specify the path for this file.

Each report contains up to four worksheets: Summary, Source Items not in Target, Target Items not in Source, and Mismatched Items. The sheets are created only if there is data to write to that sheet.

Display Tabs Conversion Utility

Use the **UpgradeTabsCMD.dll** to convert display tabs (also called filter tabs) created in previous SmartPlant P&ID versions to display sets.

1. In **SmartPlant P&ID**, open the drawing containing the display tabs that you want to convert.

2. Click **Tools > Custom Commands** to open the **Custom Commands** dialog box.

3. Browse the drawing software program directory and open **UpgradeTabsCMD.dll**. By default, this macro is located in the **~:\Program Files\SmartPlant\P&ID Workstation\Program** folder.
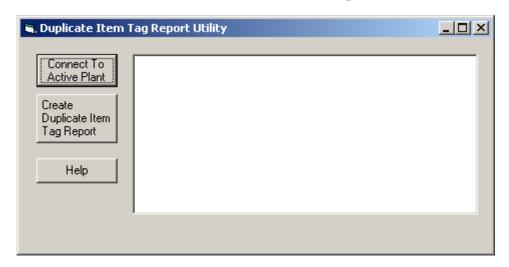
4. Enter the name of the display set to which you want the display tab filters written and click **OK**.

5. The new display set is added to the **View** > **Apply Display Set** > **My Display Sets** menu.

Duplicate Item Tag Report Utility

The **Duplicate Item Tag Report Utility** helps you locate instruments and piping components that have the same item tag. The utility creates a Microsoft Excel spreadsheet in your computer's ~\temp). The spreadsheet is named <PlantName>-DuplicateTags.xls.

1. Double-click **DuplicateTagReport.exe** in the **~:\Program Files\SmartPlant\P&ID Workstation\Programs** folder.

2. Click **Connect to Active Plant**. The name of the active plant displays.

3. Click **Create Duplicate Item Tag Report**.

4. Click the button ✕ to exit the utility.

5. Open the report spreadsheet from your TEMP folder.

Item Tag Validation Utilities

An ItemTag.dll containing the new item tag validation source code for duplicate tag checking in each of the following three project environments:

ActivePlant - (Delivered in the **Item Tag Validation** folder) Contains the delivered item tag validation code and the default ItemTag.dll with the scope set for this option.

ActiveProjectAgainstAsBuilt - Contains the delivered item tag validation code and the ItemTag.dll with the scope set for this option.
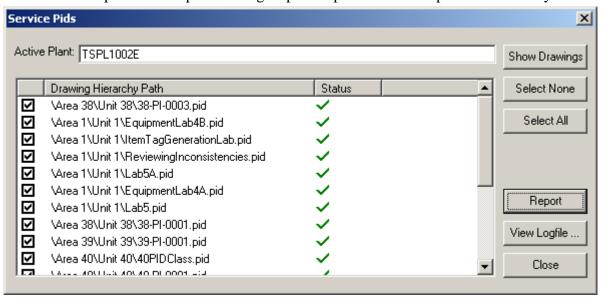
ActiveProjectAgainstAsBuiltAndProjects - Contains the delivered item tag validation code and the ItemTag.dll with the scope set for this option.

These ItemTag.dlls are delivered to the **Programmer's Guide\Sample Source code\Item Tag Validation** folder on the SmartPlant P&ID product CD. These files are not installed on your computer during setup.

To use these files, you must rename the ItemTag.dll file installed on your computer (for example, rename the file to DeliveredItemTag.dll), then copy from the product CD the ItemTag.dll flavor that you want to use. Place this copy in the same location as the installed ItemTag.dll that you just renamed. When you are finished, remove the ItemTag.dll copy, then rename the delivered copy back to its original name,

Service PIDs Executable

The ServicePidsExe is a tool to run Report/Repair Relationship Indicator Utility in Report mode on all or selected drawings in a plant. Running this tool would generate a log file which will contain detailed information. Each drawing that contains an error has to be then opened and repaired using Repair/Report Relationship Indicator Utility.

To run the Service PIDs executable

1. From **Drawing Manager** connect to the **Plant**.

2. Double click on the ~**Program Files\SmartPlant\P&ID Workstation\Program\ServicePIDsExe.exe** to run the program.

3. The **Plant** you are connected to will be displayed in the **Active Plant** field, you would need to select **Drawing Manager** to connect to another plant before running this .exe.

4. Select **Show Drawings**

5. Select **Select All**

6. Select **Report** (the green check indicate no problems were found, a yellow yield symbol would report a problem)

7. **View** the **Logfile**.

Repair Relationship Indicators Utility

The Repair Relationship Indicators utility (RepairRelIndCmd.dll) processes all graphic connections on the active drawing and verifies all relationship indicators in the graphic file and in the database. If any relationship indicator errors are found, they are reported. You can then use this utility to automatically repair any of the reported errors. This utility must be run on a drawing by drawing basis.

In the SmartPlant P&ID drawing, run the Repair Relationship Indicators utility on each drawing. There are two available modes for running the utility: Report and Repair & Report. Running this utility processes all graphic connections on the active drawing and verifies all relationship indicators in the graphic file and in the database. If any relationship indicator errors are found, they are reported. You can then use the Repair Relationship Indicators utility to automatically repair any of the reported errors.

To run the Repair Relationship Indicators Command

1. Open a SmartPlant P&ID drawing and click **Tools > Custom Commands** to open the **Custom Commands** dialog box.

2. Browse to the SmartPlant P&ID workstation program directory and select **RepairRelIndCmd.dll**.

3. Click **Open** to start the utility.

4. Select the **Report** option and click **OK** to evaluate relationship indicators and generate the **RnR-RelIndicators.log** report in the **Temp** directory. Review the report to see any relationship indicator errors existing in the drawing.

5. If any errors exist, select the **Repair & Report** option and click **OK** to repair relationship indicators and to generate an activity report, **RnR-RelIndicators.log** in the **Temp** directory. Review the report to see how each relationship indicator error was resolved.

6. Close and reopen the drawing after running this utility and before making any further modifications to the drawing.

Notes:

- This utility must be run on a per drawing basis. It cannot be run on an entire plant.

Updating Symbology

You can force the software to redraw the graphic representation of your data (that is, the drawing view) by using the Update Symbology command in SmartPlant P&ID. This command refreshes the graphic symbology - that is, line weight and color – of symbols in your drawing based on the current settings in Options Manager.

The symbology and other settings defined in Options Manager usually takes effect only in those drawings that are created after those values are defined. Updating Options Manager settings enables you to force changes in your symbology definitions to be reflected in the current drawing, regardless of when it was created.

To run the Update Symbology Command

1. Open a drawing in SmartPlant P&ID.

2. Click **Tools > Update Symbology**.

Apply Settings

The ApplySettingsCmd macro (delivered to the **~\Program Files\SmartPlant\P&ID Workstation\Program** folder) also updates the line settings, **Minimum Connector Segment** and **Routing Self-Avoidance**, so that the current values in **Options Manager** > **Distances** are reflected in the drawing.

To Update Line Styles Using the ApplySettingsCmd Macro

1. Open a drawing in **SmartPlant P&ID**.

2. Click **Tools** > **Custom Command**.

3. On the **Custom Command** dialog box, double-click **ApplySettingsCmd.dll**.

📝 **Notes:**

- Any user can update drawings using these commands. However, check your permissions, which are assigned in SmartPlant Engineering Manager, to find out if you can make changes to the plant-wide symbology in Options Manager.

- Once you load the current plant-wide symbology definitions into your drawing, you cannot revert to previous definitions. However, you can always override plant-wide symbology choices in your drawing by using drawing filters and choosing Display Sets for items.

- In Options Manager, two settings, Minimum Connector Segment and Routing Self-Avoidance, control the behavior of pipe and signal runs when they are placed in a drawing or when an inline component is placed on a run. You can change these settings in Options Manager, but the new values only affect lines placed after the change. The ApplySettingsCmd.dll macro applies the latest settings to all runs on the current drawing. You must run this macro for every drawing individually.

Update Labels

The **UpdateLabelsCMD** macro will only refresh the value of the currently placed label's property displayed on the drawing.   For example if the values for the property was changed via automation., import, or the format used for a property's unit of measure is modified (not changed) via **Format Manager**.

 The macro will <u>not</u> update the label based on modifications made to the label via **Catalog Manager**. If modifications to the label have been made via **Catalog Manager**, each instance of the label will need to be replaced in the drawings. The **Edit** > **Replace** command can be used to replace these instances or utilize the **File** > **Out-Of-Date Drawing** > **Update** command from **Drawing Manager**.

This utility is delivered as a macro to the **~\Program Files\SmartPlant\P&ID Workstation\Program** folder.

To run the Update Labels Command

1. Open a drawing in SmartPlant P&ID.

2. Click Tools > Custom Command.

3. On the Custom Command dialog box, double-click UpdateLabelsCmd.dll.

Recreate Drawings

The software continually updates the database as you edit a drawing; however, the software does not update the drawing file until you actually save the file — for example, when you click **File** > **Save** or when you quit the program. Occasionally, the software can end in an abnormal way — for example, due to power outage. As a result, the database is up-to-date with changes that you posted to the drawing, but the drawing file reflects the status when you last saved the drawing. When you re-open the drawing, the software recognizes that the drawing file is different from the database.

The software displays a message box that states One or more items in this drawing are inconsistent with the database. Click OK to re-create the drawing from the database.

During the re-create process, the status bar at the bottom of the main window keeps you informed about the particular elements currently reconciling with the database. Also, a log file, Recreate-DrawingName, is created in your Temp folder. You can check this file for irregularities that occur during the re-create process.
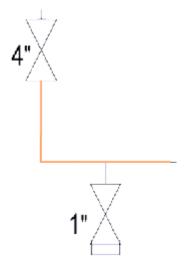
 Notes:

- Do not interfere with the re-create process once started because the drawing can become unusable.

After the re-create process is completed, the software reinitializes your drawing and displays the message **Re-create drawing is complete**.

If a section of the drawing could not re-create successfully an error condition appears on your drawing. Error conditions are always associated with a pipe or signal run, and the symbology is a heavy orange line segment. This portion of the drawing must be updated manually. Delete the heavy orange line segment and components connected directly to it. Then re-route your runs and replace connections and components as required.

The heavy orange line segment is the error condition.

How to Force a Recreate of a Drawing

📝 **Notes:**

- Normally SmartPlant P&ID recreates drawings automatically when it detects a discrepancy between the drawing and the database.

- For more information about recreating drawings, see the **Re-creating Drawings** section in the *SmartPlant P&ID Installation and Upgrade Guid*e.

1. Open the drawing that you want to recreate.

2. Place an item in the drawing.

3. Right-click an empty space on your Windows taskbar, and then click **Task Manager**.

4. Click the **Processes** tab.

5. In the list, click **draft.exe**.

6. Click **End Process**.

7. In SmartPlant P&ID, open the drawing that you opened in step 1.

8. When the software prompts you that a recreate is necessary, click **OK** to recreate the drawing from the database.

9. Delete the item that you placed in step 2.

10. Save the drawing.

Resolve a Re-create Drawing Error Condition

1. Delete all connectors and components that are directly connected to the error condition.

2. Delete the heavy orange lines that make up the error itself.

3. Re-route your pipe or signal run.

📝 **Notes:**

- Keep property breaks in mind as you re-route your lines.

4. Replace connectors and components that you deleted in step 1.

📝 **Notes:**

- Error conditions are not required items and therefore should be Deleted from Model, which will by pass the stockpile, this would ensure another user would not place this error condition in another drawing.

Local Model Item Lookup Table Utility

Use the **LocalModelItemLookupTable.sql** utility if your connected Workshare satellite experiences performance problems when transferring piping data from **SmartPlant P&ID** to **PDS**. This script converts a satellite database view (namely, the **T_ModelItemLookup**) that references a host table into a local table, allowing the data transfer to proceed without using a DBLink.

SmartPlant P&ID uses the DBLink to fetch unique Long IDs from the Host when running from a connected Workshare satellite. If the performance of opening the PID file in PDS is an issue or if maintaining the correlation between SmartPlant P&ID and PDS after the merge is not an issue, then you can run this script to change the lookup for the Long ID from a view to the host to a local query.

This utility is delivered as an SQL script to the **~:\Program Files\SmartPlant\P&ID Workstation\Program** folder and can be executed using any Oracle user interface,such as SQLPlus.

Notes:

- Do not use this script if the transferred PDS data will be merged back into a host PDS database because the Long IDs will not be unique at the host.

Understanding Database Constraints

The following database constraints improve the integrity of the data associated with your design.

- **Foreign Key** - Insures that the corresponding value, unless it is null, exists in the table referenced by the foreign key. This type of constraint is used to enforce logical relationships, such as the plant item to plant group relationship.

- **Foreign Key** in conjunction with **Not Null** - Enforces group relationships, such as the case to model item relationship. This constraint is similar to the **Foreign Key** constraint described above, but does not allow null values to persist.

- **Foreign Key** with **Not Null** and **Unique** - Enforce all subclass and one-to-one relationships, such as the pairing of OPCs. This constraint is similar to the **Foreign Key** constraint described above, but does not allow null values to persist and requires that all values be unique.

The constraints so far described serve to enforce relationship integrity. Since the relationship, the object and the foreign key it points to, already exists in the database or is created during your transaction, the constraints are satisfied without changing the scope of your transaction.

- **Check** - Used for more complex data integrity controls, such as monitoring conditions on multiple items. For example, History records can pertain to either a drawing or the model. Either of these objects can be null, but not both of them. A **Check** constraint enforces this condition by using comparisons and exclusions. Another candidate for a **Check** constraint is the enforcement of certain values for one or more items. For example, invalid null or zeroes assigned to properties are tested against **Check** constraints.

Running the Database Constraint Utility (Database Constraint Report.exe) will have absolutely no impact on your plants, it is a report only. The information generated by this utility will require correction utilities that the customer will run prior to upgrading to v4. Also note the upgrade from v3 to v4 will check for constraint violations before upgrading the database. Any violations detected will have to be corrected before the upgrade will proceed.

- SP P&ID 3.0 and above, with the latest Service Pack, includes the Database Constraint Utility and also the appropriate dll that must be ran to correct the particular problem

- Version 4.0 leverages the native database constraint capability in Oracle to improve the data integrity of the SmartPlant P&ID system.

- Database constraints have not been implemented for MS-SQL Server. MS-SQL Server does not support deferred constraints. Deferred constraints are checked when a transaction is committed.

- Database constraints enforce data integrity at the row level in the database. This stops data that violates the constraint from getting into the database.

- The new transaction processing provided in version 4.0, works in conjunction with the database constraints. If the system encounters data that violates a constraint, a rollback of the current transaction occurs and the P&ID session is ended. The drawing is placed into a recreate state to ensure the graphics are consistent when the drawing is opened the next time. The data integrity of the database is intact.

- Experience gained by analyzing numerous SmartPlant P&ID customer data sets aided in the identification of the proper constraints.

- Database constraint violations in existing datasets must be resolved prior to upgrading to v4.0.

- Intergraph is providing, with version3.0, utilities to report existing database constraint violations and assist in the repair process.

Examples of database constraints:

The following is a check constraint which enforces certain values for the Representation Class.

ALTER TABLE T_REPRESENTATION ADD CONSTRAINT REPRESENTATIONCLASS_CHECK CHECK (REPRESENTATIONCLASS IN (9,12,13,45)) DEFERRABLE;

The following is a referential integrity constraint which enforces that when SP_DrawingID is set then there has to be a matching row in T_Drawing.
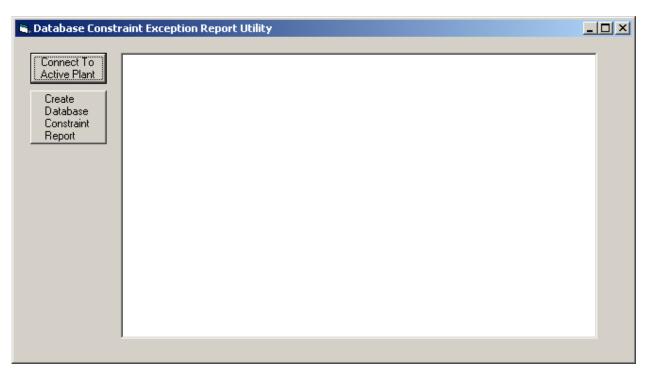
ALTER TABLE T_HISTORY ADD CONSTRAINT HISTORY_DRAWING_FK FOREIGN KEY (SP_DRAWINGID) REFERENCES T_DRAWING (SP_ID) DEFERRABLE;

The following is a unique constraint which enforces that an OPC can only be referenced by one other OPC.

