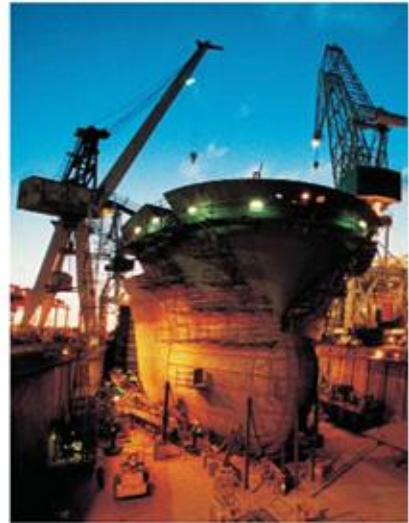
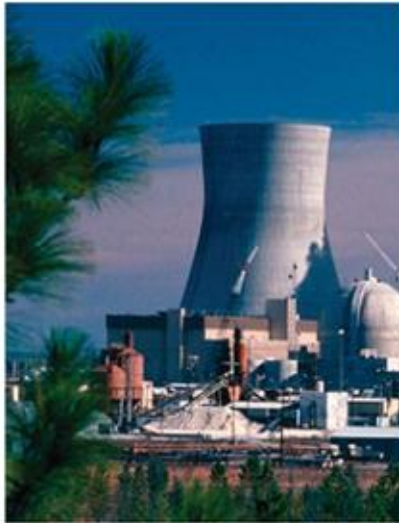


# SmartPlant 3D Equipment Reference Data

## *Student Workbook*

---

### Process, Power & Marine



## Copyright

Copyright © 2008 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Unpublished---rights reserved under the copyright laws of the United States.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>4</b>
<b>Lab 1: Creating a new Catalog Database .....</b>	<b>5</b>
<b>Lab 2: Catalog Hierarchy .....</b>	<b>7</b>
<b>Lab 3: Equipment Catalog Hierarchy .....</b>	<b>14</b>
<b>Lab 4: Working with the Custom Interface Sheet.....</b>	<b>21</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 2009.

### 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 equipment reference data.

### Course Reference Material

- SmartPlant 3D Reference Data Guide
- SmartPlant 3D Symbols Reference Data Guide
- Equipment and Furnishing Reference Data Guide
- Catalog User's Guide

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

SmartPlant 3D Training Services

## Lab 1: Creating a new Catalog Database

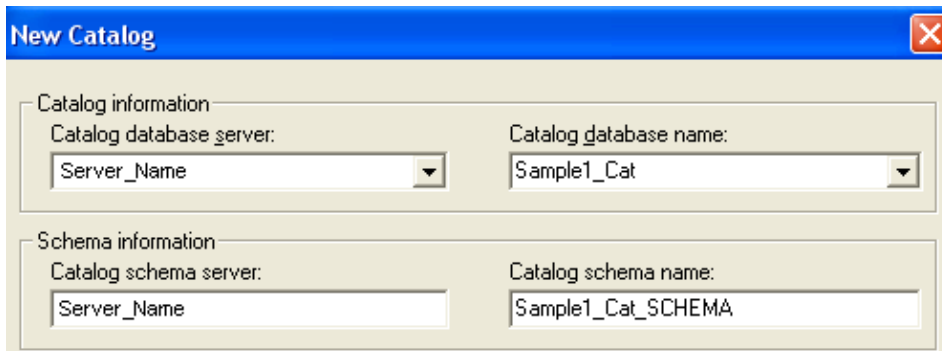
### Objective

After completing this lab, you will be able to:

- Create a new template catalog database using Project Management tool

Creating a new Catalog Database

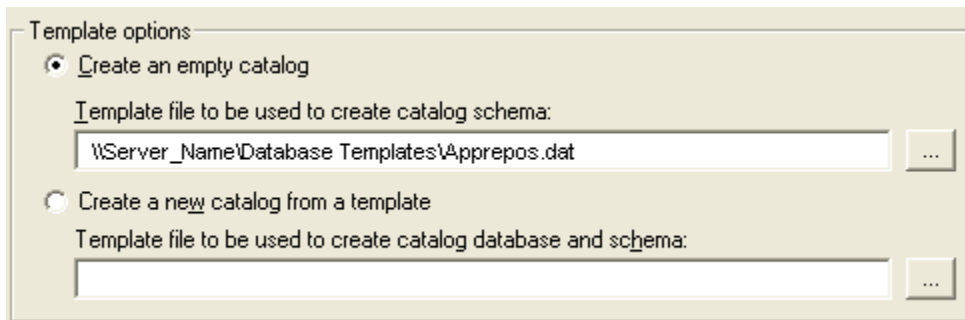
1. Start the Project Management application. Click on **Start-> Programs -> Intergraph SmartPlant 3D-> Project Management** to run the application.
2. Go to the main menu and select **Database -> New -> Catalog** to open the New Catalog dialog
3. In the Catalog **Database Server** box, select the name of the server where the Catalog Database and schema will be created.
4. To create a new database, key-in **Sample1\_Cat** in the **Database Name** box.



The 'New Catalog' dialog box is shown with the following fields:

- Catalog information:**
  - Catalog database server: Server\_Name
  - Catalog database name: Sample1\_Cat
- Schema information:**
  - Catalog schema server: Server\_Name
  - Catalog schema name: Sample1\_Cat\_SCHEMA

5. Under Template options, Check “Create an empty catalog” option and make sure the template file to be used to create the catalog schema is the Application Repository database delivered in the product. Select AppRepos.dat for SQL Server or Select APPREPOS.DMP for Oracle.



The 'Template options' section of the dialog box is shown with the following fields:

- Template options:**
  - ☒ Create an empty catalog
    - Template file to be used to create catalog schema: \\Server\_Name\\Database Templates\\Apprepos.dat
  - ☐ Create a new catalog from a template
    - Template file to be used to create catalog database and schema:

6. Under “Paths for catalog database files” area, type the symbol share location.

Paths for catalog database files

Physical database:  
Default SQL Location ...

Log file:  
Default SQL Location ...

Symbol and custom program file location:  
\\Server\_Name\\Symbols ...

OK Cancel

7. Click **OK** button.

## Lab 2: Catalog Hierarchy

### Objective

After completing this lab, you will be able to:

- Add/Modify Module Type Hierarchy

### Module Hierarchy

In this lab, you will add two new module classes called *TransformerType1* and *PipeRackType1* into the Module Type catalog hierarchy. To create the classification folders as shown below, you must edit the ModuleType Excel workbook, which contain three sheets that control the hierarchy:

**ClassNodeType**, **R-Hierarchy**, and **R-ClassNodeDescribes**. When you add a module class to the catalog hierarchy, you must update these sheets, where necessary, in order to see the data in the Catalog task or Catalog browser dialog box.

