

Common Application Tutorial



PROCESS, POWER & MARINE

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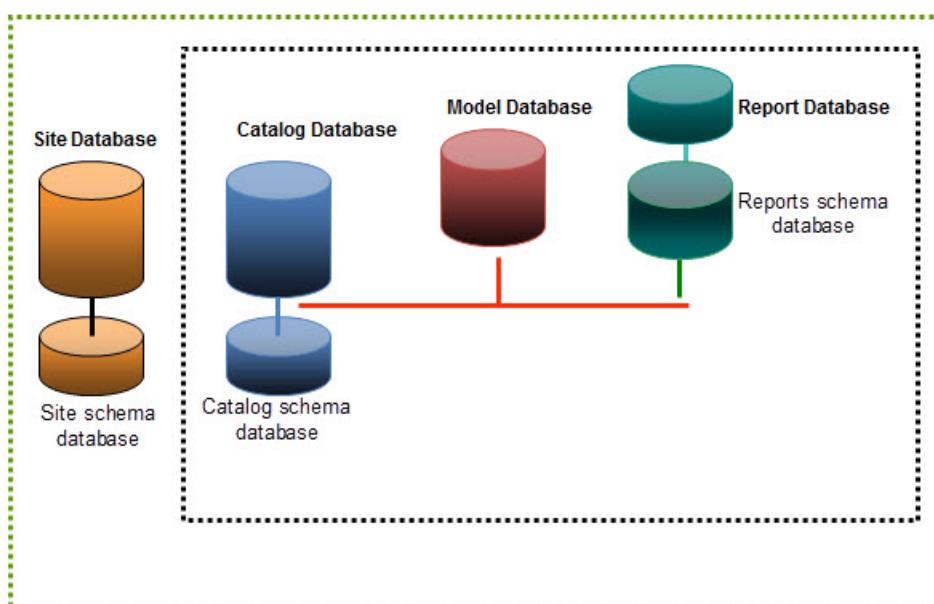
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SESSION 1

Database Architecture

Overview

Smart 3D has seven databases that are created before the users can work in Smart 3D. The Database wizard creates the site, site schema, catalog, and catalog schema databases. The model, reports, and reports schema databases are created from the Project Management task.

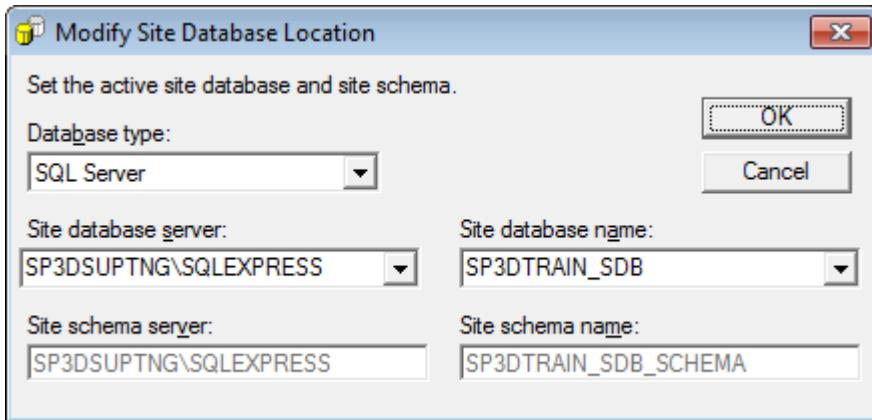


Site database

The site database serves as the primary or main database, and contains all permission groups. From the site database, you can access the model and catalog databases and their related schema databases. You must create the site database before creating a model or catalog database. A site database can have multiple model and catalog databases. When you create the site database, you also create the site schema database.

Site schema database

The site schema database stores the metadata for all business objects and their relationships. The site schema database is created when you create the site database. The site and site schema databases are containers for the other databases. A site database can point to multiple model databases.



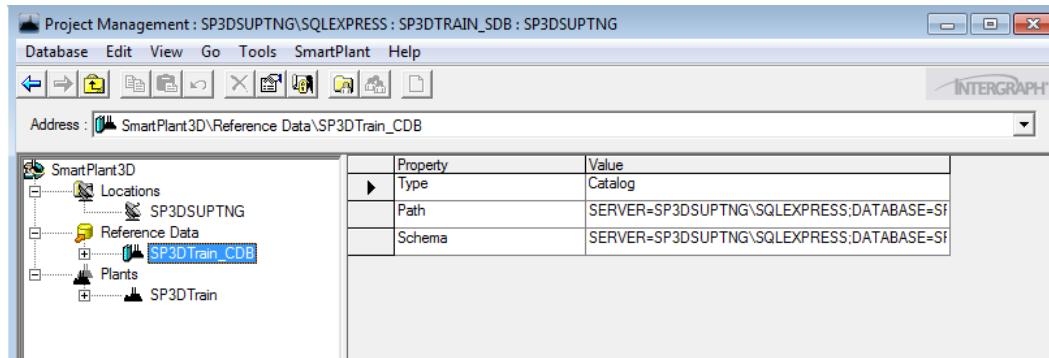
- **Database type** - Specifies the type of database. You can choose a MSSQL database or an Oracle database.
- **Site database server** - Specifies the registered SQL server for the site database. After you select a server, **Site schema server** defaults to match **Site database server**. This option is available only if the **Database type** is set to **SQL Server**.
- **Site database name** - Specifies a name for the new site database. After you enter a name for the site database, **Site schema name** defaults to match **Site database name**.

Catalog database

The catalog database contains the reference data necessary to design a model. The reference data includes graphical symbols that you can place in the model, such as equipment or piping components, and non-graphical, tabular data, such as catalog data and specification data. Catalog data includes the parts that you place in the model, such as piping components and equipment. Specification data includes the rules that govern how those parts are placed and connected. The catalog and catalog schema databases contain the reference data information, such as what is available on the market for each component, physical dimensions, and industry standards. When you create the catalog database, you also create the catalog schema database.

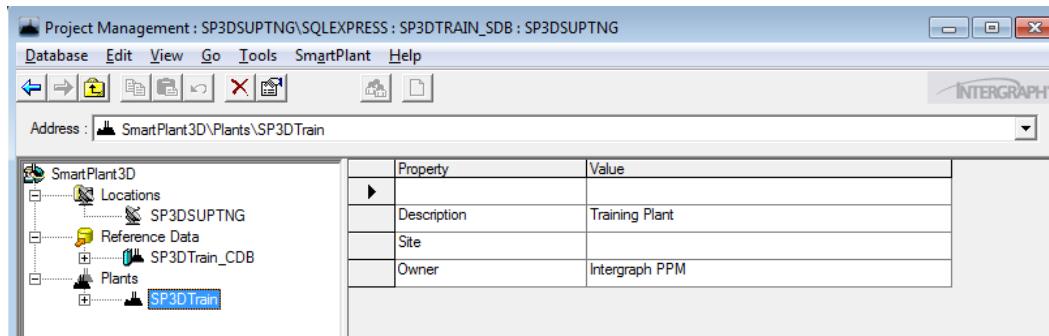
Catalog schema database

The catalog schema database stores the metadata for all business objects, such as pipes, beams, and their relationships, as well as all attribute type and codelist information.



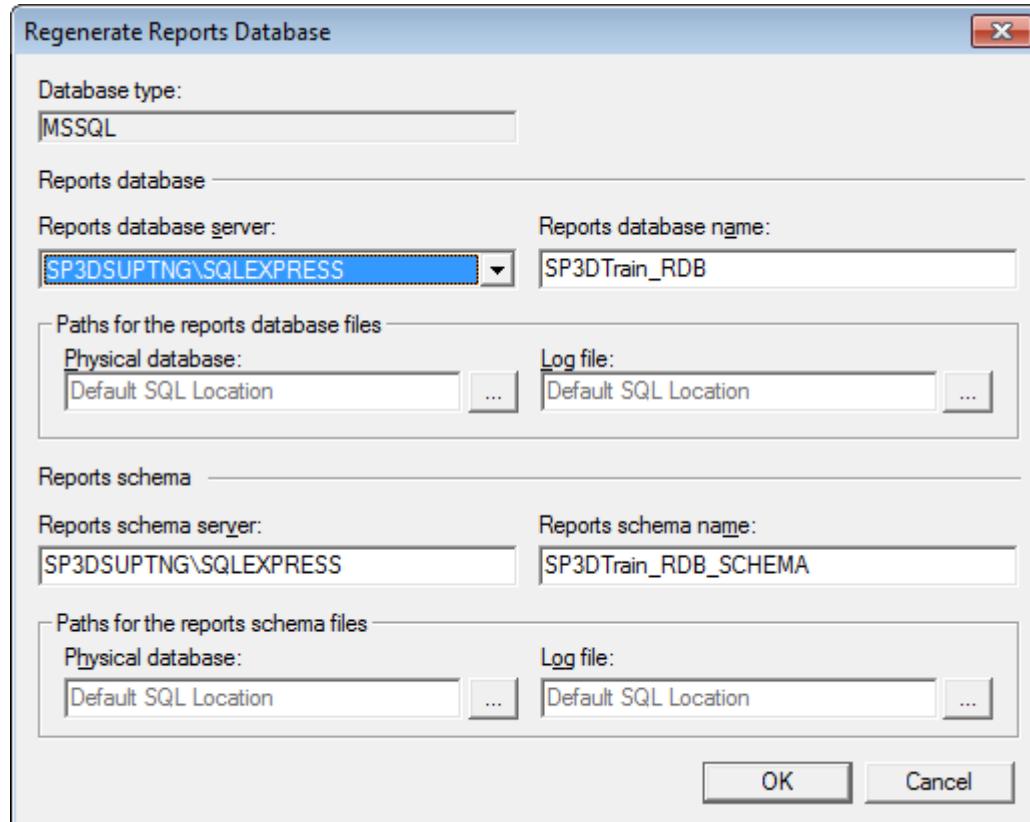
Model database

The model database organizes all of the three-dimensional objects in the model. Catalog and model databases share the same catalog schema database.



Reports and Reports schema databases

The reports and reports schema databases interact with the other five databases to generate tabular reports from Smart 3D data. The reports database point to the data in the other databases. These two databases are originally created during the model generation process.



SESSION 2

Introduction to Common Applications

Overview

The Workspace

The workspace represents the model data. Common tasks allow you to define the workspace and perform common operations on the model.

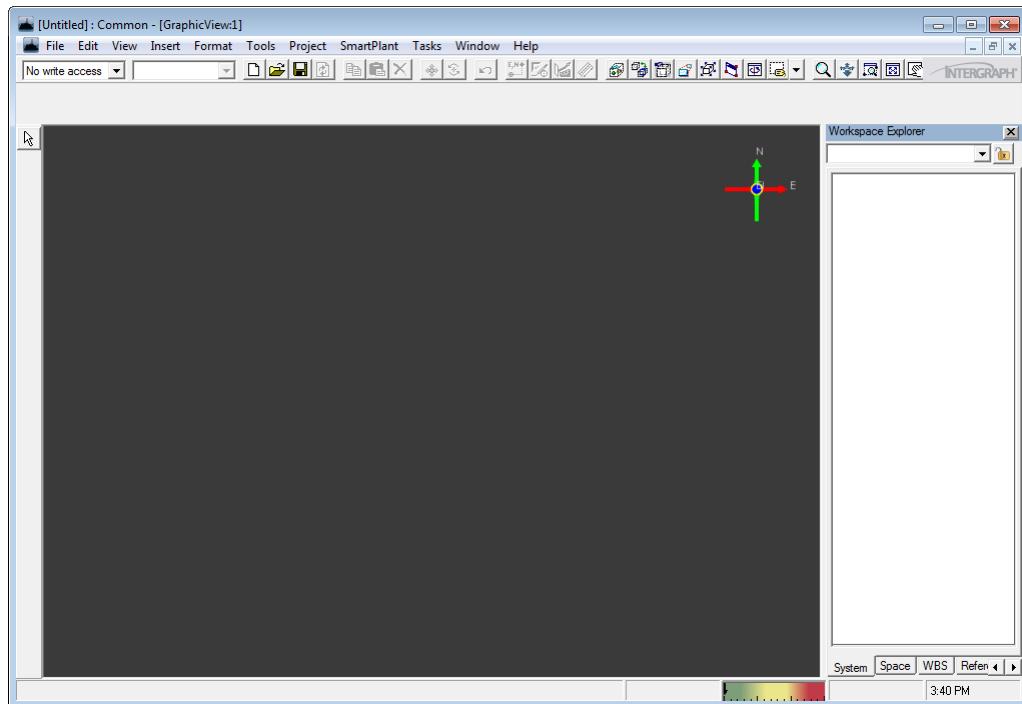


Figure 1: The Workspace

Saving the Session File

The changes you make in any task or operation are saved in a session file (.ses). This includes changes to preferences, such as colors, undo settings, and tooltips, as well as preferences for specific commands in the modeling tasks. Many tasks on the **Tasks** menu are not available until you have defined and saved your workspace.

Access Permissions

The **Active Permission Group** allows you to set the permission group for the objects you are creating or editing. The drop-down list contains all of the permission groups to which you belong. Depending on your access permissions, you can perform specified functions.

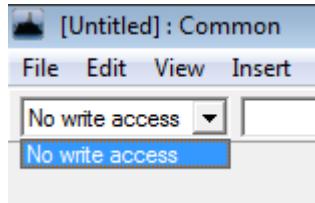


Figure 2: Access Permissions

Main Toolbar

The main toolbar in each task displays at the top of the page and contains the same menus, regardless of the active task.

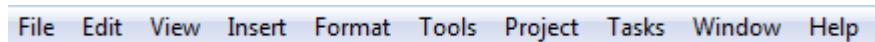


Figure 3: Main Toolbar

You can save certain properties, such as window size, layout, and view orientation, from one work session to the next. The **File** menu allows you to create, open, save, and close sessions.

The name of the current session file appears in the title bar of the application, along with the name of the task, model, and active filter. You can also see this information on the Windows task bar. This information is helpful when you have multiple Smart 3D windows open. For example, **Paste** and **Restore** require two sessions to be open.

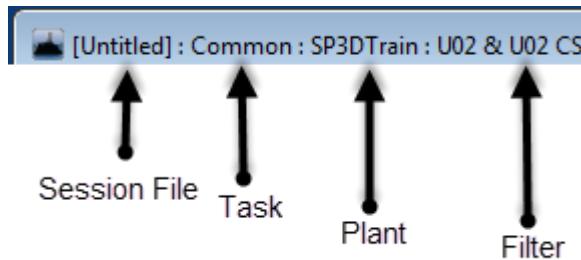


Figure 4: Title Bar

The workspace is a saved setting in a session. During a session, you define a workspace to view and work with certain objects in the model data. Defining a workspace also allows you to create and name filters that restrict the data of the entire model into more manageable subsets for working.

The workspace displays in the **Workspace Explorer**, which allows you to move throughout the hierarchy of your workspace. You can view the workspace using the **System**, **Assembly**, **Space**, **WBS** (Work Breakdown Structure), **Analysis**, **PDS**, and **Reference** view tabs at the bottom of the **Workspace Explorer**. Select **Tools > Options** to specify the tabs to show in the **Workspace Explorer**.

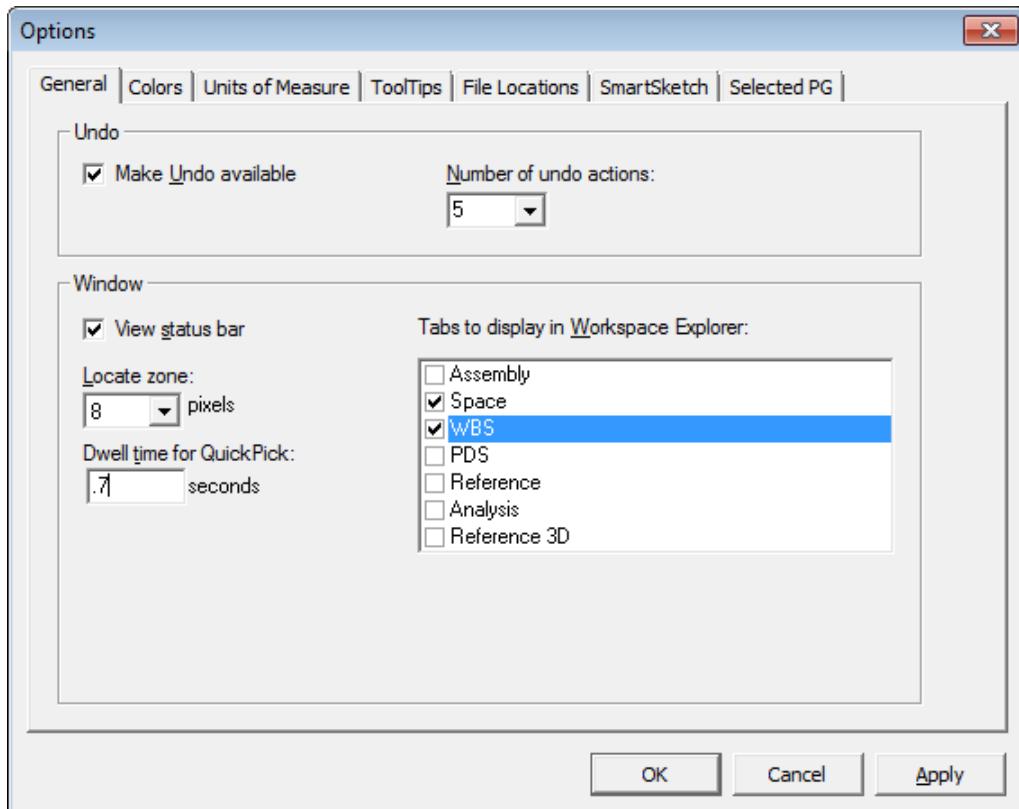


Figure 5: General Options

You can edit the following options:

- **General** - Enables the **Undo** command and the status bar. You can specify the number of actions you can undo. **Dwell time for QuickPick** specifies the amount of time before QuickPick activates. **Locate zone** defines the locate zone for the software to find SmartSketch points. You can also select the tabs to display in the **Workspace Explorer**.
- **Colors** - Selects the colors the software uses for the background, highlighted and selected objects, and handles.
- **Units of Measure** - Determines the units of measure that appear in the software. Additionally, you can specify how precisely the software displays these units. Data using units of measure, such as length, angle, volume, and mass, use the units of measure defined in the metadata. For example, the metadata defines the units of measure for length in meters. If you set the units of measure for length to **ft** in the **Options** dialog box, then the software displays the length readout as **ft**, but stores the value as meters in the database.
- **ToolTips** - Defines the ToolTips for a selected object type. ToolTips are based on catalog labels, but they are saved to the session file. You can create a label to use as a ToolTip in the Catalog task.

- **File Locations** - Sets the file locations for saved session files, workspace templates, personal report templates, report output files, and custom documentation.
- **SmartSketch** - Selects the standard SmartSketch relationship indicators to display in the software.

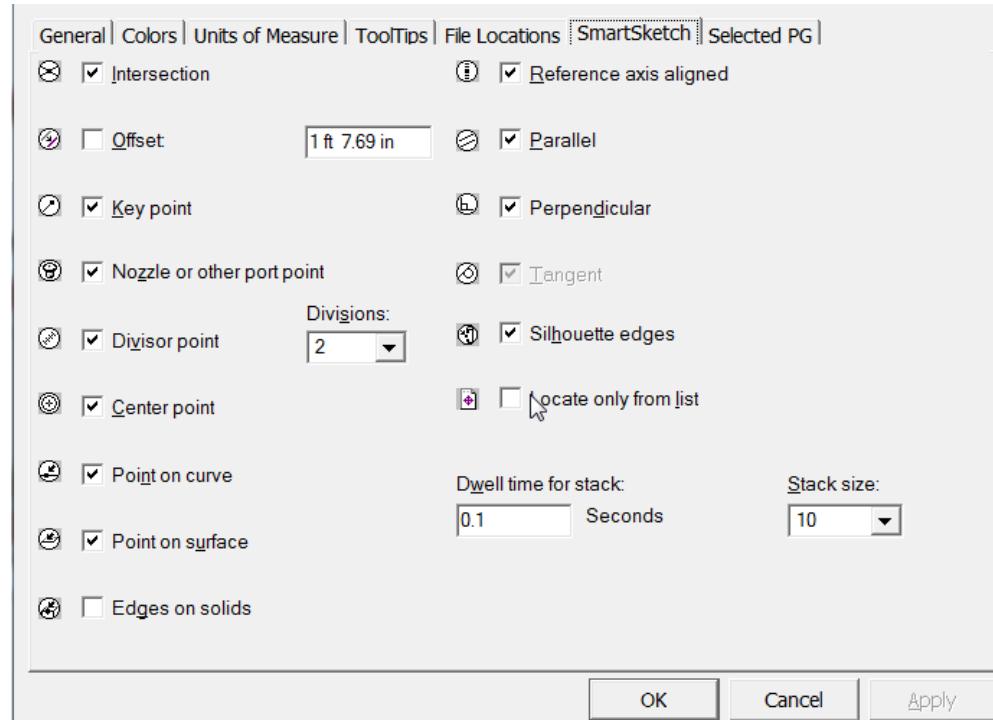


Figure 6: SmartSketch Options

- **Selected PG** - Restricts the edits and propagation to objects in the selected permission group.

Shortcut menus

Shortcut menus are menus that appear when you right-click certain areas or objects in the user interface. You can access shortcut menus by right-clicking an object in a graphical view or in the **Workspace Explorer**. These options display after you define the workspace.

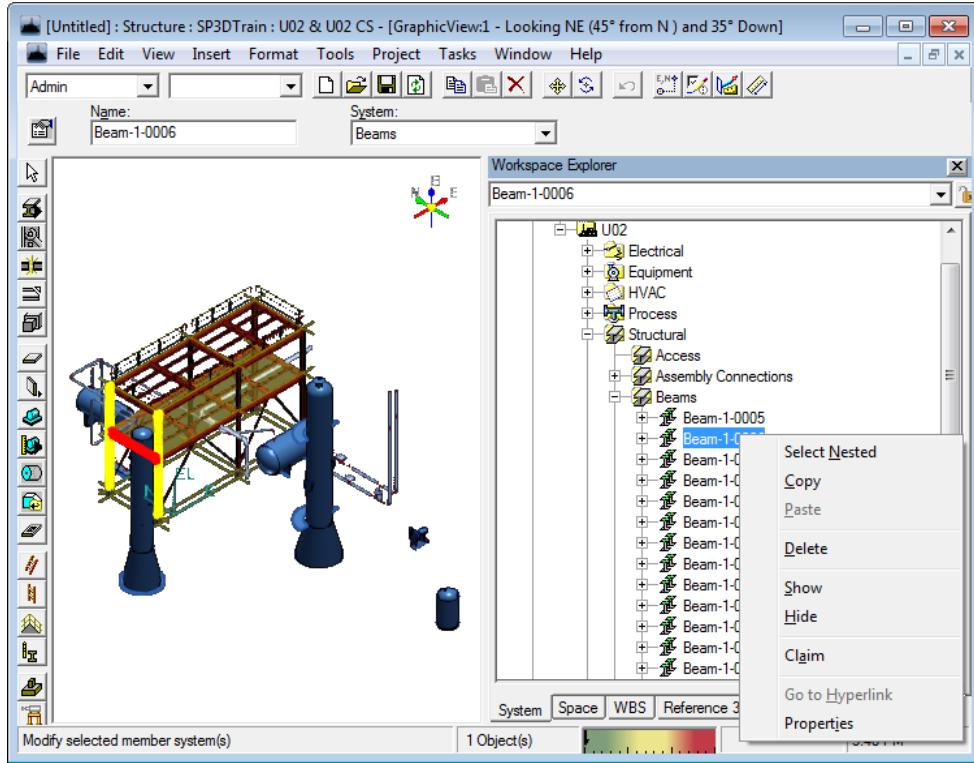


Figure 7: Shortcut Menus

The following commands are available from the shortcut menus:

- **Select Nested** - Selects the object and all of its nested children.
- **Copy** - Copies the selected object and its associated relationships to the Clipboard.
- **Paste** - Pastes the Clipboard contents in the model. **Paste** is available after you copy an object.
- **Create WBS Project** - Initializes a new Work Breakdown Structure (WBS) project. This command only appears in the **Workspace Explorer**.
- **Create WBS Item** - Initializes a new Work Breakdown Structure (WBS) item. This command only appears in the **Workspace Explorer**.
- **Delete** - Removes the selected object from the database, and deletes any relationships and notes on the object.
- **Show** - Turns on the display of a selected object.
- **Hide** - Turns off the display of a selected object.
- **Claim** - Identifies objects in the model for modification in a project.
- **Go to Hyperlink** - Views a file or a web page associated with an object in the model. This command is available after you insert a hyperlink on an object.

Introduction to Common Applications

- **Properties** - Edits the properties of a selected object.
- **New System** - Creates a new system without switching to the **Systems and Specifications** task.

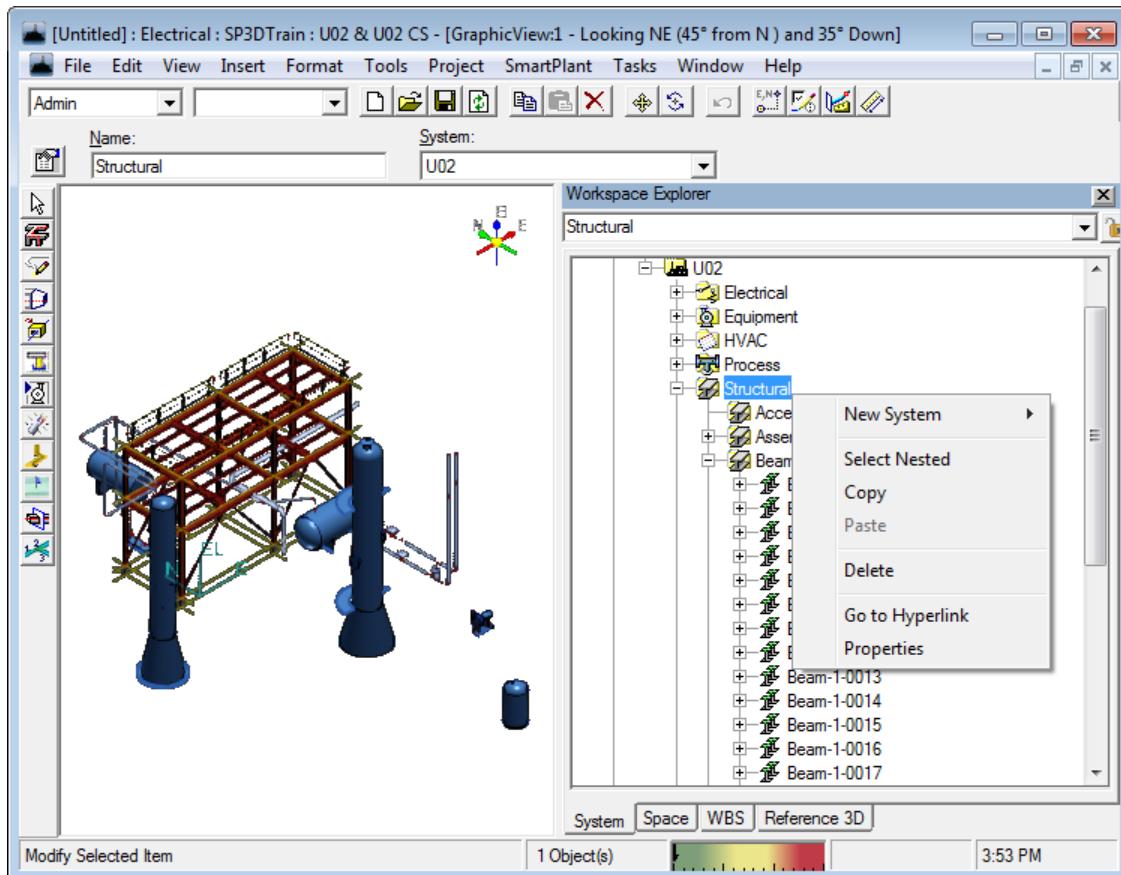


Figure 8: New System

SESSION 3

Creating a Session File

Objective

By the end of this session, you will be able to:

- Create a new session file from a session file template.

Before Starting this Procedure

- Smart 3D Introduction to Common Applications lab

Overview

To begin working in Smart 3D, you must first open a session file. You can open an existing session file or create a new session file from a session template. After you create a new session file, you must use **Define Workspace** to select the portion of the model you want to view and edit.

The session file does not store model design data. It stores your personal default settings for the commands, the active task environment, and display geometry. The display geometry is used for display only. The session file updates when you run **Define Workspace** or **Refresh**. When you select an object to edit or use an object as input for another design operation, the software retrieves the object information directly from the server. The object information must be up-to-date.

The session file stores the following data:

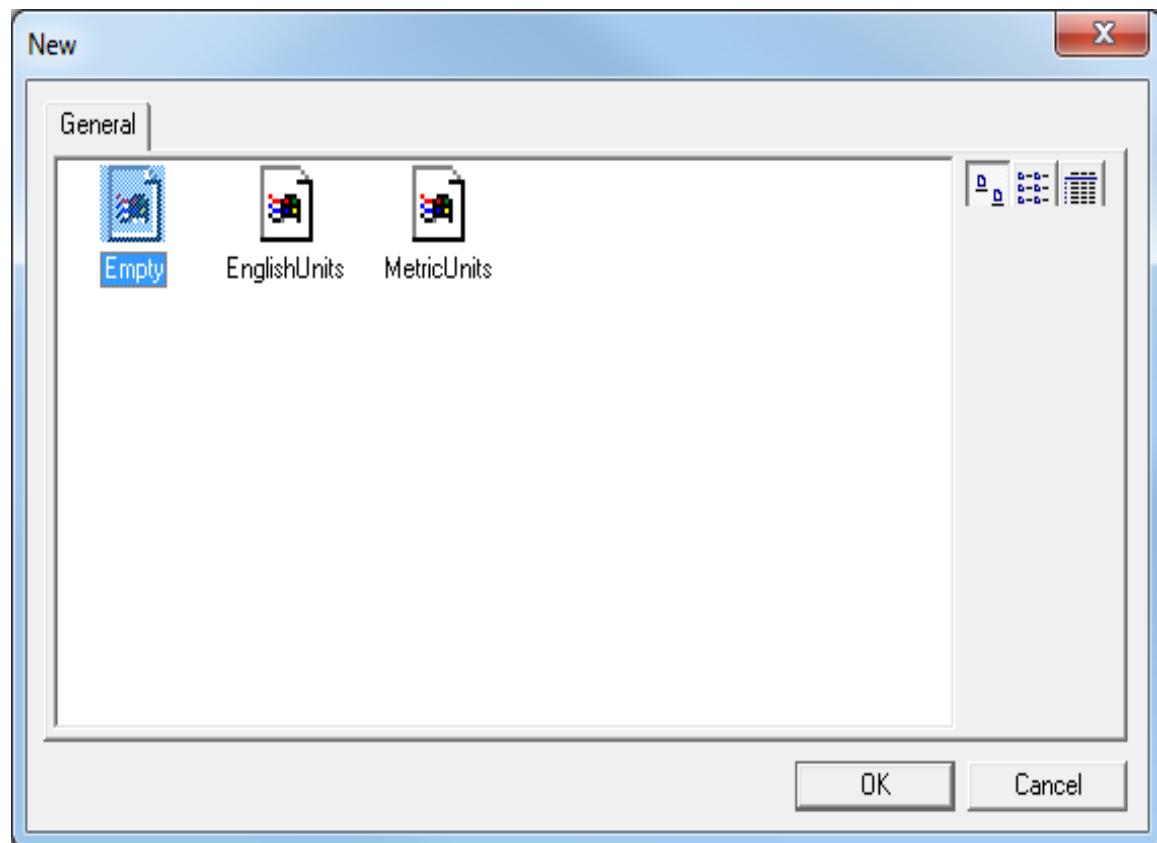
- Last active task environment
- Window layout
- Named views
- Surface style rules to apply
 - NOTE** The rule definitions are stored in the model.
- **Options** settings
- Graphic geometry for display (Display list)
- Identity of the filter used to create the display list
 - NOTE** The filter definitions are stored in the model.
- Defaults for each command's options and settings

When you exit Smart 3D, you can save the graphics and command defaults in a session file. You can quickly start another design session by opening the saved session file, which saves the previous modeling environment.

This session shows you how to create the session file from a template. To define a filter for the session file, see *Introduction to Common Applications* (on page 11).

Create a Session File

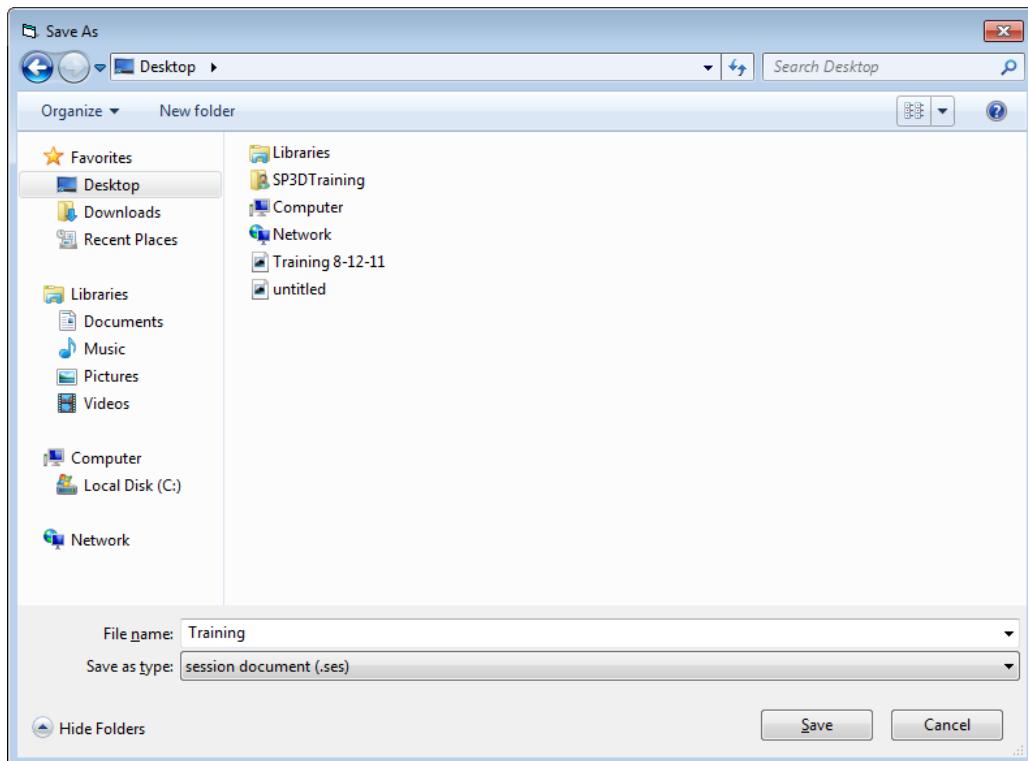
1. Create a session file and save the file on your desktop.
2. Select **Start > All Programs > Intergraph Smart 3D > Smart 3D**.
*The **New** dialog box displays.*
3. Select a template option other than **empty** and click **OK**.



NOTES

- The standard templates are:
 - **empty** - Allows the administrators to create custom templates.
 - **EnglishUnits** - Displays measurements in the English system
 - **MetricUnits** - Displays measurements in the Metric system
 - The administrator can add customized templates specific to the different disciplines.
 - Saving a session file without defining a workspace is useful only if you want to create another template. For more information, see Session 4: Defining a Workspace Using a System Filter.
4. Select **File > Save**.

The **Save As** dialog box displays.

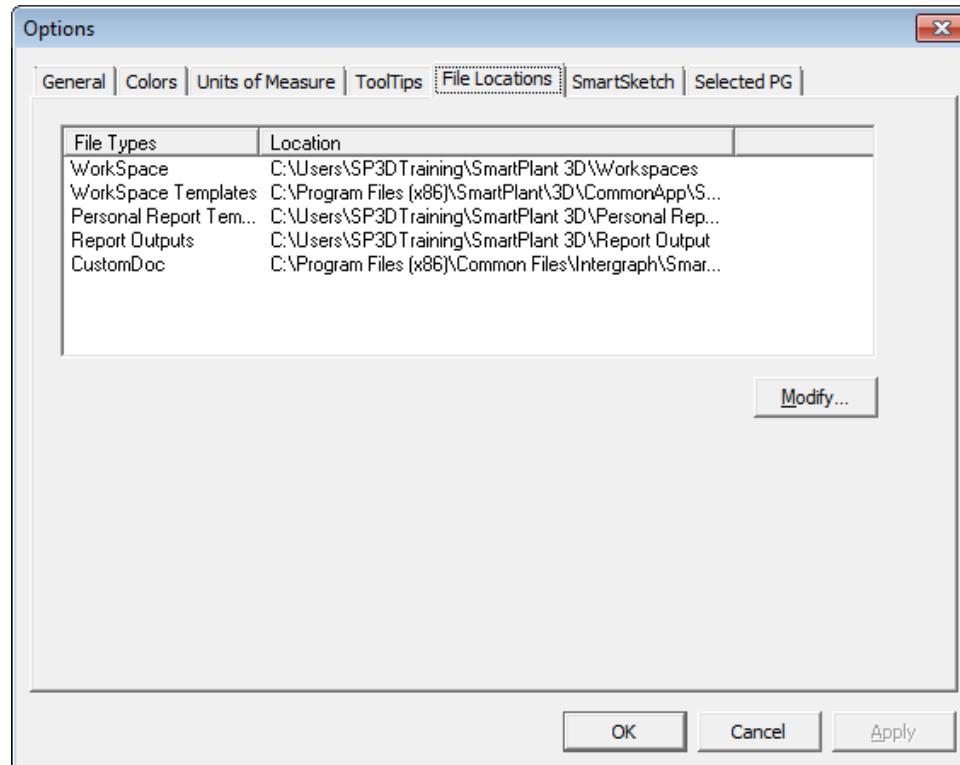


NOTES

- The **Save As** dialog box prompts you to specify the name of the session file and its saved location. You can navigate to and select a folder on a local or network drive. Session files have a .ses extension.

Creating a Session File

- The default save location for workspaces is defined under **File Location** in the **Options** dialog box.



- Click **Save**.

For more information related to session files and defining a workspace, see *Common: An Overview* and *Managing Sessions: An Overview* in the *Smart 3D Common User's Guide*.

SESSION 4

Defining a Workspace Using a System Filter

Objective

By the end of this session, you will be able to:

- Define a workspace by creating and using a System filter.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)

Overview

When you create a session file from a session template, you must use **Define Workspace** to define the portion of the model you want to view or edit. **Define Workspace** uses a filter to query the model database for the data you want to see in the model. You can select an existing filter or define a new filter. When you save the session file, the model and its applied filters are stored in the session file.

If other users add or edit objects in the model database after you have defined the workspace for your session, these objects are not visible until you click **Refresh** to update the model. **Refresh** recomputes the workspace filter and retrieves only the new or changed data that meets the filter criteria.

This session shows how to create a filter that uses the system hierarchy grouping of the design data.

NOTES

- The relationships between design objects ensure that any supporting design data required to edit a design object is automatically retrieved from the server when you edit the object. The retrieval of the required data from the server does not depend on the data you included in your session. All edits will automatically use the updated information from the model on the server.
- It is quicker to open a session file and run **Refresh** than to use **Define Workspace**. **Define Workspace** processes all the design objects retrieved by the filter to generate the graphic display. The display graphics are then stored in the session file. **Refresh** only retrieves the changed and new graphics from the server. After the graphics are included in the session file, the design objects are only activated when you select them for editing or reference. You should maintain a directory for saved session files that use the different filters needed for your daily work. As a rule, you should begin working in Smart 3D by opening an existing session file.

Define a Workspace Using a System Filter

1. Open a session file and define a workspace containing the objects in Unit **U01**, Area **A2**, by creating a System filter, **Unit 1**, for those objects.

The workspace contains the objects as shown:

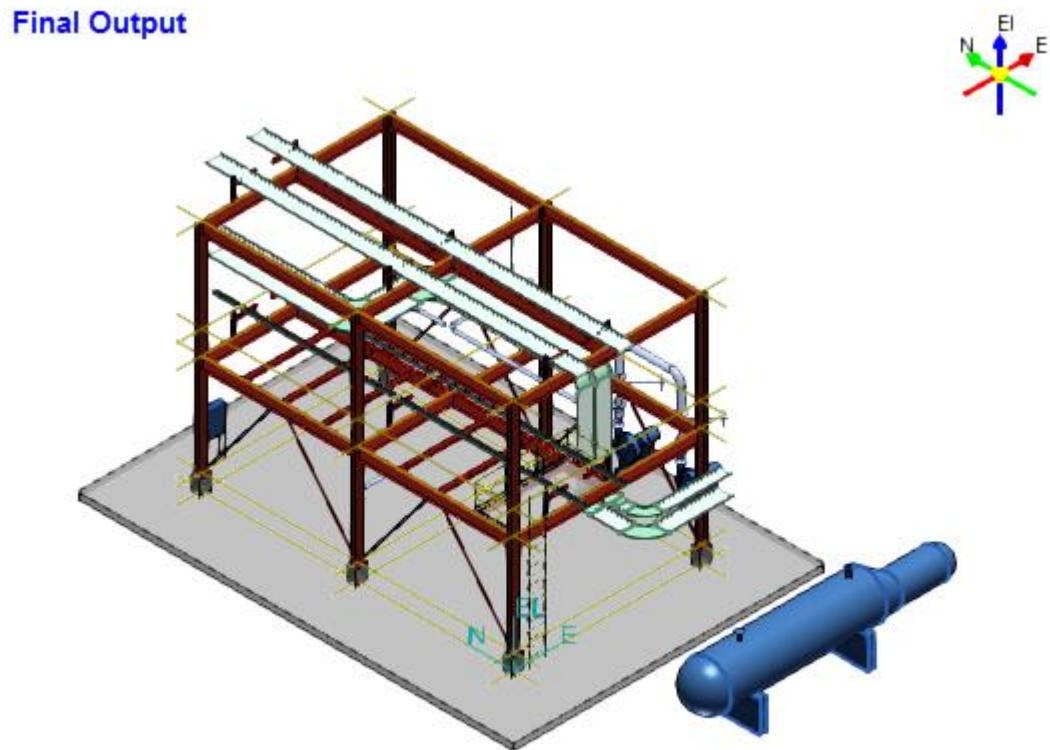


Figure 9: Final Output

2. Select **File > Define Workspace....**

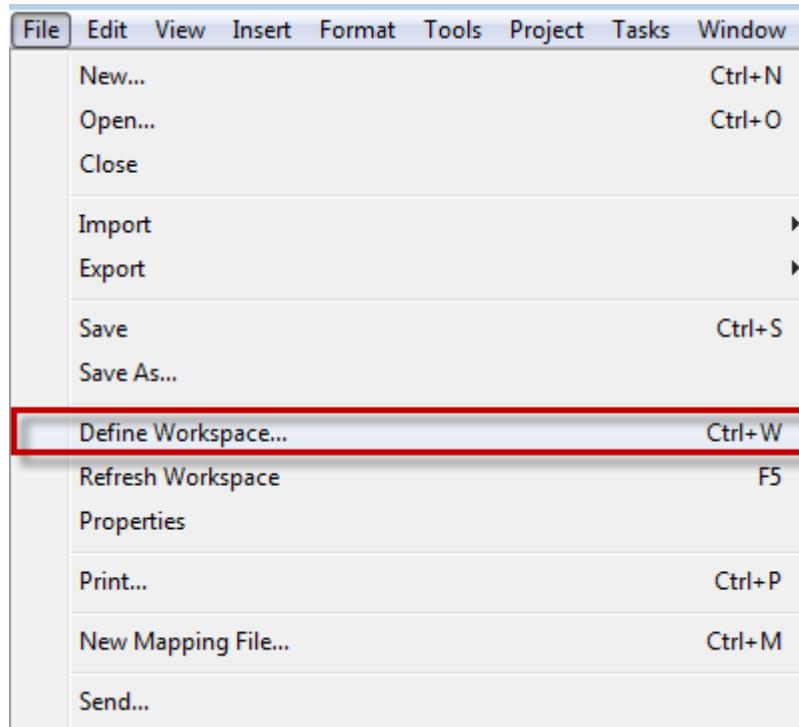


Figure 10: Define Workspace Command

*The **Define Workspace** dialog box displays.*

NOTE You can also open the **Define Workspace** dialog box by pressing CTRL + W.

3. Under **Filter**, select **More....**

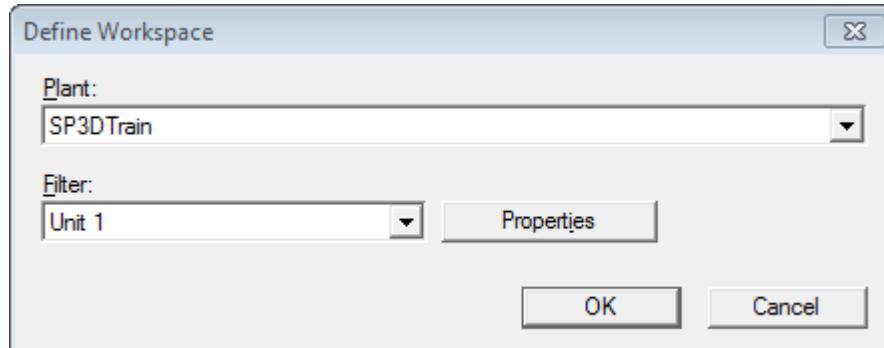


Figure 11: Define Workspace More Option

*The **Select Filter** dialog box displays.*

4. Select **My Filters** and click **New Filter (Simple or Asking)** .

*The **New Filter Properties** dialog box displays.*

NOTES

- Catalog filters are stored in the catalog referenced by the model. These filters contain criteria related to the data model, such as object type and properties.

Defining a Workspace Using a System Filter

- Model filters are stored in the model database and can be based on model objects, such as systems and named spaces (volumes).
 - You must have read permission to view the catalog and model filters defined by the site administrator.
5. Type **Unit 1** in the **Name** field.
 6. Using the CTRL key, select **A2 > U01** and **CS > U01 CS**.

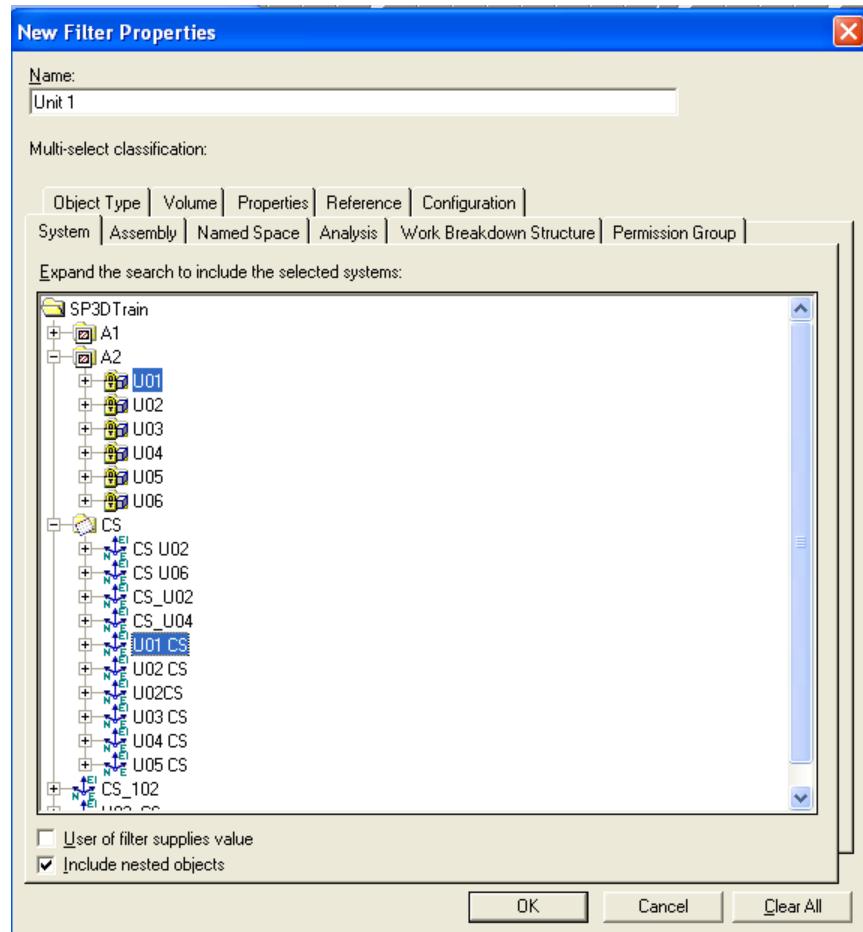
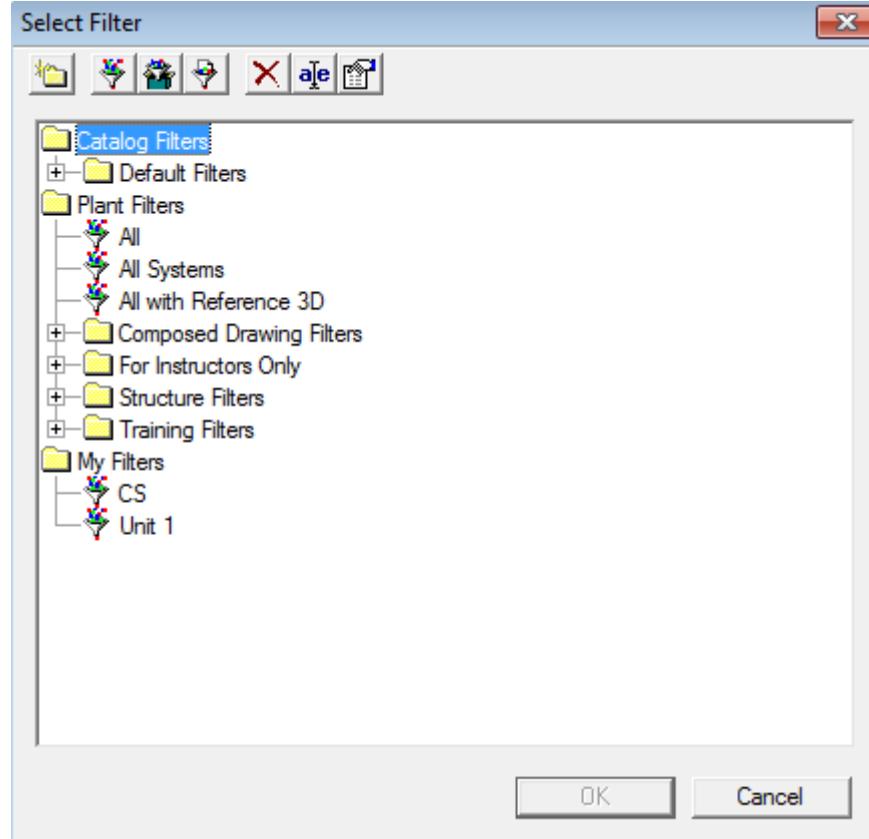


Figure 12: Selection of U01 and U01 CS

NOTES

- To create a filter, you must have write permission to the permission group of the parent folder in the model or catalog folders. You can create filters in your **My Filters** folder.
- Use alphanumeric characters to create filter names. The name must be unique in the model database.
- The **New Filter Properties** dialog box contains several tabs that define search criteria. The **System**, **Assembly**, and **Named Space** tabs expand the search for objects within a model that meet the criteria defined on these tabs. The **Volume**, **Permission Group**, and **Object Type** tabs restrict or limit the objects returned to those that meet the additional criteria, if any, defined on those tabs.

- The filter in this tutorial is a system filter because only **System** criteria are used to select the data. The system hierarchy organizes the model for design purposes. Every part in the model has one and only one system parent.
 - If **Include nested objects** is selected, the filter retrieves all nested objects under the selected systems.
 - You can apply other criteria to the filter if you want to be more selective about the displayed data.
7. Click **OK** to complete the filter definition process.
- The **Select Filter** dialog box displays.
8. Select **Unit 1** to set your workspace to display **Unit 1**, and click **OK**.



Defining a Workspace Using a System Filter

9. In the **Define Workspace** dialog box, click **OK**.

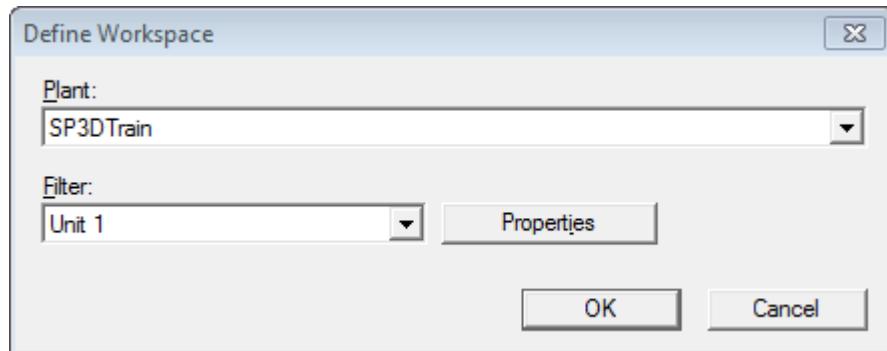


Figure 13: Selecting the Created Filter From Define Workspace Dialog Box

*You have defined a workspace by creating the filter **Unit 1**.*

NOTE To fit all objects in the active view, click **Fit** on the **Common** toolbar.

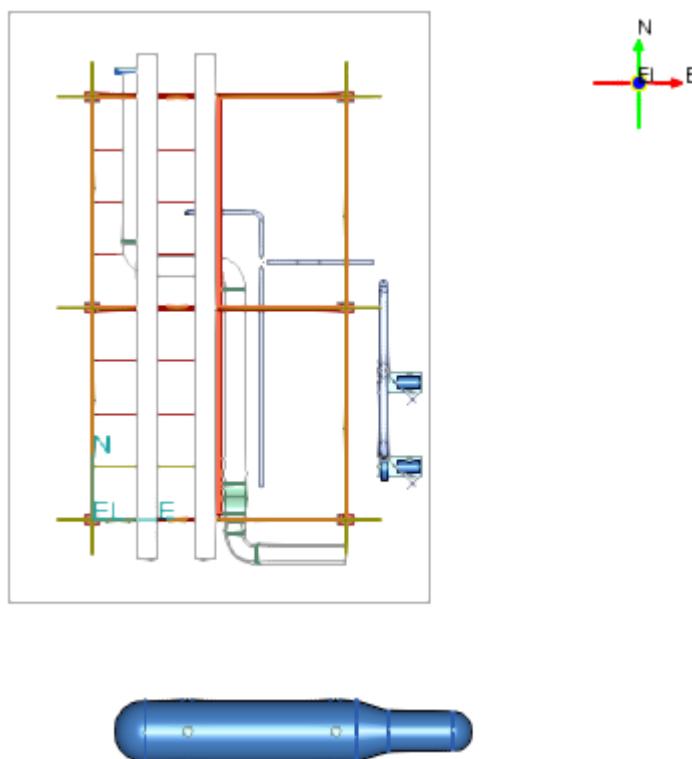


Figure 14: View of the Workspace After Creating a System Filter

For more information related to defining a workspace, see *Defining Workspace Content* and *Using the File Menu* in the *Smart 3D Common User's Guide*.

SESSION 5

Workspace Simplification by Role

Objective

By the end of this session, you will be able to:

- Exclude certain object types based on a user's role.

Overview

Define Workspace allows you to use user-defined roles to further filter the objects displayed in the workspace. In the model, this simplifies the workspace by excluding objects that are not related to your role.

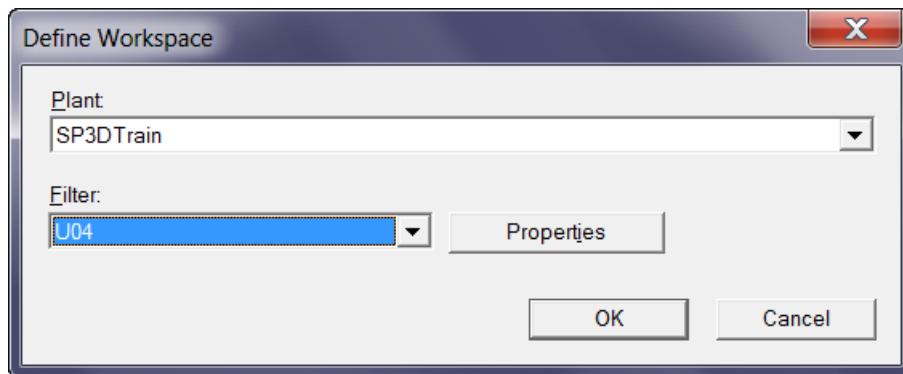


Figure 15: Define Workspace Dialog Box

Workspace Simplification by Role

When you select to use a user-defined role, the **Role** field displays in the **Define Workspace** dialog box. **Role** allows you to exclude objects that are not important to your task. For example, if a piping designer selects the **Piping Designer (Aboveground)** role, the filter excludes structural objects that are not parts. If a structural designer selects the **Structural Designer** role, the filter excludes piping objects other than parts.

