SmartPlant P&ID
Creating a P&ID Course Labs

Process, Power & Marine

INTERGRAPH

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Preface

This document is the lab guide which accompanies the SmartPlant P&ID Creating a P&ID Course Guide. The exercises in this guide provide practice and reinforce the concepts taught in TSPL1002.

Lab 1: Creating Plant Groups
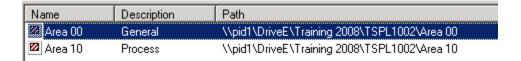
Purpose: To learn how to create plant groups in SmartPlant Engineering Manager. In this lab, students will create 2 areas and units for use in upcoming labs.

The lab exercises in this course guide are designed to be used with stand-alone plants (one plant per user). If these exercises are to be performed on a multi-user plant, you must develop a unique Area, Unit and Drawing Number naming convention so that each student is working in their own set of Area, Units and Drawings.

1. From SmartPlant Engineering Manager, create the following AREAS.

Name	Description
Area 00	General
Area 10	Process
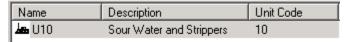
2. Modify the view to add the path to the area display. (Hint: Click on Plant. Select **Tools** > **Show Fields**).

Name	Description	Path
Area 00	General	\\pid1\DriveE\Training 2008\TSPL1002\Area 00
Area 10	Process	\\pid1\DriveE\Training 2008\TSPL1002\Area 10

3. From SmartPlant Engineering Manager, create the following UNIT under AREA 00.

Name	Description	Unit Code
LEGEND	Legend Sheets	00

From SmartPlant Engineering Manager, create the following UNIT under AREA 10.

Name	Description	Unit Code
U10	Sour Water and Strippers	10

4. Modify the view display to include the following properties when the Area node is selected and the units are displayed in the list view.

Name	Description	Unit Code	Path
LEGEND	Legend Sheets	00	\\pid1\DriveE\Training 2008\TSPL1002\Area 00\LEGEND

Hint: Click on Plant. Select **Tools** > **Show Fields**. Highlight Unit in the Show Fields dialog before selecting properties.

Lab 2: Creating Drawings

Purpose: Students will use Drawing Manager to create drawings that will be used in other lab exercises.

1. From **Drawing Manager**, select **View** > **Customize Current View** to add the **Drawing Number** and other properties to the List **View** and order the properties as follows.

   a. Out-of-Date Drawing Status **(Note: this will always be the first column)**
   b. Drawing Number
   c. Name
   d. Description
   e. Title
   f. Any additional properties you wish to include.

2. Create the following E sized drawing within the Legend unit.

   - Drawing Number: 00-LEG-01
   - Drawing Name: LEGEND01
   - Description: Equipment Assemblies

3. Create the following E sized drawing within Unit 10.

   - Drawing Number: 10-PID-01
   - Drawing Name: PID01
   - Description: Workflow drawing

   Notes:

   - During drawing creation all required properties must be entered before the OK button is highlighted. Toggle the A-Z/Categorized button to view the required properties.

   - When revising/adding a property value for a drawing remember to either tab, enter or click on another property in order for the OK button to be highlighted.

   - Remember to click out of field or press 'Enter' to save the entry.

   - You can drag-and-drop drawings from one unit to another. Be aware if there are items placed in the drawing the drawing will have to be opened after dragging-and-dropping and the Plant Group Name may have to be revised for the applicable items.

Lab 3: Customizing the Working Environment

Purpose: Students will add buttons to the toolbar and change the view properties and other user options in SPPID.
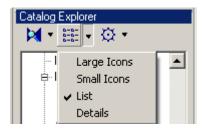
1. Open drawing **PID01**.

2. Add the **Apply Display Set** and **Clear Display Set** commands to the toolbar.

    -   Select **View** > **Toolbars** > **Customize**

        a. On the **Toolbar** tab, select **View**.

        b. Drag the **Apply Display Set** and **Clear Display Set** commands to your toolbar.

        c. Select **Close** from the **Customize** dialog box.

3. Review the commands below. Change the settings to see how they affect the working environment.

    -   **View** > **Properties**

        1. **General** tab
        2. **Display** tab
        3. **Grid** tab
        4. **Inconsistency Indicators** tab

    -   **Tools** > **Options**

        1. **General** tab
        2. **Colors** tab
        3. **Placement** tab
        4. **Files** tab

4. Define your colors via **Tools** > **Options.**

Lab 4: Working with the Catalog Explorer

Purpose: Students will learn to customize the Catalog Explorer and streamline their workflow by configuring a view, adding shortcut buttons in Catalog Explorer and creating a custom toolbar in My Catalog.

Configure a view:

1. Choose a setting from the Views Settings menu in the **Catalog Explorer.**
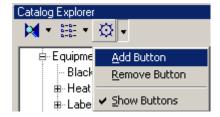
Add shortcut buttons in Catalog Explorer
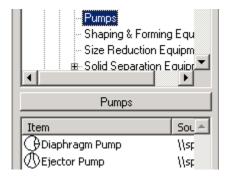
1. Use the **Show Buttons** and **Add Buttons** from the **Catalog Explorer** to add **Pumps** to the Selection List.

2. Select the **Show Buttons** command

3. Highlight **Pumps** in the **Catalog Explorer**

   - Select **Symbols** > **Equipment** > **Mechanical** > **Pumps**

4. Select the **Add Button** command

5. You should have a button named **Pumps** between the tree view and list view in the **Catalog** Explorer.
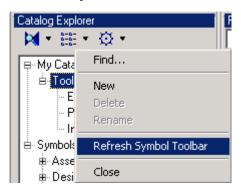
6. Add a button for nozzles.

Creating a Symbol Toolbar in My Catalog

1. Select the + to expand **My Catalog** in **Catalog Explorer**.

2. Right-click on **Toolbars** and select **New** to create a **New Category**.

3. **Rename** the **New Category** to **Equipment and Components**.

4. Create two (2) more categories in **Toolbars**

- **Piping and Components**

- **Instrumentation**

5. **Drag** and **Drop** the following symbols from the **Catalog Explorer** list view into the folders as listed below:

- Equipment and Components
  - o 1D 1 to 1 (located in Equipment >Vessels > Vertical Drums)
  - o Flanged Nozzle (located in Equipment Components > Nozzles)

- Piping and Components
  - o Primary Piping (located in Piping > Routing > Process Lines)
  - o Off-Drawing (located in Piping > Piping OPC's)
  - o Gate Valve (located in Piping > Valves > 2 Way Common)
  - o Ball Valve (located in Piping > Valves > 2 Way Common)

- Instrumentation
  - o Diaphragm Actuator (located in Instrumentation>Actuators)

- o 2 Way Generic Body Valve (located in Instrumentation>In-Line>Valves>2 Way Common)

- o Electric (located in Instrumentation>Signal Line)

- o Connect to Process (located in Instrumentation>Signal Line)

6. After placing the symbols in the appropriate folders, right-click on **Toolbars** and select **Refresh Symbol Toolbar**.
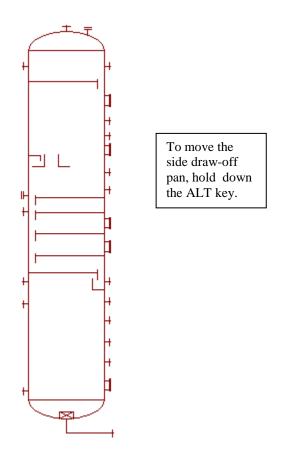
7. Your custom toolbars appear to the left side of the drawing view.

Lab 5: Placing Equipment and Equipment Components

Purpose: Become familiar with placing equipment and equipment components in SmartPlant P&ID.

1. Open drawing **LEGEND01**.

2. Place the vessel and components.

> To move the side draw-off pan, hold down the ALT key.

Hint: Use the following symbols:
Equipment > Vessels > Vertical Drums > 2to1 Parametric V Drum.sym
Equipment Components > Nozzles > Flanged Nozzle.sym
Equipment Components > Nozzles > Flanged Nozzle with Blind.sym
Equipment Components > Nozzles > Angle Parametric Nozzle.sym
Equipment Components > Nozzles > Manway-Small.sym
Equipment Components > General > Vortex Breaker.sym
Equipment Components > Trays > Pans > Side Draw-Off Pan.sym
Equipment Components > Trays > Pans > Side Seal Pan.sym
Equipment Components > Trays > Generic Trays > 1-Pass Gen Tray.sym
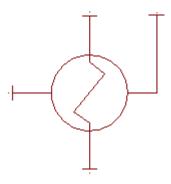
3. Place a heat exchanger and nozzles. You will need to adjust the length of the parametric nozzle so that it lines up with the other nozzle.
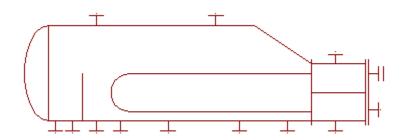
Hint: Use the following symbols:
Equipment > Heat Transfer Equipment > Shell & Tube Exchangers >
      Generic 1- Shell & Tube.sym
Equipment Components > Nozzles > Angle Parametric Nozzle.sym
Equipment Components > Nozzles > Flanged Nozzle 4.sym

4. Place another heat exchanger and nozzles.

Hint: Use the following symbols:
Equipment > Heat Transfer Equipment > TEMA Shell & Tube > Shells >
      TEMA Shell Type K.sym
Equipment > Heat Transfer Equipment > TEMA Shell & Tube > Rear Ends >
      Rear End Type L.sym
Equipment Components > Nozzles > Flanged Nozzle.sym
Equipment Components > Nozzles > Flanged Nozzle with blind.sym
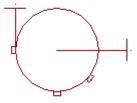
5. Place a pump and nozzles.

Hint: Use the following symbols:
Equipment > Mechanical > Pumps > Horiz Centrifugal Pump.sym
Equipment Components > Nozzles > Flanged Nozzle 4.sym
Equipment Components > Nozzles > Pump Nozzle - Internal.sym
Equipment Components > Nozzles > Instrument Connector.sym
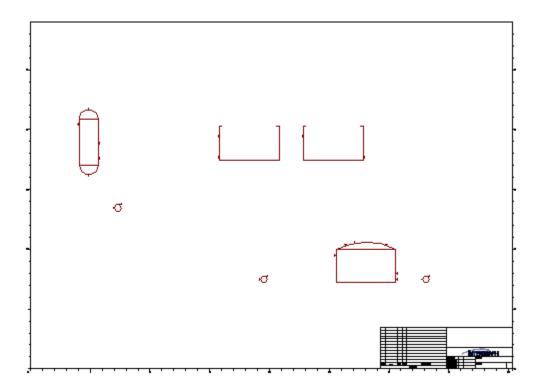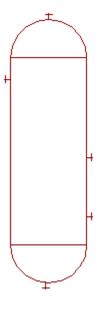
Lab 6: Placing Equipment and Components in a P&ID

Purpose: To place equipment and components in a P&ID that will be used throughout the course.

1. Open drawing **PID01**.

2. Place the following equipment and equipment components in the drawing. Place them in the locations indicated in the figure below.

3.   Place the vertical drum and components.

Hint: Use the following symbols:
Equipment > Vessels > Vertical Drums > 1D 1to1.sym
Equipment Components > Nozzles > Flanged Nozzle.sym

4.   Place the pumps with nozzles.
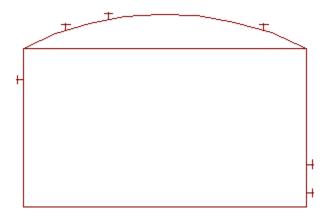
Hint: Use the following symbols:
Equipment > Mechanical > Pumps > Horiz Centrifugal Pump.sym
Equipment Components > Nozzles > Flanged Nozzle.sym
Equipment Components > Nozzles > Pump Nozzle - Tangent.sym
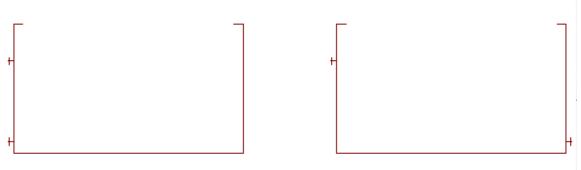
5. Place the tanks and nozzles.

Hint: Use the following symbols:
Equipment > Vessels > Tanks > Dome Roof Tank.sym
Equipment Components > Nozzles > Flanged Nozzle.sym

Hint: Use the following symbols:
Equipment > Vessels > Tanks > Open Top Tank.sym
Equipment Components > Nozzles > Flanged Nozzle.sym

Lab 7: Placing Piping and Piping Components

Purpose: Become familiar with placing piping and piping components in SmartPlant P&ID.

1. Create a new E-size drawing in LEGEND with the following properties:
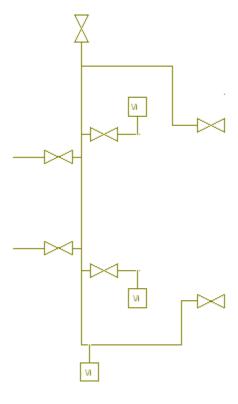
   - Drawing Number: 00-LEG-02

   - Drawing Name: LEGEND02

   - Description: Piping Assemblies

2. Open drawing **LEGEND02**.

3. Create the following graphics by routing pipe and placing components. Place any components frequently used on your symbol toolbar.

   Hints:

   - Use the PickQuick tool or mirror for correct orientation of the label on the vent detail.

   - Piping segments need to be long enough to insert valves.
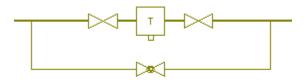
Hint: Use the following symbols:
Piping > Routing > Process Lines > Secondary Piping.sym

Piping > Valves > 2 Way Common > Gate Valve.sym
Piping > Macrocomponents > Vent Detail 1.sym

4. Create a second group of graphics by routing pipe and placing components.

Hint: Use the following symbols:
Piping > Routing > Process Lines > Primary Piping.sym
Piping > Routing > Process Lines > Secondary Piping.sym
Piping > Valves > 2 Way Common > Gate Valve.sym
Piping > Valves > 2 Way Common > Globe Valve.sym
Piping > Specialty Components > Traps & Filters > Steam Trap.sym
Piping > Fittings > End Components > Plug.sym

Lab 8: Placing Piping and Components in a P&ID
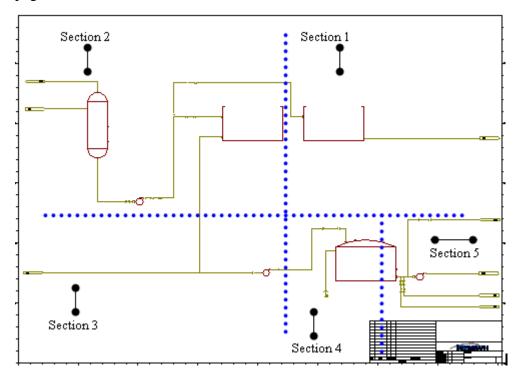
Purpose: To place piping and piping components in a P&ID used throughout the course.

1. Open drawing **PID01**.

Note: Before you start working on this lab, check the **Tools > Options > Placement** dialog and ensure that the checkbox "Place partner OPC in stockpile" is checked.

2. Route pipe and place components in this P&ID according to the following diagram. Additional zoomed images of each section appear on the following pages:

Zoomed view of section 1:
(Note: OPCs will have tag numbers when placed. The tag numbers may be different than those in the images.)
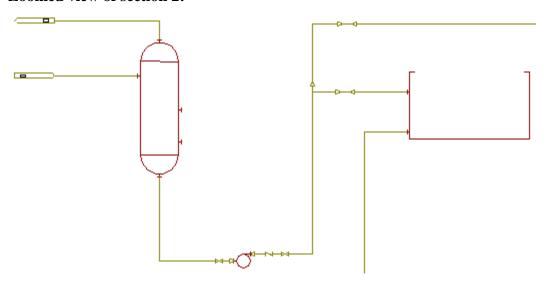
Hint: Use the following symbols:
Piping > Routing > Process Lines > Primary Piping.sym
Piping > Piping OPC's > Off-Drawing.sym

Zoomed view of section 2:

Hint: Use the following symbols:
Piping > Routing > Process Lines > Primary Piping.sym
Piping > Valves > 2 Way Common > Gate Valve.sym
Piping > Valves > 2 Way Common > Check Valve.sym
Piping > Fittings > Diameter Change > Concentric.sym
Piping > Piping OPC's > Off-Drawing.sym
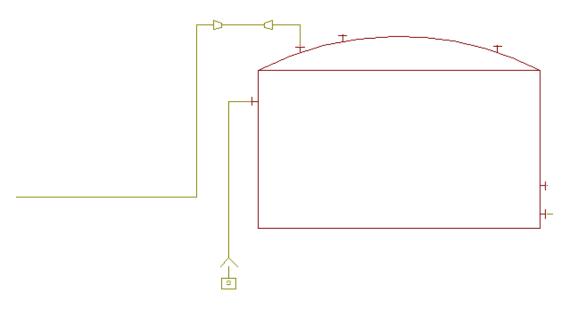
Zoomed view of section 3:

Hint: Use the following symbols:
Piping > Routing > Process Lines > Primary Piping.sym
Piping > Piping OPC's > Off-Drawing.sym
Piping > Fittings > Diameter Change > Concentric.sym

Zoomed view of section 4:

Hint: Use the following symbols:
Piping > Routing > Process Lines > Primary Piping.sym
Piping > Fittings > Diameter Change > Concentric.sym
Piping > Specialty Components > Vents & Exhausts >
        Free Vent W-O Screen.sym
Piping > Macrocomponents > End Connection Detail
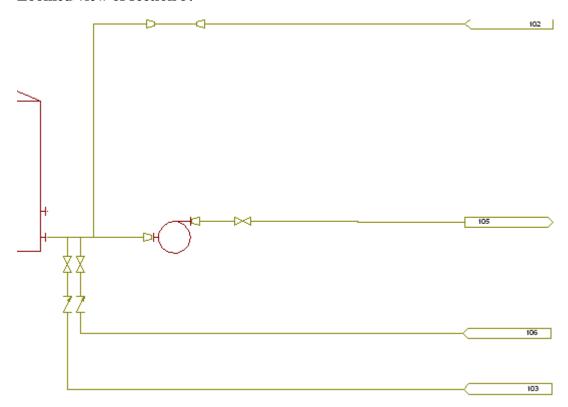
Hint: Place the End Connection Detail before the Free Vent W-O Screen

Zoomed view of section 5:

Hint: Use the following symbols:
Piping > Routing > Process Lines > Primary Piping.sym
Piping > Piping OPC's > Off-Drawing.sym
Piping > Valves > 2 Way Common > Gate Valve.sym
Piping > Valves > 2 Way Common > Check Valve.sym
Piping > Fittings > Diameter Change > Concentric.sym

Lab 9: Placing Instruments and Signal Lines

Purpose: Become familiar with placing instruments and signal lines in SmartPlant P&ID.

1. Create a new E-size drawing in LEGEND with the following properties:
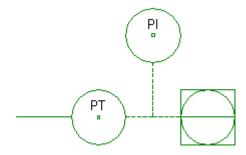
    - Drawing Number: 00-LEG-03
    - Drawing Name: LEGEND03
    - Description: Instrumentation Assemblies

2. Open drawing **LEGEND03**.

3. Create the following graphics by routing signal lines and placing instruments.

    Hint: Create shortcut buttons or add toolbar buttons to the custom symbol toolbars to easily access frequently used items.

Hint: Use the following symbols:
Instrumentation > Signal Line > Connect to Process.sym
Instrumentation > Signal Line > Electric.sym
Instrumentation > Off-Line > With Implied Components > Pressure >
        Discr Field Mounted PT.sym
Instrumentation > Off-Line > With Implied Components > Pressure >
        Discr Field Mounted PI.sym
Instrumentation > System Functions > DCS >
        DCS Func Access in Prime Loc.sym

4. Create a second group of graphics by routing signal lines and placing instruments.

Use Alt to route the
Connect to Process line
diagonally

Hint: Use the following symbols:
Instrumentation > In-Line > Orifices > Orif Plate & Flanges.sym
Instrumentation > Signal Line > Connect to Process.sym
Instrumentation > Signal Line > Electric.sym
Instrumentation > Off-Line > With Implied Components > Flow >
    Discr Field Mounted FT.sym
Instrumentation > Off-Line > With Implied Components > Flow >
    Discr Field Mounted FI.sym
Instrumentation > System Functions > DCS >
    DCS Func Access in Prime Loc.sym
Instrumentation > Off-Line > Functions > Root Extr Funct BL.sym

5. Close drawing **LEGEND03**.

6. Open drawing **LEGEND02**.

7. Add instrumentation and signal lines as shown in the following image.

Hint: Use the following symbols:
Instrumentation > Signal Line > Connect to Process.sym
Instrumentation > Off-Line > With Implied Components > Level >
    Discr Field Mounted LT.sym
Instrumentation > Off-Line > With Implied Components > Level >
    Discr Field Mounted LG.sym

Hint: you may need to move lines and components to fit the gauges in the drawing.
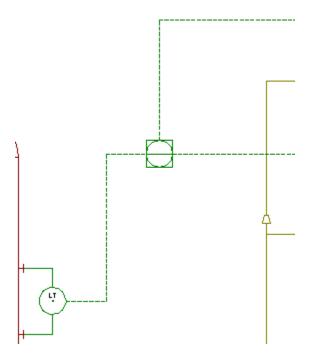
Lab 10: Placing Instruments and Signal Lines in a P&ID

Purpose: To place piping and piping components in a P&ID used throughout the course.

