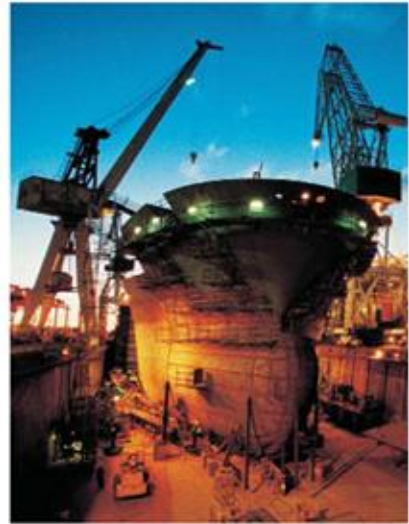


SmartPlant 3D Equipment Reference Data

Student Workbook

Process, Power & Marine



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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 2011R1.

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
- Equipment 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

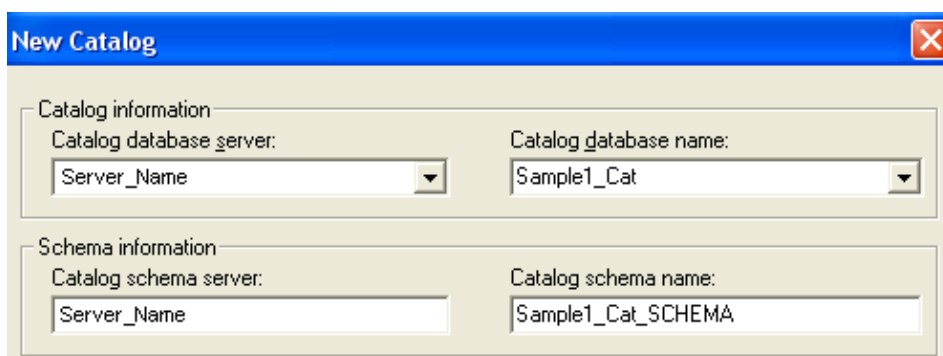
Objective

After completing this lab, you will be able to:

- Create a new template catalog database using Project Management tool

Creating a new Catalog Database

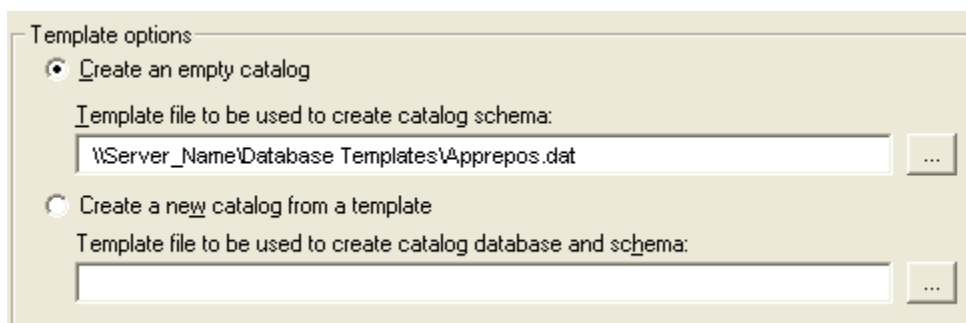
1. Start the Project Management application. Click on **Start-> Programs -> Intergraph SmartPlant 3D-> Project Management** to run the application.
2. Go to the main menu and select **Database -> New -> Catalog** to open the New Catalog dialog
3. In the Catalog **Database Server** box, select the name 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: WServer_Name\\Database Templates\\Apprepos.dat
 - ☐ Create a new catalog from a template
 - Template file to be used to create catalog database and schema:

- 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\\SharedContent ...

OK Cancel

- 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*, *Transformers*, *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	ObjectName	Name
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.

- 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		

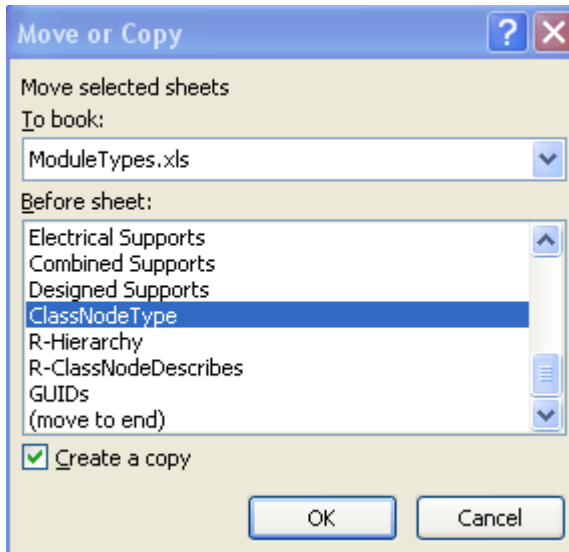
*Note: RelationSource and RelationDestination entries are **ObjectNames** of the objects participating in the relationship. A relationship can't be made unless the objects mentioned in Relationsource / RelationDestination columns are already created.*

- 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		

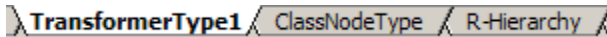
*Note: 'R-ClassNodeDescribes' is the relationship between an object from ClassNodeType worksheet as RelationSource and another object which is a PartClass as RelationDestination. RelationSource entries are **ObjectNames** of the objects participating in the relationship. RelationDestination entries are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

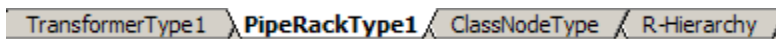


- Rename the sheet as TransformerType1.