ALTER TABLE T_OPC ADD CONSTRAINT OPC_OPC_UNIQUE UNIQUE (SP_PAIREDWITHID);

How to run the Database Constraint Report Utility

1. Double-click **Database Constraint Report.exe** in the **~\program files\SmartPlant\P&ID Workstation\programs** folder.

2. Click **Connect to Active Plant**.

3. The report output will be in the **~\temp** folder with a name of **<Plant Name>-ConstraintExceptions.**xls.

4. See the Service Pack Readme concerning the utilities required to run to address constraint violations.

Piping Specification Utility

The Piping Specification utility (PipeSpec) works with Intergraph PDS 3D or SmartPlant 3D to validate the piping materials class with the temperatures, pressures, and diameters assigned to the pipe run and to search commodity codes and fabrication categories for piping components. The database tables and library files in the 3D product provide source information for the validation and search. The service limits validation and automatic commodity code look-up can be disabled simultaneously using a switch in Options Manager. For more information about modifying the PipeSpec settings, see the *Options Manager Help*.

In Data Dictionary Manager, the **ValidateNomDiam.ForeignCalc** program ID, which is assigned to the **Nominal Diameter** property, starts the Piping Specification utility and triggers the commodity code and fabrication category lookups when a nominal diameter is changed. For more information about assigning program IDs, see the *Data Dictionary Help*.

SPPID and PDS 3D Files Used

* **pd schema** - pdtable_102 table

* **ra schema -** pdtable_201 and pdtable_202 tables

* •**library files** - us_pjstb.l, us_pjstb.l.r, and us_pjstb.l.t (The library file locations are listed in pdtable_102.)

* •**.dll files** - PipeSpec.dll, pdpjs.dll, pdpjsx.dll, and

* ValidateServiceLimits.dll

The Piping Specification utility allows separate logins for the **ra** and **pd** schemas in the PDS 3D database.

 Notes:

* To use the Piping Specification utility with SmartPlant 3D, you must install the SmartPlant 3D Piping Specification Remote Access Client, which is available on the SmartPlant P&ID product CD under Prerequisite Software.

* All of the displayed text strings are maintained as Visual Basic resources in the **PipeSpec.dll**. These strings can be translated or modified as required using a resource file editor.

* Error messages are placed in the **PipeSpecError.log** file in the directory assigned to the TEMP environment variable. Error messages help you identify the cause of

failure when the utility does not complete the tasks as expected. For example, if minimum requirements are not met for the lookup, the missing properties are listed in the log file.

- The **ServiceLimits.log** file contains any errors encountered during the Service Limit Validation process, which runs as part of the PipeSpec Utility.

Enter Required ProgIDs

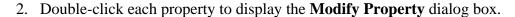1. Click Start > SPEM > Data Dictionary Manager.

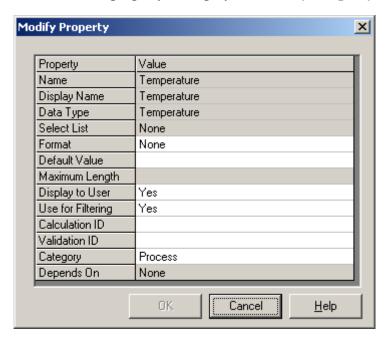2. Click the Database Tables button.

3. Click each database table named in the following table.

Database Table	Property	Calculation ID	Validation ID
Case Process	Pressure		PipeSpec. CommodityCode Validator
Case Process	Temperature		PipeSpec. CommodityCode Validator
Inline Component	Nominal Diameter		ValidateNomDiam. ForeignCalc
Inline Component	Commodity Code	PipeSpec. CommodityCode Validator	
Pipe Run	Piping Materials Class	PipeSpec. PMCFinder	PipeSpec. CommodityCode Validator
*Pipe Run	Nominal Diameter	PipeSpec. NPDFinder	
*Piping Component	Option Code	PipeSpec. OptionCodeFinder	PipeSpec. CommodityCode Validator .

 Notes:

1. The Calculation IDs for the **Nominal Diameter** property in the PipeRun table and the **Option Code** property in the Piping Component table (items marked with an (*) asterisk) are available only when the pipe specification source is

SmartPlant 3D. These validations are not available when the piping specification source is PDS 3D.

2. Double-click each property to display the **Modify Property** dialog box.

Property	Value
Name	Temperature
Display Name	Temperature
Data Type	Temperature
Select List	None
Format	None
Default Value	
Maximum Length	
Display to User	Yes
Use for Filtering	Yes
Calculation ID	
Validation ID	
Category	Process
Depends On	None

3. Type the specified information in the **Calculation ID** and **Validation ID** fields for the specific property.

4. Repeat the steps above with the information supplied in the following table to update each database table.

Enter Settings Area Data

1. Click **Start** > **SmartPlant P&ID** > **Options Manager**.

2. In **Options Manager**, click **Settings**.

3. To enable continuous service limit validation and automatic commodity code lookup, choose **Yes** in the **Enable Piping Specification Validation** field and then choose either **PDS3D** or **SmartPlant 3D** in the **Use Piping Specification** field, depending on the type of 3D database to which you are connecting.

   📝 **Notes:**

   - When changing the **Use Piping Specification** setting from **No** to either **PDS3D** or **SmartPlant 3D**, validation occurs only for items modified after the change.

- If the **Enable Piping Specification Validation** setting is **No** and the **Use Piping Specification** setting is **PDS3D** or **SmartPlant 3D**, continuous service limits validation and automatic commodity code lookup are not available. However, the **PipeSpec Commodity Code Lookup** utility continues to provide other capabilities in SmartPlant P&ID.

- If you choose to set the **Use Piping Specification** field to **No**, the PipeSpec utility continues to provide other functionalities. You can enable the selection of piping material class by using the **Calculation** button in the **PipeRun > Piping Material Class** field. You can enable the manual look-up of commodity codes for the selected piping components by using the **Calculation** button in the **Piping Component > Commodity Code** field.

4. If connecting to a **SmartPlant 3D** database, fill in the database information in the **SmartPlant 3D Plant Name** and **SmartPlant 3D Server Name** fields, and then skip the rest of this procedure.

5. If connecting to a **PDS 3D** database, proceed with the remaining steps of this procedure.

6. Select the **PDS Database Type** from the select list. Currently MSSQL and Oracle are supported.

7. Type the value for **PDS Database Server/Alias.** For MSSQL, this is the server name for the MSSQL database. For Oracle, this is the Alias name on the Oracle client machine.

8. Type the database name for **PDS Database Name**. The database name is not required for Oracle databases.

9. Type the user name and password of the **ra** schema of a PDS 3D project under **PDS Approved Reference Database Schema Name** and **PDS Approved Reference Database Schema Password,** respectively.

10. Type the user name and password of the **pd** schema of a PDS 3D project under **PDS Project Control Database Schema Name** and **PDS Project Control Database Schema Password**, respectively.

11. In the **Max-Temperature Unit in PDS3D** list, select the unit of measurement used in PDS 3D for the maximum temperature limit for piping components.

✎ **Notes:**

- For more information about changing reference data settings, see Change Reference Data Settings in *Options Manager Help*.

- The **PipeSpec Commodity Code Lookup** utility uses these settings. For more information about using this utility, see *Data Dictionary Manager Help - Enter Required ProgIDs* and *SmartPlant P&ID Help*. Calculation and validation programs are assigned in SmartPlant Data Dictionary Manager, and the utility runs because of actions in SmartPlant P&ID.

- The **PipeSpec Commodity Code Lookup** utility does not run on specialty piping components. If the **IsSpecialtyItem** value is **True**, then the utility ignores the piping component. If the value is **False**, then the utility processes the properties for the component as usual. The **IsSpecialtyItem** property is specified in SmartPlant Catalog Manager.

Performing Service Limits Validation

The Piping Specification utility verifies that the temperatures and pressures assigned to a pipe run comply with the service limits associated with the selected Piping Materials Class. In continuous validation mode, which is activated by assigned settings in Options Manager, this verification occurs each time you modify either the Piping Materials Class or a temperature-pressure pair in the process case data of the pipe run. The Service Limits validation requires at lease one complete temperature pressure pair from among design, alternate design, operating, and alternate operating cases. If any temperature-pressure pair violates the service limits of the selected Piping Materials Class, a warning displays the appropriate pair. This warning appears in the design software by appending an error string to the name of the PMC.

Performing Commodity Code and Fabrication Category Look Up

The Piping Specification utility looks up the **Commodity Code** and **Fabrication Category** properties of inline piping components. In the continuous validation mode, this lookup occurs each time the **Piping Materials Class** or any of the four case **Max** temperatures (**Design**, **Alternate Design**, **Operating**, and **Alternating Operating**) are modified on the pipe run. Validation also occurs each time the **Option Code** or **Nominal Diameter** of the component is modified. If the modification occurs on a property of a piping component, then the lookup is restricted to that particular component, but if the modification occurs on a property of a pipe run, then the lookup encompasses every piping component on that run.

The minimum requirements to cause a lookup are that the piping components must be in a pipe run, that the PMC of the pipe run must be populated and comply with service limits, and that the nominal diameter of the piping component must be specified. If the PMC is assigned but does not comply with the service limits, then the Commodity Code property displays an error message.

The PipeSpec utility uses process case temperatures of the run during the commodity code lookup only if the code for that component has a maximum temperature limit value in the 3D database. For example, in PDS 3D, a value of -9999 for maximum temperature in pdtable_202 indicates a null value, and the process case temperatures on that pipe run are ignored for the lookup. If a maximum temperature exists for that component, then the lookup insures this value is larger than all of the process case temperatures assigned to that pipe run in which the piping component resides.

Notes:

- The units for the PDS 3D maximum temperature are those specified in Options Manager.

If any temperature values for the pipe run are unspecified, then a value of zero Deg-K is assumed for each of the unspecified temperatures. If multiple records are obtained in the lookup, then the utility returns a commodity code only if all of the records have the same code value. If not, an error is recorded in the error-log file with the appropriate message.

The **Fabrication Category** property of inline piping components is a select-listed property in SmartPlant P&ID. A relationship between the fabrication category and the commodity name can be defined in the 3D database. The **Commodity Name** is a unique name for every symbol. In PDS 3D, this unique name is the **AABBCC Code** property. SmartPlant symbols are assigned the same **AABBCC Code** properties in Catalog Manager.

Similarly, the **Option Code** property is a select list of text values in SmartPlant P&ID, while it is a set of code numbers or indices in PDS 3D. **Short Value** for the **Option Code** select list contains the PDS 3D indices corresponding to the appropriate **Option Code** text in SmartPlant P&ID. The PipeSpec utility uses the entries in the **Short Value** box of the **Option Code** list to obtain the Option Code used in the PDS 3D database tables.

Notes:

- Error messages are placed in the **PipeSpecError.log** file in the directory assigned to the TEMP environment variable. Error messages help you identify the cause of failure when the utility does not complete the tasks as expected. For example, if minimum requirements are not met for the lookup, the missing properties are listed in the log file.

✎ **Notes:** The following is an excerpt from the SmartPlant 3D *Installation Guide*

Integrating with SmartPlant P&ID

To take advantage of the software's SmartPlant P&ID integration functionality, you must install the Piping Specification Remote Access Server and Client setups. The remote access server setup is available as on option in the SmartPlant 3D Installation setup for the workstation computer. The remote access client must be installed on a computer running SmartPlant P&ID and is an available option with the SmartPlant P&ID product.

After both features are installed, you can use P&ID design basis information for correlation with SmartPlant 3D.

For more specific information about using the SmartPlant P&ID integration functionality included with the software, please contact Intergraph Support.

Configure the Piping Specification Remote Access Server Service
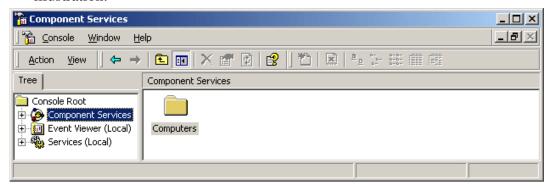
In order to use the SmartPlant P&ID integration tools available with the software, the Piping Specification Remote Access Server service must be installed and properly configured. Perform the following steps to verify, and, if necessary, manually install and configure the COM+ application.

♦ **Important**
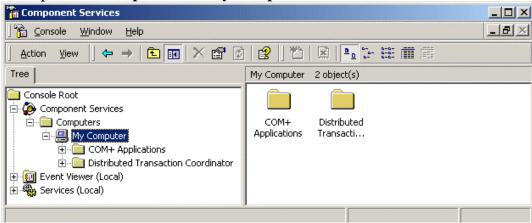
- You must have administrator privileges on the workstation computer in order to perform this installation procedure.

- The Piping Specification Remote Access Server service is installed as part of the SmartPlant 3D Installation setup. For more information, see *Installing SmartPlant 3D Client Software*.

- Upon installation you will find several documents located in the ~:\Program Files\SmartPlant\3D\PIDClient\Doc folder.

Verify SP3D Piping Specification Remote Access Server Service
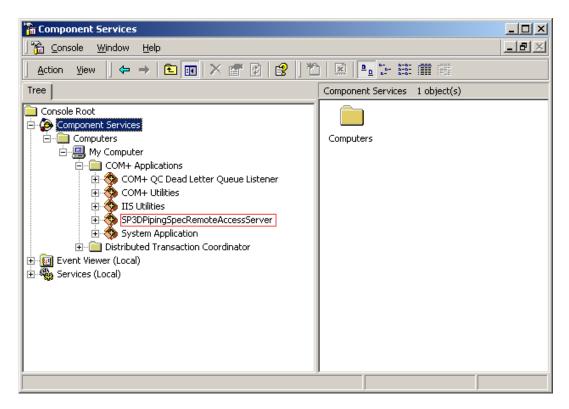
1. Open the **Control Panel** and double-click **Administrative Tools**.

2. In the **Administrative Tools** window, double-click **Component Services** to start the component services Microsoft Management Console (MMC) snap-in. The **Component Services** window appears as shown in the following illustration:

3. Expand the **Component Services** node under the **Console Root**, and then expand the **Computers** and **My Computer** nodes.

4. Expand the **COM+ Applications** node.

5. Verify the **SP3DPipingSpecRemoteAccessServer** icon appears under **COM+ Applications**. If it exists, skip to step15. If it does not exist, perform steps 6-14 to install and configure the **COM+ application**.

6. Select **Com+ Applications** under the **My Computer** node, and then click **Action** > **New** > **Application** on the horizontal toolbar. The **COM+ Application Install Wizard** displays.
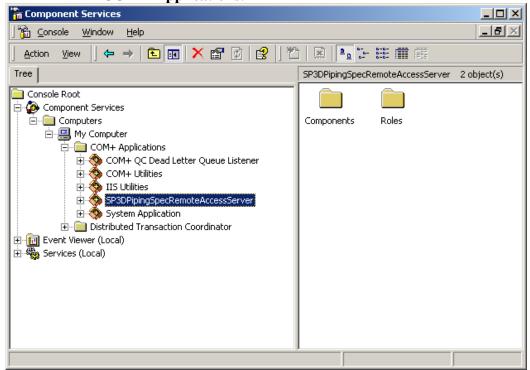
7. Click **Next** on the **Welcome to the COM Application Install Wizard** page.

8. Select **Create** an empty application on the **Install or Create a New Application** page.

9. On the **Create an Empty Application** page, type **SP3DPipingSpecRemoteAccessServer** in the **Enter a name for the new application** text box.

