

Process, Power and Marine Division

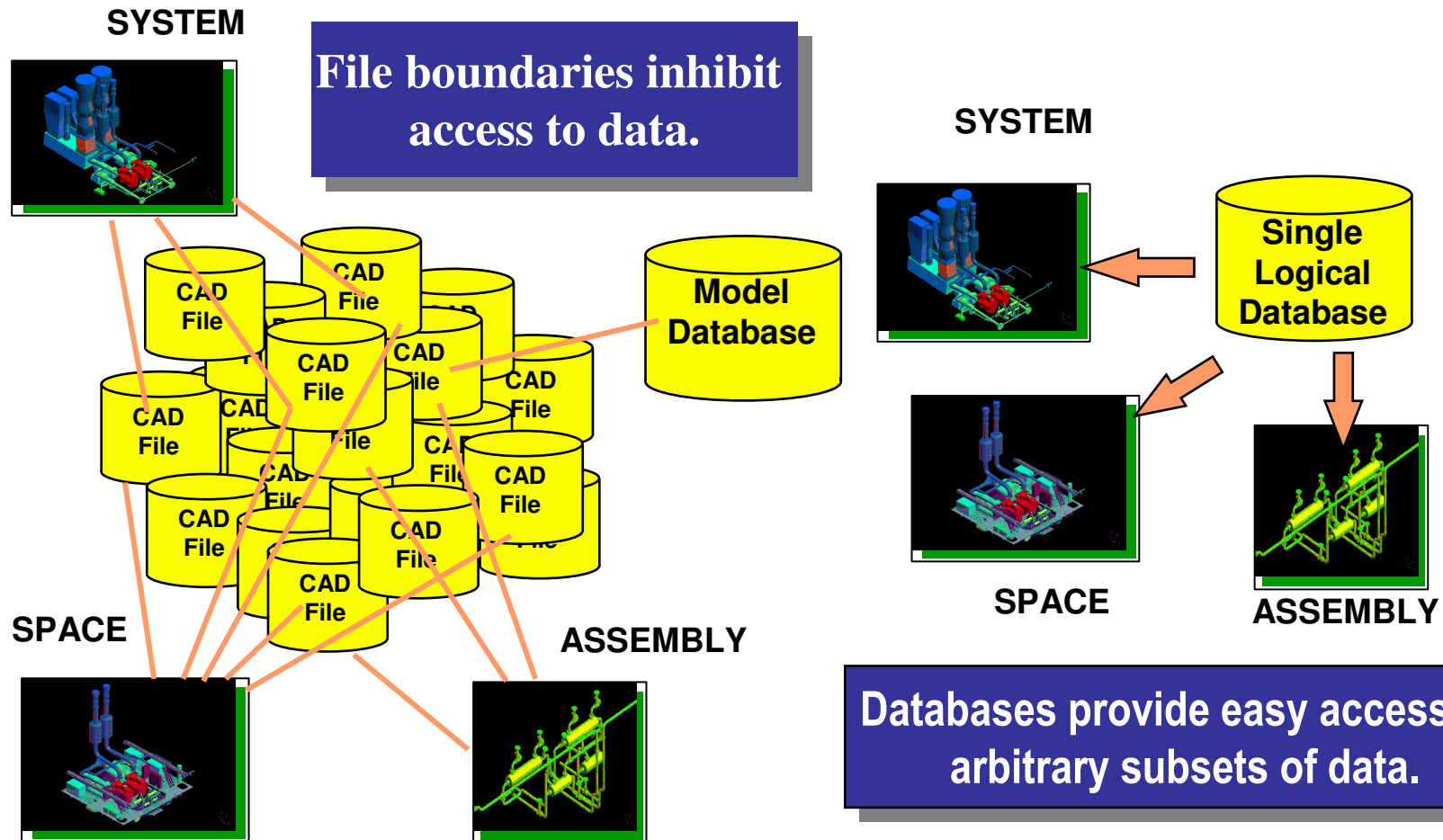
SmartPlant 3D Common Task



Agenda

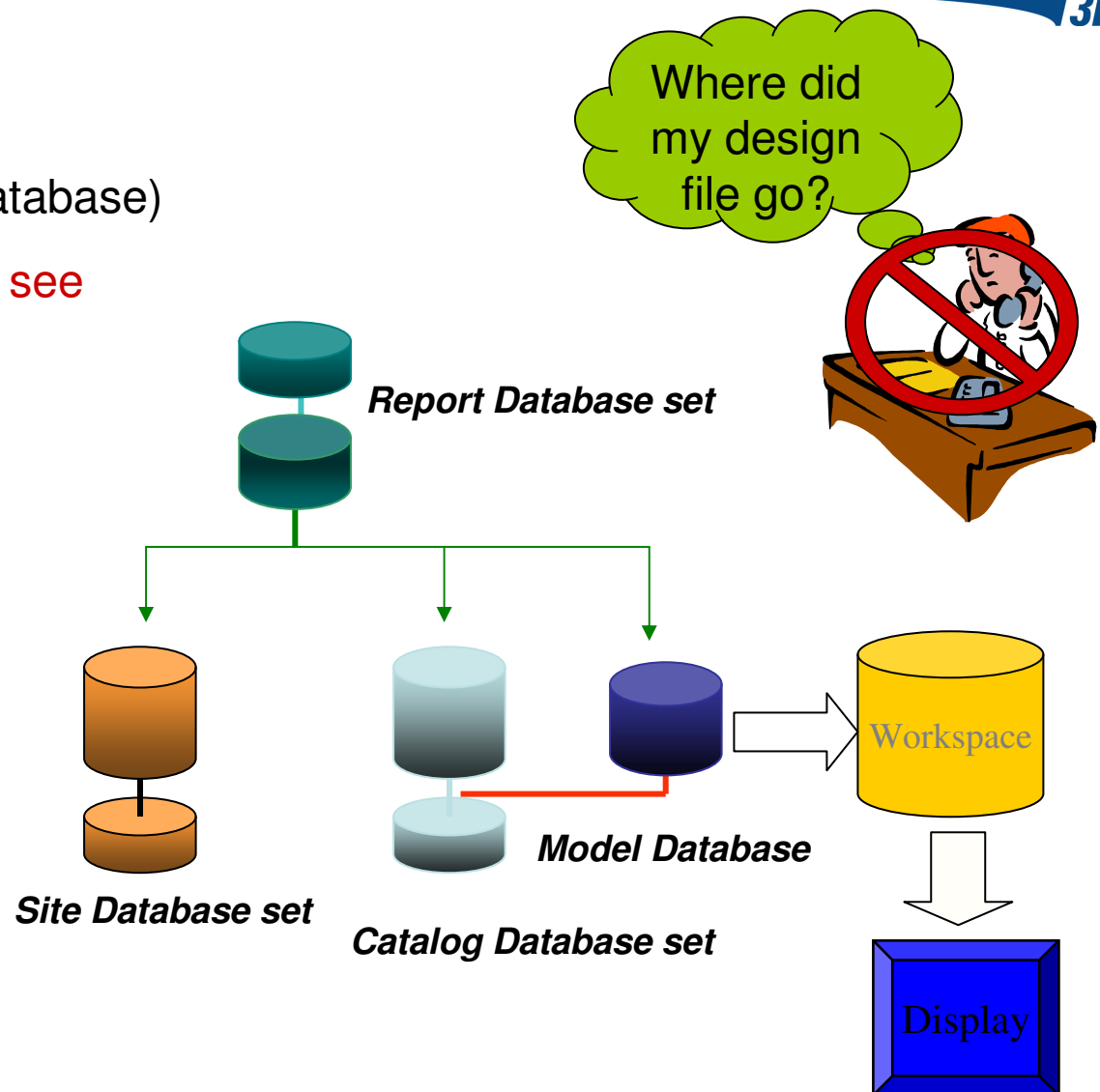
- **SmartPlant Overview**
- User Interface
- Workspace
- Filters
- Common Task
- Control Point / Notes
- Work Breakdown Structure (WBS)
- Interference Detection (IFC)
- To Do List

Single Database



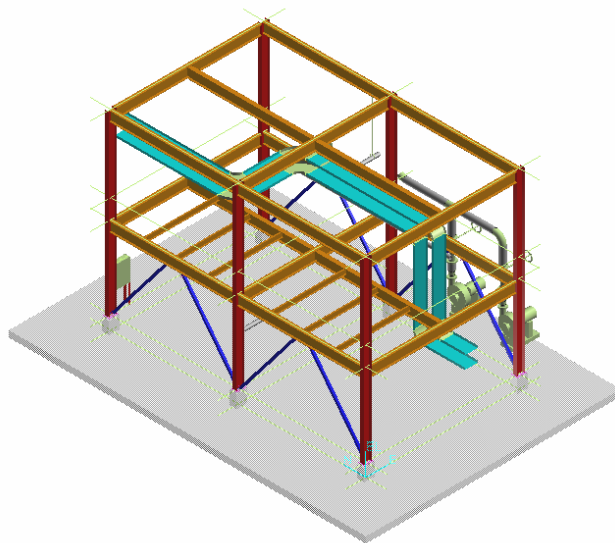
Query

- Define Workspace (filter on database)
- See only the data you want to see
- Builds a logical “Working Set”
 - System
 - Assembly
 - Spatial (Volume or Planes)
 - Logical Permission Group
 - Object Types/Properties
- Saved Session Files



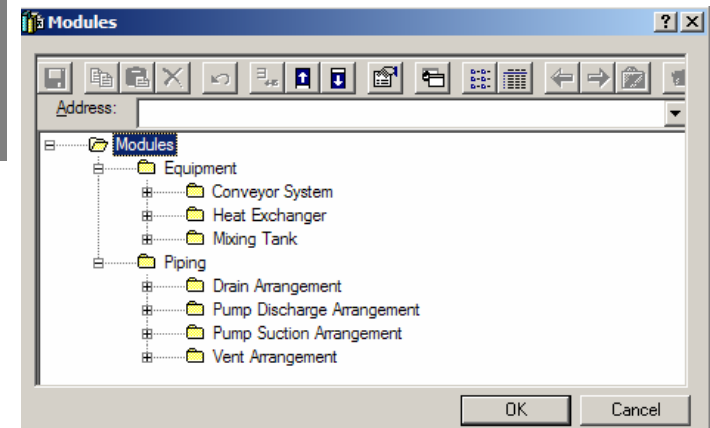
Design Re-use

SmartPlant[®]
3D



Unit1

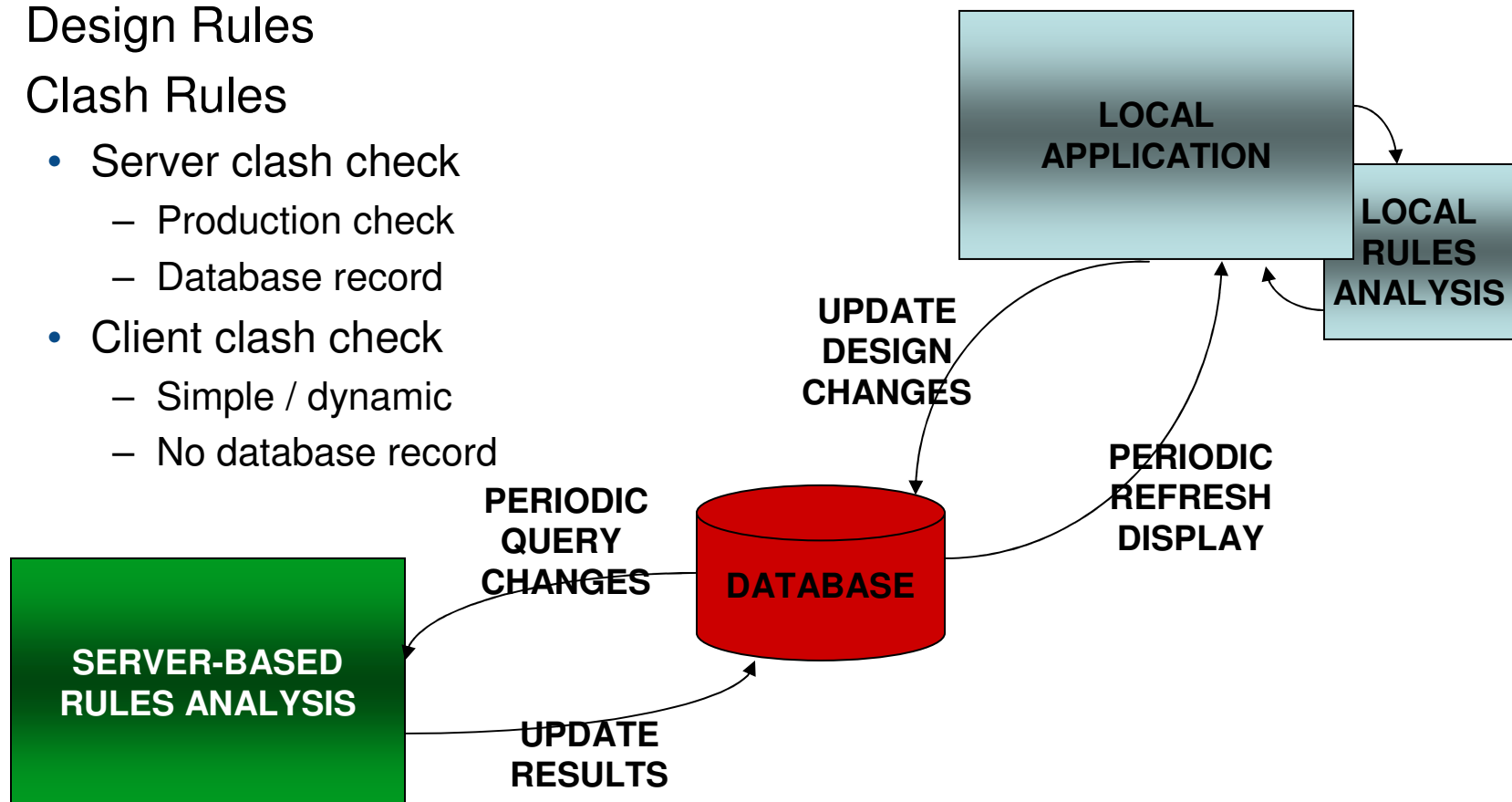
Copy to Catalog
or
Instance in
Another Location



Internal Relationships Maintained.
External Relationship Exposed.

