AUTODESK UNIVERSITY 2013

PD2021-Plant Design Workflow Using Autodesk Plant Design Suite Ultimate

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PD2021

In this class, you will learn about a proven oil and gas industry workflow using Autodesk Plant Design Suite. We will start with P&IDs and go through creating plant design models using all of the components within the Autodesk Plant Design Suite Ultimate edition. We will also cover how to incorporate Autodesk® Inventor® software models into your design.

Learning Objectives

At the end of this class, you will be able to:

- Explain how Autodesk® AutoCAD® P&ID and Autodesk® AutoCAD® Plant 3D work together
- Incorporate Inventor models, such as equipment and structural into Plant 3D
- Incorporate imported models into Plant 3D
- Apply the real-world oil and gas industry workflows demonstrated in this class using Autodesk Plant Design Suite Ultimate

About the Speaker

Carlos Caminos is the CAD Manager for Venture Engineering & Construction, Inc.(Venture), headquartered in Pittsburgh, Pennsylvania. He provides technical support, training, and software licensing management to a staff of over 60 professionals in Venture's Pittsburgh and Las Vegas offices. He has been using AutoCAD® for 20 years. Carlos is an Autodesk Inventor certified professional. Other softwares the he utilizes include Plant 3D and Caesar II. His experience is widely varied and includes real-world application of Autodesk products in the architecture, engineering and construction (AEC) and manufacturing industries

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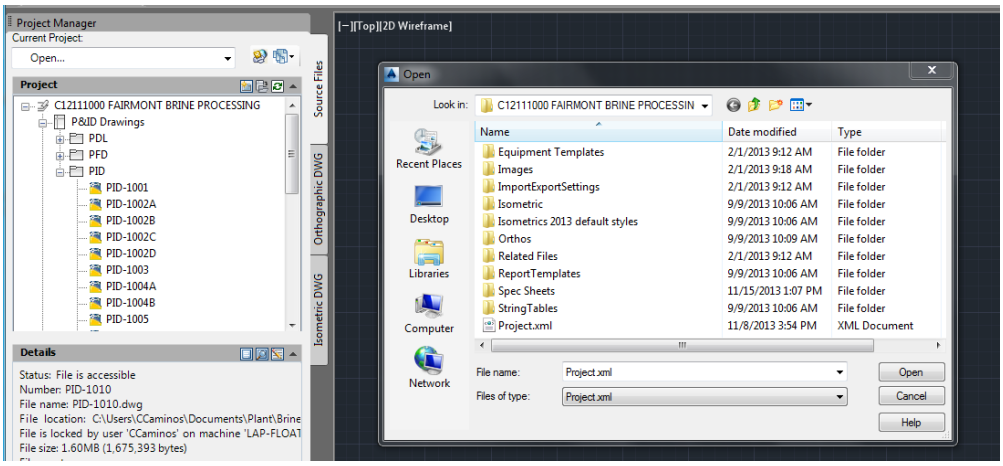
Autocad P&ID and Plant 3D

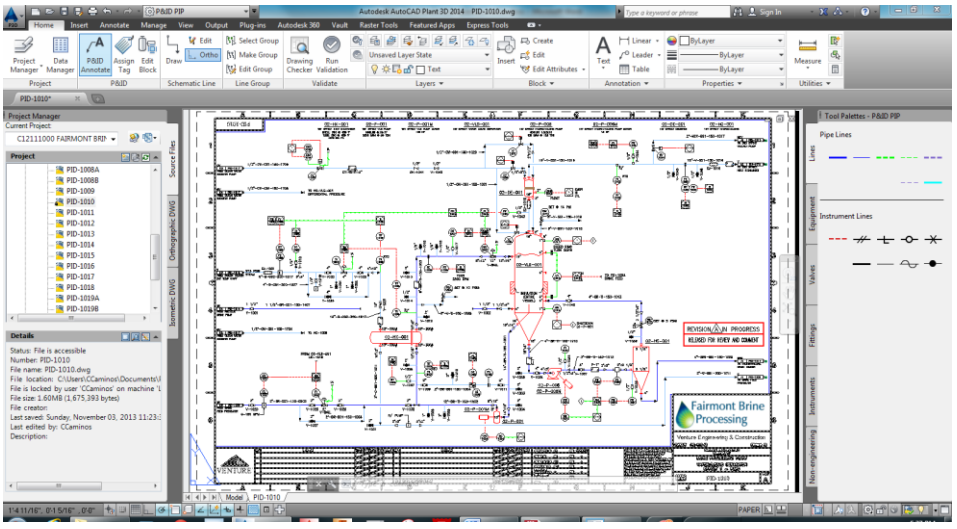
Autocad P&ID

- Project Manager organizes all of your project P&IDs
- P&ID is a simple-to-use drafting tool with built-in intelligence designed to increase P&ID productivity
- P&ID data can be simply managed through Data Manager
- Reports can be created quickly and easily either from inside AutoCAD P&ID or outside the drawing using AutoCAD Plant Report Creator.

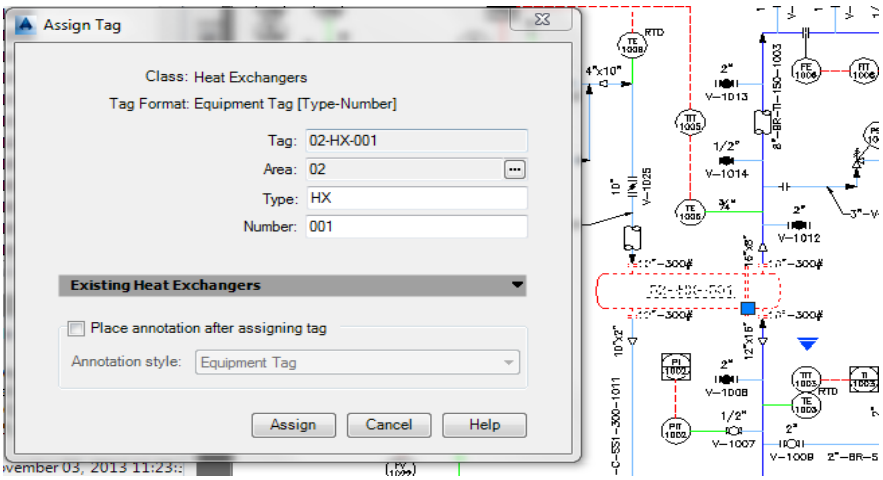
Open the project:



