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SmartPlant 3D Equipment v7

User Training Exercises

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LAB-1: Placing Parametric Equipment

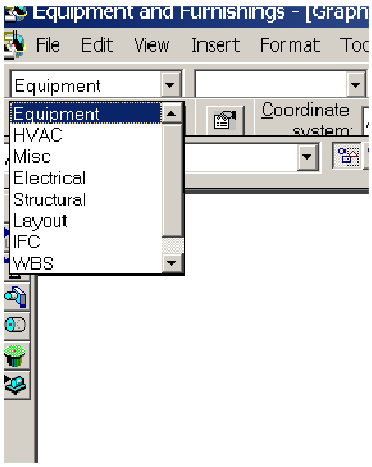
1 Remind instructor to remove any existing equipment from your training model

2 Open a Session file with Imperial Units
Note: See the common applications labs on how to define a workspace

3 Define Workspace to Display U03 and U03 CS in the training plant

4 If you are not in the Equipment task, then select Task -> Equipment and Furnishing

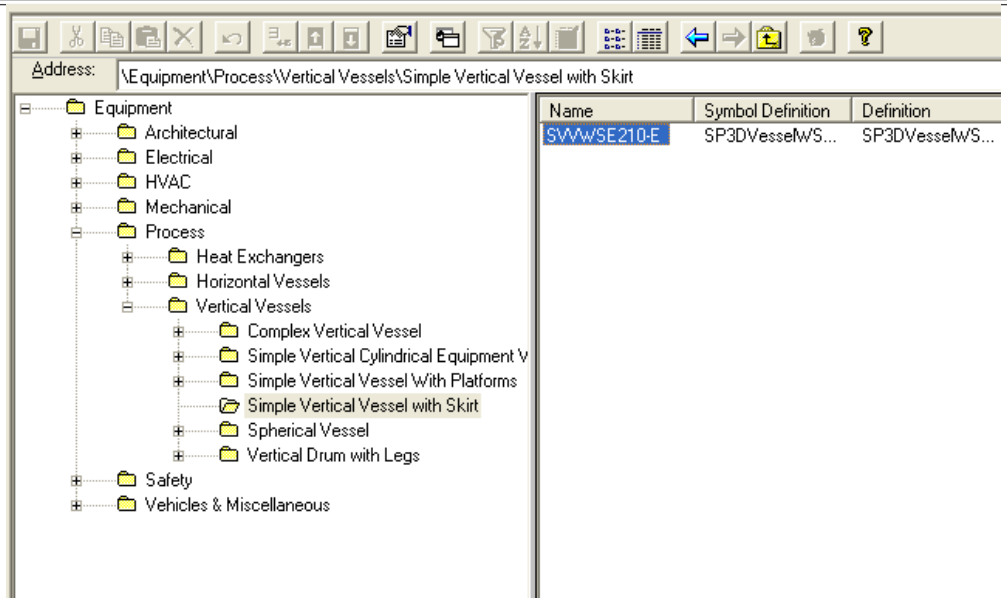
5 Make sure the Active Permission Group is set to ***Equipment*.**
Note: Objects that you place directly in the model are assigned to the active permission group. Therefore, **you are responsible of making sure the equipment is assigned to the appropriate Permission Group**.



6 Activate PinPoint by Selecting Tools > PinPoint (make sure active Coordinate system is Global)

7 Select Place Equipment Command

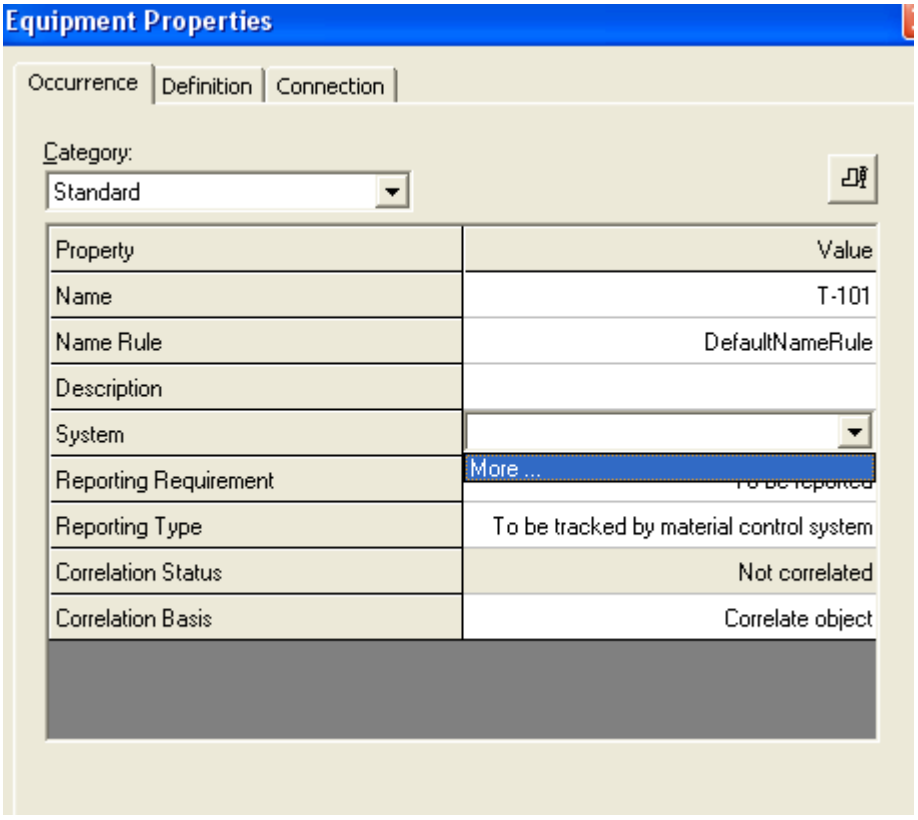
8 Expand the Equipment Folder Process Equipment\Vertical Vessels\Simple Vertical Vessel with Skirt until you see the part SWWSE210-E. Select the part and click the OK button.



9 Equipment Property page is displayed on your screen

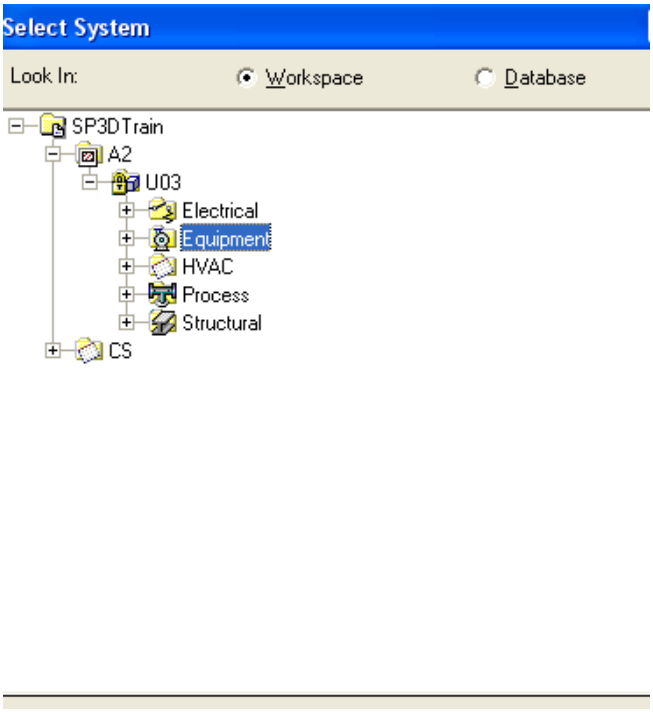
10 Key in T-101 for Name

11 Click in the System Field and select ‘More…’

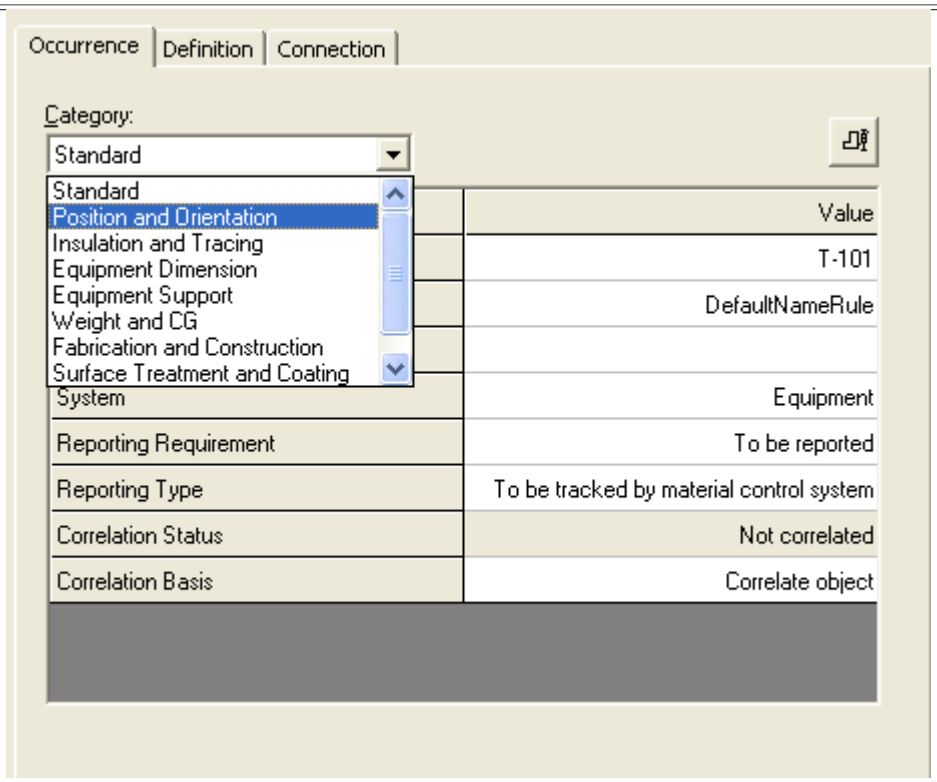


Note: Objects that you place directly in the model are associated to a system in the System Hierarchy. Therefore, you are responsible for making sure the equipment is associated to the appropriate System.

12 System opens the Select System dialog box. Select the ***A2- >U03 -> Equipment*** System and Click the OK button.

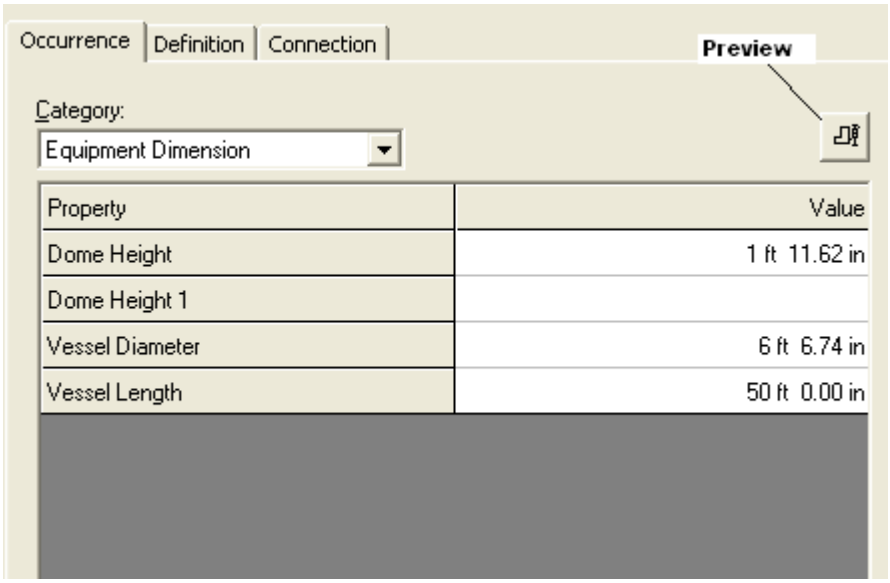


13 Switch to Position and Orientation Category



14 Key in -21’ For Easting, 40’ for Northing and 2’ for Elevation

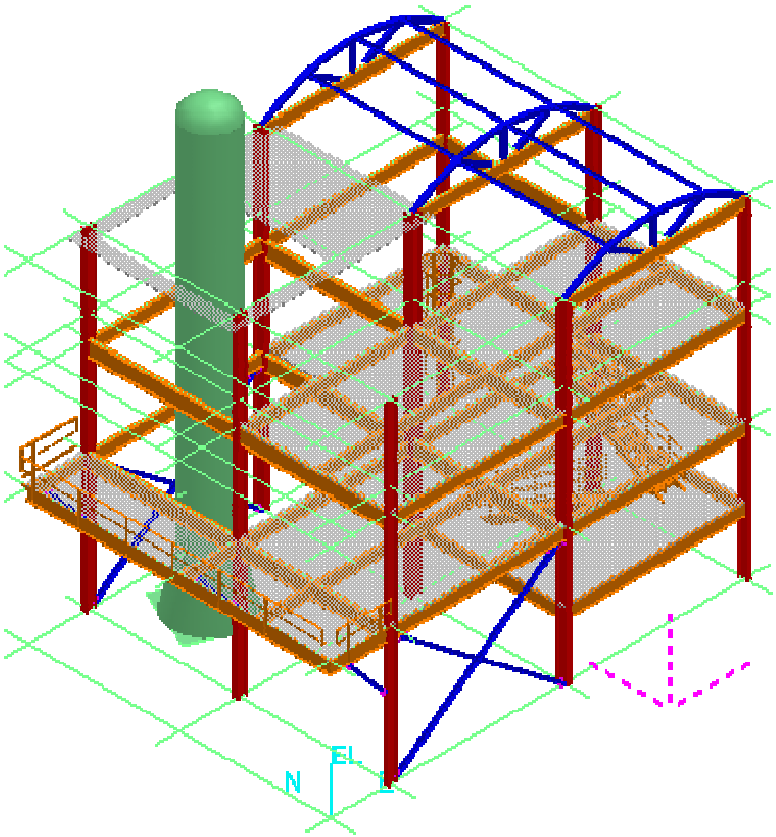
15 Switch to Equipment Dimension Category
Note: You can use preview button to understand/relate different dimension variables