1. Open drawing **PID01**.

2. Route pipe and place components in this P&ID according to the following diagram. Additional zoomed images of each section appear on the following pages:

Zoomed view of section 1:

Hint: Use the following symbols:
Instrumentation > Signal Line > Connect to Process.sym
Instrumentation > Signal Line > Electric.sym
Instrumentation > Off-Line > With Implied Components > Level >
      Discr Field Mounted LT.sym
Instrumentation > System Functions > DCS >
      DCS Func Access in Prime Loc.sym

Zoomed view of section 2:
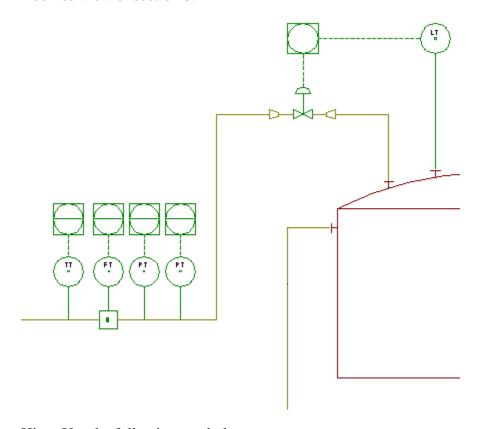
Hint: Use the following symbols:
Instrumentation > Signal Line > Connect to Process.sym
Instrumentation > Signal Line > Electric.sym
Instrumentation > Off-Line > With Implied Components > Temperature >
  Discr Field Mounted TT.sym
Instrumentation > Off-Line > With Implied Components > Pressure >
  Discr Field Mounted PT.sym
Instrumentation > System Functions > DCS >
  DCS Func Access in Prime Loc.sym
Instrumentation > Off-Line > Without Implied Components > Single Function >
  Disc Single-Func Field Mounted.sym
Instrumentation > In-Line > Valves > 2 Way Common >
   2 Way Ball.sym
Instrumentation > Actuators > Diaphragm Actuator.sym

Zoomed view of section 3:

Hint: Use the following symbols:
Instrumentation > Signal Line > Connect to Process.sym
Instrumentation > Signal Line > Electric.sym
Instrumentation > Off-Line > With Implied Components > Temperature >
       Discr Field Mounted TT.sym
Instrumentation > Off-Line > With Implied Components > Pressure >
       Discr Field Mounted PT.sym
Instrumentation > Off-Line > With Implied Components > Flow >
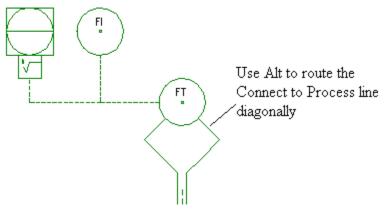   Discr Field Mounted FT.sym
Instrumentation > Off-Line > With Implied Components > Level >
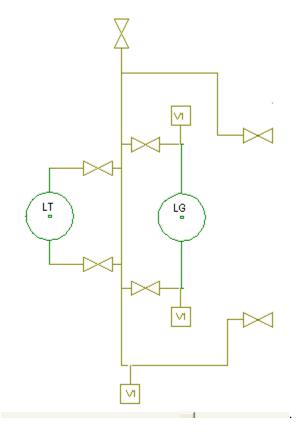   Discr Field Mounted LT.sym
Instrumentation > System Functions > DCS >
       DCS Func Access in Prime Loc.sym
Instrumentation > System Functions > DCS > DCS Field Mounted.sym
Instrumentation > In-Line > Valves > 2 Way Common >
        2 Way Generic Body.sym
Instrumentation > In-Line > Flow Instruments > Magnetic Flow Instrument.sym
Instrumentation > Actuators > Diaphragm Actuator.sym

Zoomed view of section 4:

Hint: Use the following symbols:
Instrumentation > Signal Line > Connect to Process.sym
Instrumentation > Signal Line > Electric.sym
Instrumentation > System Functions > DCS >
        DCS Func Access in Prime Loc.sym
Instrumentation > Off-Line > With Implied Components > Temperature >
        Discr Field Mounted TT.sym
Instrumentation > Off-Line > With Implied Components > Pressure >
        Discr Field Mounted PT.sym

Zoomed view of section 5:

2 Way
Generic Body
Valve

Hint: Use the following symbols:
Instrumentation > Signal Line > Connect to Process.sym
Instrumentation > Signal Line > Electric.sym
Instrumentation > Off-Line > With Implied Components > Temperature >
     Discr Field Mounted TT.sym
Instrumentation > Off-Line > With Implied Components > Flow >
     Discr Field Mounted FT.sym
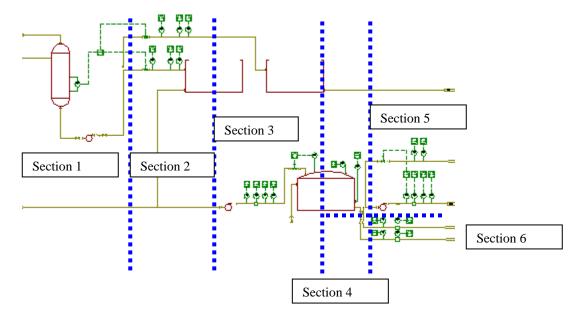Instrumentation > Off-Line > With Implied Components > Pressure >
     Discr Field Mounted PT.sym
Instrumentation > System Functions > DCS >
     DCS Func Access in Prime Loc.sym
Instrumentation > Off-Line > Without Implied Components > Single Function >
     Disc Single-Func Field Mounted.sym
Instrumentation > In-Line > Valves > 2 Way Common >
      2 Way Generic Body.sym
Instrumentation > In-Line > Flow Instruments > Magnetic Flow Instrument.sym
Instrumentation > Actuators > Diaphragm Actuator.sym

Zoomed view of section 6:

Hint: Use the following symbols:
Instrumentation > Signal Line > Connect to Process.sym
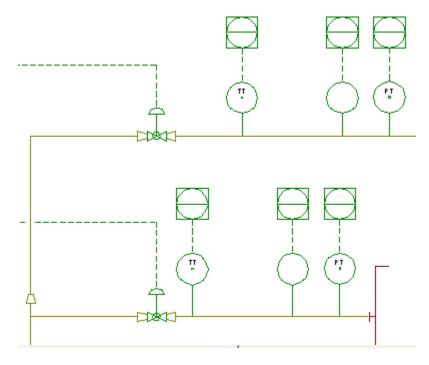Instrumentation > Signal Line > Electric.sym
Instrumentation > Off-Line > With Implied Components > Flow >
    Discr Field Mounted FT.sym
Instrumentation > Off-Line > With Implied Components > Pressure >
    Discr Field Mounted PT.sym
Instrumentation > System Functions > DCS >
    DCS Func Access in Prime Loc.sym
Instrumentation > In-Line > Flow Instruments > Magnetic Flow Instrument.sym
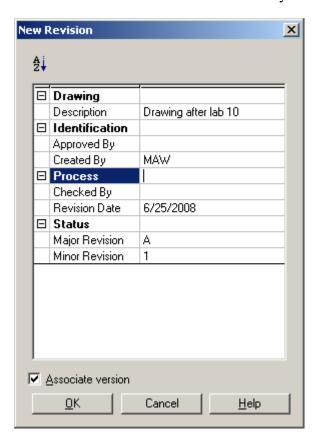
3. **Exit** the drawing.

Create a drawing revision:

4. In Drawing Manager, select drawing PID01.
5. Select Revisions > New Revision.

6. Create a revision for PID01, assigning the following properties.
   - **Major Revision**: A
   - **Minor Revision**: 1
   - **Description**: Drawing after lab 10
   - Change **Created By** to your initials.
   - Remove the **Time** from the **Revision Date**.
   - **Associate** a **version** with this revision by checking the **Associate version** box.

You will be prompted for Comments for the version that will be associated with this revision. Enter a comment noting that this is the drawing after lab 10 that has equipment, piping, and instrumentation items but no properties.
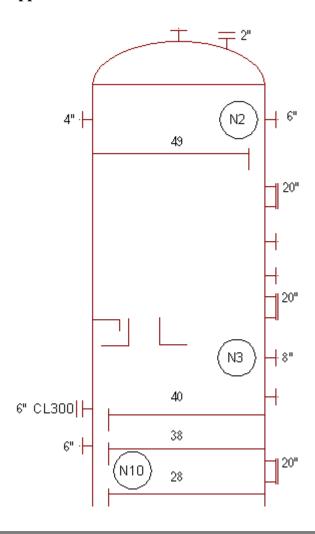
Lab 11: Entering Database Properties for SPPID Items

Purpose: The purpose of this lab is to become familiar with entering database properties for items on legend P&IDs started in earlier labs. Students will enter data for properties consisting of a variety of data types. Students will use the Brief List as well as the full Property Grid.

1. Open drawing **LEGEND01**.
2. Enter data for the equipment and components as indicated by the labels on the images below. (**Do not place labels in this step**.) Use the Brief List in the Property Grid when possible in order to help find properties more quickly. Additional data for each item is listed below the images.

   Note: some of the property values may already be populated due to system editing.

   Upper half of vessel:

Vessel
Tag Prefix: TW
Tag Seq No: 115
Diameter Internal: 6 ft 0.0 in
Equip Orientation: Vertical
Insulation Purpose: N
Insulation Thk: 3.0 in
Length (Tan to Tan): 118 ft 0.0 in
LevelReference: 19 ft 0.0 in
Liq Level High: 6 ft 0.0 in
Liq Level Low: 1 ft 0.0 in
Liq Level Normal: 3.5 ft
Piping Materials Class: 1C0031
Trim Spec: 1C0031
Construction By: By Contractor
Design By: By Contractor
Requisition By: Piping
Supply By: By Contractor

Trays
Key in value for Item Tag to assign tray number.

6" Flanged Nozzle with Blind
Rating: CL300
Piping Materials Class: 1C0031

N2
Tag Prefix: N
Tag Seq No: 2 (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Nominal Diameter: 6"
Piping Materials Class: 1C0031

N3
Tag Prefix: N
Tag Seq No: 3 (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Nominal Diameter: 8"
Piping Materials Class: 1C0031

N10
Tag Prefix: N
Tag Seq No: 10 (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Nominal Diameter: 6"
Piping Materials Class: 1C0031
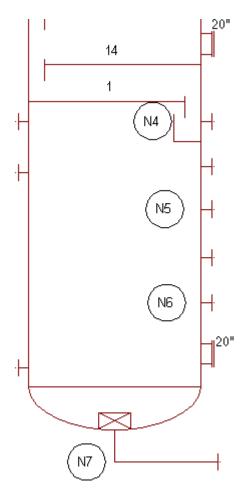
Lower half of vessel:

Trays
Key in value for Item Tag to assign tray number.

N4
Tag Prefix: N
Tag Seq No: 4 (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Nominal Diameter: 8"
Piping Materials Class: 1C0031

N5
Tag Prefix: N
Tag Seq No: 5 (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Nominal Diameter: 12"
Piping Materials Class: 1C0031

N6
Tag Prefix: N
Tag Seq No: 6 (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Nominal Diameter: 6"
Piping Materials Class: 1C0031

N7
Tag Prefix: N
Tag Seq No: 7 (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Nominal Diameter: 6"
Piping Materials Class: 1C0031
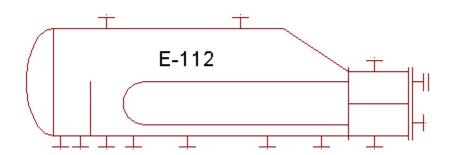
E-112
Tag Prefix: E
Tag Seq No: 112
Name: STRIPPER REBOILER
Equip Orientation: Horizontal
Heat Transfer Area per Unit: 93.6 ft^2
Insulation Purpose: N
Rated Duty: 54594.3 BTU/min
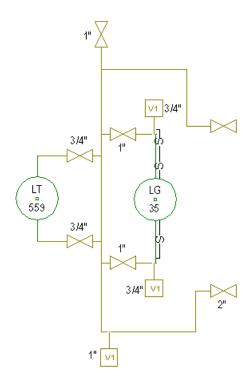
TEMA Designation: KL
Trim Spec: 1C0031
Construction By: By Contractor
Design By: By Contractor
Requisition By: Piping
Supply By: By Contractor

3. Open drawing **LEGEND02**.
4. Enter data for the piping, piping components, instruments, and signal lines as indicated by the labels on the images below. (Do not place labels in this step.) Use the Brief List in the Property Grid when possible in order to help find properties more quickly. Additional data for each item is listed below the images.

Note: You may need to click on the **Show Case Data** toolbar button in the **Catalog Explorer** if temperature and pressure data is not displayed in the **Process** category for an item.

To enter 2" for this valve without changing the nominal diameter for connecting items, turn off **System Editing**.

Remember to turn **System Editing** back on when you are finished entering these values.

LT-559
Location: Field
Name: LT_FIELD_2PROC_ELEC
Tag Seq No: 559
Construction By: By A
Design By: By Equip Vendor
Requisition By: Piping
Supply By: By Equip Vendor

Connect to process line connected to LT-559
Fluid Code: PL
Tag Sequence No: 212
MOC Class: M5
Design Max Press: 75.00 psi
Design Max Temp: 650 F
Construction By: By A
Design By: By Equip Vendor
Requisition By: Piping
Supply By: By Equip Vendor

LG-35
Location: Field
Name: LG_FIELD_2PROC
Tag Seq No: 35
Construction By: By A
Design By: By Equip Vendor
Requisition By: Piping
Supply By: By Equip Vendor

Connect to process line connected to LG-35
Fluid Code: PL
Tag Sequence No: 201
Heat Trace Medium: SL
Heat Trace Medium Temp: 115 C
Heat Trace Requirement: HT
Insulation Purpose: N
MOC Class: M5
Nominal Diameter: 1"
Design Max Press: 75.00 psi
Design Max Temp: 650 F
Construction By: By A
Design By: By Equip Vendor
Requisition By: Piping
Supply By: By Equip Vendor
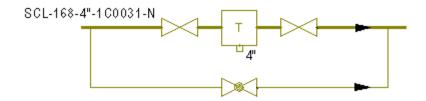
SCL-168-4"-1C0031-N
Fluid Code: SCL
Tag Sequence No: 168
Insulation Purpose: N
MOC Class: M5
Nominal Diameter: 4"
Piping Materials Class: 1C0031
Design Max Press: 135 psi-g
Design Max Temp: 300.00 F
Oper Max Press: 120 psi-g
Oper Max Temp: 280 F
Construction By: By Contractor
Design By: By Contractor
Requisition By: Piping
Supply By: By Contractor
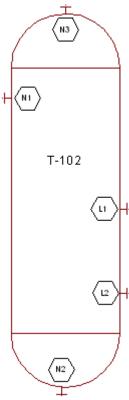
Lab 12-A: Entering Database Properties in a P&ID

Purpose: The purpose of this lab is to become familiar with entering database properties for Equipment and Piping items on the P&ID started in earlier labs. Students will enter a variety of data types, and use the Brief List as well as the full Property Grid to enter the values.

Note: A part of this lab exercise is optional. On page 48, students will have the option to enter data for the remaining nozzles. Data entry should resume with reducers on page 49 item #3.

1. Open drawing **PID01**.
2. Enter data for the **equipment** and **components** as indicated by the labels on the images below. (Do not place labels in this step.) Use the Brief List in the Property Grid when possible in order to help find properties more quickly. Additional data for each item is listed below the images.

T-102
Height: 10.0 ft
Liq Level Normal: 10.0 ft
Trim Spec: 1CB1P
Tag Prefix: T

Tag Seq No: 102   (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)

N1
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 4"
Piping Materials Class: 1CB1P
Tag Prefix: N
Tag Seq No: 1   (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)

N2
Fluid Code: P
Insulation Purpose: H
Nominal Diameter: 8"
Piping Materials Class: 1CB1P
Tag Prefix: N
Tag Seq No: 2

N3
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: 1CB1P
Tag Prefix: N
Tag Seq No: 3

L1
Fluid Code: WS
Insulation Purpose: H
Piping Materials Class: 1CB1P
Tag Prefix: L
Tag Seq No: 1

L2
Fluid Code: WS
Insulation Purpose: H
Piping Materials Class: 1CB1P
Tag Prefix: L
Tag Seq No: 2

P-104 (pump nearest T-102)
Tag Prefix: P
Tag Seq No: 104 (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Height: 1 ft
Insulation Purpose: H
Trim Spec: 1CB1P
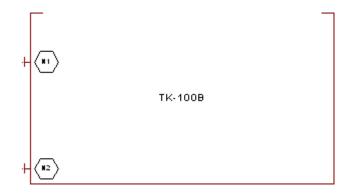
N1
Tag Prefix: N
Tag Seq No: 1

N2
Tag Prefix: N
Tag Seq No: 2

TK-100B
Height: 40.0 ft
Insulation Purpose: H
Trim Spec: 1CB1P
Tag Prefix: TK
Tag Seq No: 100   (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Tag Suffix: B

N1
Fluid Code: P
Insulation Purpose: H
Nominal Diameter: 4"
Piping Materials Class: 1CB1P
Tag Prefix: N
Tag Seq No: 1   (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)

N2
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 4"
Piping Materials Class: 1CB1P
Tag Prefix: N
Tag Seq No: 2
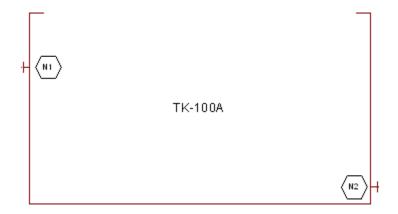
TK-100A
Height: 50.0 ft
Insulation Purpose: H
Trim Spec: 1CB1P
Tag Prefix: TK
Tag Seq No: 100
Tag Suffix: A   (**Note**: Enter this value before the Tag Prefix or Tag Seq No in order to preserve uniqueness of the item tag.)

N1
Fluid Code: P
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: 1CB1P
Tag Prefix: N
Tag Seq No: 1   (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)

N2
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: 1CB1P
Tag Prefix: N
Tag Seq No: 2
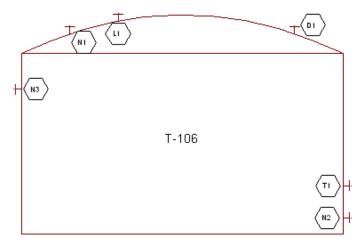
T-106
Diameter Internal: 9.77 ft
Height: 12.0 ft
Insulation Purpose: N
Trim Spec: SS
Tag Prefix: T
Tag Seq No: 106
Volume Rating: 44311 gallon

Note: Entering data for the remaining nozzles is optional.

N1
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 14"
Piping Materials Class: SS
Tag Prefix: N
Tag Seq No: 1

N2
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 18"
Piping Materials Class: SS
Tag Prefix: N
Tag Seq No: 2

N3
Fluid Code: WS
Insulation Purpose: N
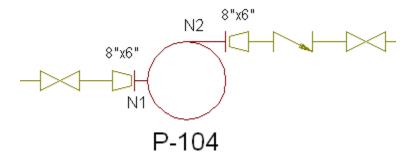Nominal Diameter: 24"
Piping Materials Class: SS
Tag Prefix: N
Tag Seq No: 3

L1
Insulation Purpose: N
Piping Materials Class: SS
Tag Prefix: L
Tag Seq No: 1

D1
Insulation Purpose: N
Piping Materials Class: SS
Tag Prefix: D
Tag Seq No: 1
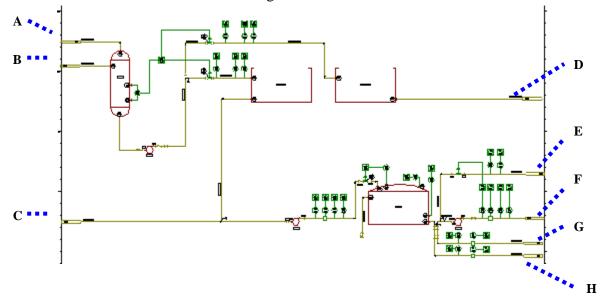
T1
Insulation Purpose: N
Piping Materials Class: SS
Tag Prefix: T
Tag Seq No: 1

3. Enter data for the following **piperuns** as indicated by lettered lines below. Do not place the line number labels in this step. Use the Brief List in the Property Grid when possible in order to help find properties more quickly. Additional data for each item is listed below the images.

A

<u>WS-143-6"-1CB1P-H</u>
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: 1CB1P
Schedule Or Thk: STD (**Note**: Use a single quote to enter text in this field)
Tag Seq No: 143

B

<u>WS-142-4"-1CB1P-H</u>
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 4"
Piping Materials Class: 1CB1P
Schedule Or Thk: STD
Tag Seq No: 142

C

<u>WS-115-16"-SS-N</u>
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 16"
Piping Materials Class: SS
Tag Seq No: 115

D

<u>WS-144-6"-1CB1P-H</u>
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: 1CB1P
Tag Seq No: 144

Note: **Turn off System Editing to enter data for lines E, F, G, and H.**

E

<u>WS-111-6"-SS-H</u>
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: SS
Tag Seq No: 111

F

<u>WS-113-16"-SS-N</u>
Fluid Code: WS

Insulation Purpose: N
Nominal Diameter: 16"
Piping Materials Class: SS
Tag Seq No: 113

G
WS-110-3"-SS-N
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 3"
Piping Materials Class: SS
Tag Seq No: 110

H
WS-107-3"-SS-N
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 3"
Piping Materials Class: SS
Tag Seq No: 107
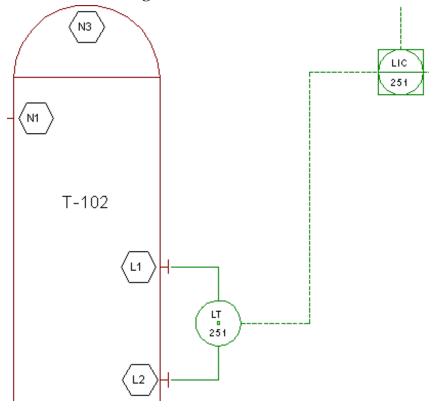
Note: Turn system editing back on.

