Process, Power and Marine Division

SmartPlant 3D Common Task

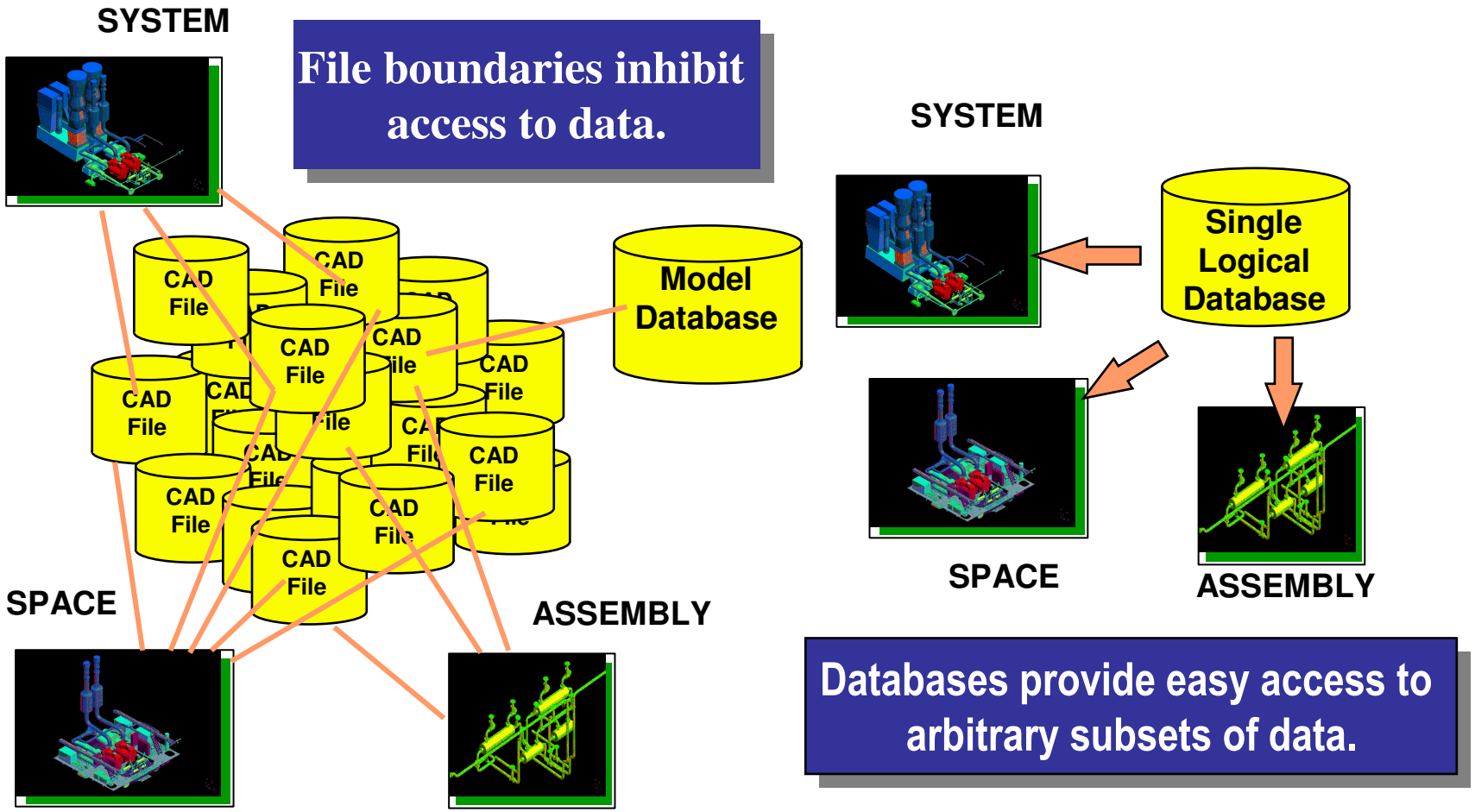


INTERGRAPH

Agenda

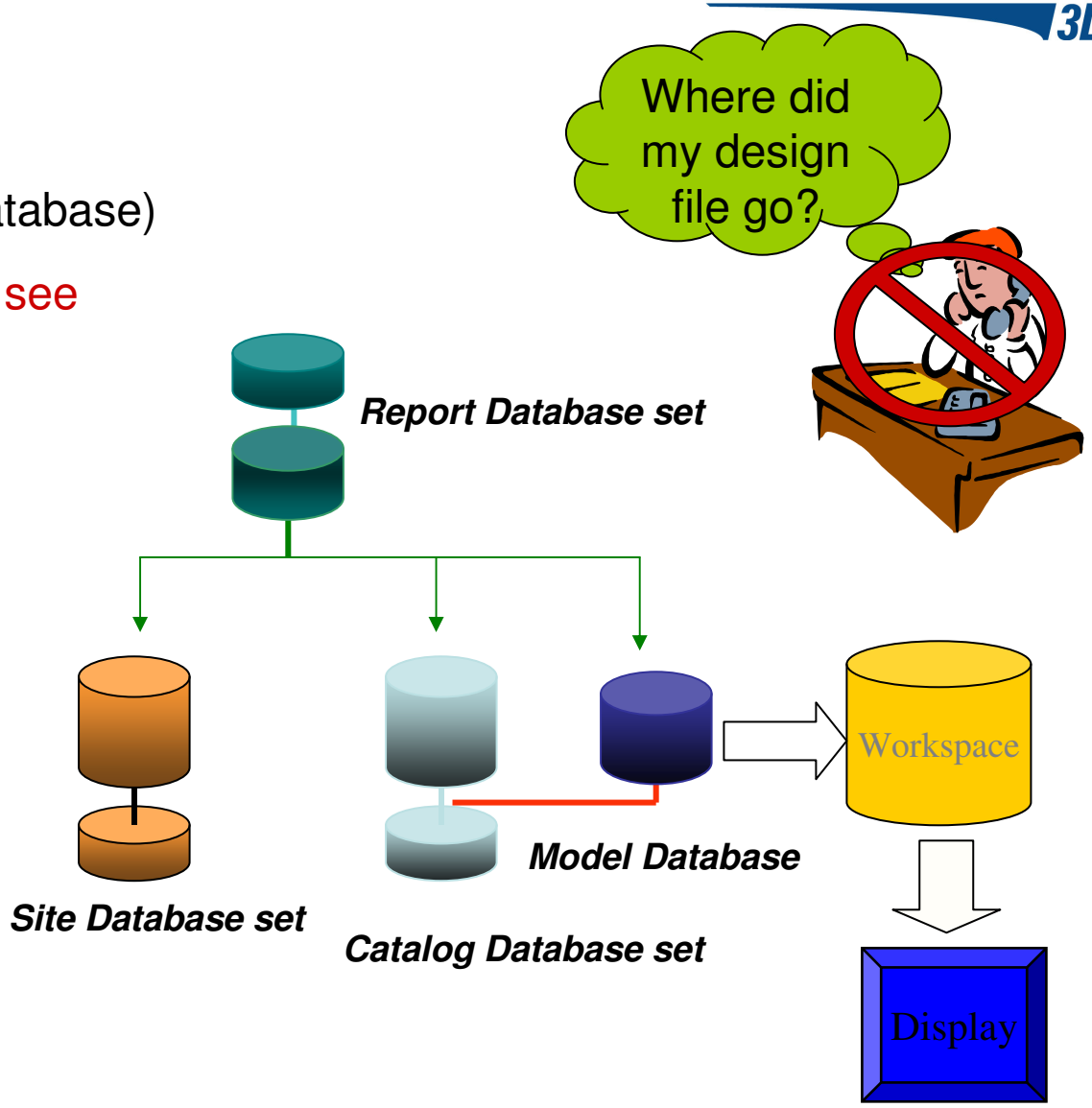
- **SmartPlant Overview**
- User Interface
- Workspace
- Filters
- Common Task
- Control Point / Notes
- Work Breakdown Structure (WBS)
- Interference Detection (IFC)
- To Do List

Single Database

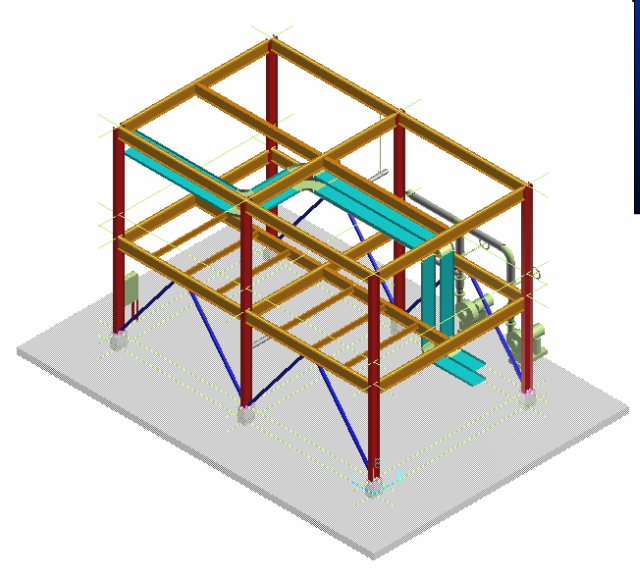


Query

- 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

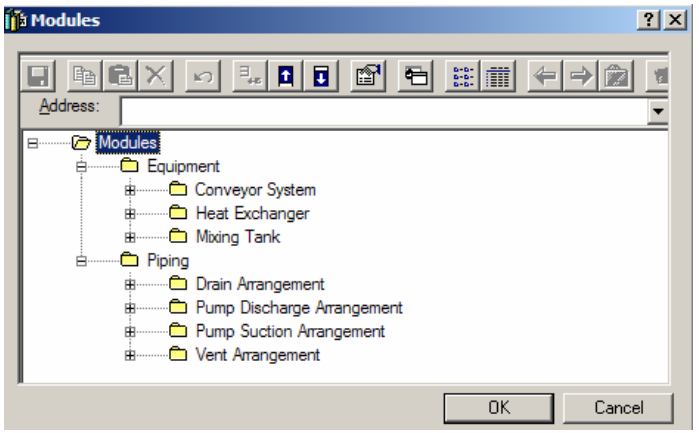


Design Re-use



Unit1

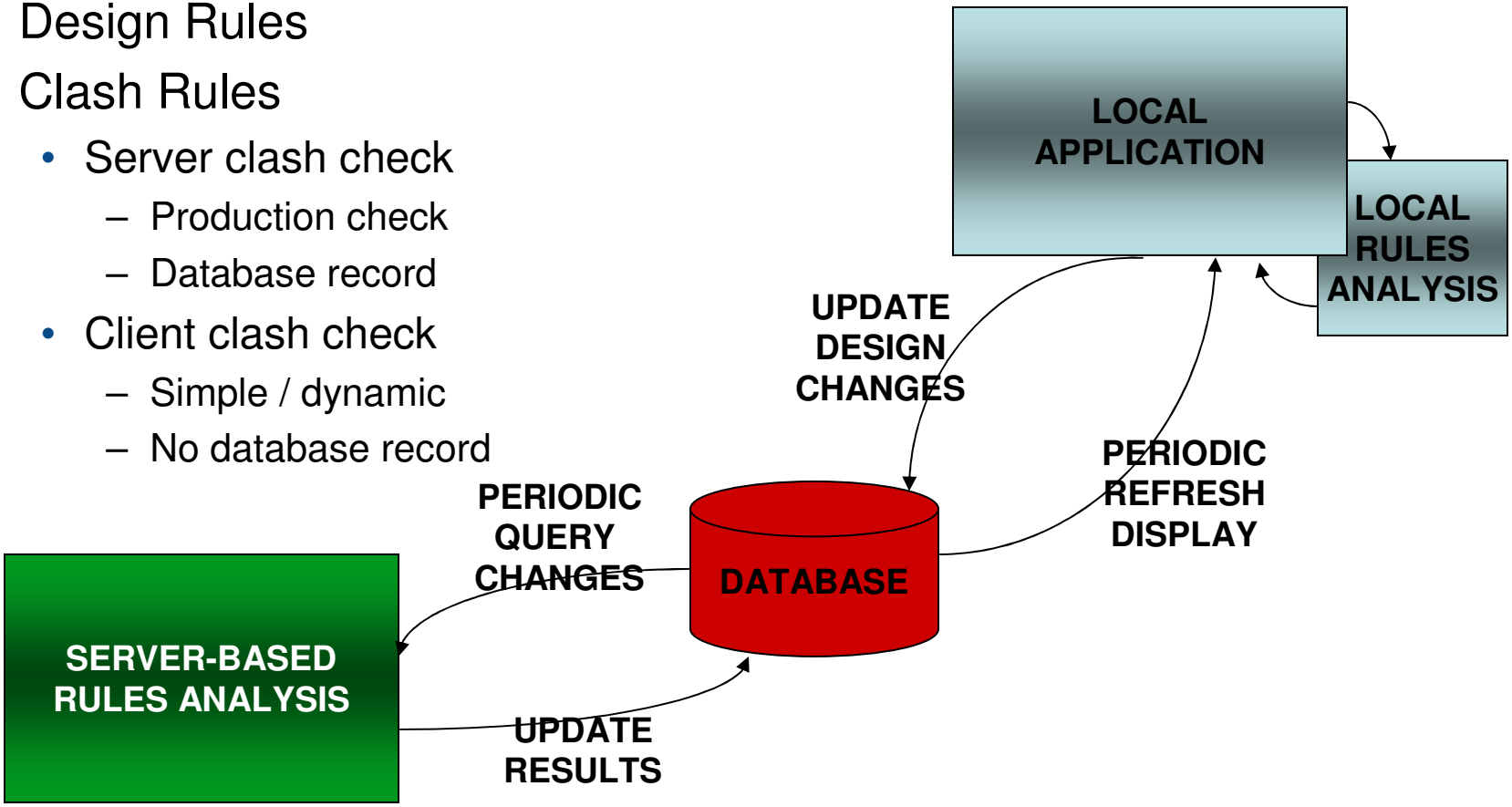
Copy to Catalog
or
Instance in
Another Location



