

# SmartPlant 3D Piping Reference Data

## *Student Workbook*

---

### Process, Power & Marine



## Copyright

Copyright © 2007 Intergraph Corporation. All Rights Reserved.

Including software, file formats, and audiovisual displays; may be used pursuant to applicable software license agreement; contains confidential and proprietary information of Intergraph and/or third parties which is protected by copyright law, trade secret law, and international treaty, and may not be provided or otherwise made available without proper authorization.

## Restricted Rights Legend

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c) of the *Contractor Rights in Technical Data* clause at DFARS 252.227-7013, subparagraph (b) of the *Rights in Computer Software or Computer Software Documentation* clause at DFARS 252.227-7014, subparagraphs (b)(1) and (2) of the *License* clause at DFARS 252.227-7015, or subparagraphs (c) (1) and (2) of *Commercial Computer Software---Restricted Rights* at 48 CFR 52.227-19, as applicable.

Unpublished---rights reserved under the copyright laws of the United States.

Intergraph Corporation  
Huntsville, Alabama 35894-0001

## Warranties and Liabilities

All warranties given by Intergraph Corporation about equipment or software are set forth in your purchase contract, and nothing stated in, or implied by, this document or its contents shall be considered or deemed a modification or amendment of such warranties. Intergraph believes the information in this publication is accurate as of its publication date.

The information and the software discussed in this document are subject to change without notice and are subject to applicable technical product descriptions. Intergraph Corporation is not responsible for any error that may appear in this document.

The software discussed in this document is furnished under a license and may be used or copied only in accordance with the terms of this license.

No responsibility is assumed by Intergraph for the use or reliability of software on equipment that is not supplied by Intergraph or its affiliated companies. THE USER OF THE SOFTWARE IS EXPECTED TO MAKE THE FINAL EVALUATION AS TO THE USEFULNESS OF THE SOFTWARE IN HIS OWN ENVIRONMENT.

## Trademarks

Intergraph, the Intergraph logo, SmartSketch, FrameWorks, SmartPlant, INtools, MARIAN, and PDS are registered trademarks of Intergraph Corporation. Microsoft and Windows are registered trademarks of Microsoft Corporation. **MicroStation is a registered trademark of Bentley Systems, Inc. ISOGEN is a registered trademark of Alias Limited.** Other brands and product names are trademarks of their respective owners.

# Table of Contents

<b>Preface .....</b>	<b>5</b>
<b>Lab 1: Piping Material Class .....</b>	<b>6</b>
<b>Lab 2: Piping Specification Validation .....</b>	<b>13</b>
<b>Lab 3: Piping Commodity Part Data .....</b>	<b>18</b>
<b>Lab 4: Branch Insertion Rule .....</b>	<b>20</b>
<b>Lab 5: Bolted Components and Valve Operators .....</b>	<b>24</b>
<b>Lab 6: Connection Components .....</b>	<b>31</b>
<b>Lab 7: PipeTakedown Parts Rule .....</b>	<b>33</b>
<b>Lab 8: Permissible Taps Rule .....</b>	<b>35</b>
<b>Lab 9: Model/Catalog Synchronization .....</b>	<b>37</b>
<b>Lab 10: Reportable Piping Commodity .....</b>	<b>39</b>
<b>Lab 11: Substitution Cap Screw Commodity Code .....</b>	<b>44</b>
<b>Lab 12: Custom Engineered/Stock Instruments .....</b>	<b>49</b>
<b>Lab 13: Instrument “On the Fly” .....</b>	<b>54</b>
<b>Lab 14: Piping Commodity Procurement Data (Optional) .....</b>	<b>57</b>
<b>Lab 15: Component Insulation Exclusion Rule (Optional) .....</b>	<b>60</b>
<b>Lab 16: Create/Modify Spec in Catalog Task (Optional) .....</b>	<b>62</b>
<b>Lab 17: New Class Command (Optional) .....</b>	<b>67</b>
<b>Lab 18: Creating Custom Interfaces using User Interface (UI) - (Optional) .....</b>	<b>72</b>

<b>Lab 19: Commodity Code Builder (Optional) .....</b>	<b>80</b>
<b>Lab 20: Piping Commodity Material Control Data (UI) -(Optional) .....</b>	<b>90</b>
<b>Lab 21: Piping Commodity Filter (UI) - (Optional) .....</b>	<b>93</b>

## Preface

This document is designed as an aid for students attending the SmartPlant 3D Reference Data class presented by Intergraph Corporation, and it's a supplement to the standard product documentation.

### Objective

This document is designed to provide comprehensive information of what is in SmartPlant 3D Reference Data version 2007

### Course description

Upon completing this course, you will be able to:

- Provide an overview of the SmartPlant 3D reference data. It describes general information about the catalog schema, terms, and the delivered piping reference data.

### Course Reference Material

- SmartPlant 3D Reference Data Guide
- SmartPlant 3D Symbols Reference Data Guide
- Piping Reference Data Guide

Questions or suggestions relating to this document should be directed to:

SmartPlant 3D Training Services

## Lab 1: Piping Material Class

### Objective

After completing this lab, you will be able to:

- Create a new Piping Material Class

Note : This lab is intended as a basic introduction to spec creation. As such it is limited to straight pipe and few fittings (Example: 90 and 45 degree elbows, tees, etc). It is not intended as an example of a functional design spec.

### Creating the Piping Specification CC150-1 Bulkload Worksheet

1. Open the Ten\_Specs\_SpecificationData.xls file located in <SP3D Installation >\CatalogData\BulkLoad\DataFiles
2. Select the following worksheets while holding down the control key:
  - a. PipingMaterialsClassData
  - b. PipingCommodityFilter
  - c. BendAngles
  - d. PipeNominalDiameters
  - e. WeldClearanceRule
  - f. StandardNotesData
3. Save the worksheets to a new Excel Workbook named “CC150-1.xls” in your own working directory.

### Editing Piping Material Class Data

1. Open the PipingMaterialsClassData worksheet in the CC150-1.xls workbook.
2. Add the following data in the columns noted for the new piping specification.
  - a. SpecName : CC150-1
  - b. MaterialsOfConstructionClass : 31 (Reference AllCodeLists.xls, MaterialsOfConstructionClass)

- c. MaterialsDescription: CL150, Carbon Steel, RFFE, .75" - 24" BE
  - d. FluidService : Process
  - e. DesignStandard : 40 (Reference AllCodeLists.xls, DesignStandard - ANSI-B31.3)
  - f. AutomatedFlangeSelectionOption: 10 (Reference AllCodeLists.xls - Enable)
  - g. PipingSpecStatus : 5 (Reference AllCodelists.xls, PipingSpecStatus- Draft)
  - h. Comments: Training Specs
  - i. RevisionNumber : A
  - j. PipingNote1: 203
3. Save the workbook.

### Editing Piping Diameter Data

1. Open the PipeNominalDiameters worksheet.
2. Add records for the new specification as shown below:

Head	SpecName	Npd	NpdUnitType
Start			
a	CC150-1	0.75	in
a		1	in
a		1.5	in
a		2	in
a		4	in
a		6	in
a		8	in
a		10	in
a		12	in
a		14	in
a		16	in
a		18	in
a		20	in
a		24	in
End			

3. Save the worksheet

## Editing Bend Angle Data

1. Open the BendAngles worksheet.
2. Add records for preferred bend angles for the new specification as shown below:

Head	SpecName	Npd	NpdUnitType	BendAngle
Start				
a	CC150-1	0.75	in	90deg
a		1	in	90deg
a		1.5	in	90deg
a		2	in	90deg
a		4	in	90deg
a		6	in	90deg
a		8	in	90deg
a		10	in	90deg
a		12	in	90deg
a		14	in	90deg
a		16	in	90deg
a		18	in	90deg
a		20	in	90deg
a		24	in	90deg
a		0.75	in	45deg
a		1	in	45deg
a		1.5	in	45deg
a		2	in	45deg
a		4	in	45deg
a		6	in	45deg
a		8	in	45deg
a		10	in	45deg
a		12	in	45deg
a		14	in	45deg
a		16	in	45deg
a		18	in	45deg
a		20	in	45deg
a		24	in	45deg
End				

3. Save the worksheet.

## Editing WeldClearanceRule Data

1. Open the WeldClearanceRule worksheet.
2. Add records for the new specification as shown below:



Head Start	SpecName	NominalPipingDiameterFrom	NominalPipingDiameterTo	NominalPipingDiameterUnits	WeldClass	WeldClearanceRadiusIncrease	WeldClearanceLength
a	CC150-1	0.75	6	in	5	6in	18in
a		8	12	in	5	8in	24in
a		14	24	in	5	16in	30in
a		0.75	6	in	10	6in	18in
a		8	12	in	10	8in	24in
a		14	24	in	10	16in	30in
a		0.75	6	in	15	6in	18in
a		8	12	in	15	8in	24in
a		14	24	in	15	16in	30in
a		0.75	6	in	20	6in	18in
a		8	12	in	20	8in	24in
a		14	24	in	20	16in	30in
End							

- Save the worksheet.

## Creating Piping Material Class Records

1. Open the PipingCommodityFilter worksheet.
2. Add records for pipes, bends, size changes and tee as shown below:

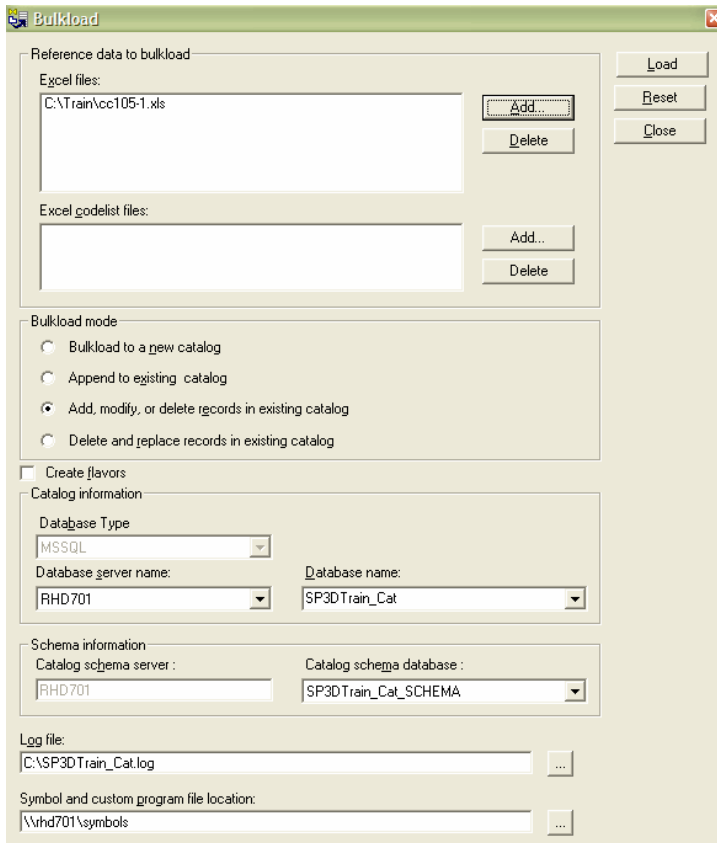
Item	Size	Schd	Commodity Code	Description
Pipe	0.75" – 1.5"	S-XS	PAAZZBPZZABAABSAZZUS	Pipe, plain ends, ASTM-A106-B, [401]
Pipe	2"-24"	S-STD	PAAZZBOZZABAABOAAZZUS	Pipe, [401], BE, ASTM-A53-B Type S
PipeBend (default)	0.75"- 1.5"	S-XS	PAAZZBPZZABAABSAZZUS	Pipe, plain ends, ASTM-A106-B, [401] Bend Radius 3 D
45 Deg Elbow (Default)	2"-24"	S-STD	MBXZZBOZZAAEADCZZUS	45 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
45 Deg Trimmable Elbow (Default)	2"-24"	S-STD	MBXZZBOZZAAEADCZZUS	45 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
90 Deg Elbow (Default)	2"-24"	S-STD	MCMZZBOZZAAEADCZZUS	90 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
90 Deg Trimmable Elbow (Default)	2"-24"	S-STD	MCMZZBOZZAAEADCZZUS	90 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	4"-24"	S-STD	MBCZZBOZZAAEADCZZUS	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	4"-24"	S-STD	MBJZZBOZZAAEADCZZUS	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Tee	2"-24"	S-STD	Tee01	Tee, [403], BE, ASTM-A234-WPB, ASME-B16.9

Head	SpecName	ShortCode	OptionCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	Comments	SelectionBasis	JacketedPipingBasis	MaximumTemperature	MinimumTemperature	EngineeringTag	CommodityCode	FabricationCategoryOverride	FirstSizeSchedule	SecondSizeSchedule	ReportableCommodityCode	QuantityOfReportableParts	AssociatedCommodityCode	BendRadiusMultiplier
Start																								
a	CC150-1	Piping	1	0.75	1.5	in						1					PAAZZBPZZABABSAZZZUS		S-XS					
a		Piping	1	2	24	in						1					PAAZZBOZZABABSOAAZZZUS		S-STD					
a		<45 Degree Direction Change	1	0.75	1.5	in						35												3
a		45 Degree Direction Change	1	0.75	1.5	in						35												3
a		45-90 Degree Direction Change	1	0.75	1.5	in						35												3
a		90 Degree Direction Change	1	0.75	1.5	in						35												3
a		<45 Degree Direction Change	1	2	24	in						70					MBXZZBOZZAAEADCZZUS		MATCH	MATCH				
a		45 Degree Direction Change	1	2	24	in						65					MBXZZBOZZAAEADCZZUS		MATCH	MATCH				
a		45-90 Degree Direction Change	1	2	24	in						70					MCMZZBOZZAAEADCZZUS		MATCH	MATCH				
a		90 Degree Direction Change	1	2	24	in						65					MCMZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	4	4	in	2	2	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	6	6	in	4	4	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	8	8	in	4	6	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	10	10	in	4	8	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	12	12	in	6	10	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	14	14	in	6	12	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	16	16	in	8	14	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	18	18	in	10	16	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	20	20	in	12	18	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Concentric Size Change	1	24	24	in	16	20	in			1					MBCZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	4	4	in	2	2	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	6	6	in	4	4	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	8	8	in	4	6	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	10	10	in	4	8	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	12	12	in	6	10	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	14	14	in	6	12	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	16	16	in	8	14	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	18	18	in	10	16	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	20	20	in	12	18	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Eccentric Size Change	1	24	24	in	16	20	in			1					MBJZZBOZZAAEADCZZUS		MATCH	MATCH				
a		Tee	1	2	24	in						1					Tee01		MATCH	MATCH				
End																								

- Save the worksheet.
- Select Start => Programs => Intergraph SmartPlant3D => Database Tools => Bulkload Reference Data.
- The Bulkload Utility form will appear.
- Select the “Add” option under “Excel Files” and select CC150-1.xls
- Load the records into the database using the “Add/Modify/Delete” mode.
- Select an existing piping catalog. Find your catalog server name and database/schema names from the pull down menus. Obtain these names from the instructor.

Note : If the file is loaded into a new catalog, then additional data files will be required and the spec will be unusable until the required files are loaded into the database – this lab assumes that a functional catalog with existing specs and rules exists.

- Enter a Log file name in your working directory.
- Point the Symbol path to the symbols share for this class.



The Bulkload dialog box is used for loading reference data into a catalog. It contains the following sections:

- Reference data to bulkload:**
  - Excel files:** A text box containing "C:\Train\oc105-1.xls" with "Add..." and "Delete" buttons.
  - Excelodelist files:** An empty text box with "Add..." and "Delete" buttons.
- Bulkload mode:** Four radio buttons:
  - Bulkload to a new catalog
  - Append to existing catalog
  - Add, modify, or delete records in existing catalog** (selected)
  - Delete and replace records in existing catalog
- Create flavors:** A checkbox that is unchecked.
- Catalog information:**
  - Database Type:** A dropdown menu showing "MSSQL".
  - Database server name:** A dropdown menu showing "RHD701".
  - Database name:** A dropdown menu showing "SP3DTrain\_Cat".
- Schema information:**
  - Catalog schema server:** A text box containing "RHD701".
  - Catalog schema database:** A dropdown menu showing "SP3DTrain\_Cat\_SCHEMA".
- Log file:** A text box containing "C:\SP3DTrain\_Cat.log" with a browse button (...).
- Symbol and custom program file location:** A text box containing "\\rhd701\symbols" with a browse button (...).

On the right side of the dialog, there are three buttons: "Load", "Reset", and "Close".

11. Review the log file once the Bulkload process is complete.

## Lab 2: Piping Specification Validation

### Objective

After completing this lab, you will be able to:

- Run the Verify Consistency between Piping Specification and Catalog tool
- Review and check for missing data in your piping specification

### Database Verification/Consistency Checks

1. Open a session or create a new workspace and enter the Catalog task.
2. Select **Tools -> Verify Consistency**
3. The system displays the Verify Consistency between Piping Specification and Catalog form.
4. Select the “Piping materials classes” check box.
5. Select spec CC150-1 in the “Available piping material classes” picklist and select the “Add” option to move the spec into the Selected piping material classes” side of the form.
6. Enable the Verify symbol placement option. Define an output location for the logfile. (Note: the filename is automatically generated by the system).

The screenshot shows a dialog box titled "Verify Consistency between Piping Specification and Catalog". It contains several sections:

- Select the types of objects to verify:** A group box with four checkboxes: "Bolt lengths" (unchecked), "Instruments" (unchecked), "Piping specialties" (unchecked), and "Piping materials classes" (checked).
- Available piping materials classes:** A list box containing the following items: 1C0031-, 1C0100-, 1C0101-, 1S3977-, 1S3984-, 2C0032-, 2L1670-, 2S3985-, 4C0033-, 5C0390-, 6C0391-, AC0014-, and NO-. Below the list are "Add >>" and "<< Remove" buttons.
- Selected piping materials classes:** A list box containing the item "CC150-1-A".
- Additional validation options:** A group box with three checkboxes: "Verify the existence of weight data" (unchecked), "Verify long or localized material descriptions" (unchecked), and "Verify symbol placement" (checked).
- Location of the output report file:** A text field containing "C:\train" and a file explorer icon to its right.
- Buttons:** "OK" and "Cancel" buttons at the bottom right.

7. Accept the form for processing by selecting the “OK” button.
8. You can rename the generated report ((Reportoutput.xls ) filename to CC150report.xls
9. Review the system generated spreadsheet once processing is complete. Go to the index sheet and select the following links:
  - Rules data undefined
  - Piping commodity undefined in piping commodity material control data
  - Piping commodity undefined in piping commodity part data
  - Summary of catalog parts


Go to Rules data undefined report. Review the missing specification rules.




**! A report of the rules for which data is undefined**

Description Of The Error	Piping Materials Class	Revision Number	Rule Name
Rule data is missing	CC150-1	A	Field Fit Length rule
Rule data is missing	CC150-1	A	Corrosion Allowance rule
Rule data is missing	CC150-1	A	Service Limits rule
Rule data is missing	CC150-1	A	Branch Intersection rule
Rule data is missing	CC150-1	A	Permissible Taps rule
Rule data is missing	CC150-1	A	Minimum Pipe Length rule
Rule data is missing	CC150-1	A	Minimum Pipe Length rule for purchase length
WARNING : Optional rule data is missing	CC150-1	A	Default Change-of-Direction rule
WARNING : Optional rule data is missing	CC150-1	A	Joint Quality Factor rule
WARNING : Optional rule data is missing	CC150-1	A	Thickness Data rule
WARNING : Optional rule data is missing	CC150-1	A	Pipe Bending Elongation rule
WARNING : Optional rule data is missing	CC150-1	A	Size Reduction rule
WARNING : Optional rule data is missing	CC150-1	A	Inside Surface Treatment rule
WARNING : Optional rule data is missing	CC150-1	A	Field Lining Thickness rule
WARNING : Optional rule data is missing	CC150-1	A	Flared Pipe rule
WARNING : Optional rule data is missing	CC150-1	A	Port Alignment rule
WARNING : Optional rule data is missing	CC150-1	A	Weld Gap rule
WARNING : Optional rule data is missing	CC150-1	A	Jacket Closure rule
WARNING : Optional rule data is missing	CC150-1	A	Swaged Jacket Pipe rule


Go to Piping commodity undefined in piping commodity material control data report. Note that tee commodity code is missing from the Piping Commodity Material Control Data sheet. This problem will be corrected in later labs.

 <p>! Piping commodity is determined to be undefined in the piping commodity material control data</p>								
Description Of The Error	Piping Materials Class	Revision Number	Contractor Commodity Code	Primary Npd	Primary Npd Units	Secondary Npd	Secondary Npd Units	Multi-size Option
Piping commodity undefined in piping commodity material control data	CC150-1	A	Tee01	0		0		

Go to Piping commodity undefined in piping commodity part data report. Note that parts are missing from the part catalog. This problem will be corrected in later labs.

