



**SSIWSC 2024**

Design. Build. Maintain. Connect.

# From Functional to Detailed Design

Blair Johnston



# Current Workflow Disconnects

- ▶ Data Integration  
Communication  
Complexity



# Current Workflow Disconnects

- ▶ Data Integration
- ▶ Communication
- ▶ Complexity

# Current Workflow Disconnects

Data Integration

Communication

► Complexity



# Functional to Detail Design Workflow

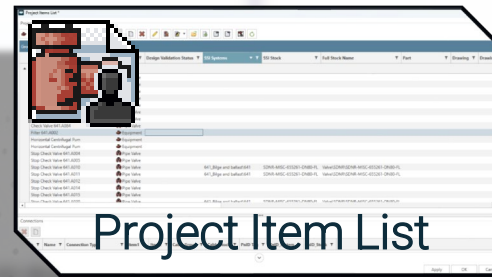


Plant 3D



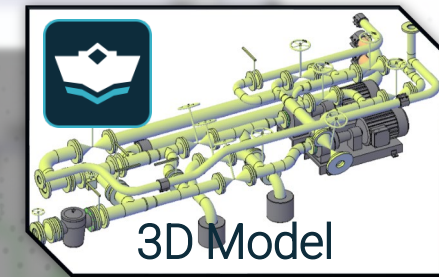
AutoCAD & Excel

Functional  
Engineering



Project Item List

Functional  
Parts List



3D Model

Detailed Design

# Functional to Detail Design Workflow

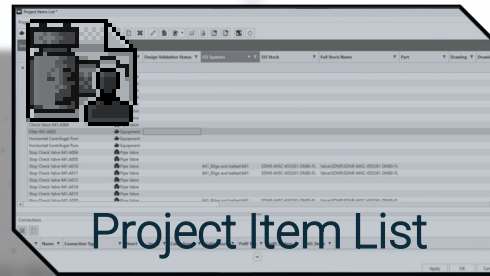


Plant 3D



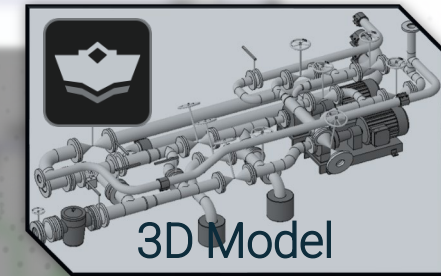
AutoCAD & Excel

Functional  
Engineering



Project Item List

Functional  
Parts List

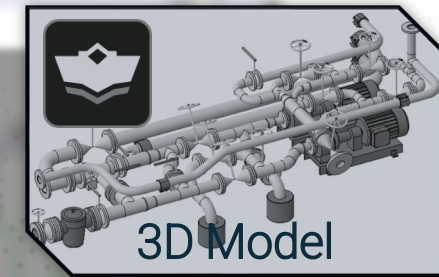
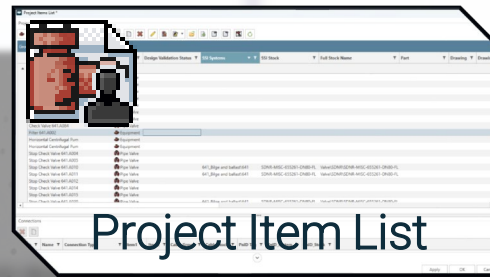


3D Model

Detailed Design



# Functional to Detail Design Workflow

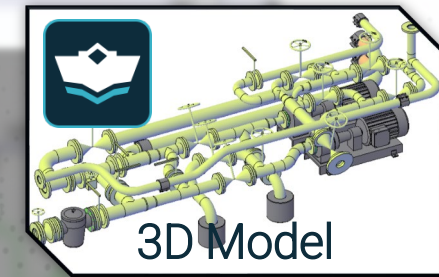
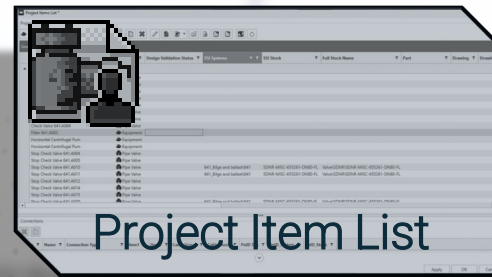