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



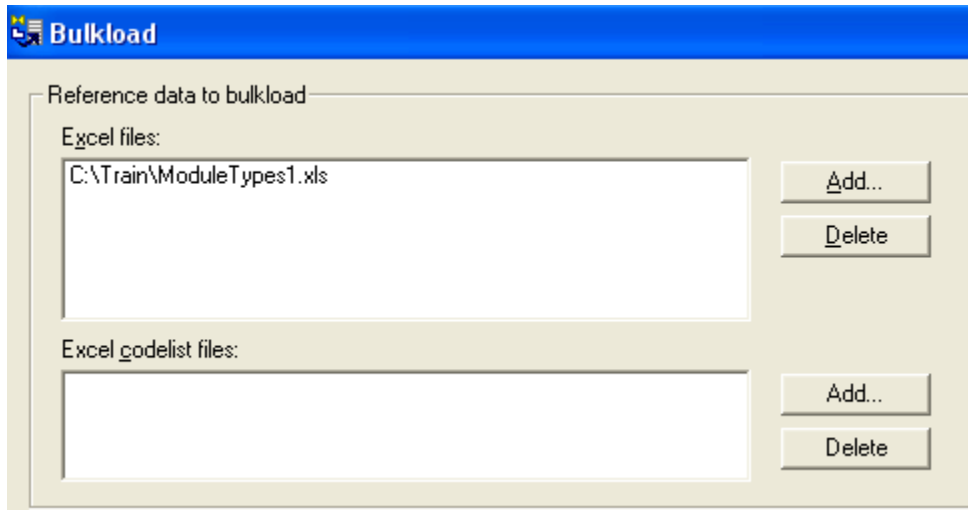
- Repeat the above steps to create the PipeRackType1 class.



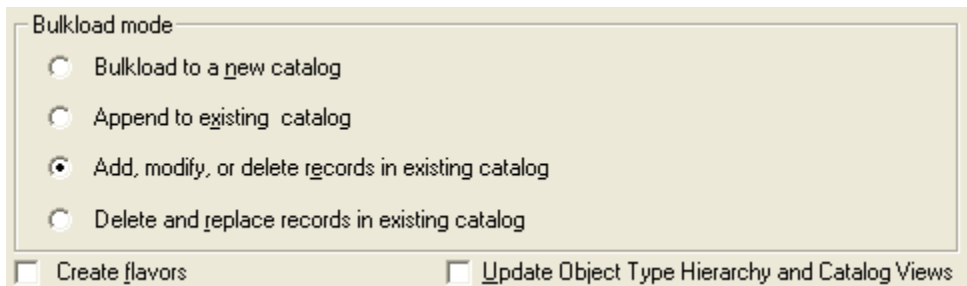
- Add 'A' on both classes as follows:

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

9. 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.

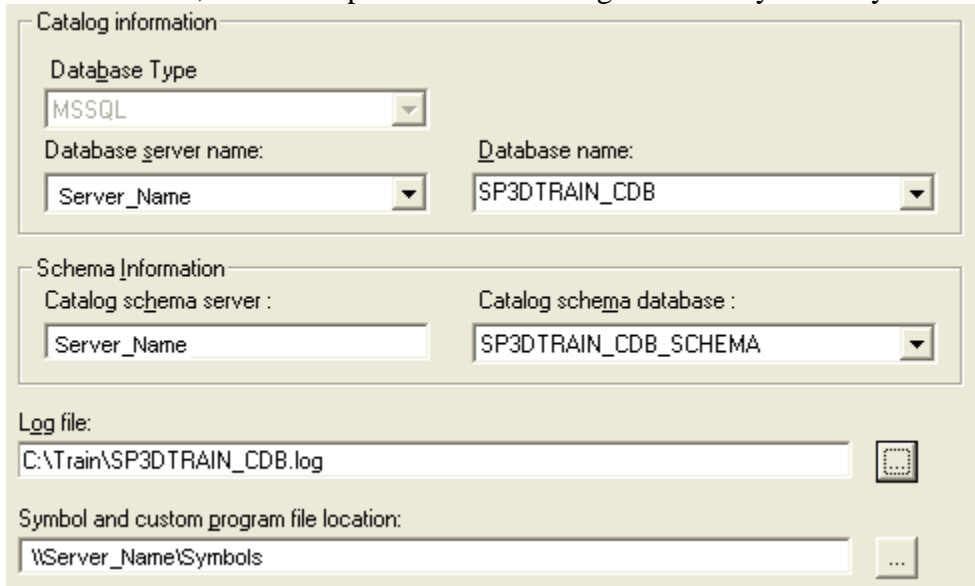


12. Under Bulkload Mode options, select the A/M/D bulkload mode and uncheck “Update Object Type Hierarchy and Catalog Views” option.