 <p>nined to be undefined in the piping commodity part data</p>											
Description Of The Error	Piping Materials Class	Revision Number	Industry Commodity Code	Short Material Description	Primary Size	Primary Size Units	Secondary Size	Secondary Size Units	Multi-size option	First Size Schedule	Second Size Schedule
Part undefined in part data	CC150-1	A	Tee01		2	in	2	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		4	in	4	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		6	in	6	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		8	in	8	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		10	in	10	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		12	in	12	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		14	in	14	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		16	in	16	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		18	in	18	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		20	in	20	in		S-STD	
Part undefined in part data	CC150-1	A	Tee01		24	in	24	in		S-STD	

Go to Summary catalog parts report. This report displays a summary of the catalog parts required by your piping spec CC150-1

 <p>! Summary of the catalog parts required by each piping materials class</p>		
Piping Materials Class	Industry Commodity Code	Short Material Description
CC150-1	MBCZZBOZZAAEADCZZUS	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
CC150-1	MBJZZBOZZAAEADCZZUS	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
CC150-1	MBXZZBOZZAAEADCZZUS	45 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
CC150-1	MCMZZBOZZAAEADCZZUS	90 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
CC150-1	PAAZZBOZZABAABOAAZZUS	Pipe, [401], BE, ASTM-A53-B Type S
CC150-1	PAAZZBPZZABAABSAAZZUS	Pipe, [401], PE, ASTM-A106-B

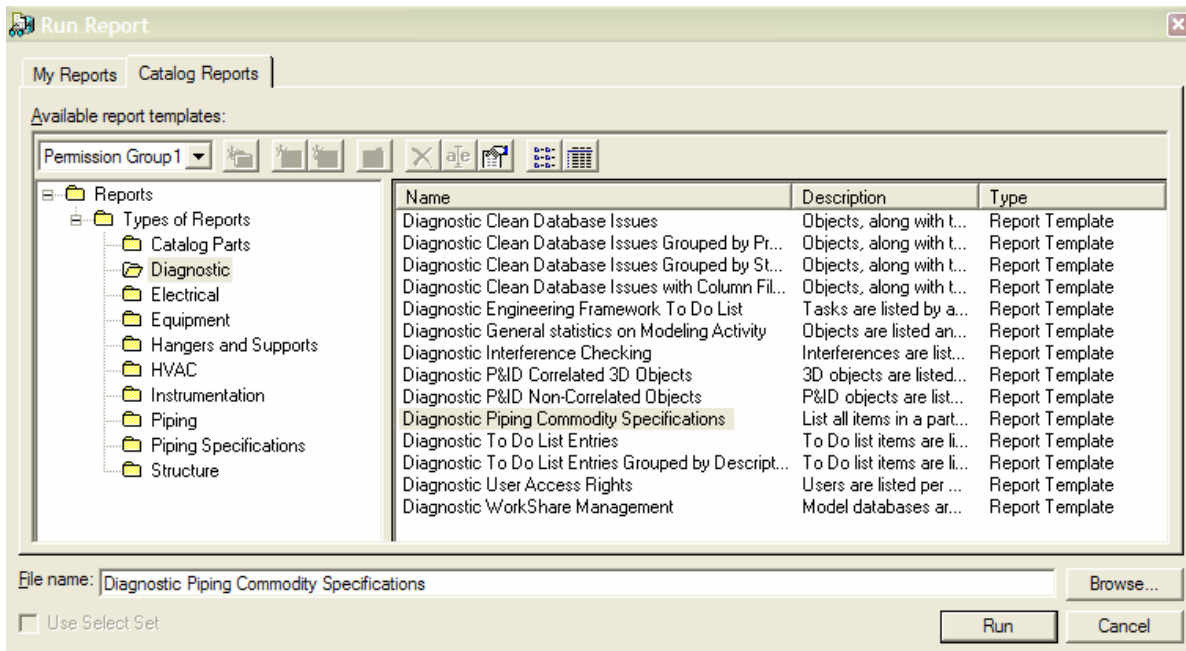
10. Go back to the Catalog Task and select Tools -> Run Reports

11. Select Catalog Reports Tab

12. Expand the report hierarchy and select Diagnostic folder.

13. Select Diagnostic Piping Commodity Specifications report

## Lab 2: Piping Specification Validation



14. Select Run button and key in the spec name CC150-1

15. Hit Finish button to generate the report.

Specification Name:	CC150-1	Date:	1/14/2007 3:38:20 PM
Fluid Service:	Process		
User:	INGRNET\hmm		

Piping Specification Report											
Short Code	Option Code	Multi Size	First Size		Second Size		Engineering Tag	Commodity Code	Selection Basis		Description
			From	To	From	To			Index	Short String	
<45 Degree Direction Change	Default		0.75	1.5 in	Undefined				35	Pipe bend	Note: Embedded labels based on model objects cannot be resolved
<45 Degree Direction Change	Default		2	24 in	MATCH			MBXZZBOZZAAEADCCZUS	70	Elbow, trimmed	45 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
45 Degree Direction Change	Default		0.75	1.5 in	Undefined				35	Pipe bend	
45 Degree Direction Change	Default		2	24 in	MATCH			MBXZZBOZZAAEADCCZUS	65	Elbow, fixed angle	45 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
45-90 Degree Direction Change	Default		0.75	1.5 in	Undefined				35	Pipe bend	
45-90 Degree Direction Change	Default		2	24 in	MATCH			MCMZZBOZZAAEADCCZUS	70	Elbow, trimmed	90 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
90 Degree Direction Change	Default		0.75	1.5 in	Undefined				35	Pipe bend	
90 Degree Direction Change	Default		2	24 in	MATCH			MCMZZBOZZAAEADCCZUS	65	Elbow, fixed angle	90 deg LR elbow, [403], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		4	4 in	MATCH	2	2 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		6	6 in	MATCH	4	4 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		8	8 in	MATCH	4	6 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		10	10 in	MATCH	4	8 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		12	12 in	MATCH	6	10 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		14	14 in	MATCH	6	12 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		16	16 in	MATCH	8	14 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		18	18 in	MATCH	10	16 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		20	20 in	MATCH	12	18 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Concentric Size Change	Default		24	24 in	MATCH	16	20 in	MBCZZBOZZAAEADCCZUS	1	Default	Concentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		4	4 in	MATCH	2	2 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		6	6 in	MATCH	4	4 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		8	8 in	MATCH	4	6 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		10	10 in	MATCH	4	8 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		12	12 in	MATCH	6	10 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		14	14 in	MATCH	6	12 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		16	16 in	MATCH	8	14 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		18	18 in	MATCH	10	16 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		20	20 in	MATCH	12	18 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Eccentric Size Change	Default		24	24 in	MATCH	16	20 in	MBUZZBOZZAAEADCCZUS	1	Default	Eccentric reducer, [414], BE, ASTM-A234-WPB, ASME-B16.9
Piping	Default		0.75	1.5 in	S-S		Undefined	PAAZBPZABABAAZUS	1	Default	Pipe, [401], PE, ASTM-A106-B
Piping	Default		2	24 in	S-STD		Undefined	PAAZBPZABABAAZUS	1	Default	Pipe, [401], BE, ASTM-A33-B Type S
Tee	Default		2	24 in	MATCH		MATCH	Tee01	1	Default	Tee, [403], BE, ASTM-A234-WPB, ASME-B16.9

## Modeling Verification

1. Enter the Systems and Specifications task.
2. Add the newly added spec to the plant hierarchy at any level you desire.
3. Enter the piping task.
4. Verify placement of spec components.



Note: Use the insert component command to **place the Tee** component on a straight pipe. System displays an error message. Note the error message indicating that the material control data of the component is not defined in the catalog.



5. Exit the model.

## Lab 3: Piping Commodity Part Data

### Objective

After completing this lab, you will be able to:

- Define piping components associated with a particular piping material class.

Reminder : The Piping Commodity Filter rule is intended to provide the data that is required to select unique piping commodity codes from the part catalog.

### Editing Piping Commodity (Part) Data

- Open the Ten\_Specs\_CatalogData.xls file located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles and **save the following worksheets to a new workbook:**

CustomInterfaces

GUIs

Tee

- Open the Tee worksheet.
- Add records for the new commodity code Tee01 as shown below:

Head Start	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	GraphicalRepresentationOrNot	SymbolDefinition	MaterialGrade	LiningMaterial	GeometricIndustryStandard	PipingPointBasis[1]	Id[1]	PressureRating[1]	EndPreparation[1]	EndStandard[1]	ScheduleThickness[1]	FlowDirection[1]	PipingPointBasis[2]	Id[2]	PressureRating[2]	EndPreparation[2]	EndStandard[2]	ScheduleThickness[2]	FlowDirection[2]	PipingPointBasis[3]	Id[3]	PressureRating[3]	EndPreparation[3]	EndStandard[3]	ScheduleThickness[3]	FlowDirection[3]	PipingNote1	DryWeight	Npd[1]Primary	NpdUnitType[1]	Npd[2]Primary	NpdUnitType[2]	Npd[3]Secondary	NpdUnitType[3]	FacetoCenter
a	Tee01	S-STD	S-STD	T	75		SP3DTee.CEqualTee	264		39	15		301	5	S-STD	3	15		301	5	S-STD	3	15		301	5	S-STD	3			3lbm	2 in	2 in	2 in	2.5in					
a																															13lbm	4 in	4 in	4 in	4.125in					
a																															29lbm	6 in	6 in	6 in	5.625in					
a																															54lbm	8 in	8 in	8 in	7in					
a																															88lbm	10 in	10 in	10 in	8.5in					
a																															128lbm	12 in	12 in	12 in	10in					
a																															176lbm	14 in	14 in	14 in	11in					
a																															200lbm	16 in	16 in	16 in	12in					
a																															318lbm	18 in	18 in	18 in	13.5in					
a																															369lbm	20 in	20 in	20 in	15in					
a																															560lbm	24 in	24 in	24 in	17in					

- Save the workbook as **Company\_Catalog.xls**.
- Open CC150-1.xls.
- Open the Ten\_Specs\_SpecificationData.xls file located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles
- Open the PipingCommodityMatlControlData worksheet
- Save the sheet into the CC150-1.xls
- Add the record for the new commodity code Tee01 as shown below:

Head Start	ContractorCommodityCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	IndustryCommodityCode	ClientCommodityCode	CIMISCommodityCode	ShortMaterialDescription	LocalizedShortMaterialDesc	LongMaterialDescription	Vendor	Manufacturer	FabricationType	SupplyResponsibility	ReportingType	QuantityOfReportableParts	GasketRequirements	BoltingRequirements	WeldingRequirement	LooseMaterialRequirements
a Tee01												Tee, [403], BE, ASTM-A234-WPB, ASME-B16.9					15	2	5		20	35	5	

10. Load the Company\_Catalog.xls into the Catalog using the Add/Modify and Delete Mode.
11. Review the log file once the Bulkload process is complete.
12. Load the CC150-1.xls into the Catalog using the Add/Modify and Delete Mode.
13. Review the log file once the Bulkload process is complete.
14. Run the Verify Consistency between Piping Specification and Catalog command again.
15. Review the output report. Note that there is no entries in the *Piping commodity undefined in piping commodity material control data* and in the *Piping commodity undefined in piping commodity part data* reports.
16. Go to the Piping Task and place the Tee using the Insert component command.

## Lab 4: Branch Insertion Rule

### Objective

- After completing this lab, you will be able to create the branch insertion rule for the specified spec.
- Open the Ten\_Specs\_SpecificationData.xls file located in <SP3D Installation >\CatalogData\BulkLoad\DataFiles
  - Select PipeBranch worksheet. Move and copy this sheet into the CC150-1.xls in your working directory.
  - Add records to create the branch insertion rule for spec CC150-1 as shown below:

Header


	0.75	1	1.5	2	4	6	8	10	12	14	16	18	20	24
0.75	RW	RW	RW	S	S	S	S	S	S	S	S	S	S	S
1		RW	RW	S	S	S	S	S	S	S	S	S	S	S
1.5			RW	S	S	S	S	S	S	S	S	S	S	S
2				T	W	W	W	W	W	W	W	W	W	W
4					T	W	W	W	W	W	W	W	W	W
6						T	W	W	W	W	W	W	W	W
8							T	W	W	W	W	W	W	W
10								T	W	W	W	W	W	W
12									T	W	W	W	W	W
14										T	W	W	W	W
16											T	W	W	W
18												T	W	W
20													T	W
24														T

Head Start	SpecName	HeaderSize	BranchSize	AngleLow	AngleHigh	HdrSizeNPDUnitType	BrSizeNPDUnitType	ShortCode	SecondaryShortCode	TertiaryShortCode
	CC150-1	0.75	0.75	89.5deg	90.5deg	in	in	Reinforcing Weld		
	CC150-1	1	0.75	89.5deg	90.5deg	in	in	Reinforcing Weld		
	CC150-1	1	1	89.5deg	90.5deg	in	in	Reinforcing Weld		
	CC150-1	1.5	0.75	89.5deg	90.5deg	in	in	Reinforcing Weld		
	CC150-1	1.5	1	89.5deg	90.5deg	in	in	Reinforcing Weld		
	CC150-1	1.5	1.5	89.5deg	90.5deg	in	in	Reinforcing Weld		
	CC150-1	2	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	4	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	6	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	8	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	10	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	12	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	14	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	16	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	18	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	20	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	24	1.5	89.5deg	90.5deg	in	in	Sockolet		
	CC150-1	2	2	89.5deg	90.5deg	in	in	Tee		
	CC150-1	4	4	89.5deg	90.5deg	in	in	Tee		
	CC150-1	6	6	89.5deg	90.5deg	in	in	Tee		
	CC150-1	8	8	89.5deg	90.5deg	in	in	Tee		
	CC150-1	10	10	89.5deg	90.5deg	in	in	Tee		
	CC150-1	12	12	89.5deg	90.5deg	in	in	Tee		
	CC150-1	14	14	89.5deg	90.5deg	in	in	Tee		
	CC150-1	16	16	89.5deg	90.5deg	in	in	Tee		
	CC150-1	18	18	89.5deg	90.5deg	in	in	Tee		
	CC150-1	20	20	89.5deg	90.5deg	in	in	Tee		
	CC150-1	24	24	89.5deg	90.5deg	in	in	Tee		
	CC150-1	4	2	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	6	4	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	8	6	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	10	8	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	12	10	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	14	12	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	16	14	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	18	16	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	20	18	89.5deg	90.5deg	in	in	Weldolet		
	CC150-1	24	20	89.5deg	90.5deg	in	in	Weldolet		

- Run the Verify Consistency between Piping Specification and Catalog command.
- Review the output report. Go to *Branch fitting undefined in piping commodity filter* report.

Note that all the branch fitting specified by the branch table is determined to be undefined in the piping commodity filter. Let add the missing components in the piping commodity filter.

## Lab 4: Branch Insertion Rule

 ! Branch fitting specified by the branch intersection rule is determined to be undefined in the piping commodity filter							
Description Of The Error	Piping Materials Class	Revision Number	Short Code	HeaderSize	Header Size NPD Unit Type	BranchSize	Branch Size NPD Unit Type
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Reinforcing Weld	0.75	in	0.75	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Reinforcing Weld	1	in	0.75	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Reinforcing Weld	1	in	1	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Reinforcing Weld	1.5	in	0.75	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Reinforcing Weld	1.5	in	1	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Reinforcing Weld	1.5	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	2	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	4	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	4	in	2	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	6	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	6	in	4	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	8	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	8	in	6	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	10	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	10	in	8	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	12	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	12	in	10	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	14	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	14	in	12	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	16	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	16	in	14	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	18	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	18	in	16	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	20	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	20	in	18	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Socketolet	24	in	1.5	in
Branch fitting in pipebranch undefined in piping commodity filter	CC150-1		Weldolet	24	in	20	in

- Go to the PipingCommodityFilter worksheet.
- Add the record for the new commodities as shown below:

Item	Size	Commodity Code	Description
Socketolet	0.75" – 1.5"	MELAWDFZZAEYABQZZUM	Socketolet, SWE, 3000#, ASTM-A105
Weldolet	2"-20"	MEKZZBOZZAEYABQZZUM	Weldolet, [412], BE, CS, ASTM-A105 MSS SP-97
Reinforcing Weld	0.75"-1.5"		Reinforcing Weld CS, ASTM A53-B

SpecName	ShortCode	OptionCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	Comments	SelectionBasis	JacketedPipingBasis	MaximumTemperature	MinimumTemperature	EngineeringTag	CommodityCode	FabricationCategoryOverride	SupplyResponsibilityOverride	FirstSizeSchedule	SecondSizeSchedule	ReportableCommodityCode
Reinforcing Weld		1	0.75	1.5	in						25										
Reinforcing Weld		1	1	1.5	in	0.75	1	in			25										
Sockolet		1	2	24	in	0.75	1.5	in			1					MELAWDFZZAEYABQZZUM					
Weldolet		1	4	24	in	2	20	in			1					MEKZZBOZZAEYABQZZUM			MATCH	MATCH	

8. Save the CC150-1.xls
9. Load the information into the Catalog using the Add/Modify and Delete Mode.
10. Review the log file once the Bulkload process is complete.
11. Run the Verify Consistency between Piping Specification and Catalog command.
12. Review the output report. Go to the index sheet and select the following links:

- Branch fitting undefined in piping commodity filter

Note that there is no entries in the *Branch fitting undefined in piping commodity filter* report.

- Piping commodity undefined in piping commodity material control data

- Piping commodity undefined in piping commodity part data

Note that there is no entries in the piping commodity material control data report. Ignores the missing full size weldolets in the piping commodity part data report.

- Plain pipe end generic data undefined

Note that there are missing plain piping generic data for the sockolet component. The system is checking the generic data in all size combinations for a part (example: sockolet) that is referenced by the piping specification and not limiting the check to the sizes that are applicable to the component.

SmartPlant®										
! Plain piping generic data undefined										
Description of the error	Piping Materials Class	Revision Number	Contractor Commodity Code	Industry Commodity Code	Short Material Description	Nominal Piping Diameter	Nominal Diameter Units	Schedule (Thickness)	End Standard	Pressure Rating
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		2	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		4	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		6	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		8	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		10	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		12	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		14	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		16	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		18	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		20	in	Undefined	Default	1
Plain pipe end generic data undefined	CC150-1	A	MELAWDFZZAEYABQZZUM	MELAWDFZZAEYABQZZUM		24	in	Undefined	Default	1

13. Go to the Piping Task and test the branch insertion rule using Route Pipe command to route a 4" header line and a 2" branch line.



## Lab 5: Bolted Components and Valve Operators

### Objective

- After completing this lab, you will be able to add, delete or modify existing piping specifications.
- Use the automated flange selection logic to distinguish between flanges to be inserted on plain piping versus fitting-to-fitting situations.

Add records for flanges and valves in spec CC150-1 as shown below:

Item	Size	Commodity Code	Description
Flange at Fitting	2"-24"	FWN001	Flange, CL150, RFFE/BE, A105, ASME-B16.5, WN
Flange	2"-24"	FSO001	Flange CL150, RFFE, A105, ASME-B16.5, SO
Gate Valve	2"-12"	GAT001	Gate Valve, CL150, RFFE, BB, OS&Y, ASTM-A216-WCB, trim 8, Crane 47

### Adding Flanges

- Open the Ten\_Specs\_CatalogData.xls file located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles and save the WeldNeckFlange worksheet to your Company\_Catalog.xls
- Open the WeldNeckFlange worksheet and edit as follows:

Head Start																																	
	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	SymbolDefinition	MaterialGrade	LiningMaterial	BendRadius	BendRadiusMultiplier	MirrorBehaviorOption	GeometricIndustryStandard	PartDataBasis	PipingPointBasis[1]	Id[1]	PressureRating[1]	EndPreparation[1]	EndStandard[1]	ScheduleThickness[1]	FlowDirection[1]	PipingPointBasis[2]	Id[2]	PressureRating[2]	EndPreparation[2]	EndStandard[2]	ScheduleThickness[2]	FlowDirection[2]	PipingNote1	DryWeight	Npd[1]	NpdUnitType[1]	Npd[2]	NpdUnitType[2]
A	FWN001		S-STD	FWN	15	SP3DWNFlange.CWNFlange	150					35	15	150	21	5		3	15				301	5	S-STD	3			6lbm	2 in	2 in	2.5in	
A																													15lbm	4 in	4 in	3in	
A																													24lbm	6 in	6 in	3.5in	
A																													39lbm	8 in	8 in	4in	
A																													52lbm	10 in	10 in	4in	
A																													80lbm	12 in	12 in	4.5in	
A																													102lbm	14 in	14 in	5in	
A																													127lbm	16 in	16 in	5in	
A																													140lbm	18 in	18 in	5.5in	
A																													170lbm	20 in	20 in	5.6875in	
A																													260lbm	24 in	24 in	6in	

- Make a copy of the WeldNeckFlange worksheet and rename it as SlipOnFlange.
- Edit the SlipOnFlange sheet as follows:

Definition	PartClassType	SymbolDefinition	UserClassName	OccClassName	SymbolIcon	OA:InsulationThickness
a	PipeComponentClass		Slip on Flange	Slip on Flange	SymbolIcons\SP3DSlipOnFlange.gif	



- Note : Add the appropriate values in the Fabrication Type, Supply Responsibility, Reporting Type, Gasket Requirement, Bolting Requirement, and Welding Requirement columns. (Hint : Check the AllCodeLists.xls spreadsheet for similar codelist items.)

## Adding Gate Valves

1. Open the Ten\_Specs\_CatalogData.xls file located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles and save the GateValve worksheet to your Company\_Catalog.xls
2. Go to the Gate Valve worksheet and edit as follows:

Head	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	GraphicalRepresentationOrNot	SymbolDefinition	SymbolIcon	MaterialGrade	LiningMaterial	GeometricIndustryStandard	PartDataBasis	ValveManufacturer	ValveModelNumber	ValveTrim
Start															
a	GAT001			GAT	15		SP3DGateValve.CGateValve		252		40			440	35
a															
a															
a															
a															
a															

PipingPointBasis[1]																			
Id[1]																			
PressureRating[1]																			
EndPreparation[1]																			
EndStandard[1]																			
ScheduleThickness[1]																			
FlowDirection[1]																			
PipingPointBasis[2]																			
Id[2]																			
PressureRating[2]																			
EndPreparation[2]																			
EndStandard[2]																			
ScheduleThickness[2]																			
FlowDirection[2]																			
PipingNote1																			
DryWeight																			
Npd[1]																			
NpdUnitType[1]																			
Npd[2]																			
NpdUnitType[2]																			
FacetoFace																			
15		150	21	5		3	15		150	21	5		3		46lbm	2 in	2 in	7in	
															110lbm	4 in	4 in	9in	
															175lbm	6 in	6 in	10.5in	
															310lbm	8 in	8 in	11.5in	
															455lbm	10 in	10 in	13in	
															650lbm	12 in	12 in	14in	

3. Save the workbook.

4. Open the CC150-1.xls workbook.
5. Open the PipingCommodityMatlControlData worksheet
  - The ContractorCommodityCode is GAT001.
  - The ShortMaterialDescription is Gate valve, *CL150, RFFE, BB, OS&Y, ASTM-A216-WCB, trim 8, Crane 47*
6. Note : Add the appropriate values in the Fabrication Type, Supply Responsibility, Reporting Type, Gasket Requirement, Bolting Requirement, and Welding Requirement columns of the part. (Hint : Check the AllCodeLists.xls spreadsheet for similar codelist items.)
7. Add the valve operator data for the Gate Valve.

Head Start												ShortMaterialDescription	LocalizedShortMaterialDesc	LongMaterialDescription	Vendor	Manufacturer	FabricationType	SupplyResponsibility	ReportingType	QuantityOfReportableParts	GasketRequirements	BoltingRequirements	WeldingRequirement	LooseMaterialRequirements	SubstCapScrewsQuantity	ValveOperatorType	ValveOperatorGeoIndStd		ValveOperatorCatalogPartNumber
	ContractorCommodityCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	IndustryCommodityCode	ClientCommodityCode	CIMISCommodityCode																		
	Tee01											Tee, [403], BE, ASTM-A234-WPB, ASME-B16.9					15	2	5		20	35	5						
	FWN001											Flange, CL150, RFFE/BE, A105, ASME-B16.5, WN					15	2	5		5	5	5						
	FSO001											Flange, CL150, RFFE/BE, A105, ASME-B16.5, SO					15	2	5		5	5	5						
A	GAT001											Gate valve, CL150, RFFE, BB, OS&Y, ASTM-A216-WCB, trim 8, Crane 47					7	10	5		5	5	50		3	1190	GAT001-BLT-150-3		
End																													


8. Save the workbook.

## Creating Piping Material Class Records.

1. Go to the PipingCommodityFilter worksheet.
2. Add records for the flanges and gate valve.


Head	SpecName	ShortCode	OptionCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	Comments	SelectionBasis	JacketedPipingBasis	MaximumTemperature	MinimumTemperature	EngineeringTag	CommodityCode	FabricationCategoryOverride	SupplyResponsibilityOverride	FirstSizeSchedule	SecondSizeSchedule
a	Flange		1	2	24	in						5					FSO001				
a	Flange at Fitting		1	2	24	in						5					FWN001				MATCH
a	Gate Valve		1	2	12	in						1					GAT001				

3. Save the file and exit.
4. Load the modified workbooks into the database using the Bulkload Utility.
5. Review the log file once the Bulkload process is complete. Run the Verify Consistency between Piping Specification and Catalog command.
6. Review the output report. Go to the index sheet and select the following links:
  - Piping commodity undefined in piping commodity material control data
  - Piping commodity undefined in piping commodity part data
  - Summary of existing symbols
  - Summary of catalog parts
  - Valve operator undefined in valve operator part data

 <b>! Valve operator is determined to be undefined in the valve operator part data</b>				
Description Of The Error	Piping Materials Class	Revision Number	Valve Operator Number	Contractor Commodity Code
Valve operator undefined in valve operator part data	CC150-1	A	GAT001-BLT-150-3	GAT001


Note: the system reports that the valve operator is not defined in the part catalog.

- Valve operator undefined in piping commodity material control data

 <b>! Valve operator is determined to be undefined in the valve operator material control data</b>				
Description Of The Error	Piping Materials Class	Revision Number	Valve Operator Number	Contractor Commodity Code
Valve operator undefined in valve operator material control data	CC150-1	A	GAT001-BLT-150-3	GAT001

Note: the system reports that valve operator is not defined in the valve operator material control data

- PMCSymbolPlacement.xls

												
Description Of The Error	Piping Materials Class	Revision Number	Industry Commodity Code	Short Code	Primary Size	Primary Size Units	Secondary Size	Secondary Size Units	Multi-size option	First Size Schedule	Second Size Schedule	Option Code
Placement of Symbol Failed. Please refer the log file C:\Train\SymbolPlacementError Log.log	CC150-1	A	GAT001	Gate Valve	2 in							1
Placement of Symbol Failed. Please refer the log file C:\Train\SymbolPlacementError Log.log	CC150-1	A	GAT001	Gate Valve	4 in							1
Placement of Symbol Failed. Please refer the log file C:\Train\SymbolPlacementError Log.log	CC150-1	A	GAT001	Gate Valve	6 in							1
Placement of Symbol Failed. Please refer the log file C:\Train\SymbolPlacementError Log.log	CC150-1	A	GAT001	Gate Valve	8 in							1
Placement of Symbol Failed. Please refer the log file C:\Train\SymbolPlacementError Log.log	CC150-1	A	GAT001	Gate Valve	10 in							1
Placement of Symbol Failed. Please refer the log file C:\Train\SymbolPlacementError Log.log	CC150-1	A	GAT001	Gate Valve	12 in							1

Note: The system reports that the system fails to construct the gate valve GAT001 symbol for all sizes.