16 Change the Vessel Length to 50’

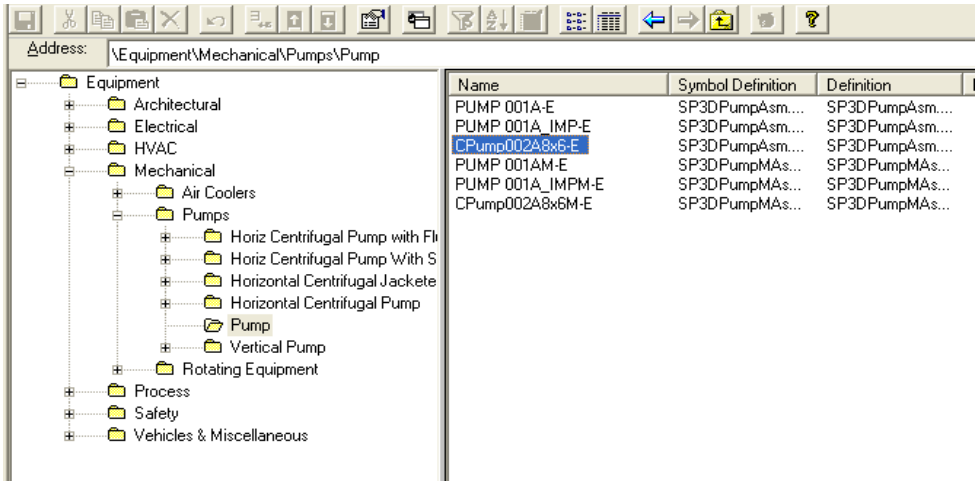
17 OK on the property page

18 Your view should resemble this



19 Select Place Equipment Command

20 Expand the Equipment\Equipment\Mechanical Equipment\Pumps\Pump until you see the part CPump002A8x6-E. Select the part and click the OK button.



21 Equipment Property page is displayed on your screen

22 Key in P-101 for Name

23 Click in the System Field and select ‘More…’

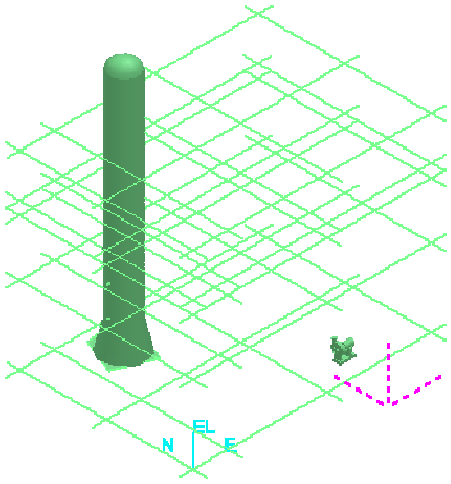
24 System opens the Select System dialog box. Select the ***A2- >U0 3-> Equipment*** System and Click the OK button.

25 Switch to Position and Orientation Category

26 Key in 1’ For Easting, 12’ for Northing and 2’ for Elevation

27 OK on the property page

28 Your View should resemble this (Beams and Columns turned off here for convenience)



LAB-2: Rotating Equipment While Placing / After Placement

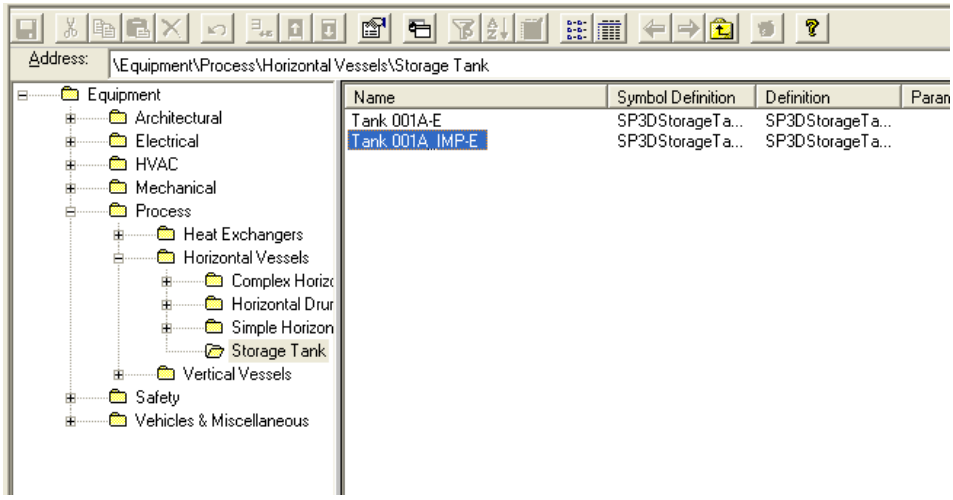
1 Define Workspace to Display U04 and U04 CS

2 Activate PinPoint if not already active

3 Make Sure Active Coordinate System is set to Global

4 Select Place Equipment command from the vertical toolbar to open the Select Equipment Dialog box.

5 From Catalog Browser, Select Process\Horizontal Vessels\Storage Tank, Tank_001A_IMP_E



6 Equipment Property page is displayed on your screen

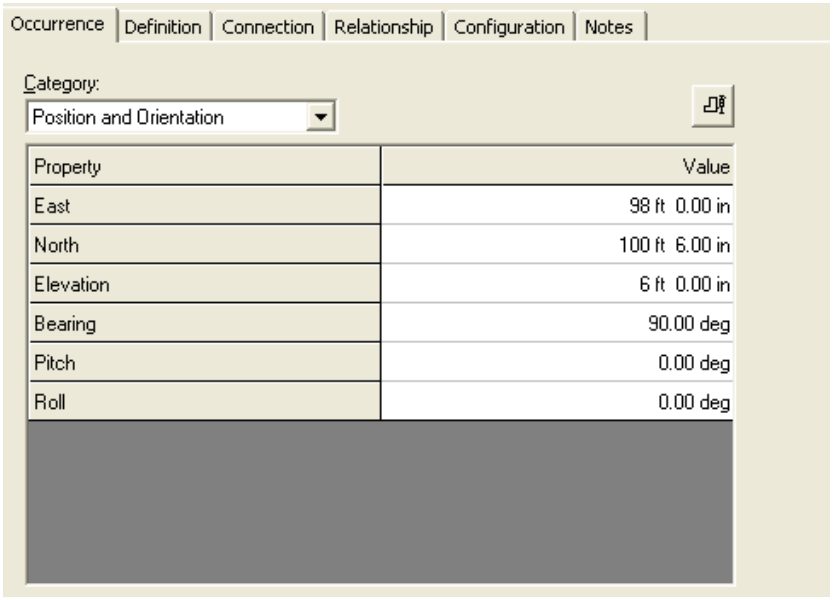
7 Key in 40V-101 for Name

8 Click in the System Field and select 'More…'

9 System opens the Select System dialog box. Select the ***A2- > U04 -> Equipment*** System and Click the OK button.

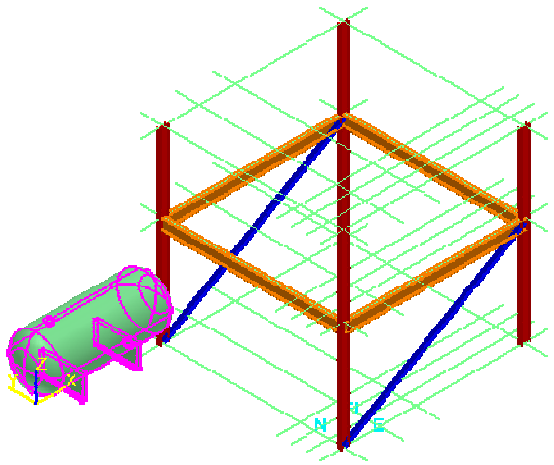
10 Switch to Position and Orientation Category

11 Key in 98’ For Easting, 100’ 6” for Northing and 6’ for Elevation



12 OK on the property page

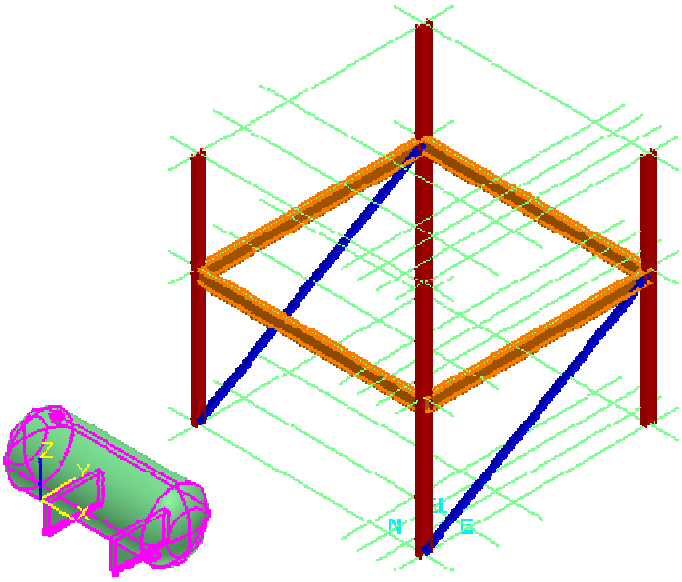
13 Your View should resemble this



14 Equipment is Placed and is still selected

15 Up / Down Axis is selected as rotation axis

16 Use Left/Right arrow key to rotate the equipment as shown



Note: While placing equipment, we could have changed the Bearing to 180 to get same rotation angle

.

LAB-3: Placing Designed Equipment and Equipment Component

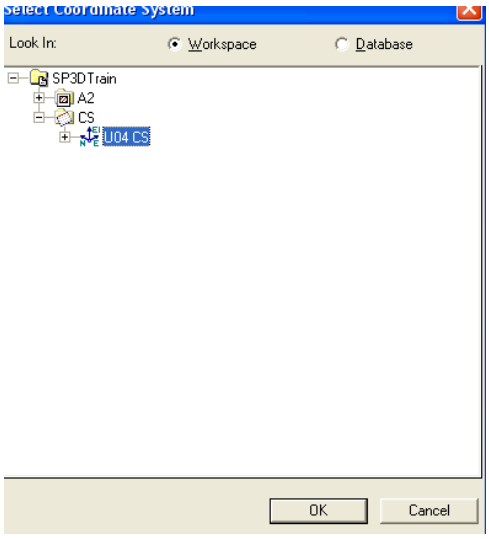
1 Open a Session file with Imperial Units