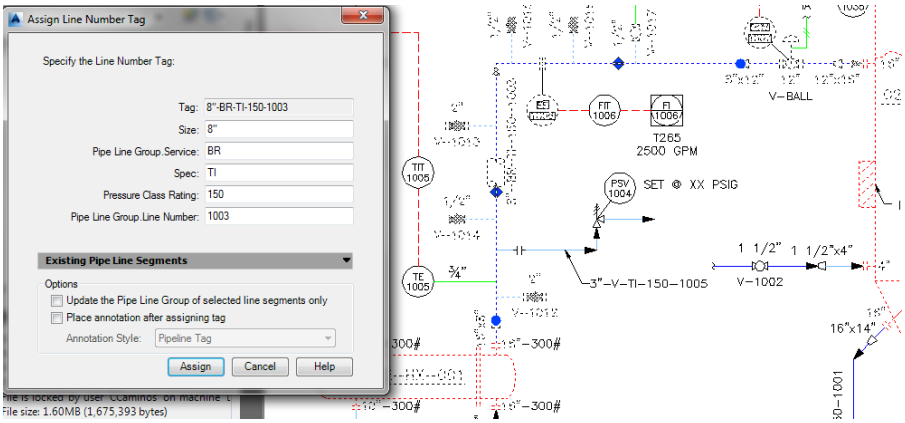
Open and create P&ID ‘PID-1010’
When the drawing opens, make sure you are in the P&ID Workspace. If not, click on the workspace symbol:



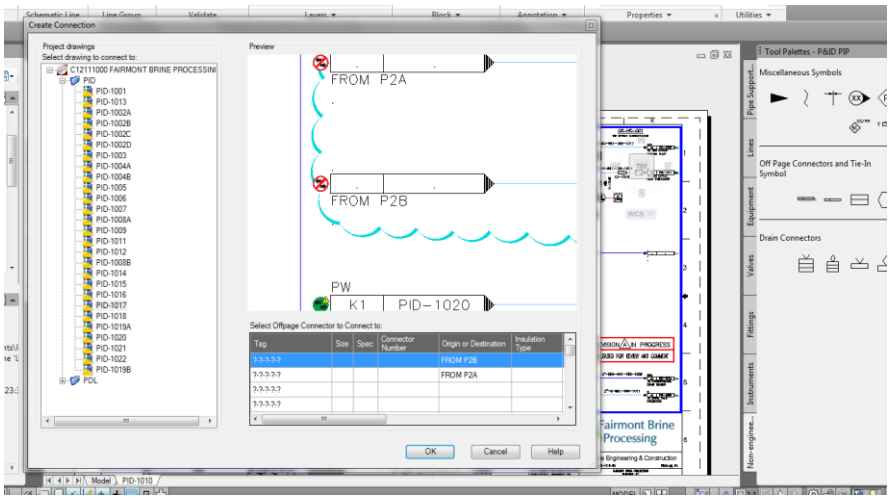
Drop in Equipment first (Compressors, Pumps, and Vessels) and assign tag information:



Run process lines and assign information:

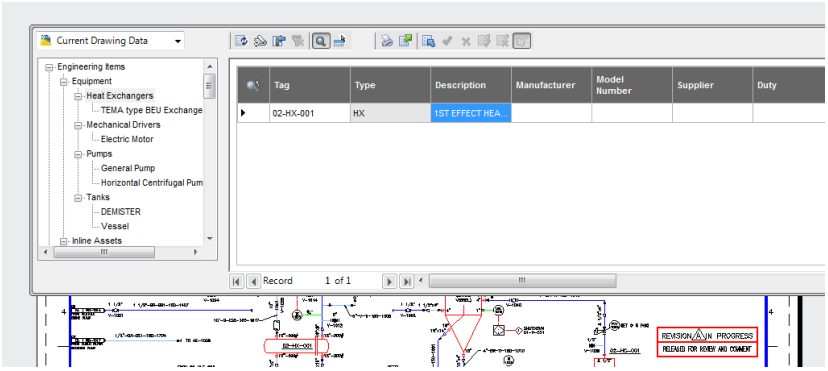


Insert page connectors, right click and connect to page connectors on other drawing:



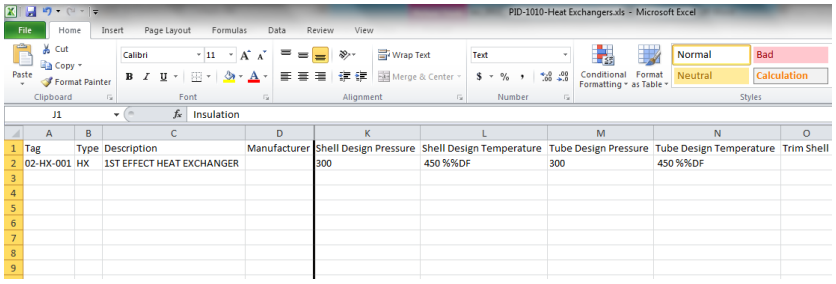
Using Data Manager to update equipment:

- Equipment name
- Tag
- Information



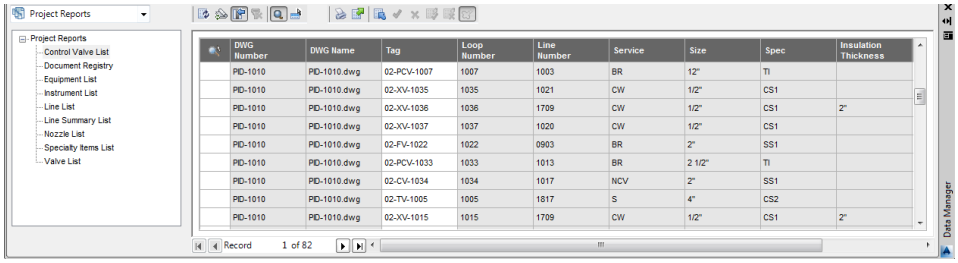
Now use Export / Import to add model number and supplier by an external user through MS Excel. First export the data to Excel:

- You can edit the information and import back into Data Manager

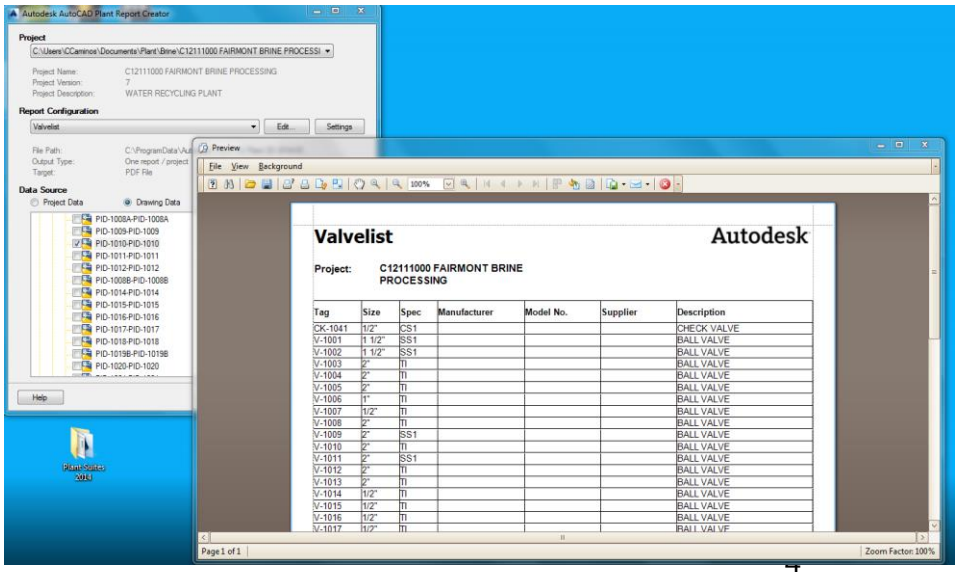


Reporting:

- Using the Data Manager, – select Project Reports in the pull-down:



- Using the Report creator select the project and the type of report to generate:

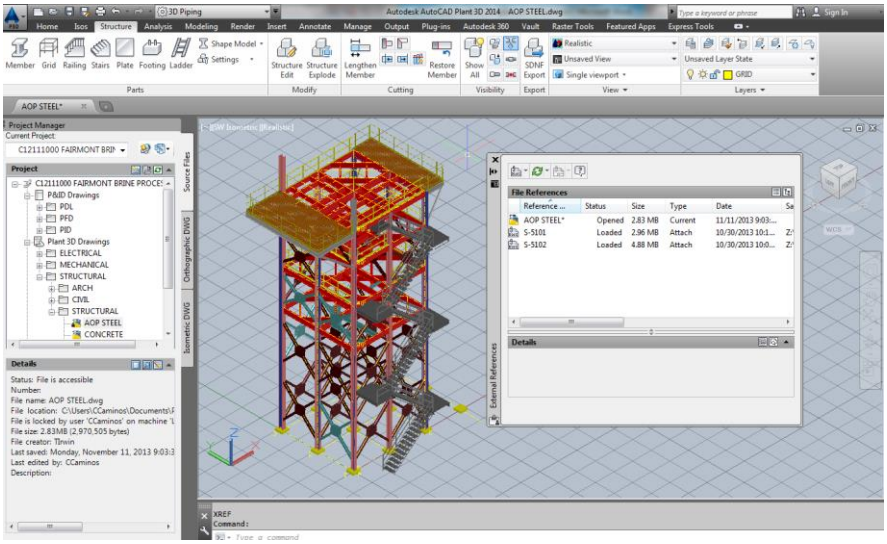


Autocad Plant 3D

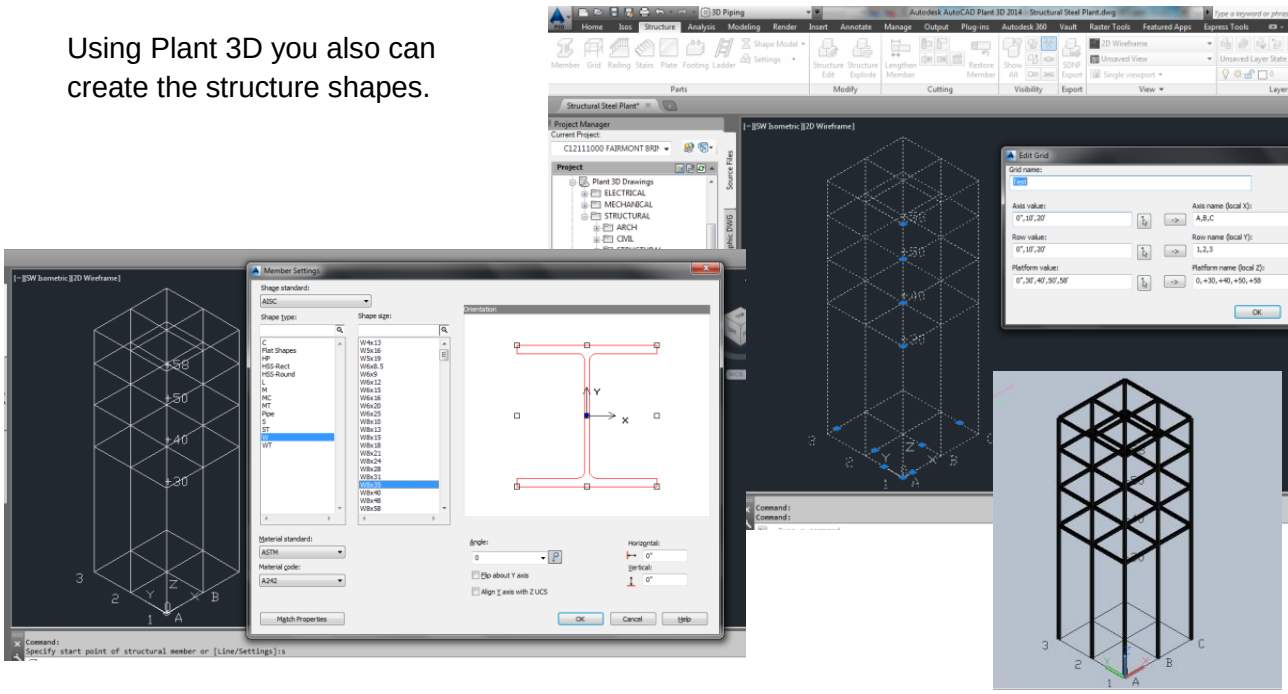
- Autocad Plant 3D (P3D) is a simple-to-use comprehensive 3D modeler for performing plant design including; structures, equipment and piping layout to create piping isometrics and orthographic drawings
- Piping isometrics can be easily created using the AutoCAD Isometrics function, which has a graphical user interface for easy customization.
- Inventor models can be imported into the P3D model as equipment and connected intelligently to P3D piping
- Structural models can be imported to P3D from Inventor or referenced from Autocad Structural Detailing.