### Adding valve operator data

- Open the Ten\_Specs\_CatalogData.xls file located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles and save the Operator3 worksheet to your Company\_Catalog.xls.
- Go to the Operator3 worksheet.
- Add the valve operator data GAT001-BLT-150-3 as shown below:

Definition	PartClassType	SymbolDefinition	SymbolIcon									
	ValveOperatorClass		SymbolIcons\SP3DOP3.gif									
CommodityPart												
	ValveOperatorNumber	ValveSize	ValveSizeUnits	SymbolDefinition	MirrorBehaviorOption	ValveOperatorIsRotatable	DryWeight	DryCogX	DryCogY	DryCogZ	OperatorHeight	OperatorDiameter
Head												
Start												
a	GAT001-BLT-150-3		2 in			5					17.813in	10in
a			4 in								28.188in	13.75in
a			6 in								35.375in	15.5in
a			8 in								45in	19.5in
a			10 in								52.5in	19.5in
a			12 in								61.125in	20in

- Save the workbook.
- Open CC150-1.xls.

12. Open the Ten\_Specs\_SpecificationData.xls file located in <SP3D Installation >\CatalogData\BulkLoad\DataFiles

13. Open the ValveOperatorMatlControlData worksheet

14. Add the valve operator data GAT001-BLT-150-3 as shown below:

	OperatorPartNumber	ShortMatIDDescription	LocalizedShortMaterialDescription	LongMaterialIDDescription	Vendor	Manufacturer	ValveOperatorType	ReportableCommodityCode	QuantityOfReportableParts
Head									
Start									
a	GAT001-BLT-150-3	Handwheel					9		
End									

15. Save the sheet into the CC150-1.xls

16. Save the file and exit.

17. Load the modified workbooks into the database using the Bulkload Utility.

18. Review the log file once the Bulkload process is complete. Run the Verify Consistency between Piping Specification and Catalog command.

Review the output report. Go to the index sheet and select the following links:

- Piping commodity undefined in piping commodity material control data
- Piping commodity undefined in piping commodity part data
- Summary of existing symbols
- Summary of catalog parts
- Valve operator undefined in valve operator part data
- Valve operator undefined in piping commodity material control data
- PMCSymbolPlacement.xls

## Lab 6: Connection Components

### Objective

- After completing this lab, you will be able to define bolt and gasket data to an existing piping specification.

### Creating Gasket Records.

- Open the Ten\_Specs\_SpecificationData.xls file located in <SP3DInstalled\_Location>\CatalogData\BulkLoad\DataFiles
- Select GasketSelectionFilter and BoltSelectionFilter sheets. Move and copy these sheets into the CC150-1.xls
- Go to the GasketSelectionFilter worksheet and add the following records:

Head Start	SpecName	NominalDiameterFrom	NominalDiameterTo	NpdUnitType	GasketOption	MaximumTemperature	EndPreparation	PressureRating	EndStandard	AlternateEndPreparation	AlternatePressureRating	AlternateEndStandard	FluidCode	ScheduleThickness	ContractorCommodityCode	Priority	RingNumber	FabricationCategoryOverride	SupplyResponsibilityOverride	Comments	PipingNote1
a	CC150-1	2	24	in	1	21	150	5							GMAHACABXBEPUS			7	10		
a	CC150-1	2	24	in	1	21	150	5	121	150	5				GMAHACABXBEPUS			7	10		
End																					

### Creating Bolt Records.

- Go to the BoltSelectionFilter worksheet and add the following records:

Head	SpecName	NominalDiameterFrom	NominalDiameterTo	NpdUnitType	BoltOption	MaximumTemperature	EndPreparation	PressureRating	EndStandard	AlternateEndPreparation	AlternatePressureRating	AlternateEndStandard	ContractorCommodityCode	Priority	BoltExtensionOption	FabricationCategoryOverride	SupplyResponsibilityOverride	Comments	PipingNote1	LubricationRequirements
Start																				
a	CC150-1	2	24	in	1	21	150	5					BAZZZZZAAYBETZZUS		1	7	10			
a	CC150-1	2	24	in	1	21	150	5	121	150	5	BAZZZZZAAYBETZZUS			1	7	10			
Start																				

- Save the file and load the CC150-1.xls using the Bulkload Utility. Review the log file.
- Run the Verify Consistency between Piping Specification and Catalog command.
- Review the output report. Go to the index sheet and select the following links:
  - Bolt for bolted joint undefined in bolt selection filter data
  - Bolts undefined in piping commodity material control data
  - Bolts undefined in bolt part data
  - Summary of bolt parts
  - Gasket for bolted joint undefined in gasket selection filter data
  - Gaskets undefined in piping commodity material control data
  - Gaskets undefined in gasket part data
  - Summary of gasket parts
- Enter SmartPlant 3D and attempt to place a flange or flanged valve on the existing lines from the prior lab.



## Lab 7: PipeTakedown Parts Rule

### Objective

- After completing this lab, you will be able to create the pipe takedown parts rule for the specified spec.
- Open the Ten\_Specs\_SpecificationData.xls file located in <SP3D Installation >\CatalogData\BulkLoad\DataFiles
  - Select PipeTakedownParts worksheet. Move and copy this sheet into the CC150-1.xls
  - Add records to create the pipe takedown parts rule for spec CC150-1 as shown below:
    - Place a Union when NPD is 0.75"
    - Place a Coupling when NPD is between 1" – 1.75"
    - Place default flanges when NPD is between 2" – 24"

Head	SpecName	TakeDownShortCode	WeldShortCode	IsPairRequired	Npd	NpdUnitType	IsWeld
Start							
a	CC150-1	Union	Butt Weld	0	0.75	in	1
a		Coupling	Butt Weld	0	1	in	1
a		Coupling	Butt Weld	0	1.5	in	1
a		Flange	Butt Weld	1	2	in	1
a		Flange	Butt Weld	1	4	in	1
a		Flange	Butt Weld	1	6	in	1
a		Flange	Butt Weld	1	8	in	1
a		Flange	Butt Weld	1	10	in	1
a		Flange	Butt Weld	1	12	in	1
a		Flange	Butt Weld	1	14	in	1
a		Flange	Butt Weld	1	16	in	1
a		Flange	Butt Weld	1	18	in	1
a		Flange	Butt Weld	1	20	in	1
a		Flange	Butt Weld	1	24	in	1
End							

- Go to the PipingCommodityFilter worksheet.
- Add the record for the new commodities as shown below:

Item	Size	Commodity Code	Description
Union	0.75" – 0.75"	MAXAWBVZZADRBQZZUS	Union, CL3000, SWE, ASTM-A105, MSS-SP-83
Coupling	1" – 1.5"	MAKAWBVZZAAGABQZZUS	Coupling, CL3000, SWE, ASTM-A105, ASME-B16.11

Head	SpecName	ShortCode	OptionCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	Comments	SelectionBasis	JacketedPipingBasis	MaximumTemperature	MinimumTemperature	EngineeringTag	CommodityCode
Start																	
a		Coupling	1	1	1.5 in							1					MAKAWBVZZAAGABQZZUS
a		Union	1	0.75	0.75 in							1					MAXAWBVZZADRBQZZUS

6. Save the sheet into the CC150-1.xls
7. Load the information into the Catalog using the Add/Modify and Delete Mode.
8. Review the log file once the Bulkload process is complete.
9. Run the Verify Consistency between Piping Specification and Catalog command.
10. Review the output report. Go to the index sheet and select the following links:
  - Piping commodity undefined in piping commodity material control data
  - Piping commodity undefined in piping commodity part data
  - Summary of existing symbols
  - Summary of catalog parts
11. Go to the Piping Task and test the pipe takedown parts rule.

## Lab 8: Permissible Taps Rule

### Objective

- After completing this lab, you will be able to create the permissible taps rule for the specified spec.
1. Open the Ten\_Specs\_SpecificationData.xls file located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles
  2. Select PermissibleTaps worksheet. Move and copy this sheet into the CC150-1.xls
  3. Add records to create the permissible taps rule for spec CC150-1 as shown below:
    - Set the default tap for a 1” NPD
    - Place a 3000# socket weld tap when NPD is between 0.75” – 4”
    - Place a hole circular end tap when NPD is between 6” – 24”

Head	SpecName	PermissibleTapNumber	IsPreferredTap
Start			
A	CC150-1	Tap-004	FALSE
A		Tap-006	TRUE
A		Tap-010	FALSE
A		Tap-012	FALSE
A		Tap-018	FALSE
A		Tap-021	FALSE
A		Tap-022	FALSE
A		Tap-023	FALSE
A		Tap-024	FALSE
A		Tap-025	FALSE
A		Tap-026	FALSE
A		Tap-027	FALSE
A		Tap-028	FALSE
A		Tap-029	FALSE
End			

Note: The Permissible TapNumbers are defined in TapProperties rule.

4. Save the sheet into the CC150-1.xls
5. Load the information into the Catalog using the Add/Modify and Delete Mode.
6. Review the log file once the Bulkload process is complete.

7. Run the Verify Consistency between Piping Specification and Catalog command.
8. Review the output report. Go to the index sheet and select the following link:
  - Rules data undefined
  - Tap undefined in tap properties data
9. Go to the Piping Task and test the permissible taps rule.

## Lab 9: Model/Catalog Synchronization

### Objective

- After completing this lab, you will be able to modify the piping specification/catalog and synchronize the catalog with the model data.

### Component Modeling

- Route items in the model that include the following items:
- Large bore pipe and fittings (NPD = 4")
- Small Bore pipe and fittings (NPD = 2")
- At least one flanged component
- At least three standard tees on the 2" pipeline: at the end of a pipe, somewhere along the pipe and between two fittings.
- Open the Company\_Catalog.xls
- Open the Tee worksheet and edit the FacetoCenter dimension for the 2" Tee as follows:

FacetoCenter = 6in

Head Start	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	GraphicalRepresentationOrNot	SymbolDefinition	MaterialGrade	LiningMaterial	GeometricIndustryStandard	PipingPointBasis[1]	Id[1]	PressureRating[1]	EndPreparation[1]	EndStandard[1]	ScheduleThickness[1]	FlowDirection[1]	PipingPointBasis[2]	Id[2]	PressureRating[2]	EndPreparation[2]	EndStandard[2]	ScheduleThickness[2]	FlowDirection[2]	PipingPointBasis[3]	Id[3]	PressureRating[3]	EndPreparation[3]	EndStandard[3]	ScheduleThickness[3]	FlowDirection[3]	PipingNote1	DryWeight	Npd[1]:Primary	NpdUnitType[1]	Npd[2]:Primary	NpdUnitType[2]	Npd[3]:Secondary	NpdUnitType[3]	FacetoCenter
m Tee01	S-STD	S-STD	T	75	SP3DTee.CEqualTee		264	39	15		301	5	S-STD	3	15			301	5	S-STD	3	15			301	5	S-STD	3	15			3lbn	2 in	2 in	2 in	6in				
Tee01	S-STD	S-STD	T	75	SP3DTee.CEqualTee		264	39	15		301	5	S-STD	3	15			301	5	S-STD	3	15			301	5	S-STD	3	15			13lbn	4 in	4 in	4 in	4 125in				
																																29lbn	6 in	6 in	6 in	5 625in				
																																54lbn	8 in	8 in	8 in	7in				
																																88lbn	10 in	10 in	10 in	8 5in				
																																128lbn	12 in	12 in	12 in	10in				
																																176lbn	14 in	14 in	14 in	11in				
																																200lbn	16 in	16 in	16 in	12in				
																																318lbn	18 in	18 in	18 in	13 5in				
																																369lbn	20 in	20 in	20 in	15in				
																																560lbn	24 in	24 in	24 in	17in				

- Load the changes into the database using the Bulkload Utility. Review the log file.
- Note : Make sure to mark modified all rows in the spreadsheet with an "M", and use the "Add, Modify, or Delete" Bulkload option.
- Open Project Management Tool

11. Select the Model and go to Tool -> Synchronize Model with Catalog command. Do not need to re-generate the views in the model.

**Synchronize Model with Catalog**

Options

☒ Synchronize model with catalog ☐ Regenerate views

Catalog

Model database server: rhd701 Model database name: SP3DTrain\_MDB Version: 7.0.0

Model

Catalog database server: rhd701 Catalog database name: SP3DTrain\_CAT Version: 7.0.0

Catalog schema server: rhd701 Catalog schema name: SP3DTrain\_CAT\_SCHEMA Version: 7.0.0

OK Cancel

12. Select OK to start the process.
13. Enter SmartPlant 3D and go to Piping task. Use F5 to update graphics if using a session file to enter the model.
14. Review the TO DO LIST dialog box.
15. Hit the Update button in the TO DO LIST to update any out of date entries in the list.

## Lab 10: Reportable Piping Commodity

### Objective

- After completing this lab, you will be able to add a lap joint flange represents the primary piping commodity, and the stub end represents the reportable piping commodity for reporting purposes. It is not necessary that the stub end be modeled.

- Add records for lap joint flange in spec CC150-1 as shown below:

Item	Option	Size	Commodity Code	Description
Flange	189	4" -8"	FLSL-01	Flange, CL150, RFFE/BE, ASTM-A105, ASME-B16.5, FLSL
		4"-8"	StubEnd-01	Stub End, ASME-B16.9, bevel end, Schedule bore to match

- Open the Ten\_Specs\_CatalogData.xls file located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles and save the LapJointFlange and StubEnd worksheets to your Company\_Catalog.xls
- Edit the LapJointFlange sheet as follows:

Head Start	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	GraphicalRepresentationOrNot	SymbolDefinition	MaterialGrade	LiningMaterial	GeometricIndustryStandard	PartDataBasis	PipingPointBasis[1]	Id[1]	PressureRating[1]	EndPreparation[1]	EndStandard[1]	ScheduleThickness[1]	FlowDirection[1]	PipingPointBasis[2]	Id[2]	PressureRating[2]	EndPreparation[2]	EndStandard[2]	ScheduleThickness[2]	FlowDirection[2]	Npd[1]	NpdUnitType[1]	Npd[2]	NpdUnitType[2]	StubLength	LapThickness
A	FLSL-01		S-STD	FSSE	15			150		39	15	150	71	5		3	15		301	5	S-STD	3			4	in	4	in	6in	0.169in	
A																								6	in	6	in	8in	0.194in		
A																								8	in	8	in	8in	0.218in		

- Go to StubEnd sheet.
- Edit the StubEnd sheet as follows:

Head	Start	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	GraphicalRepresentationOrNot	SymbolDefinition	MaterialGrade	GeometricIndustryStandard	PartDataBasis	PipingPointBasis[1]	Id[1]	PressureRating[1]	EndPreparation[1]	EndStandard[1]	ScheduleThickness[1]	FlowDirection[1]	PipingPointBasis[2]	Id[2]	PressureRating[2]	EndPreparation[2]	EndStandard[2]	ScheduleThickness[2]	FlowDirection[2]	Npd[1]	NpdUnitType[1]	Npd[2]	NpdUnitType[2]
A	StubEnd-01		S-STD	STBN DL	15				150	39		15		150	71	5		3	15			301	5	S-STD	3	4 in		4 in	
A																									6 in		6 in		
A																									8 in		8 in		

6. Save the file and exit.
7. Open the CC150-1.xls spreadsheet.
8. Open the PipingCommodityMatlControlData worksheet
  - The ContractorCommodityCode is FLSL-01.
  - The ShortMaterialDescription is Flange, CL150, RFFE/BE, A105, ASME-B16.5, FLSL
  - The ContractorCommodityCode is StubEnd-01.
  - The ShortMaterialDescription is Stub End, ASME-B16.9, bevel end, Schedule bore to match

Note : Add the appropriate values in the Fabrication Type, Supply Responsibility, Reporting Type, Gasket Requirement, Bolting Requirement, and Welding Requirement columns of the part. (Hint : Check the AllCodeLists.xls spreadsheet for similar codelist items.)

Head Start	ContractorCommodityCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	IndustryCommodityCode	ClientCommodityCode	CIMISCommodityCode	ShortMaterialDescription	LocalizedShortMaterialDesc	LongMaterialDescription	Vendor	Manufacturer	FabricationType	SupplyResponsibility	ReportingType	QuantityOfReportableParts	GasketRequirements	BoltingRequirements	WeldingRequirement	LooseMaterialRequirements	SubstCapScrewsQuantity	ValveOperatorType	ValveOperatorGeoIndStd	ValveOperatorCatalogPartNumber
	Tee01											Tee, [403], BE, ASTM-A234-WPB, ASME-B16.9					15	2	2		20	35	5					
	FWN001											Flange, CL150, RFFE/BE, A105, ASME-B16.5, WN					15	2	5		5	5	5					
	FSO001											Flange, CL150, RFFE/BE, A105, ASME-B16.5, SO					15	2	5		5	5	5					
	GAT001											Gate valve, CL150, RFFE, BB, OS&Y, ASTM-A216-WCB, trim 8, Crane 47					7	10	5		5	5	50		3	1190	GAT001-BLT-150-3	
a	FLSL-01											Flange, CL150, RFFE/BE, A105, ASME-B16.5, FLSL					15	2	5		5	5	5					
a	StubEnd-01											Stub End, ASME-B16.9, bevel end, Schedule bore to match					15	2	5		20	35	50					



## Creating Piping Material Class Record

9. Open the PipingCommodityFilter worksheet.
10. Add records for the lap joint flange and the Stub End.

SpecName	ShortCode	OptionCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	Comments	SelectionBasis	JacketedPipingBasis	MaximumTemperature	MinimumTemperature	EngineeringTag	CommodityCode	FabricationCategoryOverride	SupplyResponsibilityOverride	FirstSizeSchedule	SecondSizeSchedule	ReportableCommodityCode	QuantityOfReportableParts
Flange	189	4	8 in								5					FLSL-01			MATCH	StubEnd-01		1

11. Save the file and load both workbooks using the Bulkload Utility.
12. Review the log file once the Bulkload process is complete.
13. Run the Verify Consistency between Piping Specification and Catalog command again.
14. Review the output report. Go to the index sheet and select the following links:

- Piping commodity undefined in piping commodity material control data
- Piping commodity undefined in piping commodity part data
- Summary of existing symbols
- Summary of catalog parts
- Bolt for bolted joint undefined in bolt selection filter data
- Bolts undefined in piping commodity material control data
- Bolts undefined in bolt part data
- Summary of bolt parts
- Gasket for bolted joint undefined in gasket selection filter data
- Gaskets undefined in piping commodity material control data
- Gaskets undefined in gasket part data
- Summary of gasket parts

Note: the report shows missing bolts and gaskets.

### Creating Gasket Records.

15. Open the GasketSelectionFilter worksheet and add the following records:

Head Start	SpecName	NominalDiameterFrom	NominalDiameterTo	NpdUnitType	GasketOption	MaximumTemperature	MinimumTemperature	EndPreparation	PressureRating	EndStandard	AlternateEndPreparation	AlternatePressureRating	AlternateEndStandard	FluidCode	ScheduleThickness	ContractorCommodityCode	Priority	RingNumber	FabricationCategoryOverride	SupplyResponsibilityOverride	Comments	PipingNote1
	CC150-1	2	24	in	1			21	150	5						GMAHACABXBEPUS			7	10		
	CC150-1	2	24	in	1			21	150	5	121	150	5			GMAHACABXBEPUS			7	10		
a	CC150-1	2	24	in	1			71	150	5						GMAHACABXBEPUS			7	10		

### Creating Bolt Records.

16. Open the BoltSelectionFilter worksheet and add the following records:

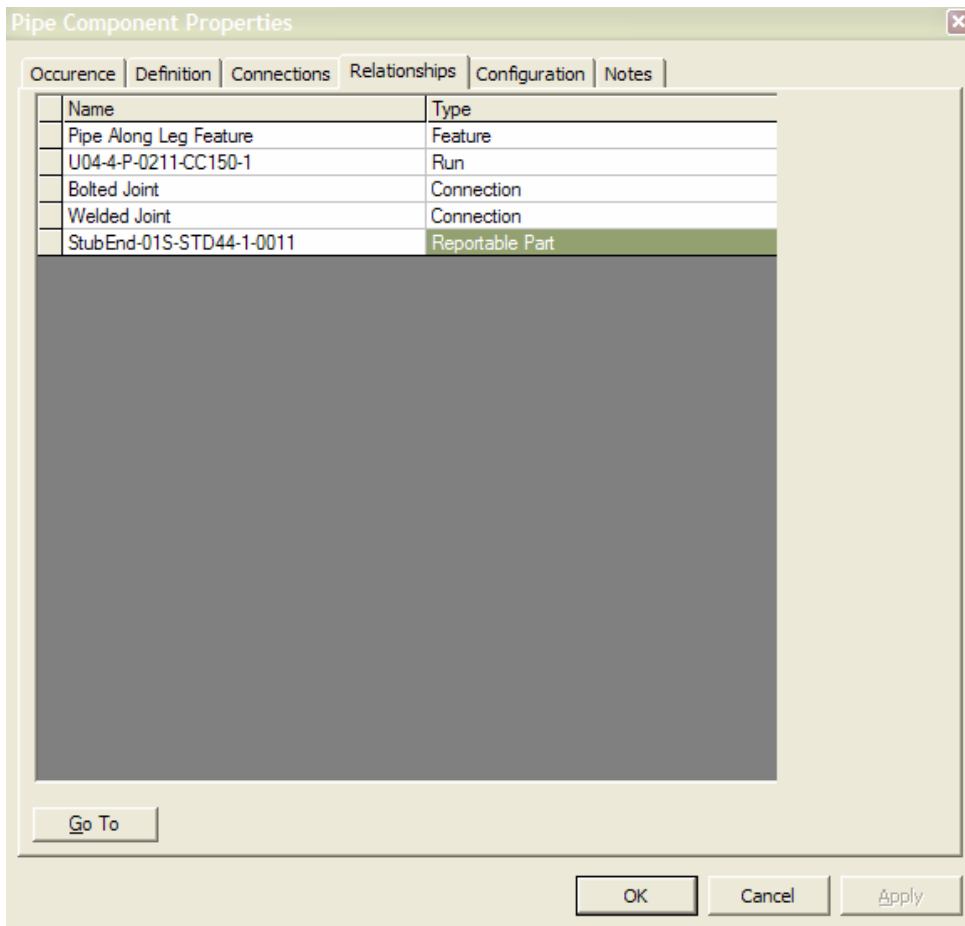
Head Start	SpecName	NominalDiameterFrom	NominalDiameterTo	NpdUnitType	BoltOption	MaximumTemperature	EndPreparation	PressureRating	EndStandard	AlternateEndPreparation	AlternatePressureRating	AlternateEndStandard	ContractorCommodityCode	Priority	BoltExtensionOption	FabricationCategoryOverride	SupplyResponsibilityOverride	Comments	PipingNote1	LubricationRequirements
	CC150-1	2	24	in	1		21	150	5				BAZZZZZAAYBETZZUS		1	7	10			
	CC150-1	2	24	in	1		21	150	5	121	150	5	BAZZZZZAAYBETZZUS		1	7	10			
a	CC150-1	2	24	in	1		71	150	5				BAZZZZZAAYBETZZUS		1	7	10			
a	CC150-1	2	24	in	1		21	150	5	71	150	5	BAZZZZZAAYBETZZUS		1	7	10			

17. Save the file and load both workbooks using the Bulkload Utility.

18. Review the log file once the Bulkload process is complete.

19. Run the Verify Consistency between Piping Specification and Catalog command again.

20. Review the output report.
21. Go to the Piping Task and place the lap joint flange.
22. Review the properties page.



## Lab 11: Substitution Cap Screw Commodity Code

### Objective

- After completing this lab, you will be able to add a lug-type wafer butterfly valve, where the valve body has threaded holes that are drilled to a manufacturer-specific depth for cap screws.
- Add records for lug-type wafer butterfly valve in spec CC150-1 as shown below:

Item	Size	Commodity Code	Cap Screws	Description
Butterfly Valve	4" –8"	BFYHP-01	4 Partial cap screw substitution for threaded holes	Butterfly valve, CL150, RFTBE, Standard Lugged Pattern, ASTM-A216-WCB

- Open the Ten\_Specs\_CatalogData.xls file located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles and save the ButterflyValve worksheet to your Company\_Catalog.xls
- Edit the ButterflyValve sheet as follows:

Head	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	GraphicalRepresentationOrNot	SymbolDefinition	MaterialGrade	LiningMaterial	GeometricIndustryStandard	PartDataBasis
Start											
A	BFYHP-01			BFYHP	15		SP3DButterflyValveSym.CButterflyValveS	252		4200	
A											
A											

PipingPointBasis[1]	Id[1]	PressureRating[1]	EndPreparation[1]	EndStandard[1]	ScheduleThickness[1]	FlowDirection[1]	PipingPointBasis[2]	Id[2]	PressureRating[2]	EndPreparation[2]	EndStandard[2]	ScheduleThickness[2]	FlowDirection[2]	PipingNote1	Npd[1]	NpdUnitType[1]	Npd[2]	NpdUnitType[2]	FacetoFace
15		150	211	5		3	15		150	211	5		3		4 in		4 in		2.125in
															6 in		6 in		2.25in
															8 in		8 in		2.5in

4. Save the file and exit.
5. Open the CC150-1.xls spreadsheet.
6. Open the PipingCommodityMatlControlData worksheet
  - The Contractor Commodity Code is BFYHP-01.
  - The ShortMaterialDescription is Butterfly valve, CL150, RFTBE, Standard Lugged Pattern, ASTM-A216-WCB

Note : Add the appropriate values in the Fabrication Type, Supply Responsibility, Reporting Type, Gasket Requirement, Bolting Requirement, and Welding Requirement columns of the part.  
(Hint : Check the AllCodeLists.xls spreadsheet for similar codelist items.)

