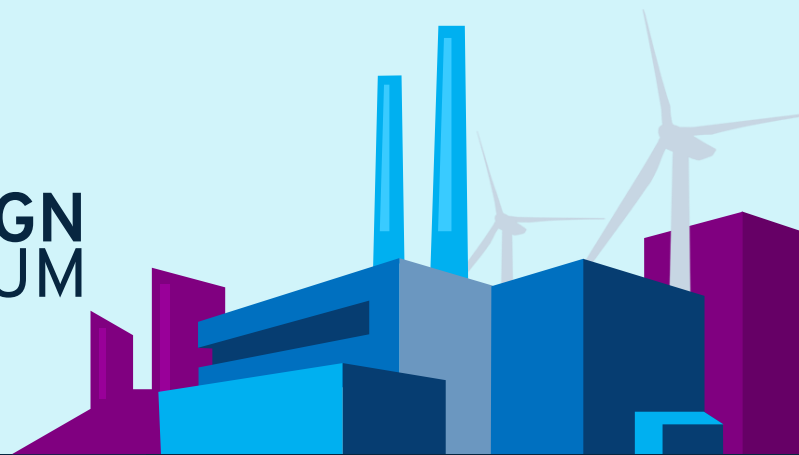




2023
INDUSTRI&DESIGN
FORUM



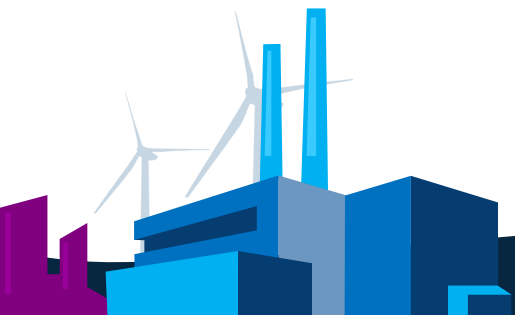
Sådan skaber du bro mellem AutoCAD Plant 3D, Inventor og Revit

Del 1 – Spor 3

Del 1 - Spor 3

- Få eksempler på, hvordan du skaber de rette betingelser for et samarbejde mellem AutoCAD Plant 3D, Inventor, Vault og Revit.

Vi introducerer konceptet 'multidisciplinært projektarbejde', der via Autodesk Construction Cloud og Vault Professional bygger broen imellem disciplinerne og fagområderne.



Komplete “Multi-discipline” Design

El / Instrumentering

3D Proces / Plant Design

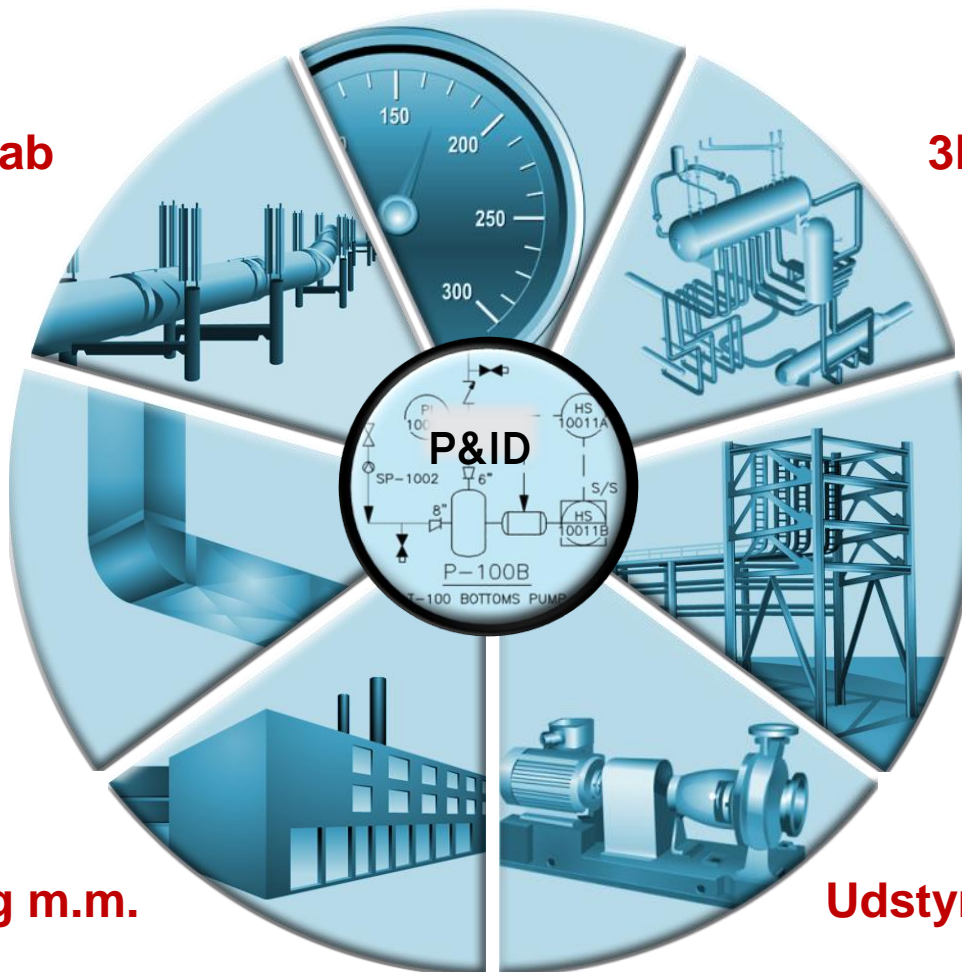
Stål / Rørbroer / Trapper
Gangbroer / Platforme

Udstyr

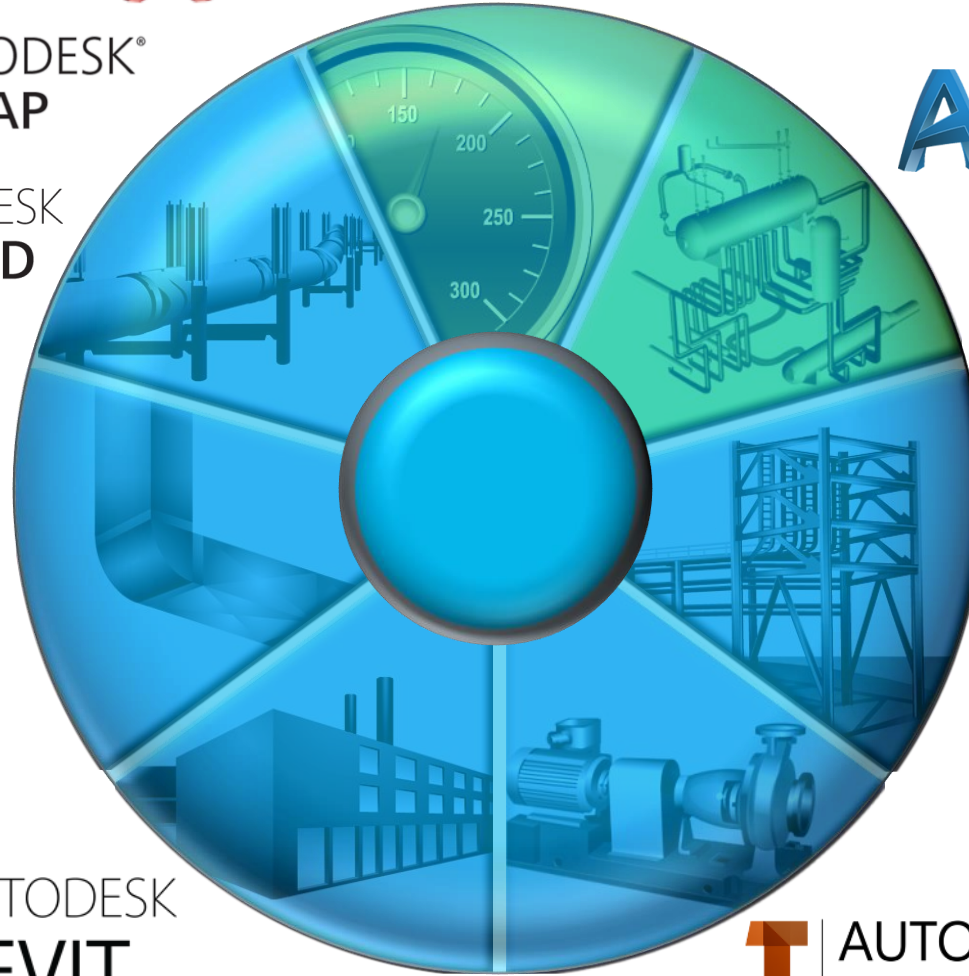
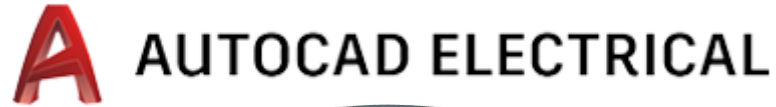
Bygning m.m.

