

“A Workflow towards a Digital Plant Asset Management System”

Preethi Rao

Sr. Technical Specialist - AEC

Sanjeev Ghosh

Sr. Technical Specialist – D&MI @2D3DnD



About the speaker

Sanjeev Ghosh

A mechanical engineer by training, Sanjeev has an experience in design in manufacturing packaging products for FMCG, Agro Chemicals, Healthcare and Lubricant industry functions. At Autodesk, Sanjeev is member of the Technical Specialists team and supports sales efforts with MMA and D&M territory customers.



About the speaker

Preethi Rao

Senior Technical Specialist at Autodesk for India & SAARC countries with 16 years of experience in the AEC Industry. In her current role at Autodesk, She works with customers in Plant & process industry to assess their current Design engineering and construction processes and put together the right set of solutions to help them improve and implement best practices. She is a part of technical team and supports sales effort with MMA and AEC territory customers.

Class Summary

A Workflow towards a Digital Plant Asset Management System

A stepwise approach of creating Digital Plant Asset. This course intends to showcase the journey right from concept to commissioning and Maintenance of the Plant. During this journey we will also cover the aspects of Digital Engineering of a Plant, addressing the 3 C's - Coordination, Collaboration and Communication as well as managing asset information in real time.

Agenda

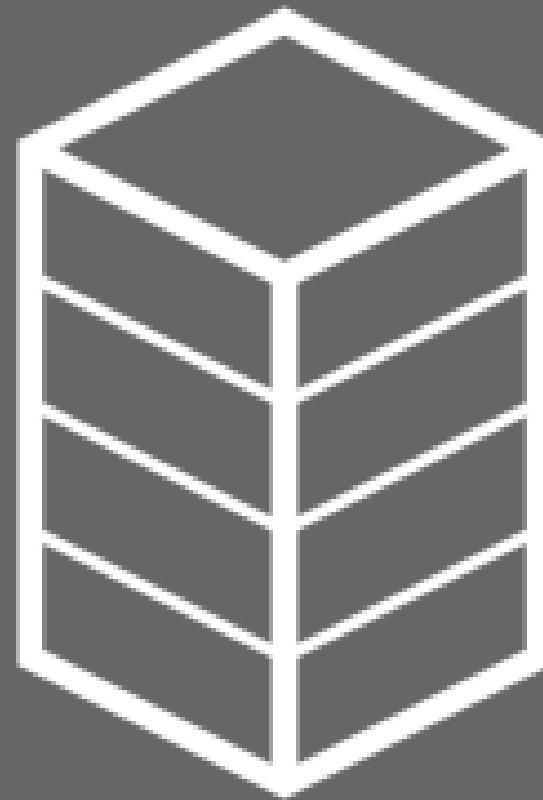
- Industry Buzzwords
- Industry Trend
- Industry Statistics
- Definitions
- Physical Asset – Digital Asset
- Digital Plant Asset Information
- Digital Plant Model CREATION
- CDE & Focus on 3c's
- Asset Management



Industry Trends



Urbanization



BIM Mandates



Distributed Project
Teams

Industry statistics



80%

1/2

18 -24
Months

Definitions

- ASSET

A piece of equipment, piping, component or functional item included within a Plant & process industry project

- ASSET INFORMATION

Important identification information related to an asset, such as name, location, manufacturer, model number, serial number etc. ;any piece of information deemed useful by a Plant operator relating to the assets within their process plant

- ASSET INFORMATION MANAGEMENT

The act of managing and storing the asset information of all necessary or desired assets related to a particular plant project

For Every Physical Asset

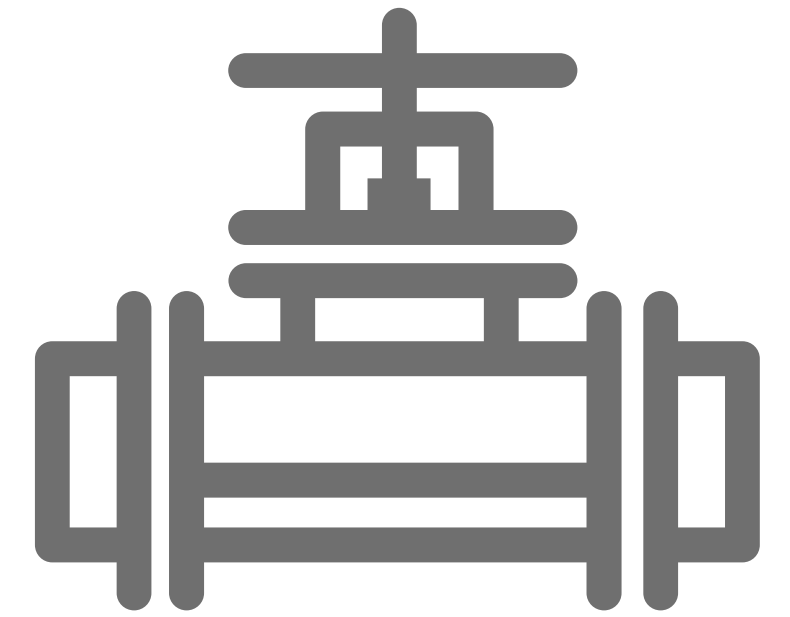
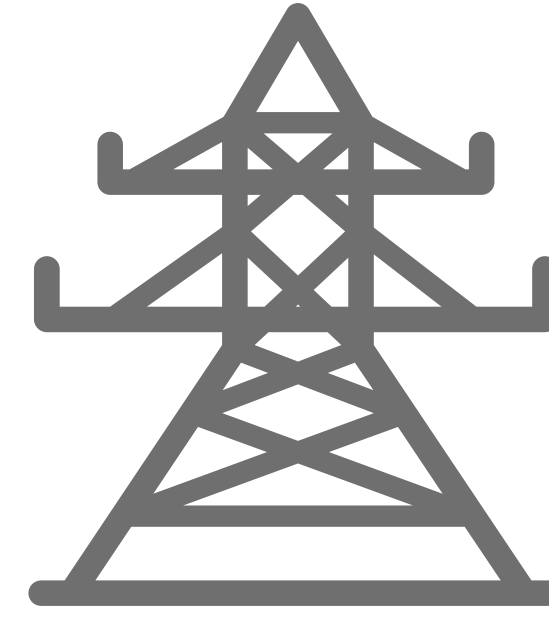
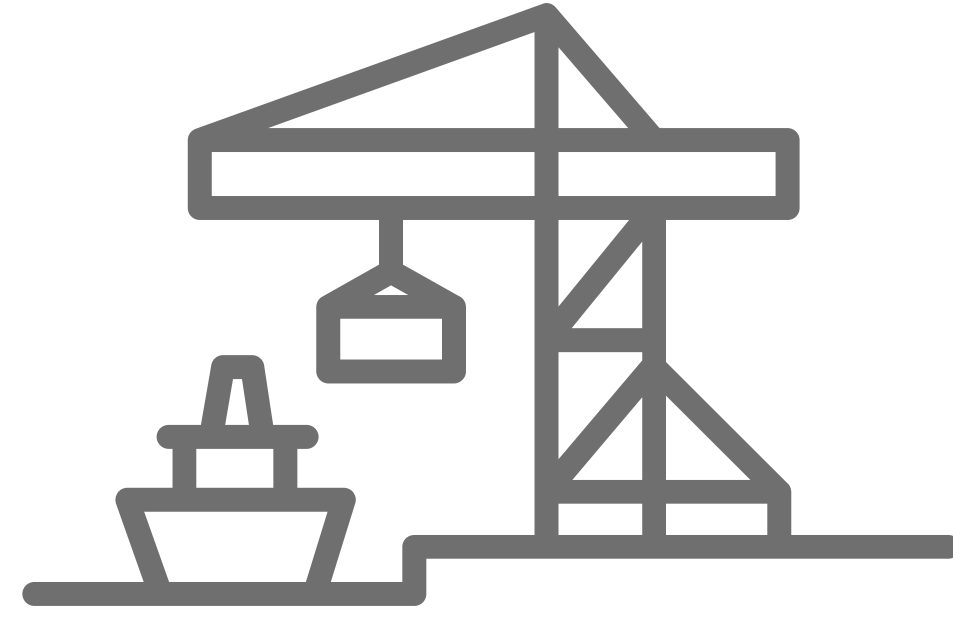
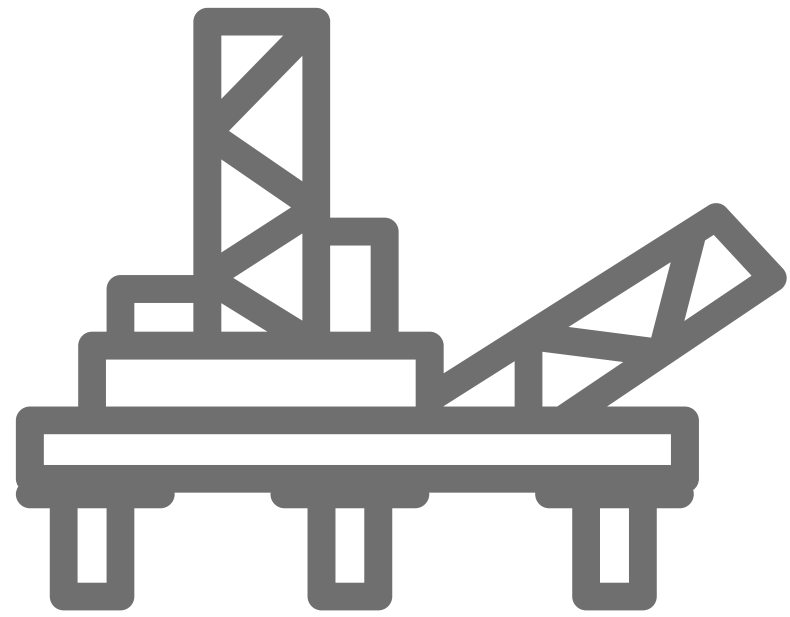