Head Start	ContractorCommodityCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	IndustryCommodityCode	ClientCommodityCode	CIMISCommodityCode	ShortMaterialDescription	LocalizedShortMaterialDesc	LongMaterialDescription	Vendor	Manufacturer	FabricationType	SupplyResponsibility	ReportingType	QuantityOfReportableParts	GasketRequirements	BoltingRequirements	WeldingRequirement
A	BFYHP-01											Butterfly valve, CL150, RFTBE, Standard Lugged Pattern, ASTM-A216-WCB					7	10	5		5	20	50

7. Add the valve operator data and the cap screws for the butterfly valve.

SubstCapScrewsQuantity	SubstCapScrewCntrCommodityCode	SubstCapScrewDiameter	TappedHoleDepth	MultiportValveOpReq	ValveOperatorType	ValveOperatorGeoIndStd	ValveOperatorCatalogPartNumber	ReportableCommodityCode
4	BCZZZZZAAYBETZZUS				17	2035	BFYHP-Bolted-150-17	

8. Save the spreadsheet.

### Creating Piping Material Class Records.

9. Open the PipingCommodityFilter worksheet.

10. Add records for the butterfly valve.

SpecName	ShortCode	OptionCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	Comments	SelectionBasis	JacketedPipingBasis	MaximumTemperature	MinimumTemperature	EngineeringTag	CommodityCode
	Butterfly Valve	1	4	8	in						1					BFYHP-01

### Creating Gasket Records.

11. Open the GasketSelectionFilter worksheet and add the following records:

Head Start	SpecName	NominalDiameterFrom	NominalDiameterTo	NpdUnitType	GasketOption	MaximumTemperature	MinimumTemperature	EndPreparation	PressureRating	EndStandard	AlternateEndPreparation	AlternatePressureRating	AlternateEndStandard	FluidCode	ScheduleThickness	ContractorCommodityCode	Priority	RingNumber	FabricationCategoryOverride	SupplyResponsibilityOverride	Comments	PipingNote1
	A CC150-1	4	8 in	1				21	150	5	211	150	5		GMAHACABXBEPUS				7	10		
	A CC150-1	4	8 in	1				71	150	5	211	150	5		GMAHACABXBEPUS				7	10		

### Creating Bolt Records.

12. Open the BoltSelectionFilter worksheet and add the following records:

Head Start	SpecName	NominalDiameterFrom	NominalDiameterTo	NpdUnitType	BoltOption	MaximumTemperature	EndPreparation	PressureRating	EndStandard	AlternateEndPreparation	AlternatePressureRating	AlternateEndStandard	ContractorCommodityCode	Priority	BoltExtensionOption	FabricationCategoryOverride	SupplyResponsibilityOverride	Comments	PipingNote1	LubricationRequirements
	A CC150-1	4	8 in	1			21	150	5	211	150	5	BAZZZZZZAAYBETZZUS		1	7	10			
	A CC150-1	4	8 in	1			71	150	5	211	150	5	BAZZZZZZAAYBETZZUS		1	7	10			

13. Save the file and load both workbooks using the Bulkload Utility.

14. Review the log file once the Bulkload process is complete.

15. Run the Verify Consistency between Piping Specification and Catalog command.

16. Review the output report. Go to the index sheet and select the following links:

- Piping commodity undefined in piping commodity material control data
- Piping commodity undefined in piping commodity part data
- Summary of existing symbols
- Summary of catalog parts
- Bolt for bolted joint undefined in bolt selection filter data

- Bolts undefined in piping commodity material control data
- Bolts undefined in bolt part data
- Summary of bolt parts
- Gasket for bolted joint undefined in gasket selection filter data
- Gaskets undefined in piping commodity material control data
- Gaskets undefined in gasket part data
- Summary of gasket parts

17. Go to the Piping Task and place the butterfly valve.

18. Review the properties page. “Go To” the bolt set properties and verify cap screws.

Pipe Bolt Set Properties

Occurrence | **Definition** | Relationships | Configuration

Category: Standard Connection Part Type: Bolts

Property	Value
Industry Commodity Code	BCZZZZZAAYBETZZUS
Bolt Type	Cap Screw
Materials Grade Practice	US Practice
Materials Category	Bolting materials
Materials Grade	A193-B7, >=1.5" lub, w/A194-2H
Coating Requirement	Undefined
Coating Type	Undefined
Geometric Industry Practice	Undefined
Geometric Industry Standard	Undefined

OK Cancel Apply



## Lab 12: Custom Engineered/Stock Instruments

### Objective:

After completing this lab, you will be able to:

- Add/Modify Custom Engineered/Stock Instrument.

Create a stock flowmeter (part number: Flow-001) with a tag number F-001. Stock items represent those piping items that are purchased from a manufacturer's catalog, where no real engineering is required other than selecting the correct size, material, etc.

Create a custom-engineered item Flow Meter called F-002.

Both flowmeters will use the symbol called SP3DCoriolisFlowMeterTy1.CCFMeterTy1.

The symbol can be found in [Install Product]\Programming\ExampleCode\Symbols\Piping

1. Open the Instrument Data.xls Excel Workbook.
2. Copy the worksheet ANG as FlowMeter1



3. Locate printable document SmartPlant 3D Symbols Reference Data Guide (or open the symbol program) and find out the inputs required to construct the symbol SP3DCoriolisFlowMeterTy1.
4. Define insulation thickness as **occurrence attributes (oa)**. The part definition for this instrument will look as follows:

Definition	PartClassType	SymbolDefinition	UserClassName	OccClassName	SymbolIcon	OA:InsulationThickness
	a InstrumentsClass	SP3DCoriolisFlowMeterTy1.CCFMeterTy1	Flow Meter1	Flow Meter1	Symbolicons/FlowMeter1.gif	

5. Add the two instruments with the following data:  
Make sure the Geometry Type is 15 (Linear, full size) and Commodity Type is 5413 (Flow Controller).

Material Grade: 150

Make sure to delete any attributes used by the ANG.

**Flowmeter 1:**

Industry Commodity Code: Flow-001

Port data:

NPD: 4 in

Rating: 150

EndPrep: 21

End Standard: 5

Flow Direction: 3

FacetoFace: 12 in

FlowDiameter: 5 in

InstrumentHeight: 18 in

InstrumentDiameter: 4 in

InstrumentWidth: 6 in

InstrumentWidth1: 8 in

**Flowmeter 2:**

Industry Commodity Code: F-002

Port data:

NPD: 4 in

Rating: 150

EndPrep: 21

End Standard: 5

FacetoFace: 12 in

FlowDiameter: 5 in

InstrumentHeight: 24 in

InstrumentDiameter: 4 in

InstrumentWidth: 6 in

InstrumentWidth1: 8 in

Make sure you **add the Requisition Type attribute**.

Head	Start	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	GraphicalRepresentationOrNot	SymbolDefinition	MaterialGrade	LiningMaterial	BendAngle	BendRadius	GeometricIndustryStandard	BendRadiusMultiplier	DryCogX	DryCogY	DryCogZ	WaterWeight	WaterCogX	WaterCogY	WaterCogZ	VolumetricCapacity	SurfaceArea	RequisitionType
a	Flow-001			5402	15				150				5275		0	0	0		0	0	0			5
a	F-002			5402	15				150				5275		0	0	0		0	0	0			10
PipingPointBasis[1]	Id[1]	PressureRating[1]	EndPreparation[1]	EndStandard[1]	ScheduleThickness[1]	FlowDirection[1]	PipingPointBasis[2]	Id[2]	PressureRating[2]	EndPreparation[2]	EndStandard[2]	ScheduleThickness[2]	FlowDirection[2]	DryWeight	Npd[1]	NpdUnitType[1]	Npd[2]	NpdUnitType[2]	FacetoFace	FlowDiameter	InstrumentHeight	InstrumentDiameter	InstrumentWidth	InstrumentWidth1
		150	21	5		3			150	21	5		3		4	in	4	in	12in	5in	18in	4in	6in	8in
		150	21	5		3			150	21	5		3		4	in	4	in	12in	5in	24in	4in	6in	8in

6. Go to the InstrumentClassData sheet and add the following data:

Head	TagNumber	GenericTagNumber	SpecName	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultiSizeOption	RequisitionType	ContractorCommodityCode	InstrumentType	GeometryType	FirstSizeSchedule	SecondSizeSchedule	PartDataBasis	IsGraphicalRepresentation	MaximumTemperature	MaterialGrade	LiningMaterial	CorrosionAllowance	ShortMaterialDescription	FabricationType	SupplyResponsibility	ReportingType	GasketRequirements	BoltingRequirements	WeldingRequirement
a	F-001			4	4	in					5	Flow-001	5402	15															
a	F-002										10		5402	15									Custom Instr	7	2	5	5	5	50

7. Go to the Piping Commodity Material Control Data sheet and add the following data for the stock instrument.

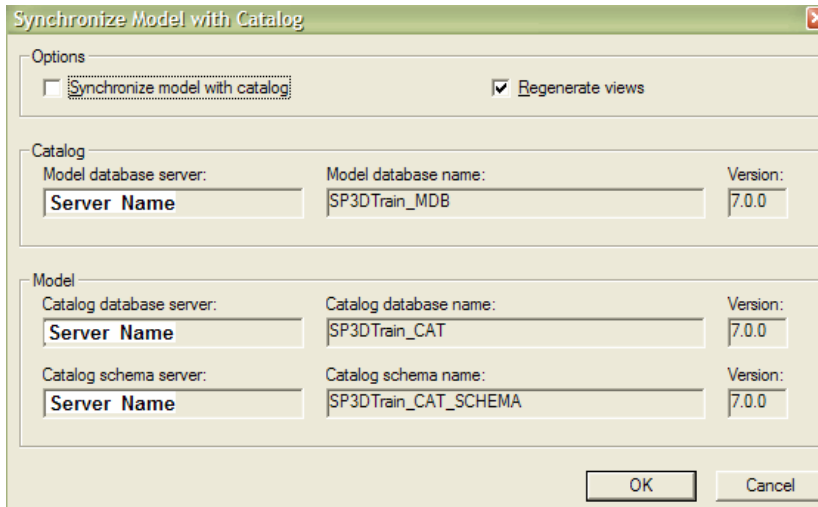
Head	ContractorCommodityCode	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	IndustryCommodityCode	ClientCommodityCode	ShortMaterialDescription	LocalizedShortMaterialDesc	LongMaterialDescription	Vendor	Manufacturer	FabricationType	SupplyResponsibility	ReportingType	ReportableCommodityCode	QuantityOfReportableParts	GasketRequirements	BoltingRequirements	WeldingRequirement
Start																							
a	Flow-001										Stock Instr					7	2	5			5	5	50

8. Create the FlowMeter.gif file and place it under \\<MachineName>\Symbols\SymbolIcons. You can use the picture for SP3DCoriolisFlowMeterTy1 in the [SmartPlant 3D Symbols Reference Data Guide](#) printable guide for illustration details.
9. Save the changes to Instrument Data.xls and use the Bulkload Utility to load the new class. Remember to add the letter A to all new rows in all sheets modified.

For faster processing, copy the worksheets that were modified above to a separate workbook: Instrument.xls. The system will require at least the following worksheets for this and next lab:

- a. FlowMeter1
  - b. PipingCommodityMaterialControlData
  - c. InstrumentClassData
  - d. CustomInterfaces
  - e. R-ClassNodeDescribes
  - f. GUIDs
10. Once the bulkload process is complete, review the log file. Run the Project Management Task. Select the Model in the hierarchy.
  11. Select Tools -> Synchronize Model with the Catalog.
  12. Uncheck the Synchronize Model with the Catalog option.

*Note: You just need to update the views in the model.*



13. Hit “OK” Button.
14. Once the process is complete. Right click on the model and select regenerate the report database.
15. Hit “OK” Button.
16. Run the Verify Consistency between Piping Specification and Catalog command.
17. Review the output report.
18. Go to the Piping Task and place both instruments.

## Lab 13: Instrument “On the Fly”

### Objective

After completing this lab, you will be able to:

- Add an Instrument “On the fly”

Create a Custom-engineered flow controller called F-101.

This flow controller will use the symbol called SP3DCICoriolisFlowMeterTy1.CCICFMetTy1.

The symbol can be found in [Install Product]\Programming\ExampleCode\Symbols\Piping

1. Open the Instrument Data.xls Excel Workbook.
2. Select IA1 sheet, copy it as FlowController into the Instrument.xls workbook from the previous lab.
3. Open the [SmartPlant 3D Symbols Reference Data Guide](#) printable guide and find out the inputs required to construct the symbol SP3DCICoriolisFlowMeterTy1.
4. Define all inputs that create the body of the instrument as occurrence attributes.
5. The Part definition for this instrument will look as follows:

Definition	PartClassType	SymbolDefinition	SymbolIcon
a	InstrumentsClass	SP3DCICoriolisFlowMeterTy1.CCICFMetTy1	Symbolicons\FlowController.gif

The occurrence attributes are:

oa:FacetoFace
oa:FlowDiameter
oa:InstrumentHeight
oa:InstrumentDiameter
oa:InstrumentWidth
oa:InstrumentWidth1
oa:InsulationThickness
OA:Npd
OA:NpdUnitType
OA:EndPreparation
OA:ScheduleThickness
OA:EndStandard
OA:PressureRating
OA:FlowDirection
OA:Id1
OA:PortIndex1
OA:Npd1
OA:NpdUnitType1
OA:EndPreparation1
OA:ScheduleThickness1
OA:EndStandard1
OA:PressureRating1
OA:FlowDirection1
OA:Id2
OA:PortIndex1
OA:Npd2
OA:NpdUnitType2
OA:EndPreparation2
OA:ScheduleThickness2
OA:EndStandard2
OA:PressureRating2
OA:FlowDirection2

6. Add the part with the following data:

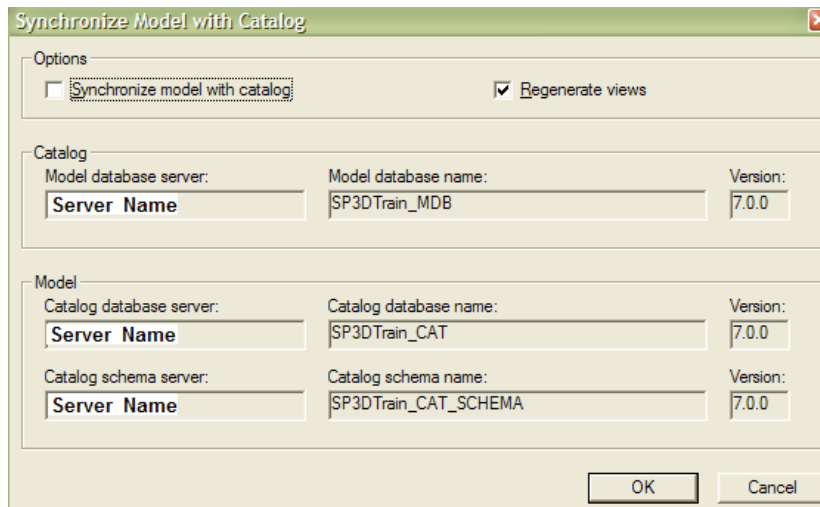
Head	IndustryCommodityCode	FirstSizeSchedule	SecondSizeSchedule	CommodityType	GeometryType	GraphicalRepresentationOrNot	SymbolDefinition	MaterialGrade	LiningMaterial	BendAngle	BendRadius	GeometricIndustryStandard	BendRadiusMultiplier	DryCogX	DryCogY	DryCogZ	WaterWeight	WaterCogX	WaterCogY	WaterCogZ	SurfaceArea	VolumetricCapacity	PipingPointBasis[1]	Id[1]	PressureRating[1]	EndPreparation[1]	EndStandard[1]	ScheduleThickness[1]	FlowDirection[1]	DryWeight	Npd[1]	NpdUnitType[1]
Start																																
a	F-101		5402	15																										4	in	

- Open the Instrument Data.xls Excel Workbook.
- Select R-ClassNodeDescribes sheet and save it to the Instrument.xls (if not already done in Lab 12).
- Go to the R-ClassNodeDescribes sheet in Instrument.xls and add the following data:

RelationSource	RelationDestination
CustomInstruments	FlowController

- Create the FlowController.gif file and place it under \\<MachineName>\Symbols\SymbolIcons. A figure to go by of the symbol SP3DCICoriolisFlowMeterTy1 can be found in the [SmartPlant 3D Symbols Reference Data Guide](#) printable guide.
- Load the information into the Catalog using the Append Mode.
- Run the Project Management Task. Select the Model in the hierarchy.
- Select Tools -> Synchronize Model with the Catalog.
- Uncheck the Synchronize Model with the Catalog option.

*Note: You just need to update the views in the model.*



15. Hit “OK” Button.
16. Once the process is complete. Right click on the model and select regenerate the report database.
17. Hit “OK” Button.
18. Go to the Piping Task and place the F-101 instrument “on the fly”.



## Lab 14: Piping Commodity Procurement Data (Optional)

### Objective

After completing this lab, you will be able to:

- Use the Piping Commodity Procurement Data to determine the *Size-Dependent Client Commodity Code* on the basis of the *Contractor Commodity Code* from the piping commodity filter
1. Open the Ten\_Specs\_SpecificationData.xls workbook located in <SP3D Installation>\CatalogData\BulkLoad\DataFiles.
  2. Go to the DefaultProjectOptions sheet.
  3. Save the sheet into the CC150-1.xls
  4. Change the PipingCmdtyProcurementDataOpt option to 10.
  5. Save the workbook.

Head	IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption	NonRadITangtlBranchODMultiplier	NonRadOffsetBranchODMultiplier	PipingCmdtyCtlgPartNoBasisOpt	PipingCmdtyProcurementDataOpt	BoltDiameterEquivalenceOption
Start	10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5	0.5	0.375	5	10	
m																						

6. Open the Piping Commodity Procurement Data.xls workbook located in <SP3D Installation>\CatalogData\BulkLoad\SampleDataFiles
7. Go to the PipingCommodityProcurementData sheet and add the following records:

Head	CommodityCode	FirstSize	FirstSizeUnits	SecondSize	SecondSizeUnits	MultisizeOption	FirstSizeSchedule	SecondSizeSchedule	ClientCommodityCode	CIMISCommodityCode	VendorPartNumber	ManufacturerPartNumber	UnitCost	RequisitionNumber	InstallationManHours	MaintenanceManHours
Start																
a	FS0001	2	in	2	in				FSACC2							
a	FS0001	4	in	4	in				FSACC4							
a	FS0001	6	in	6	in				FSACC6							
a	FS0001	8	in	8	in				FSACC8							
a	FS0001	10	in	10	in				FSACC10							
a	FS0001	12	in	12	in				FSACC12							
a	FS0001	14	in	14	in				FSACC14							
a	FS0001	16	in	16	in				FSACC16							
a	FS0001	18	in	18	in				FSACC18							
a	FS0001	20	in	20	in				FSACC20							
a	FS0001	24	in	24	in				FSACC24							
a	FWN001	2	in	2	in		S-STD		FWSACC2							
a	FWN001	4	in	4	in		S-STD		FWSACC4							
a	FWN001	6	in	6	in		S-STD		FWSACC6							
a	FWN001	8	in	8	in		S-STD		FWSACC8							
a	FWN001	10	in	10	in		S-STD		FWSACC10							
a	FWN001	12	in	12	in		S-STD		FWSACC12							
a	FWN001	14	in	14	in		S-STD		FWSACC14							
a	FWN001	16	in	16	in		S-STD		FWSACC16							
a	FWN001	18	in	18	in		S-STD		FWSACC18							
a	FWN001	20	in	20	in		S-STD		FWSACC20							
a	FWN001	24	in	24	in		S-STD		FWSACC24							
a	GAT001	2	in	2	in				GTSACC2							
a	GAT001	4	in	4	in				GTSACC4							
a	GAT001	6	in	6	in				GTSACC6							
a	GAT001	8	in	8	in				GTSACC8							
a	GAT001	10	in	10	in				GTSACC10							
a	GAT001	12	in	12	in				GTSACC12							
End																

- Save the sheet into the CC150-1.xls
- Load the information into the Catalog using the Add/Modify/Delete Mode.
- Open your session and go to the Piping Task.
- Select the weld neck flange and open the properties page. Verify the client commodity code is displayed in the properties page.

Pipe Component Properties

Occurrence | Definition | Connections | Relationships | Configuration | Notes

Category: Standard

Property	Value
Part Number	FWN001S-STD44
Part Description	
Mirror Behavior Option	Component may be mirrored
Piping Note 1	
Piping Note 2	
Piping Note 3	
Piping Note 4	
Piping Note 5	
Piping Note 6	
Piping Note 7	
Piping Note 8	
Piping Note 9	
Piping Note 10	
Face to Face	0 ft 3.00 in
Procurement Client Commodity Code	FWSACC4
Procurement CIMIS Commodity Code	

OK Cancel Apply

## Lab 15: Component Insulation Exclusion Rule (Optional)

### Objective

After completing this lab, you will be able to:

Use the Component Insulation Exclusion rule to define piping components that should not have insulation although they exist on insulated pipeline.