Ventilation /
Kabelbakker

Landskab

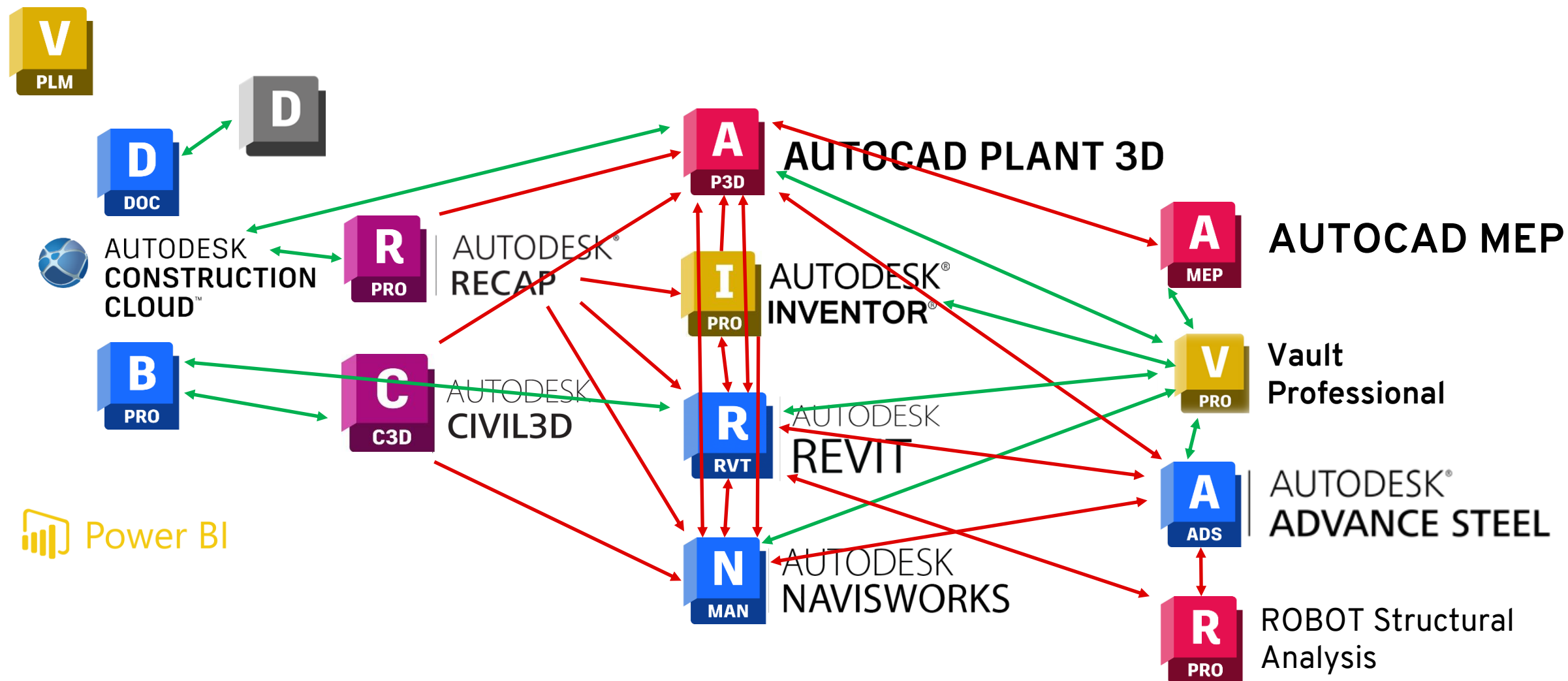


Komplete Multi-disciplin Design



Afklaring af behov

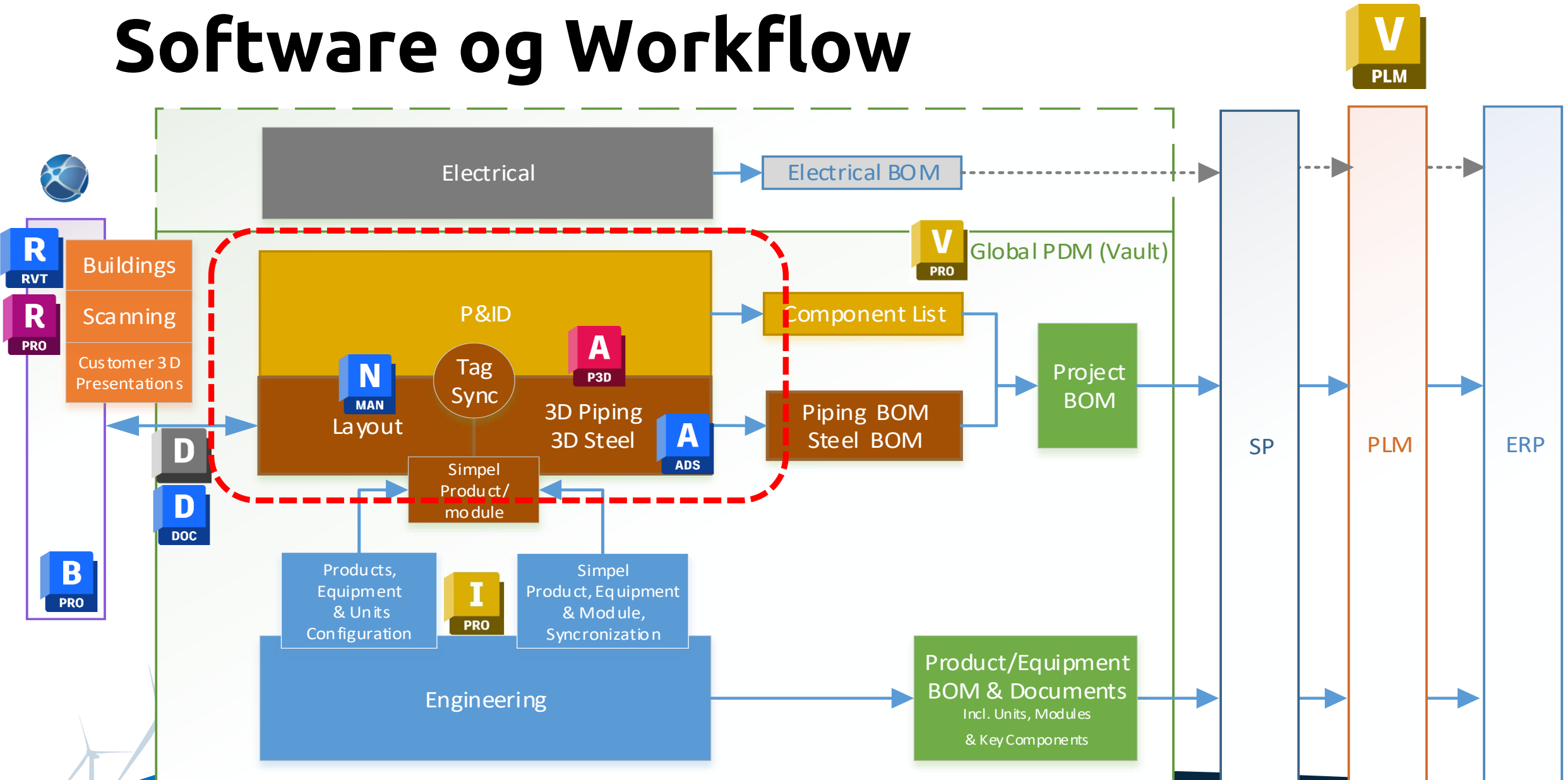
- Individuelle behov firma til firma, men også internt i firmaet.
- Der er ikke en model som passer til alle.
- Holdkortet skal defineres og rollerne fordeles



7

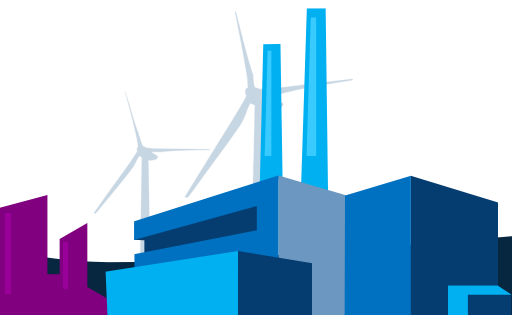


Software og Workflow



Den "meget" brugte vej


- AutoCAD Plant 3D som Central spilleren – hvor det samlede anlæg håndteres.




Leverandør til Plant Designet

Plant Design Workflow


P&I Diagrammer



AUTODESK®
RECAP




AUTODESK®
INVENTOR®



AUTODESK
REVIT

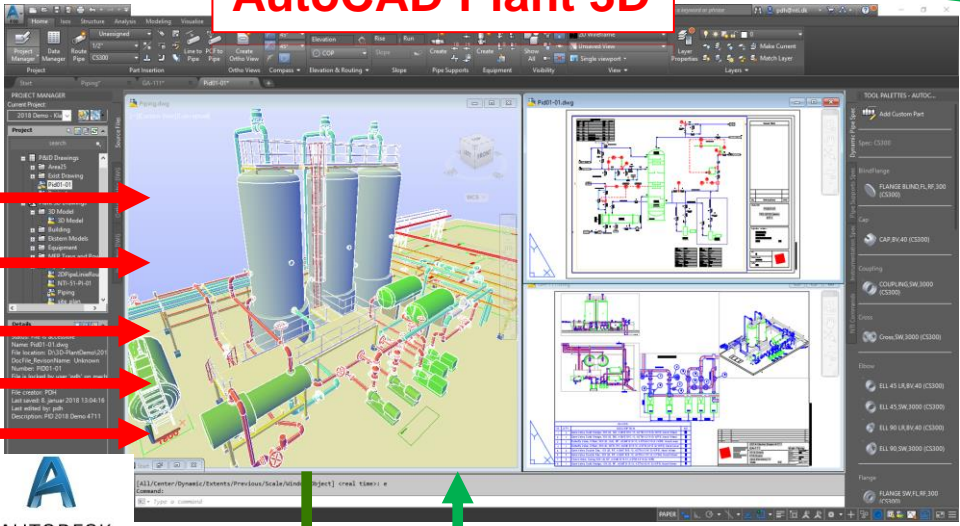
ANYCAD



AUTODESK®
ADVANCE STEEL

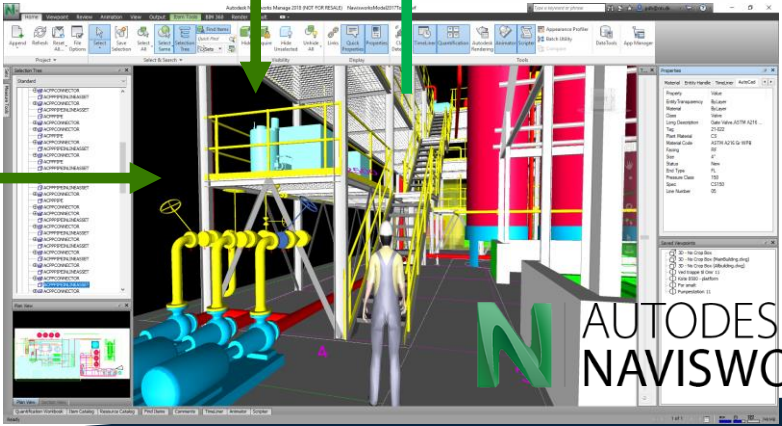
Simplificerings behov

AutoCAD Plant 3D



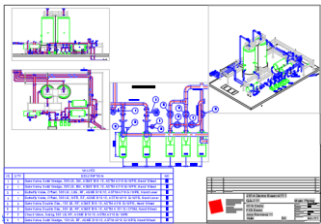
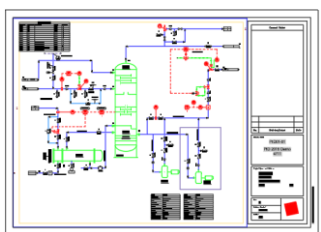
AUTODESK
AUTOCAD PLANT 3D

Coordinations model

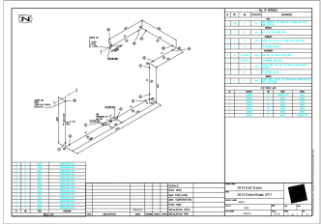


AUTODESK
NAVISWORKS

Layout & Arrangements
tegninger



Rør Isometri tegninger

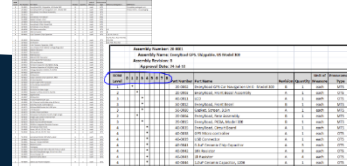


Visualisering /Walk through

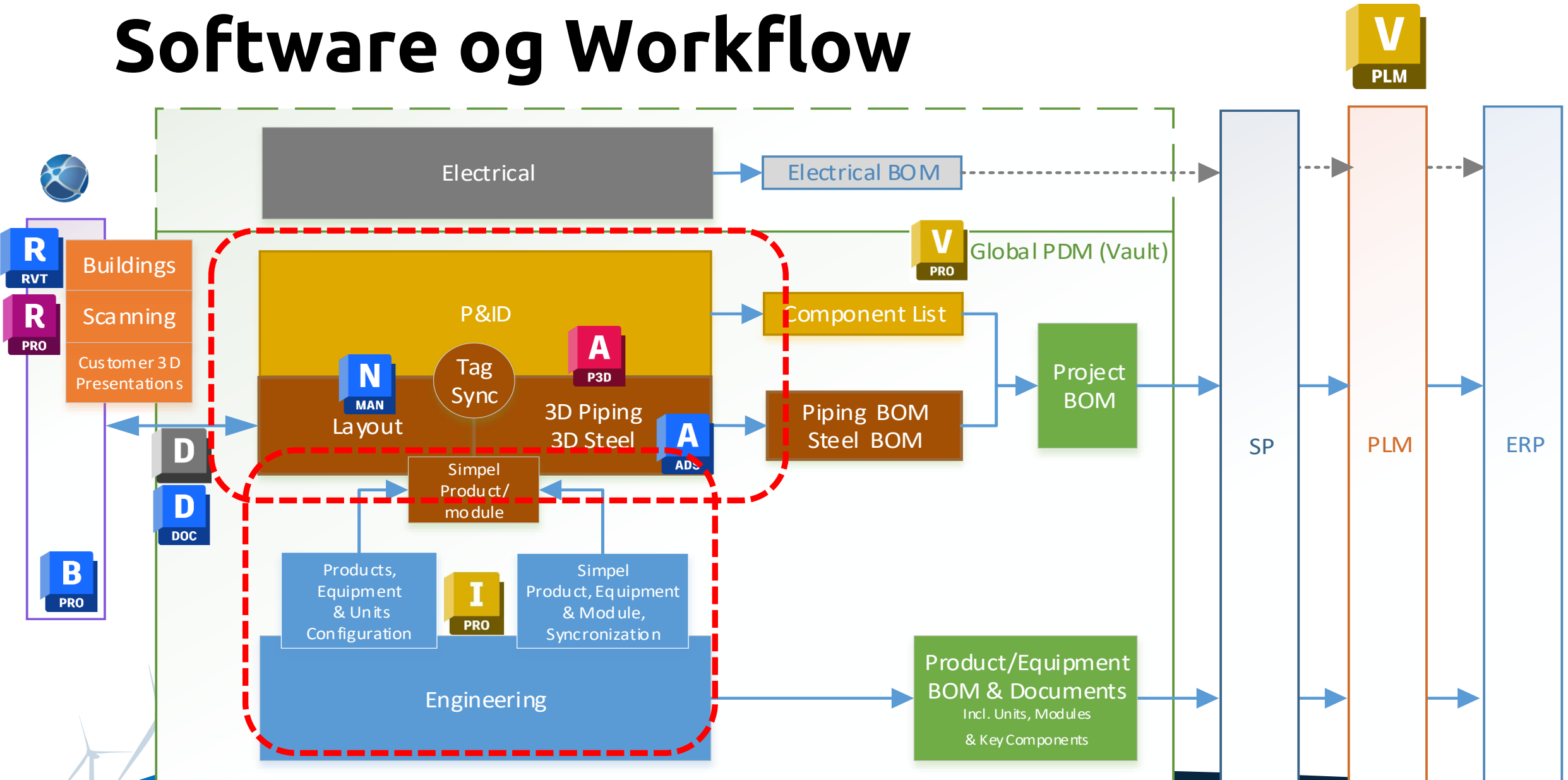
OUTPUT



Rapporter & Lister



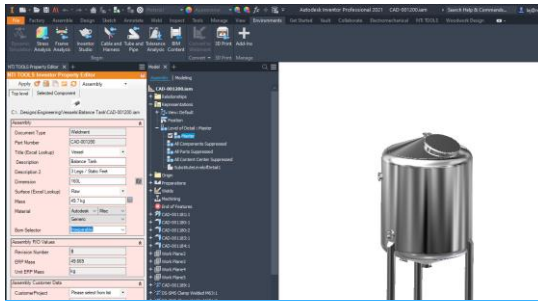
Software og Workflow



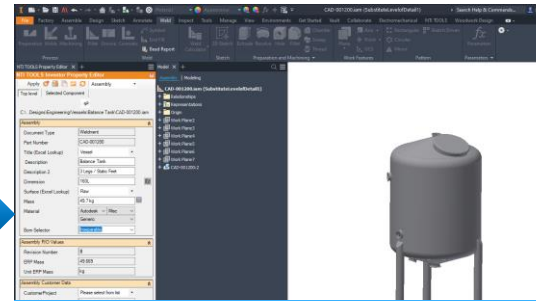
Release Process - Engineering -> Plant/Layout



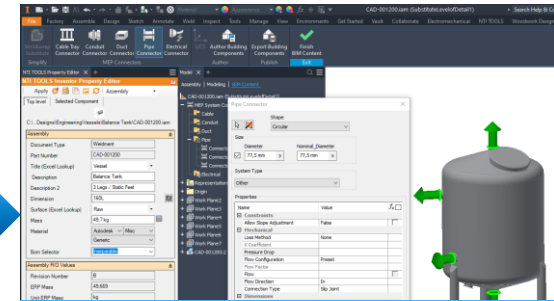
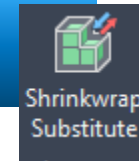
File Handling
Development
Construction



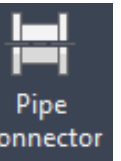
Ordinary Inventor
construction



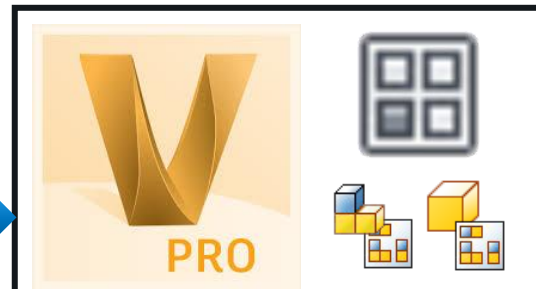
Simplify



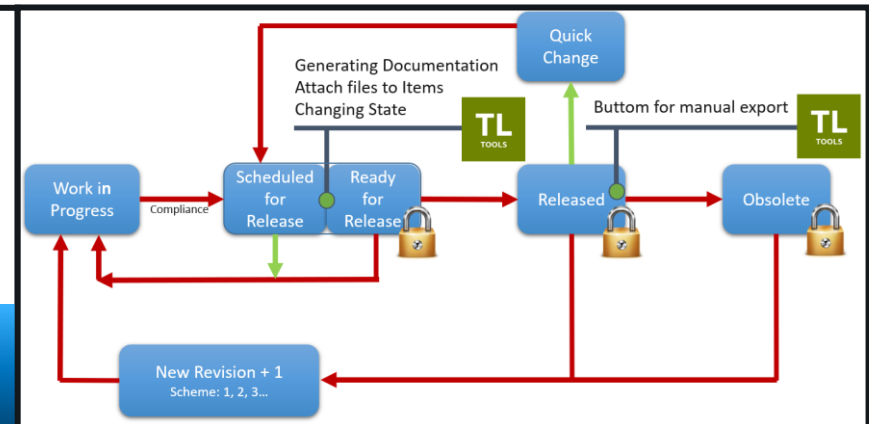
BIM Content
(Define Connectors & Properties)