There Must Be An Existence Of A Digital Asset



• Image Courtesy Of L&T WET

It Doesn't Matter the industry you Belong to



Digital Asset information

Digital Plant Asset Information



Plant



Graphical
Engineering
Information

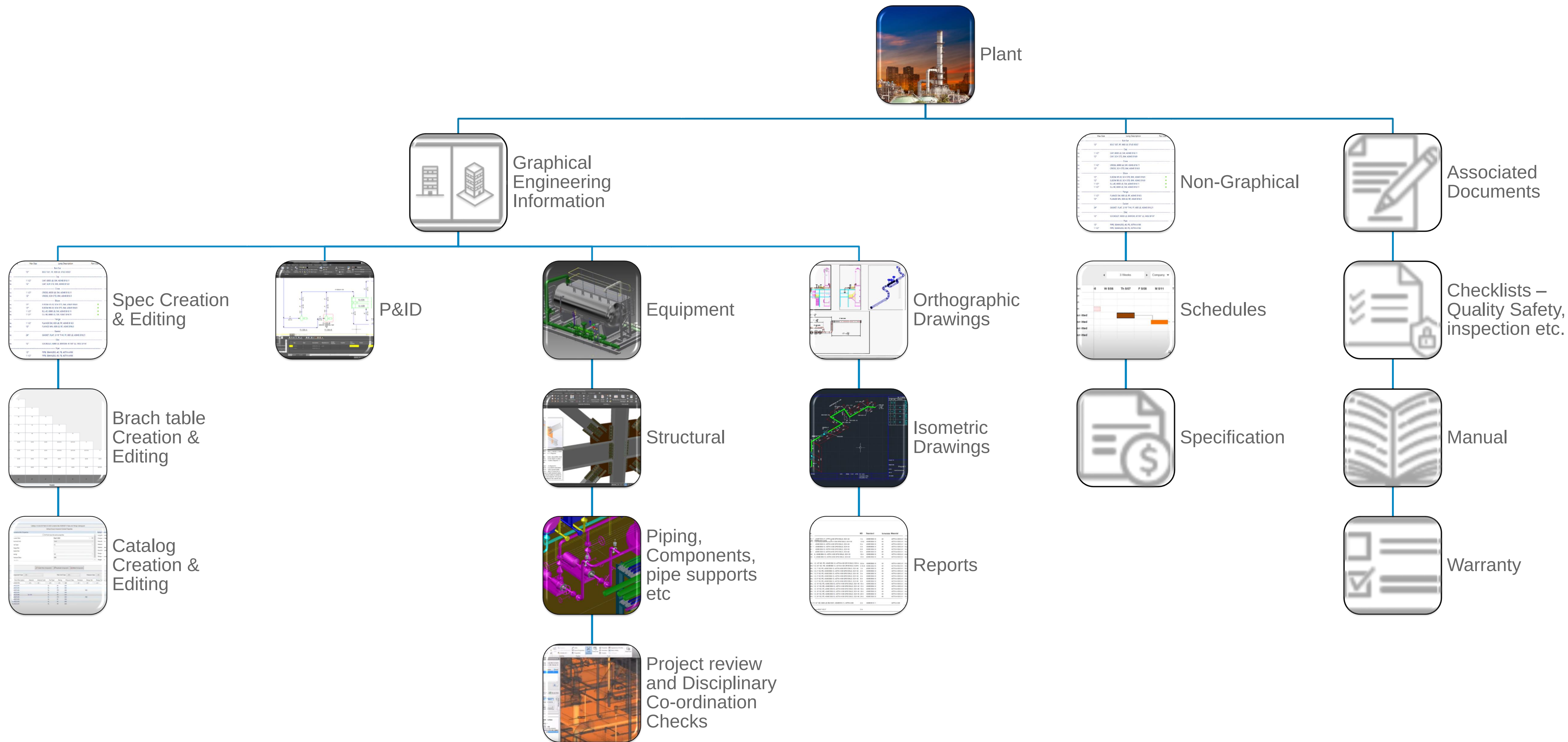
	Max Size	Long Description	Part Unit
		Bolt Set	
	12"	BOLT SET, RF, 600 LB, STUD BOLT	
		Cap	
8"	1 1/2"	CAP, 8000 LB, SW, ASME B16.11	
8"	12"	CAP, SCH STD, BW, ASME B16.9	
		Cross	
8"	1 1/2"	CROSS, 6000 LB, SW, ASME B16.11	
8"	12"	CROSS, SCH STD, BW, ASME B16.9	
		Elbow	
8"	12"	ELBOW 45 LR, SCH STD, BW, ASME B16.9	•
8"	12"	ELBOW 90 LR, SCH STD, BW, ASME B16.9	•
8"	1 1/2"	ELL 45, 8000 LB, SW, ASME B16.11	•
8"	1 1/2"	ELL 90, 8000 LB, SW, ASME B16.11	•
		Flange	
8"	1 1/2"	FLANGE SW, 600 LB, RF, ASME B16.5	
8"	12"	FLANGE WN, 600 LB, RF, ASME B16.5	
		Gasket	
8"	24"	GASKET, FLAT, 3/16" THK, FF, 600 LB, ASME B16.21	
		Orlet	
8"	12"	SOCKDLET, 8000 LB, BWXSW, 47/50" LG, MSS SP-97	
		Pipe	
8"	12"	PIPE, SEAMLESS, 40, PE, ASTM A106	
8"	1 1/2"	PIPE, SEAMLESS, 80, PE, ASTM A106	

Non
Graphical



Associated
Documents

Digital Plant Asset Information



The Journey

STAGE C

ASSET MANAGEMENT

Asset
P-1001

DELIVERED

DETAILS

ISSUES

CHECKLISTS

ATTACHMENTS

Asset ID	P-1001
Category	Equipment > Pump
Description	Primary Bottoms Pump
Barcode	678901
Location	Unspecified
Serial number	451A256B
Submittal	503
Purchase order	Unspecified
Purchase date	May 2, 2019
Installation date	Jun 2, 2019
Warranty start date	Jul 2, 2019
Warranty end date	Jul 2, 2022
Expected life (years)	30
Installed by	Mike Mechanicals
Spec section	Mechanical
Manufacturer	Goulds Pumps

Asset
P-1001

INSTALLED

Description

Primary Bottoms Pump

Barcode	678901
Location	Unspecified
Serial number	451A256B
Submittal	503
Purchase order	Unspecified
Purchase date	May 2, 2019
Installation date	Jun 2, 2019
Warranty start date	Jul 2, 2019
Warranty end date	Jul 2, 2022
Expected life (years)	30
Installed by	Mike Mechanicals
Spec section	Mechanical
Manufacturer	Goulds Pumps