10. Select **Server application** in the **Activation type** field, and then click **Next**.

11. On the **Set Application Identity** page, verify that **This user** is selected, and enter the **user name** and **password** to set the proper identity under which the **COM+ application** will run on the server.

   🔷 **Important**
   - You must specify an account with Windows administrative privileges on the server.
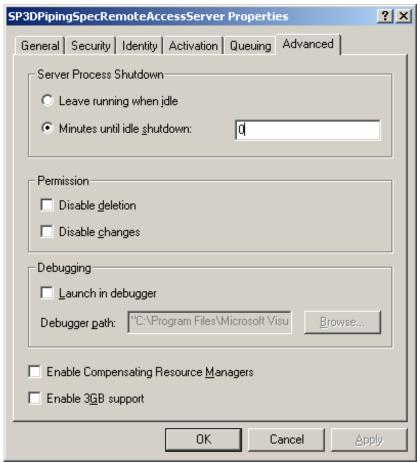
12. Click **Next**.

13. Click **Finish** to begin the installation.

   💡 **Tip**
   - When installation is complete, a **SP3DPipingSpecRemoteAccessServer.1** node is placed under **COM+ Applications.**
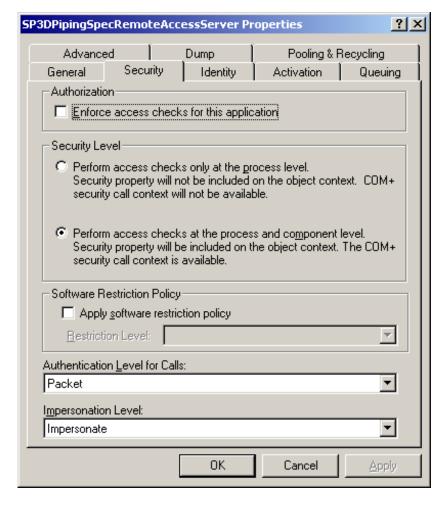
14. In the left tree view, right-click **SP3DPipingSpecRemoteAccessServer** and select **Properties**.

15. On the **Advanced** tab of the **SP3DPipingSpecRemoteAccessServer Properties** dialog box, change the **Minutes until idle shutdown** value to **0**.

16. On the **Security** tab, disable **Enforce access checks for this application** and click **OK**.
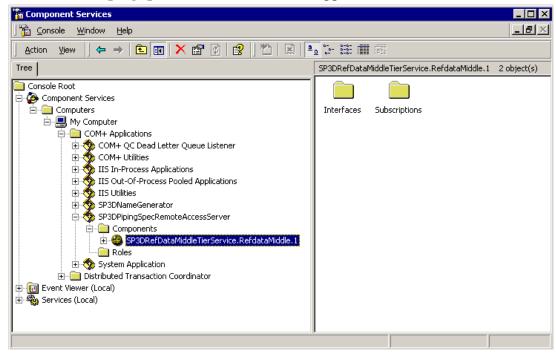
17. Next, expand the **SP3DPipingSpecRemoteAccessServer** and the **Components** nodes.

18. Under the **Components** node, verify that the **SP3DRefDataMiddleTierService.RefdataMiddle.1** component appears. If it does exist, you are finished with this procedure. If it does not exist, perform steps 19-22.

19. On the horizontal toolbar, click **Action** > **New** > **Component**. The **COM Component Installation Wizard** appears.

20. Click **Next** on the **Welcome to the COM Component Install Wizard**.

21. On the **Import or Install a Component** page, select **Install new component(s)** and browse for **SP3DRefDataMiddleTierService.dll**.

💡 **Tip**

- The component **SP3DRefDataMiddleTierService.dll** is located in [*Product Folder*]:\RefData\Middle\Bin.

22. Click **Next** on the **Install new components** page, and then click **Finish** to complete the installation procedure.

23. The **Component Services** window shows the **SP3DRefDataMiddleTierService.RefdataMiddle.1** component installed in the **SP3DPipingSpecRemoteAccessServer** application.
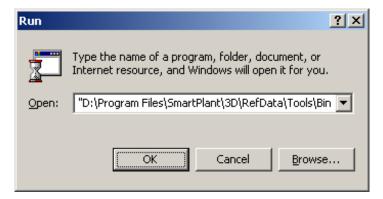
Register the Site Database for P&ID Access
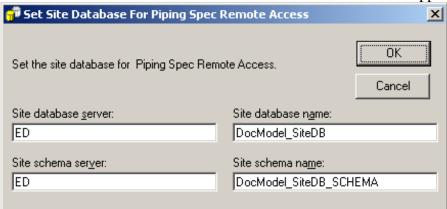
Before you complete the steps in this procedure, you must install the SP3D Piping Specification Remote Access Server service and configure the COM+ application. For more information, see *Install SmartPlant 3D Client Software*.

You must have administrator privileges on the computer in order to perform this installation procedure.

1. Click **Start > Run**, and then click **Browse** in the **Run** dialog box.

2. Navigate to [*Product Folder*]:\RefData\Tools\Bin\SetSiteForPIDAccess.exe, and click **OK**.

3. Click **OK** in the **Run** dialog box.

4. In the **Set Site Database for Piping Spec Remote Access** dialog box, enter the Site and Site schema databases names and servers in the appropriate fields.

5. Click **OK**.

📝 **Notes:** If you are logged on the server. The server must have Oracle Client loaded in order to Set Site Database. Oracle Client provides the necessary tools for this task.

Introducing SmartPlant Reference Data Synchronization Manager

SmartPlant Reference Data Synchronization (RDS) Manager provides tools for comparing, synchronizing, and managing reference data across multiple plants. This application is especially useful when you need to maintain a central set of reference data for all of the plants across a site without having a network or database connection between plants.

The reference data synchronization process involves three steps:

1. Creating an RDS package that contains the reference data from the source plant. For more information, see Creating an RDS Package: An Overview.

2. Comparing the RDS package to the target plant reference data. For more information, see Comparing the Reference Data: An Overview.

3. Synchronizing (merging) the RDS package into the plant and application reference data at the target. For more information, see Synchronizing the Reference Data: An Overview.

 Notes:

- After synchronizing the reference data across the plants, you must use the Update Drawings functionality in SmartPlant P&ID to synchronize the drawings in each plant with the updated reference data. For more information about updating drawings, see the *SmartPlant P&ID Drawing Manager Users Guide*.

Recommended Configuration

- Select the plant whose reference data you want to use as the source reference data.

- Create a data RDS package from the source plant.

- Back up the target plant.

- Lock down (set to read-only) the user access to the reference data at the source plants. Allow full-control user access to the reference data only at the target plant.

- Synchronize the target plants with the source plant RDS package.

 Notes:

- Do not use the RDS Manager to synchronize reference data between a host and satellites in a Workshare collaboration. Use the **Workshare Synchronize Reference Data** command instead.

Before Using Reference Data Synchronization Manager

Always perform the following steps at the target plant before synchronizing reference data.
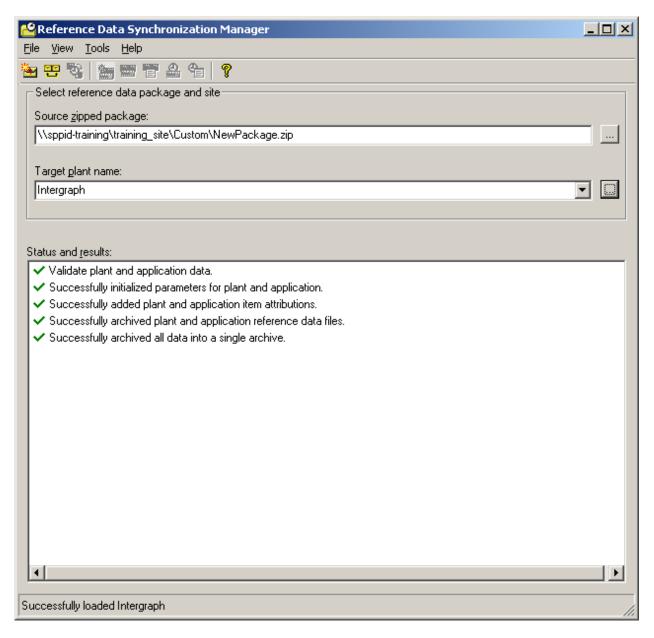
1. Back up the plant.

2. Check available memory. We recommend approximately 150 MB RAM.

3. Copy the RDS package to a local drive with at least 40 MB of free disk space.

4. Close all applications (SmartPlant Engineering Manager, P&ID, or Electrical) connected to the plant.

Assumptions and Dependencies

- The target plant hierarchy must match the source plant hierarchy.

- Data dictionary versions for each corresponding schema must match.

- The version of the RDS package must match the version of the RDS Manager software.

- The Compare process must complete successfully before merging can begin.

- The RDS Manager does not synchronize validation programs.

Understanding the Interface: An Overview

The Reference Data Synchronization Manager user interface consists of two main areas: one for selecting the source and target information, and the other for viewing the status and results of each command.

Source zipped package - Allows you to select the reference data package created at the source plant. The contents of this package will be compared with the reference data at the target plant.

Target plant name - Allows you to select the plant you want to compare to the source reference data package. If the plant you want does not appear in the drop-

down list, click the ... button and select the site server .INI file for the site containing the desired plant.

Status and results - Displays the tasks involved for the current command. The items displayed change depending on the current processing status.

Creating an RDS Package: An Overview

An RDS package is a data package produced or extracted from a plant for merging into another plant. To create this package, use the **File > New Package** command.

The RDS package contains the following data:

- Data dictionary version information for each schema.

- Plant and application codelist.

- Plant and application data dictionary item attribution.

- Application filters belonging to the plant.

- Application layouts.

- Auto gap and symbology options.

- Display set options for filtered printing.

- Format and heat trace options.

- Format file, rules file, styles file, insulation specifications, report templates, symbols and toolbar shortcuts, and borders.

🖉 **Notes:**

- The source plant must be a top-level plant (not a project or satellite) in order to create an RDS package.

- You cannot create a package from a plant created in a previous version of SmartPlant Engineering Manager. You can, however, create a package from a new plant and compare it to the old plant.

- All referenced filters must belong to the plant (filters must be created under Plant Folders in Filter Manager, not created under My Folders). If any of the data to be packaged has references to filters not owned by the plant, the package creation will fail. In other words, filters in My Folders at the source will <u>not</u> be synchronized with the target.

- Only custom symbol toolbars created in Catalog Manager are included. User-specific toolbar shortcuts (created under My Catalog in SmartPlant P&ID) at the source will <u>not</u> be synchronized with the target.

- Toolbar shortcuts must have the same share name in path and target. The shortcut definition is recorded and used to re-create the link in an alternate location.

- Saved views at the source plant are not included in the RDS package. Instead, create filters and layouts at the source and reference them with a view at the target plant.

Comparing the Reference Data: An Overview

The comparison process compares the packaged reference data from the source with the plant and application reference data at the target. All compares are based on name except for the codelist entries, which are based on ID. For attributes to be considered the same, they must have the same attribute name and the same data type definition (including column size for strings).

Notes:

- Use the **Tools > Create Report** command to view a comparison summary report in Microsoft Excel format. For more information, see Create Report Command.

- Items at the target that are not found the source package are not reported in the comparison report.

- You cannot create a package from a plant created in a previous version of SmartPlant Engineering Manager, but you can, however, create a package from a new plant and compare it to the old plant.

Comparison Tasks

Comparing Codelist Enumerations and Indexes

Codelist enumerations and codelist entries are the only data that must retain exact foreign key (ID) values in order to synchronize a plant successfully. Codelists are managed using Data Dictionary Manager.

- **Comparing codelists enumerations** - The name of the codelist (enumeration) can be edited. If both plants have the same Enumeration ID but different Names, the difference will be merged. If both plants have the same Code List

Name for the Enumeration but different IDs, the package will <u>not</u> be allowed to merge. To maintain the integrity of the definition of codelist enumerations, the ID, DependsOnID, Name, and DisplayUsage properties must match or an error is generated. Only the Description property may change. Codelist enumerations are correlated by ID.

- **Comparing codelists entries** - The value, short value, and the disable option can be edited for all codelist entries. To maintain the integrity of the definition of codelists entries, the codelist_index, codelist_text, codelist_short_text and codelist_constraint properties must match or an error is generated. Only the sort value and disabled properties may differ. Codelist entries are correlated by codelist_number and codelist_index.

Comparing Item Types and Attribution

Item attribution data is made up of several pieces of data located in the entities, item, attributes, uniqueatts and ItemAttributions data dictionary tables. Item attributions are managed using Data Dictionary Manager.

- Comparing Entities - Entities must be an exact match. Since there is no updateable information for an entity, any single property of an entity that does not match will prevent the synchronization of reference data. Entities are correlated using entity_number. If an entity cannot be correlated, an error is generated.

- Comparing Item - Compares the Description and ValidationProgID properties. Any other item property that does not match generates an error. Items are correlated using ID. If an item cannot be correlated, an error is generated.

- Comparing Attributes - Compares datatype attributes. If datatype does not match, an error is generated, except that string data types may have a greater length in the target plant than is defined in the source package. In other words, the compare will succeed when an attribute is correlated by name and the attribute data type is defined as S40 in the source package and S80 in the target plant. The attribute_defvalue, attribute_description, attribute_format, attribute_display, attribute_uomID properties are synchronized.

- **Comparing Uniqueatts** - Correlated using entity_number and unique_name. The display_name, display, filter, CalculationProgID, ValidationProgID, Category, ReadOnlyMask properties are synchronized.

- **Comparing ItemAttributions** - Correlated by Name and Path. If Manual or Discard does not match, an error is generated. The DisplayName, Category, ReadOnlyMask properties are synchronized.

Comparing Formats

The format file from the source package is compared to the format file at the target plant. Format types, formats and format items (format elements) are compared.

Comparing Application Symbols

The symbols from the source package are compared to the symbols in the associated applications at the target plant. The relative path of the symbol is used to correlate the source to target symbols. The symbols themselves are not compared, just the data associated with the symbol.

Comparing Application Reference Data Files

Rules, insulation specifications, styles file, reports, templates, and borders are compared using file attributes size and modification date. Reports, templates, and borders are correlated by relative path.

Comparing Filters

Filter data consists of several pieces of data located in the Category, CategoryFilter, FilterInstance, FilterDefinition and FilterCriteria data dictionary tables. Filters that do not belong to the target plant are excluded from the compare. MyFilters are not compared. CategoryFilter and FilterInstance are not compared since they contain only ID information for linking categories to filters. Filters are managed using Filter Manager.

- **Comparing Category** - Correlated by Name. The ParentCategoryID and Description properties are synchronized.

- **Comparing FilterDefinition** - Correlated by Name. The Description, AppUsage, Conjunctive, ItemType, FilterType and FilterUID properties are synchronized.

- **Comparing FilterCriteria** - Correlated by SourceAttribute, Operator and AttributeValue. The Conjunctive property is synchronized.

Comparing Layouts

Layout data consists of several pieces of data located in the SPTPViews, SPTPLayouts, SPTPAtrrbutes and SPSorts data dictionary tables. Layouts are managed using the EDE tool in SPP&ID.

- **Comparing SPTPViews** - Correlated using ID. The DefaultFilter and DefaultLayout properties are compared. Any other property of an SPTPView that does not match will generate an error. If an SPTPView cannot be correlated, an error is generated. If DefaultFilter had been modified, the corresponding filter name (for FilterID) is displayed in the compare results.

- **Comparing SPTPLayouts** - Correlated using SPTPViews_ID and Name. The AppUsage property is compared. OwnerID and DisplayStyle are not compared.

- **Comparing SPTPAttributes** - Correlated using SPTPLayouts_ID and Position. The AttributeID, ColumnName and ColumnWidth properties are compared.

- **Comparing SPSorts** - Correlated using SPTPLayouts_ID and referenced itemattribute name. The OrderType and SortType properties are compared.

Comparing Options

SPP&ID symbology and option data consists of auto gap, heat trace, format and symbology options found in the T_OptionAutogap, T_OptionHeatTrace, T_OptionFormat and T_OptionSymbology tables. Option data is managed using Options Manager.

