If you build it! You can pipe it in AutoCAD Plant 3D

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About the speaker

Quentin Contreras

Professional 3D Computer Aided Design Specialist with a solid understanding of process plant design utilizing 3D modeling software and piping and instrumentation diagrams. Quentin has worked for Autodesk since 2012 and an expert for AutoCAD, Plant 3D and P&ID. He has trained/instructed Computer Aided Design in educational/work environments

Learning Objectives

- Learn how to create or use existing solids that can be turned into custom parts to use in an AutoCAD Plant 3D drawing
- Learn how to use PLANTPARTCOVERT to convert blocks and add ports
- Learn how to add the converted custom parts to a catalog, and then add the converted parts to a spec
- Apply using the custom parts in an AutoCAD Plant 3D drawing, creating an isometric and ortho drawing to show functionality

Custom Parts?

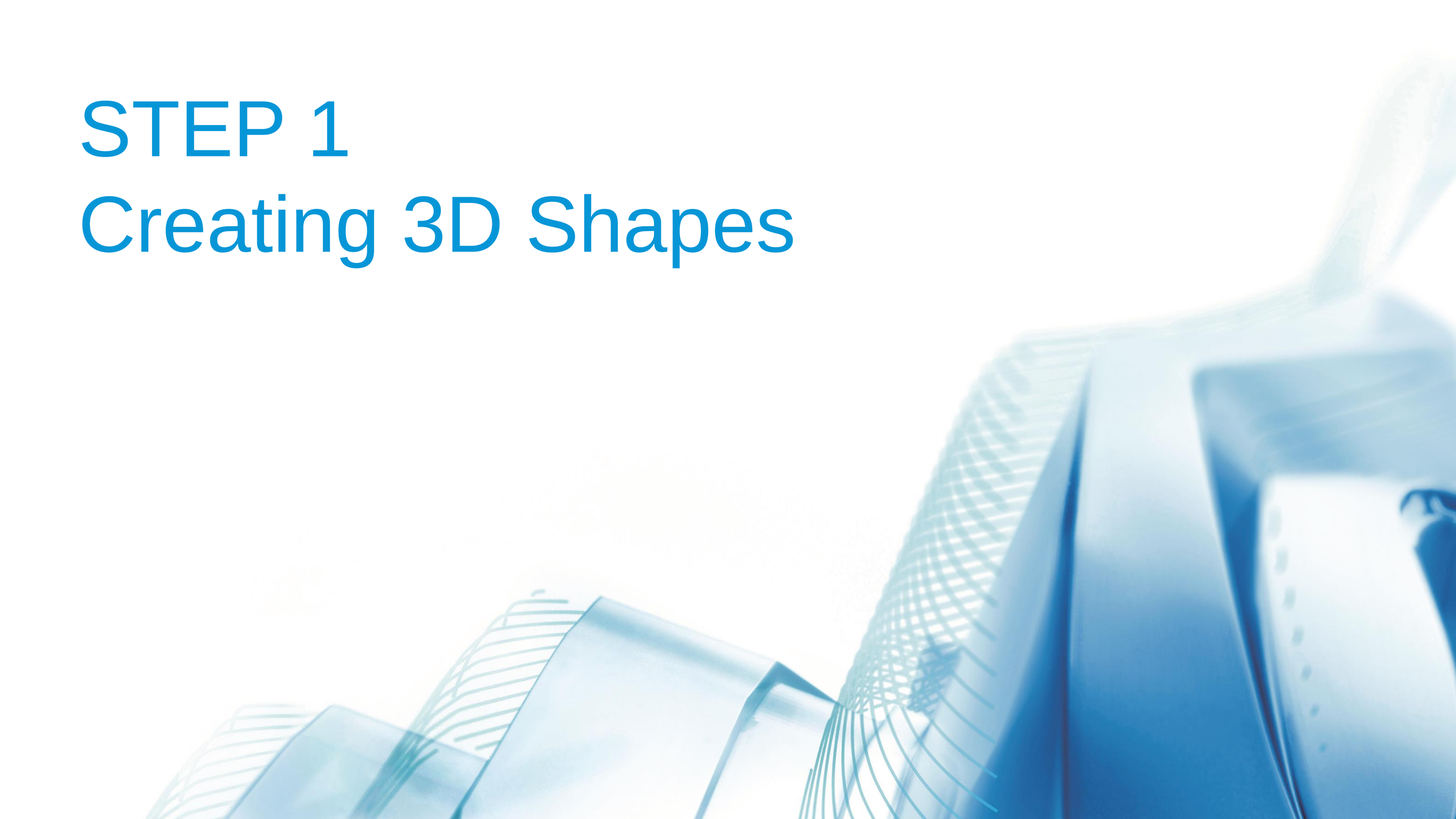
Create or use existing solids that can be turned into custom parts to use in an AutoCAD Plant 3D drawing.

Checklist:

Before we begin check to make sure you have and can locate everything you need for this lab.

- ❑ AutoCAD Plant 3D 2020
- ❑ AutoCAD Plant 3D Spec Editor 2020
- ❑ Drawing file (SS ASME Class 150 Ball Valves.dwg)
- ❑ Valve information Excel file (Valve List.xlsx)

STEP 1
Creating 3D Shapes

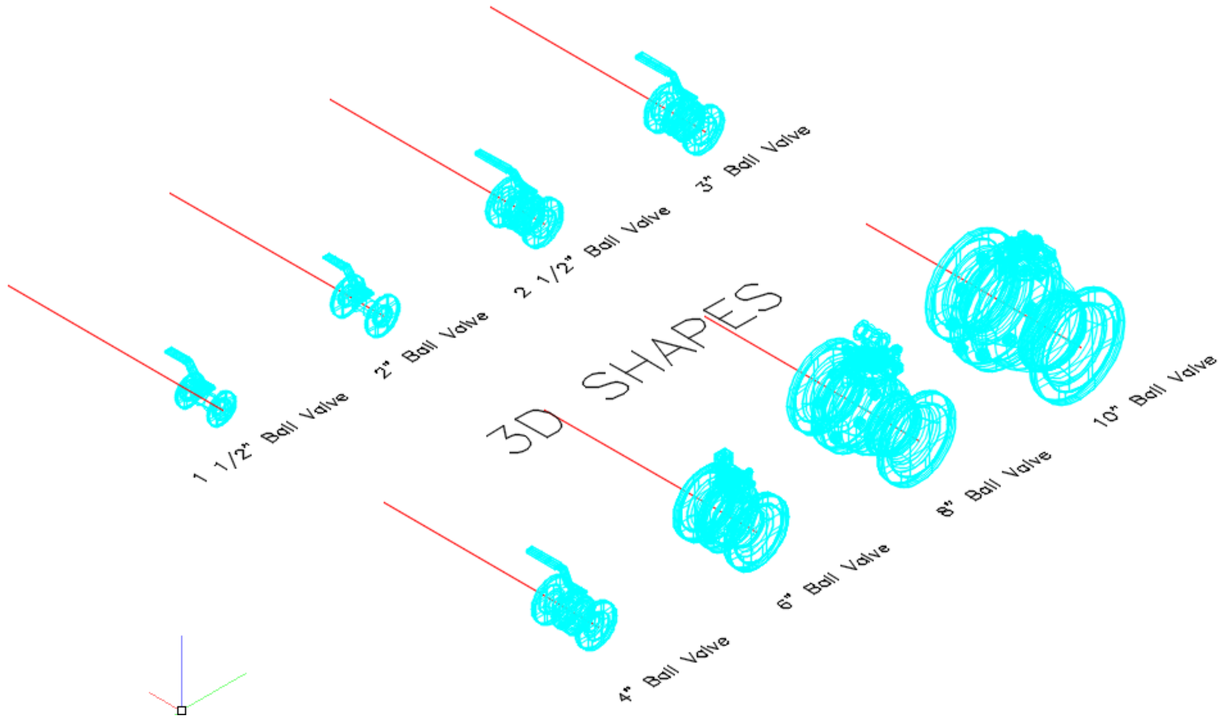


Creating 3D Shapes

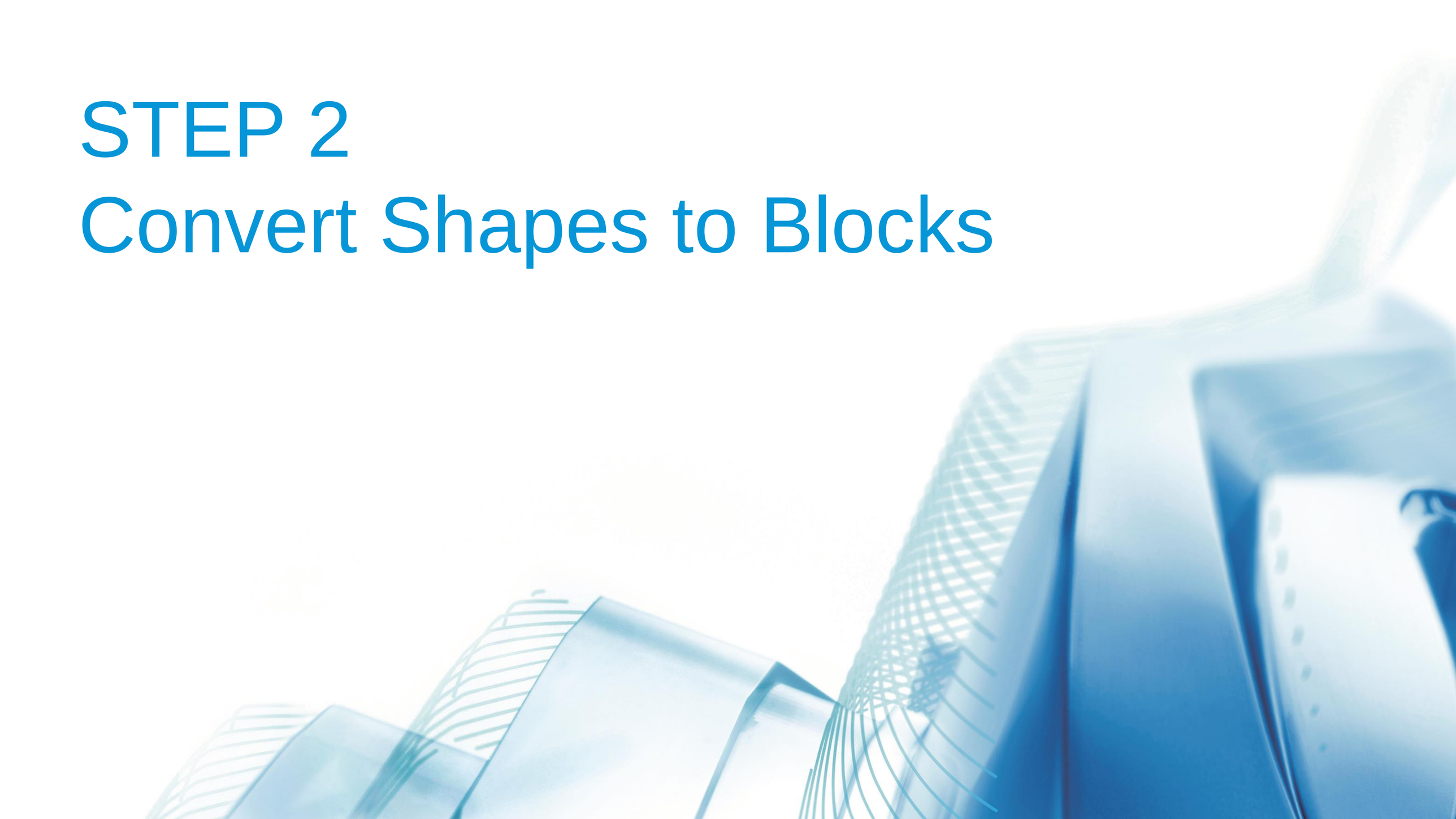
When you go to add a component to a catalog, the catalog editor is looking for a drawing file that has the blocks you want to add stored inside of it.