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.

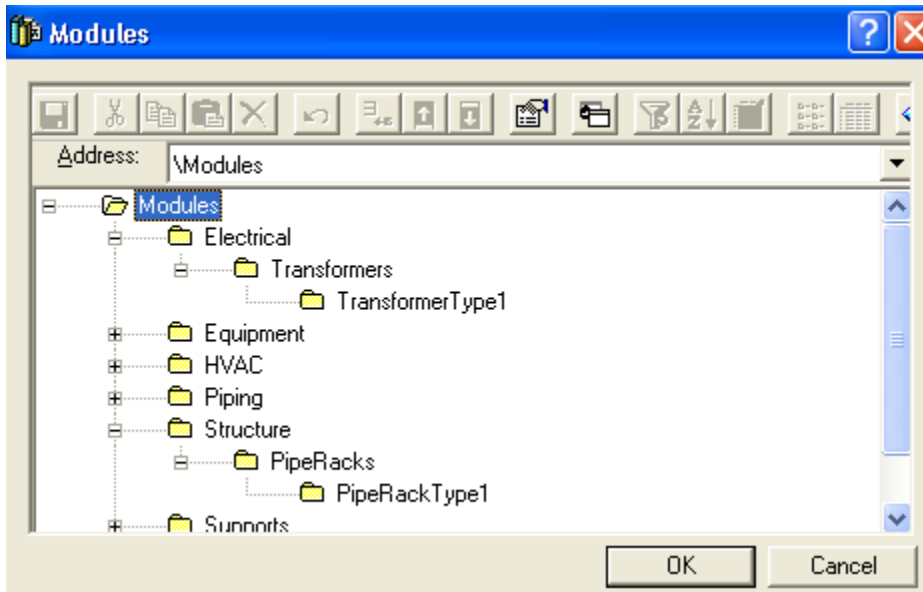


The screenshot shows the 'Catalog information' dialog box with the following fields:

- Database Type:** MSSQL (selected in a dropdown menu)
- Database server name:** Server_Name (selected in a dropdown menu)
- Database name:** SP3DTRAIN_CDB (selected in a dropdown menu)
- Schema Information:**
 - Catalog schema server:** Server_Name (selected in a dropdown menu)
 - Catalog schema database:** SP3DTRAIN_CDB_SCHEMA (selected in a dropdown menu)
- Log file:** C:\Train\SP3DTRAIN_CDB.log (text field)
- Symbol and custom program file location:** \\Server_Name\Symbols (text field)

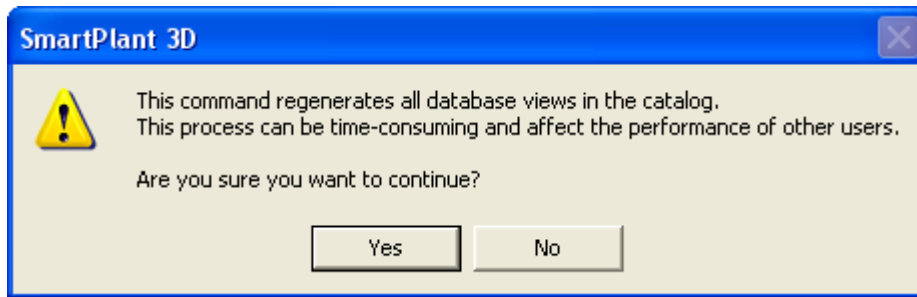
14. Select Load button to start the process.

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 should be performed if you skipped the Business Object Classification Hierarchy (BOC) and catalog views update.

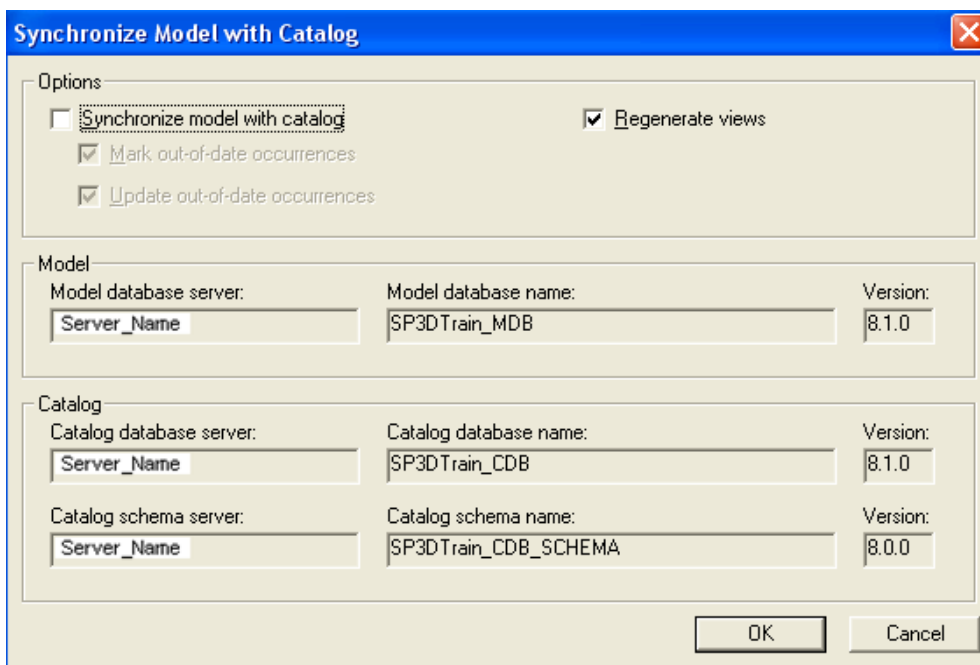
16. Open a session and go to the catalog task. Select the Catalog -> Generate Views option. The system will display a message dialog. Select Yes button to continue.