Display Sets for filtered printing found in the T_OptionDispSet and T_OptionDispSetFolder tables are also included in the SPP&ID option data. Display sets that do not belong to the plant are excluded from the compare. Display sets are managed using Drawing Manager.

RDS Manager uses an identity column for each of the option tables. The identity column is used for display or logging in compare and merge process.

- **Comparing T_OptionAutogap** - Correlated by SP_ID, using StyleName as the identity column. Columns include: OrderIndex, SP_ID, UpdateCount, StylePath, StyleName, FilterID, Orientation, SP_FilterUID. The OrderIndex, StyleName, FilterID, Orientation and SP_FilterUID properties are compared. There are no critical properties for autogap options. StylePath is not used. If FilterID has been modified, the corresponding filter name (for FilterID) is displayed in the compare results.

- **Comparing T_ OptionFormat** - Correlated by SP_ID, using DataType as the identity column. Columns include: SP_ID, UpdateCount, DataType, FormatName and DisplayName. The FormatName property is compared. If DataType or DisplayName do not match, an error is generated.

- **Comparing T_ OptionHeatTrace** - Correlated by SP_ID, using Medium as the identity column. Columns include: SP_ID, UpdateCount, StylePath,

StyleName and Medium. The StyleName property is compared. If Medium does not match, an error is generated.

- **Comparing T_ OptionSymbology** - Correlated by SP_ID, using MStyleName as the identity column. Columns include: OrderIndex, SP_ID, UpdateCount, StyleName, FilterID and SP_FilterUID. The FilterID and SP_FilterUID properties are compared. If StyleName does not match, an error is generated. If FilterID has been modified, the corresponding filter name (for FilterID) is displayed in the compare results.

- **Comparing T_ OptionDispSet** - Correlated by SP_ID, using FilterID as the identity column. Columns include: SP_ID, UpdateCount, FilterID, SP_Color, SP_Width, SP_Index and SP_OptionDispSetFolderID. The FilterID, SP_Color, SP_Width, SP_Index, SP_OptionDispSetFolderID properties are compared. There are no critical properties for display sets. If FilterID has been modified, the corresponding filter name (for FilterID) is displayed in the compare results.

- **Comparing T_ OptionDispSetFolder** - Correlated by SP_ID, using Name as the identity column. Columns include: SP_ID, UpdateCount, Name, SP_ParentID, SP_IsFolder and SP_Username. The Name and SP_ParentID properties are compared. If SP_IsFolder does not match, an error is generated.

- **Comparing T_ Preferences** - Correlated by SP_ID, using Name as the identity column. Columns include: SP_ID, UpdateCount, Name, DisplayName, GlobalValue, CategoryDisplayName and CategoryInternalName. The DisplayName, GlobalValue, CategoryDisplayName and CategoryInternalName properties are compared.

Synchronizing the Reference Data: An Overview

The synchronization process merges the packaged reference data from the source into the plant and application reference data at the target. You cannot synchronized selected parts of the packaged reference data, but must synchronize all or nothing.

The synchronization process initiates transactions for each schema that will be modified. If the merge fails, the transactions are rolled back and any added columns are dropped. The reference data files are merged last. All synchronization operations are logged as generic text strings.

Notes:

- A plant cannot be synchronized if the comparison process returned any items with errors.

- You must have site administrator or full access privileges at the target plant before you can synchronize the reference data.

- The synchronization process does <u>not</u> replace data at the target that is not in the source package.

- If the synchronization fails, you must extract any original reference data files from the archive to undo the change.

During the synchronization process, RDS Manager logs synchronization operations and archives modified reference data files to the files described below. These files are located in the Reference Data Synchronization Logs folder created in the target plant folder.

Synchronization Log Files

The synchronization log file, created new each synchronization session, contains the following information:

- Session start time - Local date

- SerialD - Session serial number

- Location - Path to the RDS package

- GUID - Unique identifier for the package

- Site server - INI filename and plant name

- Application names

Synchronization Archive Files

An archive zip file is created for each synchronization session and contains the following target reference data files if they are flagged for replacement during the comparison process. Each file is archived to this zip file before it is replaced by the corresponding file from the source package. The full path is saved when a file is added to the zip file.

- Plant format file

- Application symbols (catalog root)

- Application rules file

- Application styles file

- Application insulation specifications

- Reports

- Templates and borders

Synchronization Tasks

Synchronizing Codelists

Codelist enumerations and entries may be new or updated. Codelist numbers and indexes retain their original values when being added to a plant. Only the compared properties that did not match are updated for existing codelists.

Synchronizing Item Attributes

Synchronizing item attributions affect the following data dictionary tables:

- **Merging Item** - Can be updated only. Only the compared properties that did not match are updated.

- **Merging attributes** - Only the compared properties that did not match are updated for existing attributes. New attributes that have ID conflicts receive a new ID. All item attribution data (uniqueatts) that references the new attribute is updated to reference the new ID.

- **Merging uniqueatts** - Only the compared properties that did not match are updated for existing uniqueatts. New uniqueatts that have ID conflicts receive a new ID. All item attribution data (ItemAttribution) that references the new uniqueatt is updated to reference the new ID.

- **Merging ItemAttribution** - Only the compared properties that did not match are updated for existing ItemAttributions. New ItemAttributions that have ID conflicts receive a new ID. All item attribution data (Filter criteria, Layout attributes and sorts) that references the new ItemAttribution is updated to reference the new ID. A new column is added in the plant or application schema for new ItemAttributions. If the plant is As-Built, then the corresponding schema of each project receives a new column.

Synchronizing Application Filters

Several application data dictionary and schema tables are updated when synchronizing filters. Most of the IDs connecting the filter data together are created

during this process. Filter data that does not belong to the target plant is not synchronized.

The filter data is actually merged. In other words, existing Categories and Filters remain in the target plant if they do not conflict with anything in the source package, which may be lead to unexpected results.

- **Merging Category** - Only the compared properties that did not match are updated for existing categories. New categories that have ID conflicts receive a new ID. Referenced by Category.ParentCategoryID and CategoryFilter.CategoryID.

- **Merging CategoryFilter** - CategoryFilter ties the categories to the filter instances. Information may be added or modified to CategoryFilter to connect the new or updated categories and filter definitions to the filter instances. ID is created as needed. Referenced by Category and FilterInstance.

- **Merging FilterInstance** - FilterInstance ties one or more instances of a filter definition to one or more categories. Information may be added or modified to FilterInstance to connect a category to a new or updated filter definition or new instances of existing filter definitions. Most references to filters by ID are to FilterInstance.ID (not Filterdefiniton.ID). Referenced by CategoryFilter.FilterInstanceID, FilterInstance.ParentFilterID, T_OptionDispSet.FilterID, T_OptionAutoGap.FilterID and T_OptionSymbology.FilterID.

- **Merging FilterDefiniton** - FilterDefiniton contains the filters used by an application. Only the compared properties that did not match are updated for existing FilterDefinitons. New FilterDefinitons that have ID conflicts receive a new ID. Referenced by ID from FilterInstance.FilterDefinitionID, FilterCriteria.FilterDefinitionID and SPTPViews.DefaultFilter. Referenced by name in application rules.

- **Merging FilterCriteria** - FilterCriteria contains the criteria information of each filter definition. The filter criteria in the plant is replaced with the filter criteria in the package if any of the criteria has been changed or is new for existing filters. New ID values are generated as needed. Referenced by FilterDefinition.

Synchronizing Application Layouts

- **Merging SPTPViews** - Only the compared properties that did not match are updated for SPTPViews. Referenced by SPTPLayouts.SPTPViews_ID.

- **Merging SPTPLayouts** - Only the compared properties that did not match are updated for SPTPLayouts. New Layouts that have ID conflicts receive a new ID. Referenced by SPTPAttributes.SPTPLayouts_ID.

- **Merging SPTPAttributes** - Only the compared properties that did not match are updated for SPTPAttributes. New SPTPAttributes that have ID conflicts receive a new ID.

- **Merging SPSorts** - Only the compared properties that did not match are updated for SPSorts. New SPSorts that have ID conflicts receive a new ID.

Synchronizing Option Data

Option tables include T_OptionAutogap, T_OptionHeatTrace, T_OptionFormat, T_OptionSymbology, T_OptionDispSet, T_OptionDispSetFolder and T_ Preferences. Only the compared properties that did not match are updated for option data. Since SP_IDs are GUIDs, new option data items retain their original SP_ID.

Synchronizing Reference Data Files

A reference data file (such as rules file, insulation specifications, styles file, reports, templates, and borders) at the target is replaced only if it has been changed. All reference data files marked for replacement are archived at the target and the affected drawings are flagged for update in Drawing Manager.

Viewing Status and Results: An Overview

The commands on the **View** menu allow you to view the status and results of the package creation, comparison, and synchronization steps involved in the reference data synchronization process.

Reports and Log Files: An Overview

The following commands allow you to create and view comparison summary reports, and view log files generated during the synchronization process.

Create Report Command

The **Tools > Create Report** creates a comparison summary report in Microsoft Excel format. The **Create Report** dialog box allows you to specify a name and location for the report. Each report consists of three pages: Plant Data Summary, PID Data Summary, and Electrical Data Summary.

You are prompted to view the report when the report finishes compiling. To view the report later, use the **Tools > View Report** command.

📝 **Notes:**

- This command is not available until you have successfully run the comparison process.

View Report Command

The **Tools** > **View Report** displays the comparison summary report in Microsoft Excel. You must have generated a report using the Tools > Create Report command before this command becomes available.

View Log File Command

The **Tools > View Log File** opens current log file. The log files are located in the **Reference Data Synchronization Logs** folder under the target plant folder.

Troubleshooting

Problem: The following error message appears when you try to create a package.

"Format file is missing format (A/m^2) for datatype (648) definedin option formats."

Solution: You are trying to create a package for a plant created using a previous version of the software. The A/m^2 format was added in SmartPlant P&ID 4.2 (SmartPlant Engineering Manager 4.3) for format type 648, Current Density. You must either use the new format file or add the following entries to your existing format.txt file.

1. Under the heading **"#FORMATTYPES3#"**, add the following line:

   648,"Current Density",648,"649,650"

2. Under the heading **"#FORMATS#"**, add the following lines:

   648,"A/m^2",0,0,1,0,1,1,"",0,0,"&Zero",1,0,0,0,649,"",0

   648,"kA/m^2",0,0,1,0,1,1,"",0,0,"&Zero",1,0,0,0,650,"",0

 Notes:

- A similar error message will appear for any format and format type that is referenced by another application but has subsequently been removed from the format.txt file, whether through Format Manager or by manually editing the text file. If the format is referenced by an attribute in the Data Dictionary Manager, that attribute will also display in the message. The solution is

similar to that described above: You must either use the format.txt file that contains the referenced formats or add the appropriate entries to your format.txt file.

Problem: Temporary working folder deleted after package creation.

Solution: The package creation process creates a temporary working folder in the parent folder of the package. Data files are created in this folder and then packaged into the final zip file. The temporary working folder is deleted automatically after the package creations succeeds or fails. You can add the RefDataCleanUp=0 environment variable to keep the software from deleting this folder.

Problem: I want to trace the results of the comparison process.

Solution: Log files are produced by each process. However, you can add the DdCompareDebug=0 environment variable to enable tracing.

 Notes:

- The target plant hierarchy must match the source plant hierarchy.

- Data dictionary versions for each corresponding schema must match.

- The version of the RDS package must match the version of the RDS Manager software.

- The Compare process must complete successfully before merging can begin.

- The RDS Manager does not synchronize validation programs.

Copying a Plant Structure

The copy plant structure procedure allows you to make a copy of an existing plant structure and use this copy as a template to create new plant structures in your site. It will be possible to copy plants from a SQL Server site to on Oracle site and vice versa and between different Oracle versions and charactersets.

Copy plant has three stages. The first two are in **SmartPlant Engineering Manager** (SPEM) and the last one is in **Drawing Manager**.

In **Engineering Manager**:
1. **Save Plant Structure** - You use this command to save the plant structure you want to copy from.
2. **Load Plant Structure** - This wizard guides you through the process of loading and renaming the plant structure that you want to copy.

In **Drawing Manager**:
3. **Finish Load Plant Structure Processing** - Renames all item IDs, of all the drawings, of the plant that you have copied and loaded using the Load Plant Structure Wizard.

Notes

- To clean up any possible data corruption you should run cleanDB (DelOrpModItems.dll) and the Database Constraint report (Database Constraint Report.exe) before you save the plant structure.

- Roles are not copied with the plant. After you load the plant structure you will need to create a role that allows you to finish load plant structure processing in Drawing Manager. This role needs to have full privileges to Options Manager.

- Projects of an As-Built plant are not copied when using the copy plant structure procedure. Only the As-built may be copied and all As-built drawings will be made read/write in the target plant. The target plant will appear as a greenfield plant with projects not enabled.

- You may not use the copy plant procedure on a satellite plant structure. Copy Plant will be disabled for all workshare satellites (connected and standalone). Only the Workshare Host may be copied and all drawings in the target plant will be made read/write.

- You may not change the hierarchy of the copied plant.
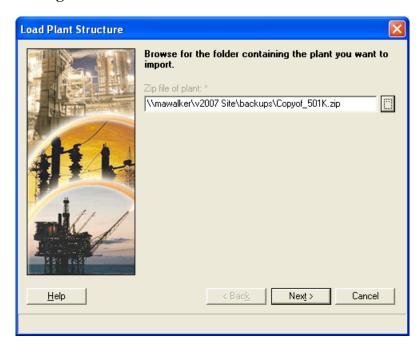
1. Save a Plant Structure (In SPEM)

1. In SmartPlant Engineering Manager, in the tree view, right click the plant structure you want to **Save**, and from the shortcut menu, select **Save Plant Structure**.
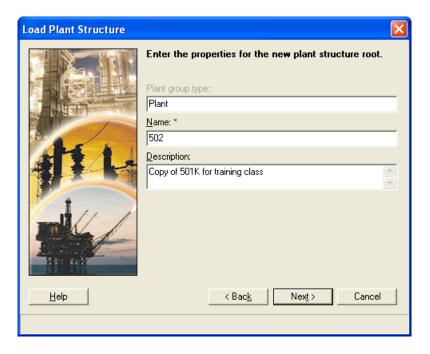
2. On the **Save Plant Structure** dialog box, next to the **Export plant to location** field, browse to where you want to save the plant structure.

3. Click **OK**.

2. Loading the Plant Structure Wizard (In SPEM)
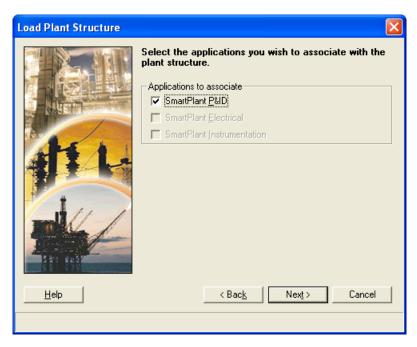
The **Load Plant Structure** wizard steps you through loading a plant structure. To start this wizard, right-click the **Plant Structures** root in the Tree view and then click **Load Plant Structure**. Once you have finished the **Load Plant Structure** process, you will need to create a new role with Full Control privileges to Options Manager to perform the **Finish Load Plant Structure Processing** command in **Drawing Manager**.

- **Zip file of plant** – Allows you to select the saved plant structure zip file.
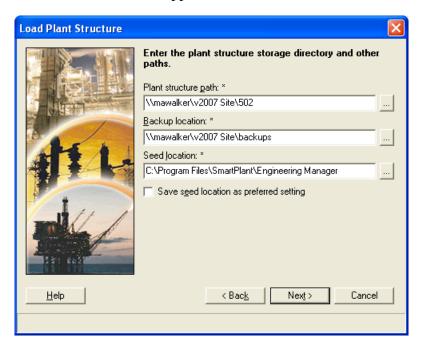
- **Plant group type** – Notes the root plant group type for the hierarchy of the plant structure. This field is not editable.

- **Name** – Allows you to specify a different name for the copied plant structure.