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



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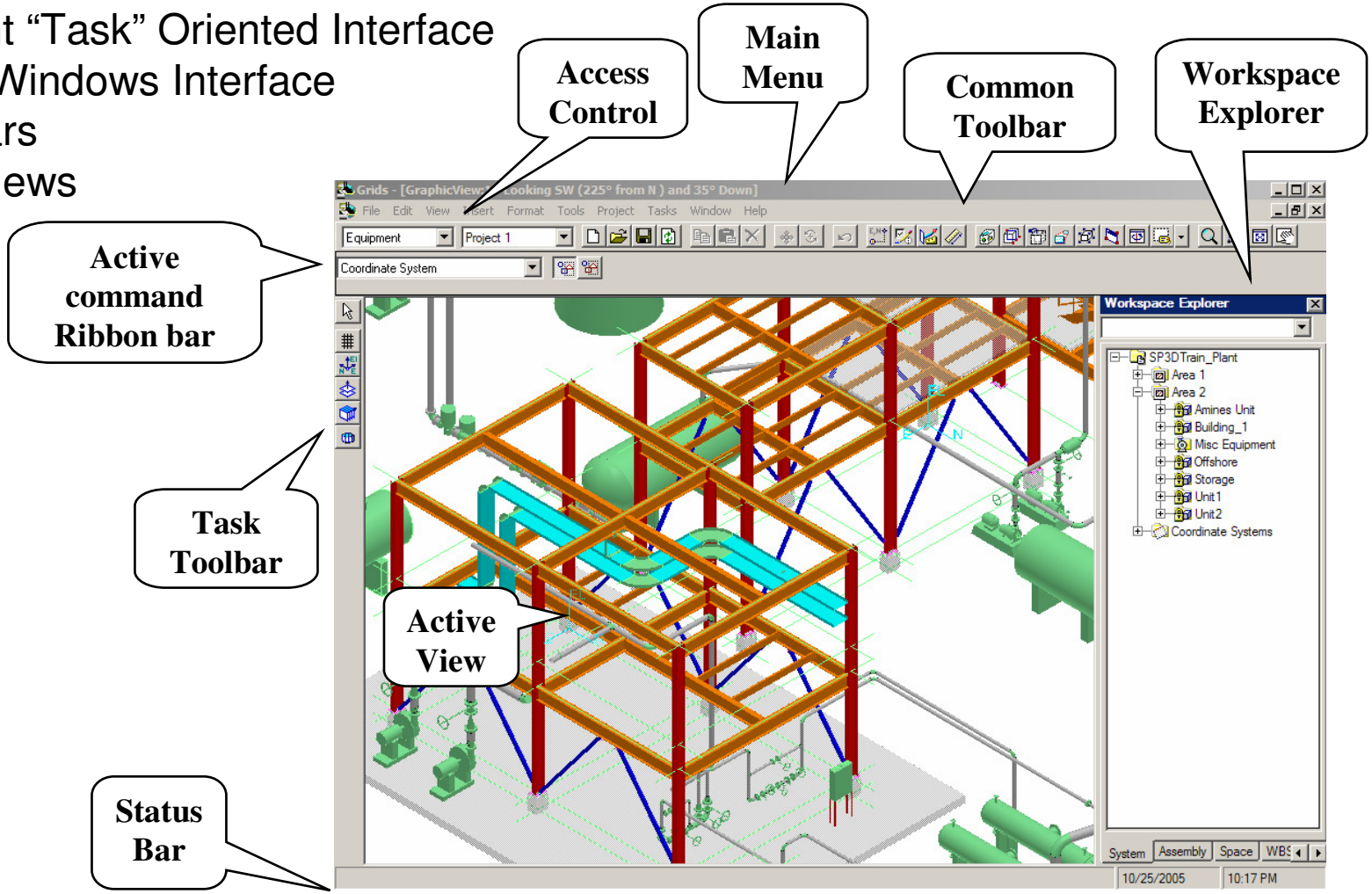
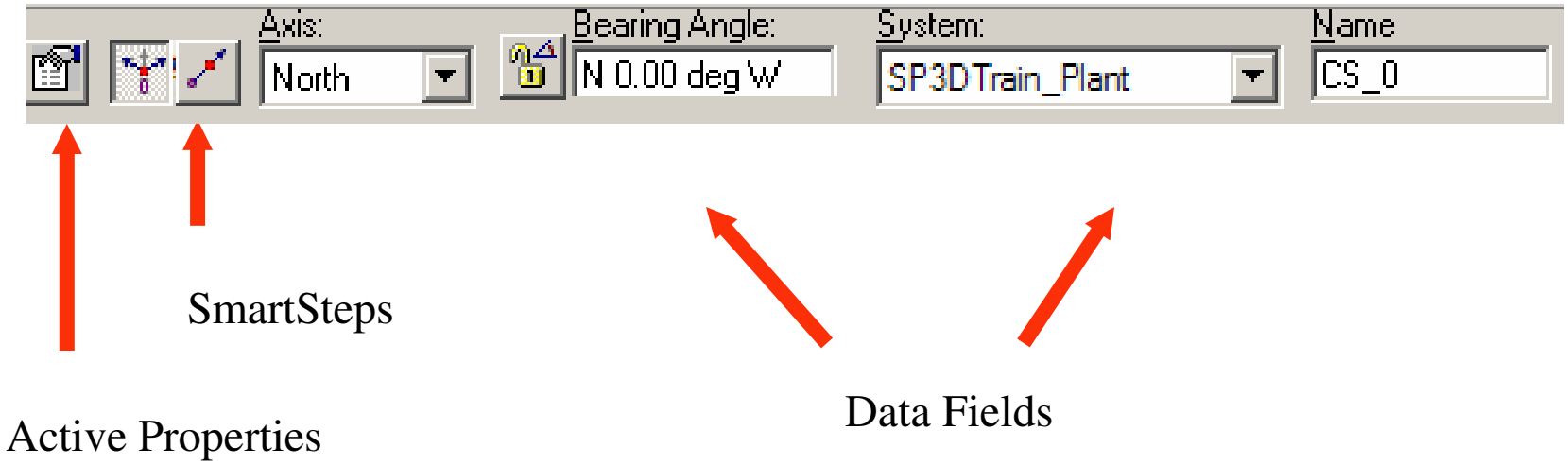
Common Windows Based User Interface

- 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



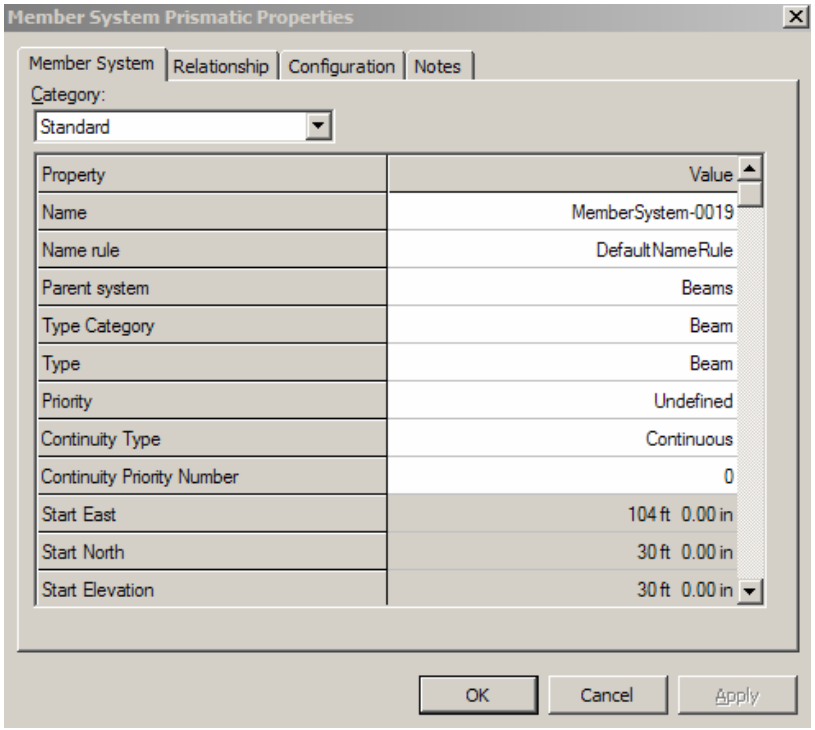
SmartStep Commands

Property Dialogs

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

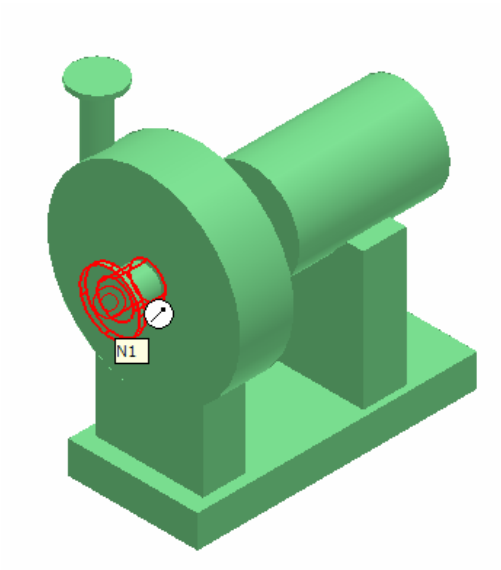
Tabbed Dialogs

Edit Controls



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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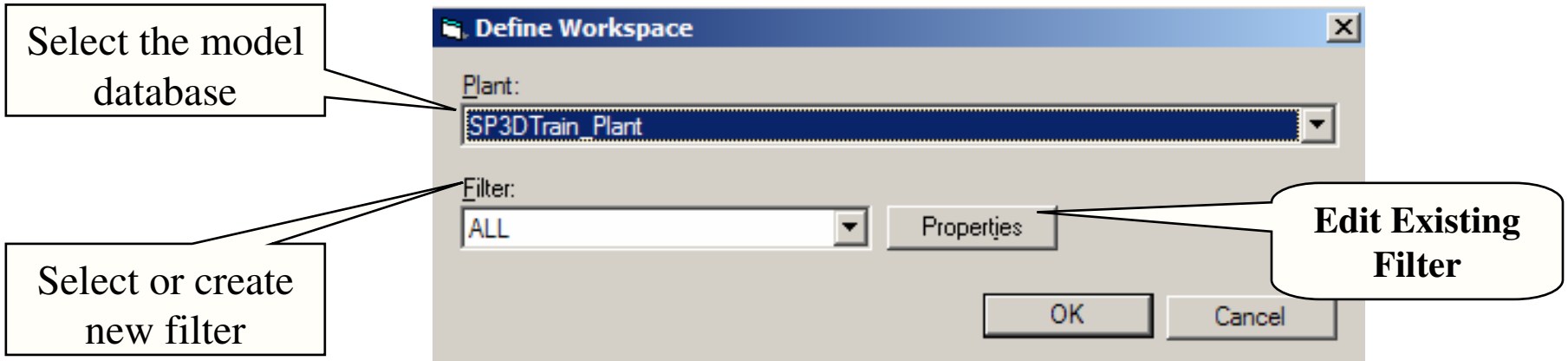
Workspace (Ctrl-w)

- 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)



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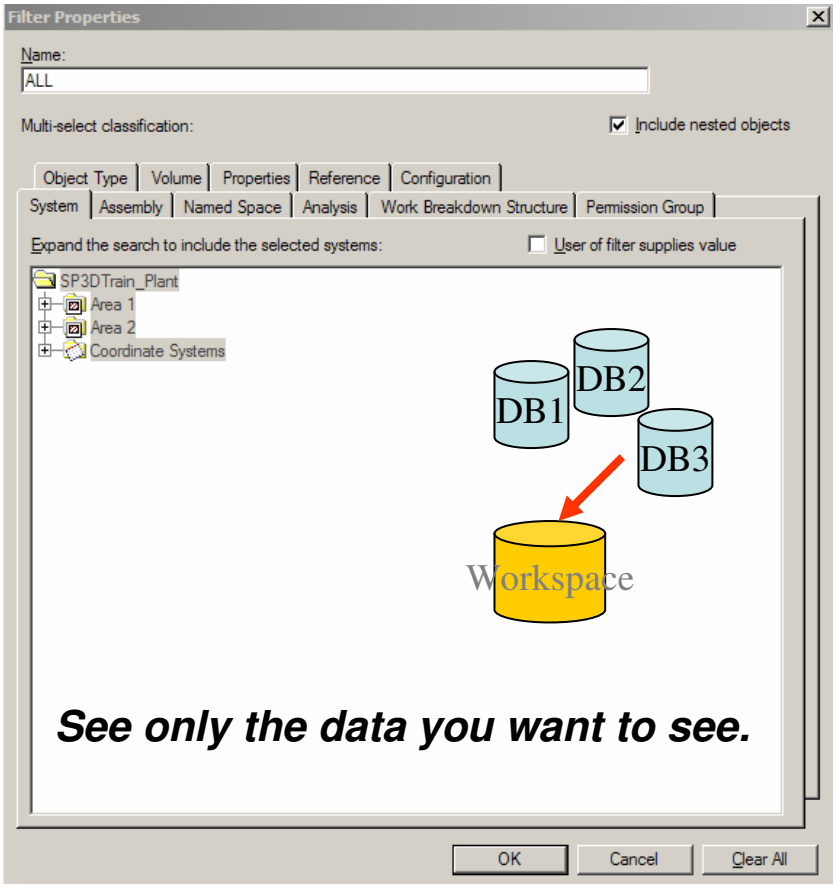
Filters

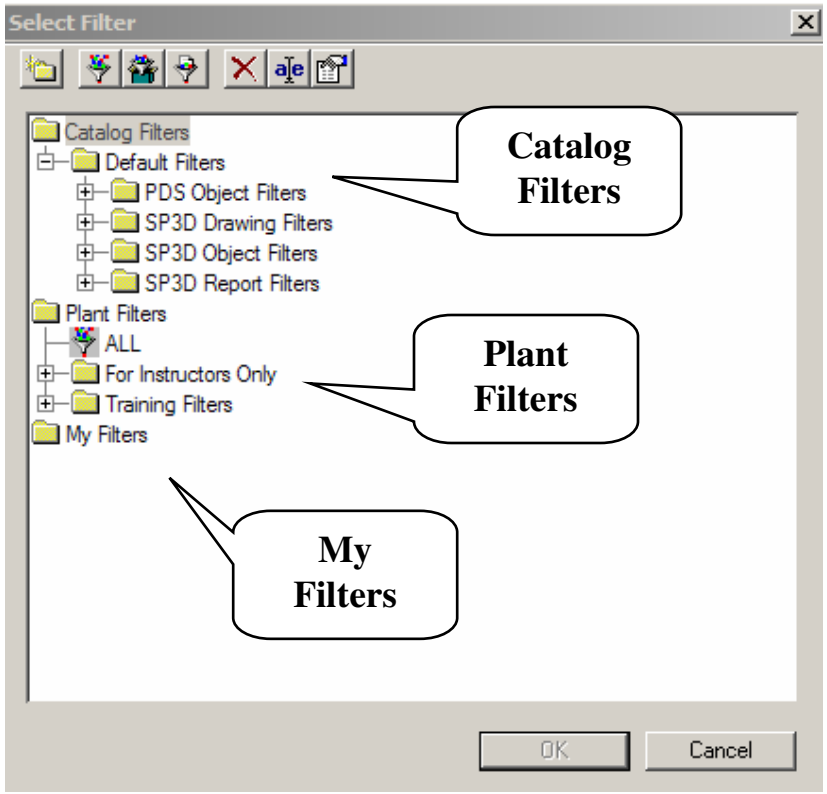
A filter is a set of search criteria that selects or retrieves data based on the object properties:

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

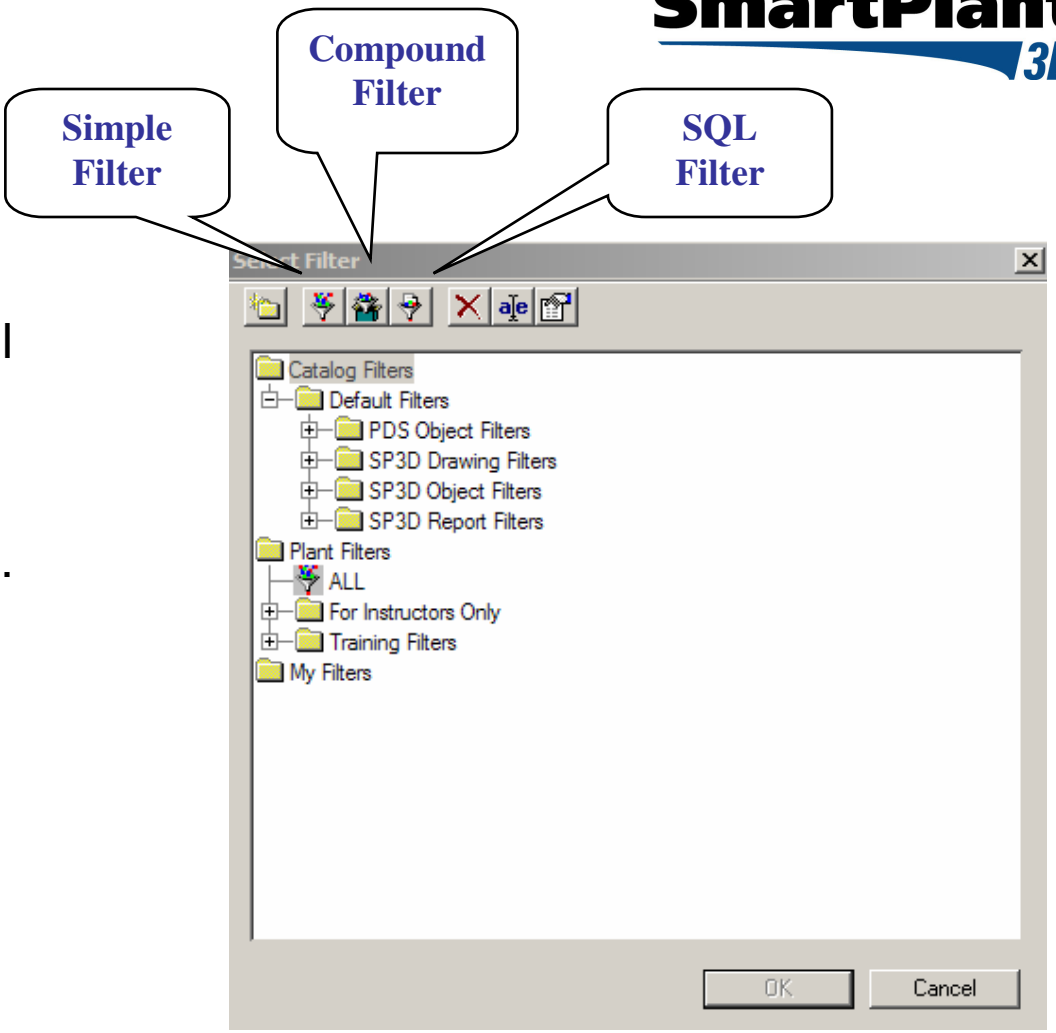


Filters

- 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

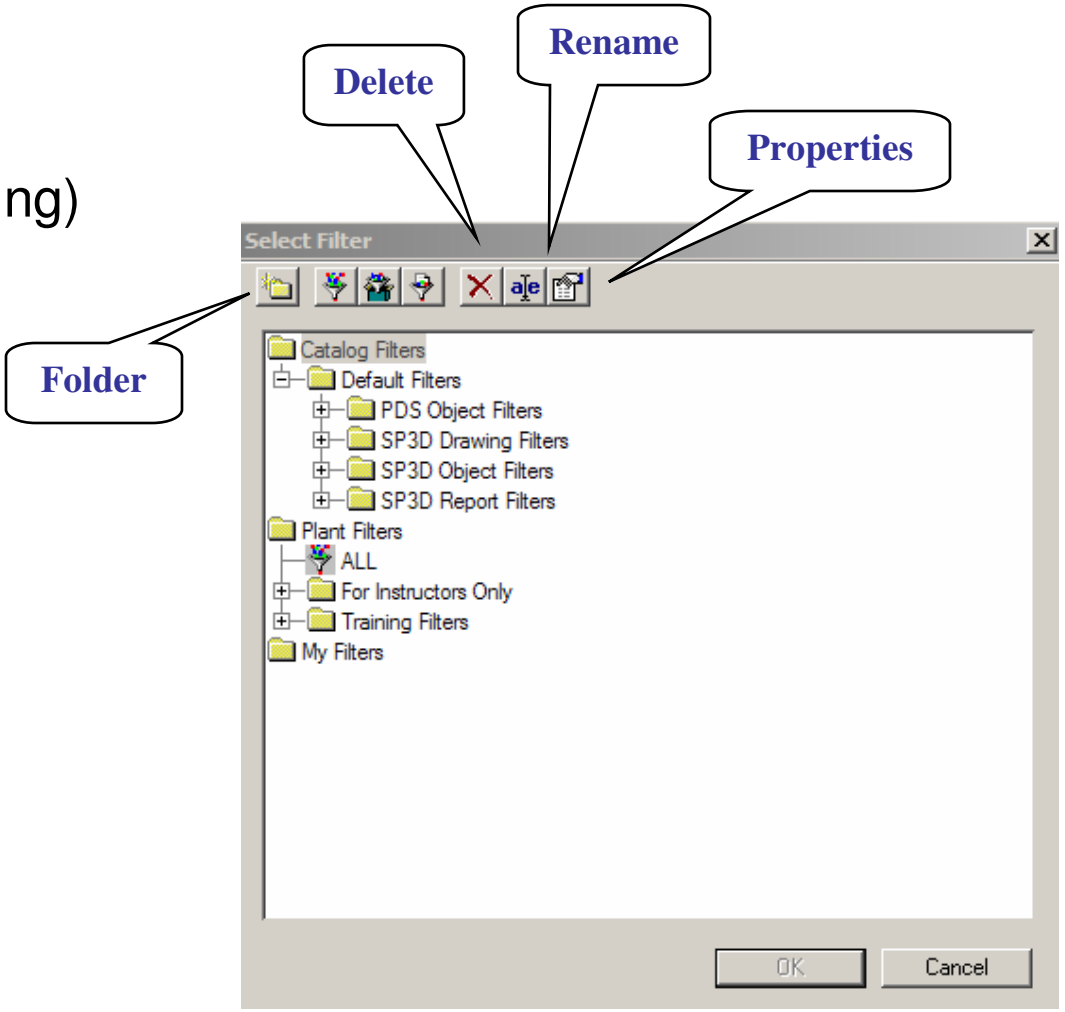
Is a filter which provides a place to store user-written SQL query

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

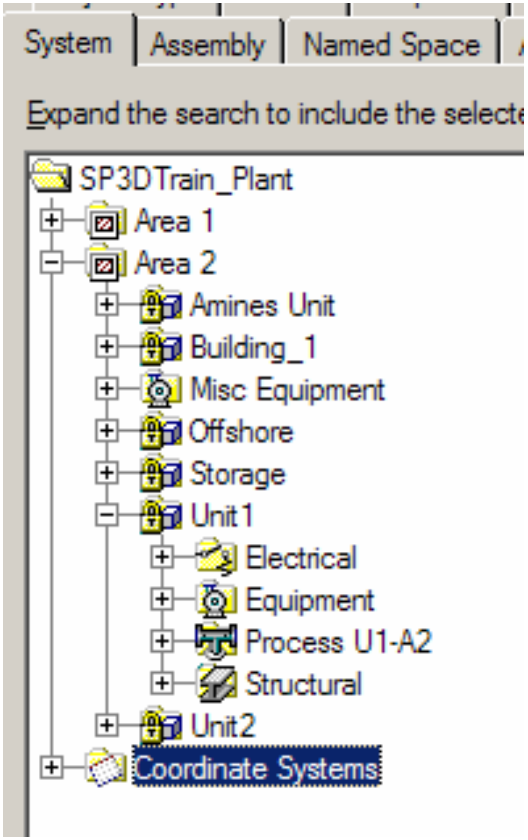


Filter Properties

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



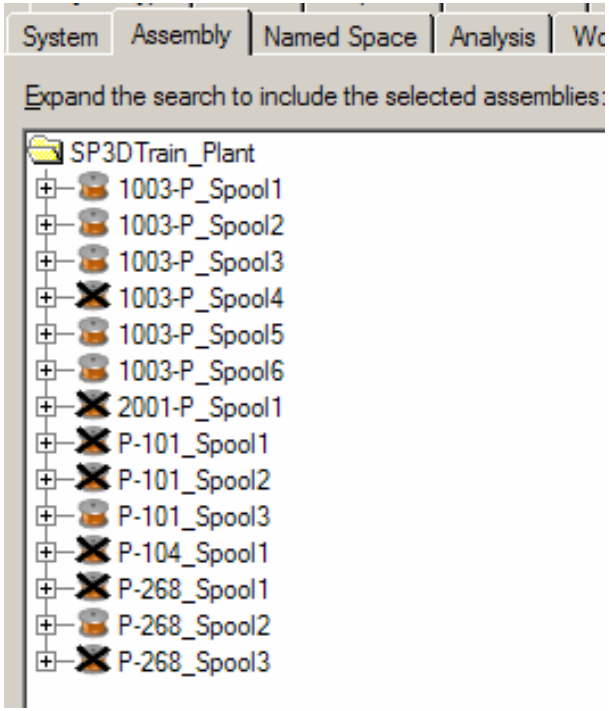
Filter Properties

Assembly Tab

Expand the search to include all selected assemblies

Example of assemblies are:

- Spools
- Hangers and Supports

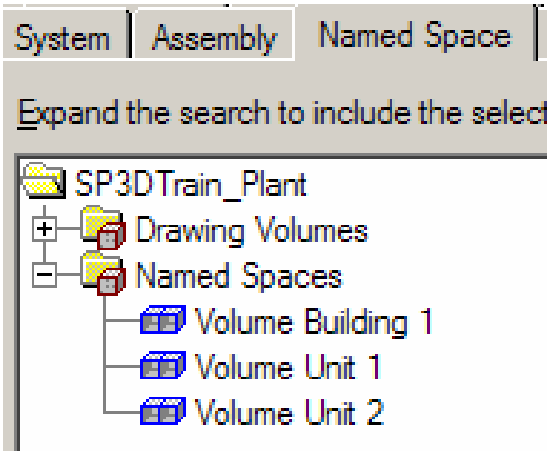


Filter Properties

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

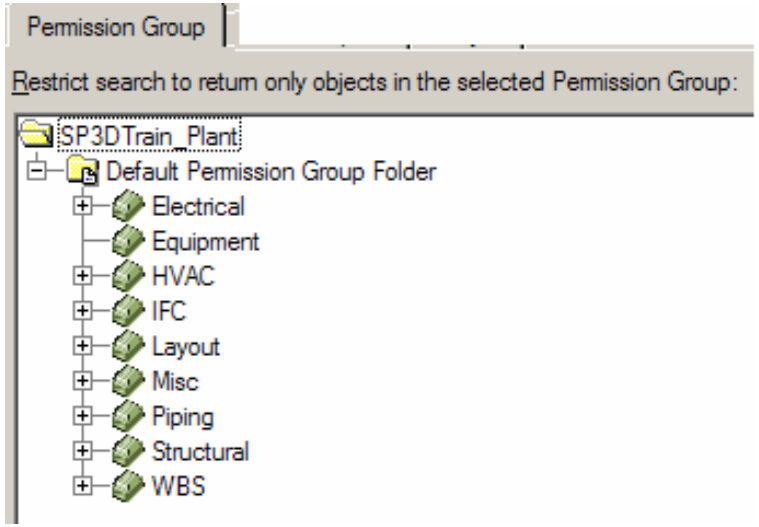


Filter Properties

Permission Group Tab

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

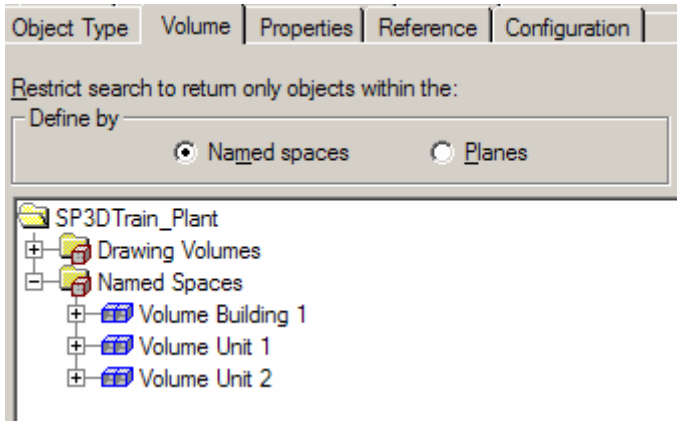
- Every object must belong to a permission group.
- The permissions for the objects in model are defined by a set of Access Control Rule:
  - Read – Can view objects
  - Write – Can create/modify/delete objects
  - Full Control – Can perform all operations on objects

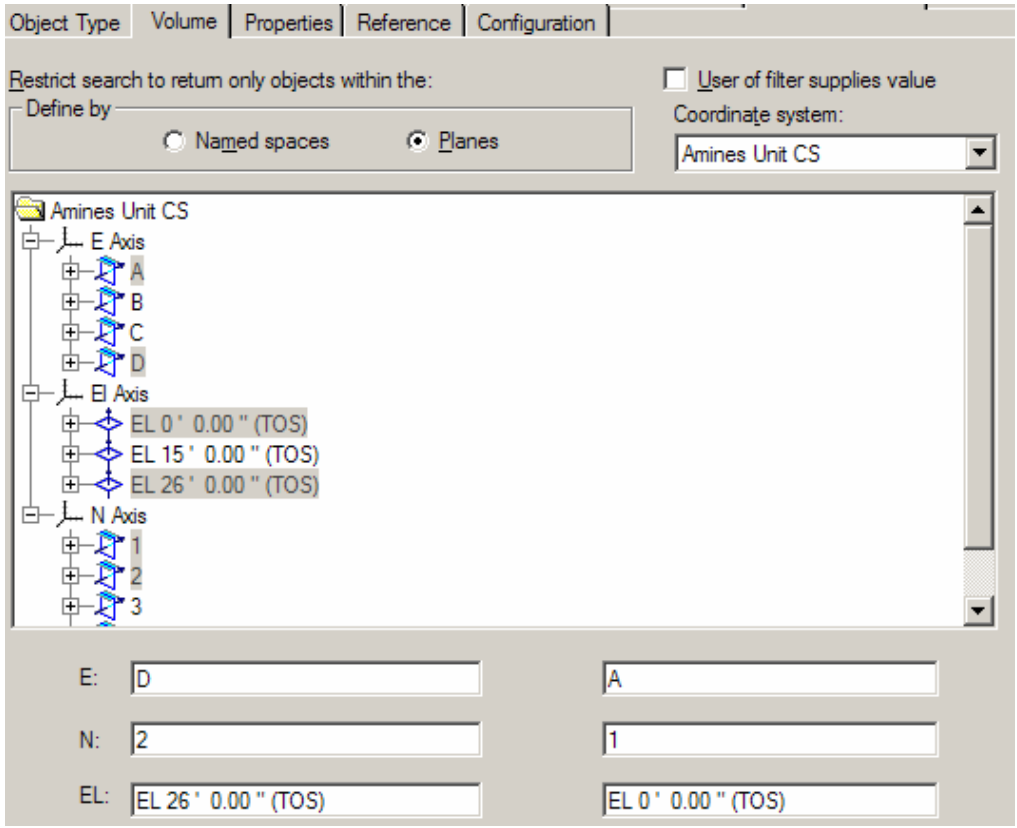


Filter Properties

Volume Tab

Restrict the search to return only objects within the volume

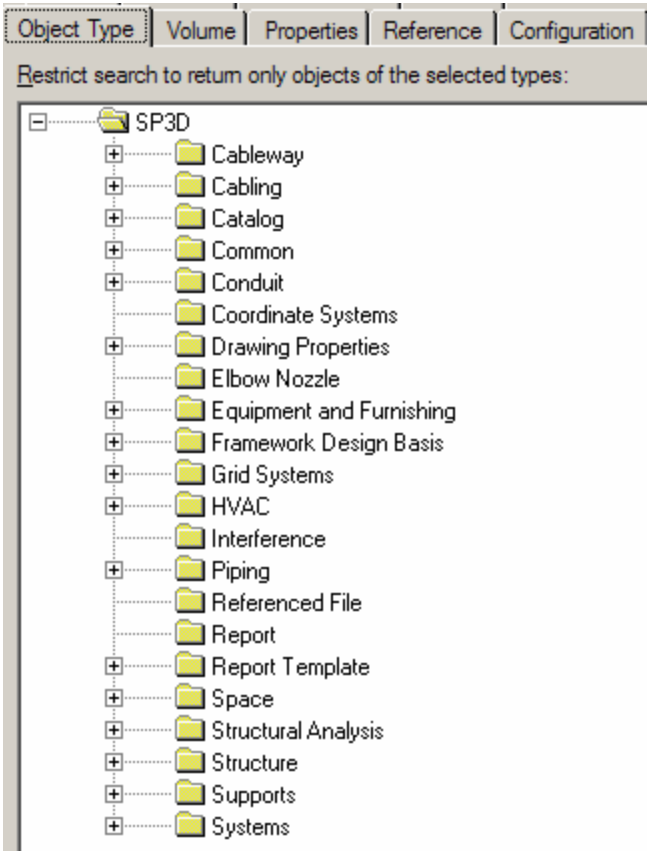




Filter Properties

Object Class Tab

Restrict the search to return only objects of the selected types

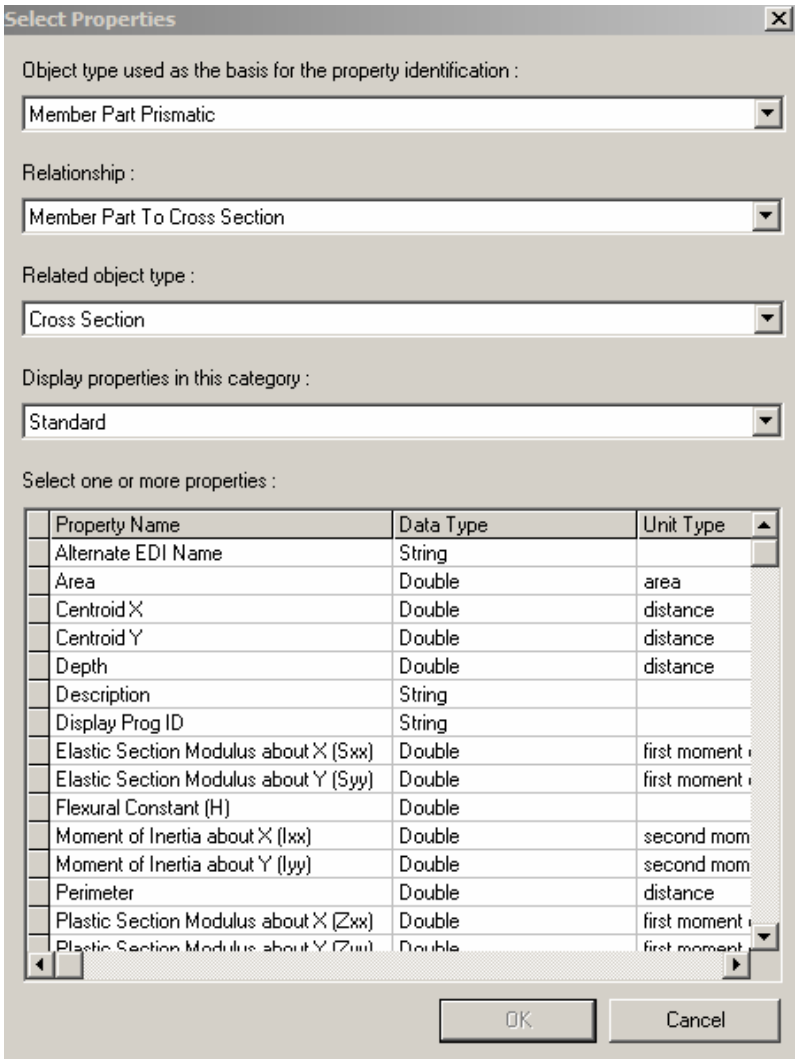


Filter Properties

Properties Tab

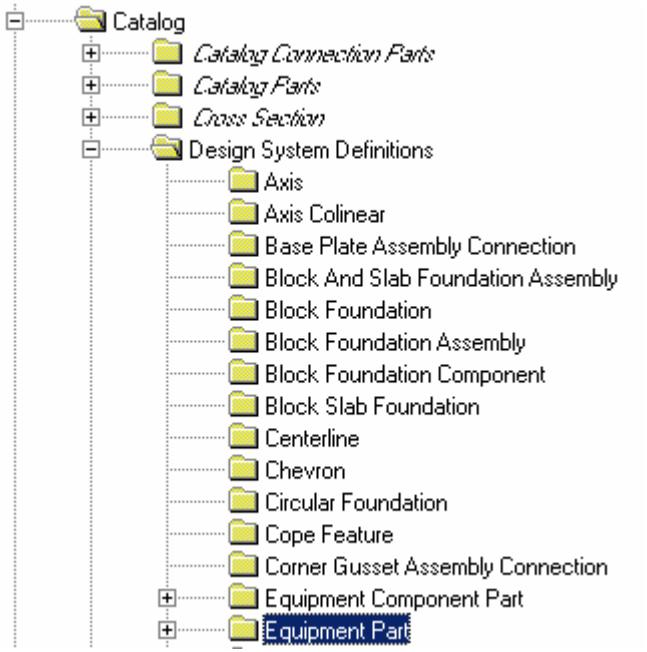
Restrict the search to return only objects matching the selected properties