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.

The screenshot shows a Windows-style dialog box titled "Regenerate Reports Database". It contains the following fields and controls:

- Database type:** A text box containing "MSSQL".
- Reports database:**
 - Reports database server:** A dropdown menu showing "Server_Name".
 - Reports database name:** A text box containing "SP3DTrain_RDB".
- Paths for the reports database files:**
 - Physical database:** A text box containing "Default SQL Location" with a browse button "...".
 - Log file:** A text box containing "Default SQL Location" with a browse button "...".
- Reports schema:**
 - Reports schema server:** A text box containing "Server_Name".
 - Reports schema name:** A text box containing "SP3DTrain_RDB_SCHEMA".
- Paths for the reports schema files:**
 - Physical database:** A text box containing "Default SQL Location" with a browse button "...".
 - Log file:** A text box containing "Default SQL Location" with a browse button "...".
- Buttons:** "OK" and "Cancel" buttons at the bottom right.

22. Hit “OK” Button.

Lab 3: Equipment Catalog Hierarchy

Objective

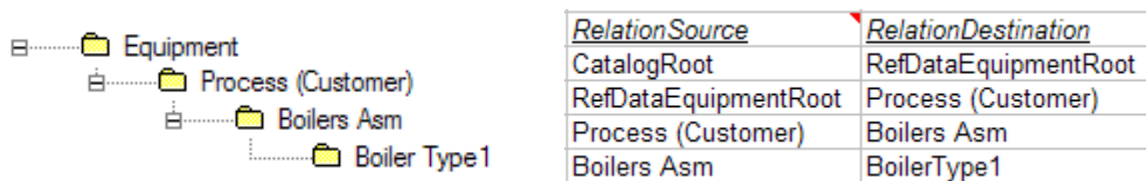
After completing this lab, you will be able to:

- 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.

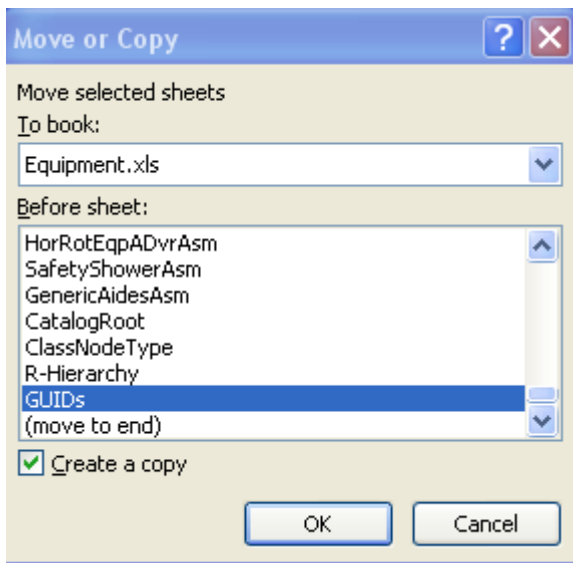
ObjectName should be unique across the entire database to identify a node uniquely. **Name** is the displayed name which appears in the CatalogBrowser hierarchy.

- 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

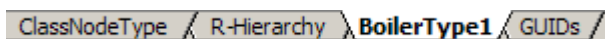
*Note: RelationSource and RelationDestination entries are **ObjectNames** of the objects participating in the relationship. A relationship can't be made unless the objects mentioned in Relationsource / RelationDestination columns are already created.*

- 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.



6. Edit the Partclass definition as follows:

Definition	<u>PartClassType</u>	<u>SymbolDefinition</u>	UserClassName	<u>OccClassName</u>
a	EquipmentAssemblyClass		Boiler Type 1	Boiler Type 1

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.