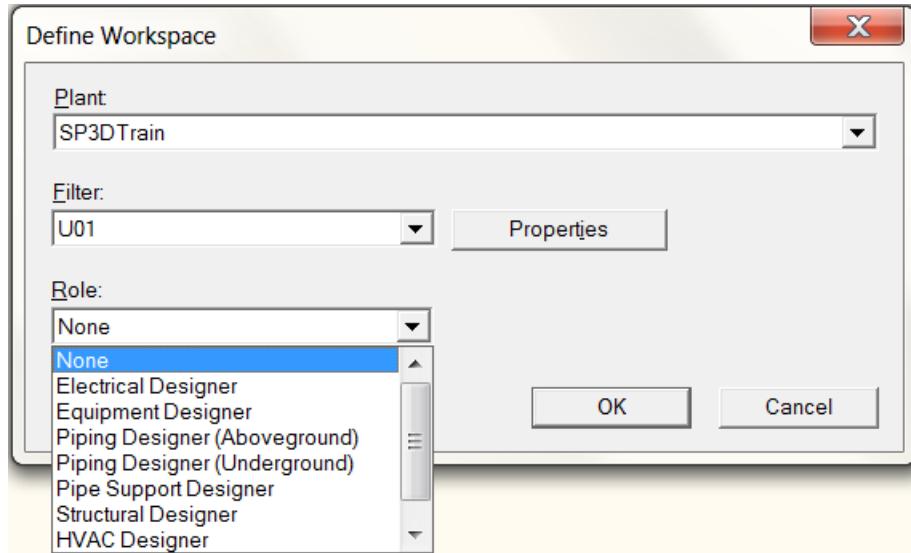


Figure 16: Define Workspace with New Role Field

Steps

1. Select **File > Define Workspace....**

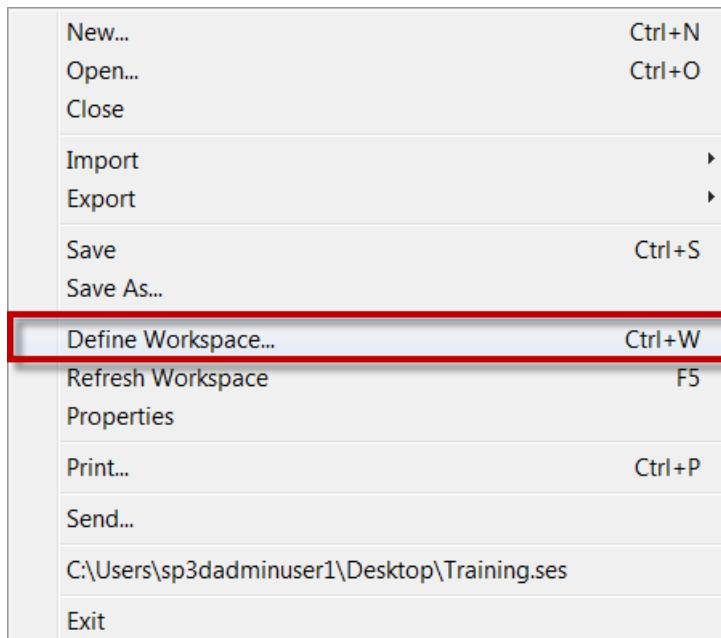


Figure 17: Define Workspace Common on the File Menu

The **Define Workspace** dialog box displays.

2. Under **Filter**, select **More....**

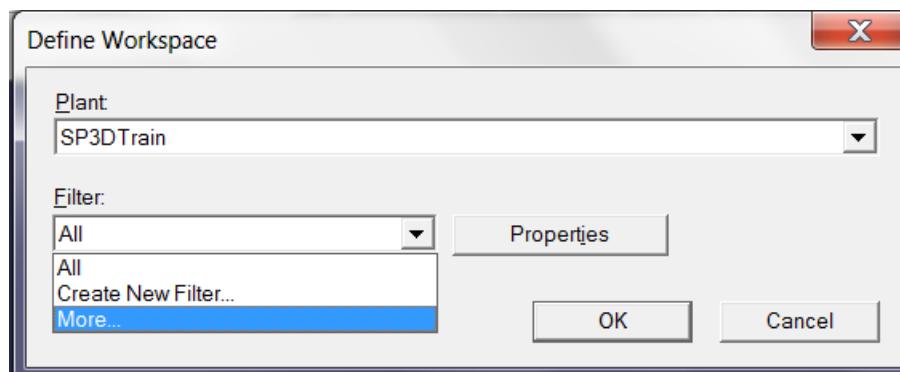


Figure 18: Define Workspace Dialog Box

The **Select Filter** dialog box displays.

3. Select **Training Filters > U01** and click **OK**.

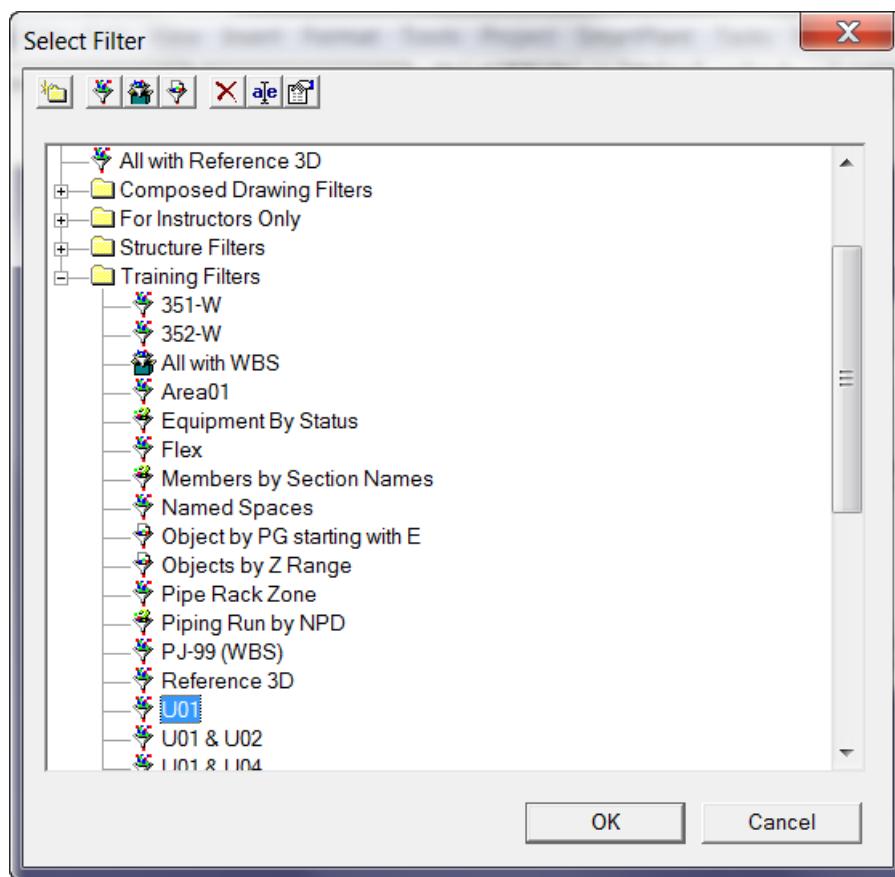


Figure 19: Select Filter Dialog Box

Workspace Simplification by Role

*This filter adds **U01** objects to the workspace.*

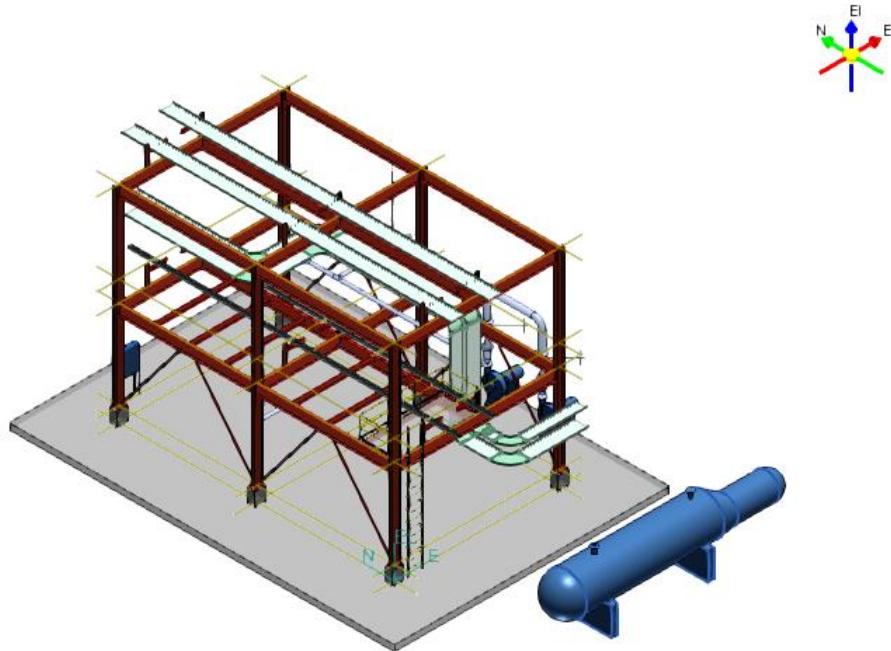


Figure 20: View of the Workspace After Selecting Unit 101

4. Navigate to [SharedContent]\Xml and locate the file name **OptimizationForRole - Plant Sample.xml**.

Name	Date modified	Type	Size
DesignBasisSchemas	4/20/2012 1:00 PM	File folder	
EFUpdateCache	4/20/2012 12:58 PM	File folder	
StructManufacturing	4/20/2012 1:00 PM	File folder	
Structure	4/20/2012 1:00 PM	File folder	
ConduitCommoditySubClassFeatureType...	4/17/2012 2:46 PM	XML Document	1 KB
DesignBasis_map.xml	4/17/2012 4:01 PM	XML Document	10,835 KB
DirectionChangeCableTrayComponentTy...	4/17/2012 2:46 PM	XML Document	2 KB
ExemptCorrelateClasses.xml	4/17/2012 2:46 PM	XML Document	2 KB
GenericDocumentComponent.xml	4/17/2012 2:46 PM	XML Document	513 KB
IgnoreChildlessValues.xml	4/17/2012 2:46 PM	XML Document	1 KB
MapClassIdToLevelDisciplines.txt	4/17/2012 2:46 PM	Text Document	8 KB
OptimizationForRole - Marine Sample.xml	4/17/2012 2:46 PM	XML Document	8 KB
OptimizationForRole - Plant Sample.xml	4/17/2012 2:46 PM	XML Document	20 KB
P3DComponent.xml	4/17/2012 2:46 PM	XML Document	8,137 KB
PDSComponent.xml	4/17/2012 2:46 PM	XML Document	7,095 KB
SP3DBatchQueues.xml	4/17/2012 2:46 PM	XML Document	1 KB
SP3DPublishMap.xml	1/31/2012 8:39 AM	XML Document	36,274 KB
SPIToSP3DPortMapping.xml	4/17/2012 2:46 PM	XML Document	1 KB
SystemSymbolConfig.xml	4/18/2012 8:26 AM	XML Document	1,212 KB

Figure 21: OptimizationForRole - Plant Sample .xml File

Workspace Simplification by Role

5. Rename the file to **OptimizationForRole**.

Name	Date modified	Type	Size
DesignBasisSchemas	21/05/2012 12:08 ...	File folder	
EFUpdateCache	21/05/2012 4:36 PM	File folder	
Structure	21/05/2012 12:08 ...	File folder	
ConduitCommoditySubClassFeatureTyp...	30/04/2012 12:35 ...	XML File	1 KB
CustomSymbolConfig	17/05/2012 6:19 PM	XML File	2 KB
DesignBasis_map	30/04/2012 1:55 PM	XML File	10,835 KB
DirectionChangeCableTrayComponentT...	30/04/2012 12:35 ...	XML File	2 KB
ExemptCorrelateClasses	30/04/2012 12:35 ...	XML File	2 KB
GenericDocumentComponent	30/04/2012 12:35 ...	XML File	513 KB
IgnoreChildlessValues	30/04/2012 12:35 ...	XML File	1 KB
MapClassIdToLevelDisciplines	30/04/2012 12:35 ...	Text Document	8 KB
OptimizationForRole - Marine Sample	30/04/2012 12:35 ...	XML File	8 KB
OptimizationForRole	30/04/2012 12:35 ...	XML File	20 KB
P3DComponent	30/04/2012 12:35 ...	XML File	8,179 KB
PDSComponent	30/04/2012 12:35 ...	XML File	7,095 KB
SP3DBatchQueues	30/04/2012 12:35 ...	XML File	1 KB
SP3DPublishMap	02/05/2012 2:37 PM	XML File	31,125 KB
SP3DToSP3DPortMapping	30/04/2012 12:35 ...	XML File	1 KB
SystemSymbolConfig	02/05/2012 2:59 PM	XML File	1,212 KB

Figure 22: Rename the File to OptimizationForRole

6. Close and reopen Smart 3D.
7. Select **File > Define Workspace....**
*The **Define Workspace** dialog box displays.*
8. Select the filter **U01** from the Training Filters as before.
*The **Role** field displays.*

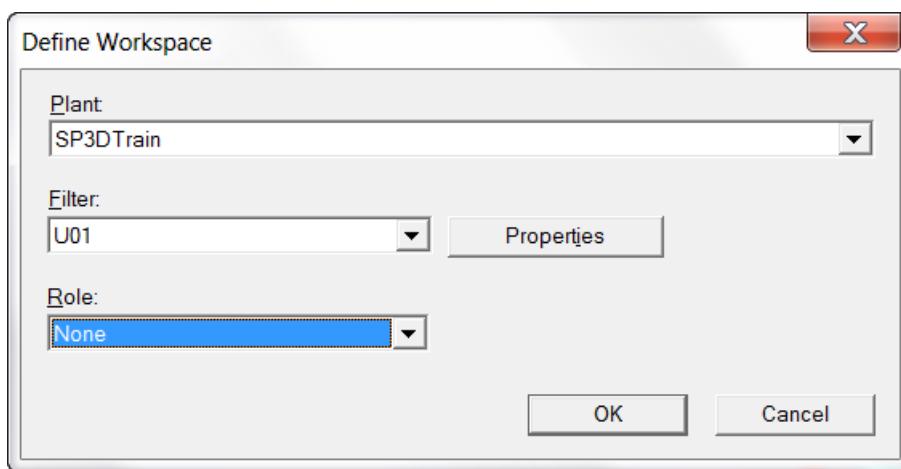


Figure 23: Define Workspace Dialog Box with Role

9. Under **Role**, select **Piping Designer (Aboveground)** and click **OK**.

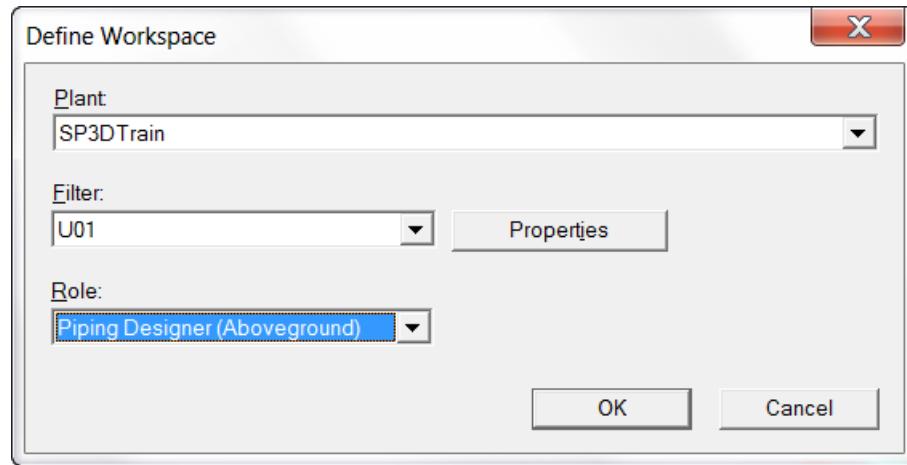


Figure 24: Piping Designer Role Selected in Define Workspace Dialog Box

Fewer objects in the workspace display.

10. Set the **Locate Filter** to **All**.

11. Hover over a piping object and wait for **QuickPick** to display.

NOTE You can select different piping objects, such as parts, features, and runs.

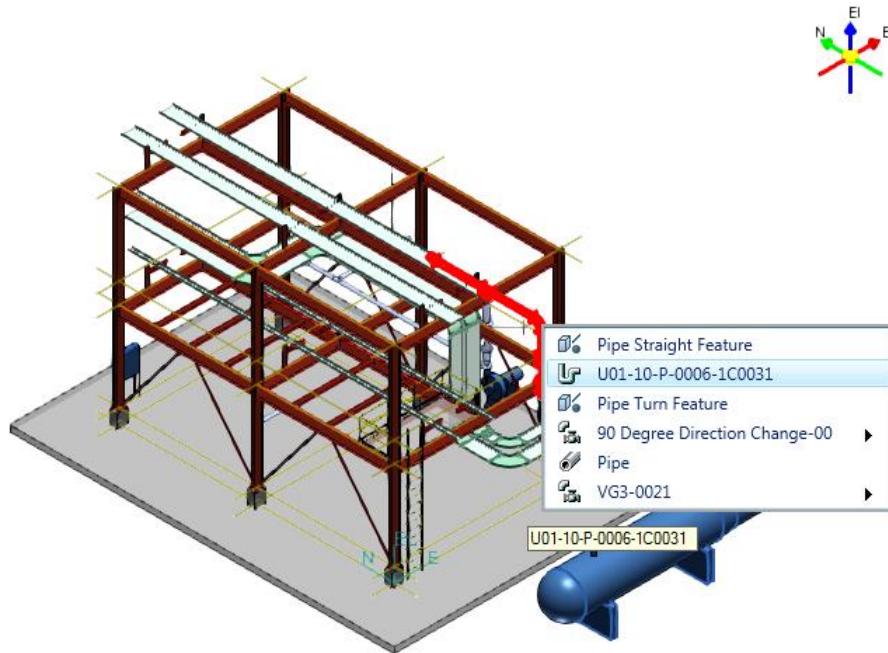


Figure 25: Quick Pick available for Piping Objects

12. Hover over a structure member.

Workspace Simplification by Role

Because the role is set to **Piping Designer (Aboveground)**, **QuickPick** does not display any selectable objects that are not piping objects.

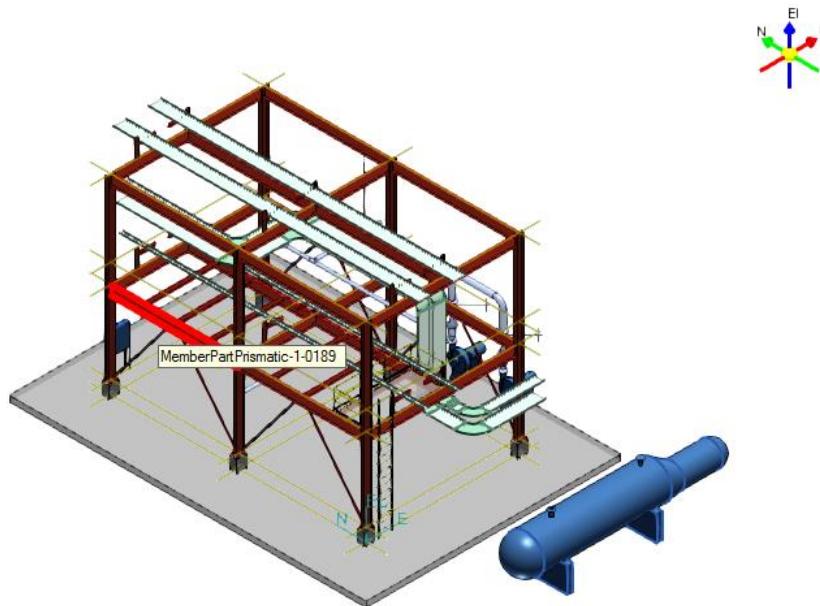


Figure 26: Only Member Part in Workspace for Piping Role

13. Close and reopn Smart 3D.
14. Select **File > Define Workspace**.
*The **Define Workspace** dialog box displays.*
15. Set **Filter** to **U01**, and set **Role** to **Structural Designer**.

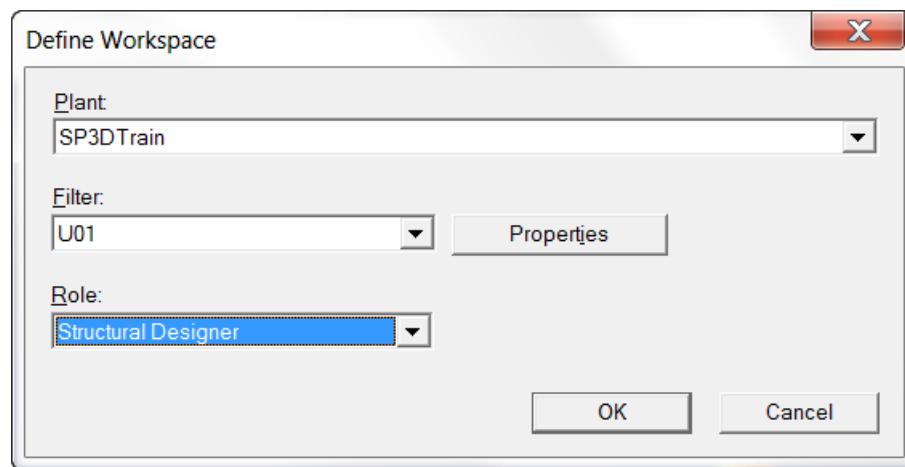


Figure 27: Structural Designer Role selected in Define Workspace Dialog Box

16. Click **OK**.
17. Hover over a structural beam and wait for **QuickPick** to display.

QuickPick displays all selectable structural objects.

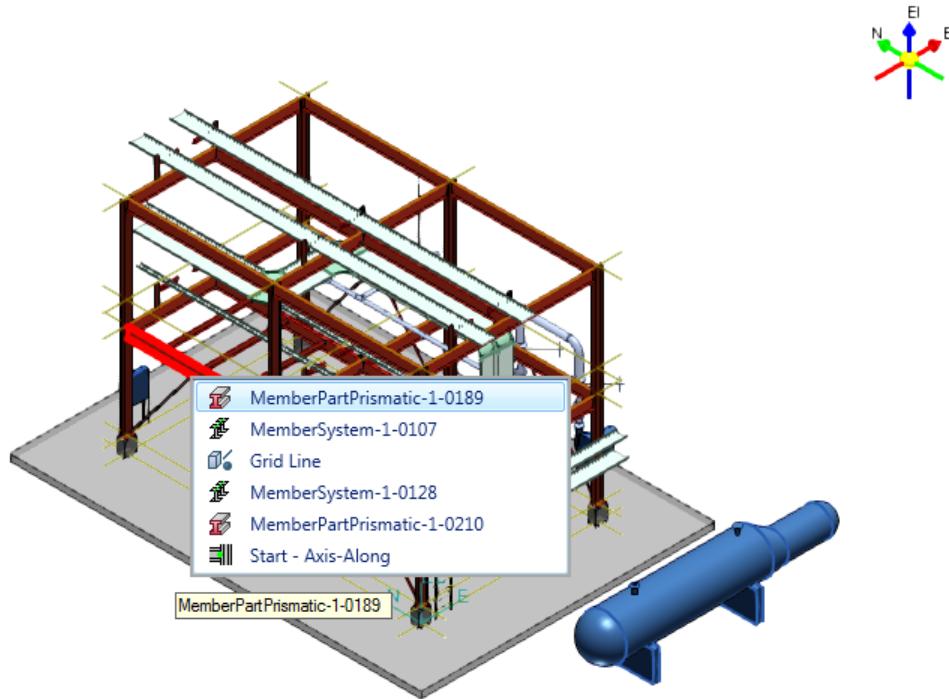


Figure 28: Quick Pick Available for Structural Objects

18. Hover over a piping feature.

Workspace Simplification by Role

*Because the role is set to **Structural Designer**, QuickPick does not display any selectable objects that are not structure objects.*

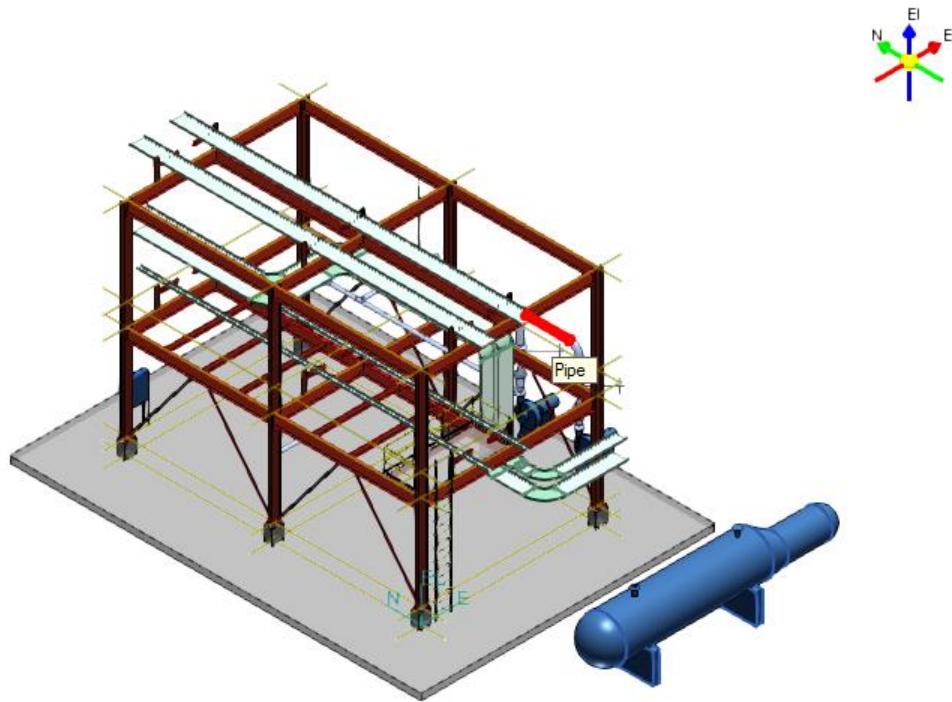


Figure 29: Only Pipe Part in Workspace for Structure Role

19. Exit Smart 3D.

20. Navigate to [SharedContent]\Xml, and rename the file **OptimizationForRole** back to **OptimizationForRole – Plant Sample.xml**.

Name	Date modified	Type	Size
DesignBasisSchemas	4/20/2012 1:00 PM	File folder	
EFUpdateCache	4/20/2012 12:58 PM	File folder	
StructManufacturing	4/20/2012 1:00 PM	File folder	
Structure	4/20/2012 1:00 PM	File folder	
ConduitCommoditySubClassFeatureType...	4/17/2012 2:46 PM	XML Document	1 KB
DesignBasis_map.xml	4/17/2012 4:01 PM	XML Document	10,835 KB
DirectionChangeCableTrayComponentTy...	4/17/2012 2:46 PM	XML Document	2 KB
ExemptCorrelateClasses.xml	4/17/2012 2:46 PM	XML Document	2 KB
GenericDocumentComponent.xml	4/17/2012 2:46 PM	XML Document	513 KB
IgnoreChildlessValues.xml	4/17/2012 2:46 PM	XML Document	1 KB
MapClassIdToLevelDisciplines.txt	4/17/2012 2:46 PM	Text Document	8 KB
OptimizationForRole - Marine Sample.xml	4/17/2012 2:46 PM	XML Document	8 KB
OptimizationForRole - Plant Sample.xml	4/17/2012 2:46 PM	XML Document	20 KB
P3DComponent.xml	4/17/2012 2:46 PM	XML Document	8,137 KB
PDSComponent.xml	4/17/2012 2:46 PM	XML Document	7,095 KB
SP3DBatchQueues.xml	4/17/2012 2:46 PM	XML Document	1 KB
SP3DPublishMap.xml	1/31/2012 8:39 AM	XML Document	36,274 KB
SPIToSP3DPortMapping.xml	4/17/2012 2:46 PM	XML Document	1 KB
SystemSymbolConfig.xml	4/18/2012 8:26 AM	XML Document	1,212 KB

Figure 30: OptimizationForRole - Plant Sample .xml File

SESSION 6

Defining a Filter based on Properties Equipment Approval Status (Asking Filter)

Objective

By the end of this session, you will be able to:

- Select the equipment in the workspace by creating filter.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)

Steps

1. Define the workspace to show the filter for **U01**.
2. Select **Tools > Select by Filter**.
*The **Select Filter** dialog box displays.*
3. Select **My Filters**, and then click **New Filter (Simple or Asking)** .
4. Type "Equipment by Approval State" in the **Name** field.
5. Switch to the **Properties** tab.

6. Select **Property > More....**

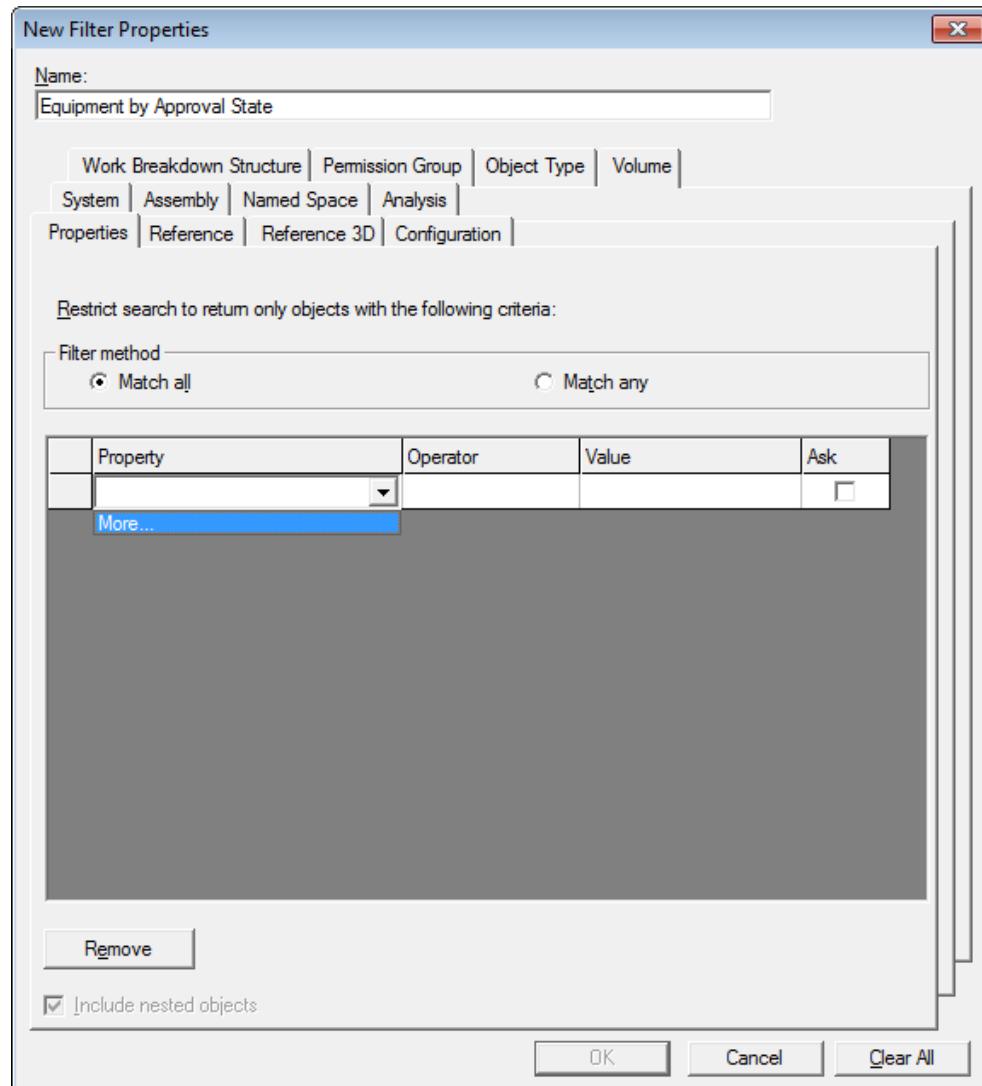


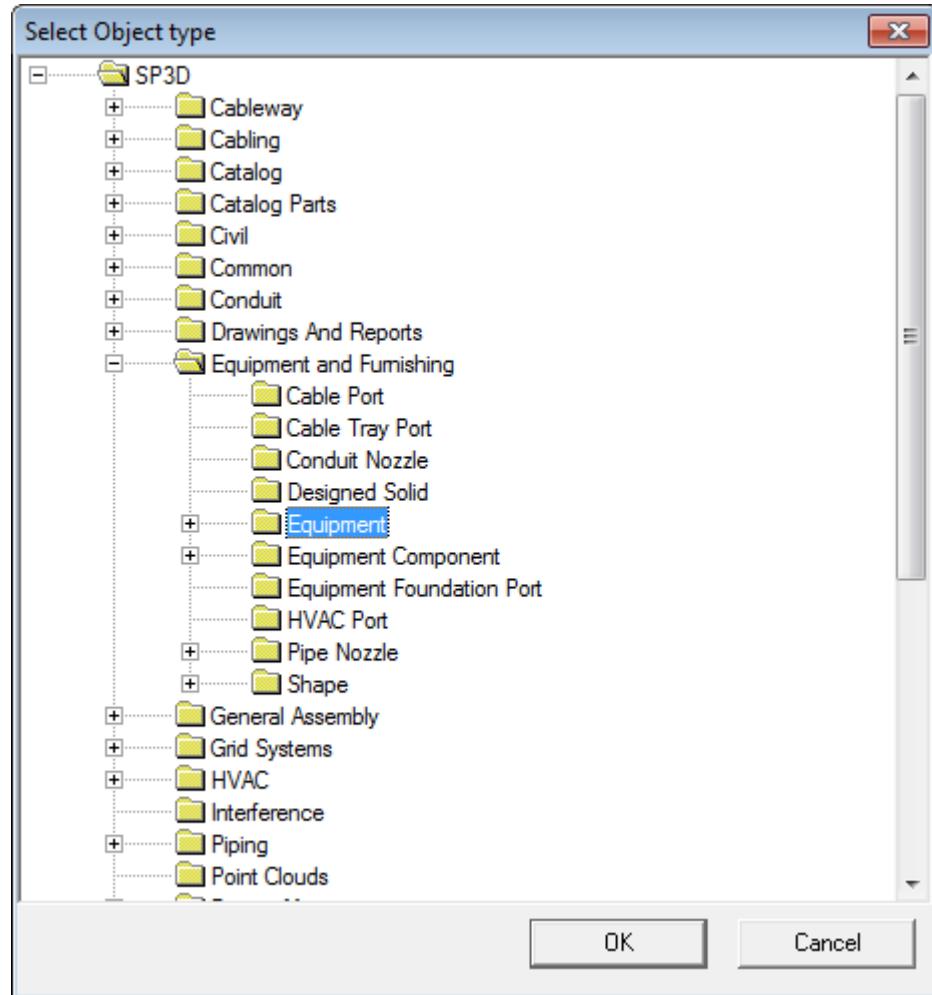
Figure 31: New Filter Properties

*The **Select Properties** dialog box displays.*

7. Under **Object type used as the basis for the property identification**, select **More**.

*The **Select Object type** dialog box displays.*

8. Select **Equipment and Furnishing > Equipment**, and click **OK**.



9. Set Relationship to Direct Property of Object Type.

10. Set **Display properties in this category** to **Standard**.

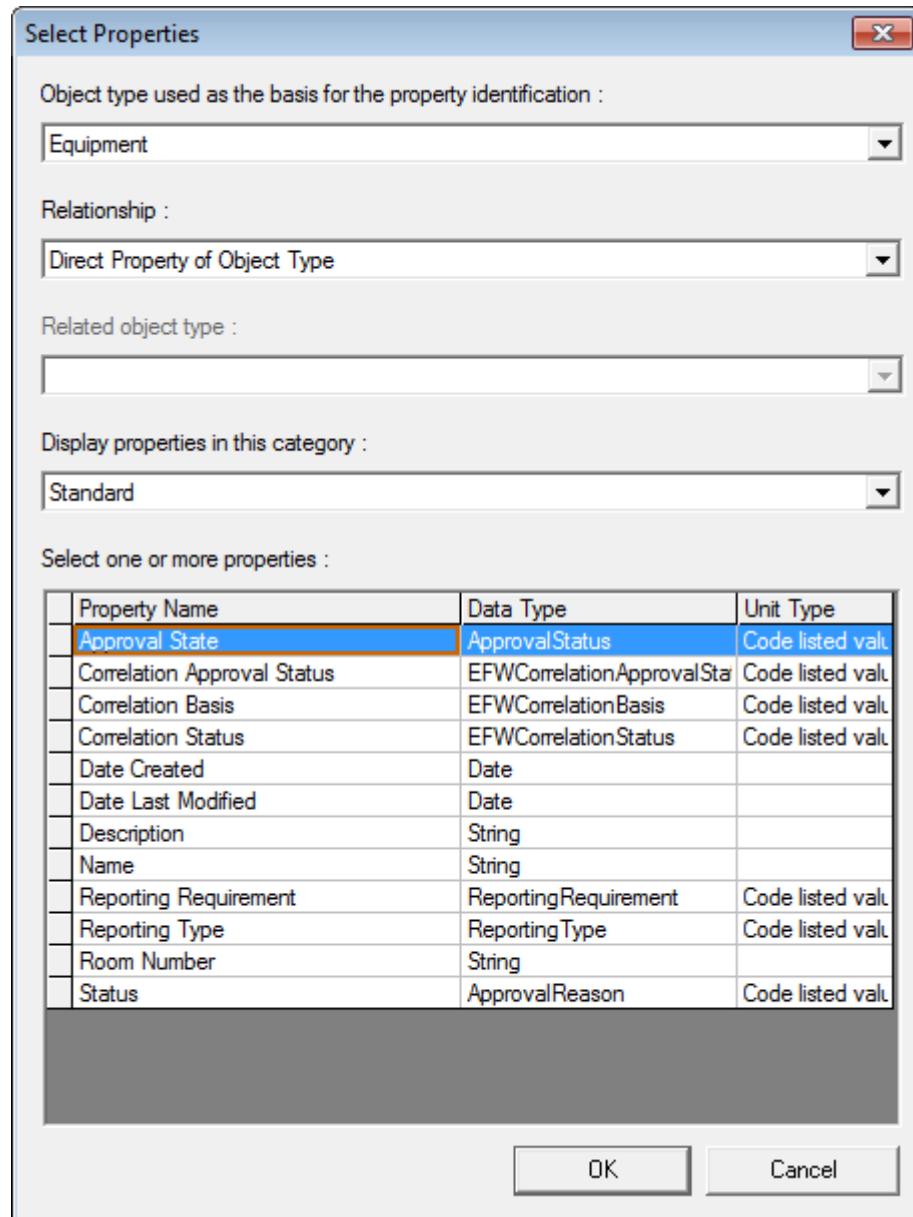
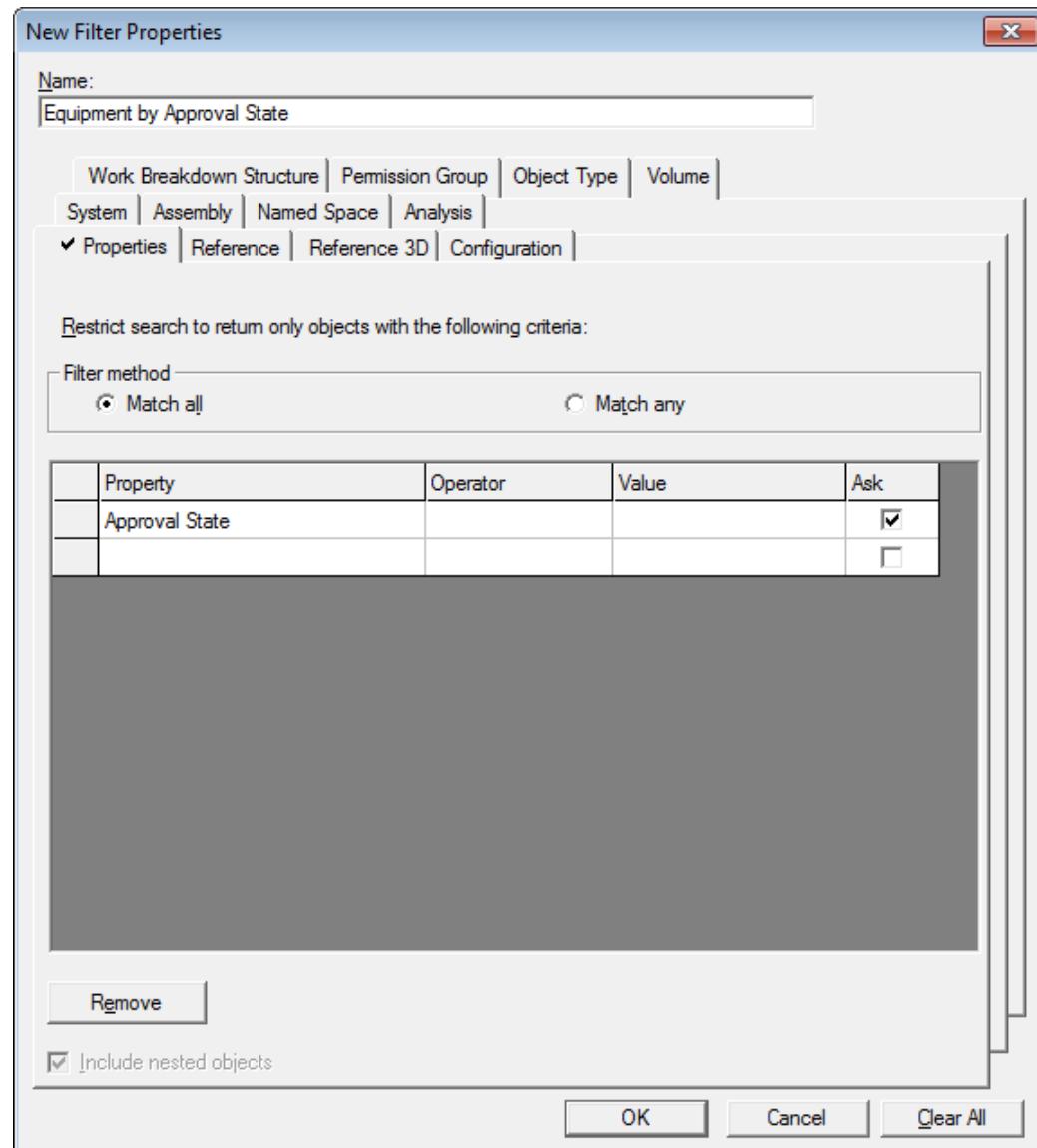


Figure 32: Select Standard Properties

11. Select **Approval State** and click **OK**.

12. For **Approval State**, select **Ask**.

Defining a Filter based on Properties Equipment Approval Status (Asking Filter)



Defining a Filter based on Properties Equipment Approval Status (Asking Filter)

13. Switch to the **Object Type** tab, and select **Equipment and Furnishing > Equipment** as the object type.

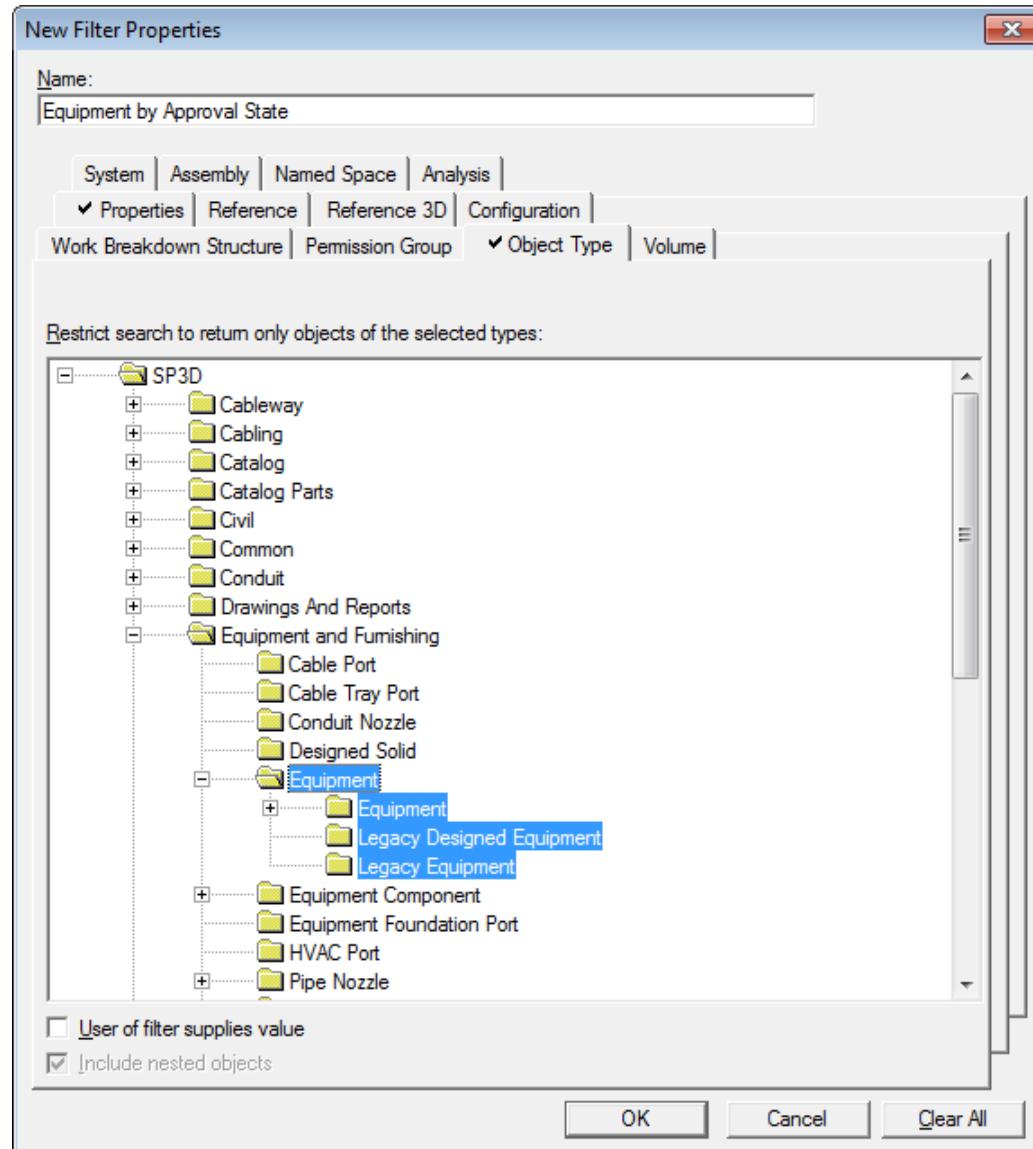


Figure 33: Select Equipment Object Type

NOTE When you edit properties under a tab, a check mark displays next to the tab name.

14. Click **OK**.

15. Select the **Equipment by Approval State** filter and **OK** on the **Select Filter** dialog box.

Defining a Filter based on Properties Equipment Approval Status (Asking Filter)

16. Set the **Value** to **Approved**.

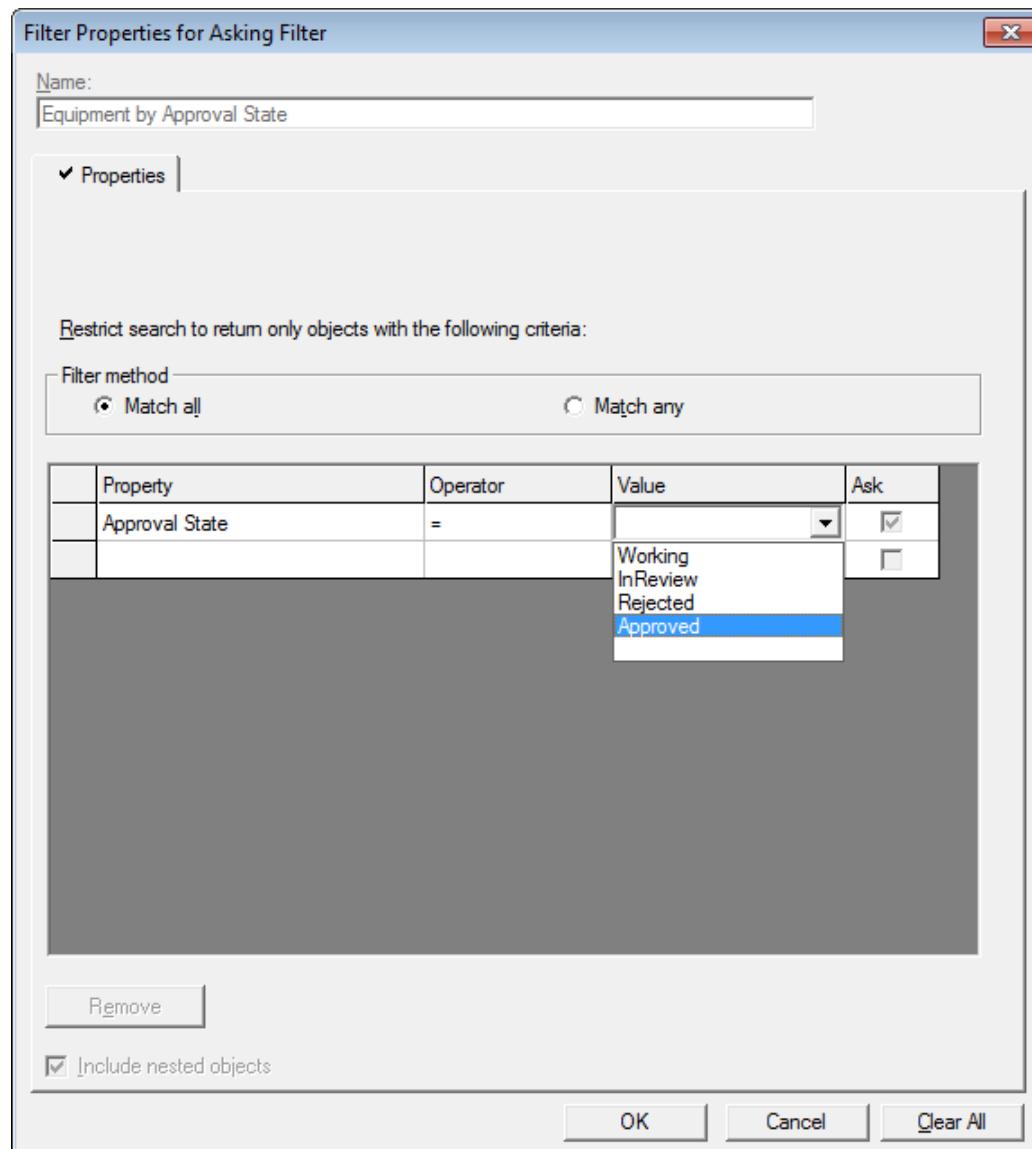


Figure 34: Select Approved

17. Click **OK**.

Approved equipment are now highlighted in the model.

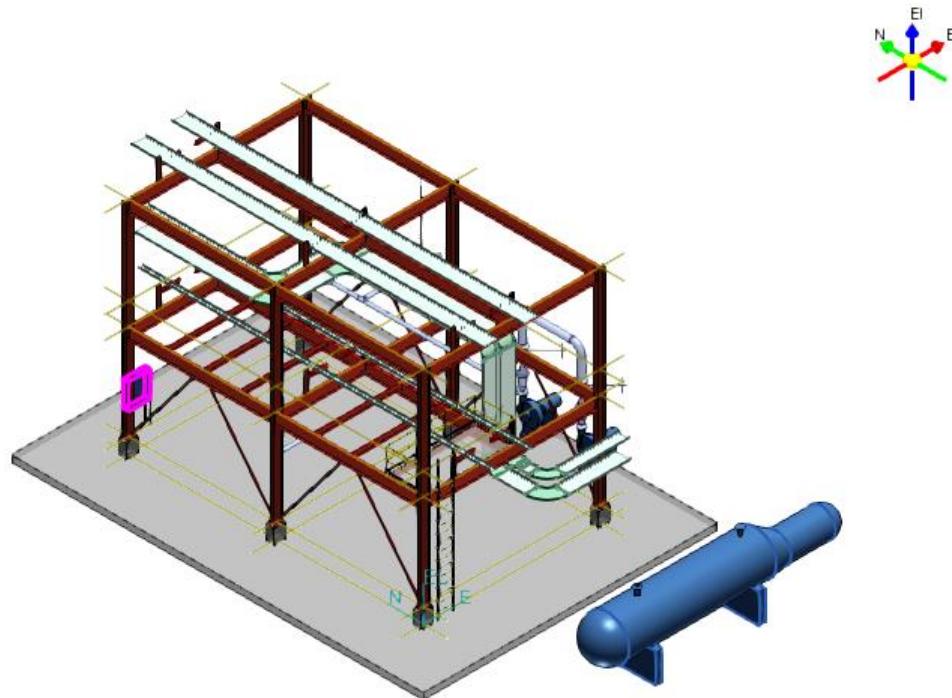


Figure 35: Approved Equipment Highlights

18. Select **Tools > Select by Filter**.

*The **Select Filter** dialog box displays.*

19. Select the **Equipment by Approval State** filter and click **Properties** .

20. Set **Value** to **Working** and click **OK**.

Defining a Filter based on Properties Equipment Approval Status (Asking Filter)

*The model highlights all equipment that have the status **Working**.*

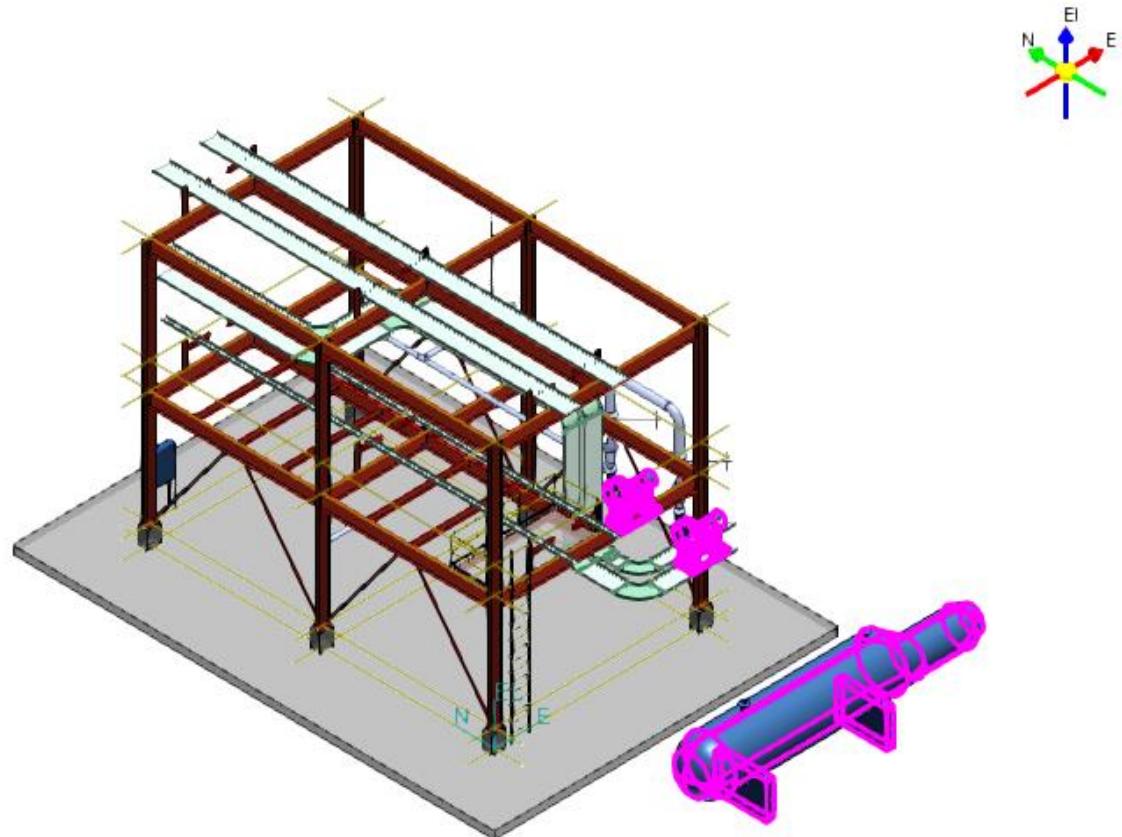


Figure 36: In Review Equipment Highlights

SESSION 7

Defining a Filter based on Properties - Piping Run NPD

Objective

By the end of this session, you will be able to:

- Select the pipe in the workspace by creating filter.