- **Description** – Allows you to enter a description for the plant structure.
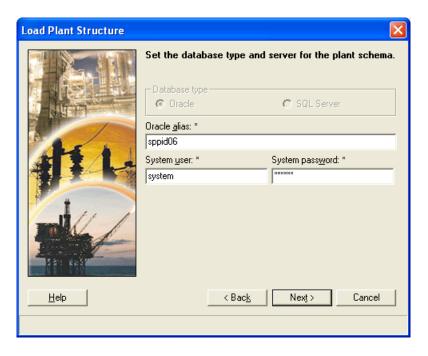
Applications to associate

Allows you to specify which applications you want for the copied plant structure. Only those applications that were associated when the Save plant structure was
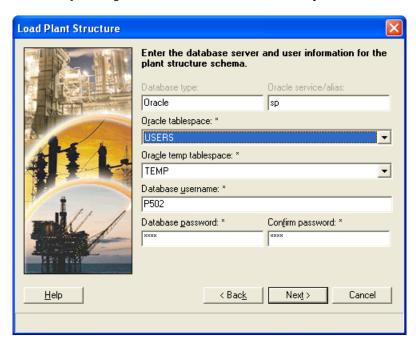
performed will be available in this dialog. You do not have to select all applications that were previously associated with the plant. In addition, if you choose, you may associate an additional application after the **Load Plant Structure** has completed.
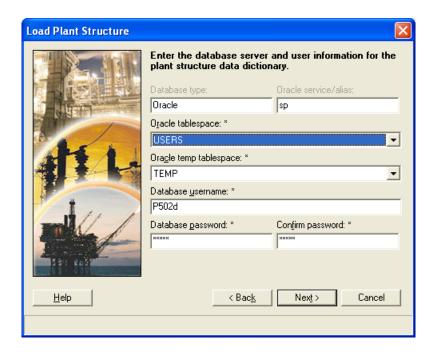
- **Plant structure path** – Allows you to specify the location for the plant structure files.

- **Backup location – A**llows you to specify the location for the plant backups. (Note: The default setting is the site backup location or the Default settings specified with Tools > Default Settings is specified and Use Default Settings was selected.)

- **Seed location** – Location of SmartPlant Engineering Manager seed files. (Note: The default location is the folder where the Engineering Manager software has been loaded.)
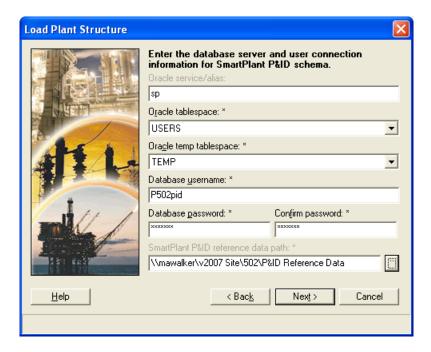
- **Oracle alias** – Allows you to specify the Oracle service for the copied plant structure. If the plant is a SQL server plant this screen and the following screens will display SQL server settings.

- **System user** – Allows you to specify a system user in Oracle or one with equivalent privileges.

- **System password** – Password for the system user.
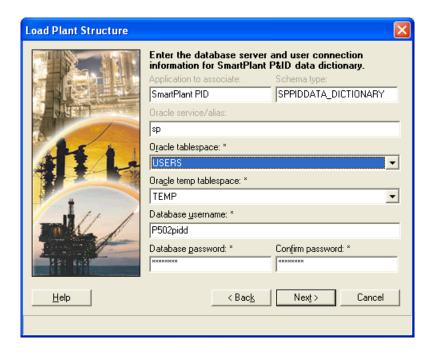
- **Oracle tablespace** – Allows you to specify the default tablespace for the plant schema

- **Oracle temp tablespace** – Allows you to specify the temporary tablespace for the plant schema.

- **Database username** – Allows you to specify the database username for the plant schema. Database user names and passwords are auto generated using the same method as is used when you create a plant structure.

- **Database password** – Allows you to specify the database password for the database username.

- **Oracle tablespace** – Allows you to specify the default tablespace for the plant data dictionary schema.

- **Oracle temp tablespace** – Allows you to specify the temporary tablespace for the plant data dictionary schema.
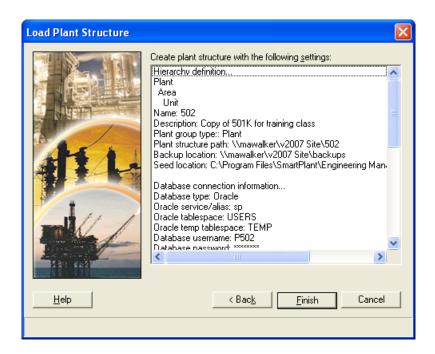
- **Database username** – Allows you to specify the database username for the plant data dictionary schema.

- **Database password** – Allows you to specify the database password for the database username.

- **Oracle tablespace** – Allows you to specify the default tablespace for the sppid schema.

- **Oracle temp tablespace** – Allows you to specify the temporary tablespace for the sppid schema.

- **Database username** – Allows you to specify the database username for the sppid schema.

- **Database password** – Allows you to specify the database password for the database username.

- **SmartPlant P&ID reference data path** – Allows you to browse and specify the location for the reference data for the copied plant. (This should be a UNC path.)

- **Oracle tablespace** – Allows you to specify the default tablespace for the sppid data dictionary schema.

- **Oracle temp tablespace** – Allows you to specify the temporary tablespace for the sppid data dictionary schema.

- **Database username** – Allows you to specify the database username for the sppid data dictionary schema.

- **Database password** – Allows you to specify the database password for the database username.

In the final dialog, you may review the information you have entered. You may click the Back button to make any corrections. When the Load Plant Structure process has finished you should get a message indicating the successful completion of the operation.

3. Finish Load Plant Structure Processing (In Drawing Manager)

The **Finish Load Plant Structure Processing** command is the last stage for a plant that has SmartPlant P&ID associated. In this stage, the software renames all item IDs, of all the drawings, of the plant that you have copied and loaded using the Load Plant Structure Wizard.

Important
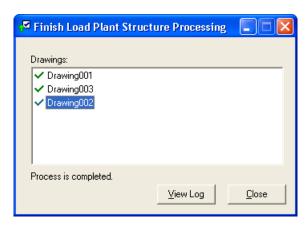
This operation can only be carried out by an administrator with Full Control Permissions to Options Manager.

Note

It is not possible to open the copied plant structure in SmartPlant P&ID or Drawing Manager before completing this process.

Running the Finish Load Plant Structure Processing command:

1. With the plant selected in Drawing Manager, click Tools > Finish Load Plant Structure Processing.

2. You will see the Finish Load Plant Structuring dialog box.

The process is complete when all drawings have a green check mark.

SmartPlant P&ID Support Utilities

Configure Item Tag Format Utility

This utility provides an alternate philosophy for configuration of the item tag. The philosophy as delivered in SmartPlant P&ID requires modification of the VB code used to generate the ItemTag.dll file for each plant that has unique tagging requirements. The ItemTag.dll file then needs to be managed so that it is installed on all workstations that are used to modify each particular plant's data. This could prove to be a very cumbersome task if a workstation is to be used to modify data on multiple plants. This utility is comprised of two components. The first component is the GUI required to configure the item tag definition for Equipment, Piperuns, Instruments and Instrument Loops, and PipingComp. Item tag definitions can be configured differently for SpecialtyComp or ReliefDevice. SpecialtyComp is PipingComp with "PipingCompSubclass" = "In-Line Speciality Component". ReliefDevice is PipingComp with "PipingCompSubclass" = "Relief Device". The second part is the new ItemTag.dll, which will dynamically read the user defined ItemTag format, then generates the ItemTag based on that format. Implementation of this item tag configuration philosophy makes it possible for users to define and manage different ItemTag formats for different plants with only one ItemTag.dll, and no change of VB code is needed.

Setup

There are two Intergraph-delivered files required to run this utility:

1. ConfigureItemTagFormat.exe, executable-installed

2. ItemTag.zip

   a. Unregister the delivered ItemTag.dll file by selecting Start > Run and entering "regsvr32 /u "{actual path}\Itemtag.dll"".

   b. Rename the delivered ItemTag.dll file located in the "…\Program Files\SmartPlant\P&ID Workstation\Program" folder.

   c. Extract the ItemTag.dll file from the ItemTag.zip file delivered to the "…\Program Files\SmartPlant\P&ID Workstation\SupportUtilities" folder to the "…\Program Files\SmartPlant\P&ID Workstation\Program" folder.

d. Register the new ItemTag.dll file by selecting Start > Run and entering "regsvr32 "{actual path}\Itemtag.dll"".

When the configuration is complete, the file "ItemTagFormat.xml" will be created in the location of the plant reference data rules file. All client machines will need to unregister the old Itemtag.dll and register the new Itemtag.dll in order to use the new tagging configuration.

Limitations

1. This utility is not Workshare or Project enabled. This utility will not verify or detect the plant's Workshare or Project environment.

2. The user's access rights are not being validated against the roles set via SmartPlant Engineering Manager.

3. The TagSequenceNo property must be used as part of ItemTag definition. Since TagSequenceNo is not a delivered property for PipingComp, the user has to add this new attribute for PipingComp in order to use it.

4. Item Types are limited to Equipment, PipeRun, Instrument, InstrLoop and PipingComp.

5. The number of properties used to define the item tag is limited to 2, 3, 4, 5, 6, 7, or 8 (Field Number).

6. The user cannot change the Duplication Option at this time. The default Duplication Options are as follows:

    a. Equipment - "No duplicated ItemTag allowed"

    b. InstrLoop - "No duplicated ItemTag allowed"

    c. PipeRun - "DuplicatedItemTag allowed with Autoloop"

    d. Instrument - "Duplicated ItemTag allowed without Autoloop". The option "Duplicated ItemTag allowed without Check" is reserved for future usage.

    e. PipingComp – "DuplicatedItemTag allowed with Autoloop"

7. The ItemTag.dll file will require modification if a property included in an item tag's definition is associated with another validation program. For example, the ValidationID value for the Nominal Diameter of a PipeRun is "ValidateNomDiam.ForeignCalc". If this property is used to define the PipeRun's item tag, the ItemTag.dll file would need to be modified to run the "ValidateNomDiam.ForeignCalc" when changed.
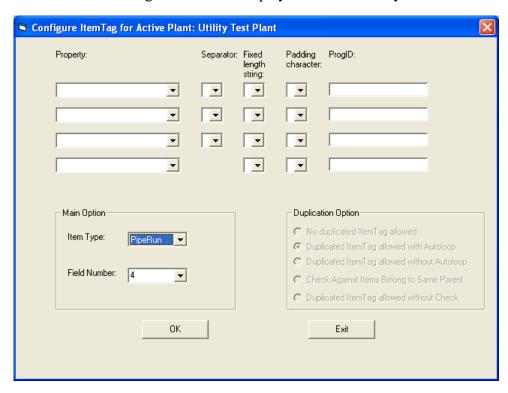
Special Notes

1. If the ItemTag validation program is called from the attribute "ItemTag", and the TagSequenceNo is blank, then no new TagSequenceNo and no new ItemTag will be generated.

2. Any attributes from plant groups, including new attributes added by users, are now available to be used for item tags. The attributes will be displayed as <Plant Group Type Name> … <Attribute Name>. For example, Plant…Name, Area … AreaNo, Unit…UnitCode, etc. There is no limit to the levels in the hierarchy that is used.

3. If a user has previously added UnitNo, AreaNo, or Train_Number for a special case, the user should change this field to the new attribute that is available in the form of <Plant Group>…<Attribute Name> as described in Special Note 2. When the user opens the Item Tag Configuration Utility, the user will not see those fields in the utility but will instead see a blank field that can be modified to use the new attribute.

Instructions
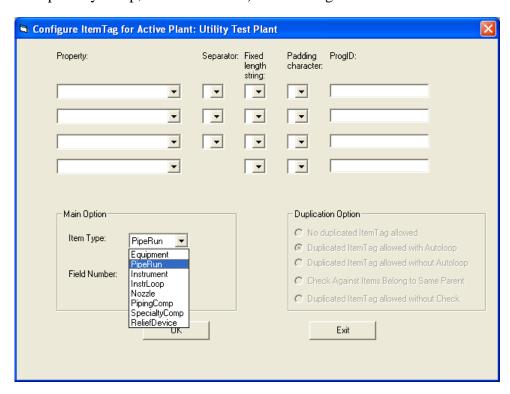
1. Set the active plant as desired via Drawing Manager.

2. The utility requires that an item of each type (i.e. PipeRun, Equipment, Instrument and Instrument Loop) must exist in the database before the Item Type's item tag can be configured.

3. Select Start > Programs > Intergraph SmartPlant P&ID > Support Utilities > Configure Item Tag Format to start the utility.
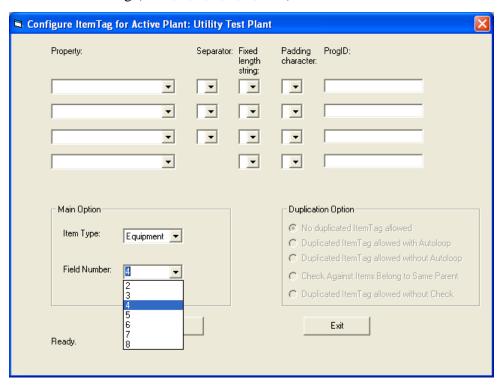
4. The following form will be displayed once the utility has initialized:
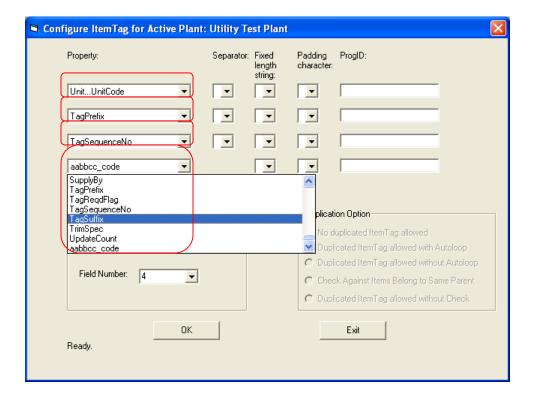
a. Select the Item Type (Equipment, PipeRun, Instrument, InstrLoop, PipingComp, SpecialtyComp, or ReliefDevice) to be configured.
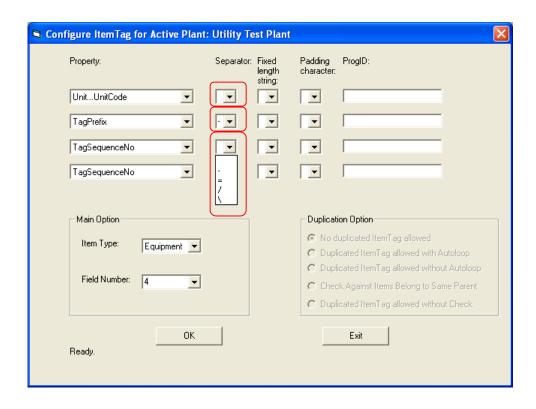
b. Set the Field Number to reflect the number of properties that will be displayed in the item tag (i.e. 2, 3, 4, 5, 6, 7, or 8).
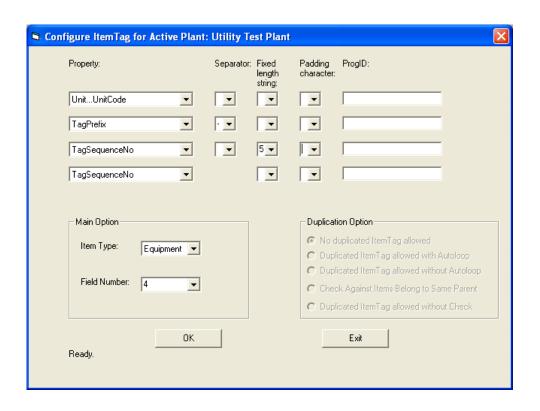
c. Select properties to be displayed from the pulldown list.
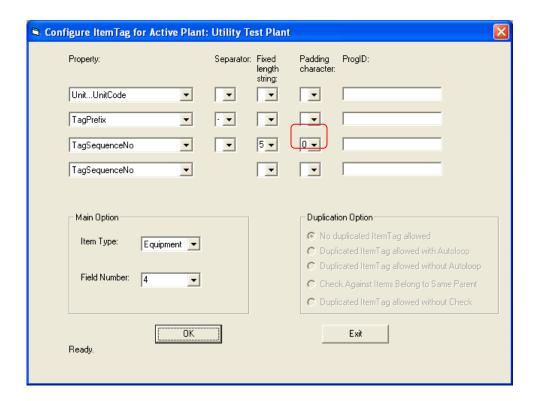
d. Enter the separator to be placed between the selected properties. The separator can be selected from the pulldown list or entered manually.
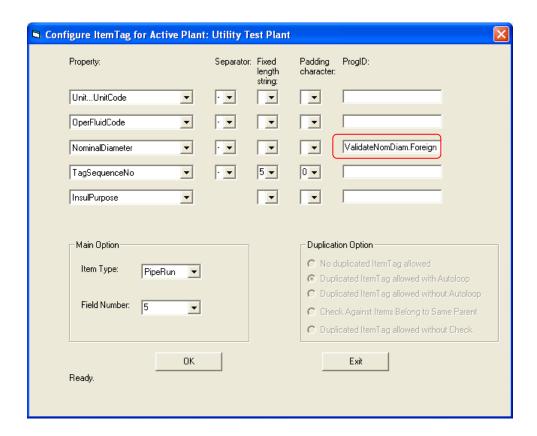
e. Enter a Fixed length string value for desired properties.

