Getting the Most out of AutoCAD Plant 3D Isometrics

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Learning Objectives

- Discover the current capabilities of AutoCAD Plant 3D 2016 Isometrics
- Learn how to differentiate between GUI-based modifications and XML-based modifications
- Learn how to utilize an engineer's Excel line list to populate Plant 3D isometric data
- Discover how to fine tune annotations to obtain desired isometric output

Description

AutoCAD Plant 3D is a powerful platform that includes a tool to automagically generate isometric drawings. The key to getting the most out of the software, and ultimately saving time and money on a project, is to tailor the output to meet your needs. We'll take a look at snippets of isometric drawing output and dig into where to make the configuration changes. We'll start at the beginner level and review the new iso style wizard and its capabilities. From there we'll take a look at the plethora of modifications that are possible when using the project setup interface. On the final leg of our journey we'll look at more complex drawing output that requires advanced techniques to accomplish. This class will give you a peak at what works, what doesn't, and what requires a bit of creativity. The knowledge will enable you to create a powerful iso style that generates drawings requiring minimal user interaction prior to checking and delivery.

Your AU Experts

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Iso Styles

Creating a New Iso Style
There are several methods for creating a new iso style. Project Setup provides a couple of user interface driven methods. To perform them, open Project Setup and then browse to the Isometric DWG Settings and then select Iso Style Setup.

Click on the + button next to the iso styles drop-down to open the Create Iso Style dialog.

Copy an Existing Style
Using an existing style as a basis for a new style is a good place to start. The existing style can be an out-of-box or a custom one, it makes no difference. Give the new style a name in the provided text box and then select the Copy existing style radio button. Select the style to copy from the drop-down list.
Click the Create button to build the new style. A new folder with the provided style name is created within the Isometric folder of the active project. The iso.atr, iso.dwt, and isoconfig.xml files from the existing style are copied into the new folder after it is created. At this point the new style is an exact duplicate of the style used as a seed. Now it’s ready to be modified.

**The Iso Style Wizard**

Another option when creating a new iso style is to use the new iso style wizard. The wizard provides a guided step-by-step tour through the setup of an iso style. It provides several popular options to choose from in each of seven different settings categories. The selected options serve as a good starting point and can be further optimized and tweaked later.

To fire up the wizard, open the Create Iso Style dialog by clicking the + button next to the iso styles drop-down. Provide a new style name and then select the Create new style radio button. If the new style will be for spool drawings, be sure to check the Spool format checkbox.

Click the Create button to launch the Create Isometric Style wizard.
Navigation in the wizard is straightforward. Clicking the arrows at the top (1) allows for forward/backward navigation through the categories. The arrows near the bottom (2) allow for navigation through the available choices for the current category. Buttons to create the iso style with the current settings (3), to access Plant 3D’s help documentation on the iso wizard (4), and to cancel the process (5) are also present.
There are several options in the Table Layout & Paper Size category which range from ANSI B up through ANSI D for Imperial projects and from A3 up through A1 for metric projects. Select the one that most closely resembles the final setup required.

**Figure 6: ISO Style Wizard – Table Layout & Paper Sizes**
The Leader lines & Enclosures category provides a ten different settings from which to choose. Each option applies different settings for spool, manual valve, and control valve callouts as well as different cut piece, weld, and part identifiers. Here again, every possible combination isn’t represented so pick the option that is closest to the new iso style requirements.

**Figure 7: ISO Style Wizard – Leader Lines & Enclosures**
The **Ribbon Planes** category allows you to select between three different stand-off distance options for string type and overall dimensions.

**Figure 8: ISO Style Wizard – Ribbon Planes**
The **Default piping styles** category allows for the selection of the default dimensioning style from three options. Small bore and existing piping styles that follow can override this style when specific criteria are met. The options provided show various combinations of string and locating dimensions to go along with the standard end-to-end dimensions.
The **Fitting-to-fitting piping styles** category provides a few starting choices for fitting-to-fitting pipe runs. The options provided show a couple of variations on string and locating dimensions to go along with the standard overall dimensions.

**Figure 10: ISO Style Wizard – Fitting-to-Fitting Piping Styles**
Small bore piping styles is the sixth category. This is another override style that is applied to pipe components whose size falls under a specified limit. There are two options provided, one with overall dimensions, and a second with some additional locating dimensions enabled.

**Figure 11: ISO Style Wizard – Small Bore Piping Styles**
The final category that the wizard guides you through is for **Text height & Symbol scale** category. There are four options provided with text height ranging from 1/10” up to 1/8”. The symbol scale that goes along with the text height varies proportionally. Again, pick the setting closest to the desired result.

![ISO Style Wizard – Text Height & Symbol Scale](image)

**Figure 12: ISO Style Wizard – Text Height & Symbol Scale**

Now that all of the choices are reviewed and the best option is chosen, click on the **Create Style** button to finish up.

![Create Style Button](image)

**Figure 13: ISO Style Wizard – Create Style Button**
After clicking the button, the wizard closes and the new style is created. The **Project Setup** dialog will come back up and the newly created iso style will be the active entry in the iso style drop-down.

**The Manual Method**
Besides the GUI’s and wizards of **Project Setup**, there’s always the good ol’ copy and paste method in Windows File Explorer. The project doesn’t necessarily have to be closed, but it’s best to do this to avoid quirky behavior in Plant 3D. The following steps show how to create a new iso style manually.

1. **Browse out to the Isometric folder of the project.**
   ![Path to Isometric Folder](image1)
   **Figure 14: Path to Isometric Folder**

2. **Select the iso style folder that will serve as the basis for the new style.**
   ![Isometric Style Menu](image2)
   **Figure 15: Iso Style Selected in Current Project**
3. Hit CTRL+C to copy and then CTRL+V to paste.

   ![Figure 16: New ISO Style Created Using Copy Paste](image1)

4. Select the new folder, which will have the same name as the copied folder with a “- Copy” appended to it, and rename it with the new iso style name.

   ![Figure 17: Renamed ISO Style Folder](image2)
5. Open Plant 3D and the iso style will show up! It’ll be in the iso styles drop-down list on the Isometric DWG settings page in Project Setup and it’ll also have its own folder on the Isometric DWG tab in Project Manager.

Customization using the User Interface in Project Setup
Open project setup and browse to the ‘Isometric DWG Settings’ section. This area of Project Setup contains all of the available options for configuring isometrics using the user interface.
**Symbols and Reference**

The **Isometric Symbology** section contains only one item, a button that links to the block editor for iso symbols. Clicking the **Edit Isometric Symbols**... button will open up the IsoSymbolStyles.dwg or ISS file. This is similar to the PSS or projSymbolStyle.dwg, only it is specifically for iso symbology. Existing symbols can be modified and new ones can be created by clicking on the button. Any new symbols also need to be mapped in the IsoSkeyAcadBlockMap.xml file in the root Isometric folder in the project workspace.