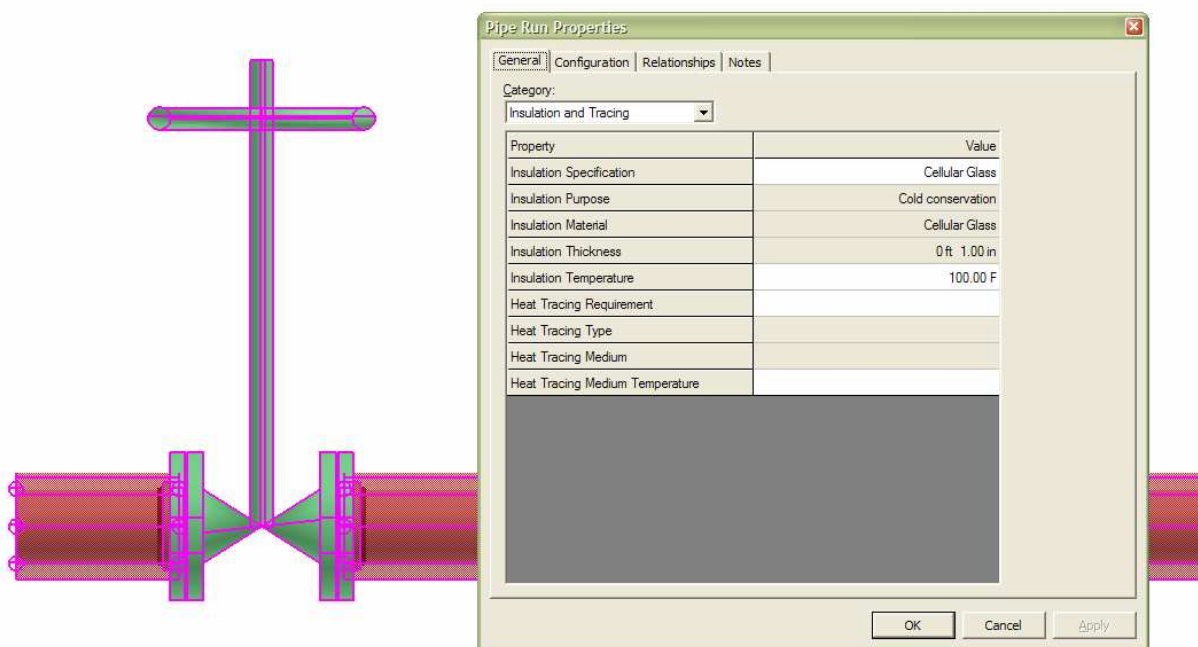
1. Open the ComponentInsulationExclusion.xls workbook located in <SP3D Installation>\CatalogData\BulkLoad\SampleDataFiles.
2. Save the sheet into the CC150-1.xls
3. Go to the ComponentInsulationExclusion sheet and add the following record:

Head	PipingCommodityType	FirstSizeFrom	FirstSizeTo	FirstSizeUnits	SecondSizeFrom	SecondSizeTo	SecondSizeUnits	MultisizeOption	HeatTracingMedium	InsulationPurpose	InsulationTemperatureFrom	InsulationTemperatureTo
!												
Start												
a	5	2	12 in								50F	200F
End												

4. Load the information into the Catalog using the Add/Modify/Delete Mode.
5. Open your session and go to the Piping Task.
6. Create a new insulated piperun using the following data:

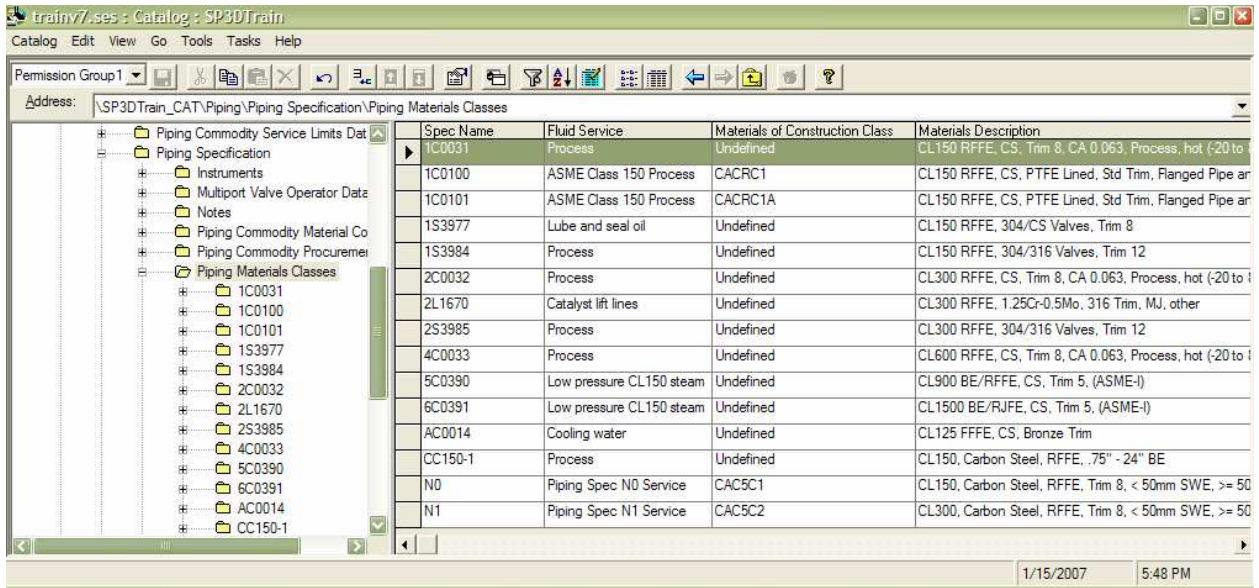
Specification:	CC150-1
Nominal Diameter:	4"
Insulation Specification:	Cellular Glass
Insulation Purpose:	Cold conservation
Insulation Temperature:	100 F

Place the gate valve along the pipe. Turn on the Insulation Aspect. Verify the gate valve is not insulated on this insulated piperun.

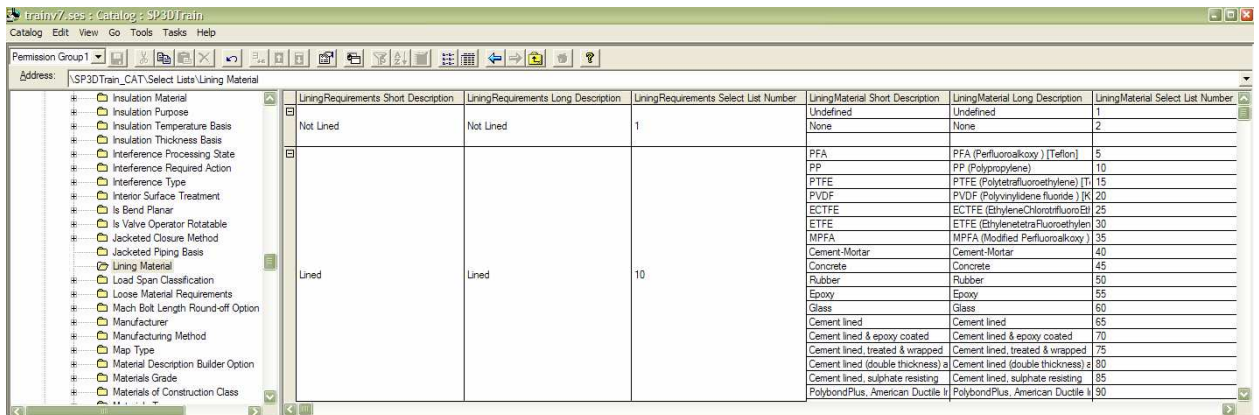




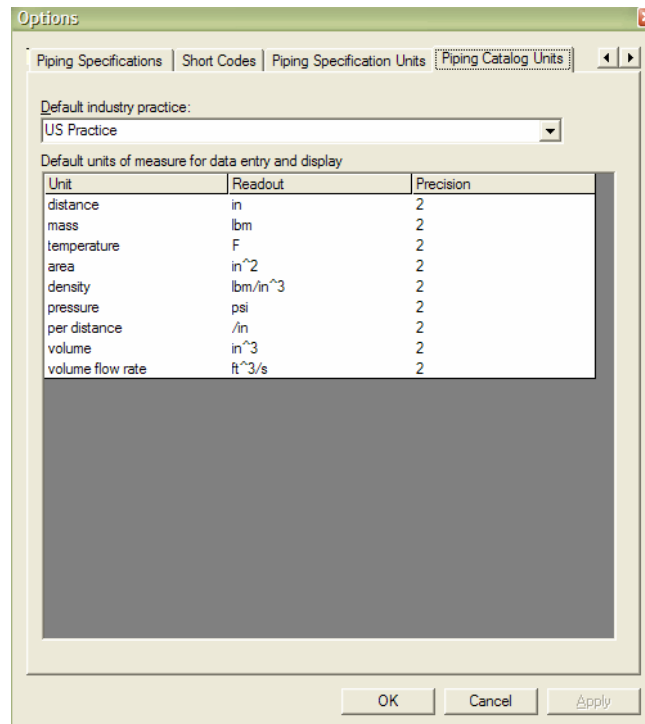
1. Open the Catalog Task to ...Piping Specification>Piping Materials Classes
2. Select a spec in the catalog tree view, e.g. CC150-1 or 1C0031.
3. Use Edit>Copy or the Copy ribbon bar button
4. Use Edit>Paste or the Paste ribbon bar button. When prompted, enter the new spec name: "CC150-1C"



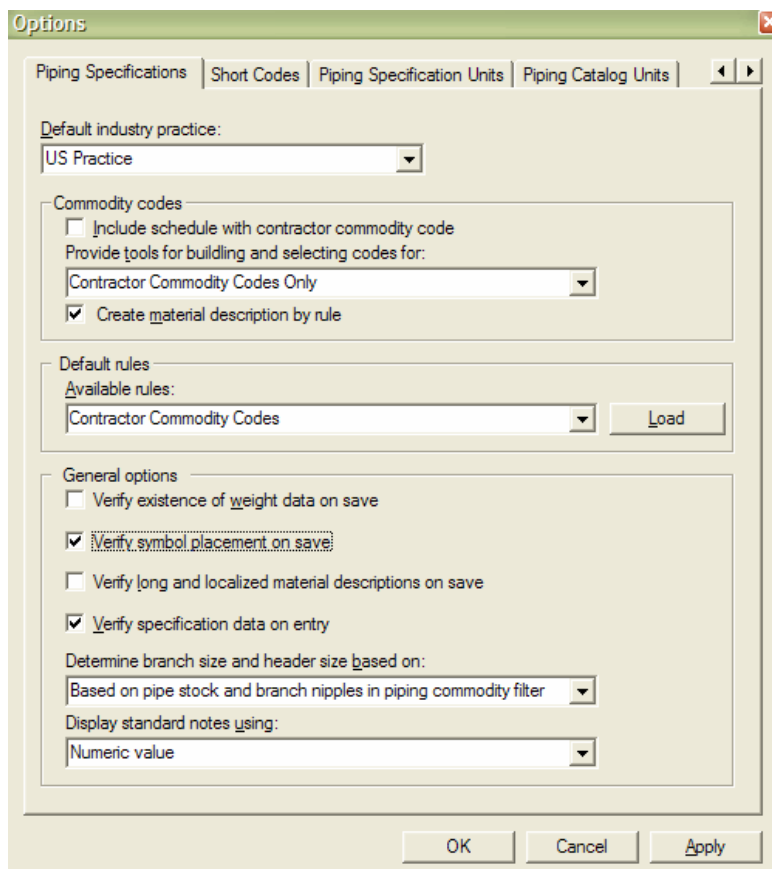
5. Open the Catalog Task to Select Lists>Lining Material
6. Verify that "Cement Lined" is available in the short description column
7. Modify the Select List to include "Kynar" as an option in the short description column



8. Return to ...Piping Specification>Piping Materials Classes and edit the pasted spec name and spec properties in the grid view to match spec requirements
9. Select Tools>Options and set all "Units" tabs to display pressure ("force per area") to Psi

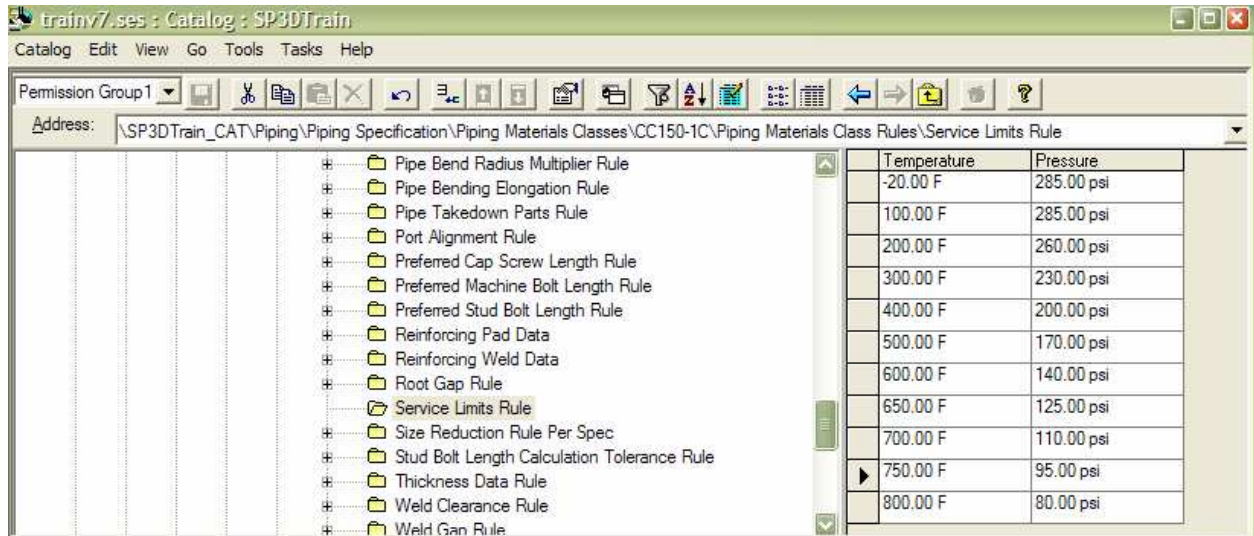


Go to Piping Specifications Tab and set the followings:

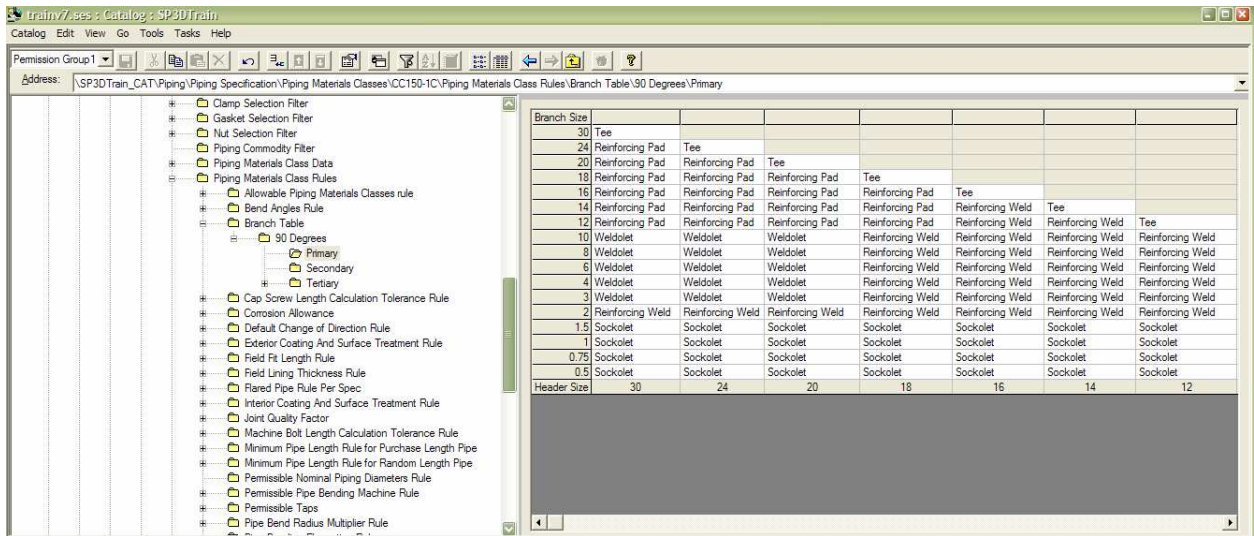




10. Navigate to Piping>Piping Specification>Piping Materials Classes> CC150-1C>Piping Materials Class Rules>Service Limits Rule and set the temperature and pressure limits rule to their proper values for this spec as provided above.



11. Open the Piping Commodity Filter node for the new piping specification, review the component data copied from the original spec.
12. If needed, define the branch components in the Piping Commodity Filter required by the branch table provided.
13. To enter the branch table preferred branching items, open the node at Piping>Piping Specification>Piping Materials Classes> CC150-1C ->Piping Materials Class Rules>Branch Table
14. To generate a simplified paper-spec style view of the branch table do as follows:
  - a. With the Branch Table node selected, use Actions>Add Range
  - b. Enter the range values for existing data: From 89.5 To 90.5
  - c. Provide a name for the range of values, e.g. "90 Degrees"
  - d. Select the branch priority level: "Primary" and OK the form
  - e. Fill the branch table per the table in the instructions above



- Once all desired fittings and components are defined, run Tools>Verify Consistency to check for errors.

In practice, make sure that a good backup of the Catalog is made after a new spec is defined. For the moment, there is no means of exporting the new specs created in the Catalog Task out to Excel.

## Lab 17: New Class Command (Optional)

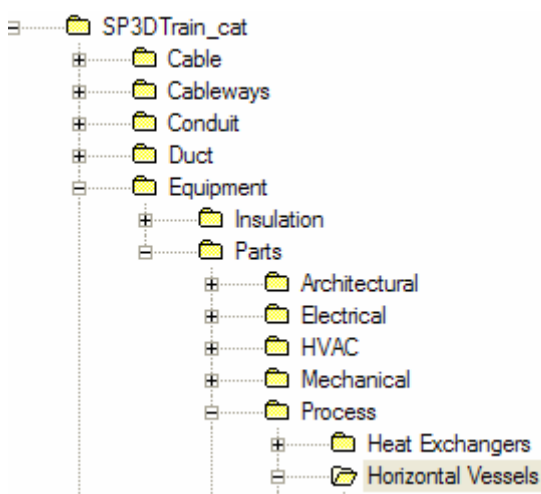
### Objective

After completing this lab, you will be able to:

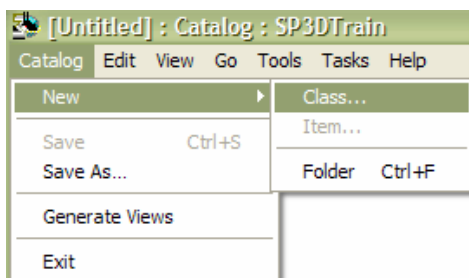
- Create a Smart Equipment Class using User Interface

In this lab, you will create Smart Equipment class using the New Class Command.

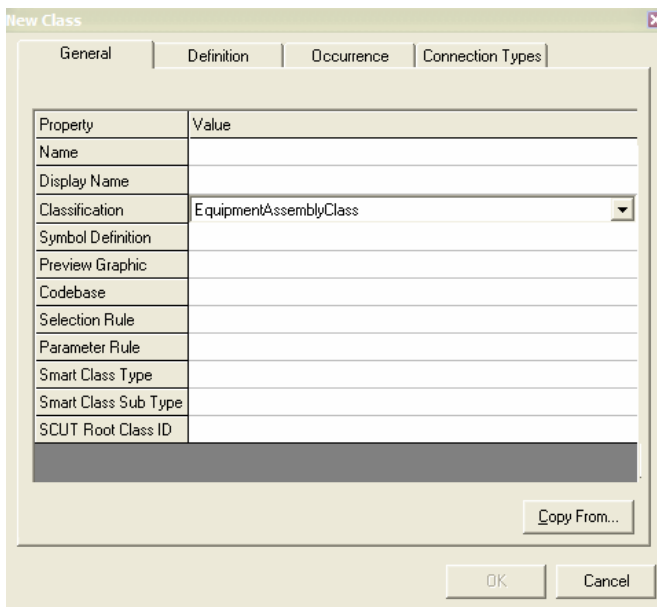
1. Start SP3D application and connect to the Training Plant using the “All” Filter.
2. Enter the Catalog Task.
3. Make sure the Active Permission Group is set to *Permission Group 1*
4. Expand the Catalog Hierarchy “\SP3DTrain\_cat\Equipment\Parts\Process\Horizontal Vessels”



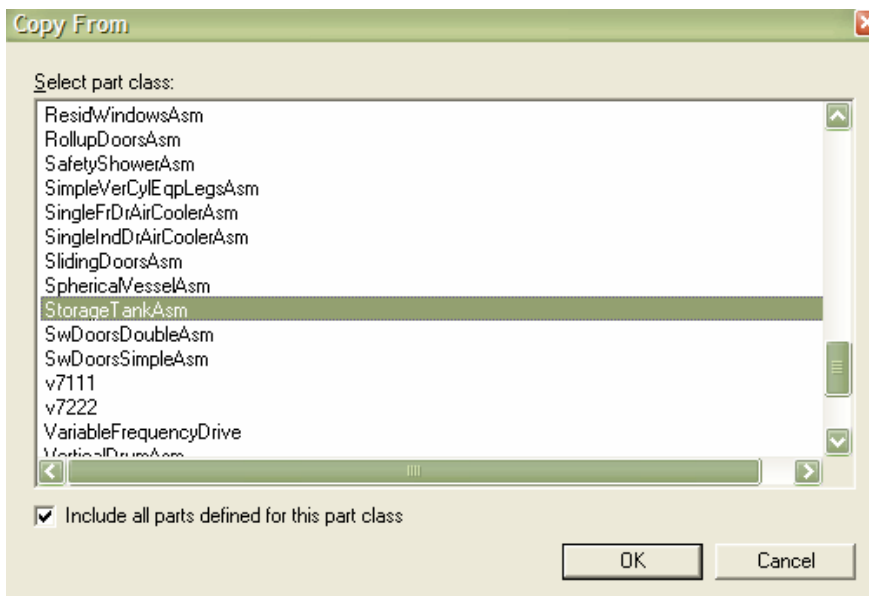
5. Select the Catalog -> New Class to create a Class.



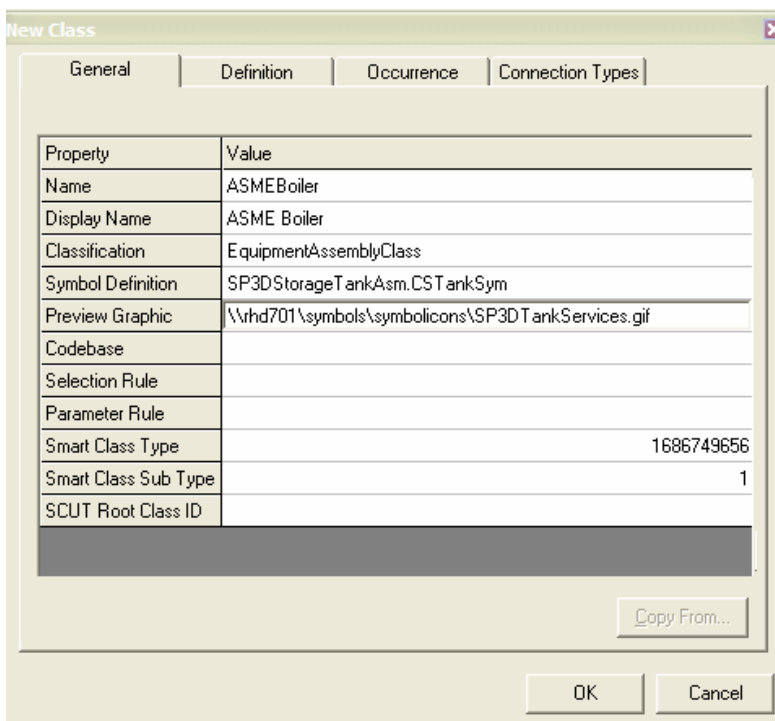
6. Make sure EquipmentAssemblyClass is defined in the Classification field.



7. Select “Copy From” Button to open the Copy From dialog box.
8. Check the “Include all parts defined for this part class”.
9. Select StorageTankAsm from the list.



10. Click “OK” button to return to the New Class dialog box.
11. Rename the Name and the Display Name as ASMEBoiler and ASME Boiler.
12. Keyin the symbol share path where the symbol icon is located on your machine.

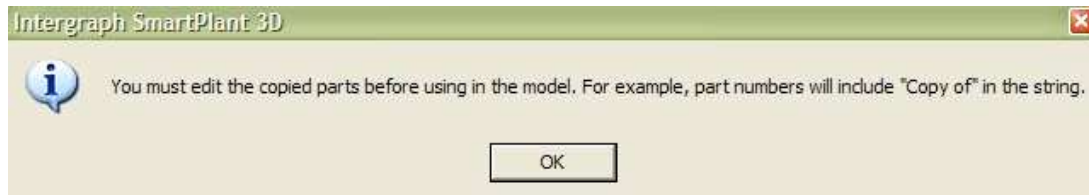


The 'New Class' dialog box has four tabs: General, Definition, Occurrence, and Connection Types. The 'General' tab is active, showing a table of properties and values.

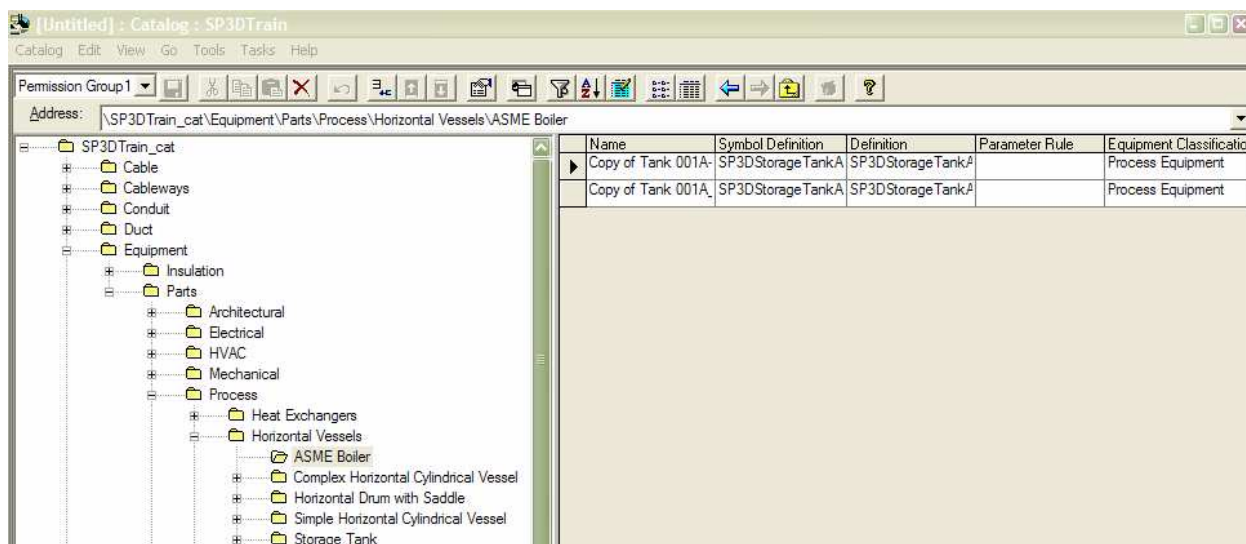
Property	Value
Name	ASMEBoiler
Display Name	ASME Boiler
Classification	EquipmentAssemblyClass
Symbol Definition	SP3DStorageTankAsm.CSTankSym
Preview Graphic	\\rhd701\symbols\symbolicons\SP3DTankServices.gif
Codebase	
Selection Rule	
Parameter Rule	
Smart Class Type	1686749656
Smart Class Sub Type	1
SCUT Root Class ID	

At the bottom right of the dialog is a 'Copy From...' button. At the very bottom are 'OK' and 'Cancel' buttons.