Lab 12-B: Entering Database Properties in a P&ID

Purpose: The purpose of this lab is to become familiar with entering database properties for instrumentation items on the P&ID started in earlier labs using Select Lists. Students will enter a variety of data types. Students will use the Brief List as well as the full Property Grid to enter property values.

1. In drawing PID01, enter data for the following instruments as indicated by the labels in the images below. Use the Brief List in the Property Grid when possible in order to help find properties more quickly. **Additional data for each item is listed below the images.**

Create a Level Loop (L-251).

LIC-251
Instr Type Modifier: IC
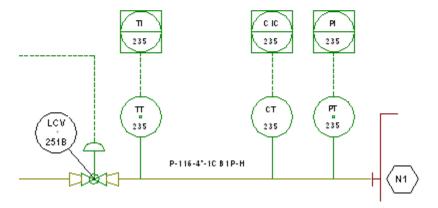
Create a Select Set with **LT-251** and **LIC-251** and assign the instruments to the Level Loop.

Note: Utilize a **select set** to assign the instruments to the Level Loop. To do this, hold down Shift key and select each instrument in order to make a select set. Then, in the **Property Window**, verify that **Select Set** is shown in the **Selected Items** list.

2. Use select sets and enter data for the following instruments near TK-100B as indicated by the labels in the image below. Use the Brief List in the Property Grid when possible in order to help find properties more quickly. **Additional data for each item is listed below the images.**

TK-100B

Create a select set with the two control valves (**LCV-251A and LCV-251B**) and assign to Level Loop (L-251).

LCV-251A
Instr Type Modifier: CV
Loop Tag Suffix: A
Insulation Purpose: H
Nominal Diameter: 3"
Schedule Or Thk: STD

LCV-251B
Instr Type Modifier: CV
Loop Tag Suffix: B
Insulation Purpose: H
Nominal Diameter: 4"
Schedule Or Thk: STD
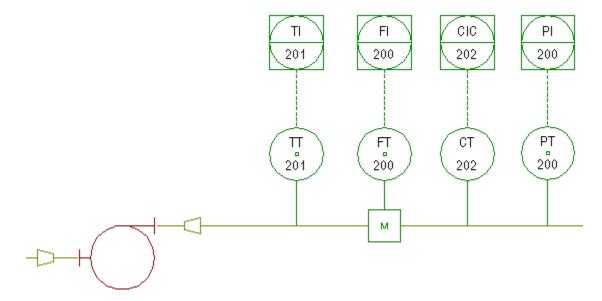
Create two Temperature Loops (**T-225 and T-235**).
Create two Typical Loops (**C-225 and C-235**).
Create two Pressure Loops (**P-225 and P-235**).

Assign the instruments to these loops according to the image above.

Assign Instr Type Modifier (T, I or IC) to the DCS and Single Functions according to the image above.

3. Use select sets and enter data for the following instruments on the left side of T-106 as indicated by the labels in the image below. Use the Brief List in the Property Grid when possible in order to help find properties more quickly. Additional data for each item is listed below the images
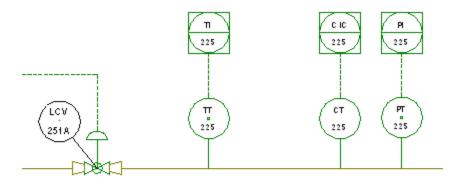

Create a Temperature Loop (**T-201**).
Create a Flow Loop (**F-200**).
Create a Typical Loop (**C-202**).
Create a Pressure Loop (**P-200**).
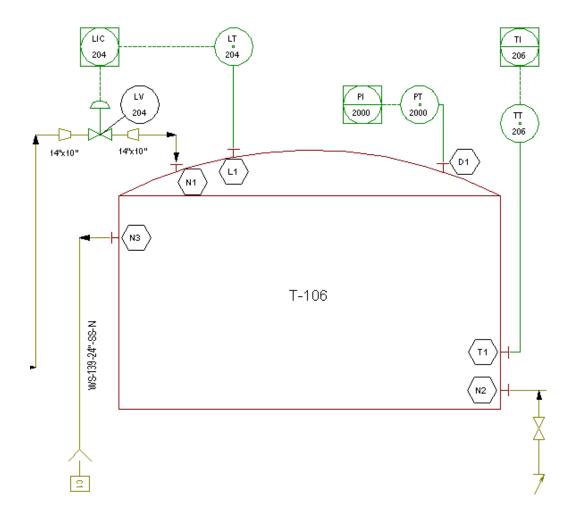
Assign the instruments to these loops according to the image above.
Assign the Inline Magnetic Flow Instrument to Flow Loop (F-200).

Inline Magnetic Flow Instrument (FE-200)
Instr Type Modifier: E
Insulation Purpose: N
Nominal Diameter: 14"
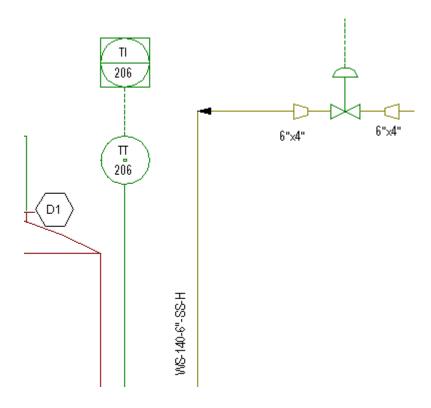
Assign Instr Type Modifier (T, I or IC) to the DCS and Single Functions according to the image above.

4. Enter data for the reducers and other items such as instruments on the left side of T-106 as indicated by the labels in the image below. Use the Brief List in the Property Grid when possible in order to help find properties more quickly.

5. Enter data for the following reducers on the right side of T-106 as indicated by the labels in the image below. Use the Brief List in the Property Grid when possible in order to help find properties more quickly.
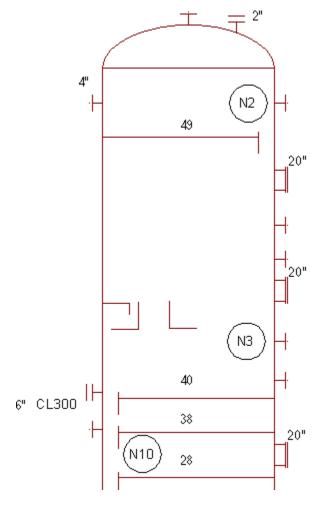
Lab 13: Placing Labels on SPPID Items

Purpose: The purpose of this lab is to place various labels on items. Students will place labels on equipment, equipment components, piperuns, and piping components.

1. Open drawing **LEGEND01**.

2. Place labels on the equipment and components as indicated by the labels on the images below.

Note: To place another instance of a label that is already placed in your P&ID, right-click on the label and select **Place New**. If any of your labels display "?", use the label to enter the indicated value. Your item tags for nozzles may differ from those displayed in the image below.

Hint: Use the following symbols:
Equipment Components > Labels - Equipment Components > Nozzle NPD.sym
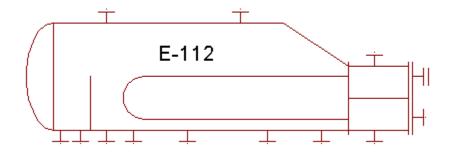
---

Equipment Components > Labels - Equipment Components > Item Tag.sym
Equipment Components > Labels - Equipment Components >
     Eq Nozzle Identification.sym
Equipment Components > Labels - Equipment Components > Nozzle Rating.sym

Hint: Use the following symbols:
Equipment Components > Labels - Equipment Components > Nozzle NPD.sym
Equipment Components > Labels - Equipment Components > Item Tag.sym
Equipment Components > Labels - Equipment Components >
     Eq Nozzle Identification.sym
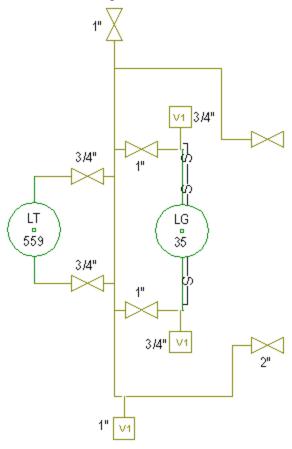
Hint: Use the following symbols:
Equipment > Labels - Equipment > Equipment ID.sym
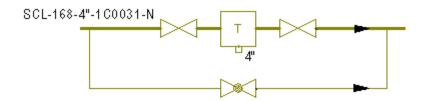
3. Open drawing **LEGEND02**.

4. Place labels on the piping, instruments, and components items as indicated by the labels on the images below.

Hint: Use the following symbols:
Piping > Labels - Piping Components > Nominal Diameter.sym

Hint: Use the following symbols:
Piping > Labels - Piping Segments > Line Number.sym
Piping > Labels - Piping Segments > Flow Direction.sym
Piping > Labels - Piping Components > Nominal Diameter.sym
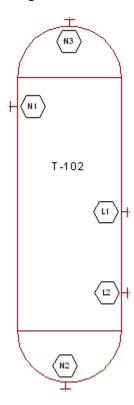
Lab 14: Placing Labels in a P&ID

Purpose: The purpose of this lab is to become familiar with placing different labels in a P&ID started in earlier labs. Students will place equipment, equipment component, piping, piping component, and instrument labels. In addition, they will place labels on the drawing. They will note that, for most instances, labels in SPPID show the database property entered for an item in previous lab exercises. They will also note that item properties can be entered using the label.
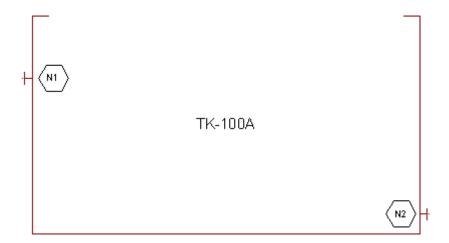
Note: Some of the labels may not populate if you did not enter all data in the previous labs. If you encounter such a situation, simply use the label to enter the data for the labeled item.
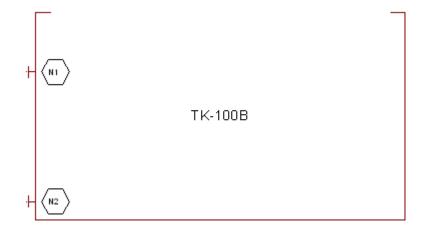
1. Open drawing **PID01**.
2. Place labels on the equipment and components as indicated by the labels on the images below.

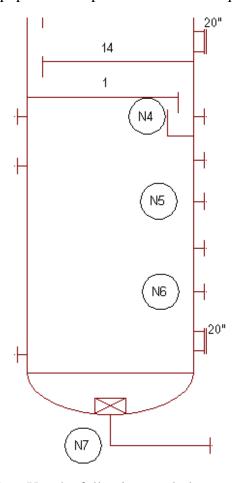Hint: Use the following symbols:
Equipment > Labels – Equipment > Equipment ID.sym
Equipment Components > Labels - Equipment Components >
      Eq Nozzle Identification(3).sym

TK-100A

Hint: Use the following symbols:
Equipment > Labels – Equipment > Equipment ID.sym
Equipment Components > Labels - Equipment Components >
      Eq Nozzle Identification(3).sym

TK-100B
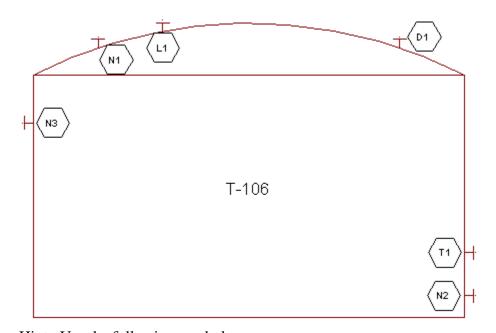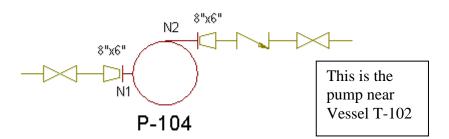
Hint: Use the following symbols:
Equipment > Labels – Equipment > Equipment ID.sym
Equipment Components > Labels - Equipment Components >
      Eq Nozzle Identification(3).sym

Hint: Use the following symbols:
Equipment > Labels – Equipment > Equipment ID.sym
Equipment Components > Labels - Equipment Components >
    Eq Nozzle Identification(3).sym
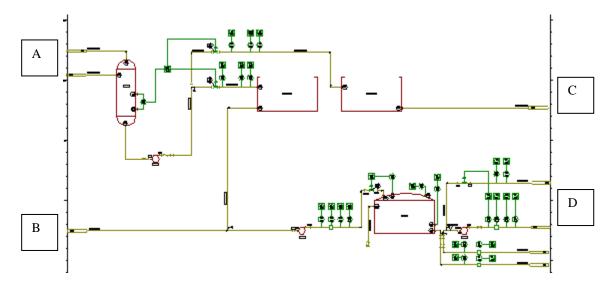
This is the pump near Vessel T-102
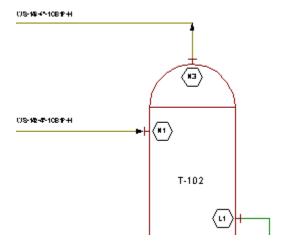
Hint: Use the following symbols:
Equipment > Labels – Equipment > Equipment ID.sym
Equipment Components > Labels - Equipment Components >
    Eq Nozzle Identification(2).sym
Piping > Labels - Piping Components > Red Nominal Diameter.sym

3. Place line number labels and flow arrows on the piperuns that were edited in Lab 12 as indicated by the labels on the images below. Also place the piping component labels. Additional zoomed images of the sections appear on the following pages:

Zoomed view of section A:
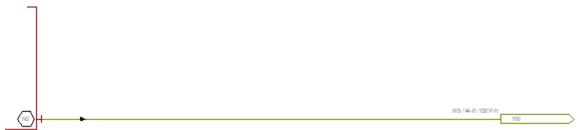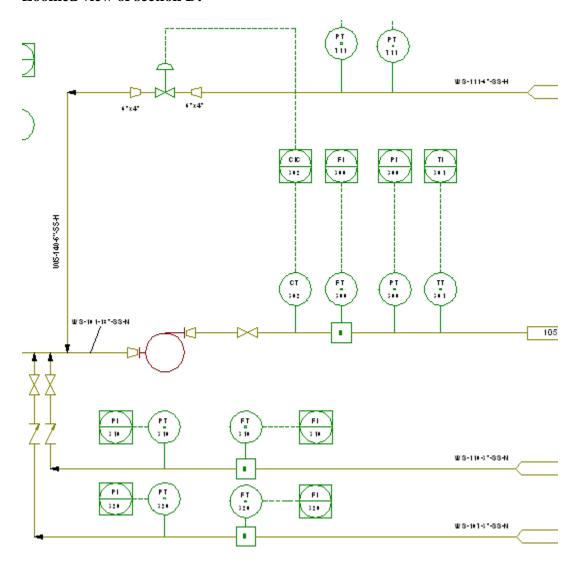
Zoomed view of section B:
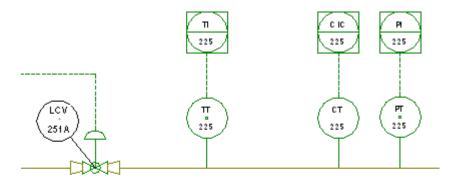
Zoomed view of section C:
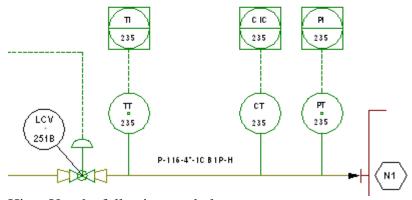
Zoomed view of section D:

4. Place tag number labels on the control valves as indicated by the labels on the images below. (Hint: To display the leader lines, right-click on the label and click Show Leader Line).

Hint: Use the following symbols:
Instrumentation > Labels - General Instrument > Tag Number with Balloon.sym

5. Place the E-size titleblock label on the drawing.
   Symbols > Design > Title Block Label – E Size.sym
6. Place a revision label on the drawing.
   Symbols > Design > Drawing Revision Record - D.sym
   (**Note**: The delivered xml revision labels do not fit in the titleblock area of our delivered templates. You will need to place it in the lower left corner of your drawing. The label will not populate with the revision information until you close and reopen the drawing.)
7. Close all drawings and SmartPlant P&ID.

Lab 15: Graphic Modifications
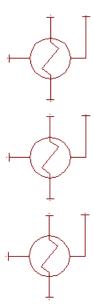
Purpose: To use copy, rotate, replace, mirror, and other graphic modification commands.

Align Labels
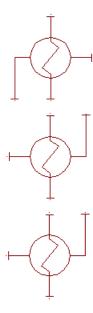
1. Open drawing **PID01**.
2. Select the labels placed on nozzles L1 and L2 (on the vessel) and use the label alignment ![alignment ribbon bar icons] ribbon bar to align them.
3. Align other labels if desired.
4. Close drawing **PID01**.

5. Open drawing **LEGEND01**.
6. Select the labels placed on nozzles N2, N3, N5 and N6 and use the label alignment ![alignment ribbon bar icons] ribbon bar to align them.

Using Copy, Mirror, and Rotate
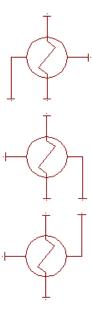
7. Use drawing **LEGEND01**.

8. Make a select set of the heat exchanger and nozzles and hold down the Ctrl key to copy the symbols above the heat exchanger. Repeat this process. You will have 3 sets of heat exchangers and nozzles as shown in the image below.
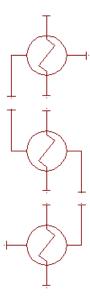
9. Make a select set of the top heat exchanger with nozzles. Use Rotate to change the configuration as shown by the following:

10. Next, modify the middle exchanger with nozzles. Use mirror on the Angle Parametric Nozzle so that you have the following:
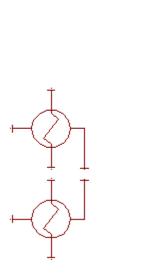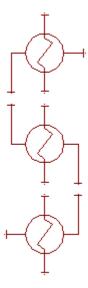
11. Still working with the middle exchanger and nozzles, turn on replace mode and replace Flanged Nozzle - 4 on the left of the exchanger with Angle Parametric Nozzle. Mirror the angled nozzle so that you have the following:
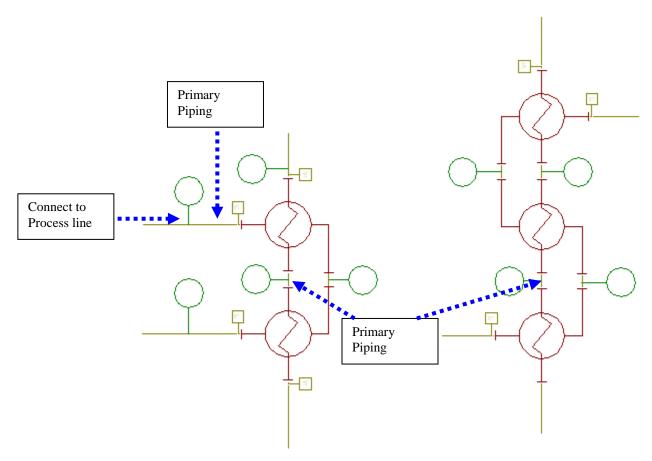
Hint: You need to adjust the angled nozzle so that it lines up with the flanged nozzle that is at the bottom of the exchanger.

12. Make a select set of the lower 2 exchangers with nozzles. Copy the select set to the left and then replace an angled nozzle on the top exchanger so that you have the following:

13. Add piping, instrument, and piping components so that you have the following:

> Hint: Use the following symbols:
> Piping > Routing > Process Lines > Primary Piping.sym
> Piping > Macrocomponents > Vent Detail 1.sym
> Instrumentation > Offline > Without Implied > Single Function >
>   Disc Single-Func Field Mounted.sym
> Instrumentation > Signal Line > Connect to Process.sym
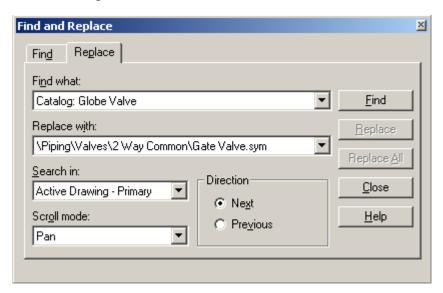
14. Close drawing **LEGEND01**.

Use Edit > Replace in the following workflow to replace globe valves with gate valves

Scenario: The project has decided to exchange the globe valves already placed in the drawings with gate valves. Utilize Edit > Replace in the following workflow to replace the globe valves with gate valves.