![Isometric Symbology Settings](image)

**FIGURE 20: ISOMETRIC SYMBOLOGY SETTINGS**
The **Reference Dimension Default Settings** section provides a way to manage the default settings for the iso reference dimensions. Each type of reference dimension has an assignable enclosure, message, and centerline line style. The message for intelligent Plant 3D items can contain references to Plant 3D class attributes which will populate in the annotation on the isometric drawing.

**Figure 21: Reference Dimension Settings**

**Iso Style Setup**

This section has several different settings areas on it. In the **Drawing format** section there is an option to toggle field welds at maximum pipe lengths. When checked a field weld will automatically be placed on the isometric drawings at the specified interval. There is another toggle for pipe makeup lengths at field fit welds. When checked, the provided makeup length will be added to the total pipe length at every field fit weld.

On the right side there is a toggle for **Table overflow** control on standard isometrics. The toggle will do one of two things. If it’s set to **Use a blank sheet** then the BOM will spill over onto a new sheet with an empty iso border. On the other hand, if it’s set to **Split the drawing** then the iso engine will attempt to break up the pipeline differently, creating two smaller sheets with a BOM that fits into the given constraints. If the style that you are editing is a spool style, then the table overflow options are grayed out because they do not apply.
The **File naming** area provides a way to customize the file naming convention used by the iso engine. Properties can be selected from the **Add property** dropdown and are added to the **Prefix** textbox. Notice that each property is enclosed with % characters. The **Suffix** dropdown gives an option for numeric or alphabetic sheet identification. The value in the **Delimiter** textbox controls only the delimiter between the prefix and the “suffix”.

The **Spool naming** setting is to the right of the **File naming** settings. A dropdown provides a variety of options for the naming convention that’ll be used. The **Spools** areas controls the split method for pipe spools. Splitting can be based on a given cube size, by weight, or by model property. When the sizing method is set to use the spool number from the model, the spool naming convention must also be set to use the same otherwise issues will be encountered.
The last area on this settings page is the **Paths**. The production iso path and the quick iso path can be configured independently of one another and they can be stored outside of the core project environment if desired.

**Iso Style Default Settings**
This page controls the default output settings that are configurable every time an iso is created within Plant 3D. The basic options in the **Create Production Iso** dialog and the advanced options in the **Advanced Iso Creation Options** dialog can all be controlled here. These should be configured so that the end users don’t have to worry about setting the options each time they create an isometric drawing. However, for better or worse, there is no option to prevent the end user from changing a setting should they feel the need. There are also settings to control the default data formats, toggles for the various dimension types to be included, and toggles for the desired table outputs for the drawings.
Customize Your AutoCAD Plant 3D Isometric Configuration

**Figure 26: Create Production ISO Dialog**

**Figure 27: Advanced ISO Creation Options Dialog**
The **Model placement adjustments** are of importance when isometric deliverables are required to reflect the state plane coordinates instead of plant coordinates. At present the rotation, x-offset, and y-offset can be specified to align the isometrics to the state plane coordinate system. Be sure to model pipe at the actual elevation required on the isometric drawings because that cannot currently be manipulated with this feature.
Annotations
This page contains all of the basic settings for the automatic annotations on the isometric drawings. Enclosure and leader styles, planes, and expandable enclosures are selectable for bills of material, spools, cut pieces, valve tags, and welds. Bills of material, welds, and cut pieces also have an indexing option to specify numeric or alphabetic identification. Monikers for flanges, gaskets, bolts, x-direction, y-direction, and elevation can be set in their respective textboxes. There is also a section for toggling various continuation and connection callouts and to customize the text that is displayed. Finally, the general text size for annotations can be set in the adjacent textbox.

**Figure 29: Annotation Settings**
**Dimensions**

This page handles the general dimension settings that apply regardless of the theme. The text size to use with dimensions should be set on this page. It can be configured independently of the annotation text size if desired. Each valve type can be configured to dimension from the center of the valve or from end-to-end. Gaskets can be included with the adjacent component, dimensioned individually, or excluded from dimensioning. Dimension spacing is controlled in the Offsets area. Both the initial offset distance and the stacking distance are configurable. The **Show reference dimension** toggle prevents the final string dimension on a line from being show when overall dimensions are turned on for the default dimensioning theme. The **Do not overconstrain string dimensions** toggle does the same exact thing, but for the other dimensioning themes. The final two settings control the pipe sizes included with small bore piping and whether or not the existing piping theme should include another type of pipe, such as demolition.

**Figure 30: General Dimension Settings**
Themes
This page is where the iso themes are configured. A big component of each theme is the dimension settings. The extreme flexibility of the dimensioning system makes it very powerful, but also a bit intimidating. Each theme is selectable via the drop-down in the upper left corner. All of them have their own group of settings which include whether or not the theme is enabled, the symbol scale, whether or not dimensions, annotations, and/or a BOM are shown, the enabled dimension types, and fine-grained control over the dimension sub-types. A diagram is provided in the upper right corner to give you a general idea for the enabled dimensions. There are a lot of settings available on this page. It is best to spend a lot of time exploring the behavior of each toggle to fully understand the impact of turning each one on or off.

![Figure 31: ISO Theme Settings](image)

<table>
<thead>
<tr>
<th>Display</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>Dimensions</td>
</tr>
<tr>
<td>Annotations</td>
<td>Symbols 0.75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimension types</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>End to end (overall)</td>
<td>String</td>
</tr>
<tr>
<td>Blind Flanges and...</td>
<td>Off</td>
</tr>
<tr>
<td>Inline branches</td>
<td>Center</td>
</tr>
<tr>
<td>Inline instruments</td>
<td>Off</td>
</tr>
<tr>
<td>Miscellaneous fittings</td>
<td>Off</td>
</tr>
<tr>
<td>Olets</td>
<td>Off</td>
</tr>
<tr>
<td>Pipe supports</td>
<td>Off</td>
</tr>
<tr>
<td>Reducers</td>
<td>Off</td>
</tr>
<tr>
<td>Valves</td>
<td>Off</td>
</tr>
</tbody>
</table>

| Field welds | Off |
| Blind Flanges and... | Off |
| Inline branches | Center |
| Inline instruments | Off |
| Miscellaneous fittings | Off |
| Olets | Center |
| Pipe supports | Off |
| Reducers | Off |
| Valves | Off |
**Sloped and Offset Piping**

Controls for the display of sloped pipe and piping offsets are shown on this page. There are a variety of choices for slope callouts in the drop-down in the upper left. The max slope angle to call out is set directly below the drop-down. Offset callout options are to the right and include the amount of the offset triangle to hatch and the monikers for horizontal and vertical that show in the annotation. The overall look is controlled in the **Offset Piping** section. Each of the 3 options for 2D offsets, 2D sloped pipe, and 3D rolled offsets have pictures for each option that show a good depiction of the final output for each situation.