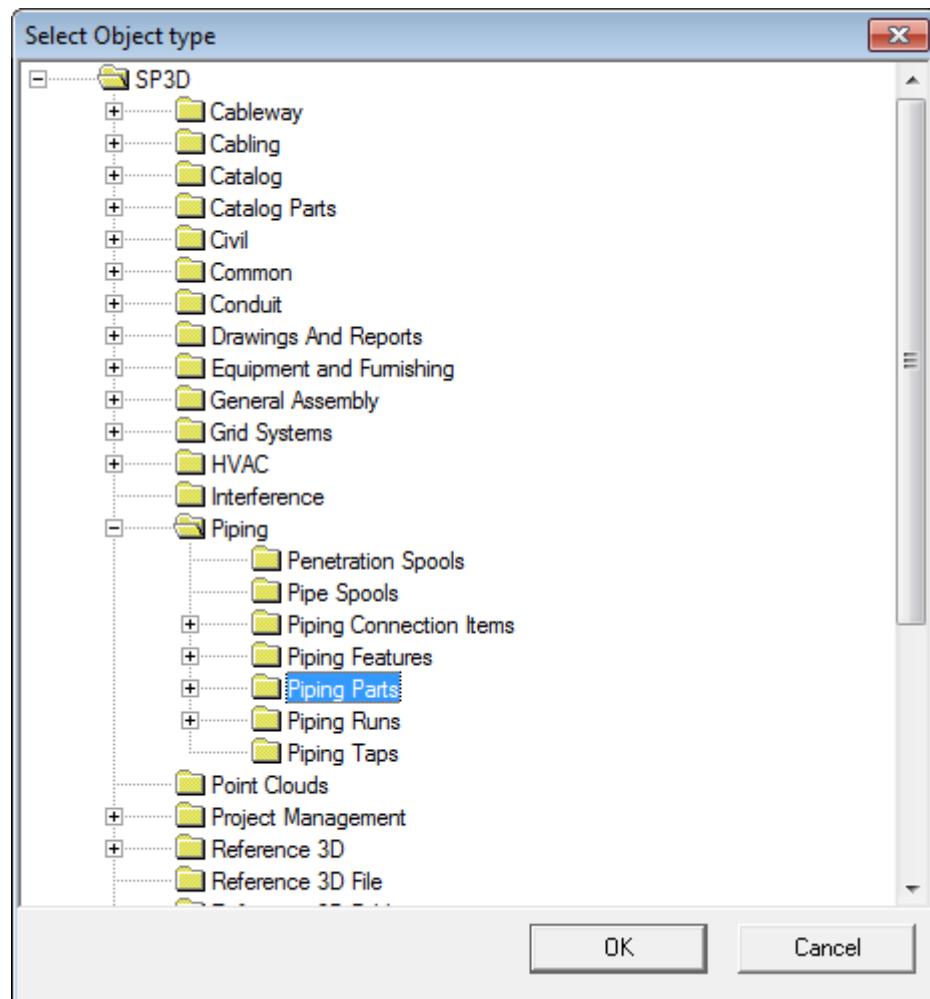
Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)

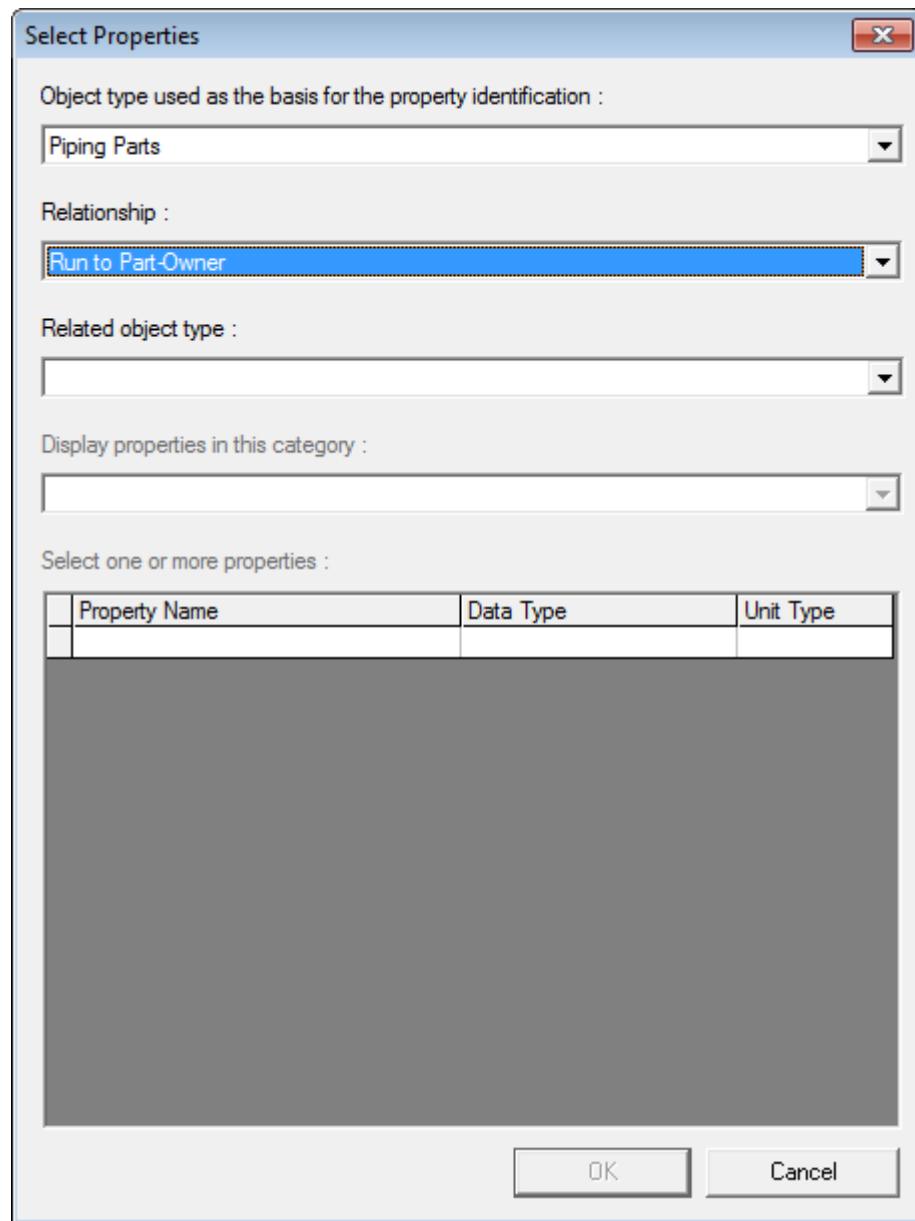
Steps

1. Define the workspace to show **U01**.
2. Select **Tasks > Piping**.
3. Select **Tools >Select by Filter**.
The Select Filter dialog box displays.
4. Select **My Filters**, and then click **New Filter (Simple or Asking)** .
The New Filter Properties dialog box displays.
5. Name the filter "Piping Run by NPD."
6. Switch to the **Properties** tab
7. Under Property, select **More....**
The Select Object type dialog box displays.

8. Select **Piping > Piping Parts** and click **OK**.



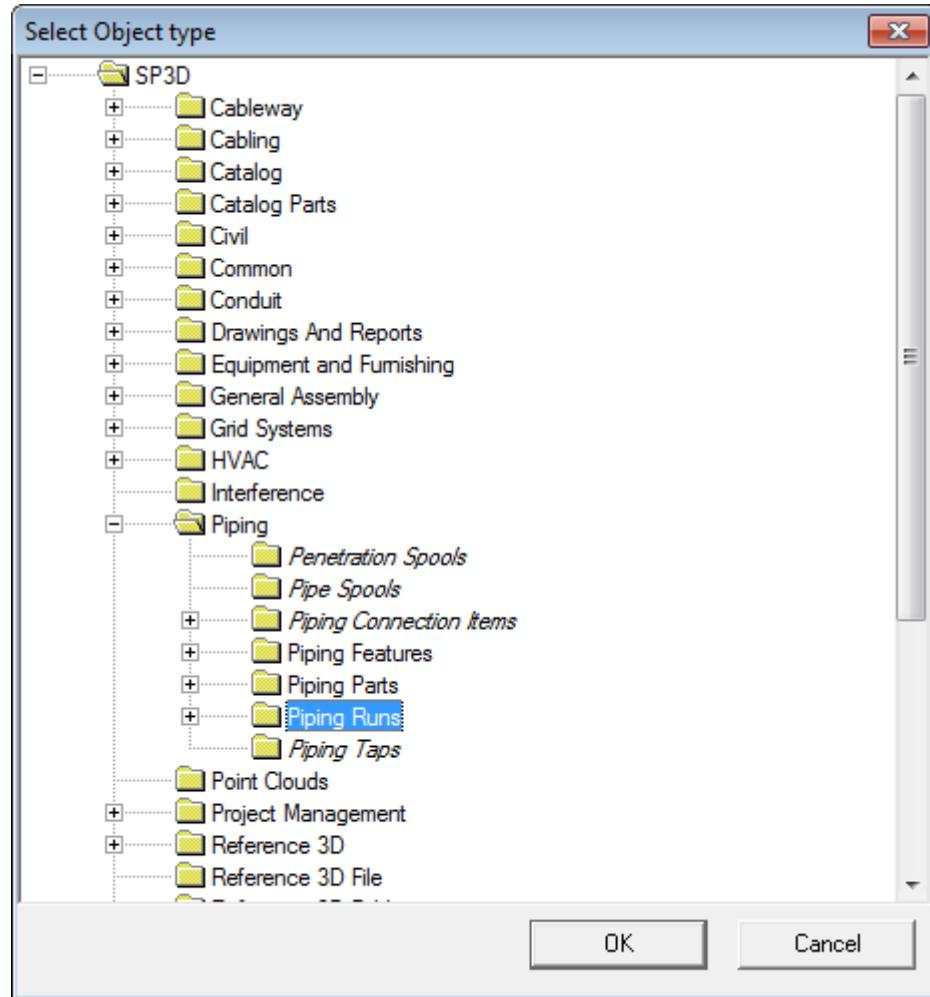
9. Set Relationship to Run to Part-Owner.



10. Select Related object type > More....

The **Select Object Type** dialog box displays.

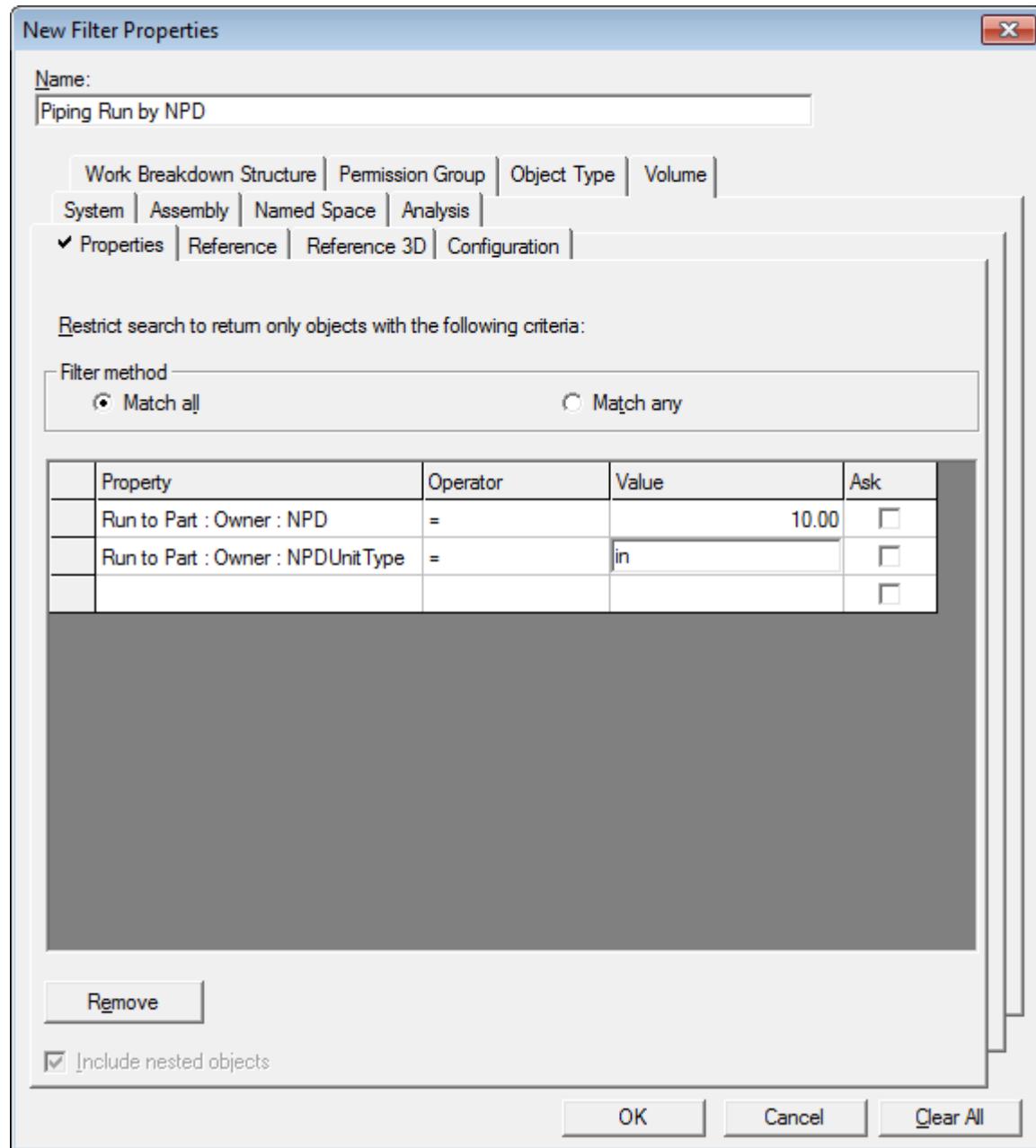
11. Select **Piping > Piping Runs** and click **OK**.



12. Under **Display Properties in this category**, select **Standard**.

Defining a Filter based on Properties - Piping Run NPD

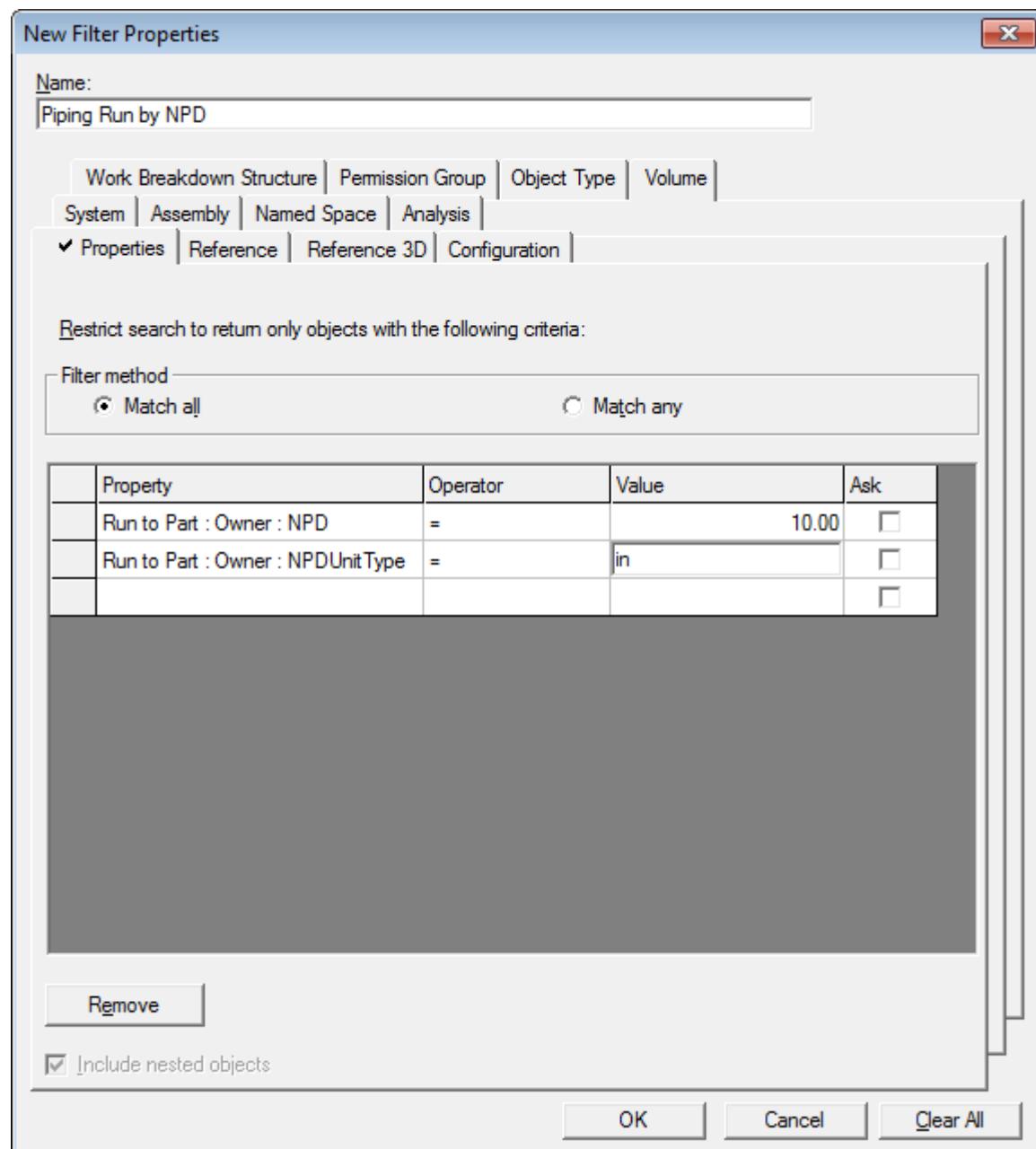
13. Select the **NPD** property and click **OK**.



14. Set the **Operator** to the equals sign =.
15. Set the **Value** to **10.00**.
16. Repeat the above steps to include the **NPDUITUnitType** property in the property grid.
17. Set the **Operator** to **Contains**.

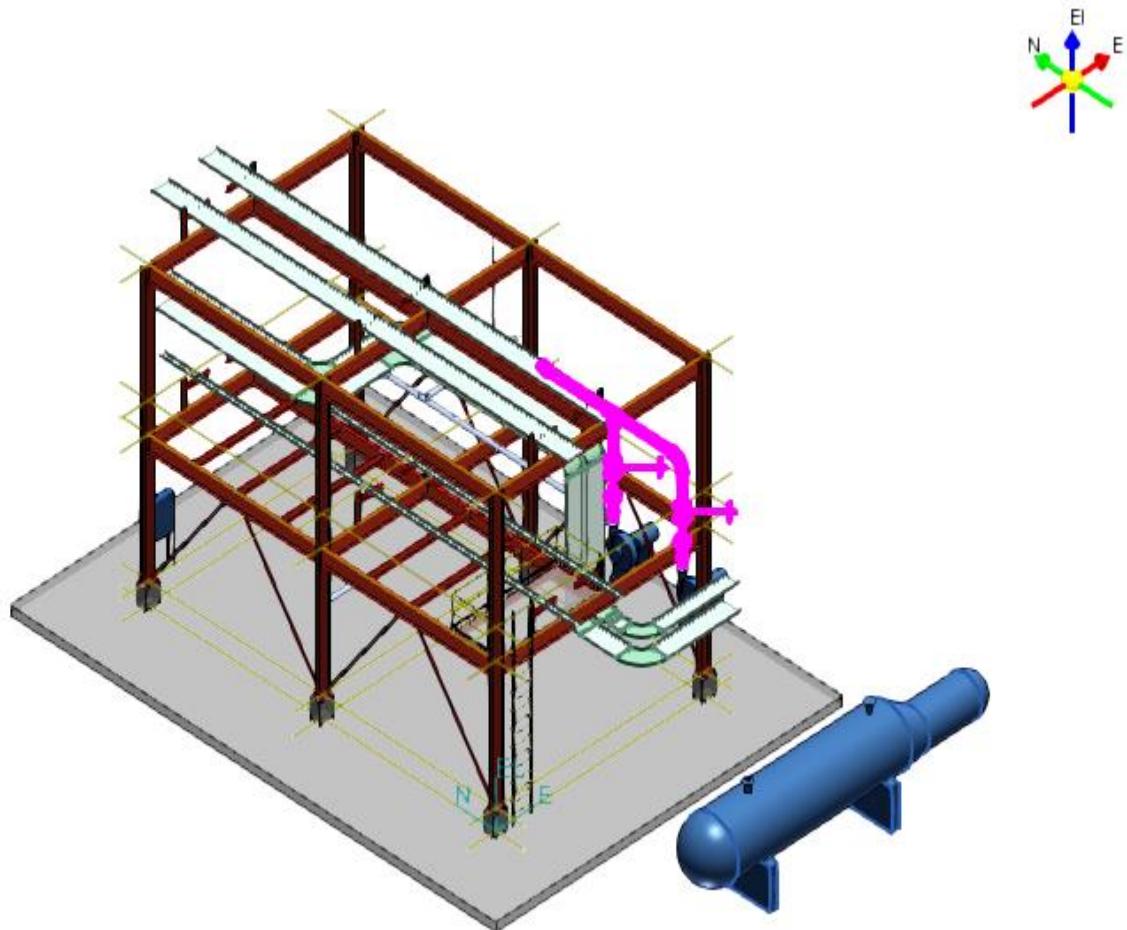
Defining a Filter based on Properties - Piping Run NPD

18. Set the **Value** to **in**.



19. Click **OK**, and then click **OK** on the **Select Filter** dialog box.

The model view now resembles the following graphic.



SESSION 8

Defining a Filter based on Properties Structural Section Names

Objective

By the end of this session, you will be able to:

- Select the members in the workspace by creating filter.

Before Starting this Procedure

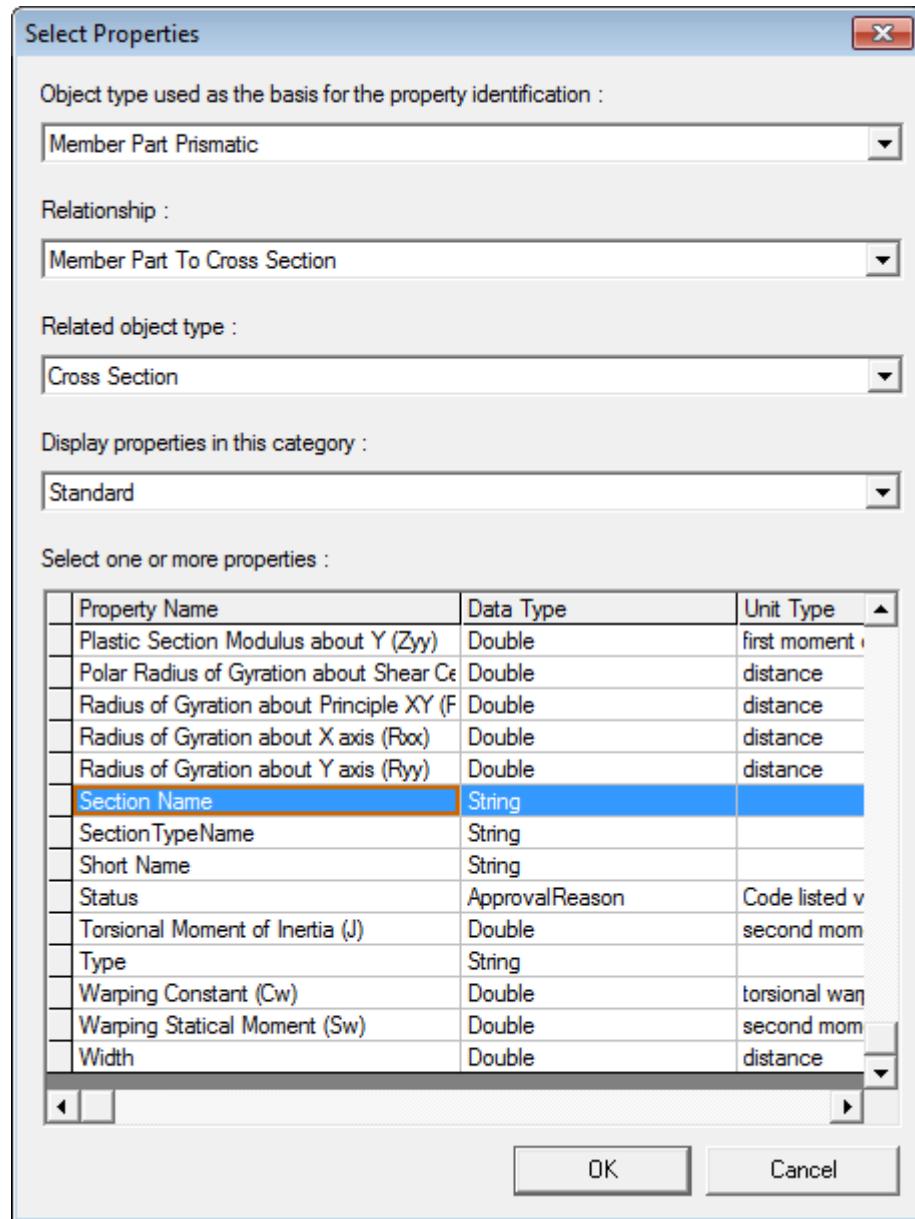
- SP3D Overview
- *Creating a Session File* (on page 17)

Steps

1. Define the workspace to show **U01**.
2. Select **Tools -> Select by Filter**.
*The **Select Filter** dialog box displays.*
3. Select **My Filters**, and then click **New Filter (Simple or Asking)** .
4. Name the filter "Members by Section Name".
5. Switch to the **Properties** tab.
6. Select **Property > More....**
*The **Select Object type** dialog box displays.*
7. In the **Object type used as basis for property identification** field, select **Structure > Members > Member Part Prismatic**.
8. Set **Relationship to Member Part To Cross Section**.
9. Set **Related object type** to **Catalog > Cross Section**.
10. Set **Display Property in this category** to **Standard**.

Defining a Filter based on Properties Structural Section Names

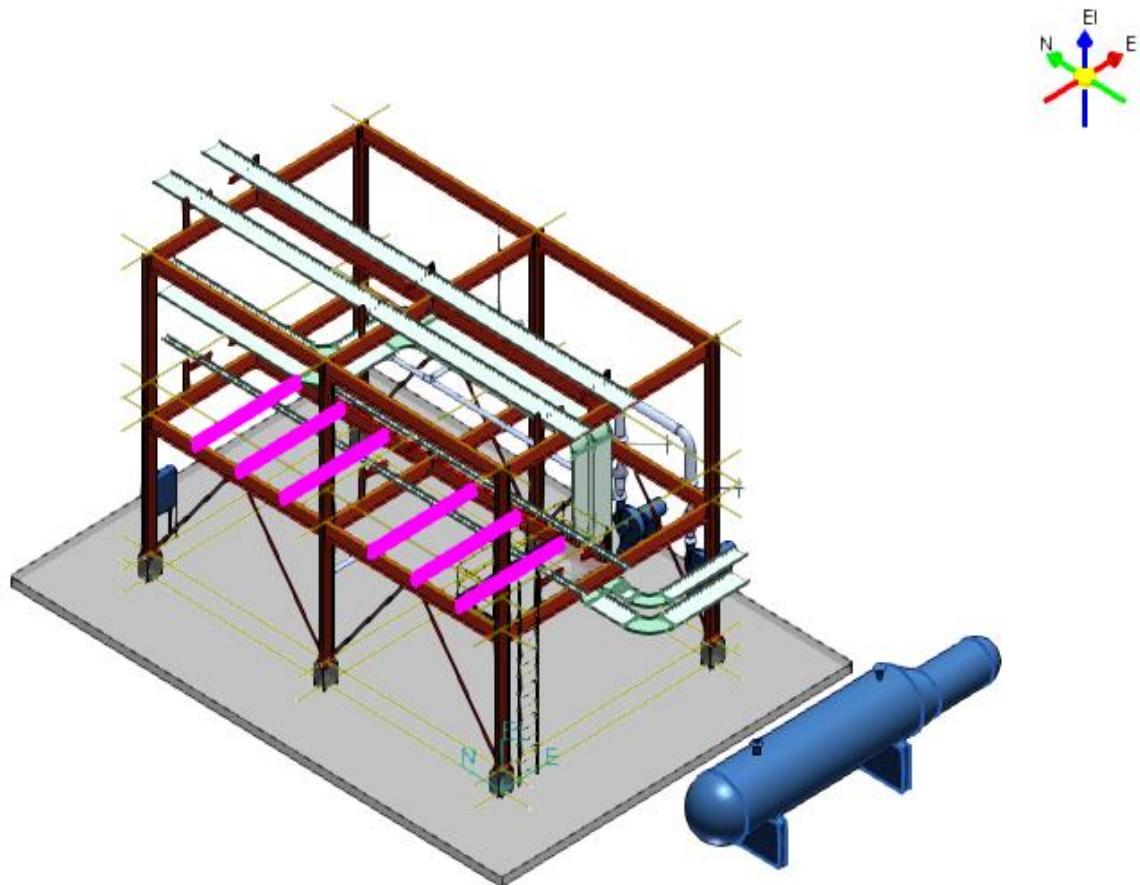
11. Select the **Section Name** property and click **OK**.



12. For the **Section Name** property, set the **Operator** to **Contains** and set **Value** to **C10X15.3**.
13. Click **OK**.
14. Select the **Members by Section Name** filter and click **OK**.

Defining a Filter based on Properties Structural Section Names

The model highlights all C10X15.3 items in the workspace.



SESSION 9

Defining a Filter based on Properties Cableway Vendor Name

Objective

By the end of this session, you will be able to:

- Select the cableway in the workspace by creating filter.

Before Starting this Procedure

- Smart 3D Overview

Creating a Session File

1. Define the workspace to show **U01**.

2. Select **Tools > Select by Filter**.

*The **Select Filter** dialog box displays.*

3. Select **My Filters**, and then click **New Filter (Simple or Asking)** .

*The **New Filter Properties** dialog box displays.*

4. Name the filter "Tray by Vendor".

5. Switch to the **Properties** tab.

6. In the **Property** field, select **More....**

*The **Select Properties** dialog box displays.*

7. Set the **Object type used as basis for property identification** field to **Cableway > Cableway parts**.

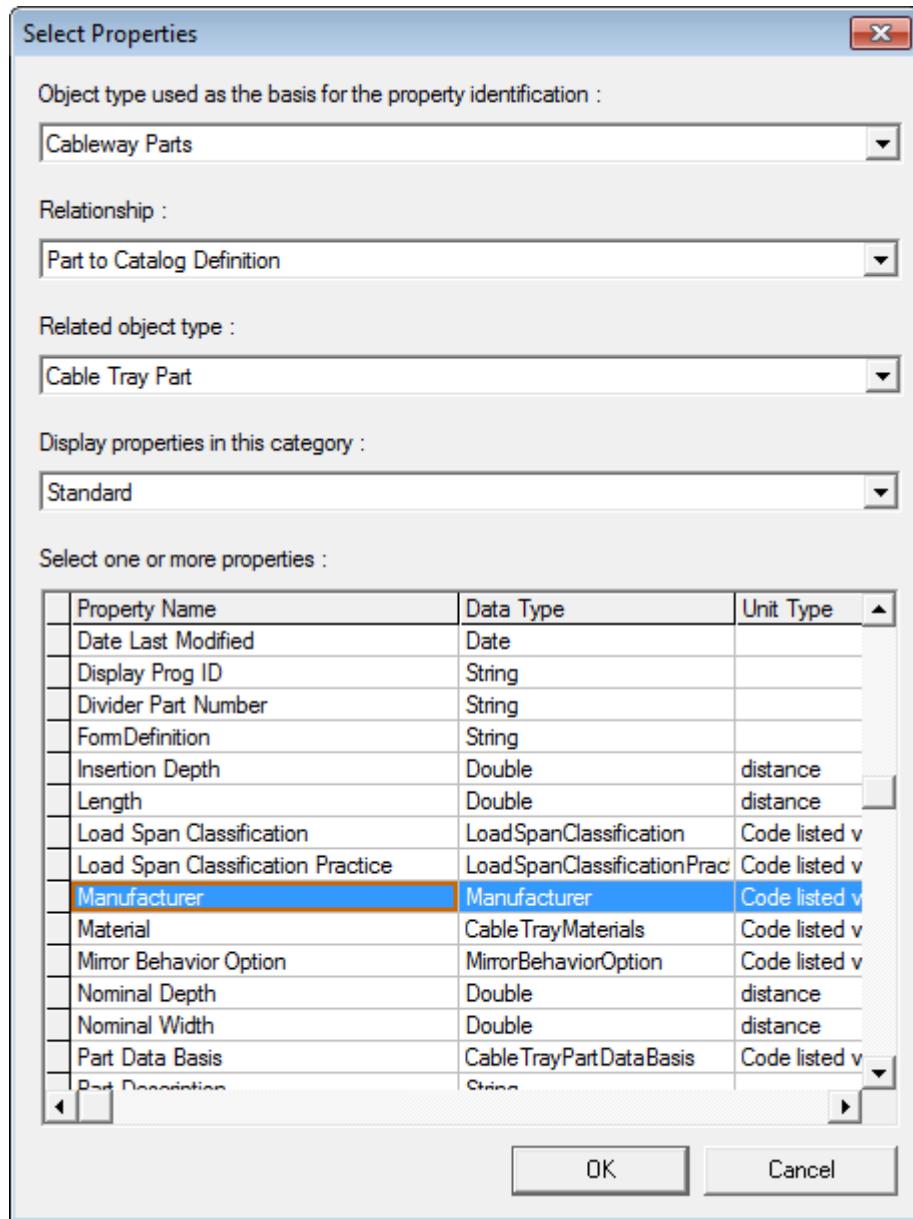
8. Set the **Relationship to Part to Catalog Definition**.

9. Set the **Related object type** to **Catalog > Cable Tray Part**.

10. Set the **Display Property in this Category** to **Standard**.

Defining a Filter based on Properties Cableway Vendor Name

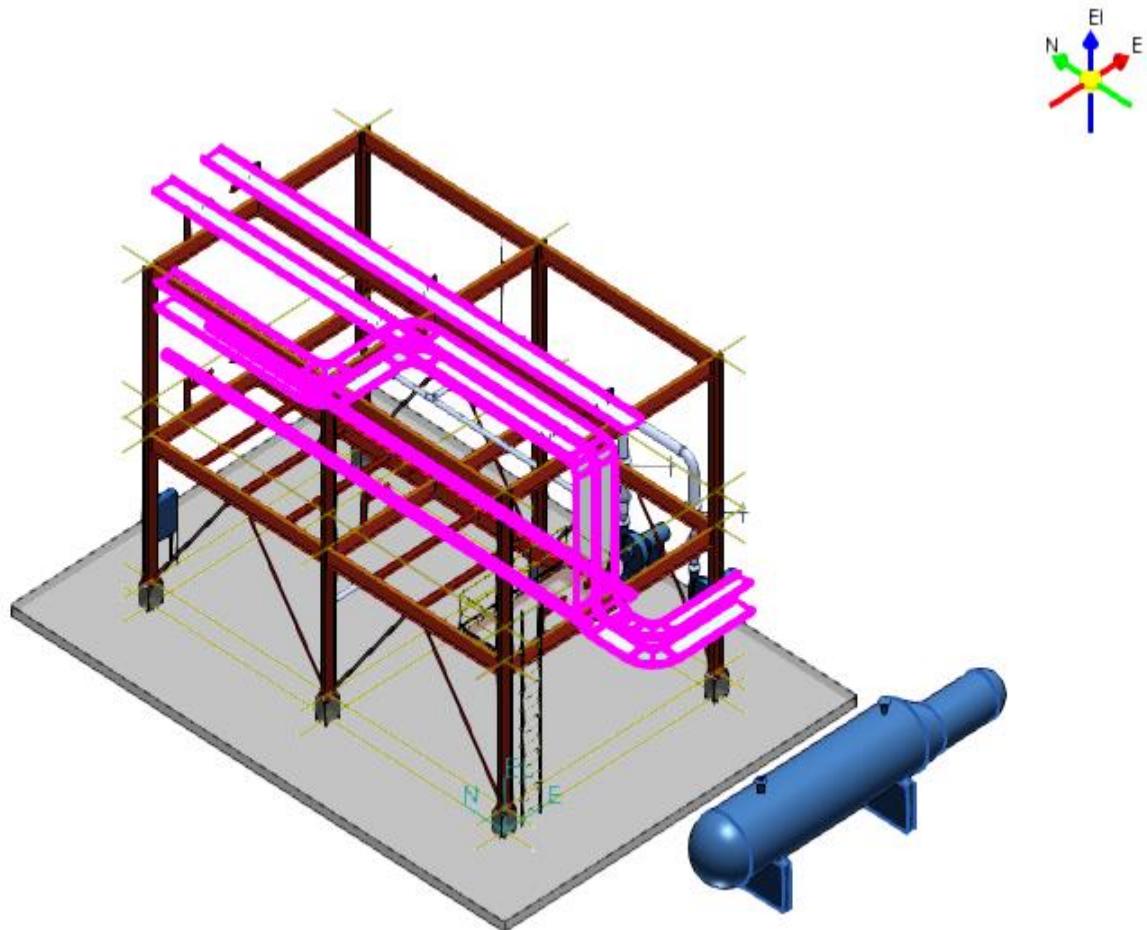
11. Select the **Manufacturer** property, and then click **OK**.



12. In the **New Filter Properties** dialog box, set the **Operator** for the **Manufacturer** property to **=**, and set the **Value** to **Cooper B-Line for vendor**.
13. Click **OK**.
14. In the **Select Filter** dialog box, select the **Tray by Vendor** filter and click **OK**.

Defining a Filter based on Properties Cableway Vendor Name

All Cooper B-Line Trays are now highlighted in the model.



SESSION 10

Defining a Workspace Using a Volume Filter

Objective

By the end of this session, you will be able to:

- Define a workspace by creating and using a volume filter.

Before Starting this Procedure

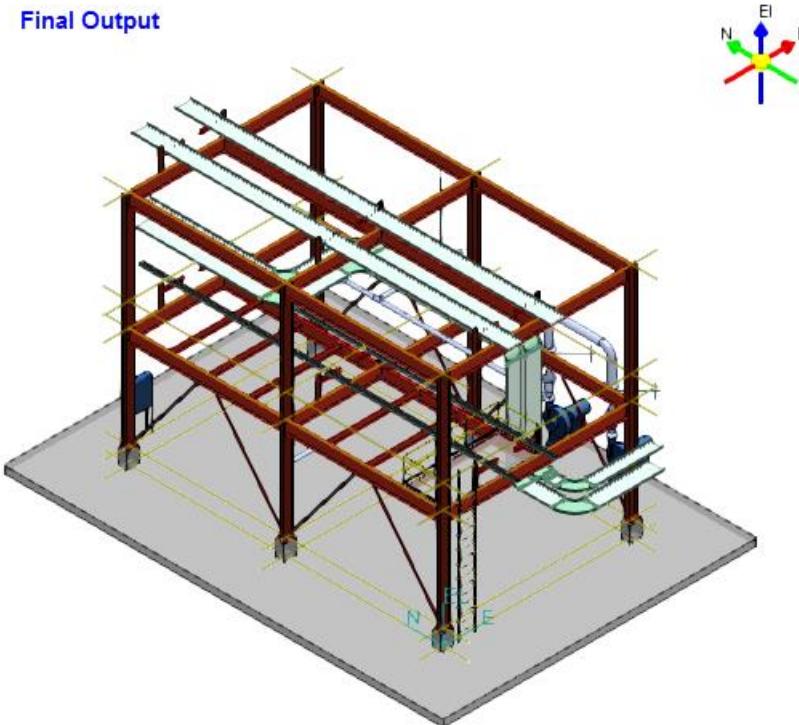
- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)

Volume Filter

You can use filters to show objects within a given volume or volumes. This restriction can be combined with any other criteria available in the **Filter Properties** dialog box.

Steps to Define a Workspace Using a Volume Filter

Define a workspace that loads all objects in the system **U01** that are also in the volume **U01**. After you define the workspace, the model should contain the objects shown below:



1. Select **File > Define Workspace** and create a new filter by clicking **New Filter (Simple or Asking)**  in the **Select Filter** dialog box.

NOTE

- To view the project filters defined by the site administrator, you need Read permission.
- To create a filter in the project or catalog, you need Write permission in the applicable permission group of the parent folder of the filter. You can always create filters in the My Filters folder.

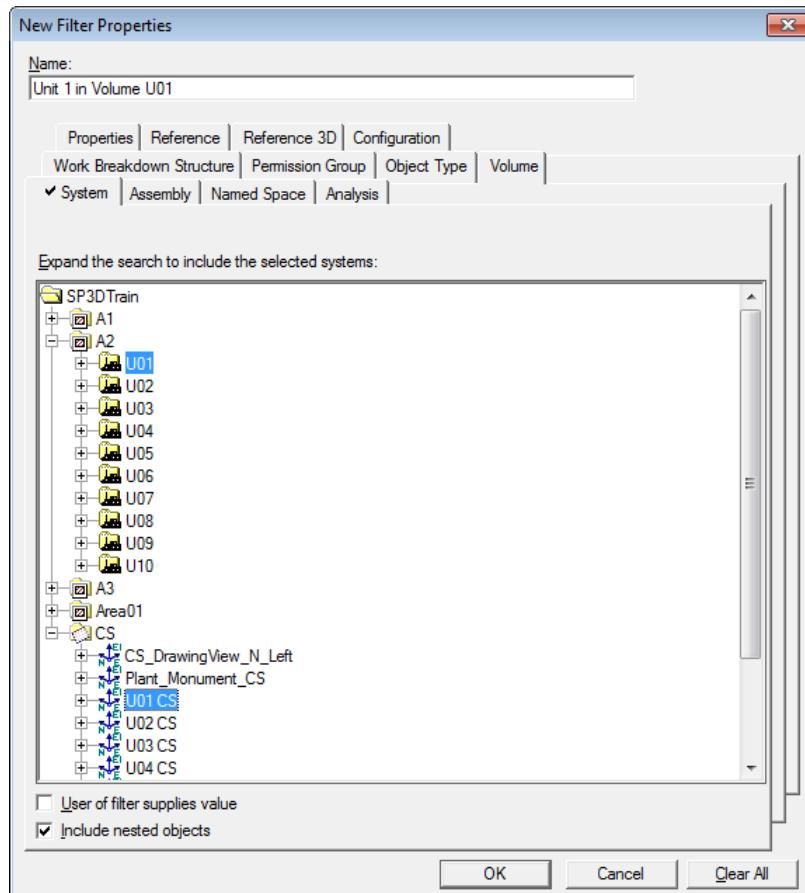
The New Filter Properties dialog box displays.

NOTE

- The New Filter Properties dialog box consists of several tabs that define search criteria. The System, Assembly, and Named Space tabs expand the search for objects within a model that meet the criteria defined on these tabs. The Volume, Permission Group, and Object Type tabs restrict or limit the objects returned to those that meet the additional criteria.
- If you do not select anything on the System, Assembly, or Named Space tabs, then the restriction filters you define are applied against all objects in the database. So, if you want to make sure your filter gets all graphic objects that meet the volume criteria, regardless of what system the objects belong to, then do not select a system at all and just define the volume criteria (skip step 2 below).

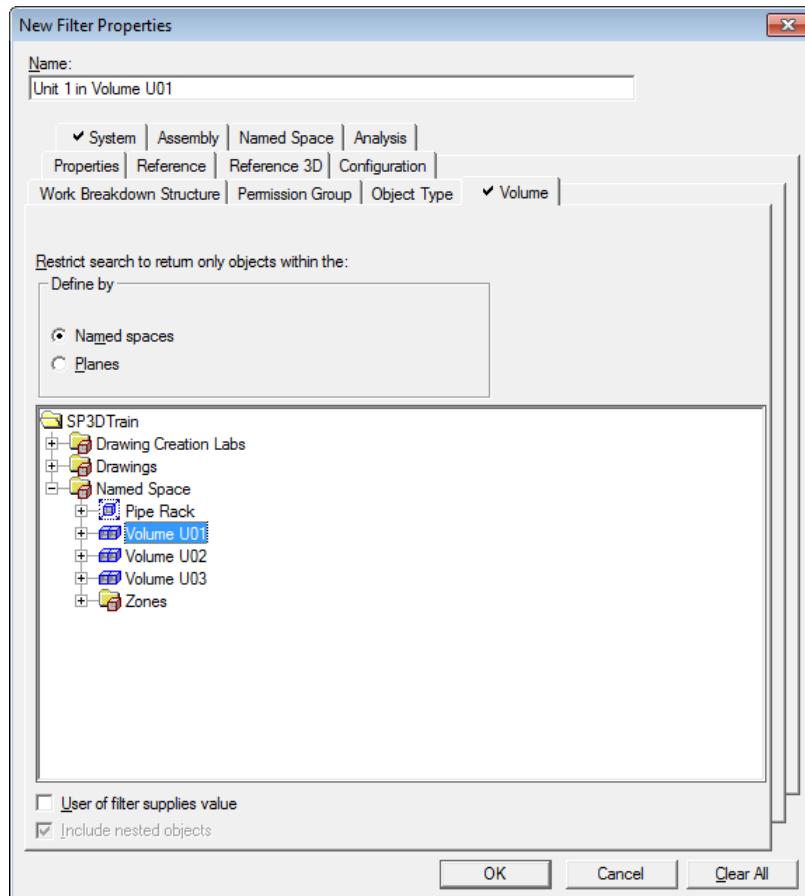
- The System tab provides a tree view of all the systems defined in the model. Systems can span disciplines and include many types of objects. A plant is the highest system in the hierarchy and includes all subsystems.
- The Named Space tab provides tree view of folders and named spaces in the folders. Named spaces are volumes that represent fire zones, design areas, volumes to be output to drawings, or other non-solid spatial concepts. Including the named spaces in the workspace enables you to view the size, shape, and position of the volumes.
- Only the SmartMarine 3D product currently uses the Assembly tab.

1. Set the **Name** to "Unit 1 in Volume U01."
2. Under the **System** tab, use the CTRL key to select **A2 > U01** and **CS > U01 CS**.



Defining a Workspace Using a Volume Filter

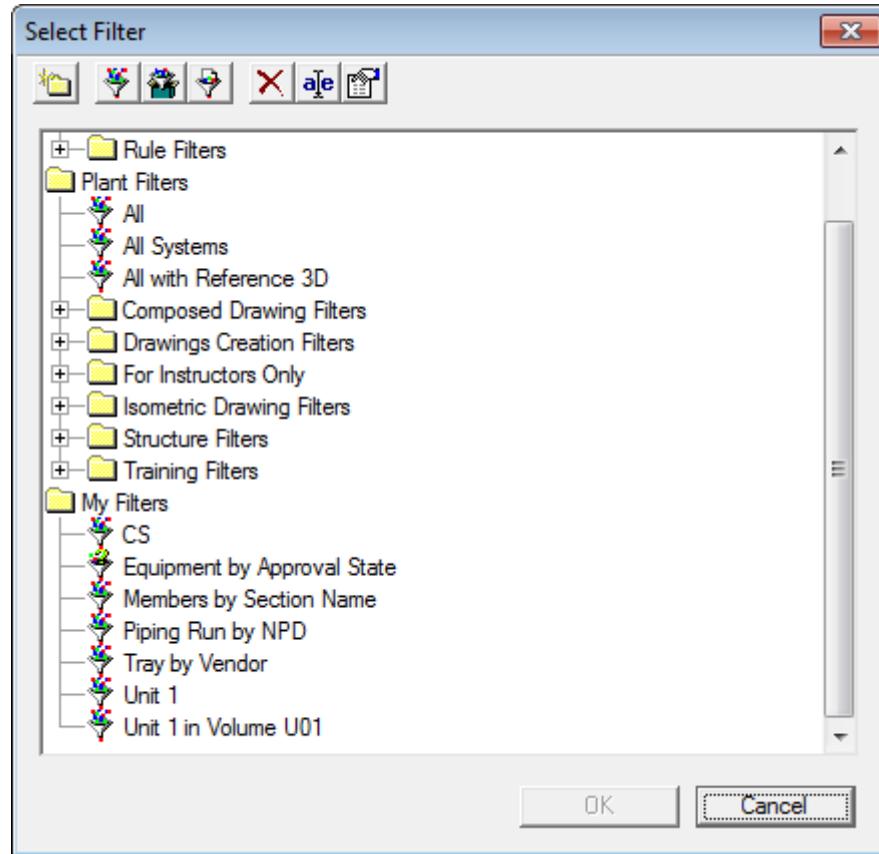
3. Under the **Volume** tab, select **Volume U01**.



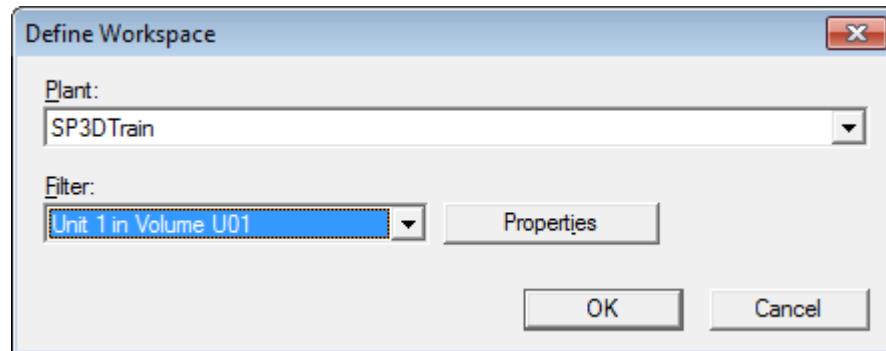
NOTE In this tab, you can select either **Named spaces** or **Planes**. **Named Spaces** allows you to select one or more existing named volumes to define the volume criteria. **Planes** allows you to define a single volume using six existing reference planes.

4. Click **OK**.

5. In the **Select Filter** dialog box, select **My Filters > Unit 1 in Volume U01** and click **OK**.



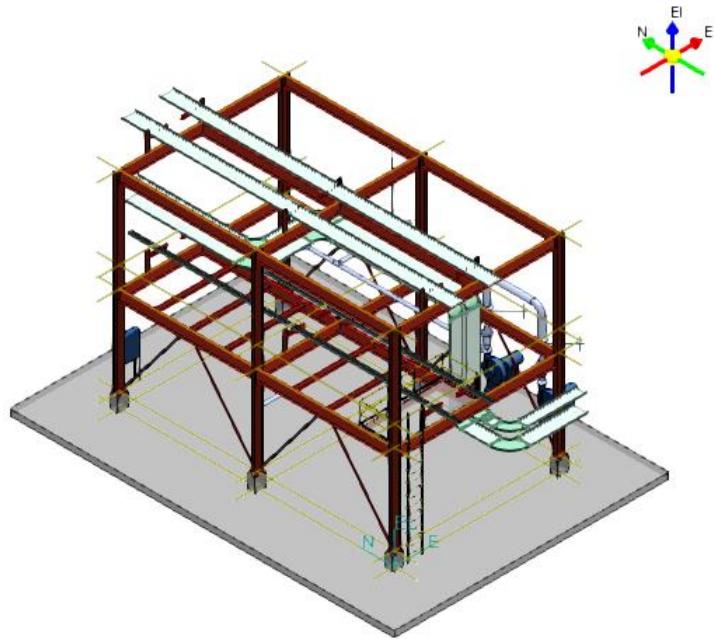
6. In the **Define Workspace** dialog box, click **OK**.



You have defined a workspace that includes all geometric objects retrieved by the volume filter Volume_U01.

Defining a Workspace Using a Volume Filter

NOTE To fit all objects in the active view, click **Fit**  on the **Common** toolbar.



For more information related to defining a workspace, see *Defining Workspace Content: An Overview* and *Using the File Menu: An Overview* in the *Smart 3D Common User's Guide*.

SESSION 11

Manipulating Views

Objective

By the end of this session, you will be able to:

- Create a graphic window and manipulate the view in the active window.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Defining a Workspace Using a Volume Filter* (on page 65)

Manipulating Views

You can manipulate the graphic windows and the views with the **Window** and **View** menus and the commands on the **Common** toolbar.

The **Window** commands create new graphic windows and arrange the position of the existing windows. The **Common** toolbar shows the most commonly used commands to manipulate the views within the windows. You can also access these commands from the **View** menu.



NOTE The view commands do not cancel an active command. When you complete or cancel the view manipulation command, the interrupted command resumes in the same command step where you left it.

The view manipulation buttons on the Common toolbar are described below:

NOTE The orientations used in viewing commands are relative to axes of the Active Coordinate System selected on the PinPoint ribbon.

- **Clip by Object** - Creates a rectangular volume based on the maximum range of the selected objects, and then clips the display to show only graphics within that volume.
- **Clip by Volume or Plane** - Creates a clipping volume by specifying two area definition points (the cross-section of the volume) and two depth points (the extent of the volume). You can specify the near and far clipping planes.
- **Clear View Clipping** - Removes all clipping from the active window.
- **Active View Control** - Allows you to view and adjust the graphic view window settings. You can view the model from the camera position, the target/focus point position, and the clipping box of the active graphic view.

Manipulating Views

-  **Common Views** - Sets the view direction of the active view when you click one of the standard viewing angles.
-  **View by Points** - Defines the viewing plane by three points.
-  **Rotate View** - Rotates a view about a point or an axis.
-  **Named Views** - Assigns a name and a description to a view and stores the definition for later reuse. The default views are **Top**, **Front**, **Right**, and **Isometric**.
NOTE A named view definition includes the clipping, but does not define the perspective angle of the view or its rendering characteristics. The defined named views are saved in the session file.
-  **Zoom Tool** - Allows you to use **Zoom**, **Zoom Area**, and **Pan**. Use the left mouse button and the mouse wheel to zoom, double-click to zoom to the rectangular area, and click the middle mouse button to drag pan.



3D Navigator - Allows you to zoom and move about the model with the mouse and keyboard.

Close - Exits the 3D navigation.

Home - Returns you to the opening model view.

Fly Mode - Disables the 3D Navigator, and allows you to 'fly' around the model with your keyboard and mouse.

Look - Changes your view of the model.

Move In/Move Out - Zooms closer or further away from the target point.

Move - Pans the model.

Fit - Fits the selected objects in the view. If no objects are selected, **Fit** shows a fitted view of the active clip volume. If there is no active clip volume, **Fit** shows a fitted view of the entire model. When you click **Fit**, the software prompts you to select another view to fit. You can also fit all of the views at the same time by holding the SHIFT+A or CTRL+A keys and clicking **Fit**. If you press SHIFT and then click **Fit**, all visible objects in the clipping volume are shown, regardless of the currently selected objects.



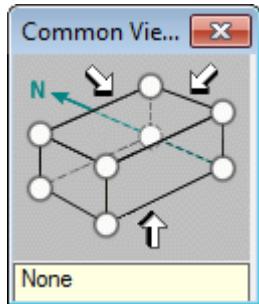
-  **Zoom Area** - Zooms to a specific rectangular area of the model.
-  **Fit** - Fits the view to show the currently selected objects. If no objects are selected, it shows all displayed objects.
-  **Center View by Object** - Centers a view based on a given point or object.
-  **Pan** - Moves the view in the current view plane.

Steps to Manipulate Views in the Active Window

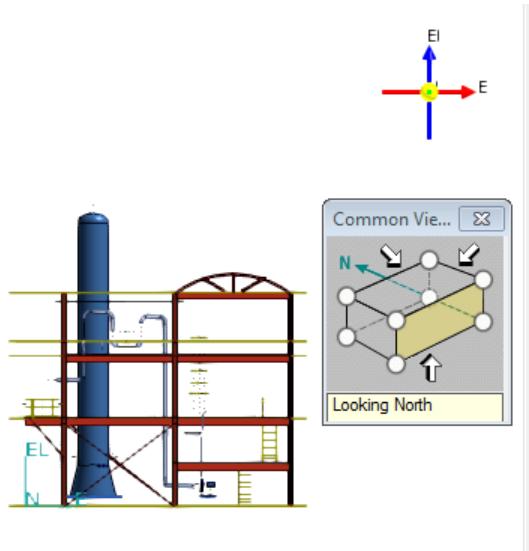
The following activity uses the view manipulation commands in a workspace containing unit U03.

1. Click **Common Views** .

*The **Common Views** dialog box displays.*

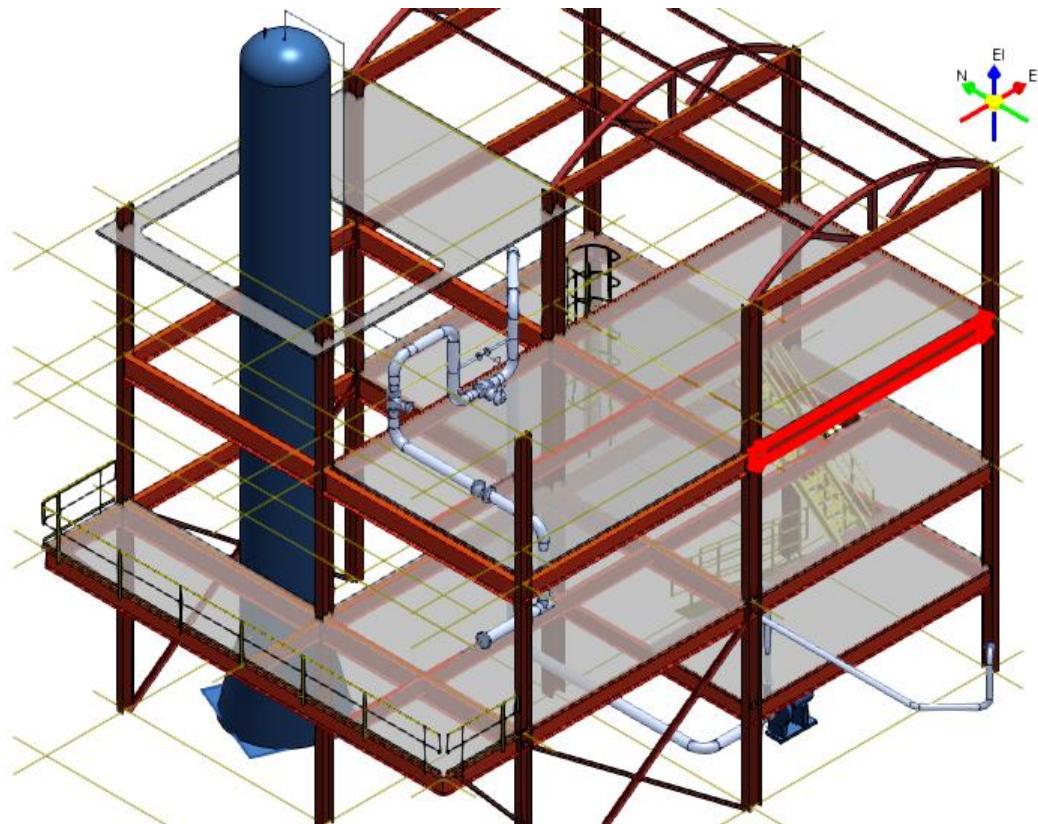


2. Select **Looking North**.



NOTE You can move this dialog to the side and leave it open while you execute other commands.