Rules Services

- Design Rules
- Clash Rules
 - Server clash check
 - Production check
 - Database record
 - Client clash check
 - Simple / dynamic
 - No database record

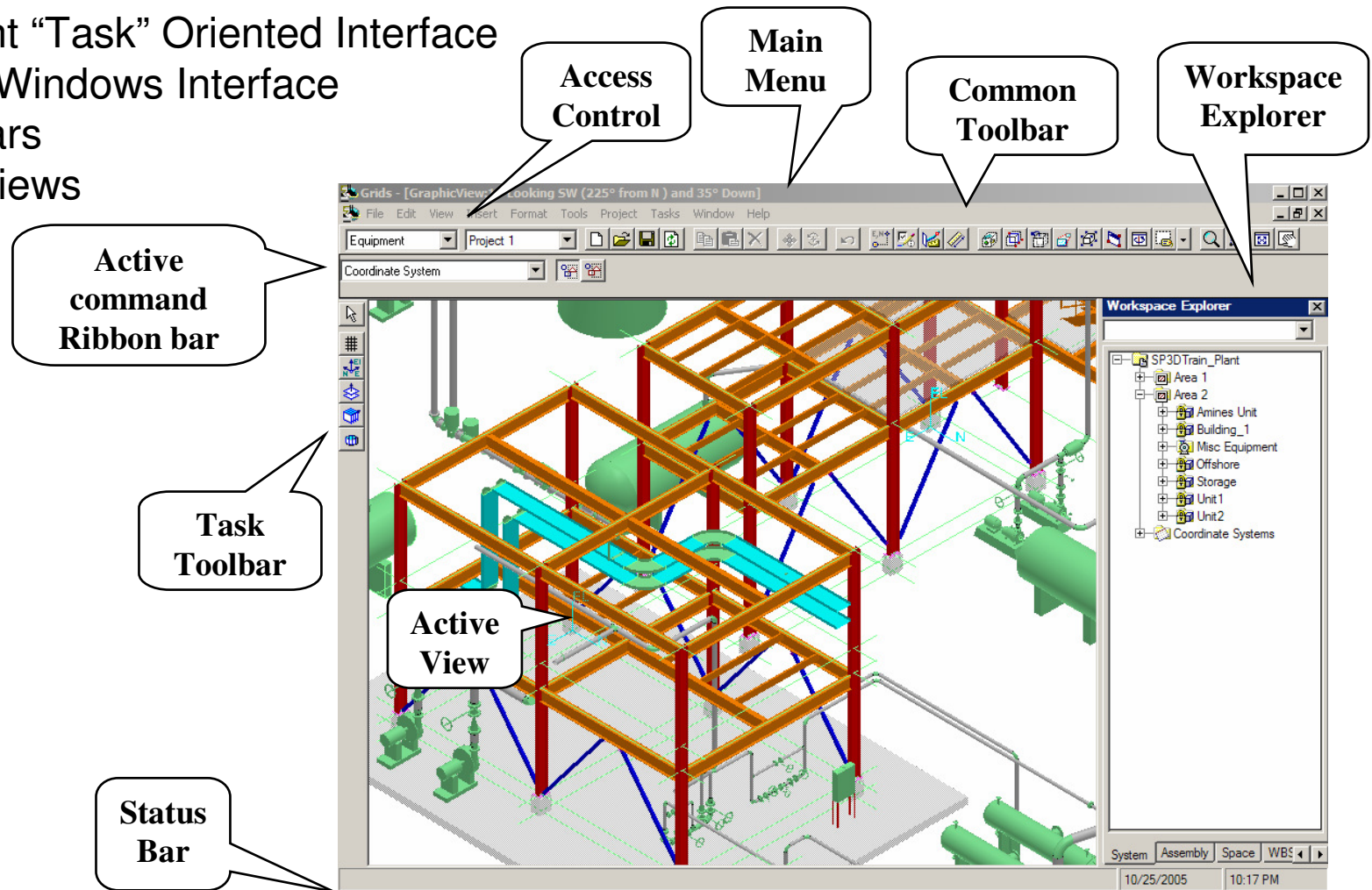


Agenda

- SmartPlant Overview
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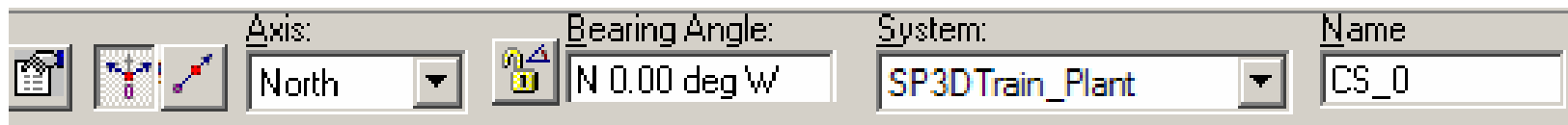
Common Windows Based User Interface

- SmartPlant “Task” Oriented Interface
- Common Windows Interface
- Ribbon Bars
- Graphic Views



SmartStep Commands

- **Same task specific ribbon bars** for placement and object-action modify commands in all disciplines



SmartSteps

Active Properties

Data Fields

SmartStep Commands

Property Dialogs

- Same properties interface available for place/modify in all disciplines

Tabbed Dialogs

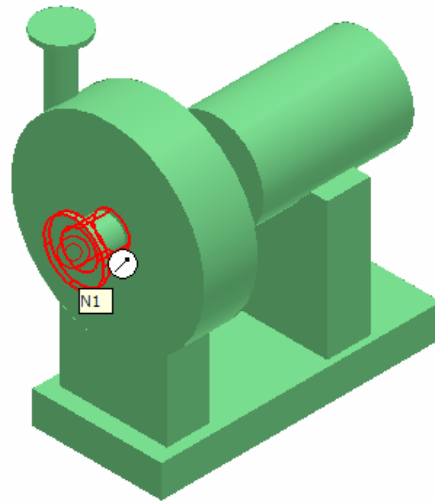
Edit Controls

Property	Value
Name	MemberSystem-0019
Name rule	DefaultNameRule
Parent system	Beams
Type Category	Beam
Type	Beam
Priority	Undefined
Continuity Type	Continuous
Continuity Priority Number	0
Start East	104 ft 0.00 in
Start North	30 ft 0.00 in
Start Elevation	30 ft 0.00 in

SmartSketch

SmartSketch is the graphic environment with the mechanism to automatically find special points when the command is looking for a graphic reference.

This locking mechanism is similar to what is found in CAD environments



Parallel	
Perpendicular	
Angle	
Reference axis aligned	
Point on Surfaces	
Offset	
Intersection	
Divisor	
Point on curves	
Key point	
Add to stack	

SmartSketch

The system finds Key point and Point on Geometry whenever you move the cursor over those graphics

SmartSketch uses only those points and checks for linear relationship points against every object in the workspace



Select Objects

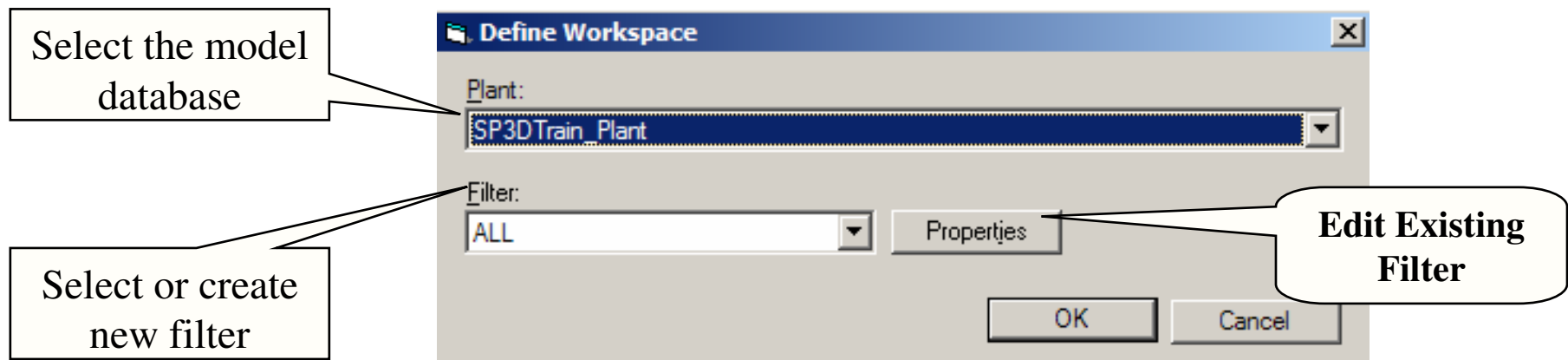
- Select Command
- By Fence (inside or overlap control)
- Use shift or ctl key to add or remove objects from the select set.
- Tools -> Select by Filter
- Use Workspace Navigator
- Quick pick tool

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Workspace (Ctrl-w)

- Allows user to define how much of the model to display during the active session:
 - Whole model, all disciplines
 - Single area/multiple areas
 - Partial areas
 - Whole model, select discipline(s)
 - Select areas, select discipline(s)



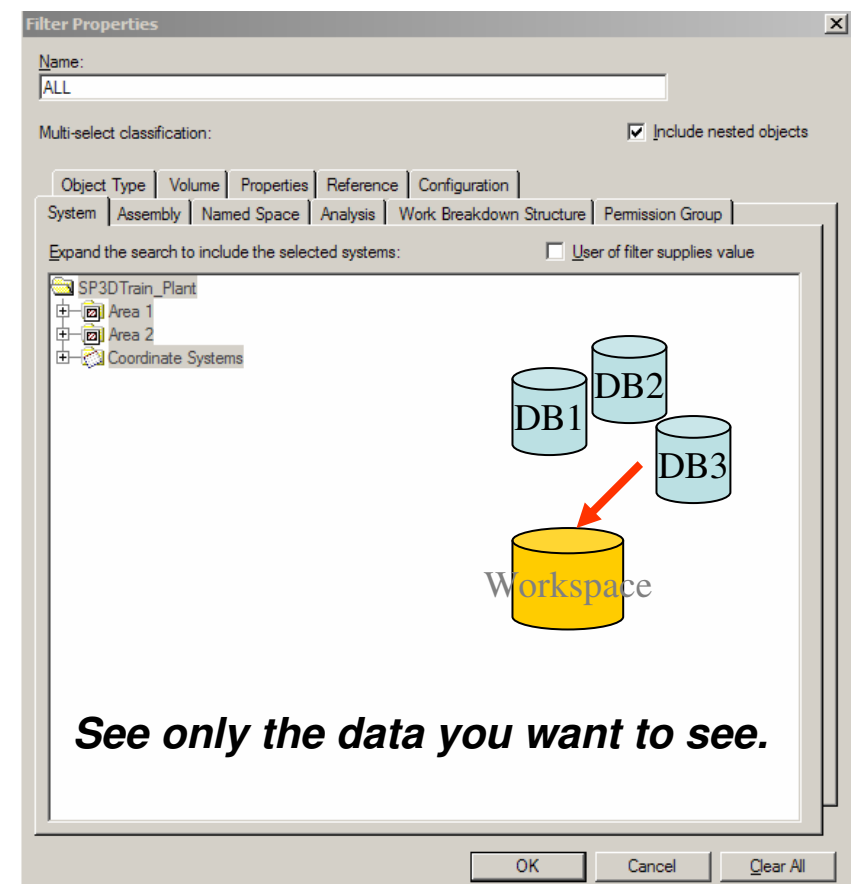
Agenda

- SmartPlant Overview
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- Workspace
- **Filters**
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Filters

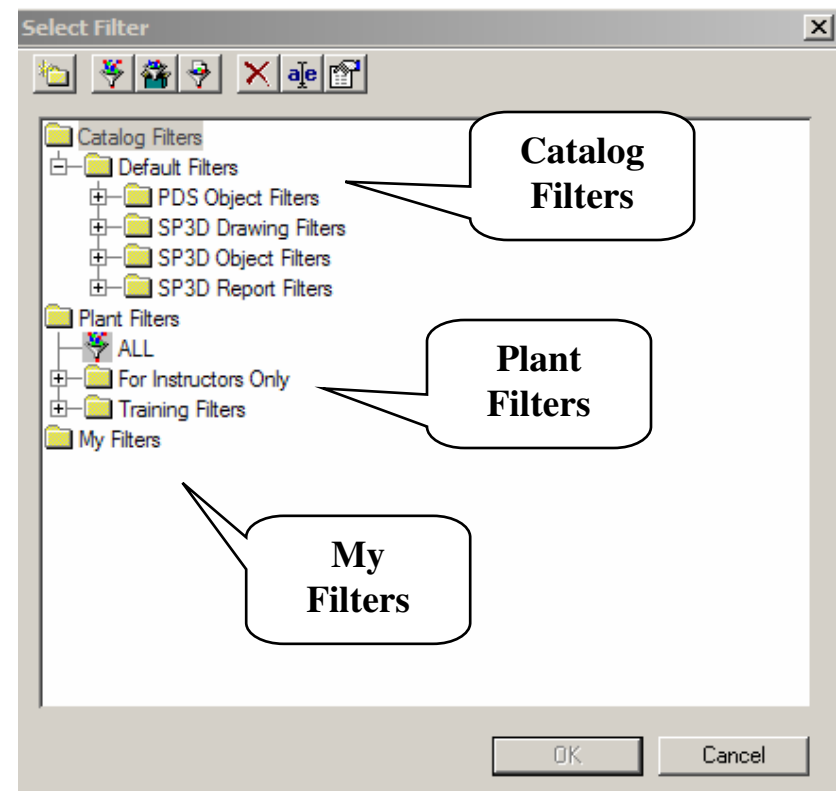
A filter is a set of search criteria that selects or retrieves data based on the object properties:

- System
- Assembly
- Named Space
- Work Breakdown Structure (WBS)
- Analysis
- Permission group
- Object Type
- Spatial (Volume)
- Reference
- Properties
- PDS (If PDS project attached)



Filters

- Catalog Filters are filters which are stored in the catalog and are available to all users that use the same catalog
- Plant Filters are filters available to all users in a model. These filters are stored in the model database
- My Filters are created by the user and are only visible to him. These filters are stored in the model database



Filters

Simple Filters

Simple Filter is a query based on the object properties defined through GUI

Compound Filters

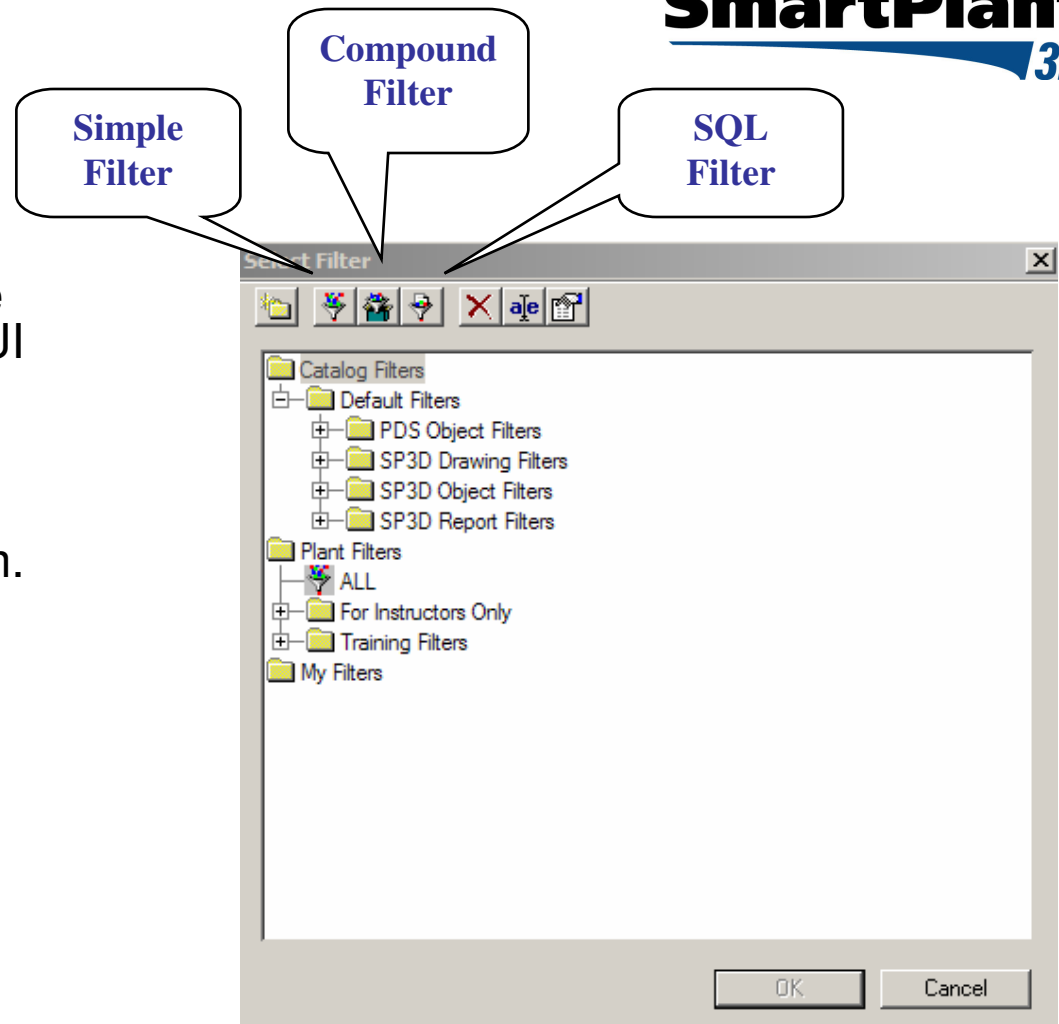
A “Compound” filter is two or more filters with an operator between them.