Specified

Ordered

Delivered

Installed

Pre-Start-Up

Start-Up

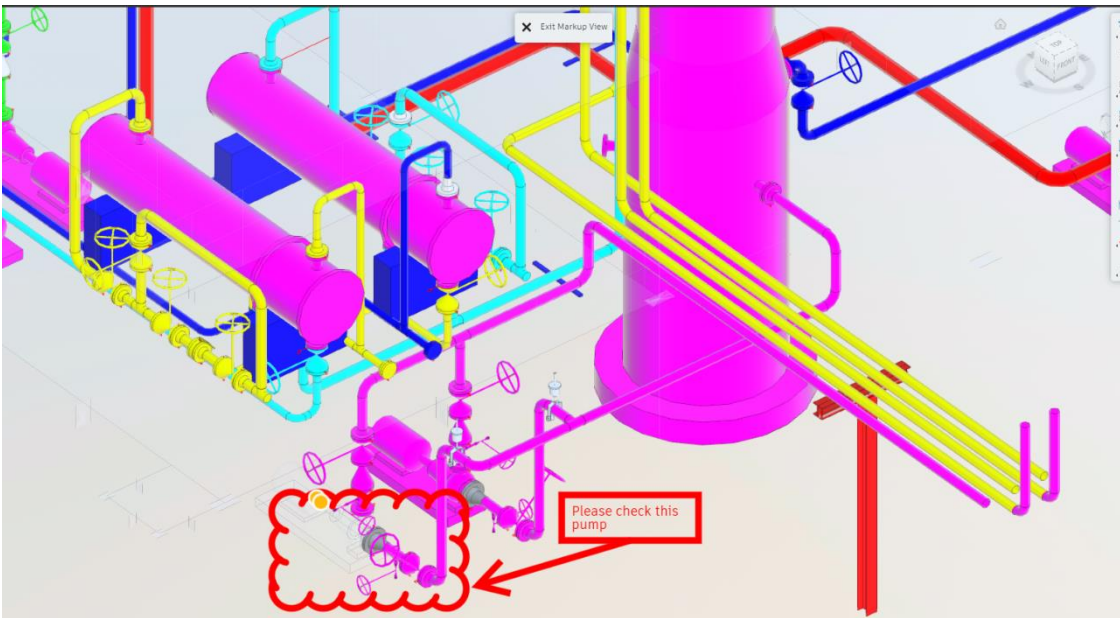
Pre-Functional Performance Tests

Functional Performance Tests

Acceptance

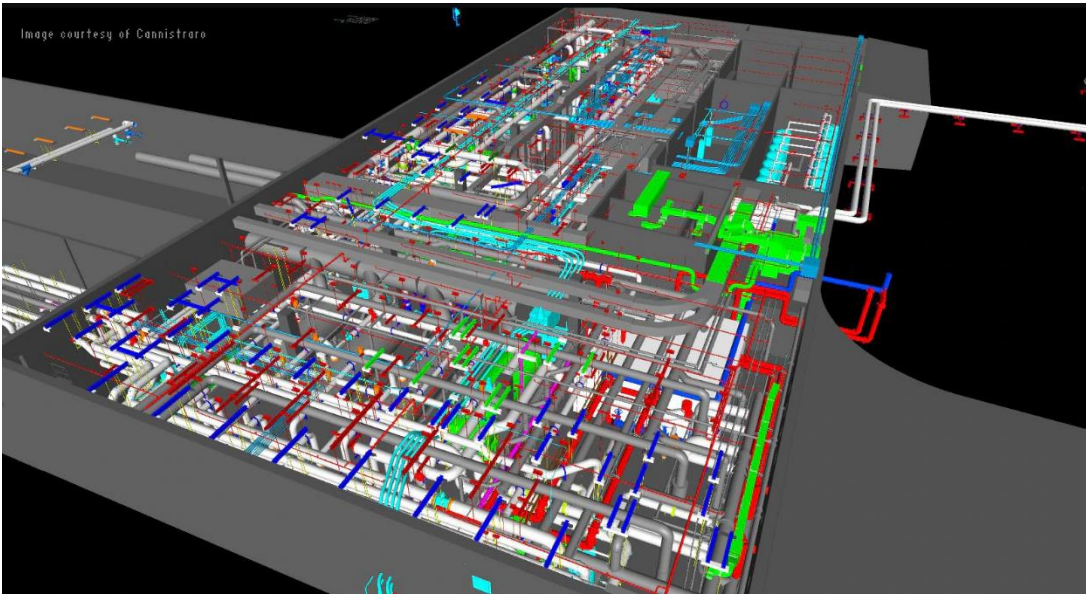
STAGE 2

CDE & FOCUS ON 3C'S

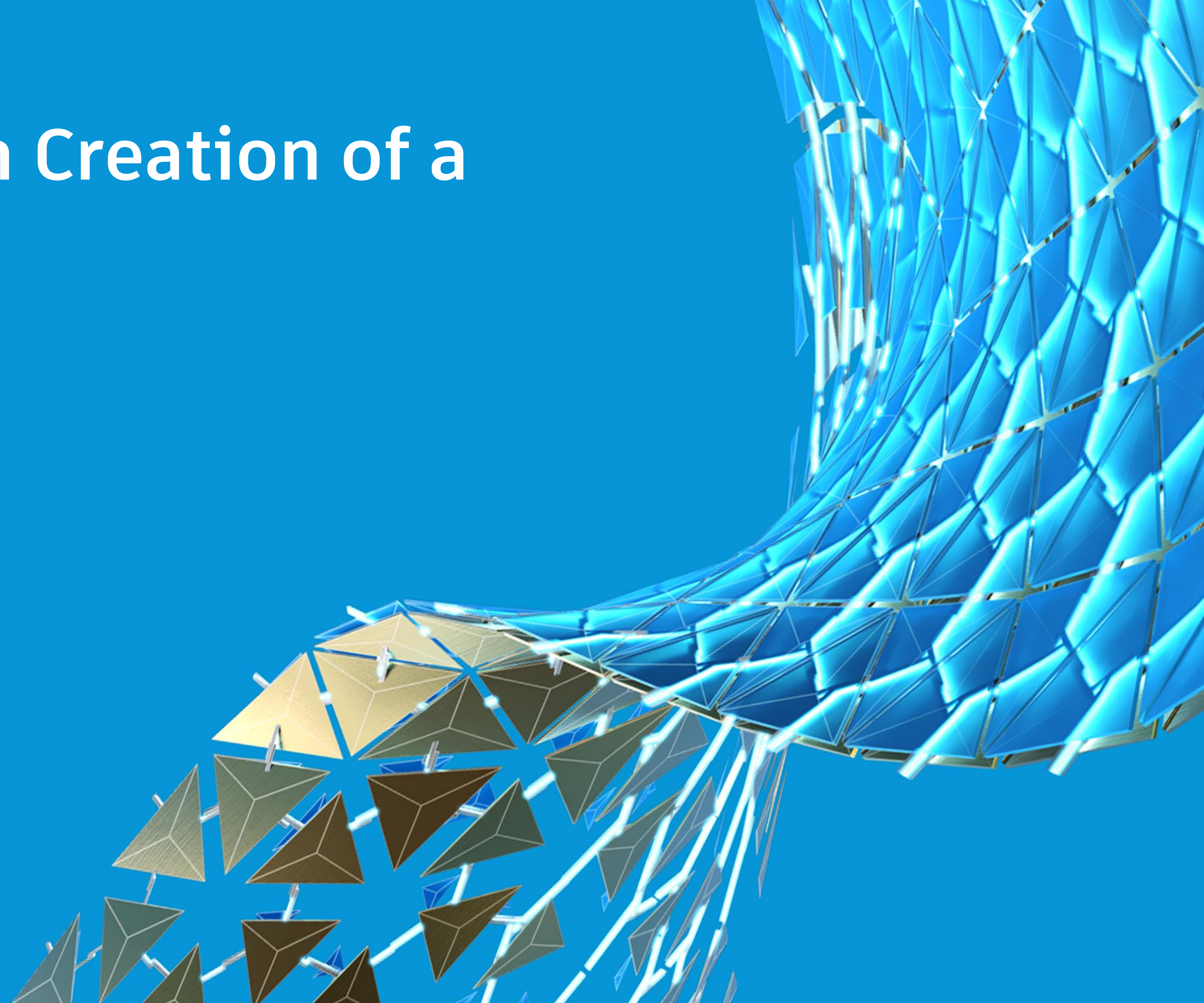


STAGE 1

DIGITAL PLANT MODEL



Live Demo on Creation of a Digital Plant



Autodesk AutoCAD Plant 3D Spec Editor 2021

FileEditSpecsCatalogsToolsHelp

Spec Editor

Branch Table Editor

Catalog Editor

Spec Sheet: C:\AutoCAD Plant 3D 2021 Content\CPak ASME\CS300.psp

Spec: CS300

Min Size	To	Max Size	Long Description	Part Use Priority	Branch In Use
1 1/2"	to	36"	Gate Valve, Double Disc, 300 LB, BW, ASME B16.10, AS		
1 1/2"	to	36"	Gate Valve, Double Disc, 300 LB, RF, ASME B16.10, AST		
1/2"	to	36"	Gate Valve, Solid Wedge, 300 LB, BW, ASME B16.10, AS		
1/2"	to	2"	Gate Valve, Solid Wedge, 300 LB, FPT, ASME B16.10, AS		
1/2"	to	36"	Gate Valve, Solid Wedge, 300 LB, RF, ASME B16.10, AST		
1/2"	to	2"	Gate Valve, Solid Wedge, 300 LB, SW, ASME B16.10, AS		
1/2"	to	10"	Globe Valve, 300 LB, RF, ASME B16.10, ASTM A216 Gr \		
1/2"	to	2"	Globe Valve, 300 LB, SW, ASME B16.10, ASTM A216 Gr		
6"	to	36"	Plug Valve, 300 LB, RF, ASME B16.10, ASTM A216 Gr W		
1"	to	12"	Plug Valve, Full Bore, 300 LB, BW, ASME B16.10, ASTM		
1"	to	12"	Plug Valve, Full Bore, 300 LB, RF, ASME B16.10, ASTM A		
2"	to	12"	Plug Valve, Short Pattern, 300 LB, BW, ASME B16.10, AS		
1"	to	12"	Plug Valve, Short Pattern, 300 LB, RF, ASME B16.10, AS		
6"	to	36"	Plug Valve, Venturi, 300 LB, BW, ASME B16.10, ASTM A		
2"	to	36"	Plug Valve, Venturi, 300 LB, RF, ASME B16.10, ASTM A2		

Edit Parts...

Add Notes to Group

Add to Spec

Remove from Spec

Find in Catalog

Layout and Settings

Catalog: C:\AutoCAD Plant 3D 2021 Content\CPak ASME\ASME Valves Catalog.pcat

Catalog: ASME Valves Catalog

Common filters

Part category: ~ All ~

Main end connection: ~ All ~

Size range: From: ~ All ~ To: ~ All ~

Reducing size range: From: ~ All ~ To: ~ All ~

Units: ~ All ~

Reset

Property overrides

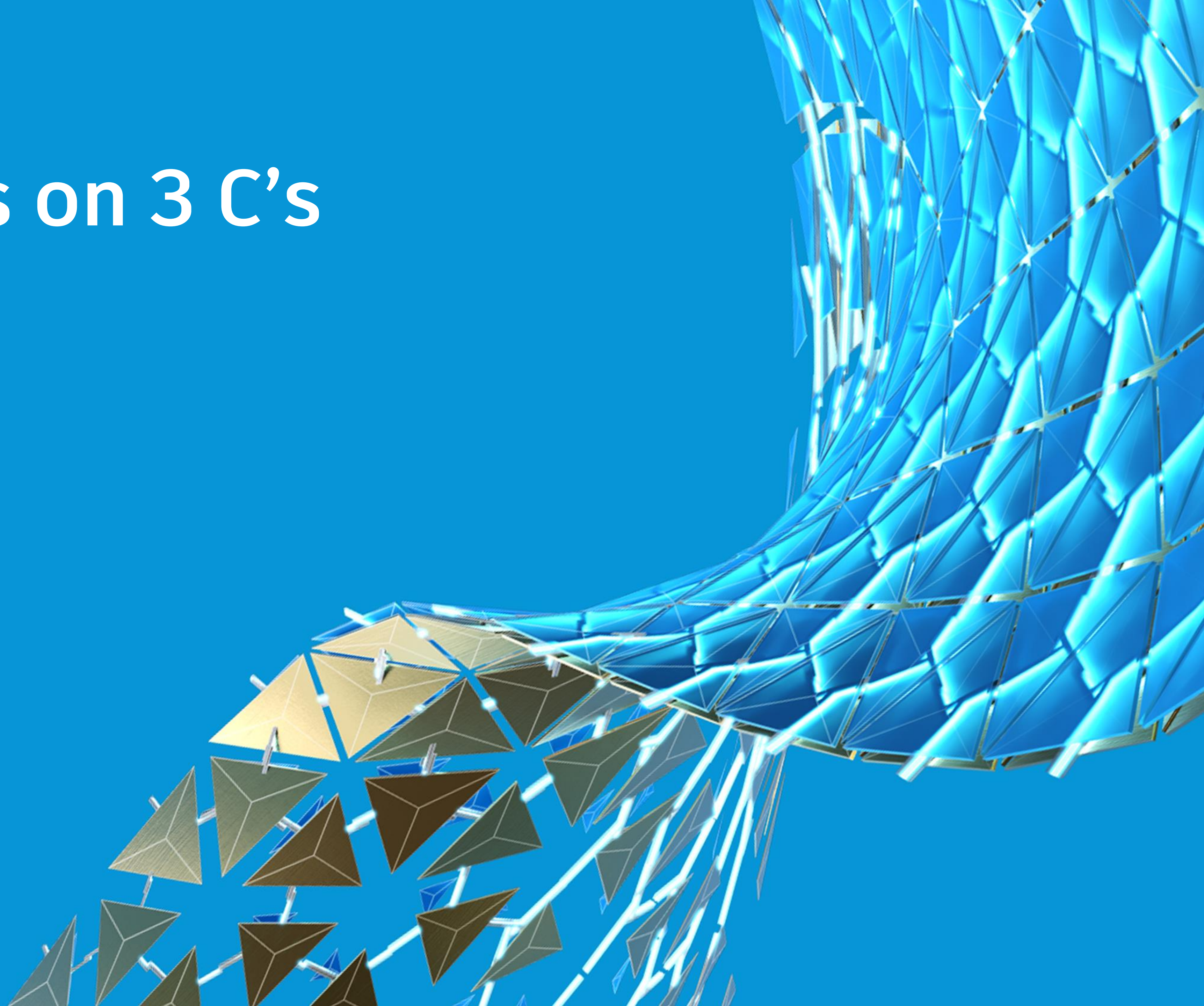
Apply property overrides to parts added to spec

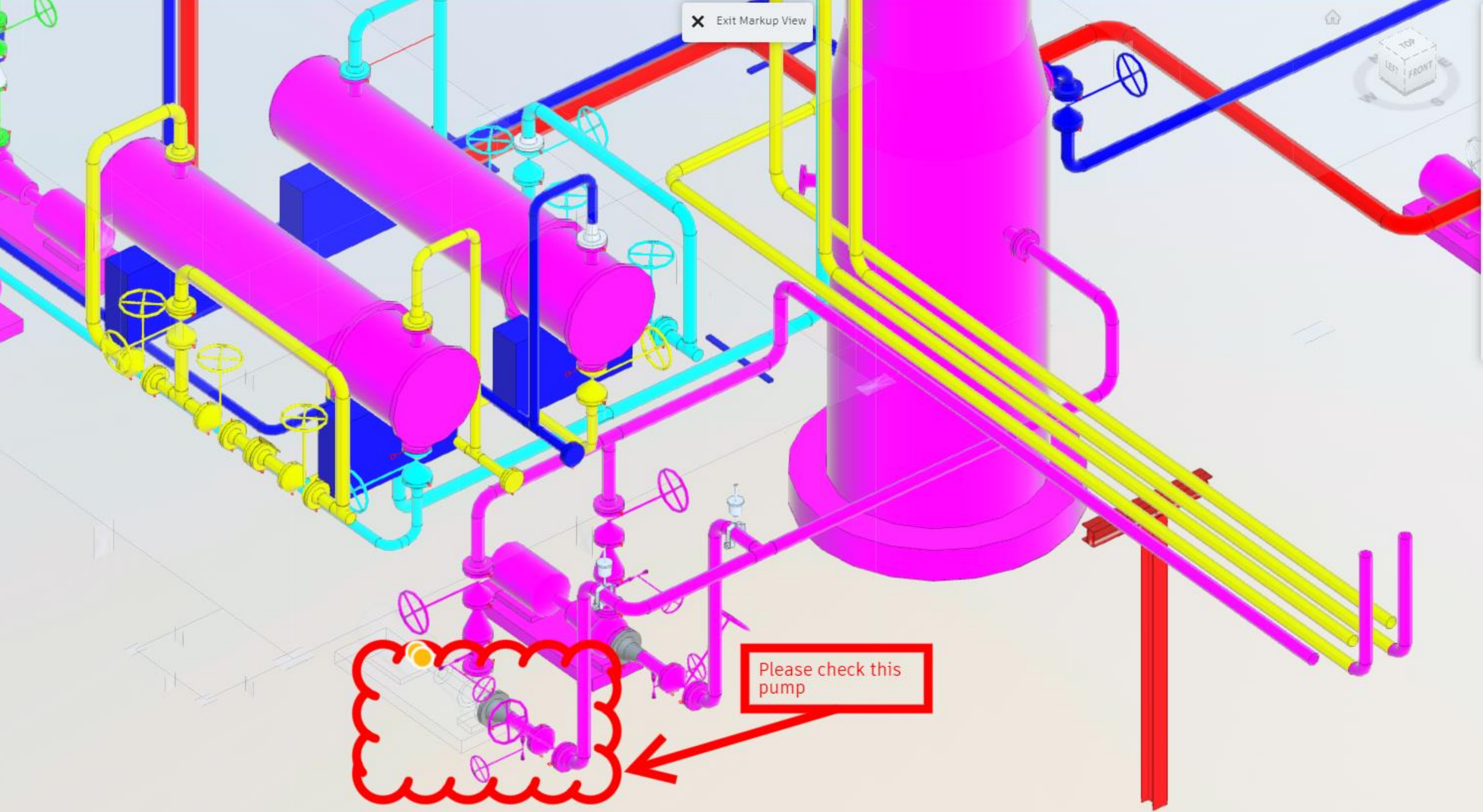
Material: Material Code: Schedule:

Filter	Size Range	Long Description (Family)	Short Description	Material	Material Code	End Type	Facing	Pressure Class	Schedule	Design Std	Design Pressure Factor	Manufacturer
	~ All ~	~ All ~	~ All ~	~ All ~	~ All ~	~ All ~	~ All ~	~ All ~	~ All ~	~ All ~	~ All ~	~ All ~
	2" - 20"	Check Valve, Single Plate, Short Pattern, 400 LB, WFR, FF, ASME B	Check Valve			WF	FF	400		Single Plate, Sh		
	1" - 24"	Control Valve, Ball, 150 LB, RTJ, ISA S75.04	Control Valve, Ball			WF	RTJ	150				
	1" - 4"	Plug Valve, Full Bore, 150 LB, RTJ, ASME B16.10	Plug Valve			FL	RTJ	150		Full Bore		
	1/2" - 2 1/2"	Control Valve, Globe, Long Pattern, 600 LB, FPT, ISA S75.12	Control Valve, Globe, Long P			THDF		600		Long Pattern		
	3/4" - 3/4"	PRESSURE RELIEF VALVE, SPRING LOADED, 0.126 SQ. IN., FPT, MA	Pressure Relief Valve, Spring			THDF				0.126 Sq. in.		
	26" - 60"	Check Valve, Dual Plate, 150 LB, RF, ASME B16.10, Series B	Check Valve			FL	RF	150		Dual Plate		
	3" - 24"	Butterfly Valve, Offset, 300 LB, WFR, RF, ASME B16.10	Butterfly Valve			WF	RF	300		Offset		
	1/2" - 4"	Control Valve, Globe, Short Pattern, 900 LB, SW, ISA S75.12	Control Valve, Globe, Short P			SW		900		Short Pattern		
	26" - 60"	Check Valve, Dual Plate, 600 LB, WFR, RF, ASME B16.10, Series B	Check Valve			WF	RF	600		Dual Plate		
	1/2" - 24"	Ball Valve, Short Pattern, 300 LB, RF, ASME B16.10	Ball Valve			FL	RF	300		Short Pattern		
	1/2" - 12"	Check Valve, Angle, Lift, Long Pattern, 600 LB, RF, ASME B16.10	Check Valve			FL	RF	600		Angle, Lift, Lon		
	26" - 60"	Check Valve, Dual Plate, 300 LB, WFR, RF, ASME B16.10, Series A	Check Valve			WF	RF	300		Dual Plate		
	4" - 4"	PRESSURE RELIEF VALVE, SPRING LOADED, M. RTJ, API 526	Pressure Relief Valve, Spring			FL	RTJ	900		M		

https://youtu.be/kVzoHg_pVhQ

CDE & Focus on 3 C's





Document Management

- Design Review
- Version Compare
- Issue and markup creation

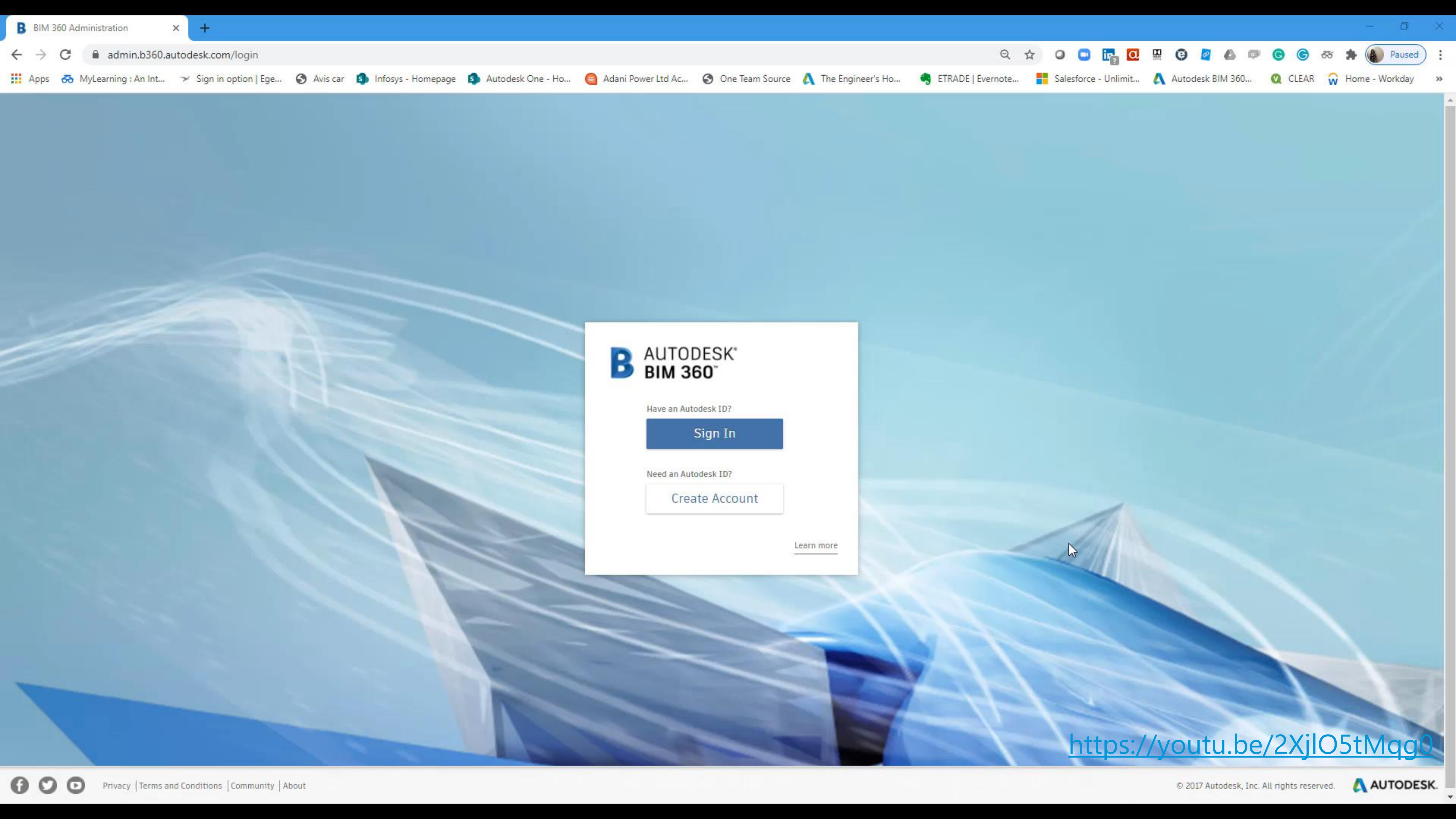


Collaboration for Plant 3D

- Project Sharing and Review
- Streamlined Approval Workflows
- Simplified Administration

Live Demo on CDE & focus on 3 C's





Have an Autodesk ID?

Sign In

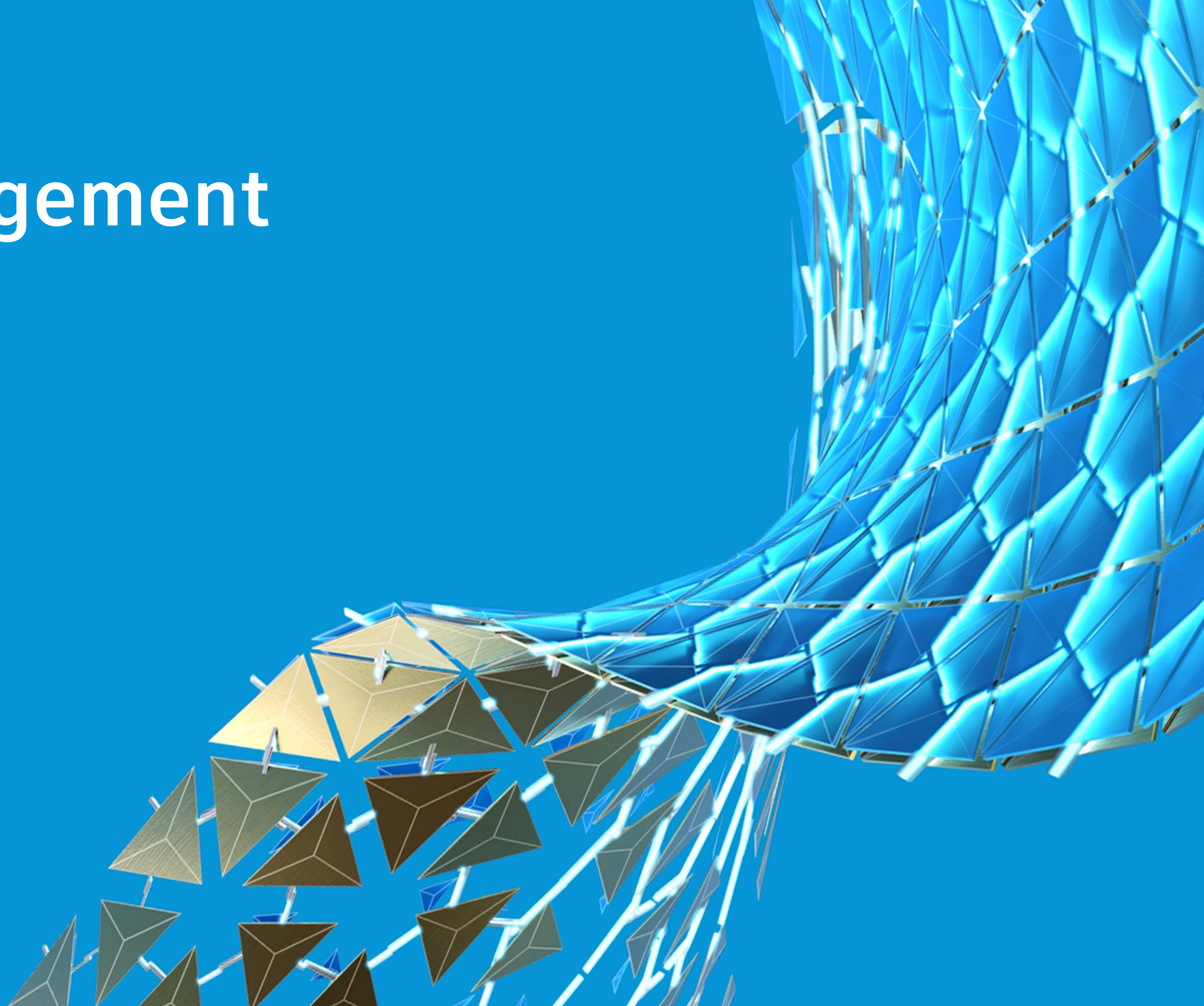
Need an Autodesk ID?

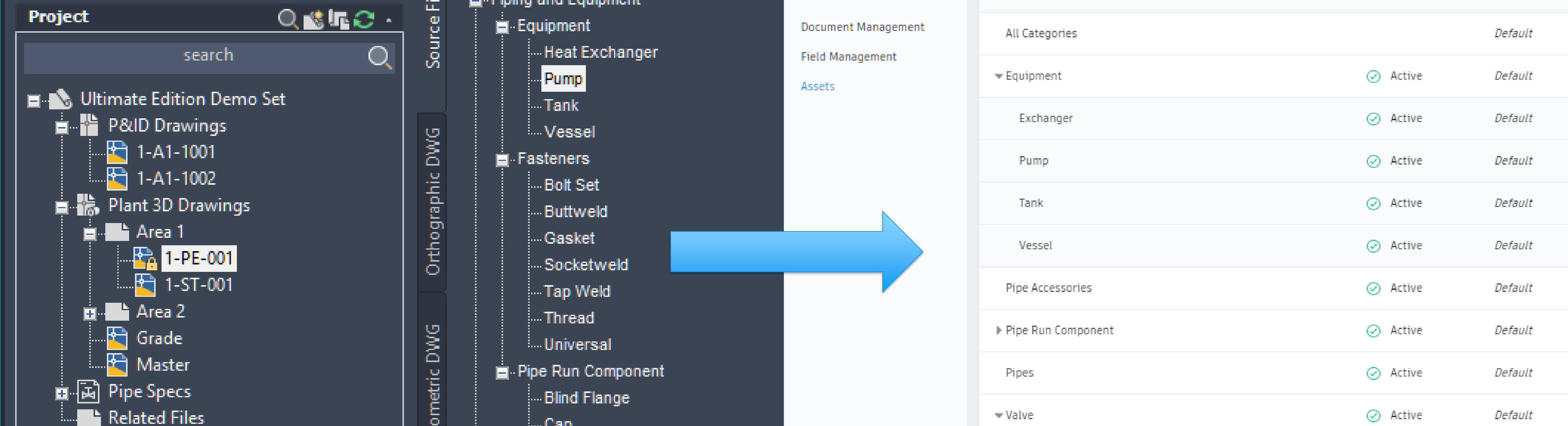
Create Account

[Learn more](#)

<https://youtu.be/2XjlO5tMqg0>

Asset Management





Refer Assets from Plant 3D

All the elements of Plant 3D model are referred and these categories are created in Assets tab in BIM 360 Project Admin

Configuring Asset - Plant 3D to BIM 360

Assets in BIM 360 can be grouped into categories and subcategories.

Configuring & customizing Status sets

- Status sets allows you to accurately track assets in a category.
- To use Assets effectively, you need to configure categories, attributes, and status sets on your project.