15. Open drawing **T1000** in unit U1.

16. Select **Edit** > **Replace** and enter the following selections.

    a. In the **Find What** drop down box select **<Catalog Item… >**

    b. From the **Select Catalog Item** dialog box select: **Symbols** > **Piping** > **Valves** > **2 Way Common** > **Globe Valve.** Then select **OK.**

    c. In the **Replace With** dropdown box select **< Browse…>**

    d. From the **Select Catalog Item** dialog box select: **Symbols** > **Piping** > **Valves** > **2 Way Common** > **Gate Valve.** Then select **OK**

    e. In the **Search In** drop down select **Active Drawing - Primary**, and in the **Scroll Mode** drop down select **Pan**.

17. Select **Find**.

18. Select **Replace All**.

19. When complete, an information message will display similar to the one below. Click **OK** to dismiss the message.

20. Close drawing **T1000** and SmartPlant P&ID.
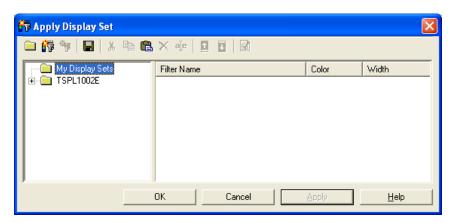
BONUS LAB:

Replace ALL Primary Piping with Secondary Piping in drawing T1000 in unit TEST.

Lab 16: Display Sets

Purpose: Students will create and apply display sets to drawings. They will modify a filter for use with a display set.

1. Open drawing **PID01**.

2. Create a new display set to display only nozzles in the P&ID and apply this display set to your drawing.

    a. Select **View** > **Apply Display Set.**

    b. Select your **Plant** name on the **Apply Display Set** dialog box.

    c. Select the **Add Display Set** command .
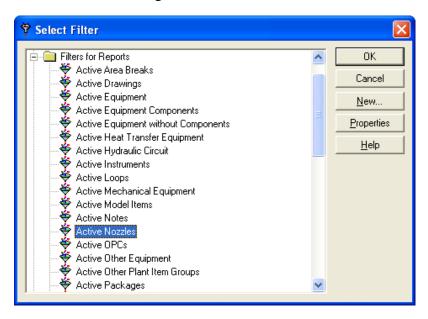
       Define a name for your Display Set, e.g. Nozzles.

d. Select the **Add Filter** command to add a filter used to display only nozzles on the drawing.

Select the Plant Folder > Filters for Reports > Active Nozzles filter from the Select **Filter** dialog box.
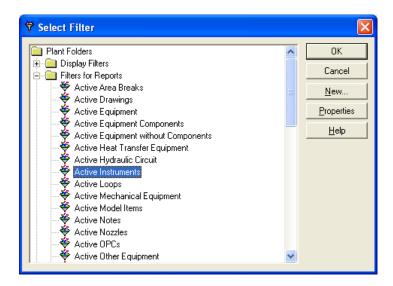
e. Select **OK** on the **Select Filter** dialog box.

f. Select **Apply** and **OK** on the **Apply Display Set** dialog box.

3. Fit your drawing view and notice only Nozzles are displayed.

4. Select **View > Clear Display Set** to display all items on the drawing.

5. Create a new display set to display only instruments and signal lines in the P&ID and apply this display set to your drawing.

a. Select **View** > **Apply Display Set.**

b. Select your **Plant** name on the **Apply Display Set** dialog box.

c. Select the **Add Display Set** command .

Define a name for your Display Set, e.g. Instrumentation and Signal Lines.

d. Select the **Add Filter** command to add a filter to display only instruments on the drawing.
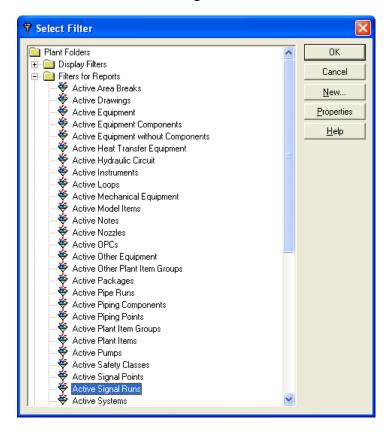
Select the **Plant Folder** > **Filters for Reports** > **Active Instruments** filter from the **Select Filter** dialog box.

Select **OK** on the Select Filter dialog box.

e. Select the **Add Filter** command again to add a filter to display only instruments on the drawing.

Select the **Plant Folder** > **Filters for Reports** > **Active Signal Runs** filter from the **Select Filter** dialog box as shown in the following image.
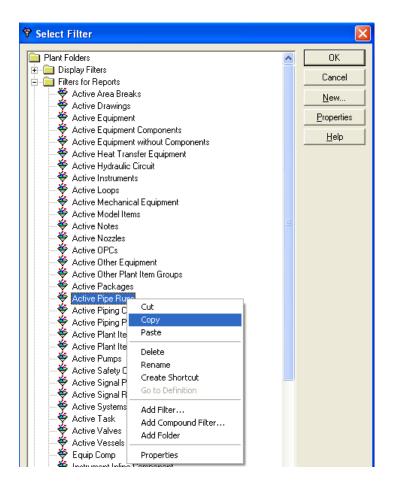
Select **Apply** and **OK** on the **Apply Display Set** dialog box.

6. Fit your drawing view and notice that only instruments and signal lines are displayed.

7. Select **View** > **Clear Display Set** to display all items again on the drawing.

8. Close the drawing.

9. Open drawing **T1000** in unit TEST.

10. Create a new display set to display piperuns with Piping Materials Class = 1C0032 in the P&ID in a dark magenta color and line width of 0.50 mm. In the same display set, background items for the drawing should have default plant symbology. Apply this display set to your drawing.

   a. Select **View** > **Apply Display Set.**

   b. Select your **Plant** name on the **Apply Display Set** dialog box.

   c. Select the **Add Display Set** command ![icon].
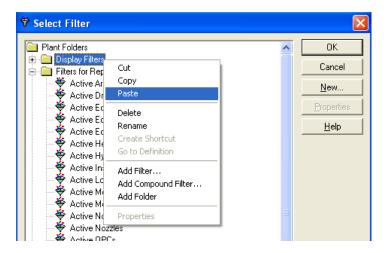
      Define a name for your Display Set, e.g. Piperuns with PMC 1C0032.

   d. Select the **Add Filter** command ![icon].

      Create a new filter for Piperuns with Piping Materials Class = 1C0032.

      Select the **Plant Folder** > **Filters for Reports** > **Active Pipe Runs** filter from the **Select Filter** dialog box. Right-click on the filter and select **Copy** as shown in the following image.
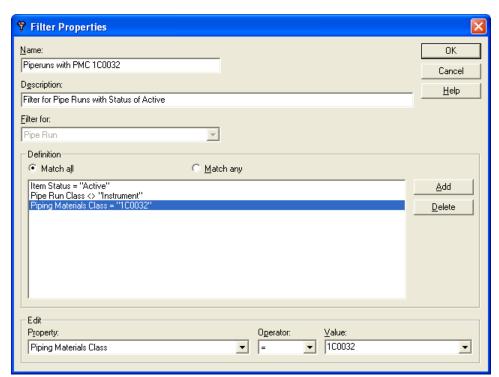
Right-click on the **Display Filters** folder and select **Paste**.

Rename the filter to be **Piperuns with PMC 1C0032**.

Select the **Properties** button to open the **Filter Properties** dialog box.

Add the criteria Piping Materials Class = 1C0032 to the criteria that is already listed.
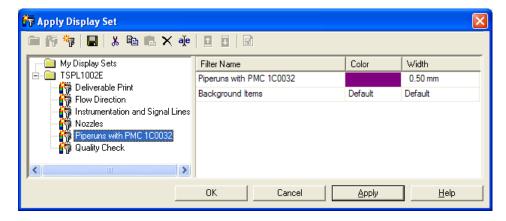
Click **OK** on the **Filter Properties** dialog box to save the change.

e.   Select **OK** on the **Select Filter** dialog box.

f.   In the **Apply Display Set** dialog box, set the **Color** for the **Piperuns with PMC 1C0032** filter to be Dark Magenta. Set **Width** = 0.50 mm. Set the **Color** for Background items to be Default.

Hint: To choose Default as the color, choose the color selection with hash lines as shown in the image below.
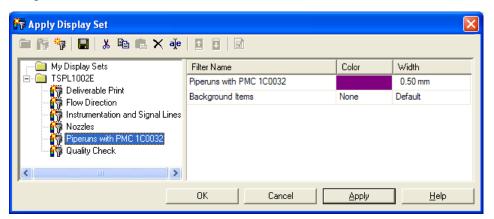
The resulting settings are shown in the image below.

g.   Select **Apply** and **OK** on the **Apply Display Set** dialog box.

11. Fit your drawing view and notice that the piperuns with piping material class = 1C0032 are displayed in the drawing with a heavier weight line and the dark magenta color. The rest of the drawing is still visible in the default symbology for the plant.

12. Select **View** > **Clear Display Set** to display all items on the drawing.

13. Edit the display set to turn off the display of the background items.

a.   Select **View** > **Apply Display Set**.

b.   Select your display set for Piperuns with PMC 1C0032.

c. Change the setting for Piperuns with PMC 1C0032. Change the Color for Background items to be None. The resulting settings are shown in the image below.

d. Select **Apply** and **OK** on the **Apply Display Set** dialog box.

14. Fit your drawing view and notice that the piperuns with piping material class = 1C0032 are the only items displayed in the drawing.

15. Select **View** > **Clear Display Set** to display all items on the drawing.

Lab 17: Data Modification

Purpose: The goal of this lab is to modify data using a variety of methods. Students will modify individual items and select sets of items.
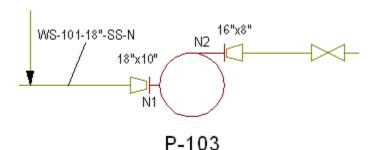
1. Open drawing **LEGEND01**.

2. Use a select set to modify the properties of the nozzles on the vertical drum to have the following properties.

   > Construction By: By Equip Vendor
   > Design By: By Piping
   > Requisition By: Equipment Vendor
   > Supply By: By Equip Vendor

   a. Use a display set to aid in the creation of the select set of nozzles.
   b. Select View > Apply Display Set to apply the Nozzles display set created in the previous lab exercise.
   c. Fence select all nozzles on the vertical drum.
   d. In the Property Grid, select Select Set. Define the desired properties for all of the nozzles simultaneously.

3. Close drawing **LEGEND01**.

4. Open drawing **PID01**.

5. Enter data for pump P-103 (to the right of T-106), nozzles, and reducers as indicated by the labels in the image below.

P-103
Tag Prefix: P
Tag Seq No: 103 (Note: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)
Insulation Purpose: N
Trim Spec: SS

N1
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 10"
Piping Materials Class: SS
Tag Prefix: N
Tag Seq No: 1   (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)

N2
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 8"
Piping Materials Class: SS
Tag Prefix: N
Tag Seq No: 2
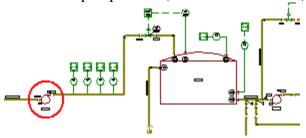
Reducer on Left Side of Pump
End 1 Nom Dia: 18"
End 2 Nom Dia: 10"

Reducer on Right Side of Pump
End 1 Nom Dia: 16"
End 2 Nom Dia: 8"

6. Use Copy/Paste Bulk Properties to copy the data from pump P-103 to P-105 (this is the pump to the left of T-106).

   a. After entering the properties for P-103, select the Copy Bulk Properties button in the Property Grid.
   b. Then select pump P-105 (located left of T-106).

   c. Select Paste Bulk Properties.
   d. Answer Yes to the prompt if you want the next available sequence number to be generated for you.
   e. Verify that the Trim Spec was copied. The Insulation Purpose was not copied because it is not defined as a Bulk Property.
   f. Modify the Tag Seq No to be 105 rather than the next available sequence number that was generated as a result of the paste command.

7. Enter data for nozzles on pump P-105.

   <u>N1</u>
   Fluid Code: WS
   Insulation Purpose: N
   Nominal Diameter: 10"
   Piping Materials Class: SS
   Tag Prefix: N
   Tag Seq No: 1   (**Note**: Enter this value before the Tag Prefix so the automatic item tag routine does not assign a different value.)

   <u>N2</u>
   Fluid Code: WS
   Insulation Purpose: N
   Nominal Diameter: 8"
   Piping Materials Class: SS
   Tag Prefix: N
   Tag Seq No: 2

8. Enter data for reducers near pump P-105.
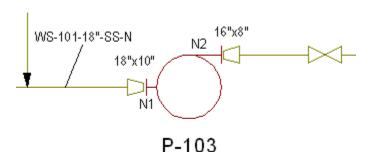
Reducer on Left Side of Pump
End 1 Nom Dia: 16"
End 2 Nom Dia: 10"
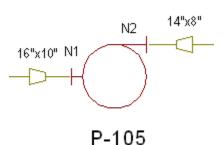
Reducer on Right Side of Pump
End 1 Nom Dia: 14"

End 2 Nom Dia: 8"

9. Place labels on the pumps, nozzles and reducers as indicated by the images below.

P-103

P-105
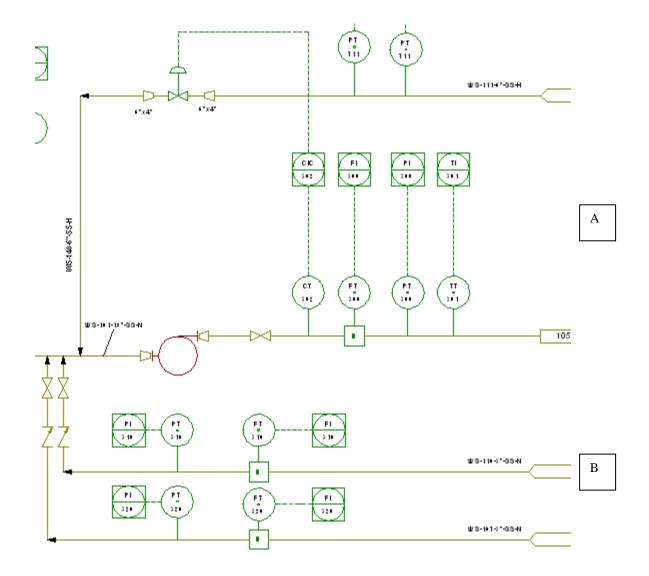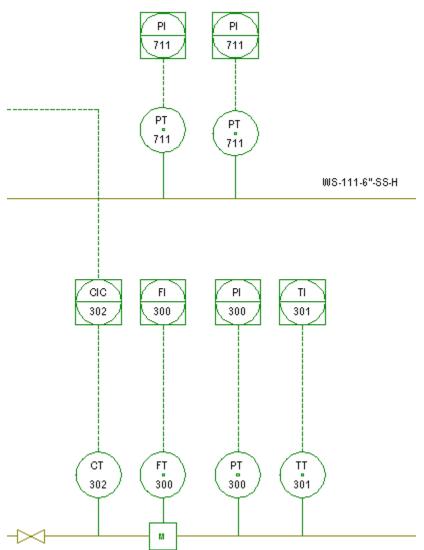
Hint: Use the following symbols:
Equipment > Labels – Equipment > Equipment ID.sym
Equipment Components > Labels - Equipment Components >
        Eq Nozzle Identification(2).sym
Piping > Labels - Piping Components > Red Nominal Diameter.sym
Piping > Labels – Piping Segments > Line Number.sym
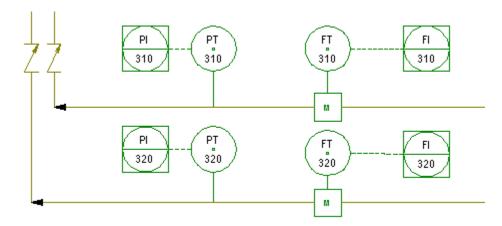
10. To correctly tag the instruments below, create the necessary loops and assign the instruments to be owned by the correct loop for the correct tagging to be shown (as indicated in the image below). Additional zoomed images of each section appear on the following pages:

Zoomed view of section A:

Zoomed view of section B:

11. Using a select set, modify all instruments from step 10 that have Instr Type Modifier = T and set the Fabrication Category property to be Contractor supplied, field fabricated.

12. Using a select set, modify all other instruments from step 10 and set the Fabrication Category property to be Shop supplied, shop fabricated.

13. Close drawing **PID01**.

14. **Scenario**: Your project has changed the pipe spec that is being used for the drawings for a client. You need to change the data for all pipes that have already been placed in drawings.

     a. Open drawing **T1000** in unit TEST.
     b. Use the display set to show all piperuns with Piping Materials Class = 1C0032 that you created in Lab 16.
     c. Use a select set to change all pipes that have Piping Materials Class = 1C0032 to have 1C0031.
     d. Close drawing **T1000**.

Lab 18: Creating and Placing Assemblies

Purpose: The goal of this lab is learn how to create assemblies and place them in drawings.

Part 1: Assembly Creation

To create assemblies:

    a. Select all items, including labels, which are to be part of the assembly.

    b. Select **File** > **Save As Assembly**.

    c. Select the assembly origin.

    d. Define the assembly name.

1. Open drawing **LEGEND01**.

2. Create a new equipment assembly for each of the following graphical groups:

   - Vertical drum
   - Heat exchanger E-112
   - Heat exchanger group created in Lab 15

3. Close drawing **LEGEND01**.

4. Open drawing **LEGEND02**.

5. Create a new piping assembly for each of the following graphical groups:

   - Level Bridle
   - Piping group with steam trap

6. Close drawing **LEGEND02**.

7. Open drawing **LEGEND03**.

8. Create a new instrument assembly for each of the instrument groups:

   - Group with PI, PT, and DCS
   - Group with orifice plates, signal lines, FT, and FI

9. Close drawing **LEGEND03**.

10. Review the log files after the creation of the assemblies. Log files are located in temp folder set by Windows TEMP environment variable.

Part 2: Assembly Placement
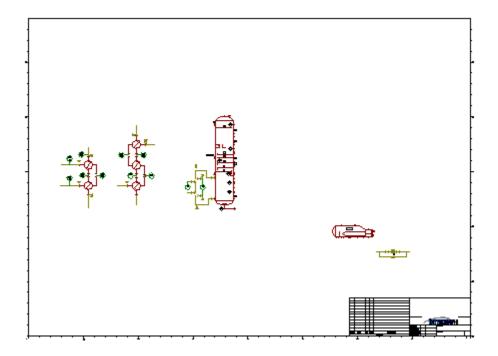
11. Create the following E sized drawing within Unit 10.

- Drawing Number: 10-PID-02
- Drawing Name: PID02
- Description: Sour Water and Strippers
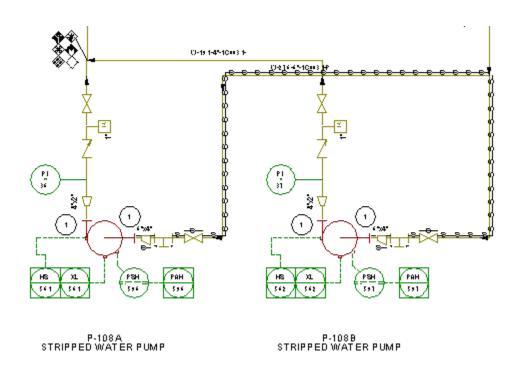
12. Place the equipment and piping assemblies created from Part 1 according to the image below. You will wait to place the instrument assemblies later.

13. Connect the level bridle to the nozzles on the vessel.

14. Utilize the break run command to insert an additional pump assembly in drawing T1000 as shown in the figure below. You will need to connect the lines individually. Move the assembly as a select set.

Lab 19: Typicals

Purpose: To create typicals and establish connection of the typical objects with objects in the primary view of the drawing.

Create Typical

1. In Drawing Manager, create a new D-size drawing in LEGEND.
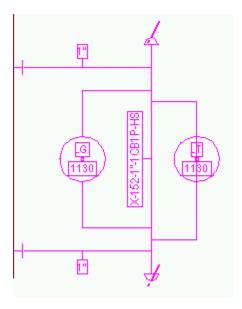
   - Drawing Number: 00-TYP-01
   - Drawing Name: TYPICAL01
   - Description: Create typicals and connect with objects in primary view

2. Open drawing **00-TYP-01**.

3. Place the assembly level bridle of vessel in your drawing. (Located in Symbols > Assemblies)

4. Select the level bridle of the vessel.

5. Right-click on the selection and select **Create Typical** (you can also select **Create Typical** from the **Edit** menu.)
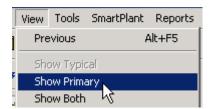
   A message will display informing you that items have been removed from the selection in order to create the typical. This is because the nozzle is not a freestanding item and attached to the vessel which is not included in the selection.

6. Click **OK** to close the message dialog.
   The **Typical origin symbol** will attach to your cursor.

7. Watch the status bar for instructions to place the typical origin.
   Once you have placed the origin the software will automatically switch to the Typical view. The selected items will be attached to your cursor.

8. Left-click to place the typical at the location of your choice. The typical will remain attached to your cursor allowing you to place another instance.

9. Left-click to place one more typical.

10. Right-click or press **ESC** to end typical placement.

Connect Typical to Objects in Primary View

11. Switch to the primary view.

12. Add 2 Flanged Nozzles to the vessel.

13. Select the 2 nozzles you have just placed on the vessel.

14. Select **Edit** > **Move to Typical** (or right-click > **Move to Typical**.)

    The software will switch to the typical view automatically.