3. Change the view to **Isometric** and use **Zoom Area**  to zoom in on the area highlighted below. Select an area that just includes the vertical tank and the pump.



4. Click on any grid line and select **Center View by Object** .

5. Select different views in the **Common Views** dialog box.

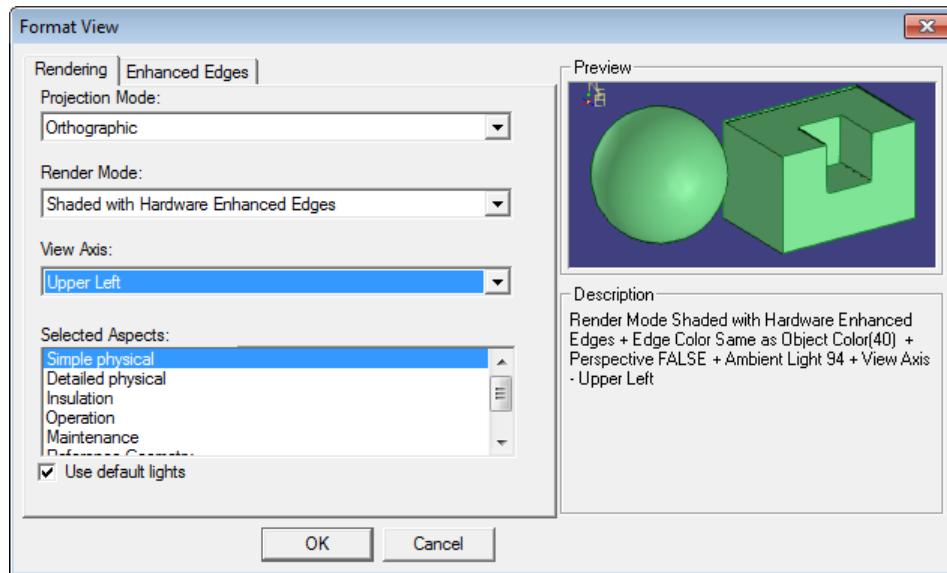
The grid line selected is always centered, no matter what view is selected.

6. To identify the orientation of your active view, select **Format > View**.

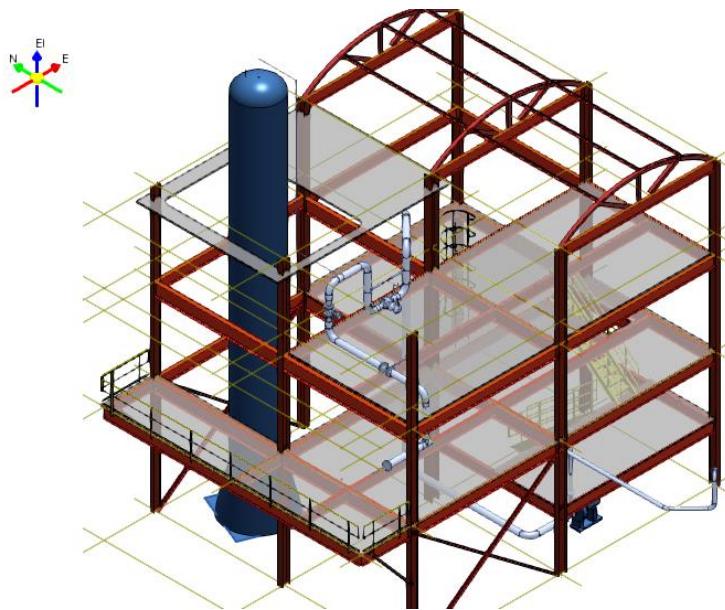
*The **Format View** dialog box displays.*

Manipulating Views

7. Set the **View Axis** to **Upper Left**, and click **OK**.



The model view is as shown:



8. Click **Rotate View** .

A green triad displays in the center of the active view.

9. Hold the left mouse button, and move the mouse.

The view rotates around the green triad.

10. Click **Move Point of Rotation**  to move the green triad.

NOTE This option allows you to set the view rotation point to any point in the model.

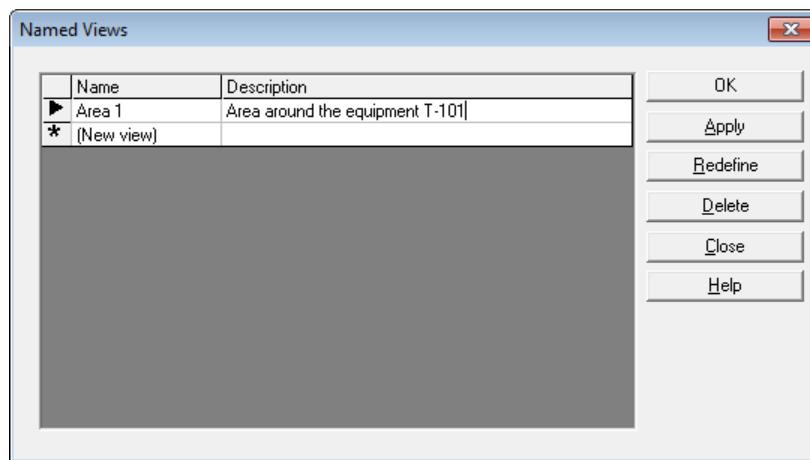
11. Click **Rotate View**  and select a vertical object.

As you rotate, the view axis changes based on the orientation of your active view.

12. Click **Named Views** .

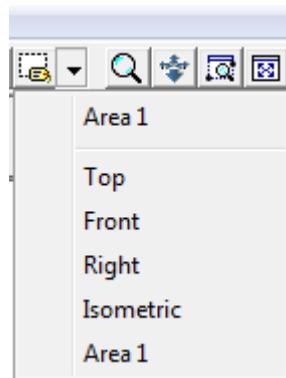
The **Named View** dialog box displays.

13. Set the named view as shown:



14. Click **Apply** and then click **OK**.

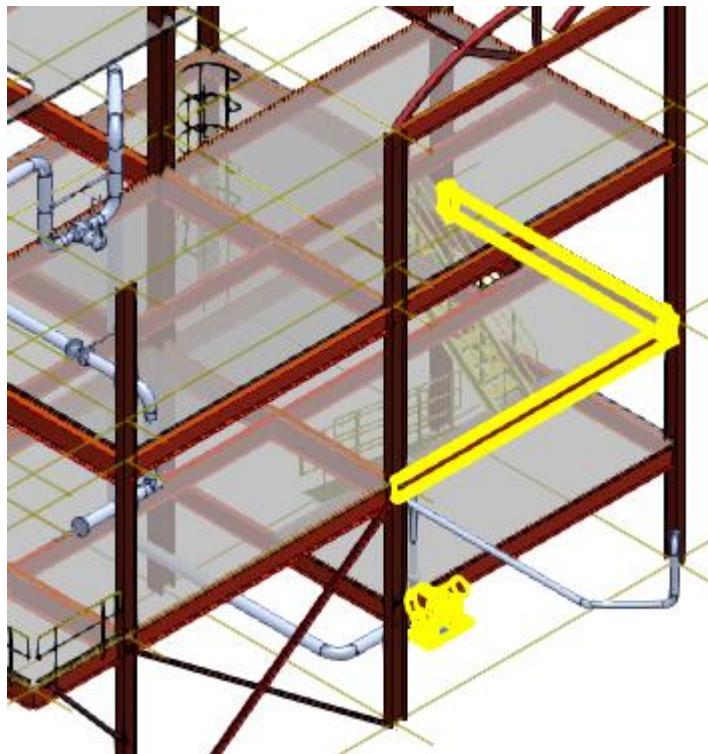
The view is added to the list of named views, and the named view definition is stored in the session file.



15. To clip to a region around the equipment P-101, click **Clip by Object**  and select the equipment and the two beams above the equipment.

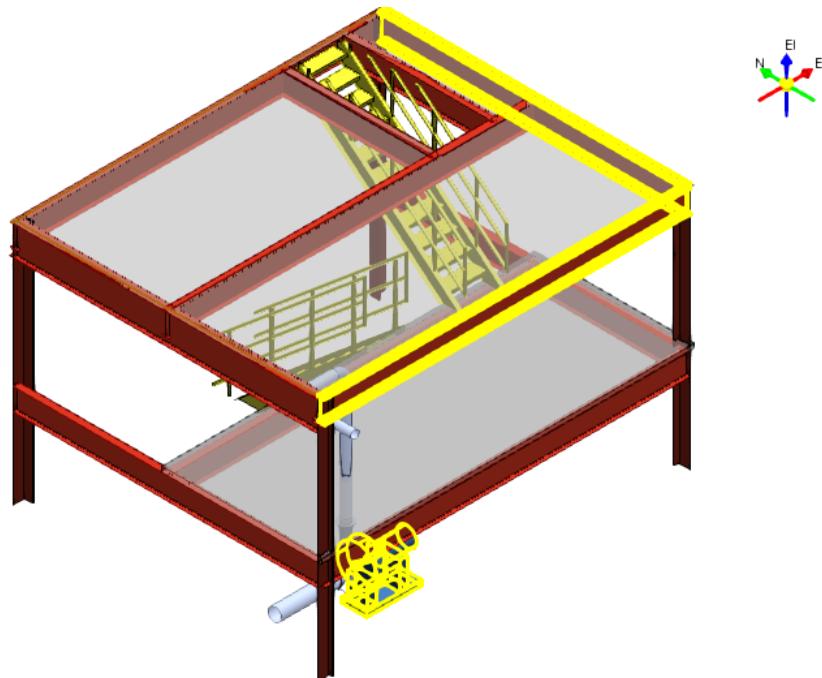
Manipulating Views

NOTE If the objects are already selected when you click **Clip by Object**, then the clipping uses the selected objects without prompting you to select objects.



16. Click **Accept** ✓.

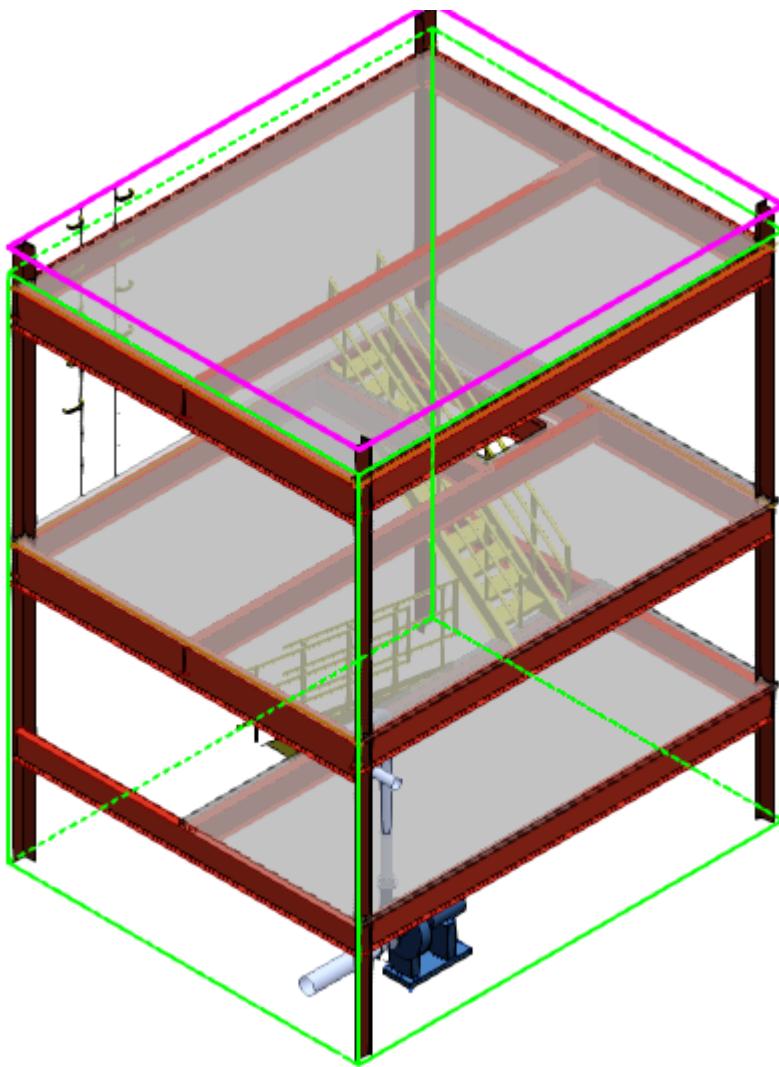
*The view is clipped. You can fit the view to the object with **Fit View**.*



17. Click **Clip by Volume or Plane** , and move top clipping boundary up to see the third story bay.

NOTES

- You can move a boundary graphically or by specifying an exact distance with **PinPoint**. You can set the clipping plane to a precise location by positioning the cursor over geometry.
- You can use **Clip by Volume** to define the clipping volume by four points. The first two points define a rectangle in the horizontal plane, and the second two points define the front and back clipping plane locations along the z-axis.
- You can also use **Clip by Plane** to specify the near and far clipping planes. **Clip by Plane** is useful only in orthographic views.



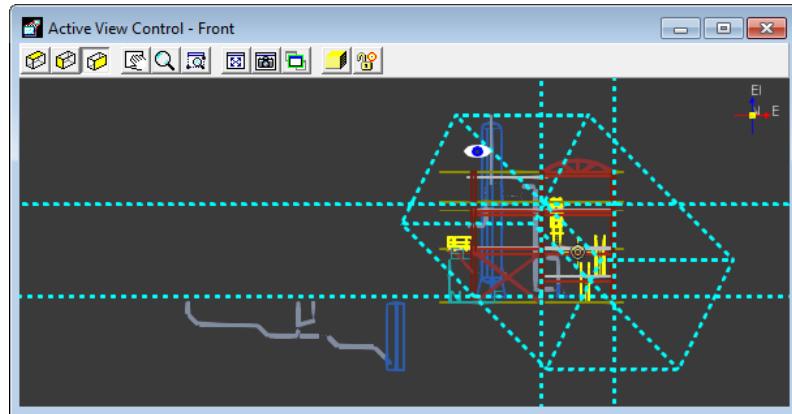
18. Set the active view to **Isometric**, and click **Active View Control**  to modify the parameters of the active view in a separate window.

NOTES

Manipulating Views

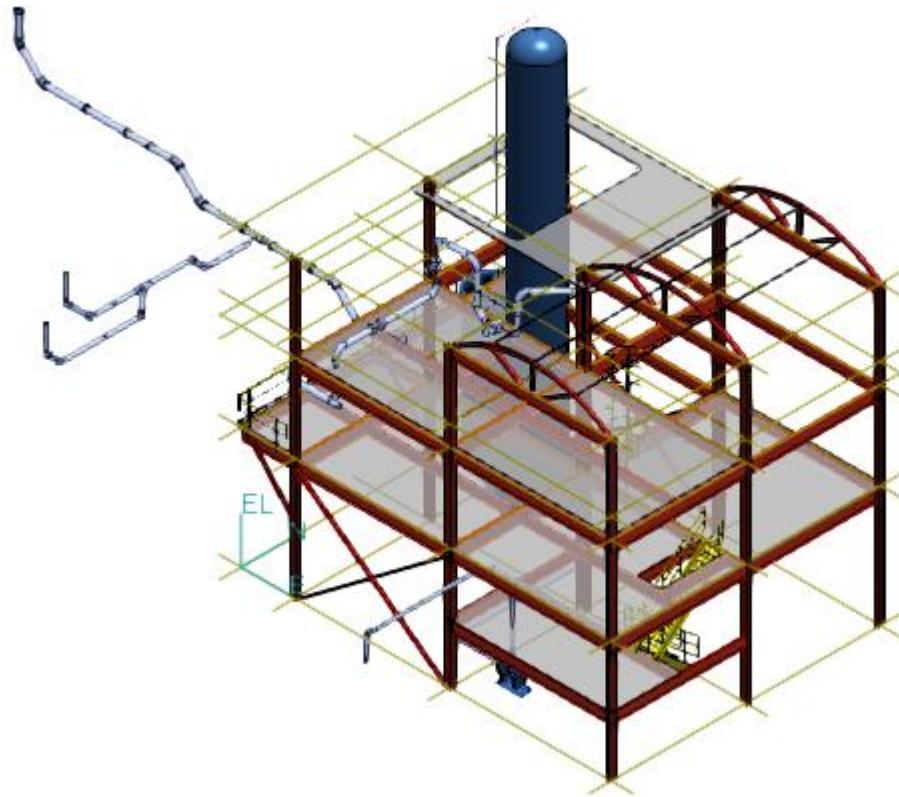
- **Active View Control** allows you to edit all the parameters of the view. It is most useful for graphically adjusting the clipping from a view where you can see all the geometry.
 - The **Active View Control** window allows you to use **Top View**, **Side View**, **Front View**, **Pan**, **Zoom**, **Window Area**, and **Fit** to manipulate the view. **Top View** is selected by default.
19. Select **Side View**, and modify the top clipping boundary of the active view by dragging the dotted clipping plane above all graphics.

The active view now looks as shown:

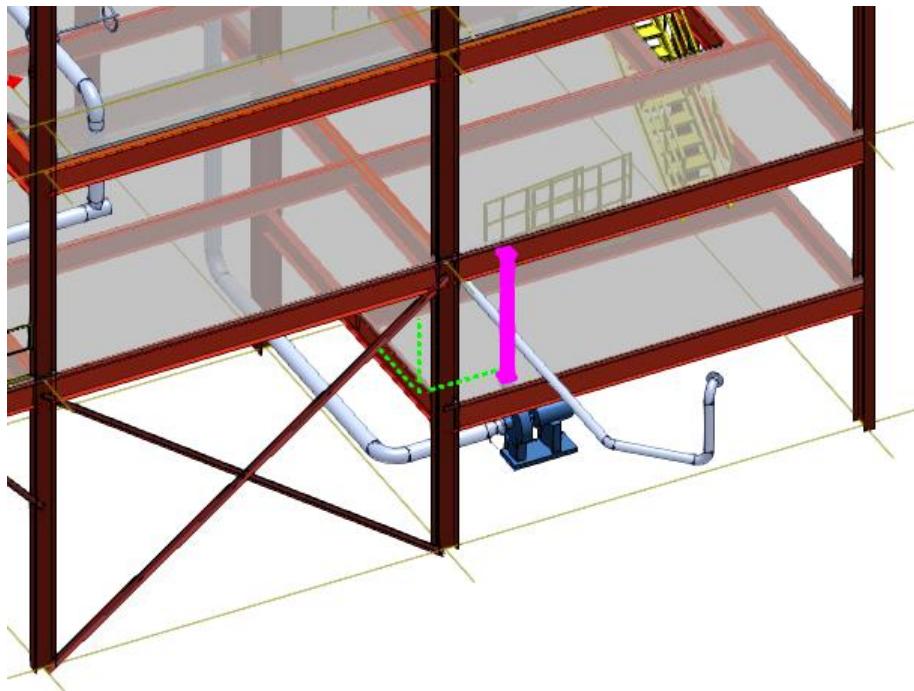


Manipulating Views

NOTE To clear the clipping, click the **Clear View Clipping** .



20. To rotate the view about the vertical discharge of the pump, click **Rotate View** .



The rotate view command displays a coordinate system triad at the center of the active window.

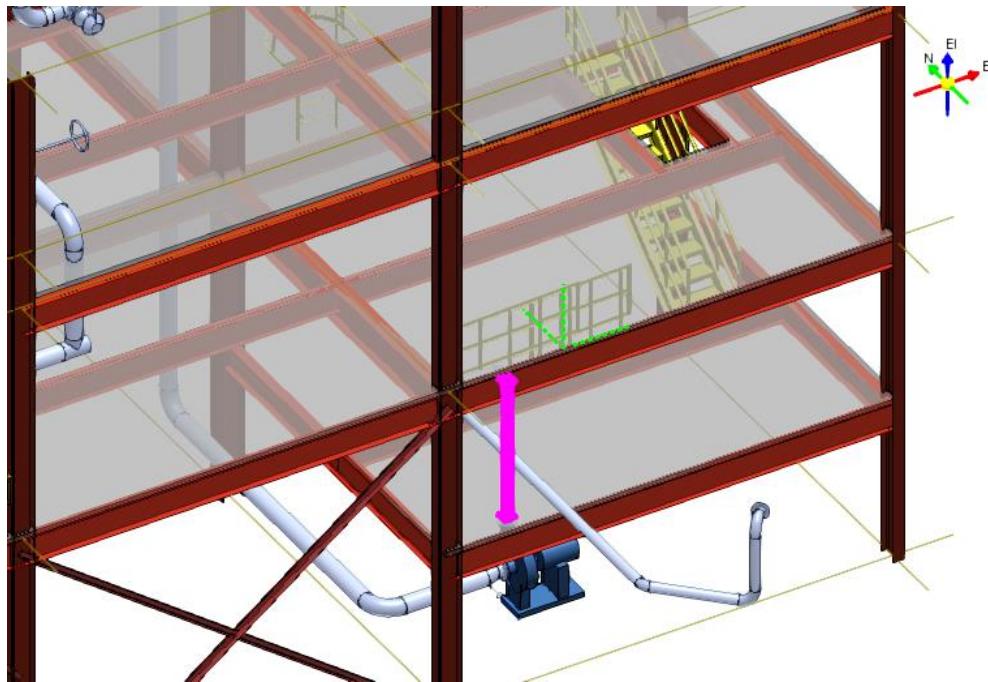
NOTE You have several options for rotating the view:

- Select an axis of the triad or any linear geometry in the model, and enter the degrees you want to rotate the view about the selected axis.
- Click and drag the selected axis to dynamically rotate the view about that axis.
- Click in the view away from the selected axis and drag to dynamically rotate the view in three dimensions about the center of the view.

21. From the standard **Isometric** view, select the vertical pipe connected to the pump discharge nozzle.

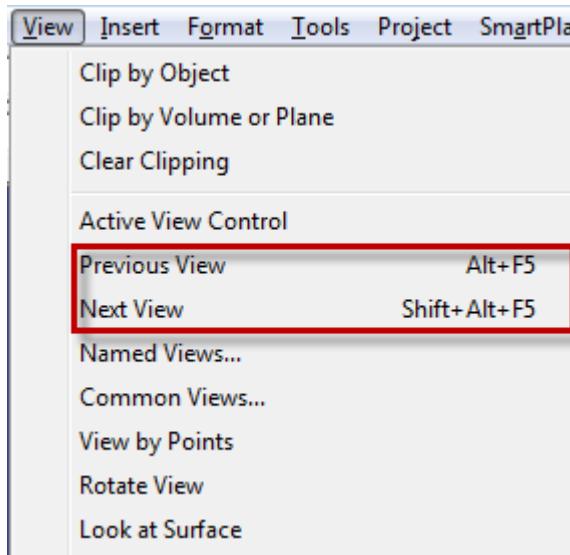
Manipulating Views

22. On the Rotate ribbon, type **15 degrees**.



23. Click and drag the vertical pipe to rotate the view. This allows you to look around a specific object.

24. Select **View > Previous View**, and then select **View > Next View**.



Now, you can navigate the ten previous and next views. **Previous View** and **Next View** can only restore the view properties for scale and orientation. They do not affect display operations, such as **Show** and **Hide**, styles, or other view properties.

For more information, see *View Menu* in the *Smart 3D Common User's Guide*.

SESSION 12

Control Display of Objects on Levels/Layers in Reference 3D Models

Objective

By the end of this session, you will be able to:

- Control the display of objects using levels and layers in reference 3D Models.

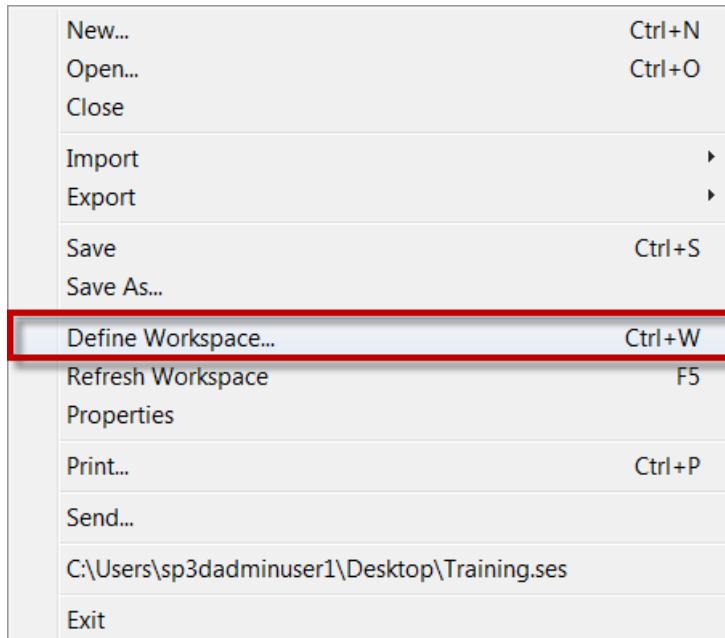
Overview

Smart 3D now allows you to use folders to organize reference files. You can also control how objects are displayed on levels and layers in reference 3D Models. The **SharedContent > PDS_GraphicOnly** folder provides a sample of how you can organize these files by disciplines.

First, we will create a filter to show the reference 3D objects in the **PDS_GraphicOnly** folder. Then, we will configure the settings so that the reference 3D objects are shown on different layers in the model.

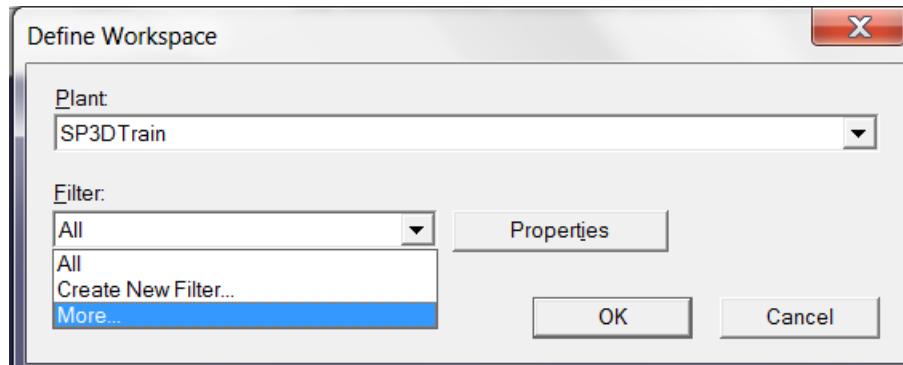
Steps

1. Select **File > Define Workspace....**

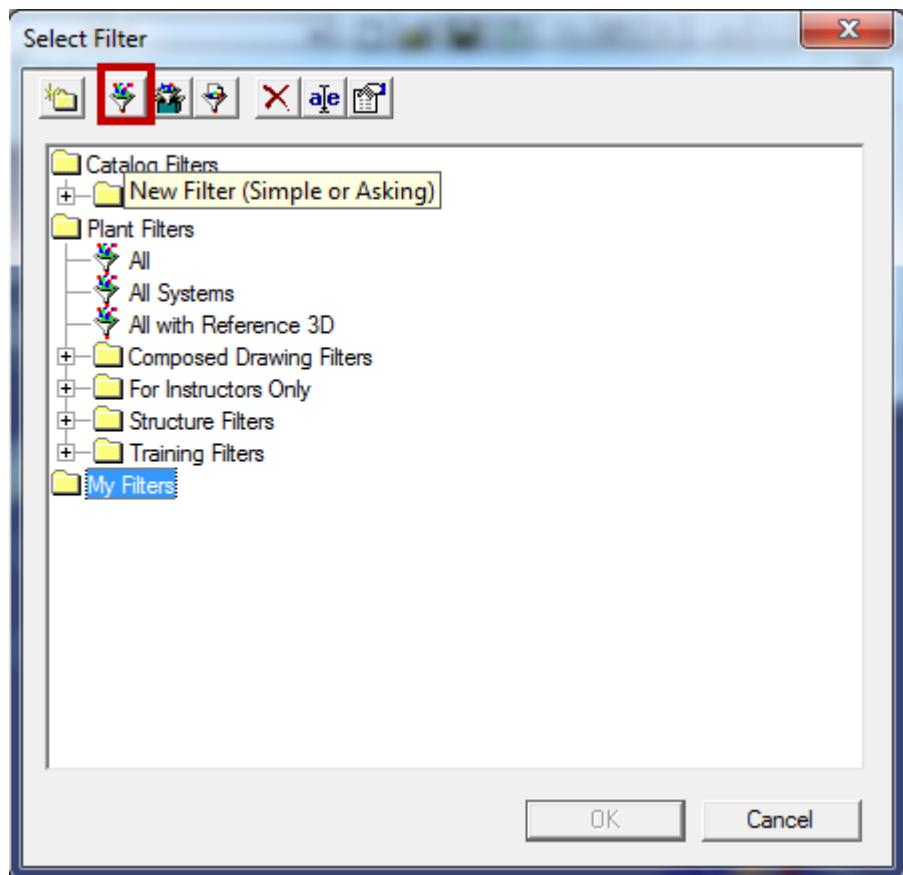


Control Display of Objects on Levels/Layers in Reference 3D Models

2. In the **Filter** field, select **More....**



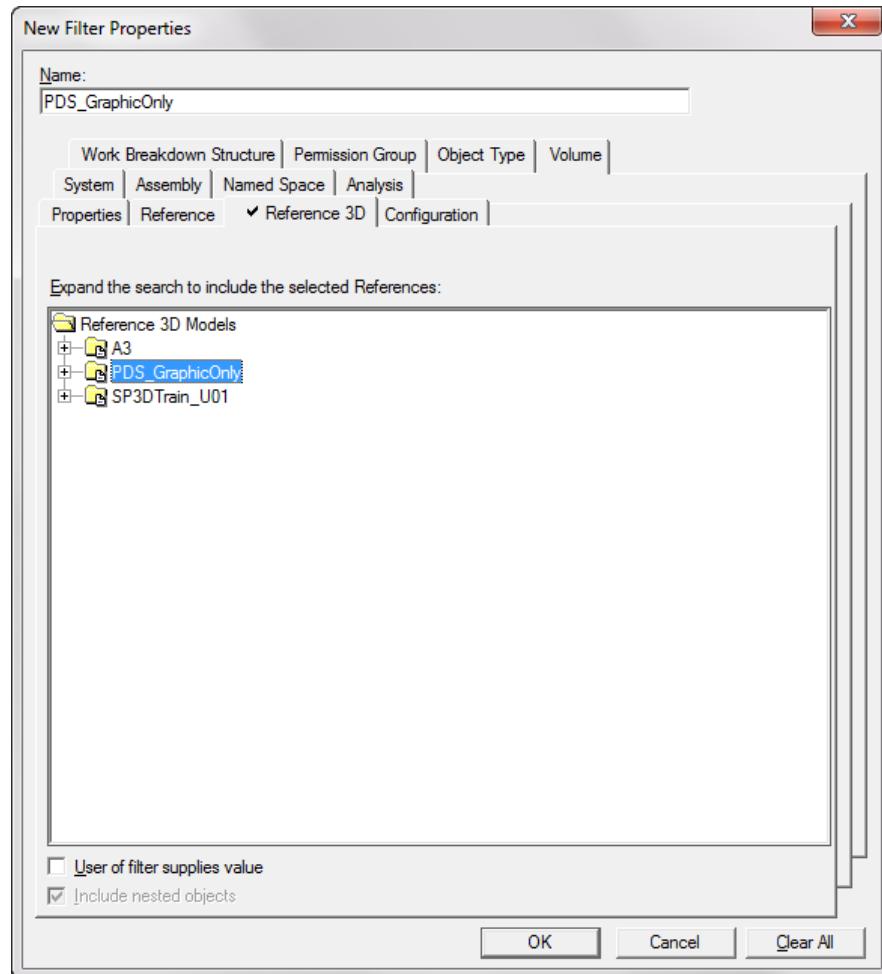
3. Select **My Filters** and click **New Filter (Simple or Asking)**.



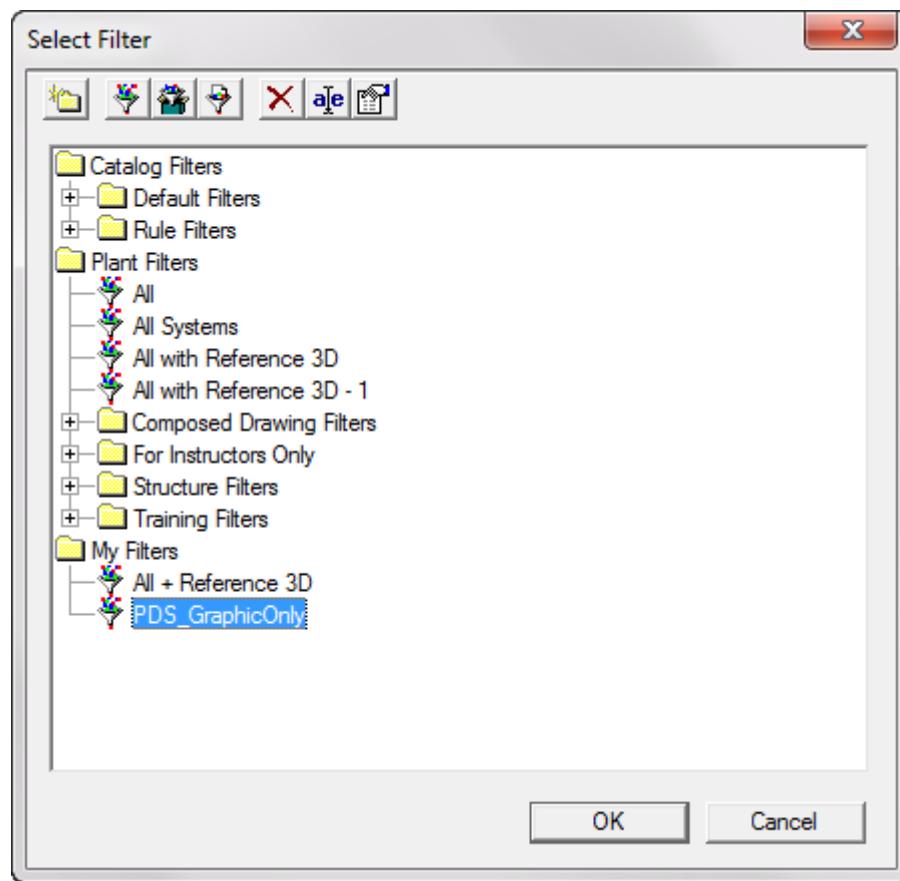
4. Set the **Name** to "PDS_GraphicOnly."

Control Display of Objects on Levels/Layers in Reference 3D Models

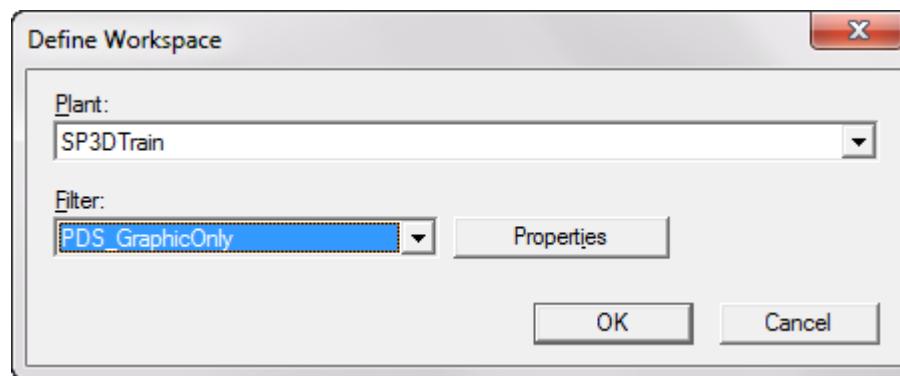
5. Under the **Reference 3D** tab, select **PDS_GraphicOnly** and click **OK**.



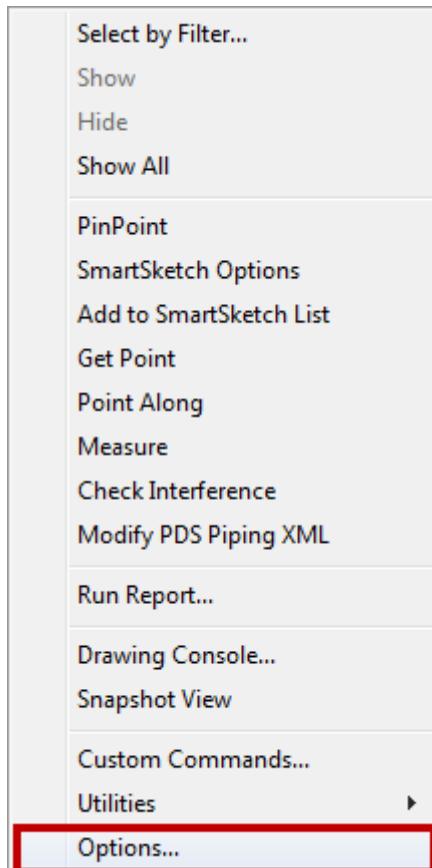
6. Select **My Filters > PDS_GraphicOnly** and click **OK**.



7. On the **Define Workspace** dialog box, click **OK** to load the new filter.



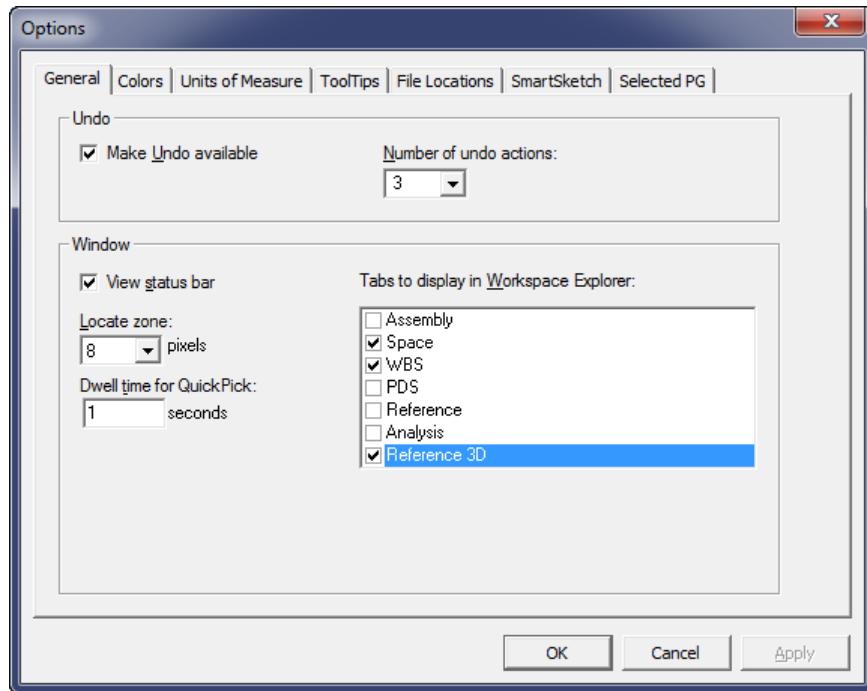
8. Select **Tools > Options**.



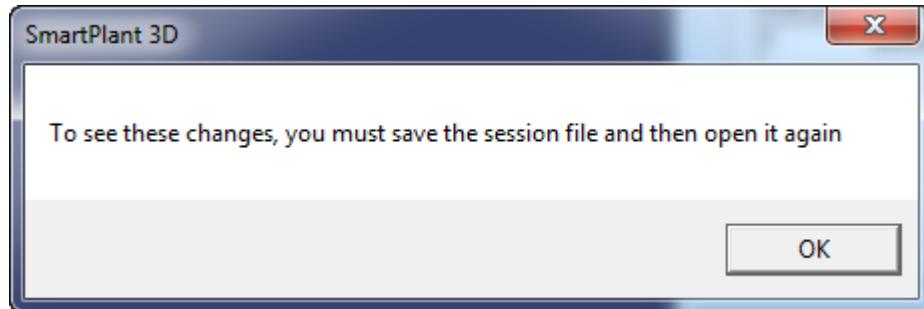
The **Options** dialog box displays.

Control Display of Objects on Levels/Layers in Reference 3D Models

- Under **Tabs to display in Workspace Explorer**, select **Reference 3D**. and click **OK**.



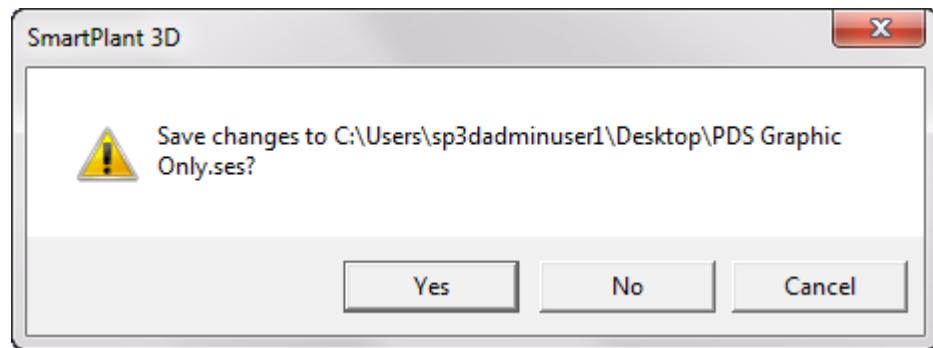
A message displays, prompting you to save the session file.



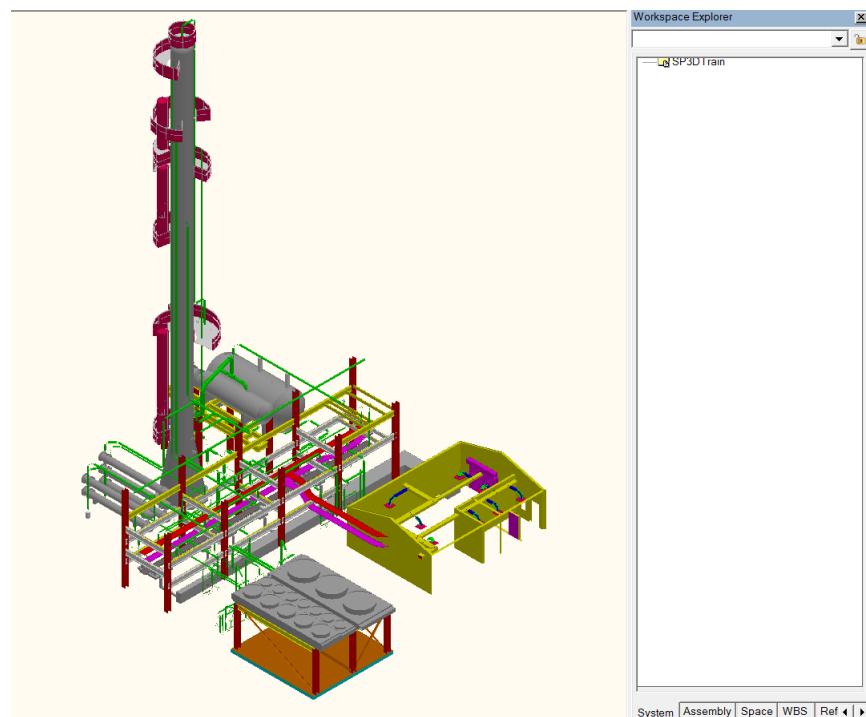
- Click **OK**, and then click **OK** on the **Options** dialog box.
- Select **File > Save**, and save the session file with the name "PDS Graphic Only."
- Select **File > Exit**.

A message displays, prompting you to save the session file.

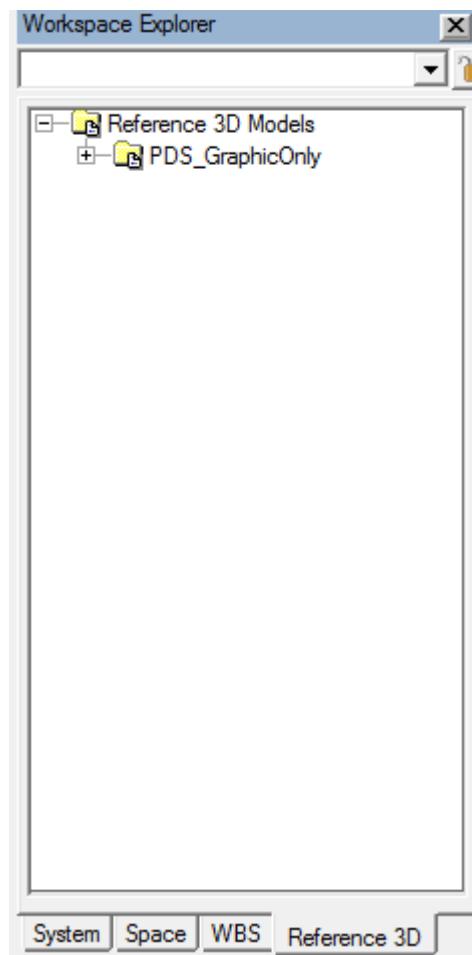
13. Click **Yes**.



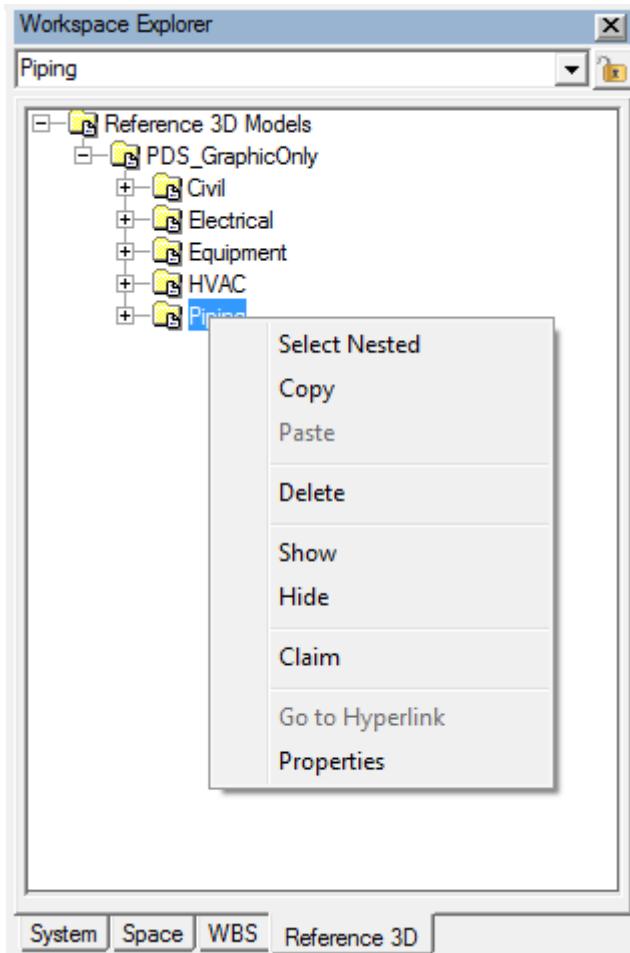
14. Open the saved session file.



15. Select the **Reference 3D** tab in the **Workspace Explorer**.

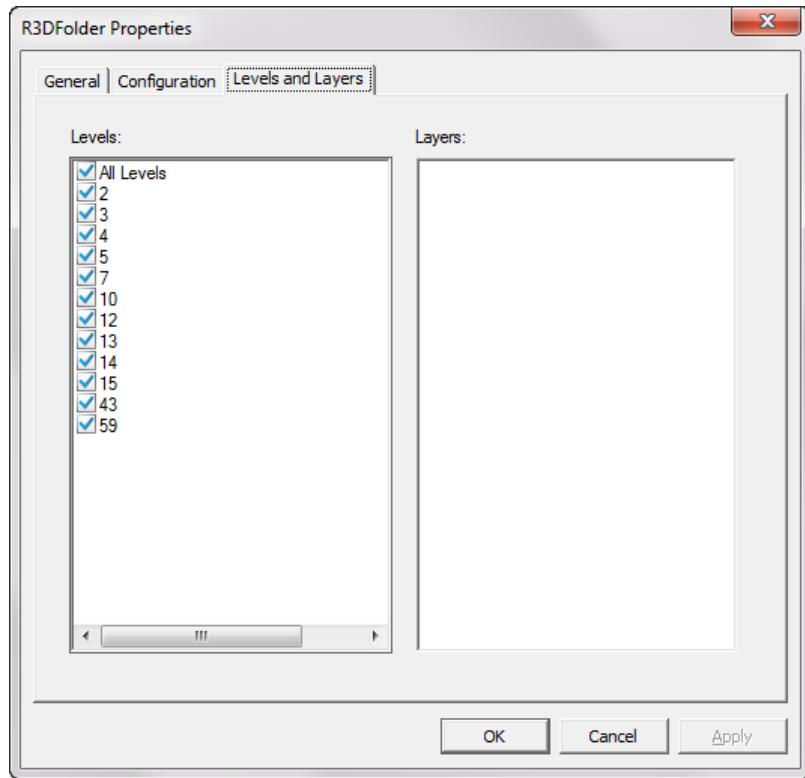


16. Right-click **Reference 3D Models > PDS_GraphicOnly > Piping** and select **Properties**.

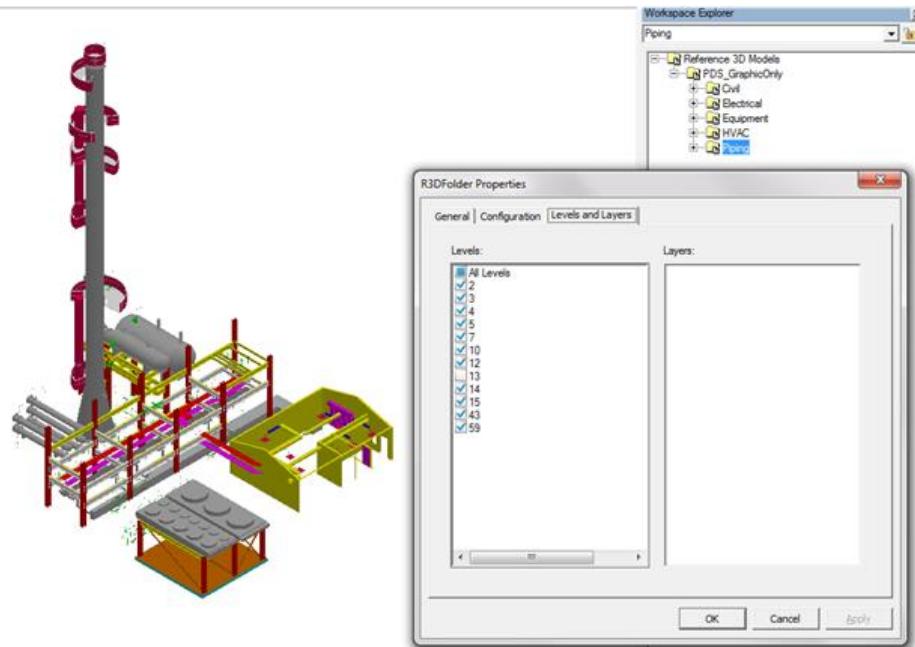


The **R3DFolder Properties** dialog box displays.

17. Under the **Levels and Layers** tab, clear **13** and click **Apply**.



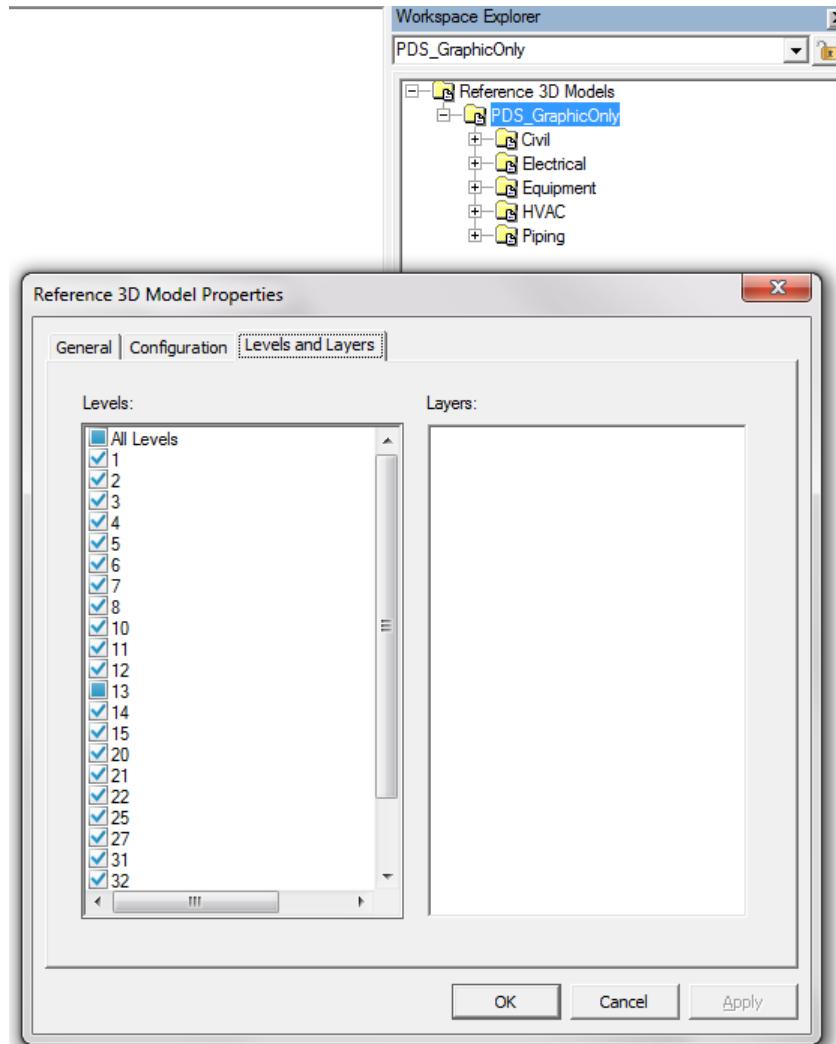
The pipes associated with level **13** are hidden in the model. The **All Levels** option in the **R3DFolder Properties** dialog box is partially filled, indicating that levels for the R3D objects are partially displayed.



Control Display of Objects on Levels/Layers in Reference 3D Models

18. With the **R3DFolder Properties** window open, right-click on the **PDS_GraphicOnly** folder in the **Workspace Explorer** and select **Properties**.

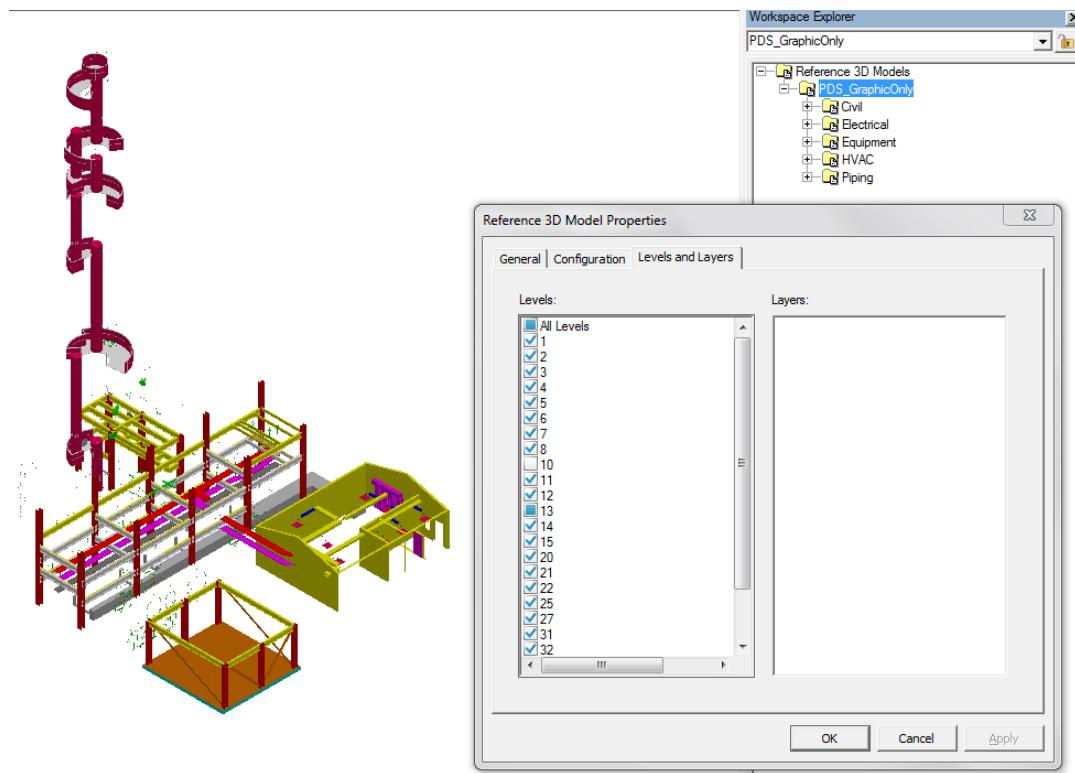
The **Reference 3D Model Properties** dialog box displays. Additional levels represent the levels for all R3D files in the **PDS_GraphicOnly** folder. Objects hidden from a lower level, such as level **13**, are represented by a partially shaded box.