Vault Files Handling
(Check In / Out)



Vault Item Handling
(Assign / Attach -> Change State)



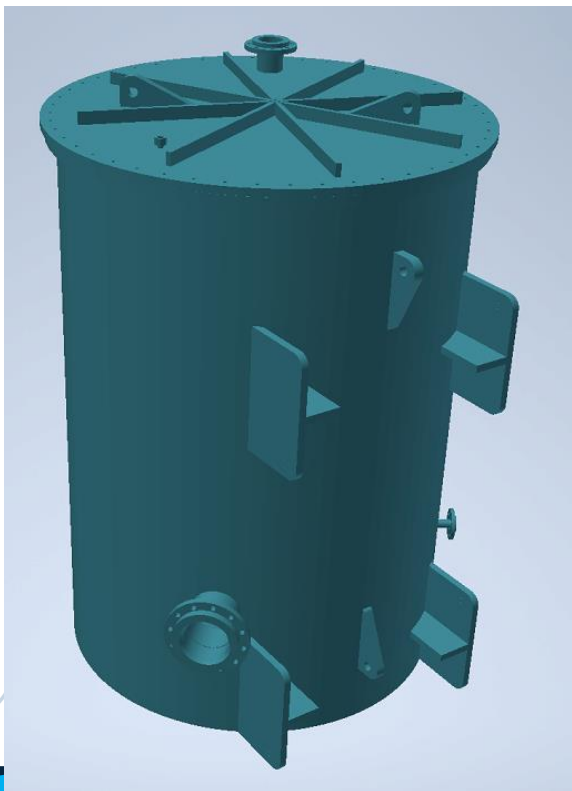
Item Handling
Ready for production



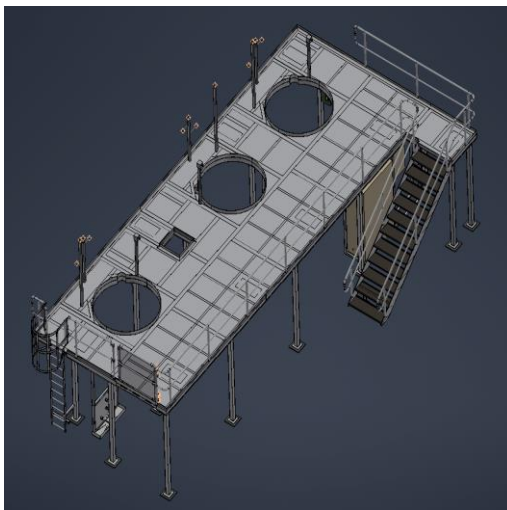
Udstyr (equipment) fra Inventor er opdelt i følgende kategorier

- Type 1 - Procesudstyr - definition: Har et TagNo. og ItemCode (varenummer)
- Type 2 - Layout-Udstyr - definition: Har ikke et TagNo., men har altid en ItemCode (varenummer)
- Type 3 - 3D-element - definition: Har ikke et TagNo eller et (varenummer)

Type 1



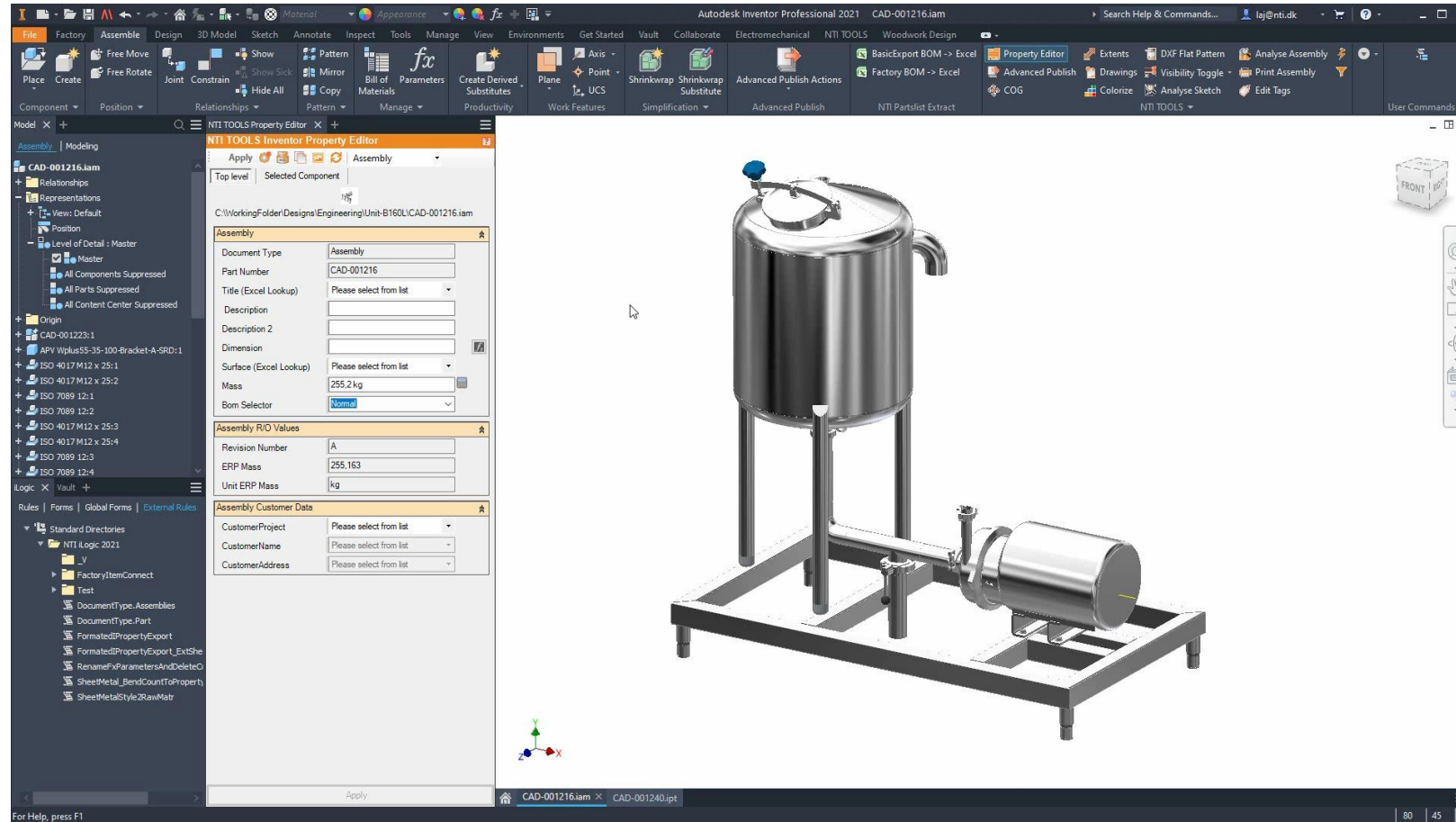
Type 2



Type 3



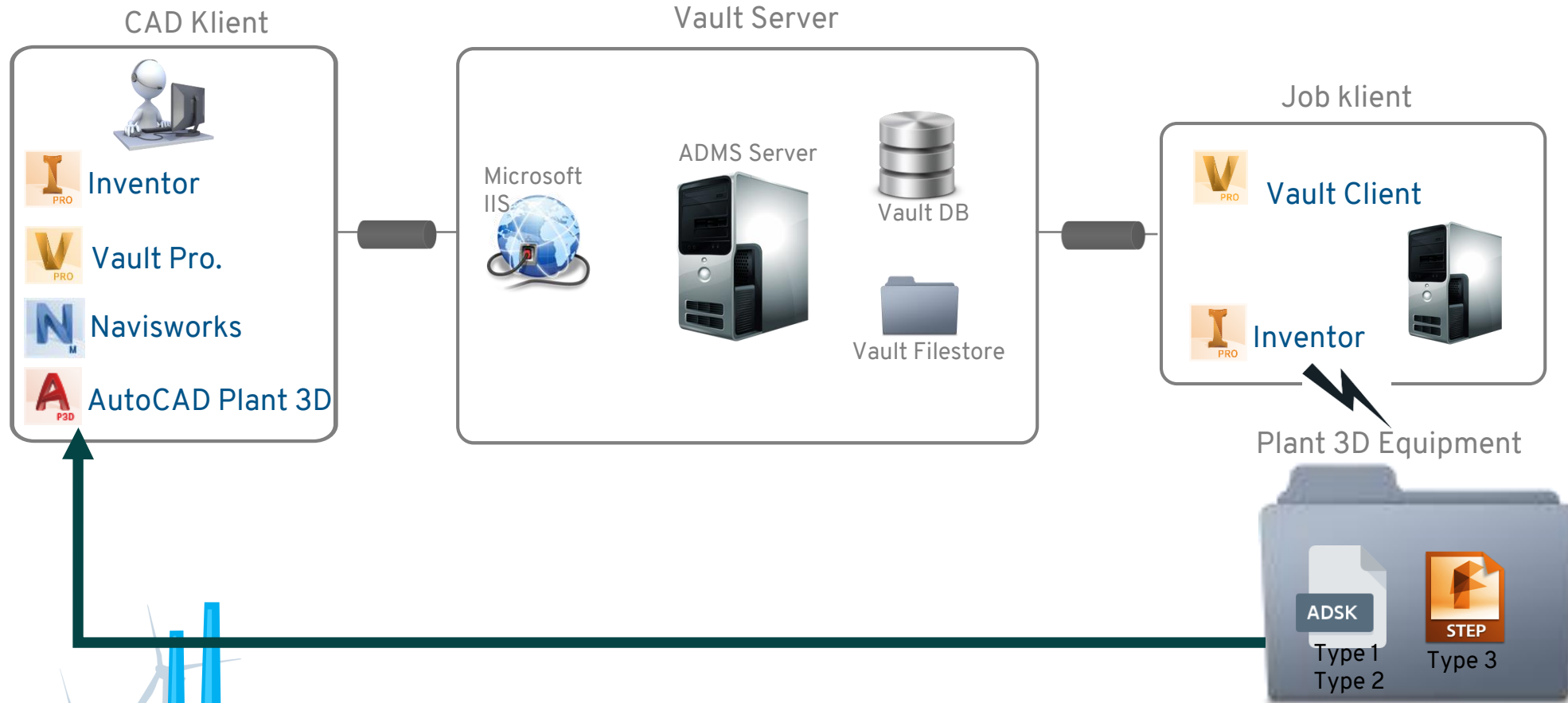
Release Process - Engineering -> Plant/Layout