SQL Filters

Is a filter which provides a place to store user-written SQL query

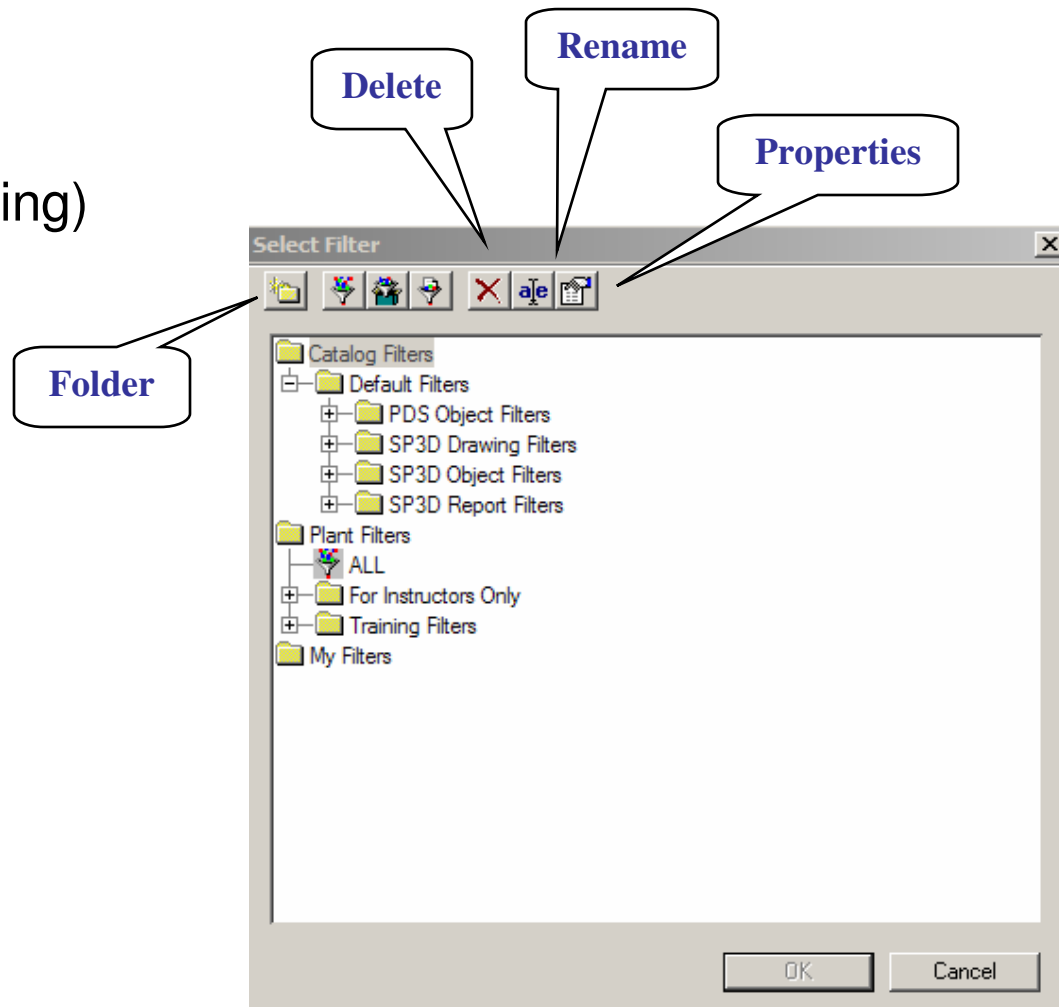
Asking Filters

Is a filter that has left specific values for certain properties as variables to be filled in by the user when user uses the filter



Filters

- New Folder
- New Filter (Simple or Asking)
- New Compound Filter
- New SQL Filter
- Delete
- Rename
- Properties

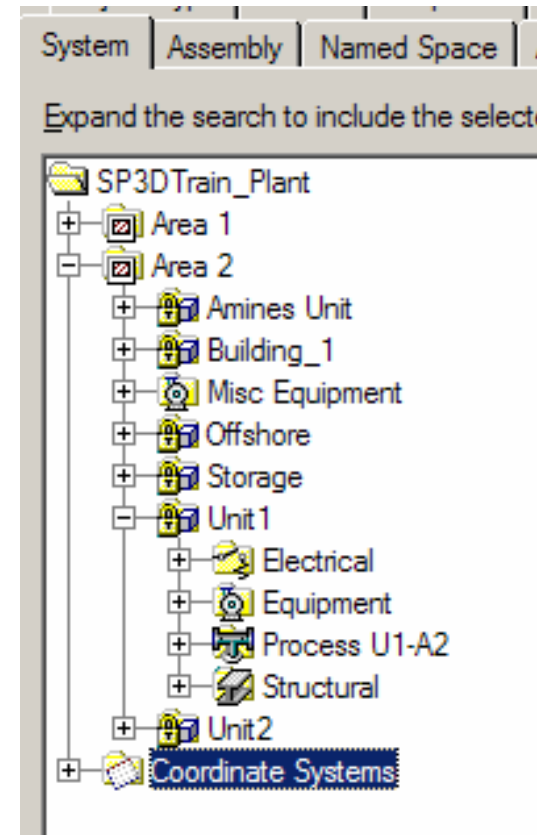


Filter Properties

System Tab

Expand the search to include all selected systems

- A system is a way to group objects logically – e.g. by discipline, by design area, by physical area, etc
- Every object must belong to a system
- System Types



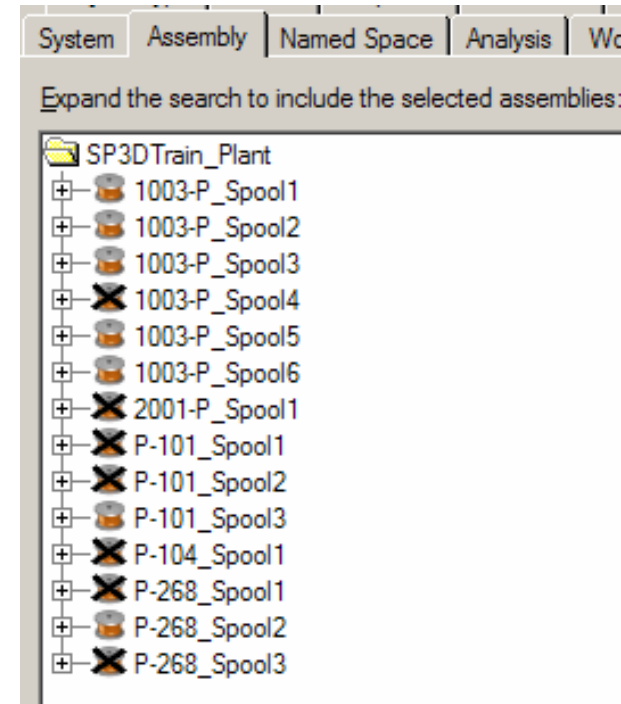
Filter Properties

Assembly Tab

Expand the search to include all selected assemblies

Example of assemblies are:

- Spools
- Hangers and Supports

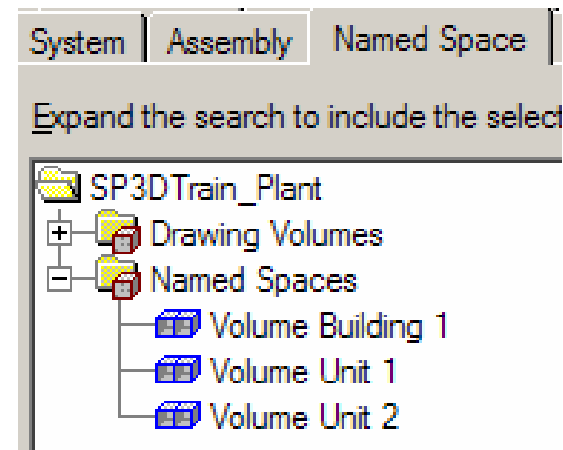


Filter Properties

Named Space Tab

Expand the search to include all selected named spaces

- A space is a way to define a relationship between the functional requirements of a space area in a model and its real geometrical position

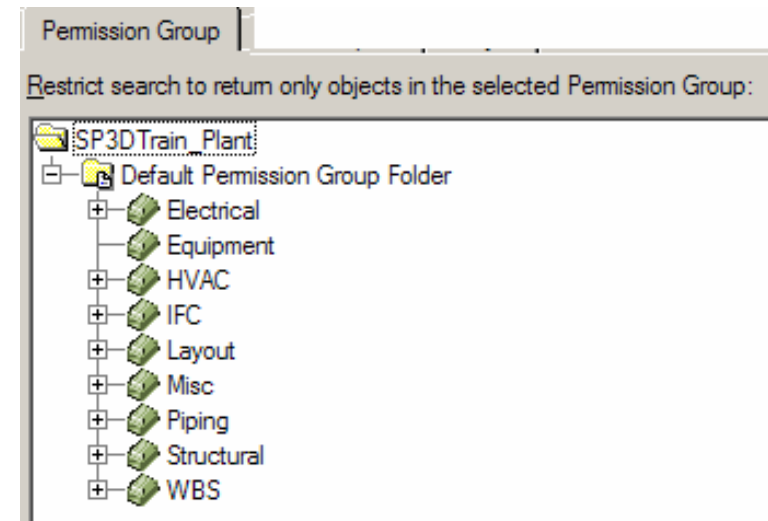


Filter Properties

Permission Group Tab

Restrict the search to return only objects in the selected permission group

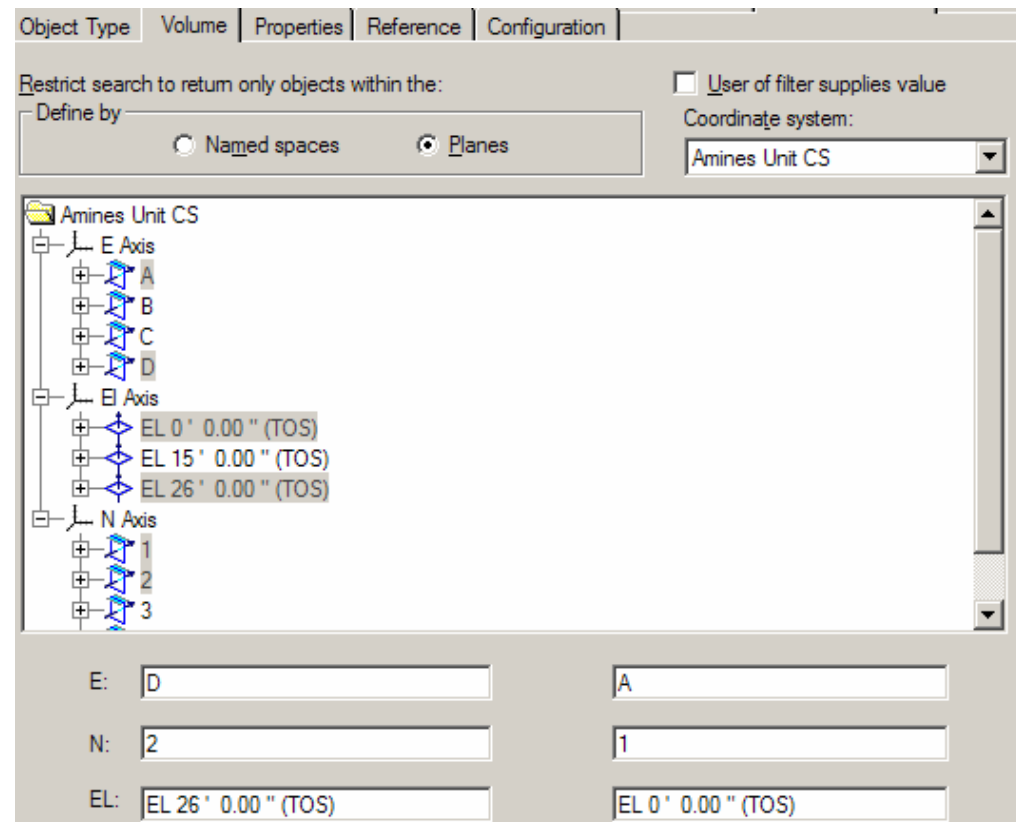
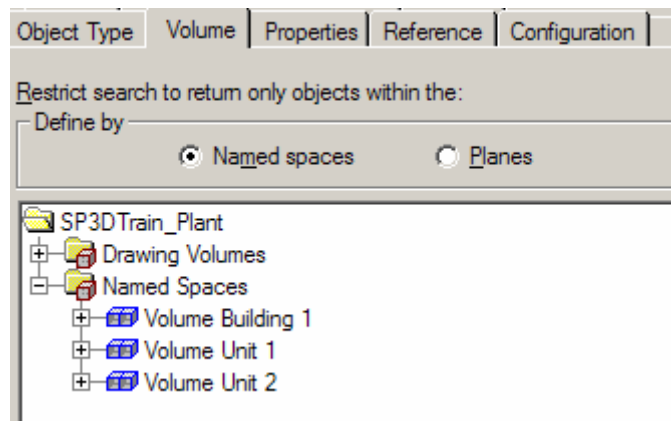
- Every object must belong to a permission group.
- The permissions for the objects in model are defined by a set of Access Control Rule:
 - Read – Can view objects
 - Write – Can create/modify/delete objects
 - Full Control – Can perform all operations on objects