19. Clear **10** and click **Apply**.

Control Display of Objects on Levels/Layers in Reference 3D Models

Objects associated with level 10 no longer display in the model.



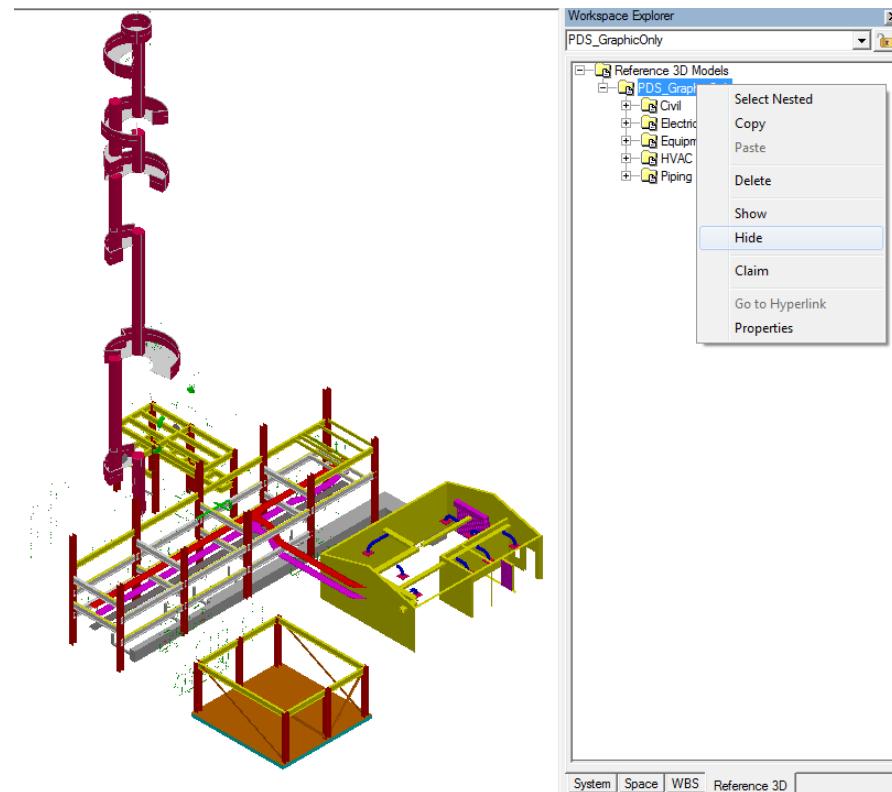
20. Select levels **10** and **13** and click **Apply**.

All objects display in the model.

21. Click **OK**.

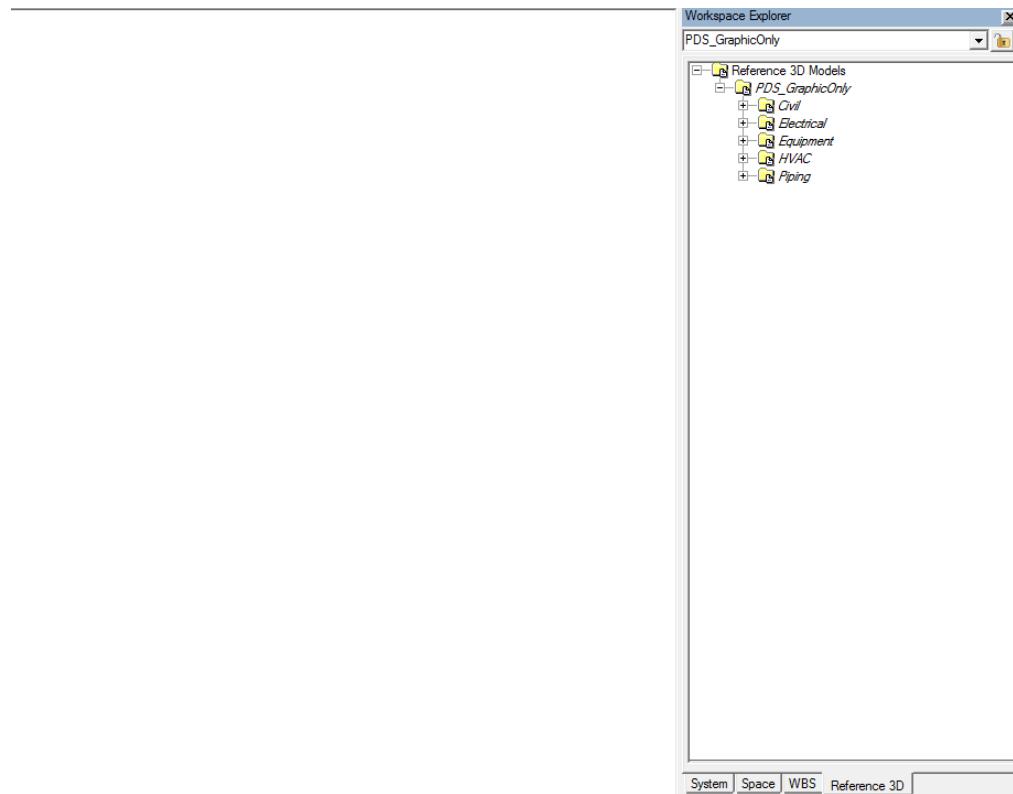
NOTE In addition to being able to control the display of objects through levels and layers, you can also hide all objects.

22. Right-click **PDS_GraphicOnly** and select **Hide**.

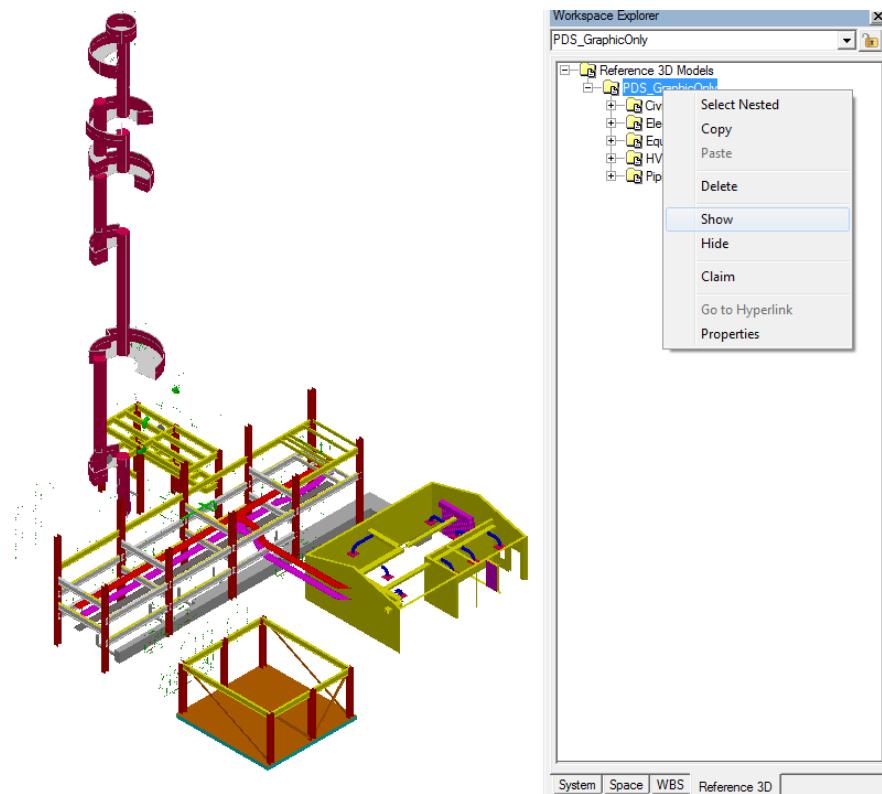


Control Display of Objects on Levels/Layers in Reference 3D Models

All Reference 3D Model Objects are hidden.



23. Right-click **PDS_GraphicOnly** and select **Show**.



SESSION 13

Selecting Objects in a Model

Objective

By the end of this session, you will be able to:

- Select objects individually, by fence, or by using filters.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Defining a Workspace Using a Volume Filter* (on page 65)
- *Manipulating Views* (on page 71)

Overview

You can select design objects for modification with **Select**  and **Select by Filter**.

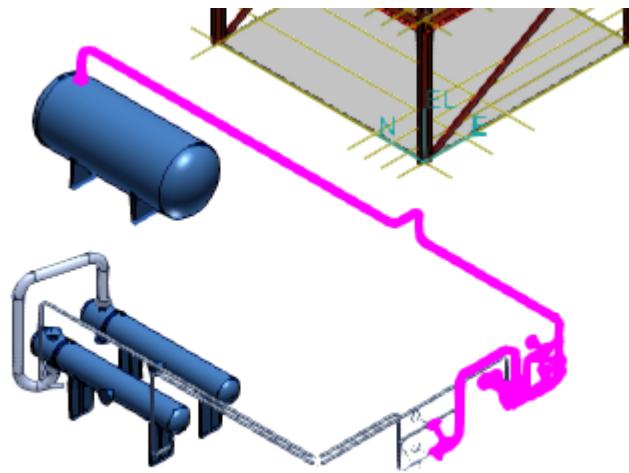
The **Select** ribbon bar contains a **Locate Filter** list, which limits the selection by object type. Each task environment provides a unique list of filter options useful for that task. **Select**  has the following selection options:

- Individual selection in the graphic view or in the **Workspace Explorer**.
- Fencing in multiple objects in the model with **Inside Fence**. You can choose to select all objects within the fence or all objects within and overlapping the fence boundaries.
- Multiple selections in the **Workspace Explorer**.
- Single selection by typing the name in the **Workspace Explorer**.
- Multiple selections by typing a name with the wild card search criteria (*) in the **Workspace Explorer**.

Tools > Select by Filter allows you to select objects by running a query on the objects with one or more filters. You can access the filters with **Select by Filter** or **File > Define Workspace**.

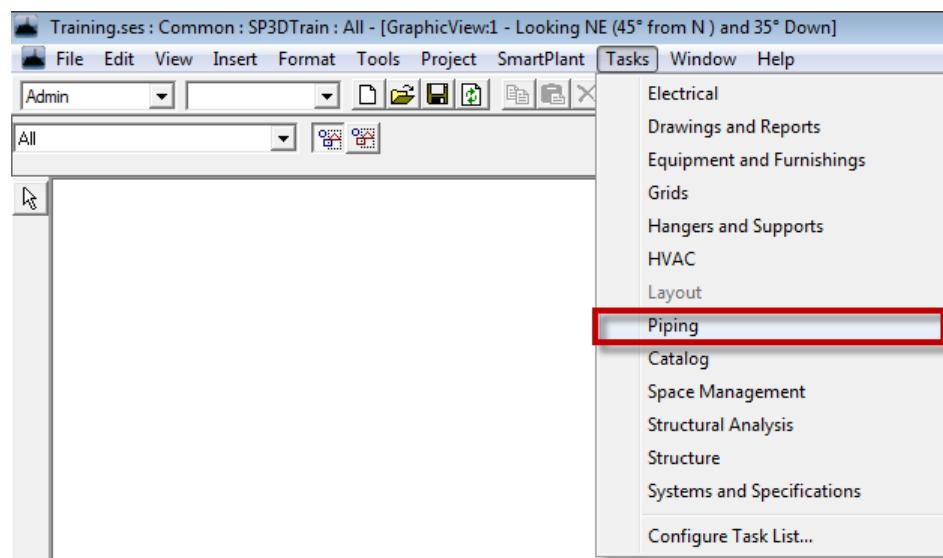
Select Individual Objects Using Select

Use **Select**  to select pipeline 400-P. After selecting the pipeline, the view should look like this:



TIP You can set the colors used for highlighted and selected objects in the **Options** dialog box.

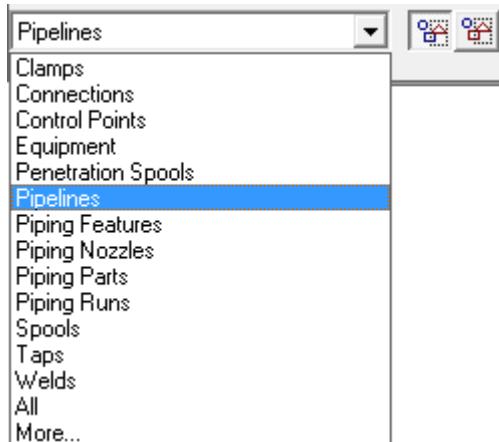
1. Define your workspace to display **Unit U04** and coordinate system **U04 CS**.
2. Select **Tasks > Piping**.



3. Click **Select** .

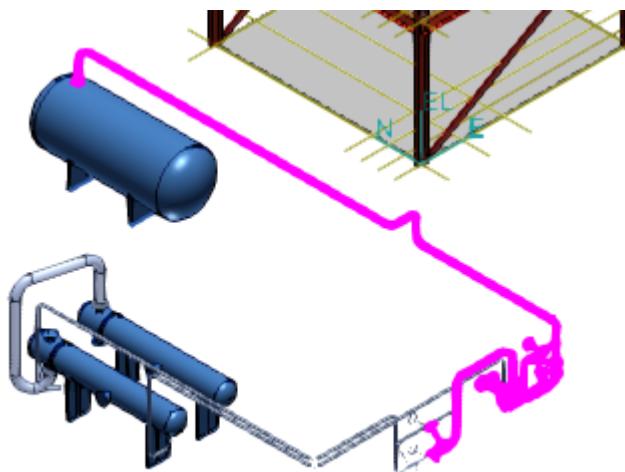
The **Select** ribbon displays.

- Set the **Locate Filter** to **Pipelines** to locate only piping objects.



TIP When you are working on a specific task, you can select objects of other disciplines by selecting **All**. For example, if you are working in the **Piping** task environment, you can set the **Locate Filter** to **All** and select a structural member.

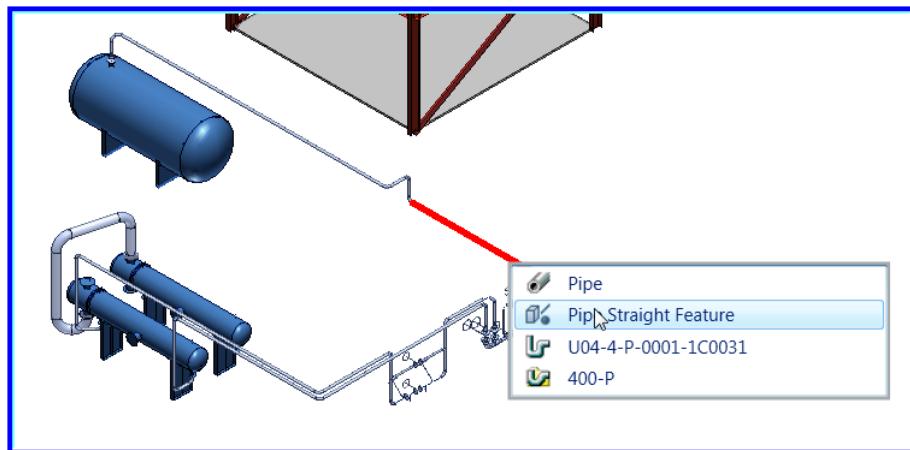
- Select pipeline 400-P.



TIPS

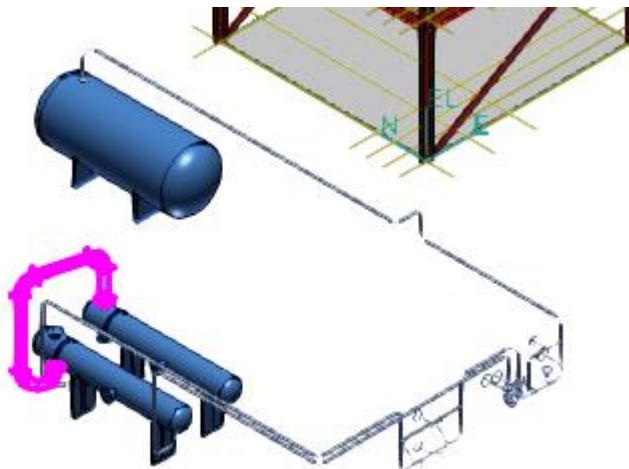
- You can change the filter after you select an object by selecting **Edit > Locate Filter**, or by pressing **CTRL+E**.

- The **Locate Zone** and **Dwell Time** properties affect object selection in the model. **Locate Zone** defines a tolerance in screen pixel dimensions about the cursor point. Objects are located if they are within this tolerance of the cursor point. The first object found at the cursor position is highlighted when you move your cursor over it. If you pause for the specified **Dwell Time**, then **QuickPick** shows all objects that are found at the current cursor position.



Select Objects Using Inside Fence

Select pipeline 403-P with **Inside Fence**. After selecting the specified objects, the view should look like this.



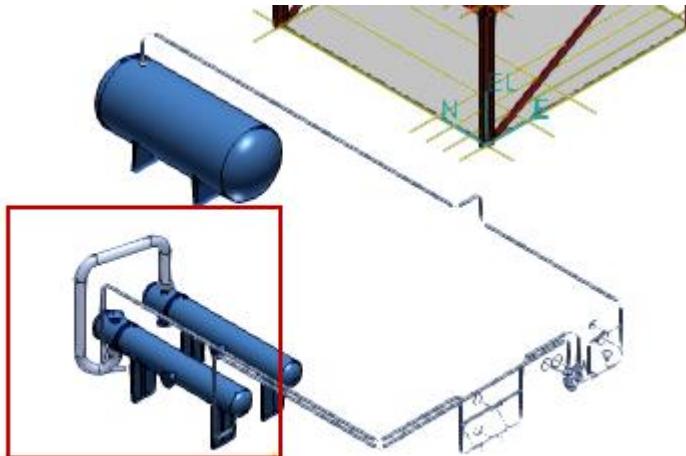
- Define your workspace to display **Unit U04** and coordinate system **U04 CS**.
- Select **Tasks > Piping**.
- Click **Select** .

The Select ribbon displays.

- Set the **Locate Filter** to **Pipelines**.
- Click **Inside Fence**.

NOTE Inside Fence remains selected until you click **Select** or until you change the option.

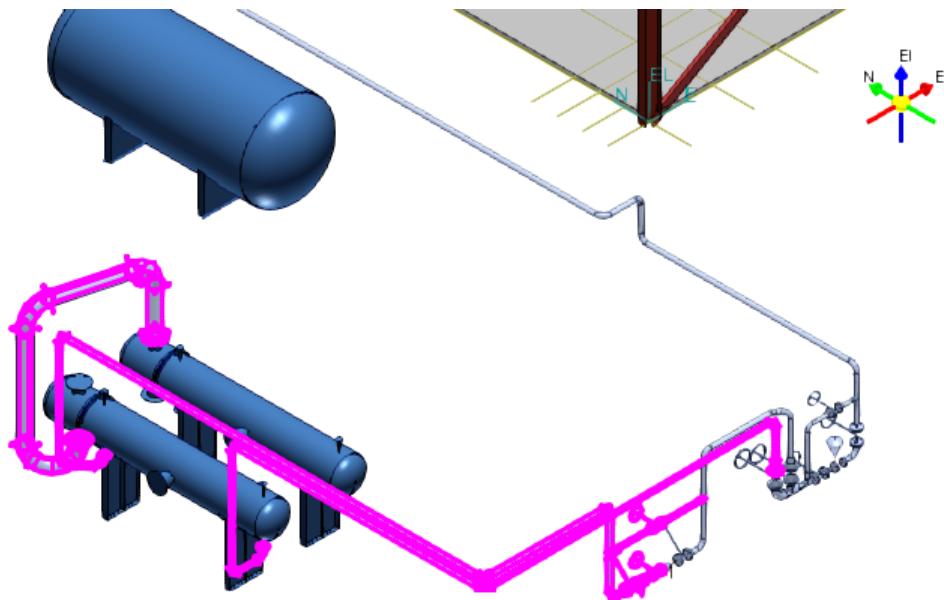
6. Click and drag a fence around pipeline 403-P.



All objects in the fence, including pipeline 403-P, are selected.

Selecting Objects with Overlapping Fence

Select pipelines 403-P, 402-P, and 401-P with **Overlapping Fence** . After selecting the specified objects, the view should look like this.



1. Define your workspace to display **Unit U04** and coordinate system **U04 CS**.

2. Select **Tasks > Piping**.

3. Click **Select** .

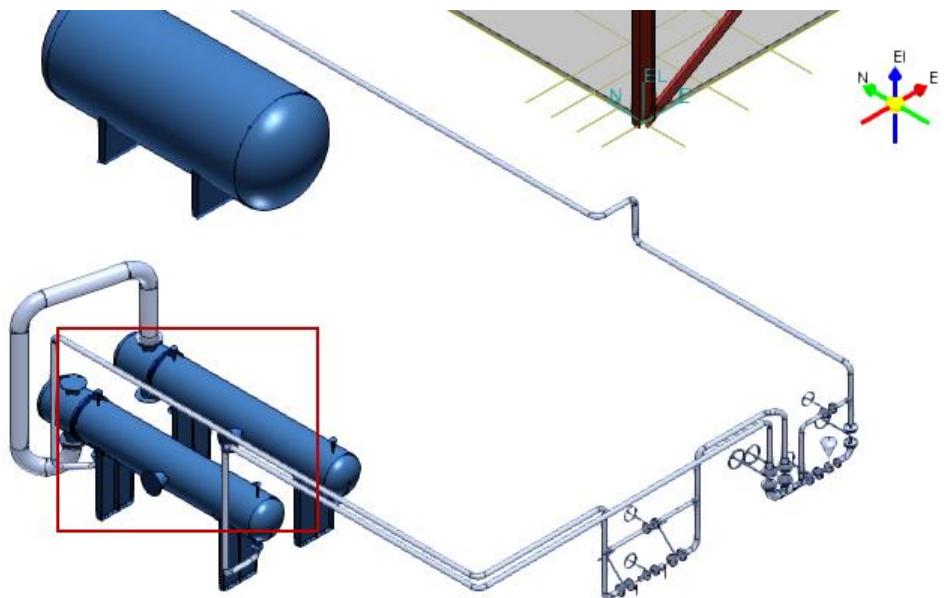
*The **Select** ribbon displays.*

4. Set the **Locate Filter** to **Pipelines**.

5. Click **Overlapping Fence** .

NOTE **Inside Fence** remains selected until you click **Select** or until you change the option.

6. Click and drag a fence around pipeline 403-P, and ensure that the fence border covers part of pipelines 402-P and 401-P, as indicated by the dotted lines below.



Pipelines 403-P, 402-P, and 401-P are now selected.

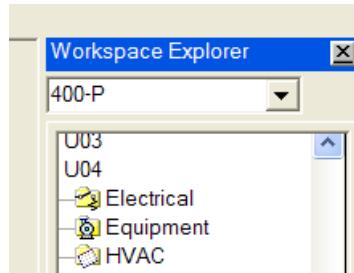
Steps for Selecting Objects by Name

Select pipeline 400-P of Unit U04 by searching for it in the Workspace Explorer.

1. Define your workspace to display **Unit U04** and coordinate system **U04 CS**.
 2. Select any task environment.
 3. Click **Select** .
- The **Select** ribbon displays.*
4. Set the **Locate Filter** to **All**.

Selecting Objects in a Model

5. In the **Workspace Explorer**, type "400-P" in the **Name** field and press ENTER.

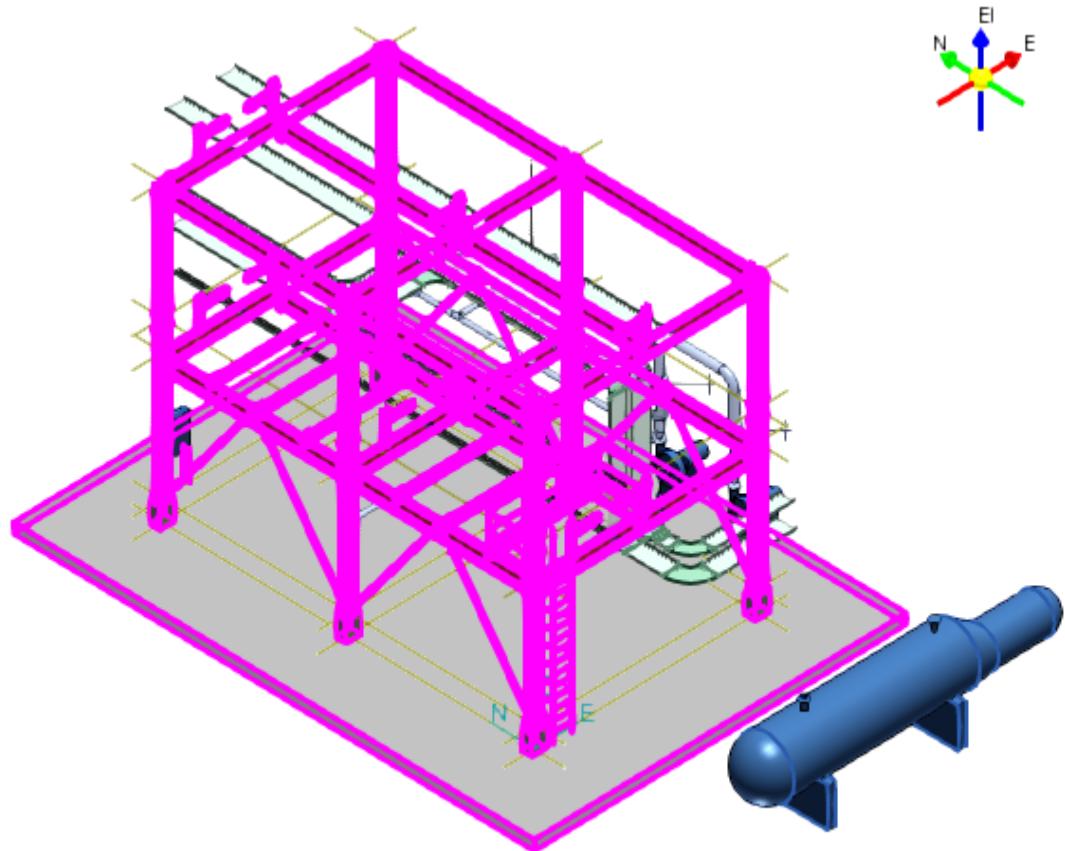


TIPS

- You can type a specific filter in the **Locate Filter** field.
- You can select multiple objects by name by entering "*" in the search. For example, "*P" would select all objects with names ending in "P."

Selecting Objects by Using Select by Filter

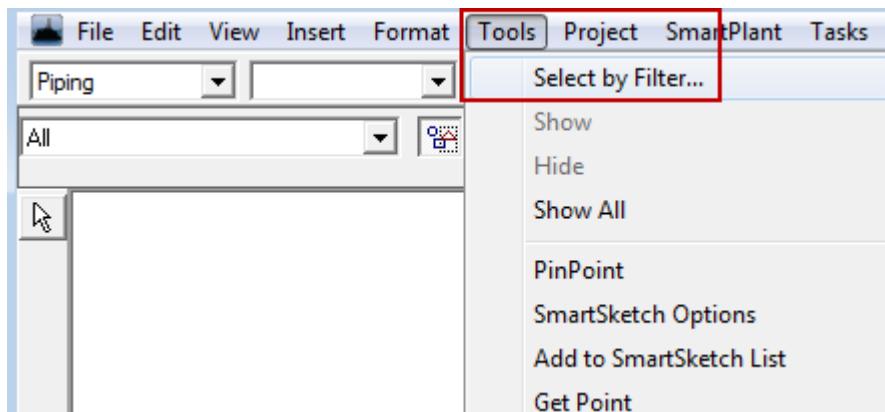
Select all the structural objects with an object type filter. After selecting the specified objects, the view should look like this.



1. Define your workspace to display **A2, U01**.

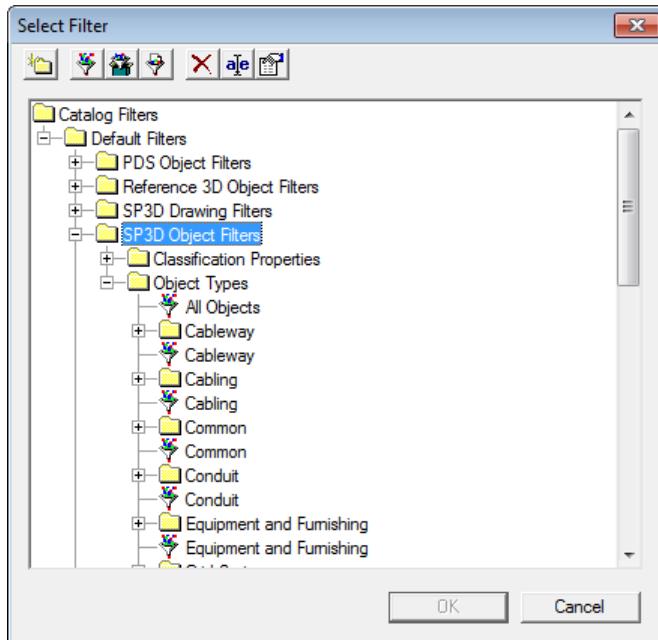
Selecting Objects in a Model

2. Select Tools > Select by Filter.

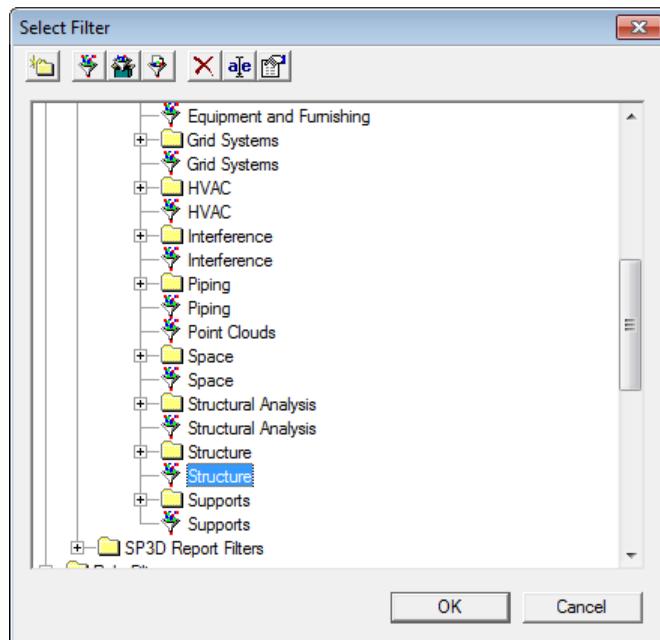


The **Select Filter** dialog box displays.

TIP The **Filter Selection** dialog box displays a tree view of the available filters. When you double-click a folder, the view expands to show the next level of the folder organization. Double-click a filter to use it.



3. Select the **Catalog Filters > Default Filters > SP3D Object Filters > Object Types > Structure** filter and click OK.

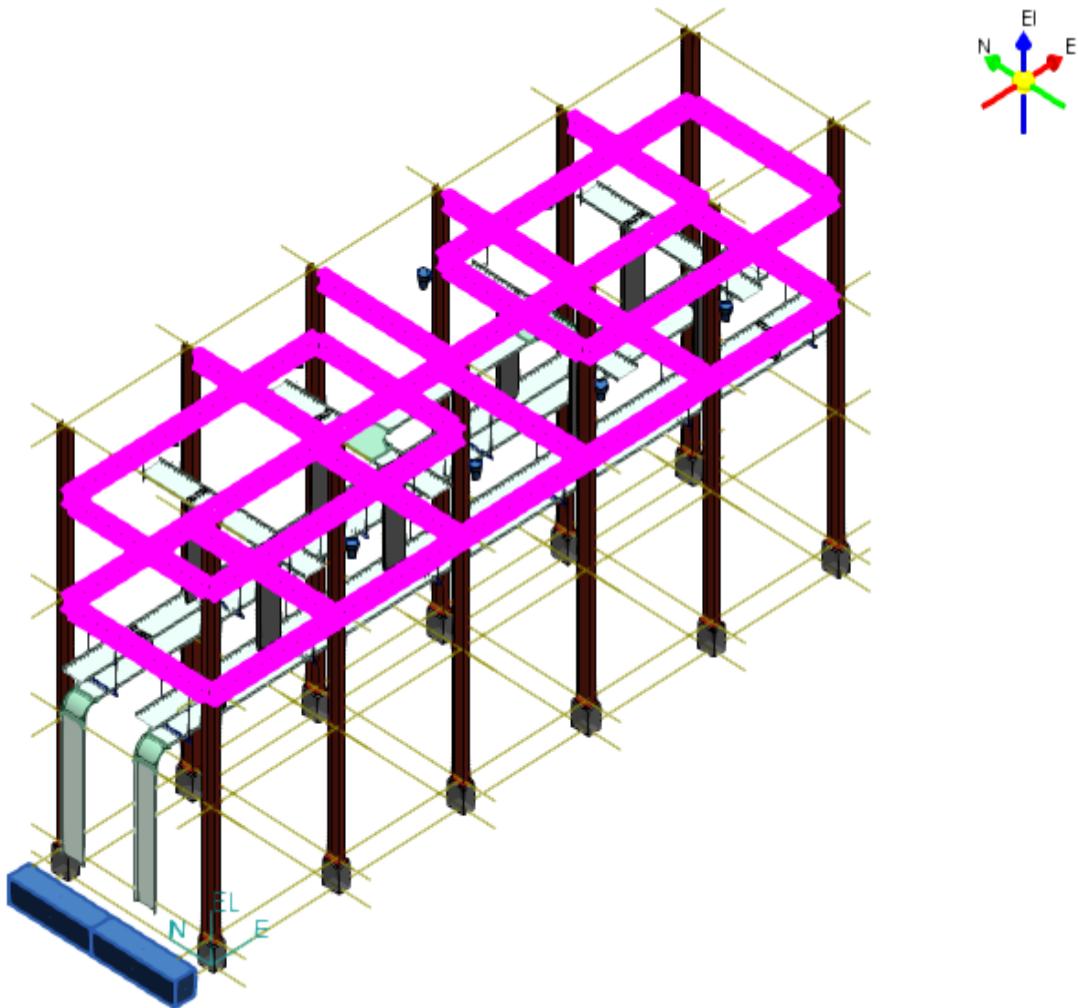


TIP You can include more than one filter by pressing the CTRL key and clicking more filters.

All structural objects are included in the current workspace.

Steps for Selecting Objects Graphically using Custom Filters

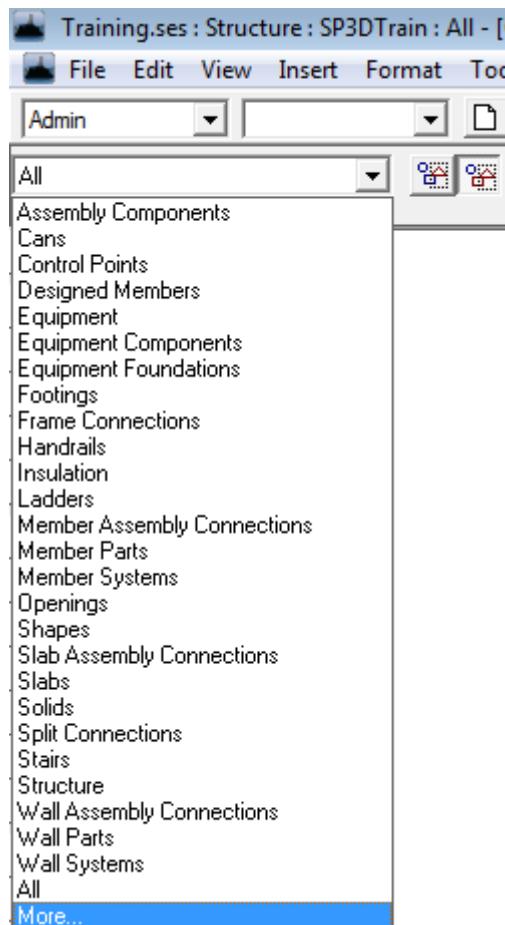
Select all the beams objects in your workspace by using a predefined catalog filter for beams.
After selecting the specified objects, the view should look like this.



1. Define your workspace to display **A2, U07**.
2. Click **Select**

*The **Select** ribbon displays.*

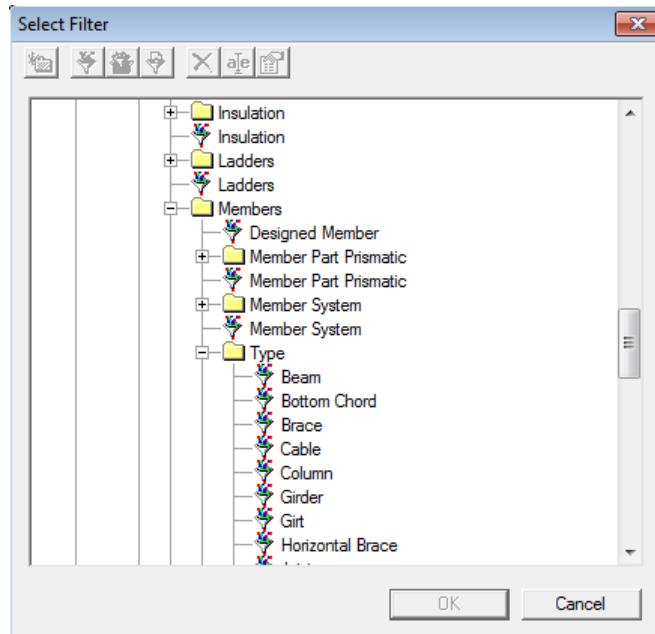
3. Under **Locate Filter**, select **More....**



The **Select Filter** dialog box displays.

Selecting Objects in a Model

4. Select **Catalog Filters > Default Filters > SP3D Object Filters > Object Types > Structure > Members > Type > Beam**, and click **OK**.



5. Click **Inside Fence** and highlight the entire structure.

The beams are highlighted in the model.

NOTE You can use these filters to perform the following:

- Control the selection of compound (or owner) objects versus selection of the constituent components. For example, in the **Piping** task, you can locate the run, the parts, or the features of the run.
- Filter on any object independent of the current task.

These filters remain available if you switch tasks, but they are not saved to the session file.

For more information, see *Using Filters: An Overview*, *Filter Properties Dialog Box*, and *Using the Tools Menu: An Overview* in the *Smart 3D Common User's Guide*.

SESSION 14

Applying Surface Style Rules

Objective

By the end of this session, you will be able to:

- Apply surface style rules to set the color and surface transparency of the objects displayed in your workspace.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Manipulating Views* (on page 71)
- *Selecting Objects in a Model* (on page 101)

Overview

The surface style rule lets you use color to distinguish objects for your individual modeling or design purposes. For example, you can display objects that are on the **To Do List** in red. You can show objects that have the approved status in one color and that have the rejected status in another color. You can show a hot service pipe in one color and a cold service pipe in another color. You can elect to show piping insulation and slabs in transparent colors so you can see the objects behind them. You can also define style rules that show objects in their approximate actual physical color if you are reviewing the model with a customer.

A surface style rule is the combination of a filter and an associated surface style. You can apply any number of surface style rules to the objects displayed in your session. An object is checked to see if it meets the filter criteria of the first surface style rule in the list of selected surface style rules. If it does, the associated surface style is applied to that object. If it does not, the next rule in the list is checked. If an object does not meet the criteria of any of the surface style rules, it is displayed in the system-defined default style.

Surface style rules are applied to objects when you:

- Place a new object.
- Edit an existing object.
- Refresh the workspace.
- Select a rule in the Workspace list, and then click **Apply** in the **Surface Style Rules** dialog box.

Applying Surface Style Rules

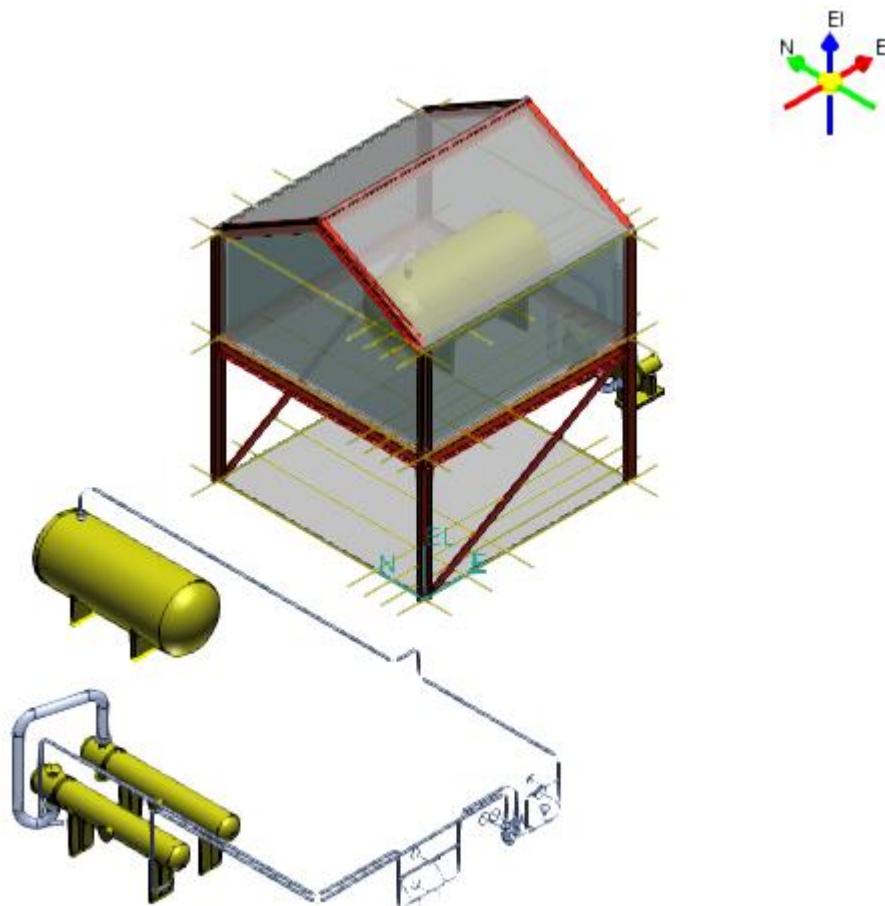
The surface style rules you select are stored in your session file and can be included in your templates.

TIPS

- Surface style rules can significantly impact the display and update performance of Smart 3D. You should use only a few rules during normal design, but may use a number of rules to create visualizations for engineering and client reviews.
- To improve performance, use filters based on object type and properties, and limit the use of filters based on the System hierarchy.

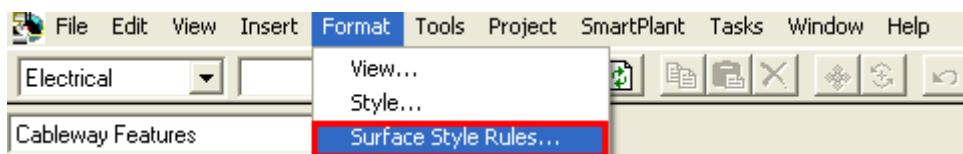
Create a Surface Style Rule

Create and apply a surface style rule to change the color of equipment objects to yellow. After applying the surface style rule, the view should resemble the highlighted area below.



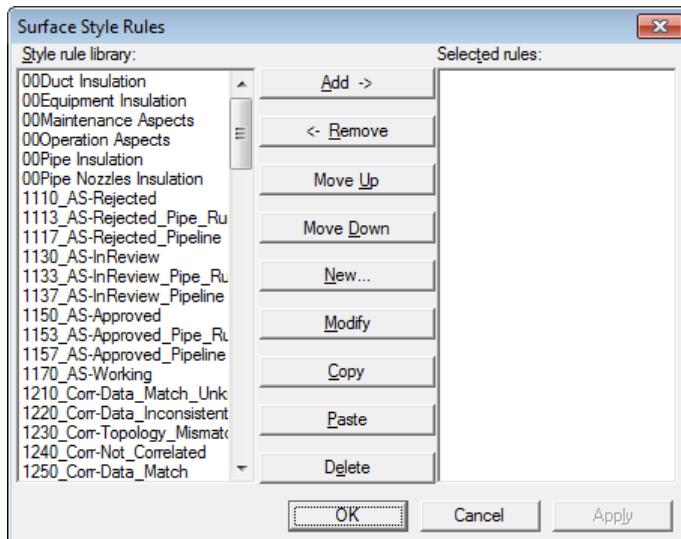
1. Define your workspace to display **Unit U04** and coordinate system **U04 CS**.

2. Select **Format > Surface Style Rules.**



The **Surface Style Rules** dialog box displays. It contains the surface style rules defined for the model.

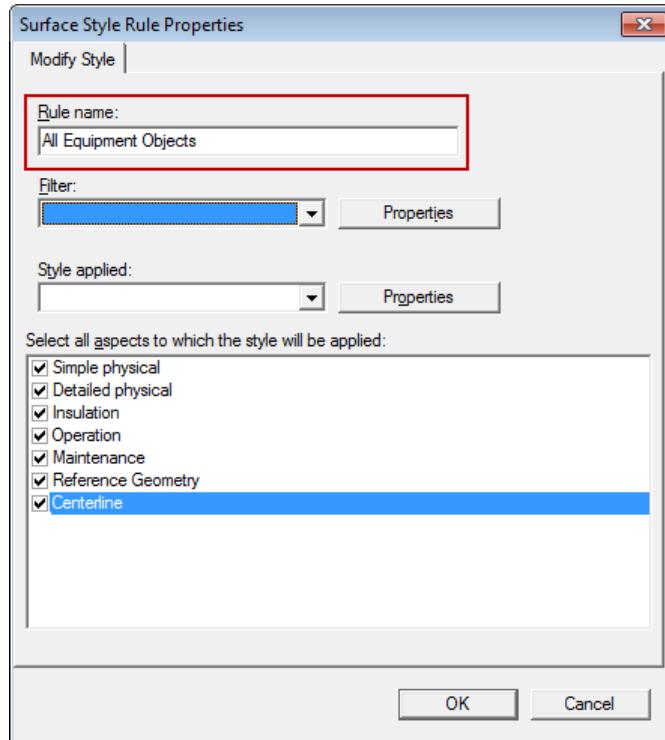
3. Click **New** to define a new rule.



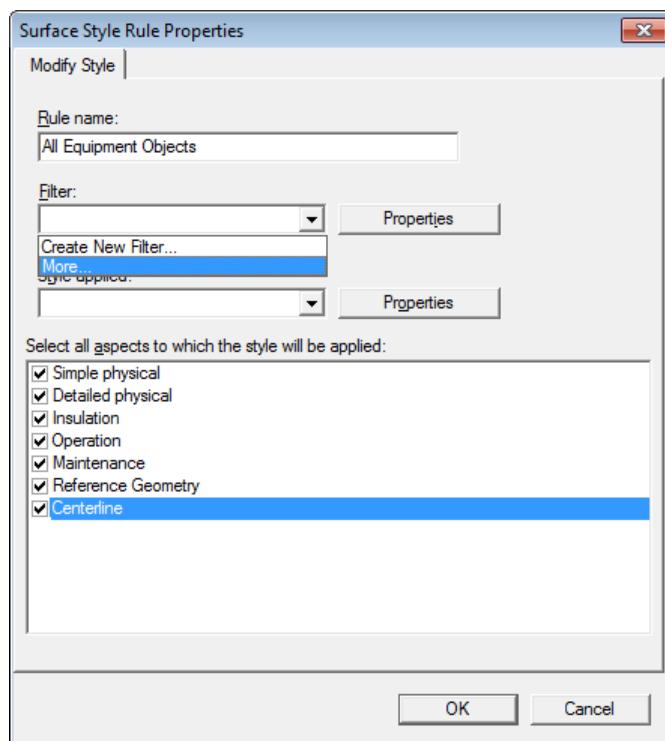
The **Surface Style Rules Properties** dialog box appears. You can define the rule name, filter, the applied style, and the geometric aspects of the object to which the style is applied.

Applying Surface Style Rules

- Type "All Equipment objects" in the **Rule** field:

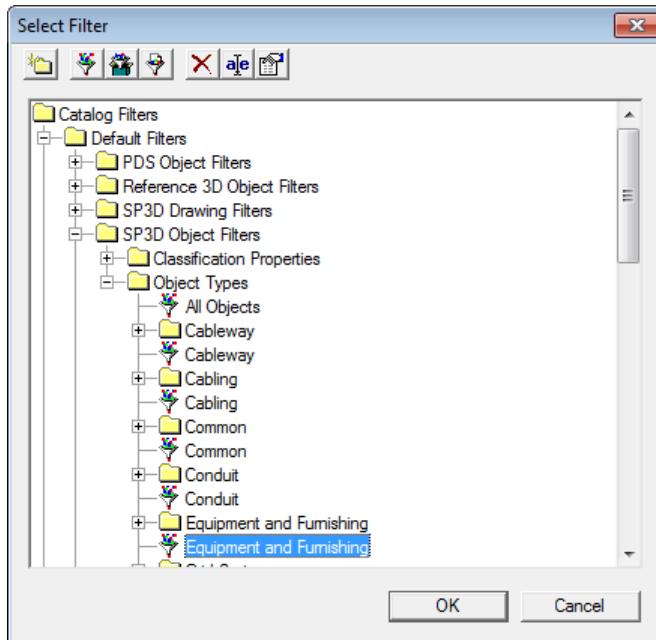


- Under **Filter**, select **More....**



The **Select Filter** dialog box displays.

6. Select Catalog Filters > Default Filters > SP3D Object Filters > Object Types > Equipment and Furnishing, and click OK.

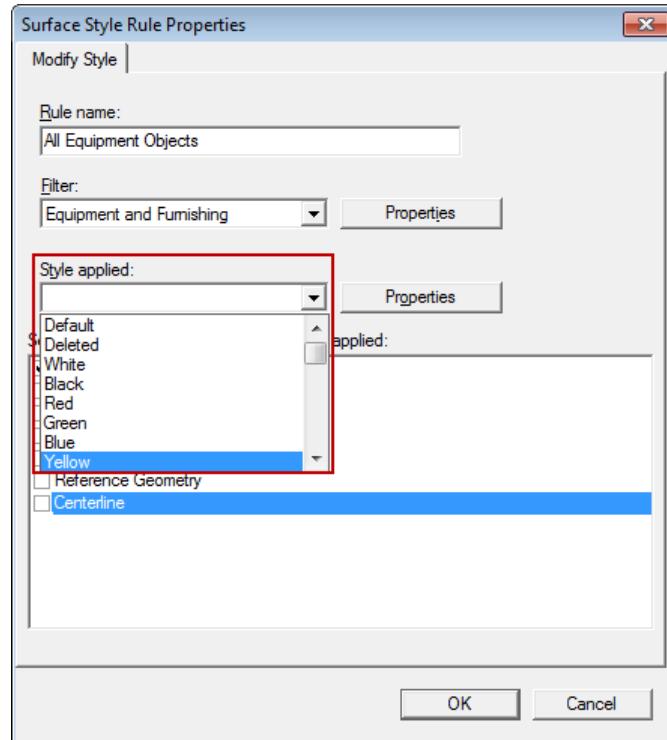


TIP

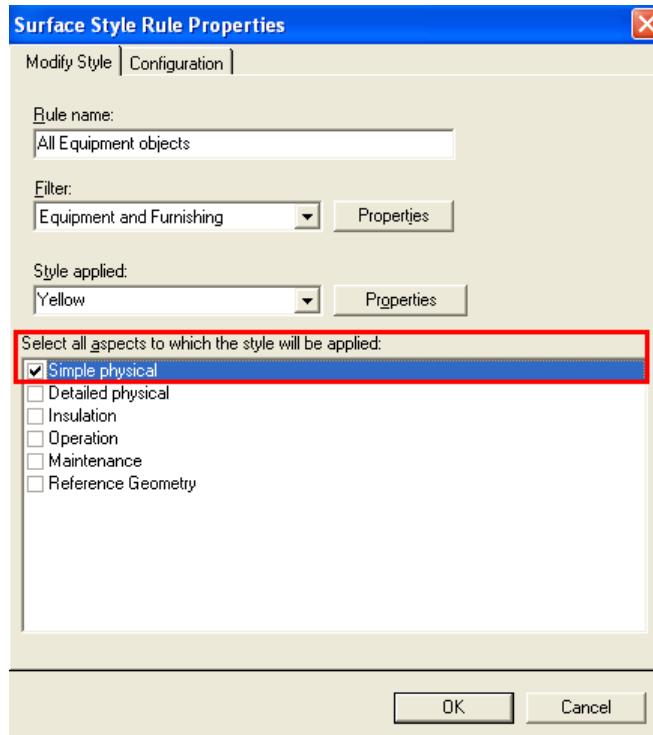
- You can modify the existing styles by selecting **Format > Style**.
- While anyone can currently edit the surface styles (change the definition of colors), the administrator should be the only one who exercises this function.

Applying Surface Style Rules

7. Under **Style applied**, select **Yellow**.



8. Under **Select all aspects to which the style will be applied**, clear all options except for **Simple Physical** and click **OK**.

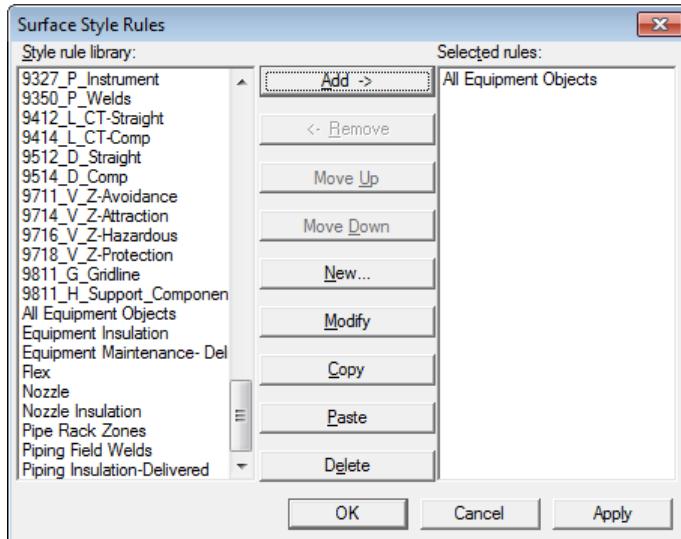


NOTES

- An aspect is an alternate geometry for a design object. An object can have one or more aspects.
- The aspects to which you can apply the selected surface style rule are:
- Simple Physical** - The physical geometry of the object that is suitable for visual recognition and interference detection purposes.
 - Detailed Physical** - A more detailed model of the physical geometry. Currently, the design objects delivered by Intergraph do not use this aspect.
 - Insulation** - Insulation geometry.
 - Operation** - The space around an object required for its operation.
 - Maintenance** - The space around an object required to perform maintenance on the object.
 - Reference Geometry** - Geometry used for design reference only and does not participate in interference checking.
 - When you create a surface style rule, the rule is assigned to your active permission group.

Applying Surface Style Rules

9. In the **Surface Style Rules** dialog box, select **All Equipment objects** and click **Add**.



10. Click **OK**.

TIP When an object is created or edited, it is checked against the filters of the surface style rules starting from the top of the list. When the object meets a filter, it is assigned that style and is not checked against the style rules further down in the list. For greatest efficiency, you should arrange the rules such that the rules appearing at the top of the list apply to most of the objects. Click **Move Up** and **Move Down** to change the order of the rules in the **Workspace** list.