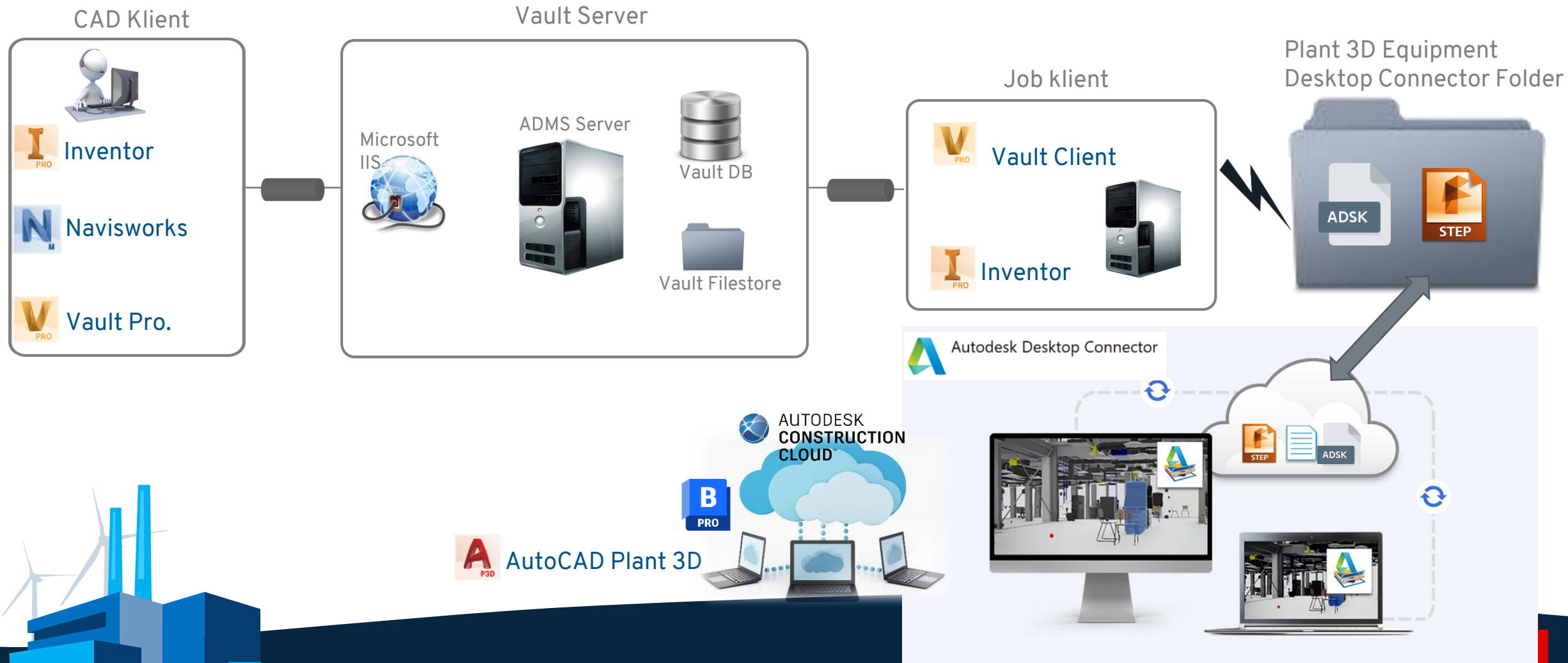
Engineering Workflow: The 3 States



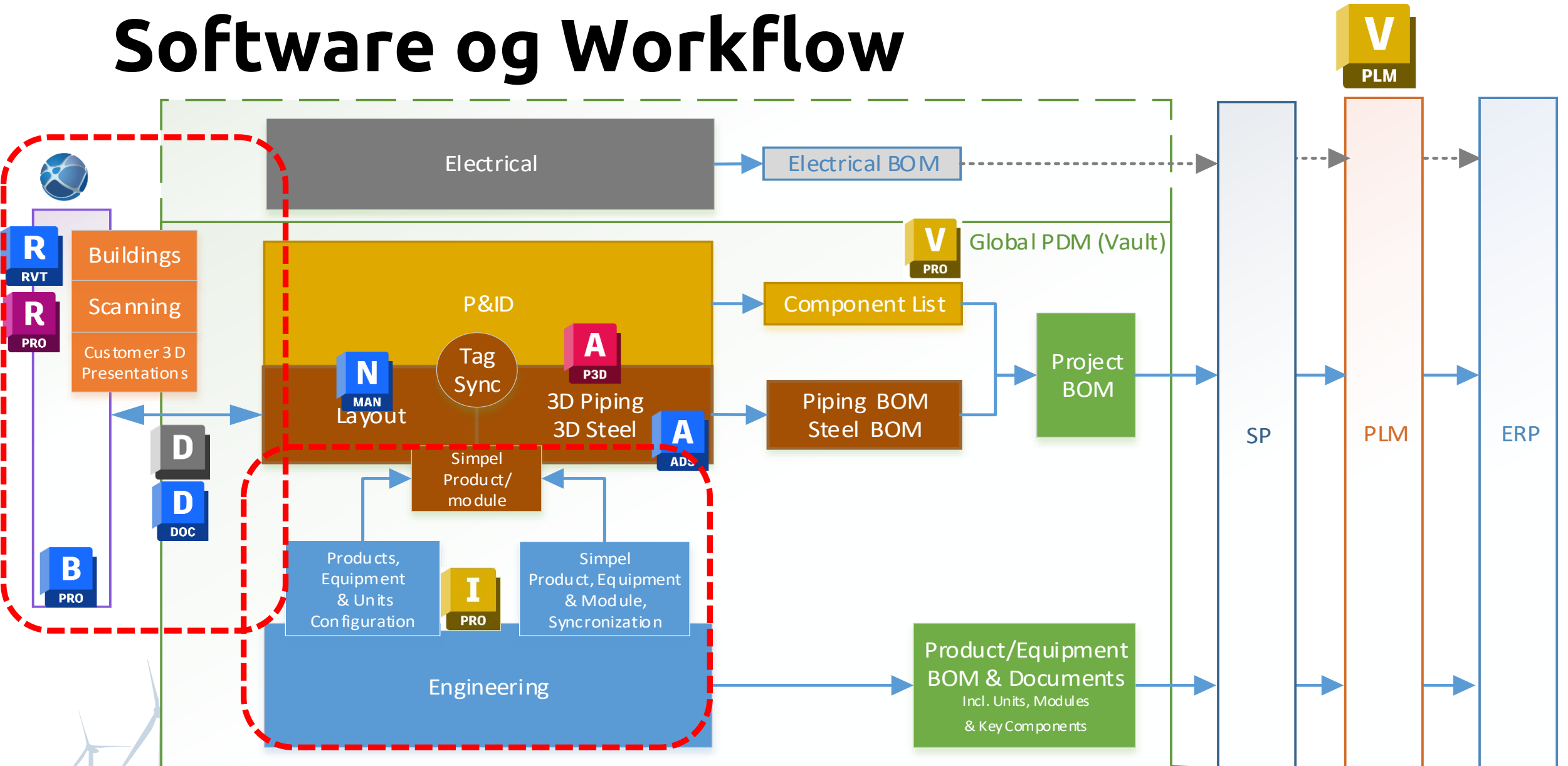
Arkitektur i NTI Plant Konceptet med Vault



Arkitektur i Konceptet med Vault og ACC/ BIM Pro

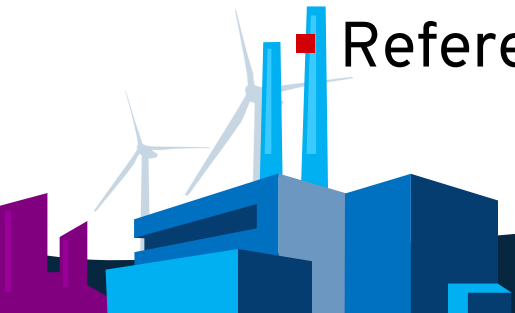


Software og Workflow



Revit & AutoCAD Plant 3D

- Designfase
 - Hvordan skal der samarbejdes
- Navisworks Manage
 - Optimal til, dynamisk, at håndtere den samlede
- Autodesk Revit
 - Forberedelse af Revit-model til brug i Plant 3D (export)
 - Reference til Plant 3D modeller i Revit (Link)
- AutoCAD Plant 3D
 - Forberedelse af Plant 3D modeller til brug i Revit (export)
 - Reference til Revit-model i Plant 3D (Xref)



Design Faser

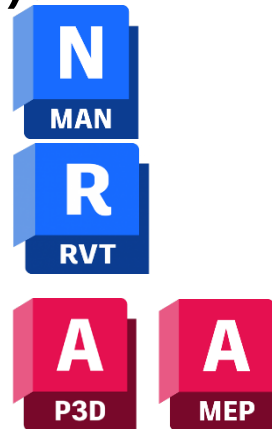
- Skematisk design
 - Revit projekt, masse-modellering
 - Plant 3D projekt, typisk P&ID udvikling
- Design udvikling
 - Revit projekt, modeludvikling
 - Plant 3D projekt, Plant design (Stål, udstyr, rørdesign...)
- Bygge dokumentation
 - Revit-projekt, tegninger (sheets)
 - Plant 3D-projekt, Ortografiske arrangement tegninger
- Fabrikations-tegninger
 - Plant 3D projekter, ISO/Spool tegninger



Autodesk software

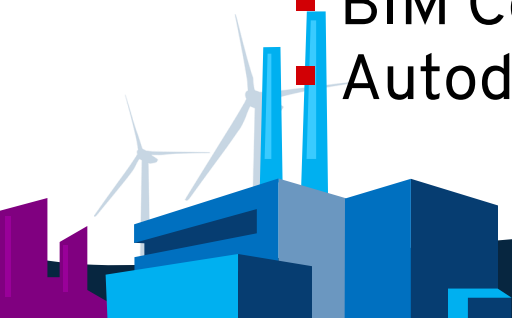
- Desktop værktøjer (AEC Collection).

- Navisworks Manage (NWM)
- Revit (RVT)
- AutoCAD Plant 3D (P3D)
- AutoCAD MEP (AMEP)
- Plant Object Enabler (P3oE)



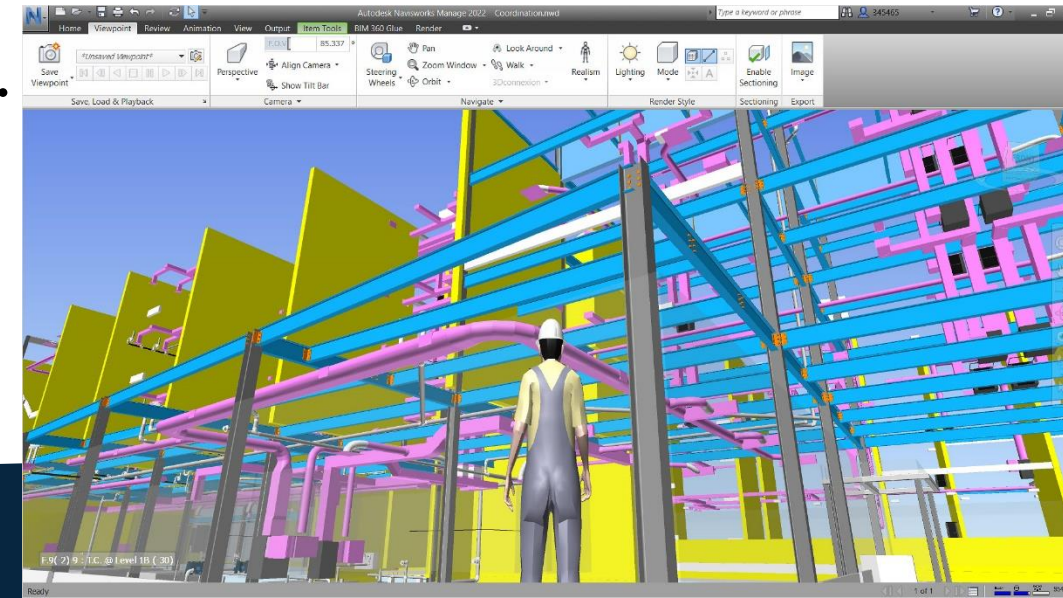
- Cloud værktøjer.

- Autodesk Construction Cloud (ACC)
- BIM Collaboration Pro (BCP)
- Autodesk Desktop Connector (ADC)



Navisworks Manage

- Navisworks som det software hvor den samlede model bor – og opdateres.
 - Her vil den samlede model altid være opdateret.
 - De opdaterede filer fra P3D og RVT opdateres via NWC filerne.
 - Dette gælder også evt. for Inventor, Point Clouds, STEP mm. (mange import muligheder / formater)
 - Kilden til ”NWD filer” – med free-viewer.

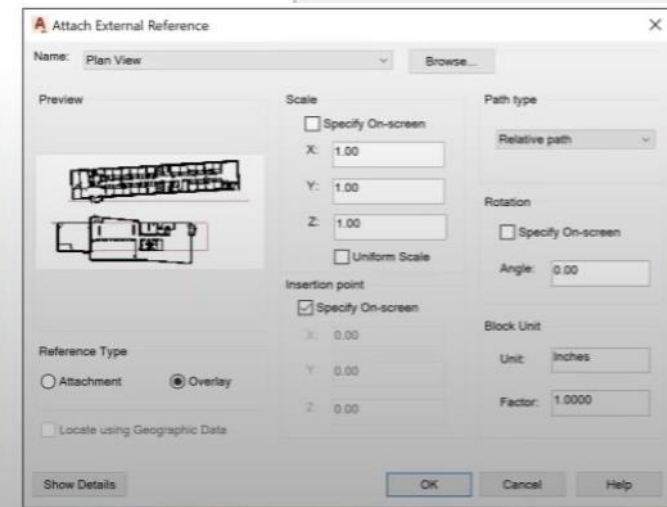
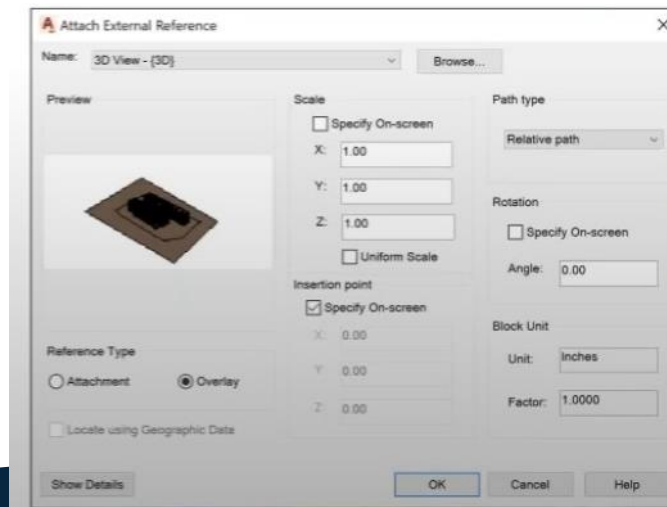
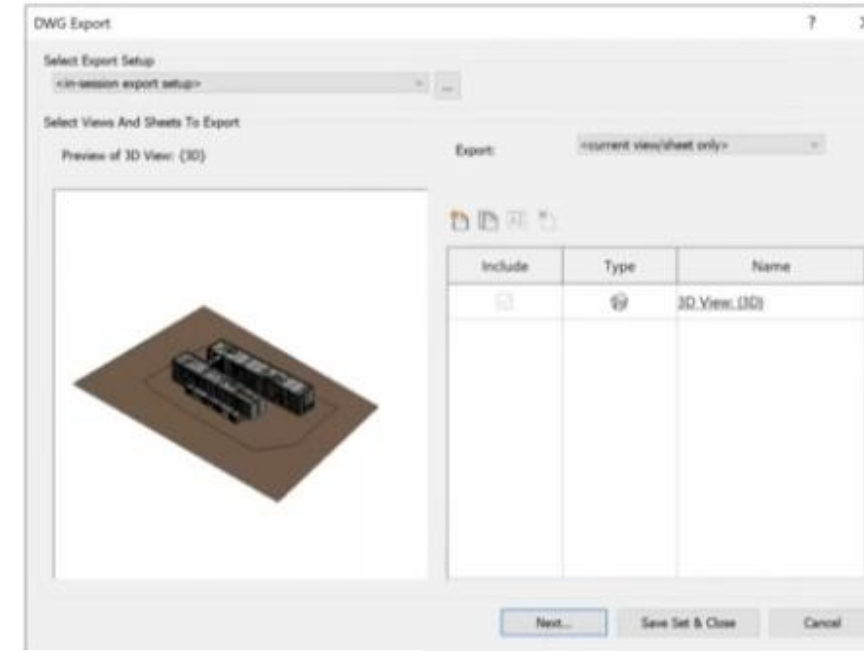