Filter Properties

Volume Tab

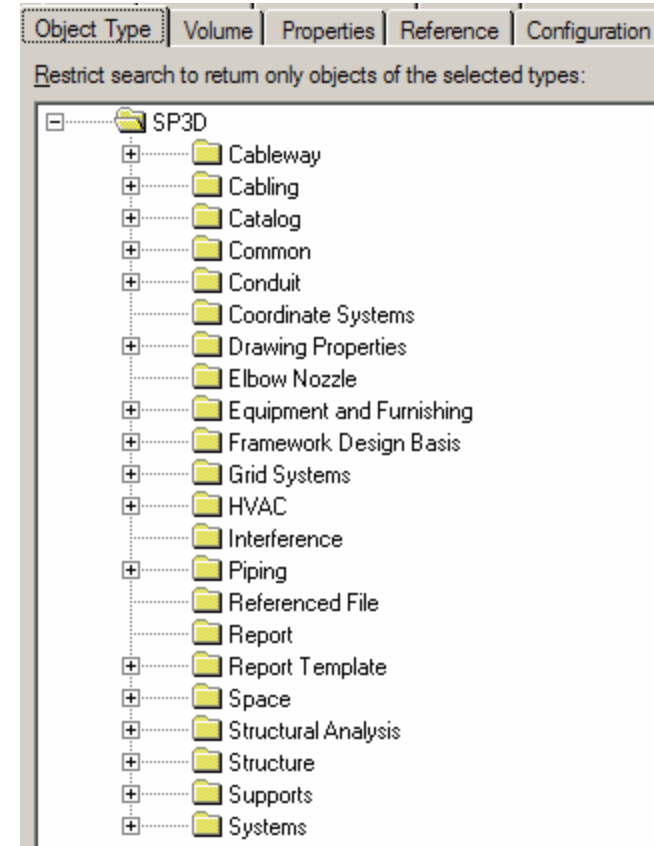
Restrict the search to return only objects within the volume



Filter Properties

Object Class Tab

Restrict the search to return only objects of the selected types



Filter Properties

Properties Tab

Restrict the search to return only objects matching the selected properties

- Select the basis object for which properties are being located
- Select the relationship that the basis object supports
- Select the related object for which properties are being located

Select Properties

Object type used as the basis for the property identification :

Member Part Prismatic

Relationship :

Member Part To Cross Section

Related object type :

Cross Section

Display properties in this category :

Standard

Select one or more properties :

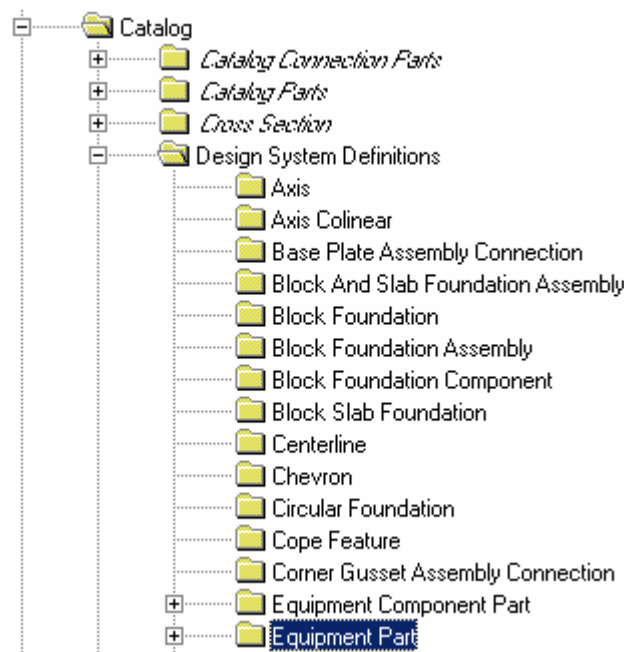
Property Name	Data Type	Unit Type
Alternate EDI Name	String	
Area	Double	area
Centroid X	Double	distance
Centroid Y	Double	distance
Depth	Double	distance
Description	String	
Display Prog ID	String	
Elastic Section Modulus about X (Sxx)	Double	first moment
Elastic Section Modulus about Y (Syy)	Double	first moment
Flexural Constant (H)	Double	
Moment of Inertia about X (Ixx)	Double	second mom
Moment of Inertia about Y (Iyy)	Double	second mom
Perimeter	Double	distance
Plastic Section Modulus about X (Zxx)	Double	first moment
Plastic Section Modulus about Y (Zyy)	Double	first moment

OK Cancel

Filter Properties

Properties Tab

Query objects based on Equipment Types



Property	Operator	Value	Ask
Occurrence to Catalog Item : toSI_OF	=	Lighting Fixtures	<input type="checkbox"/>
			<input type="checkbox"/>

Select Properties

Object type used as the basis for the property identification :

Equipment

Relationship :

Occurrence to Catalog Item

Related object type :

Equipment Part

Display properties in this category :

Standard

Select one or more properties :

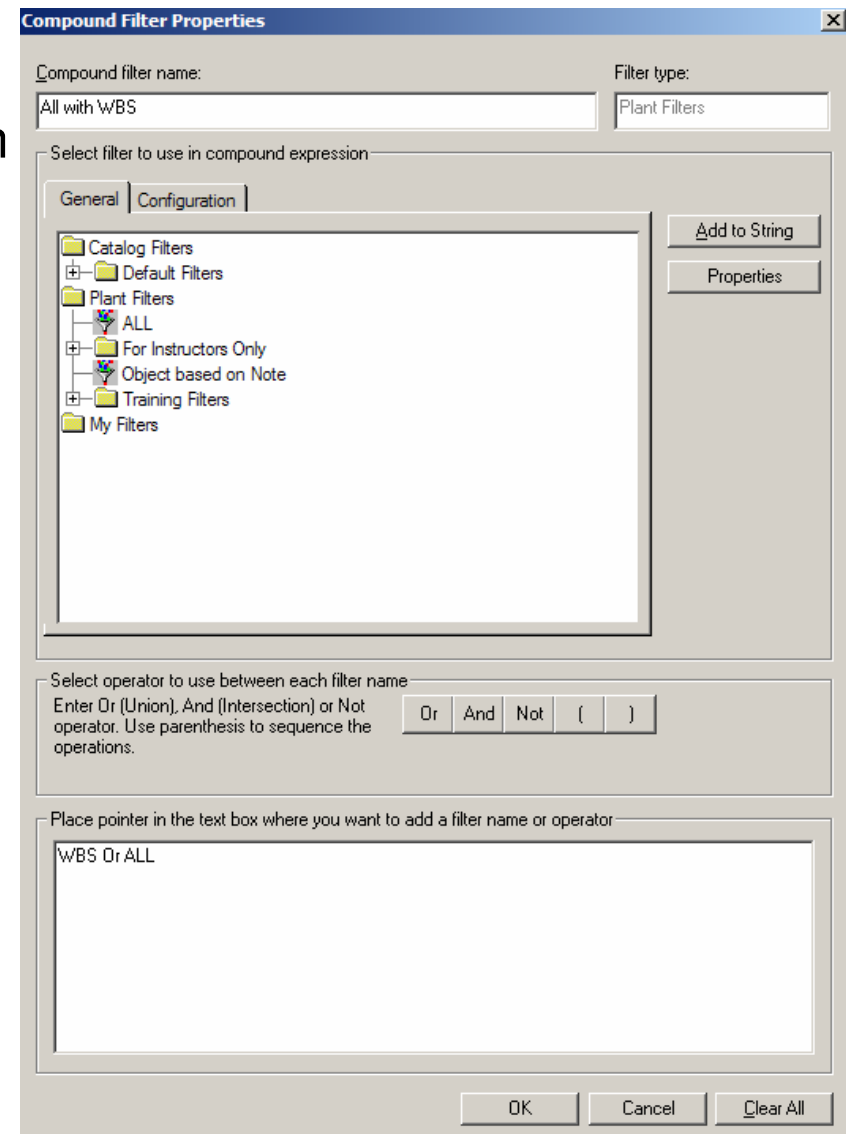
Property Name	Data Type	Unit Type
Display Prog ID	String	
Equipment Classification 0	EquipmentTypes0	Code listed val
Equipment Classification 1	EquipmentTypes1	Code listed val
Equipment Classification 2	EquipmentTypes2	Code listed val
Equipment Classification 3	EquipmentTypes3	Code listed val
Equipment Classification 4	EquipmentTypes4	Code listed val
Equipment Classification 5	EquipmentTypes5	Code listed val
Equipment Classification 6	EquipmentTypes6	Code listed val
Mirror Behavior Option	MirrorBehaviorOption	Code listed val
Name	String	
Part Description	String	
Part Number	String	
Replacement Part Number	String	

OK

Cancel

Compound Filters

- Display Properties of each filter used in the compound query by selecting the individual filter name and then clicking the Properties button
- An AND of two filters results in only those objects that the two filters had in common.
- A OR of two filters results in getting together the list of objects from both filters.
- A NOT operator on a filter results in a list of objects opposite to the selected filter return.
- Show the Compound Query string in a text box



SQL Filters

SQL (Handwritten Query) Filter Properties Dialog

- Key in the SQL text statements

Select o.oid from jdoobject o join jrangle r on r.oid = o.oid where r.zmax < 2

New SQL Filter Properties

Name:
Select objects above Zmax < 2

General | Configuration

Text of SQL query:
Select o.oid from jdoobject o join jrangle r on r.oid = o.oid where r.zmax < 2

Asking Filters

Using a Parameterized “Asking” Filter

When the creator of a filter checked any **“User of filter supplies value”** checkboxes, then that filter is an **“Asking”** or **“Parameterized”** Filter. When someone uses that filter, automatically the properties page for that filter is displayed with the “User of filter supplies value” checkboxes as read-only, but the gadgets to set the values (associated with the checked “User of filter supplies value” checkboxes) are displayed so that the user can edit only the values of the checked items. If a compound filter uses multiple Parameterized Filters, the Properties dialogs appear sequentially, automatically, in the same order that the parameterized filters appear in the compound query string.

System	Assembly	Named Space	Analysis	Work Breakdown Structure	Permission Group
--------	----------	-------------	----------	--------------------------	------------------

Expand the search to include the selected systems: ☒ User of filter supplies value

Asking Filters

Using a Parameterized “Asking” Filter

Object Type | Volume | **Properties** | Reference | Configuration

Restrict search to return only objects with the following criteria:

Filter method

☒ Match all ☐ Match any

	Property	Operator	Value	Ask
	Object to Note : GeneralNote : Purpo			<input checked="" type="checkbox"/>
				<input type="checkbox"/>

Filters

Managing Filter Names when Copy Filters

- Users can copy and paste or move filters via drag and drop to a different category directory in the Select Filter dialog's tree view
- Filters in My Filters folder can have the same name as Filters in someone else's My Filters Folder. If the filter is moved up to a Plant Filter or Catalog Filter folder, then the software must check whether there is already a filter by the same name and change the name of the cloned filter to "<filter name> n" where n is some number so that the name of the filter is unique
- Compound Filters are made up of AND, OR and Not operators between existing filters. A Compound Filter that will be stored in the Catalog must be made from other filters that are already existing in the Catalog

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Common Task

- Provide common functionality for all SP3D User Environment:
 - Session Management
 - General Options/SmartSketch 3D
 - Viewing Commands
 - Aspects/Surface Styles/Rules
 - Show/Hide
 - Measure

Session Management

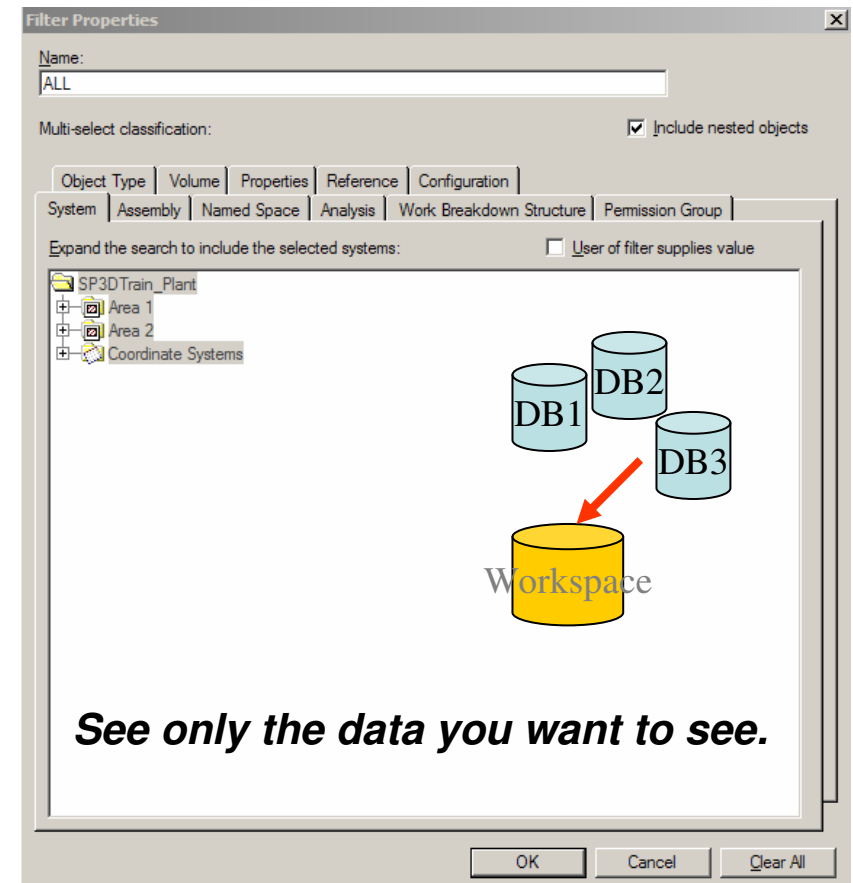
Session Templates

Store option settings such as task list,
window views, orientations,
Background colors, graphics views, etc