![Sloped and Offset Piping Controls](image)

**Figure 32: Slope and Offset Settings**
Title Block and Display
The title block settings page provides a preview of the title block that is specified in the drawing template path. There is also a button to launch into title block setup. This will be covered in more depth in the next section of this handout.

A couple of other random display settings appear at the bottom of this page. The look of elbows and bends is controlled with the two drop-downs. Each can be either square or round. To the right of these are the toggles to display insulation and pipe supports if required.
Live Preview
This is a very cool feature that comes in handy when tweaking the iso configuration using the user interface. After each change is applied, switching over to this page triggers an iso to be generated and shown in the viewing window. The iso that’s created is based on the PCF file path provided in the only setting on this page. The sample PCF shows a lot of variety, but a custom one can always be put in its place.

On occasion, the preview will fail to generate. If this happens, click OK to close out Project Setup and to force all of the changes to be synced into the IsoConfig.xml. Re-open Project Setup and the preview will generate.

Figure 35: Live Iso Preview Page
**Title Block Customization**
Title block customization is pretty straightforward, but as always there are a couple of “gotchas” here and there. This section of the handout will walk through the various steps involved with setting up and customizing an iso title block.

**The Template File**
The template for creating new drawings is the Iso.dwt file. It is located in the iso style folder that resides in the Isometric folder of the project structure. The template contains the layers, text styles, dim styles and drawing areas that are used when generating the drawing. To get started, open **Project Setup**, then go to **Isometric DWG Settings, Title Block and Display** and then click on the **Setup Title Block...** button. This will open the Iso.dwt file and set the **Title Block Setup** contextual tab as the active tab in the ribbon. All of the tools required to set up the areas, tables, attributes, and themes are on this ribbon tab.

![Isometric DWG Settings](image)

**Figure 36: Title Block Setup Contextual Tab**

Aside from the tools, the most important thing to note is that this drawing should only contain a block that is named “Title Block”.

![Iso.dwt Title Block Name](image)

**Figure 37: Iso.dwt Title Block Name**

**Important note:** Blocks not named “Title Block” in this file will be deleted the next time that the Iso.dwt template is opened using **Project Setup**. Working with blocks that have other names is possible but requires some workarounds.

**Drawing Area**
On the left side of the **Title Block Setup** ribbon tab is the Isometric Drawing Area pane. Draw Area, No-Draw Area, and Area Visibility are the three tools. Start by defining the draw area. This will appear as a green hatched area once it is placed. No-Draw areas define areas that overlap the draw area that should remain blank. This is usually used to identify the north arrow location, where a table overlaps the draw area, or for general notes. Area visibility can be toggled on/off with the respective button.

**Important note:** It is best to pull the draw area back from the outer edges of the true draw area to prevent annotations from extending outside of the printable drawing area.
Tables

The hatch areas for the four different tables, Bill of Materials, Cut Piece List, Weld List, and Spool List can be placed using the respective buttons.

Clicking Table Setup launches the Table Setup dialog. The layout of the four table types can be tweaked on the Table Layout tab. The table type is selectable from the drop-down in the upper right corner of the dialog. Columns can be added to the layout by clicking the Add Column… button. Column order can be arranged by clicking on the column header and then dragging and dropping it into position.

Figure 38: Table Setup Dialog
The bill of materials table has two special options associated with it. The first is a checkbox to use a single column for schedule and pressure class. When checked, the software will reconcile the two attributes and place the proper value in that column. The second is the layout method. The layout can be a simple materials list, a material list with like components grouped under a component title, or a material list with like components grouped, each group having its own set of columns.

The settings tab in the Table Setup dialog contains several miscellaneous bills of material settings. Going from top to bottom the list contains sort control, separation of fabrication and erection items, cutback elbow settings, fixed length pipe settings, and description settings.
North Arrow

The next pane contains a single button to place the North Arrow. The North Arrow is a dynamic block which can be configured to point to any of the four corners of the page. The iso will be arranged on the drawing according to the direction that is selected for the North Arrow.

![North Arrow Options]

**Figure 40: The North Arrow Dynamic Block Options**

Attributes

Continuing to the right in the Title Block Setup ribbon tab, next up is the Attributes panel. Clicking on the Title Block Attributes button will launch the Insert Title Block Attributes dialog. This dialog provides options for placing new attributes that are linked to project data and for mapping existing drawing attributes to project data. Additionally, it provides a mechanism for linking an external line list into the project. Once linked, the data in the line list essentially becomes project data and can be used to populate drawing attributes.

The first step to place new attributes into the drawing is to select the Attribute category from the drop-down. The categories list will show any custom general categories, custom drawing properties, line group properties, and, if configured, external line list data. Once a category is selected, the Attribute names list is populated with the available properties.

To place and attribute, select it from the list, pick a text style, a justification, and enter a text height and click the Place button. Place the attribute on the title block and then repeat the process until all required attributes are in the Title Block.
If the title block already contains attributes to place information, then the Plant 3D data can be mapped to the existing attributes. There’s no need to delete them all and start over. Clicking the Map attributes... button opens up the Map Title Block Attributes dialog box. This box provides a list of the available attributes in the “Title Block”. For each attribute in the list, a drop-down is provided in the right column that has a list of available Plant 3D properties. Selecting a Plant 3D property will map the project data to the block attribute in the drawing.
The **LDT Setup** tab provides the means to link in an external Line Designation Table otherwise known as a line list. The line list must be in Excel xls or xlsx format in order to be linked. An empty sample line list is included in the class dataset.

Before using a line list in a Plant 3D project it needs to be prepped. To prepare the line list each column will need to have a unique identifier. If this criterion isn't already met, insert a new first row and create one an identifier for each column. The second requirement is a column that matches the format of the line number tag that is used within the Plant 3D project. If necessary, add a new column and create a formula to build the tag or educate the engineer on how to enter the data. Once these two requirements are met, the line list is ready to use with isometrics.

To link the line list into the project click the ellipsis button to the right of the **LDT file (XLS)** textbox and then browse to the line list Excel file. If more than one worksheet is present in the line list document, select the correct one from the drop-down list. Next, select the number of
the header row that contains the unique identifiers in the line list. Finally, select the name of the column that contains the line number tag information.

![Line List Settings Tab](image)

**Figure 43: Line List Settings Tab**

Setup is now complete and the line list data is linked into the project. Line list data can now be placed or mapped to the title block. If everything is populated correctly in the Excel sheet, then data from the line list will come through on the isometric drawings when they’re created.
The last stop on this guided tour of the Title Block Setup ribbon tab is the Themes panel. Once again, a single button resides on the panel. Clicking the Iso Themes button launches the Iso Themes dialog box which is used to configure the default and override settings for the themes.

The Default Theme tab has the Default Styles settings on the left and the Layer Setup on the right. Under Default Styles the dimension, multileader, table, and text styles can be selected from their respective drop-downs. The buttons to the right of each drop-down launch the respective AutoCAD configuration utility so that the styles can be tweaked. For consistency’s sake, the selected styles apply to all of the iso themes.