AUTODESK BIM 360 | Preethi_Autodesk > Digital Plant Asset Management

Project Admin

MEMBERS

COMPANIES

SERVICES

PROFILE

Overview

Issues

Notifications

Locations

Document Management

Field Management

Status Sets

Permissions

Categories

Custom Attributes

Status Sets

Name	Description
▼ Default	
Specified	Specified
Ordered	Ordered
Delivered	Delivered
Installed	Installed
Pre-Start-Up	Pre-Start-Up
Start-Up	Start-Up
Pre-Functional Performance Tests	Pre-Functional Performance Tests
Functional Performance Tests	Functional Performance Tests
Acceptance	Acceptance
Post-Acceptance	Post-Acceptance

Sample Asset Import (3).xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Results Connect Help ASSEMBLE Team Search

Clipboard Font Alignment Number Styles Cells Editing Ideas

REMINDER: Don't delete or rename columns - the spreadsheet will not import.

Name	Category	Description	Status	Manufacturer
P-1001	Equipment > Pump	Primary Bottoms Pump	Installed	ACME Inc.
P-1002	Equipment > Pump	Secondary Bottoms Pump	Installed	ACME Inc.
P-1003	Equipment > Pump	Horizontal centrifugal Pump	Installed	ACME Inc.
P-1004	Equipment > Pump	Horizontal centrifugal Pump	Installed	ACME Inc.
P-1005	Equipment > Pump	Horizontal centrifugal Pump	Installed	ACME Inc.
P-1006	Equipment > Pump	Horizontal centrifugal Pump	Installed	ACME Inc.

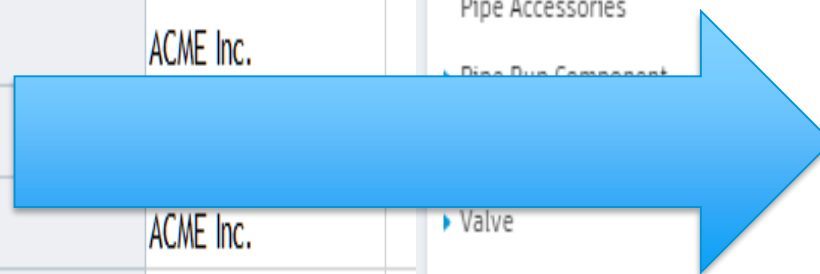
BIM 360 Assets

assets.b360.autodesk.com/projects/2ca27cbe-031c-4748-a410-7c23b225b480/assets

AUTODESK BIM 360 | Preethi_Autodesk > Digital Plant Asset Management

Assets

Asset Tree	Details	Details
All Categories	Manufacturer	Status Asset ID Category Description Created by Created at
Equipment	ACME Inc.	Installed P-1001 Equipment > Pump Primary Bottoms Pump Preethi Rao Today
Pipe Accessories	ACME Inc.	Installed P-1002 Equipment > Pump Secondary Bottoms Pump Preethi Rao Today
Valve	ACME Inc.	Installed P-1003 Equipment > Pump Horizontal centrifugal Pump Preethi Rao Today
	ACME Inc.	Installed P-1004 Equipment > Pump Horizontal centrifugal Pump Preethi Rao Today
	ACME Inc.	Installed P-1005 Equipment > Pump Horizontal centrifugal Pump Preethi Rao Today
	ACME Inc.	Installed P-1006 Equipment > Pump Horizontal centrifugal Pump Preethi Rao Today



Asset List creation in Excel

Asset List Import

Quickly populate the Asset Sheet in Excel

The Populated excel sheet will be imported into BIM360

Asset

P-1001

DELIVERED

✕

DETAILSISSUESCHECKLISTSATTACHMENTS

Asset ID	P-1001
Category	Equipment > Pump
Description	Primary Bottoms Pump
Barcode	678901
Location	Unspecified
Serial number	451A256B
Submittal	503
Purchase order	Unspecified
Purchase date	May 2, 2019
Installation date	Unspecified
Warranty start date	Unspecified
Warranty end date	Unspecified

- Specified

Ordered

Delivered

Installed

Pre-Start-Up

Start-Up

Pre-Functional Performance Tests

Functional Performance Tests

Acceptance



Asset

P-1001

INSTALLED

✕

Description	Primary Bottoms Pump
Barcode	678901
Location	Unspecified
Serial number	451A256B
Submittal	503
Purchase order	Unspecified
Purchase date	May 2, 2019
Installation date	Jun 2, 2019
Warranty start date	Jul 2, 2019
Warranty end date	Jul 2, 2022
Expected life (years)	30
Installed by	Mike Mechanicals
Spec section	Mechanical
Manufacturer	Goulds Pumps

Easily track an asset and cover every stage via status than an asset will pass through on a project

Issue Management for the Asset

- Connect assets and commissioning efforts to other project management workflows like Checklists and Issues.

Asset

INSTALLED

✕

P-1001

DETAILS

ISSUES

CHECKLISTS

ATTACHMENTS

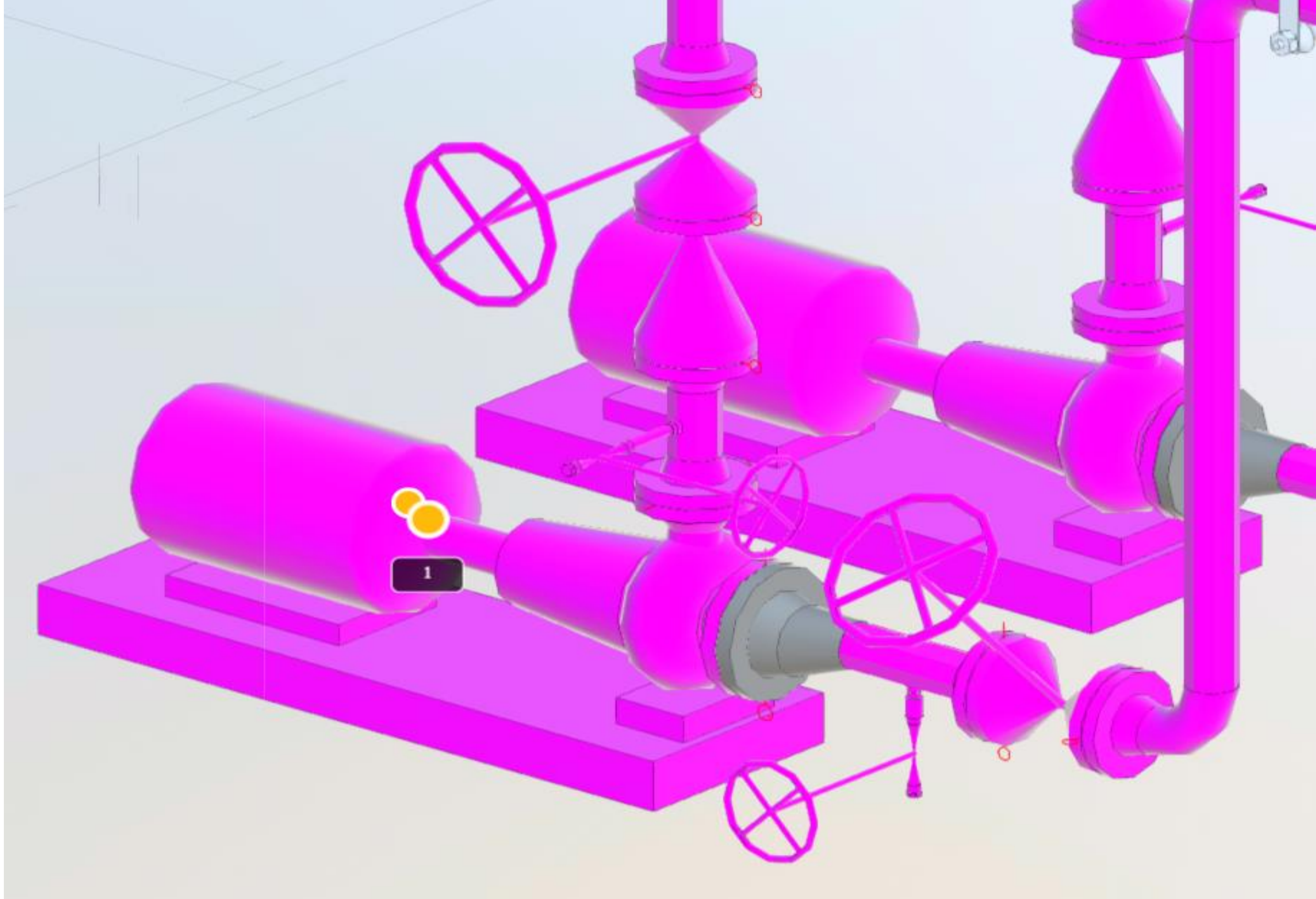
Create Issue

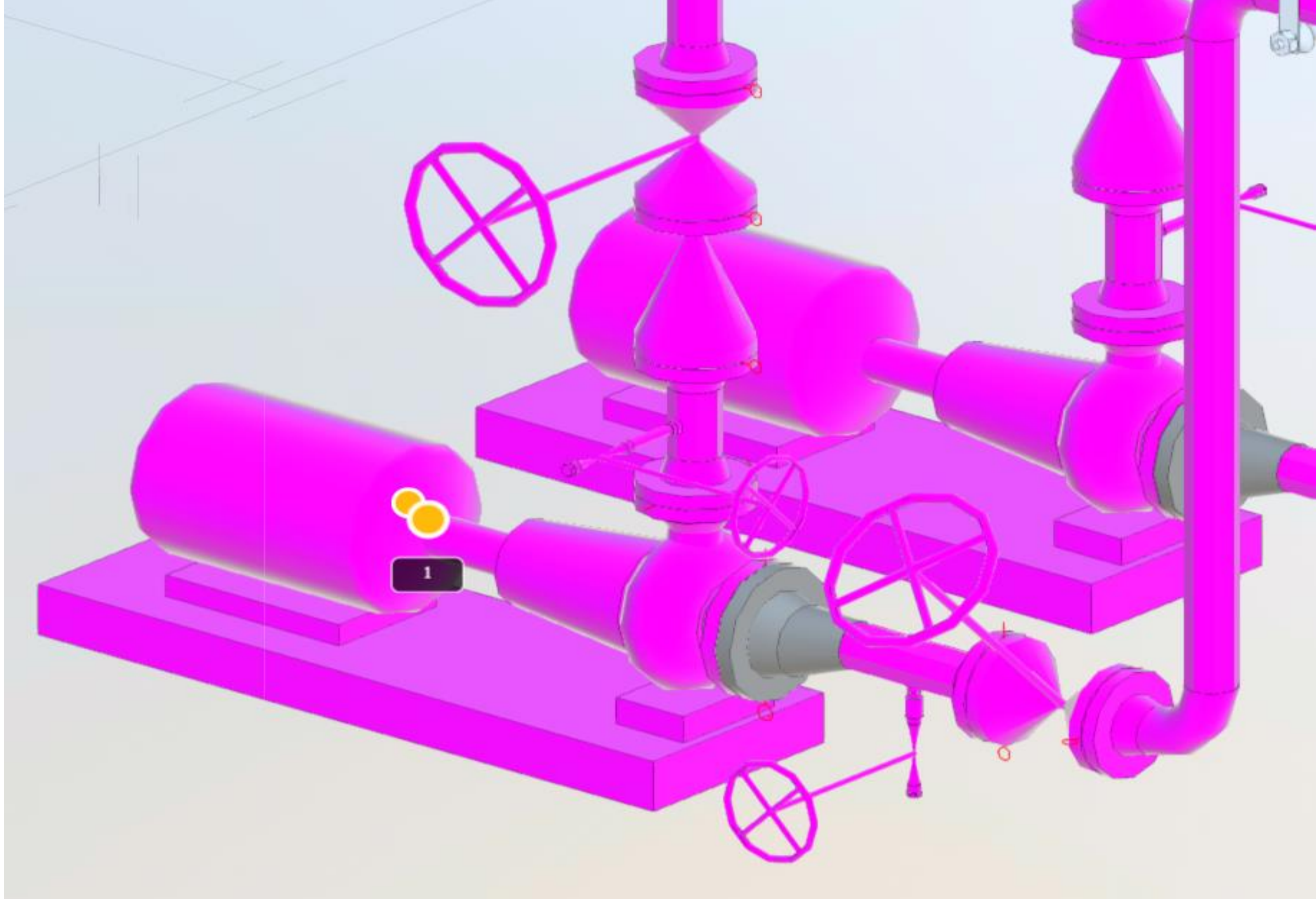
Linked references

Add reference

Issue OPEN #2 Excessive Vibrates

Issue OPEN #1 Delivery failure





Issue Management for the Asset

- Tracking the communication - Issue No.1 raised on the installed pump
- Moving the Status of the issue from Open to Ready to inspect