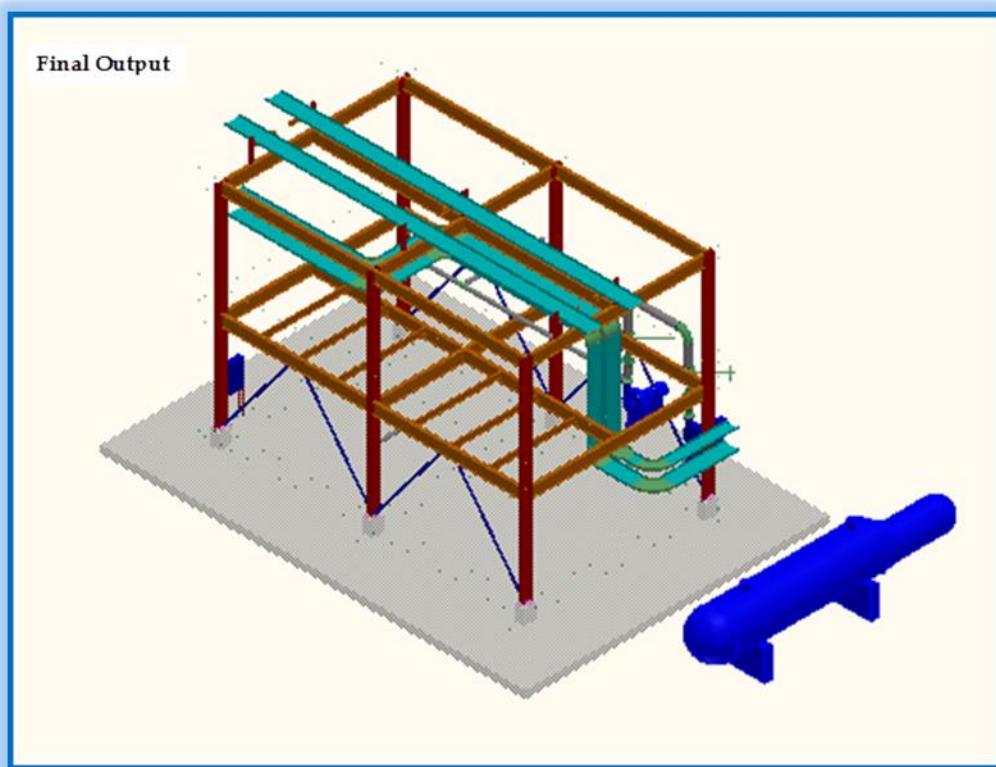
For more information, see *Using Surface Style Rules: An Overview* in the *Smart 3D Common User's Guide*.

SESSION 15

Applying Surface Style Rules to Reference 3D Objects

Creating a Surface Style Rule:

Create and apply a surface style rule to change the color of reference 3D equipment objects in your workspace to blue. After applying the surface style rule, the view of the workspace should resemble this.



Steps

1. Define your workspace to display the Reference 3D elements. In your training plant, select the **Reference 3D** filter in the **Select Filter** dialog box.
2. Select **View > Fit**.
3. Select **Format > Surface Style Rules**.

The **Surface Style Rules** dialog box displays. It contains the surface style rules defined for the model.

4. Click **New** to define a new rule.

*The **Surface Style Rule Properties** dialog box displays fields to define the rule name, filter, the applied style, and the geometric aspects of the object to which the style is applied.*

5. Type "All Reference 3D Equipment objects" in the **Rule name** field.
6. Under **Filter**, select **More**.
7. Select the **Catalog Filters > Default Filters > Reference 3D Object Filters > Object Types > Reference 3D Equipment** filter, and click **OK**.
8. Under **Style**, select **Blue**.
9. Under **Select all aspects to which the style will be applied**, clear all options except **Simple physical**, and then click **OK**.
10. To apply the rule, select the **All Reference 3D Equipment objects** rule in **Style** rule library and click **Add**.
11. Click **OK**.

All reference 3D equipment objects in the model are now blue.

SESSION 16

PinPoint Ribbon

Objective

By the end of this session, you will be able to:

- Use PinPoint to enter precision points whenever commands prompt for a point.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Manipulating Views* (on page 71)

Overview

The **PinPoint** ribbon displays when you click **PinPoint**  on the **Common** toolbar or when you select **Tools > PinPoint**. **PinPoint** controls are active when any command prompts you to enter a point. The **PinPoint** options allow you to enter precision coordinates relative to the selected coordinate system, and precision coordinate offsets relative to any point in the model.

You can change the position of the origin used for the coordinate readouts by clicking **Reposition Target**  on the ribbon and then clicking a new position in the active view. You can define the target position by entering the coordinates, or by defining a precision point found on existing geometry. As you move the cursor around, **PinPoint** displays the distances between the cursor and the target position. The target is your way of entering Delta positions. For more information, see *SmartSketch Points* (on page 133).

You can lock one or more coordinate positions by entering the coordinates in the fields. You can also use the F6, F7, and F8 to lock the East, North, and Elevation coordinates, respectively. For example, you can position your cursor so that it finds the axis of a pipe, and then press F8 to lock the elevation coordinate to the elevation of the pipe.



NOTES

- The coordinate system selected on the **PinPoint** ribbon is called the active coordinate system. All commands that have functions that reference a coordinate system use the active coordinate system.
- You can choose to work with rectangular, spherical, or cylindrical coordinates.
- You can define a temporary coordinate system with an origin and axis directions different from those of the global coordinate system or the available auxiliary coordinate systems you have defined in the Grids task.

PinPoint Ribbon

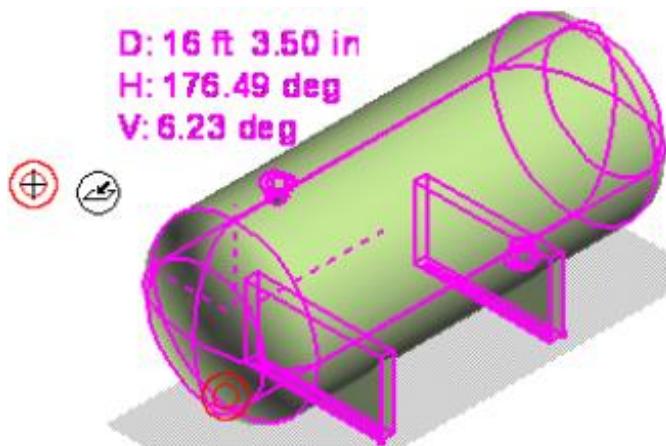
Sets options for moving or placing objects with precision.

Display On/Off (F9)

Displays or hides the **PinPoint** options and distance values. The shortcut key for this box is F9.

Reposition Target

Changes the location of the target point. The E (X) and N (Y) coordinates are relative to a target point you define in the view. Also, you can reposition the **PinPoint** target by pressing F12.



Set Target to Origin

Moves the target to the origin of the current coordinate system.

NOTE If a different coordinate system is selected in the **Coordinate System** box, you must click **Set Target to Origin** to reset the ribbon values.

Relative Tracking

Moves the target to the last location you clicked. In the **Relative Tracking** mode, the **PinPoint** target follows your mouse as you click. When toggled off, the target remains locked in the same location until repositioned.

Properties of Active Coordinate System

Shows the properties of the active coordinate system specified in the **Coordinate system** dropdown box. The dropdown lists the last seven coordinate systems selected and several options:

- **Global** - Specifies the current global coordinate system.
- **Select Graphically** - Allows you to specify the coordinate system graphically in the active window. Instructions appear in the status bar.
- **More** - Displays the **Select Coordinate System** dialog box.

Coordinate system

Sets the active coordinate system. You can select the global coordinate system. Or, you can select a coordinate system in a graphic view or from a tree view of the workspace or

database.

Define Coordinate System by 3 Points

Defines a temporary coordinate system by three points. Point 1 defines the origin of the coordinate system. Point 2 defines the end of the local x-axis. Point 3 defines the end of the local y-axis.

Rectangular Coordinates

Rectangular Coordinates

Specifies the rectangular coordinates mode for the **PinPoint** command. This is the default PinPoint mode. The following settings are added to the right side of the ribbon:

- **Step** - Specifies the **PinPoint** step value, which is an incremental distance along the **PinPoint** coordinate axes. As you use **PinPoint**, your pointer snaps to locations corresponding to the step value. You can select a step value from the list in this box, or you can type your own value.
- **E or X** - Sets the distance along the E-axis or X-axis of the active coordinate system between the target point and the current pointer location to the value that you type. The shortcut key to lock/unlock this box is F6.
- **N or Y** - Sets the distance along the N-axis or Y-axis of the active coordinate system between the target point and the current pointer location to the value that you type. The shortcut key to lock/unlock this box is F7.
- **EL or Z** - Sets the distance along the EL-axis or Z-axis of the active coordinate system between the target point and the current pointer location to the value that you type. The shortcut key to lock/unlock this box is F8.

NOTES

- Use single or double quotation marks to enclose the reference name plane. The reference plane must belong to the active coordinate system.
- Multiplication is supported. Parentheses are not supported as part of input, but the software uses standard computation operator precedence. However, expressions involving multiplication should use only one length unit. Examples include '**F10' + 2*4m*3**' and '**"F10"-2*3*4m, - 3*4cm-3m*2+6"**'.
- If an error occurs because of an invalid expression, see the *Troubleshooting Reference Guide* available from **Help > Printable Guides** for more information.

Spherical Coordinates

Spherical Coordinates

Specifies the spherical coordinates mode for the **PinPoint** command. The following settings are added to the right side of the ribbon:

- **Distance** - Sets the distance between the target and the pointer location. The shortcut key to lock/unlock this box is F6.
- **Horizontal** - Sets the horizontal angle, which is measured clockwise from the N-axis or Y-axis. This angle is in the horizontal plane. The shortcut key to lock/unlock this box is F7.

- **Vertical** - Sets the vertical angle, which is measured counter-clockwise from plan horizontal. This angle is from the horizontal plane. The shortcut key to lock/unlock this box is F8.

NOTE When you use spherical coordinates and lock the absolute distance, you must also lock at least one of the angle boxes on the ribbon. You cannot unlock an angle while the absolute distance is locked and no other angle is locked.

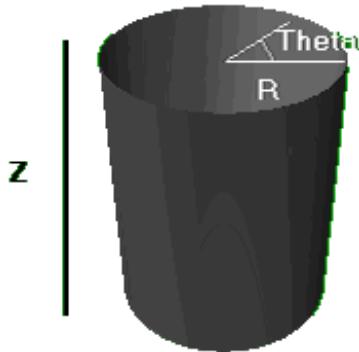
Cylindrical Coordinates

Cylindrical Coordinates

Specifies the cylindrical coordinates mode for the **PinPoint** command. The following settings are added to the right side of the ribbon:

- **Radius** - Sets the radius of the cylinder. The shortcut key to lock/unlock this box is F6.
- **Theta** - Sets the horizontal angle, measured from North and clockwise. The shortcut key to lock/unlock this box is F7.
- **Z** - Sets the height of the cylinder. The shortcut key to lock/unlock this box is F8.

The following graphic represents how the cylindrical measurements are set:



Lock and Unlock

Use **Lock**  and **Unlock**  in conjunction with the settings dropdowns for the Rectangular (F6), Spherical (F7), and Cylindrical (F8) coordinates. The current state of the button indicates whether the setting is locked or not. Deleting the contents of the box automatically unlocks the setting.

Practice Using Precision Point Tools

When a command prompts you to enter a point, you can enter the exact point with **PinPoint** and Smartsketch precision point hot spots on graphic objects. **PinPoint** allows you to view and enter coordinates relative to the coordinate system of your choice.

1. Define a workspace to display all systems of the training plant.
2. Select **Tasks > Equipment and Furnishings**.
3. Click **PinPoint**  to activate the **PinPoint** ribbon.

*The **PinPoint** ribbon displays.*

- Under **Coordinate system**, select **More....**

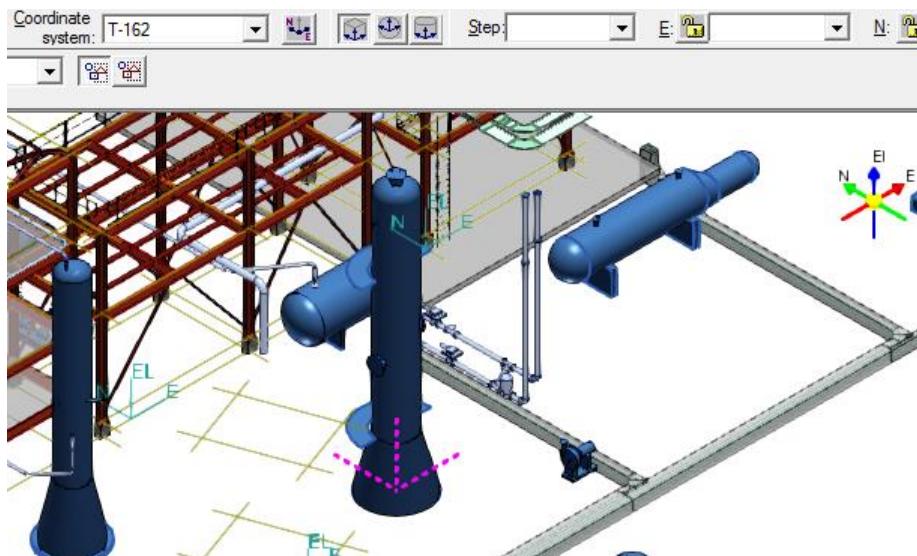
NOTES

- Previously selected coordinate systems display in the list along with the delivered options.
- All coordinates are stored in the database relative to the native global coordinate system. You cannot edit the global coordinate system. You can create other coordinate systems in the **Grids** task to use as convenient references for modeling different portions of the plant.

- Select **U04 CS** and click **OK**.

Select Graphically prompts you to select an object in the model. You can select a coordinate system by pointing at the coordinate system graphic, or you can select any object that has a local coordinate system, such as an equipment object or a structure member.

- Select **Select graphically**, select a structure member, and select equipment **T-162**.



- Under **Coordinate System**, select **U04 CS**.

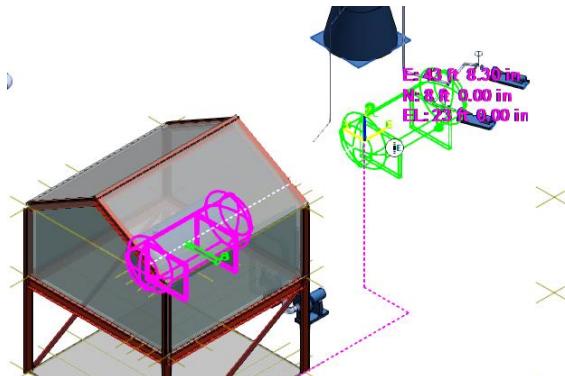
NOTE After you select the active coordinate system, you must define the origin from which the displayed coordinates are measured, or the target. The target allows you to view and enter coordinates relative to any point in the model. When you change the active coordinate system, the target position does not move. You can set the target to the origin of the active coordinate system with **Set Target to Origin** .

- Click **Set Target to Origin** .
- Click **Rectangular Coordinates** .

The rectangular coordinates display the coordinates of the current cursor position relative to the target.

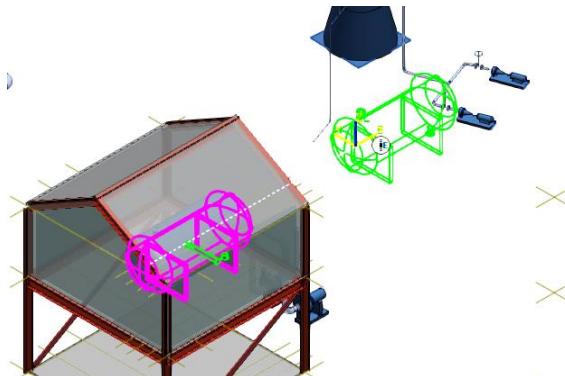
- Select equipment 41V-101 and click **Move** .

Move To  is selected by default.



Grid lines connect the target to the new location along the active coordinate system, and the coordinates of the new location display.

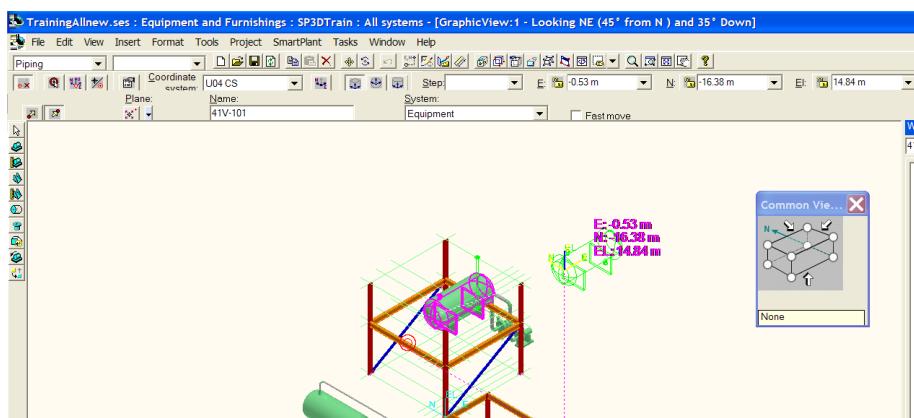
11. Press F9 to turn off the **PinPoint** graphics, and then press F9 again to turn the display back on.



NOTE You can set the target location to get coordinates relative to any point in the model.

12. Click **Reposition Target**  and hover over the midpoint of the indicated member, or hover over the midpoint and press F12.

A *glyph* displays indicating a midpoint.



13. Click **Move From**  to select a different reference point on the equipment.

14. Hover over the top nozzle of equipment 41V-101 and press F12 to set the target to the nozzle point.

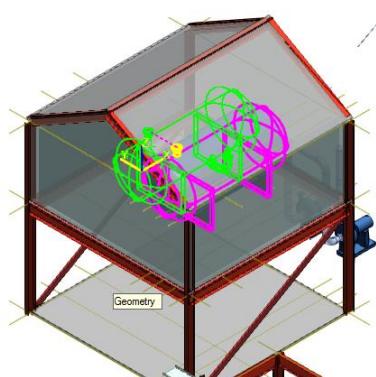
15. Hover over the nozzle and click to set the nozzle point as the "move from" point.

NOTE You can also click **Relative Tracking**  before you click **Move From** . This automatically resets the target to the last point you enter.

16. Set and lock the **East** and **Elevation** coordinates to **0.00 m**, so that movement is only permitted along the **North** axis.

17. Hover over the midpoint of the indicated member and click to move the equipment.

The nozzle point is moved to the north middle of the equipment.



18. Select **Edit > Undo** to undo the move.

For more information, see *Using the Tools Menu: An Overview* in the *Smart 3D Common User's Guide*.

Quiz:

1. Which types of coordinates can you define on the **PinPoint** ribbon?
2. Which of the following options can you use to change the target position?

- 
- 
- 
- 

SESSION 17

SmartSketch Points

Objective

By the end of this session, you will be able to:

- Use the SmartSketch options to locate precision points.
- Use SmartSketch points and **PinPoint** to enter precision points.
- Use the **Add to SmartSketch List** ribbon options to locate SmartSketch points in dense models.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)

Overview

When a command prompts you to select a point in the model, the software activates the SmartSketch point location function. When you are near a SmartSketch point, the geometric objects are highlighted and a small glyph displays the specific type of precision point found. When you click to enter the point, the precision point's coordinates, type, and objects are supplied to the command. Many commands create associative point relationships that maintain the precision point location if the geometric objects are modified.

TIP To understand the modification behavior of the different design objects, it is important to understand when associative points are established.

The basic types of SmartSketch points are:

- Key points on connection ports, such as piping nozzles, conduits, HVAC, and foundation ports.
- Key points on geometry, such as end points, divisor points, points along a linear object, and the center of a circle.
- The intersection point of two linear objects, or a point along the intersection of two planes.
- Linear relationship points. When a command prompts for two points, you can use the points to create a line parallel or perpendicular to another linear object or axis.

You can only locate SmartSketch points on objects that have been added to the SmartSketch list. You can add objects to this list automatically by hovering over the object for the designated dwell time, or you can adding objects to the SmartSketch list manually by pressing CTRL+D and selecting objects. Manually adding objects to the list is useful if your model is so dense that it is hard to locate the SmartSketch point on a specific object of interest.

You can lock and unlock relationships to keep track of SmartSketch points as you search for other points in the model. To lock a relationship, wait until a relationship indicator displays and

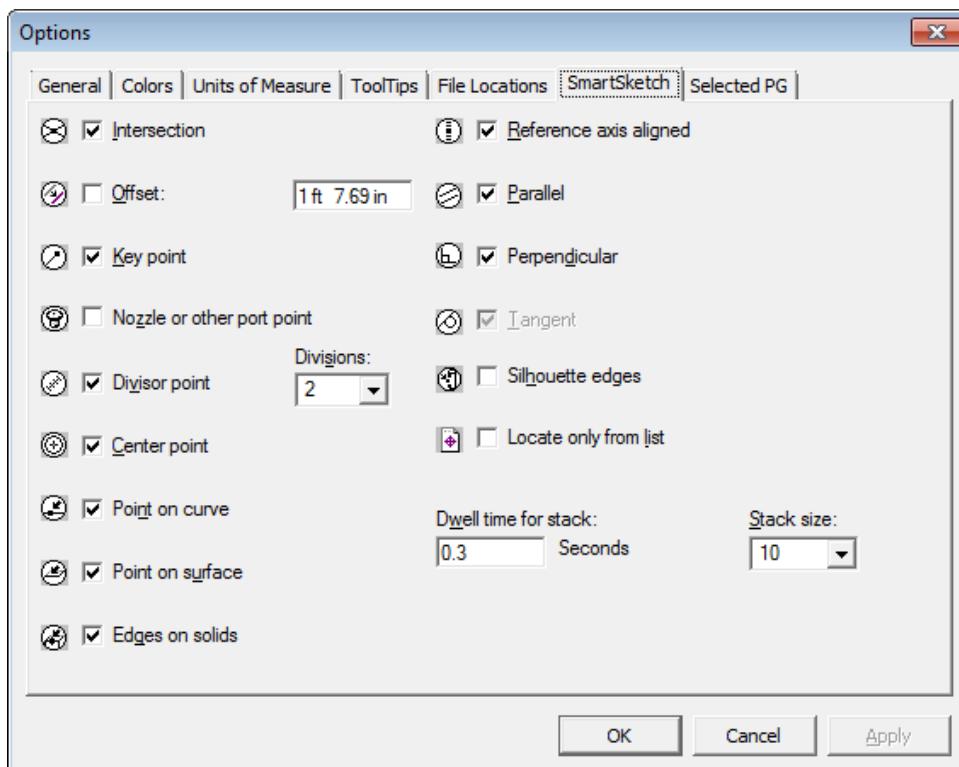
SmartSketch Points

click click the middle mouse button. To unlock a relationship, click the middle mouse button again. Locking and unlocking relationships is also helpful if you want to isolate points in a dense model.

Add to SmartSketch List  allows you to control the behavior of the precision point location. The Add to SmartSketch List ribbon displays:



 **SmartSketch Options** - Displays the Options dialog box, which allows you to specify the SmartSketch points that you want the software to locate.



- **Intersection** - Indicates where two or more linear objects or parallel planes intersect.
- **Offset** - Specifies the offset value from an object or line you have added to the SmartSketch List.

TIP You need a projection plane to locate offset points. You can set the projection plane using controls on the ribbon of the routing commands, Move command, and the 3D sketch component used in several application object modeling commands (for example, handrail and slab).
- **Key point** - Indicates a point that the object is defined as important for design purposes. For example, a nozzle has a key point at the center of the port.
- **Nozzle or other port point** - Indicates a connection port, such as a pipe nozzle.
- **Divisor point** - Indicates where a line is divided equally into divisions.
- **Center point** - Indicates the center of a circle or an arc.

- **Point on curve** - Indicates any connection point on an object, such as a nozzle on a piece of equipment.
- **Point on surface** - Indicates a surface.
- **Edges on solids** - Indicates an edge on a solid object, such as structure members, walls, and slabs.
- **Reference axis aligned** - Indicates when the line is aligned with the E-, N-, or EL-axis of the Active Coordinate System.
- **Parallel** - Indicates when the line is parallel to another linear object in the SmartSketch list. When this indicator appears, the software highlights the parallel objects. For example, if you add a section of a pipe that runs parallel to another pipe that has been added to the SmartSketch List, the glyph displays and both the objects are highlighted.
- **Perpendicular** - Indicates when the line is perpendicular to another linear object in the SmartSketch list, such as two pipes connected at a 90 degree angle.
- **Tangent** - Indicates when the line is tangent to an object.
- **Silhouette edges** - Displays an indicator  when you move the pointer over the silhouette edges of surfaces.

TIPS

- Most of the **Add to SmartSketch List** controls are also available on the SmartSketch tab of the Options dialog box.
- When a command is prompting you to locate a point, you can press F3 to toggle the relationship indicator for locating surfaces on and off. This makes locating key points much easier.

 **Select** - Selects objects to add to the SmartSketch list.

 **Delete** - Removes all objects from the SmartSketch list.

 **Locate on List Only** – Specifies that objects must be added to the SmartSketch list manually. If this option is not selected, objects are added automatically when you hover over the object for the indicated dwell time. You can either use **Select** or you can press CTRL + D at any time a command is prompting for a point and pick.

Dwell time – Specifies how long you must hover over an object before it is automatically added to SmartSketch list. We recommend setting the **Dwell time** to 0.5 seconds.

List size - Specifies the capacity of the SmartSketch list. This value must be an integer greater than 1. **List size** is the same property as **Stack size** on the **SmartSketch Properties** dialog box.

For more information, see *Using the Tools Menu: An Overview* in the *Smart 3D Common User's Guide*.

Quiz:

1. When does the software display SmartSketch points?
2. How do you select which SmartSketch point options are active?
3. When should you use the **Locate on List Only** option?
4. Where is this option located?

SmartSketch Points

5. How do you lock a SmartSketch relationship before you enter the point?

SESSION 18

Measure Ribbon

Objective

By the end of this session, you will be able to:

- Measure distance, radius, and angle.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Manipulating Views* (on page 71)

Overview

The **Measurement** ribbon displays when you click **Measure**  or when you select **Tools > Measure**. The measurements are temporary and are not stored in the model. You can specify the units of measurement under **Units of Measure** in the **Options** dialog box.

Measure  allows you to do the following:

- Measure the distance between two points.
- Measure the minimum distance between two objects.
- Display the diameters and radii of holes and fillets.
- Determine the angle between two lines or surfaces.
- Display the cumulative sum of measurements.

Measure Ribbon

Sets options for measuring distances and angles by three-dimensional representation of the E-, N-, and EL-axes (X-, Y-, and Z-axes).

Coordinate System Properties

Shows properties of the active coordinate system.

Coordinate system

Assigns the coordinate system to use to define the axis directions.

Define Coordinate System by 3 Points

Defines a temporary coordinate system by three points. Point 1 defines the origin of the coordinate system. Point 2 defines the end of the local E-axis (X-axis). Point 3 defines the end of the local N-axis (Y-axis).



Measure Distance Between 2 Points

Measures the linear distance between two key points. A key point is any point that you can highlight with the SmartSketch relationship indicators.



Measure Minimum Distance

Measures the shortest distance between two objects.

NOTE The software does not use the SmartSketch list when measuring minimum distance. The SmartSketch list is used, however, when measuring distance.



Measures from a reference point on an element to the last point clicked on the element, or along the entire element. This mode is similar to the **Point Along** command.



Measures the diameter or radius of a hole or fillet.



Measures the angular value between three key points or two surfaces.



Measures the angle between two objects in the model.

Plane

Measures the minimum distance between two objects as projected to a selected plane. The following options are available:

- **No Plane** - Measures the minimum distance between the two objects.
- **Plan Plane** - Calculates the apparent minimum distance between the two selected objects. The software calculates the minimum distance along the east and north coordinates and displays it on the ribbon bar. The minimum distances also displays in the graphic view using the annotation texts at the middle point of the solid yellow lines.
- **Elevation Plane - East West** - Calculates the minimum distance along the north and elevation coordinates and displays it on the ribbon bar. The distance also displays in the graphic view using the annotation texts at the middle point of the solid yellow lines.
- **Elevation Plane - North South** - Calculates the minimum distance along the east and elevation coordinates and displays it on the ribbon bar. The distance also displays in the graphic view using the annotation texts at the middle point of the solid yellow lines.



Resets the **Cumulative** box to zero.

Cumulative

Sums repeated measurements until you clear this box or switch between angle and distance modes.

The remaining controls on the ribbon (defined below) depend on your selection of measuring distance, minimum distance, or angle.

Measuring Distance

Distance

Displays the distance value. You can specify the units by clicking **Tools > Options** and selecting the **Units of Measure** tab.

Δ East (X)

Displays the distance along the E-axis (X-axis).

Δ North (Y)

Displays the distance along the N-axis (Y-axis).

Δ Elevation (Z)

Displays the distance along the EL-axis (Z-axis).

Measuring Minimum Distance

Minimum Distance

Displays the minimum distance value. You can specify the units by clicking **Tools > Options** and selecting the **Units of Measure** tab.

Δ E (X)

Displays the distance along the E-axis (X-axis).

Δ N (Y)

Displays the distance along the N-axis (Y-axis).

Δ EL (Z)

Displays the distance along the EL-axis (Z-axis).

Measuring Radius or Diameter

Radius

Displays the radius of the hole or fillet.

Diameter

Displays the diameter of the hole.

Measuring Angles

Angle

Displays the angle measurement. You can specify the units by clicking **Tools > Options** and selecting the **Units of Measure** tab.

Apparent angle

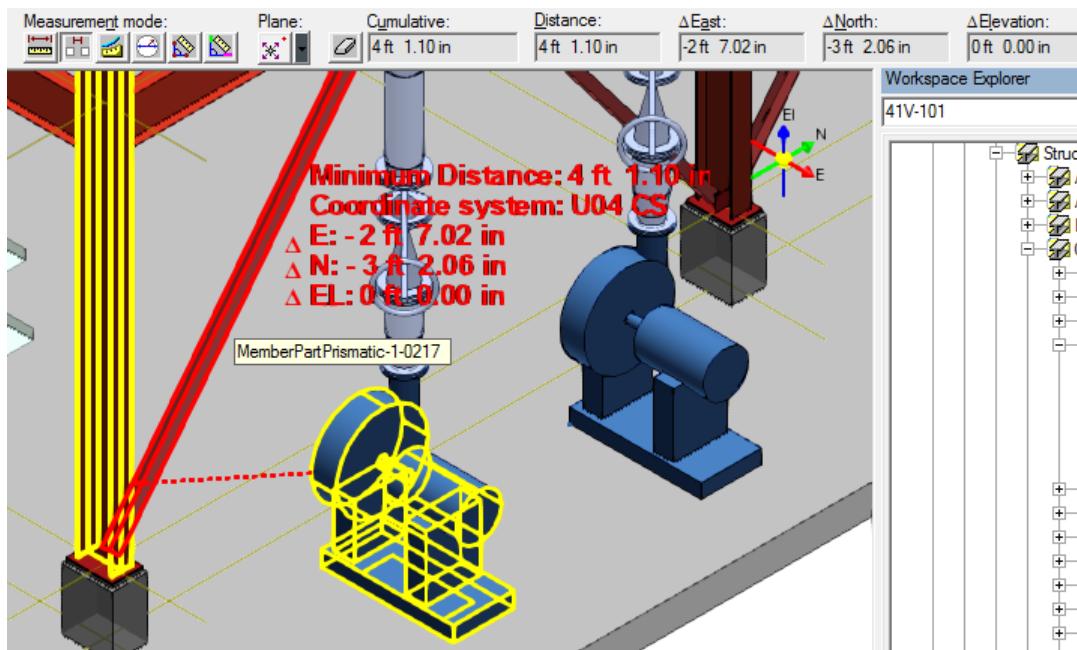
Measures the angle of the lines projected onto the active view plane. If lines intersect (coplanar), then both the **Angle** and **Apparent angle** boxes display values. If lines do not intersect (are not coplanar), then only the **Apparent angle** box displays a value.

Copy Measurement

Copies the measurement values from the ribbon. Measure the minimum distance between two objects

1. Open Tools > Options > SmartSketch and select Edges on solids.
2. Click **Measure Minimum Distance** .
3. Select the pump and the column.

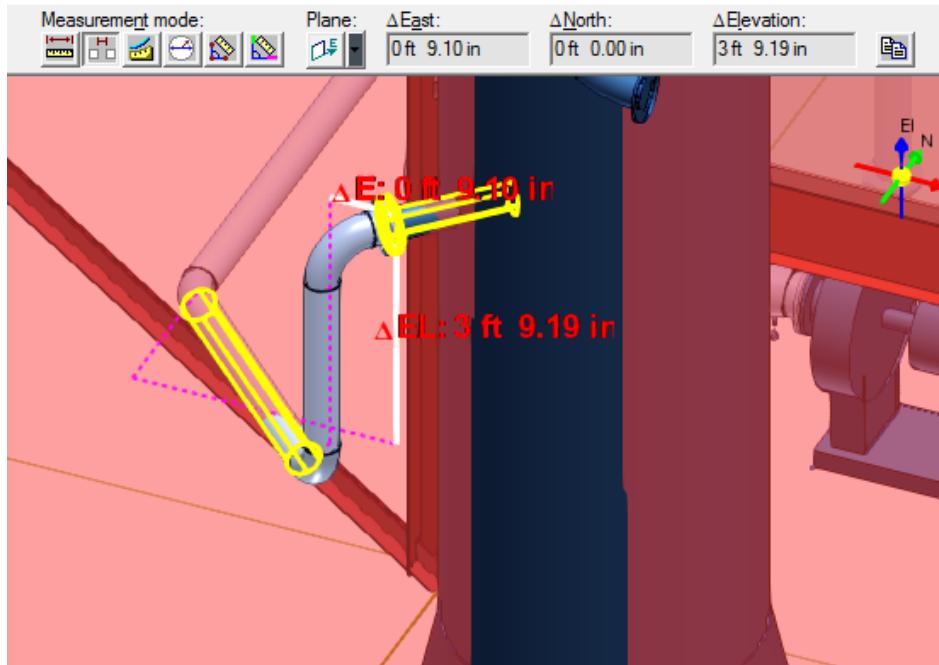
The minimum distance between the two objects and the distance along the active coordinate system axes display on the **Measure** ribbon and the graphic view, as shown below.



Measure the minimum distance between two objects as projected to a selected plane

1. Click **Measure Minimum Distance** .
2. Select a pipe and a nozzle, as shown below.

3. Under **Plane**, select **Elevation Plane - East West** .

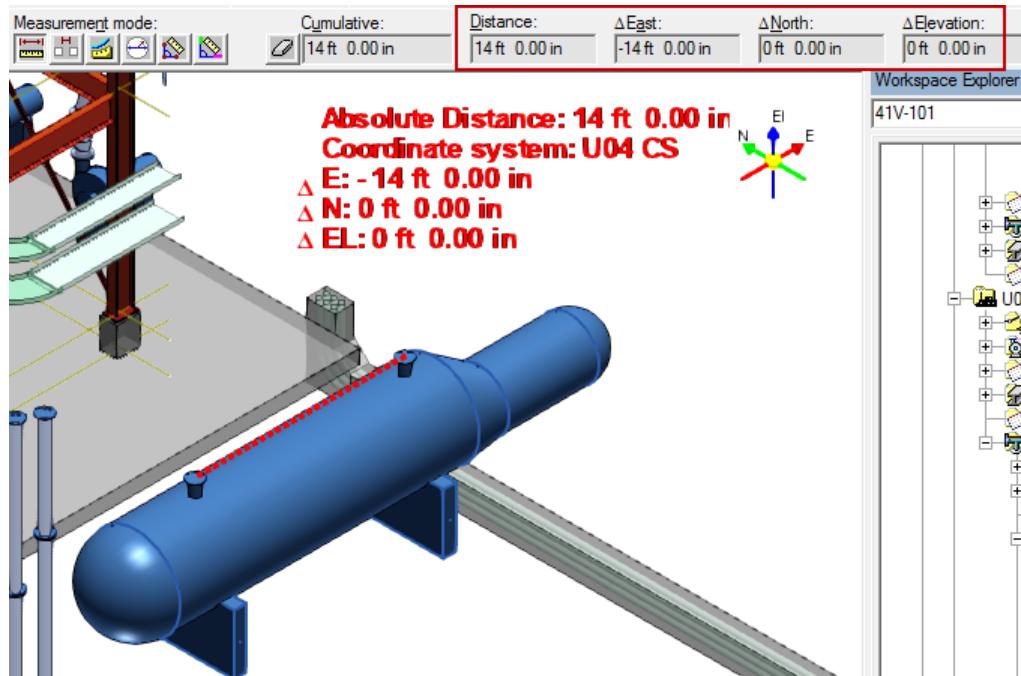


Measure the distance between two points

1. Click **Measure Distance Between 2 Points** .
2. Select the two nozzles on the tank shown below.

Measure Ribbon

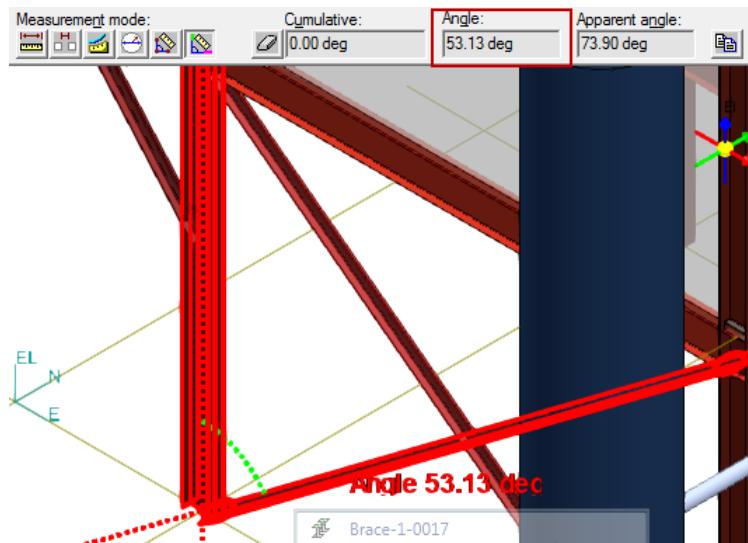
The absolute distance between the two points and the distance along the active coordinate system axes display on the **Measure** ribbon and the graphic view.



Measure the angle between objects

1. Click **Measure Angle Between Objects**
2. Select the column and the brace shown below.

If the lines or planes defined by the selected objects intersect, the angle between them displays on the **Measure** ribbon. If they do not intersect, only the apparent angle found by the projection to the view plane displays.



Measure the angle between three points

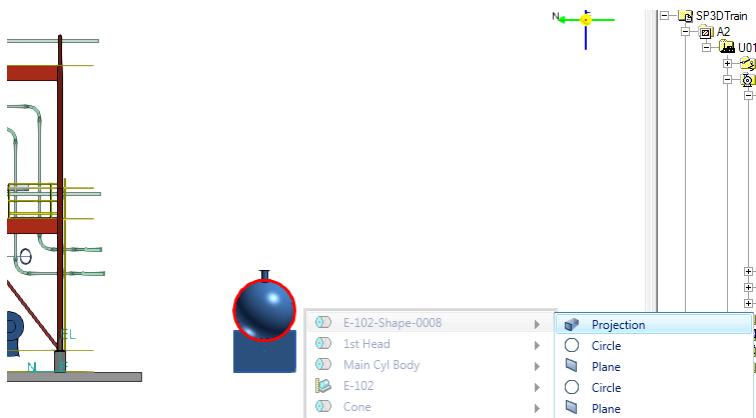
1. Click **Measure Angle Between 3 Points** .
2. Select the first, second, and third points.

*The angle defined by the three points displays on the **Measure** ribbon.*

Find the centroid of an object

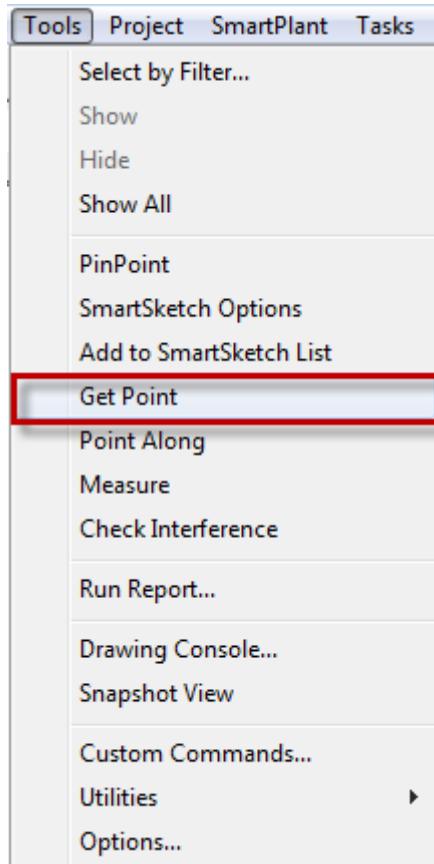
You can now find the centroid of cylinders, curves, spheres, boxes, circles and lines using **Tools > Get Point**.

1. Define your workspace to display **Unit U01** and coordinate system **U01 CS**.
2. From **Common Views**, select **Looking East**.



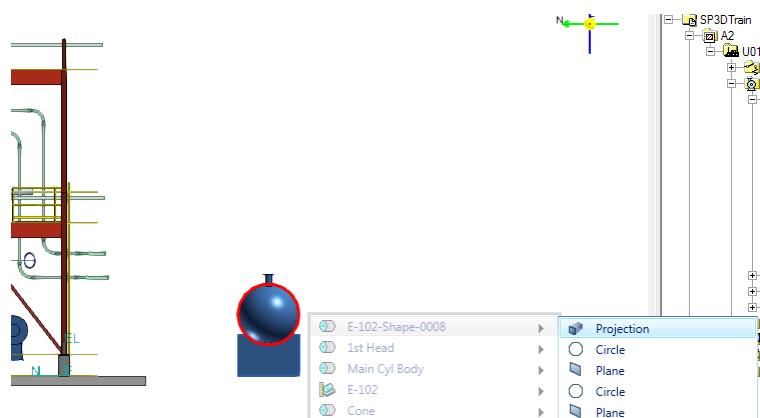
Measure Ribbon

3. Select **Tools > Get Point.**



4. Click the front of equipment E-102.

The selected part is outlined.



The center of the pump is selected.



For more information, see *Using the Tools Menu: An Overview* in the *Smart 3D Common User's Guide*.

Quiz:

1. How do you define a temporary coordinate system?
2. What options change on the **Measure** ribbon if you select different measurement modes?
3. Which measurement options measure the shortest distance between two objects?

Measure Ribbon

Assigning Objects to WBS Items

Objective

By the end of this session, you will be able to:

- Assign objects to a Work Breakdown Structure (WBS) item.
- Describe uses for the Work Breakdown Structure.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Manipulating Views* (on page 71)
- *Selecting Objects in a Model* (on page 101)
- *Applying Surface Style Rules* (on page 115)

Overview

The Work Breakdown Structure (WBS) allows you to define additional groupings of design objects. This is useful when you want to divide the design for contracting or fabrication purposes.

The first level of grouping object is the Project, or As-Built. This grouping helps owner operators manage the project work on existing facilities. EPCs can use the Project grouping for major divisions of responsibility. An object can only belong to one project.

You can nest additional types of groupings, called WBS Items, under the project. To assign an object to a WBS Item, it must be claimed to the same project as the WBS Item. An object can belong to more than one WBS Item. Your company can customize the type of WBS Item by editing the Catalog. The default types delivered with the product are suitable for contracting activities in the different disciplines. For example, the piping application uses the WBS Item groupings to manage the assignment of pipes to specific isometric drawings.

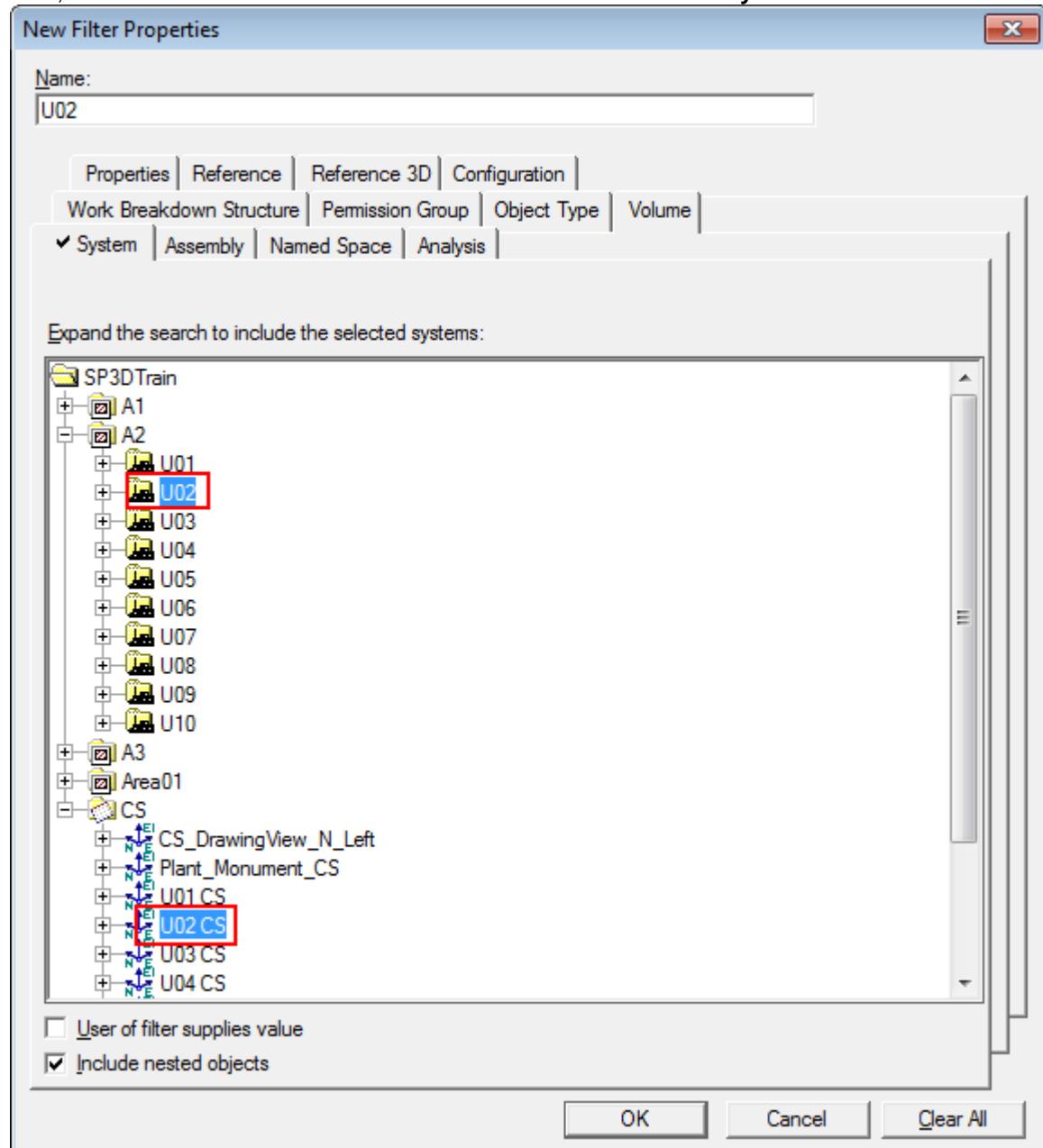
You can assign objects to WBS projects and items after they are created. You can also assign the objects automatically as you create them. If the current active group is a project, all new objects are assigned to that active project when they are created. If the current active group is a WBS Item, objects are first assigned to the parent project of the WBS Item, and then to the WBS Item.

When you edit an object, it retains its current project and/or WBS Item relationship. You change the project parent of an object by selecting the object and running **Claim**. You can change the WBS Item relationship with **Assign to WBS**.

Manually Assign Objects to a WBS Item

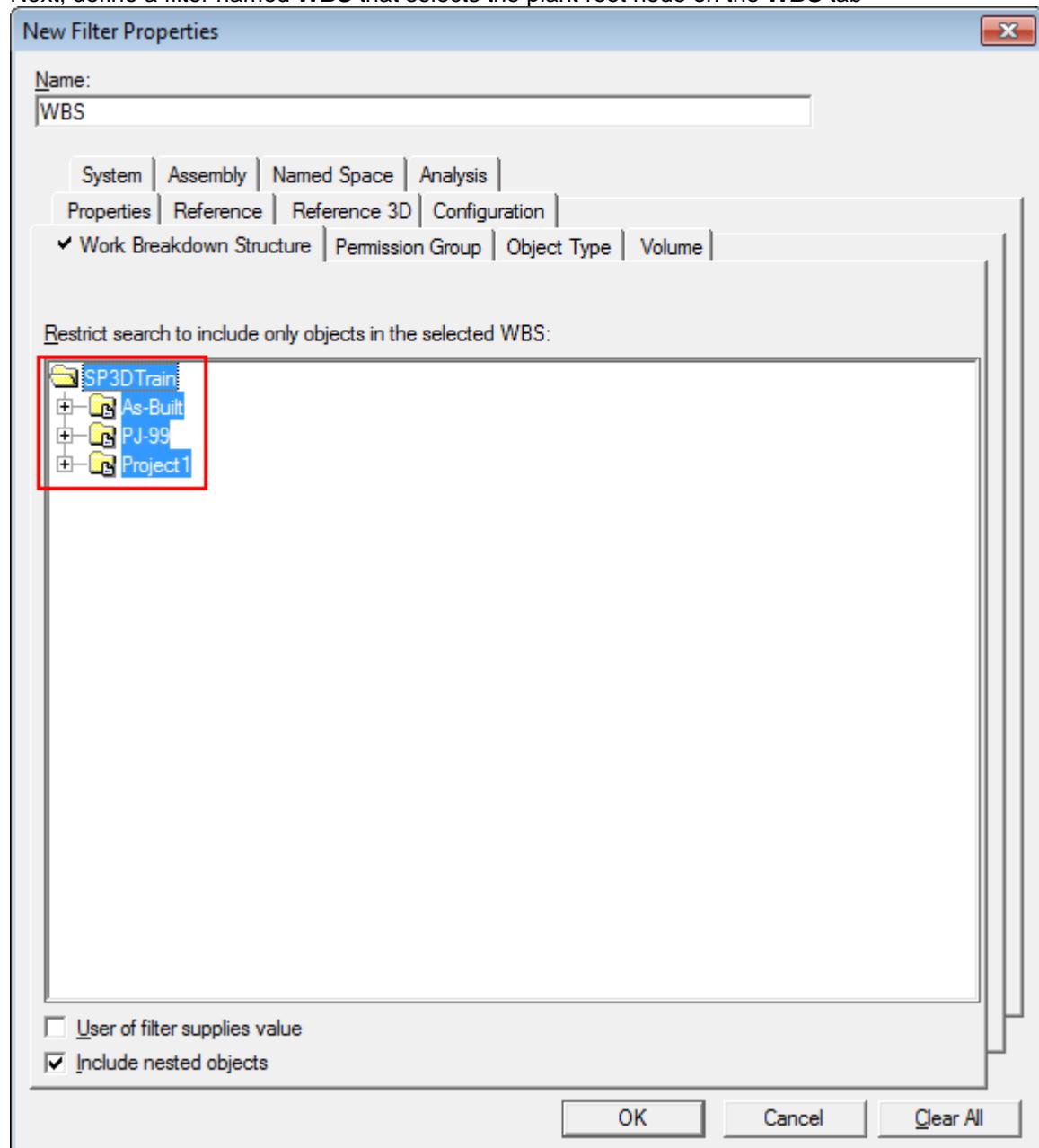
Assign all the structural objects of Unit U02 to a WBS Item, Contract2, of your active project.

1. Define your workspace to show **Unit U02** and projects under the **WBS Hierarchy** using the compound filter created below.
2. First, define a filter named **U02** that select **U02** and **U02 CS** on the **System** tab

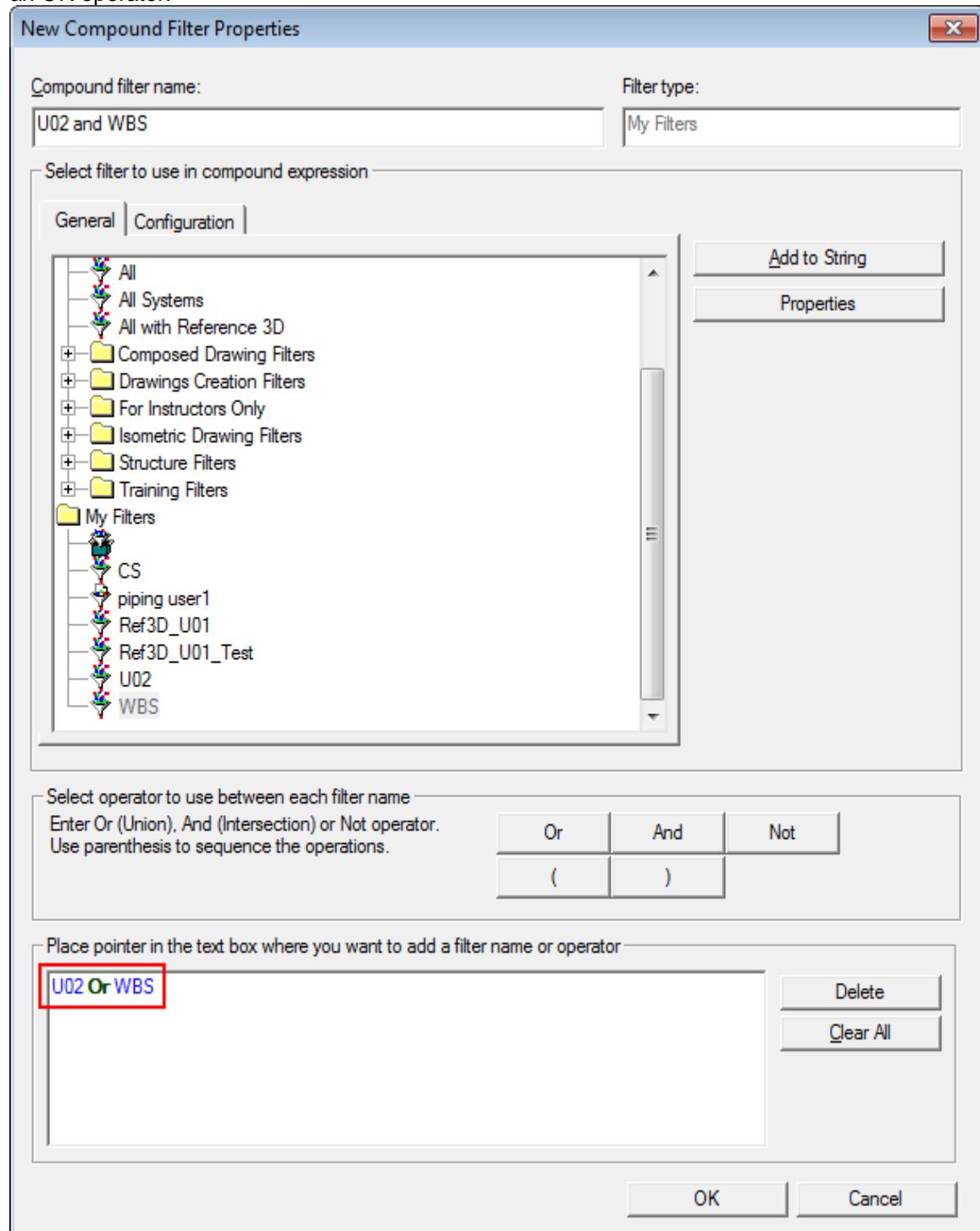


Assigning Objects to WBS Items

3. Next, define a filter named **WBS** that selects the plant root node on the **WBS** tab

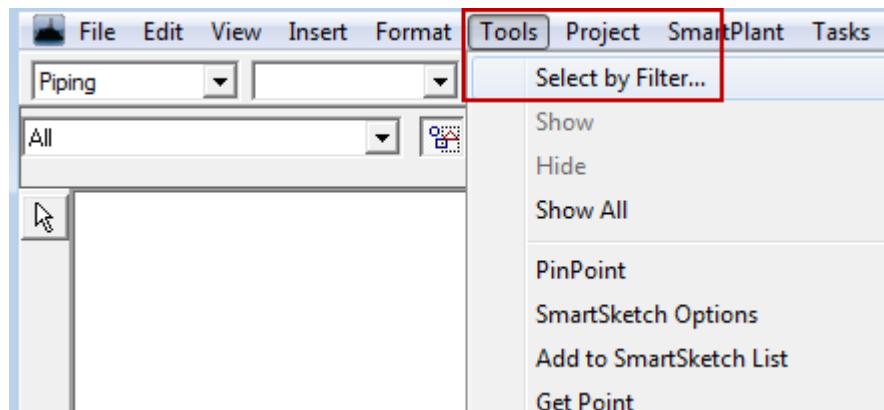


4. Finally define a compound filter named **U02 and WBS** that select both the above filters with an OR operator.

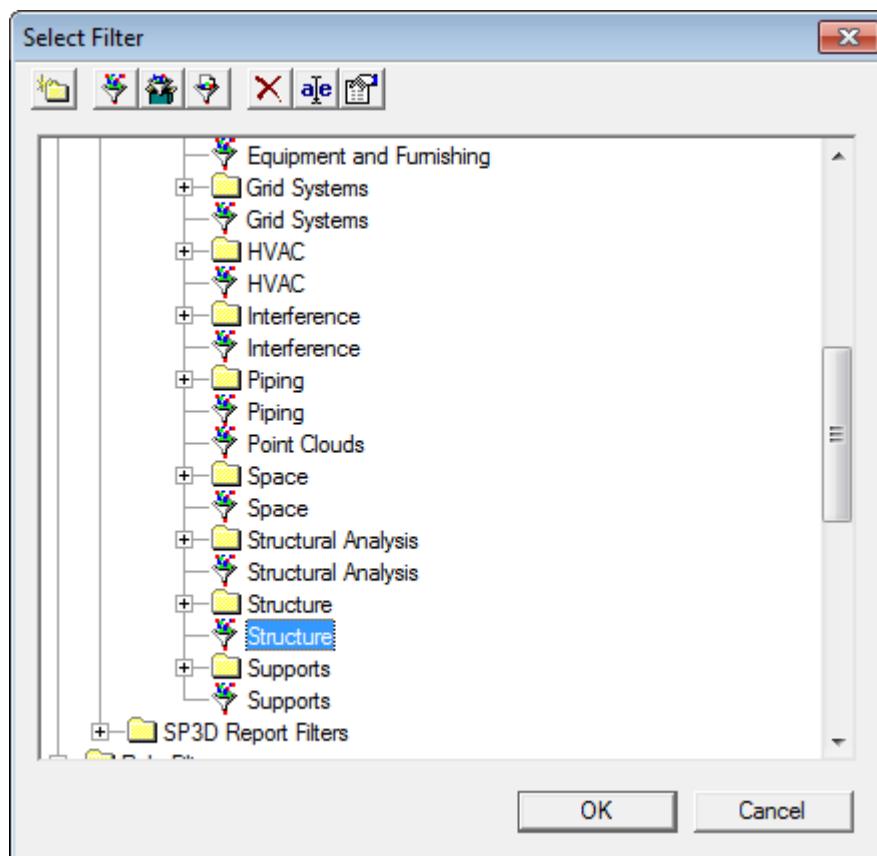


Assigning Objects to WBS Items

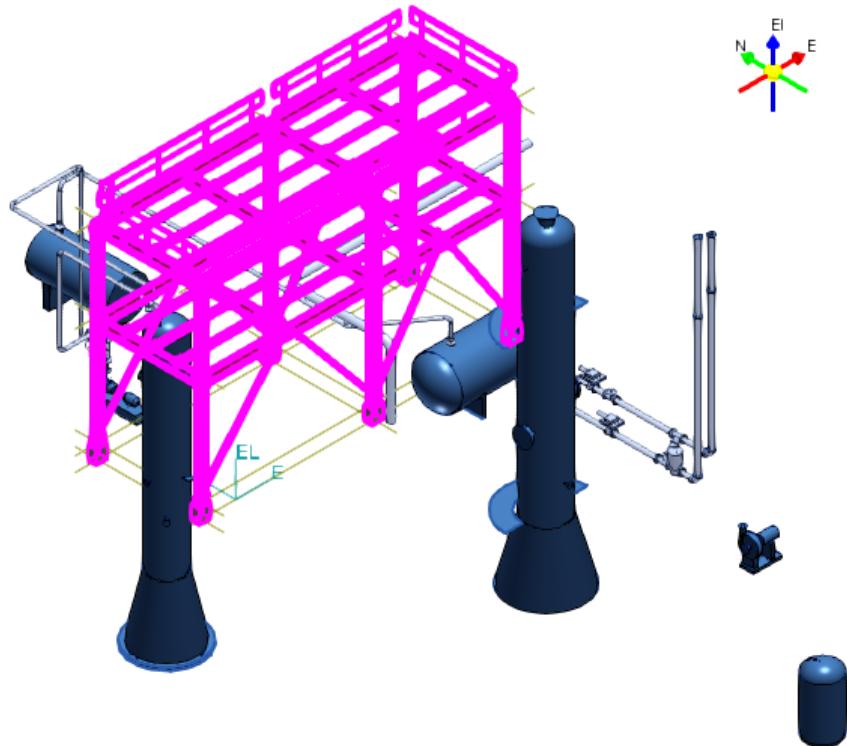
5. Select **Tools > Select by Filter** to select the objects with filters.