Filter

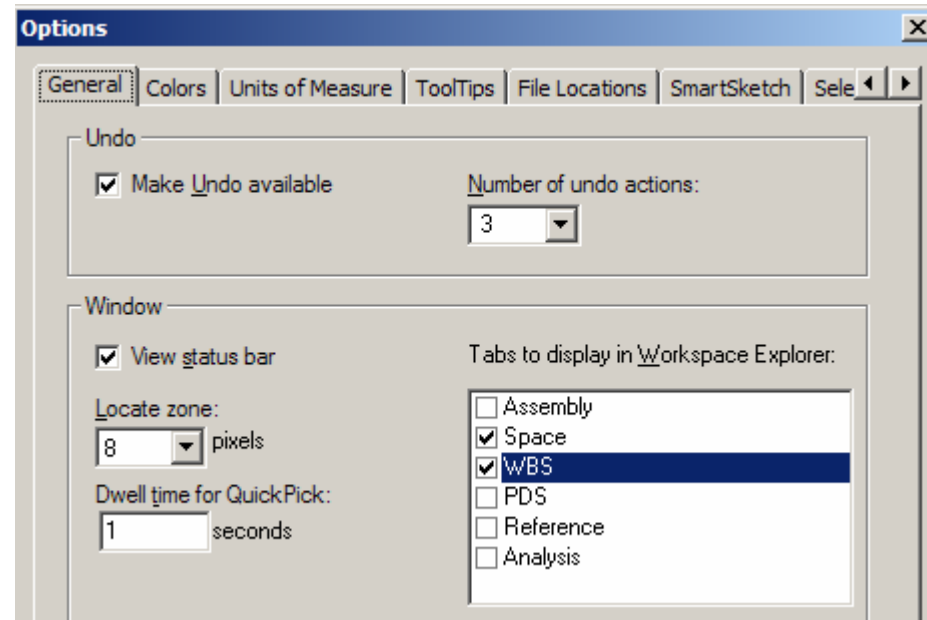
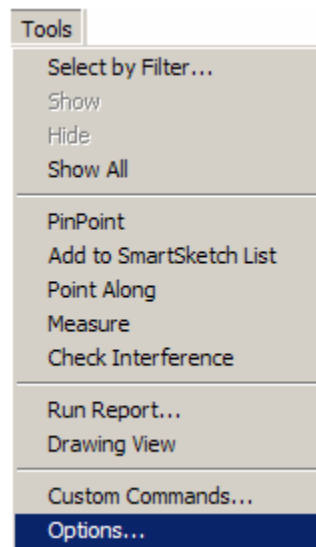
A set of search criteria that define a
query to the model database

Workspace/Session =
Session Template + Filter



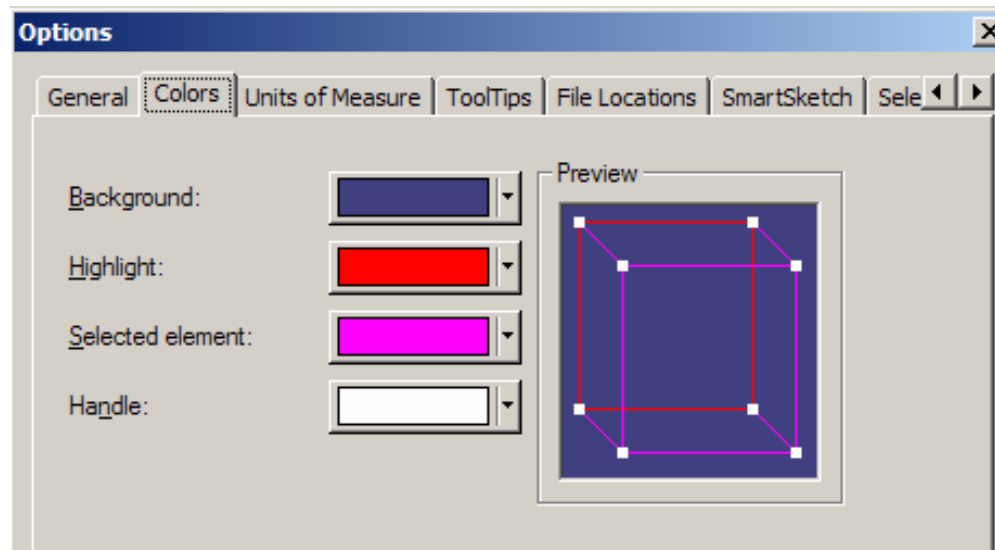
General Options

- Allows you to enable the Undo command and the status bar
- The activation time of the quick pick tool
- Define the locate zone for SmartSketch
- Define the Tabs to display in the Workspace Explorer



Colors Options

Allows you to select the colors the system uses for the background, Highlight and selected elements



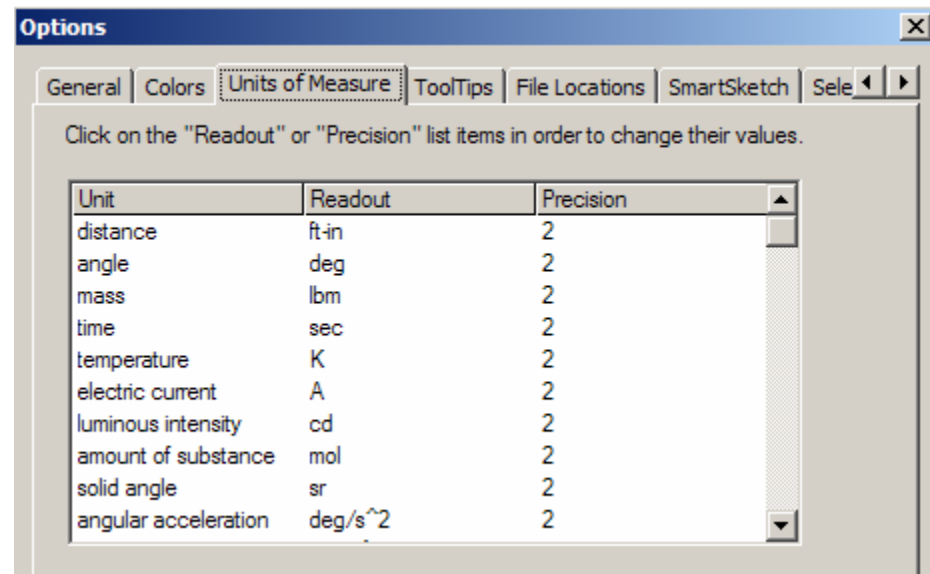
Units of Measure Options

- Sets the display units
- Sets the precision of the units
- Everything stored in SI units in database
- Units can be added to any keyed in input values

Example:

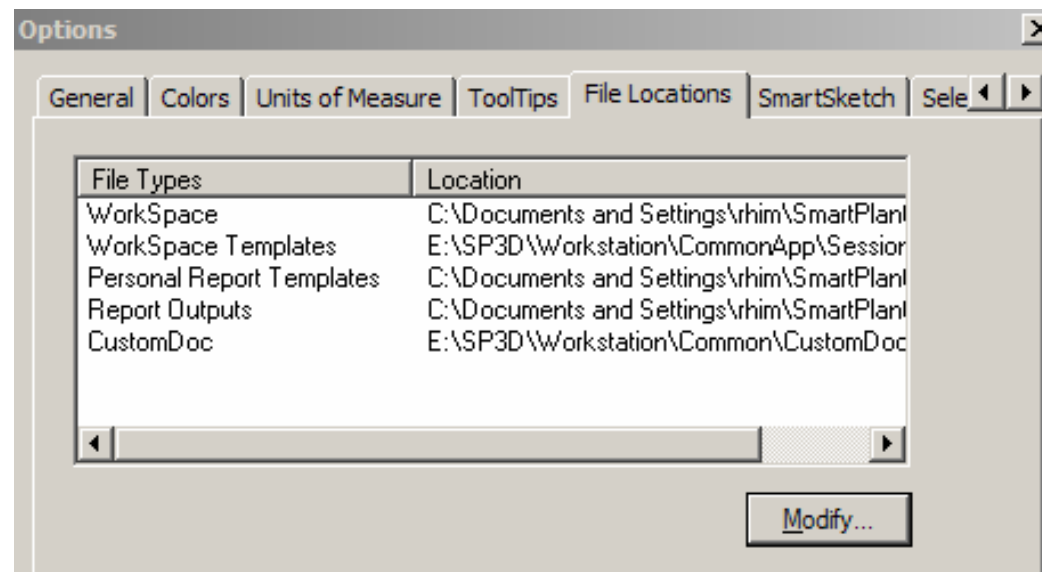
Slope: in / ft

Distance: in (fractional)



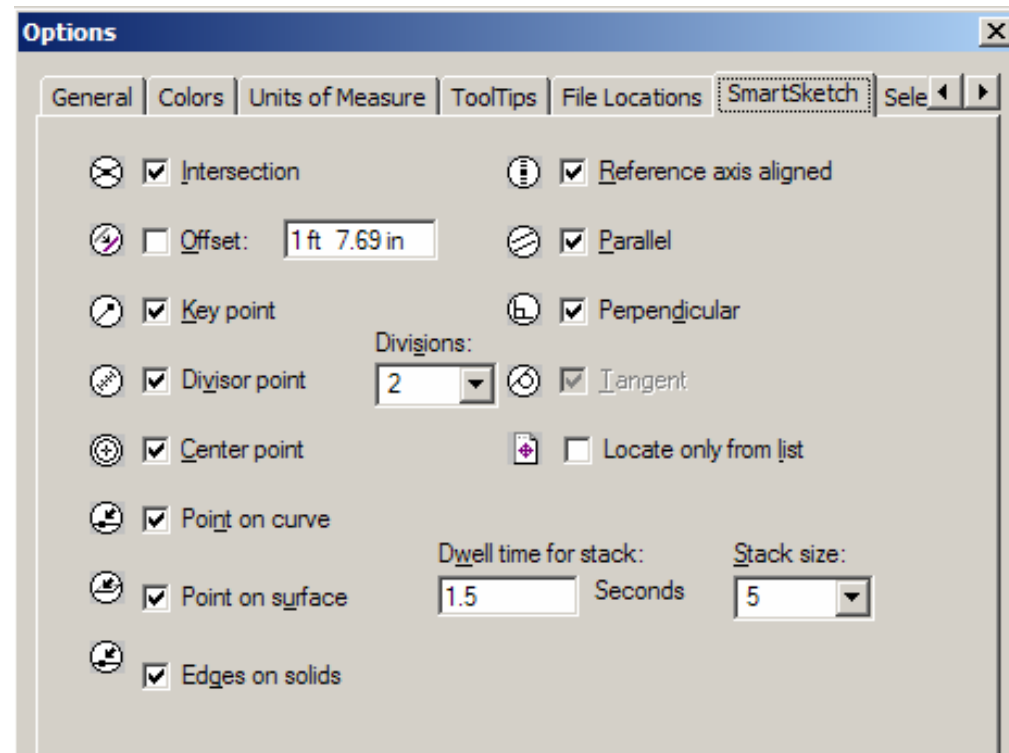
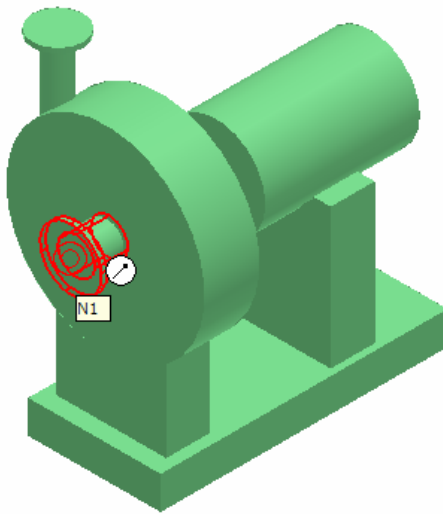
File Locations Options

- File Locations for workspace files, reports, etc.



SmartSketch Options

- Allows you to enable the smartsketch indicators

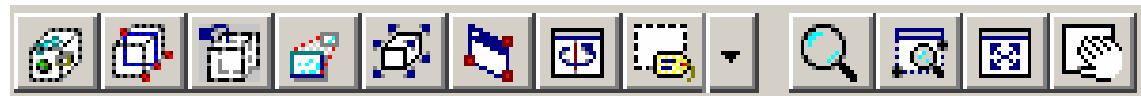
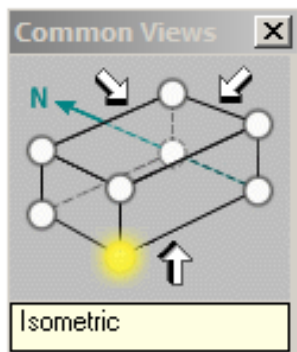


View Manipulation

- Common Views
- Zoom Tool
- Window Area
- Refresh View
- Active View Control
- Rotate View
- Looking at Surface
- View by 3 points
- View along line
- Clipping

View Manipulation

Common Environment Toolbar

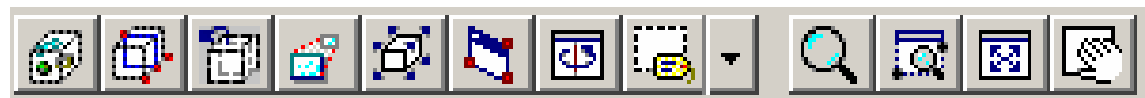


Common
Views

Common views command allow you quickly change the view orientation to any standard isometric/orthogonal orientation

View Manipulation

Common Environment Toolbar



Zoom
Tool

Zoom
Area

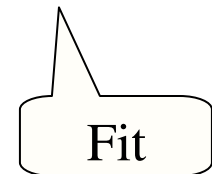
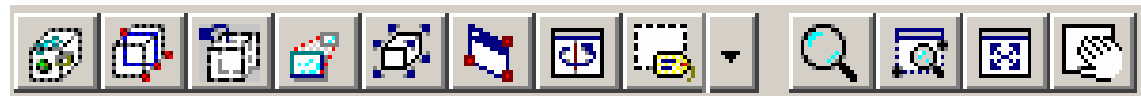
Pan

Zoom Tool command:

- Zoom in (mouse roller ball)
- Zoom out (mouse roller ball)
- Zoom Area (left mouse click, drag and release)
- Pan (Left mouse drag)

View Manipulation

Common Environment Toolbar



Fit View command:

Fit all visible objects within the current clipping volume in the Active View

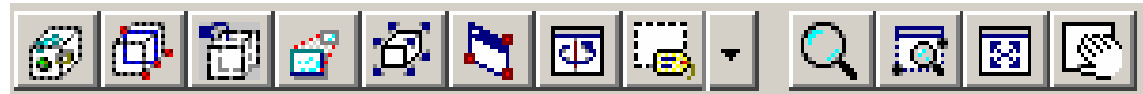
If objects are selected, then the command will fit only the selected objects

View Manipulation

Common Environment Toolbar



Refresh

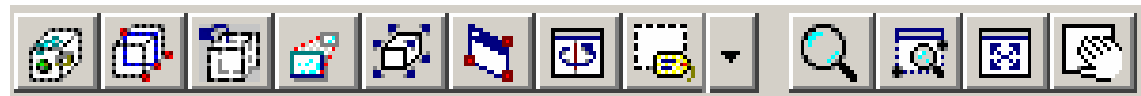


Refresh command:

Update your workspace definition (filter) in the Active View.
Will remove objects no longer in the plant database, will
update location and attributes of items still in the plant
database

