Smart 3D

Isometrics Practice Labs

Process, Power & Marine

INTERGRAPH

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Introduction

Automated isometric drawing production is naturally expected in 3D plant design and ISOGEN is the undoubted world leader in the production of such drawings.

Smart 3D manages the automatic drawing creation, utilising ISOGEN by generating a PCF (Piping Component File) and by using the 'Options Browser' for controlling the drawing configuration.

The resultant output is stored in the Smart 3D database. The drawing styles are stored in the Smart 3D catalogue and are written to an XML configuration file for processing by ISOGEN.

Workflow:

The workflow in creating an isometric drawing can be considered in two parts:

- The Administration Workflow
- The User Workflow

Administration Workflow:

The Smart 3D Administrator will create an isometric style containing a Border file and a set or configuration options, this will be Bulk Loaded into the Catalog.

A **'Piping Isometric Drawing by Query'** component is then created; this is associated to the isometric style to form a **'Package'**. The Package is stored in the 'SharedContent' for the project.

The 'Piping Isometric Drawing by Query' component specifies the "what" portion of the query.

User Workflow:

The Smart 3D user creates a 'Drawings by Query Manager' component to specify the "where" portion of the query.

The **'Drawings by Query Manager'** component references a **Package** that specifies what items will be extracted and which isometric style will be used.
The basic user workflow for creating Piping Isometric Drawings by Query is as follows:

- Create a '**Drawings by Query Manager'** component which specifies where to look for the data (Pipeline, Pipe Run ….)
- Run the filter-based query
- Create the drawings
- Update the drawings, if necessary
- Publish the drawings to a viewable graphic file; no physical data is published

Model Database
Where (Plant)
Filter
Drawings By
Query Manager
PCF
Style Data
Personal
ISOGEN
Isometric
Drawings
Reports / Logs

Total Workflow:

Delivered Styles:

Each Piping Isometric Drawing by Query component has an associated isometric style. The delivered styles are **Iso_Pipeline**, **Iso_Piperun**, **Iso_PenSpool**, **Iso_Spool**, **Iso_WBS**, and **Iso_Stress**.
You can open the **Isometric Style Options Browser** from any of the isometric drawing styles by right-clicking the drawing style in the **Console** or in the **Drawings and Reports** task and selecting **Edit Options** on the shortcut menu. The browser allows you to set options for isometric drawing format and content, these changes can be saved to the Catalog or exported to an XML file for use on other projects etc.
After creating the Piping Isometric Drawings, you can open them for viewing, editing, printing, and publishing (if your model has been registered using the Smart Registration Wizard).
To troubleshoot the drawings, you can use the **View Extraction Data** command to access part and reports information and log files.

Smart 3D User Interface:

The main user interface when in the Smart 3D is shown below, use these diagrams to located buttons and features mentioned in the labs.

In addition, when in the Drawings and Reports task, the interface is as shown below:

A drawing console is also available from within all tasks. It is displayed from the Tools -> Drawing Console menu item and provides a subset of the functionality in the Drawings task:

These labs give instructions from the 'Drawings and Reports' task, however, most of the actions can just as easily be performed using the 'Drawing Console'.

Document Icons:

Piping Isometric Drawings by Query Manager

Drawings by Query Manager

Out of Date Document

Up to Date Document

Document with Warning

No Part found in Pipeline

Out of the Box Isometric drawings extraction

Extracting Isometric Drawings using Drawings by Query Manager

1. Start Smart 3D from the Start Menu using Programs > Intergraph Smart 3D > Smart 3D
2. Define a workspace using the filter Plant Filters > Training Filters > U01

3. Switch to the **Drawings and Reports** task by selecting the Tasks >Drawing and Reports menu item.

4. Expand the Isometrics folder
5. Right click on the 'Iso Pipeline Isometrics' and select Setup…

6. Under Filter select More.. and pick Plant Filters > Isometric Drawing Filters > U01 Isometrics.

7. Click OK
8. Right click 'Iso Pipeline Isometrics' and select Run Query. This creates a hierarchy in the management console.

9. Expand the hierarchy and right click Iso Pipeline and select Create Drawings. This creates the entries for the drawings in the detail view, one drawing for each pipeline.

10. Right click on 1001-P and select Update Now

11. Once the green tick appears, double click drawing 1001-P to review the content

12. Click on the Iso Pipeline component in the Drawings console. The view of the isometric will close.

13. Right click drawing 1001-P and select View Extraction Data to review log, PCF and drawing files

This completes Lab 1.

Overview of Options Browser

All options to modify the look and feel of isometric are accessed via the Isometric Style Options Browser.

Expand the Iso Pipeline Isometric branch, select Iso Pipeline and Edit Options.

Source of Option

Version Smart 3DV2011SP1 and above, Isometric Option Browser user interface has been changed. All S3D Options are listed out separately under S3D Node in the Option Browser and all other options above S3D node are the Non-S3D Options (Isogen) options:

1. Expand and select S3D.Drawing.Dimensions
   Select CoordOutputBOP in the right pane.

Notice the bottom right corner says S3D, indicating that this is a S3D option and not the Isogen option. Built-in help explains the possible values of the switches and their effect.

2. Select Drawing.Dimensions.CoordSupports in the right pane.

Notice the bottom row now tells us an option (OP) number and a switch (SW) number. This indicates that this is Isogen option with references to Alias Isogen option and switch number. This information is provided to help lookup in the Isogen Option Switches help guide.

Search options

The search box at the top of the browser acts as a substring search for all option names.

1. Type ‘Weld’ in the search box. All options with name containing the text ‘Weld’ are displayed.

The search box also helps search for Alias options by number using the search syntax ?OPT:xx where xx is the option number.

2. Enter ?OPT:9 in the search box and press enter. This displays all Smart 3D options that used to be various switches on Alias option 9.

Sorting

1. Clicking on any column heading sorts a column

Inserting and deleting rows

1. There would be a blank row at almost every grid view where user has to add rows. To insert a row just keep on typing in the blank row and new rows would be added automatically if the last one is consumed.

   E.g. Expand Drawing.Layers.Layers(10) in tree view and start typing at very last row, observe that new blank row would create as soon as you start typing in the last row.

2. To delete a row, you can use the delete row button or delete key on keyboard, if focus is on grid view.

Saving options

1. To save options to catalog, use Save to Catalog button from the toolbar.

2. To save options to XML file, select the top node of the style and select 'Save Style XML File' button from the toolbar.

Importing options

3. To import options from a previously saved file, select any node and select the import button, then browse to the saved file. This functionality can be used to update an entire style or portion of style to new options introduced by Intergraph.
   e.g. Select AttributeMAP node in the tree and select Import Data from File. Then browse to a XML file and click OK.

4. A message is shown asking for confirmation.

5. Entering Comments

   Users can enter comments in the options browser in the Comments section of the style.

The origin column is a pick list for the users to distinguish their comments from Intergraph comments.

The intials and comments fields are standard text fields for users to enter whatever text they wish.

S3D Options

The options in the S3D section of the options browser mainly control what information is written to the PCF file. The options in the non-S3D section then control how this information is interpreted and used for generating the drawing.

S3D.Drawing.Controls

Including Pipe Supports in Material List

This option decides if supports are written to the material list or not.

1. In the Detail View, right click on 1002-P and Update Now.

2. Once the update completes, right click on 1002-P and view extraction data. Notice that the pipe support is assigned a material list number and is included in the material list.

3. Click on the PCF section of the Extraction Data window and scroll to the bottom. Notice that the pipe support appears in the MATERIALS section as shown below.

```
MATERIALS
ITEM-CODE    PAAZZBOZZABAABOAAZZUS
   DESCRIPTION    Pipe, S-STD, BE, ASTM-A53-B Type S
ITEM-CODE    Assy_VS_SR_DB_116
   DESCRIPTION    Variable Spring with Double Bolt Clamp, TYPE B SPRING, WELDED BEAM ATTACH, STND SPRING, Size:4
ITEM-CODE    MDJZZBOZZAAEADCZZUS
   DESCRIPTION    Tee, S-STD, BE, ASTM-A234-WPB, ASME-B16.9
ITEM-CODE    MCMZZBOZZAAEADCZZUS
   DESCRIPTION    90 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9
```

4. Close the ‘Extraction Data’ dialog

5. In the Management Console, right click on Iso Pipeline and Edit Options

6. Expand the nodes S3D.Drawing.Controls
7. In the right pane, set the value for IncludePIpeSupport to 'False'

8. Close the options browser and click 'Yes' to Save Option Data

9. Select 1002-P and 'Update Now'

10. Once update completes, View Extraction Data
11. Zoom into ISOSHEET1 and notice that while the support is still drawn, it no longer has a part number and does not appear in the material list.

12. Select the PCF section and scroll to the bottom. Notice that the pipe support is not written under the MATERIALS section

```
MATERIALS
ITEM-CODE    PAAZZBOZZABAABOAAZZUS
   DESCRIPTION    Pipe, S-STD, BE, ASTM-A53-B Type S
ITEM-CODE    MDJZZBOZZAAEADCZZUS
   DESCRIPTION    Tee, S-STD, BE, ASTM-A234-WPB, ASME-B16.9
ITEM-CODE    MCMZZBOZZAAEADCZZUS
   DESCRIPTION    90 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9
```

13. Edit Options and reset the IncludePipeSupport option back to True since we will need it later.

Including implied materials in the iso

1. View extraction data on 1001-P and notice that gaskets and bolts are included in the material list

OTHER THAN SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
8	Gasket, CL150, 0.125" thk, 304 spiral wnd, graph filled, CS center ring, API-601	10	GMAHACABXBEPUS	6
9	Gasket, CL150, 0.125" thk, 304 spiral wnd, graph filled, CS center ring, API-601	8	GMAHACABXBEPUS	2
10	Studbolts, ASTM-A193-B7 - 4.75 in. Length	7/8	BAZZZZZZAAYBEUZZ	72
11	Studbolts, ASTM-A193-B7 - 4.5 in. Length	3/4	BAZZZZZZAAYBEUZZ	16
12	Check valve, CL150, RFFE, BB, swing, ASTM-A216-WCB, trim 8, Pacific 180	10	VBGAHABAHAFEADAZ	2
13	Gate valve, CL150, RFFE, BB, OS&Y, ASTM-A216-WCB, trim 8, Crane 47	10	VAAAHABAHADJADAZ	2

2. View the PCF and note that they are present in the PCF

```
GASKET
   COMPONENT-IDENTIFIER    15
   MASTER-COMPONENT-IDENTIFIER    14
   END-POINT    32788.600    4907.662    3608.200    10
   END-POINT    32788.600    4907.662    3605.025    10
   ERECTION-ITEM
   UCI    {000138A8-0000-0000-213D-333B7E493004}
   ITEM-CODE    GMAHACABXBEPUS
   ITEM-DESCRIPTION    Gasket, CL150, 0.125" thk, 304 spiral wnd, graph filled, CS center ring, API-601
   INSULATION-SPEC    UNDEFINED
   PAINTING-SPEC    ELECTRO-GALVANIZED
   TRACING-SPEC    UNDEFINED
   MISC-SPEC3    UNDEFINED
   PIPING-SPEC    1C0031
BOLT
   COMPONENT-IDENTIFIER    16
   MASTER-COMPONENT-IDENTIFIER    14
   CO-ORDS    32788.600    4907.662    3605.025
   UCI    {000138A9-0000-0000-223D-333B7E493004}
   BOLT-DIA    .875
   BOLT-LENGTH    4.75
   BOLT-QUANTITY    12
   BOLT-ITEM-CODE    BAZZZZZZAAYBEUZZUS
   BOLT-ITEM-DESCRIPTION    Studbolts, ASTM-A193-B7 -  4.75 in. Length
   ERECTION-ITEM
```

3. Edit Options and change the S3D.Drawing.Controls.GenerateImpliedMat option to False

4. Update the iso for 1001-P

5. View extraction data. Notice that gaskets and bolts are no longer included in the material list. They are also missing from the PCF. However there is now a disconnection message on the face of the isometric since the gaskets are missing.

6. To disable the disconnection message, Edit Options and set the Drawing.Controls.DisconnectionMessage option to False

7. Re-update the iso for 1001-P, notice that the message is no longer shown.
8. Re-Edit Options and reset the GenerateImpliedMat and DisconnectionMessage options back to True.

S3D.Drawing.Format

Before exploring the options here, we will perform a step to modify the filter for our Drawing by Query Manager.

1. Select the Right click on the ‘Iso Pipeline Isometrics’ and select Setup…

2. Under Filter select More.. and pick Plant Filters > Isometric Drawing Filters > Smart 3DTrain Isometrics.
3. Click OK
4. Right click on ‘Iso Pipeline Isometrics’ and ‘Run Query’
5. Click ‘OK’ on the warning message. Note that it is safe to click OK since we know that the Smart 3DTrain Isometrics filter is a superset of the U01 Isometrics filter.
6. Once the process completes, note that there are extra nodes in the hierarchy for all areas in the plant. Expand A2 > U01 > Process > Iso Pipeline and note that the isos previously updated are not lost.

Bend Radius Display

1. Expand A2 > U02 > Process > Iso Pipeline
2. Right click on ‘Iso Pipeline’ and ‘Create Drawing(s)’
3. Right click on ‘2005-P’ and ‘Update Now’
4. Once update completes, View Extraction Data and view ISOSHEET1
5. Notice that this pipeline contains a single piece of pipe with two bends but no information about bend radii or angles is displayed on the isometric
6. View the PCF file and look at a BEND record. Note that information about angles or bend radii is not present.

```
BEND
   COMPONENT-IDENTIFIER    4
   END-POINT    14173.200    5334.000    4876.800    12
   END-POINT    13716.000    4876.800    4876.800    12
   CENTRE-POINT    13716.000    5334.000    4876.800
   SKEY    PB
   FABRICATION-ITEM
   INSULATION-SPEC    UNDEFINED
   PAINTING-SPEC    ELECTRO-GALVANIZED
   TRACING-SPEC    UNDEFINED
   MISC-SPEC3    UNDEFINED
   PIPING-SPEC    1C0031-PB
   WEIGHT    22.487
   UCI    {0001388C-0000-0000-0B00-6596504B2404}
   CUT-PIECE-LENGTH    17934.78
   ITEM-CODE    PAAZZBOZZABAABOAAZZUS
   ITEM-DESCRIPTION    Pipe, S-STD, BE, ASTM-A53-B Type S
```

7. Edit Options on Iso Pipeline and set options as below

8. Save options, exit options browser and re-update 2005-P.
9. Once update completes, View Extraction Data and view ISOSHEET1
10. Now the bend radius is shown as a radius multiplier, however the angle is not shown.