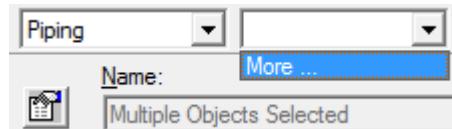
6. Select **Catalog > Default Filters > SP3D Object Filters > Object Types > Structure**, and click **OK**.



The system highlights all structure objects in your workspace.



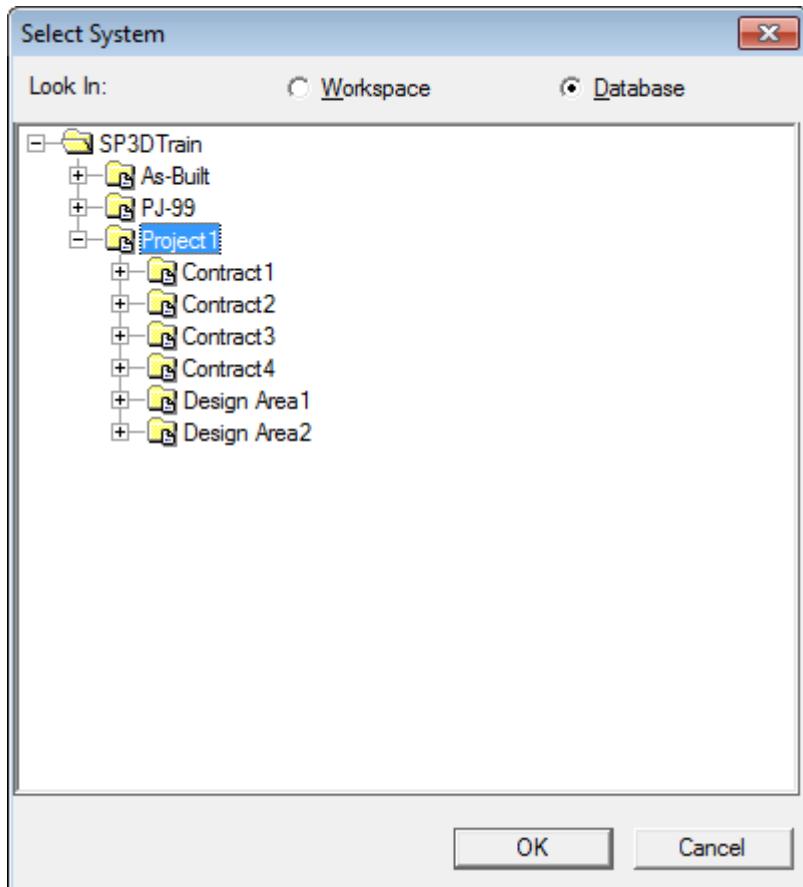
7. Under **WBS**, select **More....**



*The **Select Active Project** dialog box displays.*

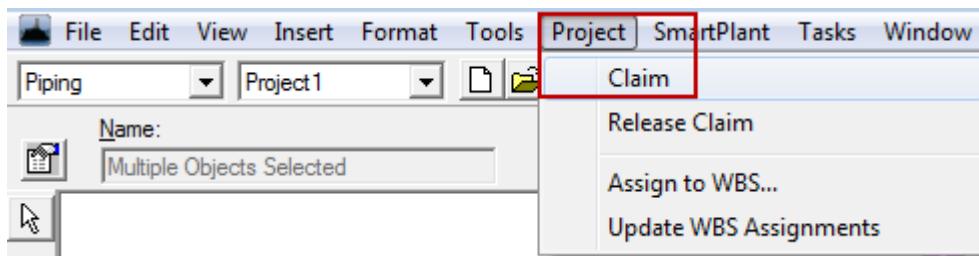
Assigning Objects to WBS Items

8. Select **Project1** and click **OK**.



NOTE If **Project1** is not available, select **Database** to display WBS Items found in the database.

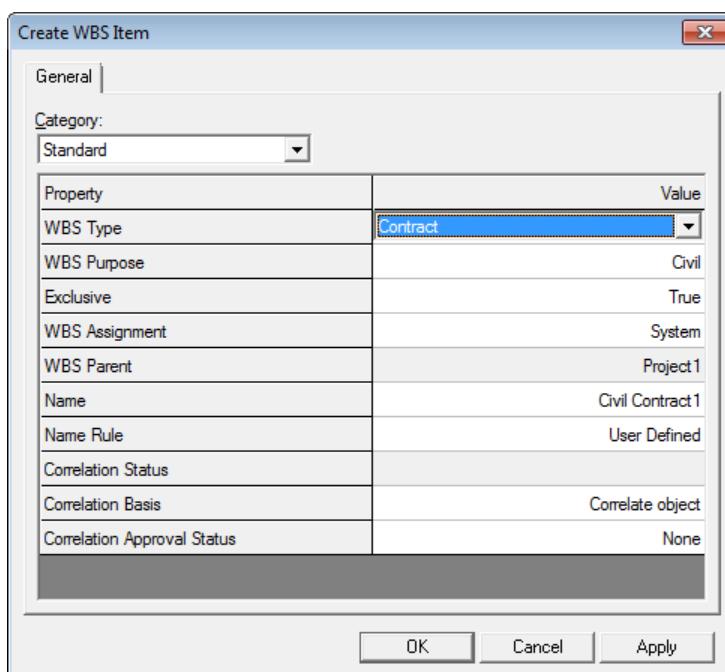
9. Select **Project > Claim** to associate all the selected objects with **Project1**.



NOTES

- **Claim** creates a relationship between the selected objects and the active project. If you are working in the Project mode in SmartPlant Enterprise, this relationship is communicated to the SmartPlant integrated environment.
- An object can be related to a single project. If you attempt to claim an object that belongs to another project, the claim fails. To move an object from one project to another, use **Release Claim** and then claim the object to a different project. SmartPlant Enterprise requires this two-step change process.

- An object must be claimed to the project of the selected WBS Item before using **Assign to WBS**.
 - You must have write access to the Project to claim an object to a project. This prevents people from creating objects within groupings they do not control. A person on a workshare site can claim objects to a project even if the host owns the project's permission group. The person making the claim at the remote location must be assigned write access to the project's permission group on the host. The same rules and behavior apply to assignment of objects to WBS Items.
10. Re-define your workspace using the **Plant Filters > Training Filters > WBS** filter
 11. Right-click **Project1** and select **Create WBS Item**.
- The **Create WBS Item** dialog box displays.*
12. Set the properties for the WBS Item as shown, and click **OK**:

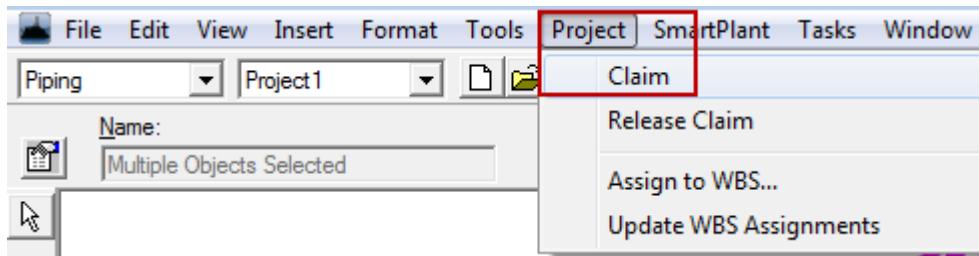
**NOTE**

- The available **Type** and **Purpose** values are defined in the Catalog.
- If **Exclusive** is set to **True**, it prevents a given object from being assigned to another WBS Item of the same **Type** and **Purpose**. If **Exclusive** is set to **False**, a given object can belong to multiple WBS Items of the same **Type** and **Purpose**.
- **WBS Assignment** controls the behavior of the Assign to WBS command. If you set **WBS Assignment** to **System** and then assign a system to a WBS Item, **Assign to WBS** automatically assigns all objects nested under the system to the WBS Item as well. If you set **WBS Assignment** to **Assembly**, the system children are not automatically assigned to the WBS Item at the time of its creation, but it automatically assigns the children of assemblies.
- The system assignment overrides any individual assignment that you may have previously made on objects to exclusive WBS Items.

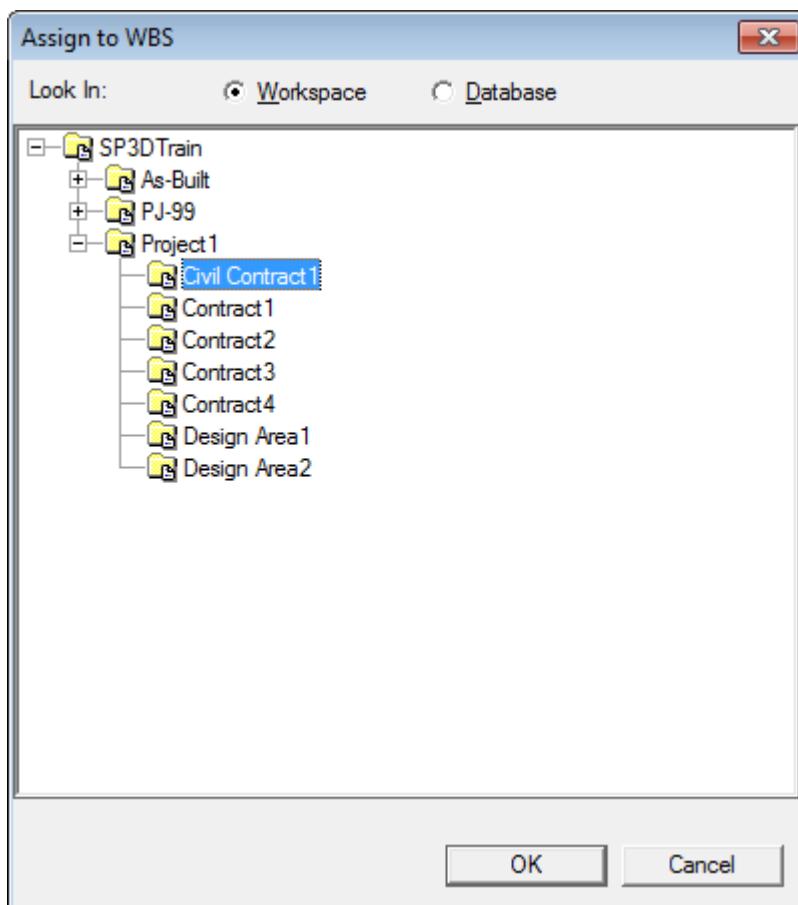
Assigning Objects to WBS Items

13. Re-select all structural objects using the Tools > Select by Filter command as above
14. With all structural objects, highlighted, select **Project > Assign to WBS....**

The **Assign to WBS** dialog box display.

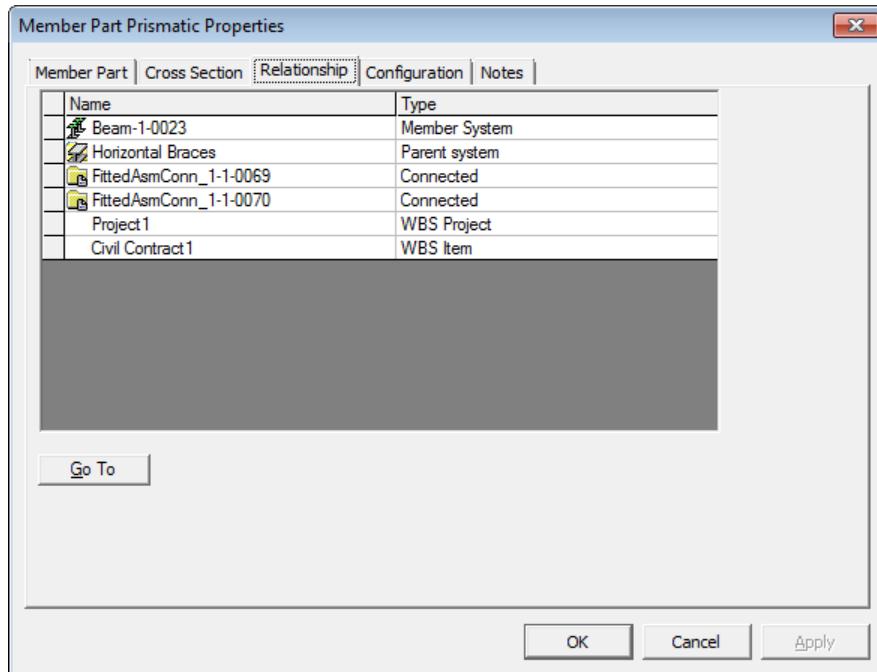


15. Select **Project 1 > Civil Contract1** and click **OK** to create the relationships between the objects and the selected WBS Item.



TIPS

- If you want to verify whether the structural objects have been assigned to the WBS Item, you can review the properties of the objects in the **Relationship** tab of the **Member Part Prismatic Properties** dialog box. You can also right-click the WBS Item and select **Select Nested** to select all nested objects under the WBS Item.



- The objects related to WBS Items are not shown in the **WBS** tab in the **Workspace Explorer**.

Automatically Assign Objects to a WBS Item

You can also assign objects to a project and WBS Item automatically as the objects are created.

- Under **Active WBS**, select **More....**
- Select the active WBS Item and click **OK**.
- Create objects in the model.

As objects are created, they are automatically assigned to the active WBS project and/or WBS Item.

NOTES

- If a WBS project is chosen as the Active WBS, then all objects you create are automatically assigned to that project. The access control rules that control manual assignment apply for the automatic assignment.
- If a WBS Item is chosen as the Active WBS, then only specific object types are automatically claimed to the parent project of the WBS Item and then assigned to the WBS Item. Only the lowest-level objects that are included in deliverables and have identity are automatically assigned. In other words, design objects, such as piping features, or grouping objects, such as pipelines, are not automatically assigned, but piping parts are assigned. You must manually claim any system object to a Project and manually assign it to a WBS Item.

Assigning Objects to WBS Items

For more information, see *Using the Project Menu: An Overview* and *Managing WBS Items and Projects: An Overview* in the *Smart 3D Common User's Guide*.

SESSION 20

To Do List

Objective

By the end of this session, you will be able to:

- Use the **To Do List** to view and correct model data inconsistencies.

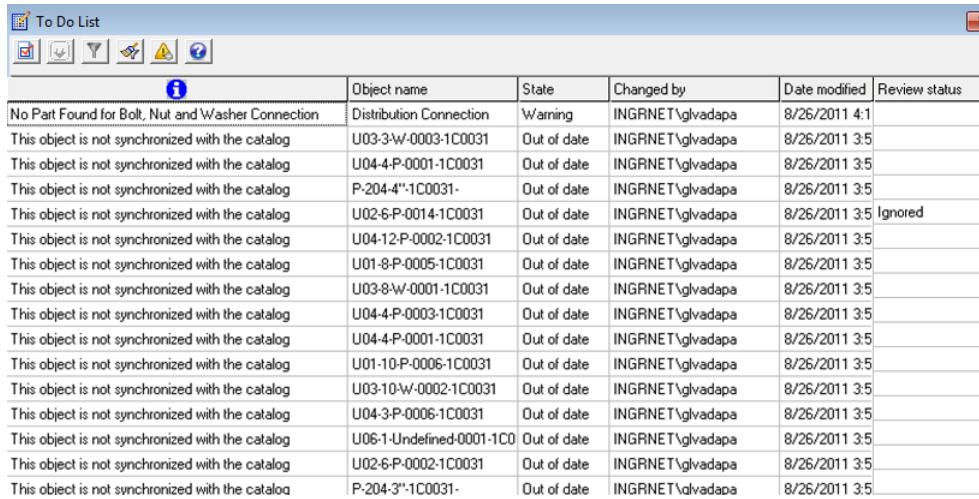
Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Applying Surface Style Rules* (on page 115)

Overview

The **To Do List** displays issues or inconsistencies that need to be resolved in your model. It is critical to review the **To Do List** often to eliminate the problems. There are three basic types of issues:

- **Out of Date** - An object has been modified but not updated. To update an object, you must have write permissions. You cannot update an object with a **Working** status. You can delay updating dependent objects in other permission groups under the **Selected PG** tab in the **Options** dialog box. If an object's reference data changes, you can use **Synchronize Model with Catalog** to add objects to the **To Do List** as **Out of date**.



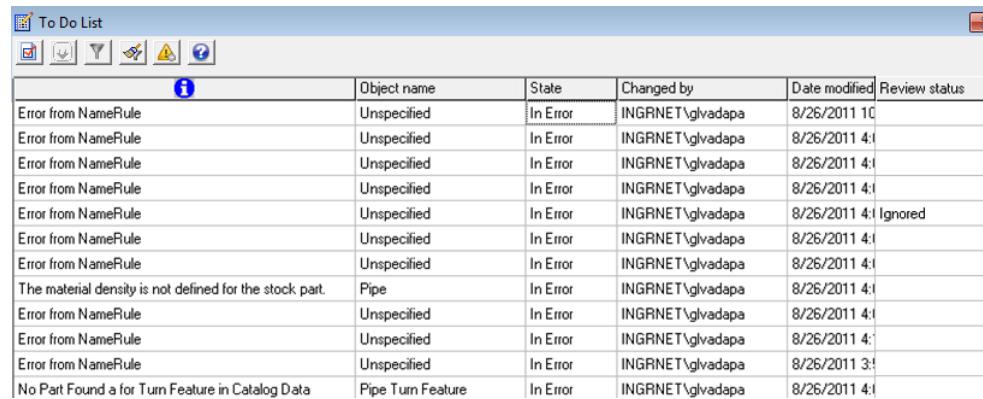
The screenshot shows the 'To Do List' dialog box with a toolbar at the top containing icons for New, Open, Save, Print, Filter, and Help. The main area is a table with columns: Object name, State, Changed by, Date modified, and Review status. The table lists various objects and their synchronization status relative to a catalog.

	Object name	State	Changed by	Date modified	Review status
No Part Found for Bolt, Nut and Washer Connection	Connection	Warning	INGRNET\glvadapa	8/26/2011 4:1	
This object is not synchronized with the catalog	U03-3-W-0003-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U04-4-P-0001-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	P-204-4"-1C0031-	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U02-6-P-0014-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	Ignored
This object is not synchronized with the catalog	U04-12-P-0002-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U01-8-P-0005-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U03-8-W-0001-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U04-4-P-0003-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U04-4-P-0001-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U01-10-P-0006-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U03-10-W-0002-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U04-3-P-0006-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U06-1-Undefined-0001-1C0	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	U02-6-P-0002-1C0031	Out of date	INGRNET\glvadapa	8/26/2011 3:5	
This object is not synchronized with the catalog	P-204-3"-1C0031-	Out of date	INGRNET\glvadapa	8/26/2011 3:5	

- **In Error** - The object is in an error state. The reason for the error is one of the following:
 - a. The object is dependent on changes in catalog data that resulted in a calculation error.
 - b. A required input object has been deleted.

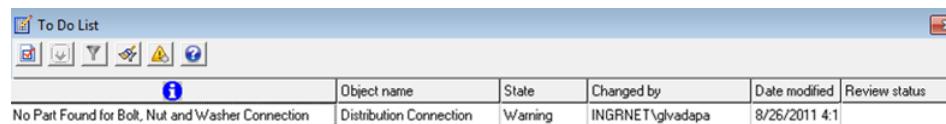
To Do List

- c. System-required data integrity rules are violated when the object is updated.



Object name	State	Changed by	Date modified	Review status
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 10:41:11 AM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
The material density is not defined for the stock part.	Pipe	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM
Error from NameRule	Unspecified	In Error	INGRNET\glvadapa	8/26/2011 3:11:11 PM
No Part Found a for Turn Feature in Catalog Data	Pipe Turn Feature	In Error	INGRNET\glvadapa	8/26/2011 4:11:11 PM

- **Warning** - Data integrity rules that may be broken by an object are not serious enough to require repair before generating design deliverables.

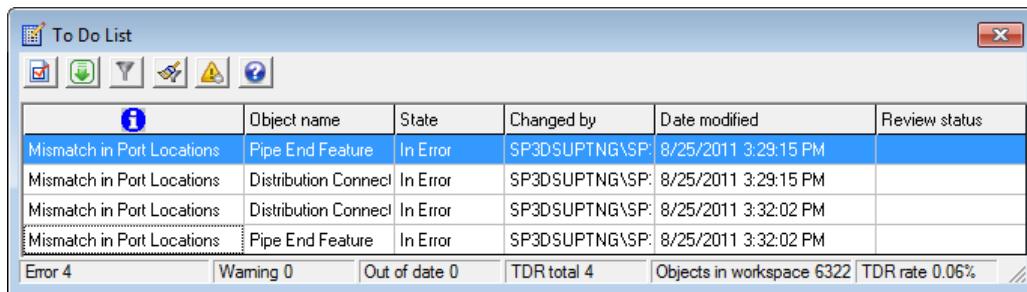


Object name	State	Changed by	Date modified	Review status
No Part Found for Bolt, Nut and Washer Connection	Distribution Connection	Warning	INGRNET\glvadapa	8/26/2011 4:11:11 PM

TIP For more information about a specific problem, click **Help** .

To Do List

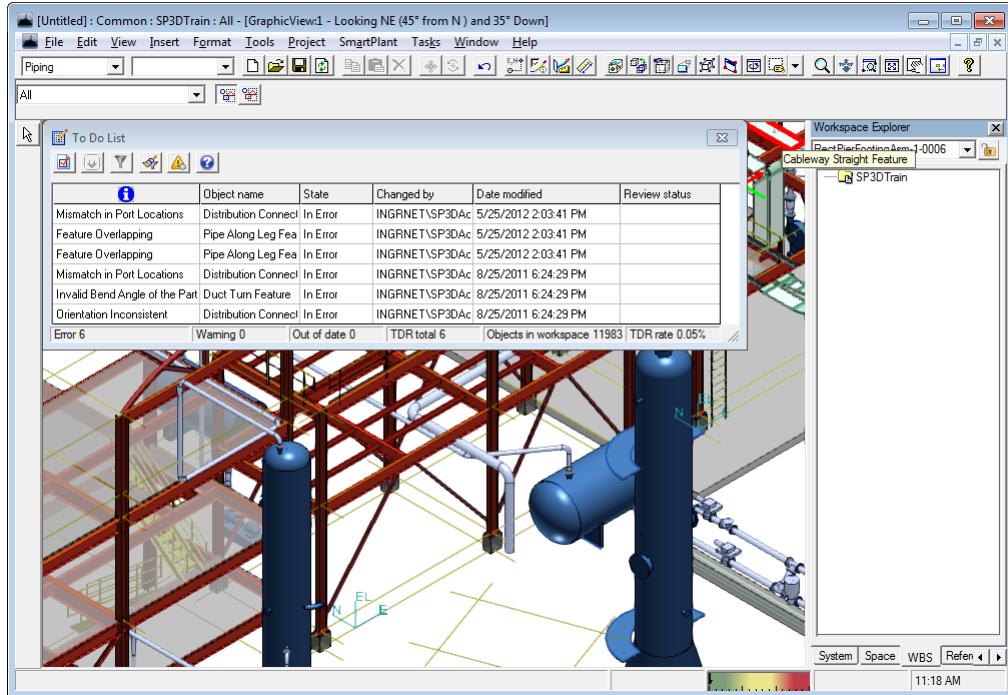
To open the **To Do List**, select **View > To Do List**.



Object name	State	Changed by	Date modified	Review status
Mismatch in Port Locations	Pipe End Feature	In Error	SP3DSUPTNG\SP	8/25/2011 3:29:15 PM
Mismatch in Port Locations	Distribution Connect	In Error	SP3DSUPTNG\SP	8/25/2011 3:29:15 PM
Mismatch in Port Locations	Distribution Connect	In Error	SP3DSUPTNG\SP	8/25/2011 3:32:02 PM
Mismatch in Port Locations	Pipe End Feature	In Error	SP3DSUPTNG\SP	8/25/2011 3:32:02 PM

Error 4 Warning 0 Out of date 0 TDR total 4 Objects in workspace 6322 TDR rate 0.06%

NOTE You can view the number of new To Do List records from the To Do Record Meter located on the status bar.



To Do List Dialog Box

The **To Do List** command on the **View** menu lists objects in the workspace that have inconsistent data. The **To Do List** dialog box allows you to edit these objects from a single location. To correct errors, select objects from the list and modify them using the appropriate commands on the **Edit** ribbon.

You can change the sort order of items in the **To Do List** by clicking column headings. The default sorting is alphabetical with **Error** objects listed and then the **Out-of- date** objects.

Properties

Opens the **To Do List Properties** dialog box, which allows you to choose the objects that appear in the **To Do List**, as well as choosing display options.

Update

Updates the out-of-date objects.

Filter To Do List by Select Set

Shows only those **To Do List** entries that are related to the selected objects in the graphical views or **Workspace Explorer**. When the **To Do List** contains hundreds or thousands of records, this option can be useful for filtering the **To Do List**.

If no objects exist in the select set when this option is checked, the **To Do List** appears empty. This option works in conjunction with the other check boxes under **List** on the **To Do List Properties** dialog box. For example, if the **Only objects which the user has permission to resolve** box is checked, then nothing shows in the **To Do List** if you select an out-of-date object that you do not have permission to resolve.

To Do List



Clear Filter

Removes the select set filter from the **To Do List** and displays all records for the workspace.



Review Status

Changes the **Review status** of the selected **To Do List** entry. The **Review status** is either blank or **Ignored**.



Note

Provides an expanded description of the problem. Point to the text in this field to display the informational note as a ToolTip. The software automatically creates the note and its contents.

Object name

Lists the name of an object, if assigned (for example, **Pump No. 42**). For an entry in a nested constraint system, **Constraint Set** is displayed.

State

Specifies if the objects on the list are in an **Out of date** or **Error** state.

Changed by

Lists the user name of the person who changed the object that caused the **Out of date** or **Error** state.

Date modified

Displays the date and local time when the object was modified, which resulted in a failure to recompute.

Discipline

Displays the discipline of the object with the **To Do List** entry.

Review status

Displays the review status of the **To Do List** entry. The status is either blank or **Ignored**. By default, this field is blank. To change the **Review status** of an entry, select the entry and click the **Review Status** button .



Opens the **Troubleshooting** help file, which contains information about **To Do List** messages. To go directly to information about a message, select the message from the list, and then click



Fixing Objects In Error

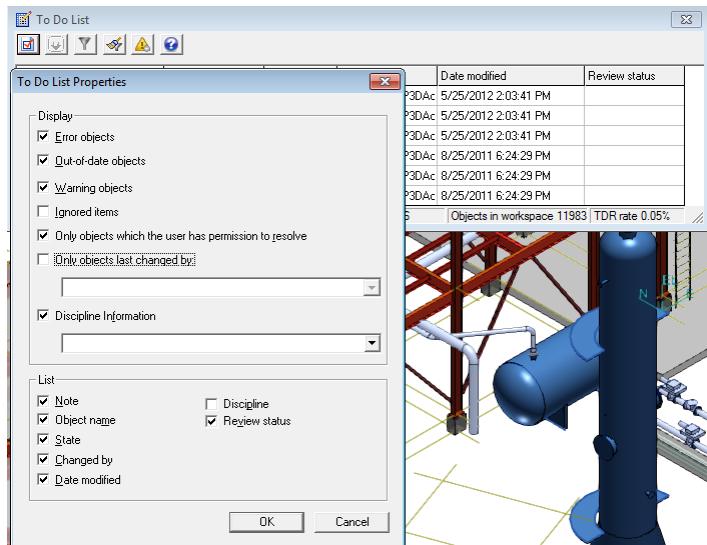
You can edit an object on the **To Do List** by selecting the object and using the **Edit** ribbon. To edit an object, you must be in the task environment in which the object was created. After you resolve the inconsistency in an object, the object is automatically removed from the **To Do List**.

TIP **In Error** objects are usually edited one at a time. However, you can also select more than one object if an **Edit** option supports multiple objects.

Filtering Objects on the To Do List

There are two ways you can filter objects on the **To Do List**: by discipline type and through the Review Status.

You can filter objects are added to the **To Do List** by discipline type. From the **To Do List**, select **Properties** . In the **To Do List Properties** dialog box, you can select to include or exclude certain objects based on the specified **Discipline Information**.



Managing the To Do List

It is critical to review the **To Do List** often to eliminate problems. Ideally, you should have no **To Do List** records related to objects that you document on design deliverables. We recommend that you do not approve an object if it has a **To Do List** record.

One way to help you notice **To Do List** issues while you design is to define a surface style rule that sets the color of items with **To Do List** records for easy identification. Your administrator can define this style rule tailored for your company for you to use.

It is possible to set to review status of a to do list entry to Ignored using the Ignore button. You may use this option when the software considers something in the model as a violation but the designer wishes to use their judgment to allow it. Ignored entries stay in the database but the user can choose to not display ignored entries.

When your catalog administrator runs **Synchronize Model with Catalog** so that the actual update of the model is delayed, many of your design objects may be marked as out of date with the current catalog data. You should update and review the impact of these changes before attempting to model additional objects relative to the out of date objects.

NOTE When a piping specification is changed in the catalog, all piping runs that use that specification and all run features must update, and are thus added to the **To Do List**. They are added even if the change to the piping specification does not cause an actual change to the resulting parts and if the piping features and parts are approved. You must update the features and review the impact.

For more information, see *Correcting Errors: An Overview* in the *Smart 3D Common User's Guide*.

To Do List

Quiz:

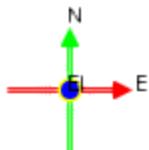
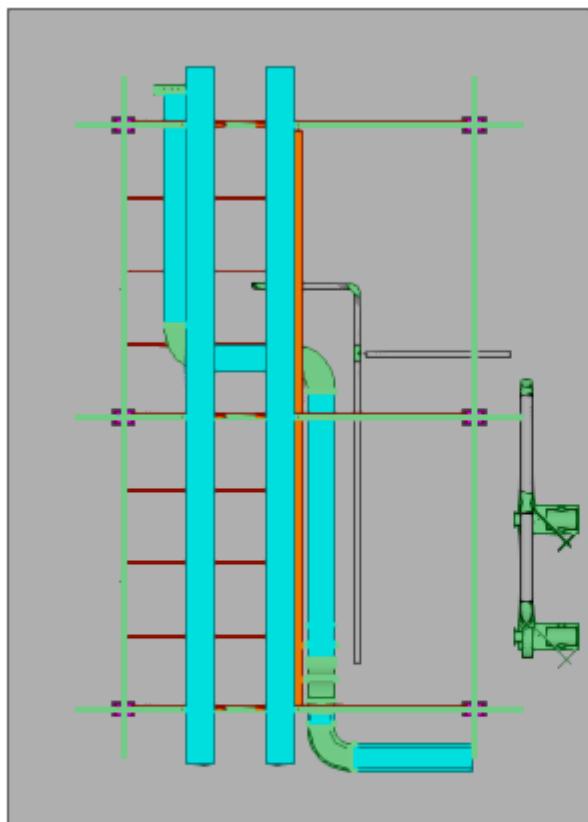
1. Give examples of reasons why an inconsistency arises in the objects within the Smart 3D database.
2. What are the different types of inconsistencies that can occur in the database?
3. Which option allows you to assign the object content in the **To Do List**?
4. Which menu allows you to open the **To Do List**?
5. Which option updates **Out of date** objects?

SESSION 21

Defining a Workspace by Reference 3D Filter

Defining a Workspace by Reference3D Filter

Define a workspace that loads objects from the Reference 3D attachment into the workspace. After the workspace is defined, it should contain the objects shown below.

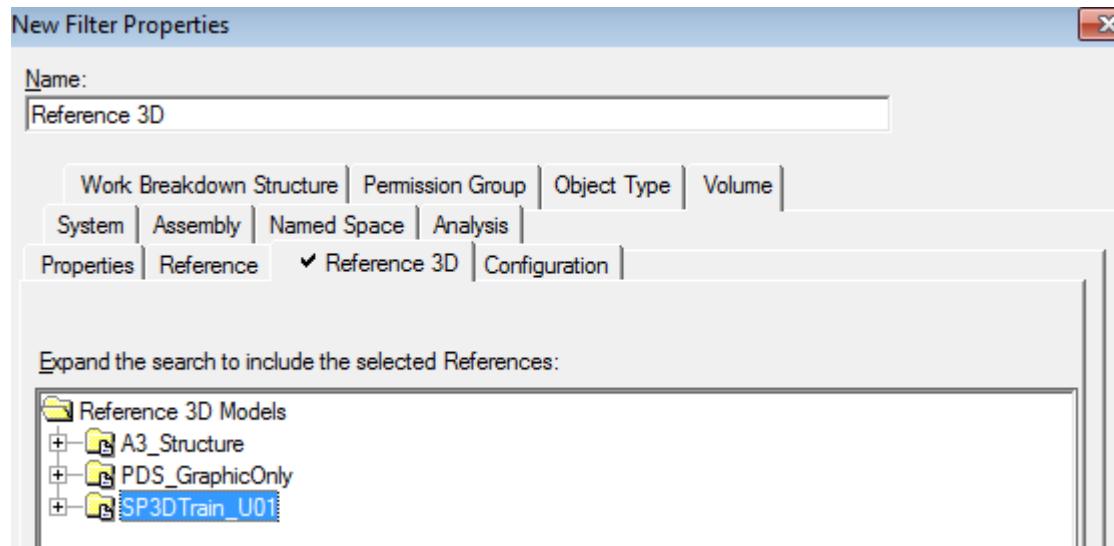


Steps

1. Define the workspace and create a new filter by using **New Filter (Simple or Asking)**  in the **Select Filter** dialog box.

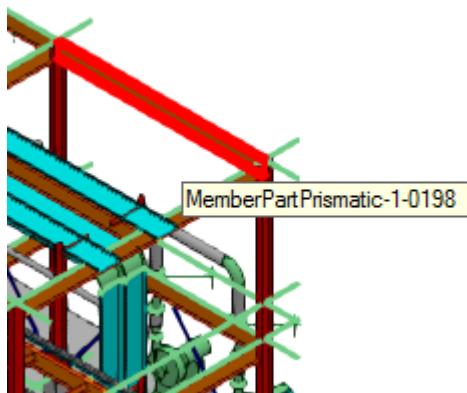
*The **New Filter Properties** dialog box displays.*

2. Set the **Name** to "Reference 3D."
3. Under **Reference 3D**, select **SP3DTrain_U01**.



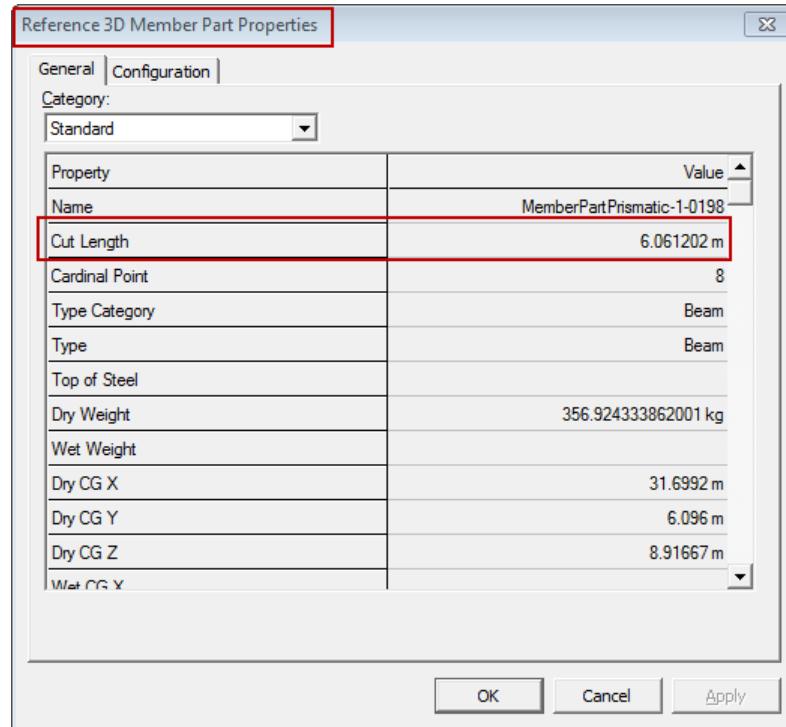
4. Click **OK**.
5. In the **Select Filter** dialog box, select **Reference 3D** and click **OK**.
6. In the **Define Workspace** dialog box, click **OK**.
7. Click **Fit**  to view all the objects retrieved by the **Reference 3D** filter.
8. Click **Named Views**  and switch to the **Isometric**.
9. Hover your mouse over a member part.

The member's name is shown.



10. Right-click on the member and select **Properties**.

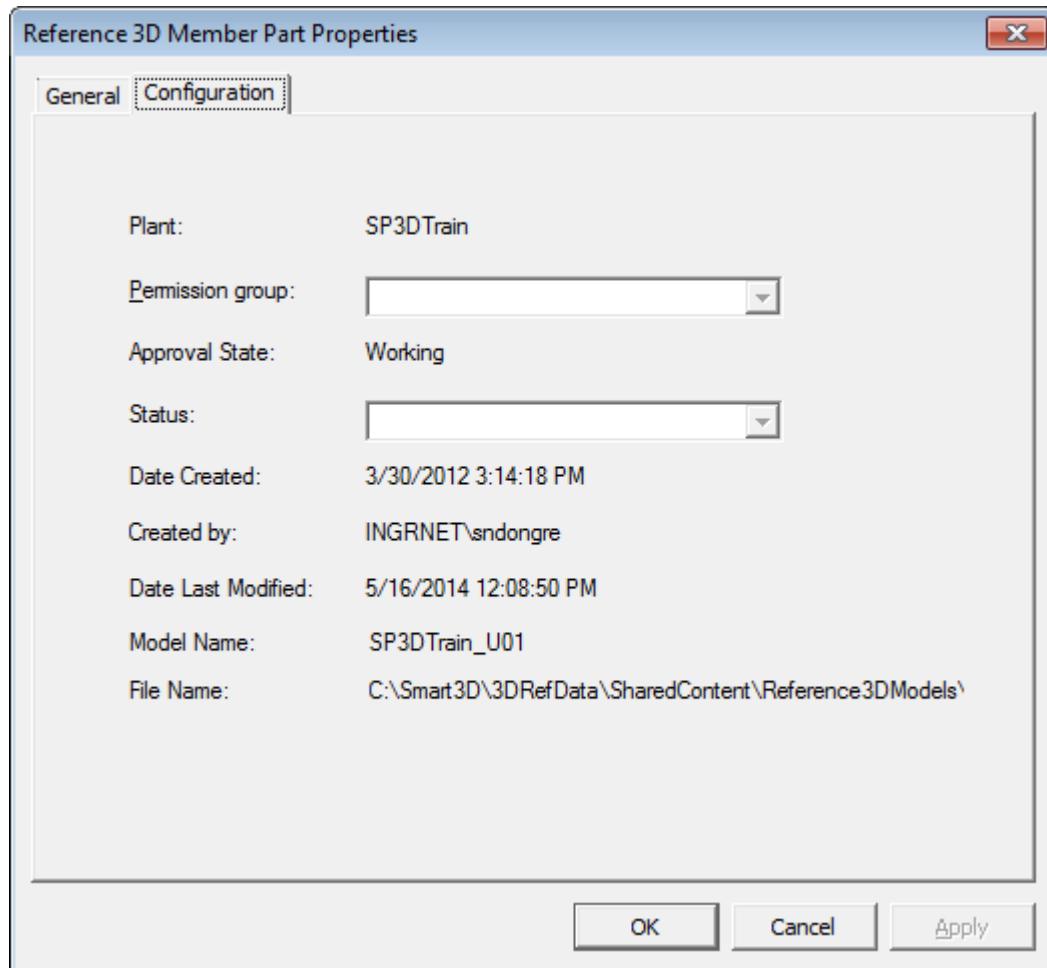
*Properties of the 3D member part are shown under the **General** tab.*



11. Switch to the **Configuration** tab.

Defining a Workspace by Reference 3D Filter

The properties show model information, such as its name, file location, and creation date:



SESSION 22

Interference Checking

Objective

By the end of this session, you will be able to:

- Describe the interference checking features of Smart 3D.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Manipulating Views* (on page 71)

Overview

Smart 3D interference detection runs in the background to identify and resolve interferences as they are created. Interference between two objects is detected when their geometry intersects. Design objects can have multiple geometries, called aspects, which represent different geometric characteristics of the objects, such as the physical shape, insulation, maintenance, and operational spaces. You can configure the Interference Checking process to detect interferences between the different types of geometry. You can also configure the amount of clearance required between the physical aspects of the different object types. The interference checking process can also check for interference with the geometry from a referenced PDS project and referenced MicroStation files.

When an interference is detected, an interference record is created. The **Type** of the record indicates the severity of the interference as defined by your administrator. If several geometric aspects of two objects intersect, only a single interference record indicating the highest severity level between two objects is created. The interference record is automatically removed when you modify the geometry so that there is no interference. You can approve interferences that you do not want to eliminate.

Two types of interference checking processes help you integrate interference detection into your daily design process:

- Server-based interference checking, also known as Database Detect
- Interactive interference checking, also known as Local Detect

Server-Based Interference Checking (Database Detect)

Database Detect runs directly on the model database. You can run Database Detect on any computer on which the Database Interference Detection service is installed. After you start the service, Smart 3D automatically checks all existing objects that have not been checked and all new or modified objects for interference.

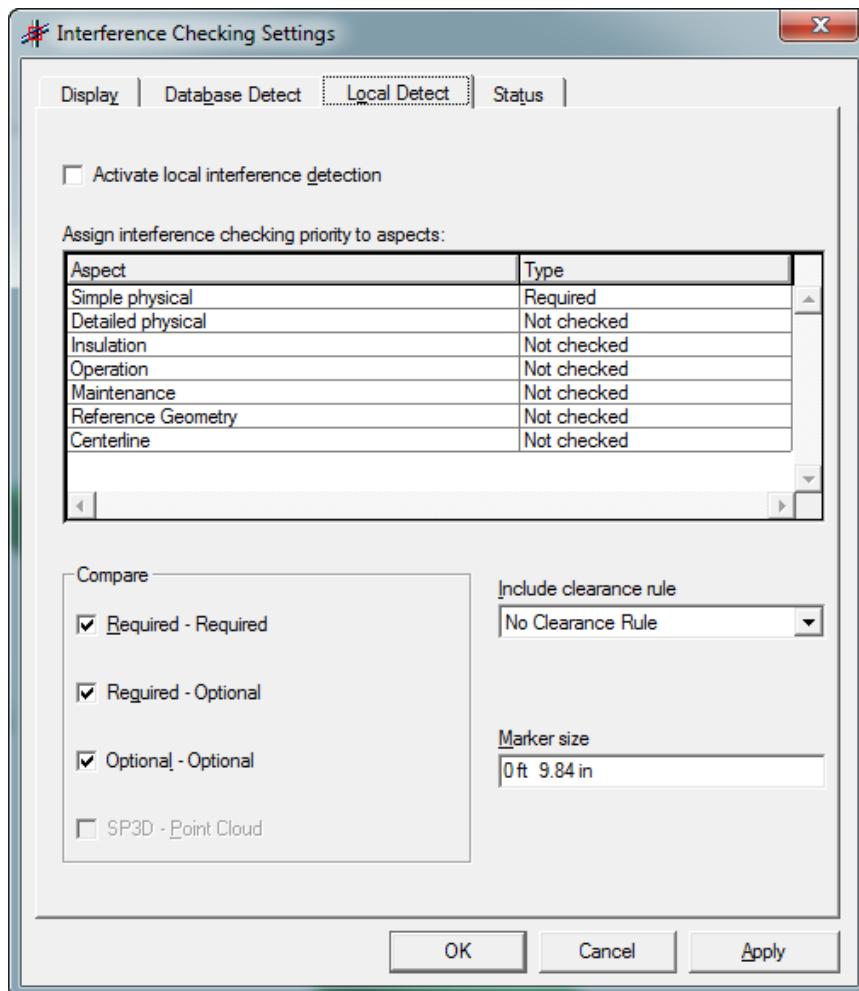
NOTE When an interference record is created, a relationship is established to the graphic objects involved in the interference. Currently, the design objects are edited from a database perspective by this operation, preventing designers from reversing any edit they have previously made to the design objects. Your administrator can set a delay time between when an object is created or edited and when the object is checked for interference. This delay should be longer than the time it typically takes an edited object to be bumped from the **Undo** buffer list. This time delay on the server checking is why you should not expect an interference you have just recently created to show up immediately as a Database Detected interference.

You can review the configuration and status of the detection by using the **Interference Detection Properties** dialog box.

In a workshare configuration, Database Detect runs at the host location. The interferences are assigned to permission groups owned by the host and then replicated to the workshare sites. They can be reviewed just like any other data added to the model, and designers with write permissions at the remote locations can edit the status of interference objects.

Review Database Interference Detection Settings

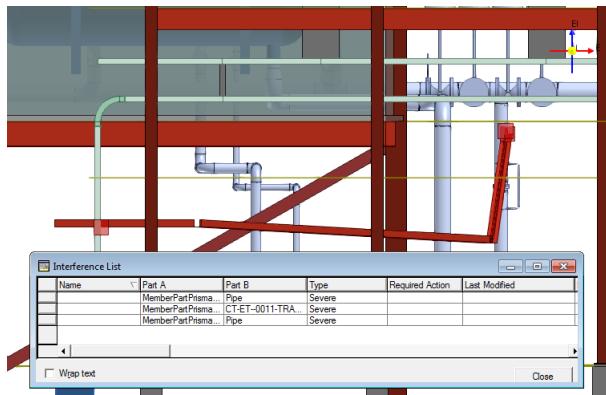
To open the **Interference Checking Settings** dialog box, select **Tools > Check Interference** to display the **Check Interference** ribbon. Then, click **Settings** .



The **Database Detect** tab displays the status of the database detection. The **Status** tab displays the status of the database interference and the time when the interference started.

Interference records relating to any object in your workspace are also automatically loaded and available for you to review in your design session. You can view any interference detected on the server after you run **Define Workspace** by refreshing the workspace.

Database Detect places spherical interference markers at the interference locations.



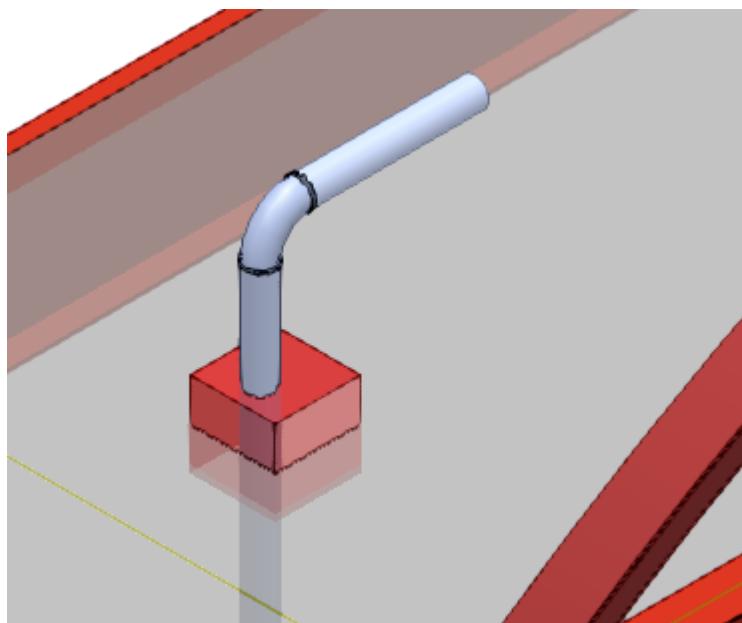
NOTE You can graphically select the interference marker without opening the **Interference List** and review the properties of the interference record by selecting **Edit > Properties**.

Interactive Interference Checking (Local Detect)

Local Detect runs only in the current session on your Smart 3D client computer and detects interferences when you create and edit objects. It does not check existing objects. Local Detect provides real-time help in the form of graphical feedback, showing you interferences immediately after placing or editing objects in the model. Hidden objects and objects that are not retrieved to the workspace from the server are not checked.

Interference Checking

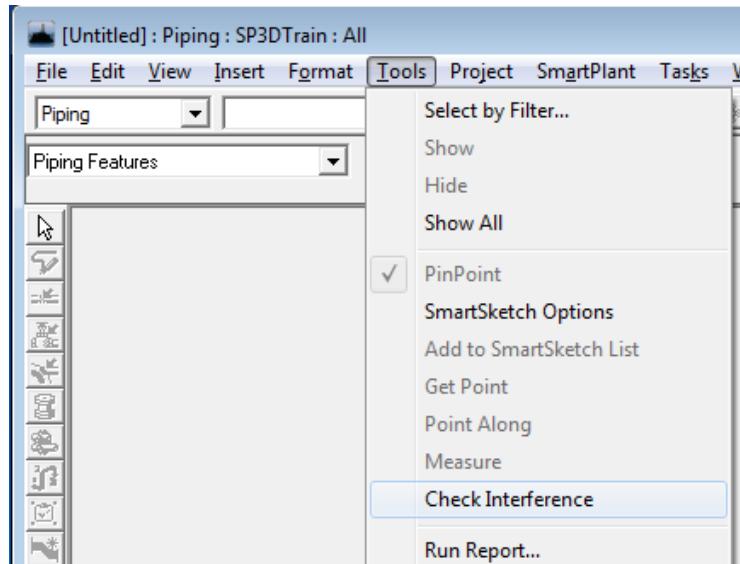
Local Detect marks any interference that it finds with a cube interference marker in the model. For example, Local Detect has placed a cube interference marker at the intersection of a pipe and the floor, as it found an interference at that location.



Local Detect interference is not persistent. Therefore, if you close and open or refresh your session file, all the local interferences are removed from memory. However, if Database Detect is running on the model, the database detection process will find any local interference in your model and be seen at some future time when you refresh your workspace.

Steps for Starting and Stopping the Local Detect Process

1. Select Tools > Check Interference.

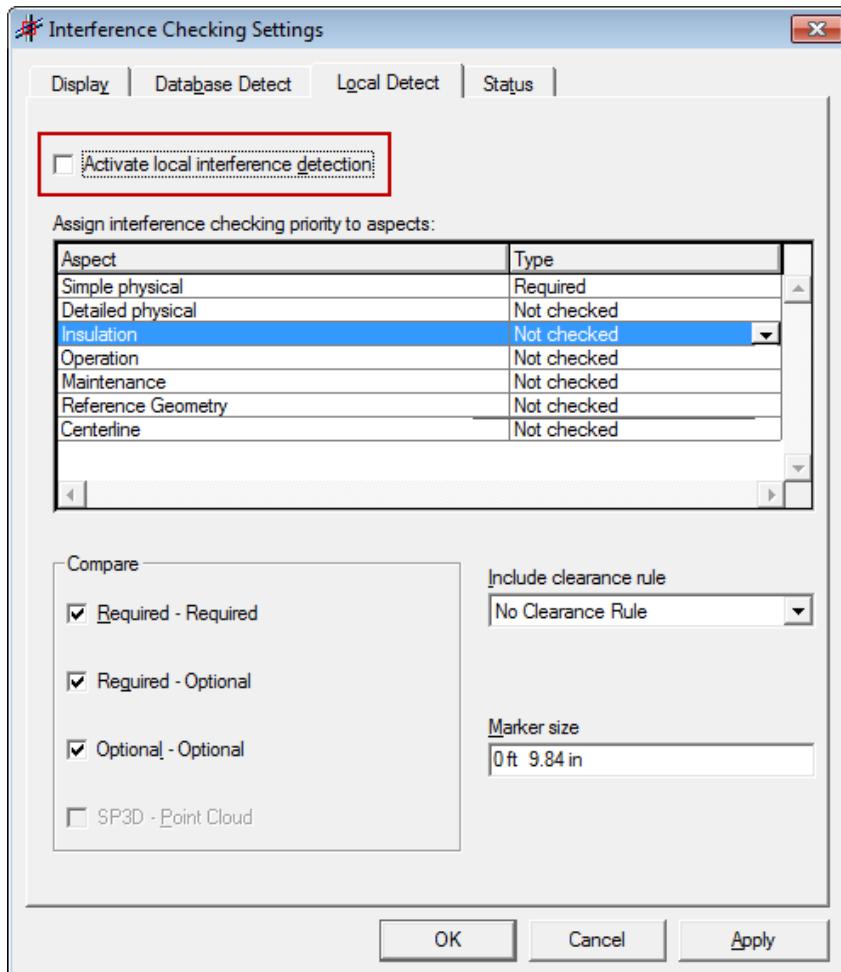


The **Check Interference** ribbon displays.

2. Click **Settings**.

The **Interference Checking Settings** dialog box displays.

3. Under the **Local Detect** tab, select **Activate local interference detection**.



4. Click **OK**.

TIP It generally best to use the same settings as your administrator for the database detection.

Check Interference Ribbon

Provides the following options related to the interference checking process at your workstation.

Settings

Displays the **Interference Checking Settings** dialog box. This dialog box allows you to specify the properties for the **Local Detect** interference. The **Database Detect** properties must be configured at the server in the Project Management task.

Show Interferences

Displays the types of interferences you specified on the **Display** tab of the **Interference**

Checking Settings dialog box. These are the interferences that may exist for the objects you select. For example, if you check **Clearance** as your interference type and **Edit** as the option for **Required Action** and then select four pipes in your workspace on which to run the interference check, the software displays only **Clearance** interferences for those four pipes when you select the **Show** command. If you do not select any parts, then interferences appear for all parts in the workspace.

Hide Interferences

Hides the interferences that exist for the currently selected parts. If you do not select any parts, then all interferences in the workspace are hidden. All **Local Detect** interferences in the workspace are automatically hidden when you select this option. For example, if four **Database Detect** and two **Local Detect** interferences appear and you select two of the **Database Detect** interferences to hide, the two **Database Detect** interferences you selected and all of the **Local Detect** interferences are hidden. Thus, your workspace contains only the two unselected **Database Detect** interferences.