- Blocks stored in a single file.
- Acquired Shapes
  - Using AutoCAD solids
  - Another Source

1. Open AutoCAD Plant 3D 2020.
2. Open the provided drawing SS ASME Class 150 Ball Valves.dwg

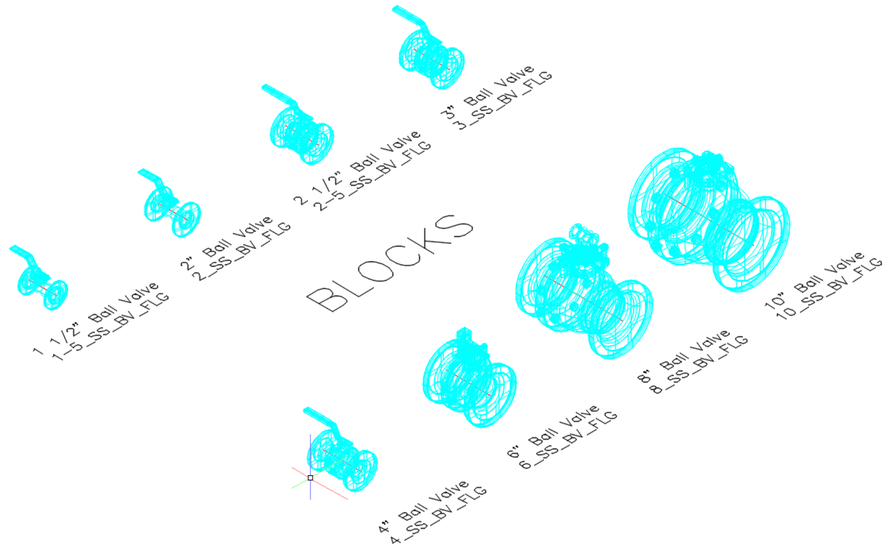


STEP 2
Convert Shapes to Blocks

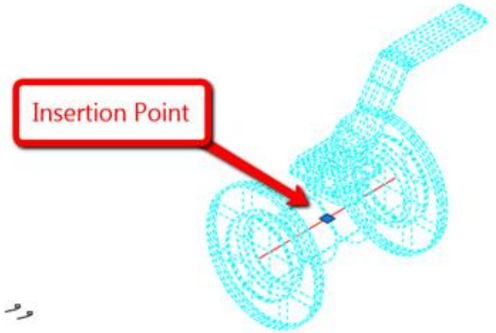


Convert Shapes to Blocks

1. Use BLOCK command to change shapes to BLOCKS (for this lab use the Block Names listed in the provided Excel file).
2. Covert all shapes to blocks (converting the 3D shapes to blocks will allow you to use PLANTPARTCOVERT).
3. When you create the block make sure to appropriately place the insertion point. For these valves, the insertion point will be placed in the middle center of the valve so that it inserts properly on the pipe.



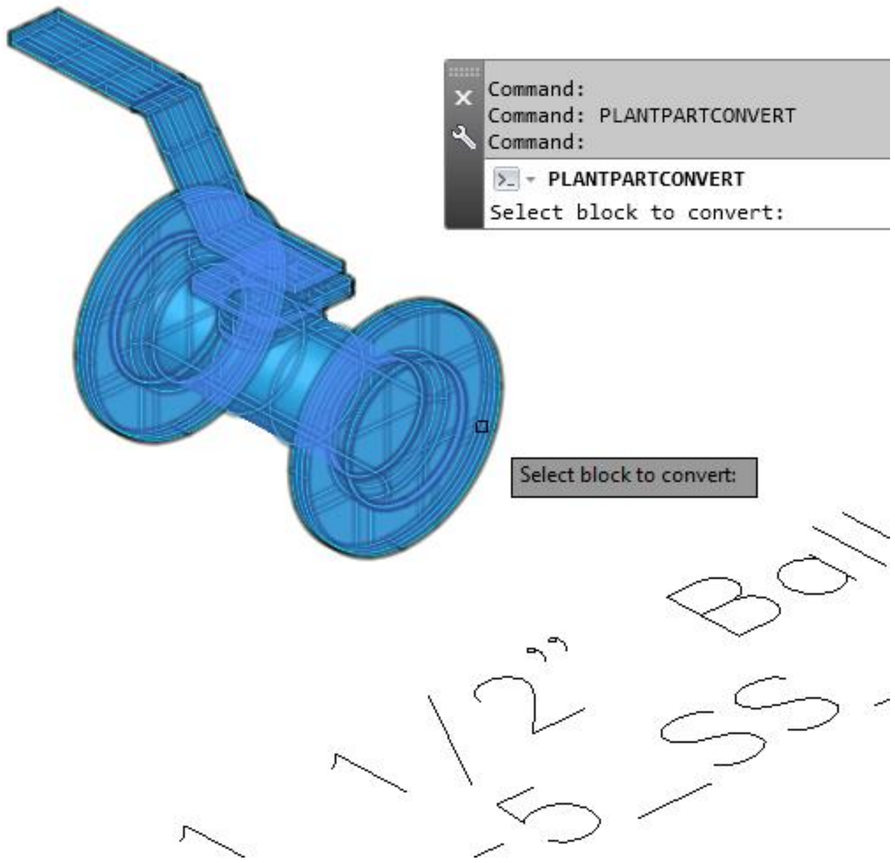
Block Name
1-5_SS_BV_FLG
2_SS_BV_FLG
2-5_SS_BV_FLG
3_SS_BV_FLG
4_SS_BV_FLG
6_SS_BV_FLG
8_SS_BV_FLG
10_SS_BV_FLG



STEP 3
PLANTPARTCONVERT

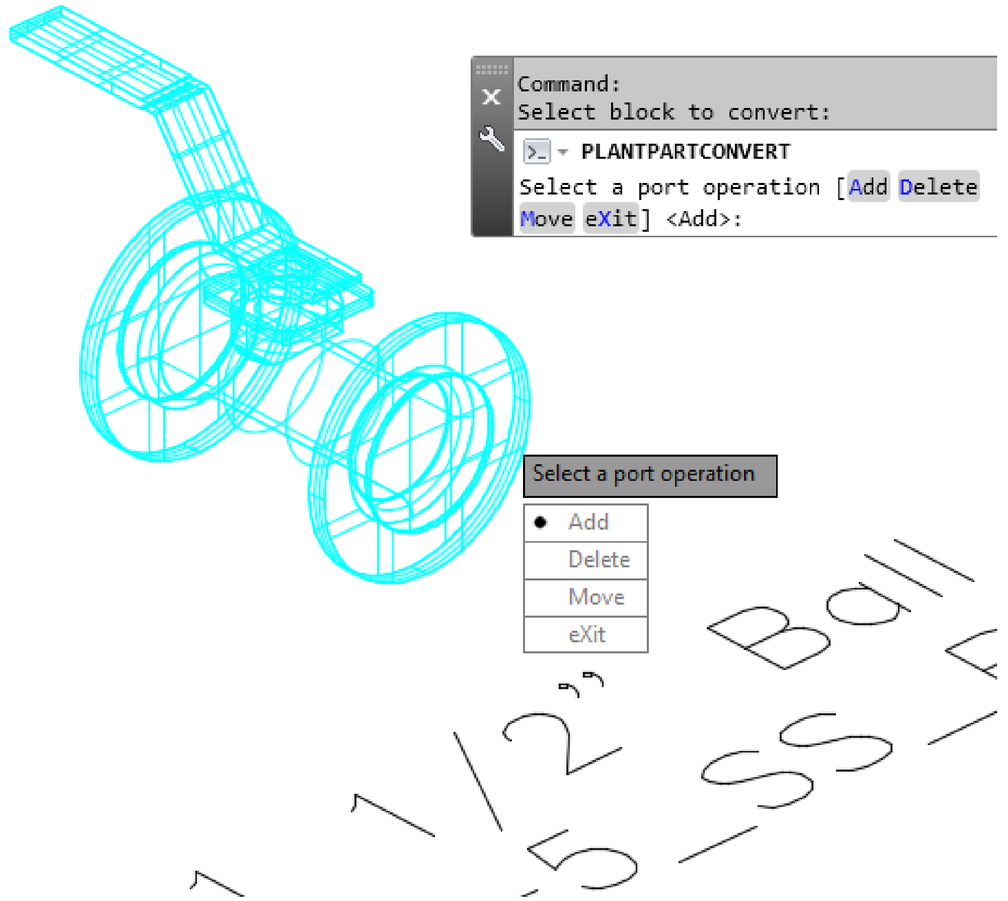
PLANTPARTCONVERT

1. Type in PLANTPARTCONVERT at the command line and hit enter then select the block to convert (start with the smallest valve first).



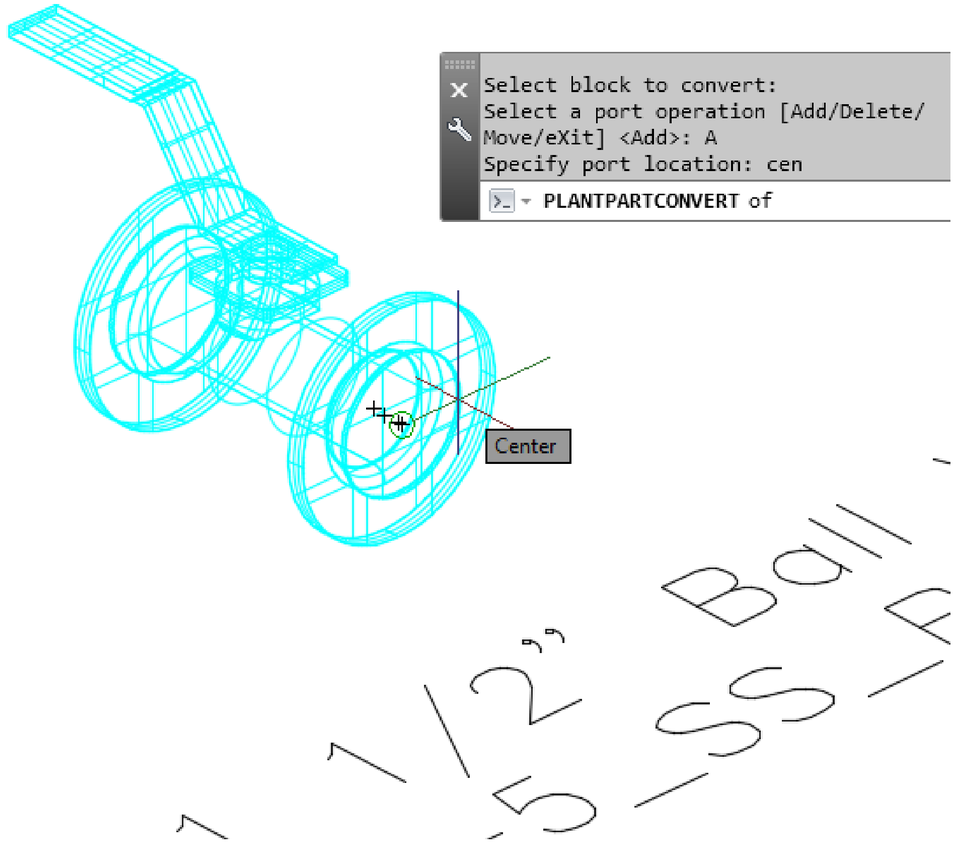
PLANTPARTCONVERT

2. Choose Add a port.



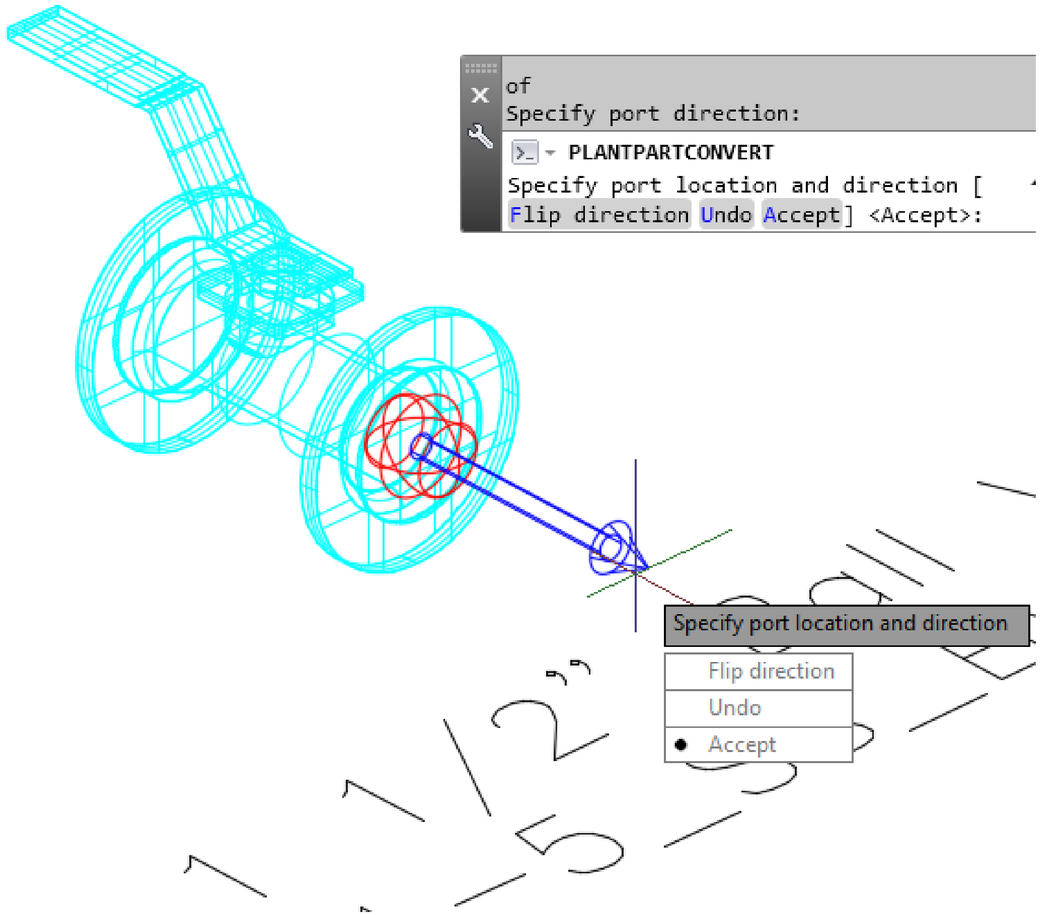
PLANTPARTCONVERT

3. Select your port location(s), for the valve make sure you use the CENTER osnap on the furthest outer part of the flange.