11. View the PCF file and look at a BEND record. Note that information about angles or bend radii is now available.

```
BEND
   COMPONENT-IDENTIFIER    4
   END-POINT    14173.200    5334.000    4876.800    12
   END-POINT    13716.000    4876.800    4876.800    12
   CENTRE-POINT    13716.000    5334.000    4876.800
   SKEY    PB
   ANGLE    9000
   BEND-RADIUS    1.5D
   FABRICATION-ITEM
   INSULATION-SPEC    UNDEFINED
   PAINTING-SPEC    ELECTRO-GALVANIZED
   TRACING-SPEC    UNDEFINED
   MISC-SPEC3    UNDEFINED
   PIPING-SPEC    1C0031-PB
   WEIGHT    22.487
   UCI    {0001388C-0000-0000-0B00-6596504B2404}
   CUT-PIECE-LENGTH    17934.78
   ITEM-CODE    PAAZZBOZZABAABOAAZZUS
   ITEM-DESCRIPTION    Pipe, S-STD, BE, ASTM-A53-B Type S
```

12. While the S3D option turned on the writing of the angle to the PCF, an Isogen option controls whether the angle is displayed.
13. Close Extraction Data.
14. To turn on the option, Edit Options and set the option Drawing.Format.AngleStyle to 'All'. Normally only non-standard angles are displayed, so notice the four options that allow you to exclude the most common angles 90/180 and those within 10th degree.

15. Save options, exit options browser and re-update 2005-P.
16. Once update completes, View Extraction Data and view ISOSHEET1
17. Now angles are displayed

Flow Arrows

1. Expand A2 > U01 > Process > Iso Pipeline and View Extraction Data on 1001-P. Note that no flow arrows are shown.
2. Edit Options on 'Iso Pipeline' and set the SegmentFlowArrowPlacement option to PipeRun

3. Save options, exit options browser and re-update 1001-P.
4. Once update completes, View Extraction Data and view ISOSHEET1
5. Notice that flow arrows are shown once per run

6. Edit Options on 'Iso Pipeline' and set the SegmentFlowArrowPlacement option to PipeFeature
7. Save options, exit options browser and re-update 1001-P.
8. Once update completes, View Extraction Data and view ISOSHEET1

9. Notice that flow arrows are shown once per feature.

Dotted Symbology

DottedSymbology can be setup either using Filters or Labels.

DottedDimensionedFilter/DottedUnDimensionedFilter.enables dotted dimensioned and un dimensioned symbology for parts included in the filter. If both parts connected at a weld are dotted, the weld will be dotted as well. If a part is returned by both the filters, the part will be dimensioned.

You can use DottedDimensionedLabel or DottedUnDimensionedLabel instead of DottedDimensionedFilter or DottedUnDimensionedFilter. If you are using the Filter versions of the options ensure that the Label versions are not set.

Note: In many cases using a Label will be faster than using a Filter. To speed up generation of isometric drawings try using DottedDimensionedLabel and DottedUnDimensionedLabel instead.

1. Edit Options
2. Select S3D.Drawing.Format.DottedSymbologyEnable = True

3. Select the ellipsis (…) in the S3D.Drawing.Format.DottedSymbology.DottedDimensionedFilter field to invoke the Select Filter dialog
4. Expand Catalog Filters\Default Filters and select the filter 'Smart 3D Drawing Filters\Types of Drawings\Isometric Piping\Piping Isometric Dotted Symbology' and click OK.

5. Save Options to catalog.
6. Switch to piping task, select a few parts from the line 1002-P and change their construction requirement to **'Existing'**.

7. Update drawing for 1002-P, you should see that the parts and the welds as dotted.

S3D.Drawing.Dimensions

BOP Coordinate at Turns

1. Notice that in the above output, the elevation shown at the elbow is the centreline elevation.
2. Edit Options
3. Select S3D.Drawing.Dimensions.CoordOutputBOP = True
4. Save options, exit options browser and re-update 1002-P.
5. Once update completes, View Extraction Data and view ISOSHEET1

6. Notice that the elevation shown is now a B.O.P. elevation.

7. View the PCF file, notice that the ELBOW now has a BOP-ELEVATION written out.

```
ELBOW
  COMPONENT-IDENTIFIER   19
  END-POINT   27355.800   11887.200   304.800   6   BW
  END-POINT   27127.200   11887.200   533.400   6   BW
  CENTRE-POINT   27127.200   11887.200   304.800
  SKEY   EL**
  ITEM-CODE   MCMZZBOZZAAEADCZZUS
  ITEM-DESCRIPTION   90 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9
  STATUS   DOTTED-DIMENSIONED
  UCI   {00013885-0000-0000-0912-CA317F495804}
  INSULATION-SPEC   UNDEFINED
  PAINTING-SPEC   ELECTRO-GALVANIZED
  TRACING-SPEC   UNDEFINED
  MISC-SPEC3   UNDEFINED
  PIPING-SPEC   1C0031
  FABRICATION-ITEM
  WEIGHT   10.886
  BOP-ELEVATION   220.6625
```

8. The prefix for the BOP elevation is controlled using the Alternative Text (ATEXT) facility.
9. Edit Options
10. Select Iso Pipeline.AlternativeTexts.AlternativeTexts(81) (note that the number in parentheses will change to reflect the number of texts set and may be different from 81)

11. Scroll to the end of the right pane and select -450 in the IsogenTextID column. Notice that the DefaultText is populated with B.O.P.

12. Key in 'WP' in the AlternateText column and click in the lower row
13. Save options, exit options browser and re-update 1002-P.
14. Once update completes, View Extraction Data and view ISOSHEET1
15. Notice that the text B.O.P. is now replaced with WP

16. Close Extraction Data
17. Now, re-Edit Options and in the row you edited, delete the text 'WP'. Do not delete the row. Effectively this will blank out the ATEXT.
18. Save options, exit options browser and re-update 1002-P.

19. Once update completes, View Extraction Data and view ISOSHEET1
20. Notice that BOP elevation is no longer displayed but centerline elevation is displayed instead.

21. View the PCF and notice that BOP-ELEVATION is still written to the PCF. Thus a combination of S3D and Isogen options and ATEXT control the output seen.
22. Now, re-Edit Options and in the row you edited and delete the row for -451. Effectively this will set the ATEXT to its default.
23. Save options, exit options browser and re-update 1002-P.
24. Notice that output shown is similar to how you started out.

Column/Grid Reference

1. Edit Options
2. Select S3D.Drawing.Dimensions.ColumnReference. Set Enable to True

3. In the StructuralReferenceFilter field, select the ellipsis (…) , this opens the Select Filter dialog and select filer named '**Piping Isometric Structural Column Reference**' from Catalog Filters>Default Filters>Smart 3D Drawing Filters>Types of Drawings>Isometric Piping.

4. Select the filter above and click OK.
5. Set S3D.Drawing.Dimensions.ColumnReference.ReferenceLocation = Column
6. Save to Catalog.

7. Update line 1002-P. You should see structural columns referenced on the iso.

8. View the PCF file. At the bottom, there is a REFERENCE-DIMENSION entry with the details of the referenced item.

```
REFERENCE-DIMENSION
   REFERENCE-POINT-LOCATION
   CO-ORDS    29260.800    3962.400    5486.400
   REFERENCE-DIMENSION-PRIME
   CO-ORDS    28041.600    3048.000    5486.400
   REFERENCED-ITEM
   CO-ORDS    28041.600    3048.000    4572.000
   CO-ORDS    28041.600    3048.000    5486.400
   SKEY    VST
   MESSAGE
   TEXT    MemberPartPrismatic-1-0706
```

9. To limit the columns from the model chosen for reference dimensioning to a reasonable value, an option to set the maximum distance is provided. Typically columns that are too far away are not useful. To exercise this, Edit Options and set values as below to (an unrealistic value of 0.1).

10. Save options, exit options browser and re-update 1002-P.
11. Notice that the line goes to an error/warning state with a yellow '!' icon.
12. Right click on 1002-P and View Log.

13. Scroll down to the bottom of the log file to notice an error is shown.

14. Close the View Log window, View Extraction Data and view ISOSHEET1. Notice that there is no column reference shown.
15. Re-Edit Options and delete the value entered for MaximumDistance and also set UseMaximumDistance to False.
16. Similarly, for displaying Grid References, a filter can be defined for Grid Systems and option '**ReferenceLocation**' should be modified to **Grid Lines** instead of **Column**.
17. Set the value S3D.Drawing.Dimensions.ColumnReference.Enable to False for later exercises.

S3D.Drawing.Content

Change Management

1. Right click on 1002-P and select Save As..

2. In the Save As dialog, select the ellipsis (…) next to the output folder and select the Desktop. Click OK.

3. In the TargetFileType column next to Isometric Drawings, select Both(*.sha, &.pcf)

4. Click OK to save the files and click OK on the message shown.
5. Edit Options
6. Under S3D.Drawing.Content.ChangeManagementEnabled, select True

7. Exit options and save when prompted.
8. Switch to the Piping task

9. Place a gate valve in the line 1002-P next to the pipe support as shown below.

10. Switch to the Drawings and Reports task and update iso for 1002-P
11. Using Windows Explorer, rename the files 1002-P.PCF and 1002-P.sha on your desktop to B1002-P.PCF and B1002-P.sha.
12. Save out the new files to the desktop.
13. Now use a text editor such as Notepad++ to open both PCF files simultaneously. Also open both sha files in SmartSketch drawing editor and tile them vertically.

14. Notice that the new material list has a FLANGE as item no 5, preserving the item no 4 for the PIPE SUPPORT.

SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
1	Pipe, S-STD, BE, ASTM-A53-B Type S	6	PAAZZBOZZABAABOA	58.3'
2	Tee, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	6X6	MDJZZBOZZAAEADCZ	1
3	90 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	6	MCMZZBOZZAAEADCZ	3
5	Flange, CL150, RFFE/BE, ASTM-A105, ASME-B16.5, WN, S-STD borebore to match	6	FAAAHDCZZAADABQZ	2
	PIPE SUPPORTS			
4	Variable Spring with Double Bolt Clamp, TYPE B SPRING, WELDED BEAM ATTACH, STND SPRING, Size:4	6	Assy_VS_SR_DB_11	1

OTHER THAN SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
6	Gasket, CL150, 0.125" thk, 304 spiral wnd, graph filled, CS center ring, API-601	6	GMAHACABXBEPUS	2
7	Studbolts, ASTM-A193-B7 - 4.25 in. Length	3/4	BAZZZZZZAAYBEUZZ	16
8	Gate valve, CL150, RFFE, BB, OS&Y, ASTM-A216-WCB, trim 8, Crane 47	6	VAAAHABAHADJADAZ	1

15. Search for the 'SUPPORT' in the old and new PCF files. Notice that the new PCF file has a REPEAT-PART-NUMBER entry with a value of 4.

```
SUPPORT
    CO-ORDS    31699.200    10461.203    5486.400    6
    SUPPORT-DIRECTION    UP
    SKEY    01HG
    ITEM-CODE    Assy_VS_SR_DB_116
    ITEM-DESCRIPTION    Variable Spring with Double Bolt Clam
    SUPPORT-TYPE    Variable Spring
    WEIGHT    14.087
    UCI    {00022303-0000-0000-0F16-CA317F495804}
    NAME    Assy_VS_SR_DB_116-1-1
    REPEAT-PART-NUMBER    4
```

16. Similarly other objects such as PIPE, ELBOW and TEE also have a REPEAT-PART-NUMBER entry. However the new objects such as FLANGE, GASKET, VALVE and BOLT do not have this entry.

Selective Display of Supports

The **S3D.Drawing.Content.SupportFilter** isometric option allows you to specify a filter that determines which supports are included on an isometric drawing. If no filter is specified, all associated supports appear on the iso.

1. Switch to the Hangers and Supports task
2. Start the ‘Place Support by Point’ command and check the ‘Design’ check box on the ribbon.
3. Place two supports on 1002-P as shown

4. Select one of the hangers and set its Status to ‘Approved’

5. Start Tools > Select by Filter command.
6. Select ‘Plant Filters’ folder

7. Create a New Filter named ‘Approved Supports’. See below for hints.

8. Switch to Drawing and Reports task
9. Edit Options
10. Expand the tree to Drawing.Content.SupportFilter. Click the ellipsis button in the Value field to display the **Select Filter** dialog box
11. Select Plant filter **Approved Supports**

12. Save options, exit options browser and re-update 1002-P.
13. Once update completes, View Extraction Data and view ISOSHEET1

14. Notice that only the support whose approval status was ‘Approved’ is shown on the isometric.

15. Also notice that it has a part number of 9 and that part no 4 is missing from the material list. This is due to change management still being in effect.
16. View the PCF file and notice that only one SUPPORT is being written into the PCF file.
17. Edit Options and blank out the filter used for SupportFilter option for later exercises.

Isometrics of Disconnected Piping

Typically an isometric is only created from a line where all components are connected. A disconnected line is treated as an error condition and the isometric is not created. However there is occasionally a need to create isometrics from disconnected lines. One common situation for this is a pipeline which is modelled initially in disconnected sections with the intermediate piping being scheduled for a later time. Another situation where disconnected piping isometrics are needed is for equipment trim lines. A new option in Smart 3D 2014 provides the ability to create isometrics from disconnected piping.

1. Expand Isometrics > Iso Pipeline Isometrics > A2 > U03 > Equipment > T-101 > Iso Pipeline

2. Right click and Create Drawing(s)
3. Right click on T-101 Trim and Update Now

4. The iso updates in error state, the error log shows the following

```
[ Information - Reported on: 12/05/13  at 22:31:57 ]

   Process Virtual Memory:   377 MB
   Description:  2022 - IDFGEN has detected a disconnected pipeline that cannot be
resolved - this is known as a HARD disconnect. Drawings have still been created that will
indicate the cause of the disconnection.
   Source:  PmfgServices::
```

5. Edit Options
6. Set the option S3D.Drawing.SortInputParts to Connected Sets

7. Close options browser and save options.
8. Re-update T-101 Trim
9. This update succeeds and a multi-sheet drawing is produced. Each connected set of trim is on its own sheet with its own material list and continuations.

Isogen Options

Drawing Content

Options in this section allow control over whether certain coordinates and callouts are shown or not. Some of these options will work if the corresponding information is present in the PCF file. For instance the Drawing.Content.ShowSupports option will only output supports if they are included in the PCF file using the S3D.Drawing.Controls.IncludePipeSupports option but may allow users to suppress supports even if they are present in the PCF file.

Drawing Controls

Options in this section allow control over North Direction of the isometric, units used for output, output of continuation graphics and messages etc. One of the options is to allow or disallow user-defined split points.