Structural Model:

- Structural model was created using AutoCAD 3D and X-Referenced in a dwg file from Inventor.

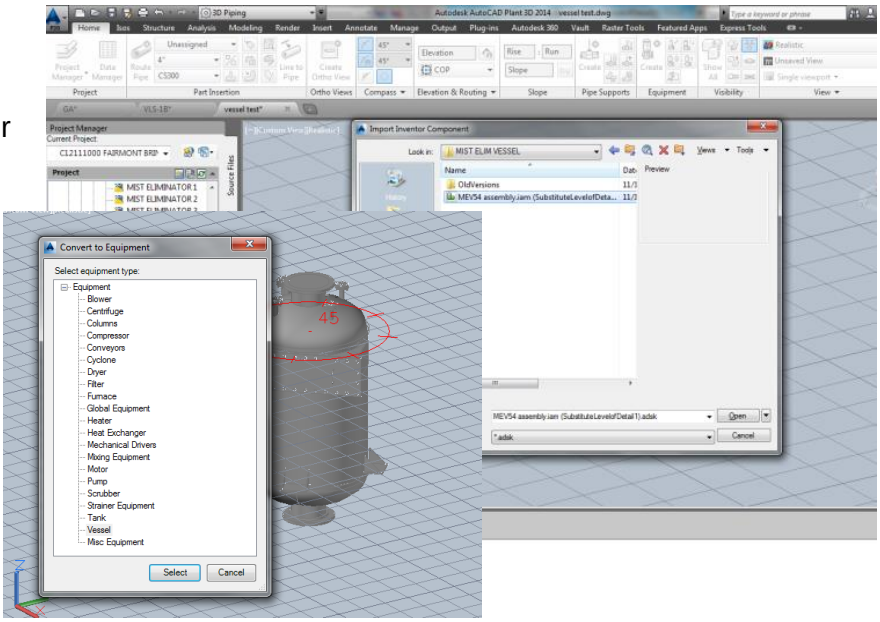


Using Plant 3D you also can create the structure shapes.

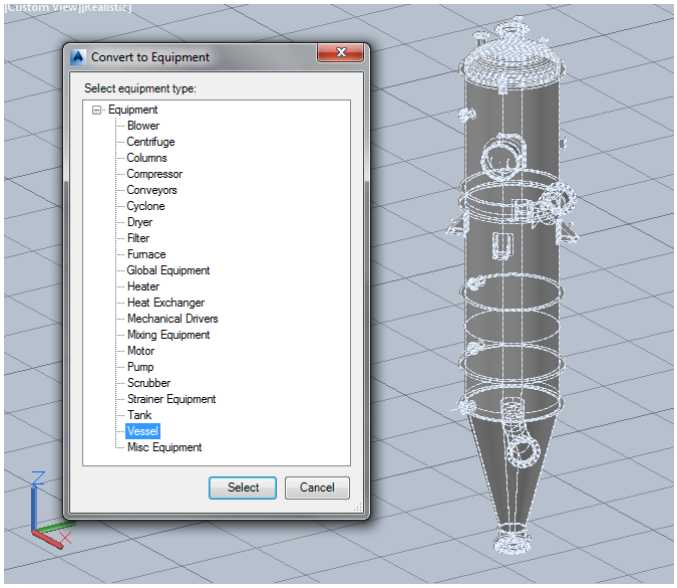


Equipment Layout:

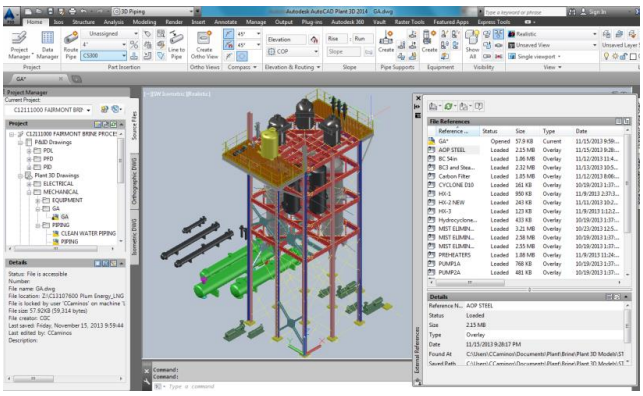
- Models Imported ADSK file:
  - ADSK file are smaller and have less detail



- Create equipment using Inventor models saved as a .dwg file format.
- Use the Plant Equipment Convert function to make this a Plant equipment.
- Assign equipment tag and nozzle locations