PLANTPARTCONVERT

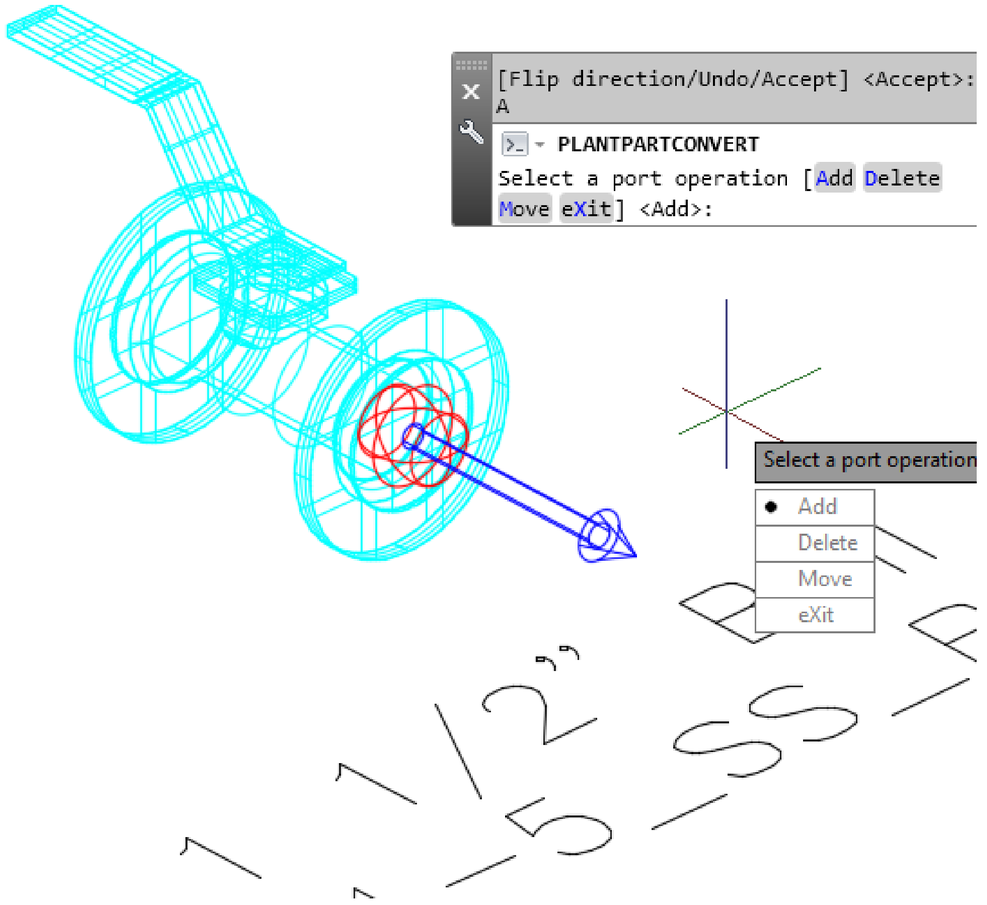
4. Select the port direction, pull away from the valve to have the port location placed as shown here.



PLANTPARTCONVERT

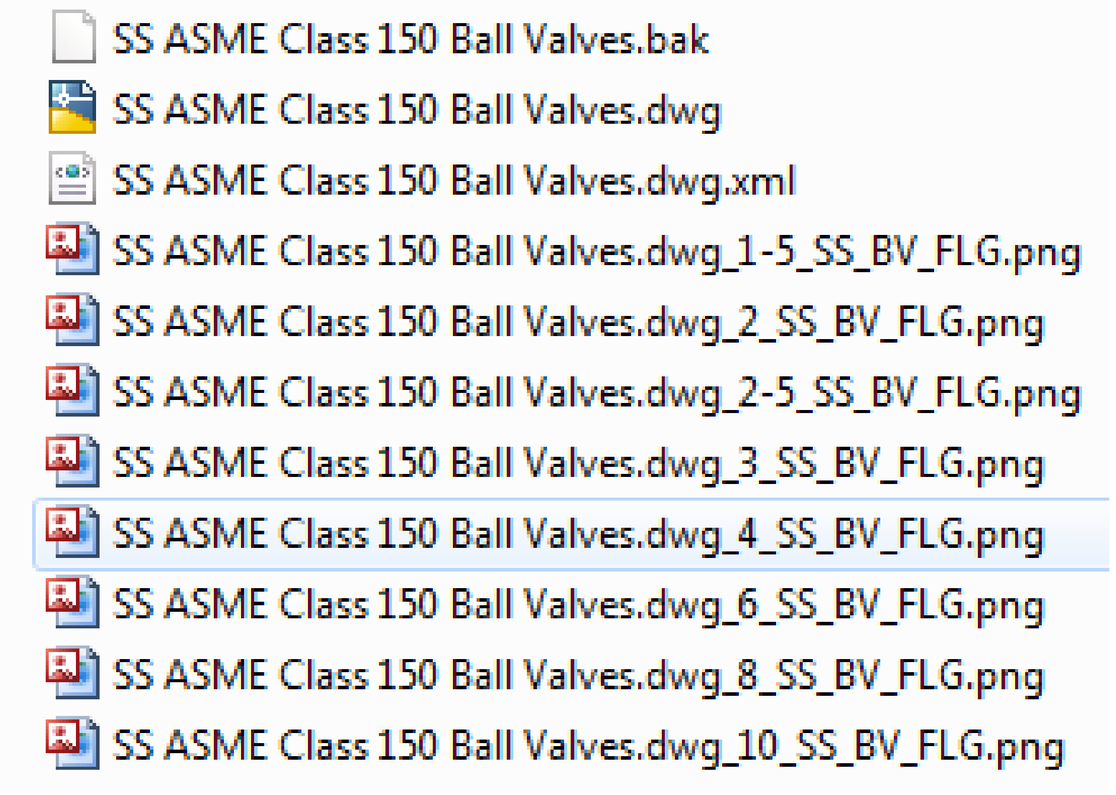
5. Select Accept and select.
6. Add to place another port on the opposite of the valve.
7. Select Accept once the other port is placed and select eXit to complete the command.

Now, repeat the process for all the remaining valve sizes.

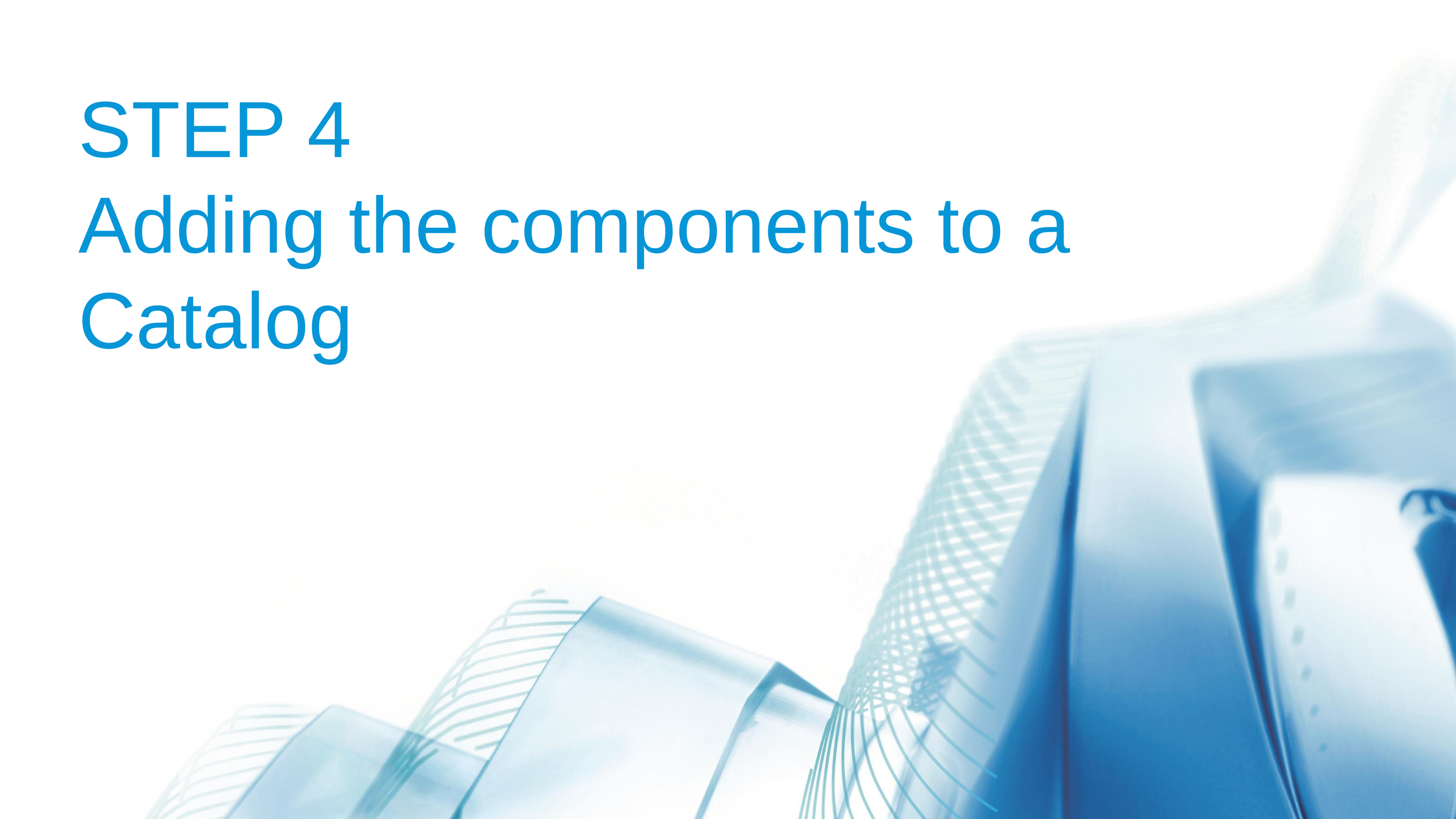


PLANTPARTCONVERT

- After running PLANTPARTCONVERT command you will notice that images are created in the folder with the drawing, along with an xml file that has additional data.