View Manipulation

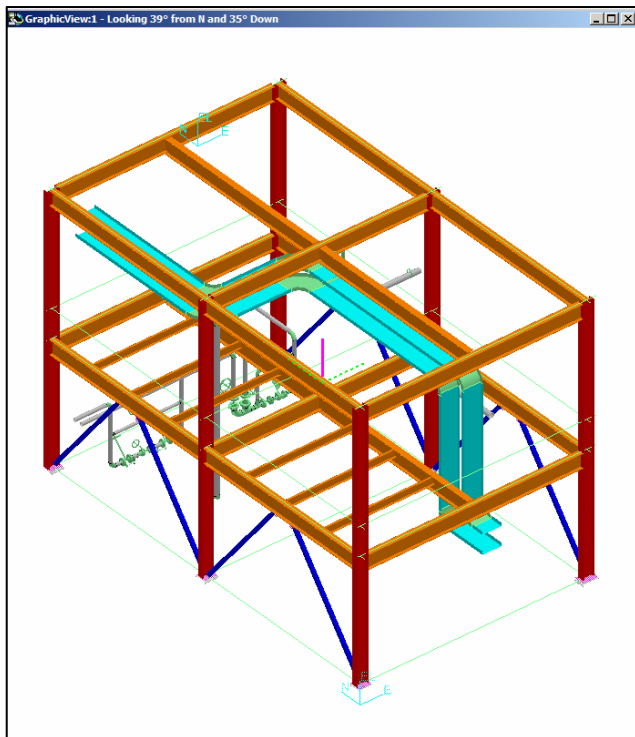
Common Environment Toolbar



Rotate
View

45.00 deg

Close



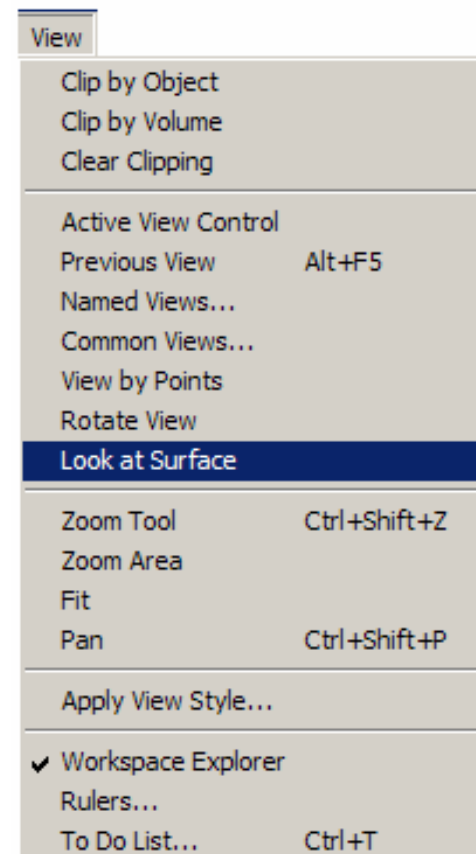
Rotate View command:

- Rotate the view interactively
- Change the rotation axis
- Change the rotation point
- Select any linear graphic (pipe, str member, tray, conduit, etc. to use as axis of rotation

View Manipulation

Look at Surface command:

- Rotate the active view planar to the selected surface



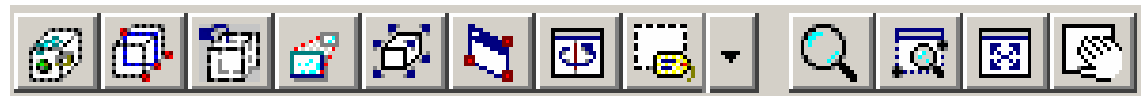
View Manipulation

Establishing Clipping Volume

- Clipping by Object
- Clipping by Volume
- Clear Clipping

View Manipulation

Common Environment Toolbar

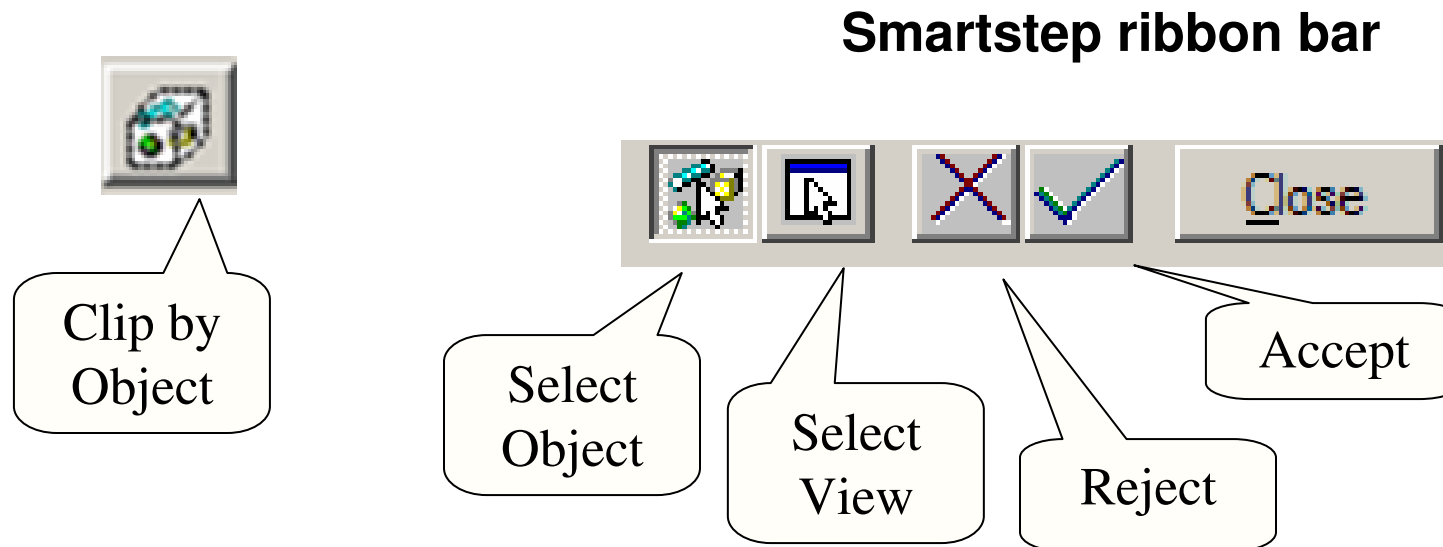


Clip by
Object

Clip by Object command:

Allows you to define the view clipping volume (rectangular parallopiped) to be the same as the object's range box in your active view

View Manipulation

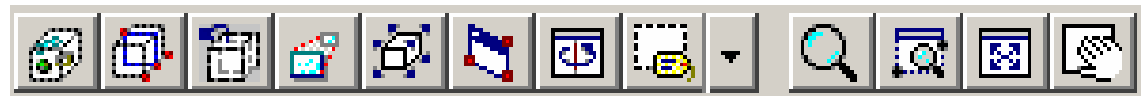


A command step is also provided to assign the same clipping volume to additional views

Use the Shift key to select multiple objects

View Manipulation

Common Environment Toolbar

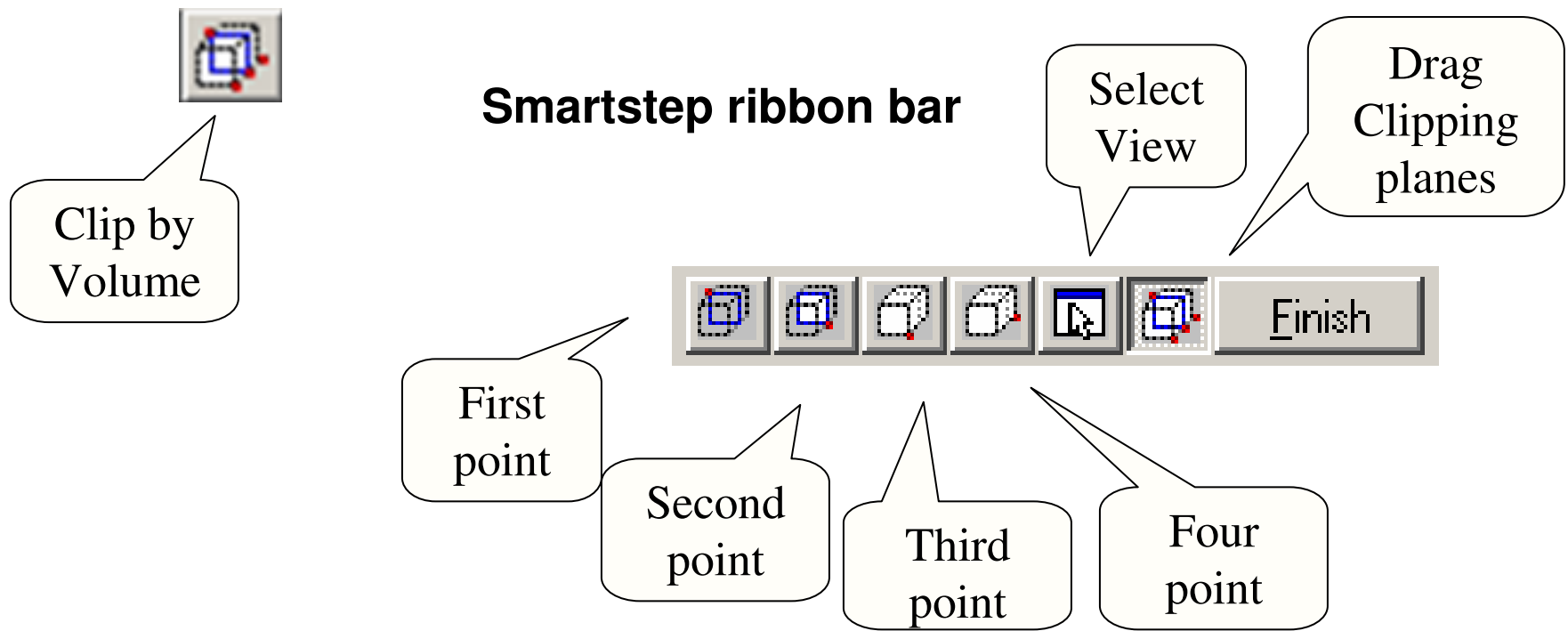


Clip by
Volume

Clip by Volume command:

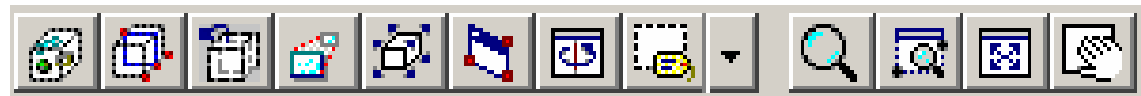
Allows you to set the view clipping volume so that all objects not inside the clipped area are hidden from the selected view

View Manipulation

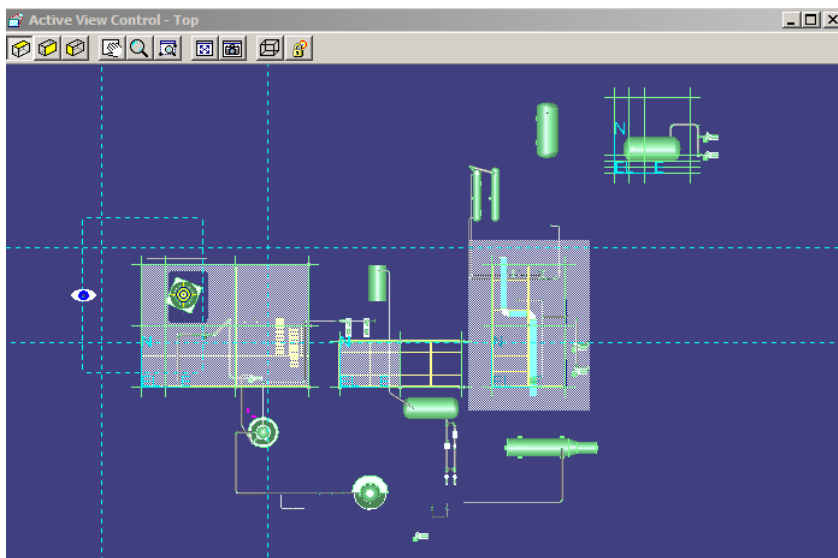


View Manipulation

Common Environment Toolbar



Active View
Control

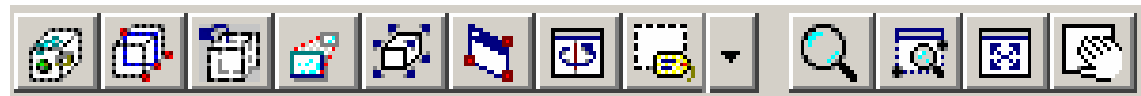


Active View control command:

Provides commands to dynamically control the view parameters of the active view. Allows user to redefine clipping planes in clipped views: Just click and drag planes

View Manipulation

Common Environment Toolbar



Clear
Clipping

Clear Clipping command:

Remove the clipping volume.

It then prompts for select of the next window to clear

The command is terminated by:

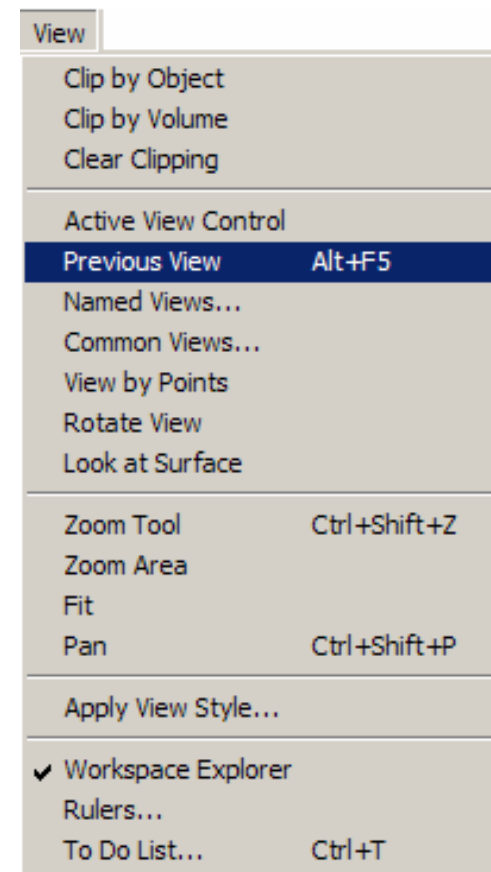
- Right mouse click
- Esc Key
- Pick of another command

View Manipulation

Restore the Previous View

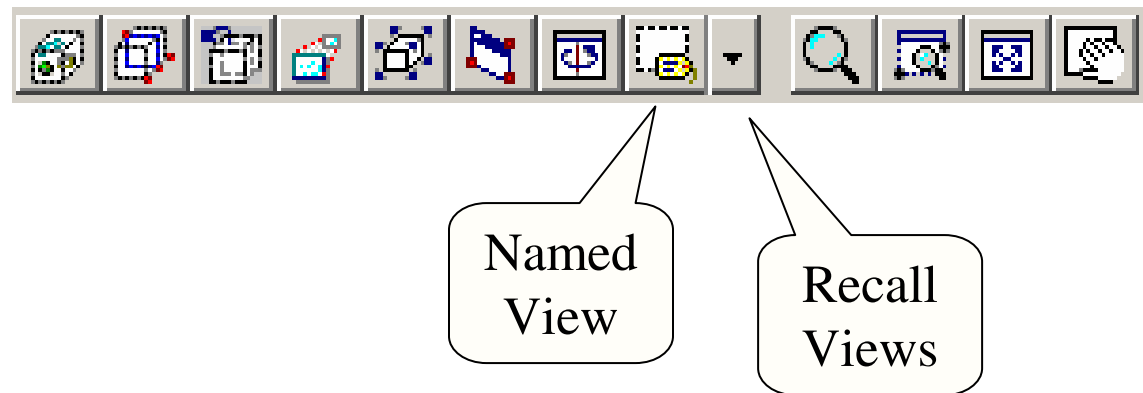
User can go back one view for the active window

Main Menu



View Manipulation

Common Environment Toolbar



Saved View (Named View) command

You can save the settings (location, orientation) of the active view so that you can apply them again later

Recall views from the pull down on the command, four standard views supplied.