2 Define Workspace to Display U04 and U04 CS

3 Activate PinPoint if not already active

4 From Ribbon Bar, select more under Coordinate systems

5 Expand Coordinate systems and select U04 CS

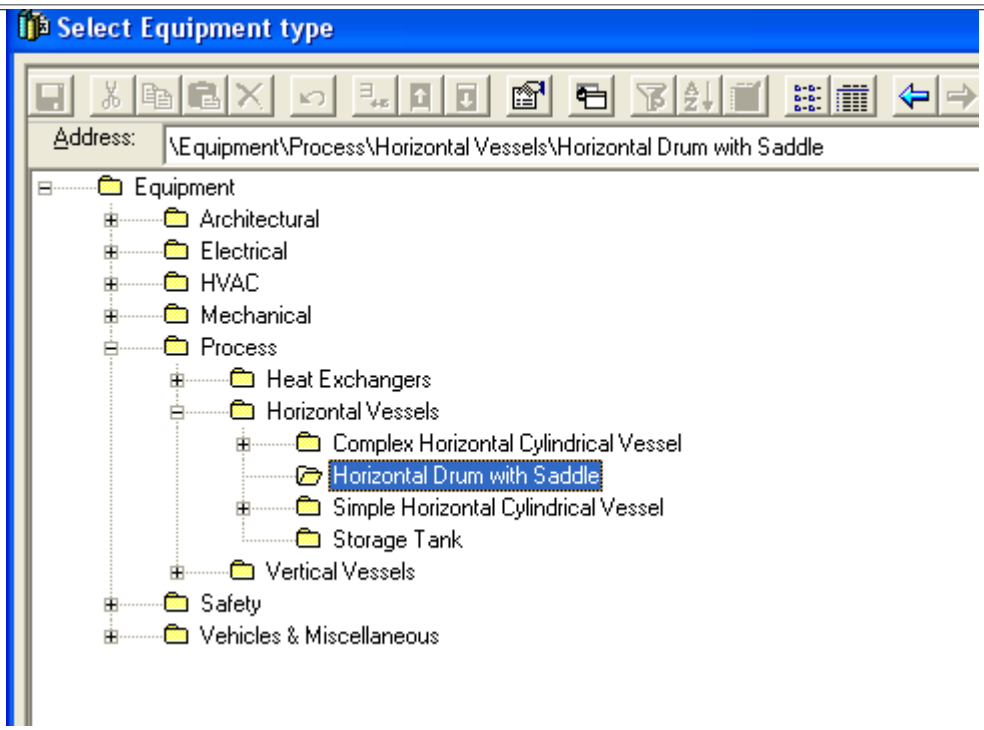


6 Ok on the Select Coordinate System form

7 Select Set target to Origin Option

8 Select Place Designed Equipment Command

9 From Catalog Browser select, \Equipment\Process\Horizontal Vessels\Horizontal Drum with Saddle



10 Equipment Property page is displayed on your screen

11 Key in 41V-101 for Name

12 Click in the System Field and select 'More…'

13 System opens the Select System dialog box. Select the ***A2- > U04 -> Equipment*** System

14 Switch to Position and Orientation Category

15 Key in 5 For Easting, 8 for Northing and 23' for Elevation

16 OK on the property page

17 Select Place **Equipment component command** from the vertical toolbar

18 If prompted select 41V-101 from WSE

19 Locate E245 Horizontal Cylindrical Tank using the tree view. Select the part and click the OK button (Equipment Components\Process Components\Vessel & Equipment Bodies\Horizontal Vessels and Tanks\Simple Horizontal Cylindrical Equipment Component E245)

20 Equipment Property page is displayed on your screen

21 Key in Tank for Name

22 Switch to Position and Orientation Category

23 Key in 5 For Easting, 8 for Northing and 23’ for Elevation

24 Switch to Equipment Dimension Category

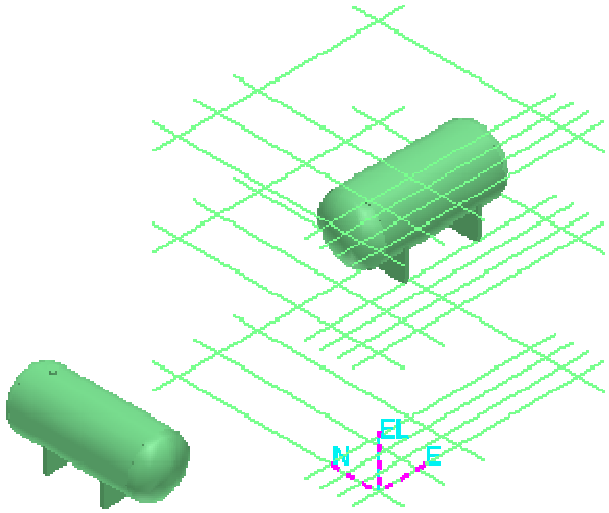
25 Make the following Changes
Vessel Center Height : 5’ 6”
Vessel Diameter: 8’
Vessel Length: 14’ 10”

26 Change the Category to Equipment Support

27 Make the following Changes
First Support Location: 3’
Second Support Location: 9’
Support Thickness: 6” (6 inches)
Support Length: 7’

28 Ok on the form

29 Your View should resemble this (only grids and equipment shown)



LAB-4: Placing Equipment with Mate Relationship

1 Open a Session file with Imperial Units

2 Define Workspace to Display U04 and U04 CS

1 Activate PinPoint if not already active

2 Make Sure Active Coordinate System is Set to U04 CS

3 Select Place Equipment command from the vertical toolbar to open the select Equipment Dialog box

4 Select Pump_001A_IMP-E, under Equipment\Mechanical\Pumps\Pump

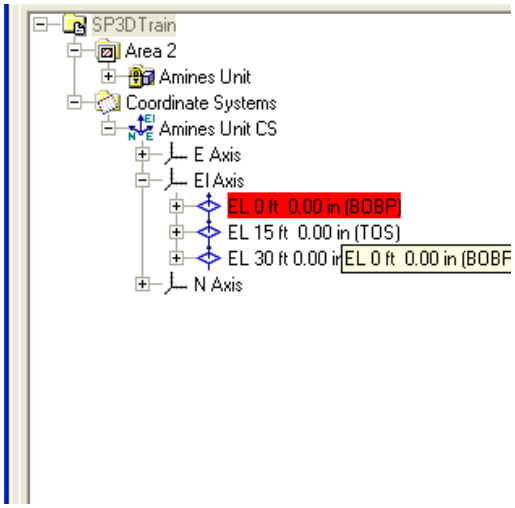
5 Ok on the property page(without making any changes)

6 Go to the Equipment ribbon bar and make sure the **U04 -> Equipment** System is set in the **System** drop down list

7 Go to the Equipment ribbon bar, and key in **41P-101A** in the Name field

8 Go to the PinPoint ribbon bar and key in 30’ for East, 5’for North and 0’ for El

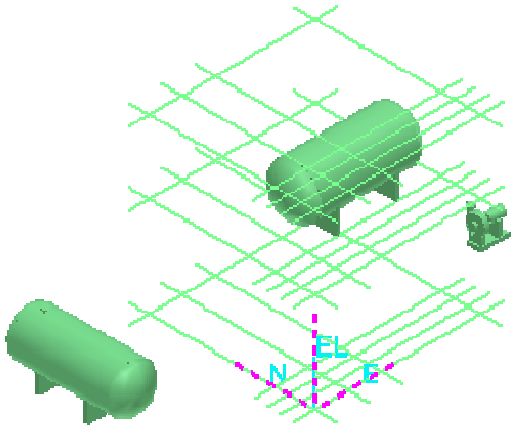
3 In Work Space Explorer, Expand the Co-ordinate System folder, Expand U04 CS folder, Expand EL Axis and Click on EL-0’-0” to mate the pump with elevation 0’.



4 In the Equipment Ribbon Bar, Key in 2’ for offset

9 Right Click in the View to de-select the Equipment

10 Your View should resemble this(only grids and equipment shown)



LAB-5: Equipment Modification

1 Open a Session file with Imperial Units

2 Define Workspace to Display U04 and U04 CS

3 In workspace explorer expand 40V-101

4 Open the properties page for 40V-101 and set the category to Equipment Dimension

5 Set the diameter to 8’ and the length to 15’ and OK

6 Set the Locate Filter to “All”

7 Select Nozzle STNoz1 under, Equipment 40V-101

8 Open property page for nozzle STNoz1

9 Change the size to 6” and name to “A”

10 Ok on the form

11 Select Suction Nozzle under 41P-101A

12 Open its Properties page

13 Change the size to 8” and name to N1
Note: After making changes, select Apply instead of OK. You do not need to close the properties page, just click on the next object to open new page. Now you have made changes to suction nozzle, hit apply and select discharge nozzle

14 Change the discharge to 6” and name to N2

LAB-6: Move / Copy / Paste Equipment

1 Open a Session file with Imperial Units

2 Define Workspace to Display U04 and U04 CS

3 Set Coordinate system to Global

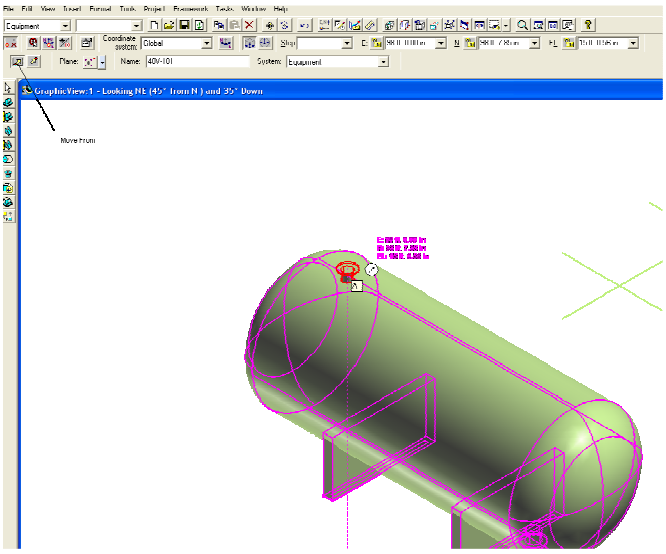
4 Select Set target to origin option

5 Select Equipment 40V-101

6 Select Move command from common ribbon bar

7 Select Move from option

8 Select Nozzle “A” as move from point



9 Key in 98’ for East, 99’ 8” for North and 8’ 3” for elevation

10 Click in the view to place the equipment at new location

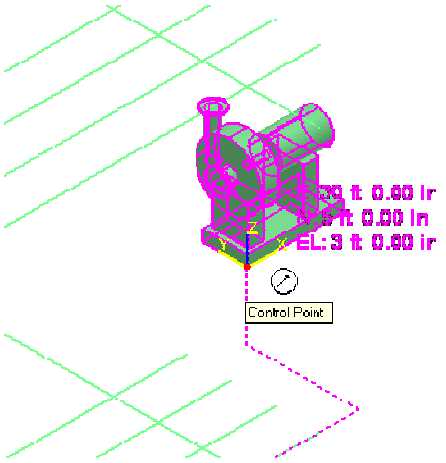
11 Set Active Coordinate system to U04 CS

12 Select Set target to origin option

13 Select pump 41P-101A

1 Select Copy command

2 When prompted for Reference point, select the Control Point at the bottom left corner



3 Select Paste command

4 System opens the Paste Special form. U04\Equipment folder in Work Space Explorer is already selected as new system folder

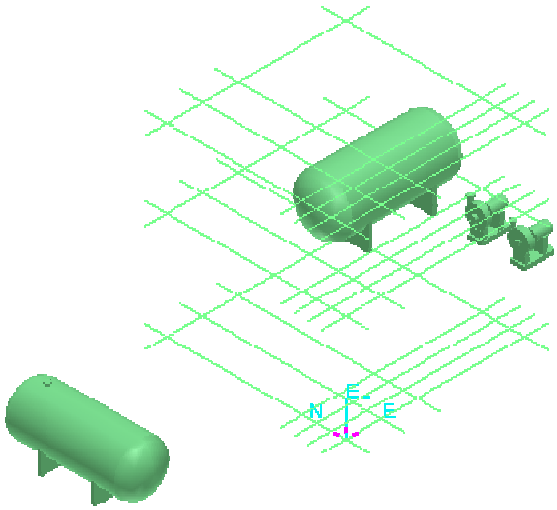
5 Uncheck the paste in place option

6 Ok on the paste form

7 Key in 30’ for East, 11’ for North and 2’ for Elevation.

8 Change the name to 41P-101B

9 Your view should resemble this(only grids and equipment shown)



LAB-7: Placing shapes to Build Designed Equipment

1 Open a Session file with Imperial Units

2 Define Workspace to Display U01 and U01 CS

3 Change the Active Coordinate system to U01

4 Select set target to origin option

5 Select Place Designed Equipment Command

6 Select Equipment\Process\Heat Exchangers\Kettle Heat Exchanger

1 Equipment Property page is displayed on your screen

2 Key in E-102 for Name

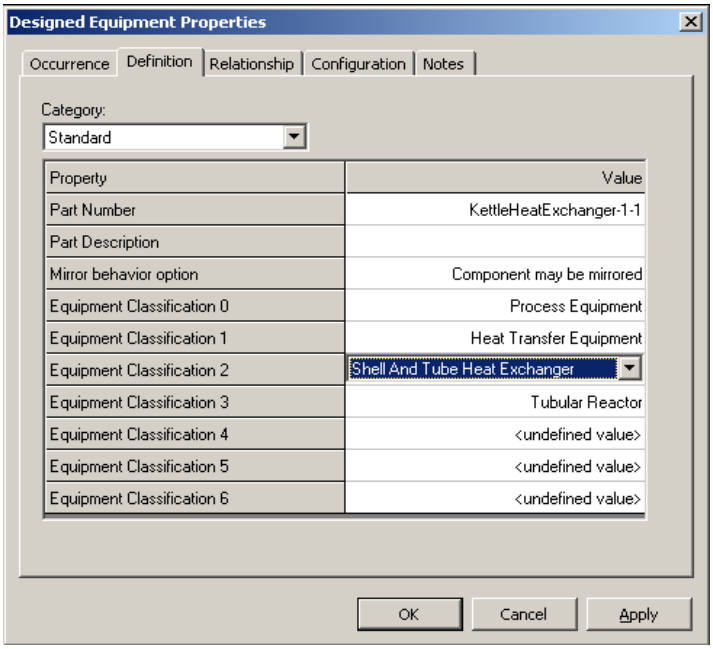
3 Click in the System Field and select 'More…'

4 System opens the Select System dialog box. Select the ***A2- > U01 -> Equipment*** System and Click the OK button.

5 Switch to Position and Orientation Category

6 Key in 5 For Easting, -20 for Northing and 6' for Elevation

7 Switch to Definition Tab and set the classifications as shown



8 Select Place shape Command(click on place shape command and hold the left mouse button to display list of shapes). Select Cylinder Shape from the shape options.