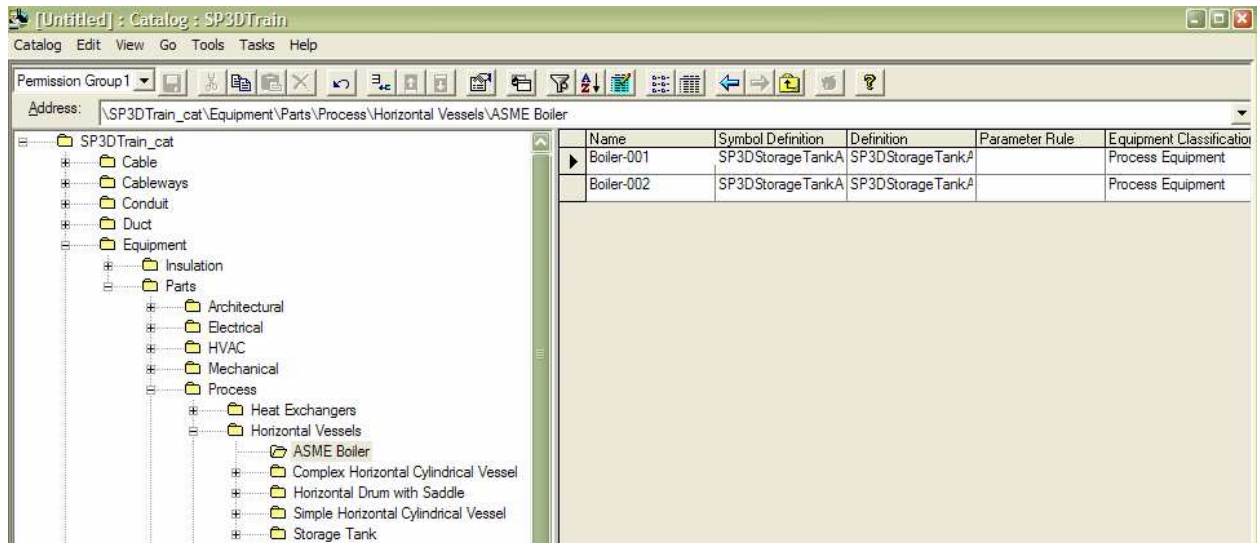
- Click "OK" button. Read the prompt and click "OK" button again to close the message dialog box.



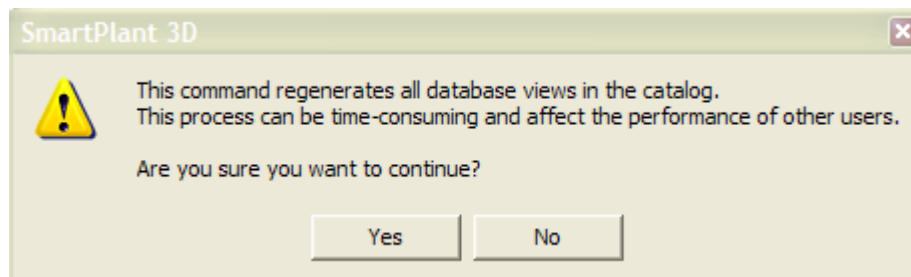
The system returns to the Catalog task. Notice the two new parts.



14. Rename the name of the two parts as follows:



15. Select Catalog -> Generate Views. This step will generate the views in the Catalog database.



16. Click “No” button. You are not going to regenerate the view at this time. (If you are working in a production catalog, you need to create the views in the catalog database)

17. Exit the SP3D application.

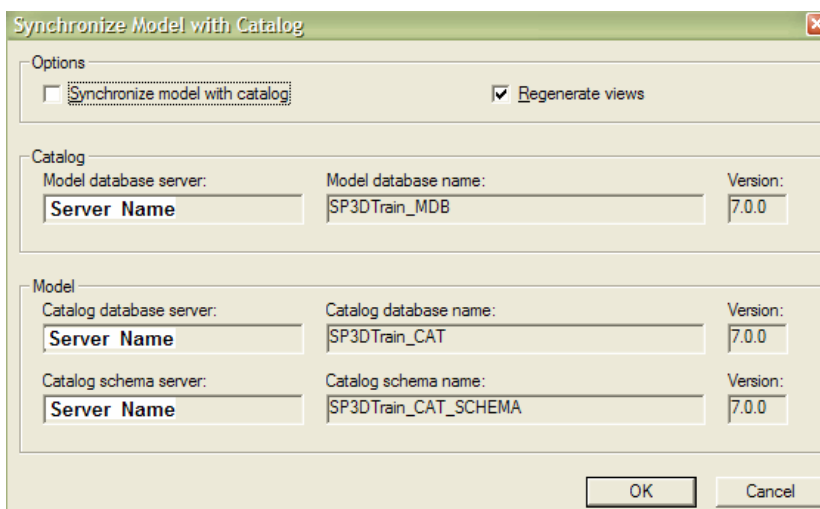
Skip step 18 through 23 if you are not working in a production catalog.

18. Go to Project Management Task.

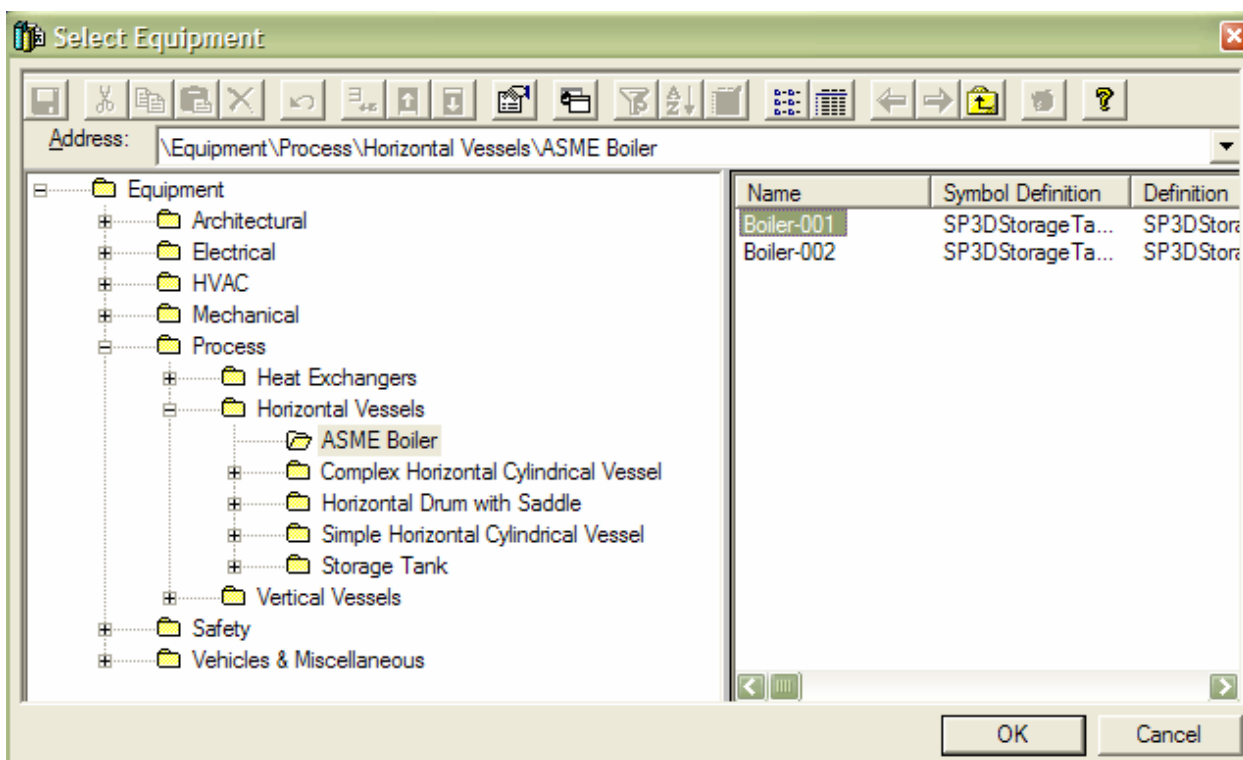
19. Select Tools -> Synchronize Model with the Catalog.

20. Uncheck the Synchronize Model with the Catalog option.

*Note: You just need to update the views in the model.*



21. Click “OK” Button.
22. Once the process is complete. Right click on the model and select regenerate the report database.
23. Click “OK” Button.
24. Go to the Equipment Task and place the Boiler-001.





## Lab 18: Creating Custom Interfaces using User Interface (UI) - (Optional)

### Objective

After completing this lab, you will be able to:

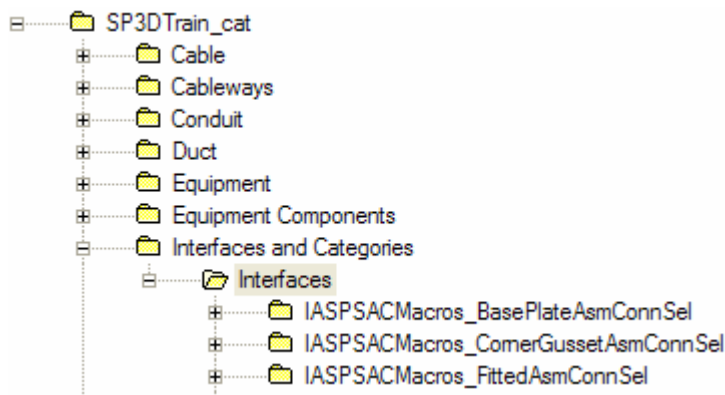
- Add User Interfaces using the User Interface


In this lab, you will add a new custom interface and two attributes for a smart equipment class called Horizontal Boiler. Use the Custom Interfaces User Interface to define the attributes name with associated data type, unit type and code list table namespace as shown below:

The screenshot shows the 'Equipment Properties' dialog box with the 'Occurrence' tab selected. The 'Category' dropdown is set to 'Equipment Specification'. Below it is a table with two columns: 'Property' and 'Value'.

Property	Value
Hold Status	On hold
Painting Responsibility	By Equipment Vendor


1. Enter the Catalog Task.
2. Make sure the Active Permission Group is set to *Permission Group 1*
3. Expand the Catalog Hierarchy ”\SP3DTrain\_cat\Interfaces and Categories\Interfaces”

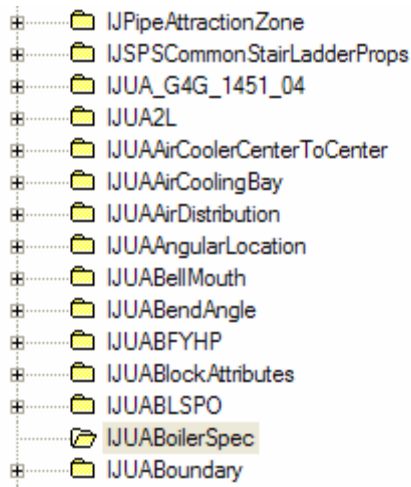



4. Go to the ribbon bar and select the Insert Row command .
5. Create a new interface called IJUABoilerSpec where the two properties will be display under Equipment Specification category as shown below:





6. Select Catalog -> Save to save the row or select Save icon .
7. Go back to the interfaces hierarchy and select the IJUABoilerSpec

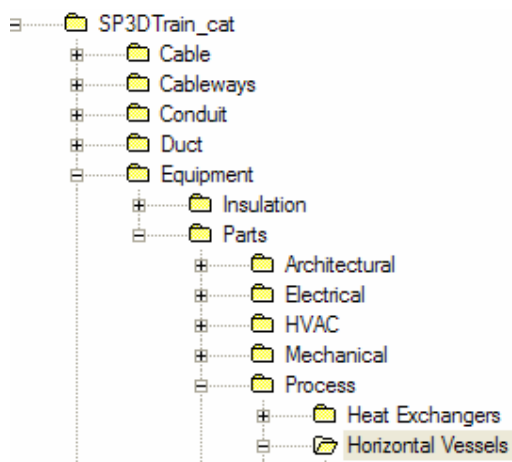


8. Go to the ribbon bar and select the Insert Row command .
9. Add the following entries:

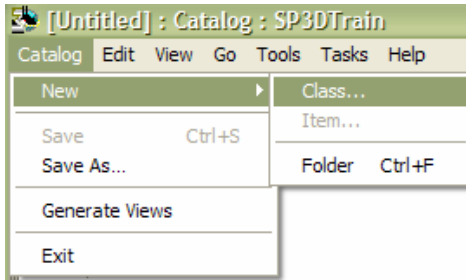
Name	User Name	Type	Units Type	Primary Units	Select List Table Name	On Property page	Is Value Required	Read Only	Description	Parent Select List Property
HoldStatus	Hold Status	Long			Hold Status	True	True	True		
PaintRes	Painting Responsibility	Long			PaintingResponsibility	True	True	False		

*Note: Select Catalog -> Save or Select Save icon  to save each row.*

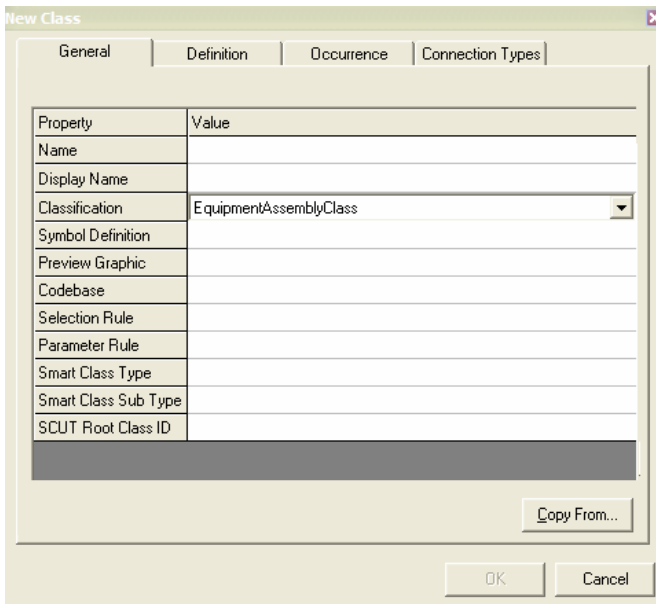
10. Go back to “\SP3DTrain\_cat\Equipment\Parts\Process\Horizontal Vessels” folder.



11. Select the Catalog -> New Class to create a Class.



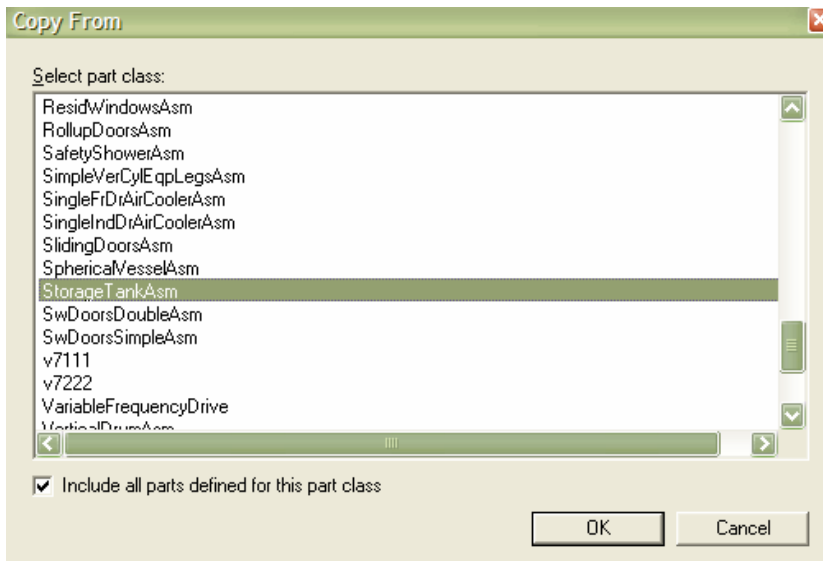
12. Make sure EquipmentAssemblyClass is defined in the Classification field.



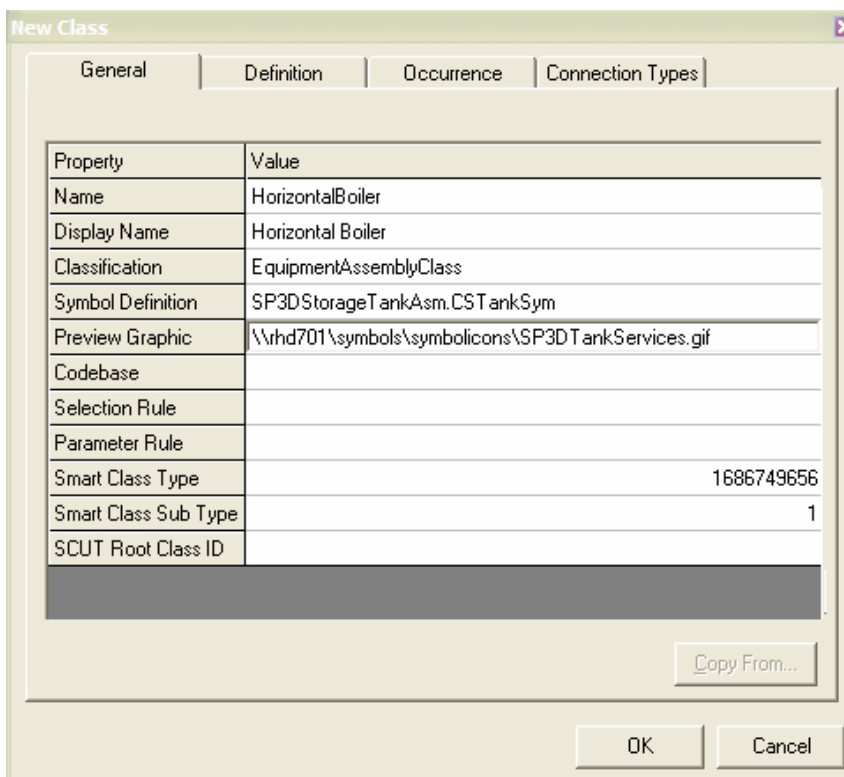
13. Select “Copy From” Button to open the Copy From dialog box.

14. Check the Include all parts defined for this part class.

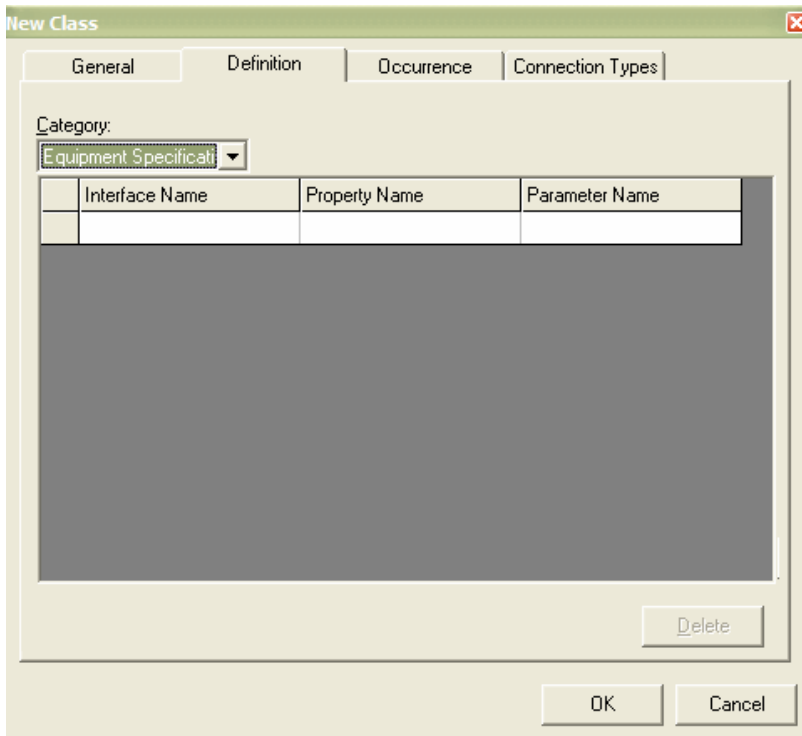
15. Select StorageTankAsm from the list.



16. Click “OK” button to return to the New Class dialog box.
17. Rename the Name and the Display Name as HorizontalBoiler and Horizontal Boiler.
18. Keyin the symbol share path where the symbol icon is located on your machine.



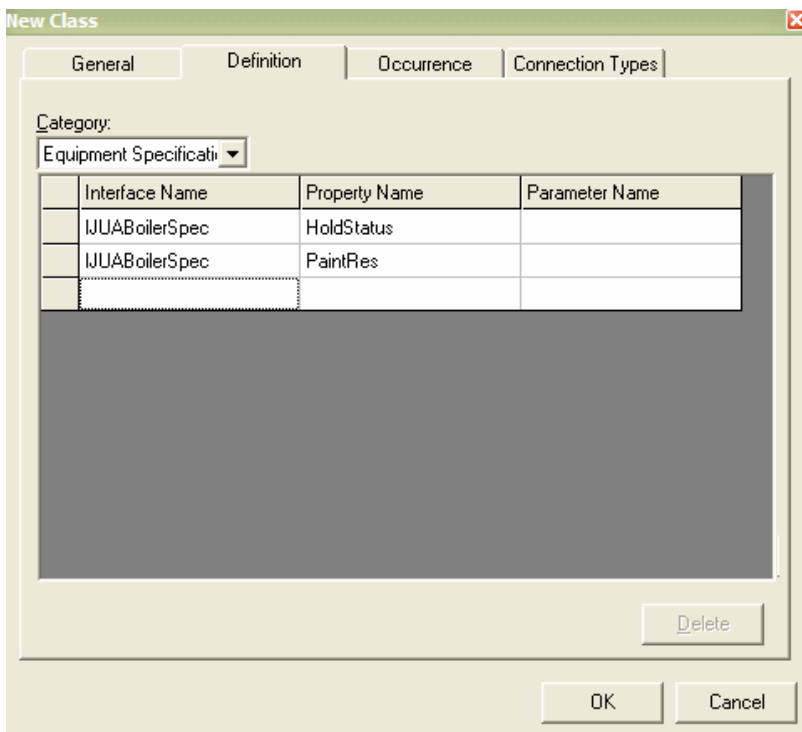
19. Select the Definition tab and Select Equipment Specification Category.



The 'New Class' dialog box is shown with the 'General' tab selected. The 'Category' dropdown is set to 'Equipment Specificati'. Below the category, there is a table with three columns: 'Interface Name', 'Property Name', and 'Parameter Name'. The table is currently empty. At the bottom right of the dialog, there are 'Delete', 'OK', and 'Cancel' buttons.

Interface Name	Property Name	Parameter Name
----------------	---------------	----------------

20. Add IJUABoilerSpec interface as shown below:

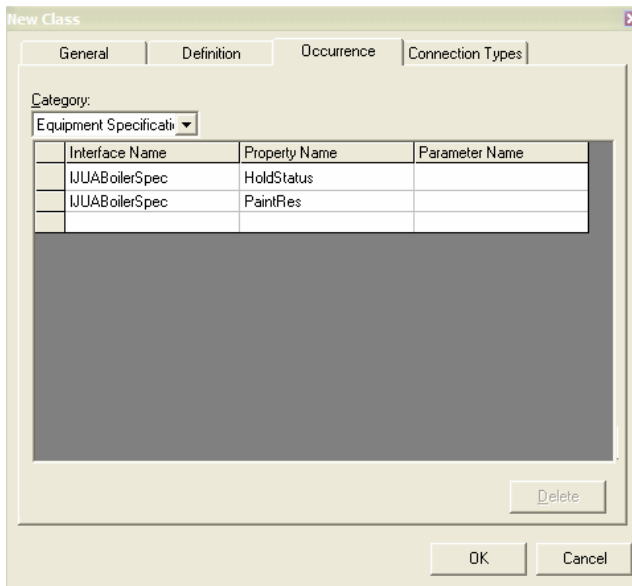


The 'New Class' dialog box is shown with the 'General' tab selected. The 'Category' dropdown is set to 'Equipment Specificati'. Below the category, there is a table with three columns: 'Interface Name', 'Property Name', and 'Parameter Name'. The table contains two rows of data. At the bottom right of the dialog, there are 'Delete', 'OK', and 'Cancel' buttons.