The screenshot displays the Autodesk BIM 360 interface for managing issues on a specific asset. The top navigation bar shows the project path: docs.b360.autodesk.com/projects/2ca27cbe-031c-4748-a410-7c23b225b480/folders/urn:adsk.wiprod:fs.folder:co.vllxGARoTmubgwIq7aroHQ/detail/viewer/items/urn:adsk.wiprod:dm.lin... The main view is titled 'Issues' and shows a list of issues. The selected issue, 'Issue #1', is highlighted in orange. The issue details are displayed on the right, showing the status 'READY TO INSPECT' and the title 'Delivery failure'. The issue was created by Preethi Rao on 18 Oct 2020. The issue type is 'Commissioning', assigned to Sanjeev Ghosh, with a due date of 19 Oct 2020. The location is 'Unspecified', and the linked document is '1-PE-001.dwg [V1, current]'. The owner is Preethi Rao, and the root cause is 'Installation'. The description states: 'The pump is not able to deliver at the required pressure'. The activity feed shows three messages from Preethi Rao: 1. 'We want your team to inspect the Pump No. P-1001 to check that the pump is not delivering at the required pressure' (Oct 18, 7:35 PM). 2. 'Status' (Oct 18, 7:38 PM) with a status change from 'OPEN' to 'READY TO INSPECT'. 3. 'Please inspect the pump' (Oct 18, 7:38 PM). The background image shows a 3D model of a pump assembly.

1-PE-001.dwg V1 No set assigned

Issues

Issue #1

DETAILS ATTACHMENTS ACTIVITY

Delivery failure

Created by Preethi Rao on 18 Oct 2020

Type Commissioning

Assigned to Sanjeev Ghosh

Due Date 19 Oct 2020

Location Unspecified

Location Details Unspecified

Linked document 1-PE-001.dwg [V1, current]

Owner Preethi Rao

Root Cause Installation

Description The pump is not able to deliver at the required pressure

Issue #1

READY TO INSPECT

DETAILS ATTACHMENTS ACTIVITY

Sub-Type Commissioning

Title Show

Description Show

Assigned to Sanjeev Ghosh

Due Date 19 Oct 2020

Issue Owner Preethi Rao

Root Cause Installation

Preethi Rao Oct 18, 7:35 PM

@Sanjeev Ghosh We want your team to inspect the Pump No. P-1001 to check that the pump is not delivering at the required pressure

Preethi Rao Oct 18, 7:38 PM

Status

OPEN → READY TO INSPECT

Preethi Rao Oct 18, 7:38 PM

Please inspect the pump

Centralized Document Management

Quickly access all asset information including product information such as cut-sheets, certifications, training materials and warranty documents through a centralized repository.

AUTODESK® BIM 360™ | Preethi_Autodesk > Digital Plant Asset Management

Assets

ASSETS

Asset Tree

All Categories

- Equipment
 - Pipe Accessories
 - Pipe Run Component
 - Pipes
 - Valve

Details

Asset ID	Category	Location	Model
P-1001	Equipment > P...	-	-
P-1002	Equipment > P...	-	-
P-1003	Equipment > P...	-	-
P-1004	Equipment > P...	-	-
P-1005	Equipment > P...	-	-
P-1006	Equipment > P...	-	-

AssetP-1001

DETAILSDetailsISSUESIssuesCHECKLISTSChecklistsATTACHMENTSAttachments

Browse to attach files

InstallationOperationMaintenance_3393.pdfPreethi Rao • Today

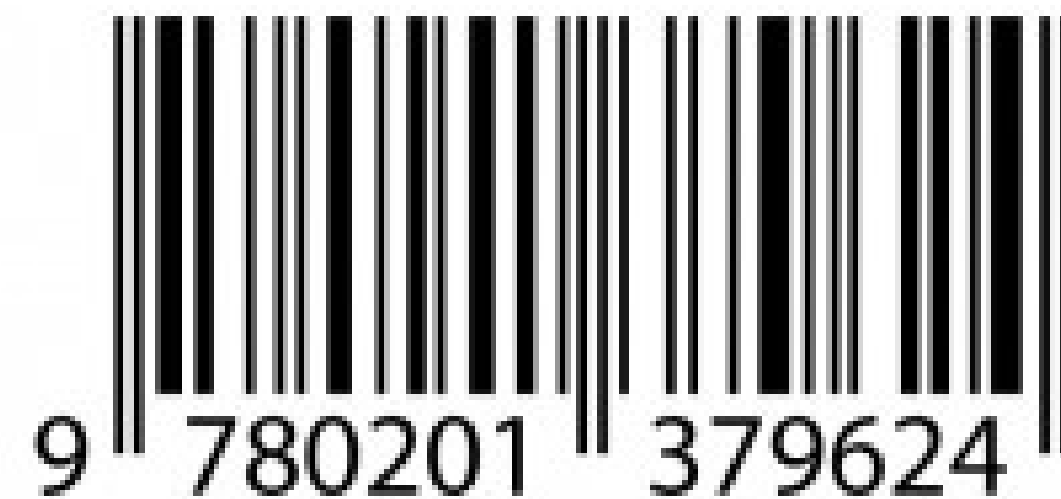
CS150.pspxPreethi Rao • Today

1-PE-001.dwgPreethi Rao • Today

EquipmentList.xmlPreethi Rao • Today

Barcode / QR code scanning

- Relevant inspections and ongoing maintenance effortlessly with the simple scan of a barcode or QR code from your mobile device.



Create checklist

PUMP - PRE-COMMISSIONING CHECKLIST

V2

Updated: Oct 19

Details

3 Sections

22 Items

0 Instances

2 Signatures

TypeCommissioning

Description
No description specified

- 1UNIT CHECK6 Items
- 1.1Visual inspection, no apparent damage

YesNoNA
- 1.2Pump mounted on base and housing ok - no leaks

YesNoNA
- 1.3Alignment checked

YesNoNA
- 1.4Coupling guard in place

YesNoNA
- 1.5Vibration mounts not bridged out or fully compressed

YesNoNA
- 1.6Impeller rotates freely



Create checklist

PUMP - WEEKLY INSPECTION CHECKLIST

V5

Updated: Oct 19

Details

1 Section

9 Items

0 Instances

2 Signatures

TypeCommissioning

Description
Weekly Inspection Checklist

- 1New Section9 Items
- 1.1Ensure Pump is Flowing Liquid

YesNoNA
- 1.2Ensure Pump is Flowing Rated Capacity

YesNoNA
- 1.3Check Discharge Pressure

YesNoNA
- 1.4Ensure pump does not lose its prime after starting

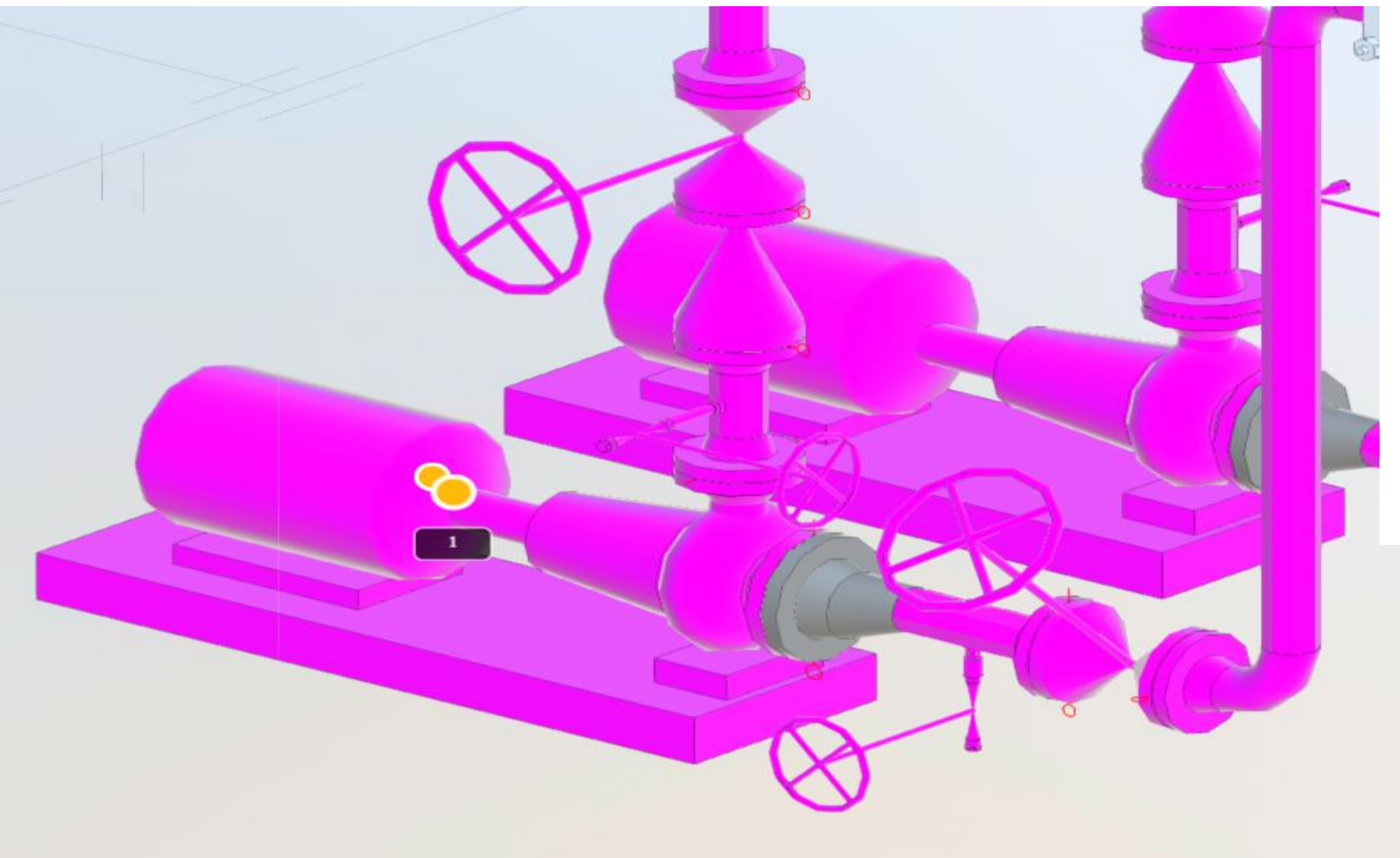
YesNoNA
- 1.5Check for Normal Load on Motor or Driver