Functional  
Parts List

Detailed Design

Functional  
Engineering

# Functional to Detail Design Workflow



Functional  
Parts List

Detailed Design

Functional  
Engineering



# Functional to Detail Design Workflow

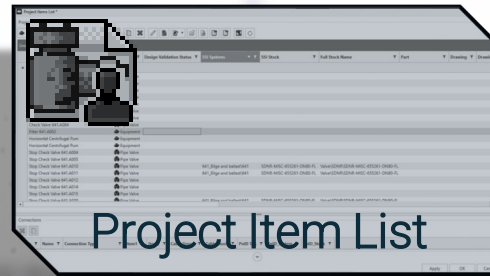


Plant 3D



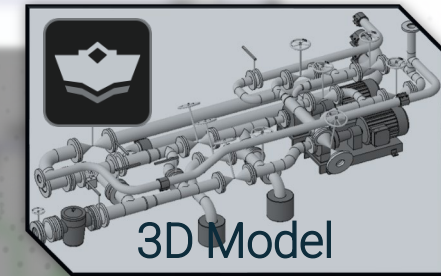
AutoCAD & Excel

Functional  
Engineering



Project Item List

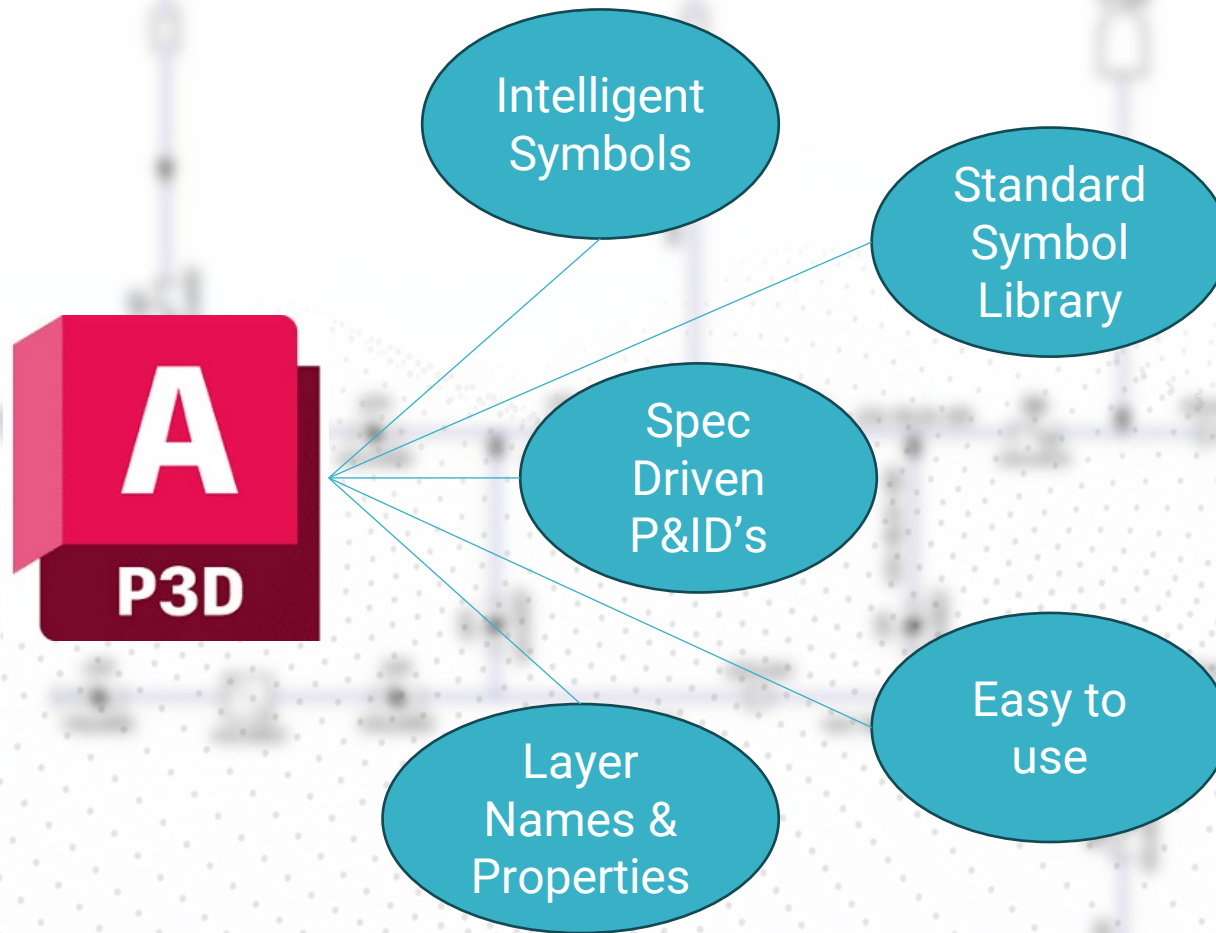
Functional  
Parts List



3D Model

Detailed Design

# Functional Engineering





# Functional Engineering



AutoCAD Plant3D

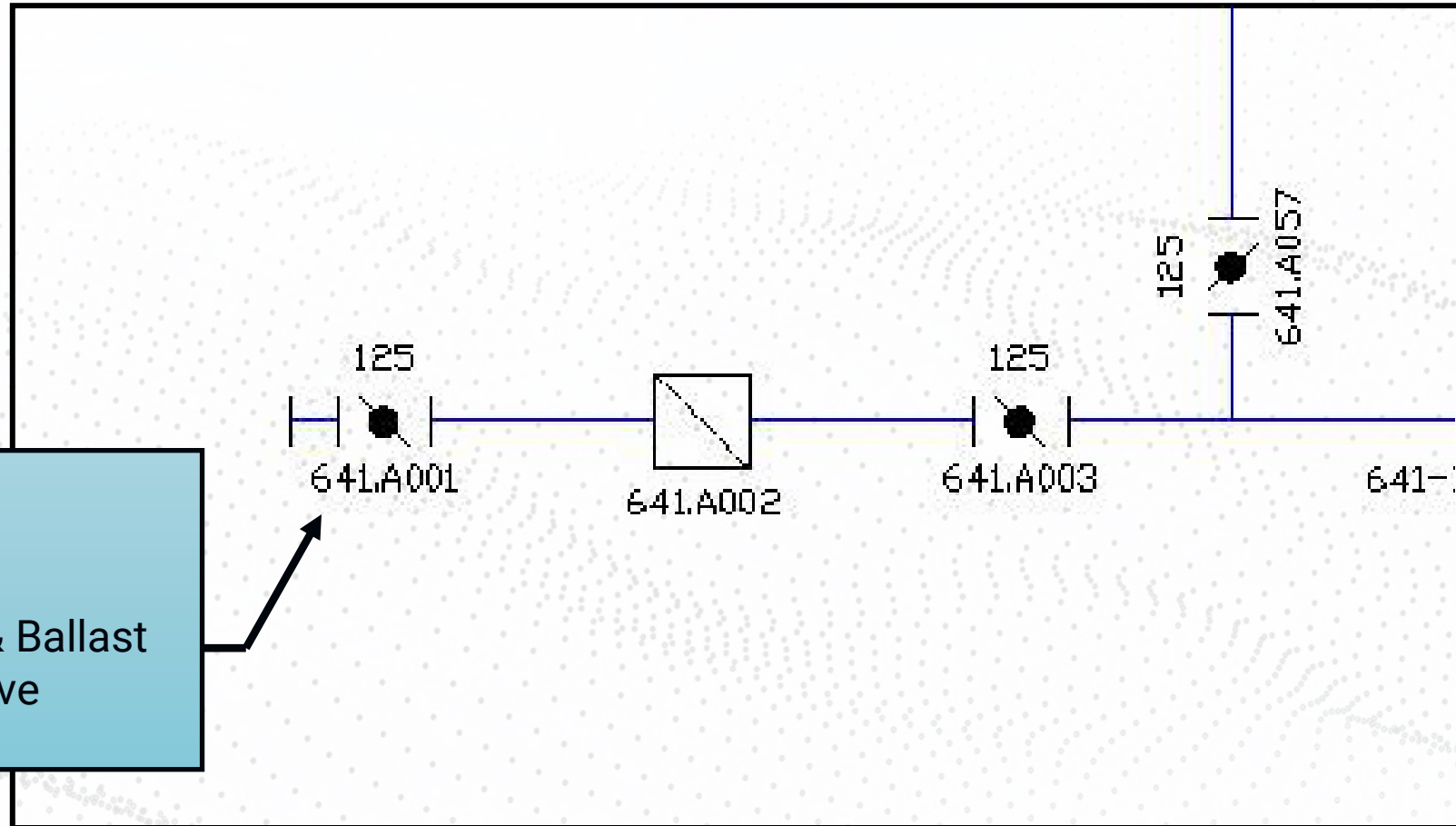


Plant3D advantages



Smart Components

Properties:  
Tag: 641.A001  
Size: 125  
System:641-Bilge & Ballast  
Class: Butterfly Valve  
Normally: OPEN