*CatalogRoot* is the *RootNode* of the ReferenceData Catalog Browser. It cannot have a parent node. It is a named-object. Similarly, *RefDataModulesRoot* is the root for the module hierarchy which appears as a child of the *CatalogRoot*. *Electrical*, *Transfomers*, *Structure* and *PipeRacks* are the nodes to facilitate the easy browsing. *TransformerType1* and *PipeRackType1* are the Module Classes.

1. Open the ModuleTypes.xls Excel workbook.
2. Go the ClassNodeType sheet and add the following entries. Remember to add the letter A to all new records.

Head	<u>ObjectName</u>	<u>Name</u>
Start		
	Equipment Modules	Equipment
	Piping Modules	Piping
	Support Modules	Supports
a	Electrical	Electrical
a	Structure	Structure
a	Transformers	Transformers
a	PipeRacks	PipeRacks
End		

*Note: This sheet describes the nodes used to navigate the CatalogBrowser hierarchy.*

**ObjectName** should be unique across the entire database to identify a node uniquely.

**Name** is the displayed name which appears in the CatalogBrowser hierarchy.

3. Go the R-Hierarchy sheet and add the following entries. Remember to add the letter A to all new records.

Head	<u>RelationSource</u>	<u>RelationDestination</u>
Start		
	CatalogRoot	RefDataModulesRoot
	RefDataModulesRoot	Equipment Modules
	RefDataModulesRoot	Piping Modules
	RefDataModulesRoot	Support Modules
a	RefDataModulesRoot	Electrical
a	RefDataModulesRoot	Structure
a	Electrical	Transformers
a	Structure	PipeRacks
End		

*Note: RelationSource and RelationDestination entries are **ObjectNames** of the objects participating in the relationship. A relationship can't be made unless the objects mentioned in Relationsource / RelationDestination columns are already created.*

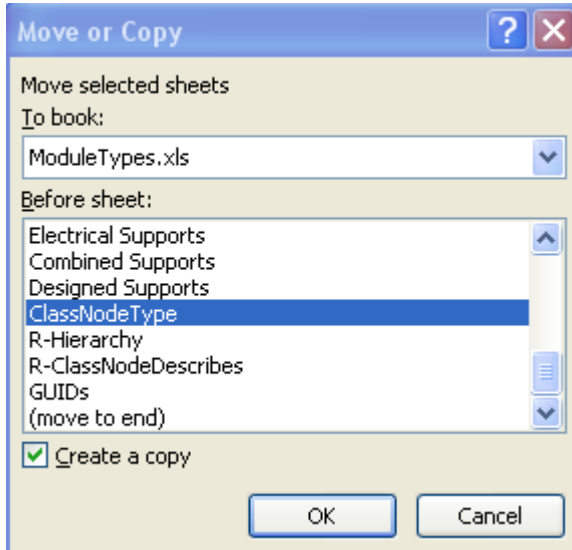
4. Go the R-ClassNodeDescribes sheet and add the following entry. Remember to add the letter A to all new records.

Head	<u>RelationSource</u>	<u>RelationDestination</u>
Start		
a	Transformers	TransformerType1
a	PipeRacks	PipeRackType1
	Equipment Modules	Conveyor System
	Equipment Modules	Heat Exchanger
	Equipment Modules	Mixing Tank
	Piping Modules	Drain Arrangement
	Piping Modules	PumpDischargeArrgment
	Piping Modules	PumpSuctionArrgment
	Piping Modules	Vent Arrangement
	Support Modules	Pipe Supports
	Support Modules	HVAC Supports
	Support Modules	Electrical Supports
	Support Modules	Combined Supports
	Support Modules	Designed Supports
End		

*Note: 'R-ClassNodeDescribes' is the relationship between an object from ClassNodeType worksheet as RelationSource and another object which is a PartClass as RelationDestination. RelationSource entries are **ObjectNames** of the objects participating in the relationship. RelationDestination entries are names of the PartClasses sheets participating in the relationship.*

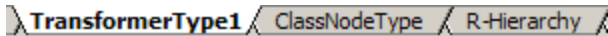


- Copy the Vent Arrangement Class by doing the following:  
Select the Vent Arrangement Sheet. Right Click to Open the Move or Copy dialog box. Enable the copy option. Select the OK button to copy the sheet before the GUIDs sheet.

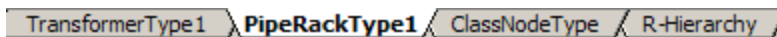


- Rename the sheet as TransformerType1.

*Note: Make sure you do not add any blank space or special characters for the name.*



- Repeat the above steps to create the PipeRackType1 class.



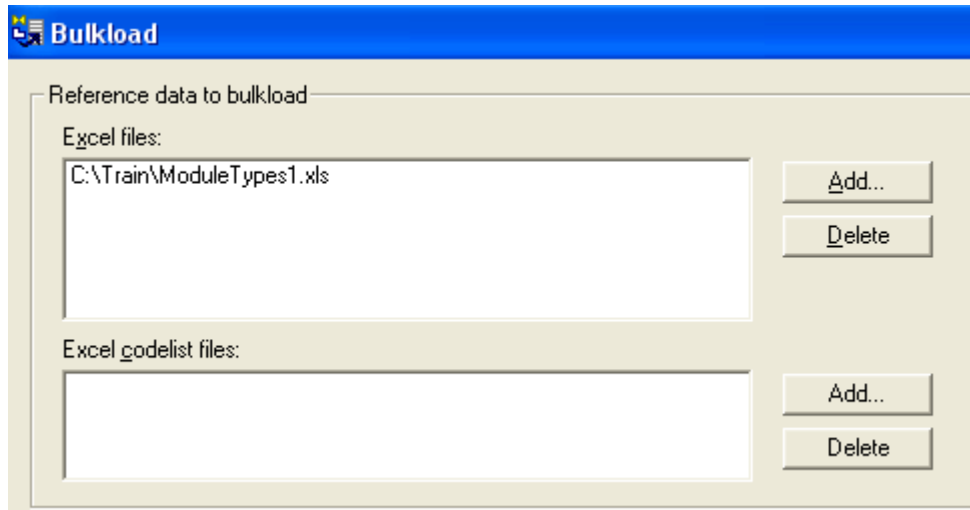
- Add A on both classes as follows:

Definition	PartClassType	SymbolDefinition
<b>a</b>	ModuleClass	
<b>Head</b>	<u>Name</u>	<u>Description</u>
<b>Start</b>		
<b>End</b>		

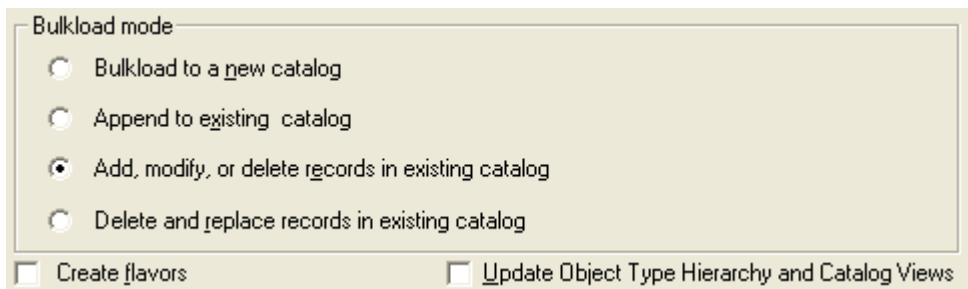
- Save the changes to a new workbook called ModuleTypes1.xls. Remember to add the letter A to all new records.

10. Select Start -> All Programs -> Intergraph SmartPlant -> Database Tools -> Bulkload Reference Data to run the Bulkload Utility.

11. Select the ModuleTypes1.xls Excel file under Excel files using the Add button.



12. Under Bulkload Mode options, select the A/M/D bulkload mode and uncheck “Update Object Type Hierarchy and Catalog Views” option.



Note: “Update Object Type Hierarchy and Catalog Views” option is provided that will allow the catalog administrator to choose when the Business Object Classification Hierarchy (BOC) and catalog views are updated.

13. Under Catalog information area, select the server name and select the training catalog databases. Last, define the path for the error log file and key in the symbol share location.

Catalog information

Database Type  
MSSQL

Database server name: Server\_Name Database name: SP3DTrain\_cat

Schema Information

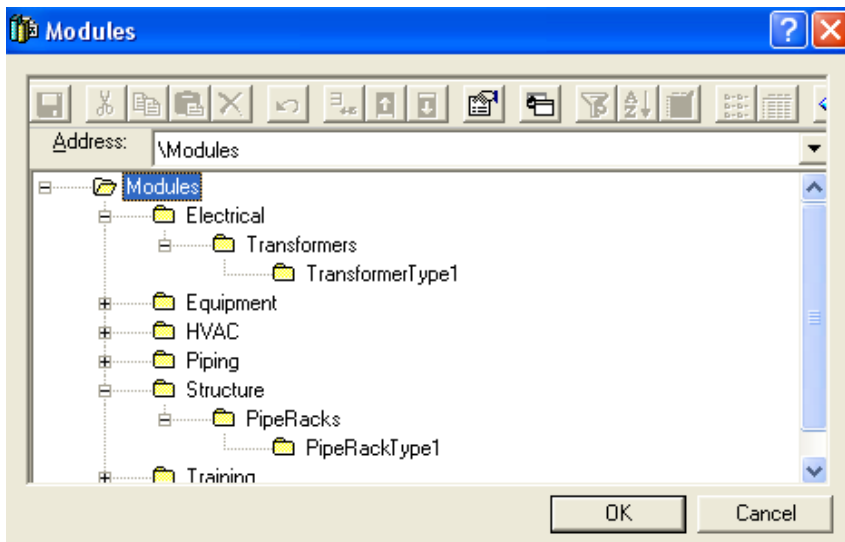
Catalog schema server : Server\_Name Catalog schema database : SP3DTrain\_cat\_SCHEMA

Log file:  
C:\Train\SP3DTrain\_cat.log

Symbol and custom program file location:  
\\Server\_Name\Symbols

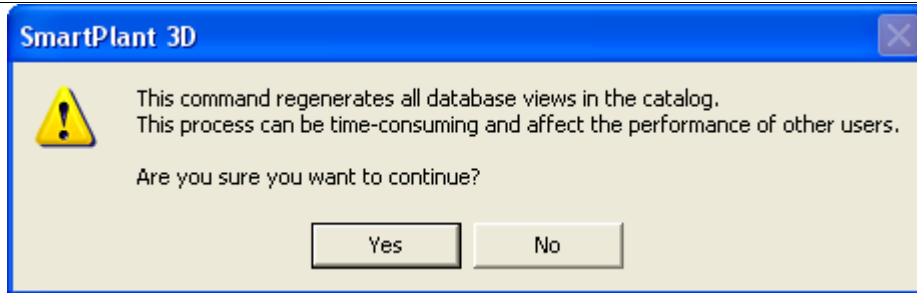
14. Select Load button to start the process.

15. Once the process is complete, go to the Common Task and run the Copy to Catalog command to check the results.



Note: The following steps must be performed if you skipped the Business Object Classification Hierarchy (BOC) and catalog views update.

16. Open a session and go to the catalog task. Select the Catalog -> Generate Views option. The system will display a message dialog. Select Yes button to continue.



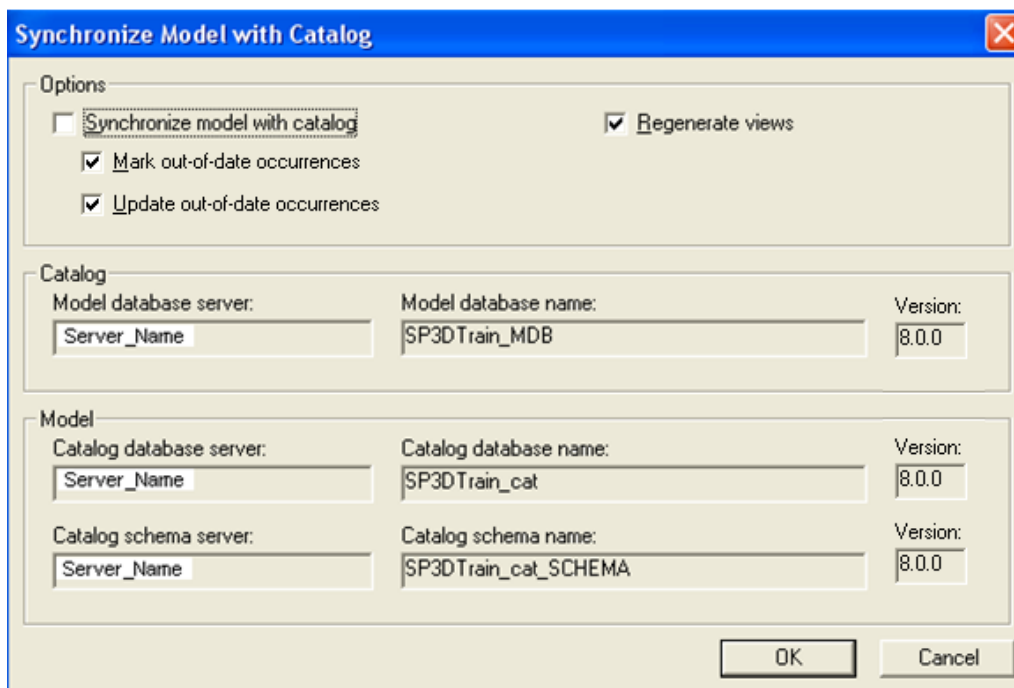
Note: The following needs to be performed on a production catalog to ensure that the data set is correct and consistent.