f. Enter the Padding character to be used for the fixed length string fields. The separator can be selected from the pulldown list or entered manually. If the value for the string is less than the fixed length, this padding character will be used in each space to the left of the entered values for the desired property.
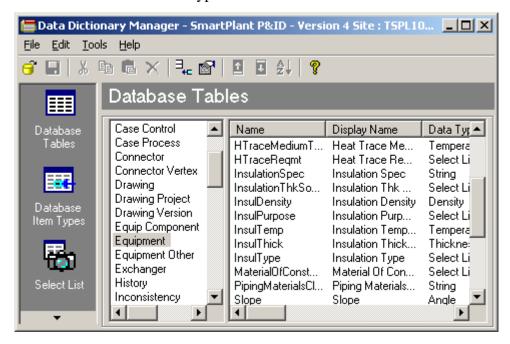
g. If you have selected a property that already has a validation program associated with it in Data Dictionary Manager, copy that ProgID from the Data Dictionary Manager field to the ProgID field. (In the example below, nominal diameter is being used in item tag for piperuns. This field has a ProgID of ValidateNomDiam.ForeignCalc in Data Dictionary Manager. It has been copied to this ProgID field. The item tag function will then call this ValidateNomDiam.ForeignCalc when it runs.)
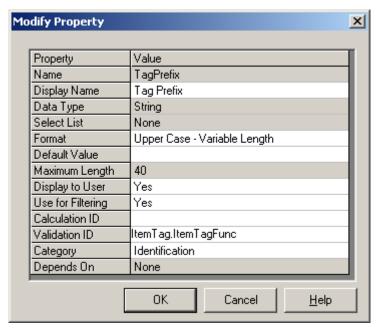
5. Click the "OK" button to save the format of the active Item Type. The following confirmation will be displayed. Select OK to continue.

6. Repeat steps 4 & 5 to configure each Item Type's item tag.

7. Click the "Exit" button to dismiss the utility form.

8. Open the Data Dictionary Manager (user must have access rights defined by Engineering Manager to complete this step of the process).

   a. Select the Item Type's Database Table.

b. Highlight the property name, right click and select properties to open the modify properties window.

c. Add the ProgID "ItemTag.ItemTagFunc" value to the "Validation ID" property.

Property	Value
Name	TagPrefix
Display Name	Tag Prefix
Data Type	String
Select List	None
Format	Upper Case - Variable Length
Default Value	
Maximum Length	40
Display to User	Yes
Use for Filtering	Yes
Calculation ID	
Validation ID	ItemTag.ItemTagFunc
Category	Identification
Depends On	None

d. Repeat steps b & c for each property included in the definition of the Item Type's item tag.

e. Repeat steps a, b, c & d for each Item Type.

f. Click the OK button to dismiss the Modify Property window.

g. Save and Exit the Data Dictionary Manager.

Change Linked Document Source Utility

SmartPlant P&ID provides functionality that allows drawings/documents to be attached to the P&ID files. There are two methods available to accomplish this task. The objects can be embedded or linked depending on the philosophy of each individual customer. Currently SmartPlant P&ID embeds the symbols placed in a drawing and also embeds the border graphics in the template file. This allows the drawings to be transported to other sites without regard to the location of the attached file. We advise the customers that intend to use the Workshare functionality to embed attachments since they will not be moved with the drawing when published or ownership is transferred. This utility is not intended for use in a Workshare environment. When a customer restores a plant to a different location or wants to create a new plant from an existing plant, the source path of drawing attachments will need to be updated. Currently the delivered software requires the customer to open each drawing and modify the source file location of each attachment using the Edit > Link > Change Source command. The Change Linked Document Source utility has been developed to enable the customer to globally update the existing drawing attachment's source path. The extent of the modification is dependent upon the philosophy used to store the original source attachments. This utility will open each drawing selected, update the attachment's source path and then close the drawing.

Setup

There are two Intergraph-delivered files required to run this utility:
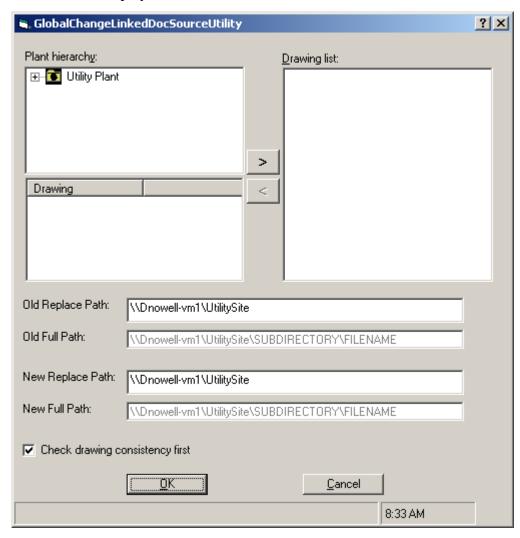
1. GlobalChangeLinkedDocSourceUtility.exe, executable-installed

2. SPMHierarchy.ocx, ocx, installed & registered
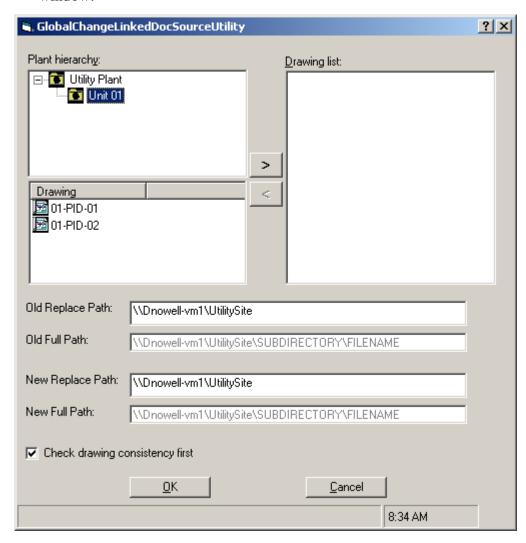
Limitations

1. This utility is not Workshare or Project enabled. This utility will not verify or detect the plant's Workshare environment or ownership of drawings nor will the utility detect the plant's Project environment.

2. The user's access rights are not being validated against the roles set via SmartPlant Engineering Manager.

3. This utility must be run prior to accessing the drawings in SmartPlant P&ID after linked objects have been moved.

Instructions
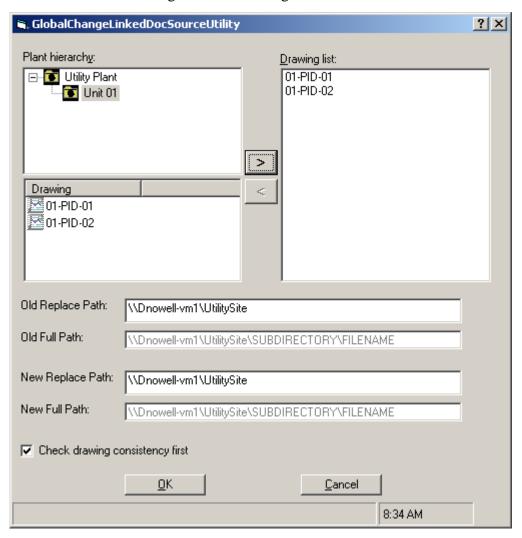
1. Set the active plant as desired via Drawing Manager.

2. Select Start > Programs > Intergraph SmartPlant P&ID > Support Utilities > Change Linked Document Source to start the utility. The following form should be displayed:

3. Expand the Plant tree in the "Plant hierarchy" window to display units. Once a unit has been selected the unit's drawing list appears in the "Drawing" window.
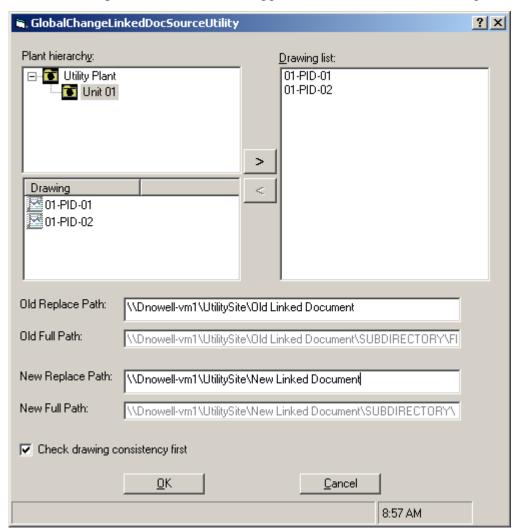

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4. Highlight all drawings that are to be processed and select the add (>) button. This adds the drawings to the "Drawing list:" window.

5. Drawings from multiple plant groups may be added to the "Drawing list:" window by highlighting the plant group at a level in the hierarchy that includes other desired plant groups in the "Plant hierarchy:" window and selecting the add (>) button.

6. All drawings from a plant item group (i.e. unit, area) or plant may be added to the "Drawing list:" window by highlighting the item in the "Plant hierarchy:" window and selecting the add (>) button.

7. Drawings can be removed from the "Drawing list:" by highlighting them in the "Drawing list:" window and selecting the remove (<) button.

8. Once the "Drawing list:" window contains all drawings that require processing, enter the path to the point that will be replaced in the "Old Replace Path:" field. Enter the path that will replace the value "Old Path:" in the "New Replace Path:" field. The "New" and "Old Full Path" fields are read-only and identify to the user what linked paths will be modified.

9. The "Check drawing consistency first" box is checked by default. This option forces the utility to test all drawings in the select set for their recreate state before the process begins. Drawings that are found to be in a recreate state will not be processed and will be logged as such in the "SPAError.log" file.

10. Click the OK button to begin processing the drawings. The utility will perform a find and replace on each linked attachment's source path.

11. The "Processing status" progress bar will be displayed during processing. When the utility has completed processing the selected files, the following message will be displayed:

Click the OK button and then the Cancel button to dismiss the utility form.

Error Log

This utility records the results of the process in the SPAError.log file, which is located the TEMP directory. The log file will be generated whether or not the process encounters an error.

Global Report Utility

This utility enables the user to create multiple reports based on a select set of drawings. Currently the delivered software requires the user to open each drawing and generate reports one report at a time. This workflow can be very cumbersome when the user requires multiple reports from many drawings.   The automation provided by this utility will minimize the time required to generate multiple reports on multiple drawings.

Setup

There are two Intergraph-delivered files required to run this utility:

1. GlobalReportUtility.exe, executable-installed

2. SPMHierarchy.ocx, installed & registered
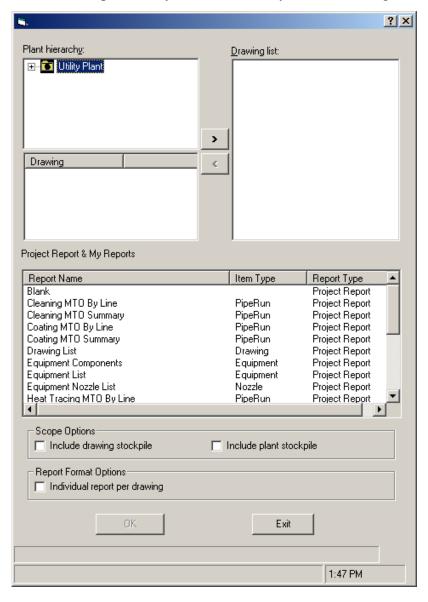
Limitations

1. This utility is not Workshare or Project enabled. This utility will not verify or detect the plant's Workshare environment or ownership of drawings nor will the utility detect the plant's Project environment.

2. The user's access rights are not being validated against the roles set via SmartPlant Engineering Manager.

Instructions

1. Set the active plant as desired via Drawing Manager.
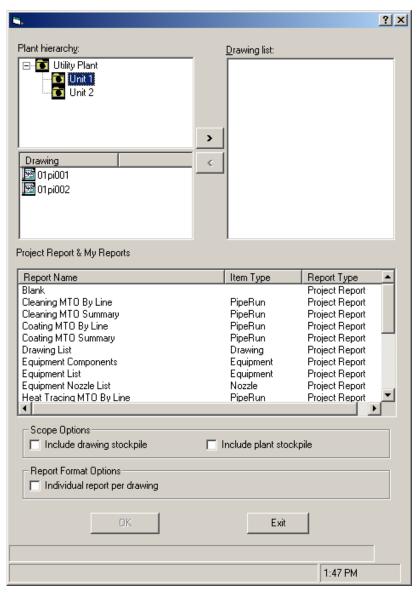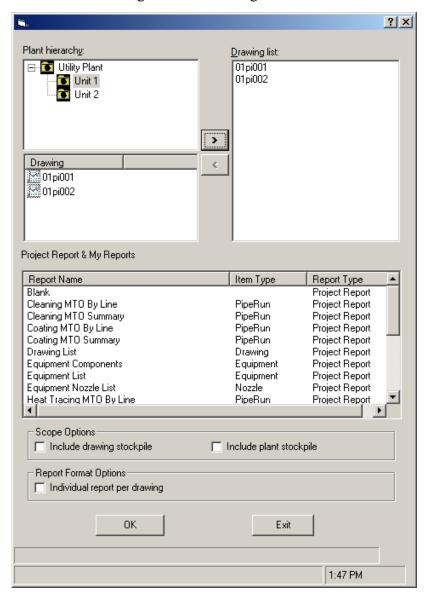
2. Select Start > Programs > Intergraph SmartPlant P&ID > Support Utilities >
    Global Report Utility to start the utility. The following form should be displayed:

3. Expand the Plant tree in the "Plant hierarchy" window to display units. Once a unit has been selected the unit's drawing list appears in the "Drawing" window.

4. Highlight all drawings that are to be processed and select the add (>) button. This adds the drawings to the "Drawing list:" window.

5. Drawings from multiple plant groups may be added to the "Drawing list:" window by highlighting the plant group at a level in the hierarchy that includes other desired plant groups in the "Plant hierarchy:" window and selecting the add (>) button.

6. All drawings from a plant item group (i.e. unit, area) or plant may be added to the "Drawing list:" window by highlighting the item in the "Plant hierarchy:" window and selecting the add (>) button.

7. Drawings can be removed from the "Drawing list:" by highlighting them in the "Drawing list:" window and selecting the remove (<) button.

8. Once the "Drawing list:" window contains all drawings that require processing, select the reports to be generated from the "Project Report & My Reports" list.

9. Check the box next to the Option "Include drawing stockpile" if you desire to generate a report including items in the drawing stockpile. Check the box next to the Option "Individual Report per Drawing" if you desire to generate individual reports for each drawing. You may also check the box next to the Option "Include plant stockpile" if you want to include plant stockpile items in your report. However, if you include the plant stockpile, the option to generate an individual report per drawing is no longer available.

10. Click the OK button to begin report generation.

11. The utility will confirm the reports to be generated by displaying a report name list in the "Selected Reports" form.