Iso Break Control Points

The user can split an isometric into sheets at a position of his choice by inserting a control point of the type Piping Mfg Limit Point as a child of a connection in the model.

1. Switch to Piping task
2. Choose “Connections” from Locate filter and select a Connection object on the Pipeline 1001-P as shown in the picture below

3. Insert > Control Point

4. Position Control Point at the selected Connection Object

5. Set the Subtype for the control point to Piping Mfg Limit Point

6. Switch to the Drawings and Reports task

7. Update isometric 1001-P, once the update completes, view extraction data and select ISOSHEET1. Note that even though there are two sheets now, they are shown as tabs in the view extraction data. You see that the iso has split into two sheets at the point specified.

8. The Piping Component File (PCF) Has ISO-SPLIT-POINT followed by the X, Y, and Z coordinates of the isometric break control point

```
ISO-SPLIT-POINT
   CO-ORDS    32788.600    5288.662    4876.800
```

9. Close extraction data.
10. Edit Options
11. Set Drawing.Controls.IgnoreUserSplitPoints to True

12. Save options, exit options browser and re-update 1001-P.
13. Once update completes, View Extraction Data and view PCF and ISOSHEET1. Notice that even though the PCF has the ISO-SPLIT-POINT written in, it is ignored due to an Isogen option.

Drawing Dimensioning and Coordinates

Isogen provides a large number of options to change the output of dimensions and coordinates. Most of these are self-explanatory and allow control of units, output of coordinates at bends, branches, overall dimensioning, tapped branch dimensioning, output of dual units etc.

Change Dimension Style to Full String

1. Open the isometric 1001-P and notice that the dimensions down the vertical line are center to center

2. Edit Options
3. Change the option Drawing.Dimensions.Format to ‘Full String’
4. Close options browser and save options

5. Update the isometric 1001-P, notice dimensions

6. Switch format back to Basic for next labs.

   You may try the other options as well.

Drawing Format

The options in this section mostly affect the look of the drawing. The BendRepresentation and ElbowRepresentation options allow to show either Round or Square bends. We will use the InstIdentification option to change the material list for instruments.

1. Update isometric 2003-P in U02
2. Open the isometric and see that the tag for the instrument is written in the description and the item code is blank.

   INSTRUMENTS

8	Component0402	6	1

3. Edit Options

4. Set Drawing.Format.InstIdentification to Use Item Code

5. Close options browser and save options
6. Update isometric 2003-P, notice that its tag is now used as its item code.

INSTRUMENTS

8	6	Component-0402	1

7. Switch to the Piping task
8. Define workspace using the Plant Filters > Training Filters > U01 & U02 filter
9. Locate Component-0402 and edit properties.
10. Switch to the Material Control Data tab. Select the GenericMaterialData category and key in Venturimeter for Short Material Description

11. Switch to the Drawings and Report task
12. Update 2003-P, notice now you have both item code and description.

INSTRUMENTS

8	Venturimeter	6	Component-0402

Alternative Texts (ATEXT)

Isogen provides the ability to change many of the strings that appear in various areas of the isometric. Some of these ATEXTs also have additional parameters that can be used to output extra information from the PCF into the isometric.

User Defined Message at Pipeline Start Point

1. Edit Options
2. In the Options Browser, Select ‘Alternative Texts\AlternativeText(73)’
3. Click the ‘Insert Row’ icon . A new row is added to the bottom of the list.
4. In the ISOGENTextID Column, select -235 from the drop down list. Type in the AlternateText column
   Pipeline: ? $ Date: #009

5. Click in another row
6. Close options browser and save options
7. Update 1002-P, the output shows similar to below

Note. Use the following special characters to insert information:

? – Pipeline Reference
?? – Spool Reference (Only on Spool isometrics)
#nnn – Attribute 0 to 199
$ - Insert a new line

In a later exercise, you will learn how to use Smart 3D labels to output values to numbered isogen attributes.

Option Overrides

Typically all isometrics in a given project are created using the same set of values for the various options in order to maintain consistency for the consumers of the isometrics. This is the reason that the isometric options are stored in the catalog and are under control of the administrator. However there are situations in a project where it is required to override the option values for a particular line or a set of lines. Some examples are below

- Some lines do not make optimum use of available space in an isometric at a particular orientation and can appear very crowded and difficult to read but can produce much cleaner output at a different orientation
- If a particular building or unit is rotated from the global origin, all isometrics can show skews, to avoid this, it may be desirable to override certain options such as rotation angle to get clean output.
- A line containing long pipes and many components can get crowded if TrueScale is used. TrueScale can be turned off for such lines.
- If certain lines should be allowed to create isometrics for in disconnected state, SortInputParts can be set to Connected Sets only for those lines.

Smart 3D 2014 allows users to set option overrides for individual lines. The overriding is a two-step process. In the first step, users declare an option or a set of options that they wish to override for a line. In the second step, the actual override values are set.

Rotation Angle

1. Expand Isometrics > Iso Pipeline Isometrics > A2 > U06 > Process > Iso Pipeline
2. Right click and Create Drawing(s)
3. Right click on 600-P and Update Now

4. View the isometric. It can be seen that the lines are not along a major axis.

5. Right click on 600-P and select Option Override…

6. In the Option Override form, click Add…

7. Enter the word Rotation in the search box. Following options are shown

8. Select the Drawing.Controls.DrawingRotationAngle and click Add
9. Click Done
10. To override the angle by 20 deg In the Option Override form, enter 200 and click OK. (Note that this is a bug, currently the number for the angle must be entered in 10th of degrees rather than whole degrees)
11. Update isometric for 600-P.

12. View the isometric. The north direction box shows the angle at which the line is rotated but the line itself is clearer since everything is drawn along major axes.

TrueScale

1. Expand Isometrics > Iso Pipeline Isometrics > A2 > U04 > Process > Iso Pipeline
2. Right click and Create Drawing(s)
3. Right click on 401-P and Update Now
4. View the isometric. This line contains a long piece of pipe and a number of components. Due to the TrueScale option being set to True, Isogen attempts to draw straight pipes roughly

proportional to their length.

5. Right click on 402-P and select Option Override…
6. Click Add
7. Search for TrueScale in the Select Options dialog
8. Select the Drawing.Controls.TrueScale option and click Add and Done
9. Set the value for Drawing.Controls.TrueScale to False and click OK.
10. Update isometric for 402-P and view the results. The output is much clearer to read.

Finding Overridden Lines

There are no permission controls for the override option facility. A user who has the ability to update an isometric has the ability to override options. In order to find overridden lines, a search folder may be used.

1. Right click on Isometrics > Isometrics with Option Override and Run Query

2. The two lines whose options have been overridden are shown in the detail view.

3. Right click on 402-P and select Option Override… This displays the option override dialog showing which option has been overridden.

Labels and Notes

Component Notes

The S3D.Labels.ComponentNote node in the style is used to output notes on the face of the iso. Notes can be output for seven kinds of objects

Object	Object passed to label
Pipe	Pipe part occurrence
Component	Pipe component occurrence
Instrument	Pipe instrument occurrence
Specialty	Pipe specialty occurrence
Valve	Pipe component occurrence
Pipe Support	Hanger assembly
RWELD	Weld

An enclosure style can be specified for the value returned by the label. Valid values are

- MESSAGE
- MESSAGE-SQUARE
- MESSAGE-POINTED
- MESSAGE-ROUND

Additionally the values may be used when the label output is limited to 3 characters

- MESSAGE-TRIANGLE
- MESSAGE-DIAMOND
- MESSAGE-CIRCLE

Text that is output using Labels.ComponentNote section is always pointed to the center of the component. Therefore this method should not be used to output notes that are intended for specific key points on a component.

Let us add a component note label to output the valve tag

1. Edit Options
2. Expand the tree to find S3D.Labels.ComponentNote.ComponentNote(0) and then click in the last blank row.

3. In the LabelAttribute2 column, select VALVE, then in the label column, browse to the catalog for the Catalog Labels and pick the Piping> Piping Isometric Valve Tag label

4. In the message enclosure column, pick MESSAGE-SQUARE

5. Save options, exit options browser and re-update 1001-P.
6. Once update completes, View Extraction Data and view ISOSHEET1

7. You should see the valve tags shown on the iso next to the valves.

8. View the PCF. The tag is output as a TEXT entry below a MESSAGE-SQUARE entry

```
VALVE
   COMPONENT-IDENTIFIER   31
   END-POINT   32788.600   7346.063   3274.825   10   FL
   END-POINT   32788.600   7346.063   3605.025   10   FL
   CENTRE-POINT   32788.600   7346.062   3439.925
   SKEY   VV**
   ITEM-CODE   VAAAHABAHADJADAZZZZUS
   ITEM-DESCRIPTION   Gate valve, CL150, RFFE, BB, OS&Y, A
   FLOW   1
   UCI   {00013885-0000-0000-3440-333B7E493004}
   INSULATION-SPEC   UNDEFINED
   PAINTING-SPEC   ELECTRO-GALVANIZED
   TRACING-SPEC   UNDEFINED
   MISC-SPEC3   UNDEFINED
   PIPING-SPEC   1C0031
   ERECTION-ITEM
   WEIGHT   206.385
   SPINDLE-DIRECTION   EAST
   DIRECTION   S 45 E
   MESSAGE-SQUARE
   TEXT   VG3
   REPEAT-PART-NUMBER   13
```

Conditional Component Notes

S3D.Labels.ComponentNote outputs the value returned by the label directly onto the isometric. However sometimes it is desired to output a note on the isometric based on certain criteria. E.g. tag for valves with certain tags are to be output on the iso but for other tags nothing is to be ouput.
Software evaluates the label specifed in TestLabelName and compares the output of the label to each of the | (pipe) separated values in the TestValues column. There is no limit to the number of values but the total length of the TestValues field must not exceed 256 characters. If a match is found, the label specified in the OutputLabelName is evaluated for the object and the result of the output label is written to the PCF file and therefore to the isometric.

1. Edit Options
2. Expand the tree to S3D.Labels.ComponentNote and delete the VALVE row created earlier.
3. Expand the tree to S3D.Labels.ComponentNoteConditional.ComponentNoteConditional(3)
4. Enter values VG3|VC35 in the TestValues in row for the VALVE and click in another row

LabelAttribute2	TestLabelName	MessageEnclosure	TestValues	OutputLabelName
SPECIALTY	Piping Isometric Component Tag	Message-Round		Piping Isometric Component
INSTRUMENT	Piping Isometric Component Tag	Message		Piping Isometric Component
VALVE	Piping Isometric Valve Tag	Message-Square	VG3|VC35	Piping Isometric Valve Tag

5. Save options, exit options browser and re-update 1001-P.
6. Once update completes, View Extraction Data and view ISOSHEET1
7. Notice that gate valves have a tag but check valves do not. This is because we tested for values VG3 and VC35 and only gate valves have a value that matches one of these.

Key Point Notes

Users can place notes on piping components at specific keypoints using either the Insert Note command or the property pages. These notes can be classified by purpose. The S3D.Drawing.KeyPointNotes section of the style options allows the output of these notes on the iso at the point at which they are placed in the model.

1. Edit Options
2. Expand the tree to S3D.Drawing.KeyPointNotes.KeyPointNotes(0)
3. Select values as below
   PartType: PIPE-COMPONENT
   Purpose: Any
   Keypoint: Any
   MessageEnclosure: MESSAGE

.

4. Click in another row.
5. Save options, exit options browser and re-update 1001-P.
6. Once update completes, View Extraction Data and view ISOSHEET1
7. A note is shown at the end of the 45 deg elbow as shown below

Notes (optionally dimensioned) at point on a pipe

Notes can be placed at a specific point on a straight pipe using control points. The control point must be placed as a child of a pipe part, then a note of the type 'Fabrication' placed on the control point. The text of the note is then output to the iso. Checking the 'Show Dimension' check box of the note will also dimension the note.

1. Switch to Piping task and zoom in on 1001-P
2. Set locate filter to 'Piping Parts'
3. Select the straight pipe part between the elbow and the tee
4. Insert > Control Point

5. Locate the middle of the pipe as shown and click to place the control point.

6. With the control point selected, invoke the property page
7. Click the notes tab and click 'New Note'
8. Enter Fabrication as Note type, enter 'Tie-In 1005-P' as text of the note and check the Show Dimension box.

9. Click OK to complete note placement.
10. Switch to the Drawings and Reports task and update 1001-P

11. View Extraction data. Notice that the note is shown and is dimensioned.

Component Attributes to PCF file

These labels, if present in the style, are evaluated for each piping part and written to the PCF file. This PCF file can then be read by Stress Analysis software such as CAESAR II.

1. Edit Options
2. Expand the tree to find S3D.Labels.ComponentAtts.ComponentAtts(0)

3. In the first row, select values as below
   Type: All
   CompAttribute: COMPONENT-ATTRIBUTE1
   LabelName: Schedule Thickness 1
   ObjectType: Part

4. Simiarly add COMPONENT-ATTRIBUTE2 which maps to Schedule Thickness 2 label in the second row.

5. Save options, exit options browser and re-update 1001-P.

6. Once update completes, View Extraction Data and view the PCF File
7. Notice that Schedule thickness added to the components

```
ELBOW
   COMPONENT-IDENTIFIER    1
   END-POINT    32788.600    9601.200    4876.800    10    BW
   END-POINT    32788.600    9872.203    4989.053    10    BW
   CENTRE-POINT    32788.600    9759.950    4876.800
   SKEY    EL**
   ITEM-CODE    MBXZZBOZZAAEADCZZUS
   ITEM-DESCRIPTION    45 deg LR elbow, S-STD, BE, ASTM-A234-W
   ANGLE    4500
   COMPONENT-ATTRIBUTE1    S-STD
   COMPONENT-ATTRIBUTE2    S-STD
   UCI    {00013885-0000-0000-D53D-333B7E493004}
   INSULATION-SPEC    UNDEFINED
   PAINTING-SPEC    ELECTRO-GALVANIZED
   TRACING-SPEC    UNDEFINED
   MISC-SPEC3    UNDEFINED
   PIPING-SPEC    1C0031
   FABRICATION-ITEM
   WEIGHT    19.051
   BOP-ELEVATION    4740.27499999906
   REPEAT-PART-NUMBER    5
```

End Connection Labels

These are special labels that are evaluated for end connections of an isometric. There are only two valid values for LabelAttribute3 column,

	LabelAttribute3	LabelName	MessageEnclosure
▶	END-CONNECTION-EQUIPMENT	Piping Isometric Continuation Label Type A	Message-Square
	END-CONNECTION-PIPELINE	Piping Isometric Pipe Line Continuation	Message-Pointed
*			

For evaluating the END-CONNECTION-EQUIPMENT label, the nozzle is passed to the label and the label is responsible for returning the data of interest such as equipment name, nozzle name, and nozzle attributes such as size, end preparation, pressure rating etc.