9 If prompted, select Designed equipment E-102 in WSE

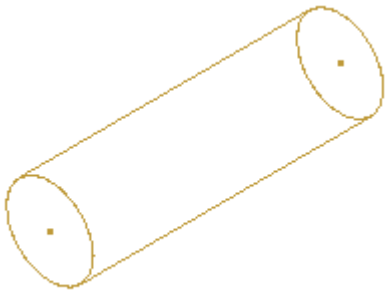
10 Enter A=20’ and B=6’

11 Using PinPoint place the shape at

Easting: 5 ft relative to the U01 coordinate system

Northing: -20 ft relative to the U01 coordinate system

Elevation: 6 ft relative to the U01 coordinate system

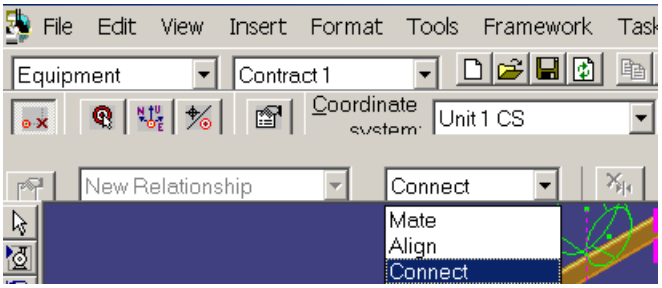


12 Select Place shape command and select Eccentric Cone from shapes

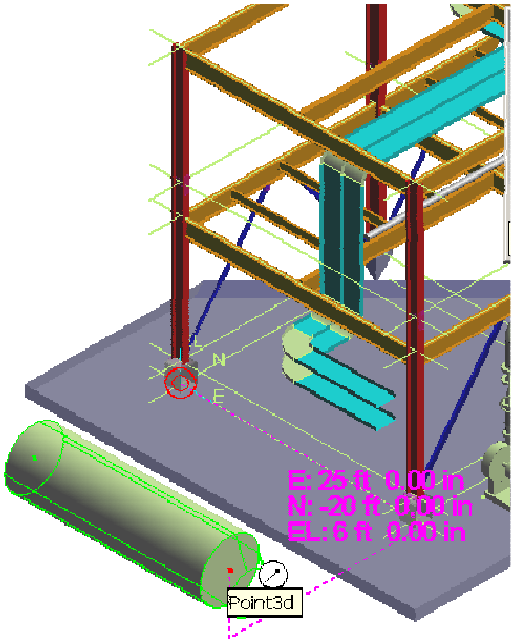
13 Select Designed equipment E-102

14 Enter A=3 ft, B=6 ft, C= 4 ft and Click OK

15 Change the Relationship to Connect from Mate



16 Select the Point at the East end of the Cylinder



17 Using Arrows Keys rotate the shape so it is Flat on Bottom(Use up arrow key to change rotation axis, left / right arrow key to rotate)

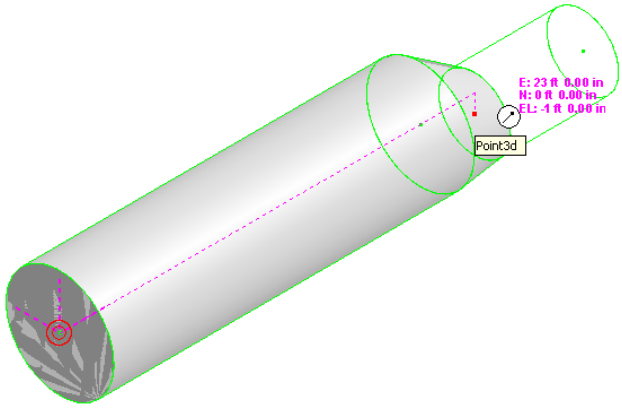
Elevation View

18 Select Place Shape Command. Select a Cylinder

19 Identify E-102

20 Enter A=6 and B=4

21 Using Connect Place it at the free end of Eccentric cone



22 On Pinpoint's Coordinate System pulldown select "Select Graphically"

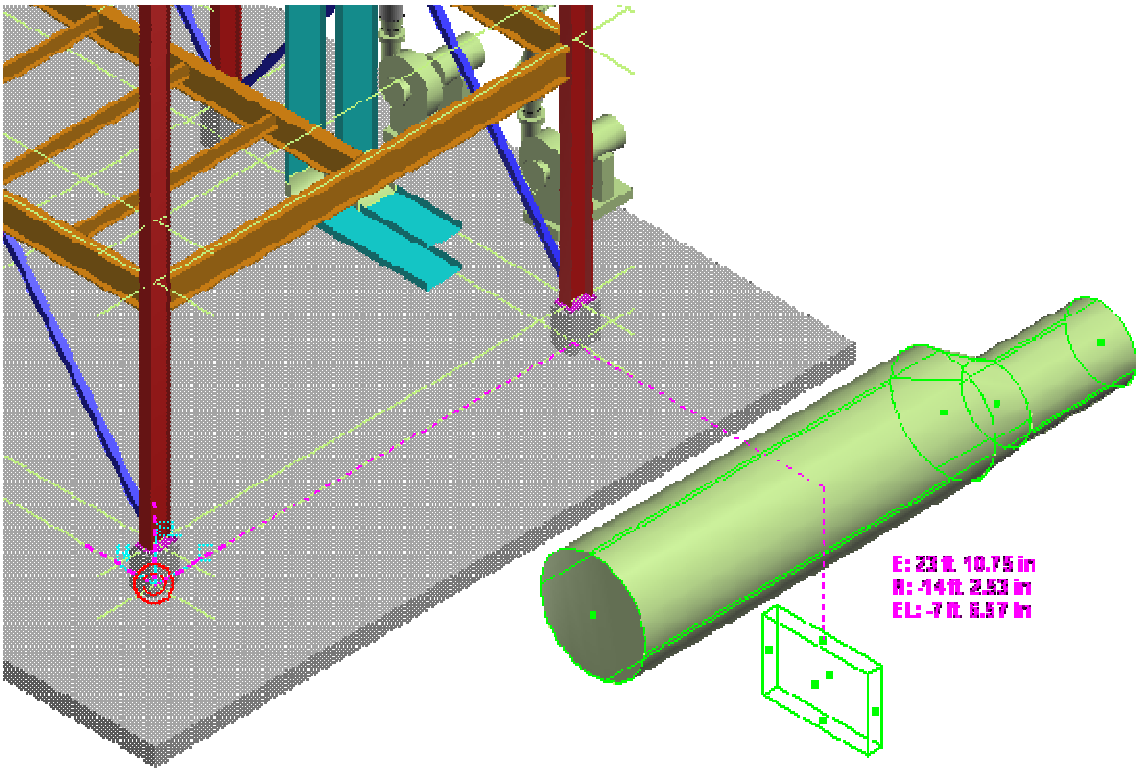
23 Click on the main body of E-102

24 Select "Set target to Origin" from Pinpoint ribbon menu. The target point should appear on the cylinder as shown above

25 Select place Rectangular Solid shape

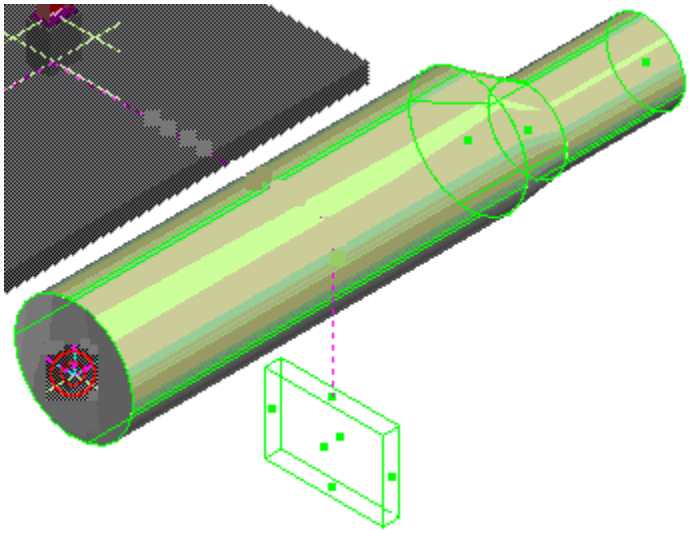
26 Enter A=4', B=6' and C=10" (C is 10 inches)

27 Using arrow keys rotate the shape as shown

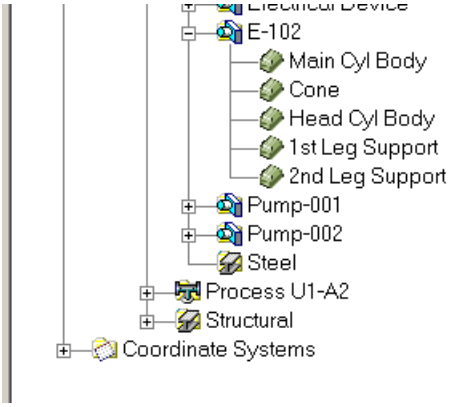


28 Place the shape at
Easting: 4 ft relative to the first shape coordinate system
Northing: 0 ft relative to the first shape coordinate system
Elevation: -2 ft relative to the first shape coordinate system

29 Place a second Rectangular shape with same dimensions and orientation at
Easting: 18 ft relative to the first shape coordinate system
Northing: 0 ft relative to the first shape coordinate system
Elevation: -2 ft relative to the first shape coordinate system

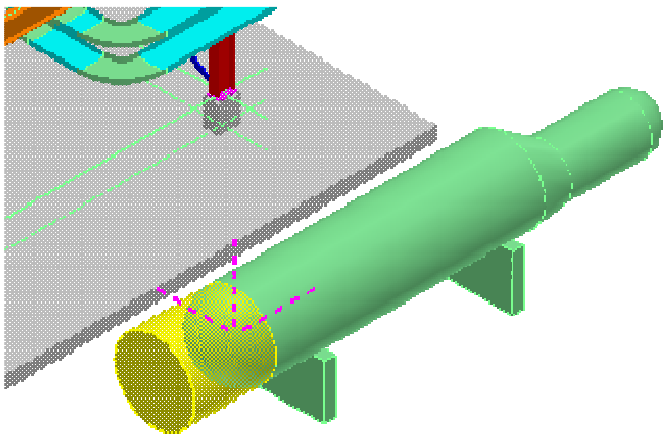


30 Rename all the Shapes under Designed Equipment E-102 as Shown



31 Add Head on Both ends of Equipment as shown.

32 Add 6’ long 6’ Dia cylinder on Bigger end of Equipment as Maintenance Envelope. (Turn Maintenance Aspect on under Format View. Apply Surface style rule to make it transparent)