12. Click OK to continue. Clicking Cancel will dismiss the "Selected Reports" dialog box.

13. The utility will generate the reports selected from the list. When the report generation is complete the following message will be displayed:

14. Click the OK button and then the Exit button to dismiss the utility form.

15. The default location of the reports generated by this utility is the "C:\Documents and Settings\{username}\My Reports\Output" folder.

16. The naming convention used for the reports generated by this utility is {Drawing Name}-{Report Name}.xls.

Error Log

This utility records the results of the process in the SPAError.log file, which is located the TEMP directory. The log file will be generated whether or not the process encounters an error.

Global Symbol Update Utility

Since SPPID v3.0, all symbols and labels are embedded instead of linked, which means if the symbol/label definition is modified, user need to replace the existing symbols/labels to update the changes. Find/Replace tool with delivered software requires user to open each drawing manually, and it can only update one symbol/label each time. There is a strong demand to have a tool to update multiple symbols/labels and multiple drawing at a time. The Global Symbol Update Utility allows the P&ID user batch process multiple symbols/labels update for one or many drawings in active project. User can select to update symbol/label with origin symbol file or with different symbol file, such as replace ball valve with gate valve. Utility will open each drawing selected, then update selected symbols/labels, then close the drawing.

Setup
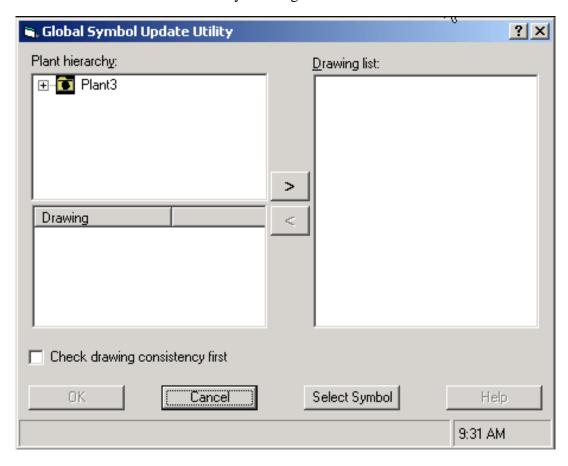
There are 3 intergraph-delivered files to run this utility, you may create a sub-directory to hold these files. As long as these files are in same directory as the executable, no register is needed.

1. GlobalSymbolUpdateUtility.exe, Executable.

2. SPASymbolControl.ocx, Active-X Control

3. SPMHierarchy.ocx, Active-X Control
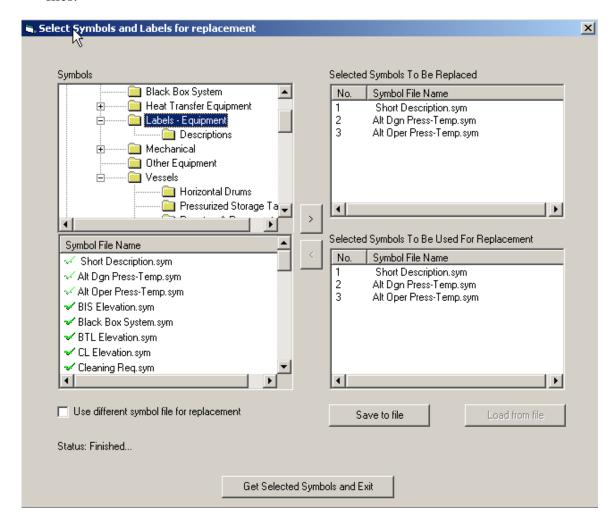
Instructions

1. Select Start > Programs > Intergraph SmartPlant P&ID > Support Utilities > Global Symbol Update Utility to start the utility. The following form should be displayed:
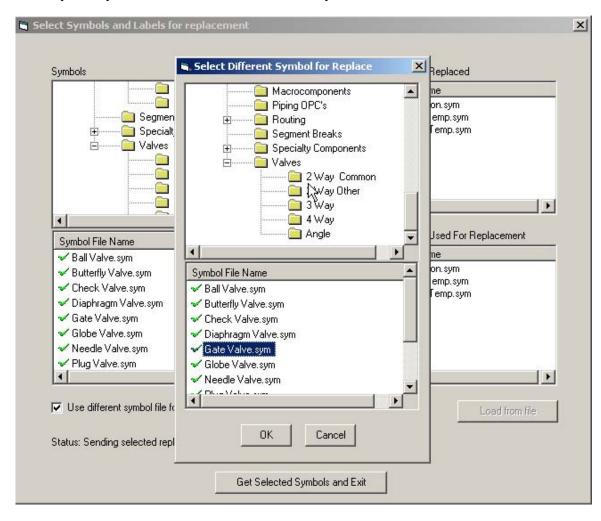
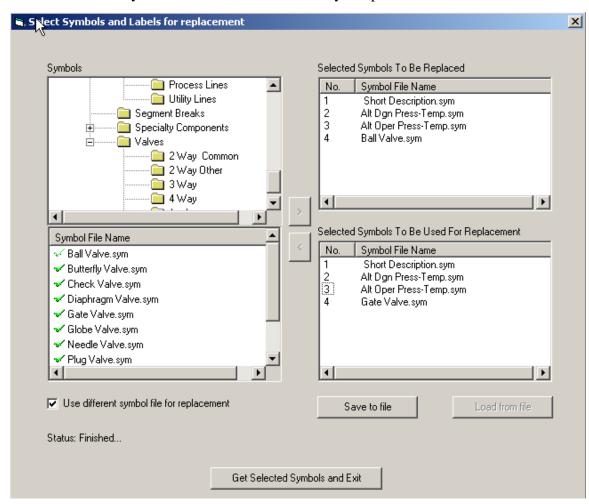   The user can select one or many drawings.

2. Click "Select Symbol" to get the new form to select symbols/labels to be updated. In this case, the user selected to update three equipment labels with origin symbol files.
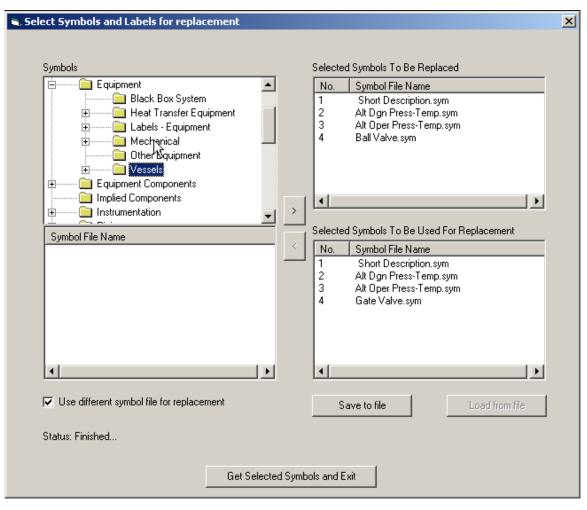
3. In this case, the user selected to update ball valve with gate valve. Select can do so if, (1) check box "user different symbol file for replacement" is checked, (2) only one symbol is selected when send to key > is clicked.
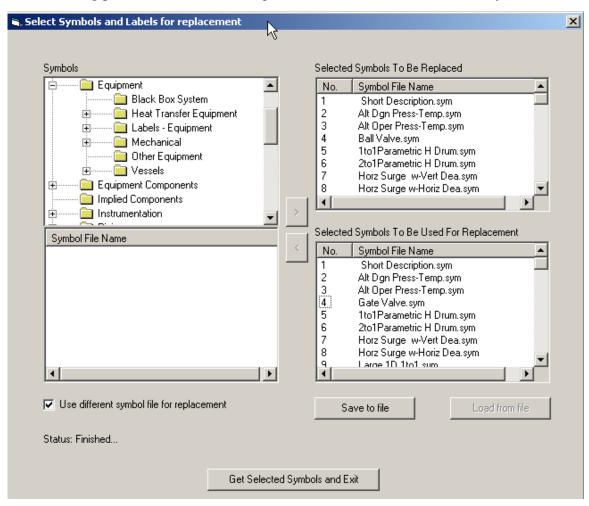
4. Now user has symbols/labels selected and ready to update.
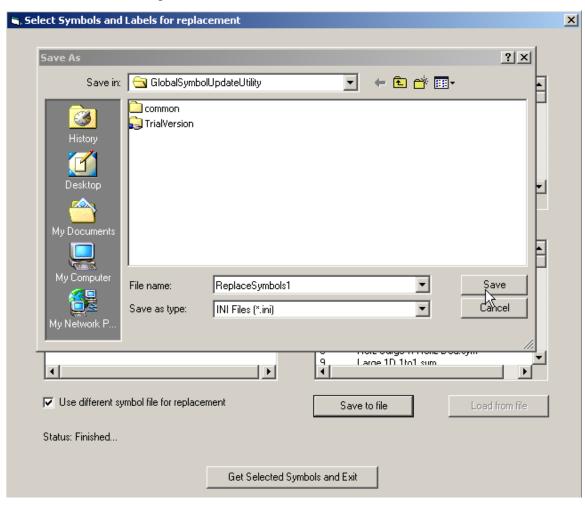
5. The user can send whole folder to be replaced. In this case all files under Vessels directory will be sent to be replaced.

6. The following picture shows what user got after sent whole Vessels directory.
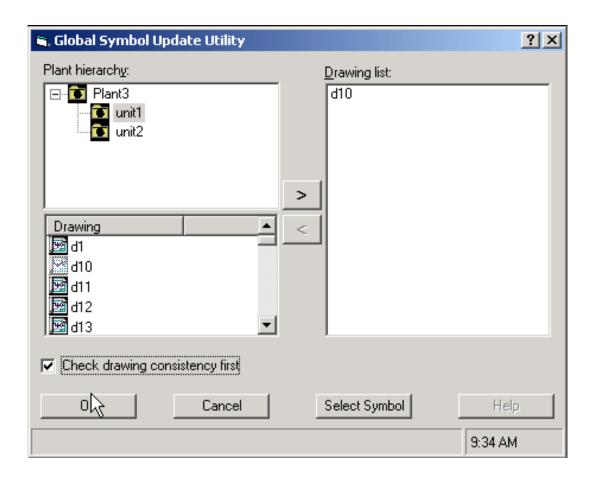
7. User can save the settings as an INI file.
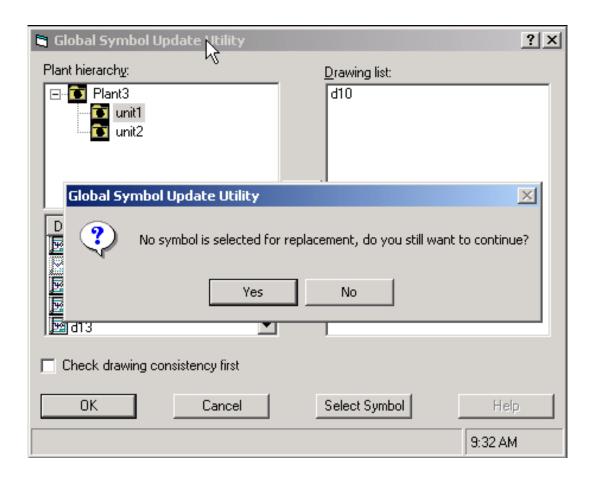
8. Next time the user runs the report, he can load the settings from this file directly.

9. You can choose to first the drawing consistency first for the selected drawings, if any selected drawings are in inconsistency mode, program will not proceed.

10. In case of no symbol/label being selected, the utility runs in the mode to open and close each drawing, which may update drawing for following purposes: (1) data is updated through automation when drawing is closed, which might leave content in label outdated. (2) rule file is modified when drawing is closed. In this case, open and close drawing will make drawing graphic matches data in database and latest rule file.

Known Problems:

1. In case a problem symbol is being updated, it may cause the drawing corruption and requires to recreation. It also seems that select a large amount of symbols, such as all symbols under reference directory which may over 1000 items, is more likely to cause update failed and left drawing corruption.

2. In case selected drawing needs to be recreated or read-only, program will be hang until user come to click the button. For safety seek, user may choose to "check drawing consistency first" option. This way, only all selected drawing are consistent, then program will continue.

3. If any drawing is opened from same workstation this utility is running, this utility may detect it, then the program won't continue. However, if any

drawing from active project is opened from other workstations, this utility won't detect it, therefore, it will try to open it again and user will get warning of this drawing is opened by someone else. In this case, user should click No, and exit the utility. Then close the drawing and run the utility again.

4. The utility won't check user access and it is not workshare aware.

5. You cannot replace the title block label, PipeRun, SignalRun.

Error Log

Error log is maintained in the TEMP directory in the SPAError.log file. Even no runtime error occurs, some information still will be written into log file.

Global Validation Update Utility

This utility will enable the user to implement changes to a plant's item tag configuration, 3D pipe specifications, or insulation specification as well as change the plant group association for items on a drawing. During the course of a project, it is very common to have changes required to the item tag configuration and modification or additions to the 3D piping specifications and insulation specification. Using this utility the changes to these items can be made without impacting P&ID production. The user will be able to select a drawing set and run the item tag validation for items such as Equipment, Piperuns, Instruments, Instrument Loops, Piping Components, and Signal Runs. It will also allow the user to optionally process items in the drawing stockpile. Pipe Specification and Insulation Specification validation can also be re-validated with this utility. Currently this type of change would require the user to open each drawing and modify a property included in the item tag to update the Item Tag property. The user would also need to select the calculate button on the Commodity Code property of each item to re-validate the 3D piping specifications. In addition, this utility will allow the user to change the plant group association for items on the selected drawing(s). This is useful if the user has moved drawings from one plantgroup to another.

Setup

There are two Intergraph-delivered files required to run this utility. It is recommended that they be placed in a sub-directory in the SmartPlant P&ID program folder.

1. GlobalValidationUpdateUtility.exe

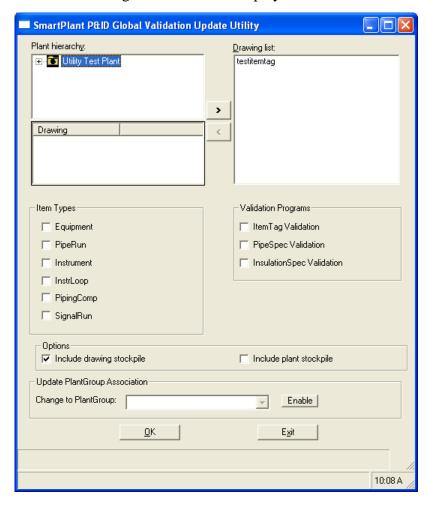2. SPMHierarchy.ocx ("Common Files" folder - must register ocx)

Special Notes

A drawing must be open for the PipeSpec Validation and the InsulationSpec Validation options to be enabled.
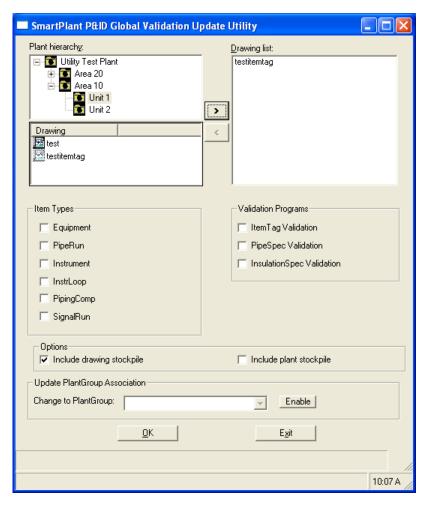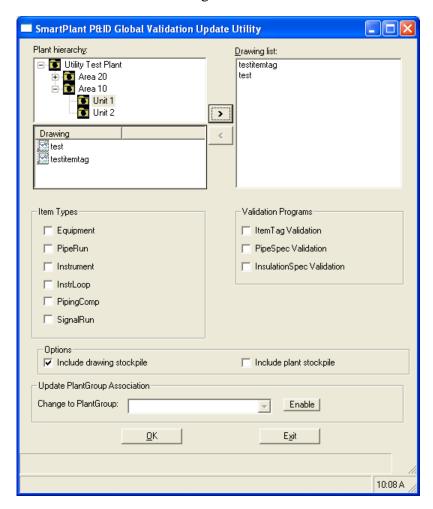
Instructions

1. Set the active plant.

2. Select Start > Programs > Intergraph SmartPlant P&ID > Support Utilities > Global Validation Update Utility to start the utility.