The Layer Setup on the other hand, can be configured differently for each iso style. The Default theme settings are on the Default Theme tab while all of the other style’s layer settings are on the Override Theme tab. To assign an iso component to a layer simply select the appropriate layer from the drop-down that is adjacent to each component category. Be sure to go through the settings for all of iso themes to make sure components appear on the proper layer.
Advanced Customization

So is that all? Nope. There are still a lot of options that aren’t exposed through the Project Setup user interface.

File Structure

The top level of the isometric file structure is housed in the Isometric folder in the project workspace. There are 5 files at the top level:

- BoltSizeMappings.xml - Imperial to Metric bolt size conversions
- IsoSkeyAcadBlockMap.xml - AutoCAD block name to isometric SKEY mappings
- IsoSymbolStyles.dwg - Contains all of the 2D symbology used on isometric drawings
- Plant3dIsoSymbols.dwg - Contains the 3D blocks for isometric items used in piping models
- PropertyTranslationMapping.xml - Mappings that force the iso engine to swap out a given text string with another

The content of these files is used by every iso style that resides in the project. In other words, additions or changes to one of these files affects every isometric drawing.

The iso style folders contain a few more files that are unique to the individual style. Here they are:

- ClientConfig.isf - Contains output paths, the line list linking info, and a couple other misc. settings
- IsoConfig.xml - The main configuration file for the iso style
- Iso.dwt - The isometric drawing template
- Iso.atr – Lists title block and BOM attributes
There are also a few files that are created on the fly when an isometric drawing is created by the iso engine:

- IsoCreationLog.txt – Log file that contains output from the last iso run
- PipelineReferenceMap.xml – Contains the pipeline information for the last pipeline created during the previous iso run
- PipelineSettings.xml – Contains various units settings

**XML Editors**

Before digging in to direct editing of the iso configuration files, a good XML editor is required. Here are three examples that are very good and best of all, free! Any of these editors will provide a much better experience than using Windows Notepad.

The First Object XML Editor is quite nice, but it does require some preferences tweaks to the tree customizations to take full advantage. Once it’s set, it’s good to go though and will meet the requirements of most users. A settings.xml file is included in the dataset along with instructions on where to copy it after the software is installed.

Notepad++ is a great, all-around, open-source editor. It’s not specifically designed with XML in mind, but it does support code highlighting and tree folding, both helpful features. The biggest thing that Notepad++ has going for it is the plug-ins, especially the compare plug-in. This performs a side-by-side comparison of two files and allows all differences between them to be navigated easily.

The third offering is the Visual Studio Code editor, a new editor designed specifically for coders. Microsoft essentially pulled the editor out of Visual Studio for everyone to use. It has syntax highlighting and code folding.

**Let’s Dive Deeper and Look at Some Real Examples!**

Alright, so a lot of ground was covered so far. The basics of creating an iso style were explained and the coverage has gone a bit deeper and explored iso configuration inside of Project Setup. The files involved in advanced configuration were touched on, but what about specific problem solving and real world examples? What are the true capabilities of the iso engine? What can really be done with it? Is there anything to watch out for? Well now it’s time to dive in and answer some of these questions! The following case studies come from real world requests and scenarios encountered over the past several years.

**My Users Always Pick the Wrong Iso Style!**

It always seems that no matter how much time you spend educating the users, they always manage to muck things up in one way or another! Believe it or not, a frequent problem for us when it came to isometrics was the simple act of getting them to pick the right iso style!

Up until now, the default iso styles liked to hang around in the project. Try to delete them and they always managed to pop back into the project when it was re-opened. There were a couple of tricky workflows out there that attempted to circumvent this “functionality”, but they weren’t foolproof and I didn’t have much luck with them in my experience. Now with the 2016 release, the default iso styles can be deleted from your project and they won’t come back! The available iso styles are now easily controlled and your users can be limited to the choices that they should use.
**Important note:** In order to maintain the live preview functionality in Project Setup, be sure to keep the ‘Live Preview’ folder in addition to the iso style folders that you wish to keep.
Configuring Isometrics to Use a Client Title Block
More often than not, when configuring a Plant 3D project for a client, the isometric template will also need to match the client’s seed file. Sometimes there are multiple blocks in the client’s seed file and even if there is only one, rarely is it ever named “Title Block”. So what do you do? First, try pushing back on the client a bit. A lot of times they treat isometrics as disposable documents and they don’t care how the digital file is configured as long as it looks correct. Other times, you won’t be so lucky, so now what?

You’d think it should be as simple as pointing the dwt path at the client dwt and then using Project Setup to configure the title block, right? Nope. As mentioned before, any blocks that aren’t named “Title Block” are deleted when the Iso.dwt is opened through Project Setup. There are ways around this, but it’s tedious. Here are the methods that I use for client title block integration.

Title Block Consists of a Single Block with Different Name
In this case, the client title block is a single block, it just has a different name. To make it play nice with Project Setup RENAME the block from its current name to “Title Block”. At this point, continue as normal. Open the iso.dwt through Project Setup, delete and purge the existing block, and then bring the new one into the file. Make adjustments to page setups, viewports, drawing limits, and then configure the drawing areas, tables, themes, etc. The catch with this method is that the “Title Block” will need to be renamed back to the client’s block name prior to turning the isometric drawings over to them. Using a batch script works well and isn’t difficult.

FIGURE 47: RENAME DIALOG
**Title Block Contains Multiple Blocks**
The other case is a client title block that is composed of multiple blocks. The method that I use in this case starts with opening the client seed file directly, that is, outside of the Project Setup interface. Once open, select everything that makes up the client’s title block and then turn it into a block using the BLOCK command. Be sure to name it “Title Block” and then save the file. At this point it can be brought into the iso.dwt and configured without issue. At the end, before turning the drawings over to the client, a simple EXPLODE reverts the file to the client title block setup.

**Figure 48: BLOCK Dialog**
Drawing size and its impact
Believe what you will, but size does matter! Yes, if you ask the iso engine, bigger is definitely better! A bigger drawing area that is! The deliverable size for isometrics is typically a B-Size drawing. By the time the title block area and tables are taken into account the final draw area is only between a third and a half of the total space. Start adding in no-draw areas on top of that to accommodate the North arrow and general notes and then even less space is available.

The small drawing area can lead to a few different outcomes. First, there can be absolutely no issues whatsoever and everything may work perfectly for a given set of pipelines. In my experience this was the case on small projects with small pipe runs, but only about 75% true on large projects with very long pipe runs.

The second scenario is that a pipeline may iso, but it will have an excessive number of sheets. With little room to work with, the iso engine will break the pipeline up more than it really needs to. The MaxDirectionChanges and CongestionLevel settings in the IsoConfig.xml can be tweaked to try to force the iso engine to cram as much as possible onto a sheet, but they only help so much.