# Functional Engineering

A

P3D

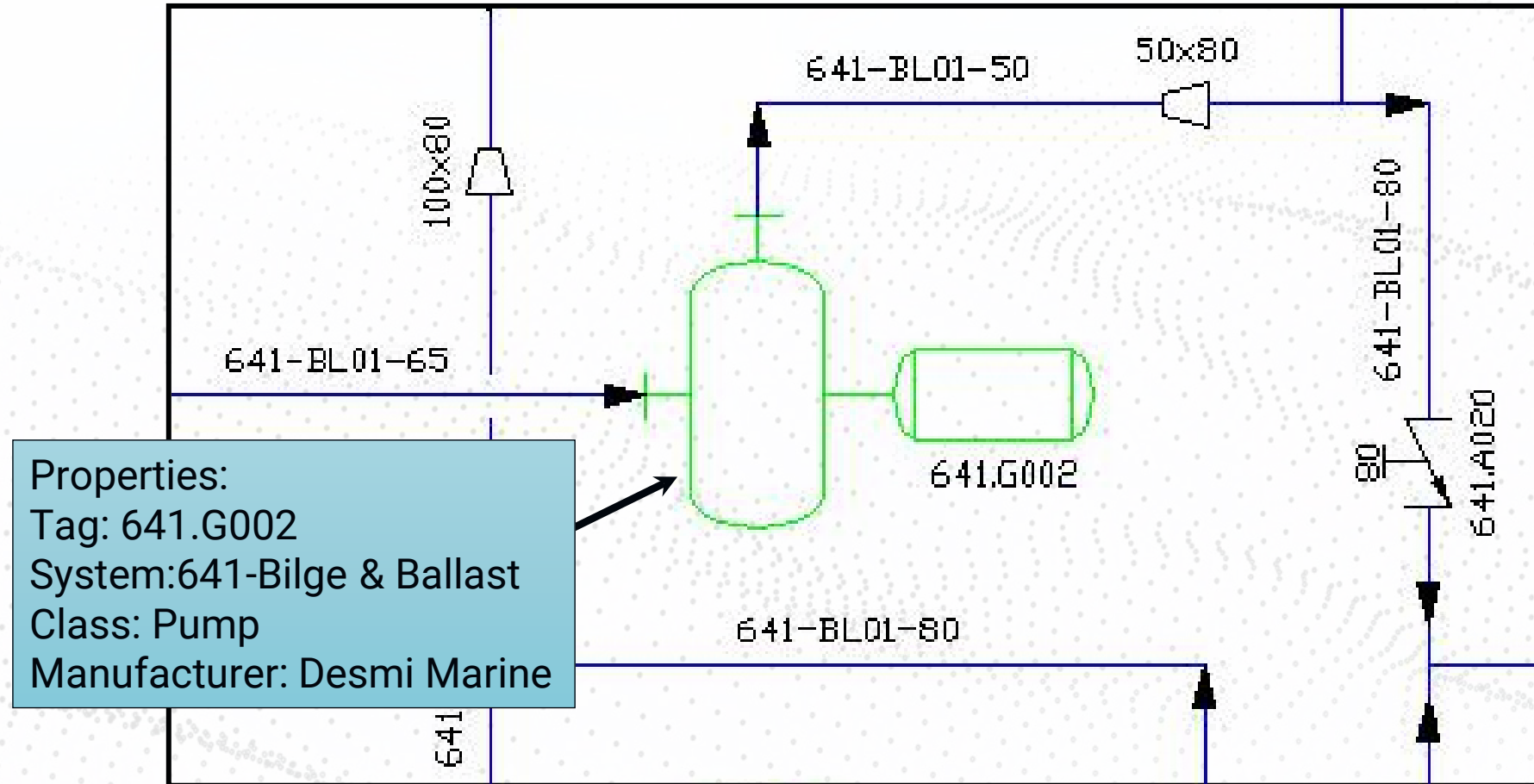
AutoCAD Plant3D



Why Plant3d



Smart Components





# Functional Engineering

A

P3D

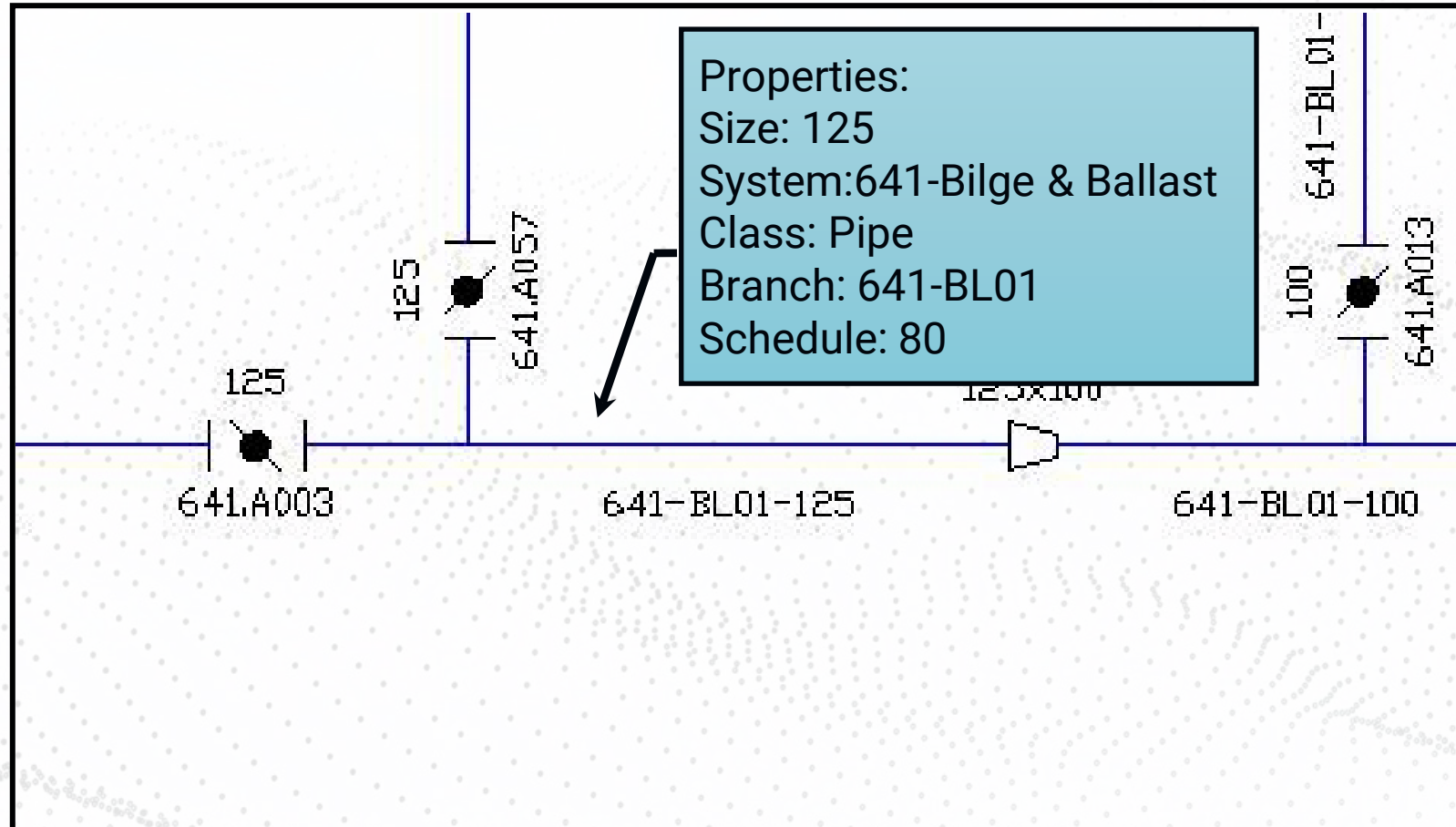
AutoCAD Plant3D



Why Plant3d



Smart Components



# Functional Engineering



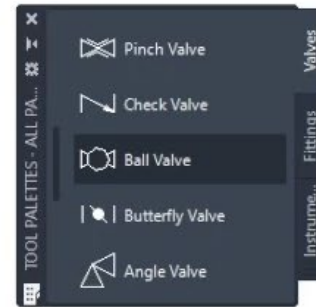
AutoCAD Plant3D



Why Plant3d

 Smart Components

 Intuitive Design Tools