View along
line

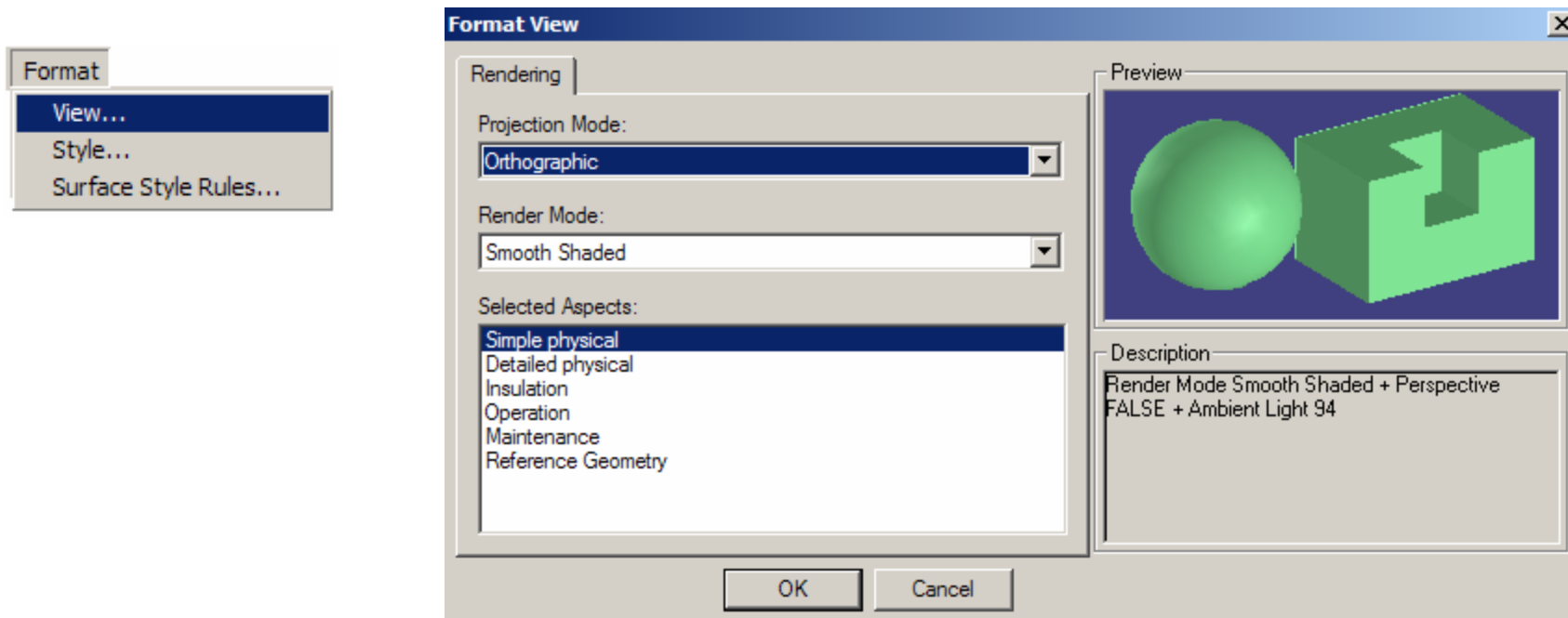
View by
pts

- Lets you pick the 3 Points that define a plane
- The plane of your screen is the plane defined above

- Lets you pick the two points along a line.
- The plane of your screen is the plane perpendicular to above line

Formatting the Active View

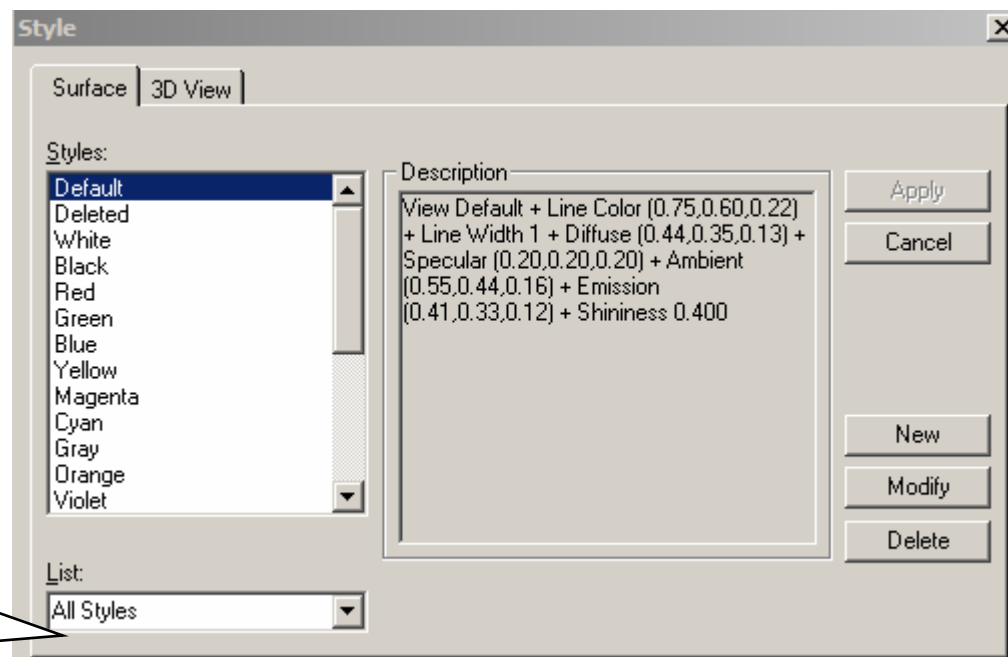
- You can format a View by defining a render mode and perspective setting
- Render mode: Outline, Smooth Shaded and Shaded with Enhanced Edges
- Aspect is a geometric representation for an object, like a working category.



Applying Styles

Styles are collections of color, lighting, and render modes that you can apply to all views or to specific items in the views. New user styles are stored in the database

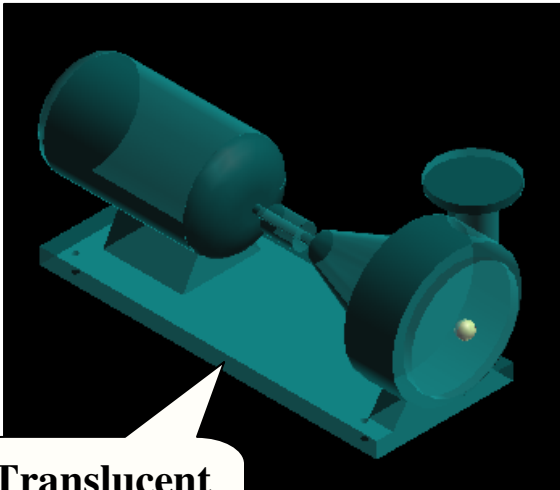
- View Style
- Surfaces Style



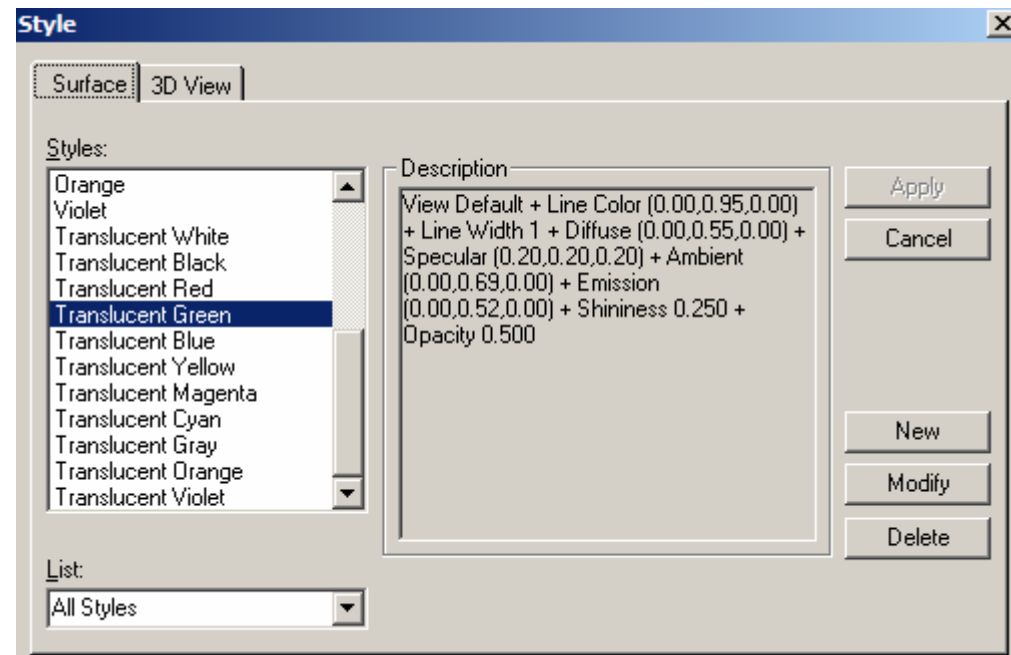
All Styles
Or
Styles used in
workspaces

Applying Surface Style

- to Selected objects
- Using surface style rules



**Translucent
Green**



Applying Surface Style

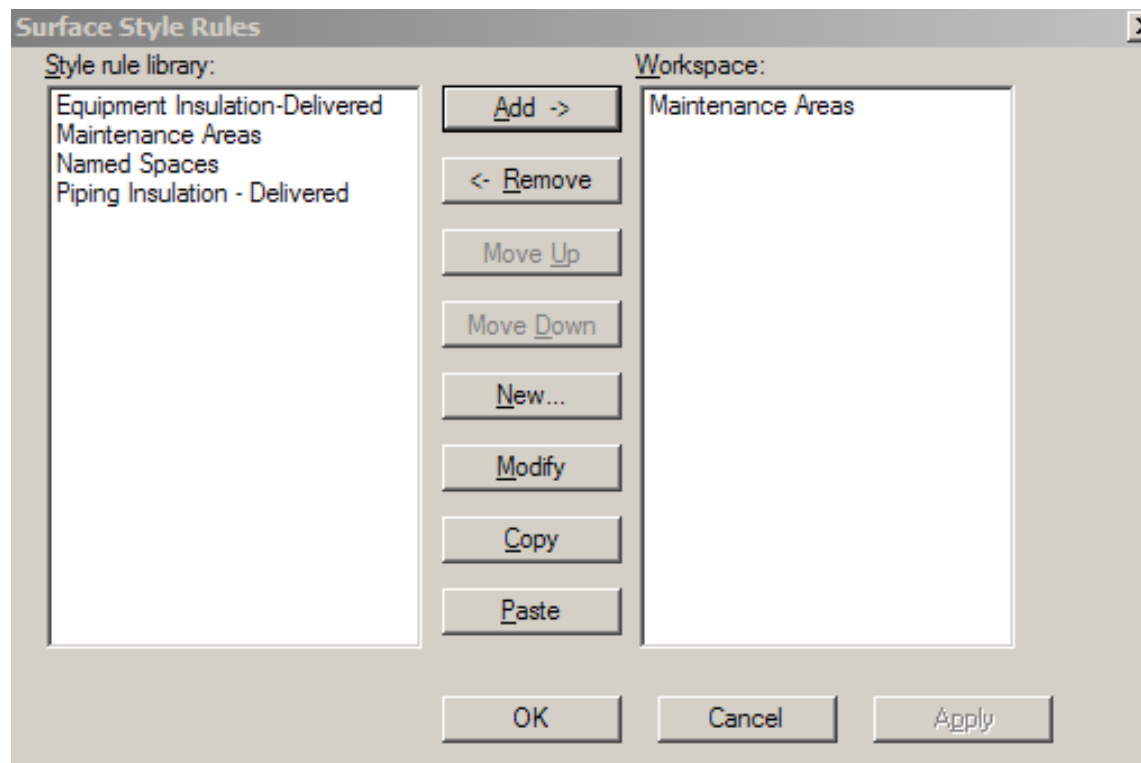
- A Surface Style Rule consists of a filter and the named surface style to be applied to the specific aspects of the objects identified by the filter

The screenshot shows the 'Surface Style Rule Properties' dialog box with the 'Configuration' tab selected. The 'Rule name' field contains 'Named Spaces'. The 'Filter' dropdown is set to 'Named Spaces' with a 'Properties' button next to it. The 'Style applied' dropdown is set to 'Translucent White' with a 'Properties' button next to it. Below these, a section titled 'Select all aspects to which the style will be applied:' contains a list of checkboxes: 'Simple physical' (checked), 'Detailed physical', 'Insulation', 'Operation', 'Maintenance', and 'Reference Geometry'. At the bottom right are 'OK' and 'Cancel' buttons.

Aspect	Selected
Simple physical	Yes
Detailed physical	No
Insulation	No
Operation	No
Maintenance	No
Reference Geometry	No

Applying Surface Style

- Surface style Rules is saved in the model database
- Surface style rule applied to the workspace is saved in the session file
- Copy/Paste functionality