7. For the parts, rename the name and description for both parts as follows:

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

Also change the SymbolDefinition and Definition fields to use the Visual Basic symbol:

<u>SymbolDefinition</u>	<u>Definition</u>
SP3DStorageTankAsm.CSTankSym	SP3DStorageTankAsm.CSTankDef
SP3DStorageTankAsm.CSTankSym	SP3DStorageTankAsm.CSTankDef

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

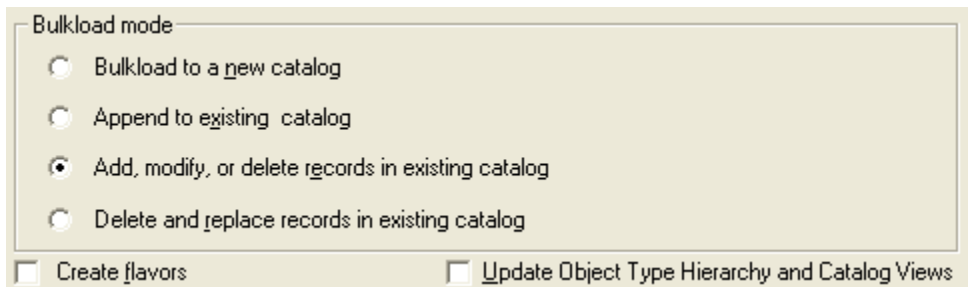
Definition	<u>PartClassType</u>	<u>SymbolDefinition</u>
a	EquipmentAssemblyClass	
Head	<u>Name</u>	<u>PartDescription</u>
Start		
a	BoilerType1 001A-E	BoilerType1
a	BoilerType1 001A_IMP-E	BoilerType1

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

10. Select the BoilerTypes.xls file under Excel files using the Add button.

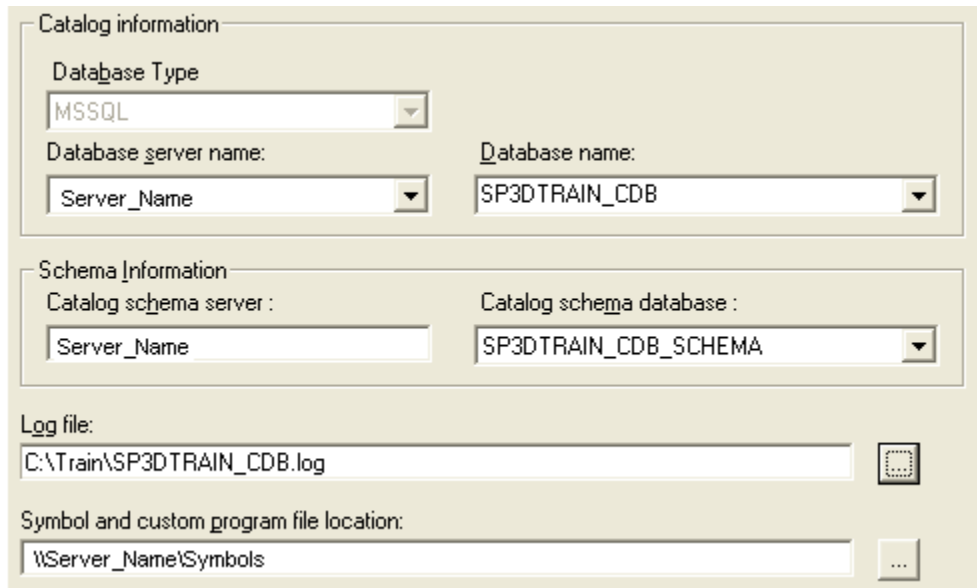


11. Under Bulkload Mode options, select the A/M/D bulkload mode and uncheck “Update Object Type Hierarchy and Catalog Views” option.



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_CDB

Schema Information

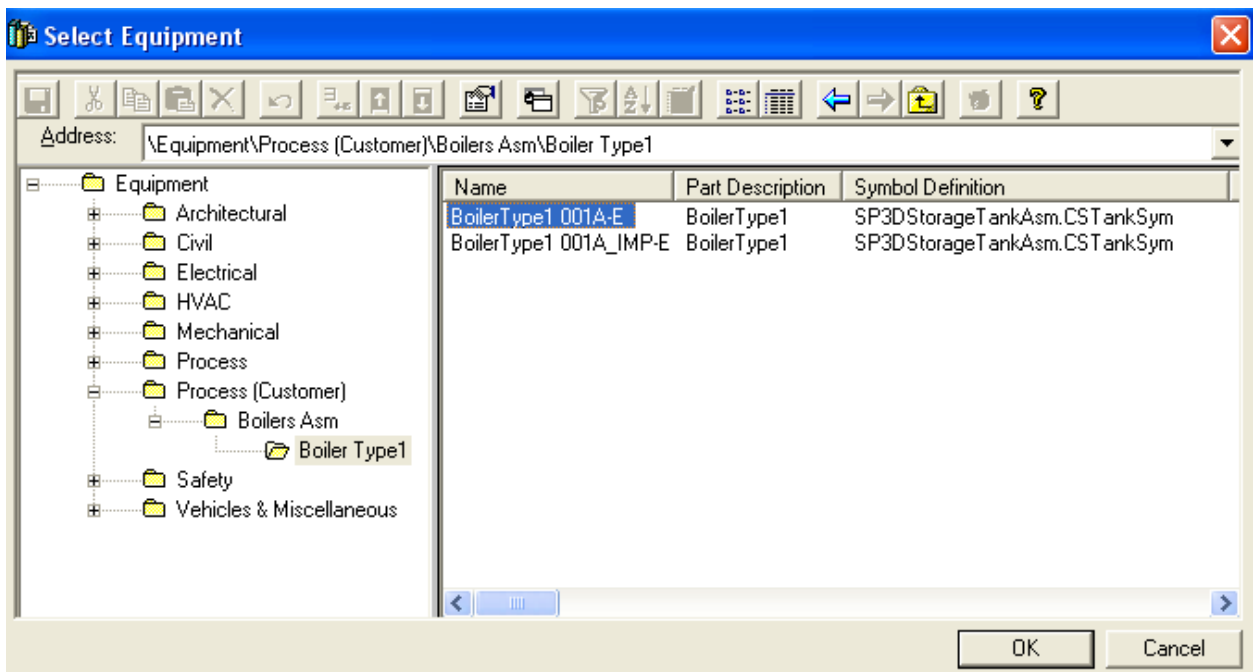
Catalog schema server: Server_Name Catalog schema database: SP3DTRAIN_CDB_SCHEMA