For the END-CONNECTION-PIPELINE label, the piping part connected to the last object on the current iso line is passed to the label. It is the label which then retrieves the appropriate continuation item based on the kind of isometric being run.

Pipeline isometric	Pipeline that the part belongs to
Spool isometric	Spool if part belongs to spool, or part name if the connected part does not belong to a spool
WBS isometric	WBS Iso Drawing Name if part is assigned to WBS Item of type Iso Drawing, pipeline name if it is not assigned to a WBS Item
Penetration spool isometric	Pipeline that the part belongs to

Attribute Breaks

Add a new break for cleaning requirement

Functionality is available to output attribute/specification breaks on the iso. This functionality has two parts, setting an AlternativeText and supplying a label to get the data for parts.

Specification attributes are divided into two categories, standard and miscellaneous. The standard attributes are piping specification, insulation specification, tracing specification and painting specification. These are output for every part in the PCF file by default as well as in the header section of the PCF (to establish the baseline for the entire iso). It is possible to override the default outputs for these by means of labels.

Whether the breaks are shown on the iso is actually controlled by the AlternativeTEXT values being set or not for each attribute. If the ATEXT value is set to a non-null string, the string is output as a prefix.
e.g. For the isometric shown below, ATEXT -289 was set to CLASS:

Item	Default Value	Optional Label	ATEXT
Piping Specification	Spec Name		-289
Insulation Specification	Short String Value of Insulation Material code list attribute	S3D.Labels.InsulationSpec	-290
Tracing Specification	Short String Value of Heat tracing type code list attribute	S3D.Labels.TracingSpec	-291
Painting Specification	Short String Value of Coating type code list attribute	S3D.Labels.PaintingSpec	-292

The miscellaneous or user-defined specification attributes are set using labels.

The miscellaneous attributes are functionally identical to the standard attributes, except that the user is able to set the value to whatever attribute is desired. Labels are specified for each of the miscellaneous specifications. The labels are evaluated for each piping part and written into the PCF for each part and into the header.

1. Edit Options
2. Expand the tree to find S3D.Labels.MiscSpec
3. Notice that MISC-SPEC-3 is already set to use a label but this label is not delivered with Smart 3D. So we will create this label in the Catalog task and use it in options browser.
4. Switch to Catalog Task
5. Tools > Define Label
6. Expand Labels > Types of Labels > Piping and click 'New COM Label'

7. Name the label 'Piping Isometric Cleaning Requirement'
8. Delete the 'Name' property in the Properties section
9. Click Add…

10. Select More.. in the ‘Object Type used for Property Identification’ and select Piping Parts

11. For Relationship, select ‘Run to Part-Owner’
12. For Related object type, select More.. and then select Piping\Piping Runs
13. For Display properties in this category select ‘Surface Treatment and Coating’

14. Select the ‘Cleaning Requirement’ property and click OK.

15. Select the Cleaning Requirement in the ‘Properties’ section and click ‘Insert a field to layout’ in the Layout section.

16. Click OK to define the label
17. Switch to the Drawings and Reports task
18. Edit Options
19. Expand AlternativeTexts.AlternativeTexts(81)
20. Notice that ATEXT -295 has already been set to CLEAN:

21. Expand S3D.Labels.MiscSpec.MiscSpec(1)

22. There is one row which already contains MISC-SPEC-3, select the ellipsis next to LabelName and pick the label just defined.

23. Close options browser and Save options.

24. Switch to Piping task, select the pipe run shown and set its Cleaning Requirement to CC1

25. Switch back to Drawings and Reports task and update iso for line 1002-P. Cleaning requirements break is shown as below.

26. View the PCF, notice that MISC-SPEC-3 is written for each component in the PCF.

```
PIPE
   COMPONENT-IDENTIFIER    1
   END-POINT    32309.526    10461.203    5486.400    6
   END-POINT    32491.820    10461.203    5486.400    6
   FABRICATION-ITEM
   INSULATION-SPEC    UNDEFINED
   PAINTING-SPEC    ELECTRO-GALVANIZED
   TRACING-SPEC    UNDEFINED
   MISC-SPEC3    CC1
   PIPING-SPEC    100031
   WEIGHT    8.609
   UCI    {0001388C-0000-0000-C904-6BAC9E521D04}
   ITEM-CODE    PAAZZBOZZABAABOAAZZUS
   REPEAT-PART-NUMBER    1
   ITEM-DESCRIPTION    Pipe, S-STD, BE, ASTM-A53-B Type S
   COMPONENT-ATTRIBUTE1    S-STD
   COMPONENT-ATTRIBUTE2    S-STD
   SPOOL-IDENTIFIER    NO SPOOL FOUND
   CUT-PIECE-LENGTH    182.29
FLOW-ARROW
```

Symbol Mapping

It is possible to map Part classes, Supports, Welds and End conditions to distinct Isogen symbol keys.

For part classes, it is possible to specify different symbols for different end conditions. It is also possible to specify that the same SKEY should be output for all end conditions and the end conditions output independently.

Part classes/components

1. Edit Options
2. Expand S3D.SymbolMAP.SymbolMap(1060)
3. Click the Smart 3DPartClass column to sort by PartClass
4. Find Partclass **CIVenturimeter** and delete the row
5. Close options browser and save options.
6. Update iso for pipeline 2003-P. It updates in error state.
7. View the error log. It contains the entry below.

8. View extraction data and notice that face of iso also contains a message that the SKEY for the CIVenturimeter was not found.

9. The component does not appear in the material list.

10. View the PCF file. The venturimeter is written out as a VALVE with SKEY NC**

```
VALVE
    COMPONENT-IDENTIFIER    43
    END-POINT    9823.450    9628.632    2937.383    6
    END-POINT    9213.850    9628.632    2937.383    6
    SKEY    NC**
    UCI    {000138B6-0000-0000-8C01-659ADB492404}
    INSULATION-SPEC    UNDEFINED
    PAINTING-SPEC    ELECTRO-GALVANIZED
    TRACING-SPEC    UNDEFINED
    MISC-SPEC3    UNDEFINED
    PIPING-SPEC    1C0031
    WEIGHT    0.000
    MESSAGE-POINTED
    TEXT    CIVENTURIMETER NOT FOUND IN SKEY MAPPING
    UNDIMENSIONED
```

11. Close Extraction Data.
12. Edit Options
13. Select S3D>SymbolMAP>SymbolMap(1059) and add a new row
14. Enter the following values to map the Partclass **CIVenturimeter** to an Isogen SKEY and Component class.

15. Close options browser and save options.
16. Re-update 2003-P and view extraction data.

17. Now the venturimeter appears as an instrument, there is no error, its name appears in a circle and it appears in the material list.

18. In the PCF file it appears as an INSTRUMENT with the right SKEY and TAG.

```
INSTRUMENT
    COMPONENT-IDENTIFIER    43
    END-POINT    9823.450    9628.632    2937.383    6    FL
    END-POINT    9213.850    9628.632    2937.383    6    FL
    CENTRE-POINT    9518.650    9628.632    2937.383
    SKEY    II**
    ITEM-CODE    Component-0402
    FLOW    3
    UCI    {000138B6-0000-0000-8C01-659ADB492404}
    INSULATION-SPEC    UNDEFINED
    PAINTING-SPEC    ELECTRO-GALVANIZED
    TRACING-SPEC    UNDEFINED
    MISC-SPEC3    UNDEFINED
    PIPING-SPEC    1C0031
    WEIGHT    0.000
    TAG    Component$0402
```

Multi-port components

Generating Isometrics for component with multiple ports requires a special SKEY mapping and its configuration.

A “MultiportDia5WayOptions” valve from Bio Pharm Catalog.xls (delivered as sample data) is used as an example for this.

1. Turn on PinPoint
2. Edit > Paste from Catalog

3. Expand Modules > Training > Piping Class
4. Select Multi-Port and Click OK

5. Click OK on the Place Macro dialog.

6. Define a Placement point by keying in E=0, N= 0, EL = 0 on the Pin Point Ribbon bar and select anywhere on the screen to paste the “Multi-port” pipeline from Catalog

7. Multi-port Pipeline is available under A2\U01\Process.

8. Observe the Multi-port component (“MultiportDia5WayOptions”) with 5 Pipe Run on one side and 1 Pipe Run on other side of the component. Now, we need to configure Isometric Option by specifying a SKEY for this component – Part Class of the component is “MultiportDia5WayOptions”
9. Switch to Drawings and Reports Task.

10. Right Click “Iso Pipeline” under A2 > U01 > Process and click Create Drawings.
11. This will create an entry for ‘Multi-Port’ as below:

12. Edit Options
13. Click in the first blank row in the SymbolMap and Map S3DPartClass “MultiportDia5WayOptions” to EndPrepCodeSKEY =0, SKEY = XV** and ComponentClass = MULTI-PORT-COMPONENT

14. Close options browser and save options.
15. Update “Multi-Port” Isometric
16. View extraction data and see the output.

Supports

1. Edit Options
2. Select S3D>SymbolMAP>SymbolMap(1057) and scroll down until SUPPORT is seen in the PartClass column.
3. For Hanger and Supports the EndPrepCode corresponds to the CodeListNumber of the HngSupSupportType codelist.

D	E	F	G
SupportsType ShortDescription	SupportsType LongDescription	Codelist Number	Sort Order
e textual value, but must not change the numeric value or the meaning of the val			
		10	
Pipe Support		11	
Anchor		12	
Anchor - Rotational		15	
Longitudinal Guide Horizontal		21	
Longitudinal Guide Vertical		22	
Penetration Plate		23	
Wall Penetration		24	
Floor Penetration		25	
Longitudinal Guide Vertical and Horizontal		30	
Travel Stop		31	
Shoe Longitudinal Guide Horizontal		41	
Shoe Longitudinal Guide Vertical		42	
Shoe Longitudinal Guide Vertical and Horizontal		43	
Shoe Travel Stop		44	
Rod Hanger		45	
Rod Hanger Double		46	
Variable Spring		54	
Variable Spring Double		55	
Constant Spring		60	
Constant Spring Double		61	
Variable Spring Base		64	
Constant Spring Base		68	
Dynamic Restraint		70	
Sway Strut		72	
Structural		74	
Riser Clamp		80	
Riser Clamp Variable Spring		81	
Straight Pipe Leg Extension		90	
Elbow Leg Extension		91	
Dummy Leg		95	
		100	

on | HngSupSupportType | HngSupTypeSelectionRule | HvacComponentTypes | HVACI

4. Change the SKEY in the row that corresponds to EndPrepCode 54 to HANG

(**54** codelist value corresponds to **Variable Spring** in HngSupSupportType codelist)

5. Close options browser, save options and update 1002-P.

Before: “Variable Spring” mapped to SKEY “01HG“

After: “Variable Spring” mapped to SKEY “HANG”

6. Change mapping back to original SKEY (01HG).

Welds

1. Edit Options

2. Select S3D>SymbolMAP>SymbolMap(1057) and scroll down until WELD is seen in the PartClass column.
3. For welds the EndPrepCode corresponds to CodeListNumber of the WeldType codelist.

eserve all other numeric values.

	1
Undefined	1
Pipe Connector	2
	5
Shop weld	5
Shop weld at job site fabrication shop	10
Automatic shop weld	15
Miter weld	20
Miter weld at job site fabrication shop	25
Thermal fusion shop weld	65
Thermal fusion shop weld at job site fabrication shop	66
Electrofusion shop weld	67
Electrofusion shop weld at job site fabrication shop	68
Laminated shop weld	69
Laminated shop weld at job site fabrication shop	70
Brazed joint at shop	71
Brazed joint at job site fabrication shop	72
	10
Field weld at assembly site	30
Field weld at job site, including offshore	35
	15
Field weld at job site for loose flange	50
	20
Field fit weld at assembly site	40
Field fit weld at job site, including offshore	45
Field fit weld for nozzle at assembly site	60
Field fit weld for nozzle at job site, including offshore	55
Thermal fusion weld at assembly site	61
Electrofusion weld at assembly site	62
Laminated weld at assembly site	63
Brazed joint at assembly site	64

ent WeldType WBSAssignment WBSAutoGroupingRuleType WBSItemPurpose WBSProj

4. Change the SKEY in the row that corresponds to EndPrepCode 5 (Shop Weld) to WWA

5. Close options browser, save options and update 1002-P.

Before: Shop Weld SKEY mapped to WW

After: Shop Weld SKEY Mapped to WWA

6. Make sure to change mapping back to original SKEY (WW).

End Preparations

1. Edit Options
2. Expand S3D.SymbolMAP.Supplement.Supplement(63)
3. Change the EndPrepMap in the row that corresponds to EndPrepCode 301 from BE (Beveled End) to SW (Socket Welded End)

EndPrep1	EndPrepCode	EndPrepMap	Description
FFFTBEH	271	FL	Flat-full-face thru-bolted end
BE	301	SW	Beveled end
MTE	331	SC	Male threaded end
MGE	341	LC	Male grooved end
MQCE	351	LC	Male quick connect end
MFRE	361	CP	Male ferrule end
MHE	371	PL	Male hose end
MSE	381	SC	Spigot end
MBSE	385	BW	Male bevel seat end
PE	391	PL	Plain end
SE	401	SW	Socket end
SWE	421	SW	Socket welded end
FTE	441	SC	Female threaded end
FGE	461	LC	Female grooved end
FQCE	481	LC	Female quick connect end
FFRE	501	CP	Female ferrule end

4. Close options browser, save options and update 1002-P.
5. Notice Beveled Ends represented as Socket Welded Ends

Before: 301 EndPrepCode mapped to SKEY (BW)

After: 301 EndPrepCode mapped to SKEY (SW)

6. Make sure to change mapping back to original SKEY (BW).

Create a new symbol key

SmartPlant Symbol Editor provides a user-friendly interface in which you can easily create new or modify existing XML-based or ASCII symbol files for use in ISOGEN drawings. The software allows you to graphically define and modify a component, and then export the symbol to an ISOGEN ASCII file so that it can be used in the isometric drawings you generate with SmartPlant 3D

SmartPlant Symbol Editor is delivered on Intergraph eCustomer website.

1) Click Symbol Editor.exe from desktop to launch the **SmartPlant Symbol Editor**.
2) From Library Explorer, expand to All Symbols>Valves>Basic Valve>VV**

3) Right Click VV** and select New Symbol

4) In New Symbol form, specify SKEY VV**, Turn on the Check Box to Copy original symbol Graphics By Specifying same SKEY VV** in the New Symbol dialog, we are re-defining an existing System Symbol.