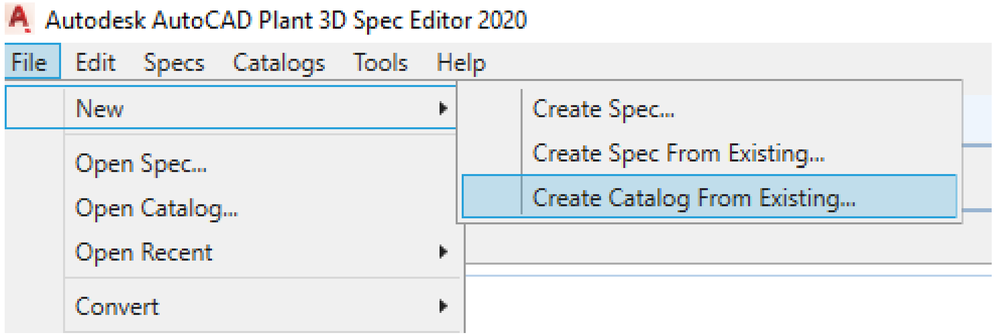


STEP 4
Adding the components to a Catalog



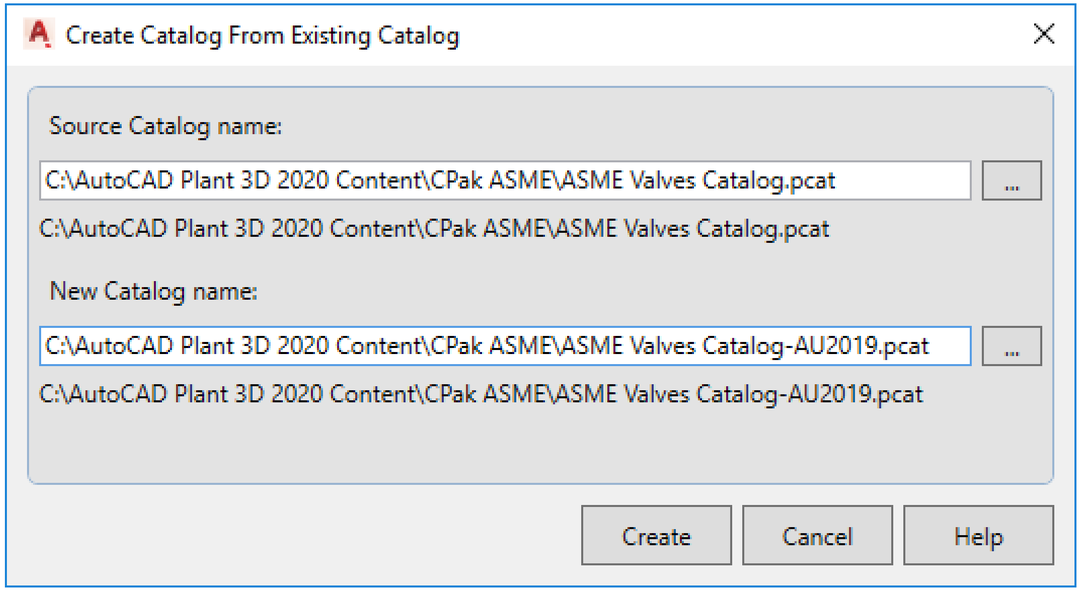
Adding the component to a Catalog

1. Open AutoCAD Plant 3D Spec Editor 2020 and create a new Catalog that will contain the valves. You will select New and Create Catalog From Existing…



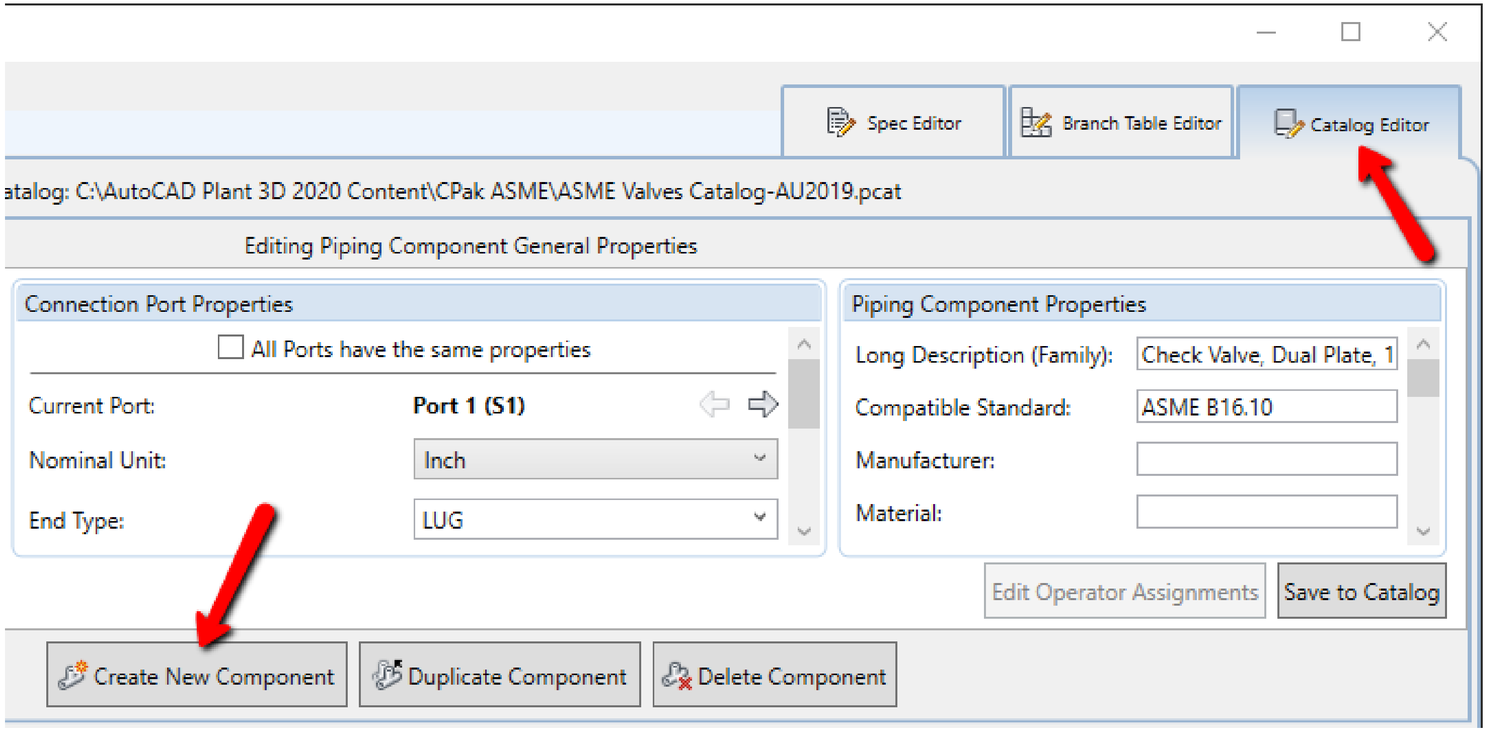
Adding the component to a Catalog

2. Since Spec Creator does not give you the option of creating blank Catalog, you will select and use the existing ASME Valves Catalog. This will be located here: C:\AutoCAD Plant 3D 2020 Content\CPak ASME
3. Then name the new catalog, ASME Valves Catalog-AU2019.pcat
4. Once the catalog is opened you will want to select the Catalog Editor tab. This will enable you to see all the items that are contained in the catalog. You will need to select all the components in the Catalog Browser and delete them. This will give you a blank catalog to work with.



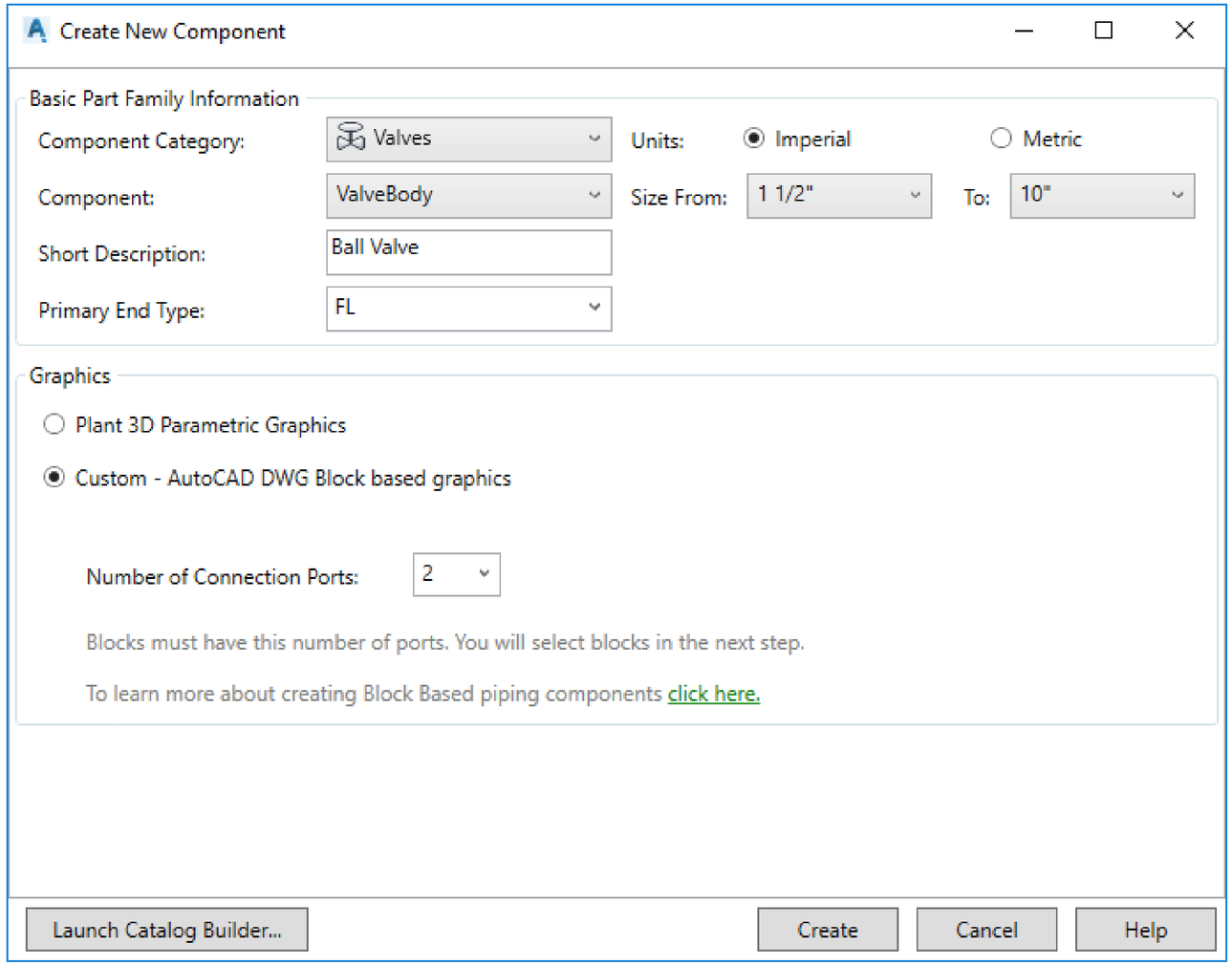
Adding the component to a Catalog

5. With the blank catalog opened select the Catalog Editor tab, click Create New Component.



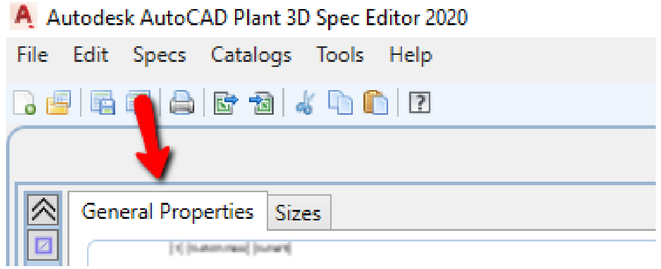
Adding the component to a Catalog

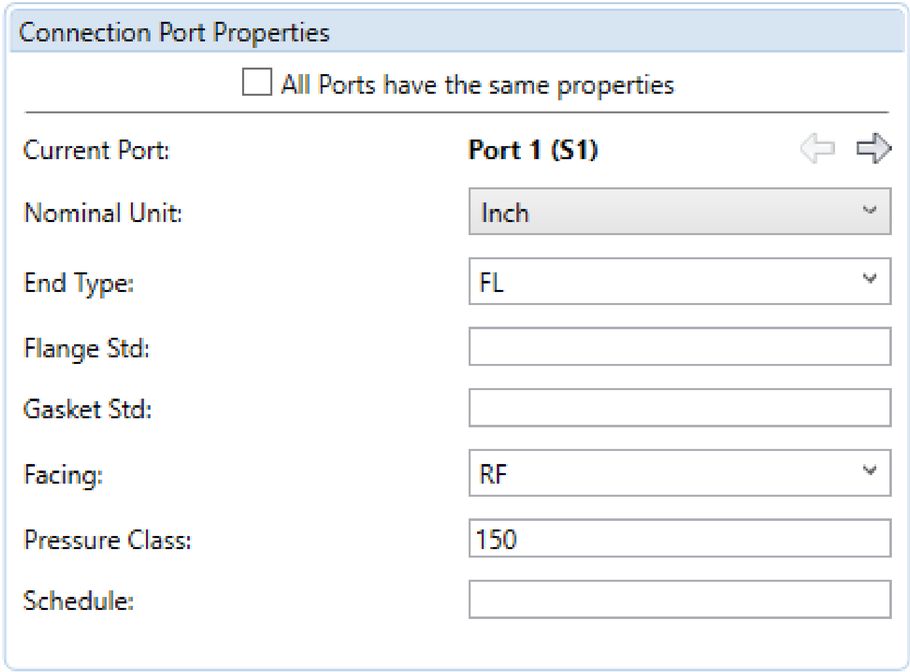
6. In the Graphics section:
   - Select Custom – AutoCAD DWG Block based graphics
   - Number of Connection Port: 2
7. In the Basic Part Family Information section:
   - Component Category: Valves
   - Component: ValveBody
   - Short Description: Ball Valve
   - Primary End Type: FL
   - Size From: 1 1/2” To: 10” Imperial
   - Select Create to close Create New Component window