3. The following form should be displayed:

4. Expand the Plant tree in the "Plant hierarchy" window to display units. Once a unit has been selected the unit's drawing list appears in the "Drawing" window.
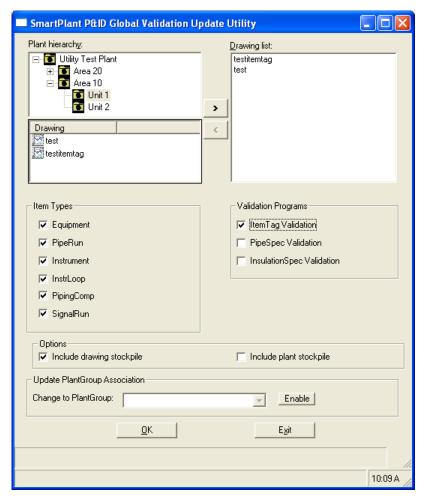
5. Highlight all drawings that are to be processed and select the add (>) button. This adds them to the "Drawing list:" window.
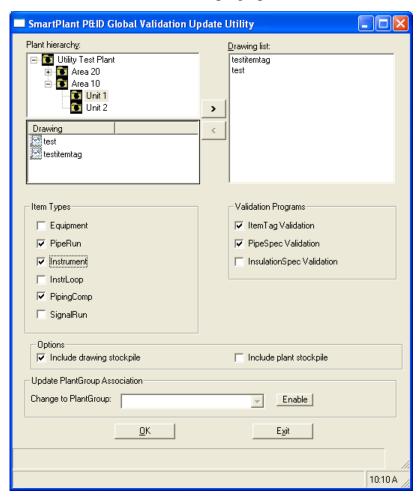

6. Drawings from multiple plants may be added to the "Drawing list:" window by repeating steps 3 and 4 for each plant as required.

7. All drawings from a plant item group (i.e. unit, area) or plant may be added to the "Drawing list:" window by highlighting the item in the "Plant hierarchy:" window and selecting the add (>) button.

8. Drawings can be removed from the "Drawing list:" by highlighting them in the "Drawing list:" window and selecting the remove (<) button.
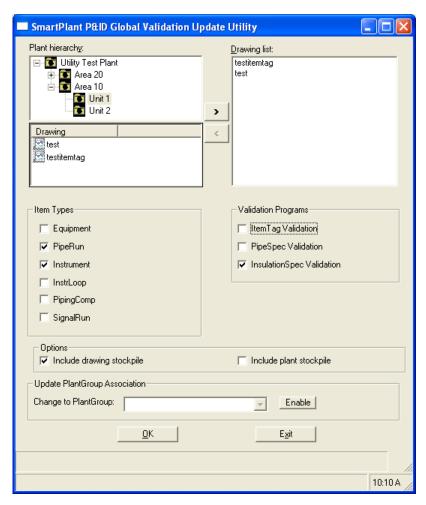
9. Once the "Drawing list:" window contains all drawings that require processing, check the box next to the Item Types that you want to update in the "Item Types" frame of the form. Also check the box next to Item Tag Validation in the "Validation programs" frame of the form to allow item tag validation of the selected item types to be re-validated.
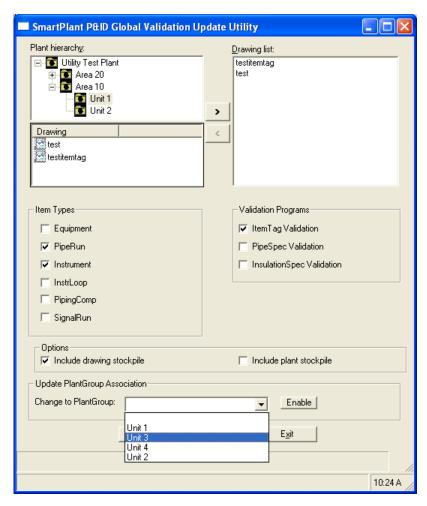
10. Check the box next to the PipeSpec Validation in the "Validation programs" frame of the form to allow Piping Specification validation to be re-validated.

11. Check the box next to the InsulationSpec Validation in the "Validation programs" frame of the form to allow Insulation Specification validation to be re-validated

12. Click the Enable button next to Change to PlantGroup if you want to change the plant group association for items on the selected drawing(s). Then, select the new plantgroup for association from the dropdown list. If you select the Change to PlantGroup, you must also select ItemTag Validation.

13. Validation Programs and Item Types can be selected in any combination for processing.

14. Check the desired options in the Option frame. The user can use the "Include drawing stockpile" and "Include plant stockpile" options in any combination to process the items as required.

15. Select the OK button to begin re-validating the item tags, pipe specs, and/or insulation specs.

16. The frame at the bottom of the "SmartPlant P&ID Global Validation Update Utility" form is use to display status of update.

17. When processing has completed the following message will be displayed:

Select the OK button and then select the Exit button to dismiss the utility form.

Error Log

The utility records the results of the item tag validation and insulation spec validation to the AutomationError.log file. The piping specification validation information will be record in the PipeSpecError.log file. The log files will be generated whether or not the process encounters an error and will be located the TEMP directory.
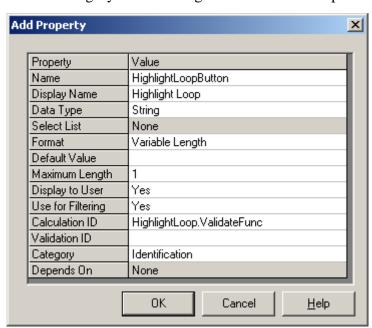
Highlight Loop Utility

This utility will enable the user to identify all items in the drawing that are associated to the selected instrument loop. The utility will highlight the items and generate a select set of all items associated to the selected instrument loop.

Setup

There is one Intergraph-delivered file required to run this utility:

1. HighlightLoop.dll, installed & registered

2. Add a new property to the Instrument Loop table via the Data Dictionary Manager

   a. Set Active Plant.

   b. Open the Data Dictionary and select the Instrument Loop table.

   c. Add a new property defined as follows:

   The category can be changed to suit the user's preference.

Property	Value
Name	HighlightLoopButton
Display Name	Highlight Loop
Data Type	String
Select List	None
Format	Variable Length
Default Value	
Maximum Length	1
Display to User	Yes
Use for Filtering	Yes
Calculation ID	HighlightLoop.ValidateFunc
Validation ID	
Category	Identification
Depends On	None

OK   Cancel   Help

   d. Click OK then Save and Exit the Data Dictionary Manager.

Instructions

1. Set the active plant as desired via Drawing Manager.

2. Open the desired drawing.

3. Open the Engineering Data Editor and select Instrument Loop.

4. Select an instrument loop from the list and click the Calculation Button on the "Highlight Loop" property (or property as named by user's preference during the utility set-up). All instruments associated with this loop will be highlighted and placed in a select set that can be used for possible modification.

    a. The following error message will be displayed if more than one Instrument Loop is selected in the Engineering Data Editor when the calculation button is clicked:

    b. The following error message will be displayed if the Instrument Loop selected is not associated with any items:

    c. The following error message will be displayed if the Instrument Loop selected is associated with items, but none of those items are in the current drawing:

5. When running this utility from the data fields of the Engineering Data Editor (EDE), the user needs to click the select tool icon, if it is not already active, after clicking on the calculation button in order to highlight the selection in the graphics view. The display set will be created and be the active selection in the property grid without clicking the select tool. Running this utility from the EDE

does not create a new select set; it only adds to any current select set already in place.

Error Log

This utility records the results of the process in the SPAError.log file, which is located the TEMP directory. The log file will be generated whether or not the process encounters an error.
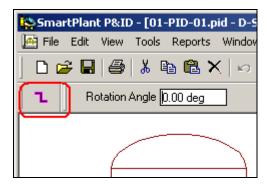
Show Loop Utility

This utility will enable the user to identify all items in the drawing that are associated to the selected item's Instrument Loop. The utility will highlight the items and generate a select set of all items associated to the selected item's Instrument Loop.

Setup

There is one Intergraph-delivered file required to run this macro.

1. ShowLoopButton.dll, installed & registered

2. When installed using the install shell, following ToolBar will be added to SmartPlant P&ID automatically:

Instructions

1. Set the active plant as desired via Drawing Manager.

2. Open desired drawing.

3. Select an instrument and then select the "Show Loop" button. All instruments associated with this instrument's loop will be highlighted and placed in a select set for possible modification.

   a. The following error message will be displayed if more than one item is selected when the "Show Loop" button is selected:

b. The following error message will be displayed if the item is not associated with an instrument loop or is not an instrument:

Error Log

This utility records the results of the process in the SPAError.log file, which is located the TEMP directory. The log file will be generated whether or not the process encounters an error.
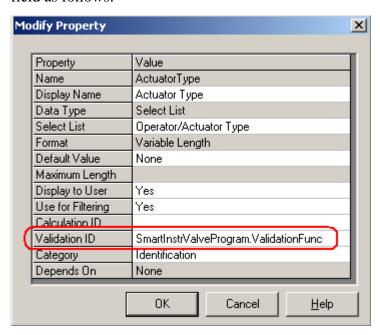
Smart Instrument Valve Utility

This utility will provide a more integrated relationship between the instrument valve and its associated actuator. When an instrument valve is placed the user can specify the type of actuator required. The software will then place the actuator automatically. When the actuator type of an instrument valve needs to be changed, the user can change the value of the instrument valve's "Actuator Type" property and automatically update the graphics. If the user replaces the actuator (or deletes the actuator and places another one), the "Actuator Type" property of the instrument is updated automatically by the software.

Setup

There is one Intergraph-delivered file required to run this utility:

1. SmartInstrValveProgram.dll, installed & registered

2. Copy INI file ActuatorTypeAndSymbolName.ini under folder specified in OptionSetting as "Catalog Explorer Root Path". If the file is not copied, default symbol files will be used, which is hard coded.

3. Open the Data Dictionary Manager and edit the database tables as follows:

    a. Set the active plant as desired via Drawing Manager.
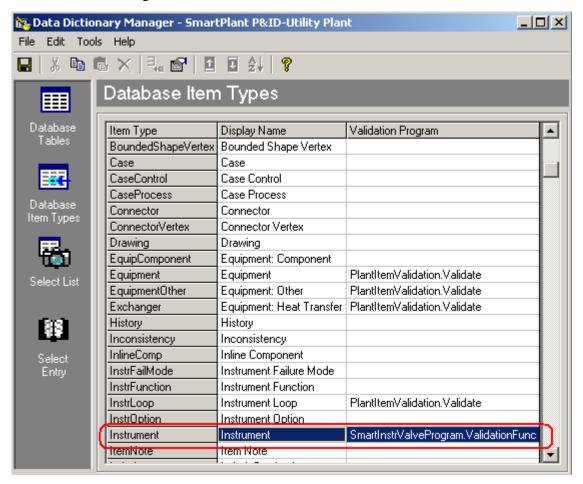
    b. Select the Database Table for Inline Component.

Highlight the "Actuator Type" property, right click and select Properties. Add the value "SmartInstrValveProgram.ValidationFunc" to the Validation ID field as follows:

c. Select the Database Item Type for Instrument.

Update the field 'Validation Program', replace
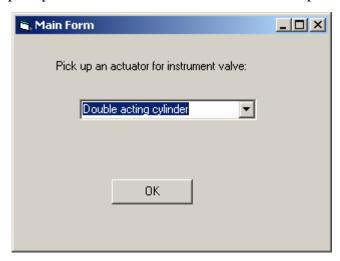"PlantItemValidation.Validate" with
"SmartInstrValveProgram.ValidationFunc"

d. Save and Exit the Data Dictionary Manager.

Instructions

1. Open a drawing.

2. When an instrument valve is being placed, a dialog box will be displayed with a prompt for the user to select the actuator to be placed on the instrument valve.

a. Select the desired actuator from the list and it will be placed on the instrument. The value of the instrument valve's "Actuator Type" property will be updated to match the actuator selected.

b. Click OK to continue placing the actuator. The utility will look the actuator symbol file of the selected actuator type based on mapping information in this INI file: ActuatorTypeAndSymbolName.ini. One actuator type might be able to be mapped to multiple actuator symbol files.

c. If an actuator type is selected that does not have a matching symbol the following error message will be displayed and the instrument valve will be placed without an actuator.

3. When an instrument valve's actuator type needs to be modified the user should update the value of the instrument valve's "Actuator Type" property in the property grid.

a. The existing actuator symbol will be deleted and a new actuator will be placed according the actuator type that user selected.

b. If an actuator type is selected that does not have matching graphics the following error will be displayed and the actuator will not be replaced.
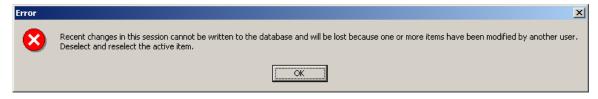

Limitations

1. When an actuator is replaced via the modification of the instrument valve's Actuator Type property the symbol will be replaced (if the appropriate symbol exists). However, there may be items that require clean up.

   a. Any instrument signal lines connected to the original actuator will require manual re-attachment.

   b. Any labels associated with the actuator will be deleted and require manual replacement.

   c. Rotation of the actuator on placement of the instrument valve is governed by the placement method used when placing the individual instrument valve (i.e. cursor above line will place the actuator on top of the valve).

2. If an instrument valve and its associated actuator are deleted from a drawing to the stockpile and processed in the same select set, the user will receive the following warning:

   Click OK, save the drawing and continue.

3. If an instrument valve and its associated actuator are deleted from the model and processed in the same select set, the user will receive the following error:

   Click OK, save the drawing and continue.

Symbol Report Utility

SPPID Symbol Utility can be used to create a list of Symbols available in SPPID Reference Data.

The list is created in Microsoft Excel file with the following information

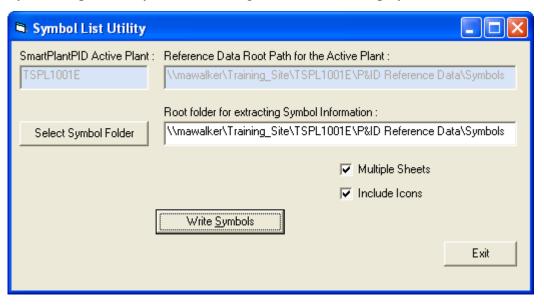|	
Columns A to F	Symbol Path
Column G	AABBCC Code
Column H	Symbol Graphics
Column I	Symbol File Name
Column J	Item Type
Column K	Class
Column L	Sub Class
Column M	Type

Setup

There are two Intergraph-delivered files required to run this utility. It is recommended that they be placed in a sub-directory in the SmartPlant P&ID program folder.

1. SymbolReportUtility.exe

2. SPMHierarchy.ocx ("Common Files" folder - must register ocx)

Instructions

1. Set the active plant. This will also populate the Reference Data Path for the current active Plant.

2. Select Start > Programs > Intergraph SmartPlant P&ID > Support Utilities > Symbol Report Utility. The following form should be displayed:

3. Verify that the correct symbol folder is set. If not, the user can use this button to select a folder at any level under P&ID Reference Data. For example, if the user wants to create a list of all equipments in a particular plant then the user can navigate down the P&ID Reference Data and select "Equipment" folder. This will allow the user to create the list with only equipments in it. It can also be used to override the default Reference Data Path.

4. Choose the desired options for multiple sheets and/or including icons.

   a. Multiple Sheets Checkbox:

      If checked, this option creates multiple sheets based on the number of folders that exist under root folder selected by using Select Symbol Folder button. The Sheet names are same as the folder names. For example, if the default Reference Data Path is selected then the Sheets created would be "Assemblies", Design", "Equipment", "Equipment Components" etc.

   b. Include Icons Checkbox:

      If checked, Symbol graphics are included in the sheets as inserted objects.

5. Click the Write Symbols button to create the excel file containing the SPPID Symbols.