YesNoNA

Digitizing Checklist

Checklist for the Asset

- Filled checklist could be referenced to assets



Asset

P-1001

INSTALLED ▾



DETAILS

ISSUES

CHECKLISTS

ATTACHMENTS

Add New Checklist

Linked references

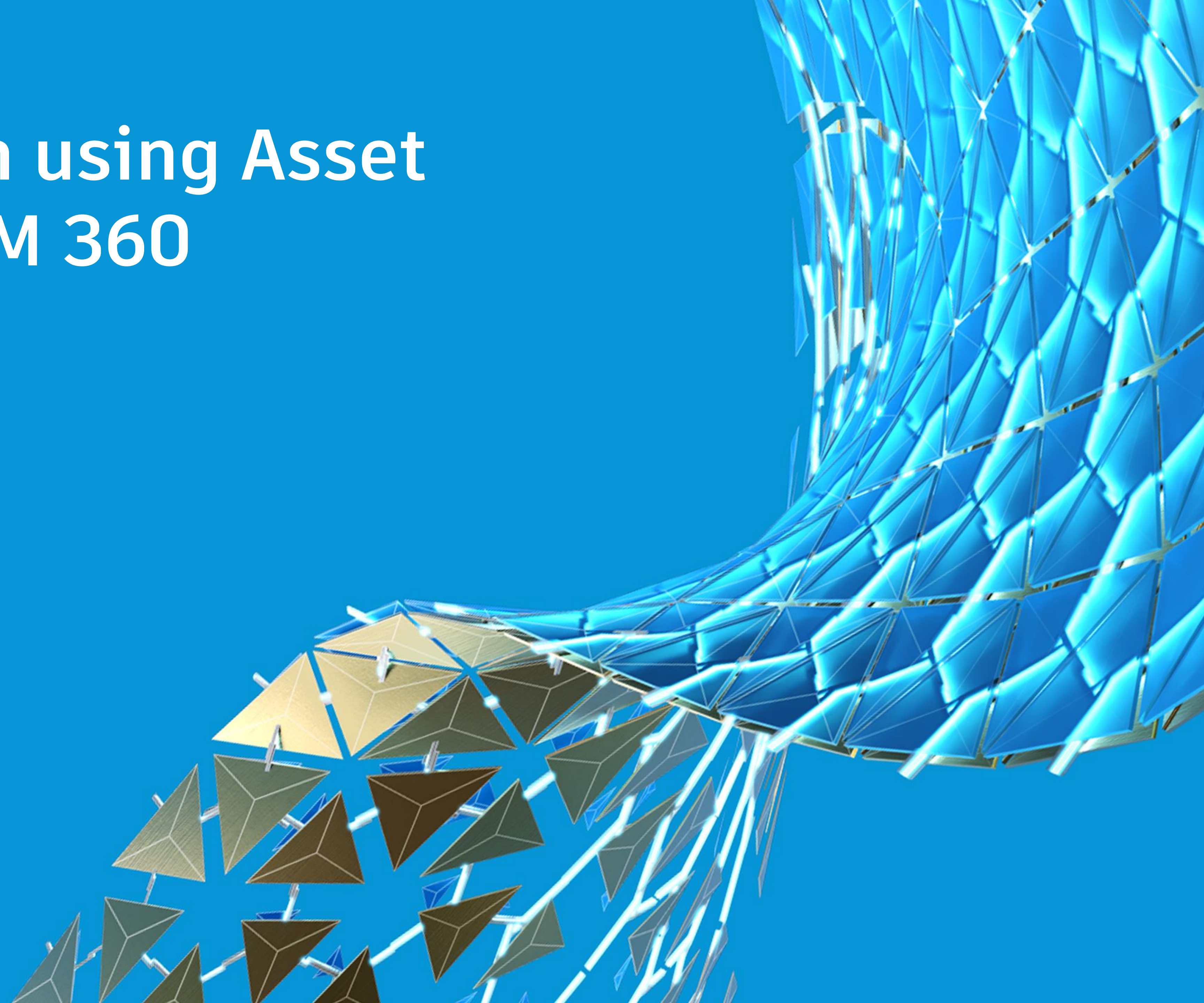
Add reference

Checklist **NOT STARTED** #3 P-1001 PUMP - WEEK 2 INSPECTION CHECKLIST

Checklist **NOT STARTED** #2 P-1001 PUMP - WEEK 1 INSPECTION CHECKLIST

Checklist **IN PROGRESS** #1 P-1001 PUMP - PRE-COMMISSIONING CHECKLIST

Live Demo on using Asset service in BIM 360



PROFILE

Locations

Field Management

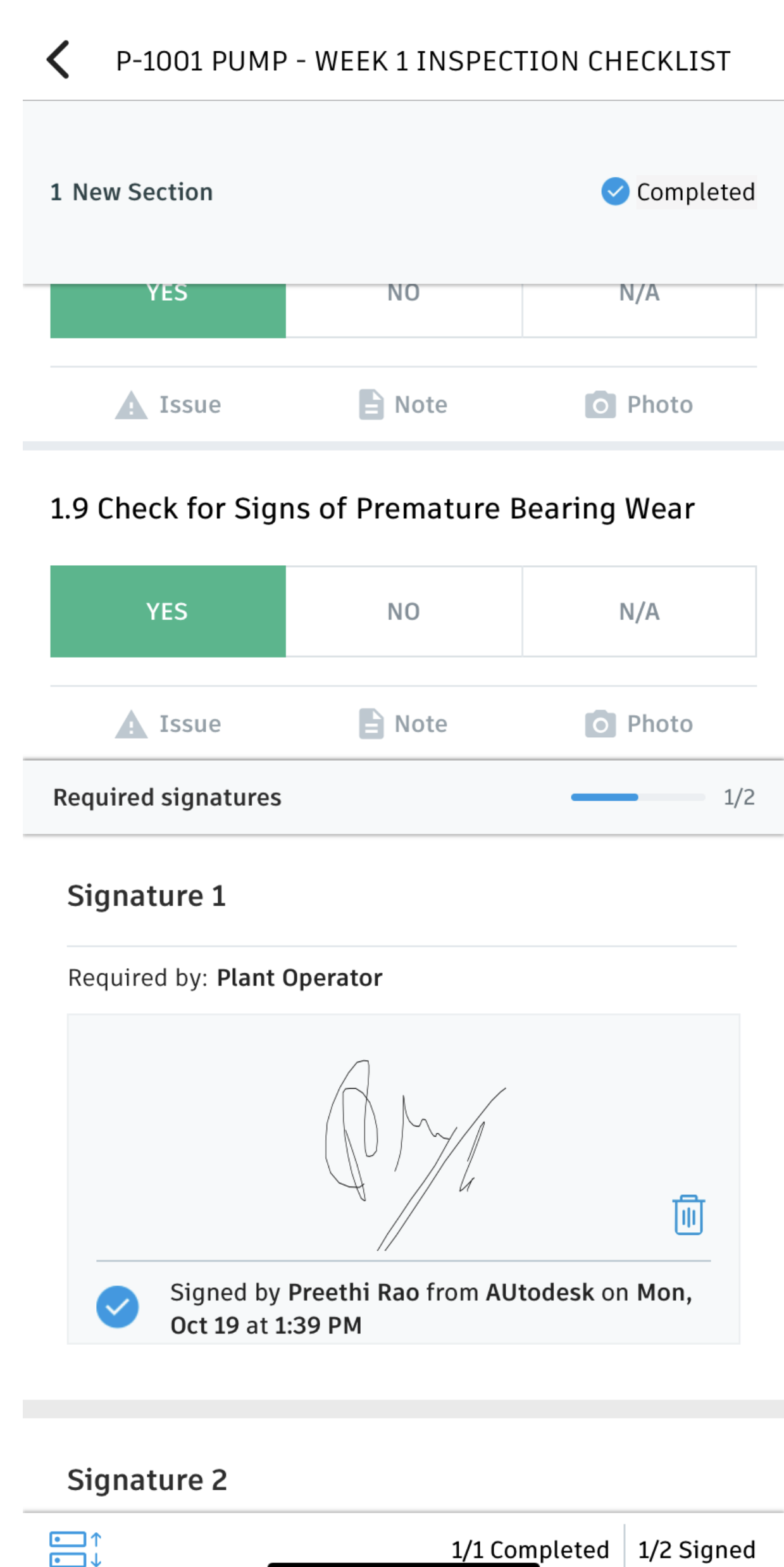
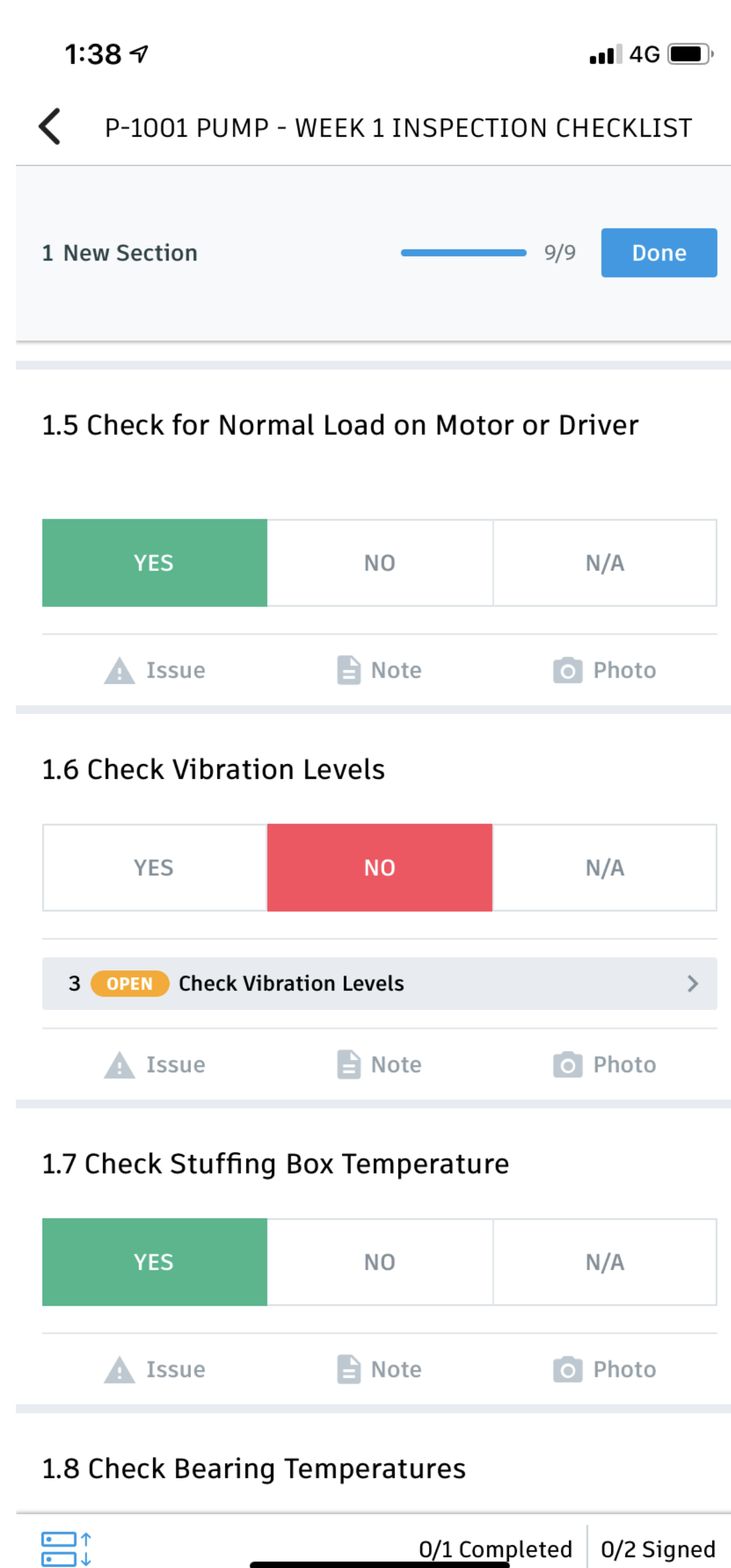
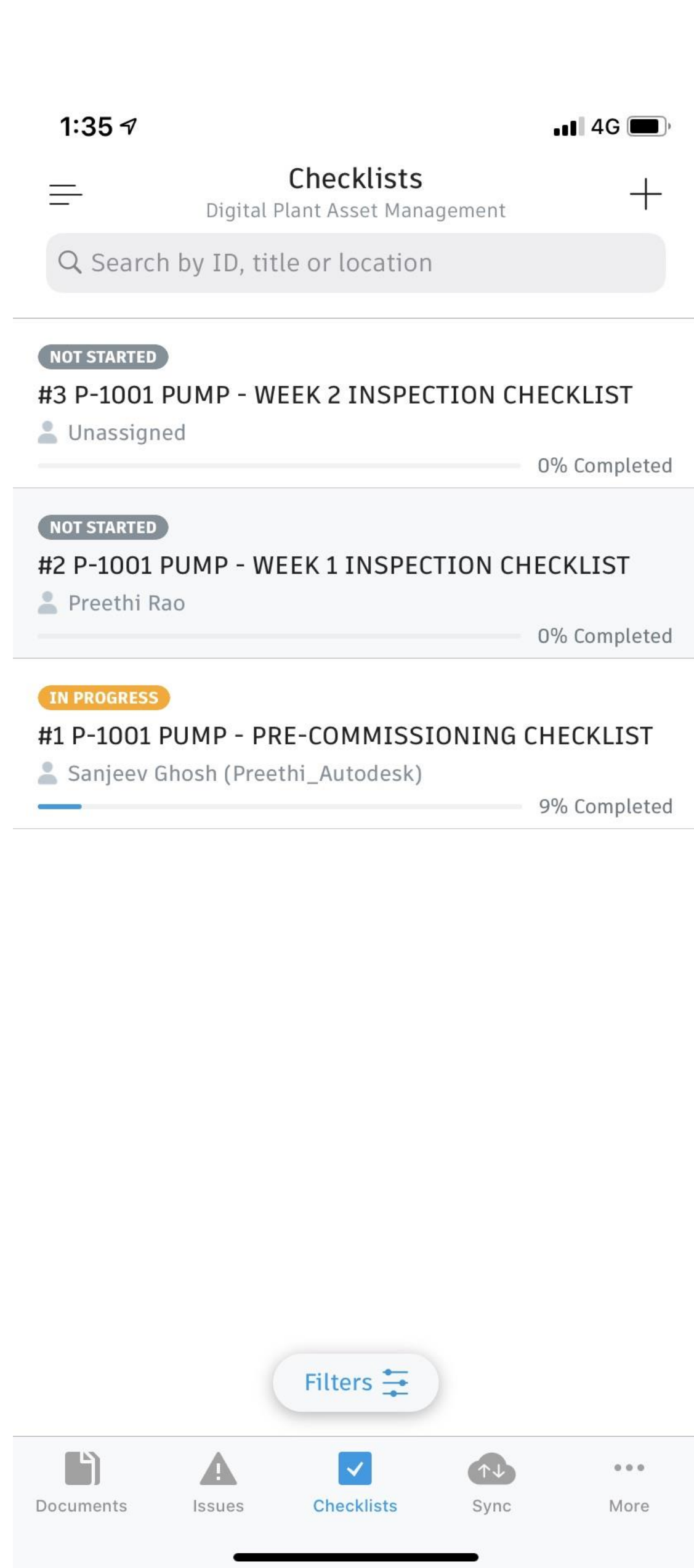
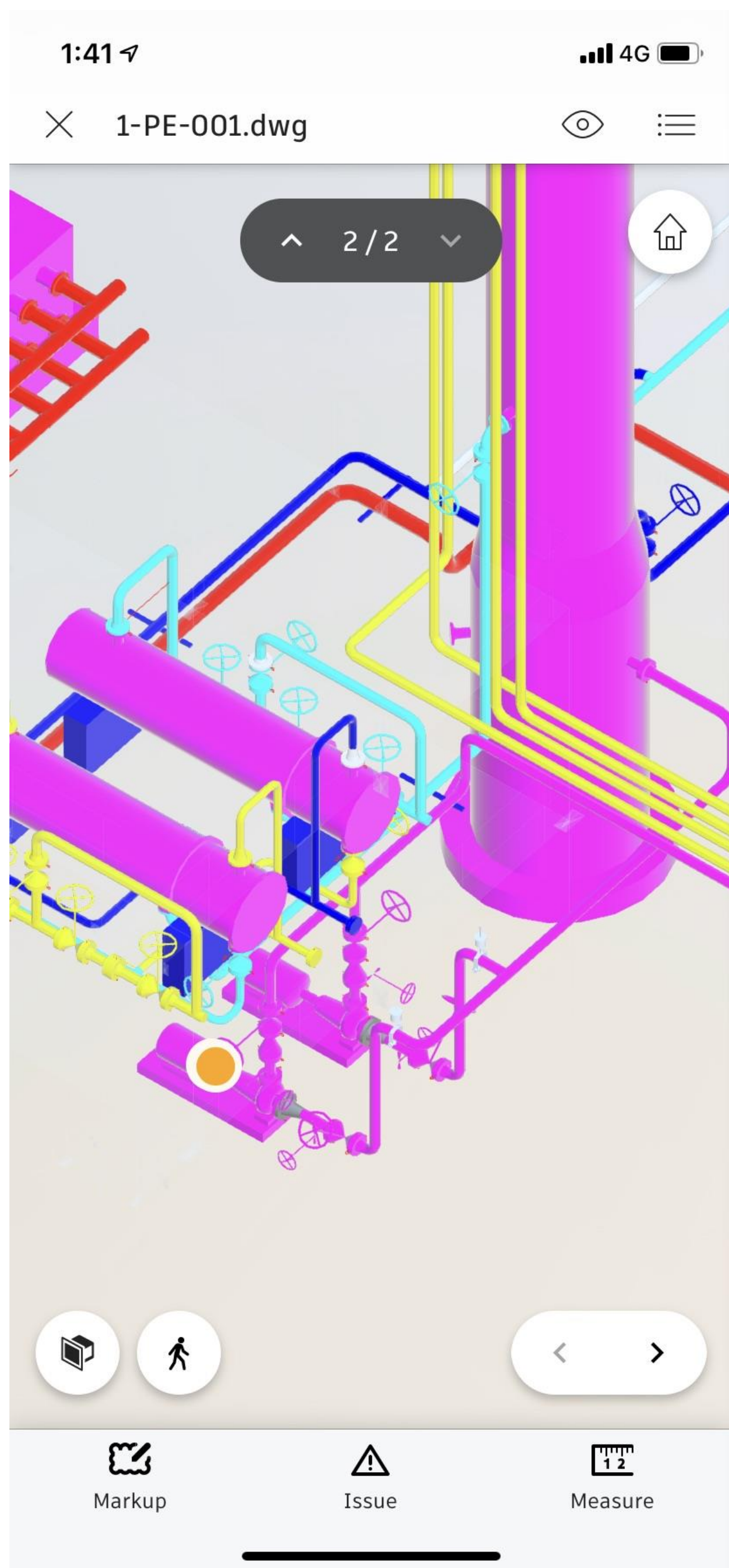
Assets