5) The **Library Explorer** uses color to distinguish between system symbols (that have not been redefined) and customized symbols. System symbols display in black text, whereas customized symbols display in blue text.

Click OK on the form. Observe that since the System Symbol is being redefined, the color changes to Blue.

6) On the right, Symbol Graphics would be seen as below:

7) Now, we will makes some changes to the Symbol Graphics
Select the Valve Symbol and observe that Graphics are all in one Group. So will we ungroup the symbol first. Click the Symbol and from Symbol Menu, select Ungroup command

8) Select Line Segment and delete the lines (Edit>Delete) as shown in the image below:

9) Draw some new lines to change the representation of symbol.

Click Symbol>Draw Line or Click from Ribbon Bar>Draw Line

10) Draw new lines from the Start Point (Green Dot) to look like a Flanged End

11) Similarly, draw the lines at the End Point (Red Dot)

12) Now, Move the end points of the line (highlited in red) towards the inner edge of the flange

After lines are repositioned, the symbol would look as below:

13) Draw a Circle to the center of the Valve Symbol.

14) Export Symbols ASC to SharedContent\PmfgIsoStyleData

15) Exit the Symbol Editor.
16) Open S3D Session
17) Edit Options
18) In Supplementary.DataFiles.DataFiles(2), add a new row, select ASCII-SYMBOLS from drop down list under FileType column.
    For File Path, Browse for CustomSKEY.ASC file that had been saved in step 14

19) GateValve inserted on Pipeline 1001-P is mapped to SKEY VV**

20) Update 1001-P and see if changes made to the SKEY VV** for GateValve is reflected.

Original VV**:

Modified VV**

Detail Sketches

Functionality to show static detail sketches is available. Depending on the part class of the object selected, a specified label is invoked, if the value returned by the label matches the value specified to check against, the symbol is shown on the isometric.

1. Open the SmartSketch Drawings Editor
2. File > Properties
3. Select the Units tab and the length readout unit to be mm

4. Click OK
5. File > Sheet Setup
6. Select Paper Units to mm and click OK.
7. Start rectangle tool and draw a 50 mm x 50 mm and angle 0 rectangle.
8. Start pinpoint and set origin to be lower left corner of the rectangle.
9. Using the text box command, place the word DETAIL using Courier New font at 2 mm text size as shown below at (32, 45) measured from the bottom left corner of the square

10. Draw your detail sketch graphics in the square. E.g. draw a circle and two lines

11. Select All graphics using Edit > Select All
12. Create New Symbol using the Create Symbol command (draw toolbar).
13. Place the origin of the symbol in the bottom left corner of the rectangle

14. Save symbol to folder [SharedContent]\PmfgIsoStyleData\ with name DETAIL1.SYM.
15. Exit SmartSketch Drawing Editor.
16. Edit Options
17. Expand Supplementary.DetailSketches
18. Set Path as [SharedContent]\PmfgIsoStyleData\

19. Expand S3D.Supplementary.DetailSketches.
20. Set ShowDetailSketch to True
21. Expand S3D.Supplementary.DetailSketches.SketchMapping
22. Change HANGER2.SYM to DETAIL1.sym & Change SketchChkValue to Assy_VS_SR_DB_116

23. Close options browser and save to catalog.

24. Update 1002-P. A detail sketch will be shown in the top right corner of the isometric with corresponding ‘SEE DETAIL A’ next to the support.

Drawing Definitions

It is possible to change the symbology (such as layer, color, thickness, linestyle etc) used for various elements on an isometric based on type of element, size of piping and category.

1. Edit Options
2. Select Drawing.Definitions.Definitions(23) and you will see the current definitions

AppliesTo	LowerBore	UpperBore	Category	Colour	Layer	DScale	ThicknessActual	ThicknessLogical	LineStyle
PipeLine	1.00	2.00	ALL	5	5	100.00	0.65 mm	2.00	0
PipeLine	2.00	8.00	ALL	5	5	100.00	0.95 mm	3.00	0
PipeLine	8.00	42.00	ALL	5	5	100.00	1.25 mm	4.00	0
SPLIT-POINTS	1.00	1.00	ALL	0	5	100.00	0.35 mm	1.00	0
SPECIAL-STATUS	1.00	1.00	ALL	0	5	100.00	0.65 mm	1.00	0
CONTINUATION	1.00	1.00	ALL	0	5	100.00	0.35 mm	1.00	0
General Fittings	1.00	2.00	ALL	1	10	90.00	0.30 mm	2.00	0
General Fittings	2.00	42.00	ALL	1	10	120.00	0.35 mm	2.00	0
NOZZLE	1.00	1.00	ALL	0	50	100.00	0.00 mm	0.00	0
WELDS	1.00	1.00	ALL	0	45	100.00	0.35 mm	1.00	0
UNDIMENSIONED-BRANCHES	1.00	1.00	ALL	0	10	110.00	0.65 mm	2.00	0

Tip: The Options browser can be resized to show more columns.

3. In the current drawing, the flanges are being shown in blue, this will change them to be drawn red (the same as the pipe).
4. To do this, click in a column of the last row for inserting new data.
5. Applies to = Flanges, UpperBore = 1, LowerBore = 1, Category = ALL, Colour = 5, Layer = 10, DScale = 100, , ThicknessActual = 0.35, ThicknessLogical = 2.00, Line Style = 0 as shown:

Note: If you change the Drawing units to be Metric Bores then all the bore values in this table will need to be changed to their metric equivalents. Setting LowerBore and UpperBore to 1 applies the setting to all elements regardless of size.

6. Let us also change the flow arrows to make them bigger, to do this, enter data in another row Applies to = FLOW-ARROWS, UpperBore = 1, LowerBore = 1, Category = ALL, Colour = 1, Layer = 30, DScale = 200, ThicknessActual = 0.30, ThicknessLogical = 0.00, Line Style = 0 as shown below

AppliesTo	LowerBore	UpperBore	Category	Colour	Layer	DScale	ThicknessActual	ThicknessLogical
FLOW-ARROWS	1.00	1.00	ALL	1	30	200.00	0.30 mm	0.00

7. Close options browser and save options.

8. Update the isometric 1001-P. Notice that flanges are now red and flow arrows are larger.

Material List – Fixed and Variable

Isometric Drawings generation in Smart 3D has three basic options for configuring the Material List (MTO). These are

1) **Fixed** – Little user control over report format. In PDS this was known as a “STYLE1” MTO
2) **Variable** – User can specify column headings, content and width – the report layout is character based (PDS = STYLE2)
3) **User Defined** – most flexible report, column headings and grid lines are placed in backing sheet and column positions are defined by coordinates. Users are encouraged to use this type of MTO. (PDS STYLE3). This is possible to define using the Drawing Setup Tool (Wizard)

It is also possible to use labels to define attributes. Several AlternativeTexts can be set or unset to modify the column and section headings for the material list as well as to control if certain elements are shown at all.

Adding Sub-Headings

As indicated, for Fixed Layout there is a little user control over report format. However, certain attributes on the material lists can be modified/added such as Header Text, Group Sub heading etc using AlternateTexts (ATEXT)

1. Open the 1001-P isometric. Note that the material list has no sub-headings under it.

SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTYCODE	QTY
1	Pipe, S-STD, BE, ASTM-A53-B Type S	10	PAAZZBOZZABAABOA	20.5'
2	Tee, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10X10	MDJZZBOZZAABAOCZ	1
3	Concentric reducer, S-STD x S-STD bore, BE, ASTM-A234-WPB, ASME-B16.9	10X8	MBCZZBOZZAABAOCZ	2
4	90 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10	MCMZZBOZZAABAOCZ	1
5	45 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10	MBKZZBOZZAABAOCZ	1
6	Flange, CL150, RFFE/BE, ASTM-A105, ASME-B16.5, WN, S-STD borebore to match	10	FAAAHOCZZAAOABOZ	4
7	Flange, CL150, RFFE/BE, ASTM-A105, ASME-B16.5, WN, S-STD borebore to match	8	FAAAHOCZZAAOABOZ	2

OTHER THAN SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTYCODE	QTY
8	Gasket, CL150, 0.125" thk, 304 spiral wnd, graph filed, CS center ring, API-601	10	GMAHACABXBBPUS	6
9	Gasket, CL150, 0.125" thk, 304 spiral wnd, graph filed, CS center ring, API-601	8	GMAHACABXBBPUS	2
10	Studbolts, ASTM-A193-B7 - 4.75 in. Length	7/8	BAZZZZZZAAYBBUZZ	72
11	Studbolts, ASTM-A193-B7 - 4.5 in. Length	3/4	BAZZZZZZAAYBBUZZ	16
12	Check valve, CL150, RFFE, BC, swing, ASTM-A216-WCB, trim 8, Pacific 150	10	VBGAHABAHAFBAOAZ	2
13	Gate valve, CL150, RFFE, BB, OS&Y, ASTM-A216-WCB, trim 8, Crane 47	10	VAAAHABAHAOJAOAZ	2

PIECE MARKS

1001-P_SPOOL1 1001-P_SPOOL2 1001-P_SPOOL3

2. Edit Options
3. We will edit Header Text for Description, We will make use of ATEXT -307, -308, -309 to show a group sub-heading under which Pipes, Fittings & Flange are listed. We will also change the category for other than shop materials to ‘FIELD MATERIALS’
4. Edit Iso_Pipeline style in Option Browser and for Alternative Texts section, modify the ATEXT -303, -307, -308, -309 and -310 as shown in the image. A blank value for ATEXT indicates that that specific ATEXT is suppressed.

AlternateText	ISOGENTextID	DefaultText
SHOP MATERIALS	-300	FABRICATION MATERIALS
COMPONENT DESCRIPTION	-303	COMPONENT DESCRIPTION
NPD	-304	N.S.
CMDTY CODE	-305	ITEM CODE
PIPE	-307	PIPE
FITTINGS	-308	FITTINGS
FLANGES	-309	FLANGES
FIELD MATERIALS	-310	ERECTION MATERIALS

5. Close options browser and save options.

6. Update 1001-P and observe that header text for description had been changed and also sub grouping of the components are seen for PIPE, FITTINGS and FLANGES.

SHOP MATERIALS

PT NO	COMPONENT DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
	PIPE			
1	Pipe, S-STD, BE, ASTM-A53-B Type S	10	PAAZZ@OZZA@AA@OA	20.5'
	FITTINGS			
2	Tee, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10X10	MOJZZ@OZZAA@AOCZ	1
3	Concentric reducer, S-STD x S-STD bore, BE, ASTM-A234-WPB, ASME-B16.9	10X8	M@CZZ@OZZAA@AOCZ	2
4	90 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10	MCMZZ@OZZAA@AOCZ	1
5	45 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10	M@XZZ@OZZAA@AOCZ	1
	FLANGES			
6	Flange, CL150, RFFE/BE, ASTM-A105, ASME-B16.5, WN, S-STD borebore to match	10	FAAAHOCZZAAOA@OZ	4
7	Flange, CL150, RFFE/BE, ASTM-A105, ASME-B16.5, WN, S-STD borebore to match	8	FAAAHOCZZAAOA@OZ	2

FIELD MATERIALS

PT NO	COMPONENT DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
8	Gasket, CL150, 0.125' thk, 304 spiral wnd, graph filed, CS center ring, API-601	10	GMAHACA@X@@PUS	6
9	Gasket, CL150, 0.125' thk, 304 spiral wnd, graph filed, CS center ring, API-601	8	GMAHACA@X@@PUS	2
10	Studbolts, ASTM-A193-B7 - 4.75 in. Length	7/8	@AZZZZZZZAAY@@UZZ	72
11	Studbolts, ASTM-A193-B7 - 4.5 in. Length	3/4	@AZZZZZZZAAY@@UZZ	16
12	Check valve, CL150, RFFE, BC, swing, ASTM-A216-WCB, trim 8, Pacific 150	10	V@GAHA@AHAF@AOAZ	2
13	Gate valve, CL150, RFFE, BE, OS&Y, ASTM-A216-WCB, trim 8, Crane 47	10	VAAAHA@AHAOJAOAZ	2

PIECE MARKS

Weights

To see WEIGHT data in an MTO, you must set additional Iso Options.

Before WEIGHT can be included in the Material List, the following options must be set.
S3D.MaterialList.ExcludeWeightData = FALSE
MaterialList.WeightsStyle = Total or Individual.

Note: If MaterialList.ExcludeWeightData is set to TRUE or if MaterialList.WeightsStyle is set to None, no weight will be displayed in the Material List on the Iso Drawing.

1. Edit Options
2. Set MaterialList.WeightsStyle to 'Total'

WeightsStyle	Total

3. Close options browser and save options.
4. Update 1001-P and notice that a column for weight has appeared. The weight listed is the total weight for that row (individual weight x quantity). Notice that weight listed for concentric reducers is 20.9 kg

PT NO	COMPONENT DESCRIPTION	NPD (IN)	CMDTY CODE	QTY	WEIGHT (KGS)
	PIPE				
1	Pipe, S-STD, BE, ASTM-A53-B Type S	10	PAAZZBOZZABAABOA	20.5'	375.4
	FITTINGS				
2	Tee, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10X10	MDJZZBOZZAAEADCZ	1	40.0
3	Concentric reducer, S-STD x S-STD bore, BE, ASTM-A234-WPB, ASME-B16.9	10X8	MBCZZBOZZAAEADCZ	2	20.9
4	90 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10	MCMZZBOZZAAEADCZ	1	37.7
5	45 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10	MBXZZBOZZAAEADCZ	1	19.1

5. Edit Options and set WeightsStyle to Individual and re-update 1001-P. Notice that weight listed for concentric reducer is now 10.5 kg which is the weight of each individual reducer.

PT NO	COMPONENT DESCRIPTION	NPD (IN)	CMDTY CODE	QTY	WEIGHT (KGS)
	PIPE				
1	Pipe, S-STD, BE, ASTM-A53-B Type S	10	PAAZZBOZZABAABOA	20.5'	18.4
	FITTINGS				
2	Tee, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10X10	MDJZZBOZZAAEADCZ	1	40.0
3	Concentric reducer, S-STD x S-STD bore, BE, ASTM-A234-WPB, ASME-B16.9	10X8	MBCZZBOZZAAEADCZ	2	10.5
4	90 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10	MCMZZBOZZAAEADCZ	1	37.7
5	45 deg LR elbow, S-STD, BE, ASTM-A234-WPB, ASME-B16.9	10	MBXZZBOZZAAEADCZ	1	19.1

6. Edit Options and expand AlternativeTexts.AlternativeTexts
7. Scroll down till you see the ATEXT -355, -379 and -380. Notice that they have been blanked out. Blanking out ATEXT suppresses the corresponding output.