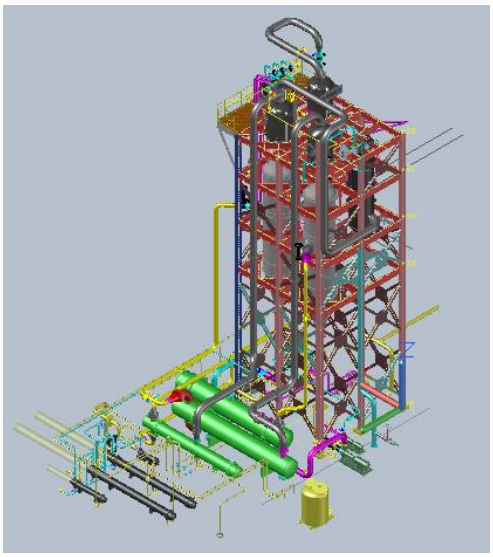


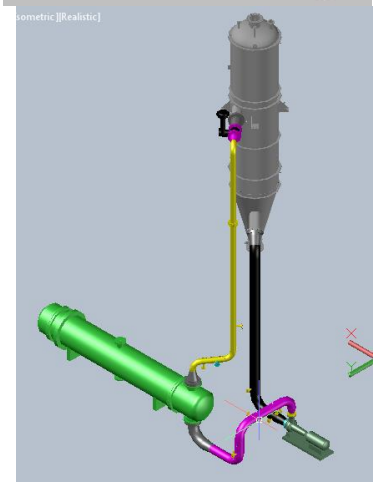
Models can also be created in Plant 3D



Piping Layout

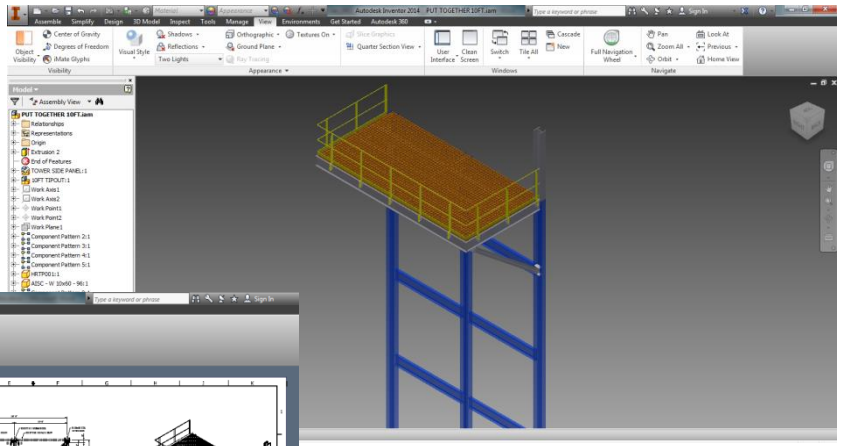
- Unload Structural layout and leave the equipment you are piping “on” from the External References window.
- Choose the pipe size and spec selector from the ribbon.
- Route pipe from nozzle location of one equipment to the other.

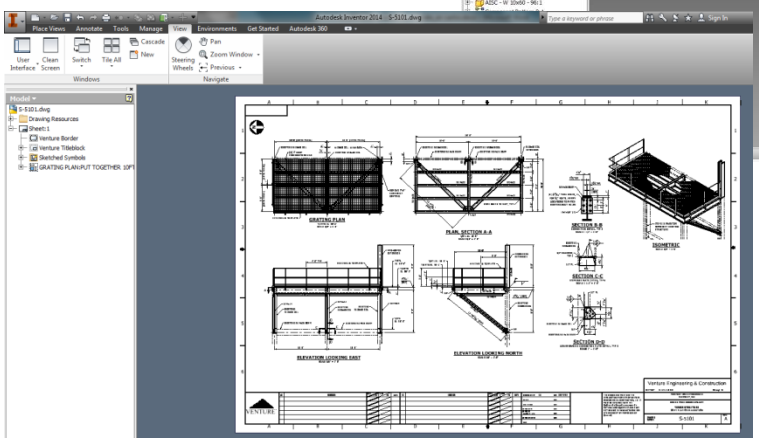




Incorporating Inventor Equipment, Structural and Electrical (MEP)

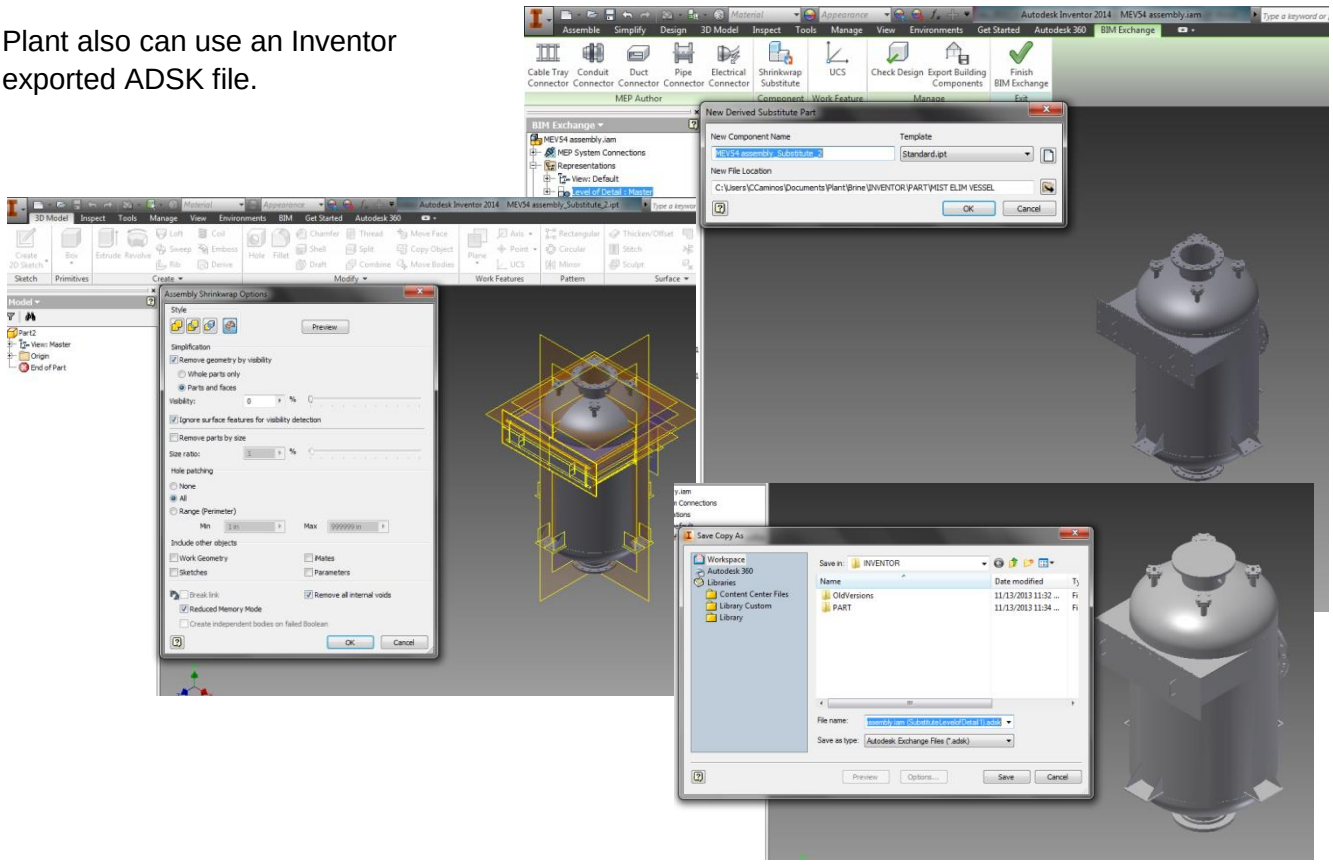
Structural model is created in Inventor and saved as a .dwg file format. Fabrication drawing also created in Inventor.