17. Run the Project Management Task. Select the Model in the hierarchy.

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

19. Uncheck the Synchronize Model with the Catalog option.

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



20. Hit "OK" Button.

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

**Regenerate Reports Database**

Database type:  
MSSQL

Reports database

Reports database server: Server\_Name Reports database name: SP3DTrain\_RDB

Paths for the reports database files

Physical database: Default SQL Location Log file: Default SQL Location

Reports schema

Reports schema server: Server\_Name Reports schema name: SP3DTrain\_RDB\_SCHEMA

Paths for the reports schema files

Physical database: Default SQL Location Log file: Default SQL Location

OK Cancel

22. Hit “OK” Button.

## Lab 3: Equipment Catalog Hierarchy

### Objective

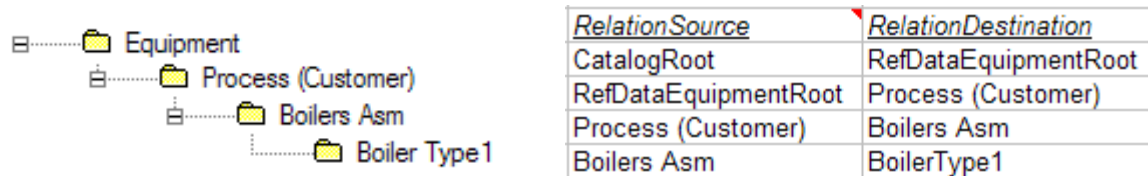
After completing this lab, you will be able to:

- Add/Modify Equipment Catalog Hierarchy

### Equipment Hierarchy

All the nodes (Classification folders) are **ClassNodeType** objects except for the leaf nodes which are Smart Classes. A relation between two nodes can be created in the 'R-Hierarchy' worksheet. A relation between a **ClassNodeType** object and a Smart Class can also be created in the 'R-Hierarchy' worksheet.

In this lab, you will add a new smart class called **Boiler Type1** into the equipment catalog hierarchy. To create the classification folders as shown below, you must edit the Equipment Excel workbook, which contain two sheets that control the hierarchy: **ClassNodeType** and **R-Hierarchy**. When you add a smart class to the catalog hierarchy, you must update these sheets, where necessary, in order to see the data in the Catalog task or Catalog browser dialog box.



*CatalogRoot* is the *RootNode* of the *ReferenceData Catalog Browser*. It cannot have a parent node. It is a named-object. Similarly, *Equipment* is the root for the equipment hierarchy which appears as a child of the *CatalogRoot*. *Process (Customer)* and *Boilers Asm* are the nodes to facilitate the easy browsing. *Boiler Type1* is the Smart Class.

1. Open the Equipment.xls Excel workbook.
2. Go the **ClassNodeType** sheet and add the following entries. Remember to add the letter A to all new records.

Head	ObjectName	Name
Start		
a	Process (Customer)	Process (Customer)
a	Boilers Asm	Boilers Asm

*Note: This sheet describes the nodes used to navigate the CatalogBrowser hierarchy.*

*ObjectName* should be unique across the entire database to identify a node uniquely.

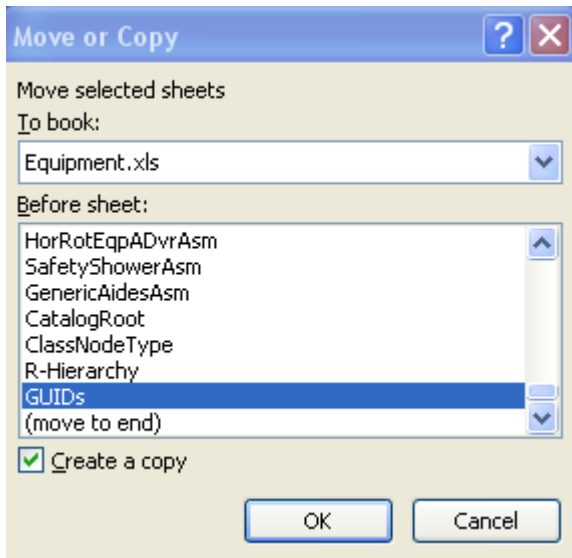
**Name** is the displayed name which appears in the CatalogBrowser hierarchy.

- Go the R-Hierarchy sheet and add the following entries. Remember to add the letter A to all new records.

Head	RelationSource	RelationDestination
Start		
a	RefDataEquipmentRoot	Process (Customer)
a	Process (Customer)	Boilers Asm
a	Boilers Asm	BoilerType1

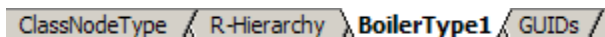
*Note: RelationSource and RelationDestination entries are **ObjectNames** of the objects participating in the relationship. A relationship can't be made unless the objects mentioned in Relationsource / RelationDestination columns are already created.*

- Copy the StorageTankAsm sheet by doing the following:  
Select the StorageTankAsm Sheet. Right Click to Open the Move or Copy dialog box. Enable the copy option. Select the OK button to copy the sheet before the GUIDs sheet.



- Rename the sheet as BoilerType1.