- 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

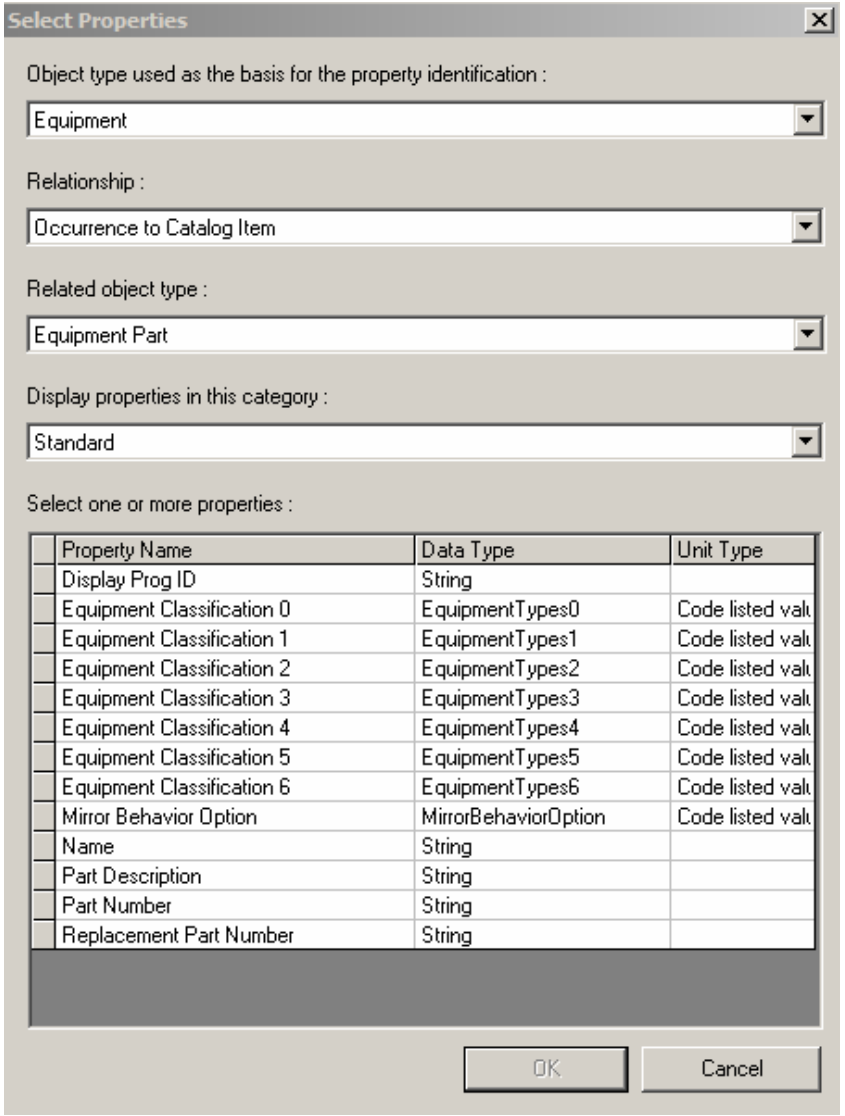


Filter Properties

Properties Tab
Query objects based on Equipment Types

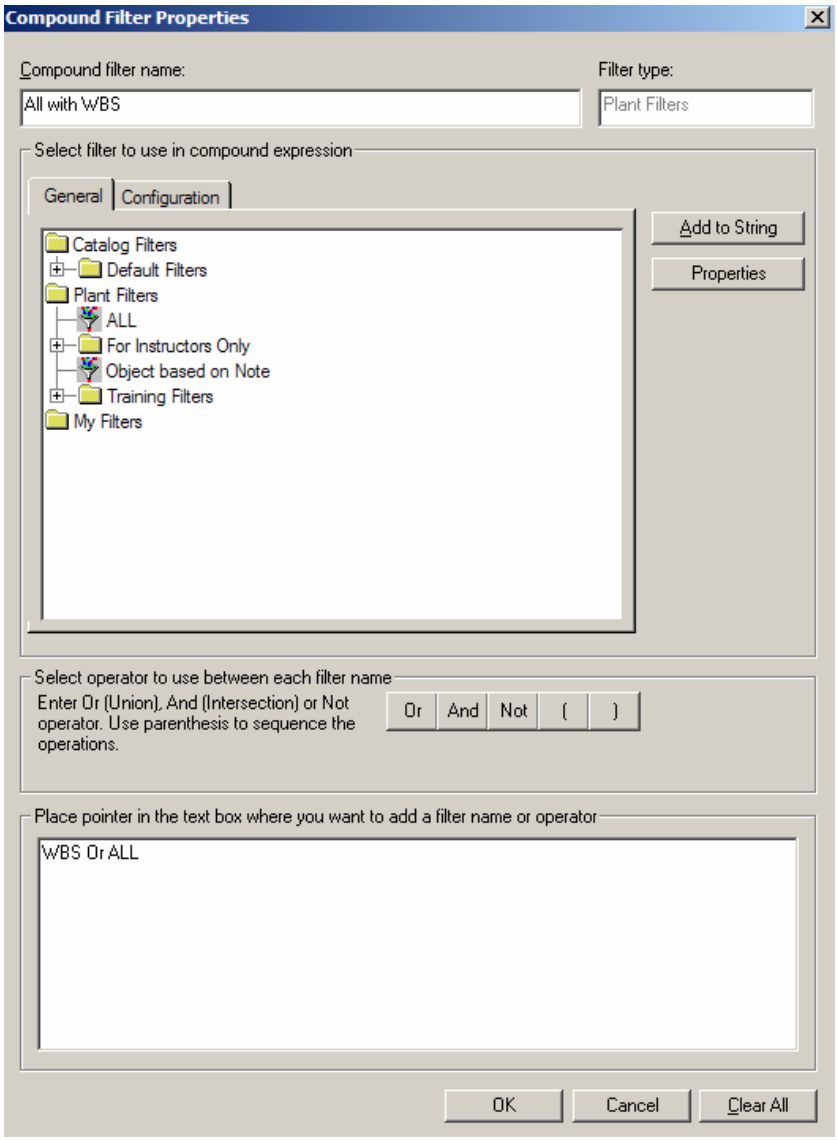


	Property	Operator	Value	Ask
	Occurrence to Catalog Item : toSI_OF	=	Lighting Fixtures	☐
				☐



Compound Filters

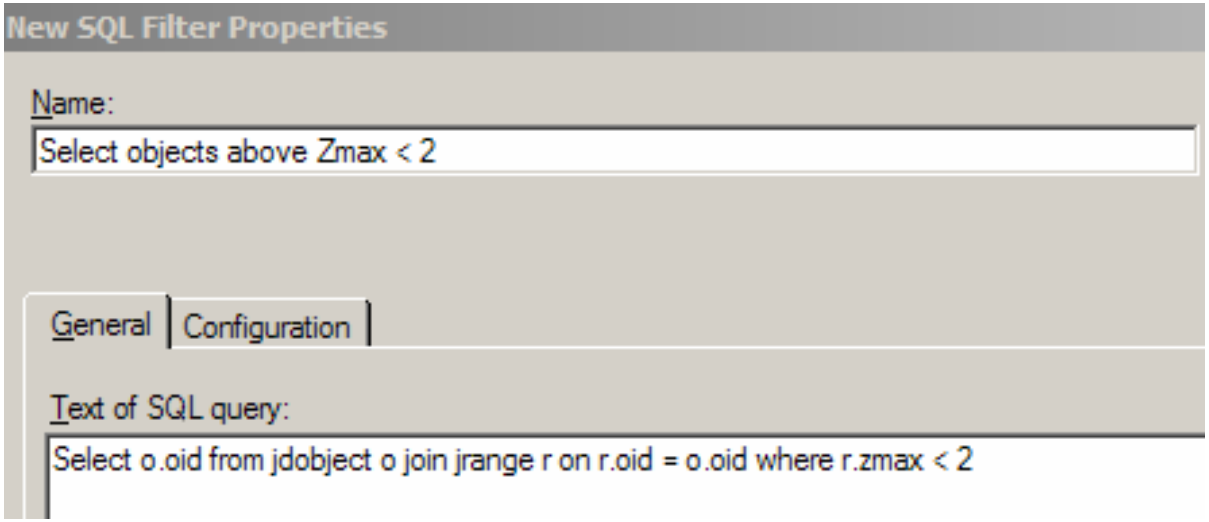
- Display Properties of each filter used in the compound query by selecting the individual filter name and then clicking the Properties button
- An AND of two filters results in only those objects that the two filters had in common.
- A OR of two filters results in getting together the list of objects 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

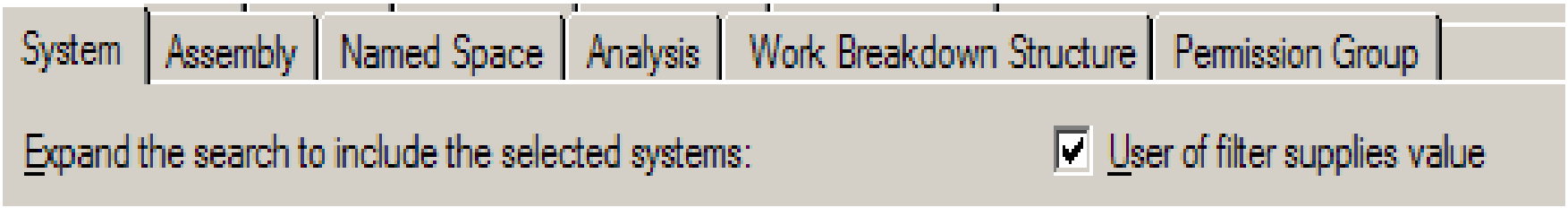
Select o.oid from jdobject o join jrange r on r.oid = o.oid where r.zmax < 2



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.



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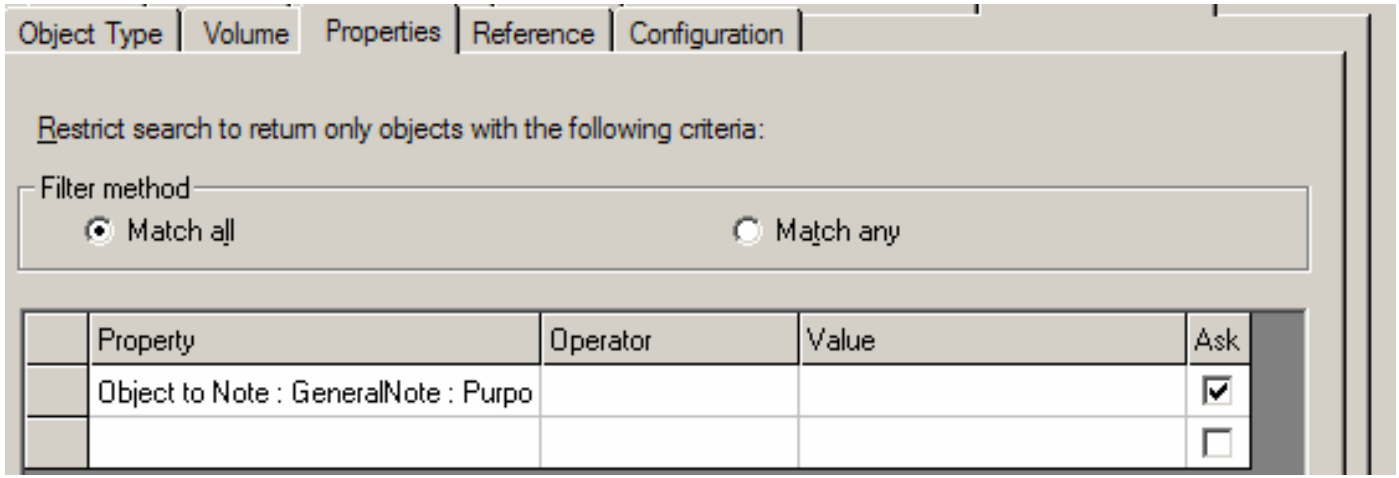

Filters

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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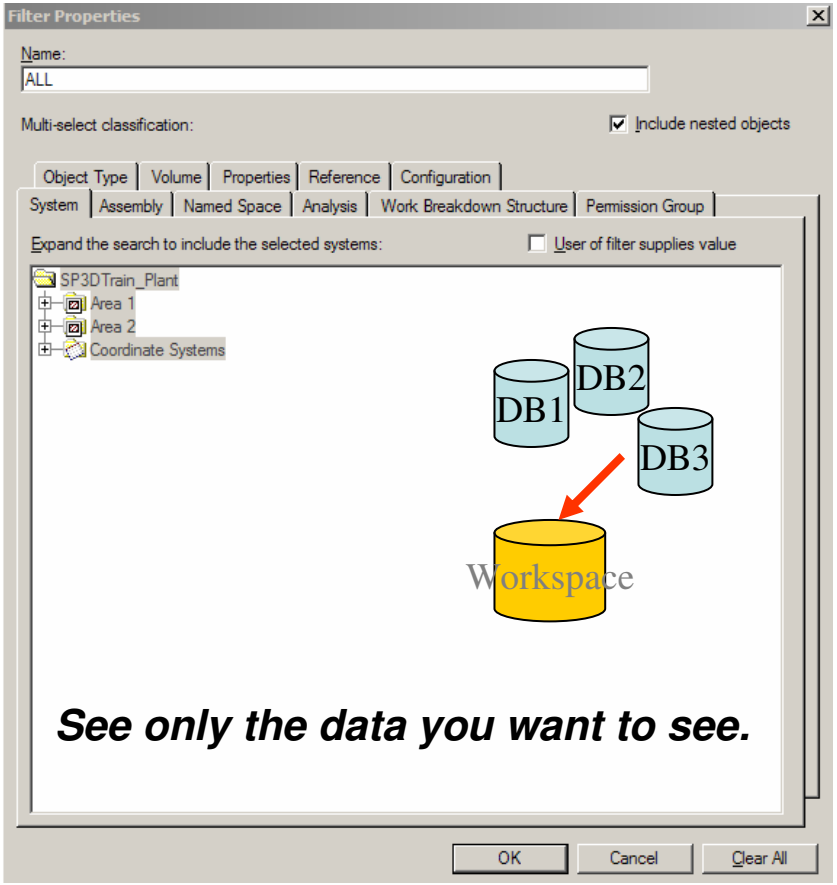
Common Task

- 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

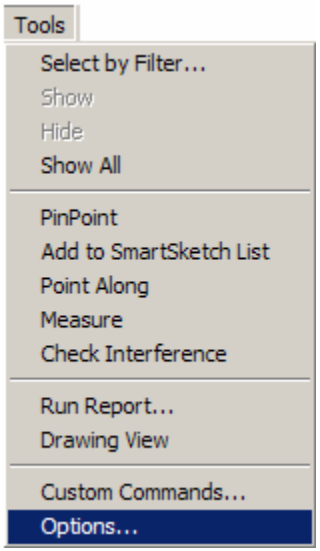
Session Templates
Store option settings such as task list, window views, orientations, Background colors, graphics views, etc