LAB-8: Placing Nozzles

1 Open a Session file with Imperial Units

2 Define Workspace to Display U01 and U01 CS

3 Change the Active Coordinate system to U01

4 Select set target to origin option

5 Select Place Nozzle Command

6 Select Shape(Main Cyl Body) under E-102

7 From the Port Type control on the Nozzle Properties form select **Piping Straight Nozzle**.

8 Define the following Properties:

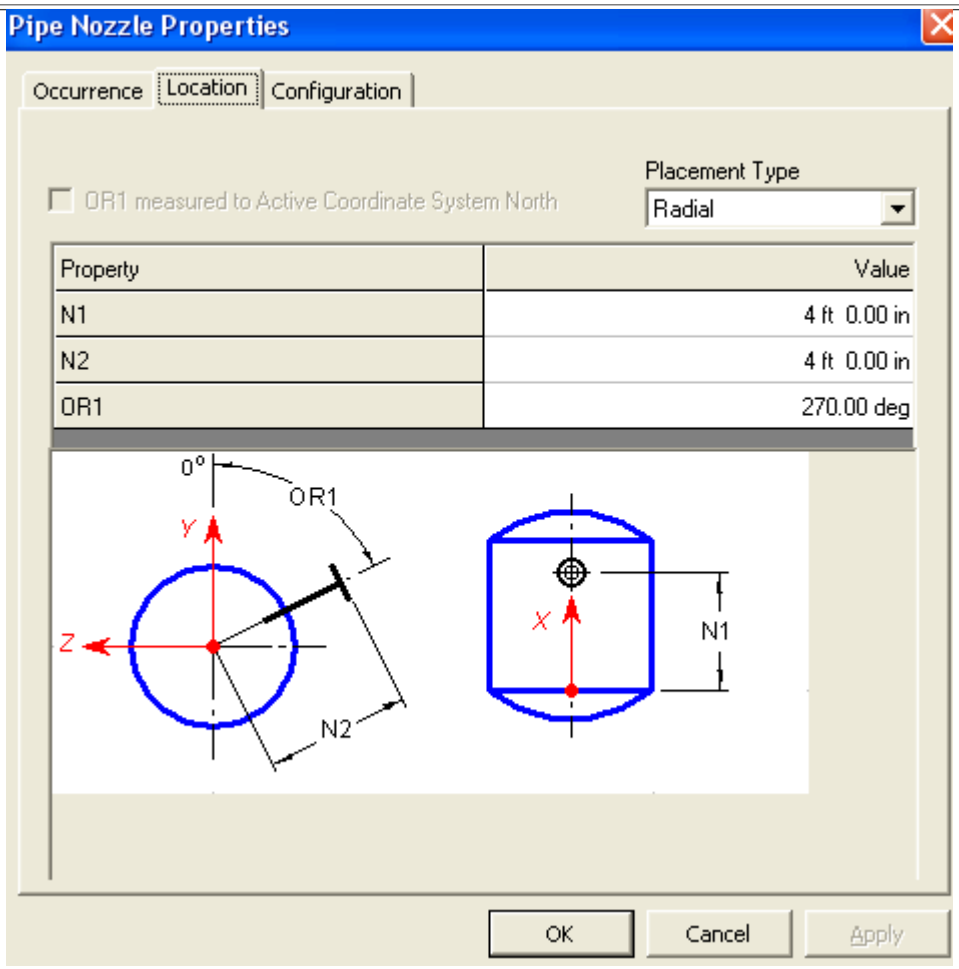
PortIndex: 1
NorminalSize: 8
NPDUnitType: in
Termination Class: Bolted
Termination SubClass: Flanged
End Preparation: RFFE
End Practice: US Practice
End Standard: Default
Rating Practice: US Practice
Pressure Rating: CL150
Flow Direction: Flow leaves this port

Scroll down

Nozzle Length: 1 ft
Name: N1

Switch to the location tab and select Radial in the Placement Type control. Define the following:

N1 = 4 ft
N2 = 4 ft
OR1 = 270 degree



9 Select Place Nozzle Command

10 Select Shape(Main Cyl Body) under E-102

11 From the Port Type control on the Nozzle Properties form select **Piping Straight Nozzle**.

12 Define the following Properties:

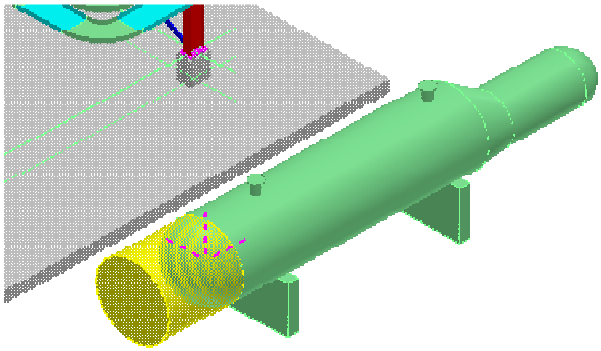
PortIndex: 2
NorminalSize: 8
NPDUnitType: in
Termination Class: Bolted
Termination SubClass: Flanged
End Preparation: RFFE
End Practice: US Practice
End Standard: Default

Rating Practice: US Practice
Pressure Rating: CL150
Flow Direction: Flow leaves this port

Scroll down
Nozzle Length: 1 ft
Name: N2

Switch to the location tab and select Radial in the Placement Type control. Define the following:
N1 = 18 ft
N2 = 4 ft
OR1 = 270 degree

13 Your view should resemble this



14 Activate PinPoint if not already active

15 Define Workspace to Display U04 and U04 CS

16 Change the Active coordinate system to 41V-101(U04\equipment\)

17 Select Set target to origin option

18 Select Place Nozzle Command

19 Select Shape(Tank) under 41V-101

20 From the Port Type control on the Nozzle Properties form select Piping Straight Nozzle.

21 Define the following Properties, 8”, RFFE, Length 1’, Name N1 (Define Rest of the properties as previous labs)

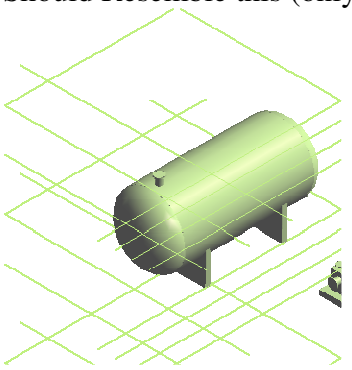
22 From Location Tab, select Position by point option. Ok on the form

23 Key in East 1, North 0 and Elevation 5’

24 Rotate the Nozzle using arrow keys. Make sure RFFE is on top

25 Click to place the nozzle

26 Your View Should Resemble this (only equipment and grids shown)



Select Place nozzle command

27 Select same Tank again

28 Define the following Properties, 8”, RFFE, Length 1’, Name N2 (Define Rest of the properties as previous labs)

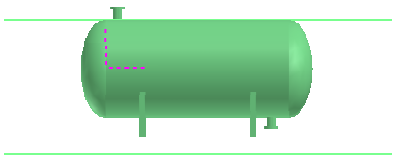
29 From Location Tab, select Position by point option. Ok on the form

30 Key in East 13 6”, North 0 and Elevation -4’ 10”

31 Rotate the Nozzle using arrow keys. Make sure RFFE is at the bottom

32 Click to place the nozzle

33 Your View Should Resemble this



LAB-9: Importing Equipment from External Modeler

1 Ask instructor for Tank_Shape.sat file

2 Open a Session file with Imperial Units

3 Define Workspace to Display U02 and U02 CS

4 Activate PinPoint if not already active

5 Change the active coordinate system to U02 CS

6 Select Set target to origin option

7 Select Place Designed Equipment Command

8 From Catalog select \Equipment\Process\Horizontal Vessels\Horizontal Drum with Saddle

9 OK on the property page

10 Key in East 15', North 30' and Elevation 0

11 Left click to place the equipment

12 Change the System to U02, Equipment

13 Change the Name to DR-100 (Press ENTER to force the name update)

14 Select the place imported shape from file command on the vertical toolbar.

15 If prompted, select DR-100 from the workspace explorer

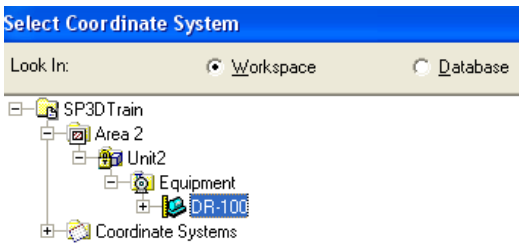
16 Select the Tank_Shape.sat file from specified location

17 In the Display aspects dialog, select Simple Physical and click OK.

18 Key in East 15', North 30' and Elevation 0

19 Change the name of tank to Drum Body

20 Change the Active coordinate system to DR-100



21 Select Set target to origin option

22 Select place Nozzle Command

23 Select Drum Body as shape to add nozzle to

24 Define the following Properties, 8”, RFFE, Length 1’, Name N1 (Define Rest of the properties as previous labs)

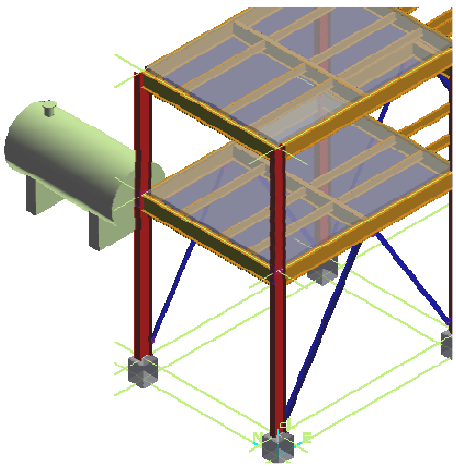
25 From Location Tab, select Position by point option. Ok on the form

26 Key in East -2’ 6”, North 8’ and Elevation 9’.

27 Rotate the Nozzle so RFFE is on top

28 Click in the view to place the nozzle

29 Your View Should Resemble this



LAB-10: Equipment from Shapes and Components

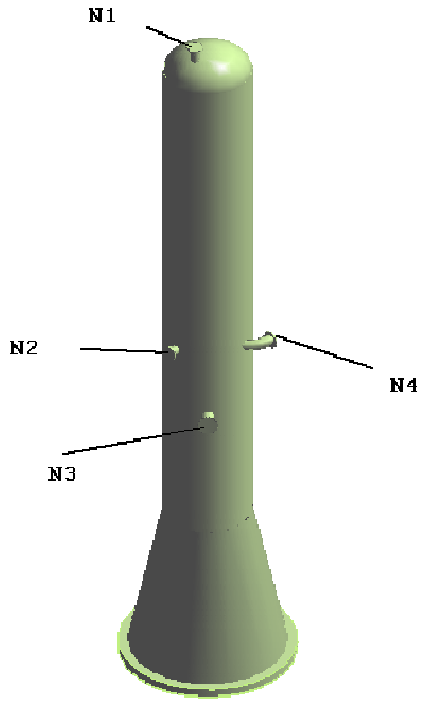
NOTE: These are not detailed steps. Just an outline of things to consider

1 Open a Session file with Imperial Units

2 Define Workspace to Display U02 and U02 CS

3 Activate PinPoint if not already active

4 Change the active coordinate system to U02 CS



5 Select Place Designed Equipment Command

6 Select \Equipment\Process\Vertical Vessels\Simple Vertical Vessel with Skirt and click OK.

7 Property page is displayed on your screen

8 Key in VS-102 for Name

9 Change the system to U02 -> Equipment System

10 OK on the property page

11 Place the design equipment at E -25, N -15 and EL 2

12 Select Place Shape command. Select the cylinder shape.

13 If prompted, select VS-102 as designed equipment

14 Place a Cylinder as base with dimensions A=6”(inches) and B=10’

15 Place the shape at E -25, N - 15 and EL 2

16 Rotate the shape so that the place point is at the Bottom

17 Change the name to Base

18 Select Place Equipment component command. Select VS-102 (if prompted)

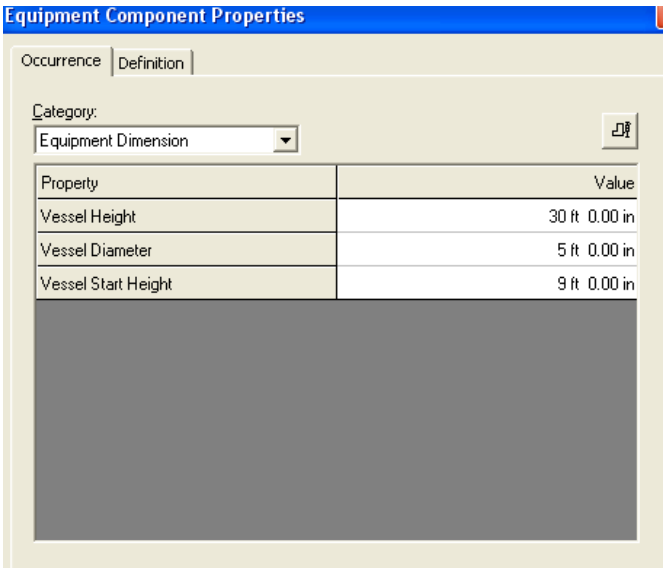
19 Select E(210)-Vertical tank under \Equipment Components\Process Components\Vessel & Equipment Bodies\Vertical Vessels and Tanks\Simple Vertical Cylindrical Equipment Skirt Component (E210)

20 Property page is displayed on the screen

21 Change the name to Vertical Tank

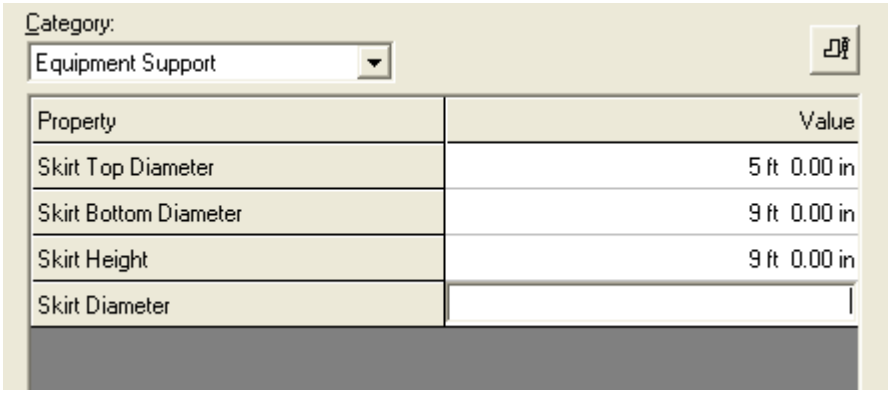
22 Switch to Equipment Dimension Category