Log file:
C:\Train\SP3DTRAIN_CDB.log

Symbol and custom program file location:
\\Server_Name\Symbols

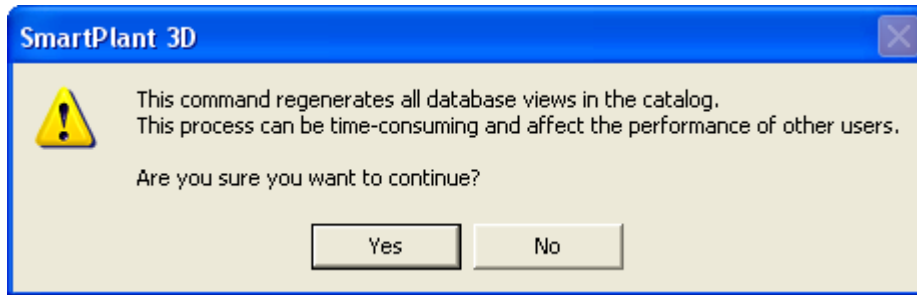
13. Select Load button to start the process.

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



Note: The following steps should 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.



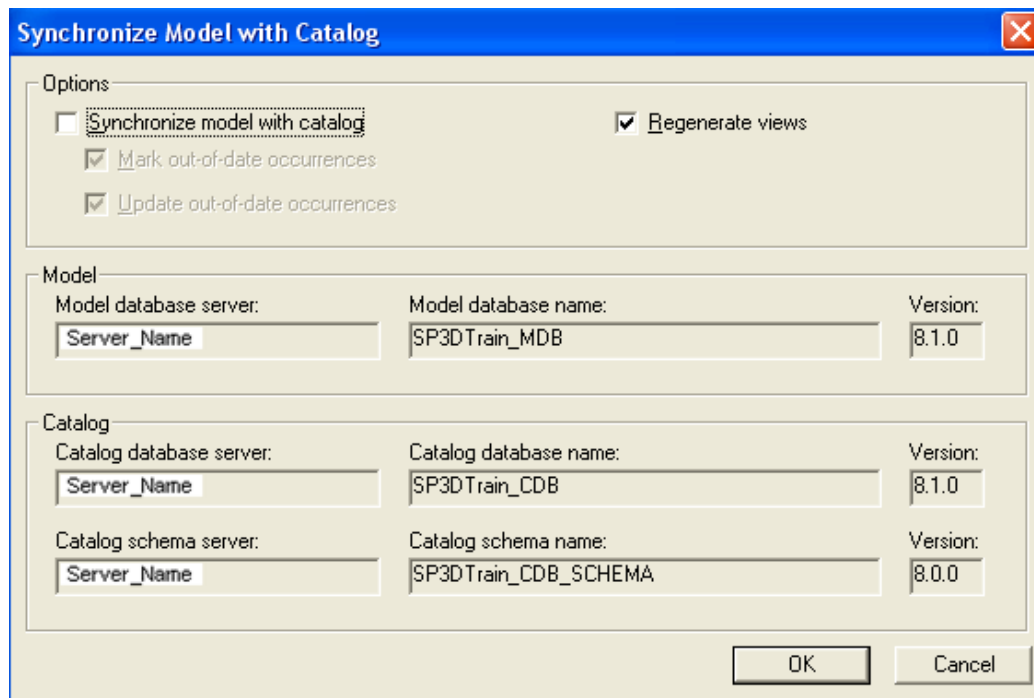
Note: The following needs to be performed on a production catalog to ensure that the data set is correct and consistent.

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 screenshot 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.