Adding the component to a Catalog

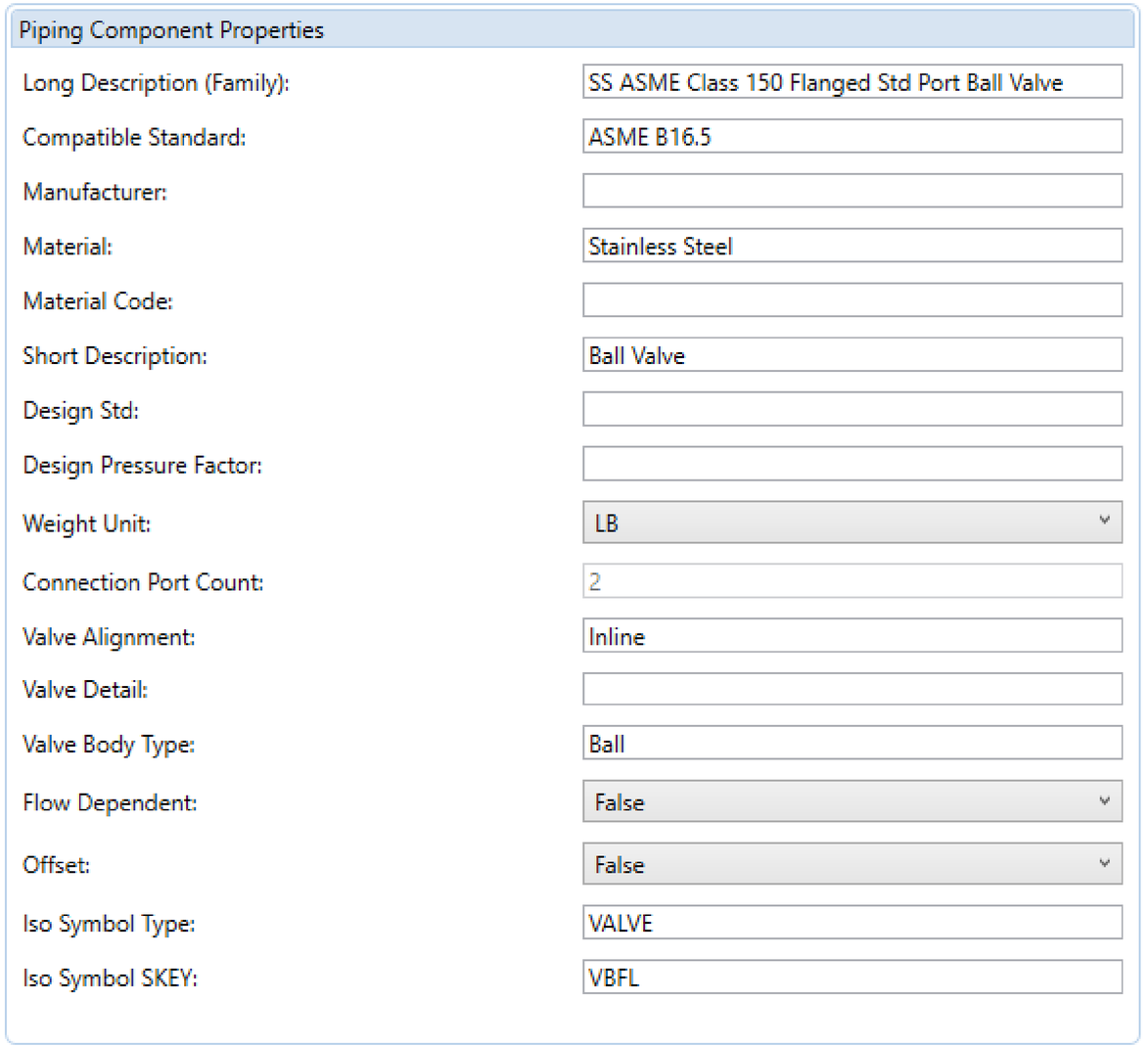
8. With the General Properties tab enter in these values:
   - End Type: FL
   - Facing: RF
   - Pressure Class: 150
   - **Make sure that both Port 1 and Port 2 have the same properties.*





Adding the component to a Catalog

9. Enter the properties for the Piping Components Properties:
    - Long Description (Family): SS ASME Class 150 Flanged Std Port Ball Valve
    - Compatible Standard: ASME B16.5
    - Material: Stainless Steel
    - Weight Units: LB
    - Valve Alignment: Inline
    - Valve Body Type: Ball
    - Iso Symbol Type: VALVE
    - Iso Symbol SKEY: VBFL



Adding the component to a Catalog - BONUS

- Not sure which Iso Symbol SKEY to use?
- Refer to the Autodesk document De-mystifying AutoCAD Plant 3D Isometrics

- The actual list for SKEY symbols is compiled from the default IsoSkeyBlockMap.xml and the SKEY symbol blocks are found in the IsoSymbolStyles.dwg of the project

Default Symbol Keys

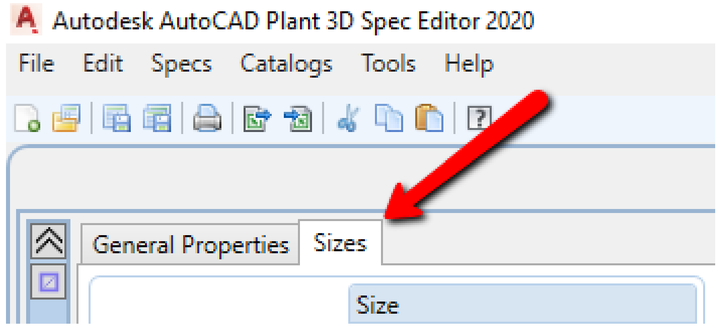
While a comprehensive symbol list is not available, a general list of the default values included in each project are below.

The list is compiled from the default IsoSkeyAcadBlockMap.xml.

Symbol	SKEY	Block Name	Image	Default Type
Elbow	EL??, EB??	Elbow		ELBOW
Reducing Elbow	ER??	ElbowReducing		ELBOW
Bend	PB??, BE??	Bend		BEND
Mitered Bend	MI??	BendMitre		BEND
180 Elbow Return	EU??	Elbow-180return		ELBOW
180 Bend Return	BU??	Bend-180return		BEND
Tee	TE??, TY??	Tee		TEE
Tee Bend	BT??	TeedBend		TEE

Adding the component to a Catalog

10. Switch to the Sizes tab.

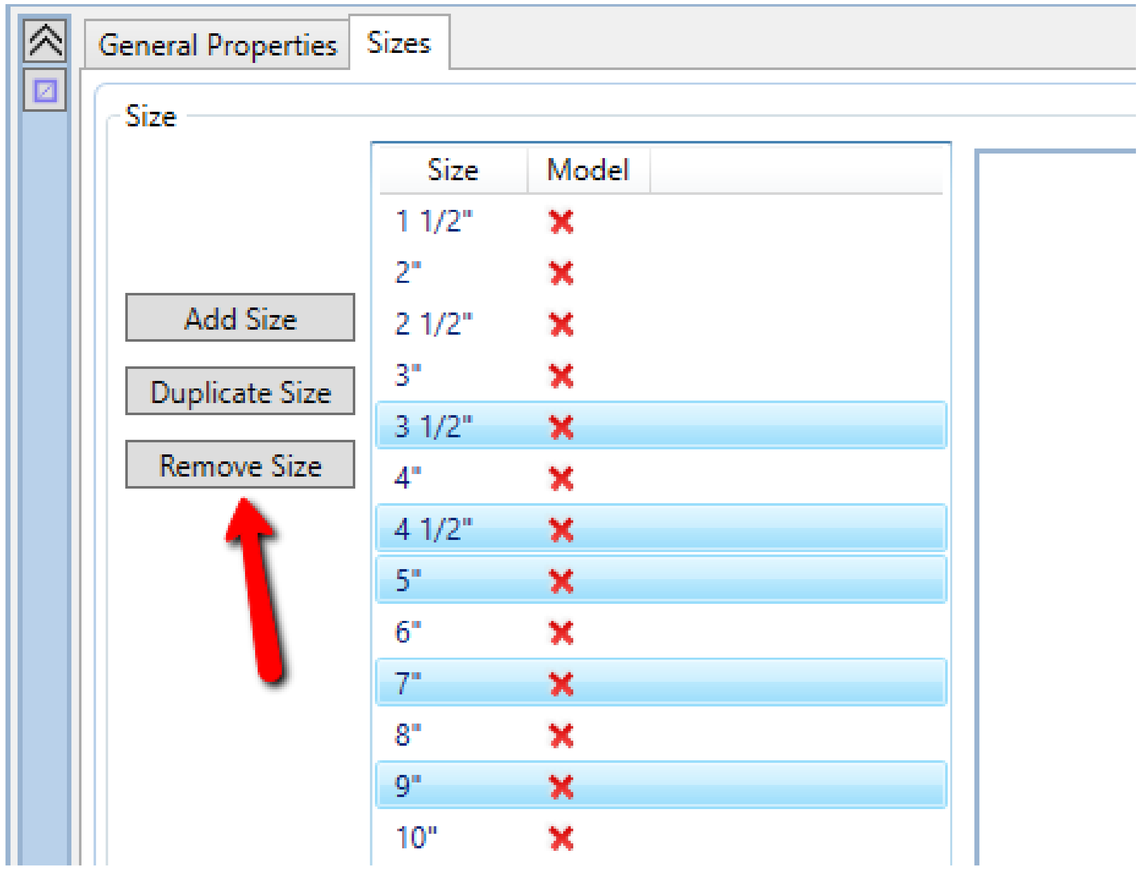


Adding the component to a Catalog

During the previous Create New Component process a size range were selected.

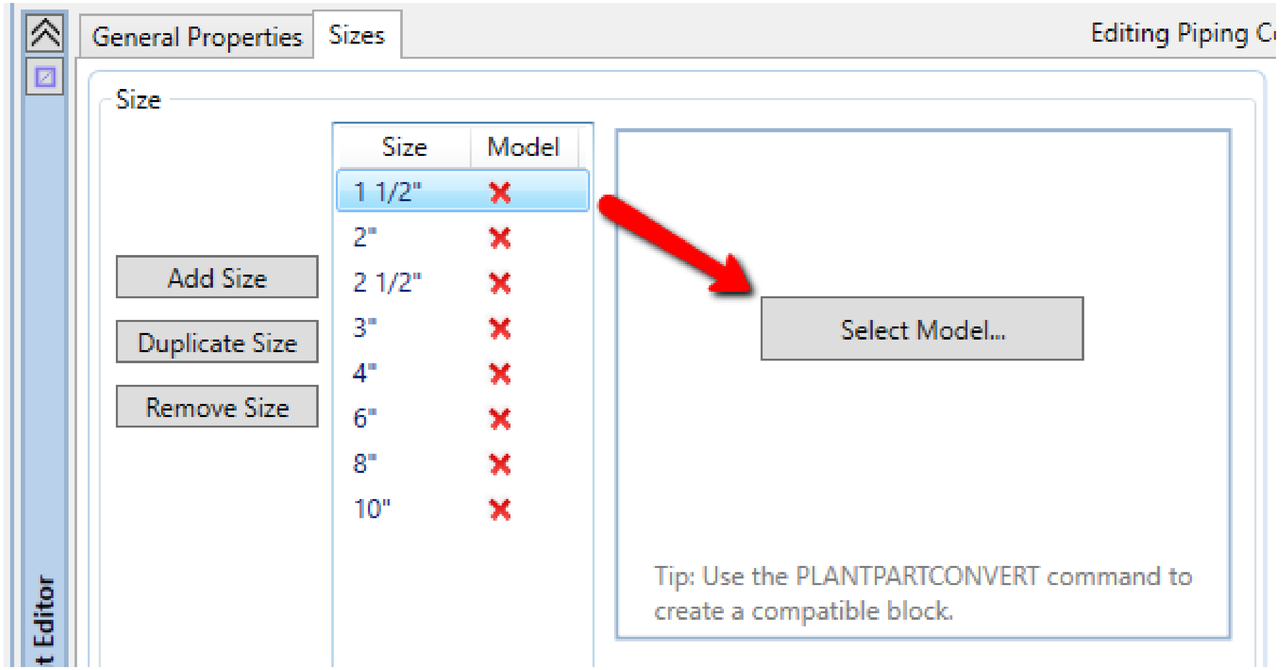
- Need to remove some sizes because valves were not created for all the listed sizes.