![Figure 49: Example Draw Area](image)

![Figure 50: MaxDirectionChanges Attribute of the Spool Element](image)
Third and most extreme, is that the iso will not run. The iso engine will try to figure out how to arrange the pipeline in the allotted drawing area, but it entirely possible that the iso can outright fail due to the space constraints. Even if the iso doesn’t outright fail, it can fail due to reaching the timeout limit. When an iso is created in Plant 3D, it will process in the background for up to 30 minutes. After 30 minutes, the timeout limit is reached and Plant 3D kills the iso creation task.

To get around these issues our approach is to use a D-size or 22x34 sheet size. The extra area works wonders on pipelines that are hundreds or thousands of feet in length. The iso engine does not have nearly as many hiccups and we encounter fewer timeouts and a lower number of total sheets than with a B-size border. In order to achieve a good looking 11x17 deliverable for our clients, the text size for dimensions and annotations is doubled in the iso style configuration. The final prints are then done at full D-size in the PDF’s as well. If printouts are required, then the PDF’s are printed at 11x17 to give to the client.

Custom Drawing, File, and Spool Names

By default the IsoConfig.xml names the drawing and file based on the PIPELINE-REFERENCE which is the pipeline’s tag in Plant 3D followed by a dash (‘-’) and a single digit sheet number. This output isn’t locked down by any means. Both the drawing name and filename can be customized using various properties from the model, independently of one another.

The names consist of three components, a prefix, a sheet or spool number, and a suffix. The prefix can be comprised of any number of pipeline properties, each with its own appended delimiter. The sheet and spool numbers are numeric or alphabetic indices to represent the sheet or spool. However, for single sheet isometrics, the field is always blank. The suffix is built exactly like the prefix and can consist of any number of pipeline properties with preceding delimiter.

**Project Setup**

**Project Setup** provides a method of changing only the file naming convention and to be completely honest the implementation was poorly done. The interface allows properties to be added to the prefix by selecting them from the dropdown. Alternately, they can be keyed in by typing the property name enclosed in % characters in the textbox. The delimiter box provides a means to enter a delimitation character, but it only applies to the last property entered into the prefix box. The suffix drop-down isn’t actually the suffix at all, but rather is the type of sheet numbering that you prefer. Numeric or alphabetic are selectable, but the number of characters to use is not.
To get more flexibility and control over the drawing and file naming conventions I recommend that you skip **Project Setup** and go straight to the IsoConfig.xml.

The **FileNameFormat** and the **DrawingNameFormat** sections of the configuration are identical with the exception of the main element name. There is one attribute on the main element, the boolean **UseSpoolNameAsFileName** attribute. This only comes into play for spool iso styles. Setting it to true uses the spool name defined in that configuration instead of using the file or drawing name settings. For standard isometrics, the attribute should be false.

The **PrefixModelProperties** element contains one or more **ModelProperty** elements. Each **ModelProperty** element has two attributes, one to reference a model property by name and another to specify the delimiter that comes immediately after the property.

The **SheetNumber** element contains 3 attributes. The **AutoLabelOption** can be either “Number” or “Alphabet”. The **NumberOfDigits** attribute only applies when **AutoLabelOption** is set to “Number” and it represents the total number of digits used to show the sheet number. Leading zeroes are used to fill in extra digits to the left of the sheet number if required. For example, if **NumberOfDigits** is set to 3 and the sheet number is 2 then the output on the drawings will say “002”.

The last element of the **FileNameFormat** is the **SuffixModelProperties**. This is set up the same way as the **PrefixModelProperties**. Adding **ModelProperty** elements to the suffix element will append values after the sheet number. There is a slight difference in the handling of the delimiter though. For the suffix, the delimiter precedes the model property whereas in the prefix it came afterwards.
The **SpoolNameFormat** is only used on spool isometric styles. The element is very close in structure to the drawing and file name sections. In fact, the **PrefixModelProperties** and **SuffixModelProperties** elements are identical in setup and behavior. There are two key differences though.
The first difference is that there are two attributes on the SpoolNameFormat element, Prefix and Suffix. These are both strings which are prepended and appended, respectively, to the spool name. For example, if all spools should begin with “MK-” then that would be the Prefix attribute value.

The other difference is the SpoolNumber element that appears in place of the SheetNumber element. This element drives the spool names on the isometrics. This can be done either automatically or manually in Plant 3D.

To use automatic naming, the option to create spools based on cube size or weight must be enabled. When these items are set, the UseModelPropertyAsSpoolName attribute is set to false and the iso engine uses the AutoLabelOption, NumberOfDigits, and StartFrom attributes to assign the spool names.

To use manual naming, the iso configuration must be set to use the spool number from the model. In this case, the UseModelPropertyAsSpoolName attribute is set to true. The SpoolNumber element then relies on the value of the ModelPropertyForSpoolNumber attribute to pull data from the model for the spool number. The attribute must be populated by the designer for this method to work.

```xml
<SpoolNameFormat Prefix="" Suffix=""/>
<!-- Properties included in the spool name prefix -->
<!-- PrefixModelProperty contains one or more ModelProperty elements. -->
<PrefixModelProperty>
  <!-- 'Name': (string); The model property name. -->
  <!-- 'Delimiter': (string); The delimiter. -->
  <ModelProperty Name="PIPELINE-REFERENCE" Delimiter=""/>
</PrefixModelProperty>
<!-- Sheet number format -->
<!-- 'AutoLabelOption': 'Number' or 'Alphabet' -->
<!-- 'Number' = numeric increment -->
<!-- 'Alphabet' = alphabetic increment -->
<!-- 'NumberOfDigits': (decimal); Number of digits. -->
<!-- 'StartFrom': (decimal); The number or alphabet the auto label starts from. -->
<!-- 'Name': (string); spool number name -->
<!-- 'StartFrom': (string); which number or alphabet the auto label starts with -->
<!-- 'UseModelPropertyAsSpoolNumber': 'true' or 'false' -->
<!-- 'true' = use the model property as spool number -->
<!-- 'false' = use simple numeric or alphabetic increment as spool number -->
<!-- 'ModelPropertyForSpoolNumber': (string); The property in the model. -->
<SpoolNumber AutoLabelOption="Number" NumberOfDigits="1" StartFrom="1" Name="SpoolNumber" UseModelPropertyAsSpoolNumber="false" ModelPropertyForSpoolNumber="SPOOL-IDENTIFIER"/>
<!-- Properties included in the spool name suffix -->
<SuffixModelProperty>
  <ModelProperty Name="" Delimiter=""/>
</SuffixModelProperty>
</SpoolNameFormat>
```

Figure 55: SpoolNameFormat in ISOConfig.xml

You can now see that there is a lot more to file, drawing, and spool naming than there seems on the surface through the Project Setup interface.
Custom Line Callouts – Simple, Yet Tricky at Times

Yes, the title of this section is 100% true. Custom line callouts can be either a piece of cake or they can be extremely difficult. To understand why this is, we need to look at the `LineNumberScheme` element in the IsoConfig.xml file. The `AnnotationStyle`, `Alignment`, and `LeaderStyle` attributes are all aesthetic and have no bearing on the difficulty. The key attributes are `Format`, `ComponentFormat`, `LineFormat`, `ComponentFields`, and `LineFields`.