Measure



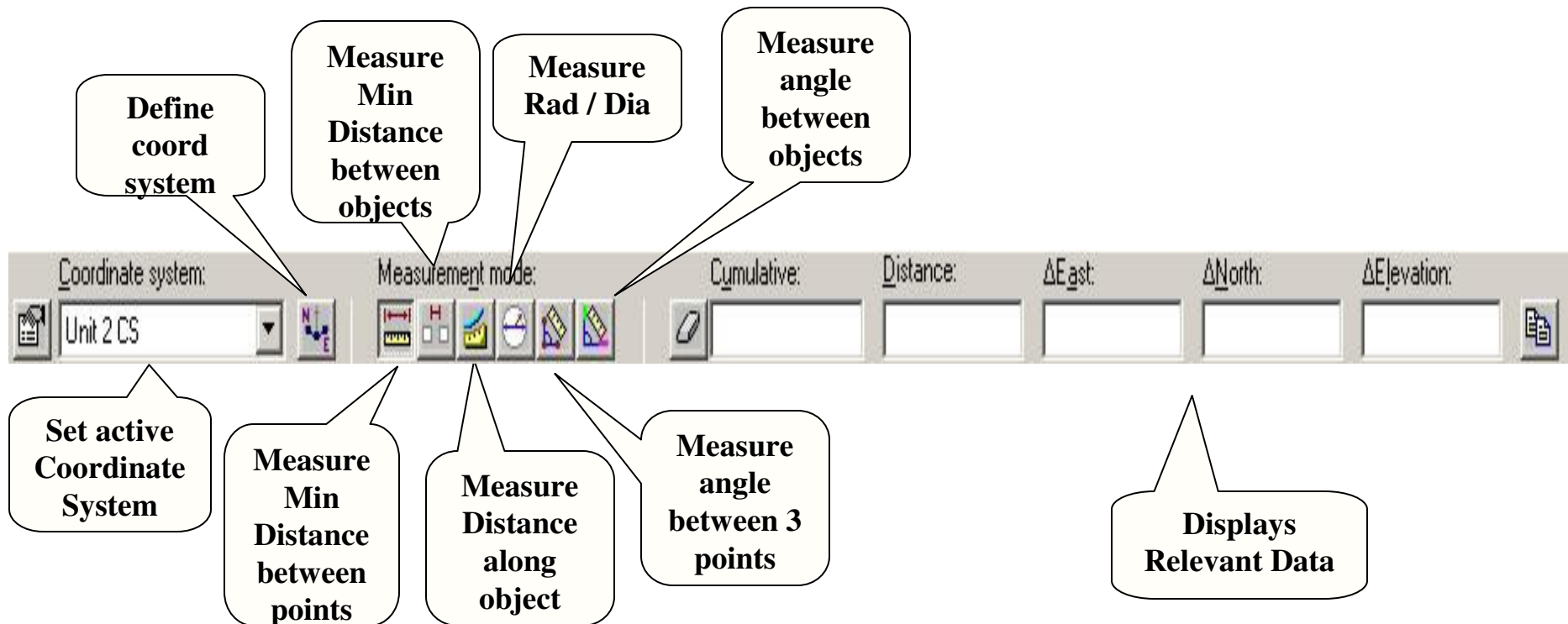
Tool -> Measure

Measure Actual or Minimum 3D linear distance between two points

Measure delta E, N, EL distance between two points

Measure actual angle defined by three points

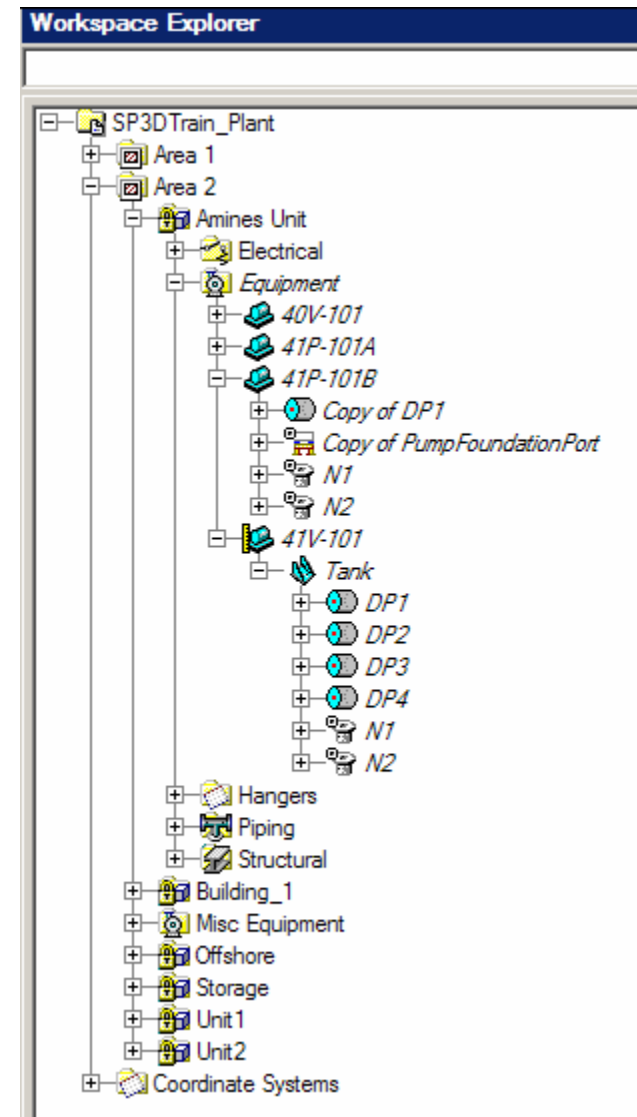
Measure radius and diameters



Hide/Show command

Hides selected items from display

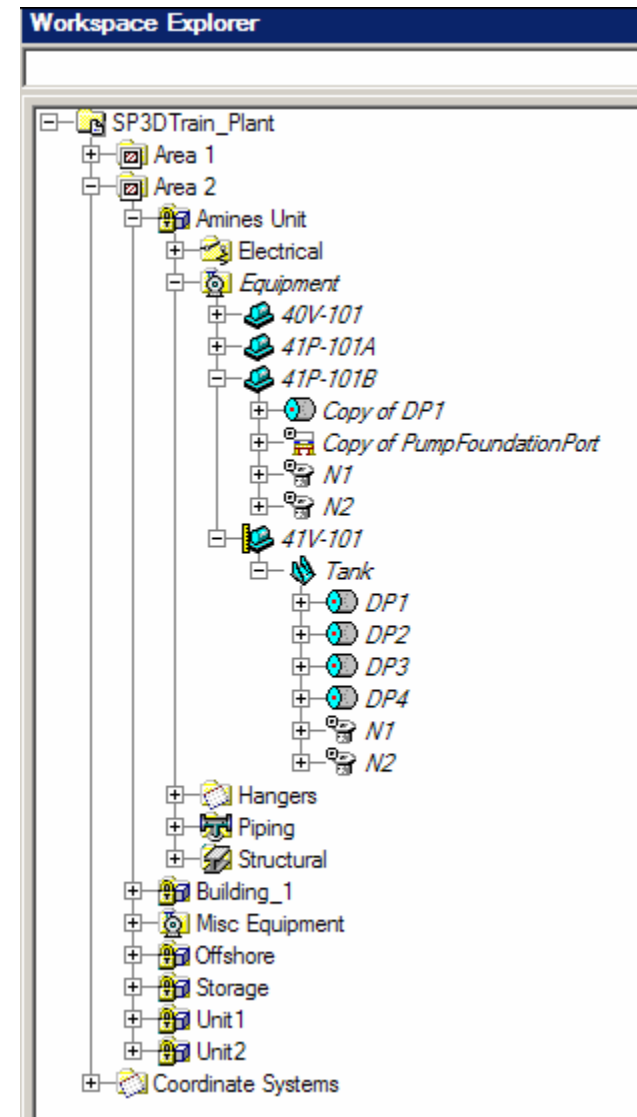
Hidden objects are displayed in *Italic text* in the Workspace Explorer



Hide/Show command

Hides selected items from display

Hidden objects are displayed in *Italic text* in the Workspace Explorer



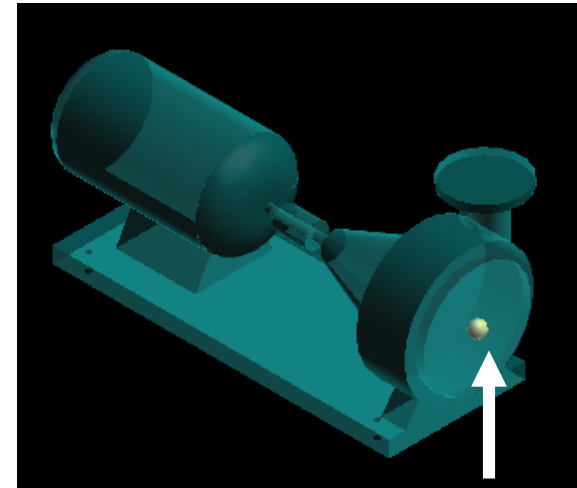
Agenda

- SmartPlant Overview
- User Interface
- Workspace
- Filters
- Common Task
- **Control Point / Notes**
- Work Breakdown Structure (WBS)
- Interference Detection (IFC)
- To Do List

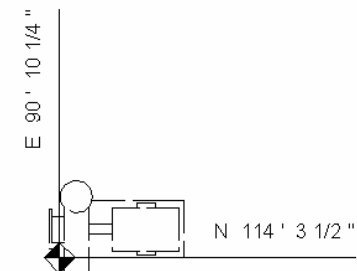
Control Points

Definition

- A 3D object representing a point in the model
- Drive label locations on orthographic drawings
- Placement method:
 - Insert Control Point Command
 - Define in the Symbol Definition
- Control point location is user defined
- The position can be declared to be at a fixed global position or the positioning method can be associatively maintained.
- The control point is associative to a parent object
- Control Point graphics is a sphere that does not support interference detection
- Control Point is displayed in Reference Geometry Aspect



**Control
Point**



Control Points




 Type Subtype Name

Properties

- Parent Object
- Point Location
- Type
- Sub Type
- Name

Control Point Properties

General Relationships Configuration Notes

Category:

Property	Value
Control Point Type	Control Point
Control Point Sub Type	Process Equipment
Name	ControlPoint-0101
Naming Rule	DefaultNameRule
Diameter	0 ft 3.94 in
Parent Object	40E-101A
Associativity	True
E	78 ft 10.50 in
N	71 ft 9.00 in
EL	3 ft 0.00 in

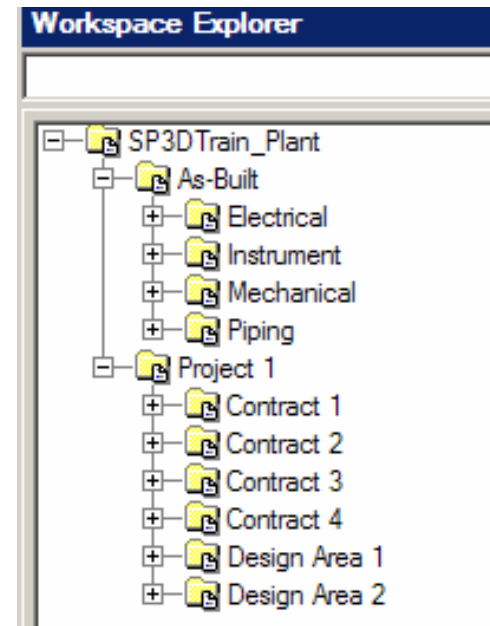
OK Cancel Apply

Agenda

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Work Breakdown Structure

- Logical grouping for items sharing a common attribute or task, referred to as “project”. E.g. All items (piping/eqp/str) to be painted/coated by the same vendor can be grouped under a common project
- Hierarchy to handle Projects
- The Project object serves as a grouping function for both As-Built and Projects
 - Create WBS Command
 - Claim Command
 - Release Claim Command



Work Breakdown Structure

Project Status: Enumerated

- Created
- Active
- Started Completion
- Completed
- Merged
- Finished
- Cancelled
- Terminated

General

Category:
Standard

Property	Value
Type	Project
Project Purpose	Project
Project Status	Active
WBS Parent	SP3DTrain_Plant
Name	Project 2
Correlation Status	Not correlated
Correlation Basis	Correlate object

OK Cancel Apply

Work Breakdown Structure

WBS Item (Type)

WBSItemType	WBSItemPurpose
ShortDescription	ShortDescription
Contract Group	
	Contract Group Piping
	Contract Group Civil
	Contract Group Architecture
	Contract Group Electrical
	Contract Group Instrument
	Contract Group Mechanical
Contract	
	Contract Fabrication
	Contract Erection
	Contract Fabrication and Erection
	Reference
	Other
Design Area	
	Design Area Piping
	Design Area Civil
	Design Area Architecture
	Design Area Electrical
	Design Area Instrument
	Design Area Mechanical
Group	
	Group Miscellaneous
	Group Piping
	Group Structure

WBS Item Properties

General | Configuration | Notes

Category: Standard

Property	Value
WBS Type	Sub-Contract
WBS Purpose	Fabrication
Exclusive	False
WBS Assignment	System
WBS Parent	Project 1
Name	Contract 1
Correlation Status	Not correlated
Correlation Basis	Correlate object

OK Cancel Apply

Work Breakdown Structure

WBS edit ribbon bar

The image shows a software ribbon bar for editing a Work Breakdown Structure (WBS) item. It contains several interactive elements: a 'Setting' icon (a document with a pencil), a 'Select Related Object' icon (a mouse cursor), a 'Deselect All' icon (an 'X' in a square), and a 'Finish' button. To the right of these icons are four input fields: 'Type' with the value 'Contract', 'Purpose' with the value 'Contract Fabrication', 'Name' with the value 'Contract 2', and 'WBS Parent' which is a dropdown menu currently showing 'Project1'.

- Setting
- Select Related Object
- Deselect All
- Finish
- Purpose
- Name
- WBS Parent

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- **Interference Checking (IFC)**
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Checking Interferences

SP3D provides two mode of operations:

- Server-based Interference checking (Database Detect).
 - Run on a separate IFC server
 - Look for all interferences for the full model
- Interactive interference checking (Local Detect).
 - Help the designer in real time
 - Local to a session (what you see in your workspace)

Checking Interferences

Three type of checking (based on the object aspects):

- Required
- Optional
- Not Checked

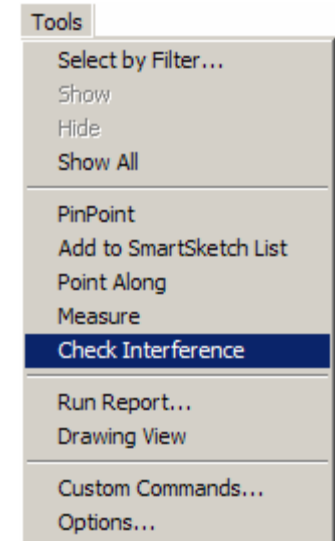
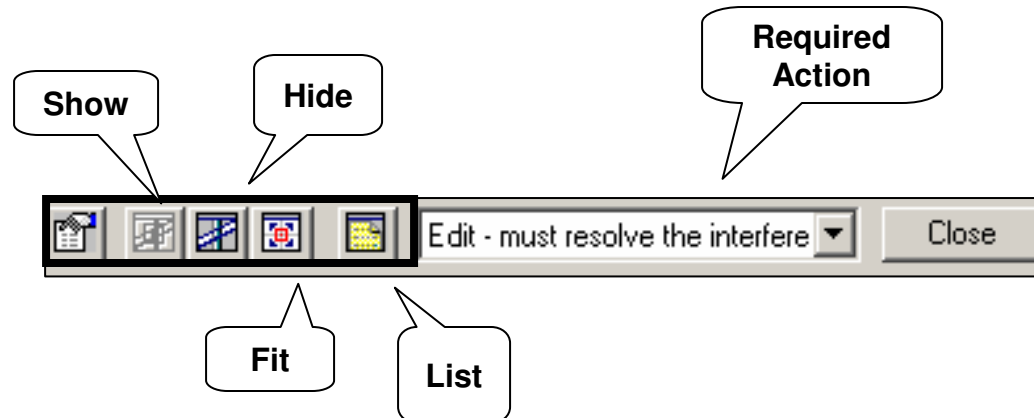
Can process:

- Required – Required
- Required – Optional
- Optional – Optional

A clearance rule can be used

Checking Interferences

Check Interference ribbon bar controls review of database (permanent) clashes and local (temporary) clashes



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To Do List

- If an object's relationship with another object is lost or corrupt, the system generates an **Error** entry in the To Do List
- If a relationship has changed between two objects, but the person who modified the relationship only has write access to one of the objects, the system generates an **Out of Date** entry in the To Do List



	Object name	State	Changed by	Date modified
	Cableway Straight Feature	In Error	INGRPPD\rhim	10/29/2005 6:46:11
	Cableway Along Leg Feature	In Error	INGRPPD\rhim	10/29/2005 6:46:11
	Route Connection	Out of date	INGRPPD\rhim	10/29/2005 8:03:37

Displays list of objects that are in Error or Out-of-date