Unfortunately there is not an option to select multiple items to be removed. So, each size will need to be selected individually. From the list remove sizes 3 ½”, 4 ½”, 5”, 7” and 9”.



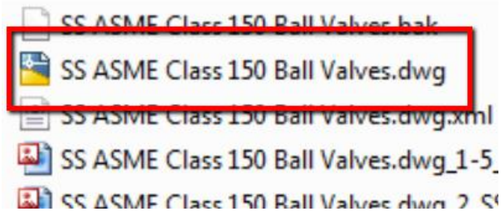
Adding the component to a Catalog

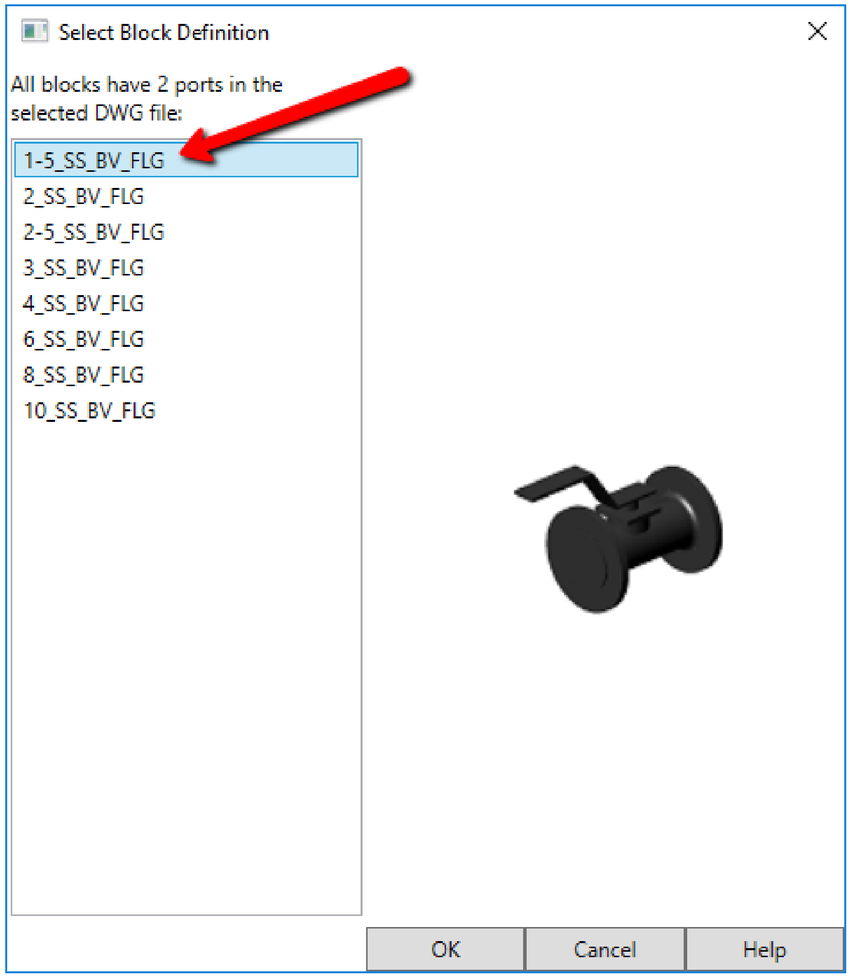
11. Select size 1 ½” first and then on the left, click Select Model…



Adding the component to a Catalog

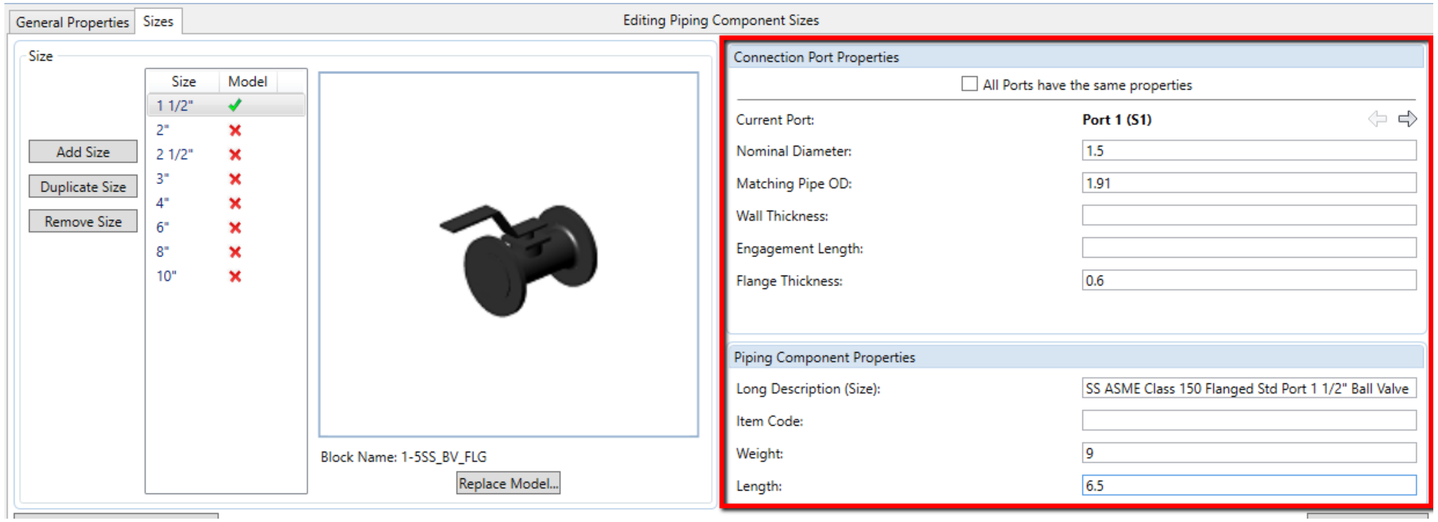
12. Select the SS ASME Class 150 Ball Valves.dwg file where you used PLANTPARTCONVERT to create the XML and PNG files.
13. Select 1-5_SS_BV_FLG from the block definition list.





Adding the component to a Catalog

14. Fill in the properties on the right and make sure you are filling in values for each port of the valve.
    - Connection Port Properties:
        - Matching Pipe OD: 1.91
        - Flange Thickness: 0.68
    - Piping Component Properties:
        - Long Description (Size): SS ASME Class 150 Flanged Std Port 1 1/2" Ball Valve
        - Weight: 9
        - Length: 6.5



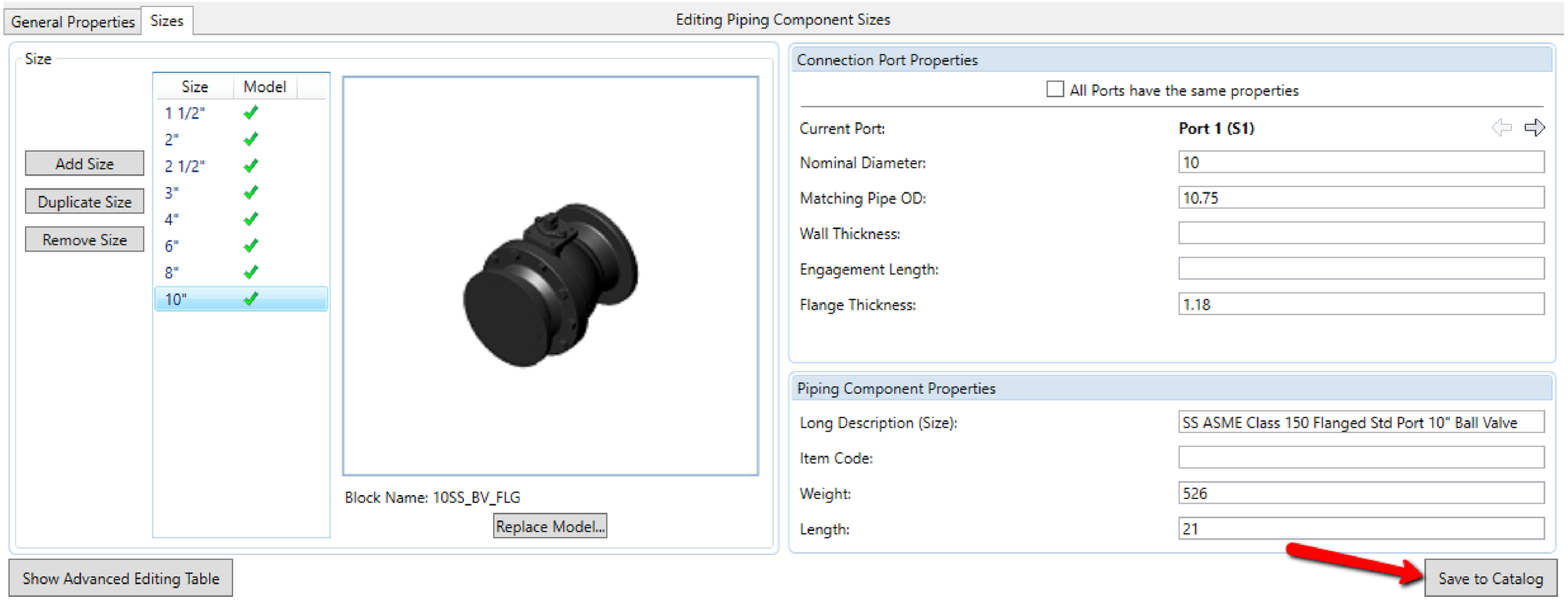
Adding the component to a Catalog

15. Repeat the process for the remaining valve sizes.
    - *Refer to the Valve information Excel file (Valve List.xlsx) for the remaining property values that will be used for the valves.*

Size	Long Description	Short Description	Matching Pipe OD	Flange Thickness	Weight	Length
1.5"	SS ASME Class 150 Flanged Std Port 1 1/2" Ball Valve	Ball Valve	1.91	0.68	9	6.5
2"	SS ASME Class 150 Flanged Std Port 2" Ball Valve	Ball Valve	2.375	0.75	18	7
2.5"	SS ASME Class 150 Flanged Std Port 2 1/2" Ball Valve	Ball Valve	2.875	0.87	27	7.5
3"	SS ASME Class 150 Flanged Std Port 3" Ball Valve	Ball Valve	3.5	0.94	34	8
4"	SS ASME Class 150 Flanged Std Port 4" Ball Valve	Ball Valve	4.5	0.94	73	9
6"	SS ASME Class 150 Flanged Std Port 6" Ball Valve	Ball Valve	6.625	1	117	10.5
8"	SS ASME Class 150 Flanged Std Port 8" Ball Valve	Ball Valve	8.625	1.12	310	18
10"	SS ASME Class 150 Flanged Std Port 10" Ball Valve	Ball Valve	10.75	1.18	526	21

Adding the component to a Catalog

16. Once you have completed entering the property information for the remaining valve size select the Save to Catalog button.