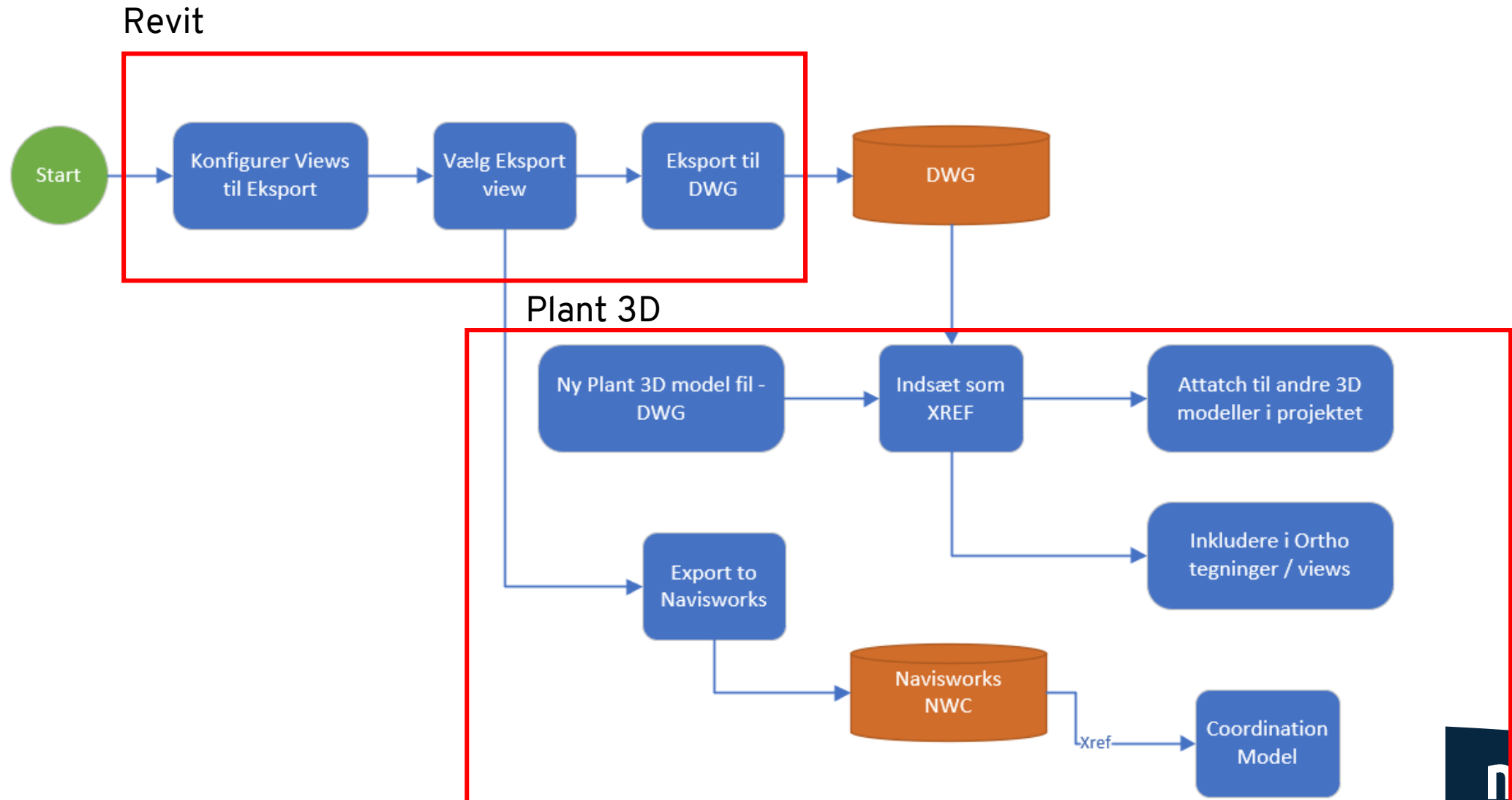
Revit model i AutoCAD Plant 3D

- Design fasen.
 - Koordinering er vigtigt, mange opdateringer.
Her vil en Navisworks Coordination model (NWC) være optimalt.
- Konstruktions / dokumentations fasen.
 - Exporterede DWG 3D modeller som xreffes ind i P3D
 - Exporterede DWG / PDF 2D layouts som xreffes ind i P3D

*Revit modellen skal simplificeres / beskæres så den tilpasses til det område der er nødvendigt i Plant 3D modellen.
Herved øges performance betragteligt i Plant 3D – både i 3D arbejdet men også ved håndtering af Ortho tegninger / views*



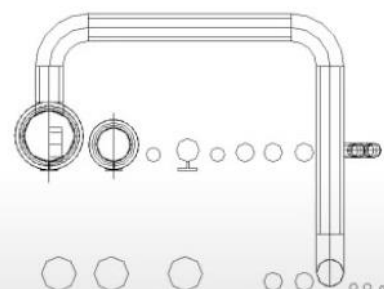
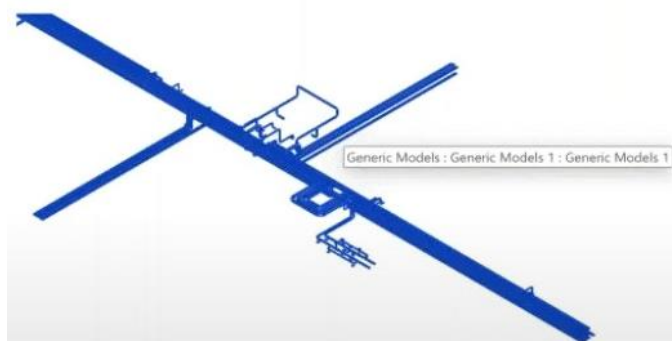
Workflow overblik



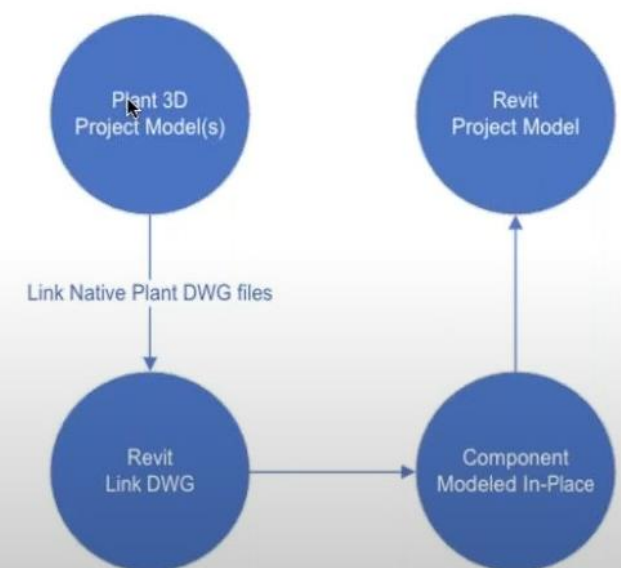


AutoCAD Plant 3D model ind i Revit

- Den "bedste" metode afhænger igen af behovet.
 - Design fasen:
Eksportere Plant 3D modellen til AutoCAD DWG (solids)
 - Link Plant 3D models (direkte)



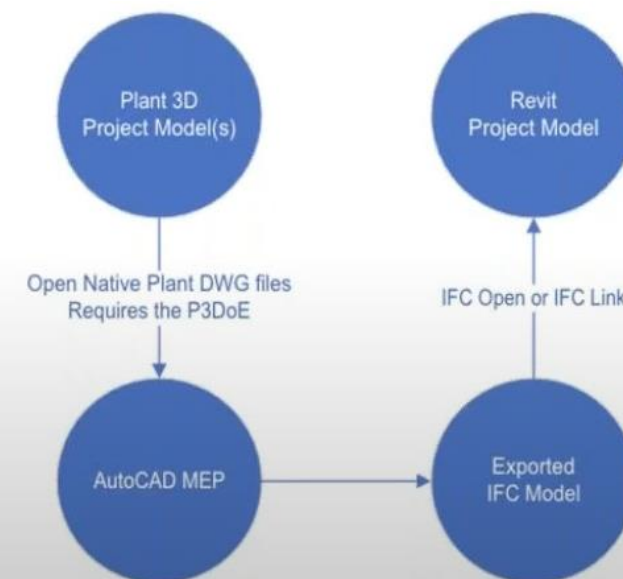
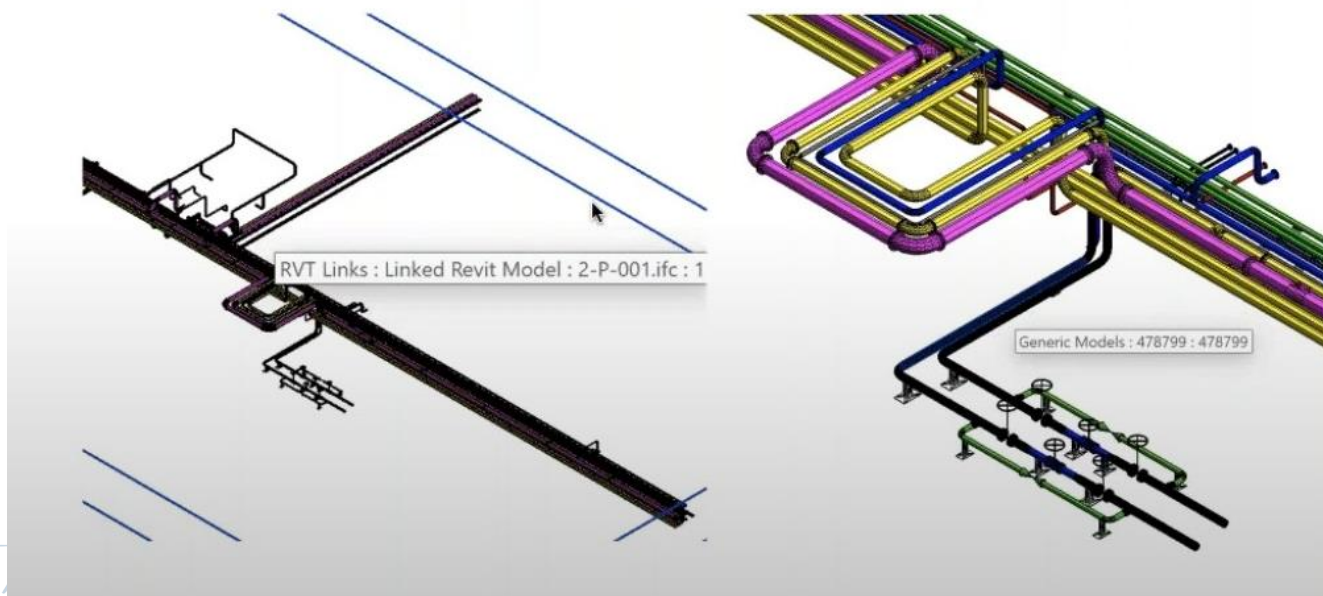
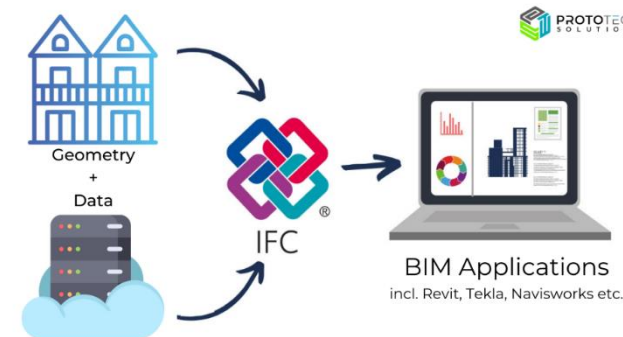
Level 2
10' - 0"





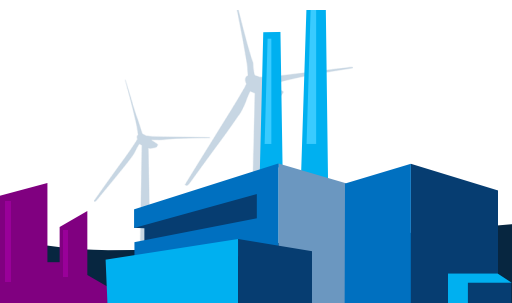
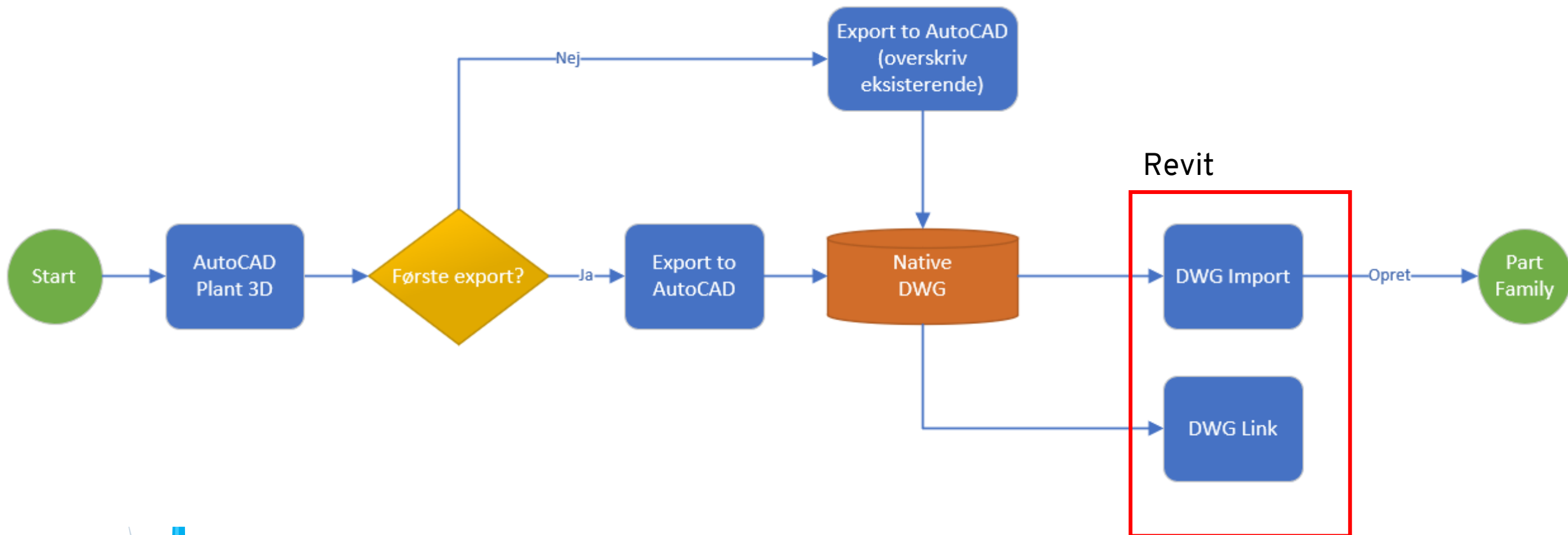
AutoCAD Plant 3D model ind i Revit

- Metode afhænger igen af behovet – hvis der er behov af geometri & data.
 - Eksporter til IFC format for herefter at åbne eller linke til IFC filen.