Format defines the final layout of the line callout that shows up on the isometric. The {0} and {1} correspond to the `ComponentFormat` and `LineFormat`, respectively. They can be placed in any order and be separated by other text. The ‘\n’ character combination can be used to force a newline in the annotation if needed.

The `ComponentFormat` is built using {0}, {1}...{x}. Each represents a property from the `ComponentFields` attribute. `LineFormat` is similar, except that it is built using the properties that show up in the `LineFields` attribute. I know, this is a bit confusing, especially if you’re not used to writing code!

Let’s look at the example below and do a few substitutions to make sense of everything. The `Format` is {0}-{1}. Substituting in the other attributes, we get `ComponentFormat-LineFormat`. Going a step further and substituting again, we end up with `ComponentField0-ComponentField1-LineField0`. Now by doing a final substitution the result is `SIZE-PIPINGSPEC-PIPELINEREFERENCE`.

```xml
<!-- Line Number annotation scheme -->
<!-- 'Name': Unique Identifier. -->
<!-- 'AnnotationStyle': (string); Used to generate annotations. -->
  If a block annotation style is used the attribute tag must be set in the Tag field. -->
<!-- 'Alignment': (string); Can be 'FlatHorizontal', 'FlatAligned', or SpreadAligned. -->
<!-- 'Positioning': Can be 'Anywhere', 'Above', or 'Below'. -->
<!-- 'LineFields': (list of strings): PipeLine attributes, POF header info. -->
<!-- 'Format': (string); Line properties formatting string. -->
<!-- 'ComponentFields': (list of strings): Component properties such as spec, size, etc. -->
<!-- 'ComponentFormat': (string): Component properties formatting string. -->
<!-- 'Format': (string): Line and component formatted properties combined format. -->
<LineNumberScheme Name="LineNumber" AnnotationStyle="Standard" Format="{0}-{1}" Alignment="FlatAligned" LeaderStyle="NoNeeded" ComponentFields="Size PIPINGSPEC LineFields PIPELINE-REFERENCE" ComponentFormat="{0}-{1}" LineFormat="{0}" />
```

**Figure 56: LineNumberScheme in IsoConfig.xml**

The difficult part of this whole setup is that component and line fields cannot be easily mixed together. For a simple line callout, everything lines up nicely. Component fields are separate from the line fields and everything comes together in a simple fashion.
A more difficult, advanced line callout, if you will, is one where the component fields are intermixed with some of the line group fields. In these cases, the Calculated Properties Manager, which requires the PLANTDEFINECALCPROPERTIES key-in, comes in handy. An example of a more advanced line callout is:

Size-Service-LineNumber-Spec-InsulationThickness

There is no way to do this easily because Spec and Size are component fields and there are line fields mixed in between them.

To get around this limitation a new calculated property named LineSuffix is created on the PipeRunComponents class. A formula is used to form the part of the line callout that comes after the size. This is an effective way to combine a series of fields that cannot be done in the XML file.

The resultant property can be added to the Iso.atr file and pulled into the LineNumberScheme as a line field. The final line callout is then easily set up in the IsoConfig.xml file.

Just when you think you have your head around line callouts, a request comes in from so far out of left field that you find yourself asking “Why me?”! These ones really require you to tap into your ingenious nature and be creative! An example of a ridiculous line callout of this nature is:

Size-[MetricConversion]-Spec-Service-LineNumber-InsulationType-TracingType

To accomplish this, you need to jump through a few flaming circus hoops!
Step one is to create a new class property on the Pipe Run Component class in the **Plant 3D DWG Settings** in **Project Setup**. The new attribute will hold the data for the metric conversion of the Imperial size.

![Class settings: Pipe Run Component](image)

**Figure 59: Adding a Class Property**

Continuing on, there are a couple of options to get the metric size. Both of them boil down to doing a lookup using the Imperial size information in the model to get the metric size.
The first option is to use the **External Database Reference Manager** inside of Plant 3D. It can be launched using the `PLANTXDBMANAGER` key-in. Running the command will open the dialog below. Of course to use the utility, you need to have a database with a table that contains the Imperial to metric mappings. Microsoft Access or Microsoft SQL are good choices depending on your individual skill set. After the database is created, you can connect to it and then map the information to the new class property.

![External Database Reference Manager Dialog](image)

**FIGURE 60: EXTERNAL DB REFERENCE MANAGER DIALOG**

The details of how to use this utility are beyond the scope of this class, but there is an AU 2015 course, OG10334-L, that goes into it in detail if you’re interested.
The other option, which I must note is entirely unsupported by Autodesk, involves the creation of a table within the Plant 3D Piping database and some SQL magic to populate the attribute. To begin, create the table in the SQL database and then populate it with the mapping information.

![PipeSizeConversion SQL Server Table](image)

Now this is where things get a bit hairy if you’re not familiar with SQL. You need to write a SQL trigger that runs on the EngineeringItems table every time a record is inserted or updated. Nothing overly complicated, but more than enough to scare some of you into learning the other method I’m sure!

![SQL Trigger](image)
That takes care of new components and components being updated. To populate the new property on all existing components in the project you need to write and run a SQL update query on the `EngineeringItems` table.

```
UPDATE [Piping].[dbo].[EngineeringItems]
```

**Figure 63: SQL Update Query**

Now that all of the legwork is done, the `LineNumberScheme` can be built. Since the component and line fields are mixed together, you need a new calculated property to represent the suffix of the callout, basically everything that comes after the size. Add the new suffix property to the `Iso.atr` file, build the formats in the `LineNumberScheme`, and then test away.

**Custom Property Breakers**

Hopefully you’re beginning to understand how powerful the IsoConfig framework really is. There really is a lot that you can do with it. For property breakers, it’s common practice to indicate where spec changes occur on an isometric for a pipeline. But what about schedule or insulation type or tracing? These can all be added by creating a new `PropertyBreakerScheme`. To do this, copy the `SpecBreaker` scheme and give it a new name, such as `TraceBreaker`. After that change the value of the Field attribute to `TracingType`. Now the breaker flags will appear whenever the tracing changes on a pipeline.

```xml
<PropertyBreakerScheme Name="SpecBreaker" AnnotationStyle="SpecBreak" Tag="Left Right" Alignment="FlatHorizontal" LeaderStyle="AlwaysNonArrowed" Filter="SpecBreakItems" Field="Piping.SpecBreaker" DefaultAnnotationStyle="Standard" DefaultLeaderStyle="Always" WordWrapLimit="10" EnableMultiple="true" />
```

**Figure 64: PropertyBreakerScheme in IsoConfig.xml**

**Turn a weld list into a connection list**

Let’s say that you have a desire to more accurately track the labor estimate for the various piping connections on a project. There is a weld list, but you don’t really want it to be just a weld list. You want to track welds, threads, glue joints, etc. To do this you have to do a little digging into how the Weld list is getting the data. If you look in the Data section of the IsoConfig.xml you’ll see the `AggregatedLists` section. The `AggregatedList` named Welds is the one that we want. The `Filter` attribute on the `RowFilter` element is used to build the list which, in turn, shows up in the weld table on the isometric drawing. In this case the filter is called `Weld`. 
Now skip down to the Filter section near the end of the IsoConfig.xml file. Find the Weld filter. The Value attribute of the filter is a component query that is used on the model. The value here shows that only items with a “Type that is like ‘*Weld’” are considered. The ‘*’ serves as a wildcard.