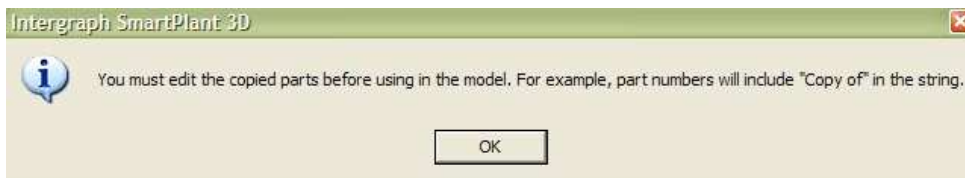
Interface Name	Property Name	Parameter Name
IJUABoilerSpec	HoldStatus	
IJUABoilerSpec	PaintRes	

21. Select the Occurrence tab and Select Equipment Specification Category.

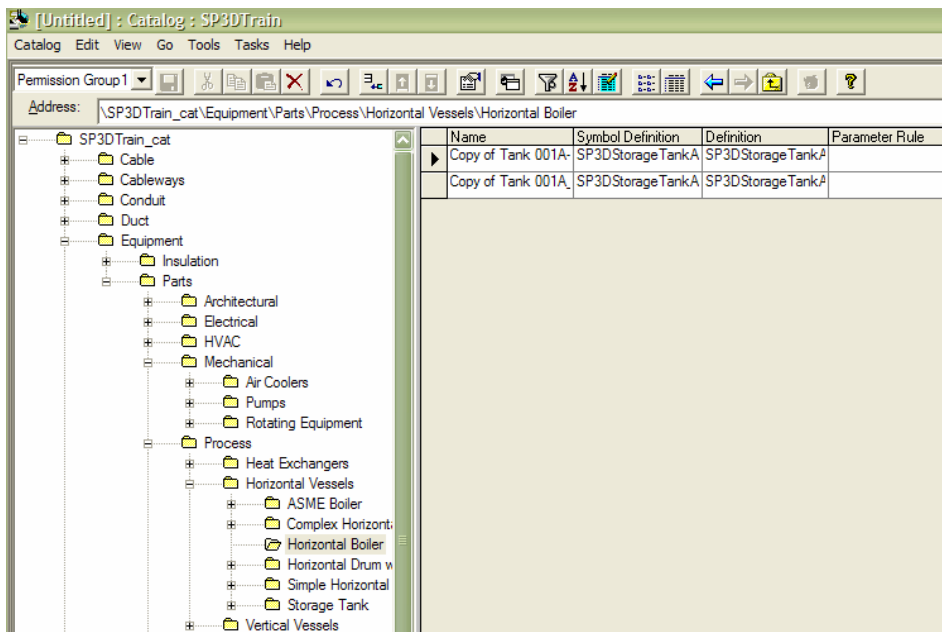
22. Add IJUABoilerSpec interface as shown below:



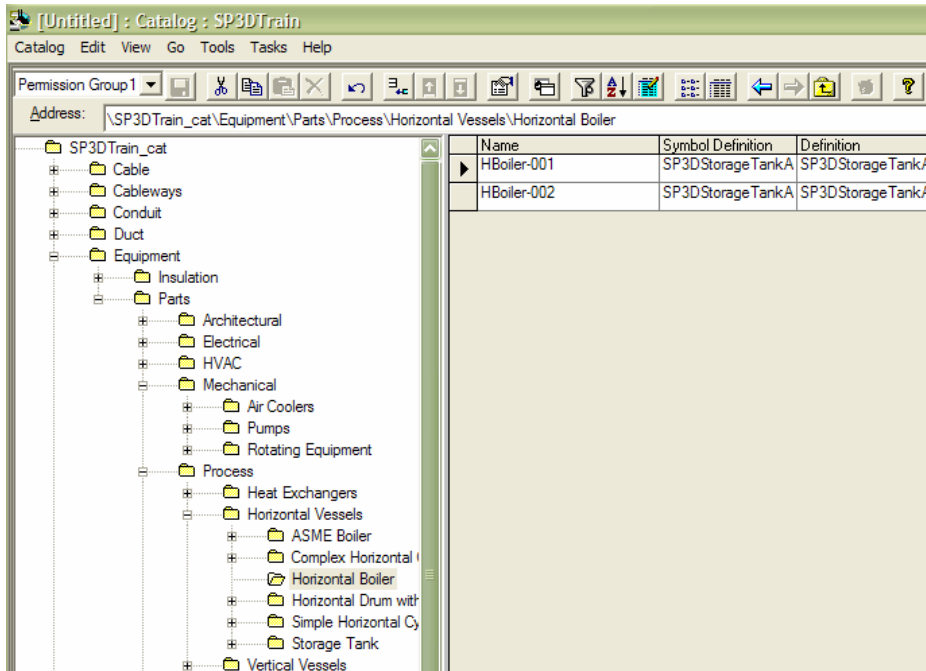
23. Click “OK” button. Read the prompt and Click “OK” button again to close the message dialog box.



24. The system returns to the Catalog task. Notice the two new parts.



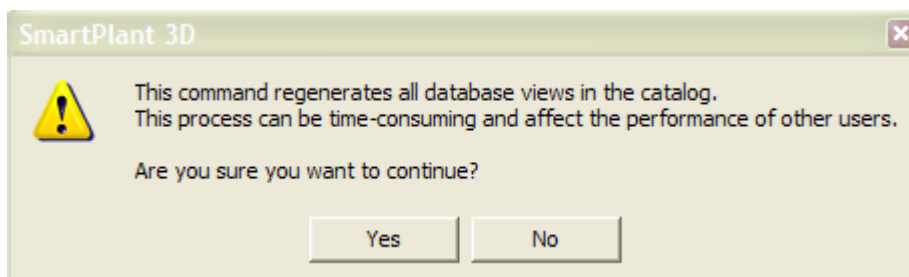
25. Rename the name of the two parts as follows:



26. Scroll to the left and set the Hold Status and Painting Responsibility values as shown below:

Hold Status	Painting Responsibility
On hold	Equipment Vendor
Not on hold	Owner

27. Select Catalog -> Generate Views. This step will generate the views in the Catalog database.



28. Hit “No” button. You are not going to regenerate the view at this time. (If you are working in a production catalog, you need to create the views in the catalog database)

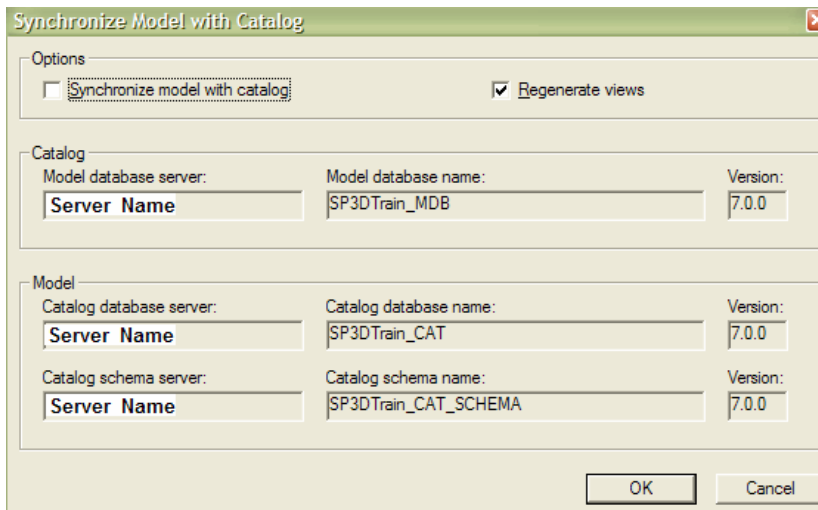
29. Exit the SP3D application.

Skip step 30 through 35 if you are not working in a production catalog.

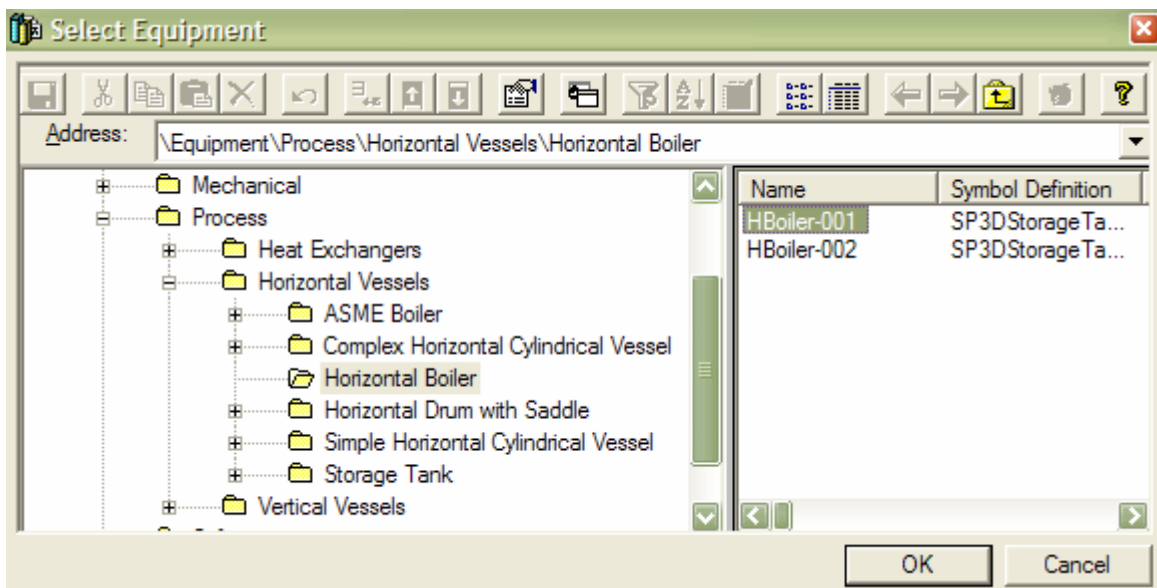
30. Go to Project Management Task.

31. Select Tools -> Synchronize Model with the Catalog.
32. Uncheck the Synchronize Model with the Catalog option.

*Note: You just need to update the views in the model.*



33. Click "OK" Button.
34. Once the process is complete. Right click on the model and select regenerate the report database.
35. Click "OK" Button.
36. Go to the Equipment Task and place the HBoiler-001.



## Lab 19: Commodity Code Builder (Optional)

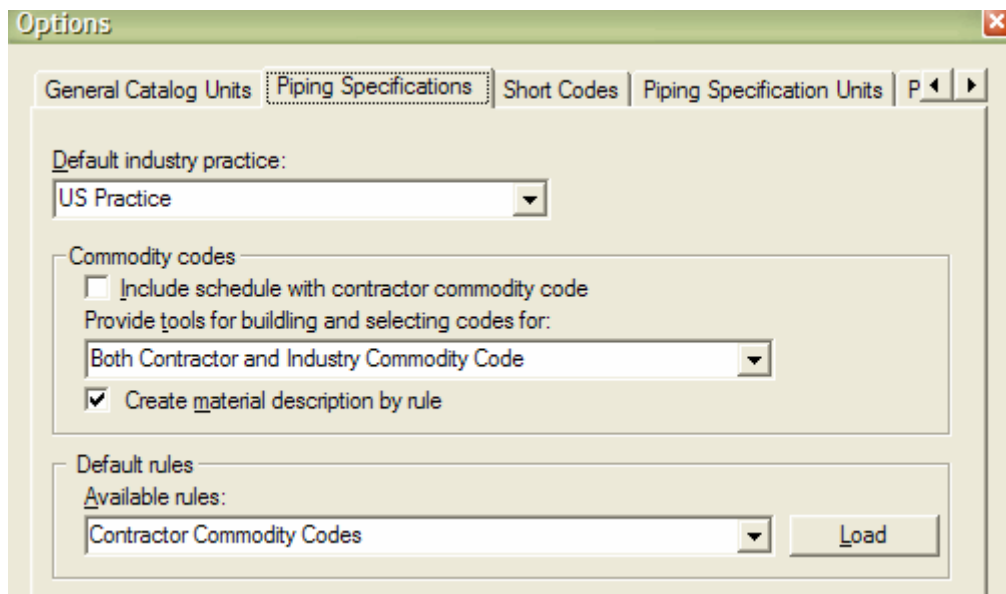
### Objectives

After completing this lab, you will be able to:

- Create a Piping Component Class using the User Interface
- Use the commodity code builder to create the commodity code
- Add a part using the User Interface

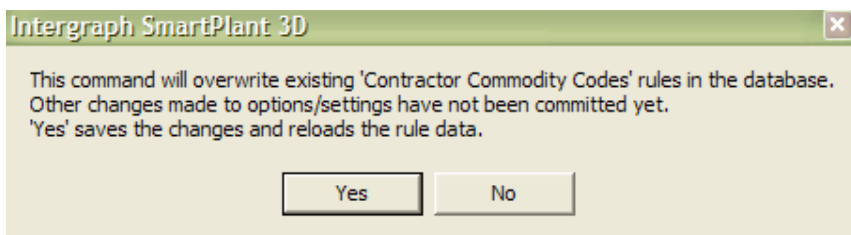
In this lab, you will create a new piping component class using the New Class Command. Once the class is created, then you use the commodity code builder to create the commodity code for the new part in this new class.

1. Start SP3D Application and connect to the Training Plant using the “All” Filter.
2. Enter the Catalog Task.
3. Make sure the Active Permission Group is set to *Permission Group 1*
4. Go Tools > Options in the Catalog task and select the Piping Specifications tab.
5. Make sure US Practice is set as the default industry practice.
6. Enable the commodity code builder option by selecting Contractor Commodity code and Industry Commodity Code.
7. Make sure the Create material description by rule option is checked.

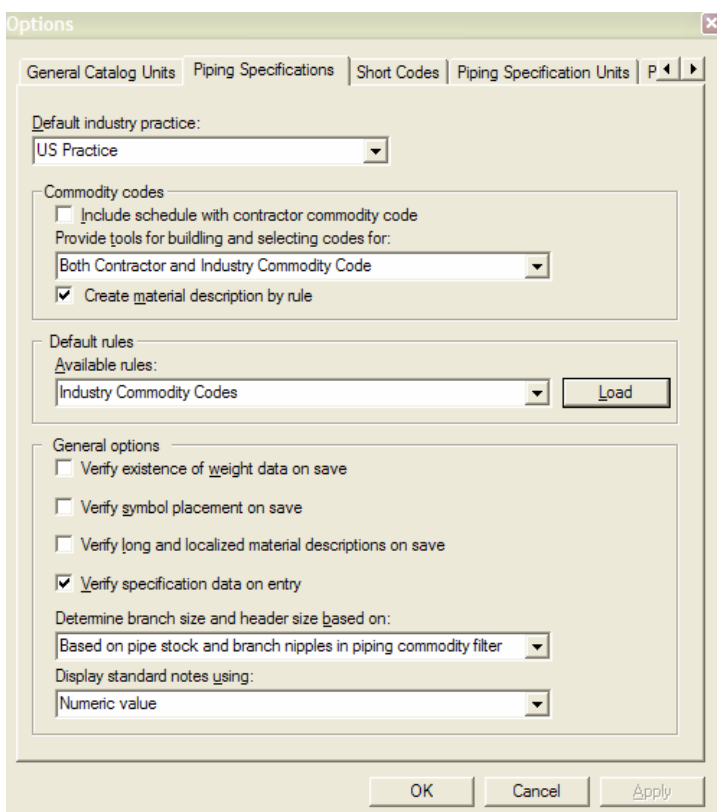




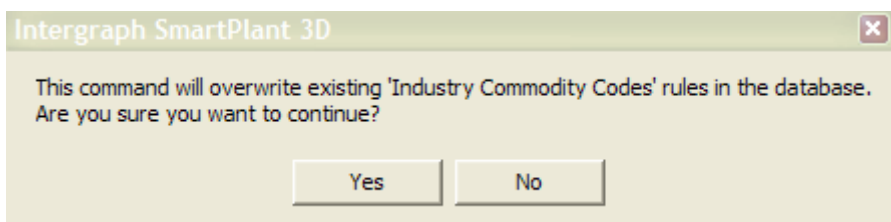
8. Click “Load” button to load the Contractor Commodity Codes rule.



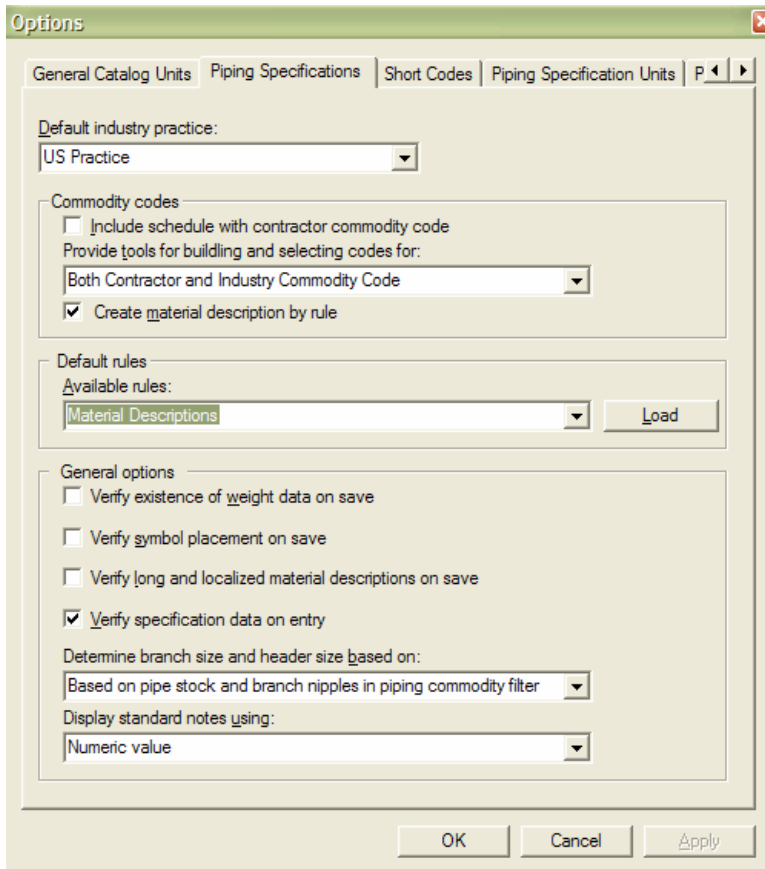
9. Click “Yes” button. Select the Industry Commodity Codes in the Available rules.



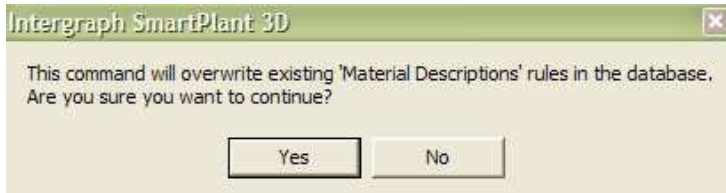
10. Click “Load” button.



11. Click “Yes” button. Select the material description rule in the Available Rules.

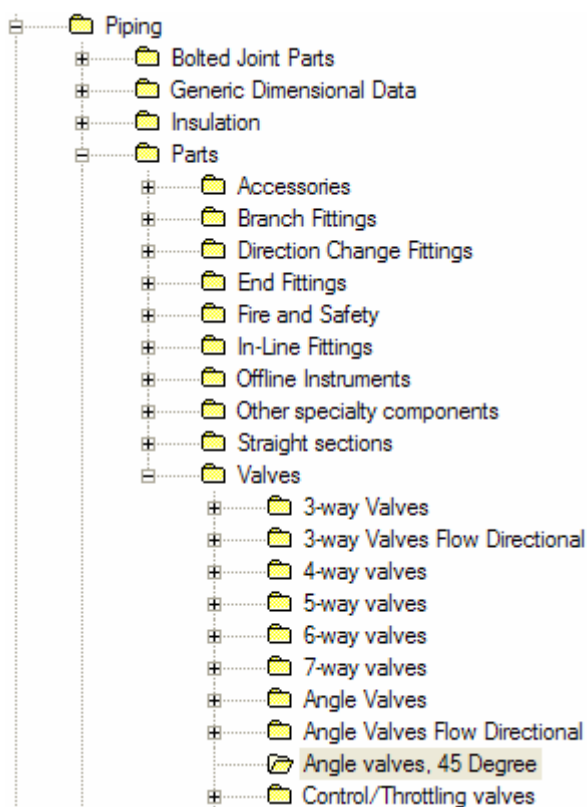


12. Click “Load” button to load the material description rule.

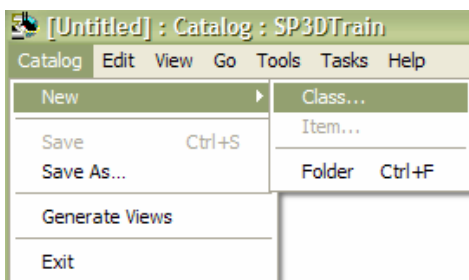


13. Click “Yes” button.

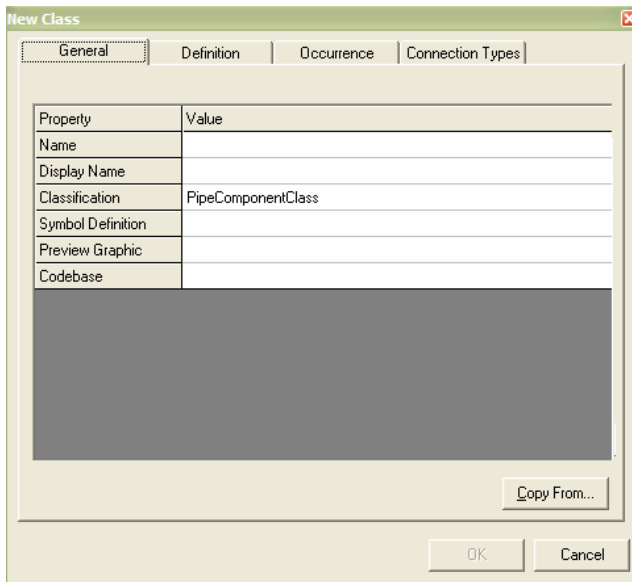
14. Expand the Catalog Hierarchy “\SP3DTrain\_cat\Piping\Parts\Valves\Angle valves, 45 Degree”



15. Select the Catalog -> New Class to create a Class.



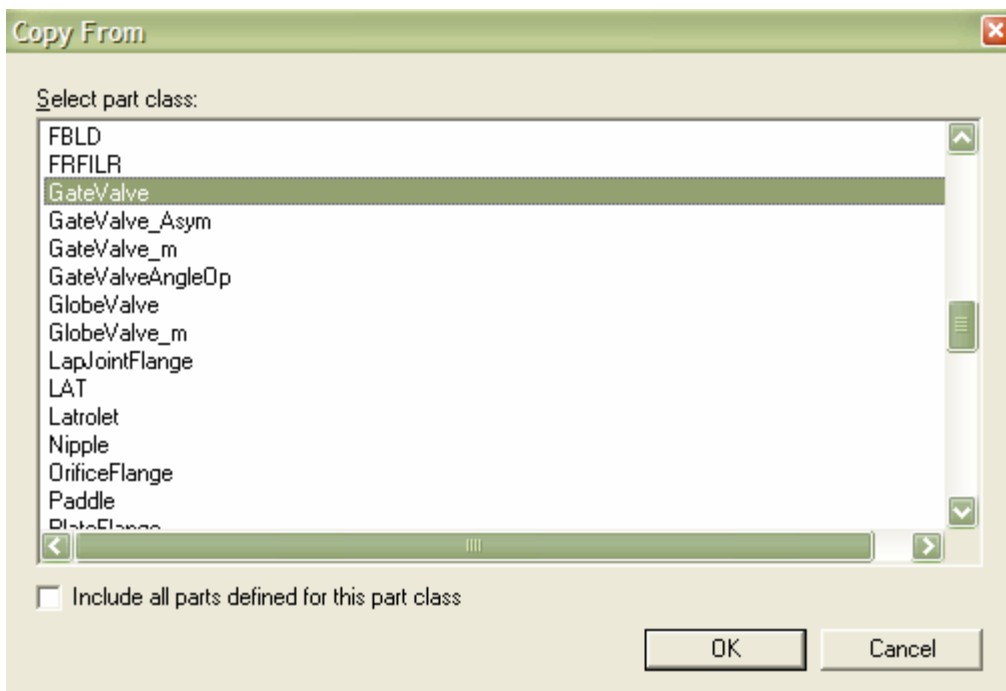
16. Make sure PipingComponentClass is defined in the Classification field.