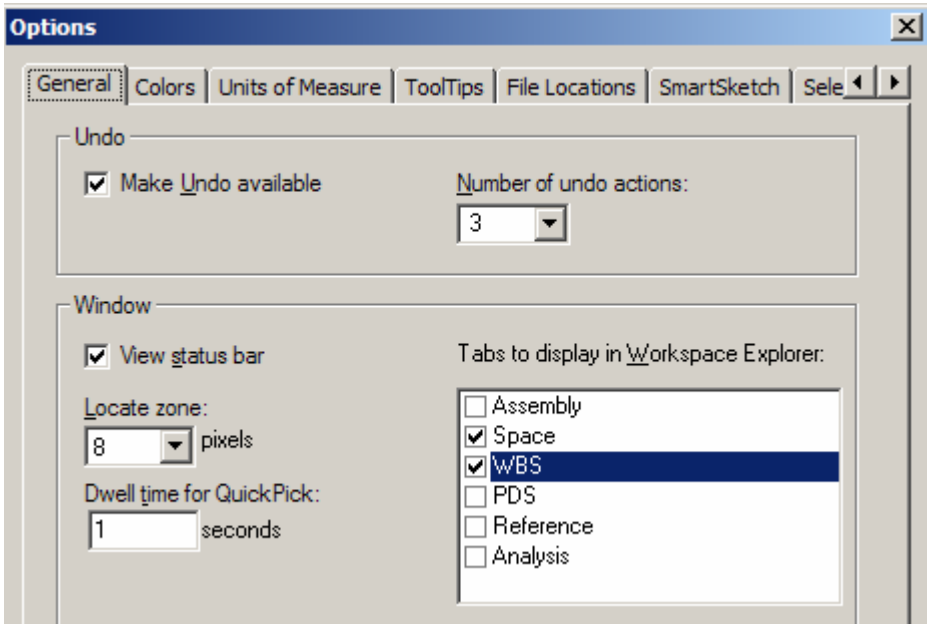
Filter
A set of search criteria that define a query to the model database
Workspace/Session =
Session Template + Filter



General Options

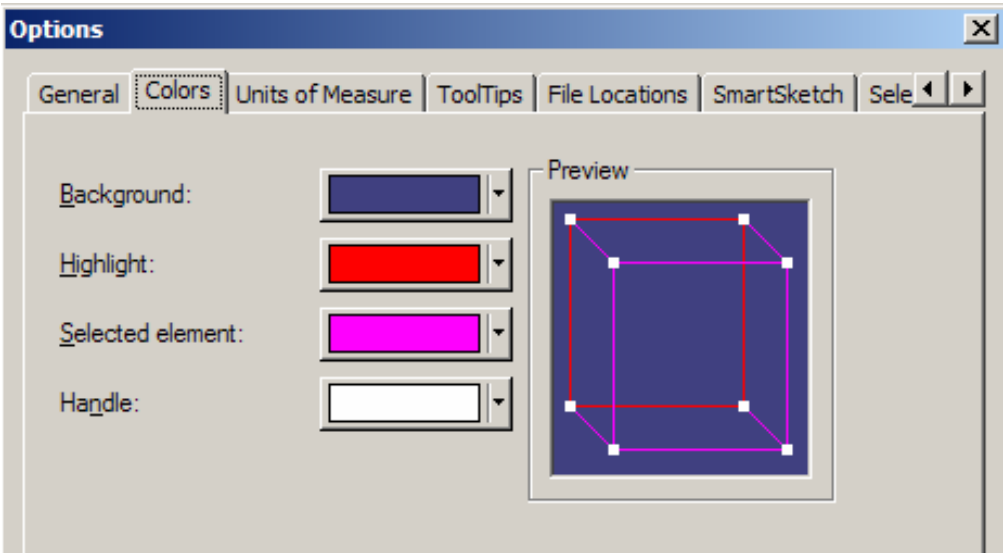
- Allows you to enable the Undo command and the status bar
- The activation time of the quick pick tool
- Define the locate zone for SmartSketch
- Define the Tabs to display in the Workspace Explorer





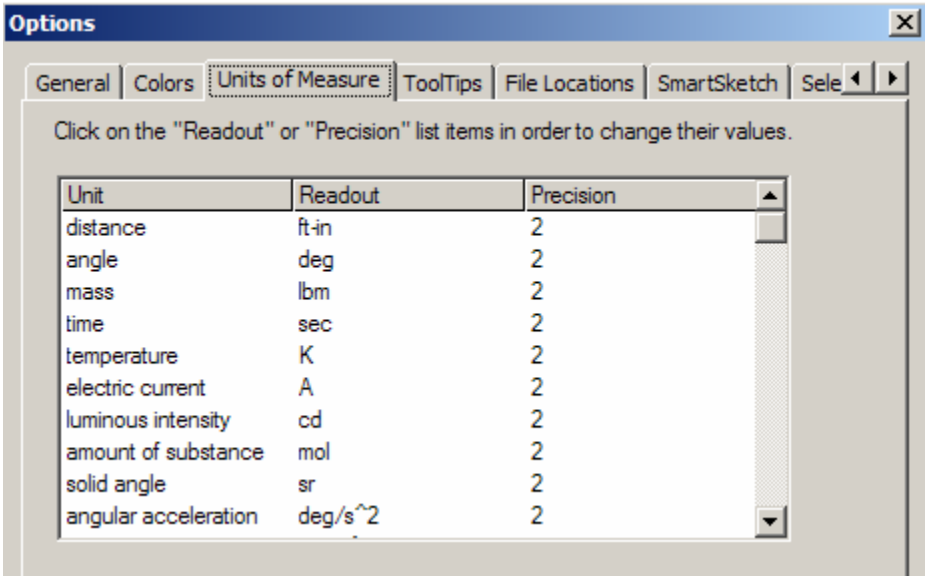
Colors Options

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



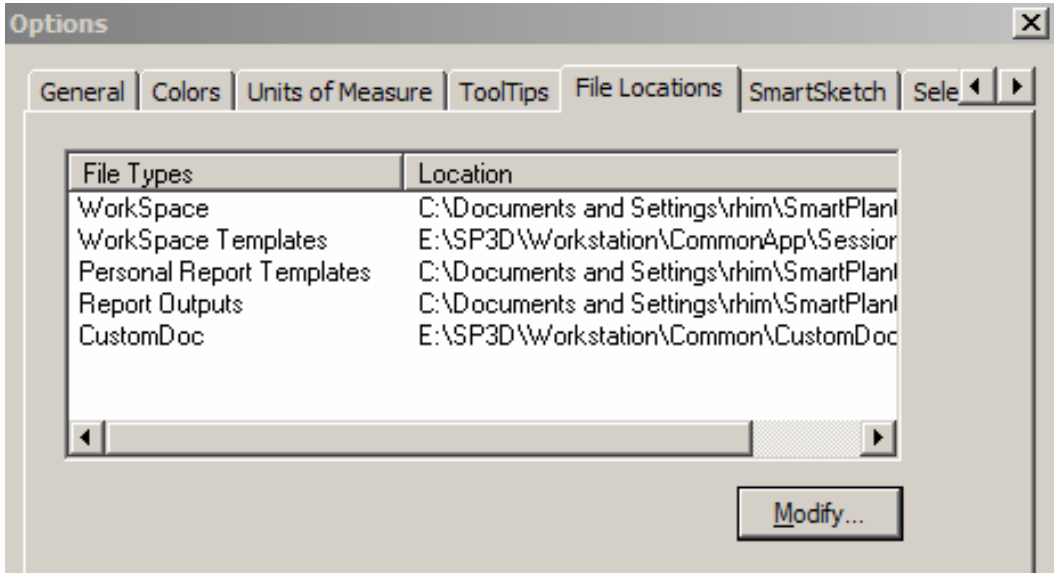
Units of Measure Options

- 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)



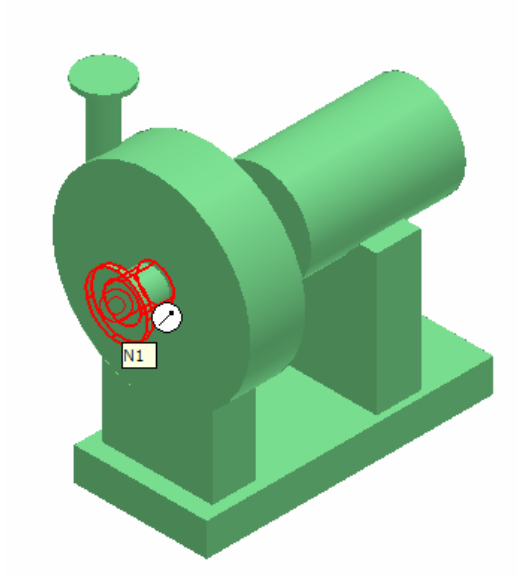
File Locations Options

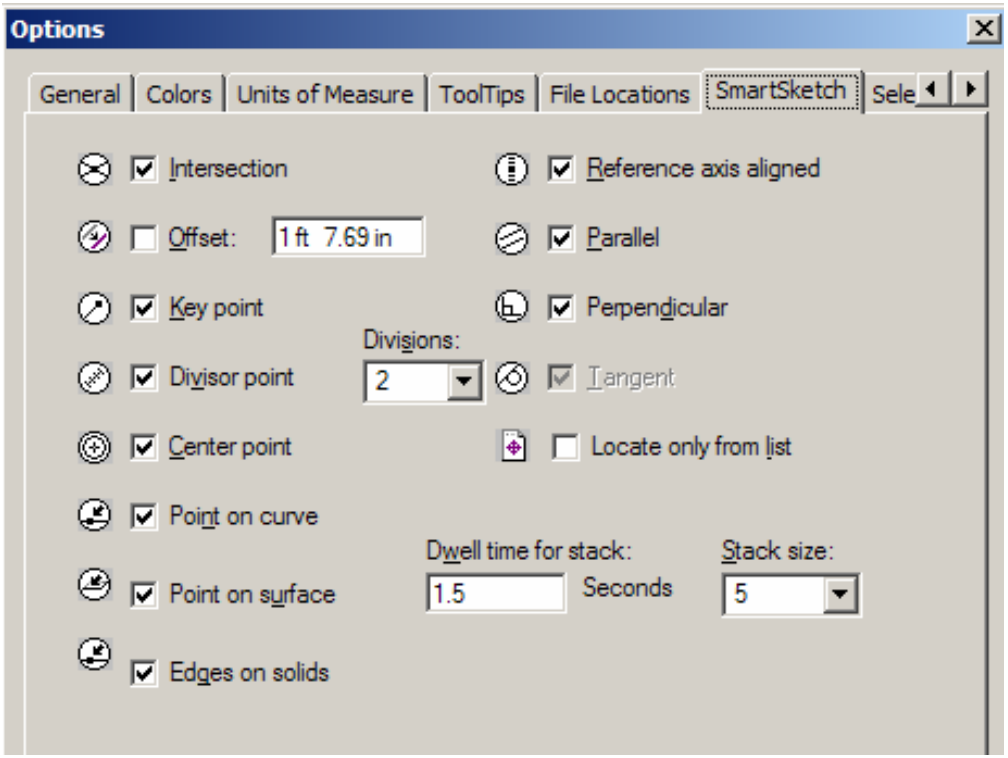
- File Locations for workspace files, reports, etc.



SmartSketch Options

- Allows you to enable the smartsketch indicators

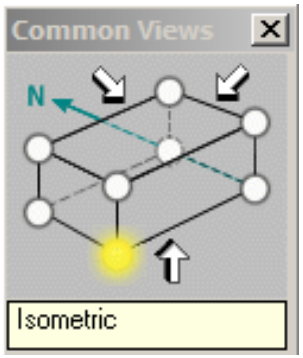




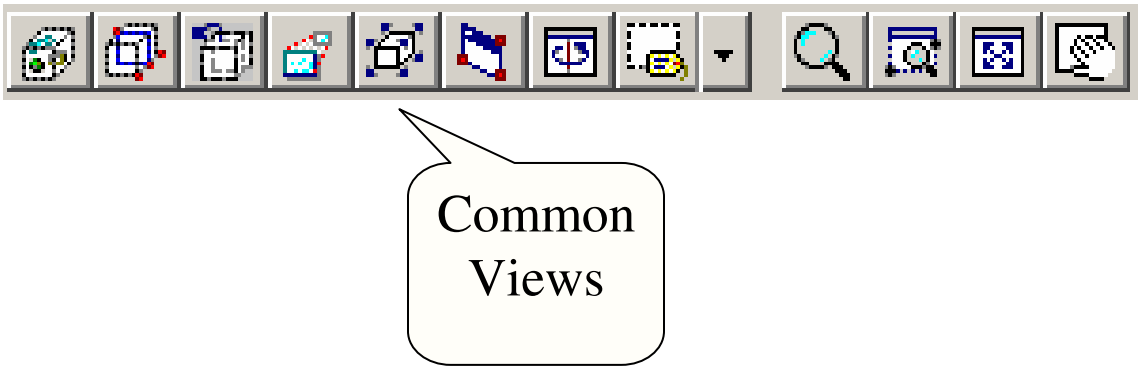
View Manipulation

- 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



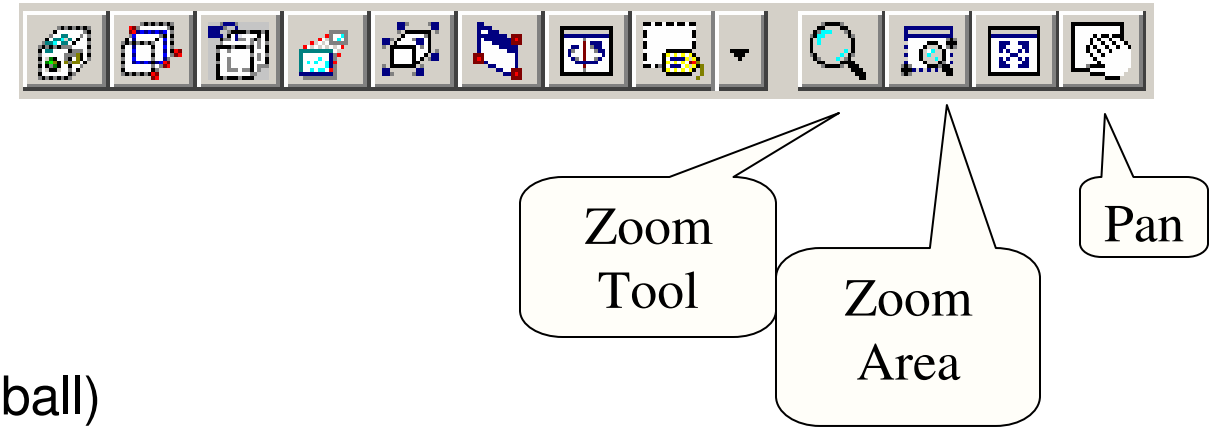
Common Environment Toolbar



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

View Manipulation

Common Environment Toolbar

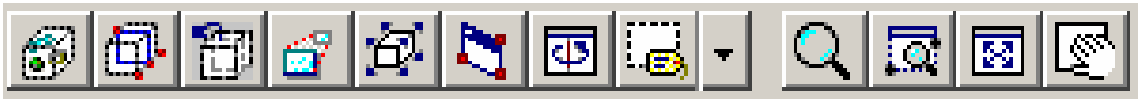


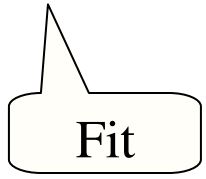
Zoom Tool command:

- 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





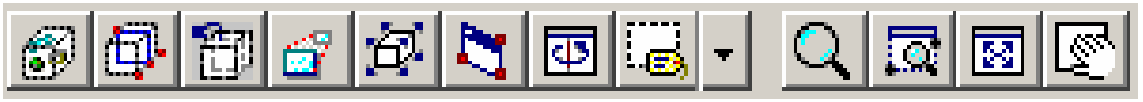
Fit View command:

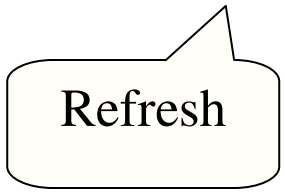
Fit all visible objects within the current clipping volume in the Active View

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

View Manipulation

Common Environment Toolbar



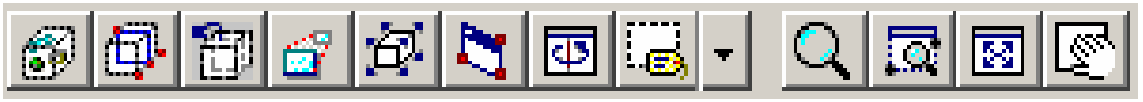


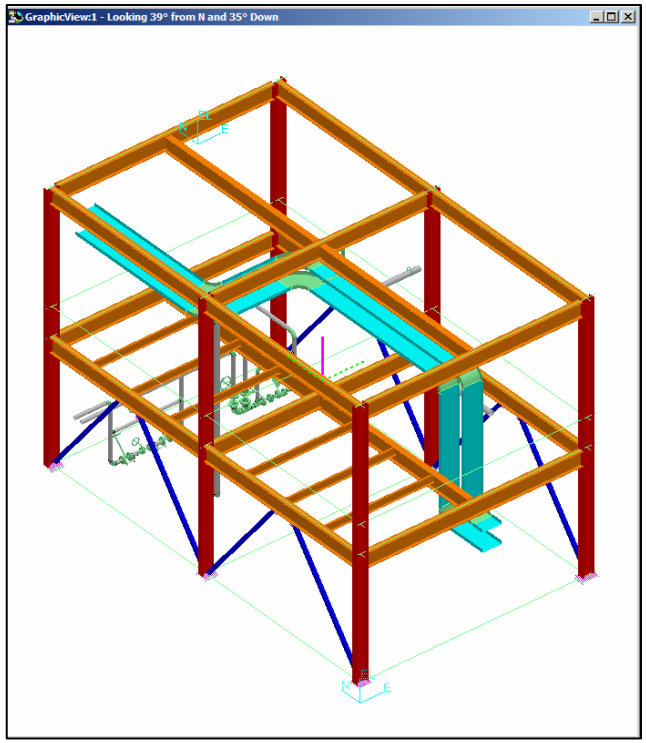
Refresh command:

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

Rotate View command:

- Rotate the view interactively

- Change the rotation axis

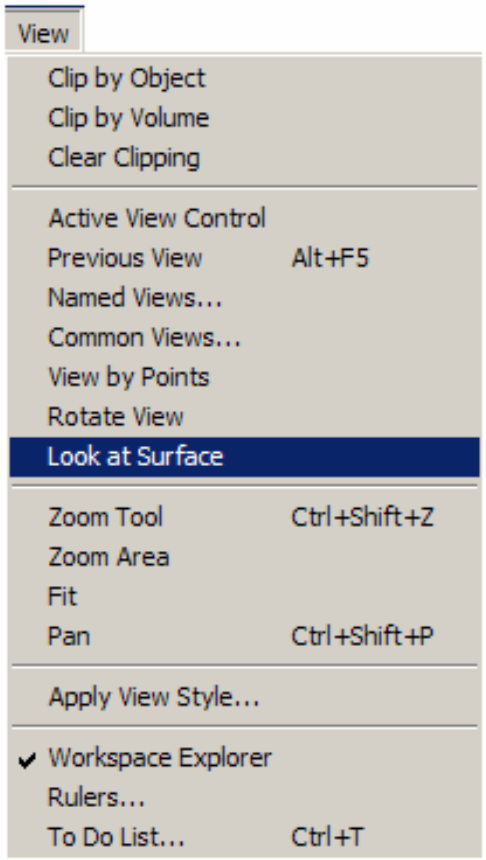
-Change the rotation point

-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



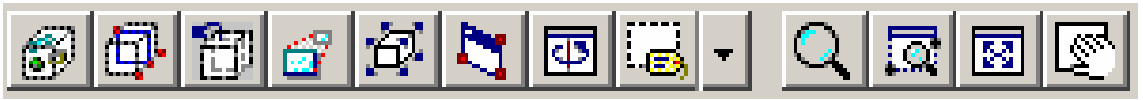
View Manipulation

Establishing Clipping Volume

- Clipping by Object
- Clipping by Volume
- Clear Clipping

View Manipulation

Common Environment Toolbar

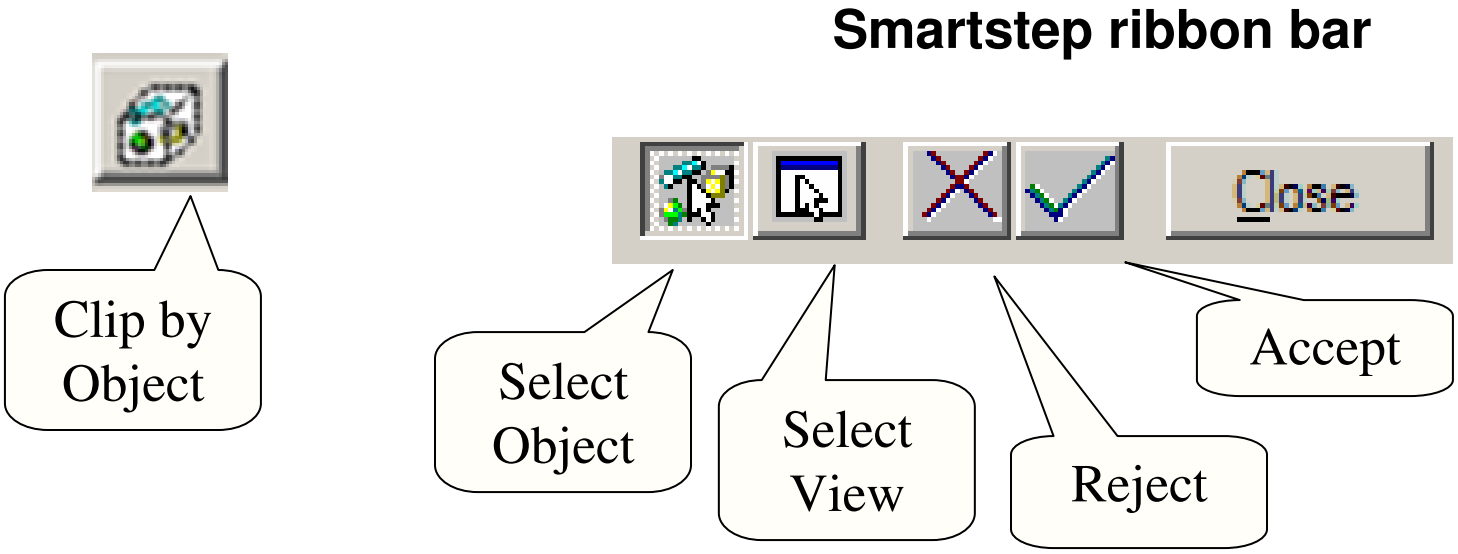


Clip by Object

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

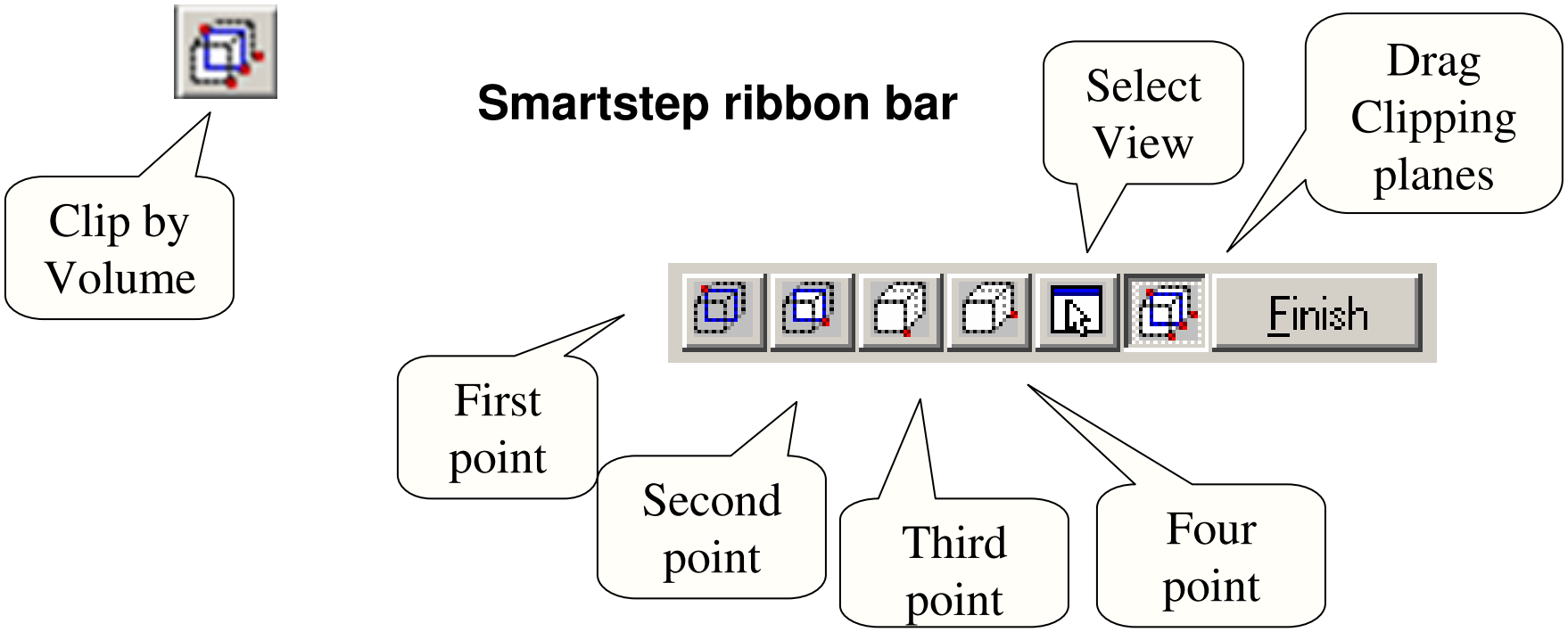
View Manipulation

Common Environment Toolbar

Clip by Volume command:

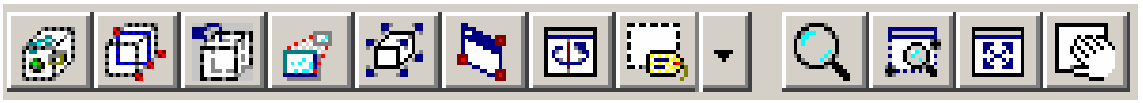
Allows you to set the view clipping volume so that all objects not inside the clipped area are hidden from the selected view

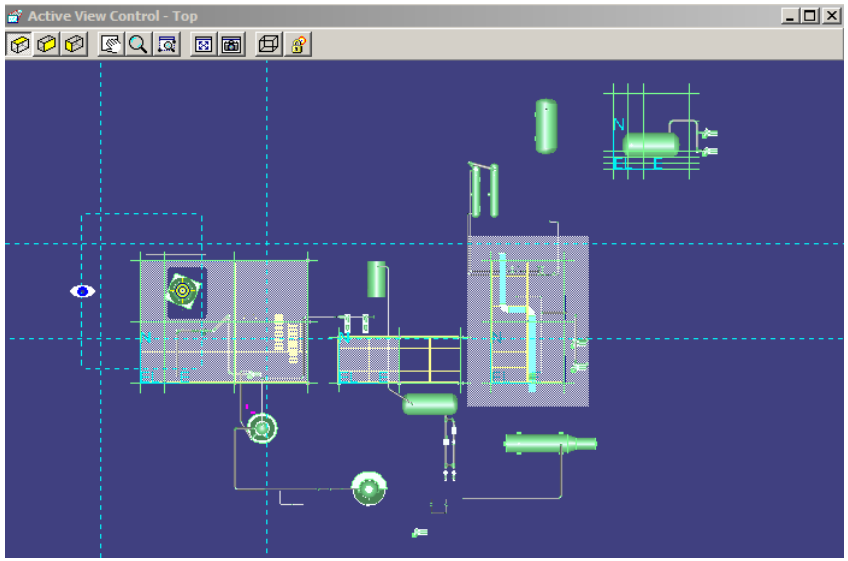
View Manipulation



View Manipulation

Common Environment Toolbar





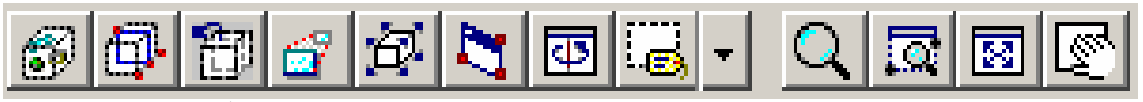
Active View Control

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 command:

Remove the clipping volume.

It then prompts for select of the next window to clear

The command is terminated by:

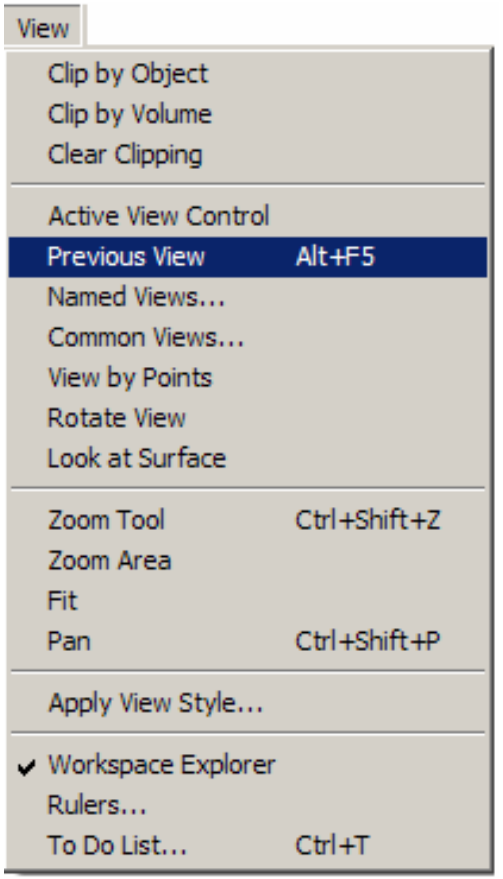
- Right mouse click
- Esc Key
- Pick of another command

View Manipulation

Restore the Previous View

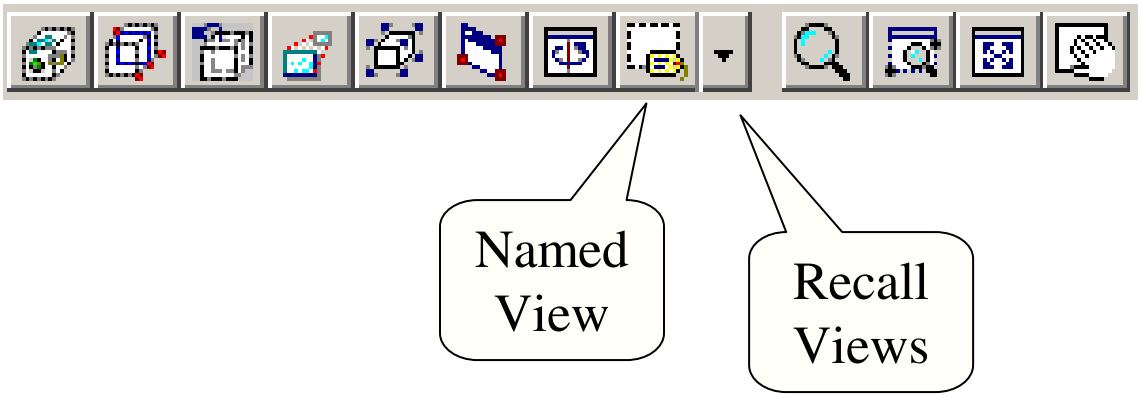
User can go back one view for the active window

Main Menu



View Manipulation

Common Environment Toolbar

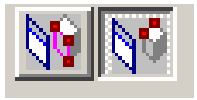


Saved View (Named View) command

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.

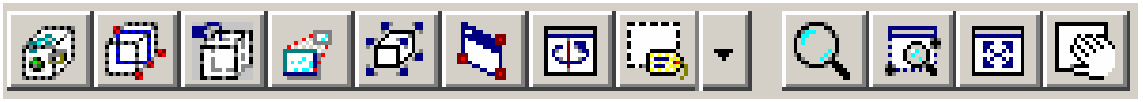
View Manipulation



View by 3 pts

View along line

Common Environment Toolbar



View by pts

View by 3 Points

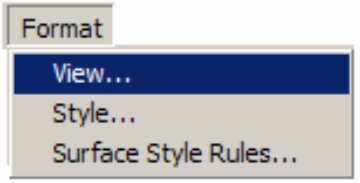
- Lets you pick the 3 Points that define a plane
- The plane of your screen is the plane defined above

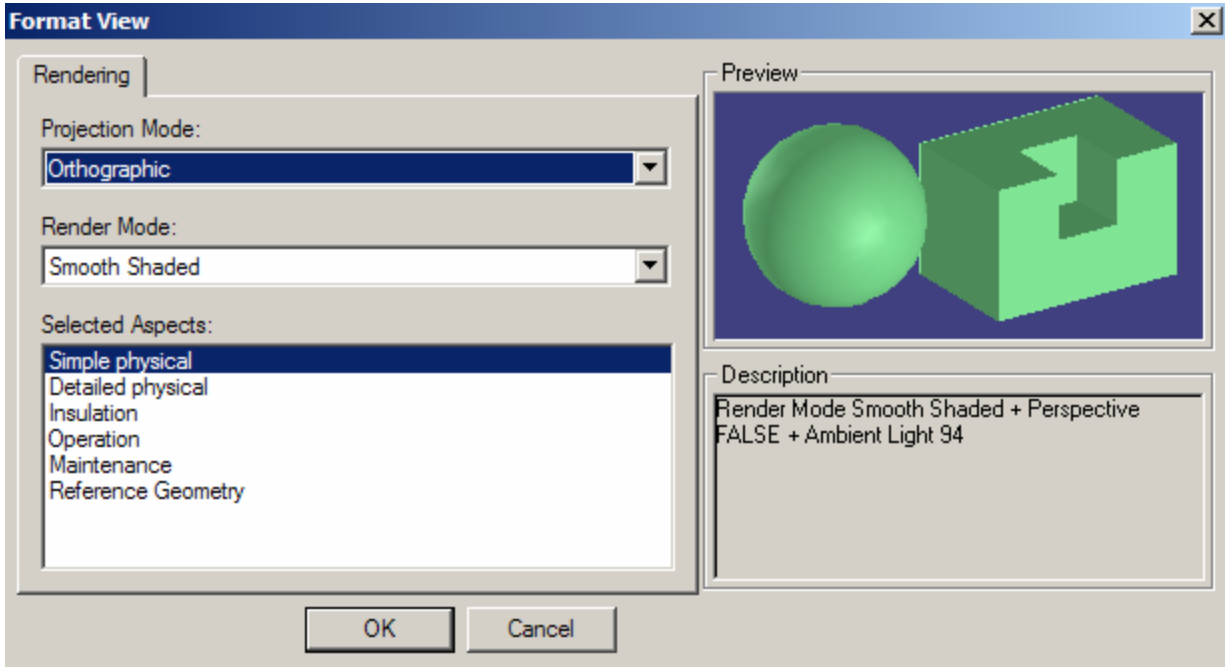
View along line

- 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.