21. Hit “OK” Button.

Lab 4: Working with the Custom Interface Sheet

Objective

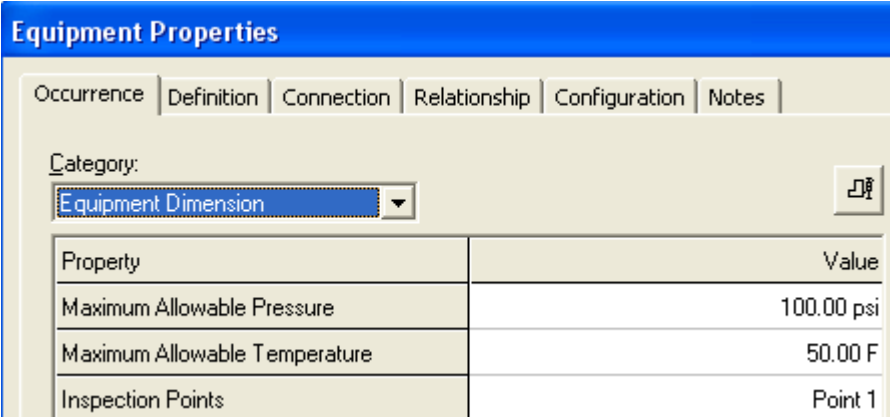
After completing this lab, you will be able to:

- 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.

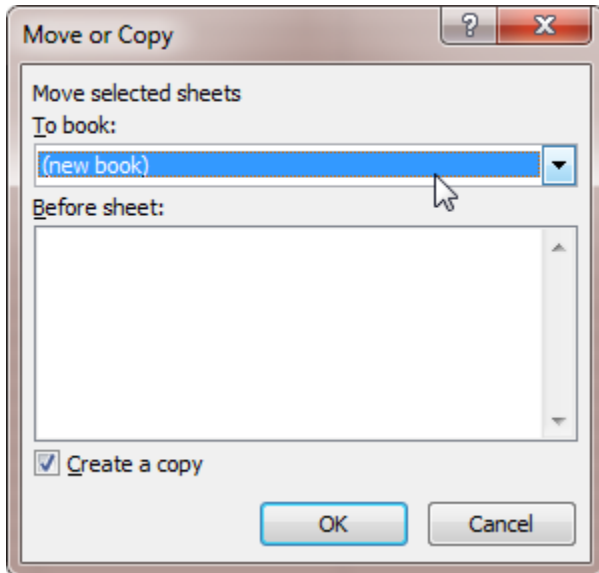
In this lab, you will add a new custom interface and three attributes for a smart class called BoilerType2. Also, you will create a new code list table namespace called Inspection Points in the catalog schema. Use the Custom Interfaces sheet to define the attributes names with associated data type, unit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



The screenshot shows the 'Equipment Properties' dialog box with the 'Definition' tab selected. The 'Category' dropdown is set to 'Equipment Dimension'. Below this is a table with three rows: 'Maximum Allowable Pressure' with a value of '100.00 psi', 'Maximum Allowable Temperature' with a value of '50.00 F', and 'Inspection Points' with a value of 'Point 1'.

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. Copy the WasherType worksheet into a new workbook by doing the following:
Select the WasherType sheet. Right Click to open the Move or Copy dialog box. In the “To book:” field, select (new book). Enable the copy option. Select the OK button.



3. Create a User defined Code List as follows:

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

InspectionPoints

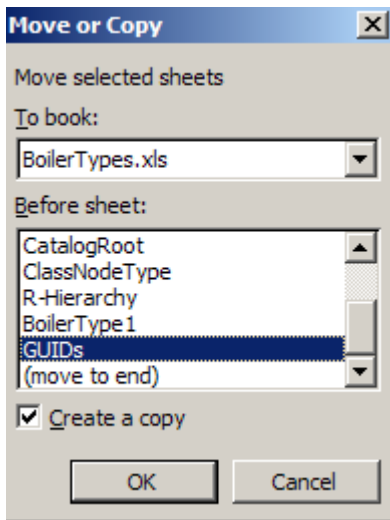
Note: The limit for a codelist name is 64 characters. You cannot use blanks or special characters for the codelist name.

4. Save the workbook as InspectionPointsCodelist.xls.
5. Open the BoilerTypes.xls Workbook.

6. Go the R-Hierarchy sheet and add the following entry.

Head	<u>RelationSource</u>	<u>RelationDestination</u>
Start		
a	Boilers Asm	BoilerType2

7. Copy the BoilerType1 Smart Class by doing the following:
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.



8. Rename the sheet as BoilerType2



9. Rename UserClassName and OccClassName in the partclass Definition as follows:

<u>UserClassName</u>	<u>OccClassName</u>
Boiler Type 2	Boiler Type 2

10. Change the name and description for both parts as follows:

Head	<u>Name</u>	<u>PartDescription</u>
Start		
a	BoilerType2 001A-E	BoilerType2
a	BoilerType2 001A_IMP-E	BoilerType2