To include more connection types in the Weld table, change the value to “Type LIKE ‘*Weld’ OR Type LIKE ‘Thread’ OR Type LIKE ‘Glued’”. Now when the iso is created all weld connections, threaded connections, and glued connections will appear in the list!

The INSTRUMENT Spec
Every project has its own collection of one-off specialty control valves and other items that are requested by the client or one of the many engineers on the job. Over time some of the same items get requested over and over again. Rather than reinvent the wheel every time one of these items is requested, we create them all in catalogs and then load them into a generic INSTRUMENT spec that is copied into every project that we do in Plant 3D.

For years, going back to our Isogen days, each of these items was indicated on our isometrics in the same fashion. A custom symbol based on the Isogen SKEY of “II??” with a capital ‘I’ added into the center of the box. This is not an out-of-the-box symbol in Plant 3D either so a new symbol must be created.

This is done by modifying the IsoSymbolStyles.dwg (ISS) file through Project Setup. To find the block to use as a template we first need to look in the IsoSkeyAcadBlockMap.xml file.
To create the new block, open up the ISS file, and find the Instrument-Inline block. Save a copy of it as AU-Instrument-Inline block. Now modify it to your liking, save, and return to Project Setup. Now add the name to a new entry in the IsoSkeyAcadBlockMap.xml file.

Each custom instrumentation component with the AU!? SKEY has a special symbol on the isometric drawing. However, there is a slight problem! Spec break flags are showing up on each side of the custom component! This is definitely not something that we want to show. Recall from above the information on the SpecBreaker PropertyBreaker Scheme. Looking at the element in the IsoConfig.xml shows that the breaker is generated based on the SpecBreakItems filter.

The filter needs to be modified to exclude components that have a spec equal to INSTRUMENT.
Customize Your AutoCAD Plant 3D Isometric Configuration

By adding an AND clause to the filter the spec flags are no longer generated at INSTRUMENT spec components.

```xml
<Filter Name="SpecBreakItems" Value="Type &lt;&amp;gt; 'FLOW ARROW' AND Type &lt;&amp;gt; 'BOLT' AND Type NOT LIKE '%Weld' AND NOT (Type='support') AND [FILTER SPEC] NOT LIKE 'INSTRUMENT'"/>
```

FIGURE 70: SPECBREAKITEMS FILTER IN ISOCONFIG.XML

One last step is required to get the items from the Instrument spec to show up in the BOM on the isometric drawings. Currently there is not a group for instruments so you have to add one to the Materials AggregatedList. Start by copying the Group element for PIPE and then tweak it to make it work for instruments. The Name attribute in both the Group element and the Label element are changed to “Instrument”. The RowFilter element is the most important item though. The Filter attribute must be set to a filter that will select only the instrument items from the pipeline. Luckily there is already a filter name Instrument that works for us.

```xml
<Group Name="INSTRUMENT" UseAlternateUnitsStyle="true">
  <!-- An expression that is used to filter which rows are included in the list -->
  <!-- for expression syntax. -->
  <RowFilter Filter="Instrument"/>
  <!-- List of 'Label' configurations -->
  <Labels>
    <!-- 'Label' : (string) -->
    <!-- The label of the group. Used only in table templates. -->
    <Label Name="Instrument"/>
  </Labels>
  <!-- List of columns to group rows by -->
  <Columns>
    <!-- 'name' : (string); Column name -->
    <Column Name="Category"/>
    <Column Name="Code"/>
    <Column Name="Description"/>
  </Columns>
  <!-- Specifies the sort columns and sort order -->
  <!-- 'SortBy' : (string); Contains the column name followed by a space and 'ASC' (ascending) or 'DESC' (descending). -->
  <!-- Columns are sorted ascending by default. Multiple columns can be separated by commas. -->
  <Sort SortBy="Type ASC, ConnectionSize ASC"/>
  <Precisions/>
</Group>
```

FIGURE 72: INSTRUMENT GROUP FOR MATERIALS AGGREGATEDLIST
Survive Constantly Evolving Piping Specifications
If your projects are anything like ours, then you know that piping specifications can be quite the moving target at times. As the piping specs evolve, some components are removed, some are added, and some are only tweaked. The tweaked items aren’t such a big deal because there are mechanisms in Plant 3D to assist with that. Adding and removing parts however, cause changes to the associated PnPID’s in the specs and, in turn, the model. The bigger problem is that some of the old parts still live in the model and short of deleting and redrawing, which could be a substantial effort, there’s no way to make sure everything is completely up-to-date with the spec.

The mismatches can cause a couple of issues with BOM’s on the isometrics. Duplicate line items with differing quantities and two size entries for a single line item are two that I commonly see. The solution to these issues lies in the aggregated list section of the IsoConfig.xml. To fix these two particular issues the Materials aggregated list requires modification.

The root cause of the duplicate line item issue is that the aggregated list is taking too many criteria into account when combining things. In this case the component’s code is the extra bit of information that is causing the issue. The code is generated from the component’s PnPID in the EngineeringItems table of the piping spec. If a component was removed and then re-added to a spec, then it will have a different PnPID, even if it is the exact same component. Removing the code from the aggregate list will force the software to combine like items based on category and description alone. This will cause the duplicate line items to be combined on subsequent iso runs.
For the second case, where multiple sizes are showing for a single line item, the opposite problem is causing the issue; too little information is being considered. The result is that two different sizes match up based on the data being combined. In this case, the Size of the items in question needs to be added to the equation. To resolve the issue a new Column element must be added to the component type that is combining incorrectly.

**Spool Drawings**

Streamlining fabrication is becoming more and more important as project schedules and budgets continue to get compressed. Creating spool drawings is an easy way to streamline the pipe fabrication and construction process in Plant 3D. Creating spool drawings can be as easy as copying an existing iso style and tweaking a couple of settings.