# Functional Engineering

A

P3D

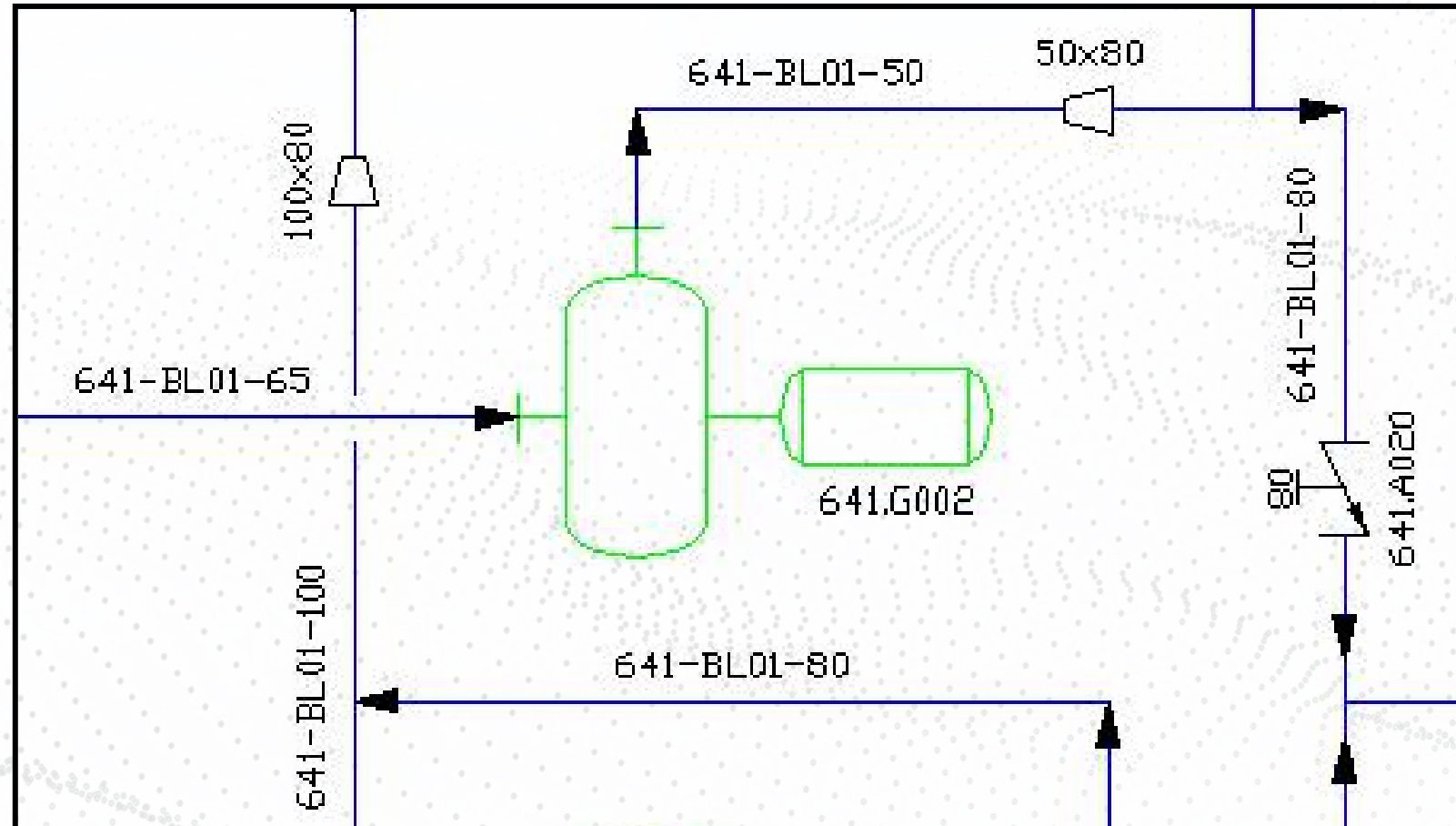
AutoCAD Plant3D



Why Plant3d



Smart Components



# Functional Engineering



## Pro's

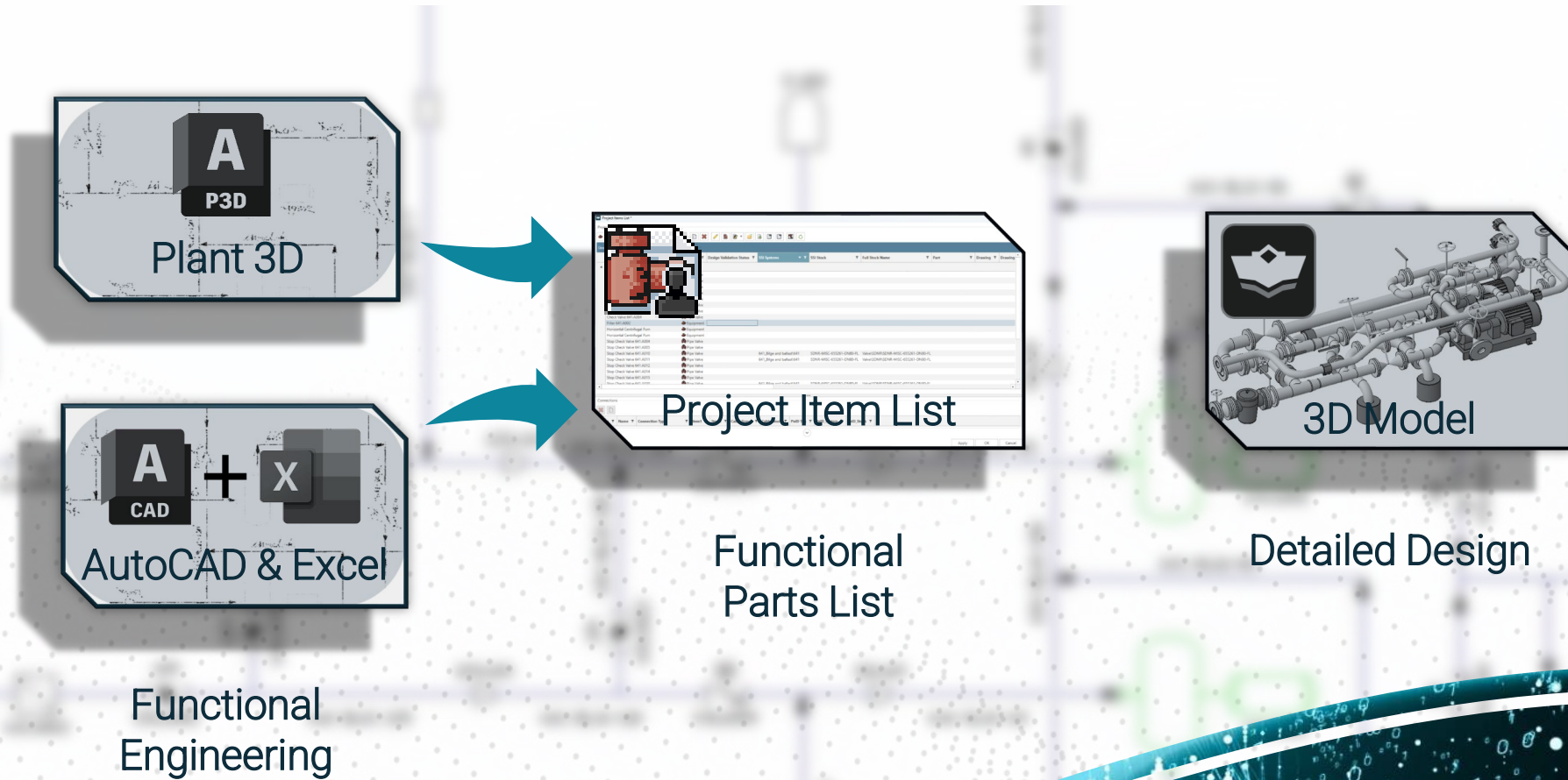
- Most Likely already on this path
- simple

## Con's

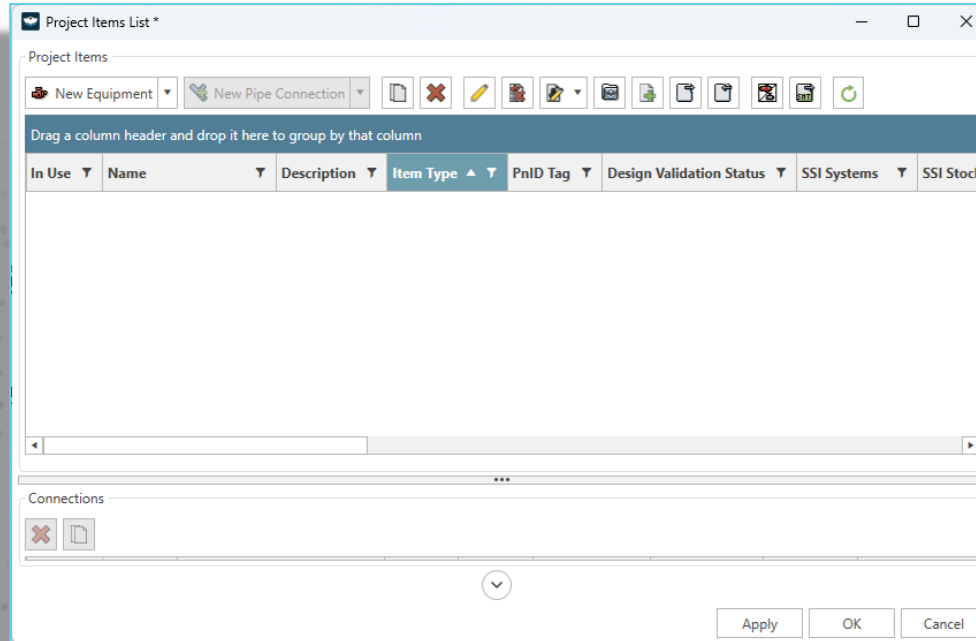
- Disassociation between the drawing and its Dataset
- Lose ability to run PnID Design Validation