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

<u>InterfaceName</u>	<u>CategoryName</u>	<u>AttributeName</u>	<u>AttributeUserName</u>	<u>Type</u>
IJUABoilerSpecs	Equipment Dimension	MaxPressure	Maximum Allowable Pressure	Double
		MaxTemp	Maximum Allowable Temperature	Double
		InspectionPoints	Inspection Points	Long

<u>UnitsType</u>	<u>PrimaryUnits</u>	<u>CodeList</u>	<u>codelistt</u>	<u>OnPropertyPage</u>	<u>ReadOnly</u>	<u>SymbolParameter</u>
27	182			TRUE	FALSE	
5	104			TRUE	FALSE	
0	0	InspectionPoints	UDP	TRUE	FALSE	

Note: Values for UnitsType and PrimaryUnits can be found on the UOM worksheet in AllCommon.xls found in <SP3D Installation Folder>\CatalogData\Bulkload\Datafiles.

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.

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

<u>Definition</u>	<u>PartClassType</u>	<u>SymbolDefinition</u>	<u>oa:MaxPressure</u>	<u>oa:MaxTemp</u>	<u>oa:InspectionPoints</u>
a	EquipmentAssemblyClass	SP3DStorageTankAsm.CSTankSym			
Head	<u>Name</u>	<u>PartDescription</u>	<u>MaxPressure</u>	<u>MaxTemp</u>	<u>InspectionPoints</u>
Start					
a	BoilerType2 001A-E	BoilerType1	100	50	5
a	BoilerType2 001A_IMP-E	BoilerType1	200	60	10

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>.

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

Bulkload

Reference data to bulkload

Excel files:
D:\Train\BoilerTypes.xls
Add...
Delete

Excel codelist files:
D:\Train\InspectionPointsCodelist.xls
Add...
Delete

Load
Reset
Close

Bulkload mode

☐ Bulkload to a new catalog
☐ Append to existing catalog
☒ Add, modify, or delete records in existing catalog
☐ Delete and replace records in existing catalog

☐ Create flavors ☒ Update Object Type Hierarchy and Catalog Views

Catalog information

Database Type
MSSQL

Database server name: Server_name Database name: SP3DTrain_CDB

Schema information

Catalog schema server: Server_name Catalog schema database: SP3DTrain_CDB_SCHEMA

Log file:
D:\Train\SP3DTrain_CDB.log

Symbol and custom program file location:
\\Server_name\SharedContent

14. Once the bulkload process is complete, run the Project Management Task. Select the Model in the hierarchy.
15. Select Tools -> Synchronize Model with the Catalog.

16. 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

Model

Model database server: peacock2 Model database name: SP3DTrain_MDB Version: 9.1.0

Catalog

Catalog database server: peacock2 Catalog database name: SP3DTrain_CDB Version: 9.1.0

Catalog schema server: peacock2 Catalog schema name: SP3DTrain_CDB_SCHEMA Version: 8.0.0

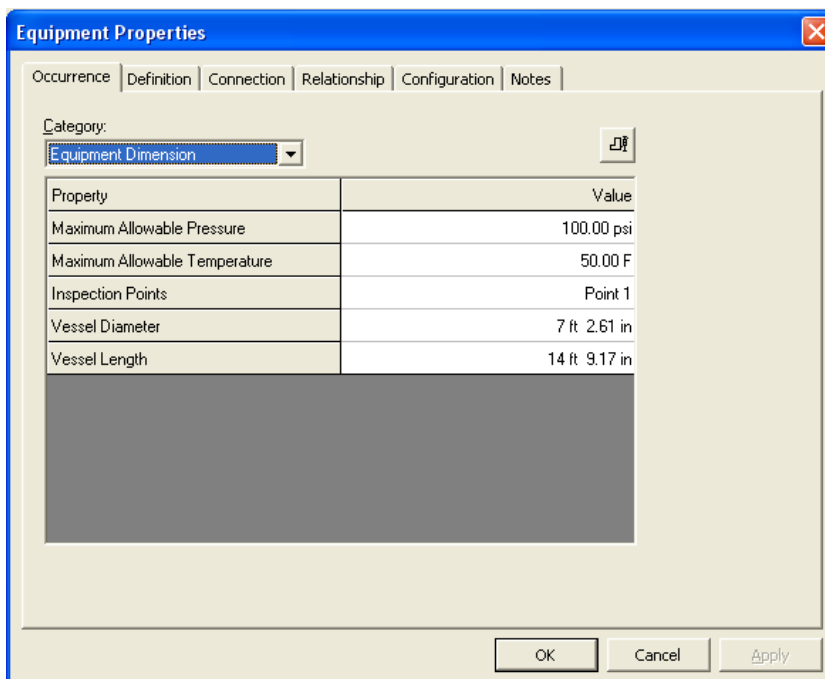
OK Cancel

17. Hit “OK” Button.

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

19. Hit “OK” Button.

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



The Equipment Properties dialog box is shown with the Configuration tab selected. The Category is set to Equipment Dimension. The table below lists the properties and their values:

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

At the bottom of the dialog box are the OK, Cancel, and Apply buttons.