*Note: Make sure you do not add any blank space or special characters for the name.*



- Rename the name and description for both items as follows:

<u>Name</u>	<u>PartDescription</u>
BoilerType1 001A-E	BoilerType1
BoilerType1 001A_IMP-E	BoilerType1

7. Rename UserClassName and OccClassName as follows:

<b>UserClassName</b>	<b><u>OccClassName</u></b>
Boiler Type1	Boiler Type1

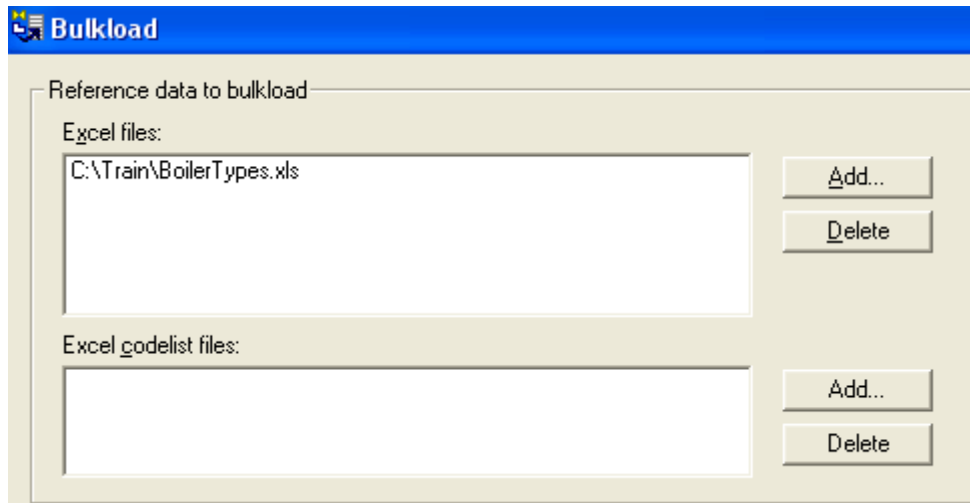
*Note: The UserClassName is also known as a definition class name. You can use this field to provide a more meaningful name for the class or a name with blank spaces in it. This name appears in the Catalog task and Catalog browser dialog box. The OccClassName appears in the business object hierarchy on the Object Type tab on the Filter Properties dialog boxes.*

8. Save the changes to a new workbook called BoilerTypes.xls. Remember to add the letter A to all new records.

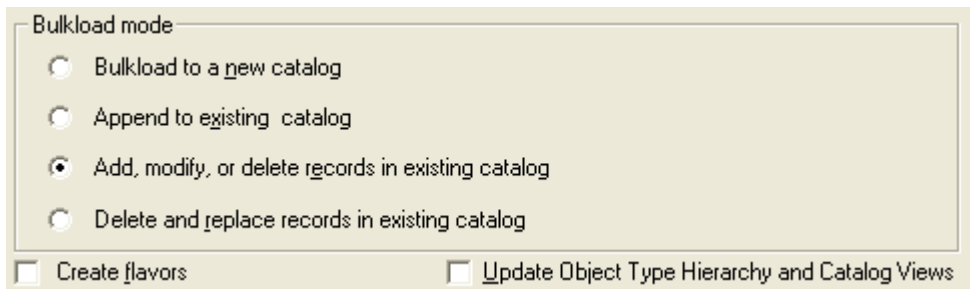
<b>Definition</b>	<u>PartClassType</u>	<u>SymbolDefinition</u>
<b>a</b>	EquipmentAssemblyClass	SP3DStorageTankAsm.CSTankSym
<b>Head</b>	<u>Name</u>	<u>PartDescription</u>
<b>Start</b>		
<b>a</b>	BoilerType1 001A-E	BoilerType1
<b>a</b>	BoilerType1 001A_IMP-E	BoilerType1
<b>End</b>		

9. Select Start -> All Programs -> Intergraph SmartPlant -> Database Tools -> Bulkload Reference Data to run the Bulkload Utility.
10. Select the BoilerTypes.xls Excel file under Excel files using the Add button.



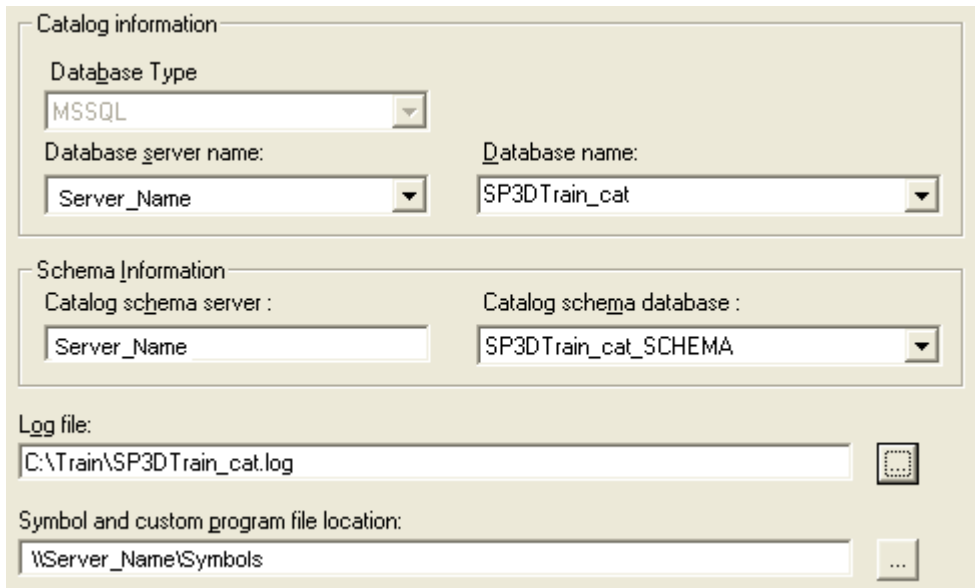


11. Under Bulkload Mode options, select the A/M/D bulkload mode and uncheck “Update Object Type Hierarchy and Catalog Views” option.



Note: “Update Object Type Hierarchy and Catalog Views” option is provided that will allow the catalog administrator to choose when the Business Object Classification Hierarchy (BOC) and catalog views are updated.

12. Under Catalog information area, select the server name and select the training catalog databases. Last, define the path for the error log file and key in the symbol share location.