Status Sets

Create New Cate

Name	Active / Inactive	Status Set	Attributes
All Categories		Default	-
Equipment +	Active	Default	-
Pipe Accessories	Active	Default	-
▶ Pipe Run Component	Active	Default	-
Pipes	Active	Default	-
▶ Valve	Active	Default	-

<https://youtu.be/VTmcSatq4>



The Journey

STAGE C

ASSET MANAGEMENT

Asset
P-1001

DELIVERED

DETAILS

ISSUES

CHECKLISTS

ATTACHMENTS

Specified

Ordered

Delivered

Installed

Pre-Start-Up

Start-Up

Pre-Functional Performance Tests

Functional Performance Tests

Acceptance

Asset ID

Category

Description

Barcode

Location

Serial number

Submittal

Purchase order

Purchase date

Installation date

Warranty start date

Warranty end date

P-1001

Equipment > Pump

Primary Bottoms Pump

678901

Unspecified

451A256B

503

Unspecified

May 2, 2019

Unspecified

Unspecified

Unspecified

Asset
P-1001

INSTALLED

Description

Primary Bottoms Pump

Barcode

Location

Serial number

Submittal

Purchase order

Purchase date

Installation date

Warranty start date

Warranty end date

Expected life (years)

Installed by

Spec section

Manufacturer

678901

Unspecified

451A256B

503

Unspecified

May 2, 2019

Jun 2, 2019

Jul 2, 2019

Jul 2, 2022

30

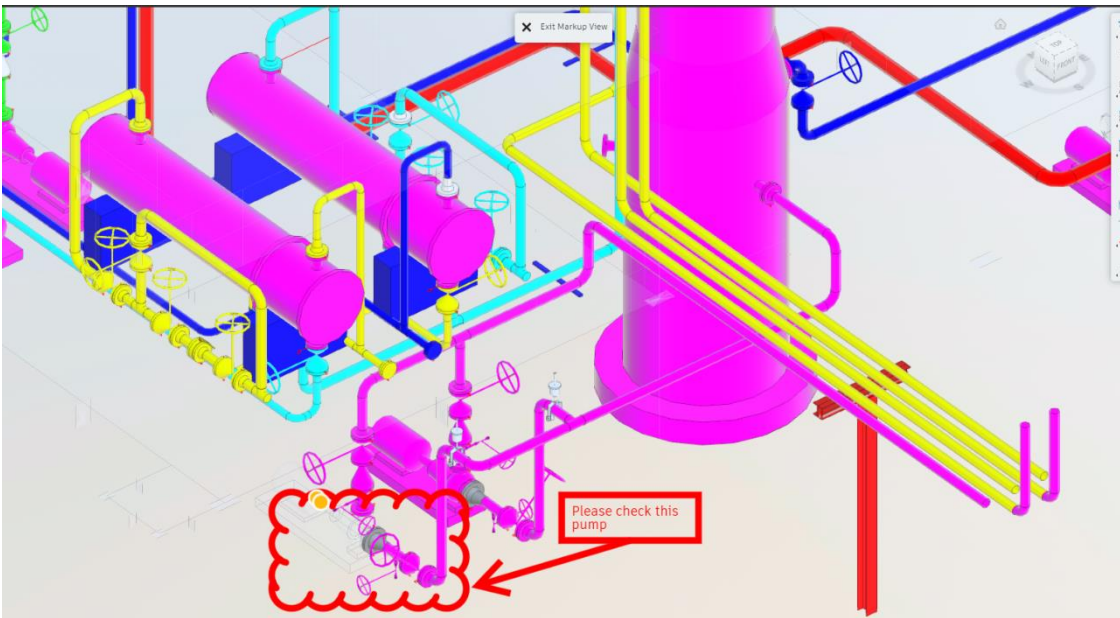
Mike Mechanicals

Mechanical

Goulds Pumps

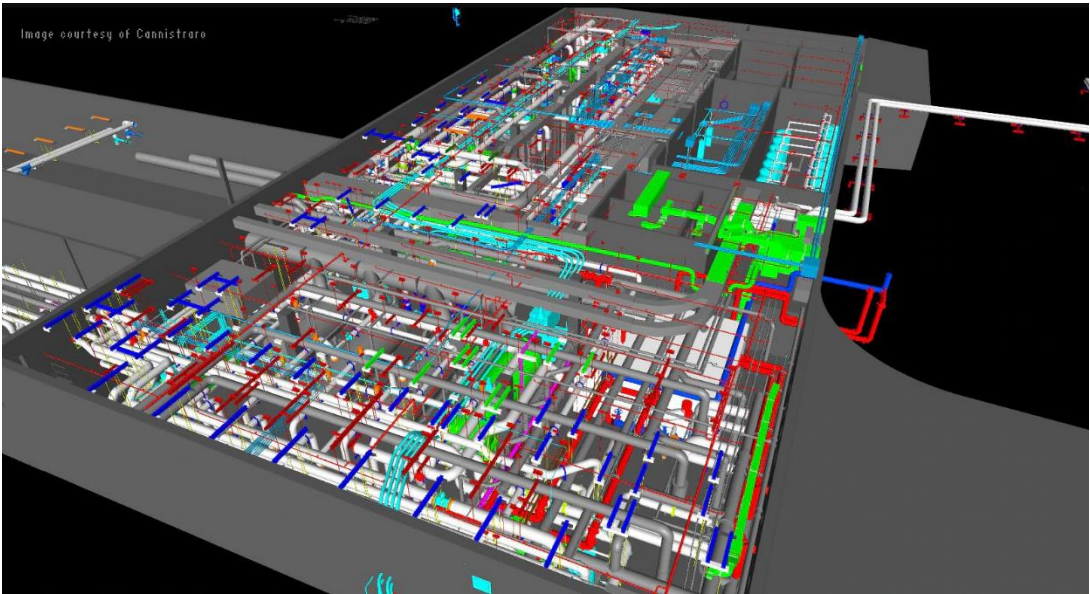
STAGE 2

CDE & FOCUS ON 3C'S



STAGE 1

DIGITAL PLANT MODEL





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