	-355	TOTAL WEIGHT - THIS DRG
	-379	TOTAL FABRICATION WEIGHT
	-380	TOTAL ERECTION WEIGHT

8. To enable these outputs, either enter a value or delete the rows. Deleting rows means they are no longer blanked out and default values are used.
9. Close options browser and save options.

10. Update 1001-P and notice that sub-totals for categories are shown.

TOTAL FABRICATION WEIGHT	622.6

CMDTY CODE	QTY	WEIGHT (KGS)
GMAHACABXBEPUS	6	-
GMAHACABXBEPUS	2	-
BAZZZZZZAAYBEUZZ	72	-
BAZZZZZZAAYBEUZZ	16	-
VBGAHABAHAFEADAZ	2	235.9
VAAAHABAHADJADAZ	2	206.4

TOTAL ERECTION WEIGHT	884.5
TOTAL WEIGHT - THIS DRG	1507.1

Other Material List Options

Several other material list options allow accumulation of items, control of units, sheet numbers etc. One important option allows treatment of fixed length pipe either as length or quantity.

1. Update isometric for 2002-P, notice that pipe accumulates as quantity in the material list.

PT NO	COMPONENT DESCRIPTION	NPD (IN)	CMDTY CODE	QTY	WEIGHT (KGS)
	FITTINGS				
3	Flanged Tee, CL150, RFFE, ASME-B16,5, ASTM-A395, PTFE Lined	8X8	MDJAHABACAJVABAX	2	-
4	Pipe, RFFE, ERW, long seam, 85% JQ, S-40, ASTM-A53-B, PTFE Lined	8	PAAAHABACAJVABOA	8	81.9

2. Edit Options
3. Set MaterialList.FixedPipeAccumulation to be By Length
4. Close options browser and save options.
5. Update 2002-P and notice that pipe now accumulates as length.

PT NO	COMPONENT DESCRIPTION	NPD (IN)	CMDTY CODE	QTY	WEIGHT (KGS)
	PIPE				
4	Pipe, RFFE, ERW, long seam, 85% JQ, S-40, ASTM-A53-B, PTFE Lined	8	PAAAHABACAJVABOA	50.5'	13.0
	FITTINGS				
3	Flanged Tee, CL150, RFFE, ASME-B16,5, ASTM-A395, PTFE Lined	8X8	MDJAHABACAJVABAX	2	-

Cut List

A cut list can be output for the stock parts in the material list.

1. Edit Options
2. Set MaterialList.CutList.Visible to True and Set ActiveList = Fixed
3. Close options browser and save options.
4. Update isometric for line 1002-P and Cut List should look as below:

CUT PIPE LENGTH

PIECE NO	LENGTH (FT-INS)	NPD (IN)	REMARKS	END ONE	END TWO	ITEM CODE
<1>	7.3/16"	6		SQ.CUT	BEVEL	PAAZZBOZZABAABOA
<2>	8'0.5/8"	6		BEVEL	BEVEL	PAAZZBOZZABAABOA
<3>	3'5.1/2"	6		BEVEL	BEVEL	PAAZZBOZZABAABOA
<4>	5'6"	6		BEVEL	BEVEL	PAAZZBOZZABAABOA
<5>	15'6"	6		BEVEL	BEVEL	PAAZZBOZZABAABOA
<6>	4'3"	6		BEVEL	SQ.CUT	PAAZZBOZZABAABOA
<7>	20'10.1/4"	6		BEVEL	SQ.CUT	PAAZZBOZZABAABOA

Variable Layout

When the style MaterialList.ActiveList = Variable, the Iso Drawing will derive its MTO format from the MaterialList.VariableLayout options.

Each row in the MaterialList.VariableLayout Columns list specifies a column in the MTO. The MaterialList.VariableLayout.HeaderLine text is used for column headings.

When a user formats a VariableLayout MTO, the following guidelines should be honored if well formated text is to be expected.

Leave one or more free spaces between individual columns.

Each Column entry has a starting postion and a width. Adjacent columns should have at least one (1) free space between them. So if your first column begins in position 1 and has a width of 5 characters, the texts for that column will occupy positions 1-5. If we leave a space between this column and the next (position 6), then we would want to start the next column in position 7 or greater.

Use Numeric Justification for columns that display decimal numeric values.

Variable MTO's allow the justification of output. Most commonly Left justification is used, but this causes some problems for data that is in the form of decimal numbers (typically pipe lengths). Alias recommends the use of Numeric justification for columns that display decimal numeric data. Numeric Justification will align the the decimal characters of numbers, for improved readability. WEIGHT is another example of an Attribute that should be formatted as Numeric.

Set the HeaderLine text AFTER formatting columns.

The MaterialList.HeaderLine option is used to specify the column headings and also to define the TOTAL width (in characters) of the MTO. The number of characters can be controlled by placing a "|" character at the end of the line. Isogen will use the position of this character to control how much space it reserves for the MTO (which can be placed either on the right or left hand side of the drawing, by setting the property RightSide = True or False). The drawing area will be automatically reduced to accommodate the width of the list.

It is easiest to create this in an editor using a non-proportional font, such as Courier New. In the text editor, first place an indexing rule to show position numbers ("1234567890" repeated over and over). On the next line enter the text for the Header. Do NOT let the header text for one column overlay the boundary between columns as unexpected results may result.

A typical Header Line example for the following column configuration is shown below:

Now in an editor, with New Courier font, we enter the rule line and then the header text below it as you wish it to appear. If the Header text uses two rows, enter them on separate lines in the text editor, aligned as you would wish to see them in the drawing.

```
0         1         2         3         4         5         6
1234567890123456789012345678901234567890123456789012345678901234567890123
PT       Component                Size
No.      Description             (N.S.)      QTY             WT
```

Next, we need to join the two lines so that the text can be placed in the Options Browser as the value of the MaterialList.VariableLayout.HeaderLine option. To do this you must place an end-of-line character (|) followed by a continuation character (\) in the last position defined on the first row. An end-of-line character is also needed on the second line in the same possition as the line above. This is position of the last character of the last column (WEIGHT). In this example that is position 64.

```
0         1         2         3         4         5         6
1234567890123456789012345678901234567890123456789012345678901234
PT       Component                Size                            |\
No.      Description             (N.S.)      QTY             WT     |
```

Join the two lines so that the text can be placed in the Options Browser as the value of the MaterialList.VariableLayout.HeaderLine option. To do this you must place an end-of-line character (|) followed by a continuation character (\) in the last position defined on the first row. An end-of-line character is also needed on the second line in the same position as the line above. This is position of the last character of the last column (WEIGHT). In this example that is position 64.

After updating the drawings, the resulting MTO will look as follows.

SHOP MATERIALS

PT No.	Component Description	Size (N.S.)	QTY	WT
1	PAAZZBOZZABAABOA	8	16.968'	219.8
2	PAAZZBOZZABAABOA	8	4.000'	51.8
3	FAAAHDCZZAADABQZ	8	1	17.7
4	FAAAHDCZZAADABQZ	8	1	17.7

OTHER THAN SHOP MATERIALS

PT No.	Component Description	Size (N.S.)	QTY	WT
5	GMAHACABXBEPUS	8	1	-
6	BAZZZZZZAAYBETZZ	3/4	8	-

PIECE MARKS

1 NO SPOOL FOUND

Note: Isogen has special behavior for the Description attribute. Instead of truncating the text at the specified number of characters, it will wrap the text on to as many lines as needed to display it all.

If no width is specified for the Description field, the property DefaultDescriptionWidth will be used to control the wrapping of text.

For example, with Width = 32 characters

PIPE, CS API 5L SML, GRD B, STD
WT

Width = 10 characters

PIPE, CS
API 5L
SML,
GRD B,
STD WT

1. Edit Options

2. Expand MaterialList.VariableLayout.VariableLayout. Fill in values as below

3. Set MaterialList.ActiveList to Variable

4. Refer the MaterialList.VariableLayout formatting guidelines to format Header Line Columns Open Word Pad and Type in Column Headers as shown in the image below:

5. Set MaterialList.VariableLayout.TextSize to XXLarge

6. Set MaterialList.TextFont = Courier new (True Type)

7. Close options browser and save options.
8. Update isometric for line 1001-P and observe the Format of Variable Layout

```
        SHOP MATERIALS

PART    ITEM                SIZE      QTY        WT
 NO     CODE                (N.S.)
       PIPE
1       PAAZZBOZZABAABOA    10      20.5'      18.4

       FITTINGS
2       MDJZZBOZZAAEADCZ    10X10     1        40.0

3       MBCZZBOZZAAEADCZ    10X8      2        10.5

4       MCMZZBOZZAAEADCZ    10        1        37.7

5       MBXZZBOZZAAEADCZ    10        1        19.1

       FLANGES
6       FAAAHDCZZAADABQZ    10        4        23.6

7       FAAAHDCZZAADABQZ    8         2        17.7

                TOTAL FABRICATION WEIGHT      622.6
```

Note that the item code is truncated to 16 characters based on the option MaterialList.ItemCodeLength. Also note that sub-headings and weight ATEXT and options are in force even for the variable material list.

Using Labels in Variable Material List

It is possible to add up to 100 user-defined material list attributes and have their value returned by evaluating labels. The label specified for each will be evaluated for each piping part and the result of the label will be written into the PCF and thence into the iso.

1) ExpandS3D.Labels.MaterialList and add a row
2) Select MATERIAL-USER1 as LabelAttribute and Browse for Label 401 as displayed in the picture below:

3) Expand MaterialList.VariableLayout
4) Replace the column N.S. by MATERIAL-USER1

5) Close options browser and save options.

6) Update isometric 1001-P. Observe that Schedule Thickness values are returned instead of Nominal Size

SHOP MATERIALS

PART NO	ITEM CODE	SIZE (N.S.)	QTY	WT
	PIPE			
1	PAAZZBOZZABAABOA	S-STD	02.5'	18.4
	FITTINGS			
2	MDJZZBOZZAAEADCZ	S-STD	1	40.0
3	MBCZZBOZZAAEADCZ	S-STD	2	10.5
4	MCMZZBOZZAAEADCZ	S-STD	1	37.7
5	MBXZZBOZZAAEADCZ	S-STD	1	19.1
	FLANGES			
6	FAAAHDCZZAADABQZ	Undefined	4	23.6
7	FAAAHDCZZAADABQZ	Undefined	2	17.7
		TOTAL FABRICATION WEIGHT		622.6

Using Labels for Item Code and Material Description

Several options are available to set Material Descriptions using labels. Each of these options will, if set, report the value returned by the label as the description of the item.

S3D.MaterialList.UserDefinedPipeMaterialDescription

S3D.MaterialList.UserDefinedSupportMaterialDescription

S3D.MaterialList.UserDefinedBoltMaterialDescription

S3D.MaterialList.UserDefinedGasketMaterialDescription

S3D.MaterialList.UserDefinedNutMaterialDescription

S3D.MaterialList.UserDefinedWasherMaterialDescription

S3D.MaterialList.UserDefinedInstrumentMaterialDescription

S3D.MaterialList.UserDefinedSpecialtyMaterialDescription

S3D.MaterialList.UserDefinedClampMaterialDescription

There is a corresponding set of options to call labels for setting the item code. These may be used to set a size-dependent item code or a client commodity code instead of the contractor code.

S3D.MaterialList.UserDefinedItemCode

S3D.MaterialList.InstrSpecialtyItemCode

S3D.MaterialList.UserDefinedSupportItemCode

S3D.MaterialList.UserDefinedBoltItemCode

S3D.MaterialList.UserDefinedGasketItemCode

S3D.MaterialList.UserDefinedClampItemCode

S3D.MaterialList.UserDefinedNutItemCode

S3D.MaterialList.UserDefinedWasherItemCode

Drawing Setup Tool

The Drawing Setup Tool is a visual way of laying out your Piping Isometrics. The tool allows you to see where you are placing information on the drawing. We start by loading a new backing sheet, and then positioning the required data on it. Updating a drawing then shows how we have created a completely new Isometric layout.

The Piping Isometric Drawing Setup Tool is a major new piece of functionality that is a big help to Administrators when deciding the layout of Piping Isometrics generated by ISOGEN. Until now positions on the backing sheet could only be entered as text values but this tool allows you to place information visually.

The Drawing Setup Tool performs several functions. These are:

- Load a new backing sheet
- Lay out drawing and list position
- Set up content for the 3 lists (material, welding and cutting)
- Position attributes on the backing sheet

The Drawing Setup Tool can be stepped through like a wizard, or navigated through using the tabs. All screens display the backing frame

The first screen, Basic Setup, allows you to choose a new backing sheet. You must match the Drawing output size to this backing sheet. You can also choose which of the 3 standard lists you want on the drawing.

The second screen is the layout of backing sheet. You can align the drawing port with the area allocated on the backing sheet and position any lists required.

There are additional screens for each list selected. On these you choose the columns required, and position them accurately on the backing frame.

The final screen allows you put individual pieces of data onto the backing sheet. These are the usual Title Block information, such as specs, temperatures, pressures, testing or location information.
Once changes in the tool are complete you can update a drawing to see the results

The main window of the drawing tool contains two toolbars, a main tabbed window and some tab-specific controls.

The tool starts on the Basic Setup tab.

The main toolbar allows you to Save and Exit the tool. Saving writes the changes back to the master database. You do not need to Save in the Options Browser as well.

The green arrows step you through the tabs, similar to a traditional wizard.
The secondary toolbar allows you to zoom into a particular area of the backing frame for accurate placement. You can use these buttons on tabs to look at different areas of the backing sheet. The middle mouse button/wheel zoom and pan work in the usual way.

It also has a few buttons for adding and removing attribute data.

At any point during the workshop you can review the changes by updating a drawing. You can do this by saving your changes, exiting the Drawing Setup Tool and Options Browser. Then selecting a drawing, right click and choose “Update Now”. Once the update is complete and the green tick is displayed you can open it and see what you have changed.

You can also review the changes in the Options Browser by navigating to the relevant section in the tree view. Basic Setup controls are generally under Drawing.Controls. The Material List properties are under MaterialList.UserDefined. The attributes are under DrawingFrame.Attributes, and finally the WeldList is under WeldList.UserDefined.

We will start from an existing package UserIsoA2 which has a A2 size backing sheet but all options are still for a D size drawing. We will modify these using the setup tool

Drawing Area

1. Right click on the Packages folder and select New…

2. In the Add Component dialog, click the 'Isometrics (by Query)' tab

3. Select UserIsoA2 and click OK.

4. Right click on UserIsoA2 and Edit Options. A message is shown indicating that they style needs to be modified. This happens the first time a style is edited using a new version of software. OK this message.