Catalog information

Database Type  
MSSQL

Database server name: Server\_Name Database name: SP3DTrain\_cat

Schema Information

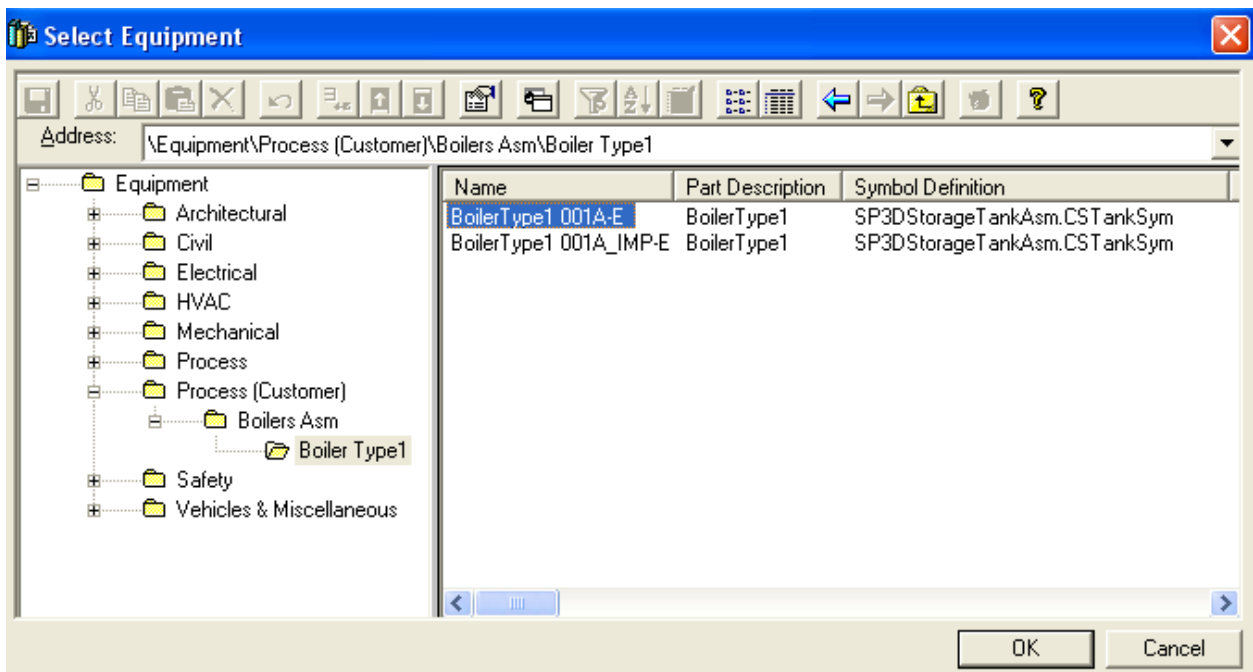
Catalog schema server: Server\_Name Catalog schema database: SP3DTrain\_cat\_SCHEMA

Log file:  
C:\Train\SP3DTrain\_cat.log

Symbol and custom program file location:  
\\Server\_Name\Symbols

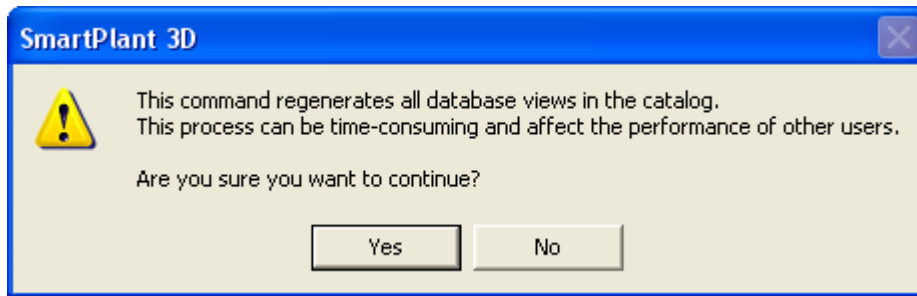
13. Select Load button to start the process.

14. Once the process is complete, go to the Equipment Task and place the Boiler Type1.



Note: The following steps must be performed if you skipped the Business Object Classification Hierarchy (BOC) and catalog views update.

15. Open a session and go to the catalog task. Select the Catalog -> Generate Views option. The system will display a message dialog. Select Yes button to continue.



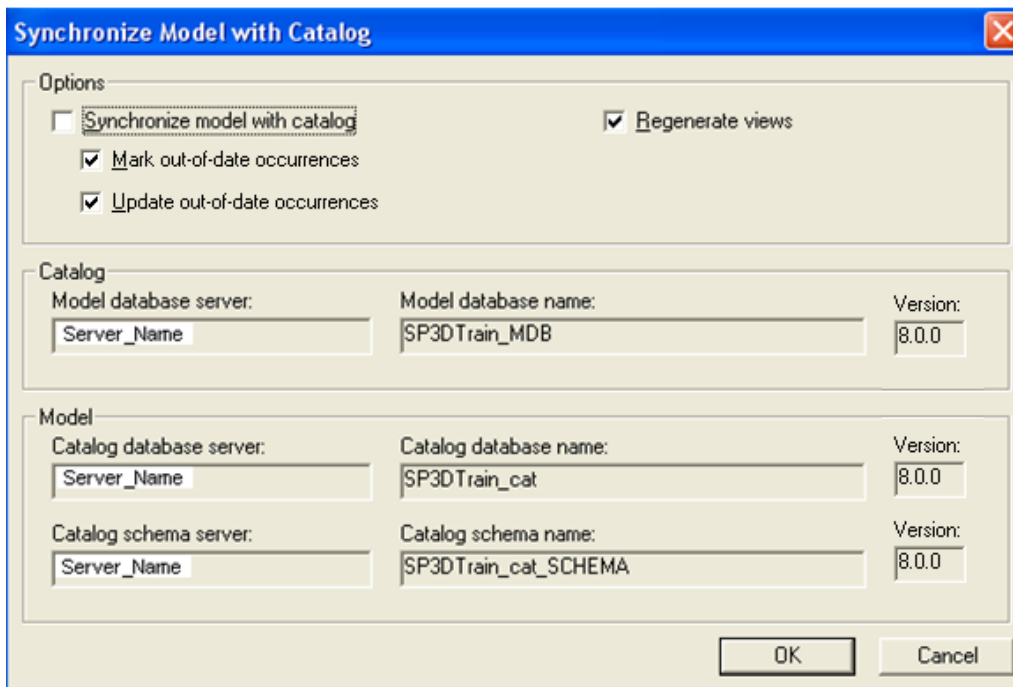
Note: The following needs to be performed on a production catalog to ensure that the data set is correct and consistent.