Equipment creation:

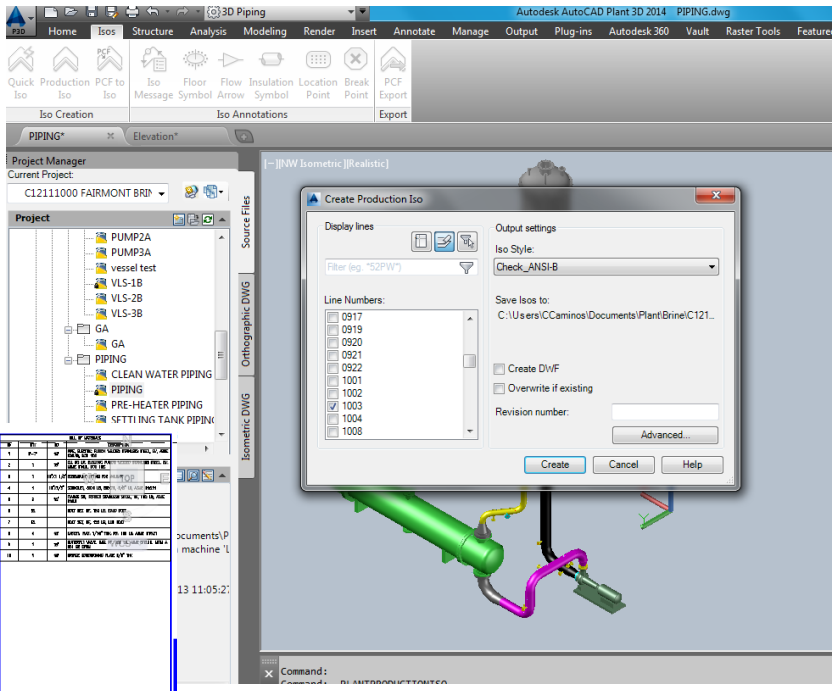
Plant also can use an Inventor exported ADSK file.

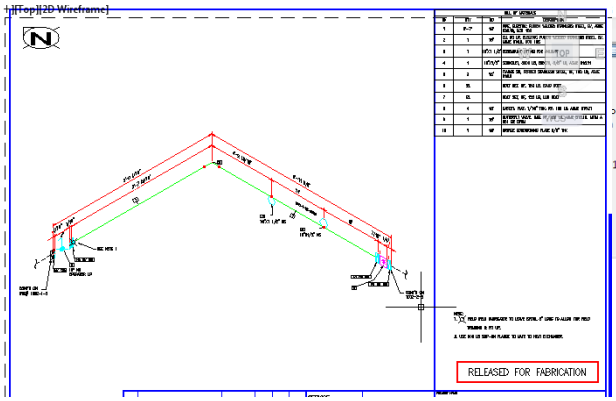


Deliverables

Isometric Creation

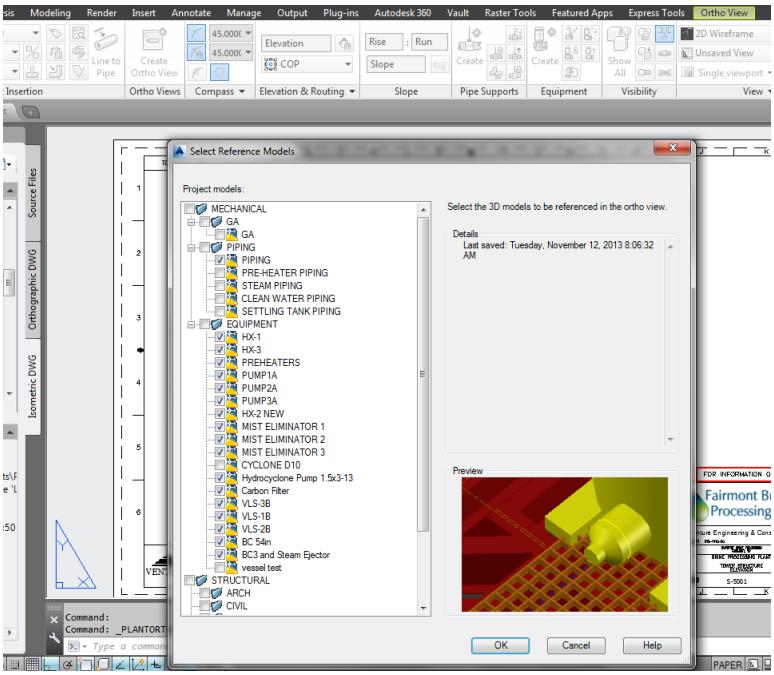
- Click on the ISO menu
- Click the type of ISO you would like
- When ISO window comes up choose line number and the ISO style.