17. Select “Copy From” Button to open the Copy From dialog box.

18. Select GateValve from the list.

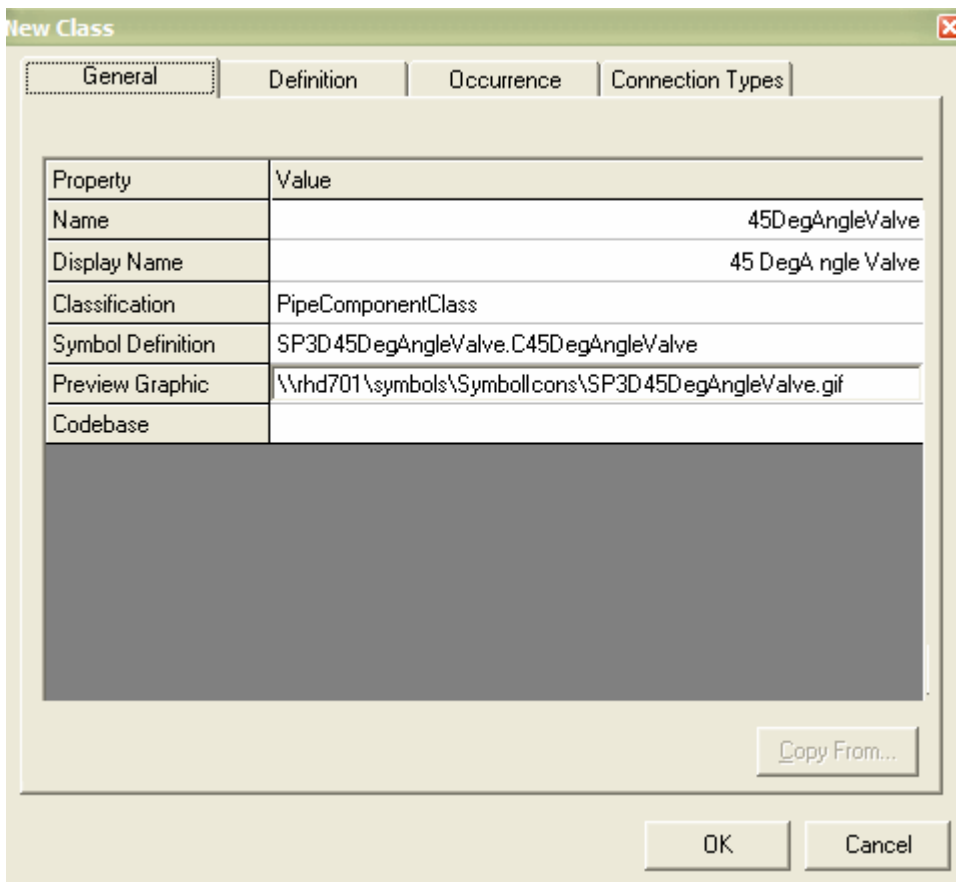
*Note: We are only copy the Gate valve schema.*



19. Click “OK” button to return to the New Class dialog box.

20. Rename the Name and the Display Name as 45DegAngleValve and 45DegAngleValve.

21. Keyin the appropriate symbol definition as SP3D45DegAngleValve.C45DegAngleValve.
22. Keyin the symbol share path where the symbol icon is located on your machine.



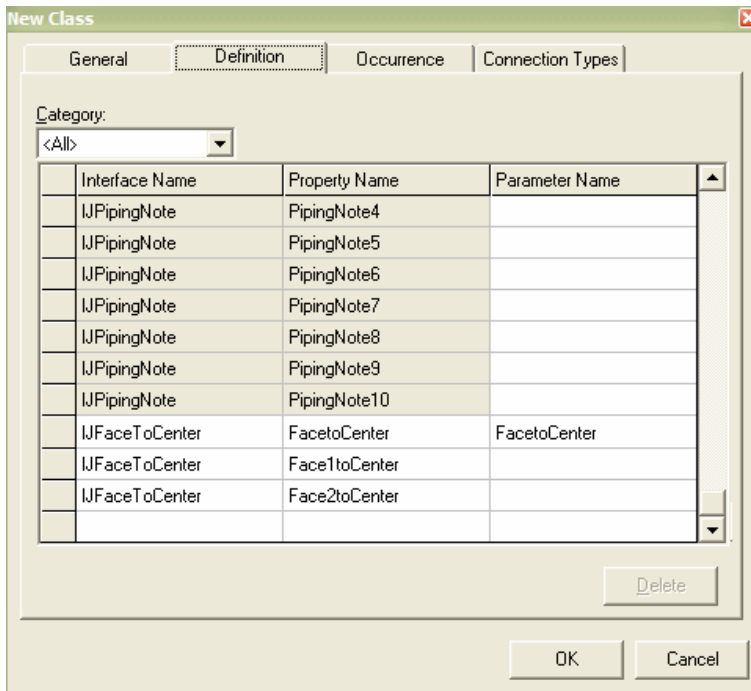
Property	Value
Name	45DegAngleValve
Display Name	45 DegA ngle Valve
Classification	PipeComponentClass
Symbol Definition	SP3D45DegAngleValve.C45DegAngleValve
Preview Graphic	\\rhd701\symbols\SymbolIcons\SP3D45DegAngleValve.gif
Codebase	

Buttons: Copy From..., OK, Cancel

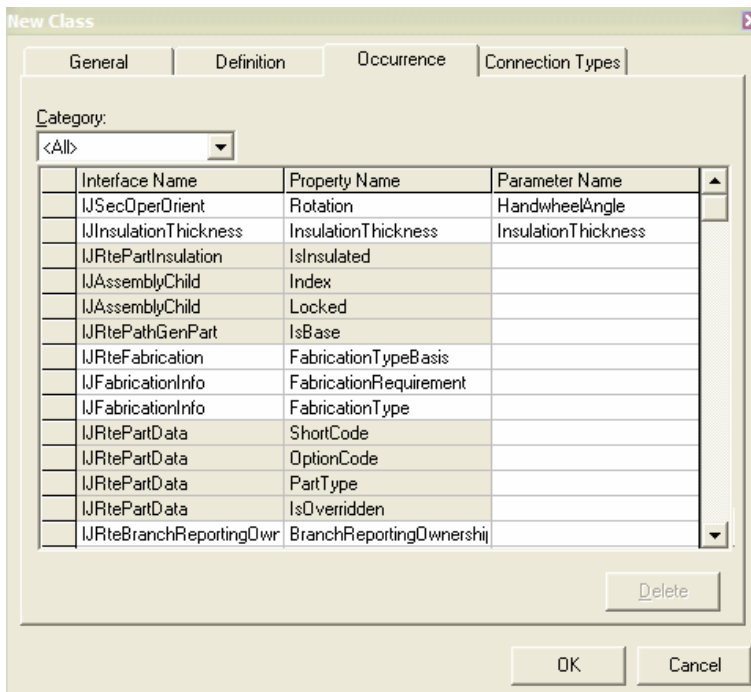
23. Go to the Definition Tab and delete FacetoFace value from the Parameter Name.

Interface Name	Property Name	Parameter Name
IJFaceToFace	FacetoFace	

24. Insert IJFacetoCenter to the list and keyin the FacetoCenter value in the Parameter Name.

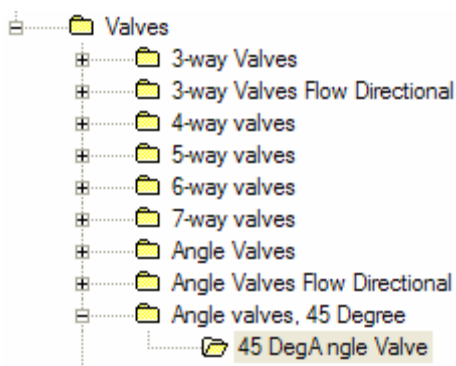


25. Go the Occurrence tab and make sure the IJSecOperOrient and IJInsulationThickness are defined in this tab.




26. Click “OK” button.

The system returns to the Catalog task. Notice the new part class.



27. Go to the ribbon bar and select the Insert Row command .

28. Go to the Industry Commodity Code and select “Select Commodity Code”.

Part Number	Part Description	Mirror Behavior Option	Industry Commodity Code	First Size Schedule	First Size Schedule Practice	Second Size Schedule
		May be mirrored		Undefined	Undefined	Undefined
Select Commodity Code						

29. Build the commodity code as shown below:

**Select Commodity Code**

Commodity type:

- Bolts
- Flanges
- Gaskets
- Miscellaneous Fittings
- Miscellaneous Parts
- Nuts
- Plain Piping and Nipples
- Stock Instruments
- Stock Piping Specialties
- Tubing and Hose
- Valves**
- Washers

Method:

☒ Build code from part properties

☐ Choose code from available parts

Part properties:

Property	Value	Code
Piping Commodity Type	Angle slurry valve, 45 Degree	VEC
Pressure Rating	150	AH
End Preparation	RFFE	AB
Valve Trim	Undefined	ZZ
Valve Manufacturer and Model Number	Undefined	ZZZ
Materials Industry Standard and Grade	A105	ABQ
Valve Requisition Classification	Undefined	ZZ
Lining Material	Undefined	ZZ
Geometric Industry Practice	US Practice	US

Commodity code:

VECAHABZZZZABQZZZUS


Material description:

Valves

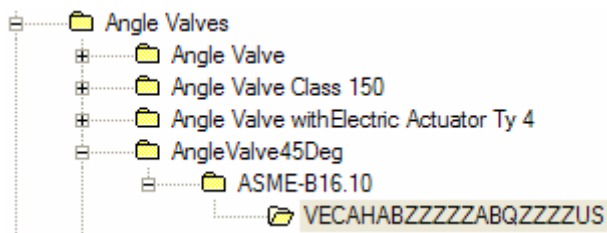
OK Cancel

30. Click “OK” button. Fill in the appropriate part data as shown below:

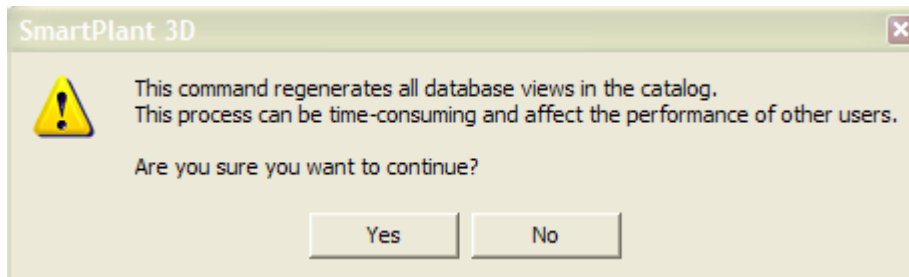
Commodity Type	Commodity Sub Class	Commodity Class	Part Data Basis	Materials Practice	Geometric Industry Practice	Geometric Industry Standard
Angle slurry valve, 45 Degree	Angle valves, 45 Degree	Valves	Default	US Practice	US Practice	ASME-B16.10
Geometry Type	Materials Grade	Materials Category	Display Prog ID	Face to Center		
Elbow, fixed angle (including angle valves)	A105	Carbon Steels	SP3D45DegAngleValve.C45DegAngleValve	6in		
Primary Size	Primary Size Units	Secondary Size	Secondary Size Units	Npd1	Npd Unit Type 1	NPD 2
4	in	4	in	4	in	4
Piping Point Basis 1	Id 1	Rating Practice 1	Pressure Rating 1	Termination Class 1	Termination Sub Class 1	End Preparation 1
Dual Flow		US Practice	150	Bolted	Flanged	RFFE
End Practice 1	End Standard 1	Schedule Practice 1	Schedule Thickness 1	Flow Direction 1		
US Practice	Default	Undefined	Undefined	Bi-directional		
Piping Point Basis 2	Id 2	Rating Practice 2	Pressure Rating 2	Termination Class 2	Termination Sub Class 2	End Preparation 2
Dual Flow		US Practice	150	Bolted	Flanged	RFFE
End Practice 2	End Standard 2	Schedule Practice 2	Schedule Thickness 2	Flow Direction 2		
US Practice	Default	Undefined	Undefined	Bi-directional		

31. Select Catalog -> Save to save the row or Select Save icon .

*Note: The system returns to the Catalog task. Notice the new part.*



32. Select Catalog -> Generate Views. This step will generate the views in the Catalog database.



33. Click “No” button. You are not going to regenerate the view at this time. (If you are working in a production catalog, you need to create the views in the catalog database)

34. Exit the SP3D application.

35. Go to Project Management Task.

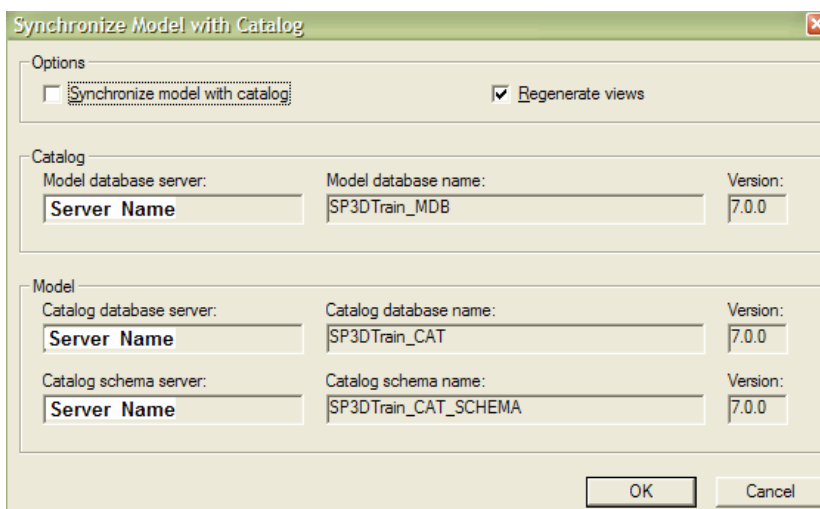
36. Skip step 37 through 41 if you are not working in a production catalog.

37. Select Tools -> Synchronize Model with the Catalog.

38. Uncheck the Synchronize Model with the Catalog option.

*Note: You just need to update the views in the model.*





39. Click “OK” Button.

40. Once the process is complete. Right click on the model and select regenerate the report database.

41. Click “OK” Button.

## Lab 20: Piping Commodity Material Control Data (UI) - (Optional)

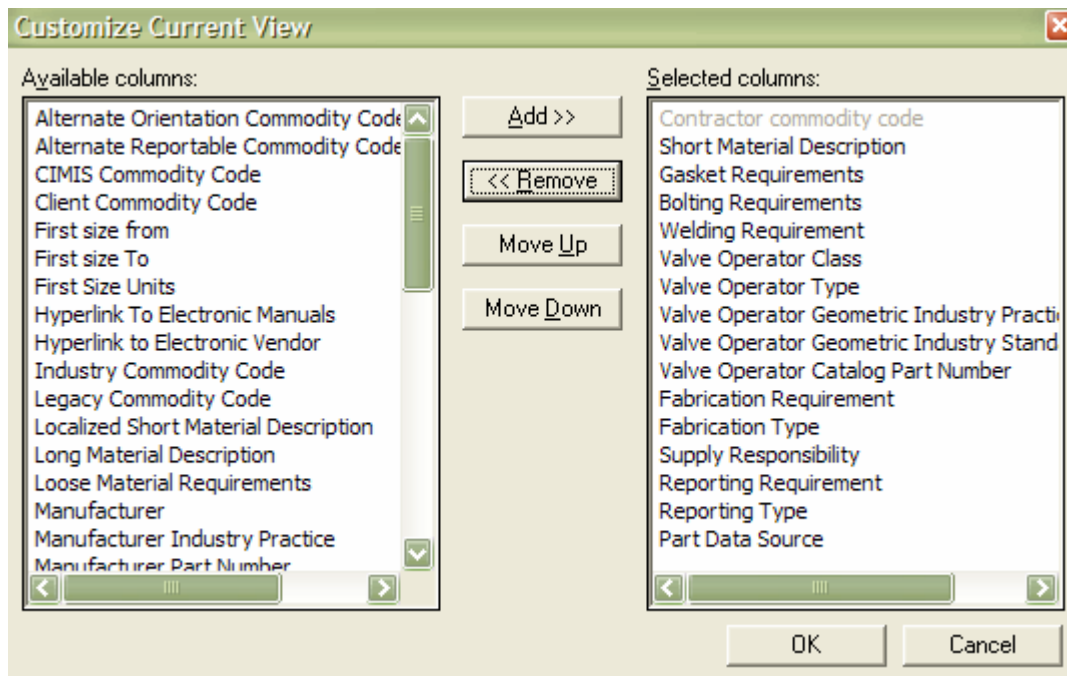
### Objective


After completing this lab, you will be able to:

- Create a record in the Piping Commodity Material Control Data using User Interface

In this lab, you will create a record for the new part in the Piping Commodity Material Control Data using the user interface.

1. Go to Catalog Task.
2. Make sure the Active Permission Group is set to *Permission Group 1*
3. Expand the Catalog Hierarchy “\SP3DTrain\_cat\Piping\Piping Specification\Piping Commodity Material Control Data”
4. Use Customize the Current View Command to remove the First size from, First size to and First size Units columns.



5. Select Insert Row Command .
6. Go to the Industry Commodity Code and select “Select Commodity Code”.

7. Select Valve in the Commodity Type tree. Pick the Angle slurry valve, 45 Degree in Piping Commodity Type field.

**Select Commodity Code**

Commodity type:

- Bolts
- Flanges
- Gaskets
- Miscellaneous Fittings
- Miscellaneous Parts
- Nuts
- Plain Piping and Nipples
- Stock Instruments
- Stock Piping Specialties
- Tubing and Hose
- Valves**
- Washers

Method:

☒ Build code from part properties

☐ Choose code from available parts

Part properties:

Property	Value	Code
Piping Commodity Type	Angle slurry valve, 45 Degree	VEC
Pressure Rating		
End Preparation		
Valve Trim		
Valve Manufacturer and Model Number		
Materials Industry Standard and Grade		
Valve Requisition Classification		
Lining Material		
Geometric Industry Practice		

Commodity code:

VEC

Material description:

OK Cancel

8. Check “Choose code from available parts” and Pick the item from the list.

**Select Commodity Code**

Commodity type:

- Bolts
- Flanges
- Gaskets
- Miscellaneous Fittings
- Miscellaneous Parts
- Nuts
- Plain Piping and Nipples
- Stock Instruments
- Stock Piping Specialties
- Tubing and Hose
- Valves**
- Washers

Method:

☐ Build code from part properties

☒ Choose code from available parts


Commodity codes:

Commodity Code	Material Description
VECAHABZZZZABQZZZZUS	

OK Cancel

9. Click “OK” button. Fill in the appropriate part data as shown below:

	Contractor commodity code	Short Material Description	Gasket	Bolting Requirements	Welding
▶	VECAHABZZZZABQZZZUS	Valves	Gasket required	Reportable bolts required	No welds required
Valve Operator	Valve Operator	Valve Operator	Valve Operator	Valve Operator	
Manual Operators	Handwheel	US Practice	ASME-B16.10	GAT-Bolted-150-3	
Fabrication	Fabrication Type	Supply	Reporting	Reporting Type	Part Data Source
By fabricator	SF	Vendor	To be reported	Included in Material Control System	Piping commodity class data

10. Select Catalog -> Save to save the row *or Select Save icon* .

## Lab 21: Piping Commodity Filter (UI) - (Optional)

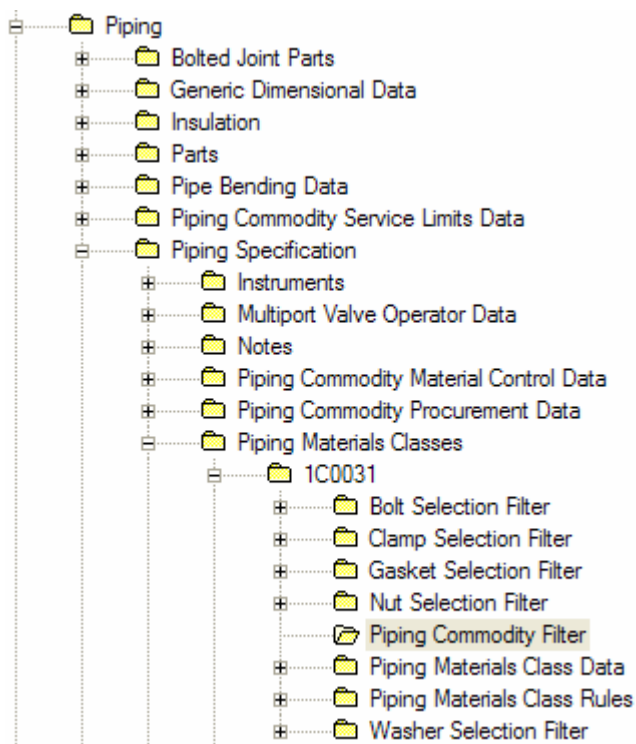
### Objective

After completing this lab, you will be able to:

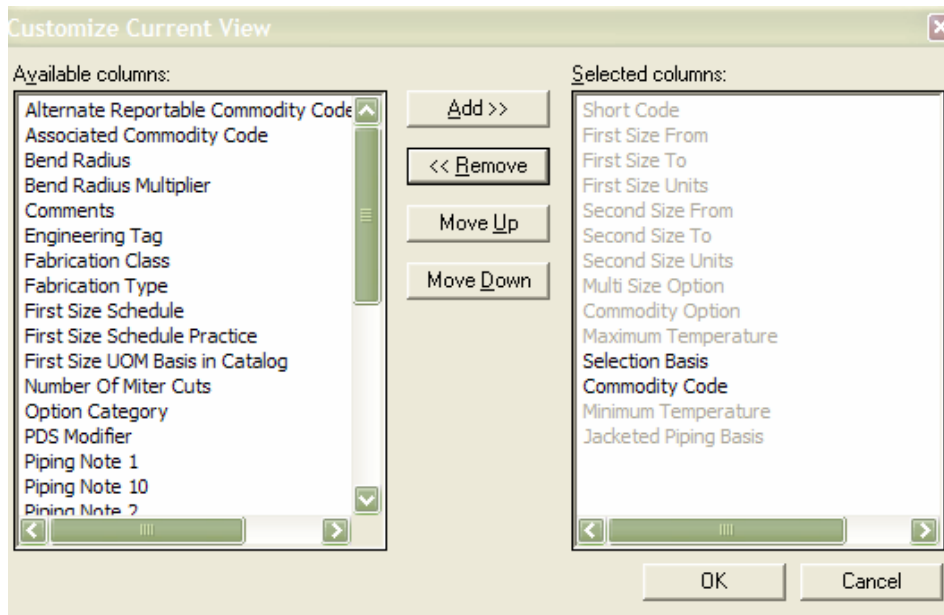
- Create a record in the Piping Commodity Filter using User Interface

In this lab, you will create a record in the Piping Commodity Filter using the user interface so that you can place the new part.

1. Go to Catalog Task.
2. Make sure the Active Permission Group is set to *Permission Group 1*
3. Expand the Catalog Hierarchy \SP3DTrain\_cat\Piping\Piping Specification\Piping Materials Classes\1C0031\Piping Commodity Filter”



4. Use Customize the Current View Command to remove the columns as shown below:




5. Click “OK” Button.
6. Fill in the appropriate data as shown below:

Short Code	First Size From	First Size To	First Size Units	Second Size From	Second Size To	Second Size Units	Multi Size Option
▶ Angle Hose Valve	4	4	in	<undefined>	<undefined>		

Commodity Option	Maximum	Selection Basis	Commodity Code
Default	<undefined>	Default	VECAHABZZZZZABQZZZZUS

7. Select Catalog -> Save to save the row or Select Save icon .
8. Go to the Piping Task and place the Angle Valve.