5. Click the 'Drawing Setup Tool' button.

6. The drawing setup tool dialog is shown.

7. Use Zoom in/out button to zoom out. You will see that the backing sheet (actual border graphics) is smaller than the drawing area (green rectangle)

8. In the Backing Sheet section, select A2 for drawing size

9. Select just the User Defined Material List for now

When a list is selected an extra tab is created for the list in the setup tool.

10. Click the green Right arrow in the toolbar to advance to the Drawing Areas tab. Alternatively you can click the Drawing Areas tab.
11. Drag the green frame to match the drawing area on the Drawing Frame. This could produce some odd numbers like below.

You may want to edit the numbers to whole mm

Material List – User Defined

1. Now click the anchor controls for Material list positions and drag them to the top left of the boxes containing the appropriate list. There is an anchor for each section of the Material List, but the second anchor is constrained to the same horizontal position as the first
2. Click the Material List tab to start the Material List set up. Now you have a Material List pane on the left.
3. Add columns to list by clicking the green Add Attribute button.
4. For each column you need to choose the contents by clicking the Name and selecting the required data from the drop down.

5. Select the following values for the columns: Part Number, N.S., Item Code, Description and Quantity.
6. You can position the whole list by moving the red box, which is the master control for list. You can move individual columns by dragging the green boxes horizontally. You should make the columns line up with the output. For each column you can specify a maximum number of characters after which the text should be wrapped to the next line. The description field only has

space for 25 characters, so this should be set to 25. The other columns do not need a limit.

7. You should also set Maximum Entries to limit the number of rows in each section of the list. The number of boxes shown in the list indicates where ISOGEN will plot up to. Here 20 entries should be used for each section.

Attribute Map

You can add Attributes, by editing the row at the bottom of grid. You can also edit the list in bulk using the Add/Remove attributes button. This brings up a new dialog which allows you to pick multiple attributes. All the other standard properties of the attributes are available in the grid (besides position), such as Font, Color and Justification.

1. Click the Attributes tab. Here you place individual pieces of data on the backing frame, normally on the Title Block. Several attributes are already present from the previous setup, so the first job is to focus on the bottom of the screen and drag these into the desired location.

2. Zoom into the lower left portion of the drawing sheet.

3. Locate the ‘Piping Specification’ attribute.

4. Pan or look to the right and locate the place available in the backing sheet for this attribute.

5. Drag the attribute to the correct location.
6. Similarly drag all other attributes (except Extraction Date) to the right locations. The drawing number and number of drawings attributes are way out to the right of the border, so you need to pan over there to find them.
7. You can remove any attribute you don’t want using the Remove attribute button..

8. Remove the Extraction Date attribute

9. When you have finished placing the Attributes save the changes, exit the Drawing Setup Tool

10. Set the value of option Drawing.Controls.IgnoreUserSplitPoints to True

11. Close options browser and save options

12. Right click on Isometrics and select New..

13. Select Drawing by Query Manager

14. Right click on Drawing by Query Manager and select Setup…
15. Under Filter select More.. and pick Plant Filters > Isometric Drawing Filters > U01 Isometrics.

16. Click OK

17.

? package

18. Click OK on the Setup dialog.
19. Right click on Drawing by Query Manager and Run Query
20. Right click on Drawing by Query Manager and Create Drawing(s)

21. Expand through till UserIsoA2
22. Right click on 1001-P and update now. You should see a two sheet isometric.

Welds

Smart 3D allows weld numbers to be shown on the isometric. The format for the weld numbers is user-definable as well. However, since Smart 3D manages welds in the model, some weld related Isogen options may not be applicable.

Sequence welds

To turn on weld numbering, first one must sequence the welds in a pipeline. To do this,

1. Switch to the Piping task.
2. Select the Sequence Objects command on the vertical toolbar and select the 1001-P pipeline.
3. Click OK to sequence welds

Show Weld Numbers on Isometric

Turn on weld numbers

1. Switch to Drawings and Reports task
2. Edit Options on the **UserIsoA2** style
3. Search for all weld related options using the word ‘WeldNumber’ in the search box
4. Set Drawings.Welds.ShowWeldNumbers to True
5. Close options browser and save options.
6. Update isometric 1001-P and see weld numbers

Change weld numbering format

1. Edit Options on **UserIsoA2** style
2. Select the option **S3D.Drawing.Welds.WeldNumberLabel**
3. Browse and assign label **‘Piping Isometric Weld Type and Sequence Number’**

4. Close options browser and save options.
5. Update 1001-P isometric.

Change enclosure for welds

1. Edit Options

2. Select the option Drawing.Welds.FabWeldEnclosure and change to Diamond End

3. Close options browser and save options.

4. Update 1001-P isometric.

Weld List

1. Edit Options
2. Note that the Pipeline List Box is enabled, and over part of the weld list. Set S3D.DrawingFrame.PipeLineList.ShowPipeLineListBox to False
3. Start the Drawing Setup Tool
4. In the Reports section, check the box ‘User defined weld list’

5. In the Drawing Areas tab, drag the anchor control to the top of the weld list.

6. Select the Weld List tab

7. Use the add attributes button to add four attributes as shown below

Column 1	
Name	**WELD-ATTRIBUTE1**
Offset	**0**
Maximum Characters	**0**
X	**23.23**
Column 2	
Name	**WELD-ATTRIBUTE2**
Offset	**42.76**
Maximum Characters	**0**
X	**65.98**
Column 3	
Name	**WELD-TYPE**
Offset	**79**
Maximum Characters	**0**
X	**102.23**
Column 4	
Name	**WELD-CAT**
Offset	**115**
Maximum Characters	**0**
X	**138.23**
Column 5	
Name	**WELD-NO**
Offset	**156**
Maximum Characters	**0**
X	**179.23**

8. Save and exit the drawing setup tool
9. Close options browser and save options
10. Update 1001-P, a weld list is shown

WELDING LIST

WELD NO.	SIZE	TYPE	SHOP / FIELD	SEQUENCE ID
1001-P14	8	BW	S	S - 14
1001-P13	10	BW	S	S - 13
1001-P12	10	BW	S	S - 12
1001-P11	10	BW	S	S - 11
1001-P10	10	BW	S	S - 10
1001-P3	10	BW	S	S - 3
1001-P4	10	BW	S	S - 4
1001-P5	10	BW	S	S - 5
1001-P6	10	BW	S	S - 6
1001-P2	10	BW	S	S - 2
1001-P1	10	BW	S	S - 1

Drawing Frame

The drawing setup tool allows us to position attribute values from the PCF into the border.

For document properties, these will not be written as attributes in the PCF, instead, they will be linked from the drawing document to the border file.

Document properties can be set at any level in the Management Console, for instance, the project Tile could be set at project level and inherited by all the document, whilst the Drawn By, Revision, Drawing Title etc. will be set on individual documents.

Placing Drawing Property Labels

In this Lab, you are going create a link between a document property value and the border using special Text Boxes with XML linking the property to the box.

1. Copy the file UserIsoA2.sha from the [SharedContent]\PmfgIsoStyleData folder to SharedContent]\Drawings\Catalog\templates folder

2. Enter the Drawings and Reports Task.
3. Tools > Edit Border Template.
4. Select “UserIsoA2.sha”

5. From the View menu, select Background Sheets

6. Select the Place Drawing Property Label command

7. In the Label Set pull down, pick Title Area
8. In the Field pull down, pick Site Name

9. Click in the title area to the right corner of the sheet to place the label as shown below:

10. Similarly pick the Title1 and Title 2 fields from the Title label set and place them as well.
11. Tip: By clicking on the two box's you are able to display the placed labels as well as defining Text Height, Font, Justification etc.
12. Set the view back to 'Working Sheets', Save the template and exit Drawings Editor.
13. Copy the file UserIsoA2.sha back from the [SharedContent]\Drawings\Catalog\templates folder to the [SharedContent]\PmfgIsoStyleData folder
14. In Smart 3D, from the Isometrics\Packages folder, select UserIsoA2 and 'Edit Options'
15. Whilst the Options Browser is open, Copy and Paste the "UserIsoA2.sha" from the [SharedContent]\PmfgIsoStyleData folder to replace the one existing in the windows TEMP (%TMP%) folder.
16. Save and exit from the options browser.

Setting Document Properties

1. Right click on UserIsoA2 and edit Properties

2. Select The Title Area tab and set the site name to 'MY SITE':

3. Click OK

4. Right click on 1001-P and select ‘Properties’

5. Select the Title Area tab and set Title1= ISOMETRIC DRAWING and Title 2 = FOR PIPELINE 1001-P as shown

6. Click OK

7. Notice that the Drawing status changes to Out –of-date

since we changed properties of the drawing.

8. Update the drawing 1001-P and observe the output for the property label on the drawing.

Drawing Frame Attributes

Isogen has 99 user definable attributes available for the user to set. These attributes can then be positioned on the sheet (in the area outside the drawings area) by coordinate.

Mapping the attribute is a 3 step process.

Step 1: Use the AttributeMAP section of the style to map External Name (user entered name) to an ISOGEN attribute (choose from ATTRIBUTE11 to ATTRIBUTE99)

Step 2: Use a label to decide what data the chosen Isogen ATTRIBUTE will hold. It is possible to decide at this point the oidtype of the item that the label is evaluated for. The choices are 'Default' which evaluates the label for the object that the iso is being created for (i.e. pipeline for pipeline isos, spool for spool isos etc), or explicit choice of 'PipeRun', which evaluates the label for the 'prime run' (largest NPD run on the pipeline, if there are more than one with the largest NPD, then one of them).

Step 3: Using DrawingFrame.Attributes section of the style (or the drawing setup tool), position the label on the sheet at known coordinates, and set the text properties (height, width and font).

Attribute MAP

1. Edit Options for the 'Iso Pipeline' style.
2. Go to 'S3D.AttributeMAP.AttributeMap(127)' section
3. On the last blank row, enter External Name as 'User1' & pick ATTRIBUTE21 for the Isogen Attribute

4. Expand S3D.Labels.DrawingFrame.DrawingFrame(3)
5. On the last blank row, Pick 'User1' for LabelAttribute
6. Pick the catalog label 'Piping Tooltip pipe run' as the LabelName

7. Pick PipeRun as the OidType

	LabelAttribute	LabelName	OidType
	ATTRIBUTE15	IsoPipingCommodityCode	PipeRun
	Pipeline Reference	Piping Isometric Pipe Line Reference	Default
	Extraction Date	Piping Isometric Extraction Date	Default
▶	User1	Piping ToolTip Pipe Run	PipeRun
*			

DrawingFrame.Attributes

1. Expand DrawingFrame.Attributes and add a new row
2. Pick User1 for HostAttribute and specify values as below

AttributeName	CharHeight	XPos	YPos	Font	Barcode
User1	3.2 mm	164 mm	34 mm	Courier New (True Type)	0

CharWidth	Justification	Layer	Colour	RotationAngle	TextWeight	TruncationLength
3.2 mm	Left	30	0	0	0	0

3. Close options browser and save options.
4. Update 1002-P and see the label value at the position specified

Add Pipeline List Report

An excel table containing the properties of the runs in the pipeline may be placed on the sheet at the desired coordinates. It is possible to use labels to specify which attributes should be displayed in the excel sheet. The excel position on the drawing sheet can be determined by coordinates.

DrawingFrame.PipelineList

'ShowPipelineListBox' controls whether the report is output or not.

The UseReportTemplate option controls whether the new style (report) is used or old style (label driven list) is used.

The BoxOriginX, BoxOriginY and BoxOrigin pick lists can be used to position the Report on the drawing sheet.

Report Template

1. Edit Options
2. Set S3D.DrawingFrame.PipeLineList.UseReportTemplate = True

3. For the option S3D.DrawingFrame.PipeLineList.ReportTemplate.TemplateName, pick the ellipsis (…) and select the Report template from Reports – Types of Reports – Piping – Piping Pipe Line List

4. Close options browser and save options.
5. Update 1002-P Pipeline List Report would be placed at shown below.

Pipeline	PipeRun	NPD	Piping Spec.	Insul Spec	Insul Matrl
1002-P	U01-6-P-0002-1C0031	6.00 in	1C0031		
1002-P	U01-6-P-0001-1C0031	6.00 in	1C0031		

PIPING SPEC:	1C0031	DATE:	Today's Date (Locale Sensitive format) : 12		
INSULATION SPEC:	UNDEFINED	PLANT:	SP3DTrain	REV. #	DESCRI

Reference Planes

The Reference Planes option provides the ability to reference virtual planes for coordinate callouts on isometric drawings. Definition of the planes is in a file with *.RPD extension

For this Lab, a Reference plane file (RefPlanes.RPD) is already created with some pre-defined volumes and it's X,Y,Z planes.

1. Edit Options
2. Go to Supplementary.ReferencePlanes option.

3. Change "Enabled" value to True.
4. For the file Path, point to the [SharedContent]\PmfgIsoStyleData\RefPlanes.RPD.
5. Change the CoordStyle and CoordStyleAtLocationPts value to Relative Coordinates.
6. Go to Alternative Texts and set AText -398 to VOL ?

7. Save changes to the Options Browser and close the browser.
8. Update Drawing 1001-P
9. Notice that the Volume name (U01) listed in the Refplanes.RPD is now shown in the coordinate readout. Also note that the coordinates are listed as distances from X, Y and Z planes of the relevant volume.

Volume and its Planes for Unit U01 specified in Refplanes.RPD file.

```
VOLUME   U01
PRIORITY     1
LIMIT1       22000    500      0
LIMIT2       34000    18000    10000

X-PLANES
X1     E24384
X2     E31699.20

Y-PLANES
Y1     N3048
Y2     N9144
Y3     N15240

Z-PLANES
ELO     ELO

NEAREST-Z-PLANE
```

Coordinates would be seen as shown in the picture below:

Six Alternative Text records have been assigned to output Relative directions (-443,-444,-445,-446,-447,448)

^ is substituted with the Reference Plane Name
? is substitited with the distance from the nearest Reference Plane

A typical RPD file would look as below:

```
FRAMEWORK-UNITS  MMS

X-PLANES
GLOBAL_X     E0

Y-PLANES
GLOBAL_Y     N0

Z-PLANES
GLOBAL_Z     EL0

NEAREST-Z-PLANE

VOLUME  U01
PRIORITY    1
LIMIT1      22000   500     0
LIMIT2      34000   18000   10000

X-PLANES
X1    E24384
X2    E31699.20

Y-PLANES
Y1    N3048
Y2    N9144
Y3    N15240

Z-PLANES
EL0    EL0

NEAREST-Z-PLANE
```

WBS Isometrics

Smart 3D uses the drawings by query mechanism which requires that all piping isometrics have a target object that is used as a starting point. This means that an isometric is always created for a specific object (such as pipeline, spool, assembly etc) and extraction rules are used to determine which parts (related to the object) need to be included in the isometric drawing.