16. Run the Project Management Task. Select the Model in the hierarchy.

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

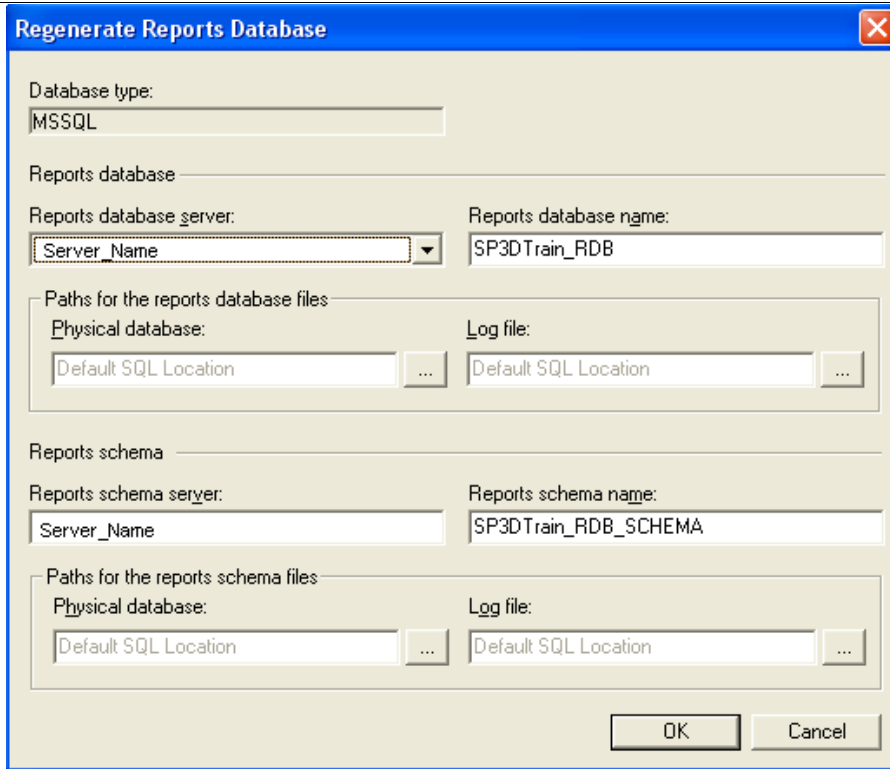
18. Uncheck the Synchronize Model with the Catalog option.

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



19. Hit "OK" Button.

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



The image shows a Windows-style dialog box titled "Regenerate Reports Database". It contains several input fields and buttons. The "Database type:" field is set to "MSSQL". The "Reports database" section has a "Reports database server:" dropdown menu showing "Server\_Name" and a "Reports database name:" text field containing "SP3DTrain\_RDB". Below this, the "Paths for the reports database files" section has two rows: "Physical database:" and "Log file:", each with a text field containing "Default SQL Location" and a browse button "...". The "Reports schema" section has a "Reports schema server:" dropdown menu showing "Server\_Name" and a "Reports schema name:" text field containing "SP3DTrain\_RDB\_SCHEMA". It also has two rows for "Physical database:" and "Log file:" with text fields containing "Default SQL Location" and browse buttons "...". At the bottom right are "OK" and "Cancel" buttons.

Database type:  
MSSQL

Reports database

Reports database server: Server\_Name Reports database name: SP3DTrain\_RDB

Paths for the reports database files

Physical database: Default SQL Location Log file: Default SQL Location

Reports schema

Reports schema server: Server\_Name Reports schema name: SP3DTrain\_RDB\_SCHEMA

Paths for the reports schema files

Physical database: Default SQL Location Log file: Default SQL Location

OK Cancel

21. Hit "OK" Button.

## Lab 4: Working with the Custom Interface Sheet

### Objective

After completing this lab, you will be able to:

- Add User Defined Code List
- Add User Interfaces

### Custom Interfaces

The Custom Interfaces sheet allows you to load a custom schema into the metadata of a catalog. This sheet defines the customized user interfaces and attributes (properties) for the smart/part classes in the workbook.

In this lab, you will add a new custom interface and three attributes for a smart class called BoilerType2. Also, you will create a new code list table namespace called Inspection Points in the catalog schema. Use the Custom Interfaces sheet to define the attributes names with associated data type, unit type and code list table namespace as shown below:

Property	Value
Maximum Allowable Pressure	100.00 psi
Maximum Allowable Temperature	50.00 F
Inspection Points	Point 1

1. Open the AllCodeList.xls Excel workbook.
2. Add a User defined Code List as follows:

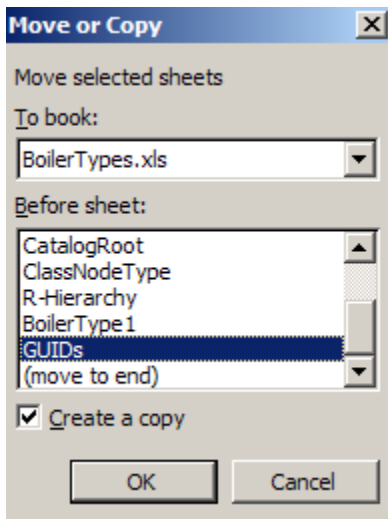
HEAD	InspectionPoints ShortDescription	InspectionPoints LongDescription	Codelist Number	Sort Order
!				
START				
a	Undefined		1	
a	Point 1		5	
a	Point 2		10	
a	Point 3		15	
a	Point 4		20	
END				
InspectionPoints				

*Note: The limit for a codelist name is 30 characters. You cannot use blanks or special characters for the codelist name.*

3. Save the AllCodelist.xls and open the BoilerTypes.xls Workbook.
4. Go the R-Hierarchy sheet and add the following entry.

Head	RelationSource	RelationDestination
Start		
a	Boilers Asm	BoilerType2

5. Copy the BoilerType1 Smart Class by doing the following:
6. Select the BoilerType1 Sheet. Right Click to Open the Move or Copy dialog box. Enable the copy option. Copy the sheet next to GUIDs sheet.



7. Rename the sheet as BoilerType2



8. Rename the name and description for both items as follows:

Name	PartDescription
BoilerType2 001A-E	BoilerType2
BoilerType2 001A_IMP-E	BoilerType2

9. Rename UserClassName and OccClassName as follows:

UserClassName	OccClassName
Boiler Type2	Boiler Type2

10. Create a new interface called IJUABoilerSpecs. Go to the Custom Interface sheet and add the following entries

InterfaceName	CategoryName	AttributeName	AttributeUserName	Type	UnitsType	PrimaryUnits	CodeList	codelisttablenamenamespace	OnPropertyPage	ReadOnly	SymbolParameter
IJUABoilerSpecs	Equipment Dimension	MaxPressure	Maximum Allowable Pressure	Double	27	182			TRUE	FALSE	
		MaxTemp	Maximum Allowable Temperature	Double	5	104			TRUE	FALSE	
		InspectionPoints	Inspection Points	Long	0	0	InspectionPoints	UDP	TRUE	FALSE	

*Note: An interface is a collection of attributes. A complete interface definition includes one or more attribute names with associated data type, unit type, and optional symbol parameter. The appropriate unit type and the primary unit values are found using the AllCommon.xls workbook. The Category Names are listed in the Property Categories codelist. The codelist namespace for user-defined codelists is UDP.*