15. Clear the select set and select one of the nozzles.

    Note: Do not fence select to include the inconsistency marker because this will keep you from being able to move the nozzle.
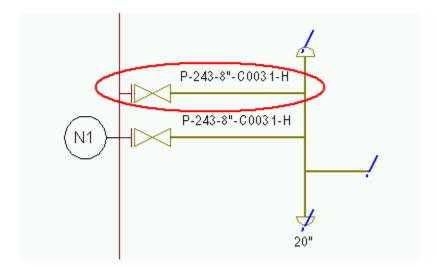
16. Hold down the **Alt** key and move the nozzle to the desired location in the typical view. If you prefer, you can also move the typical record close to the nozzle.

17. Connect the piperun to the nozzle.

18. Connect the second piperun to the second nozzle. The typical record is now connected to the vessel.

BONUS LAB

1. Place the assembly **subheader vessel** in your drawing (Located in Symbols > Assemblies)

2. Select the nozzle, the valve, the horizontal piperun, and the label.

3. Create a typical from the selection and place in the typical view.

4. Using what you learned in class and in the first lab exercise, connect the typical to the vessel and the vertical subheader.

Lab 20: Adding Design Elements

Purpose: The goal of this lab is to use some of the items available in the Design category in the catalog. Students will place annotations, revision clouds, and revision triangles.

1. Open drawing **PID01**.

2. Place a revision cloud around the offline instruments above TK-100B with tag sequence number of 225.

   Hint: Use the following symbol:
   Design > Revision Cloud.sym
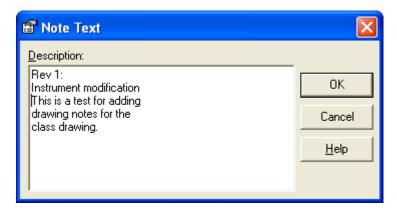
3. Set the **Area Break Style** in the **Property Grid** so that you see a cloud linestyle.

4. Add a revision triangle to the cloud. Click on the triangle and add **Revision Number = 1** in the **Property Grid**.

   Hint: Use the following symbol:
   Design > Revision Triangle.sym

5. Place an item note on the drawing with text. Utilize the calculation button on the Note Text field to bring up the larger note text dialog.

   Hint: Use the following symbol:
   Design > Annotation > Labels > Item Note & Label.sym
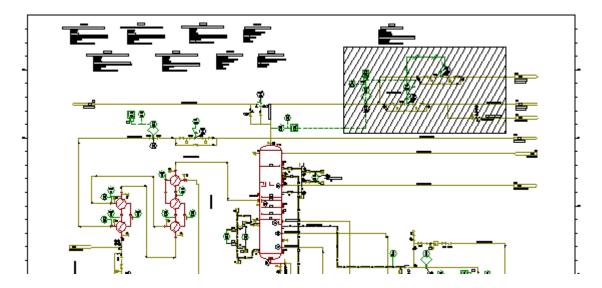
6. Place several other annotations in your drawing, using annotation points and labels. Use "Select Associated Item" to identify the labeled item.

7. Close drawing **PID01**.

Lab 21: Auxiliary Graphics

Purpose: In this lab, students will work with auxiliary graphics, using a variety of commands.

1. Open drawing **T1000** in unit TEST.

2. Click **Edit** > **Insert** > **Auxiliary Graphics** to show a demolition area on the drawing as shown in the figure below.

3. Select **File > Close Auxiliary Graphics** to exit the Auxiliary Graphics environment. Note that you cannot move the demolition area in SP P&ID.

4. Re-enter auxiliary graphics to modify the fill in the demolition area.

5. Experiment with other auxiliary graphics commands and text. Think about whether and how you would use auxiliary graphics at your job and implement your ideas.
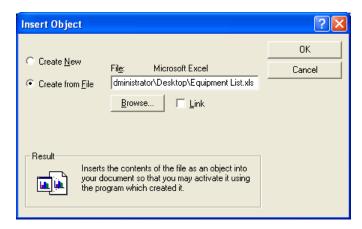
    Be aware that if you add auxiliary graphics to a symbol (for example, legs to a pump), you will have to move the auxiliary graphics separately if you need to move the symbol in your drawing.

6. Click **File** > **Close Auxiliary Graphics** to exit the auxiliary graphics session.

7. Close drawing **T1000**.
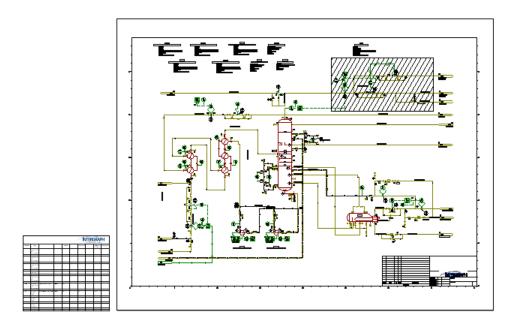
Lab 22: Working with OLE Embedded Items

Purpose: The goal of this lab is to practice inserting OLE embedded items.

1. Open drawing **T1000**.

2. Use **Edit > Insert > Object** to place the Equipment List on the drawing, outside the drawing border. The equipment list will be provided by your instructor.

3. Embed the file by **unchecking** the **Link** checkbox.

4. After the equipment list output has been embedded in the drawing, it should look similar to the figure below.
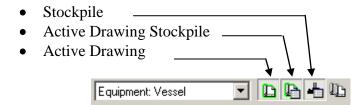
5. Close drawing **T1000**.

Lab 23: Working in the EDE
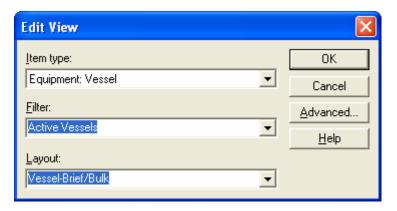
Purpose: Students will become familiar with the EDE. They will change view settings in the EDE, enter data for items, and utilize asking filters.

1. Open drawing **PID01**.

2. From the **Engineering Data Editor** toggle the **Item Type** to **Equipment**:**Vessel** to create a tabular view of the Equipment Vessels in your Plant.

3. Verify the following are toggled on.

    - Stockpile
    - Active Drawing Stockpile
    - Active Drawing
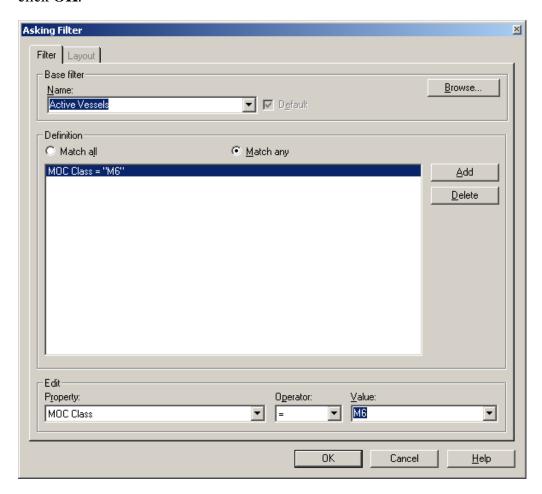
4. Utilize the **View** > **Display Settings** from the **Engineering Data Editor** for icons, rows and columns in the Engineering Data Editor.

    - For the Active Drawing Row Item set

        a. Color = Red
        b. Font = MS Sans Serif; apply **Bold** & *Italics*

    - Select colors and Fonts for Active Drawing Stockpile, Plant Stockpile, and Other drawings.

    - Select OK.

5. Select the Other Drawings button and notice the difference in fonts and color for the active and other drawings.

6. Select one of the items in the active drawing from the **Engineering Data Editor** and notice the item will be highlighted in the Drawing.

    - Also note the Property Window is displaying the data for this Equipment item.

7. Display only the Active Drawing for Equipment in Engineering Data Editor.

    - Toggle off the **Active Drawing Stockpile, Stockpile, and Other Drawings**

8. Select **View** > **Edit View**

9. Change the Layout to Vessel- Brief/Bulk on the Edit View form and click OK. Note the change in the columns displayed in the EDE.

10. From the **Engineering Data Editor**, set the **MOC Class** to **M6** for the **Vertical Drum T-102** by double clicking in the **MOC Class** field for the Vertical Drum.

- Select anywhere in the **Engineering Data Editor** to **Accept** this value.

- Notice the **Property Window** will not refresh until you re-select the Equipment item.
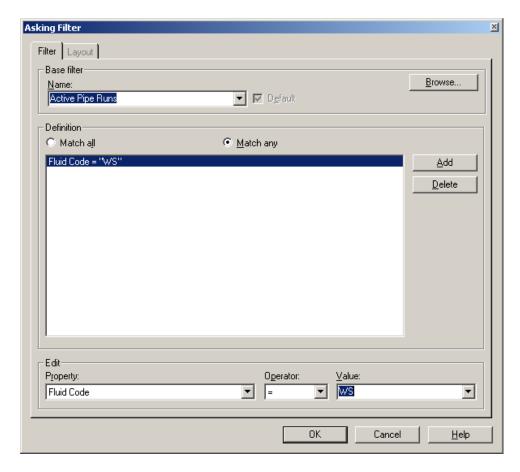
11. You may use the **Asking Filter** button in the **EDE** to further refine your queries in the EDE, especially in situations where you have many records in your plant. Practice using the Asking Filter with the following workflows.

* With Equipment: Vessel as the selected item type, click the Asking Filter button to further refine your queries when using the EDE.

* Add MOC Class = M6 to the **Asking Filter** dialog box that is opened. Then click **OK**.

You should only see T-102 in the EDE because it is the only equipment vessel that has MOC Class = M6 at this time.

- Change the item type to **Pipe Run** in the **EDE**. Because the **Asking Filter** button is still selected, you will see the **Asking Filter** dialog box.

- Add Fluid Code = WS to the **Asking Filter** dialog box that is opened. Then click **OK**.
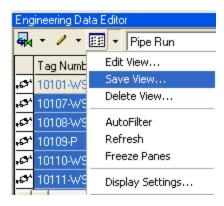
- In the EDE you will see all piperuns with Fluid Code = WS. Note the number of piperuns.

- Deselect the **Asking Filter** button and note that the number of piperuns in the EDE has increased to include piperuns with Fluid Codes other than WS.

12. Close drawing PID01.

Lab 24: Creating a Saved View in the EDE
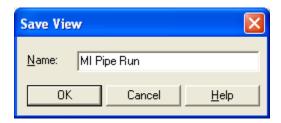
Purpose: Students will create a saved view using a new layout and make changes to the layout in the EDE.

Saved views within the EDE can be utilized to customize the layout for an individual user rather than changing the layout for all users of the plant. Use the following workflow to practice creating a saved view.

1. Open drawing **PID01**.

2. From the **Engineering Data Editor** toggle the **Item Type** to **Pipe Run** to create a tabular view of the piperuns in your Plant.

3. Verify that the button for **Active Drawing** is selected.

4. Create a Saved View by selecting **View** > **Save View** in the EDE.

Enter a name for the saved view (such as your initials + Pipe Run).
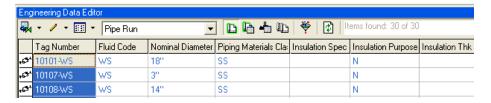
Then click **OK**.

You should see the following indicating that your view was saved. (The view is saved in the database). The new view will also be active in the EDE.

5. Create a new layout for the view you just created:

    a. Select **View** > **Edit View** in the EDE.

    b. In the **Edit View** dialog, select the **Advanced** button. The **Advanced View Properties** dialog will display.

    c. Select the **Layout** tab.

    d. Define a new layout for the saved view by typing a new layout name in the **Name** field (such as your initials + PipeRun).

    e. Select OK on the **Advanced View Properties** dialog. The **Layout Modified** dialog will display.

    f. Select **Yes** to save the changes to the layout to the database.

    g. Select OK in the **Edit View** dialog.

6. In the **EDE**, move the columns for the layout to be as follows:

    *   Tag Number

    *   Fluid Code

    *   Nominal Diameter

    *   Piping Materials Class

- Insulation Spec

- Insulation Purpose

- Insulation Thk

Note: You could have also changed the column order in the Advanced Properties dialog by using the Up and Down buttons in the Layout Definition section.

7. Change the item type in the EDE to be the delivered Pipe Run view.

8. Select Yes to save the changes and OK to the **Successfully Updated** dialog.

9. Change the item type to your Saved View again.
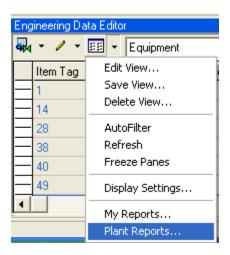
You should see the layout in the EDE as you defined it earlier (with the changed column order), rather than the layout that is the default for the Pipe Run item type.
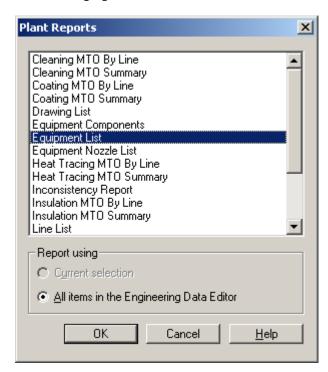
10. Close the drawing and SmartPlant P&ID.

Lab 25: Multiple Representations and the EDE

Purpose: Learn how to place multiple representations of equipment.

1. Open drawing **PID01**.

2. Note the item tag of the vertical drum: T-102.

3. Open drawing **LEGEND1**.

4. Place the multiple representation of T-102.

   a) Select Equipment: Vessel in the EDE.

   b) Display Vessels in **Other Drawings** only (**Active Drawing**, **Active Drawing Stockpile**, and **Stockpile** buttons should be toggled **off**). This will make the item easier to find.

   c) Select T-102 in the EDE.

   d) Right click and select **Place Multiple Representation**.

   e) Place the multi rep onto drawing LEGEND01.

5. Run the **Equipment List** from the **Engineering Data Editor**.

   a) Set the Item Type in the **EDE** to **Equipment**

   b) Ensure the **Active Drawing** and **Other Drawings** are toggled on in the **EDE**

   c) From the **EDE**, select **View** > **Plant Reports**

d) Run the **Equipment List** for **All items in the EDE**.

e) There should be an entry similar to the one below in your report.

f) Notice the P&ID Name(s). All drawings in which the multi rep is represented are listed but the data for the item only appears once in the report.

Equipment Number	Equipment Name	Equipment Type	P&ID Name	Constr. Status	Hold Status	Materials of Construction
T-102		1D 1C, 1:1 V Drum	10PID01	New		
			LEGEND01			

6. Replace the 1D1C 1to1 vessel in drawing LEGEND01 with a different representation of the vessel (e.g., Equipment > Vessels > Vertical Drums > 1D 1to1 Rep1).

    a) Toggle **Replace Mode ON** by selecting the command from the toolbar.

    b) Select the **1D 1to1 Rep1** from the **Catalog Explorer**.

    c) Move your cursor over the 1D1C 1to1 in the drawing.

    d) When the 'Replace' symbol displays click to replace one representation of the vessel with the other.

7. Turn **Replace Mode OFF** ; otherwise the software will think you are still in Replace mode.

8. Close the drawings and SmartPlant P&ID.

9. In Drawing Manager, create a revision for PID01, assigning the following properties.
    - **Description**: Drawing after lab 25 (multi rep)
    - Change **Created By** to your initials.
    - Remove the **Time** from the **Revision Date**.
    - **Major Revision**: B
    - **Minor Revision**: 1

10. Associate a version with this revision. See lab 10 for more details on creating revisions and versions.

Lab 26: Working with the Stockpile

Purpose: The goal of this lab is to work in the EDE with items that reside in the stockpile. Students will work with instrument loops, hydraulic circuits, packages, and OPCs. Students will also manipulate items in the EDE.

Working with Instrument Loops

1. Open drawing PID01.

2. Send the following loops to the drawing stockpile:

   Hint: In Catalog Explorer, Loops are located in Instrumentation > Loops

   - Pressure Loop

   - Level Loop

   - Temperature Loop

3. Set the tag sequence number properties for the loops:

   Hint: In the EDE, Loops can be found under **Instrument Loops**

   Pressure Loop
   - Tag Seq No: 2000

   Level Loop
   - Tag Seq No: 204
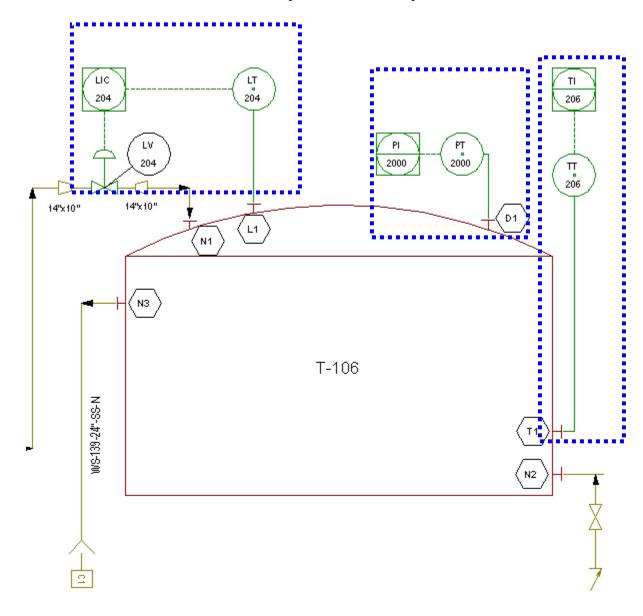
   Temperature Loop
   - Tag Seq No: 206

4. Associate the instrumentation and signal lines with the appropriate loops according to the sectioned image below:

    Note: If an instrument is assigned to a loop that measures a different variable, the measured variable of the instrument is adjusted automatically.

Working with Hydraulic Circuits
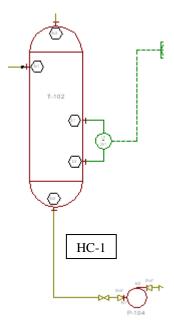
5. Send 6 hydraulic circuits to the **Drawing Stockpile** and assign the following properties in the **Engineering Data Editor**:

Hint: Use Symbols > Design > Hydraulic Circuit.sym
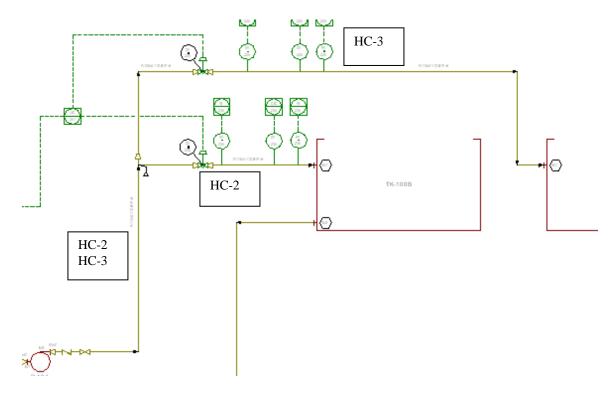
Item Tag	Name	Description
HC-1		T-102 to P-104
HC-2		P-104 to TK-100B
HC-3		P-104 to TK-100A
HC-4		TK-100B to P-105
HC-5		P-105 to T-106
HC-6		T-106 to P-103

6. Assign equipment, equipment components, and piperuns to the hydraulic circuits as shown in the images below. After the images, information is listed about the items assigned to each hydraulic circuit. Some items will be assigned to more than one hydraulic circuit.

Caution: Do not use select sets to assign Hydraulic Circuits to items belonging to more than one hydraulic circuit.

HC-1
T-102, nozzle, piperun, nozzle, P-104
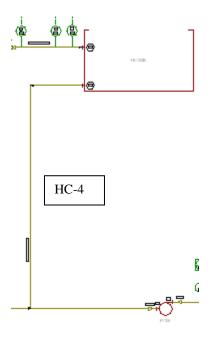
HC-2
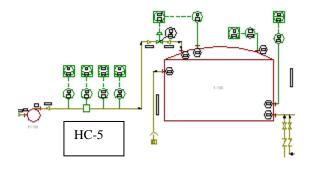
P-104, nozzle, piperun, nozzle, TK-100B

HC-3
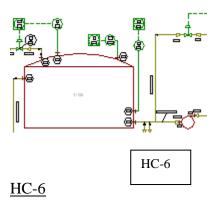
P-104, nozzle, piperun, nozzle, TK-100A

HC-4

TK-100B, nozzle, piperun (vertical and horizontal), nozzle, P-105

HC-5

P-105, nozzle, piperun, nozzle, T-106

HC-6

<u>HC-6</u>

T-106, nozzle, piperun, nozzle, P-103

Working with Packages

Scenario: In your project, you are ordering equipment that will come with nozzles on a Skid. You need to assign a skid number to the equipment and components.

7. Send a package to the (Plant) **Stockpile**.
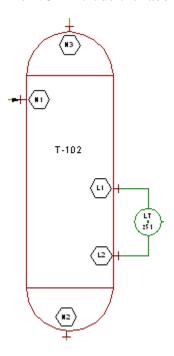
    Hint: Use Symbols > Design > Package.sym

8. From the **Engineering Data Editor**, define an **Item Tag** = **Skid123** for the **Package**.

    To simplify the view, toggle the Engineering Data Editor to only view Stockpile items.

9. Create a select set of T-102 and the nozzles and instruments that are attached to it. Do NOT include the labels in the select set.