There are however times when it is required to create and manage an isometric drawing for a group of connected parts that do not have such an object as a parent. For instance users may wish to control the sheet assignment for large pipelines which do not fit into a single sheet. They may also wish to issue a revision for only one sheet out of a pipeline that contains many sheets. In modular design, pipelines can extend across module boundaries but isometrics may only need to be created and issued for a subset of the parts of that pipeline which belong to a particular module. On the other hand, a large network of piping across multiple pipelines may need to be stress analyzed and a stress isometric needs to be created that contains parts from several pipelines.

To allow this, it is possible to create isometrics from WBS items. When a pipeline isometric is created, the pipeline exists before the parts that belong to it are modeled. Relationships are established between pipelines and parts (via runs) as a result of normal modeling activity. However this is not the case for WBS items. So WBS isometric creation has additional steps to create the WBS item, claim parts to a WBS project and assign the parts to the WBS item before an isometric can be created for it.

WBS items can be created manually and then parts can be manually assigned to them. WBS items can be created and parts assigned using a command in the piping task. The item creation and part assignment can also be automated using the RuleChecker service and special rules. We will learn about the manual and command based approaches in this course.

Manually Creating and Assigning Piping Objects to WBS Items

Claiming objects to Project

1. Switch to the Piping task
2. Define workspace using the Plant Filters > Training Filters > U04 and WBS Items filter
3. Select the All option in the Locate Filter drop-down list.
4. In the Workspace Explorer window, expand the hierarchy A2 > U04 > Process.

5. Right-click the pipeline system 403-P and click the Select Nested command in the menu, to select all the piping objects in the graphic view.

6. Select the More… option in the Active Project drop-down list on the toolbar to specify the active project.
7. The Active Project dialog box appears. Select the Database option to see all the WBS projects in the dialog box and then select PJ-99, to specify PJ-99 as an active project.

8. Click OK on the Active Project dialog box. The selected active project should display.
9. Select the Project > Claim command, to associate the selected piping objects with the active project PJ-99.
10. After the claim process is complete, Smart 3D displays the Claim dialog box. Click Close to close the dialog box.

Manually Assigning Piping Objects to WBS item

1. In the Workspace Explorer, select the WBS tab and expand PJ-99 > Iso Fabrication.
2. Right-click the Iso Fabrication system in the Workspace Explorer and select the Create WBS Item command from the menu, to create a new WBS item in the system Iso Fabrication.

3. Enter or select values below, and click OK.

   - WBS Type: Group
   - WBS Purpose: Iso Drawing – Fabrication
   - Exclusive: True
   - WBS Assignment: System
   - Name PJ-99-A
   - NameRule: User Defined
   - Correlation Basis: Correlate object

4. In the Workspace Explorer window, select the System tab to expand A2 > U04 > Process and select the pipeline system 403-P. This will select the pipeline 403-P in the graphic view.
5. Select the Project > Assign to WBS… command. This command creates a relationship between all the components of the selected pipeline system and a selected WBS item.
6. The Assign to WBS dialog box appears. In the Assign to WBS dialog box, expand PJ-99>Iso Fabrication and select the WBS item PJ-99-A to which the piping objects need to be assigned. Then, click OK.

7. Select the WBS tab in the Workspace Explorer. Expand PJ-99 > Iso Fabrication. Right-click PJ-99-A and click the Select Nested command in the menu. The highlighted objects in the graphic view are assigned to the PJ-99-A WBS item.

Creating Isometric Drawing from WBS item

1. Switch to the Drawings and Reports
2. In the Management Console, expand the drawing hierarchy to Isometrics > Iso WBS Isometrics.
3. Right click the Iso WBS Isometric component and select Set up.
4. For filter select “PJ-99(WBS)” located under Plant Filters>Training Filters. Click OK.

5. For package select ‘WBS Iso – Fabrication’ and click OK

6. Click OK to complete Setup.
7. Right click the ‘Iso WBS Isometrics’ and Run Query
8. Right-click the Iso WBS Package under Iso WBS Isometrics > PJ-99 > Iso Fabrication and cick Create Drawing(s)

9. Right-click PJ-99-A and update it.

10. Open the drawing to view.

Creating WBS Items and Assigning Piping Objects to WBS Items using Group Pipe Parts command

1. Switch to the Piping task.
2. Define workspace using the Plant Filters > Training Filters > U01 and WBS Items filter
3. Select the All option in the Locate Filter drop-down list.
4. In the Piping task, select the Piping Parts option in the Locate Filter drop-down list on the Common toolbar to select only the piping parts in the graphic view.
5. Use the Inside fence option on the Common toolbar to select all piping parts belonging to the pipeline 1001-P and select the piping parts.

6. Your Active Project, should be set to PJ-99, if not, set it.
7. Select the Project > Claim command to associate the selected piping objects with the active project PJ-99.
8. After the claim process is complete, Smart 3D displays the Claim dialog box. Click Close to close the dialog box.

Creating WBS Items by Rule and Assigning Piping Objects

The ‘Group Pipe Parts’ command will group the piping parts into sets that share the value returned by a label, then create WBS items based on the label value and assign the piping objects to the created WBS items. The label used will return the pipeline name and the isometric sheet number from the pipe parts. Our task is to first set the sheet number on the parts

1. Select the piping parts of the pipeline 1001-P, as shown in Figure 4, to assign them to isometric sheet number A.

2. Edit Properties.

3. Key in A in the Isometric Sheet Number box in the Selection Properties dialog box, and click OK.

4. Now select the remaining pipe parts belonging to 1001-P

5. Edit properties and assign a sheet number B.

6. Now to assign these pipe parts to the appropriate WBS items, select the Group Pipe Parts button on the vertical toolbar.

7. The Automated WBS Creation dialog box appears. Set the following values in this dialog box, and click OK

   - WBS Automated Creation Rule Name: WBS Iso- Fabrication
   - Name Rule: Label Name Rule
   - Query Label: WBS Iso Grouping Query- Fabrication
   - Discrimination Filter: Plant Filters\Training Filters\U01
   - WBS Item's Parent: PJ-99\Iso Fabrication
   - Maximum Number Of Objects: 100
   - Pull In Associated Items: Connection and Reportable
   - Maintain Existing WBS Items?: True

8. Smart 3D prompts you to view the log file once the process is complete. Click No to close the log dialog box and click Cancel on the Automated WBS Creation dialog box.

9. Two WBS items are created in the WBS hierarchy. Select the WBS tab in the Workspace Explorer to view the WBS item Iso Fabrication.
10. Set the Locate Filter to ALL. Right-click the WBS item 1001-P-A-1 in the Workspace Explorer and Select Nested to highlight all the pipe parts that belong to it.

Creating Isometric Drawing from WBS items

1. Switch to the Drawings and Reports
2. In the Management Console, expand the drawing hierarchy to Isometrics > Iso WBS Isometrics > PJ-99 > Iso Fabrication > Iso WBS
3. Right-click Iso WBS and 'Create Drawings'
4. Right click 1001-P-A-1 and 1001-P-B-1 and update the isometrics.

Importing Microstation DGN Border file

Importing existing DGN border/seed file

1. If you have an existing DGN or DWG file which is being used as seed/border, it can be re-used for Smart 3D isometrics.
2. An existing DGN file (UserIso_PipelineDGN.dgn) is available at [SharedContent]\PmfgIsoStyleData. If using DGN file, first, using MicroStation tools, merge the seed and border file into a single DGN file. However, for this lab we have a ready-made DGN file to import in Shape2D.
3. Start SmartSketch Drawing Editor
4. In the Tools – Options – Foreign Data tab, click Options… for the MicroStation format, then, uncheck the 'Fit imported data to active sheet' option.

5. File – Open and navigate to the DGN (UserIso_PipelineDGN.dgn) file.
6. Go to File – Sheet Setup and adjust the width and height of sheet with Standard or Custom size. Make sure that the Border graphics are in Background sheet and not in Working sheets. Sheet setup needs to be performed for both working as well Background sheet.

7. Set Custom Width as 24 in and Height as 18 in so as to match the size of imported DGN file.

8. File – Move sheet Border. Specify the X and Y origin values as 0 (Zero). The Pin point would refer the setting specified over here. The Drawing Frame labels would be placed referring to Origin settings provided here.

9. Change background color (if necessary) using Tools – Options and make other changes as required.

10. Save the file as a UserIso_PipelineDGN.sha
11. Rename the file as UserIso_PipelineDGN.igr
12. This imported DGN file can now be used as a normal border file which can be utilized for creation of a new style.

Creating New Style

Creating a new style involves editing/importing a border/template file, copying the XML file with options and bulkloading the new style into the catalog.

Copying Existing Smart 3D Border

1. Using Windows Explorer, navigate to [SharedContent]\PmfgIsoStyleData.
2. Copy and paste Iso_Pipeline.igr file in place
3. Rename the new file as UserIso_Pipeline.igr

Bulkloading New style

1. Copy the file Bulkloadisokeys.xls from [Install Directory]\CatalogData\Bulkload\DataFiles to your desktop
2. Ensure the file is not read-only
3. Click on the PipeMfgRules sheet
4. Select row 6 (Iso_Pipeline) and right-mouse Copy.
5. Select row 14 (End) and right-mouse Insert Copied Cells.
6. Add letter A in column A of row 14 (newly added row)
7. Change Iso_Pipeline to UserIso_Pipeline in the IsoNames column
8. Change OutPutIsoDrawingsLocation to IsoDrawings\UserIso_Pipeline
9. Change IsoBackingSheet to PmfgIsoStyleData\UserIso_Pipeline.igr
10. Change IngrOption to PmfgIsoStyleData\UserIso_Pipeline.xml
11. Save the excel spreadsheet and close Excel.
12. Browse to the folder [SharedContent]\ PmfgIsoStyleData and copy the file, Iso_Pipeline.xml, rename it to be UserIso_Pipeline.xml and uncheck the read only property for the files.
13. Open the UserIso_Pipeline.xml file using a text editor and use the search tool for the word Iso_Pipeline. Change all occurrences of Iso_Pipeline to UserIso_Pipeline
14. Save the file.
15. Start the Bulkload utility using Start > Programs > Intergraph Smart 3D > Database Tools > Bulkload Reference Data
16. Click the Add button and add the BulkloadIsoKeys.xls from \CatalogData\Bulkload\DataFiles
17. Change the bulkload mode to Add/Modify/Delete records
18. Pick the server, catalog and catalog schema name
19. In the log file field, select the ellipsis (…) button and click OK.

20. Click Load to load the new style into the catalog.

21. Review the log file , it should say
    Successfully created the object in row [14]

Create Package and Setup Hierarchy

Creating a package

1. Switch to Drawings and Reports task.
2. Add a new folder under the root of the plant called ‘Packages’
3. Right-click on Packages folder and add a new ‘Piping Isometric Drawings by Query’ component. Rename the component ‘User’
4. Setup… User and in the filter field select More…
5. Expand the tree till the ‘Piping’ folder as shown in the picture and pick the Pipelines filter under Catalog Filters->Default Filters->Smart 3D Object Filters->Object Types-> Piping

6. In the style field, select the style ‘UserIso_Pipeline’ (This style was bulkloaded in earlier lab)

7. Right-mouse User and Save Package…

8. Name the Package ‘User’ and save it in the ‘Isometrics (By Query) folder

Creating Drawing by Query Manager

1. Right-click ‘Isometrics’ folder, select New… and add a new ‘Drawing by Query Manager’
2. Rename it to be ‘User Drawings’

3. Select More… in the filter field on the Setup dialog and select the ‘Plant Filters\All’ filter

4. Select More… in Packages field and select the ‘User’ package

5. Right-mouse ‘User Drawings’ and pick Run query
6. Expand hierarchy and create drawings for A2 – U01 - Process.

7. Update 1001-P

Appendix: Performance Analysis Tool

Isometric Performance log Analyser is a tool which provides an easy method of identifying labels/filers/report contributing to poor performance of Isometrics.

In general, if a specific attribute from Model/Catalog is to be seen on Isometric, Labels are created in Catalog and configured within Isometric Option Browser to display the property values returned by the label on Isometric drawing/MTO/Cut List/Neutral File/Drawing Frame and so on. In process of creating these labels, sometimes user may unknowingly create specific labels that might introduce a huge impact on performance of Isometrics.

A good example of such poor label would be a SQL label. It is recommended to avoid using SQL Labels in Isometric Option Browser. COM labels are always the best choice for outputs. If COM Labels are limited for some specific properties, VB Label should be considered as a next option after COM Label.

The performance can also have impact from filters and reports that are mapped in Isometric Option Browser. So this tool helps in identifying poor filters and Reports too.

Isometric Performance log Analyser can be downloaded from eCustomer website. For more details please check with your Instructor or log a Service Request on Smart 3D Support.

This lab would give you hands-on experience on setting up the tool and on diagnosing the logs.

1. Open Windows Explorer and browse to [Smart3D]\ Core\Tools\Administrator\Bin\Assemblies\Release
2. Start the PerfLogViewer.exe
3. Click the Option button in the bottom right
4. On the options form, check the box to enable performance log tracing and change the base file name to IsoPerfLog

5. Click Apply
6. Exit the PerfLogViewer
7. Open S3D session and update one or many Isometrics that you want to analyse
8. Close S3D session.
9. You'll find the _PERFIso.plg file in %TEMP%.
10. Copy it to another folder (such as a folder named IsoPerfLog on your desktop)
11. Run IsometricPerfLogAnalyser.exe from and browse to the folder containing the *.plg file.
12. Select the log file from the drop down list and observe the captured data for Number of Isometrics, Time to execute the total number of Isometrics, Average time per Iso, Individual Label names, Percent and Time.

The colours indicate labels/filters/reports that take a significant proportion of the time.
Red > 20%
Yellow > 10%
Dark Green > 5%
Green > 1%.

13. In the SP3DTrain plant, there are not any poor performing labels\filters\reports, However it gives you a basic idea of how the tool is functioning and how it displays data about Labels\Filters\Reports names, actual time and its overall percentage.
14. Once done Analysing the tool, Disable performance logging by restarting PerfLogViewer.exe and unchecking the box on the options form.

Additional Points to Rememeber:

- IsometricPerfLogAnalyser modifies the log files in the folder you point it at and creates “.csv” files. If the log file you copy into the folder is called, for example, “test.plg” then it will try to create “test.csv”. If “test.csv” already exists then it will do nothing.
- Always close S3D before copying the log file. The log will not be completely written to disk until S3D is closed