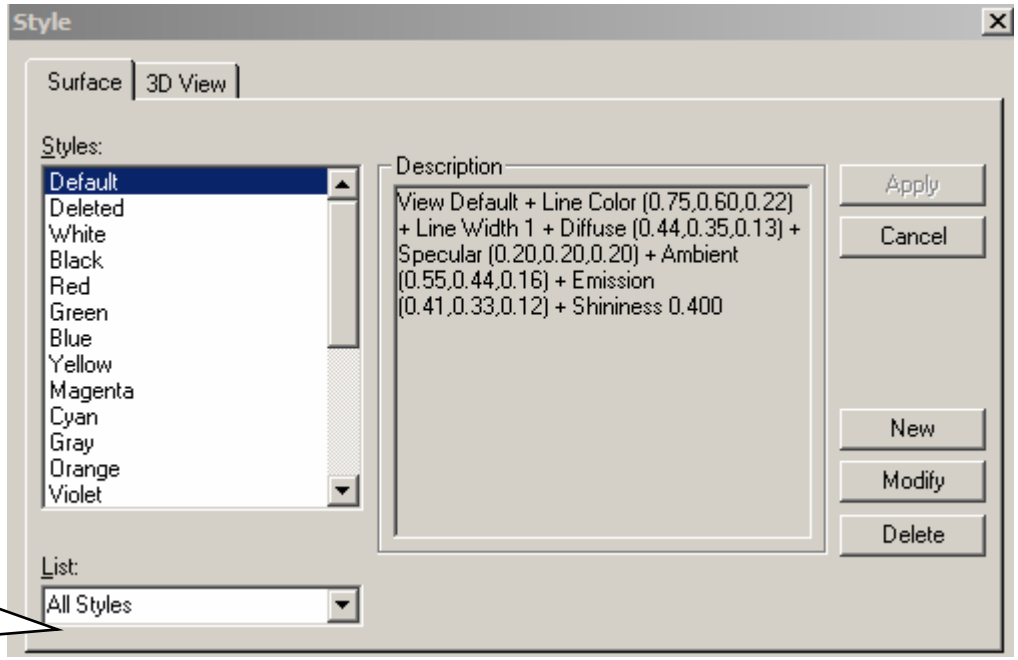




Applying Styles

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

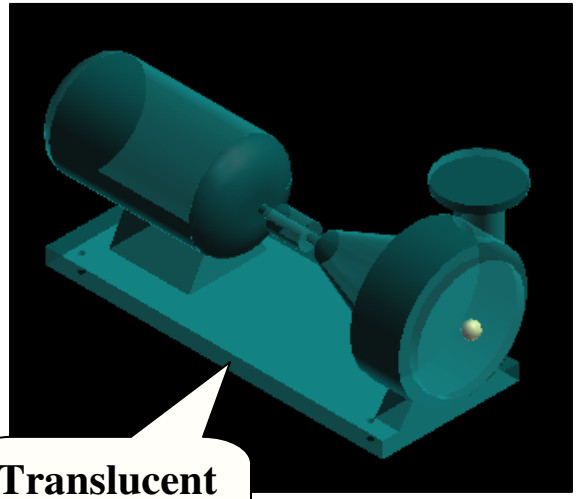
- View Style
- Surfaces Style

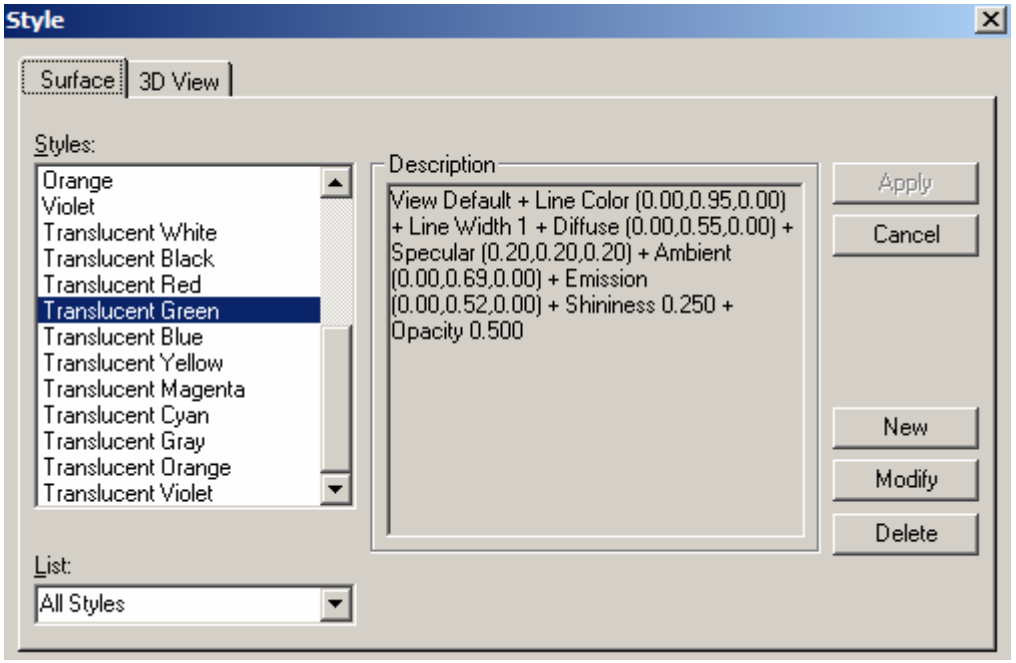


All Styles
Or
Styles used in workspaces

Applying Surface Style

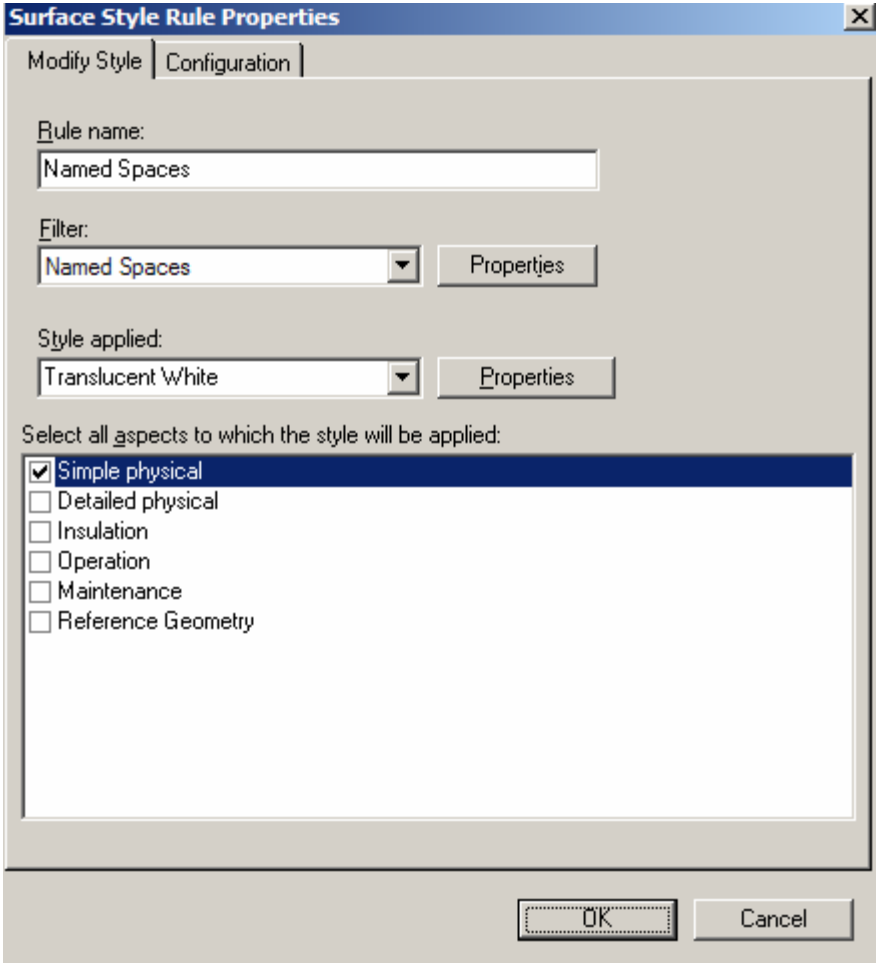
- to Selected objects
- Using surface style rules