# Functional to Detail Design Workflow



# Functional Parts List – Project Item List (PIL)





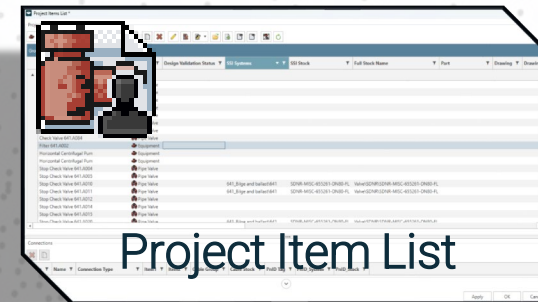
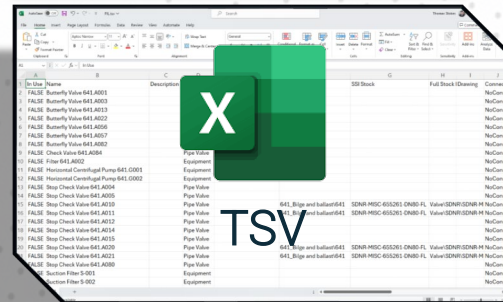
# Functional Parts List – from Plant 3D

## Direct Approach



# Functional Parts List – Traditional method

## Direct Approach





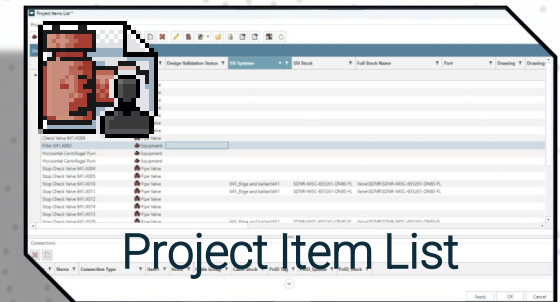
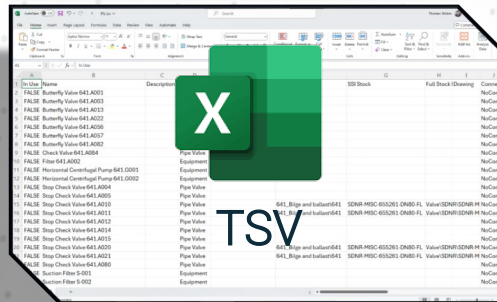
# Functional Parts List – Plant 3D and PLM

## Configuration Managed Approach



# Functional Parts List – Traditional with PLM

## Configuration Managed Approach





# Functional Parts List – ShipbuildingPLM

The screenshot displays the Aras Innovator ShipbuildingPLM interface. The left sidebar shows a navigation menu with categories like Documents, Catalog, Functional Design, Product Model, Change Management, My Innovator, Searches And Reports, Portfolio, Sourcing, Administration, and Extended Classification. The main content area is titled 'Pipe' and shows a 'SWBS' (Structure of Work Breakdown Structure) view. The SWBS details include:
 

- Created By: Innovator Admin
- Created On: 2024-10-07 06:07:54
- Modified By: Innovator Admin
- Modified On: 2024-10-07 06:14:44
- Claimed By:
- Major Rev: A
- Release Date:
- Effective Date:
- Generation: 1
- State: Preliminary

 Below the details, there are checkboxes for 'Has Parts' (checked), 'Has Drawing', 'Has Children', and 'Changes Pending'. The 'SWBS Hierarchy' tab is active, showing a table of functional parts:
 

Number	Name	Revision	State
Pipe	Pipe	A	Preliminary
SSI-0101-P15-S01	Floor Fr.69 (P)	A	Preliminary
SSI-0103-P02-S03	Tween Dk	A	Preliminary
P-1860	N/A	A	Preliminary
P-12614	N/A	A	Preliminary
SSI-0107-P11-S02	Bhd Fr.72 + 170 (S)	A	Preliminary
P-6008	N/A	A	Preliminary
P-12313	N/A	A	Preliminary
P-1796	N/A	A	Preliminary
SSI-0105-P01-P23	Shell	A	Preliminary

# Functional Parts List

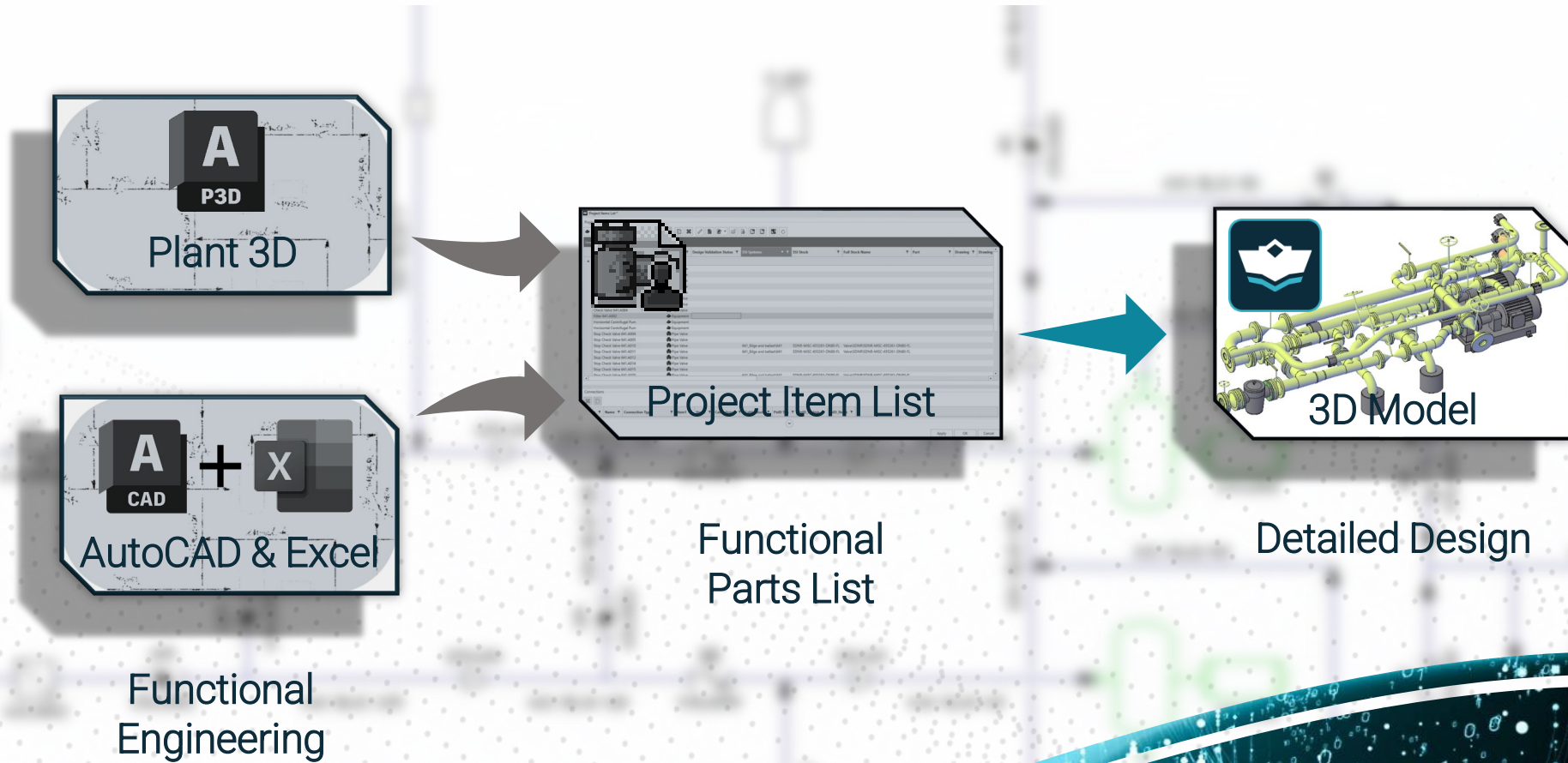
The screenshot shows a software window titled "Project Items List". At the top, there are two dropdown menus: "New Equipment" and "New Pipe Connection". Below these are several icons for file operations. A "Grouped by:" dropdown is set to "In Use". The main area is a table with the following columns: Name, Item Type, PnID\_Stock, PnID\_System, PnID Tag, PnID Description, and Design Validation St. The table is currently filtered to show items "Not In Use" (23 items). The items listed are:

Name	Item Type	PnID_Stock	PnID_System	PnID Tag	PnID Description	Design Validation St
Butterfly Valve 641.A001	Pipe Valve			641.A001	BUTTERFLY VALVE	
Butterfly Valve 641.A003	Pipe Valve			641.A003	BUTTERFLY VALVE	
Butterfly Valve 641.A013	Pipe Valve			641.A013	BUTTERFLY VALVE	
Butterfly Valve 641.A022	Pipe Valve			641.A022	BUTTERFLY VALVE	
Butterfly Valve 641.A056	Pipe Valve			641.A056	BUTTERFLY VALVE	
Butterfly Valve 641.A057	Pipe Valve			641.A057	BUTTERFLY VALVE	
Butterfly Valve 641.A082	Pipe Valve			641.A082	BUTTERFLY VALVE	
Check Valve 641.A084	Pipe Valve			641.A084	CHECK VALVE	
Filter 641.A002	Equipment			641.A002	FILTER	
Horizontal Centrifugal Pump 641.G001	Equipment			641.G001	HORIZONTAL CENTRIFUGAL PUMP	
Horizontal Centrifugal Pump 641.G002	Equipment			641.G002	HORIZONTAL CENTRIFUGAL PUMP	
Stop Check Valve 641.A004	Pipe Valve			641.A004	STOP CHECK VALVE	
Stop Check Valve 641.A005	Pipe Valve			641.A005	STOP CHECK VALVE	
Stop Check Valve 641.A010	Pipe Valve	SDNR-MISC-655261-DN80-FL	641	641.A010	STOP CHECK VALVE	
Stop Check Valve 641.A011	Pipe Valve	SDNR-MISC-655261-DN80-FL	641	641.A011	STOP CHECK VALVE	

At the bottom of the window, there is a "Connections" section with two icons (a red X and a document icon) and a scroll bar. The bottom right corner contains "Apply", "OK", and "Cancel" buttons.



# Functional to Detail Design Workflow



# Detailed Design—ShipConstructor

Project Items List

Project Items

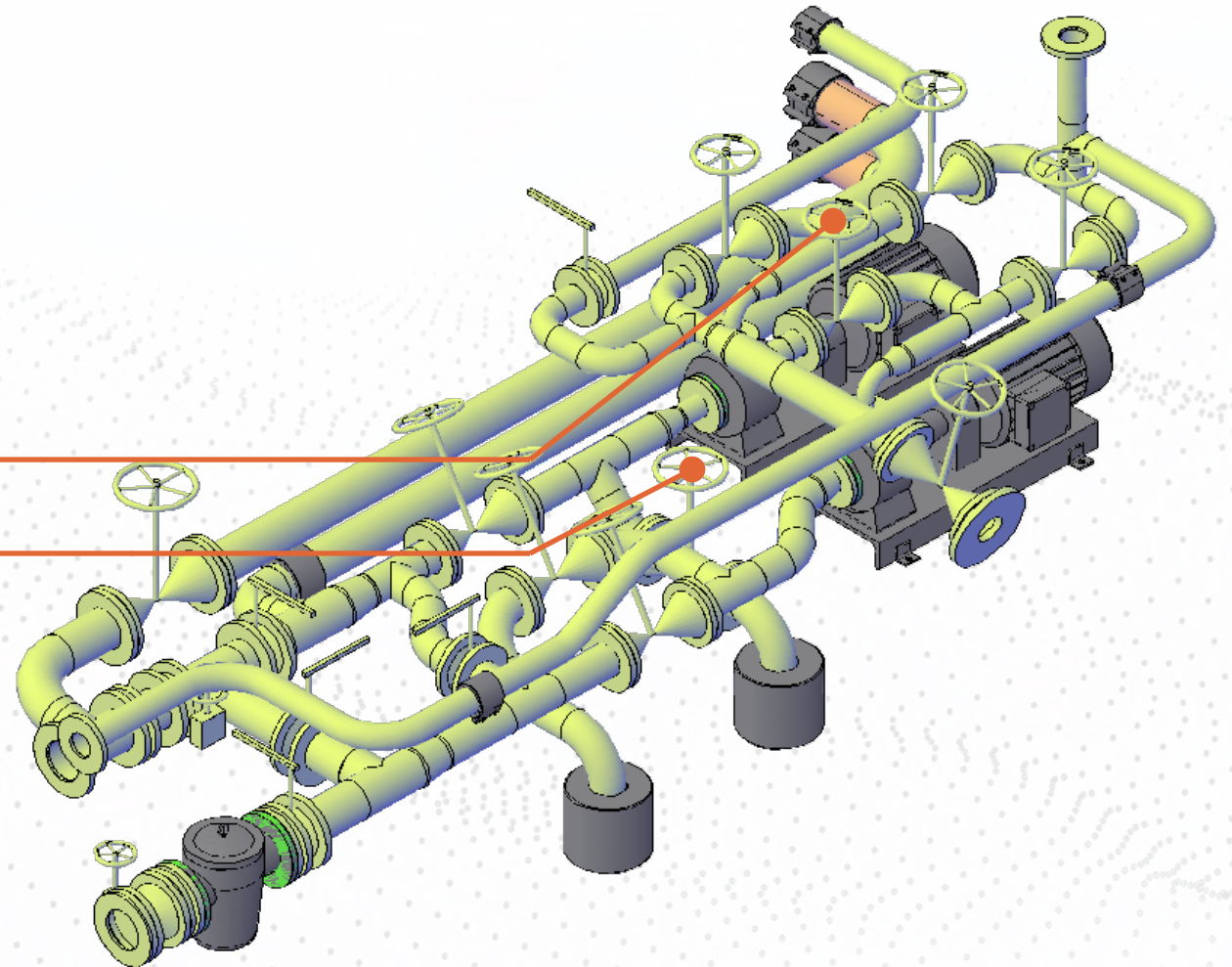
New Equipment | New Pipe Connection

Drag a column header and drop it here to group by that column

In Use	Name	Description	Item Type	PnID Tag
	Butterfly Valve 641.A082		Pipe Valve	641.A082
	Check Valve 641.A084		Pipe Valve	641.A084
	Stop Check Valve 641.A004		Pipe Valve	641.A004
	Stop Check Valve 641.A005		Pipe Valve	641.A005
	Stop Check Valve 641.A010		Pipe Valve	641.A010
	Stop Check Valve 641.A011		Pipe Valve	641.A011
	Stop Check Valve 641.A012		Pipe Valve	641.A012
	Stop Check Valve 641.A014		Pipe Valve	641.A014
	Stop Check Valve 641.A015		Pipe Valve	641.A015
	Stop Check Valve 641.A020		Pipe Valve	641.A020
	Stop Check Valve 641.A021		Pipe Valve	641.A021

Connections

Apply OK Cancel





# Detailed Design—ShipbuildingPLM

**aras INNOVATOR** SHIPBUILDINGPLM

Q Functional Parts x P-10570 x HVAC x SWBS x Training x \*PIPE-15,0x1,0-...