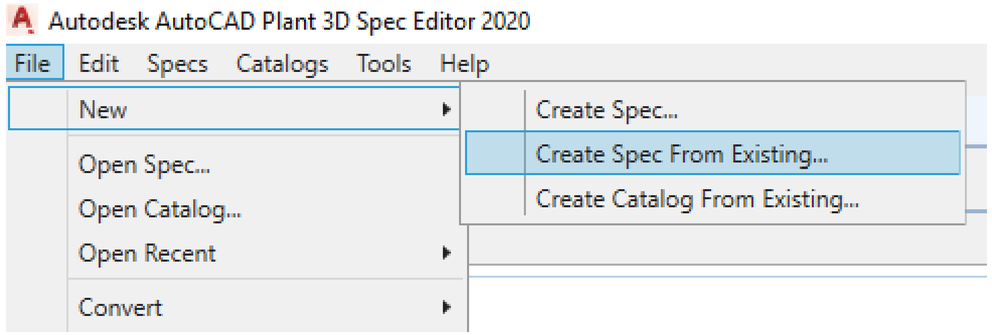


STEP 5
Adding the Valve to a Spec

Adding the Valve to a Spec

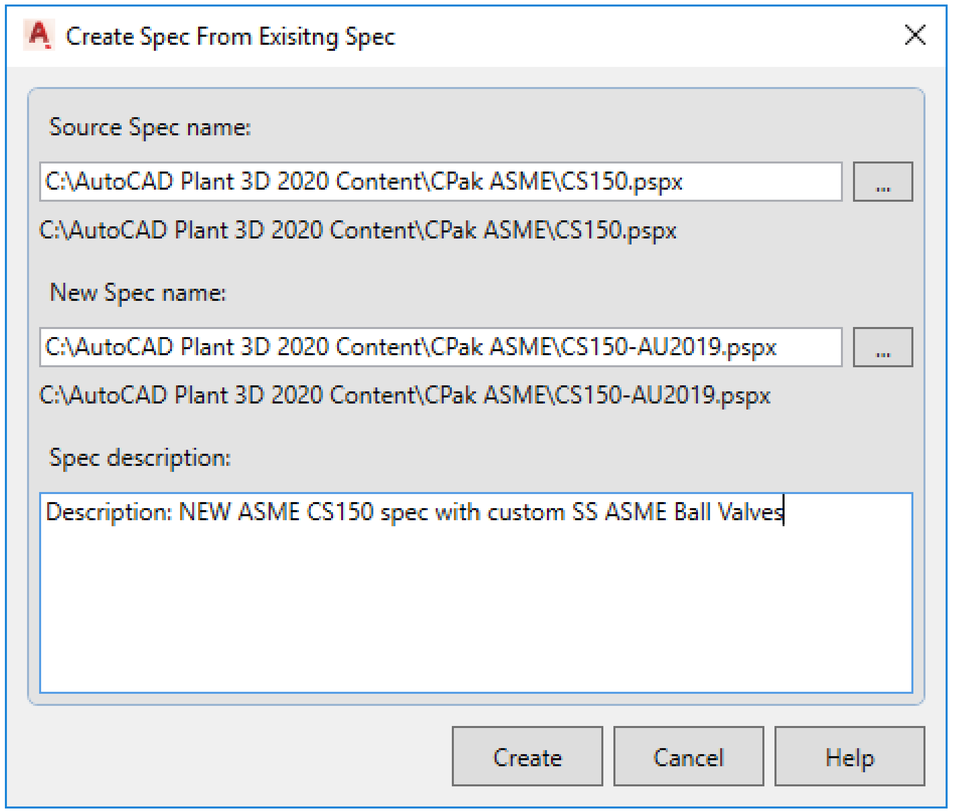
Now that you have created a Catalog and added the valve to the catalog you need to add the valve to a spec to use it in a Plant 3D drawing.

1. Select File, New and Create Spec From Existing.



Adding the Valve to a Spec

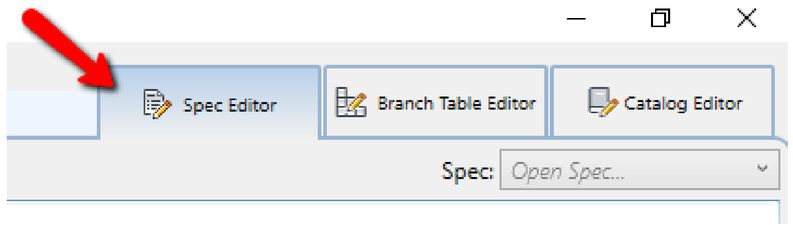
2. Use the existing CS150 spec as the source spec.
3. Name the new spec CS150-AU2019.
4. Click Create.

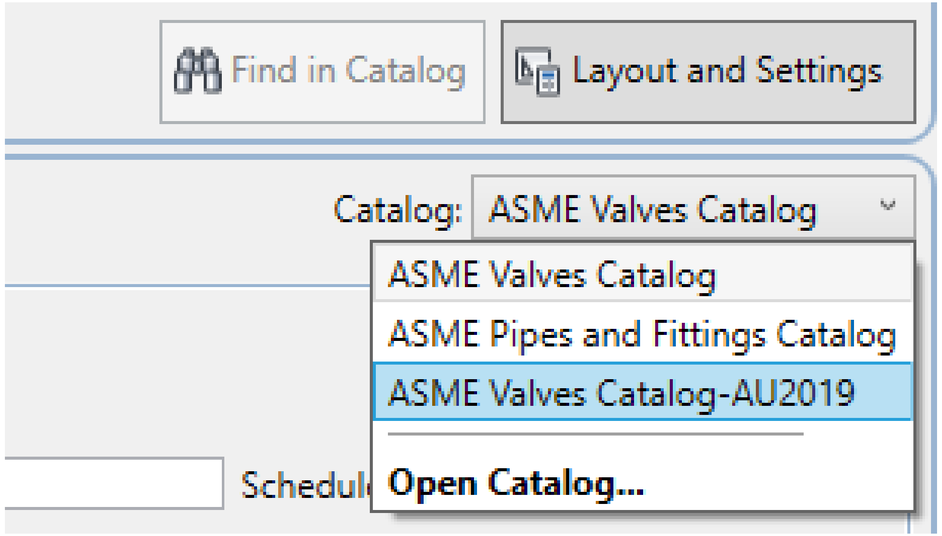


Adding the Valve to a Spec

Now that you have a new spec you can add the custom valve to the spec.

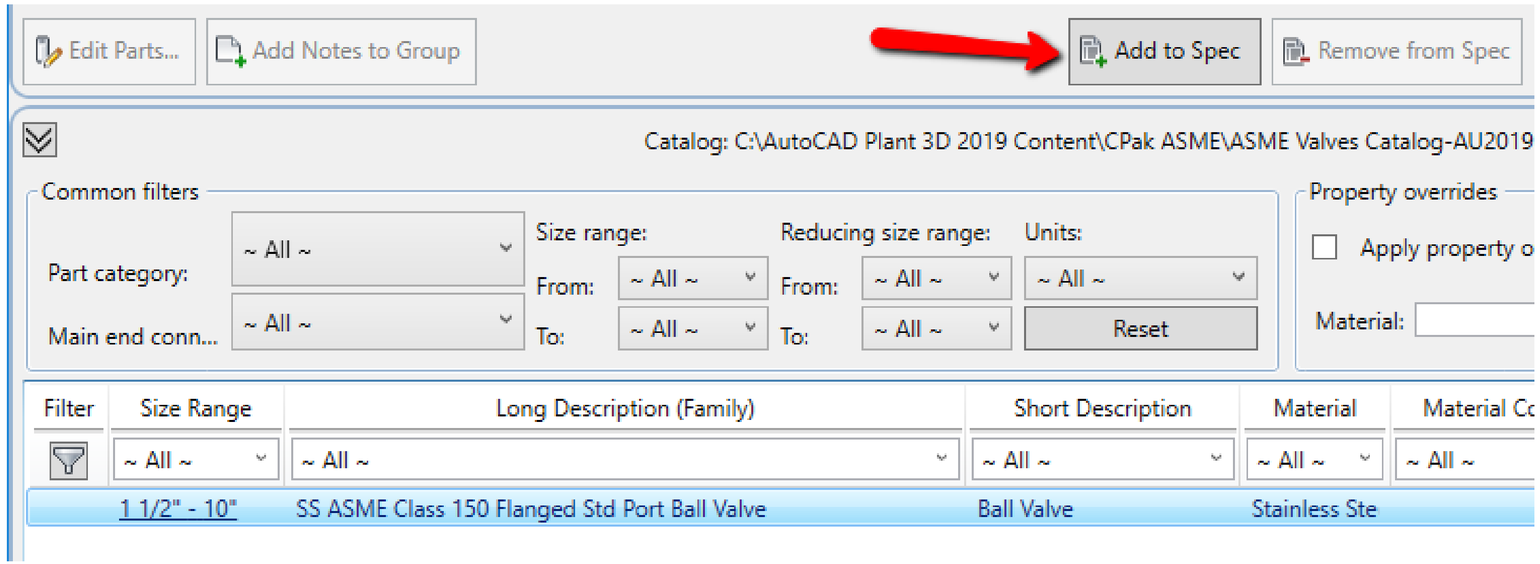
5. With the Spec Editor tab selected.
6. Browse to open the ASME Valves Catalog-AU2019.





Adding the Valve to a Spec

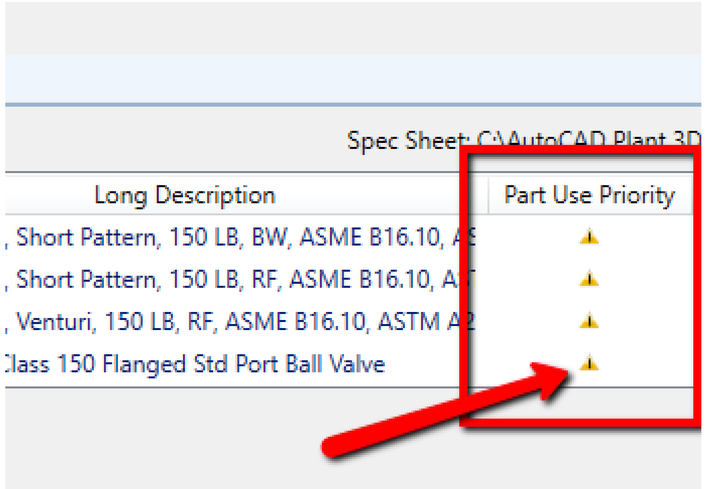
7. With the catalog opened select the SS ASME 150 Flanged Std Port Valve.
8. Click Add to Spec.



Adding the Valve to a Spec

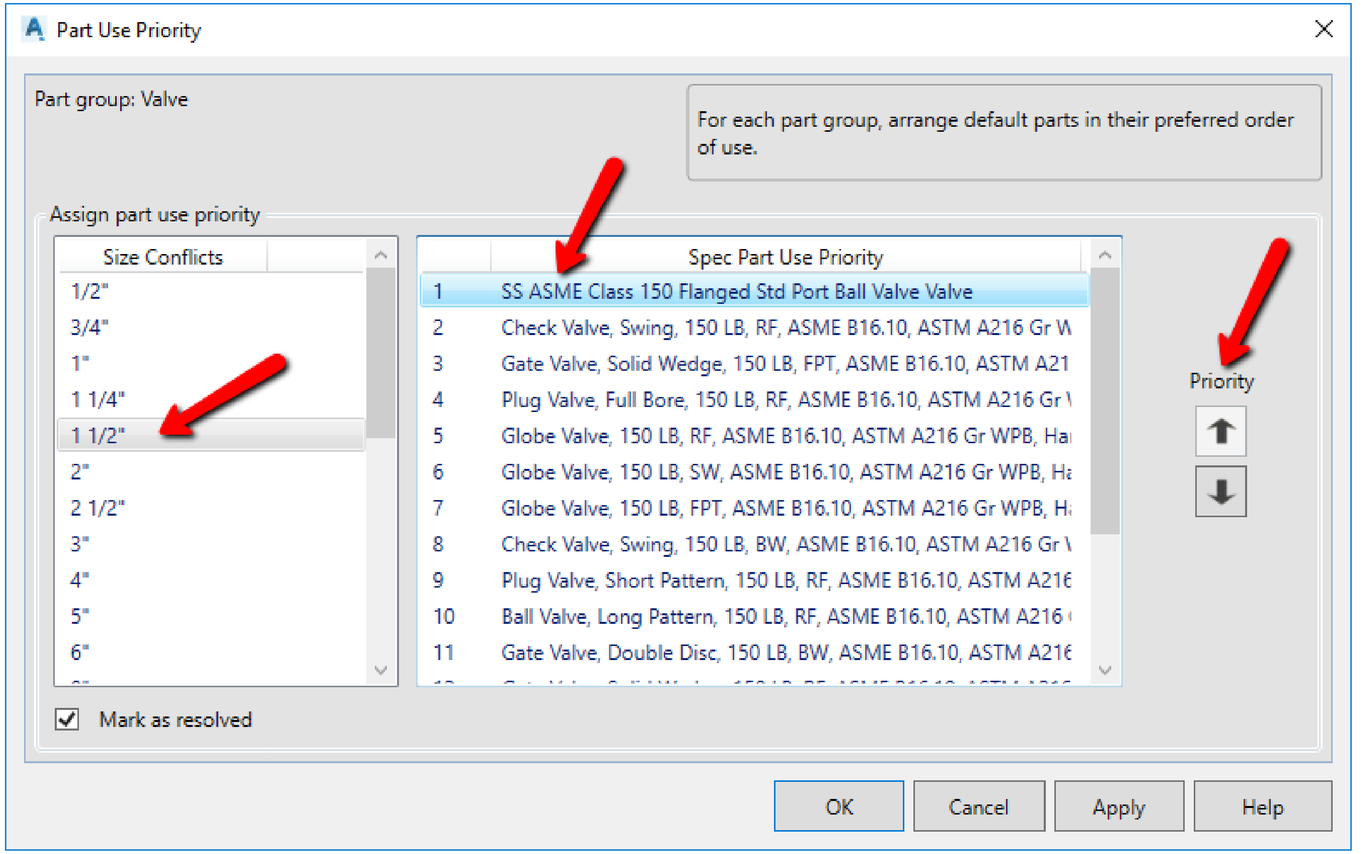
After the valve has been added to the spec, the part use priority must be set.