23 Make following changes



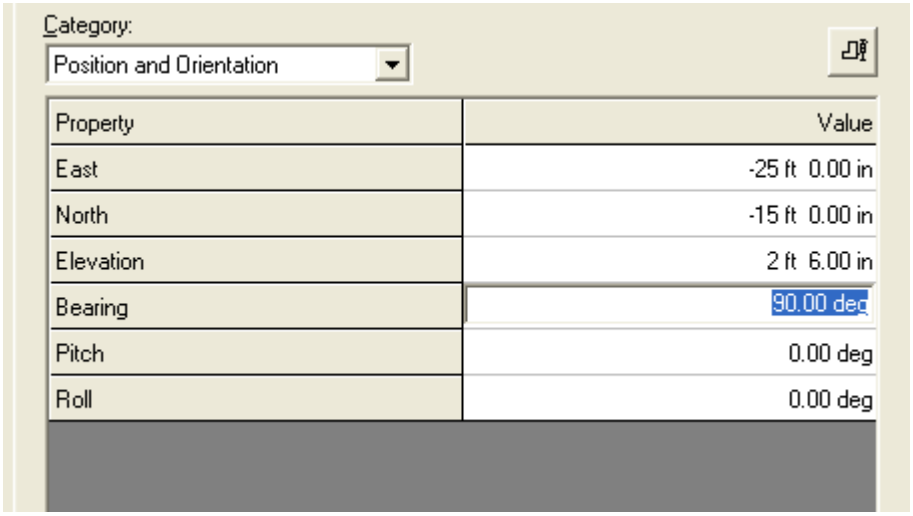
24 Switch to Equipment Support Category

25 Make following changes

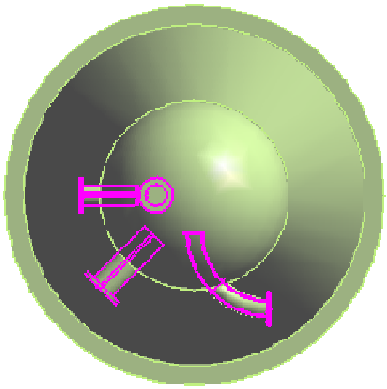


26 Switch to Position and Orientation Category

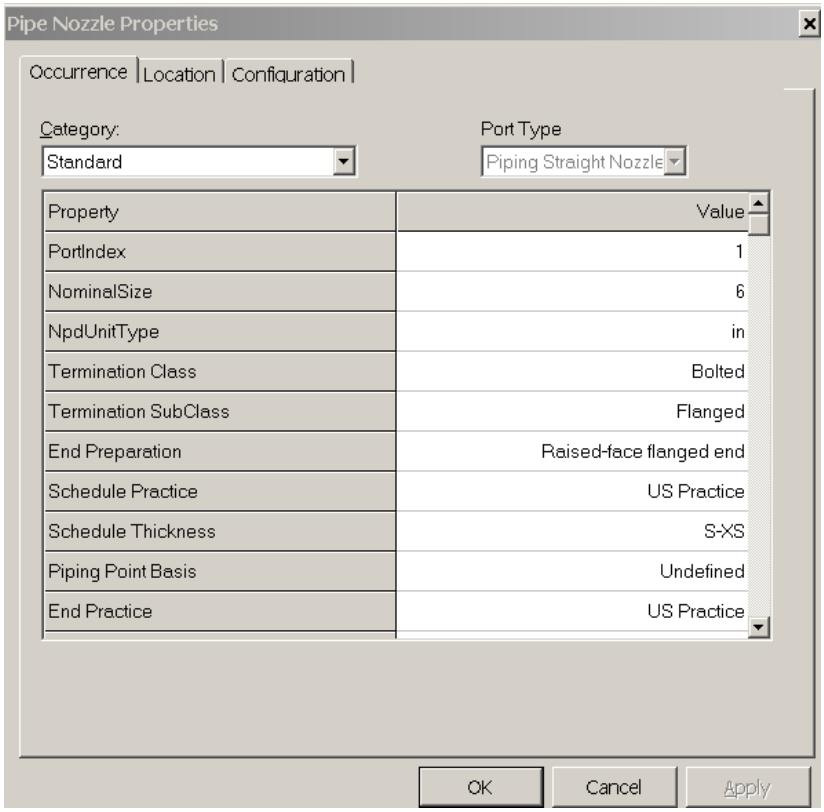
27 Make following changes and OK on the form