**P-10570**

Functional Part

**Functional Part**

Created By: Innovator Admin  
Created On: 2024-10-07 06:12:02  
Modified By: Innovator Admin  
Modified On: 2024-10-07 06:14:51  
Claimed By:  
Major Rev: A  
Release Date:  
Effective Date:  
Generation: 1  
State: Preliminary

Functional ID	Tag	Type
P-10570		Bulk

Changes Pending

Quantity: 1.00 Unit of Measure: Each

Model In ShipConstructor

Exported To ShipConstructor

SWBS: HVAC  
Hull: Training  
Class: SSI

**Part Catalog Properties**

Number	Name
	"PIPE-15.0x1.0-WICU"

Type	Rev	State
Design-Part	A	Request

ERP Product Group	Classification Society

NSN	Foundation Requirement

Unit of Measure	Weight	Unit
	3.10	kg

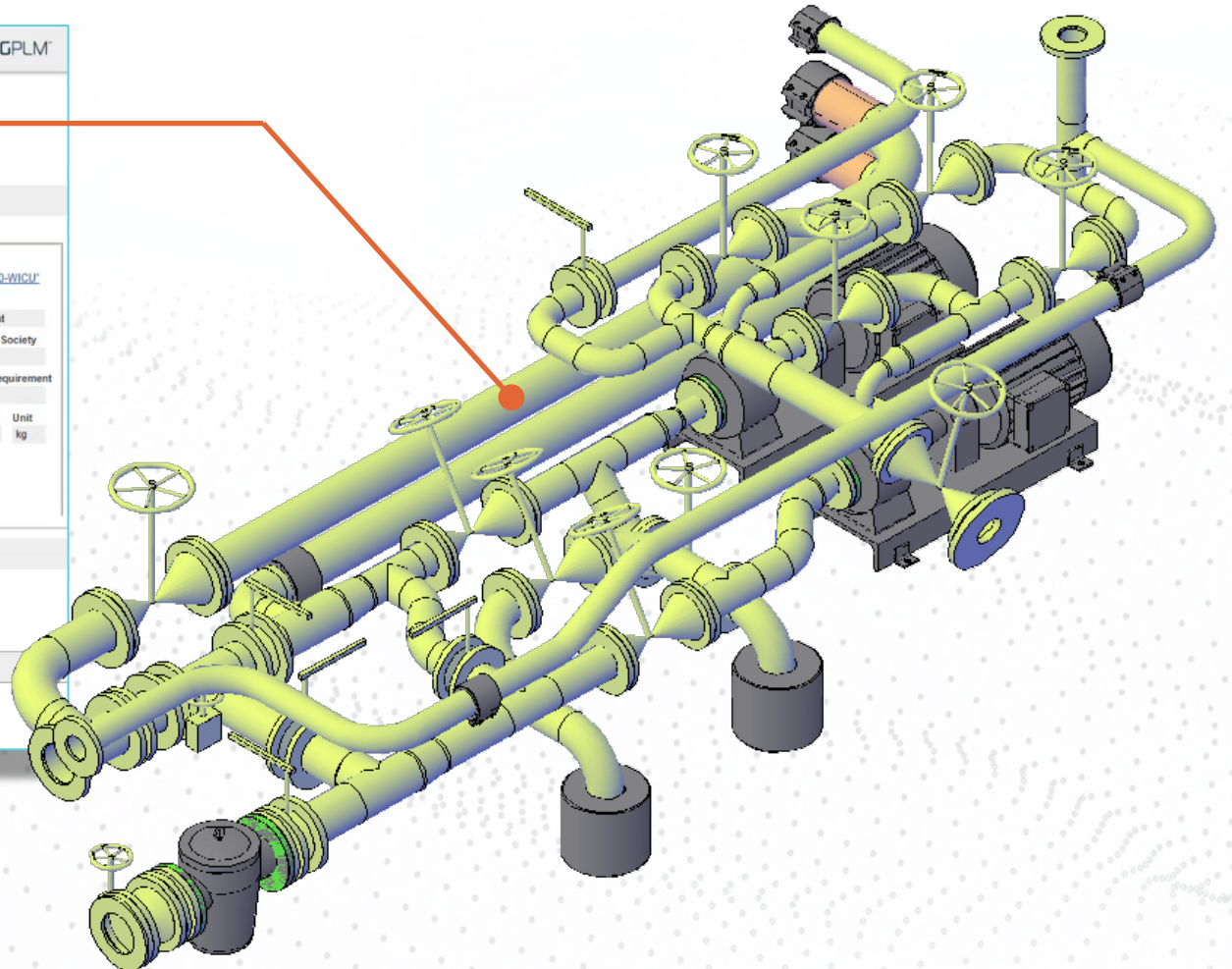
ShipConstructor Type

Model In ShipConstructor Description

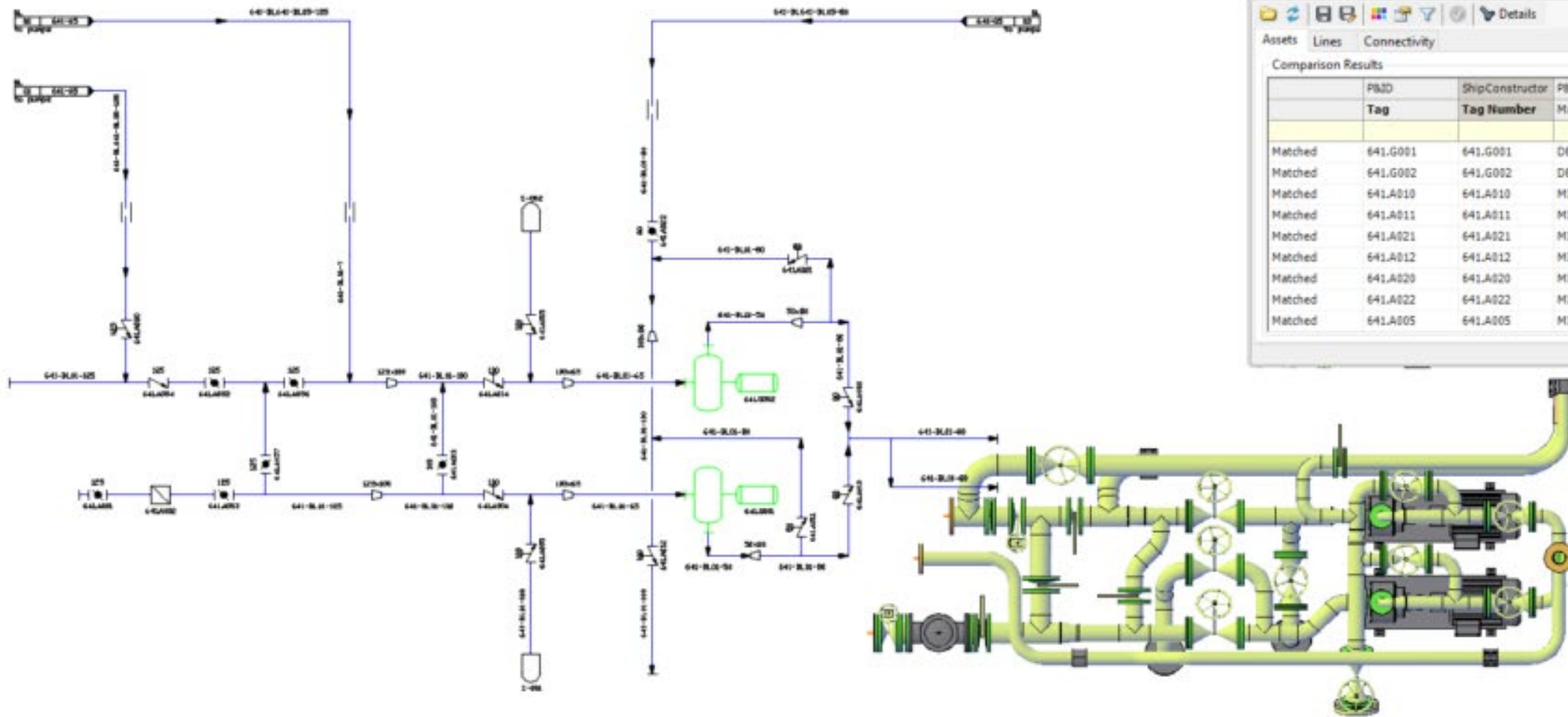
Where Used SWBS: ShipConstructor Parts Compartments Changes SSI Scoped

ShipConstructor Parts

Part [...]	Type	Generation	Revision	State	Block [...]	Class [...]	Hull [...]
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# P&ID Design Validation