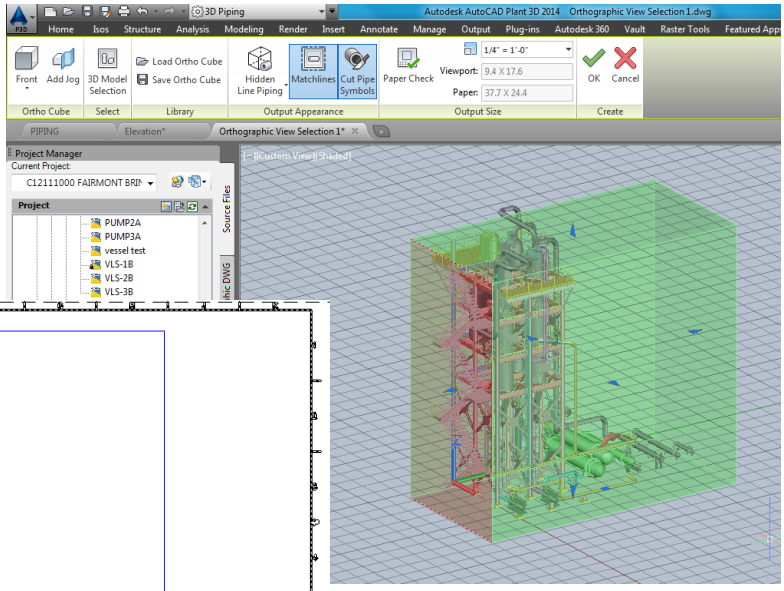


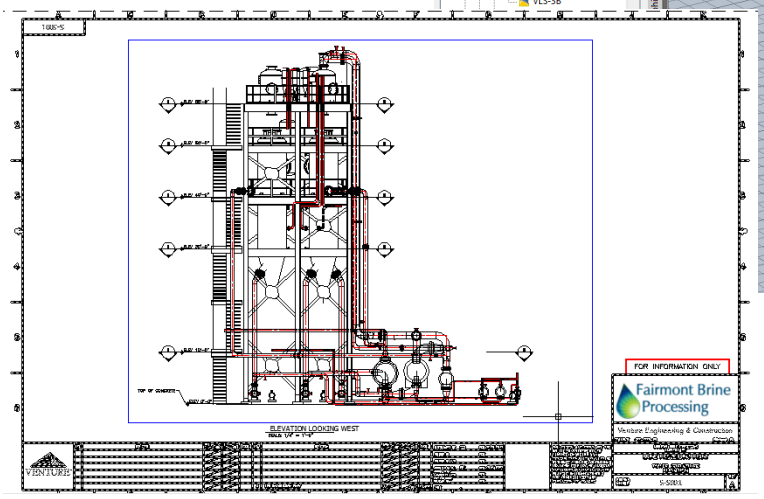
Orthographic Creation

- Using the ORTHO Create button on the ribbon, this window will appear.
- Choose the equipment, structure and piping.



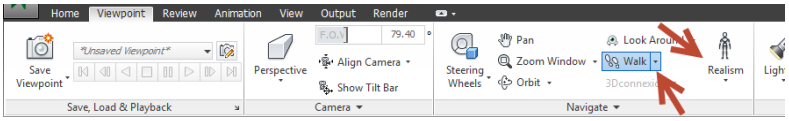
- Choose the orientation for the drawing the model cube
- Ok to create ORTHO view





Project Collaboration and Clash Detection

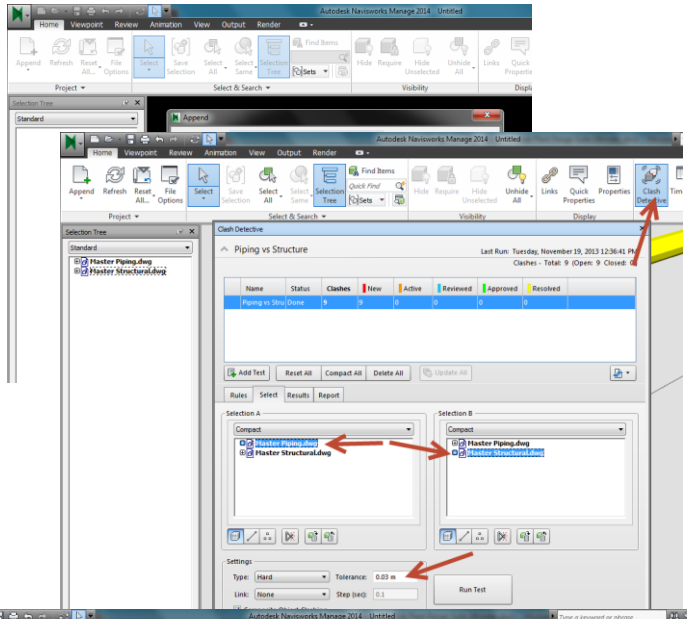
Project Review



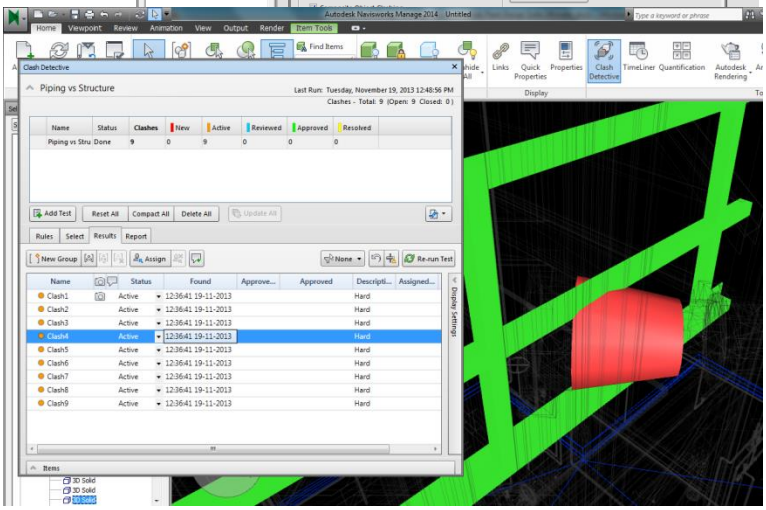
- You can use the 'fly' and 'walk' commands to review the project:
- In 'walk' mode you have various types of realism.
    - 'Collision' - you will not be able to walk through objects
    - 'Gravity' – you can walk through solid objects
    - 'Crouch' – you will attempt to crawl under or jump over objects in your path
    - 'Third Person' – you can look over the shoulder of an avatar

Clash Detection

You can check piping against structure.