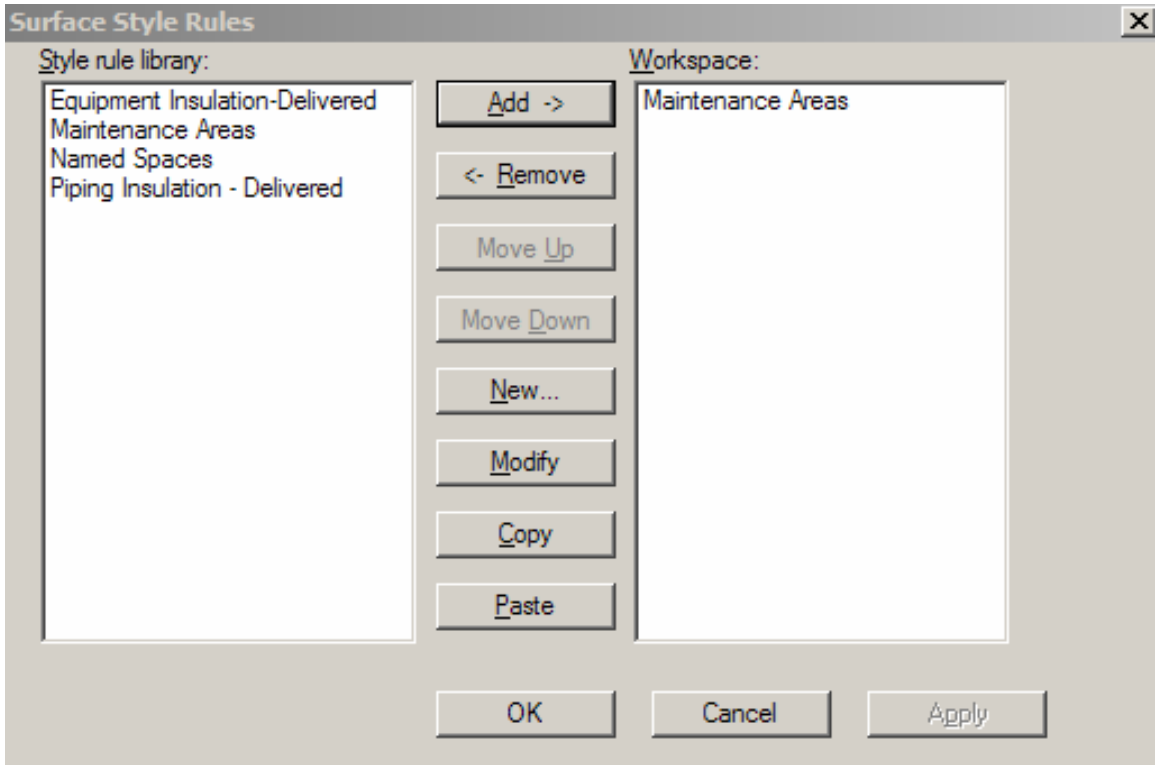
Applying Surface Style

- 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



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

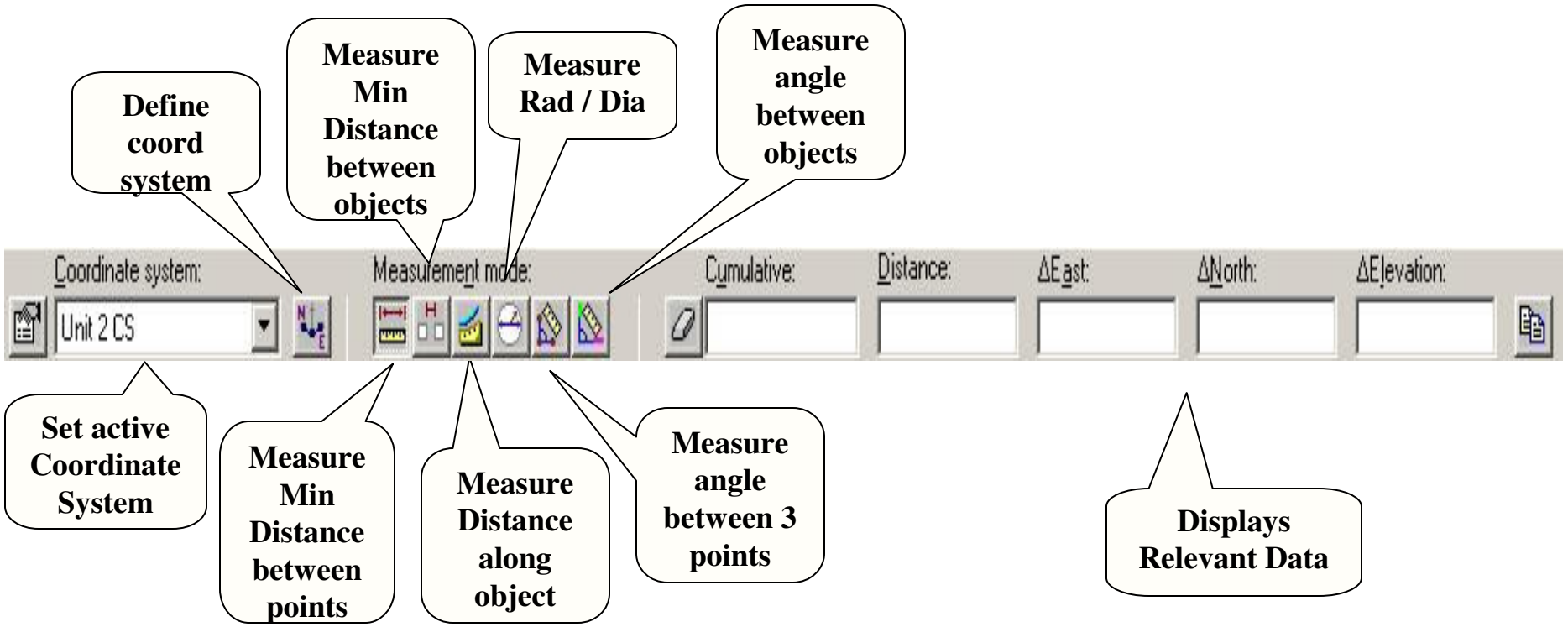
Tool -> Measure

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

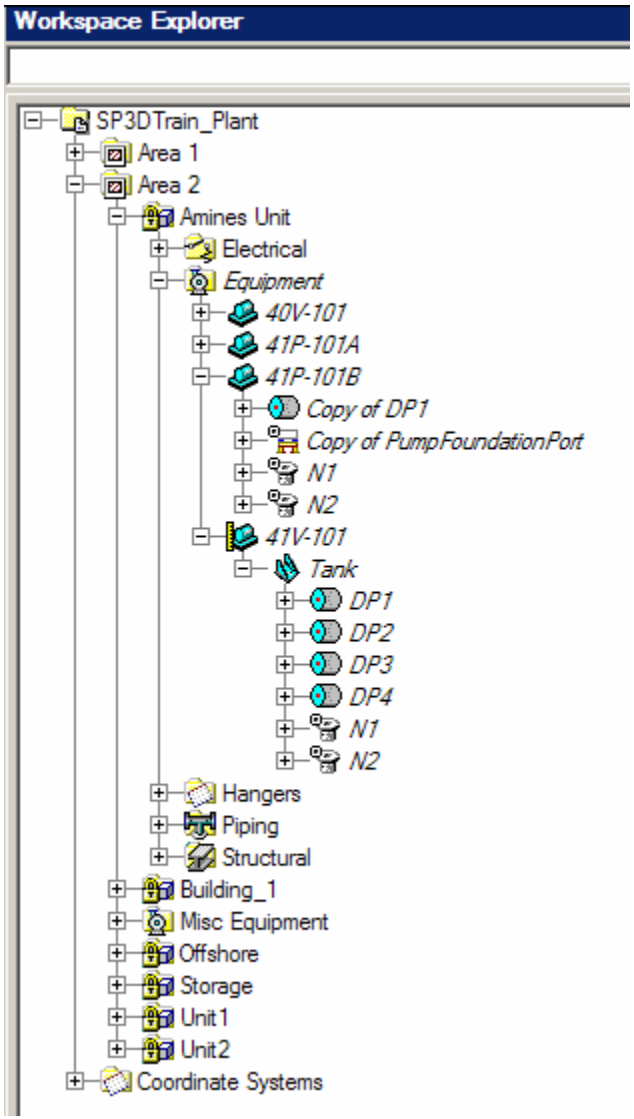
Measure radius and diameters



Hide/Show command

Hides selected items from display

Hidden objects are displayed in Italic text in the Workspace Explorer



Hide/Show command

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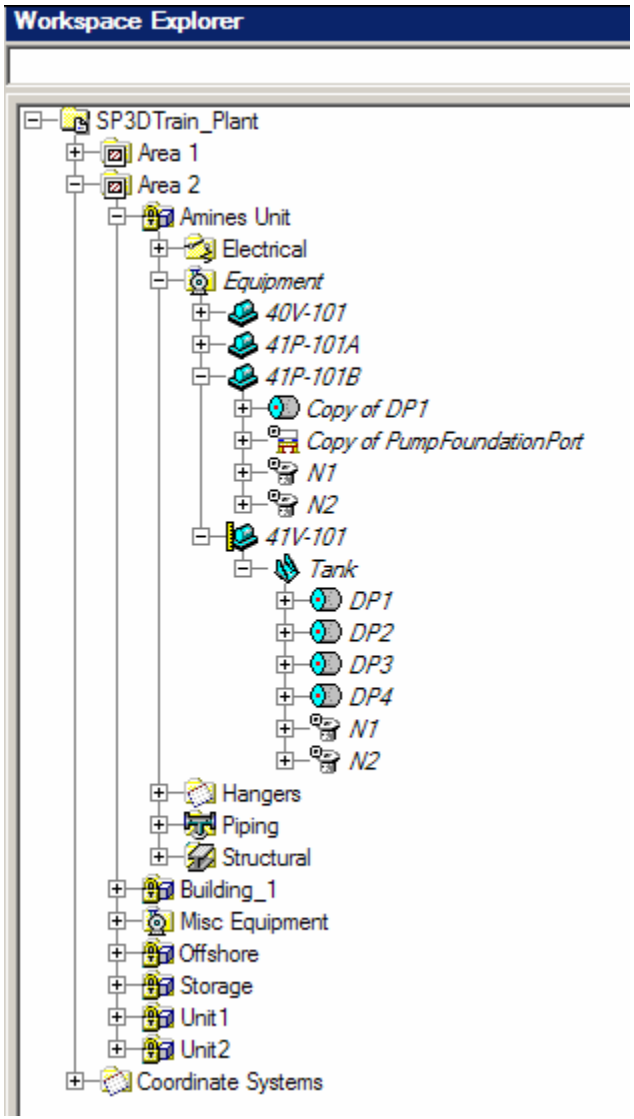


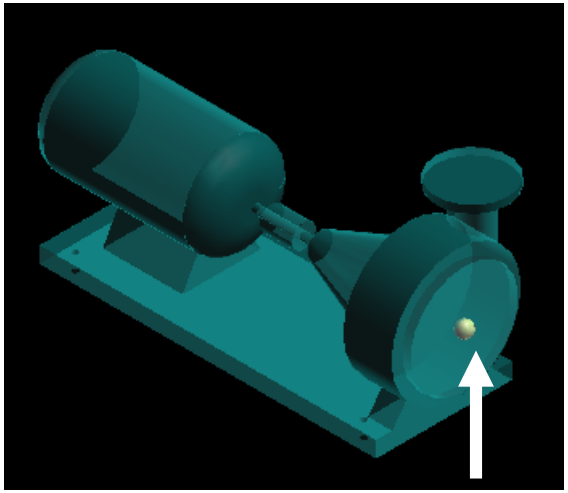
Agenda

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

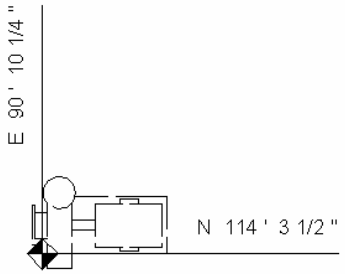
Control Points

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



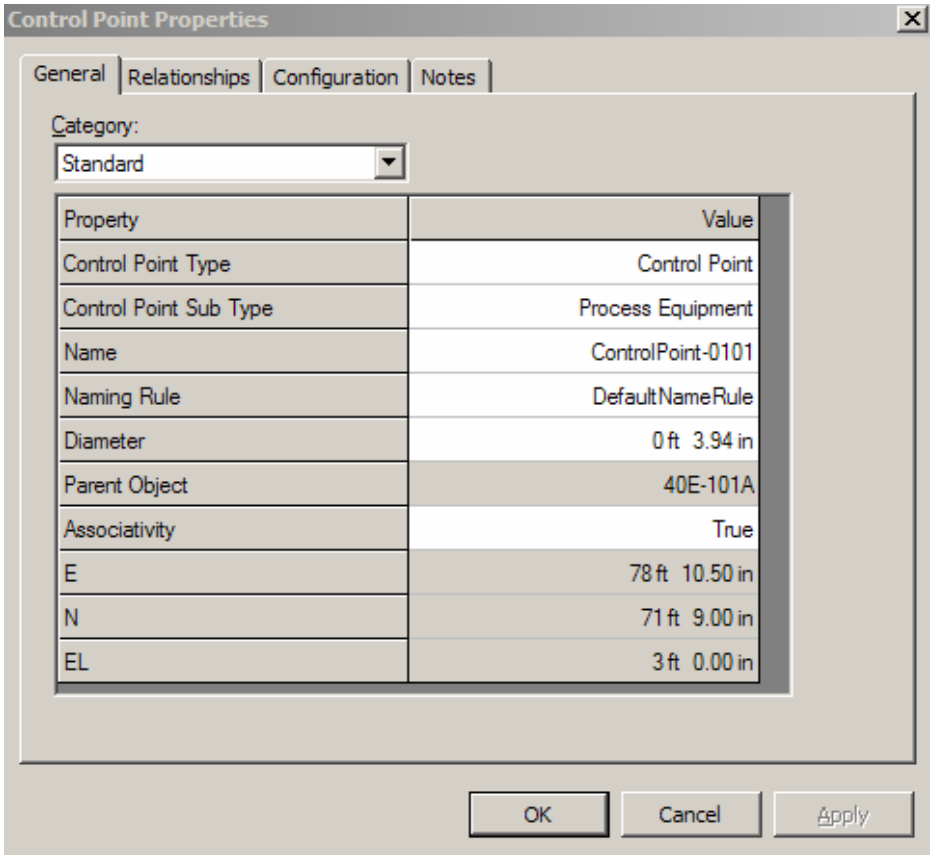
Control Point



Control Points

Properties

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



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- SmartPlant Overview
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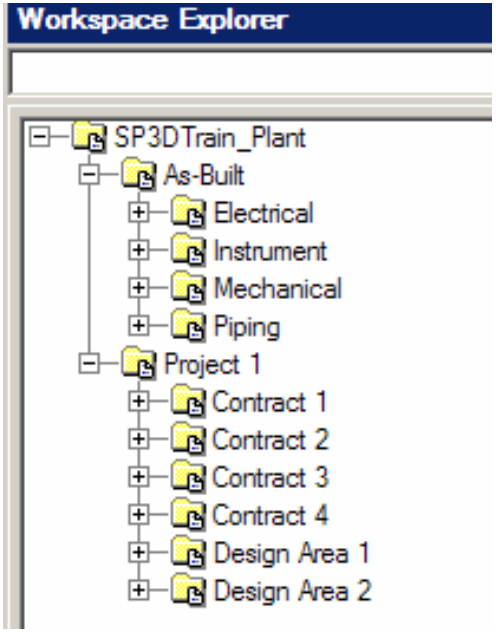
- To Do List

Work Breakdown Structure

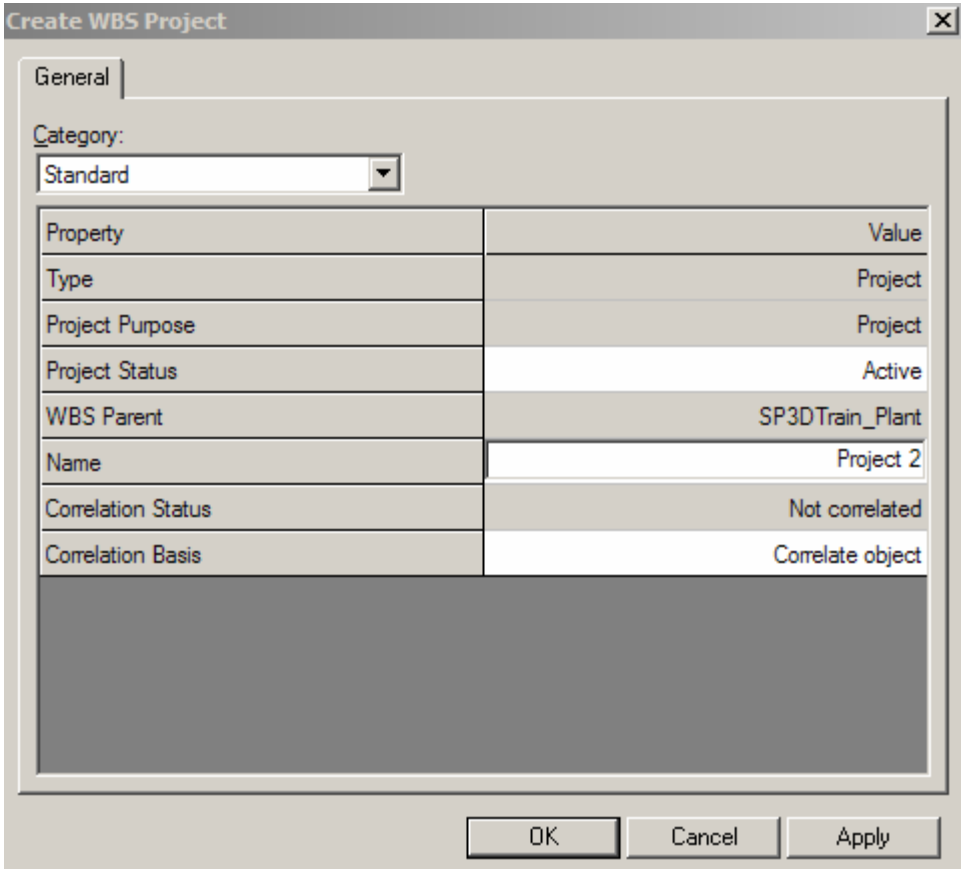
- Logical grouping for items sharing a common attribute or task, referred to as “project”. E.g. All items (piping/eqp/str) to be painted/coated by the same vendor can be grouped under a common project
- Hierarchy to handle Projects
- The Project object serves as a grouping function for both As-Built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



Work Breakdown Structure

Project Status: Enumerated

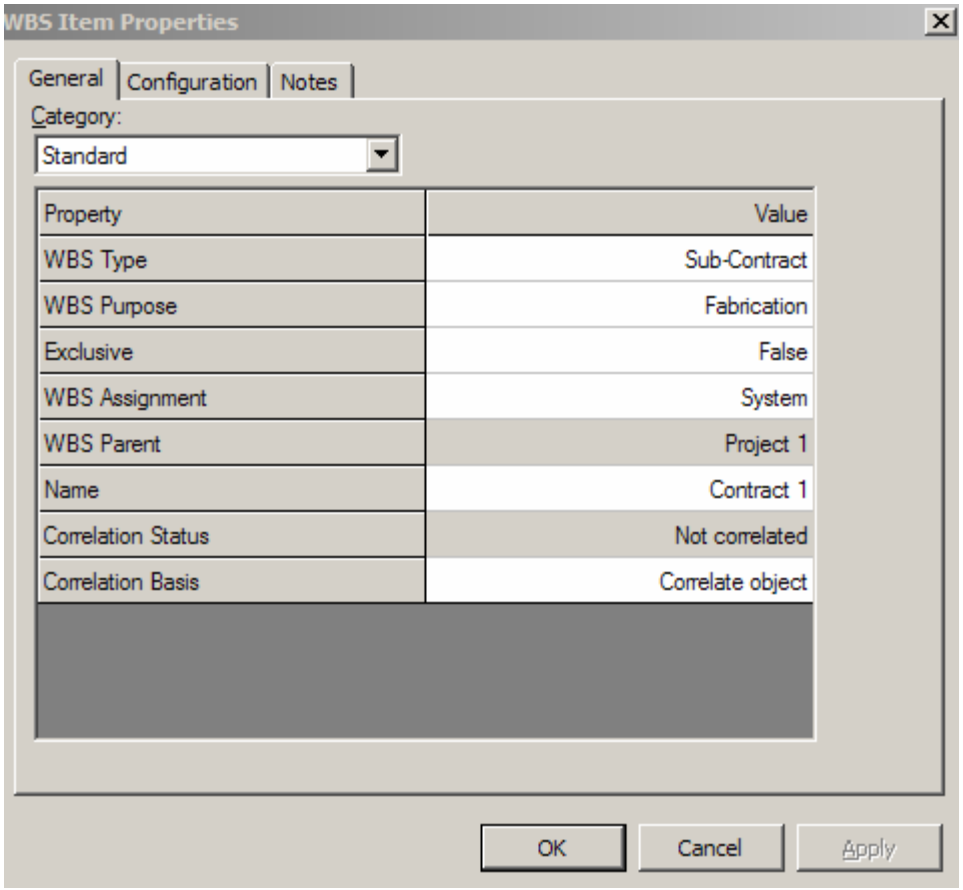
- Created
- Active
- Started Completion
- Completed
- Merged
- Finished
- Cancelled
- Terminated



Work Breakdown Structure

WBS Item (Type)

WBSItemType ShortDescription	WBSItemPurpose 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



Work Breakdown Structure

WBS edit ribbon bar

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

Agenda

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- **Interference Checking (IFC)**
- To Do List

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

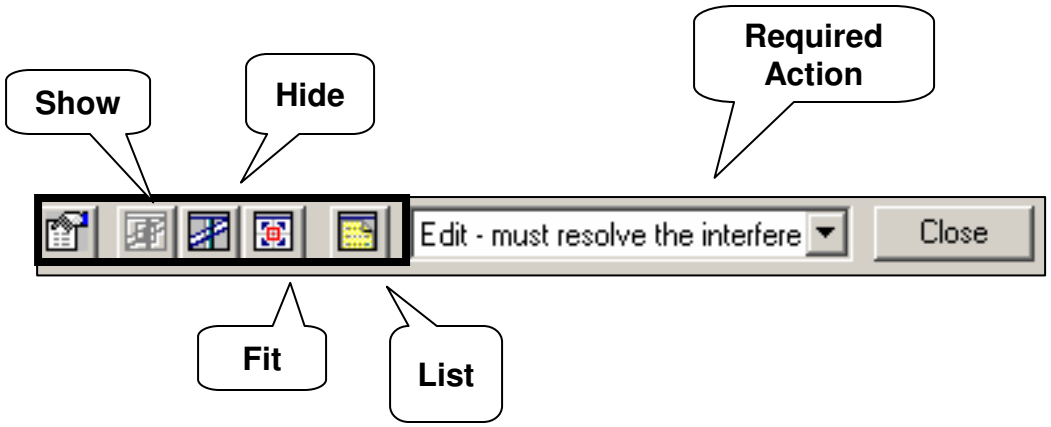
Can process:

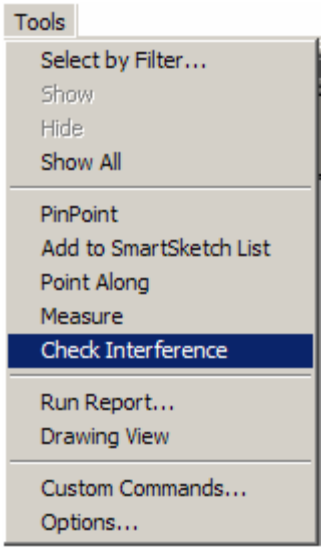
- Required – Required
- Required – Optional
- Optional – Optional

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**

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