10. Assign the **Package Item Tag** of **SKID123** to the **Select Set**.

   Hint: Be sure the Item Type in the Property Window is set to Select Set.
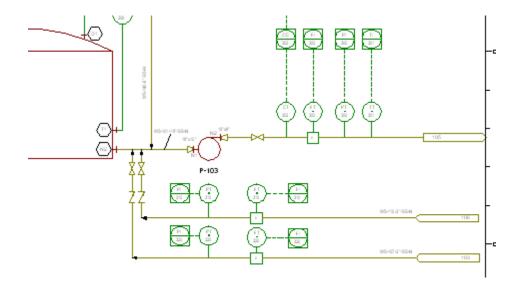
Working with OPCs

11. In Drawing Manager, create the following E sized drawing within Unit 10.
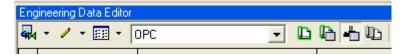
   - Drawing Name: PID03
   - Drawing Number: 10-PID-03
   - Description: Vendor Drawing

12. In **PID01**, find the OPC on the lower right side that is going off the drawing to the right. Note the Item Tag of the OPC. In this example, the OPC tag is 105. The tag may be different in your drawing depending on the order in which you placed the OPCs.
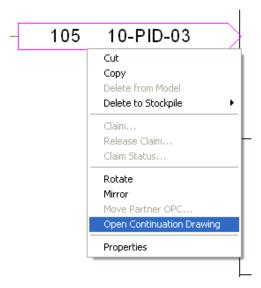
13. Open **PID03**.

14. In the **EDE**, set the view to OPC and select only the Plant Stockpile button.
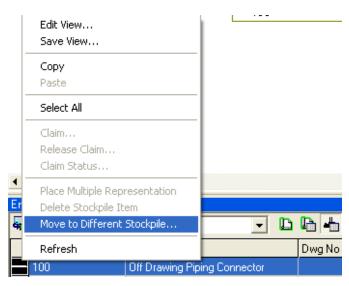
15. Find the mating OPC for 105.

16. Select and place the mating OPC on **PID03**.

17. Notice that the connecting drawing number is displayed.

18. Connect a short piece of pipe to OPC 105 in **PID03**.

19. **File > Exit** to get out of **PID01** and **PID03**.

20. Open **PID01.**

21. Note that the connecting drawing number is now displayed for OPC 105**.**

22. Right-click on the **Off-Page Connector** and select **Open Continuation Drawing.**

23. This will open the connected drawing (PID03). This is useful when working on a group of related drawings and resolving inconsistencies, etc.

24. Close the **PID03** drawing.

25. In **PID01**, find the piperun that is going off to the right of the drawing from TK-100A. Note the OPC tag. In this example, the OPC tag is 100.

26. In the **EDE**, set the view to OPC and select only the **Plant Stockpile** button.

27. Find the mating OPC 100 and select it in the **EDE**. Send it to another drawing stockpile by right-clicking on it and selecting **Move to Different Stockpile…**
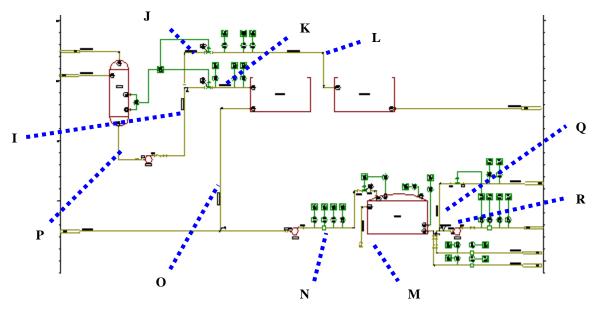
Note that OPC 100 disappears from the plant stockpile as soon as you move it to a different stockpile.

28. Close the drawings and SmartPlant P&ID

Lab 27-A: System Editing

Purpose: The goal of this lab is to allow students to see properties copied when system editing is on. Also, students will observe how to control the spread of data with the placement of property breaks.

1. Open drawing PID01.

2. Refer to the image below and the additional zoomed images for steps 2-12.
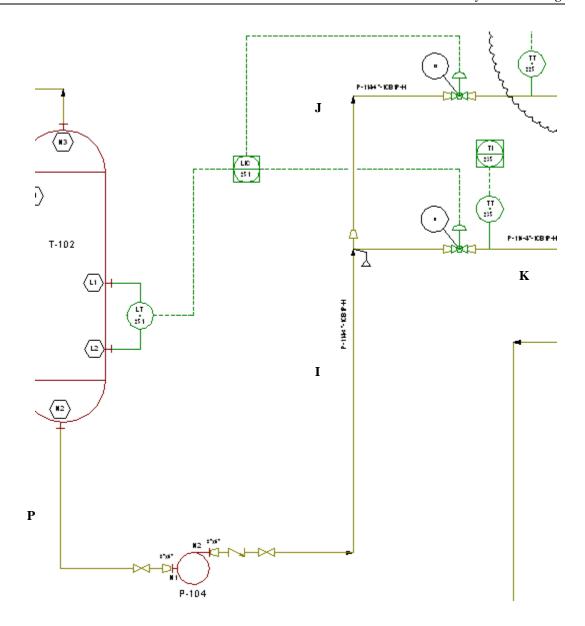
3. Place your cursor in the Fluid Code field for line I. Notice that when you click in the field to enter fluid code, the connected lines are highlighting also. This is showing you the scope of the change due to system editing being in place. Enter Fluid Code = P if not already set.

4. Turn off system editing by selecting **Tools** and <u>unchecking</u> **System Editing**.

5. Start entering the fluid code property again (or just click in the field as if you were going to enter a value). Notice that no connected lines highlight because system editing is off.

6. Turn on system editing again by selecting **Tools** and <u>checking</u> **System Editing**.

7. Place the end of group break on the end of line **K** where it connects to line **I**.

   Hint: Use Piping > Segment Breaks > End of Group.sym

8. Again, click on the fluid code property field of line **I**. Do you see other connected lines highlight?

The connected line K should not highlight because a segment break will stop the copying of the fluid code property values performed by system editing.

9. Click **Edit** > **Undo** or the **Undo** toolbar button [↩] to remove the end of group break.

10. Click in the fields for the other properties needed for line **I**. Note the other properties that will copy or spread through the connected pipes because of system editing.

   - Fluid code, insulation purpose, and piping materials class will copy.
   - Tag sequence number will copy across the reducer unless the line on the other side of the reducer has a value already defined for it. It will copy into line K unless there is an existing inconsistency for tag sequence number.
   - Nominal diameter will not copy across the reducer. Nominal diameter will not copy into line K because a value is defined already. If a value for nominal diameter was not already present in line K, then the value would copy (the rule is: copy bi-directional if NULL).

11. Again, place the end of group break on the end of line **K** where it connects to line **I**.

12. Enter the properties for lines I, J, K, and P as indicated in the zoomed image below:

   Note: The end of group break is a segment break that stops the flow of several properties: Fluid Code, Fluid System, Insulation Purpose, Nominal Diameter, Piping Materials Class, Tag Seq No. It also suppresses the display of inconsistencies for these properties.

I

P-114-8"-1CB1P-H
Estimated Length: 200.0 ft.
Fluid Code: P
Insulation Purpose: H
Nominal Diameter: 8"
Piping Materials Class: 1CB1P
Schedule Or Thk: STD
Tag Seq No: 114

If you get a message that a duplicate tag was found, select No to the prompt if the system should generate the next available tag sequence number for you.

J

P-114-6"-1CB1P-H
Estimated Length: 1000.0 ft.
Fluid Code: P
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: 1CB1P
Schedule Or Thk: STD
Tag Seq No: 114

K

P-116-4"-1CB1P-H
Estimated Length: 20.0 ft.
Fluid Code: P
Insulation Purpose: H
Nominal Diameter: 4"
Piping Materials Class: 1CB1P
Schedule Or Thk: STD
Tag Seq No: 116

P

P-147-8"-1CB1P-H
Estimated Length: 10.0 ft.
Fluid Code: P
Insulation Purpose: H
Nominal Diameter: 8"
Piping Materials Class: 1CB1P
Schedule Or Thk: STD
Tag Seq No: 147

13. Place line number labels as indicated by the zoomed image for the previous step for lines I, J, K, and P.

14. Place the end of group break on line O as indicated in the image below (where line O meets the line going to pump P-105). It is important to place this first so that you do not unintentionally copy property values due to system editing.

15. Enter the properties for lines L, M, N, and O.

You may get a message "Duplicate tag 'TAG NO' for Pipe Run found in active plant. Do you want the next available sequence number to be generated for you?"

Click **No** so that you do not get the next available sequence number. We will resolve any duplicate entries later.

L
P-114-6"-1CB1P-H
Estimated Length: 20.0 ft.
Fluid Code: P
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: 1CB1P

Schedule Or Thk: STD
Tag Seq No: 114

M
WS-139-24"-SS-N
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 24"
Piping Materials Class: SS
Tag Seq No: 139

N
WS-108-14"-SS-N
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 14"
Piping Materials Class: SS
Tag Seq No: 108
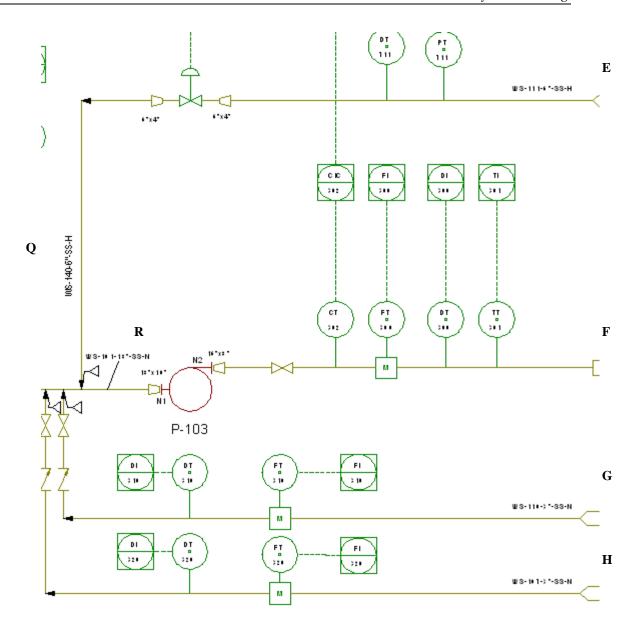
O
WS-138-4"-1CB1P-H
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 4"
Piping Materials Class: 1CB1P
Tag Seq No: 138

16. Place any line number labels as indicated by the zoomed image for the previous step for lines L, M, and O. (N does not have a line number label).

17. Also place the flow arrows as indicated by the zoomed image for the previous steps for lines L, M, N, and O. You may need to change the flow direction of the pipe to place the arrows in the direction as shown.

18. Place the end of group breaks as shown in the image below.

   - Break at end of line Q where it meets line R
   - Break at end of line G where it meets line R
   - Break at end of line H where it meets line R

19. Enter the properties for lines Q and R as indicated in the zoomed image above.

Q
WS-140-6"-SS-H
Fluid Code: WS
Insulation Purpose: H
Nominal Diameter: 6"
Piping Materials Class: SS
Tag Seq No: 140

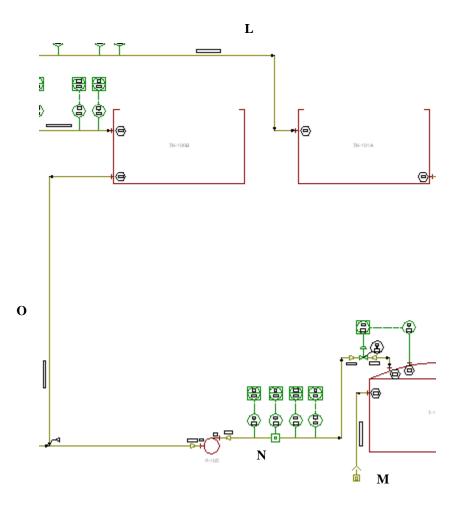**R**

WS-101-18"-SS-N
Fluid Code: WS
Insulation Purpose: N
Nominal Diameter: 18"
Piping Materials Class: SS
Tag Seq No: 101
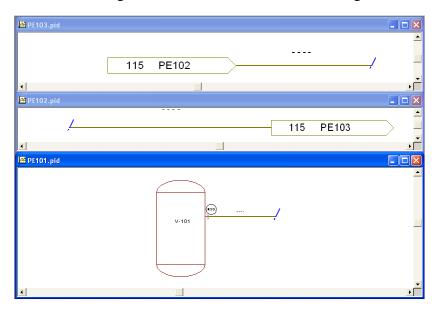
20. Place line number labels as indicated by the zoomed image for the previous step.

21. Close the drawing and SmartPlant P&ID.

Lab 27-B: System Editing with Plant Editing

Purpose: The goal of this lab is to allow students to see how property values are propagated from a non-active drawing to other connected drawings via OPCs when system editing is on. Also, students will observe the benefits of using the EDE to edit all objects in the Plant.

Note: System Editing should be ON. Three drawings (PE101, PE102, and PE103) have been created to use in this lab. Starting with #9, you will be using a different drawing; the PID03 drawing.

1. Open drawings **PE101**, **PE102** and **PE103**.

2. Using the Window menu, tile all three (3) drawings horizontally so that you can see all the drawings at once. Adjust the view so that you can see all the objects in the drawings.

3. Click on drawing PE101 to make it the active drawing.

4. Place an Off-Drawing OPC; connecting it to the Pipe Run.   **Note:** Place the partner OPC in the Stockpile of drawing PE102.

   * Notice that the Consistency Check between the OPC and the Pipe Run cannot be evaluated at this time.

5. Click on drawing PE102 to make it the active drawing.

6. From the EDE, place the partner of the OPC placed in #4. *Check the Drawing Stockpile.*

* Notice that the Inconsistency disappeared after placing the OPC because it knows of its partner OPC (OPC in drawing PE101) and the continuing pipe run.

IMPORTANT: The placement of the partner OPC does not update the relationships of the first OPC placed and the connected pipe run. **To update the relationships, you must close and reopen the drawing.** *(When Plant Editing object data in a non-active drawing, this relationship between connected pipe runs must be established in order for data to propagate across OPCs to other non-active drawings.)*

7. Close and reopen drawing PE101.

   * Notice that the Inconsistency disappeared because the OPC now knows of its partner OPC and the continuing pipe run.

8. **Close all drawings** (PE101, PE102 and PE103).

   _____
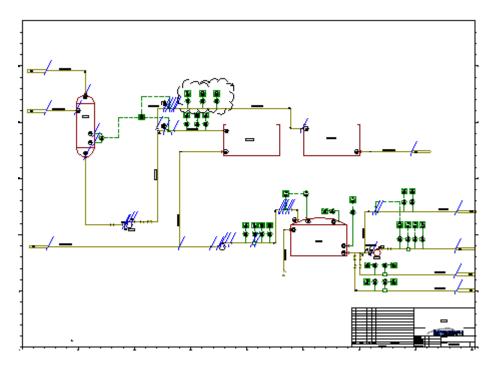
9. Open the drawing **PID03**.

10. In the EDE, select the Item Type of 'Pipe Run'.

11. Using the View > Edit View > Advanced > Layout Tab, modify the EDE view:

    a. Move the 'Rep Drawing Number' property to be the first column.

    b. Add the 'Fluid System' property and move the order next to the 'Fluid Code' property.

    c. Click OK, Yes, and OK to the dialogs.

12. Click on the 'Other Drawings' button.

13. Turn the 'AutoFilter' ON.

14. On the 'Rep Drawing Number' column, click on the (Custom…) button to customize the display to show only the drawings with the name beginning with the capital letters 'PE'. Hint: Use "PE*".

15. Using the View > Display Settings…, customize the read-only and read/write properties to distinguish between the two in the EDE.

16. For drawing PE101, set the Fluid Code = W (Water) for the pipe run.

    *Notice the propagation of data to the other connected drawings and the population of Fluid System due to validation.

17. For drawing PE102, set the Nominal Diameter = 1" for the pipe run.

18. Delete the Nominal Diameter for all pipe runs in drawings PE101, PE102, and PE103.

19. For drawing PE101, set the Nominal Diameter = 2" for the pipe run.

    *Notice that the Nominal Diameter propagates to all connected pipe runs regardless of which drawing is edited.

20. For drawing PE102, set the Insulation Temp = 375F, the Insulation Purpose = H, and the Insulation Spec = CS-H.

    *Notice the propagation of the Insulation Spec and Insulation Temp data and the population of Insulation Thickness data due to validation.

21. Close drawing PID03 and SmartPlant P&ID.

22. Open Drawing Manager.

    *Notice that the drawings (PE101, PE102, and PE103) are out-of-date.

23. View the Out-of-Date Drawings Report.

    *Notice the Out-of-Date Model Items is checked.

24. Run Update on the drawings (PE101, PE102, and PE103).

25. Open drawings (PE101, PE102, and PE103) to verify labels and data input.

26. Close all drawings and SmartPlant P&ID.

Lab 28: Consistency Checking

Purpose: The goal of this lab is to allow students to review inconsistency indicators and resolve inconsistencies in the drawing.

1. Open drawing **PID01**.

2. Select **View > Show Inconsistencies** so that you are able to view inconsistency indicators.

3. Your drawing should look similar to the one shown in the image below. We need to review and resolve the inconsistency indicators in this drawing.
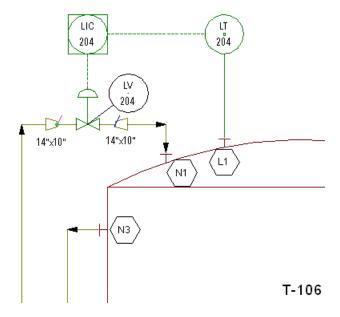
Controlling the Display of Inconsistencies
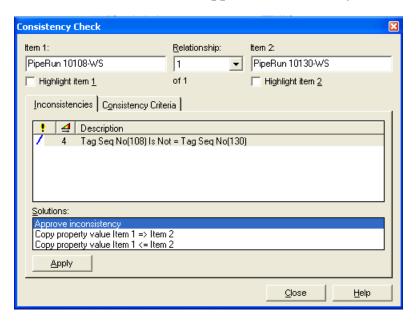
You can control the inconsistency indicators that are shown on the drawing according to the indicator type and severity level.

Use the following workflow to practice controlling the display of inconsistencies.

4. Find the control valve to the left of T-106 as shown in the image below.

5. Right-click on the inconsistency indicator on one of the reducers and select **Consistency Check**. (If you do not have an inconsistency indicator here, then choose a different indicator. Do not choose the indicators on the OPC's for this workflow.)

6. This will bring up the **Consistency Check** dialog box with the Inconsistency descriptions for this indicator.

7. In the **Solutions** field, select **Approve inconsistency** and click **Apply**.
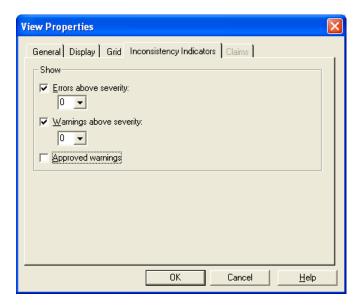
8. After approving all inconsistencies for this indicator, the indicator should change to a green check mark for Approved Warning.

14"x10"
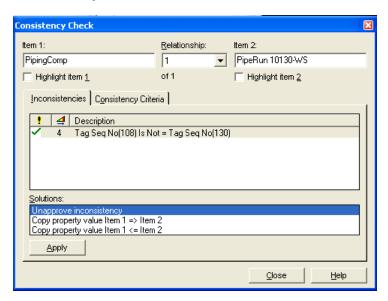
9. Turn off the Display of Approved Inconsistency Indicators by selecting **View** > **Properties** > **Inconsistency Indicators**.

   Then, uncheck the **Approved Warnings** and click **OK** to close the dialog box.
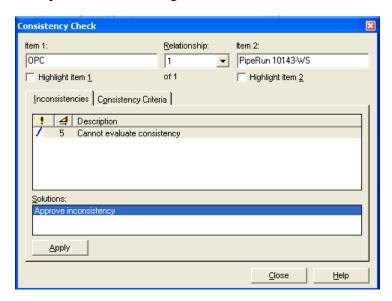
10. The approved warning should not be visible on the reducer.

11. Turn on the display of approved warnings again.

12. Bring up the **Consistency Check** dialog box again and **Unapprove** the inconsistency.
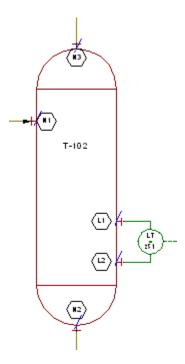
Reviewing and Resolving Inconsistencies

13. Look at the messages for the inconsistency indicators on the OPCs. The description should be **"Cannot evaluate consistency"** unless the mating OPC has been placed on a drawing.
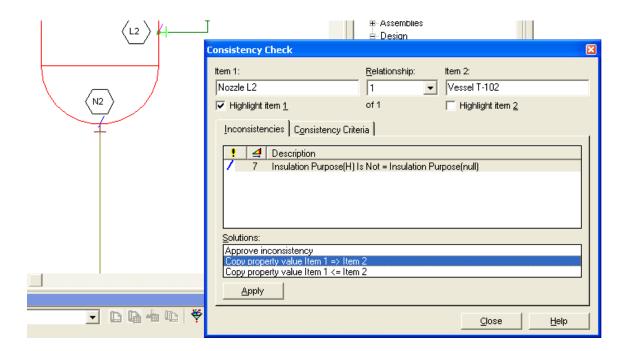
14. Click **Close** to close the **Consistency Check** dialog.