- Use the Append button to open the piping and the structure file.
- Select Clash Detective from the ribbon
- Add a test to run and give it a name Piping vs Structure
- In column selection A choose the Piping file and in column Selection B select the structure file.
- In the settings area chooses what type and enters the tolerance.
- Click on the Run Test to perform the Clash Detection



- Once the Test has completed, the results will be displayed in the 'Results' tab.
- Click on each clash listed to review each clash. There will be two clashes that are real and two that are due to the supports being attached to the structure. You can ignore these by selecting 'Approved' in the pull-down under status:

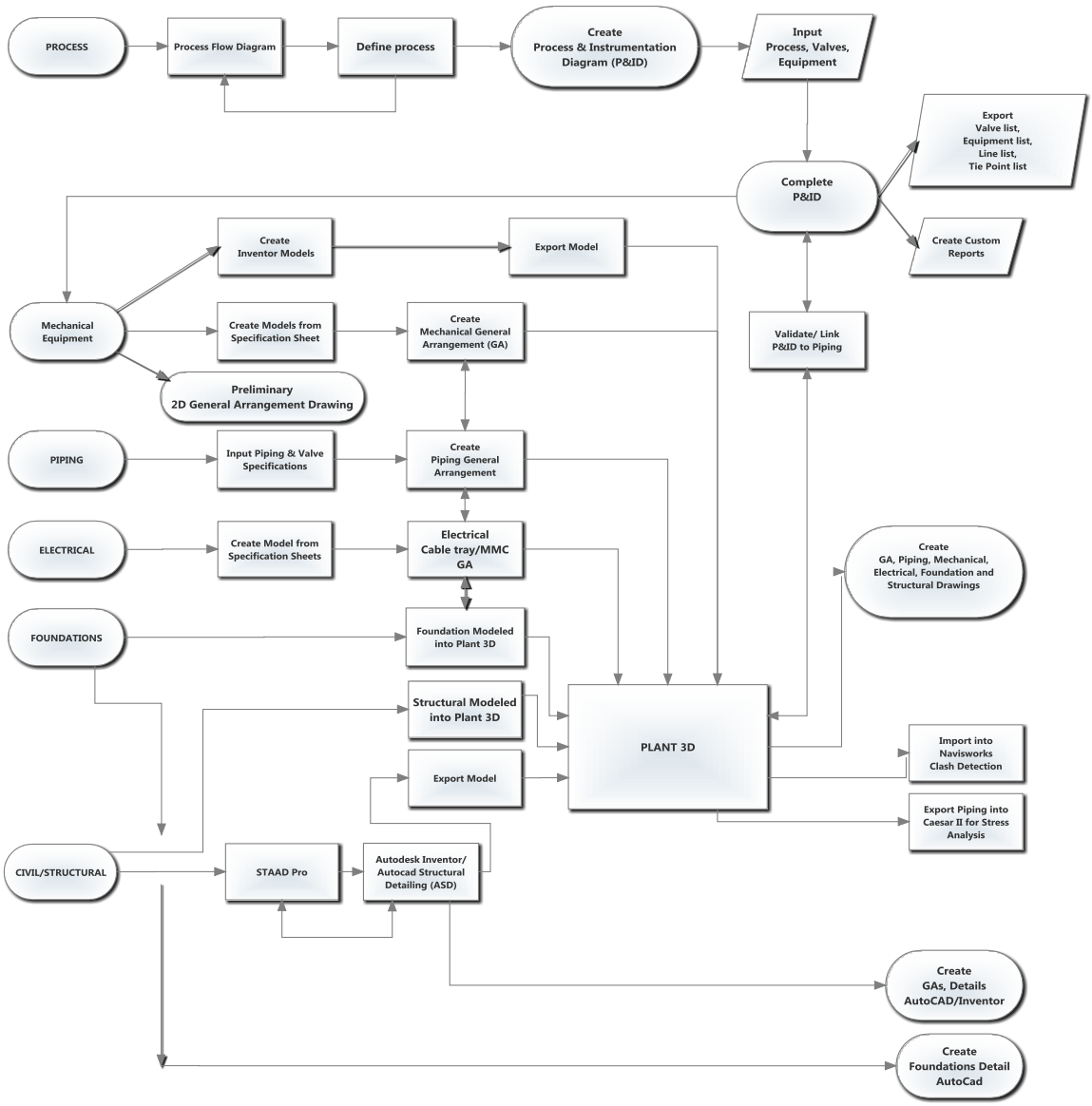
Workflows

Plant Design Suite Workflow

- Autocad Process & Instrumentation Diagram (P&ID)
- Autocad Plant 3D
  - Structural
  - Equipment Modeling
  - Electrical
  - Piping
- Autocad Structural Detailing (ASD)
  - Structural
- Autodesk Inventor
  - Equipment Modeling
  - Structural

Oil & Gas Workflow

- Process/Mechanical/Piping Workflow
  - Autocad Plant 3D / PID
  - Autodesk Inventor
- Civil/Structural Workflow
  - Autocad Plant 3d
  - Autocad Structural Detailing
  - Autodesk Inventor
- Project Collaboration
  - Navisworks Interference Detection
- Deliverables
  - Piping Isometrics drawings
  - Orthographic drawings



Conclusion:
You have been just been introduced to a viable industry workflow using the design tools within the Autodesk Plant Design Suite Ultimate 2014. Now, you have a good understanding of how the following tools interact with each other to be interoperable:

- P&ID's
- Structural, Equipment and Piping Modeling
- Structural Workflows using Autodesk Inventor and AutoCAD Structural Detailing
- Equipment Workflow using Inventor and Plant 3D
- Collaboration with Navisworks
    - Interference Detection
- Deliverables
    - Isometrics
    - Orthographic