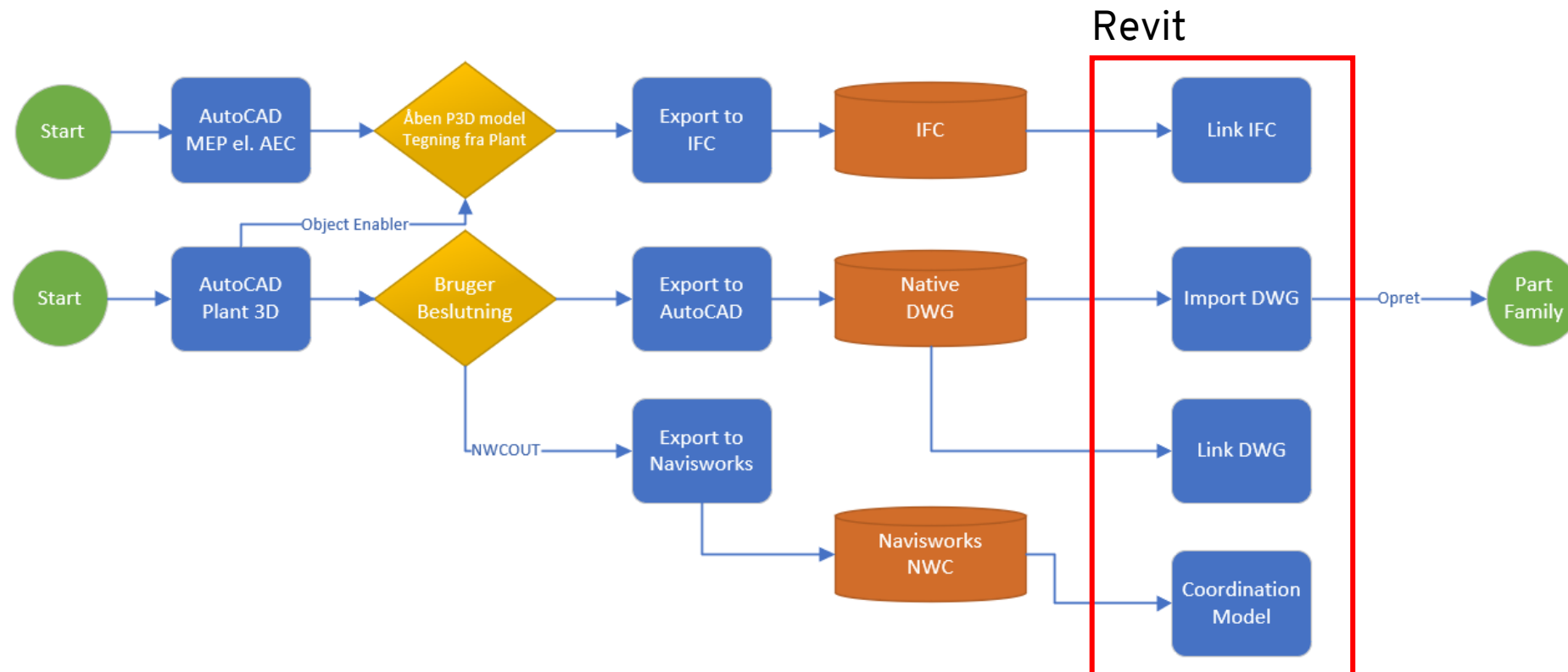
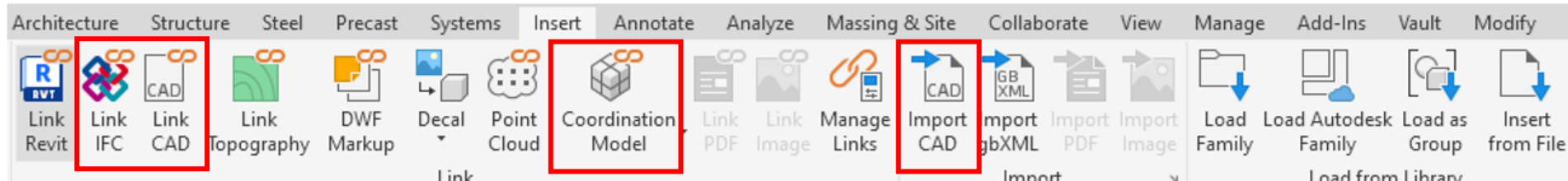




Workflow overblik – Plant 3D til Revit 2023 - Basic



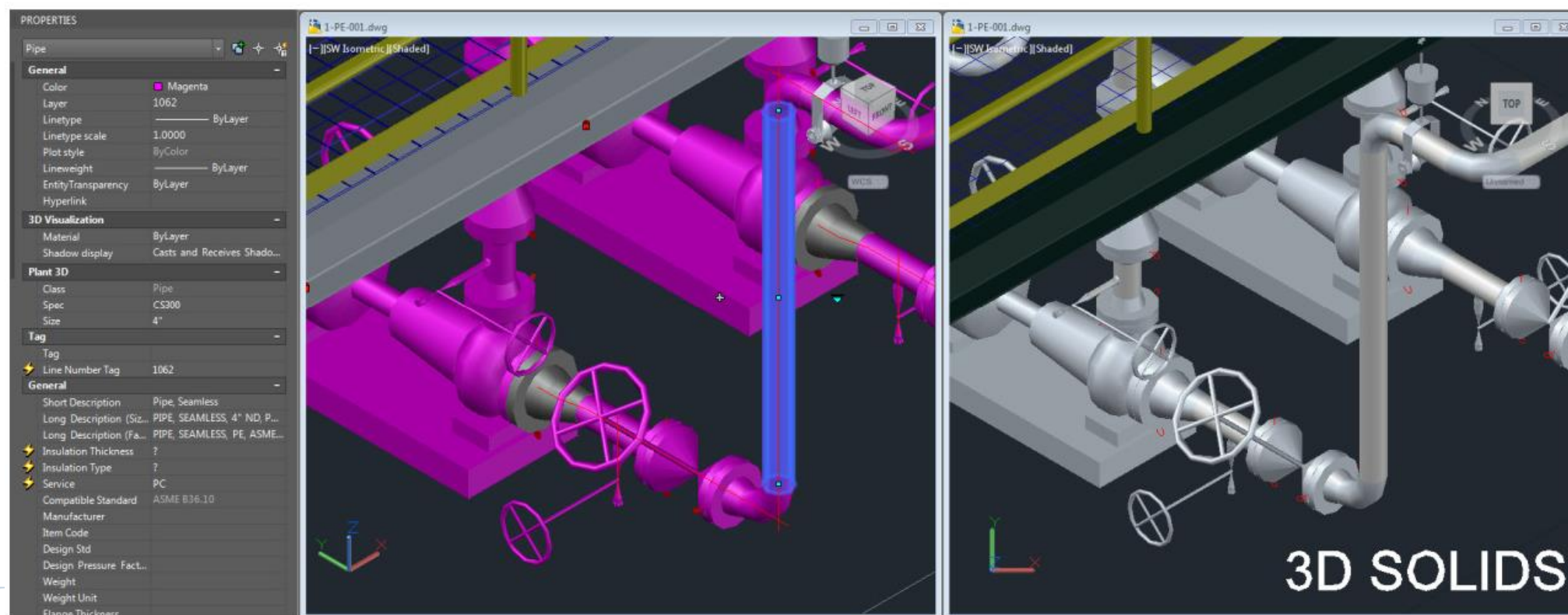
Workflow overblik – Plant 3D til Revit 2023 - Alternative metoder





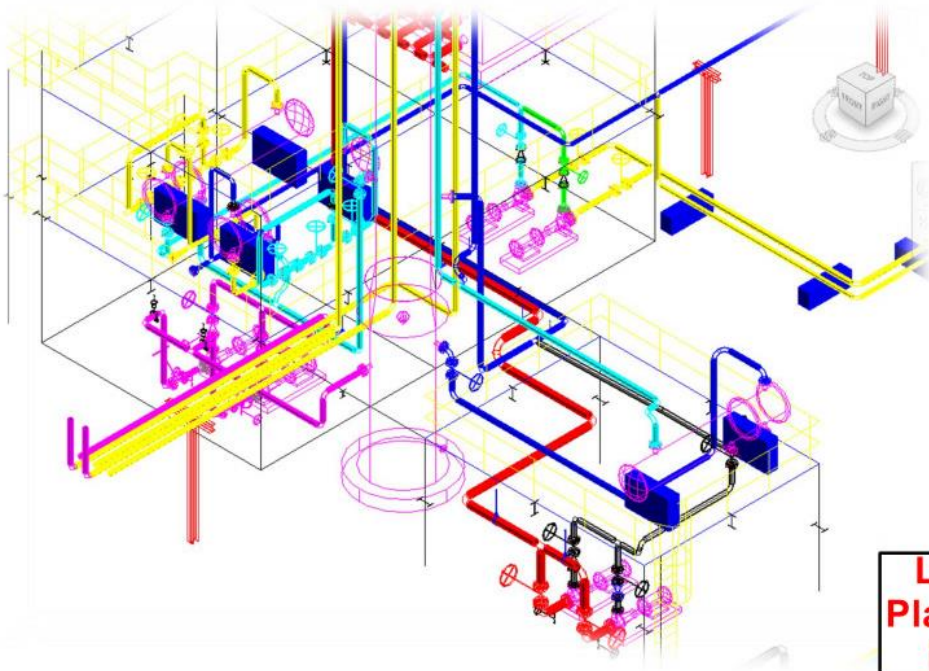
Plant 3D til Revit

- Native Plant 3D model filer kontra Export to AutoCAD (solids)

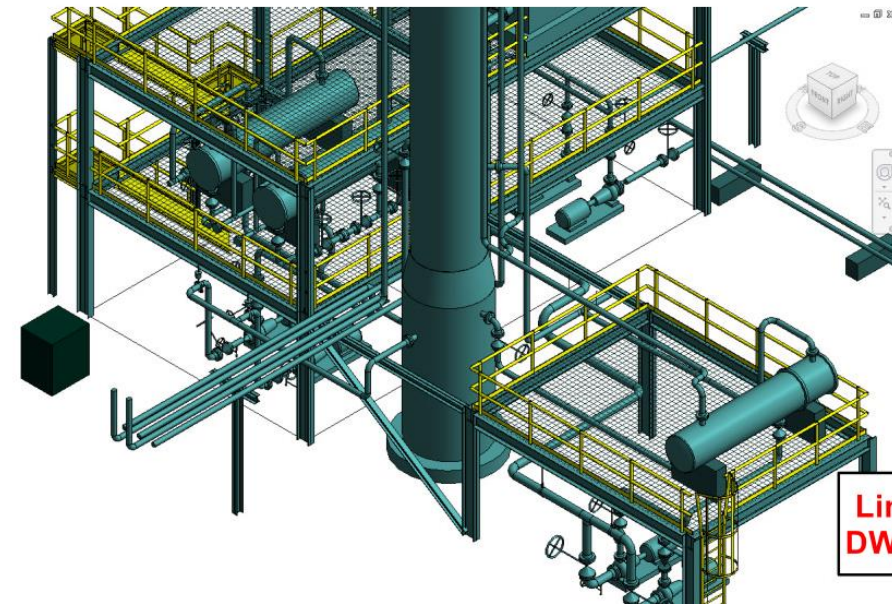


Plant 3D til Revit

- Native Plant 3D model filer kontra Export to AutoCAD (solids)



Link native
Plant 3D DWG
into Revit



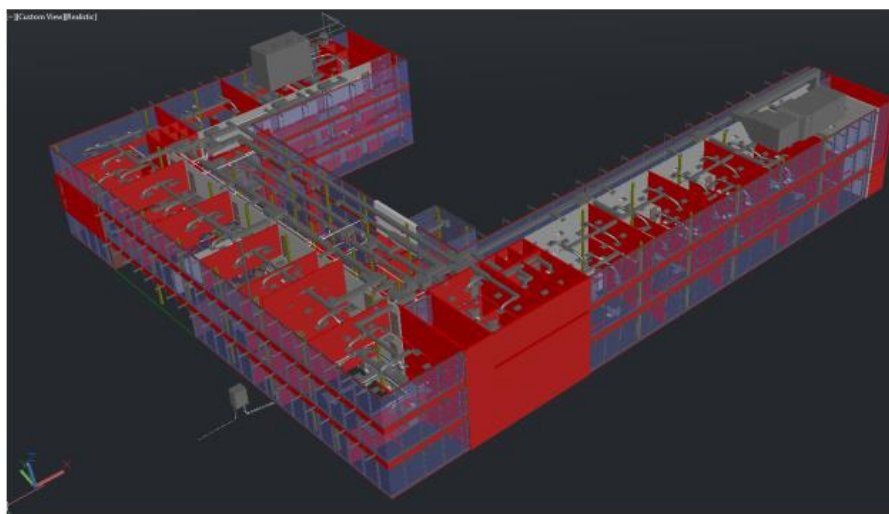
Link Exported
DWG Into Revit



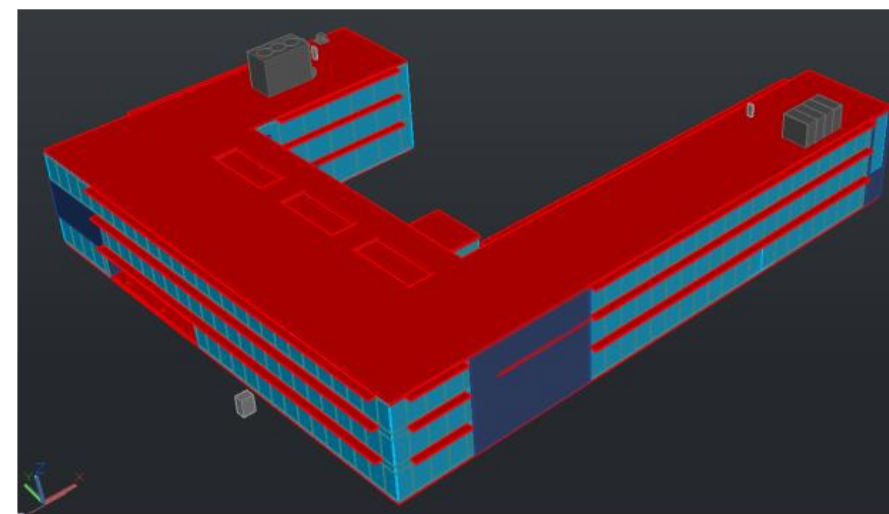


Plant 3D til Revit

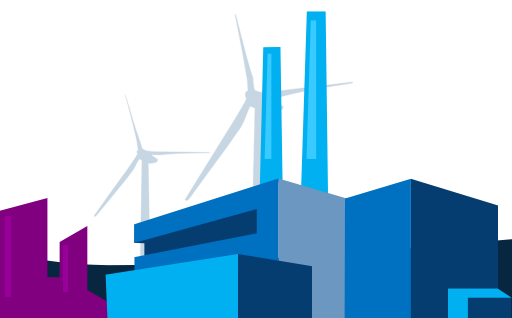
- Eksportere kun objekter som er nødvendige for Plant 3D