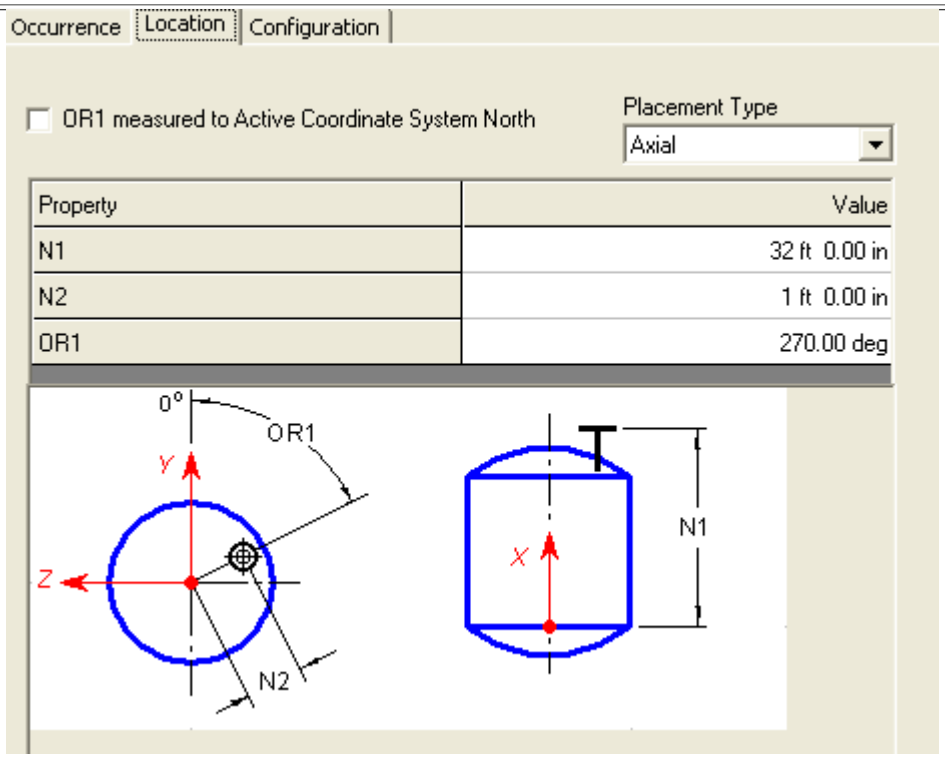


28 Place All nozzles by selecting DP2 under Vertical Tank. Nozzle Properties are detailed below

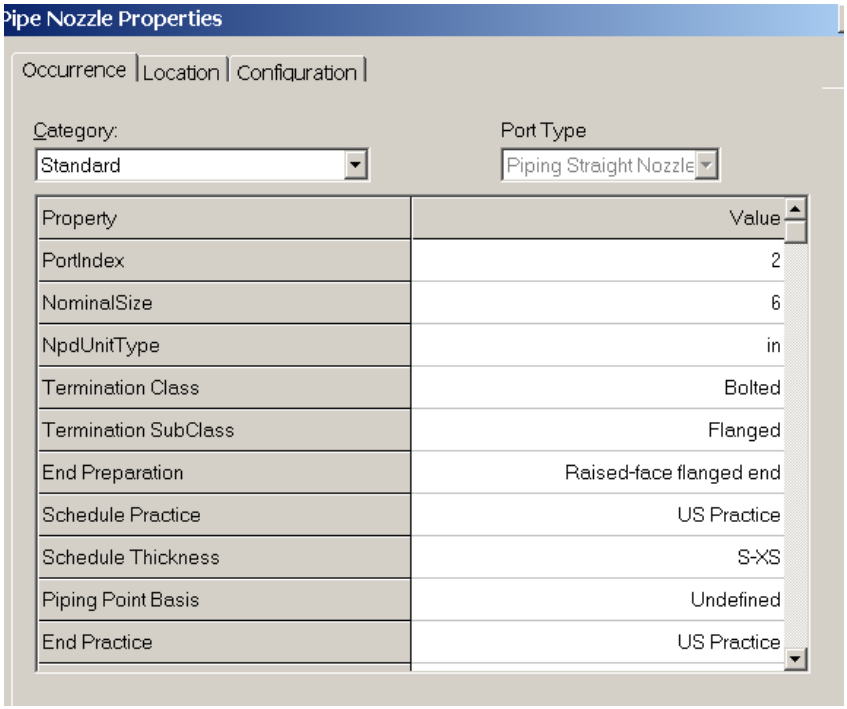


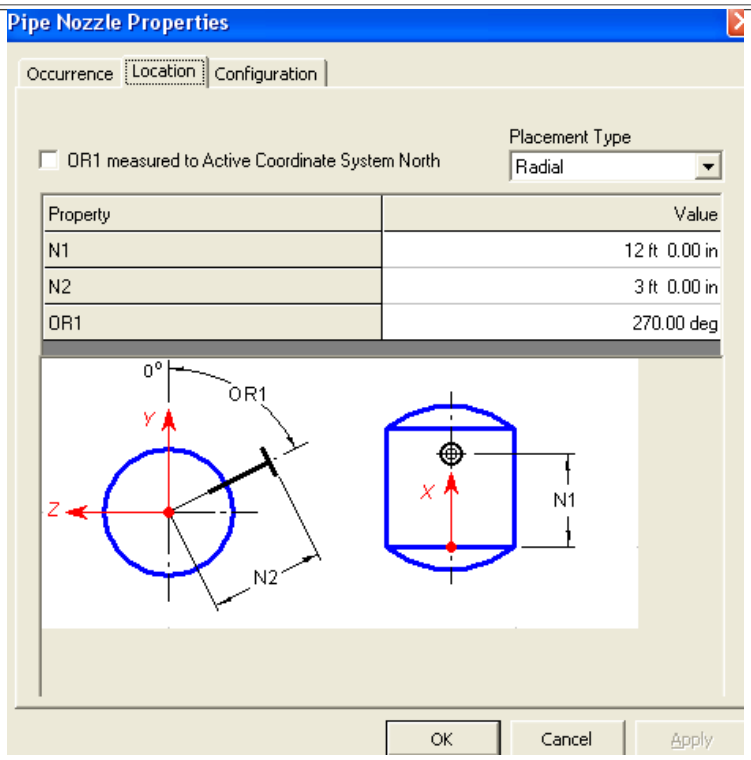
Nozzle: N1
Nozzle Length: 1’ Name: N1



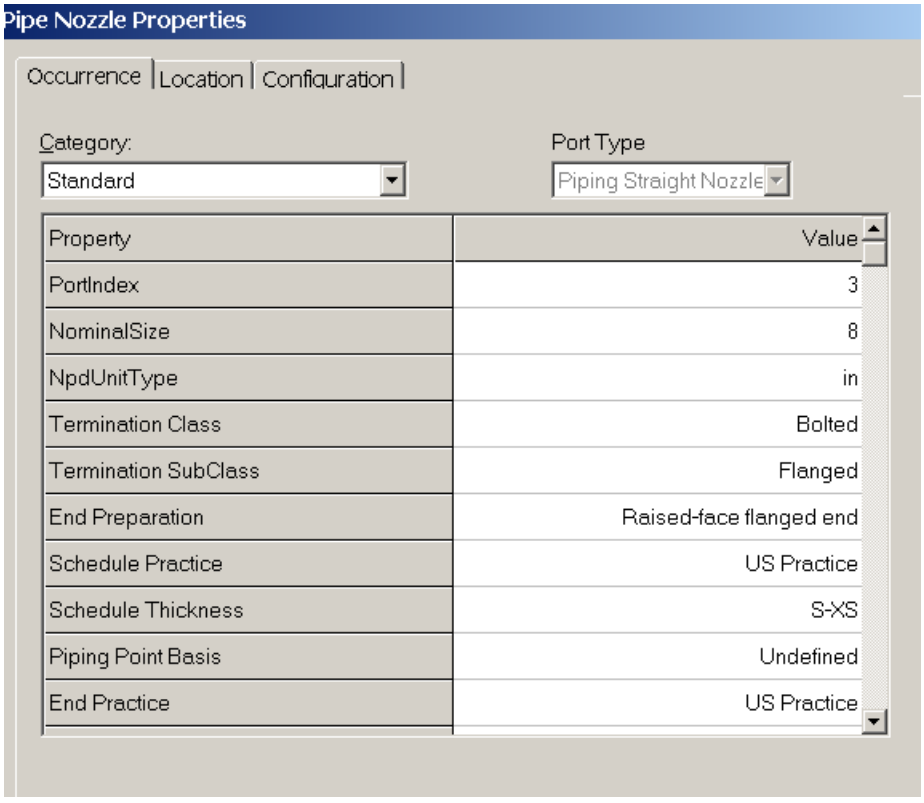


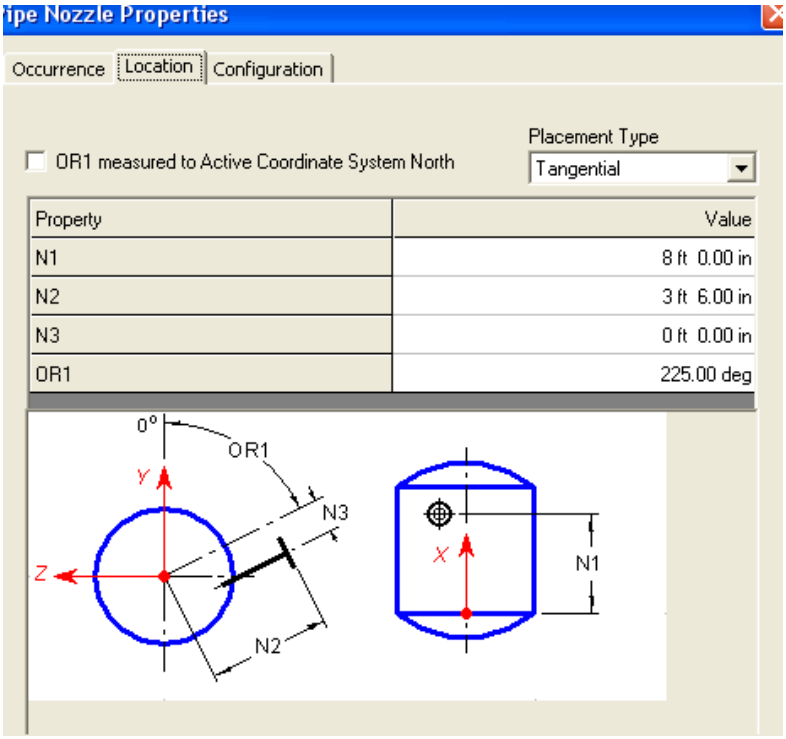
Nozzle: N2
Nozzle Length: 1’ 6” Name: N2



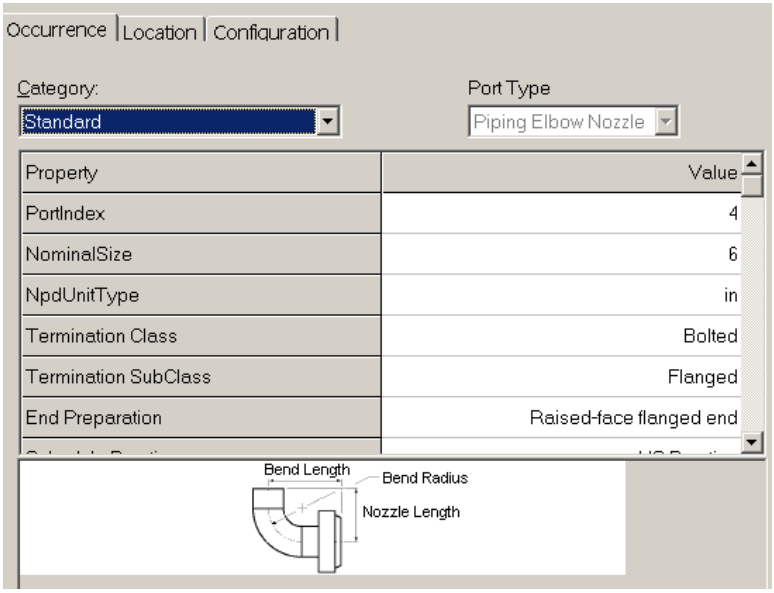


Nozzle: N3
Nozzle Length: 2’ Name: N3




ipe Nozzle Properties
Occurrence
Location
Configuration
OR1 measured to Active Coordinate System North
Placement Type
Tangential
Property
Value
N1
8 ft 0.00 in
N2
3 ft 6.00 in
N3
0 ft 0.00 in
OR1
225.00 deg
0°
OR1
Y
N3
Z
N2
X
N1

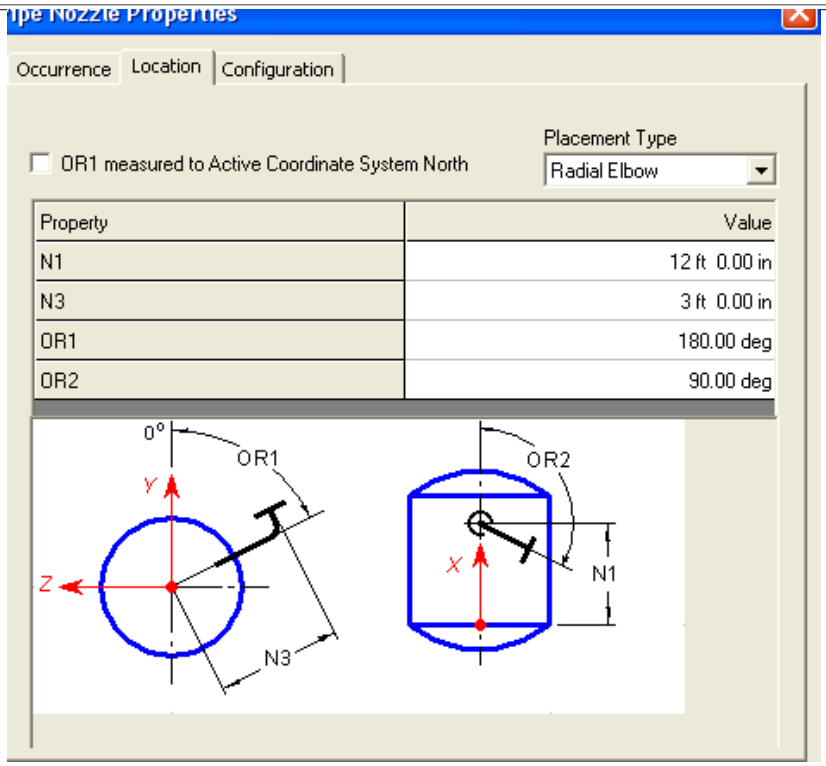
Nozzle: N4


Occurrence
Location
Configuration
Category:
Standard
Port Type
Piping Elbow Nozzle
Property
Value
PortIndex
4
NominalSize
6
NpdUnitType
in
Termination Class
Bolted
Termination SubClass
Flanged
End Preparation
Raised-face flanged end
Bend Length
Bend Radius
Nozzle Length

Property	Value
Schedule Practice	US Practice
Schedule Thickness	S-XS
Piping Point Basis	Undefined
End Practice	US Practice
End Standard	Default
Rating Practice	US Practice

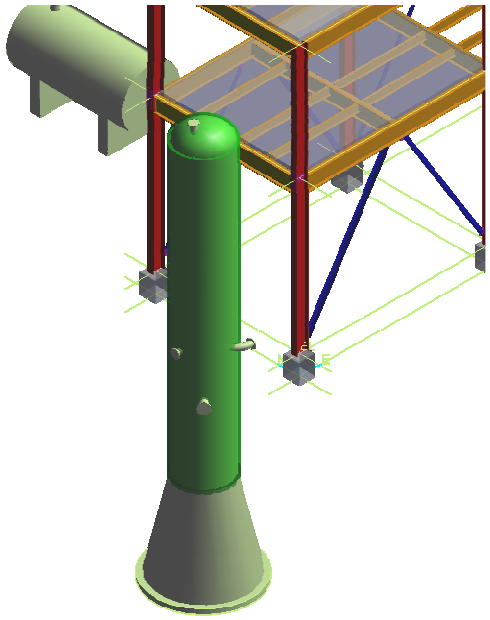
Property	Value
Pressure Rating	CL150
Flow Direction	Undefined
Flange Or Hub OutsideDiameter	0 ft 11.00 in
WallThickness Or GrooveSetback	0 ft 0.00 in
Raised Face Or Socket Diameter	0 ft 8.50 in
Flange Or HubThickness	0 ft 1.00 in

Property	Value
Nozzle Length	2 ft 0.00 in
Bend Length	2 ft 0.00 in
Bend Radius	2 ft 0.00 in
Name	N4
Correlation Status	Not correlated
Correlation Basis	Correlate object



Adding Insulation Aspect

Add 3” insulation to the main Vessel Body(to equipment component, not design equipment)
Define a Surface Style Rule to make Insulation Translucent



LAB-11: Placing Equipment from P&ID

1 Open a session file and define a filter for your workspace that includes the U02 and its coordinate system.

2 Activate PinPoint if not already active

3 Change the coordinate system to U02 CS

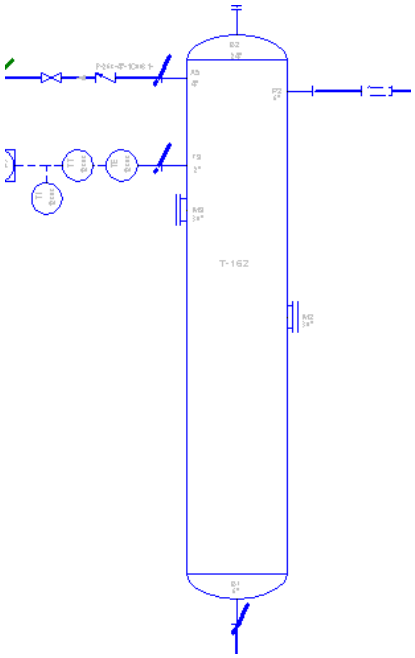
4 Select Set target to origin option

5 Go to Smartplant > View P&ID

6 Select INT01 from the PID list, Select open button

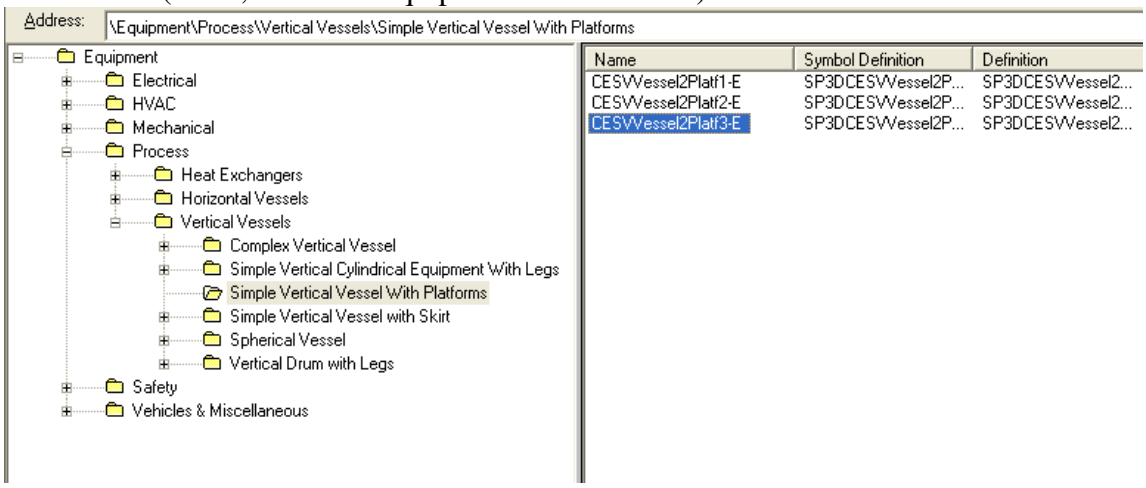
7 PID Viewer opens up in a Window

8 Select Equipment T-162 from PID

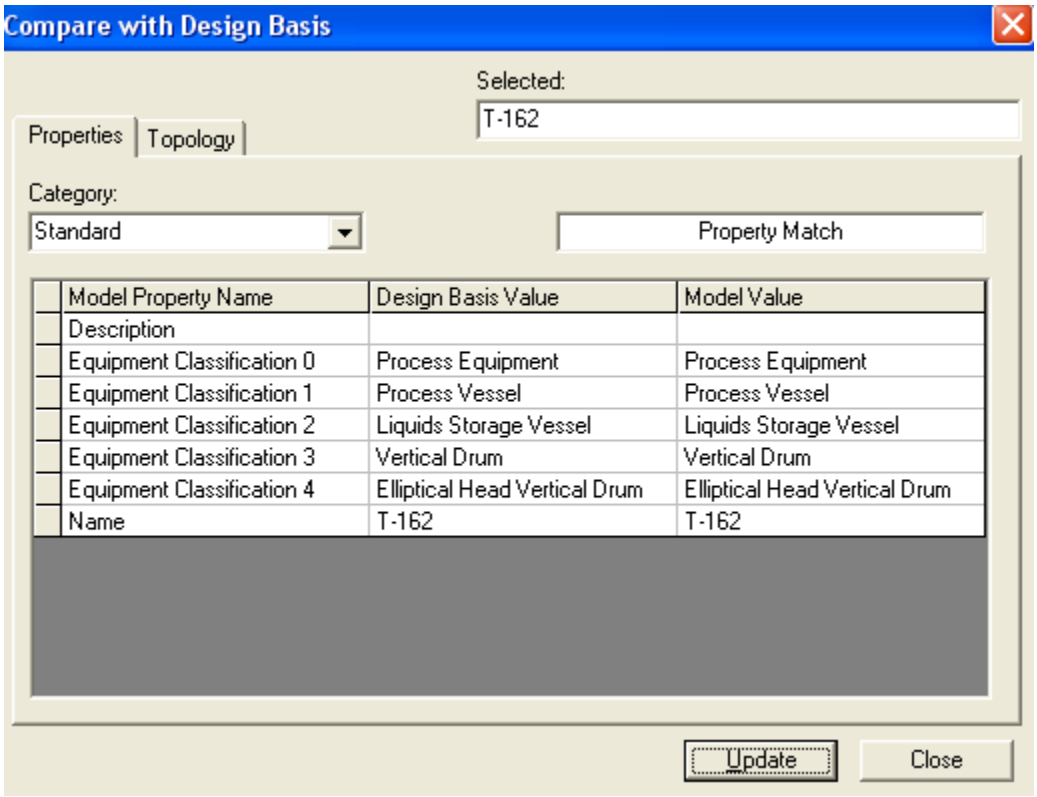


9 Select Place Equipment Command

10 System opens up the Catalog Browser, and Simple Vertical Vessel is selected. Ok on the form (if not, select the equipment shown below)