15. Look at **T-102**. Do you have inconsistency indicators on the nozzles? Right-click on the inconsistency indicator to look at the Consistency Check dialog and find what is inconsistent.

In this example, the inconsistency indicators are showing that the Insulation Purpose of the nozzles is set to H while the vessel has no value (null) set for Insulation Purpose.

16. Notice that you can check the box to **Highlight Item 1** and the software will highlight the nozzle in the drawing view as shown in the image below.
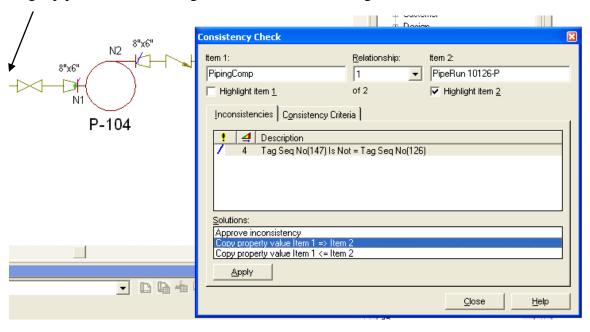
17. To resolve this inconsistency, copy the property value from the Nozzle to the Vessel. In this case, we will choose **Copy property value Item 1 => Item 2** as shown in the image from the previous step.

18. Note that after you click on the solution to resolve the inconsistency for one nozzle, all of the other indicators are removed from T-102. This is because the insulation purpose is H for all nozzles attached to the vessel.

19. Review the inconsistency indicators near pump P-104. (You may not have any indicators, depending upon how you created the graphics and added the property values).
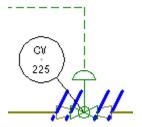
In this example, both inconsistency indicators are showing that the Tag Seq No of the piperun connected to the large end of the reducer is not the same as the Tag Seq No of the zero length piperun between the reducer and the nozzle.

20. You may check the **Highlight item 2** checkbox so that you can see the zero length piperun in the drawing view as shown in the image below.
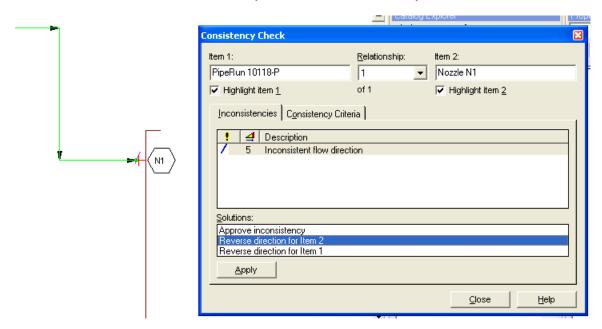
21. To resolve these inconsistencies, copy the property value from the reducer to the zero length piperun. In this case, we will choose **Copy property value Item 1 => Item 2**.

22. Resolve the inconsistency indicators near pump P-103 and P-105. In our example they have the same problem as the ones near pump P-104.

    Hint: To find the pumps, select Equipment: Mechanical in the EDE and then select a pump. Click Fit on the SmartPlant P&ID toolbar to focus in on the pump.

23. Look at CV-225 above and left of TK-100B. Do you have inconsistency indicators here?

- Depending upon how you routed piperuns, you may have some inconsistency indicators with Inconsistent flow direction as the description. To resolve these, set the flow direction for the component so that it matches the piperuns.

- You may have inconsistencies for Tag Seq No. To resolve these, use the Solutions to copy the value for Tag Seq No you have entered for the main piperun into the smaller segments. Utilize your highlight checkboxes to highlight the lines and look at the line number label to make sure you are copying the right values from one item to another. It is easier to start on the left side of the control valve and work toward the right to ensure that you have the correct tag sequence number copied.

24. Look at CV-235 which is below CV-225 from the previous step. Do you have inconsistency indicators here? Resolve these as you did for CV-225.

25. Look at nozzle N1 on TK-100B. Do you have an inconsistency indicator here?

In this example, the inconsistency indicator is showing that flow direction in inconsistent between the piperun and the nozzle.
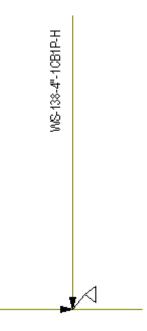
26. To resolve this inconsistency, copy the property value from the piperun to the nozzle. In this case, we will choose **Reverse direction for Item 2**.

Segment Breaks and Inconsistencies
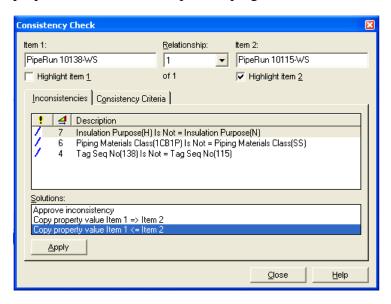
Property breaks labels are used to stop the copying of one or more property values from one point to another. The presence of a property break indicates that there is a property value difference, reducing ambiguity on the drawing. It also turns off the display of the inconsistency indicator that would be present if the segment break was not placed.

27. Find an end of group break that you have placed in your drawing. Delete the end of group break. You should see an inconsistency indicator appear. What properties are inconsistent at this point?

For an example, we can look at the end of group break at the line WS-138-4"-1CB1P-H (line out of TK-100B) where it intersects WS-115-16"-SS-N (line that runs into P-105).
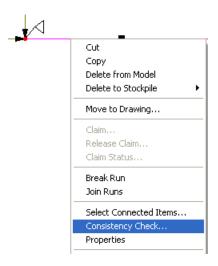
28. When we delete the end of group break, we will see inconsistencies on 3 properties: Insulation Purpose, Piping Materials Class, and Tag Seq No.
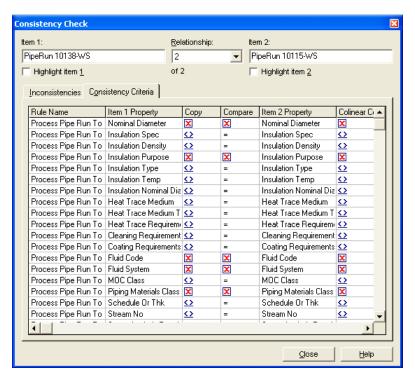
29. Click **Edit > Undo** or the Undo toolbar button to undo the deletion of the end of group break.

30. You may look at the properties that are being broken by a segment break in another way. Right-click on the line that runs into P-105 and select **Consistency Check…**
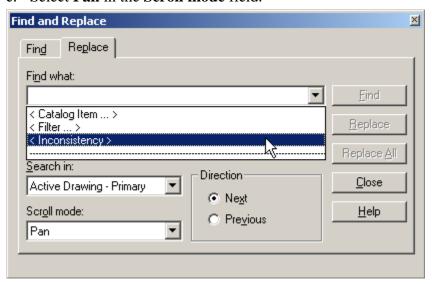
In the consistency check dialog, you will see the Consistency Criteria tab. Make sure to change the Relationship item so that it is between PipeRun and PipeRun. All of the Red X's show that the property value comparison is being controlled by the end of group break. Note that Fluid Code and Fluid System are being controlled. In this example, those property values are the same for the two piperuns.

Utilizing FIND to review Inconsistencies

To help find inconsistencies in a crowded drawing, you may utilize the **Edit > Find** command.

31. Find any remaining inconsistencies in the drawing and resolve them. When you are finished, you should only have inconsistency indicators on the OPCs where the mating OPCs are not placed.

32. Select **Edit** > **Find**.

33. In the **Find and Replace** dialog, make the following selections:

   a. Select **Inconsistency** in the **Find What** field.

   b. Select **Active Drawing** in the **Search in** field.

   c. Select **Pan** in the **Scroll mode** field.

   d. Select **Find.**

34. While the **Find and Replace** dialog is still up, right-click on the inconsistency indicator and bring up the description of the inconsistency. You may resolve the inconsistency or go on to look at others.

35. Continue to select **Find** and cycle through several Inconsistencies.

   In this way, you can review the inconsistencies and resolve them while retaining the zoom level of the drawing.

   Note: Pan does not go in a particular order in the drawing (such as with flow direction, etc.).

36. When the software shows a message box that it has finished searching the document, select **OK**.

37. Select **Close** to exit the **Find and Replace** dialog box.

38. Close the drawing and SmartPlant P&ID.

Lab 29: Using Automatic Item Tag Generation

Purpose: Students will observe the Intergraph delivered automatic item tag generation.

1. Create a new E-size drawing in unit TEST with the following properties:

   - Drawing Name: TESTSPEC
   - Drawing Number: TESTSPEC
   - Description: Test drawing

2. Place the following graphics.

   - Horizontal Drum (**Symbols** > **Equipment** > **Vessels** > **Horizontal Drums**)

   - Nozzle on Horizontal Drum (**Symbols** > **Equipment Components** > **Nozzles**)

   - Route Piping from the Nozzle into the drawing (**Symbols** > **Piping** > **Routing** > **Process Lines**)

   - Place an Off-Line Flow Instrument w/ Implied Components (**Symbols** > **Instrumentation** > **Off**-Line > **With Implied Components > Flow**)

   - Place an Off-Page Connector on the end of the Pipe (**Symbols** > **Piping** > **Piping OPC's** > **Off –Drawing**), sending the mating **OPC** to the **Stockpile**

     Notice the OPC tag number generated at placement of the Off-Page Connector.

   - Send an Instrument Flow Loop to the Stockpile (**Symbols** > **Instrumentation** > **Loops**)

     Toggle the **Engineering Data Editor** to **Instrument Loop** and select the Stockpile button to view the loop.

3. Select the following items you just placed and define the **bold** property values in the **Property Window**:

   Notice how the item tags are generated.

   - Horizontal Drum - **Tag Prefix**
   - Nozzle – **Tag Prefix**
   - Piping - **Fluid Code**
   - Instrument Loop – **Tag Suffix**. (Utilize the Engineering Data Editor for defining the Tag Suffix for the Instrument Loop.

- Associate the flow instrument to the flow loop (Assign the loop tag property in the property grid).

4. Place another Horizontal Drum.

5. Define the same Tag Prefix and Tag Sequence Number as defined for the previous Horizontal Drum.

6. You should receive a message similar to the one below indicating that there is a duplicate tag for the equipment in the active plant. Click Yes to generate the next available sequence number.

Clicking No will revert the sequence number to what it was previously. Contrary to piperun item tags, equipment item tags must be unique.
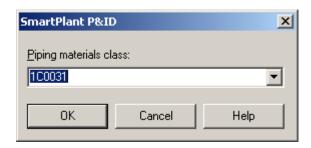
Lab 30: Using Piping Specification Access

Purpose: The goal of this lab is for students to become familiar with the piping specification access and validation. They will observe the following

- Error messages for invalid temperature/pressure pairs on pipe runs

- Commodity codes, Fabrication Categories and validation errors for piping components.

1. Open drawing **TESTSPEC**.

2. Route primary piping and assign a nominal diameter of 4" to the pipe run.

3. Define a value for **Piping Material Class** for the pipe.

   Set Piping Materials Class = 1C0031
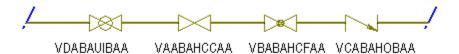
   When you select the Piping Materials Class property you receive a Calc button ⬚ in the field. This is because a calculation prog id is defined in the data dictionary. Select the button, and choose a Piping Material Class from the list.

SmartPlant P&ID [×]

Piping materials class:

1C0031 [▼]

[OK]   [Cancel]   [Help]
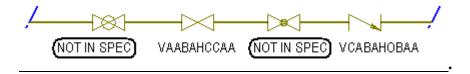
4. Place a ball valve on the pipe run (Piping > Valves > 2 Way Common > Ball Valve).

5. Observe:

    - the commodity code for the ball valve has been updated to VDABAUIBAA.
    - the Fabrication Category for the ball valve has been updated to the value: Contractor supplied, field fabricated

6. Enter a **Design Max Temp** of 100F and a **Design Max Pressure** of 20000 psi. A Service Limits error will display for the temperature/pressure pair because the values are not in the valid range.

Service Limit Validation [×]

The following property values exceed the specified service limits found in the service limit table:

PipeRun	Property	Value
22155E13CF0D4...	Design Max Temp	100F
22155E13CF0D4...	Design Max Press	20000.00 psi
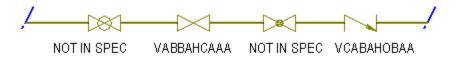
7. Click OK to dismiss the Service Limit Validation dialog.

8. Observe:

    - '(Service Limits ERROR)' is added to the pipe run's Piping Material Class
    - the ball valve's Commodity Code value is set to: '**ERROR in PMC**'.
    - the Fabrication Category property for the ball valve has been cleared

9. Change the **Design Max Pressure** of the pipe to 200 psi. No error is generated because the temperature/pressure pair is within the service limits of the pipe.

10. Place a Gate Valve, a Globe Valve, and a Check Valve on the pipe run.

11. Place Commodity code labels on the valves (Piping > Labels – Piping Components > Commodity Code). Note that each valve has a different Commodity code.

12. <u>Change the diameter on the globe valve to 10".</u> System editing will propagate the value to pipe run and the other valves. Observe that the commodity codes for the Globe Valve and the Ball Valve are not in the spec for NPD=10".

13. On the **Gate Valve**, set the Option Code to SFFE. Use the drop down list for the Option Code field to select the code. The software will run a routine to validate the Commodity Code. Observe that the Commodity Code for the Gate Valve is not in the spec for Option Code SFFE.

14. On the **Gate Valve**, set the Option Code to CL300. The software will calculate the commodity code and the field will be repopulated since a Commodity Code exists for Option Code CL300
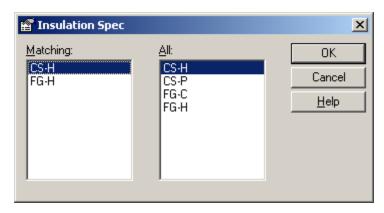
15. Review the PipeSpecError.log and ServiceLimits.Log files in the Windows TEMP location.

16. Close drawing **TESTSPEC** and SmartPlant P&ID.

Lab 31: Insulation Specification Access
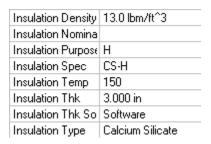
Purpose: In this lab, students will work with delivered insulation specifications. They will observe the population of insulation thickness values based upon the spec selected for piperuns and equipment.

1. Open drawing **TESTSPEC**.

2. Select the pipe and define a **Nominal Diameter** of **4"** and an **Insulation Temperature** of **150 F** for the pipe.

3. Choose an Insulation Spec for the pipe. (When you select the field you receive a button ⋯ in the properties field. This is because a calculation prog id is defined in the data dictionary for this property. Select the button, and choose a spec from the list.)

    Insulation Spec: CS-H
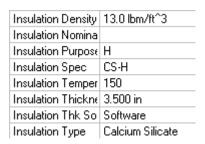
4. The software should run a routine to retrieve the following property values:

Insulation Density	13.0 lbm/ft^3
Insulation Nomina	
Insulation Purpose	H
Insulation Spec	CS-H
Insulation Temp	150
Insulation Thk	3.000 in
Insulation Thk So	Software
Insulation Type	Calcium Silicate

5. For the next steps, turn **System Editing OFF** .

    Why? Because if you do not turn System Editing Off, then when we change the Nominal Diameter of the Gate Valve to 6" the diameter of the Pipe will also be changed to 6".

6. On the **Gate Valve**, set **Nominal Diameter** = **6"**

7. The software should run the routine again to retrieve the following property values for the valve:

Insulation Density	13.0 lbm/ft^3
Insulation Nomina	
Insulation Purpose	H
Insulation Spec	CS-H
Insulation Temper	150
Insulation Thickne	3.500 in
Insulation Thk So	Software
Insulation Type	Calcium Silicate

8. Resolve the **Inconsistency** on the upstream and downstream side of the **Gate Valve**.

    a. Approve the Inconsistency

    AND/OR

    b. Place the appropriate Segment Break.

9. Select the **Check Valve** and set the **Insulation Thickness** = 4.000 in.
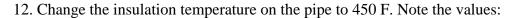
    Observe that the **Insulation Thk Source** property changes from **System** to **User**.

10. Try to change the **Insulation Spec** for the pipe from **CS-H** to **CS-P**.

    You will receive a message of:

Project Insulation Specification

The temperature or diameter value falls outside the range of the insulation specification. Please enter another value.

OK

11. Turn **System Editing ON** ⊠ .

12. Change the insulation temperature on the pipe to 450 F. Note the values:

Insulation Density	13.0 lbm/ft^3
Insulation Nomina	
Insulation Purpose	H
Insulation Spec	CS-H
Insulation Temp	450
Insulation Thk	4.500 in
Insulation Thk So	Software
Insulation Type	Calcium Silicate

13. Now change the **Insulation Spec** to **FG-H**.

    Note the changes in the property values Insulation Density, Insulation Thk and Insulation Type.

14. Close drawing **TESTSPEC**.

Lab 32: Running Reports

Purpose: Students will run delivered reports against their drawing that has been used throughout the course. Students will run the Equipment List, Piperun List, Valve List, and P&ID Instrument List. Also, in comparing their reports to examples, they can check the data they have entered for these items throughout the course.

Reporting from the Engineering Data Editor

1. Open **PID01**.

2. Display all Equipment for the plant in the **Engineering Data Editor** (Choose Active Drawing, Active Drawing Stockpile, Stockpile, and Other Drawings).

3. Generate the **Equipment List** report from the Engineering Data Editor and save the report.

4. Display all Instruments and generate the **P&ID Instrument List**.

5. Display all Piping Components and generate the **Valve List**.

Reporting from a Drawing

6. Run the following Plant Reports from the Reports menu for the entire drawing PID01 and save the reports.

   1. **Equipment List**

   2. **P&ID Instrument List**

   3. **Valve List**

7. Compare the reports for the entire plant to the reports for the drawing.

Output for Equipment List

Running the Line List and Pipe Run List

8. Run the Line List for the entire drawing **PID01.**

9. Run the Macro for FROM / TO data.

    a.   Select **Tools** > **Macro** > **Macros**

    b.   Select **PrintFromToDataforActiveSheet**

    c.   Select **Run**

    📝 **Notes:**

    Flow Direction must be defined for the **FROM/TO** information to be displayed.

10. Did you have data reported in the From/To fields for all piperuns?

11. Run the Pipe Run List for the entire drawing **PID01**.

12. Run the Macro for FROM / TO data. (same as for Line List)

13. Again, check to find if you have data reported in the From/To fields for all piperuns.

14. Close the drawing and SmartPlant P&ID.

Bonus Labs
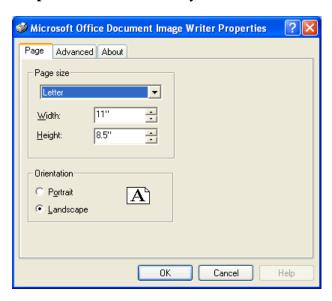
1. Run an **Equipment List** of Items highlighted in the **Engineering Data Editor**.

2. Run an **Equipment List** of Items highlighted in the **PID01** drawing.

Lab 33: Printing from SPPID and Drawing Manager

Purpose: Students will print from SmartPlant P&ID and Drawing Manager and observe the options available in each.

Print from SmartPlant P&ID

1. Click **File > Print** drawing **PID01** from within SmartPlant P&ID.

2. Select **Microsoft Office Document Image Writer** as the printer. Click the **Properties** button and verify that **Orientation** is set to **Landscape**.

3. In the **Print** dialog, select:

    - **Print range**: *Drawing*

    - **Options**: *Fit to page*
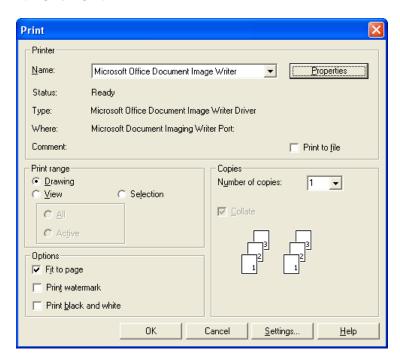
4. Click OK.

5. You will see a **Save As** dialog box. Take the default name in the **Save As** dialog box. Then click **Save**.

6. View the drawing that would be "printed". If you have inconsistency indicators displayed in your drawing view, they will also show in the "printout". To turn them off, use **File > Exit** to close the Microsoft Document Imaging dialog and then turn off the inconsistency indicators in the drawing by deselecting **View** > **Show Inconsistencies**.

7. Close the Microsoft Document Imaging dialog.

8. Select a portion of your drawing and repeat steps 1-7, choosing **Print range**: *Selection* in the Print dialog.

9. Zoom in on a portion of your drawing and repeat steps 1-7, choosing **Print range**: *View* in the Print dialog.

10. **Exit** the drawing and SP P&ID.

Print from Drawing Manager

11. In Drawing Manager, select **PID01**, **LEGEND01**, and **LEGEND02**.

Hint: Select View > Include Subnodes and highlight the plant in order to be able to see drawings in all plantgroups.

12. Click **File > Print**.

13. Select **Microsoft Office Document Image Writer** as the printer.

14. Click **Apply Display Set** and then click **Browse**.

15. Select your **Plant** name on the **Apply Display Set** dialog box and then select the **Deliverable Print** display set. This will turn off the printing of segment breaks (except the end of group breaks) in the prints.