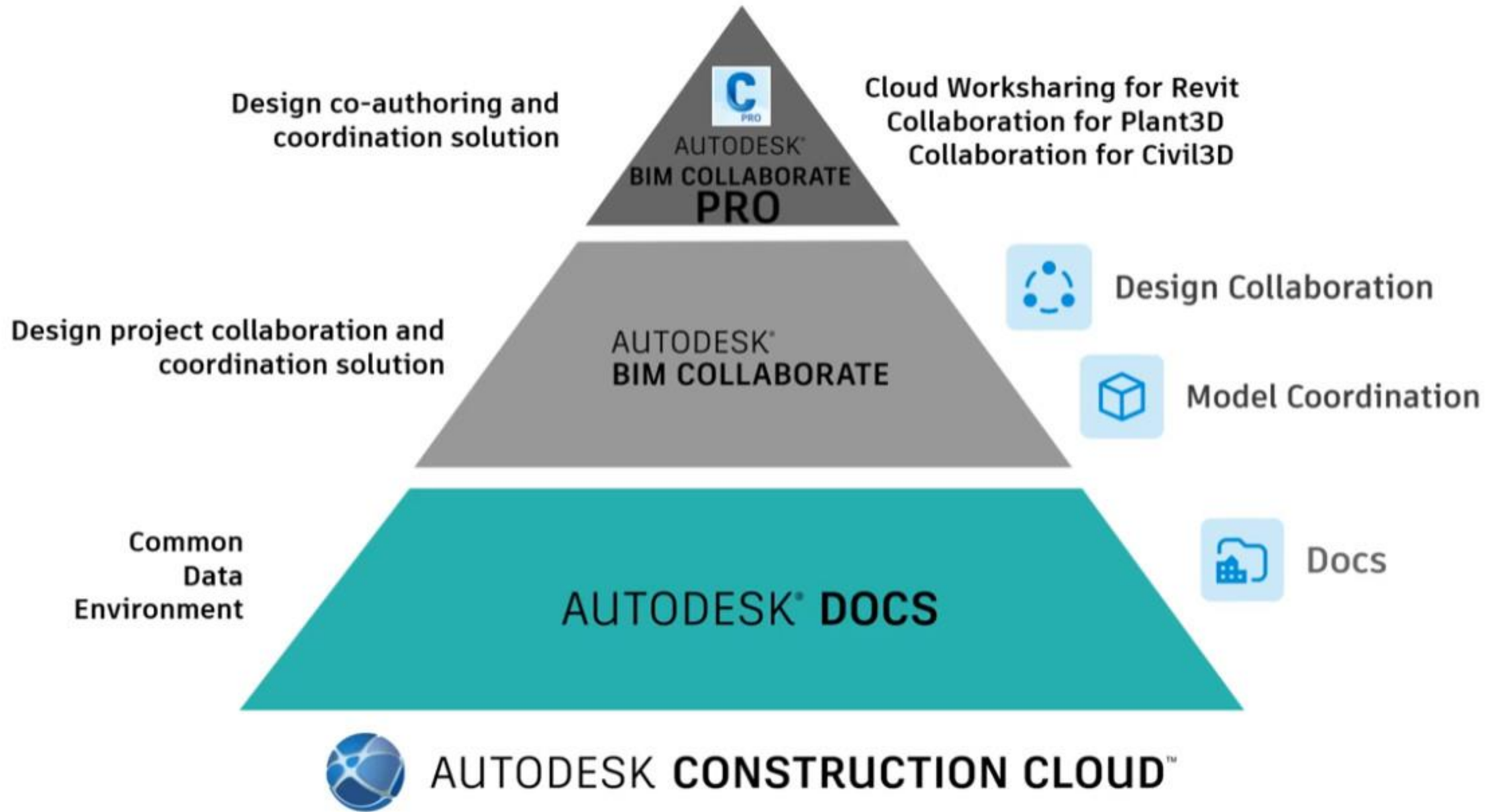


Full Revit Model Export
12.6 MB

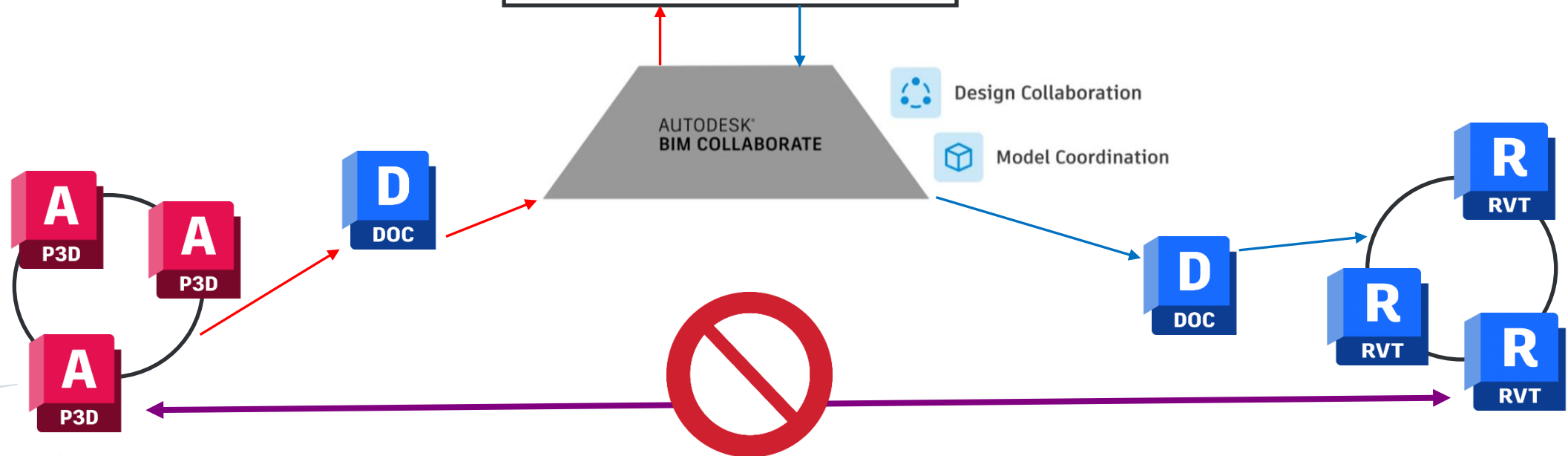
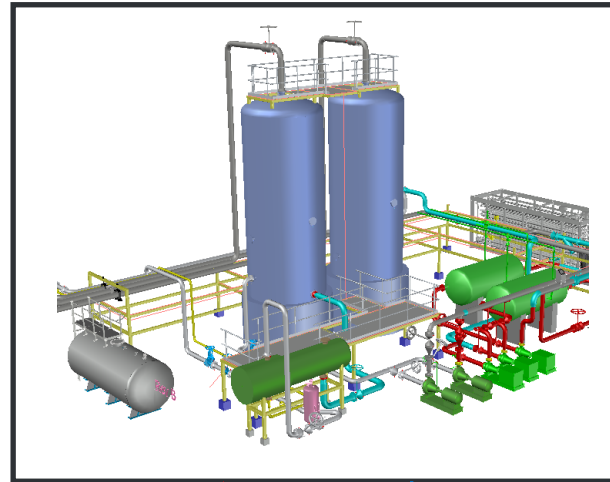


Simplified Revit Model Export
3.82 MB

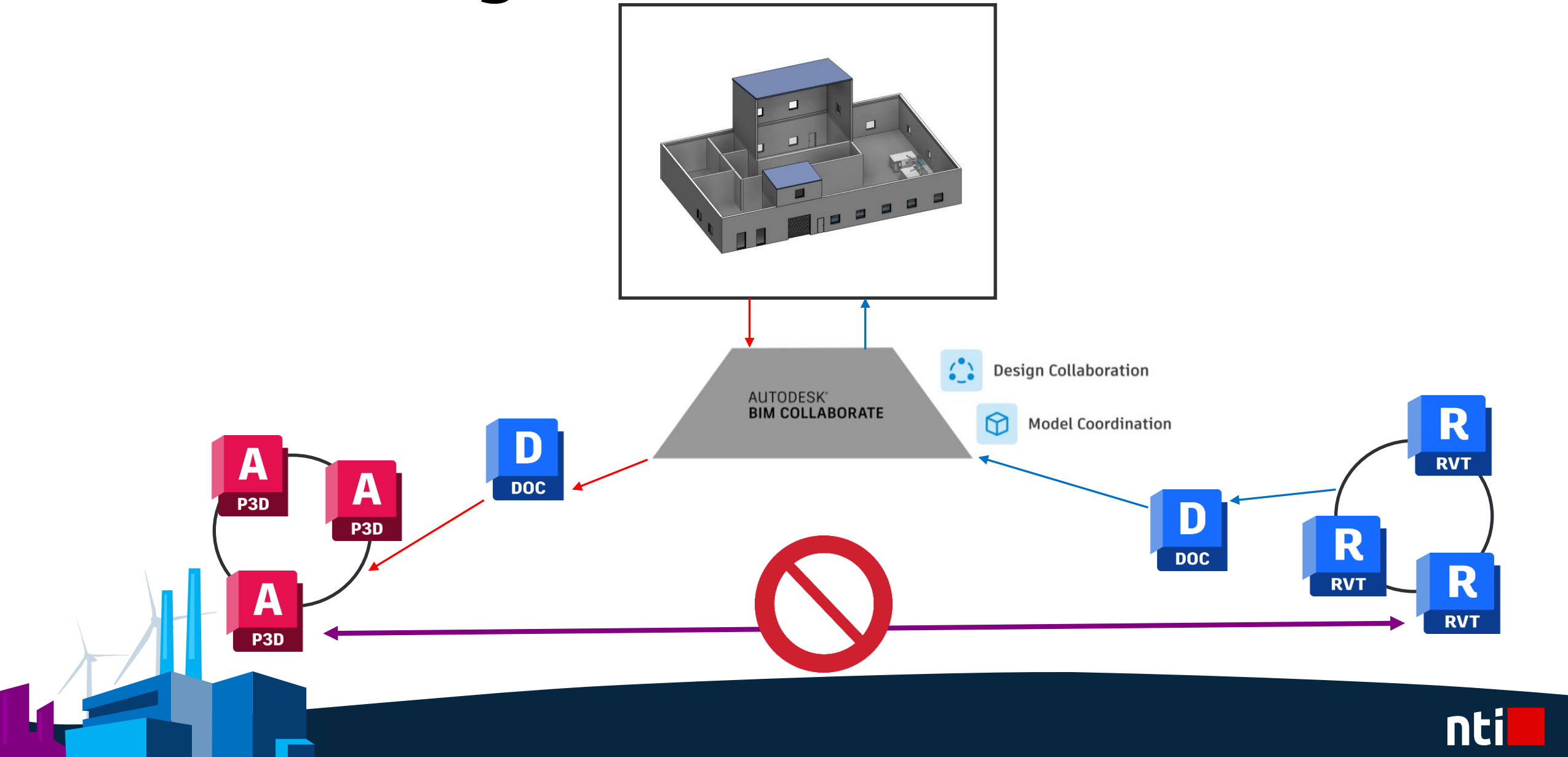




ACC - Design Collaboration

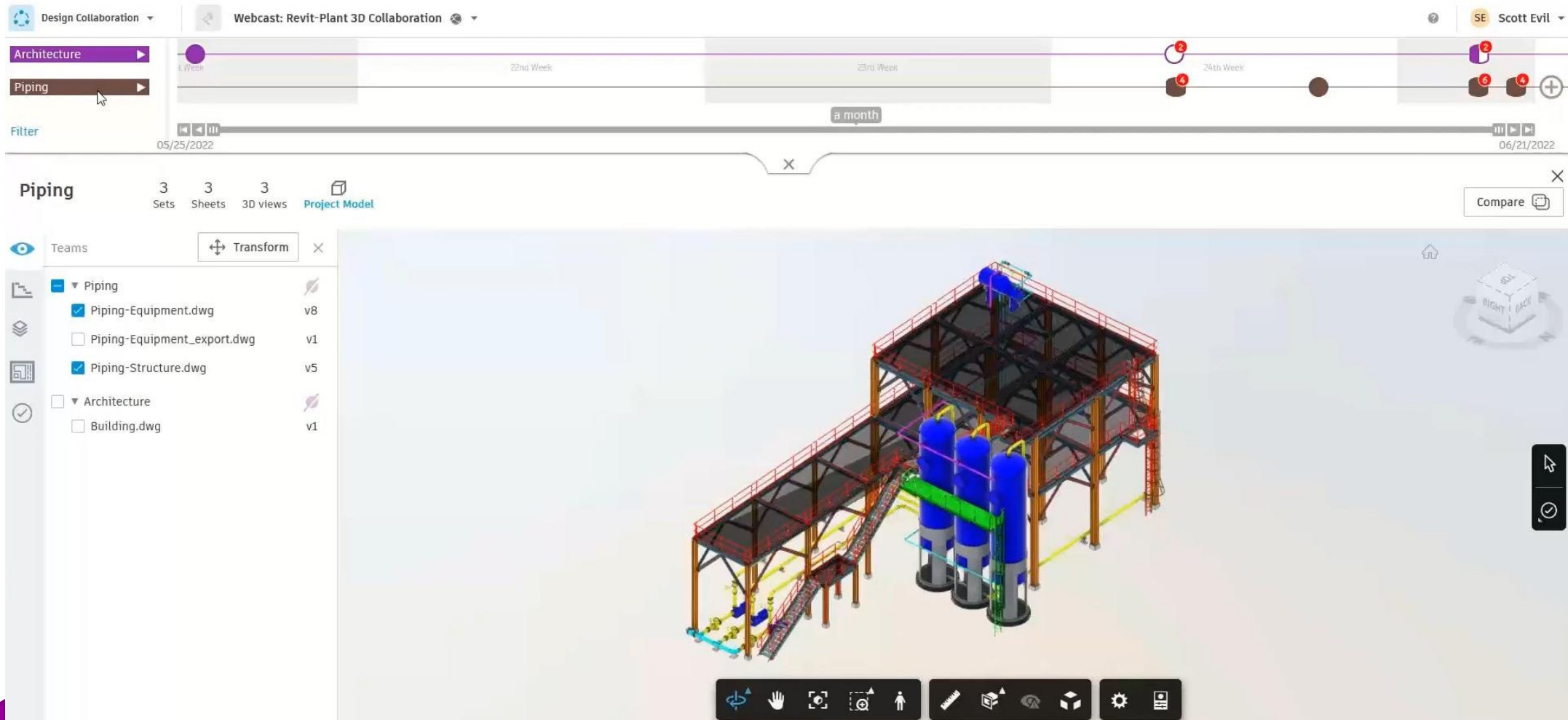


ACC - Design Collaboration



ACC - Design Collaboration

- Hver "disciplin" (eller team) har deres egen "swim lane"