11 System Opens up Compare design Basis form. This reflects difference between Model and PID



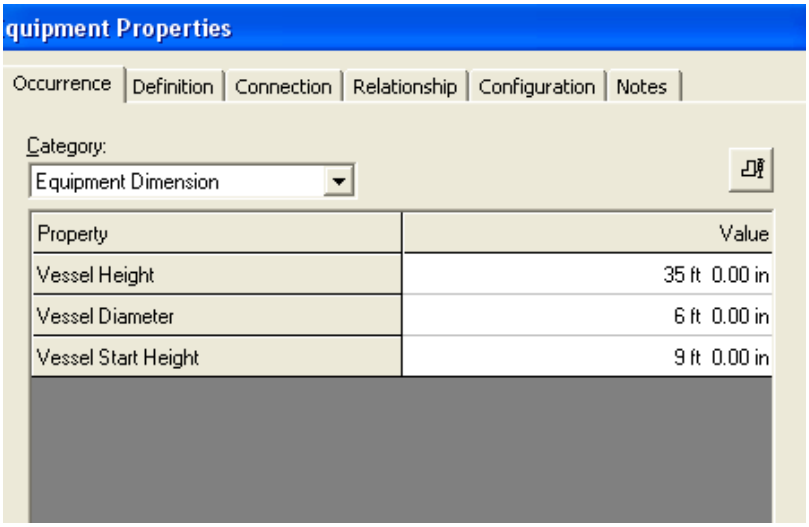
12 Select Update on the form. Click close

13 Software displays the properties page

14 System fills the name from PID (T-162)

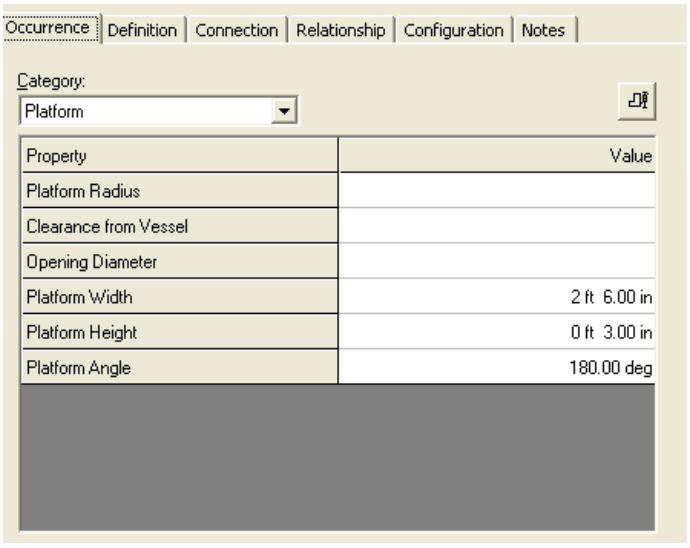
15 Change the system to U02 > Equipment

16 Change the Category to Equipment Dimension and make following changes



17 Switch to Equipment Support Category, Skirt top Dia 6', Bottom Dia 11', Skirt height 9'

18 Switch to Platform Category and make following changes



19 Switch to Position and Orientation category

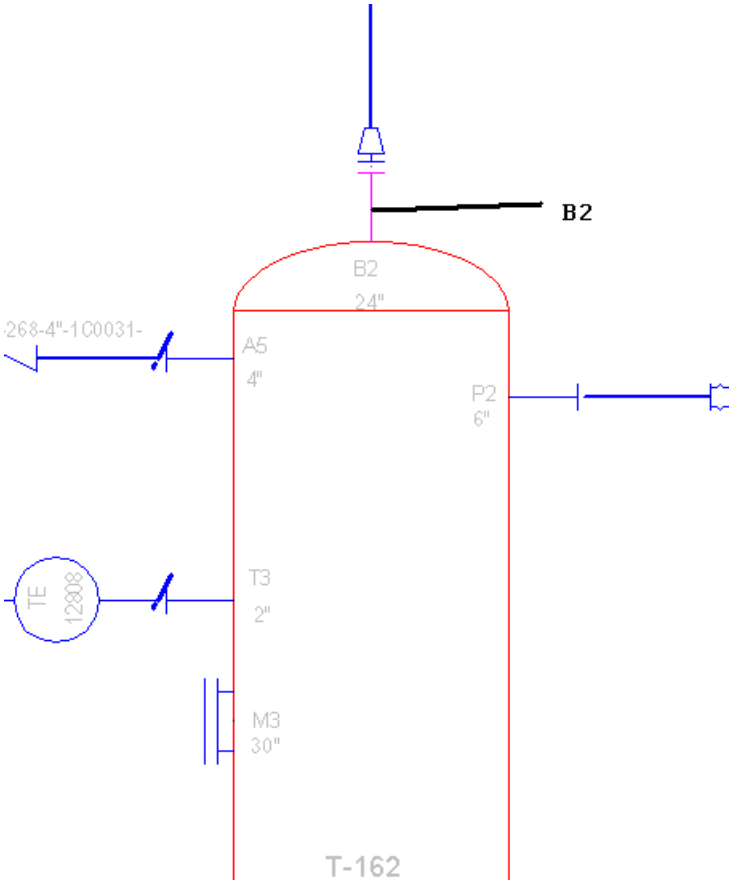
20 Place the Equipment at E 10, N -35, EL 2

21 Select the Nozzle, Vessel Noz1 at the top of the Equipment T-162 in the model.

22 Select Smartplant, Correlate with Design Basis option

23 System prompts from Item from PID

24 Select Nozzle B2, at the top in PID Viewer



25 Select Update from Compare design basis form. This will change the nozzle properties in the model to match PID

26 Close the form

27 Select Nozzle B2 in WSE and open its properties page

28 Change its length to 1’ 6”

29 Select the Nozzle, Vessel Noz2 on Equipment T-162 in the model.

30 Select Smartplant, Correlate with Design Basis option

31 System prompts from Item from PID

32 Select Nozzle P2, in PID Viewer

33 Select Update from Compare design basis form. This will change the nozzle properties in the model to match PID

34 Close the form

35 Select Nozzle P2 in WSE and open its properties page

36 Change its length to 1’ 6”

37 Switch to location tab and change N1 to 33’. Ok on the form

38 Select the Nozzle, Vessel Noz3 on Equipment T-162 in the model.

39 Select Smartplant, Correlate with Design Basis option

40 System prompts from Item from PID

41 Select Nozzle A5, in PID Viewer

42 Select Update from Compare design basis form. This will change the nozzle properties in the model to match PID

43 Close the form

44 Select Nozzle A5 in WSE and open its properties page

45 Change its length to 1’ 6”

46 Switch to location tab and change N1 to 32’. Ok on the form

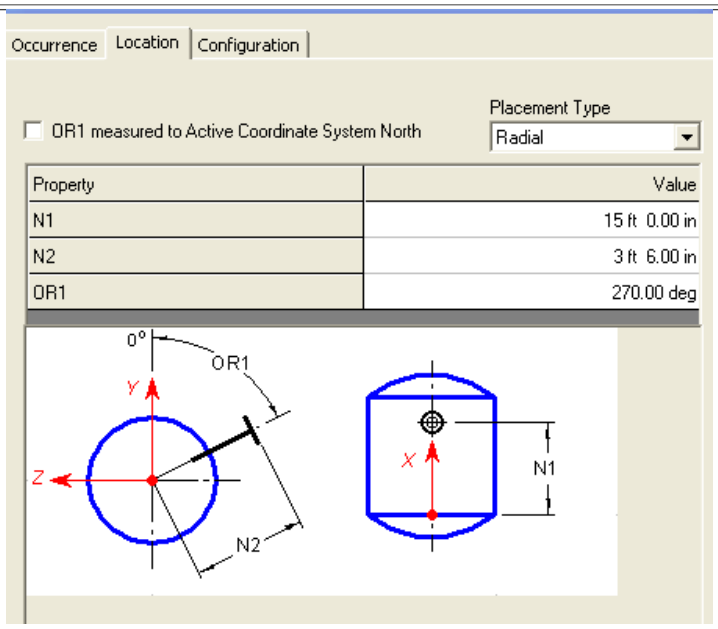
47 Select nozzle T3 in PID viewer

48 Select place nozzle command in the model

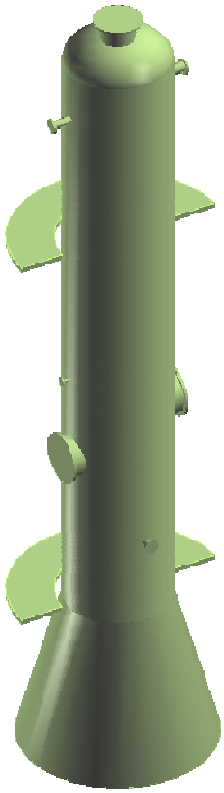
49 Select DP2, under T-162 in WSE, as the shape to add nozzle to.

50 Software displays Place Nozzle form with all Nozzle data already filled from PID. Change the length to 1’

51 Switch to Location tab, and make following changes



Place all the Nozzles from PID on EQP T-162.



52 Change your Workspace to Display all Filter

53 Expand U04, Equipment and select 41P-101A.

54 Select Copy command.

55 Select Top of Discharge nozzle as Reference point.

56 Select Paste command. Check Paste in Place option and Ok on the form

57 Select New Equipment (copied equipment) if not already selected

58 Open properties page

59 Change system to U02, equipment.

60 Switch to position and orientation category

61 Change the coordinates to E 25, N -50 and EL 3 WRT U02 CS

62 Select the copied equipment and go to Smartplant, Correlate with Design Basis.

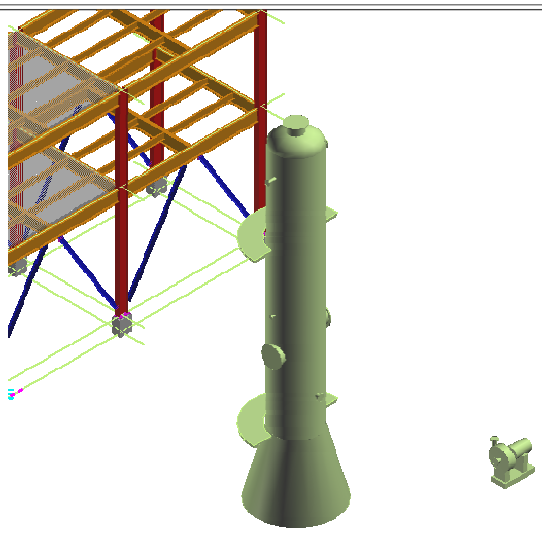
63 System prompts for Select PID item to be correlated

64 In PID viewer select pump P-162. System displays Compare with Design Basis form. Select Update.

65 Select nozzle N1 under pump, select Smartplant compare design basis.

66 Update on the form. Close the form. This should turn nozzle green.

67 Update nozzle N2 same way. When done. The equipment and nozzles should turn green in the PID. If Equipment is not green, Select the equipment and select Compare with Design Basis. Select update. This will turn Equipment and Nozzles green in PID.


Looking Plan

FUTURE LABS:

1 MORE PRACTICE WITH RELATIONSHIPS ON THE FLY AND AFTER PLACEMENT
2 MODEL OTHER DISCIPLINES EQP: ELECTRICAL, HVAC
3 PLACING CONN PORTS OTHER THAN PIPING
4 REFERENCING DGN AND ADDING CON PORTS TO SAT OR DGN REF'S