11. Go to the BoilerType2 Smart Class Definition and insert the following data:

Definition	PartClassType	SymbolDefinition	oa:MaxPressure	oa:MaxTemp	oa:InspectionPoints
A	EquipmentAssemblyClass	SP3DStorageTankAsm.CSTankSym			
Head	Name	PartDescription	MaxPressure	MaxTemp	InspectionPoints
Start					
A	BoilerType2_001A-E	BoilerType2	100	50	5
A	BoilerType2_001A_IMP-E	BoilerType2	200	60	10
End					

*Note: Occurrence attributes are interpreted by the identifier 'OA:' and are defined along with the definition of the SmartClass in the SmartClass worksheets. An attribute with the same name can exist on more than one interface. On our smart class sheet, you can scope the user attributes based on their interfaces and symbol parameters. The scoping syntax is Interface::UserAttribute<Symbol Parameter>.*

12. Save the changes and use the Bulkload Utility to load the new class and codelist. Remember to add the letter A to all sheets.

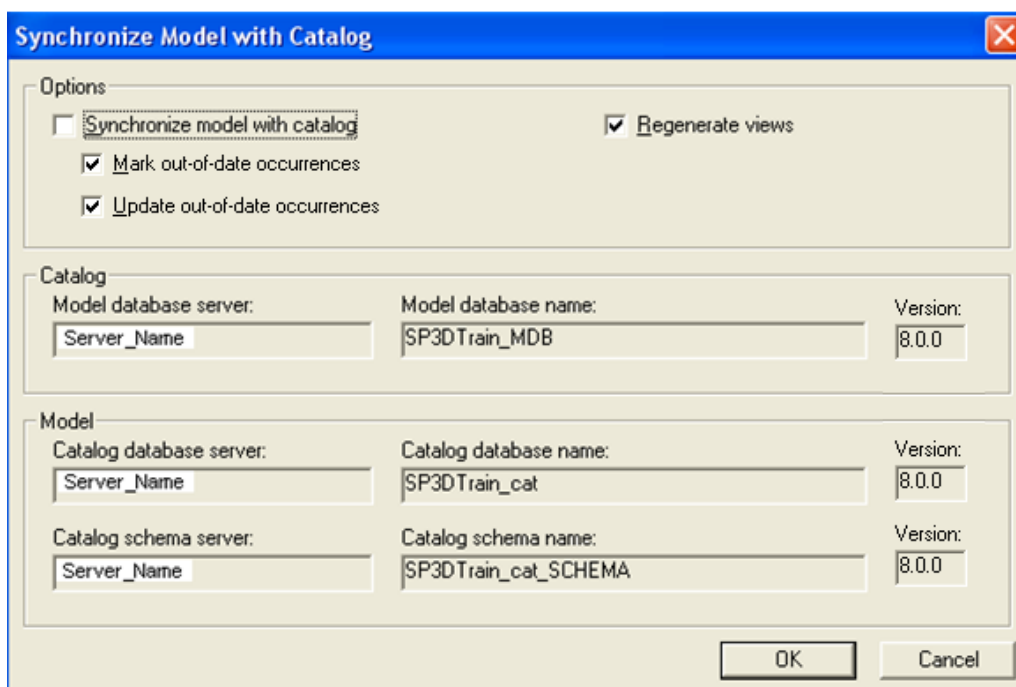
13. Once the bulkload process is complete, run the Project Management Task. Select the Model in the hierarchy.

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

15. Uncheck the Synchronize Model with the Catalog option.

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





**Synchronize Model with Catalog**

**Options**

☐ Synchronize model with catalog ☒ Regenerate views

☒ Mark out-of-date occurrences

☒ Update out-of-date occurrences

**Catalog**

Model database server: Server\_Name Model database name: SP3DTrain\_MDB Version: 8.0.0

**Model**

Catalog database server: Server\_Name Catalog database name: SP3DTrain\_cat Version: 8.0.0

Catalog schema server: Server\_Name Catalog schema name: SP3DTrain\_cat\_SCHEMA Version: 8.0.0

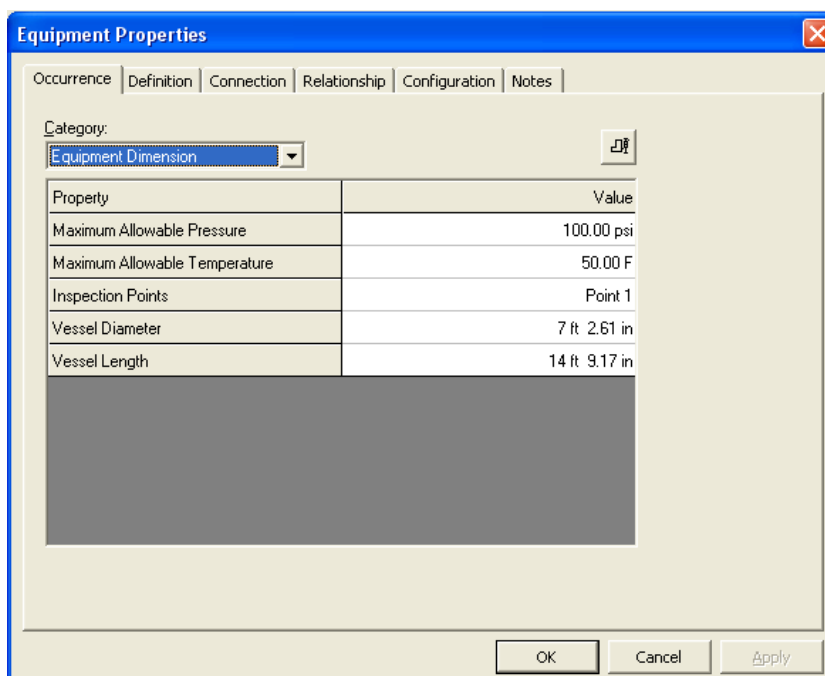
OK Cancel

16. Hit “OK” Button.

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

18. Hit “OK” Button.

19. Go to the Equipment Task and place the BoilerType2. Use the Equipment Properties page and review the attributes.



**Equipment Properties**

Occurrence | Definition | Connection | Relationship | Configuration | Notes

Category: Equipment Dimension

Property	Value
Maximum Allowable Pressure	100.00 psi
Maximum Allowable Temperature	50.00 F
Inspection Points	Point 1
Vessel Diameter	7 ft 2.61 in
Vessel Length	14 ft 9.17 in

OK Cancel Apply