9. Click the part use priority warning icon to open the Part Use Priority dialog.



Adding the Valve to a Spec

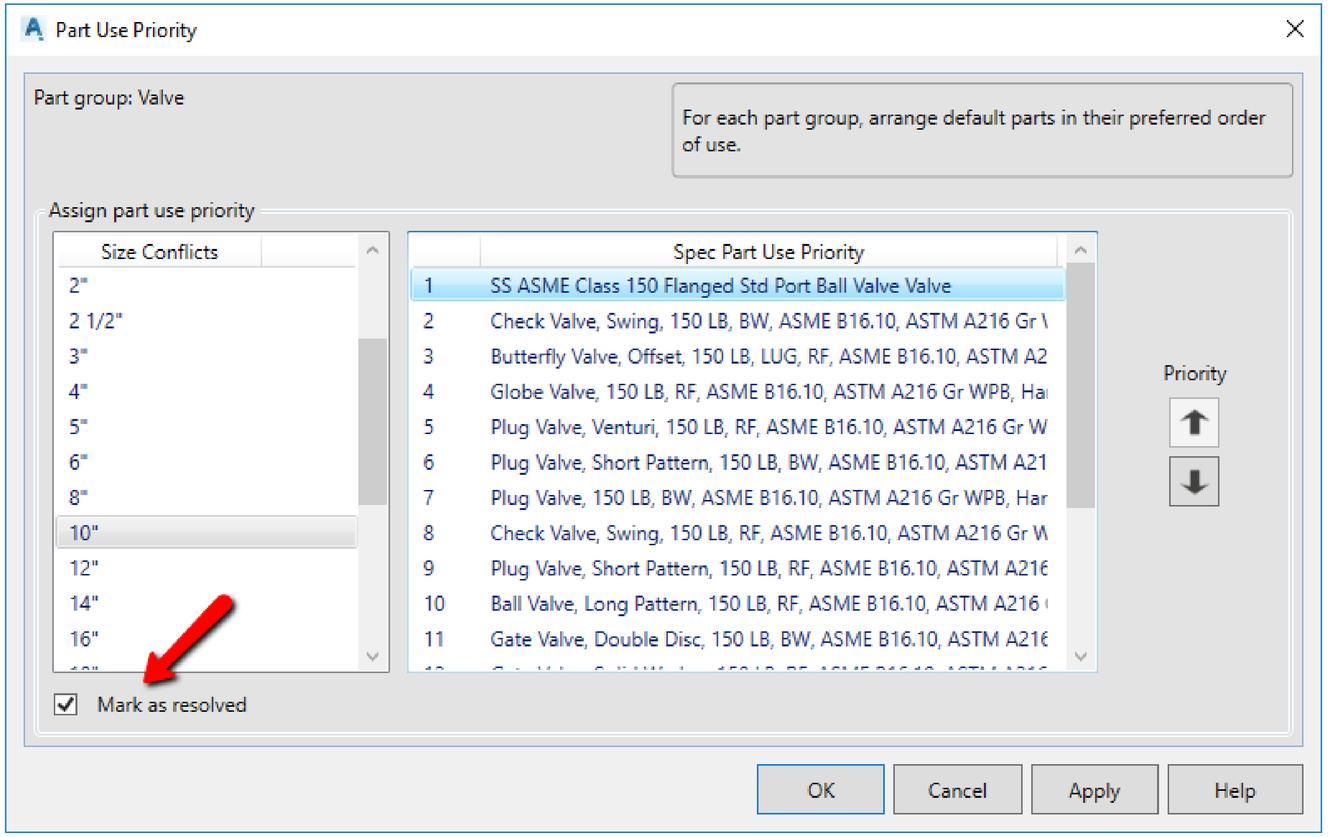
10. Find all the sizes for the valve and make sure they are placed first.
11. Select the valve in the window and use the priority arrows to move the valve to first on the list.



Adding the Valve to a Spec

Once all the valves have been moved to the first position, then check Mark as resolve and select OK to save.

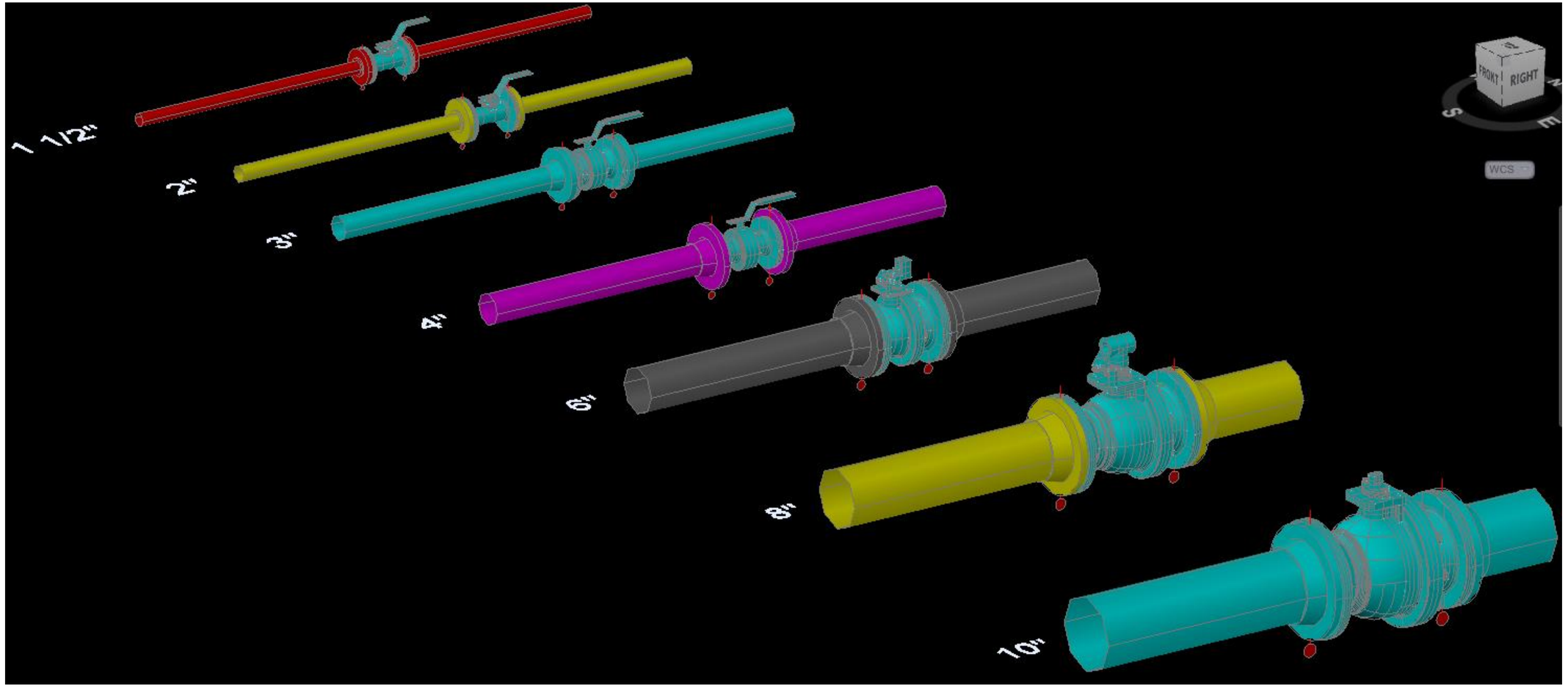
12. For the remaining valves that still display the part priority warning icon, select each one and select Mark as resolved .
13. Save the changes to spec CS150-AU2019.
14. Close Spec Editor.



STEP 6
Let’s Test

Testing in an AutoCAD Plant 3D Project

Open AutoCAD Plant 3D 2020, create a new project and create a new Plant 3D drawing. You now want to place the valves in the model to see they are working as expected.



Testing in an AutoCAD Plant 3D Project

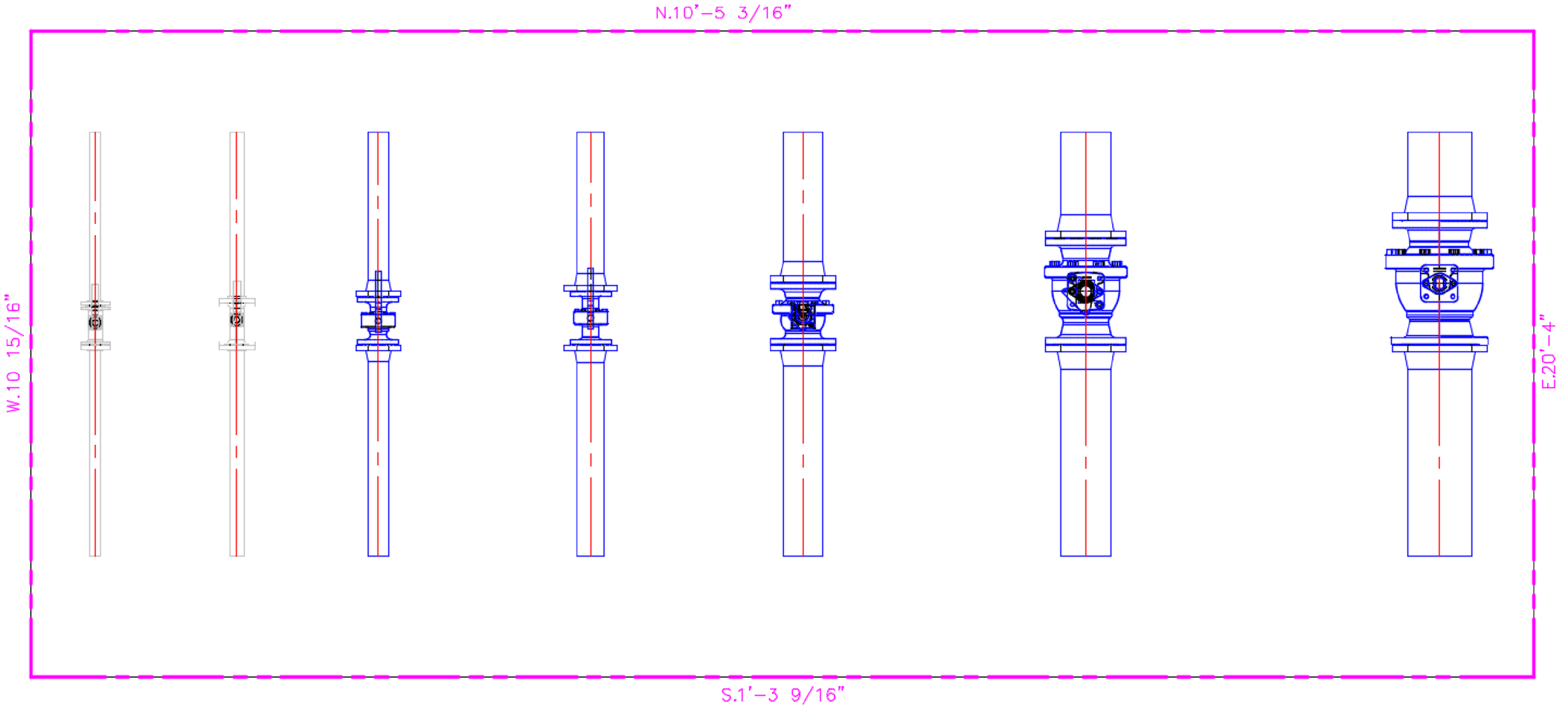
Now create an iso that contains the valve to check the iso generates without errors.

BILL OF MATERIALS

ID	QTY	ND	DESCRIPTION
1	3'-7"	10"	PIPE, SEAMLESS, PE, ASME B36.10, ASTM A106 GR B SMLS, SCH 40
2	2	10"	FLANGE WN, 150 LB, RF, ASME B16.5, ASTM A234 GR WPB
3	24	7/8"X4 1/2"	BOLT SET, RF, 150 LB, STUD BOLT
4	2	10"	GASKET, SWG, 1/8" THK, RF, 150 LB, ASME B16.20, CS/PTFE
5	1	10"	SS ASME CLASS 150 FLANGED STD PORT BALL VALVE

Testing in an AutoCAD Plant 3D Project

- Finally, create an ortho view to make sure valves are illustrated correctly.



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