Assets Lines Connectivity

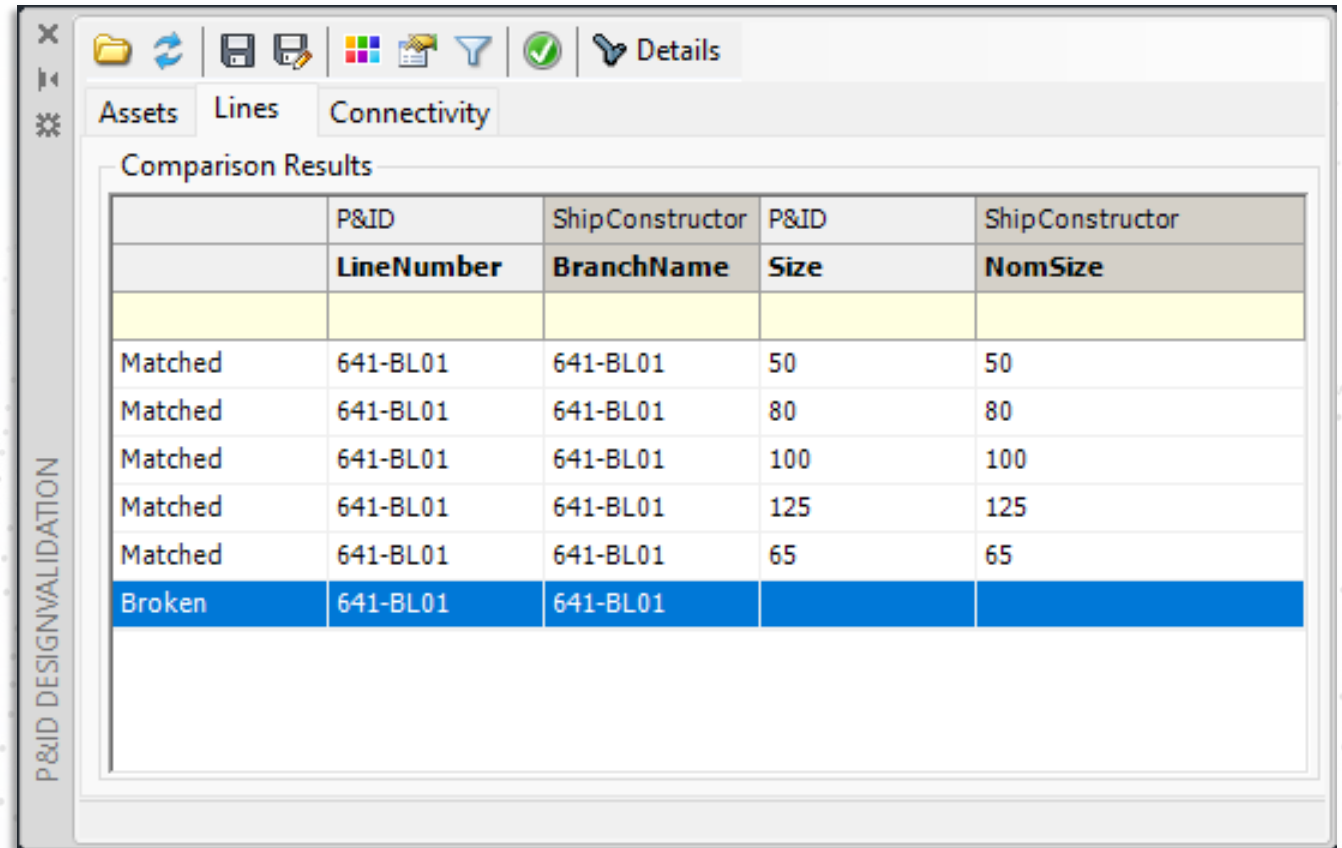
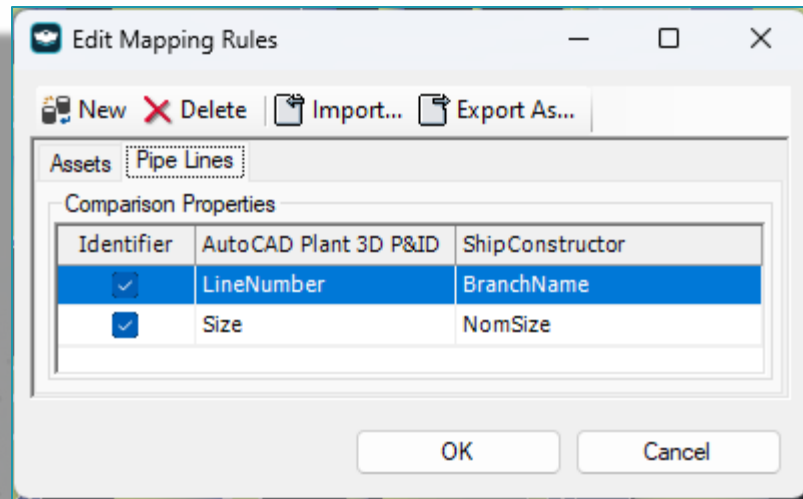
Comparison Results

	P&ID Tag	ShipConstructor Tag Number	P&ID Manufacturer	ShipConstructor ManufacturerName
Matched	641.G001	641.G001	DESMI MARINE	DESMI MARINE
Matched	641.G002	641.G002	DESMI MARINE	DESMI MARINE
Matched	641.A010	641.A010	MISC	MISC
Matched	641.A011	641.A011	MISC	MISC
Matched	641.A021	641.A021	MISC	MISC
Matched	641.A012	641.A012	MISC	MISC
Matched	641.A020	641.A020	MISC	MISC
Matched	641.A022	641.A022	MISC	MISC
Matched	641.A005	641.A005	MISC	MISC

P&ID DESIGN VALIDATION



# P&ID Design Validation



# Functional Engineering—Design Validation



AutoCAD Plant3D



Why Plant3d

- Smart Components
- Property inheritance
- Design Validation

Tag Number	641.A010
<b>Connected Parts</b>	
<b>Handle</b>	
<b>Product Hierarchy</b>	
<b>Weight</b>	
<b>Spool Information</b>	
<b>Stock Attributes</b>	
Additional Thickness	0mm
Article Number	655261
Body Weight	24.5kg
Description	Screw-down non-return valve Fo
Manufacturer	MISC
Material	Cast iron GG 25
Model Number	655261
Nominal Size	80 mm

<b>Tag</b>	
Tag	641.A010
<b>Styles</b>	
<b>General</b>	
PnPGuid	29726d69-45e0-410e-aed3-101ad1d2e...
Description	STOP CHECK VALVE
Manufacturer	MISC
Model Number	
Supplier	
Comment	
Status	
Size	80
Spec	100HC01
SC System	641
Valve Code	A
Normally	NO





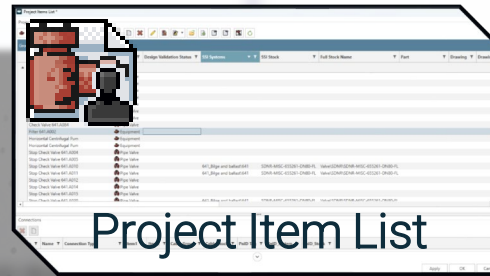
# Functional to Detail Design Workflow



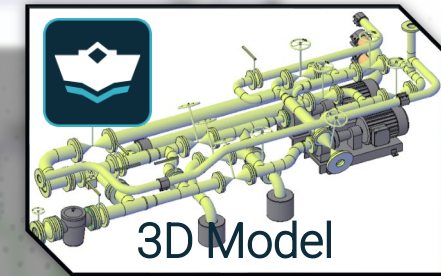
Plant 3D



AutoCAD & Excel



Project Item List



3D Model

Functional  
Engineering

Functional  
Parts List

Detailed Design

# RECAP

- ▶ Data Integration
- ▶ Communication
- ▶ Complexity



# Questions