To begin, go through the process of copying your existing iso style. After you create the new style, check the **Spool format** checkbox, select a spool naming method from the drop-down, and select an automatic spool sizing method. At this point you’re ready to go. Each pipeline will be broken up and named based on the selected settings.
If the resulting output isn’t desirable, then you can go a step further to control the spooling output. Doing this involves manually adding a spool number to the components in the model. The spool iso style can be configured to use the spool number from the model to create the spool drawings. In Project Setup change the naming and sizing method to **Use spool number from model**. Setting these will also automatically change the **SpoolNameFormat** setting to use the model property as well. Once these changes are made, assign the spool numbers in the model and run the isometrics.
**Iso repeatability**

A frequent problem with isometrics is that they never seem to look the same from run to run. An evolving pipeline will inevitably have changes and these modifications make the pipeline appear completely different to the iso engine. There are a couple of different methods to make an attempt at managing this.

The first is to split a pipeline by property. The pipeline can be split by line number, service, spec, size, material or any combination therein. This can help by breaking up a pipeline at the same points every time. However, there is no guarantee that there will not be additional split points inserted by the iso engine in between the defined break points.

![Iso Splitting by Property](image)

**Figure 78: Iso Splitting by Property**

Placing manual split points is another method. These have been in Plant 3D for a couple of years now. Manual split points are objects that are placed on the pipeline by the designer to control where the iso engine breaks the pipeline and goes on to the next sheet. For the most part, these work pretty well. However, it was a toss-up as to which end the iso engine would choose to begin the isometric drawing. New in 2016 is the ability to also define the start point of a pipeline which fixes this issue. One other catch to using manual split points is that sometimes the iso engine flat out doesn't like how the designer split up the pipeline. In this instance the iso run will either fail outright or run until the timeout is reached.

![Start and Break Point Buttons in Ribbon](image)

**Figure 79: Start and Break Point Buttons in Ribbon**

Another new feature in Plant 3D 2016 is the ability to import split points into the model from a previous iso run. When an isometric drawing is created, two xml files that contain the start point and split points are also created now. These can be imported into the model using the Convert Split Points button in the Isometric Creation Results dialog. Once the split points are imported into the model, it is possible to recreate a single sheet from a multi-sheet isometric drawing. This makes clouding changes for a re-issue much more user friendly.
Isometric Drawing Management
Managing isometric drawings is not as simple as running a production isometric and letting Plant 3D take care of the rest. Variations in file naming and the total number of sheets can give you a headache down the road if you don’t carefully manage the drawings.

When an iso is created within Plant 3D, an entry is made for each file that is created. The entries appear under the pipeline number in the folder for the iso style used to create it. This seems cool, but what if the iso is ran again. Everything only works ok if no changes were made to the pipeline or the iso file naming configuration and the Overwrite if existing box is checked. There isn’t a cleanup process that occurs automatically in between iso runs on the same pipeline.

For example, let’s look at changes to a pipeline. This can result in single sheet iso’s going to multiple sheets. This is a problem because the old single sheet drawing is still in the tree because it is named differently than the multi-sheet counterpart. Another scenario is that a multi-sheet iso runs onto less
sheets. This is a problem because the 18th sheet on the last run is still out there. You can see how the isometric drawings folder can become a jumbled nightmare in short order.

The solution is to remove and delete iso drawings from the project prior to each run. To do this the user must select the drawings in the isometric DWG tree for the pipelines that are going to be created again. Right-click and then remove them from the project. Additionally, the user must browse out to the drawings folder on their c-drive or network location and delete them as well. This workflow will keep the drawings folder clean and save your users from pulling their hair out when it comes time to issue a work package.

![Figure 82: Remove ISO Drawing](image-url)
Automation
The API’s provided by Autodesk for Plant 3D allowed us to do some cool things over the past couple of years. Here are a couple of examples of workflow automation that we’ve accomplished in the past year.

**Manage Iso Title Blocks**
Populating iso title block can be a tedious process, especially when there are several thousand iso sheets to update. We tapped into the AutoCAD API to automatically populate the selected attributes with data for the users. With a couple of minutes of setup the designers are able to update all of their drawings for issue at once in less time than it would take to update a single drawing manually.

![P3D Property Editor](image_url)

**Figure 83: Custom Property Editing App**

**Fix Broken Linesets**
On rare occasion we’ve run into a situation where the relationship structure of a pipeline was broken and needed to be repaired. One large client project of ours had major issues with this problem. The resultant isometrics for the pipelines with corrupt relation data had one Plant 3D component per drawing sheet. We had header lines with 200+ sheets! We discovered that a way to fix this was to select all of the elements on a pipeline, set the Tag to unassigned, save, and then re-assign the line number. In effect, this forced Plant 3D to rebuild the relationship information for the pipeline. When the iso was re-created, it ran on 17 sheets; much better!
But, this is a very manual process. Due to the widespread nature of this problem on the project some 1200 pipelines needed to be fixed. To streamline the process we worked with Autodesk Enterprise support and they used the API to automate this process at the database level. This blog post appeared shortly after we received the code so that everyone could take advantage of the fix should they encounter the problem.

**Offload Iso Generation**

Another time eater on projects turned out to be iso generation itself. Using the Plant 3D API we were able to write a custom application to completely offload this process. The designers build linesets, groups of pipelines from their project, and push them off to a server for processing. When the job is complete they receive an email so that they can take a look at their isometric drawings!

![Figure 84: Custom Iso Generation App](image)

**Figure 84: Custom Iso Generation App**
**Additional Resources**

This handout is meant to be a reference, but it is by no means all-inclusive. There are a lot of other great places out on the Internet to find help with isometric setup and configuration. Here are a few that I find myself visiting frequently, some not only for isometric support, but for Plant 3D in general.

**De-mystifying AutoCAD Plant 3D Isometrics**
The Autodesk white paper, [De-mystifying AutoCAD Plant 3D Isometrics.pdf](#) is an excellent resource. It provides good information on iso symbology and blocks, themes, IsoConfig.xml layout, and a whole host of other topics.

**Autodesk Plant 3D General Discussion Forum**
Participation in the [Autodesk Plant 3D Discussion Forum](#) is a great way to find answers to your questions. Search functionality allows you to find existing posts that may solve your dilemma or give insight on a solution. If nothing is out there on your topic, post a question. Both Autodesk and community experts keep a constant eye on the posts and are always there to help out when needed.

**In-the-Pipes Blog**
[In-the-Pipes](#) is a Plant 3D blog that is maintained by the Autodesk product support team. The topics aren’t solely focused on isometrics, but there are some excellent posts that deserve a read.

**Autodesk Screencast**
New instructional workflow videos show up on [Autodesk’s Screencast site](#) every day. Chances are someone has done a demo concerning the problem that you’re currently facing. Better yet, become a contributor and help other users out!

**Autodesk University Website**
Visit the [AU website](#) and search for information on isometrics. There are quite a few classes over the past several years that have tackled this topic. Browse through the handouts, presentations, and datasets for ideas and solutions to problems that you encounter. There are even some recorded sessions to watch.