Fit Interferences

Fits the active graphic view to the parts that match the interference check criteria. For example, you might have six severe interferences and two of these interferences are between a pump and a boiler. If you select this pump and boiler and then click the **Fit** command on the **Check Interference** ribbon, the software fits only these two parts into the graphic view. If you do not select any of the six interferences, the **Fit** command is unavailable.

Refresh Reference 3D Interferences

Retrieves interferences between Reference 3D (R3D) objects. This option is available when an external 3D reference model has been attached to the model. For more information, see *Reference 3D Model* in the *Project Management User's Guide*.

TIP Click **Refresh Workspace** , **File > Refresh Workspace**, or press **F5** to retrieve interferences between all Smart 3D objects and all other object types. This includes interferences between Smart 3D and Reference 3D objects.

List View

Toggles the display of the **Interference List** dialog box. The list on this dialog box shows all interferences that currently appear in the workspace. The list automatically updates whenever you add an interference object to the workspace. You can add an interference from the **Local Detect** process, or when you select the **Refresh Workspace** or **Define Workspace** commands.

Required Action

Displays the action required to deal with the selected interference. You cannot edit this option for local interferences.

TIP The choices in the **Required Action** box are controlled by the **IFC Required Action** select list in the Catalog task. For more information about select lists, see the *Catalog User's Guide* available from the **Help > Printable Guides** command in the software.

Close

Closes the **Check Interference** ribbon.

You can graphically select an interference you see and then edit the **Required Action**, or you can edit the interference using the **Properties** dialog box.

You can add notes about the interference on the **Interference List View** or in the **Properties** dialog box.

Recommended Workflow for Managing Interferences

Interference detection allows you to integrate interference information into your daily design activities without having to wait for batch checking.

Use Local Detect when you design. This will help you detect and solve problems immediately.

Regularly scan your model for graphic interference markers, and open the **Interference List View** to inspect the Database Detected interferences related to your area of responsibility. There are several ways the server process can assign interferences to you. For example, the name of the interference can indicate responsibility when it is calculated by a custom name rule. Optionally, the interferences can be assigned to different permission groups by rule. Your administrator can configure these settings.

In addition to your administrator-established method, you can view all interferences related to design objects you have created by defining a workspace that includes only the objects you have created. The **Interference List View** then shows the interferences that involve your objects. When you select an interference, both objects involved in the interference are highlighted in the model, even if you have not included one of the objects in your workspace definition. The software automatically retrieves the graphics for the other object from the server.

For more information, see *Checking Interference: An Overview* in the *Interference Checking Guide*.

Quiz

1. Which interference detection process generates records that are not persistent?
2. How do you identify the interferences that are generated by the Local Detect and Database Detect processes?
3. How do you start and stop the Local Detect process in your workspace?
4. How can you review the Database Detect settings on your local machine?

SESSION 23

Space Management

Objective

By the end of this session, you will be able to:

- Place space objects (folders and volumes).

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Manipulating Views* (on page 71)
- *Selecting Objects in a Model* (on page 101)
- *PinPoint Ribbon* (on page 125)

Overview

The Space Management task allows you to create volumes to define a conceptual space, such as fire zones, access ways, or drawing views. You then define your workspace so that it shows a created volume. You can identify a volume as an interference volume to run interference detection on the model.

Because the volumes are not actually constructed, they are not included in the system hierarchy. Volumes have their own separate hierarchy on the **Space** tab in the **Workspace Explorer**. You can use **Create Space Folder**  to create space folders in this hierarchy to group your volumes. You can review and edit the volumes by selecting them on the **Named Space** tab in the **Filter Properties** dialog box.

Creating Spaces

There are four basic volume categories:

- **Area** - Identifies volumes that do not overlap.
- **Zone** - Identifies volumes that may overlap.

NOTE Area volumes and zone volumes have no enforced functional difference. However, it is recommended that zones be used to identify volumes that may overlap. Areas should be used to identify volumes that do not overlap for the same type of area.

- **Interference** - Volumes that are checked for interferences. You can associate an interference type of volume with one design object. When the design object moves, the associated volume moves with it.
- **Drawing** - Volumes used to generate volume drawings. This method is no longer recommended for new users, but the special drawing volume creation commands are

available to support experienced users. New customers can use rectangular volumes to define drawing views.

The following commands are available in the **Space Management** task:

-  **Select** - Used to select objects in the model.
-  **Create Space Folder** - Creates a new hierarchical node for the organization of space objects.
-  **Place Volume by Two Points** - Defines a volume by selecting two points to represent opposite vertices of the volume that you need.
-  **Place Volume by Four Points** - Defines a volume by three points to define a base plane and a fourth point to define elevation or depth.
-  **Place Volume by Window** - Defines a volume based on the active graphical view of the model. The view boundaries, depth range, and possible clipping are used when generating the volume.
-  **Place Volume by Selection** - Defines a rectangular volume that encloses a selected set of objects in the model.
-  **Place Volumes by Plane and Offset** - Defines rectangular volumes based on a reference plane and offsets from the plane.
-  **Place Volumes by Grids** - Defines many volumes at once, based on a set of grid and elevation planes.
-  **Create Volume Bound by Spaces** - Defines a volume by selecting sufficient bounding spaces to create a closed volume.
-  **Merge Volumes** - Merges multiple existing volumes into a single new space.
-  **Place Volume Along Path** - Places a volume by specifying a cross-section and projecting the cross-section along a path.
-  **Place Volume Using Primitive Shapes** - Places a volume in the model by selecting a pre-defined volume shape from a palette and then providing dimensional information to define the shape size.
-  **Associate Volume to Object** - Establishes a relationship between an object and a space in the model.
-  **Place Drawing Volume by View** - Creates a clipping volume that is associated with a drawing volume component and a drawing view.
-  **Place Drawing Volume by Selection** - Generates a drawing volume around a selected set of objects in the model.
-  **Place Drawing Volume by Two Points** - Creates a clipping volume that

is associated with a drawing volume component by selecting two points to represent opposite vertices of the volume that you need.



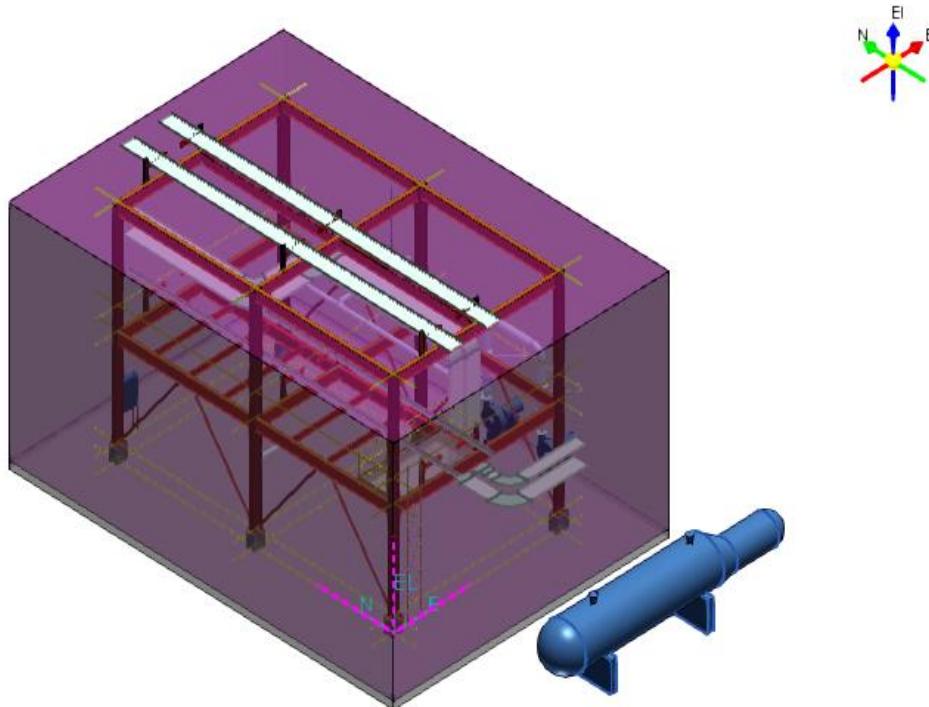
Place Drawing Volume by Four Points - Creates a clipping volume that is associated with a drawing volume component by typing three points to define a base plane and a fourth point to define elevation or depth.

NOTE

Some commands can create relationships to the inputs used to define the volumes. These commands have two toggle buttons on the create ribbon to control this associative behavior. If you establish relationships when you place the volumes, you cannot move the volume, but its size and position adjust when the input objects are edited. If these buttons are not displayed, then the volumes are created by the command without relationships to other objects in the model.

Place a Volume by Two Points

Use **Place Volume by Two Points**  to create a rectangular hazardous zone with referencing objects in **Unit U01**.



1. Define your workspace to show unit **U01** and **U01 CS**.
2. Select **Tasks > Space Management**.

TIPS

- Select a folder from the **Named Space** tab in the **Workspace Explorer** to retrieve volumes from the database. Newly created volumes will disappear when you refresh

your workspace. In this example, existing volumes are being left out of the workspace so that they don't obscure the view.

- By default, the volume appears opaque when it is placed. To display the volume with translucent surfaces, you can apply surface style rules. For more information, see *Applying Surface Style Rules* (on page 115).

3. Click **PinPoint** .
 4. Click **Rectangular Coordinates**  and set the coordinate system to **U01 CS**.
 5. Click **Place Volume by Two Points** .
- The **Place Volume by Two Points** ribbon displays.
6. Under **Type**, click **More....**
- The **Select Space** dialog box displays.
7. Select **Definitions > Zones > Generic Zones > Hazardous Atmospheres > SPACE_DEF_HZ01** and click **OK**.

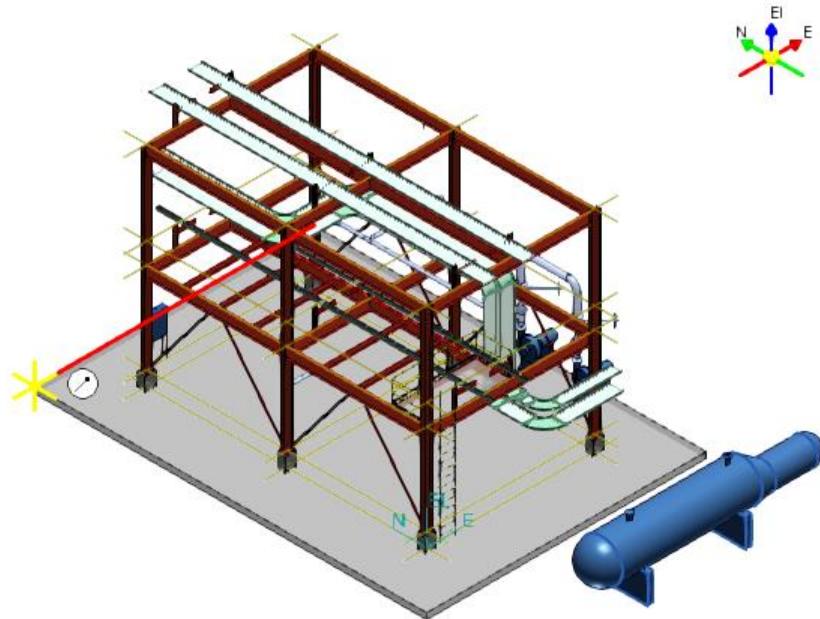
TIPS

- You can edit the properties without interrupting the **Place Volume by Two Points** process.
 - Your administrator can customize the available types of zones most useful for your reporting and design purposes.
 - The volume name can be created automatically with a naming rule. Open the **Properties** dialog on the **Place Volume by Two Points** and select the **Descriptive** name rule. This name rule is selected by default the next time you use the command. The name is generated at the time the volume is created.
8. Under **Space folder**, select **SP3D Train** to assign the new volume to that folder in the space management hierarchy.

TIPS

- If no space folders are created, the default folder in Smart 3D is the root of the model, in this case, SP3DTrain.
 - Assigning volumes to a space folder helps organize the volumes you create.
9. Click **Disable Assoc Point Creation**  to turn the associative points off.

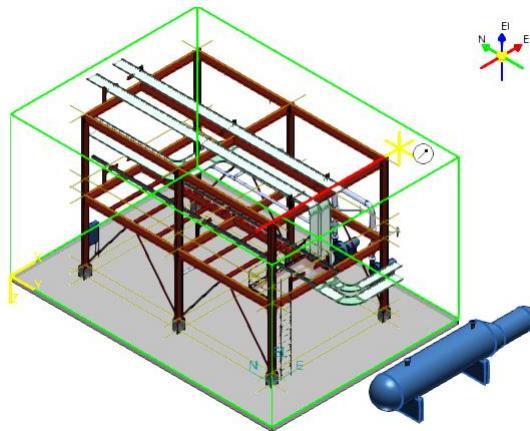
- Locate the corner of the slab with the SmartSketch key point and click to define the first point of the rectangular volume.



TIP You can select and move the volume after you create it when **Disable Assoc Point Creation** is not selected. However, if the objects in the volume are modified, the volume size does not change. Generally, it is helpful to have associative points.

- Define the second volume point as the slab corner diagonal from your first volume point with an elevation value equivalent to that of the structure.

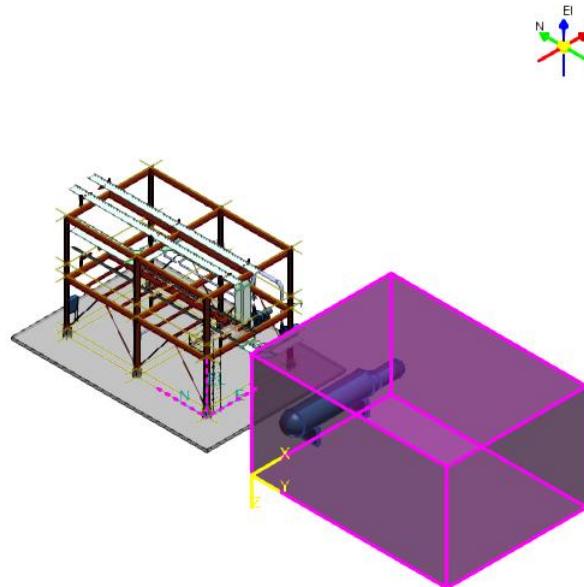
NOTE To define the second volume point, hover over the slab corner diagonal to the first volume point and press F6 and F7 to lock the East and North coordinate values. Then, locate the grid line at the top of the structure to define the Elevation coordinate.



The volume is saved to the database.

Space Management

12. Use the move command to move the volume to a new location to see that the SmartSketch points you used to create the volume do not control its position.

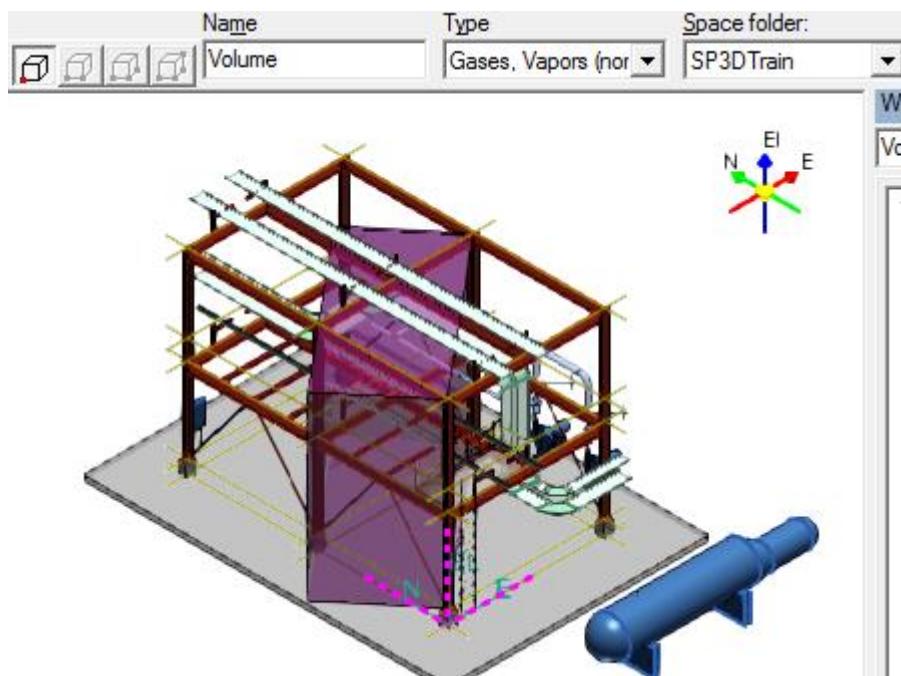


13. Undo the move.
14. Refresh the workspace.

*The volume disappears, because the workspace of this example was defined to show only objects under the **System** hierarchy.*

Place a Volume by Four Points

Use **Place Volume by Four Points**  to place a volume using the same workspace as in previous example.

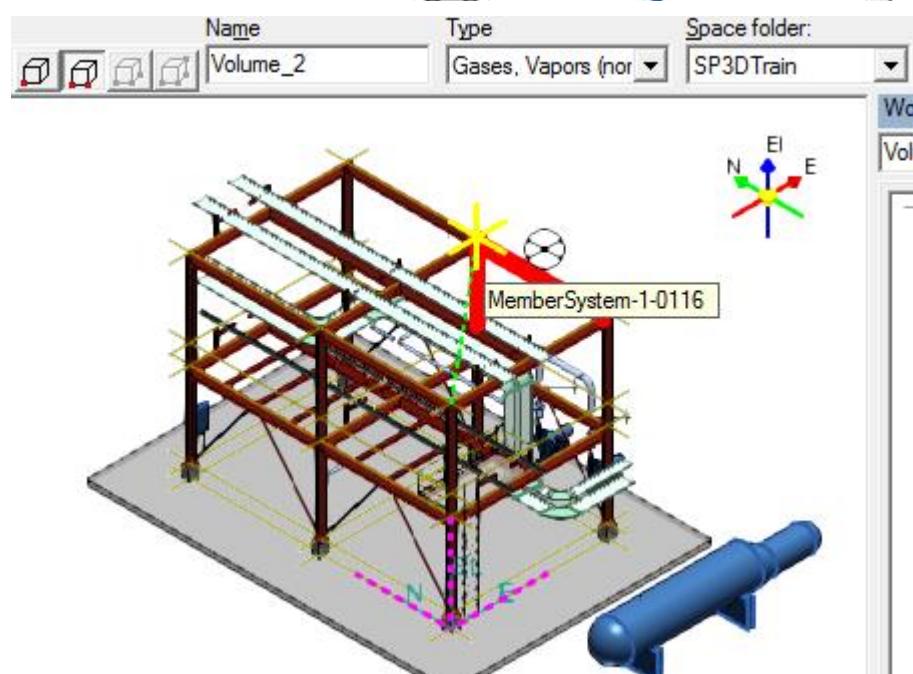
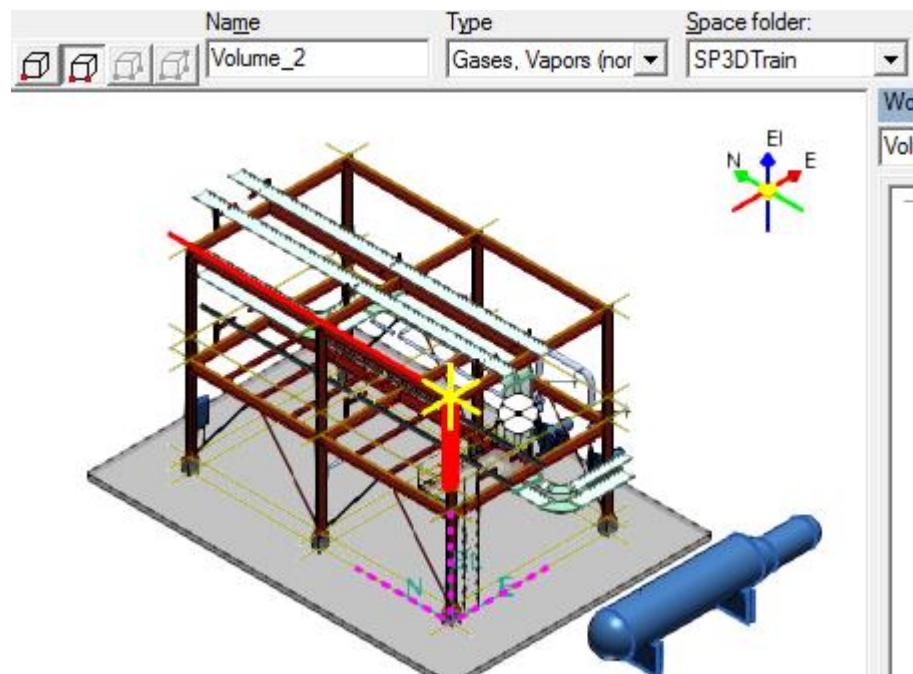


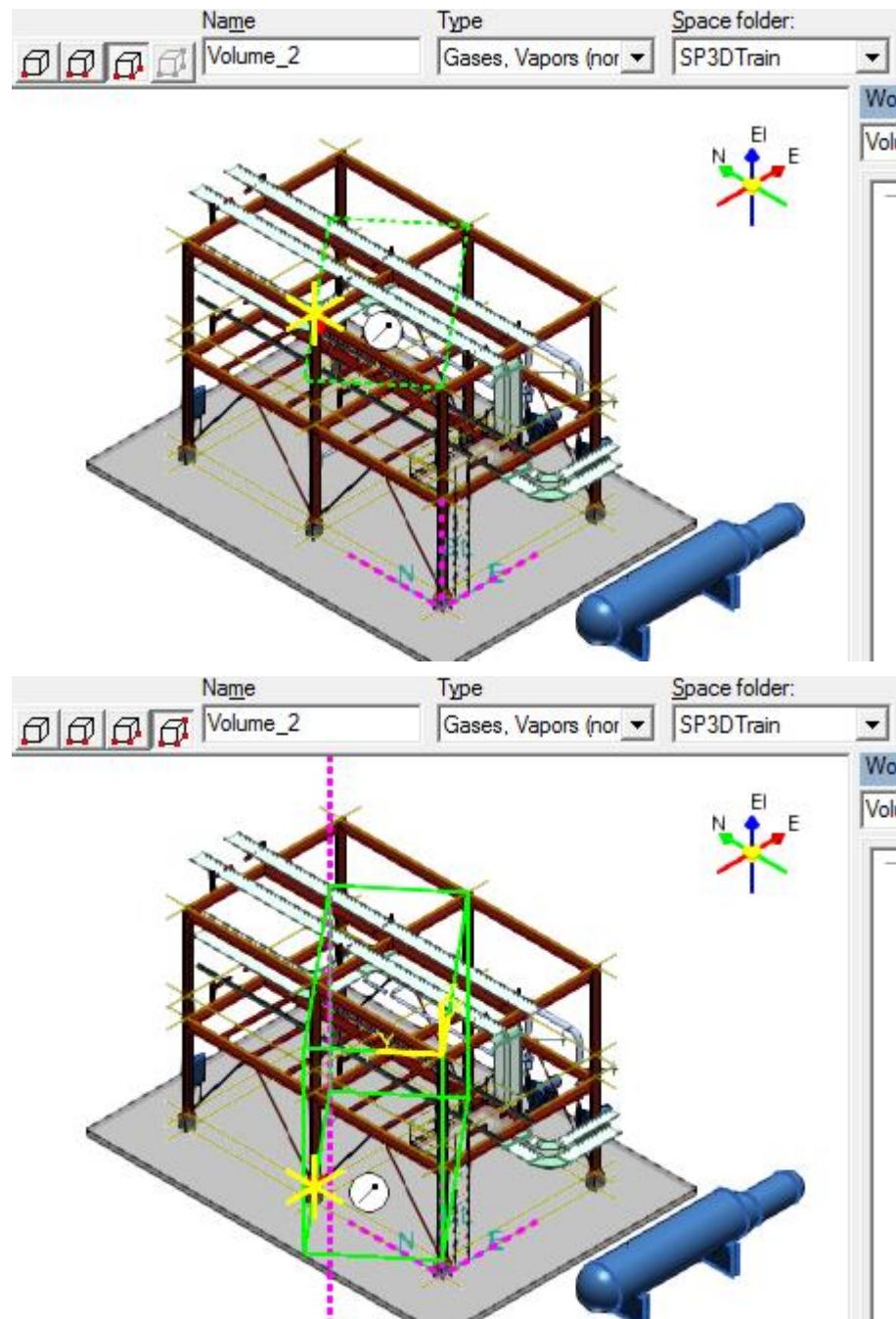
TIP You typically use **Place Volume by Four Points**  when you want to place a volume that is not aligned with an existing coordinate system. If the volume can be aligned with a coordinate system, then it is best to use **Place Volume by Two Points** .

1. Click **Place Volume by Four Points** .
2. Set the **Name** to "Volume_2."
3. Under **Type**, select **More...**
The Select Space dialog box displays.
4. Select **Definitions > Zones > Generic Zones > Hazardous Atmospheres > SPACE_DEF_HZ01** and click **OK**.
5. Set the **Space** folder to **SP3D Train**.

Space Management

6. Specify the four points of the volume as shown:



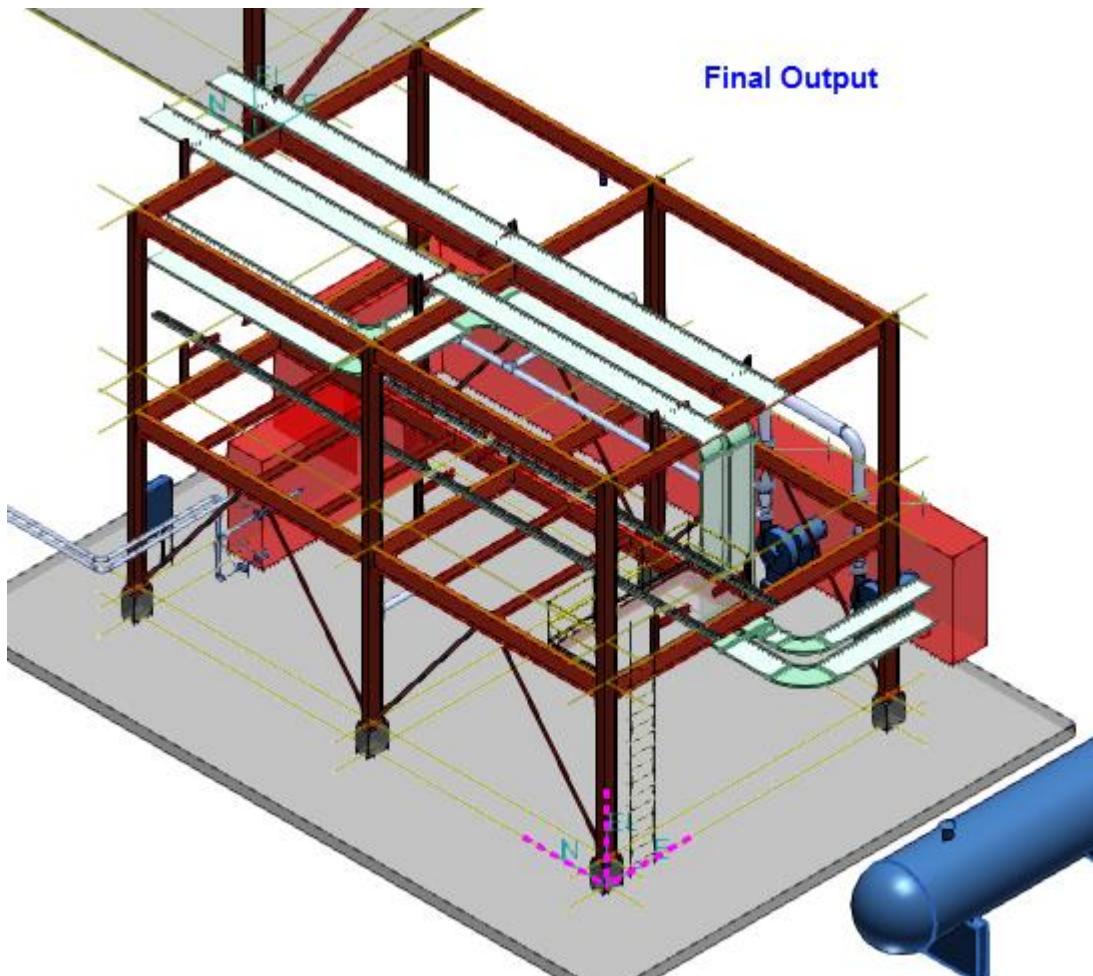


The volume is created.

7. Review the volume, and then delete the volume from the model.

Place a Volume Along Path

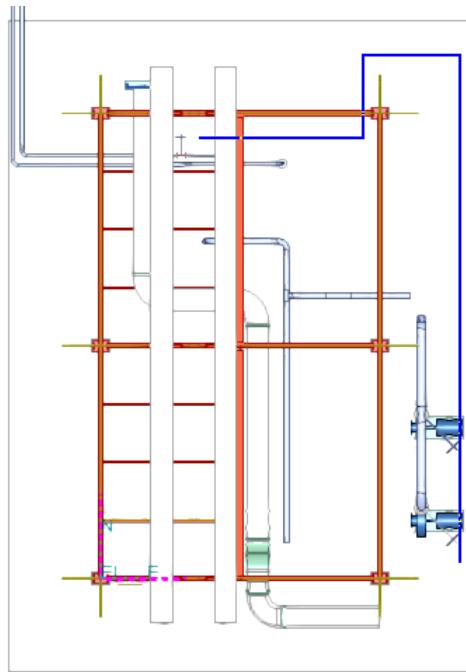
Use **Place Volume Along Path**  to place an interference volume for an access path in the portion of the plant occupied by units **U01** and **U04**.



1. Define your workspace to show units **U01**, **U04** and coordinate systems **U01CS** and **U04CS**.
2. Select **Tasks > Space Management**.
3. Click **Place Volume Along Path** .

*The **Path** ribbon is displays.*

4. Sketch the access way path as shown:

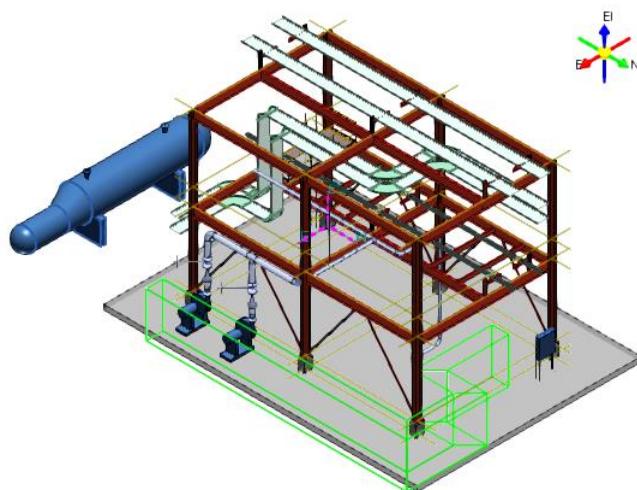


TIPS

- Start near the pumps.
- The exact coordinates of the path are not important for this exercise. Imagine the path as defining the inside edge of the access way.
- Make sure the surface of the slab is located when selecting the points.

5. Click **Finish**.

The path is created.

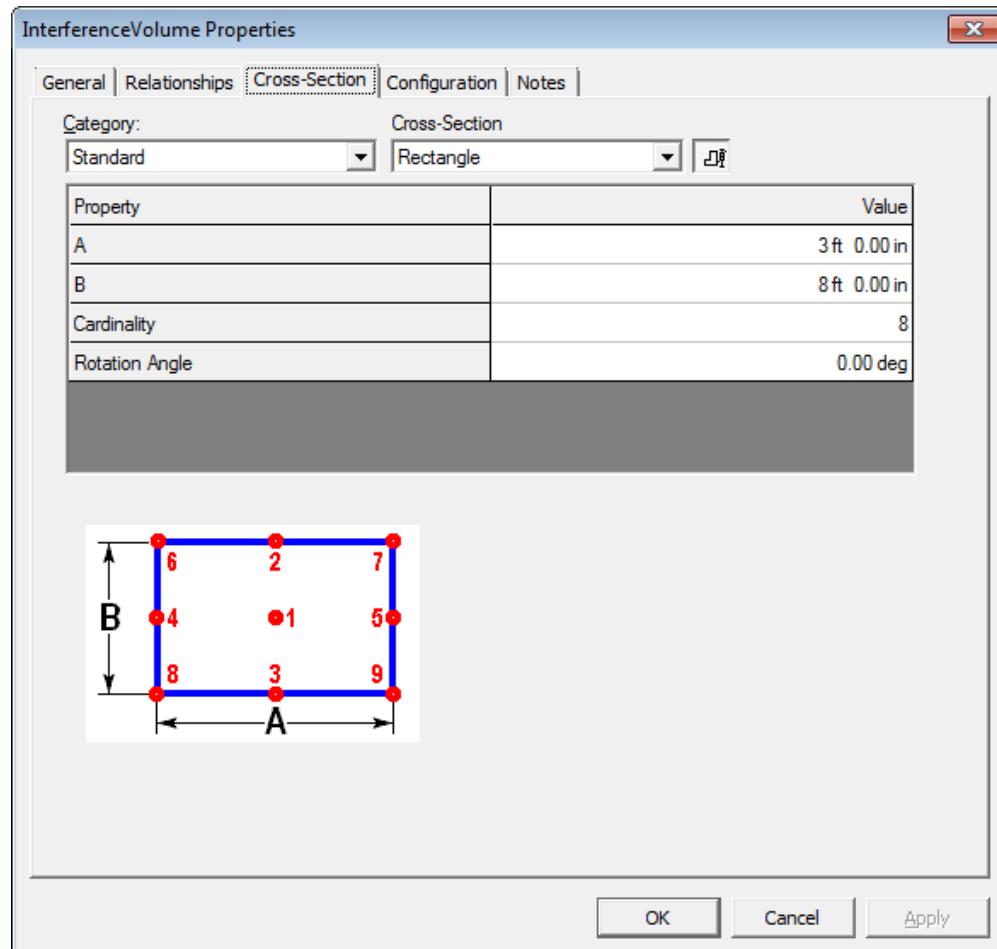


Space Management

6. Click **Properties**.

The **Zone Properties** dialog box displays.

7. Under the **Cross-Section** tab, specify the properties as shown:



TIPS

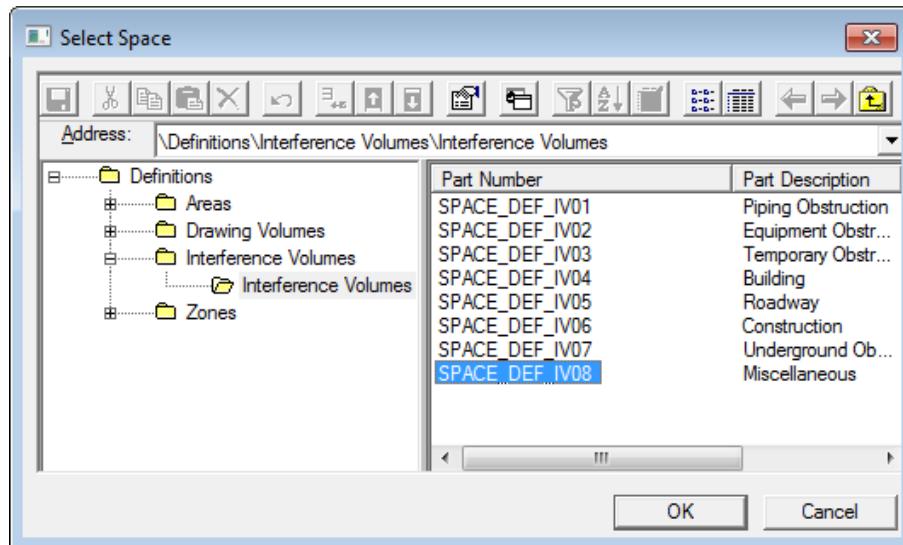
- The cross section is oriented on the path at the specified **Cardinality** point. The orientation of the sketch looks from the first point to the second point of the path.
- If the path does not orient correctly the first time, restart the command after specifying the desired cross section and cardinal point. This sets the defaults correctly for the next execution of the command.

8. Set the **Name** to "Volume_3."

9. Under **Type**, select **More...**

The **Select Space** dialog box displays.

10. Select Definitions > Interference Volumes > SPACE_DEF_IV08 and click OK.



11. Set the **Space folder** to **SP3DTrain**.

12. Click **Finish**.

The volume is placed.

For more information, see *Space Management: An Overview* and *Creating Space Objects: An Overview* in the *Smart 3D Space Management User's Guide*.

SESSION 24

Inserting Reference Files

Objective

By the end of this session, you will be able to:

- Insert a reference file in a model.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Defining a Workspace Using a Volume Filter* (on page 65)
- *Manipulating Views* (on page 71)
- *Selecting Objects in a Model* (on page 101)

Overview

You can reference geometry files from other formats in Smart 3D. To insert a reference file into the model, the file must reside on a directory shared on the network. The default share location is the Symbol share. In a global workshare configuration, your administrator updates the Symbol share at each remote location to match that on the host. You can attach a reference file that is in a share other than the Symbol share, but you will not have access to the reference files at the remote workshare locations that cannot access the shared location. The software warns you if you choose a share other than the Symbol share. You must share the file on your computer or on the network. Your administrator will tell you what shares you may use. The currently supported files are MicroStation V7 files with the .dgn extension and 2D or 3D AutoCAD files with the .dxg and .dwg extensions.

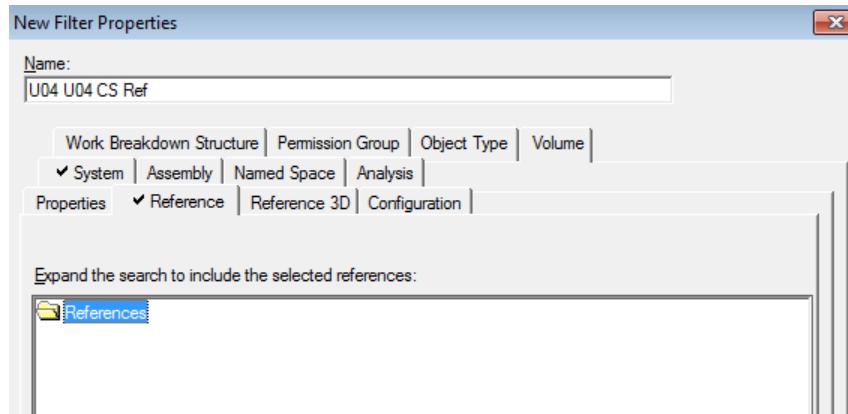
MicroStation design files use the concept of master units: sub units: positional units (MU: SU: PU) to express length dimension. All distances in Smart 3D are stored in meters. When you insert a reference file in Smart 3D, the MU: SU: PU working units are used to convert units into meters. If the MU: SU: PU units are not defined within the MicroStation file, an error displays. The recommended working units in a reference file are 1:1000:80 for the metric system (m: mm) and 1:12:2032 (ft: in) for the English system.

Insert a Reference File

Insert a MicroStation V7-format .dgn file in a model.

Inserting Reference Files

1. Define your workspace using Unit **U04**, coordinate system **U04 CS**, and **References** from the **Reference** tab. Name the filter **U04 U04CS Ref**.



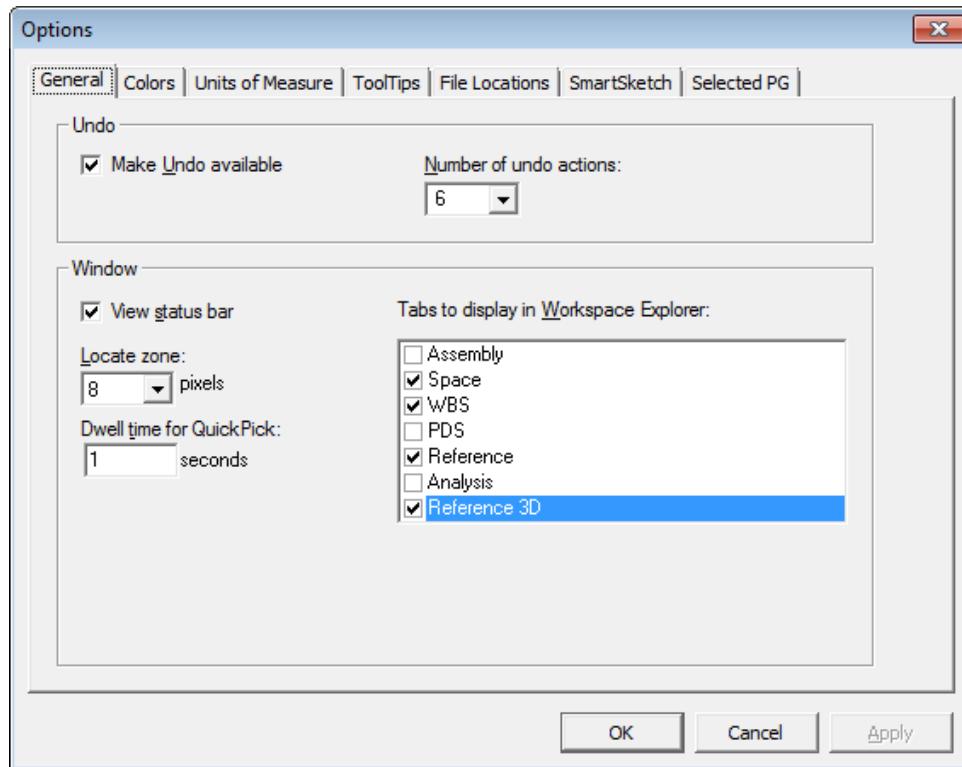
TIPS

- The **References** folder displays only if a reference file was inserted into the current model. The References folder displays even if the reference file is later deleted, because the reference node object is not created until a reference file is first inserted.
- If you do not see a **References** folder, redefine your filter as described above after you have inserted your first reference file.

2. Select **Tools > Options**.

The **Options** dialog box displays.

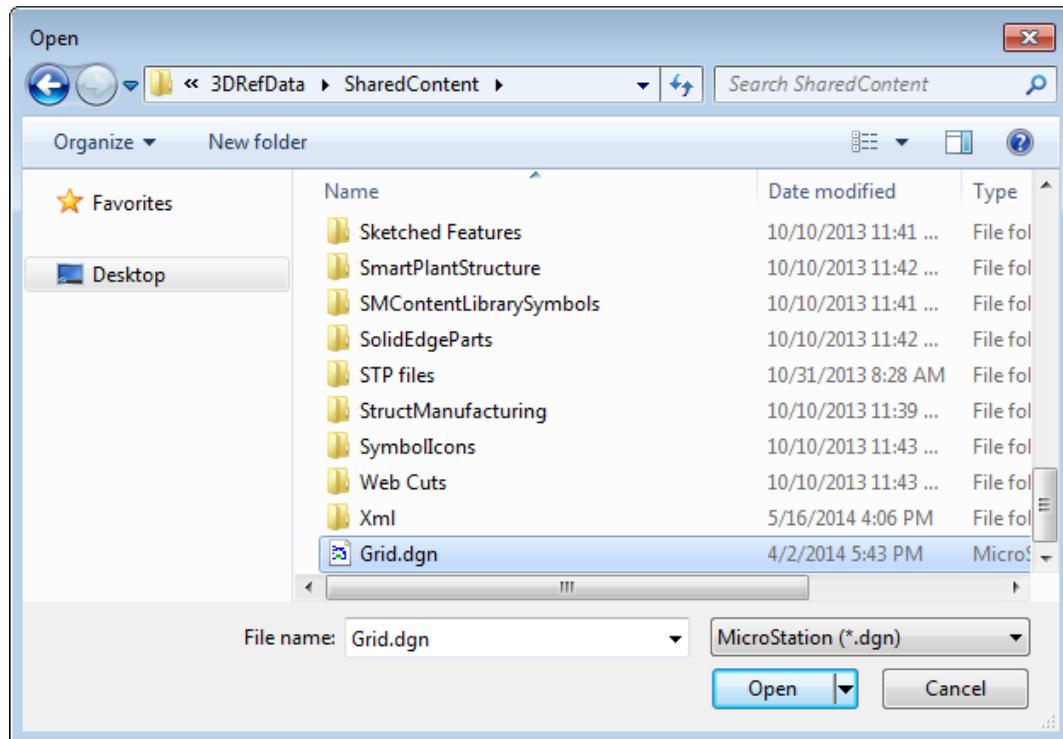
3. Under **Tabs to display in Workspace Explorer**, select **Reference** and click **OK**.



4. To display the **Reference** tab in the **Workspace Explorer**, save the session, and then close and reopen Smart 3D. Alternatively, switch from the **Common** task to the **Catalog** task and back to the **Common** task.
5. Select **Insert > File**.

The **Insert File** dialog box displays.

6. Browse to the **dgn** folder, select **grid.dgn**, and click **Open**.



TIP You can select multiple files by holding down the CTRL or SHIFT key while selecting the files.

The **Reference** tab displays the hierarchy of the referenced data. The **Reference** tab also displays in the **Filter Properties** dialog box. You can define your workspace to include the reference files.

TIPS

- The location and orientation of the inserted files match the active coordinate system.
- You can move and rotate the attachment.
- You can view the attachments on the **Reference** tab of the **Workspace Explorer**.
- You can define your workspace to include the reference files.
- To detach a reference file from a model, delete the file in the **Workspace Explorer** and then refresh the workspace.
- When troubleshooting reference files, make sure that the file or folder is shared with proper permissions. Also, make sure that the working units of the reference file are supported. The file must have units that the software can read and convert.

For more information, see *Using the Insert Menu: An Overview* in the *Smart 3D Common User's Guide*.

SESSION 25

Placing Control Points

Objective

By the end of this session, you will be able to:

- Place control points.

Before Starting this Procedure

- Smart 3D Overview
- *Creating a Session File* (on page 17)
- *Defining a Workspace Using a System Filter* (on page 21)
- *Manipulating Views* (on page 71)
- *Selecting Objects in a Model* (on page 101)
- *PinPoint Ribbon* (on page 125)

Overview

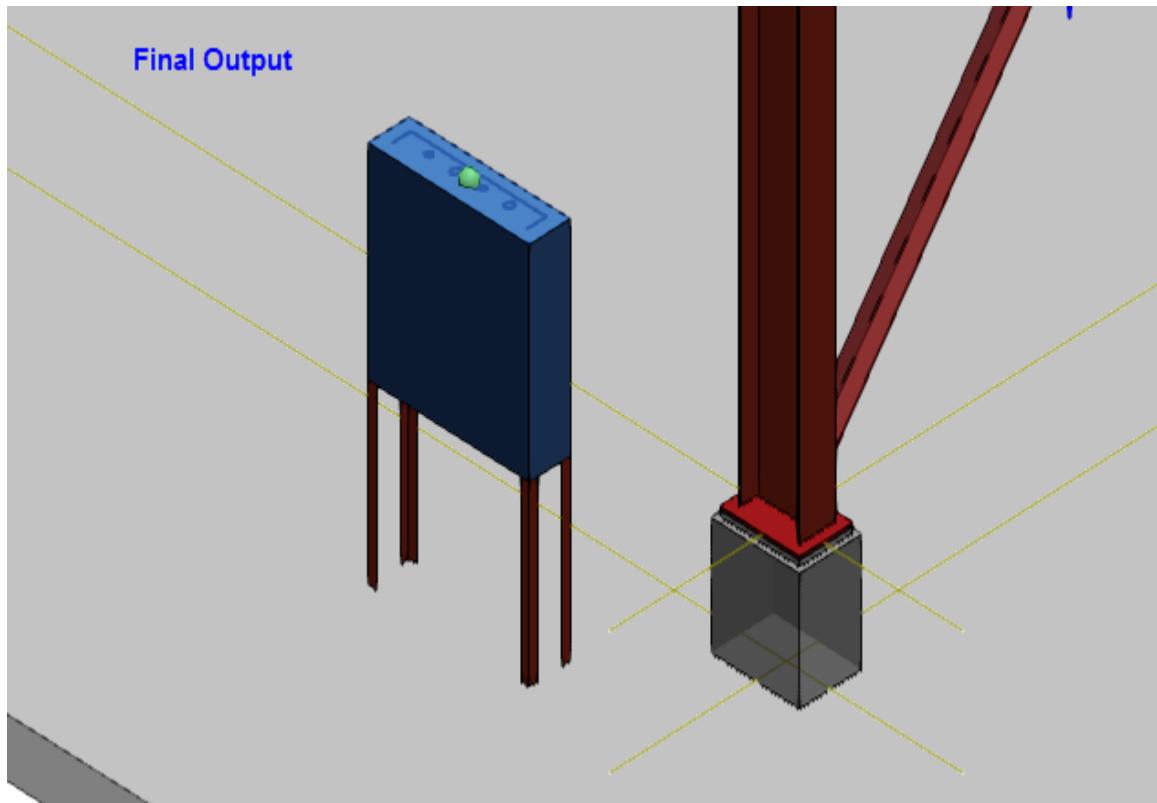
A control point defines a 3D coordinate and is associated to another object. Its geometry is a sphere with a user-defined diameter. It is not included in interference detection. The control point is automatically assigned to the same permission group as the parent object. If you delete the parent object, the control point is automatically deleted. Any object can be a parent object, including the System hierarchy objects. It has properties and associated notes. The **Type** and **Subtype** properties indicate the meaning or intended use of each specific control point.

Control points are used for:

- Labels on drawings – Drawing styles can detect the control point of any desired type and subtype and output the note associated with the control point as a label with the leader pointing to the location of the control point.
- Points for automatic dimensioning on drawings – Piping Isometric and Orthographic drawings place dimensions automatically as defined by the dimensioning style rules of the drawing. Orthographic drawings can dimension control points of any type and subtype. Isometric drawings can dimension control points that are associated to a straight pipe, and have a Fabrication note. The text content of the note is displayed on the isometric drawing.
- Division point in piping – The spooling and automatic WBS Item creation commands in piping use a control point of a specific type and subtype. The details of what types of control points are used are covered in the piping tutorials.
- Recording points of design interest with notes – Any design note you might want to record that refers to a coordinate in the model can be added using control points.

Place Control Points

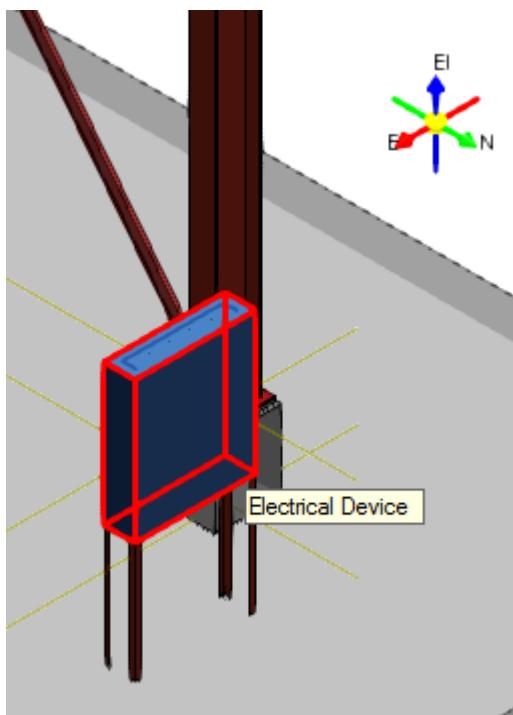
Place a control point on an electrical device in Unit U01.



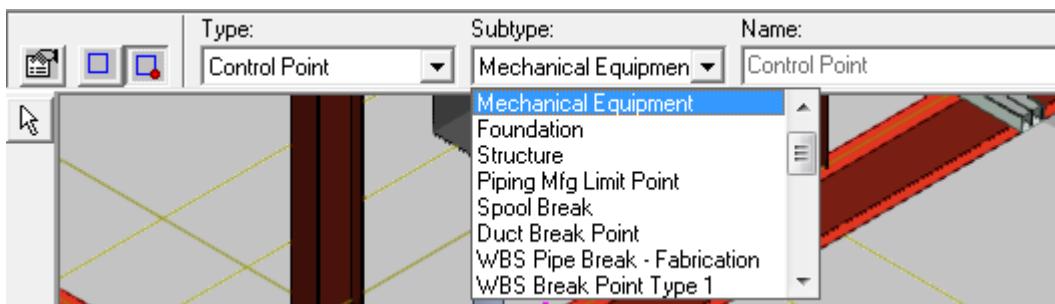
1. Define your workspace to show **Unit U01**.
2. Select the **Electrical Device** under the **Equipment** system and edit properties.
3. Click the **Configuration** tab.
4. Set Status to **Working** and click OK
5. Select **Insert > Control Point**.

The **Control Point** ribbon displays.

6. Set **Electrical Device** as the parent object of the control point – the object on which the control point has to be placed.



7. Set the **Subtype** to **Mechanical Equipment**.

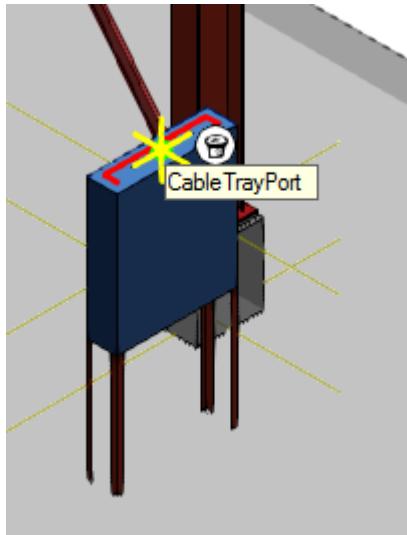


TIPS

- The available **Types** are **Control Point**, **Key Point**, and **Insertion Point**. Only **Control Point** has fixed software meaning for piping isometrics and WBS group creation when related to piping objects. You can configure the automatic dimensioning and labeling of orthographic drawings to use any type of control point. Your administrator will give you instruction for which types to use to drive automation of your custom drawing types.
- You can use **PinPoint** to place the control point at a specific coordinate or at some specific offsets from a location on the parent object.

Placing Control Points

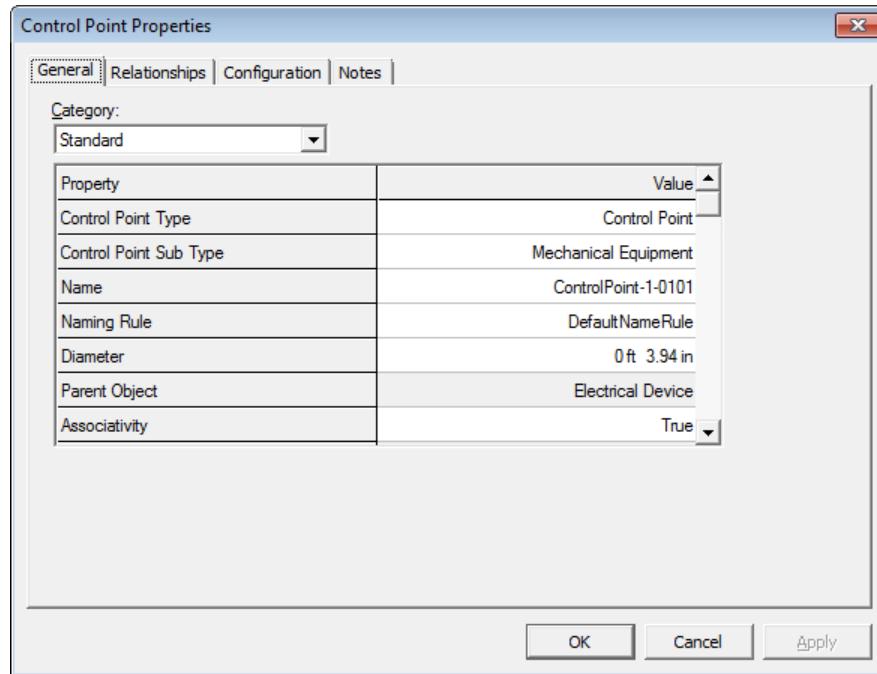
8. Click the cable tray port of the Electrical Device to place the control point as shown:



TIPS

- If you select the desired parent object before inserting a control point, the selected object is automatically assigned as the parent of the control point to be placed and the software prompts you to position the control point. This allows you to avoid a QuickPick that may display if there are many potential control point parent objects in the portion of the model you are working in. For example, you can select the specific connection you want to split an isometric drawing in before inserting a control point. If the object selected before starting the command is not a potential control point parent, the software prompts you to select the parent as in the workflow above.
- After placing control points in a model, you can view them graphically by setting your view to show the **Reference Aspect**.
- You can select the control point graphically when the reference aspect is displayed. If the control point is inside the volume of the object or difficult to graphically select, you can select it in the **Workspace Explorer**. First, select the parent object of the control point. The **Workspace Explorer** automatically scrolls so you can see the selected object. The control point is nested under its parent object in the **Workspace Explorer**. You can then easily see and pick the control point from the **Workspace Explorer** rather than graphically.

- You can see the control points related to an object by looking at the **Relationships** tab of the object's **Properties** dialog box.



- You can change the size of the control point sphere by changing the **Diameter**.
- When **Associativity** is set to **True**, the control point moves when you move the parent object. You cannot move the control point relative to the parent object. When set to **False**, the control point does not move when you move the parent object. You can also select and move the control point relative to the parent object. Once you toggle the associativity of the control point to **False**, you cannot toggle it back to **True**.

For more information, see *Using the Insert Menu: An Overview* in the *Smart 3D Common User's Guide*.

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