16. Verify that **Print inconsistency markers** is **unchecked**.

17. Select the **Preview** to view the drawings that will be printed.

18. Click Next to cycle through the print preview of the 3 selected drawings.

19. Click **OK** to exit the Preview dialog.

20. Click **OK**.

21. As the software processes through the printing process, you will see a Save As dialog box for each drawing because we are using the **Microsoft Office Document Image Writer** as the printer. Each time, take the default name in the **Save As** dialog box. Then click **Save**.

22. View the drawings that would be "printed".

23. **Exit** the viewer.

24. Print from Drawing Manager again, experimenting with different print settings and different display sets.

Lab 34: Creating and Working with Drawing Revisions

Purpose: Students will become more familiar with creating drawing revisions.

1. In Drawing Manager, create a revision for **PID01**, assigning the following properties.

   - **Description**: Drawing after lab 33
   - Change **Created By** to your initials.
   - Remove the **Time** from the **Revision Date**.
   - **Major Revision**: C
   - **Minor Revision**: 1
   - **DO NOT** associate a version with this revision. We will create a version in the next lab exercise.

2. Create 2 more revisions for Drawing **PID01.** For each revision, as a minimum assign a value for :

   a. **Description**

   b. Change **Created By** to your initials

   c. Remove the **Time** from the **Revision Date**

   d. **Major Revision**

   e. **Minor Revision**

3. **Open** the drawing

4. Observe the updates to the revision label placed in an earlier exercise.

E	1	80% Completion	MAW	8/19/2008
D	1	Incorporating ECNs #456 and #678	MAW	8/19/2008
C	1	30% Completion	MAW	8/19/2008
B	1	Drawing after lab 33	MAW	8/19/2008
A	1	Drawing after lab 10	MAW	6/25/2008

   Note: if more than 5 revisions exist for a drawing, the oldest one will "scroll off" the bottom of the label

5. **Exit** the Drawing.

Lab 35: Creating and Working with Drawing Versions

Purpose: Students will become more familiar with working with drawing versions. They will utilize the compare function to compare the versions of their drawings at various stages in the course. Students will also fetch a deleted drawing.

1. Create a new **version** of Drawing **PID01**.

    a. In Drawing Manager, select the drawing PID01.

    b. Select **Revisions** > **New Version.**

    c. Enter a comment that this version was created prior to fetching an earlier version.

2. Select **Revisions** > **Version History**

3. **Compare** the version that you just created with the version created after Lab 10.

4. Become familiar with the commands on the **Compare** form.

5. Fetch an earlier version of the drawing created after Lab 10.

6. Open the drawing to see that it is back to the point where it has only equipment, piping, and instrumentation items but no properties.

7. Exit the drawing.

8. Fetch the version of the drawing you created in step 1.

9. Open the drawing in the SP P&ID modeler to see that it is back to the version you created before the fetch in step 5.

10. Select **Tools** > **Compare and Refresh** to open the Compare With dialog.

11. Select one of the earlier versions and choose **OK**. Note that you should not choose the last version created because there are no differences between this version and the current drawing.

12. Examine the differences between the current and previous versions.

13. Select to refresh some of the changes in the **Action** column and click OK to return to the drawing.

14. Examine the results of the refresh actions in the drawing

15. Undo (**Edit** > **Undo**) refreshing the changes to return the drawing to the state it was in before the refresh.

Fetch a deleted drawing:

16. **Delete** drawing **TESTSPEC**.

17. **Fetch** the deleted drawing **TESTSPEC**.

     a. Select the **Plant**
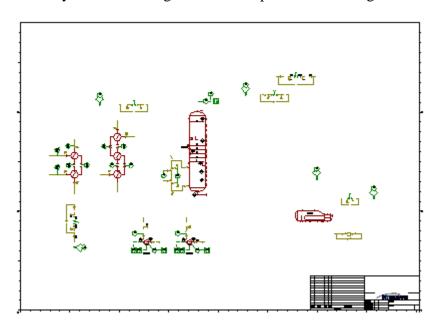
     b. Select **Revisions** > **Fetch Deleted Drawings**

Lab 36: The P&ID

Purpose: Students will create a large P&ID.

1. Open **PID02**.

2. Lay out the P&ID from a hard copy the instructor will supply.

    Note: You may place a number of delivered assemblies as well as the instrument assembly created in your lab exercises to achieve the following as a starting point.

    You may not have enough time to complete this drawing.

Hint: Use the following assemblies:

Assemblies> Equipment > Pump01.pid
Assemblies> Piping > Control01.pid
Assemblies> Piping > Control02.pid
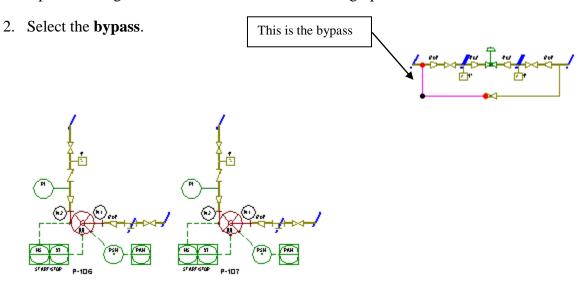Assemblies> Piping > Control03.pid
Assemblies> Instrumentation > Flow01.pid
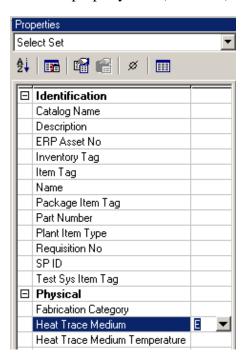
Appendix A: Optional Exercises

Lab A-1: Select Connected Items

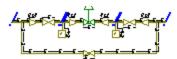**Purpose:** Students will become familiar with the Select Connected Items command.

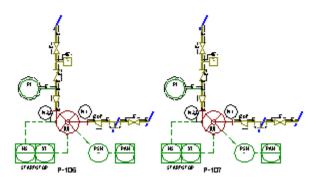1. Open Drawing **T1000** and **Zoom Area** around all graphics.

2. Select the **bypass**.

This is the bypass

3. Right-click and choose **Select Connected Items…**
4. Toggle the **Scope** to **Drawing** and select **OK**.

5. Toggle the **Property Window** to **Select Set** and define the **Heat Tracing Medium** property to **E** (electrical).

6. All piping should have heat tracing with electrical symbology including off-line instruments connected to the piping.
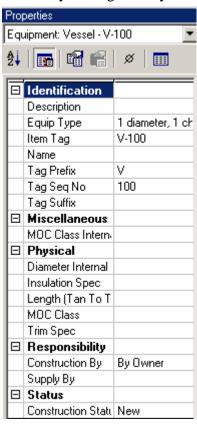
Lab A-2: Brief/Bulk List

Objective: Utilizing the Brief/Bulk List.

1. From **Drawing Manager,** enter drawing **PID01**.

2. Select the **Vertical Drum**.

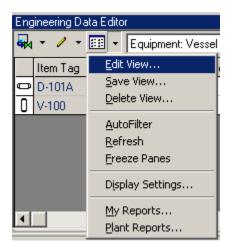3. Select the **Show Brief Properties** command from the **Property Window**.

   The software includes a default set of brief properties, but now we will change this set by editing the Layout tab of the Advanced Table Properties dialog box.
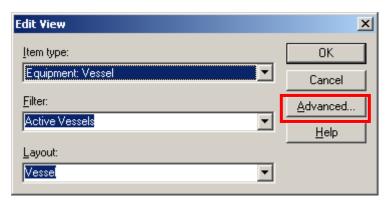

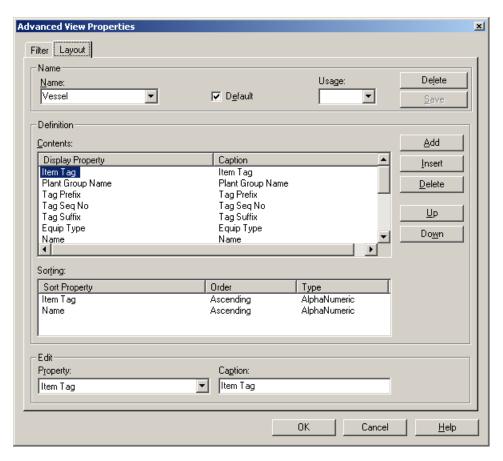4. From the **Engineering Data Editor** toggle the **Item Type** to **Equipment Vessel**.

5. From the **Engineering Data Editor**, select the **View** > **Edit View** command. We will add a custom **Brief/Bulk** list for **Equipment Vessels**.

6. Select the **Advanced** button on the **Table Properties** form to modify the **Layout**.
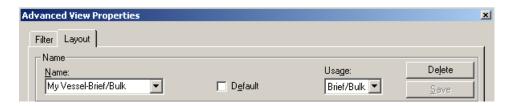
7. Select the **Layout** tab on the **Advanced Table Properties** form to add a custom Brief/Bulk list.
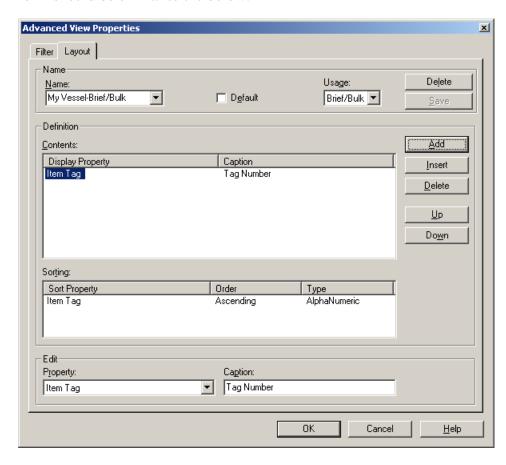

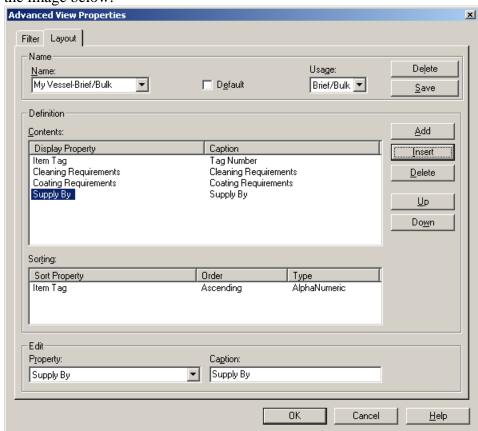Define the following in the Name frame on the Advanced Table Properties form.

- Name: My Vessel – Brief/Bulk
- Un-check the Default box
- Usage: Brief/Bulk
- Save

8. Delete all Properties except the **Item Tag** from the **Display** and **Sort Property** fields in the **Definition** frame. Select **Save.** Your **Advanced View Properties** form should be similar to the below.

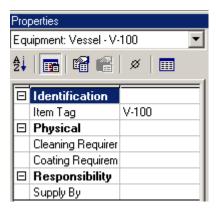9. Complete the following sub steps to add the following Properties to the **Display** field in the **Definition** frame.

   a. Select **Add**

   b. Select the property from the **Edit – Property**

        o Cleaning Requirements

   c. Select **Add**

   d. Select the property from the **Edit – Property**

        o Coating Requirements

   e. Select **Add**

        o Supply By

   f. Select **Save**

10. When complete your **Advanced Table Properties** should be similar to those in the image below.

- Select **OK** and **OK**.

11. From the design file, de-select the Vertical Drum. and re-select the Vertical Drum.

12. Select **Show Brief Properties** command from the **Property Window** if the command is not enabled.
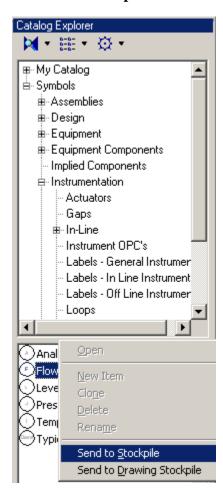
13. In the Brief list define the following values.

    - Cleaning Requirements: CC1
    - Coating Requirements: Galv
    - Supply By: By A

14. Place a horizontal drum outside the drawing border to test copying and pasting bulk properties.

15. **Copy** the **Bulk Properties** from the **Vertical Drum** to the **Horizontal Drum**

    a. Select **Copy Bulk Properties** from the **Property Window**.
    b. Select the Horizontal Drum in the Drawing.

    c. Select **Paste Bulk Properties** from the **Property Window**.

16. Verify Properties were copied to the **Horizontal Drum**.

17. **File** > **Exit** drawing.

Lab A-3: Saved View for Instrument Loops

Objective: Utilizing saved instrument loop views from the Engineering Data Editor

1. From **Drawing Manager** enter drawing **PID01**.

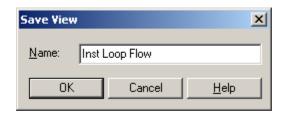2. Send a **Flow Loop** and **Pressure Loop** to the **Stockpile**.

3. From the **Engineering Data Editor** set the **Item Type** to **Instrument Loop**.

4. From the **Engineering Data Editor** select **View** > **Save View**

5. Create two new views named:

   a. **Inst Loop Flow**

   b. **Inst Loop Pressure**

6. Set the **Engineering Data Editor** Item Type to **Inst Loop Flow**.

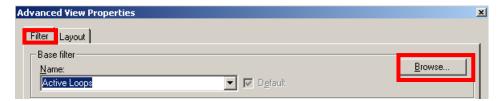7. From the **Engineering Data Editor** select **View** > **Edit View** to edit the **Inst Loop Flow** view to add a new **simple filter** where we discriminate on **Loop Function** of **F** (Flow).

a. On the **Edit View** form select the **Advanced** button.

b. On the **Advanced View Properties** form, **Filter** tab, select the **Browse** button. We will add a **new** Filter of Inst Loop Flow in the next step.
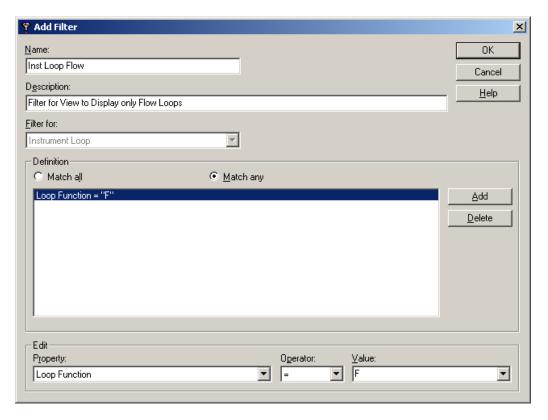
c. On the **Select Filter** form, select the **Display Filters** and select the **New** button to add a new **simple Filter** (Inst Loop Flow).
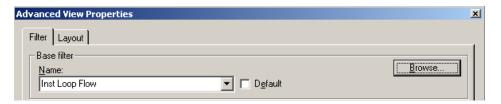
d. Select **Simple filter** and **OK.**
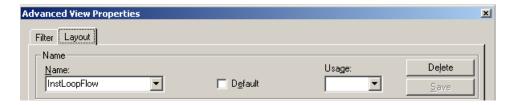
e. On the **Add Filter** form:

   i. Define the **Name** of the filter as **Inst Loop Flow**

   ii. Define a **Description**.

   iii. Select **Loop Function** from the **Edit Property** drop down box.

   - **Operator** of =

   - **Value** of **F**

   iv. Select **OK**

   v. Select **OK**
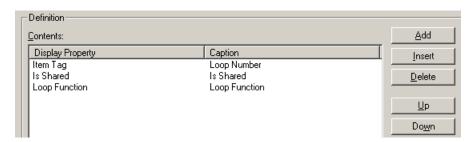
f.   The **Base Filter** name on **Advanced View Properties** form should display **Inst Loop Flow**.
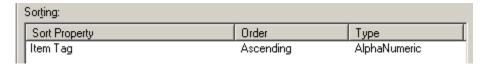
8.   Select the **Layout** Tab on the **Advanced View Properties** form.

a.   Define the **Name** of the layout as **InstLoopFlow**

b.   Select **Save**
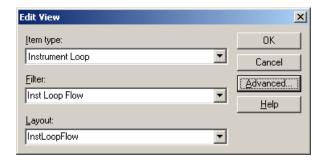
9. **Delete** all properties in the **Definition Display Properties** with the exception of **Item Tag** and **Loop Function**.

10. **Add** the **IS Shared** property to the **Definition Display Properties.**

    a. Select **ADD**

    b. Select the **IS Shared** property from the **Edit Property** drop down box.


11. Utilize the **Up** button to move the **IS Shared** property between the **Item Tag** and **Loop Function** properties.

12. **Delete** the **Name** property from the **Sort Property** field.
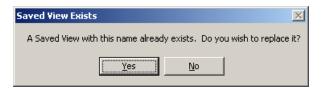
    a. Select **Save**

    b. Select **OK**

    c. The **Edit View** dialog box should have the Filter set to Inst Loop Flow and the Layout set to InstrLoopFlow

    d. Select **OK**

e. Select **View > Save View** from the Engineering Data Editor and save the **Inst Loop Flow** view again.

Select **Yes** when prompted to replace.

The Saved View should be successfully updated.
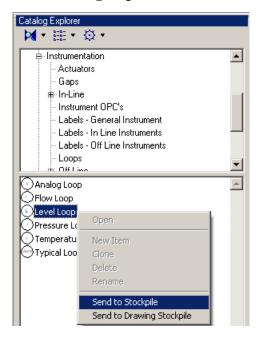
Select **OK**

13. Set the **Engineering Data Editor** Item Type to **Inst Loop Pressure**.

14. Repeat steps 7 – 12 to edit the **Inst Loop Pressure** view to create a new **simple filter** and **layout** to discriminate on **Loop Function** of **P** (Pressure)

15. From the **Catalog Explorer**, send a **Level Loop** to the **Stockpile.**

16. From the **Catalog Explorer**, send a **Temperature Loop** to the **Stockpile**.

17. Toggle the **Engineering Data Editor** to **Instrument Loops**.

   - Notice the change

18. Toggle the **Engineering Data Editor** to **Inst Loop Flow**.

   - Notice the change.

19. Toggle the **Engineering Data Editor** to **Inst Loop Pressure**.

Lab A-4: Importing Data

Objective: To utilize the import functionality

Importing an Equipment List for Zyqad.

1. Use **Windows Explorer** to open the file **VESS.XLS**.

   - VESS.XLS is a Zyqad Equipment List.
   - Your instructor will let you know the location of this file.

2. View the contents of the file

   Review the **Item Tag** definitions in the first column ATI-1 through ATI-4.

3. **Close** the file. Do not save.

4. Create the following E sized drawing within Unit 10.

   - Drawing Name: PID04
   - Drawing Number: 10-PID-04
   - Description: Vendor Drawing

5. Open drawing **PID04**.

6. Delete some or all items from the **Stockpile**.

   a. Toggle the Item Type in the **EDE** to **Plant Item**

   b. Only have the **Stockpile** active in the **EDE**

   c. Select **Edit** > **Select All**

   d. Select **Stockpile** > **Delete Stockpile Item**

7. Place 4 Vessels in the drawing.

   Symbols > **Equipment** > **Vessels** > **Vertical Drums**

8. Define Properties for the 4 Vessels

    a. Tag Prefix = ATI (use this value for all four vessels)

    b. Tag Seq No of:

        - 1 (you will need to override the autogenerated number)
        - 2
        - 3
        - 100

9. Import the Vess.xls file.

    File > **Import** > **Data File**

10. Review the log file in ~\temp\SPImport.log

    ```
    ----------------------------------------------------------
    SmartPlant import log
    Date: 11/21/2006 3:00:48 PM
    ----------------------------------------------------------
    Starting Microsoft Excel
    Opening workbook 'VESS.XLS'
    Starting import of sheet 'Sheet1'
    Getting data from sheet 'Sheet1'
    Updating database
    Item: ATI-1 --> Updating item properties
    Item: ATI-2 --> Updating item properties
    Item: ATI-3 --> Updating item properties
    Item: ATI-4 --> Creating new item
    Item: ATI-5 --> Creating new item
    Closing Excel workbook
    ```
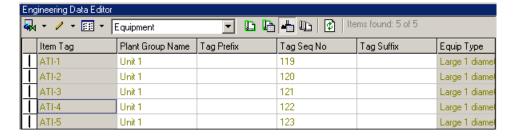
11. Place ATI-4 and ATI-5 from the Stockpile into the Drawing.

Item Tag	Plant Group Name	Tag Prefix	Tag Seq No	Tag Suffix	Equip Type
ATI-1	Unit 1		119		Large 1 diame
ATI-2	Unit 1		120		Large 1 diame
ATI-3	Unit 1		121		Large 1 diame
ATI-4	Unit 1		122		Large 1 diame
ATI-5	Unit 1		123		Large 1 diame

12. **File** > **Exit** drawing.

Bonus Lab

1. Run an **Equipment List** on this drawing**.**

2. Edit the output of the **Equipment List** report and assign the following:

    -   **Material of Construction Class** of **M1** or **M99**.

    -   Key in a Name

3. Import the Equipment List Report.

    File > **Import** > **Data File**

4. Were there any warnings/errors?

5. Did some of the data import?

Revision History

Document Number	Modified By	Modification Date	Reviewed By	Review Date
DPID2-TP-200027B	Margaret Walker	9/30/2008	Marie Elhajj	9/30/2008
DPID2-TP-200027C	Astrid Mcintosh	11/3/2008	Marie Elhajj	11/3/2008
	Marie Elhajj	9/9/2009	Astrid Mcintosh	9/9/2009
	Marie Elhajj	4/20/2011	Astrid Mcintosh	4/20/2011