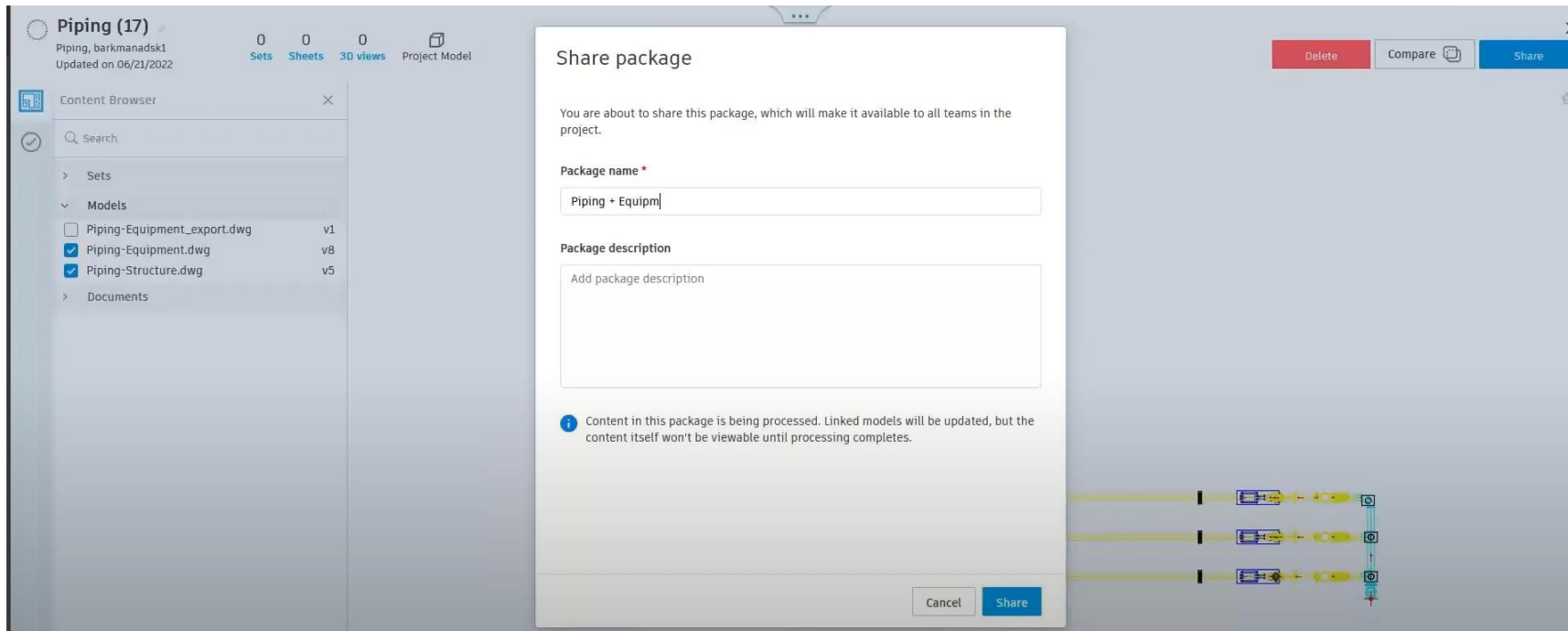


The screenshot displays the ACC Design Collaboration interface for a project titled "Webcast: Revit-Plant 3D Collaboration". The interface is organized into several key sections:

- Top Navigation:** Includes a "Design Collaboration" dropdown, the project name, and a user profile for "SE Scott Evil".
- Swim Lane View:** A horizontal timeline at the top shows the project schedule with "22nd Week", "23rd Week", and "24th Week" highlighted. A "Piping" swim lane is selected, showing a timeline with red markers and a "a month" duration indicator.
- Left Panel:** Contains a "Teams" section with a "Transform" button. Below it, a list of files is shown, including "Piping-Equipment.dwg" (v8), "Piping-Equipment_export.dwg" (v1), "Piping-Structure.dwg" (v5), and "Building.dwg" (v1). The "Piping" team is selected.
- 3D Model View:** The main area displays a 3D model of a plant structure with piping and equipment. The model is rendered in a perspective view, showing a complex network of pipes and structural elements. A "Compare" button is visible in the top right corner of the model view.
- Bottom Panel:** Features a toolbar with various navigation and manipulation tools, including a hand icon, a camera icon, a selection tool, and a settings icon.

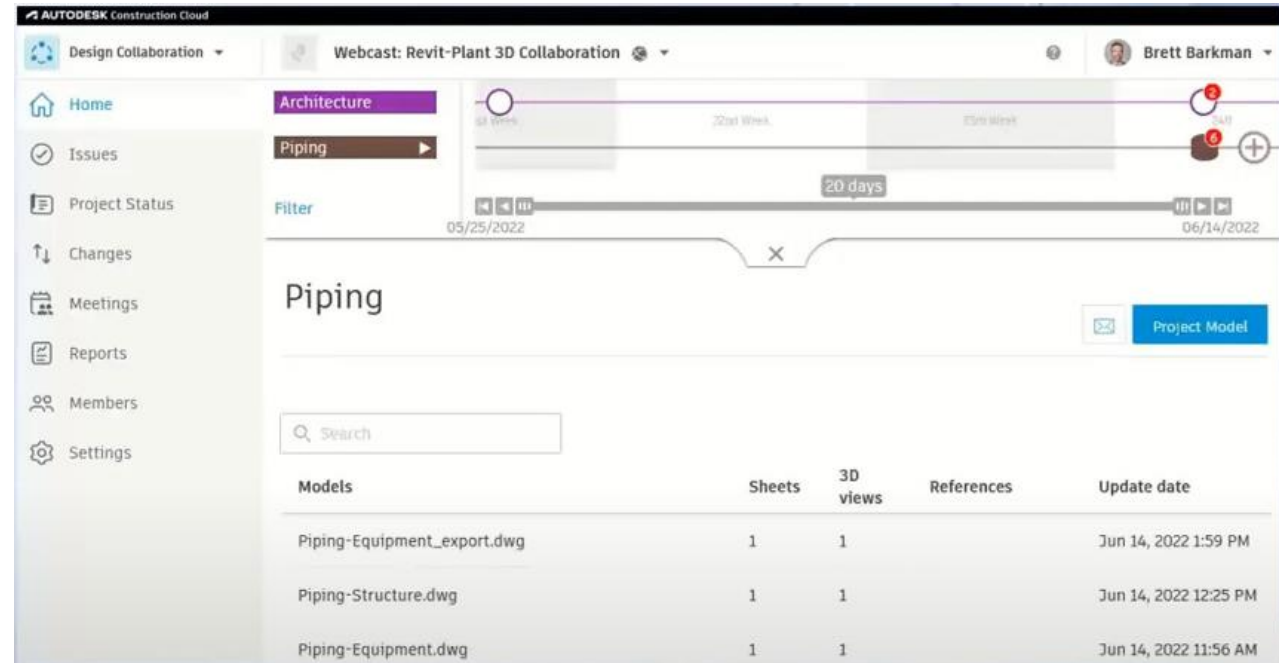
ACC - Design Collaboration

- Der skabes en ”pakke” af det man gerne vil dele med andre. (f.eks. en piping pakke fra Plant 3D)



ACC - Design Collaboration

- Andre Teams kan så ”consume” pakken og bruge den i deres design (f.eks. i Revit)
- ACC kopiere pakken ned til et angivet Workspace i Docs og her kan der linkes til Piping-pakken i Revit.



Models	Sheets	3D views	References	Update date
Piping-Equipment_export.dwg	1	1		Jun 14, 2022 1:59 PM
Piping-Structure.dwg	1	1		Jun 14, 2022 12:25 PM
Piping-Equipment.dwg	1	1		Jun 14, 2022 11:56 AM

Plant 3D XREFs

AUTODESK CONSTRUCTION CLOUD

Design Collaboration

INTERNE EMEA Collab District

Alexandre Mihalache

Home

Project Status

Changes

Meetings

Members

Settings

6-Industry (Revit + PL...)

9-External contributor

5-Industry (Revit ...)

A1-VB-Equipments.dwg

A1-VB-Piping.dwg

A1-VB-Structure.dwg

Archi Village BIM Indu...

B1-VB-Cooler.dwg

Filter

08/25/2021

7 days

09/01/2021

5-Industry (Revit + Plant 3D - Village BIM) (6)

5-Industry (Revit + Plant 3D - Village BIM), Alexandre Mihalache
Shared on 09/01/2021

Package description

No description added

Package content

0 Sets **10 Models** 0 Documents

Models

References ↑

A1-VB-Equipments.dwg

A1-VB-Piping.dwg

This model has references

References

A1-VB-Piping.dwg contains 2 references

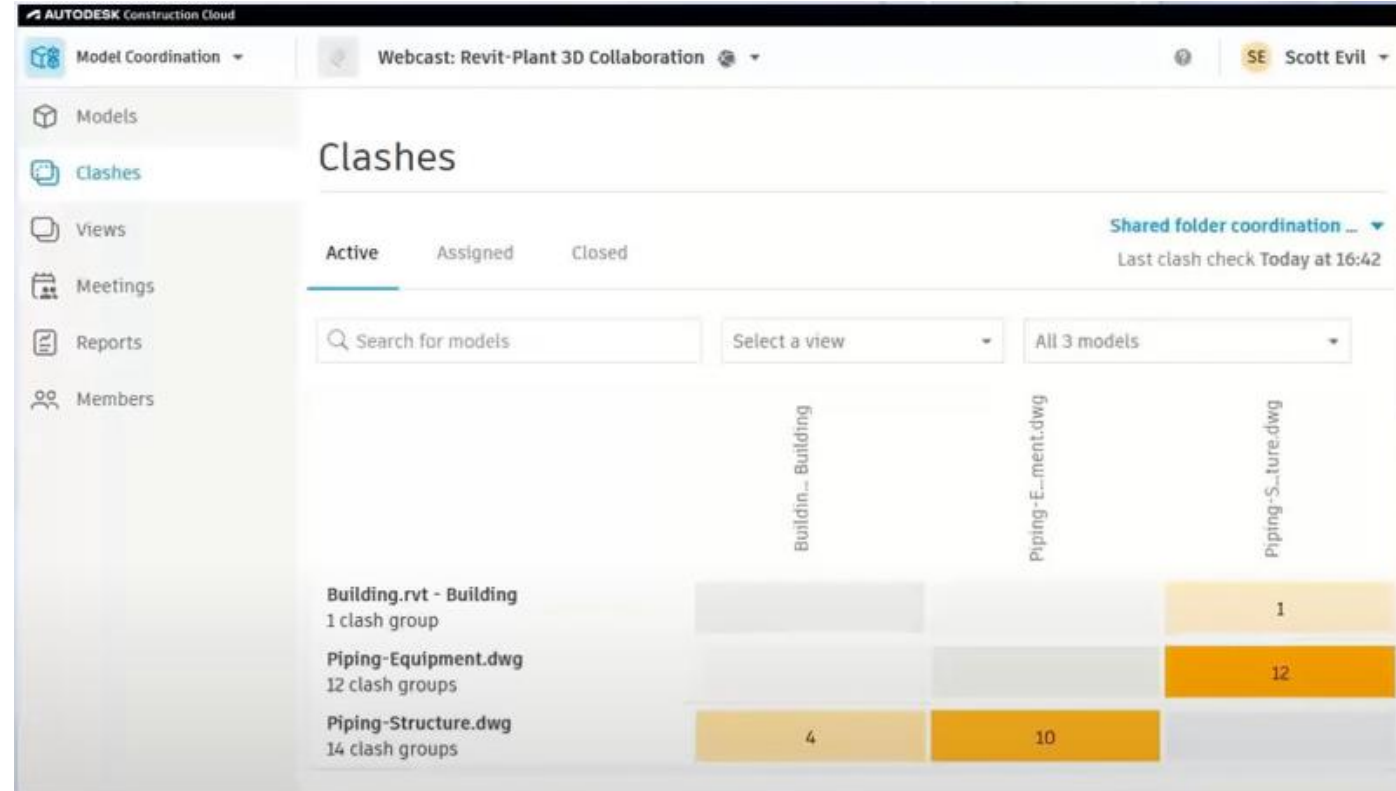
A1-VB-Structure.dwg v3

A1-VB-Equipments.dwg v3

Package has been shared with everyone in your project.

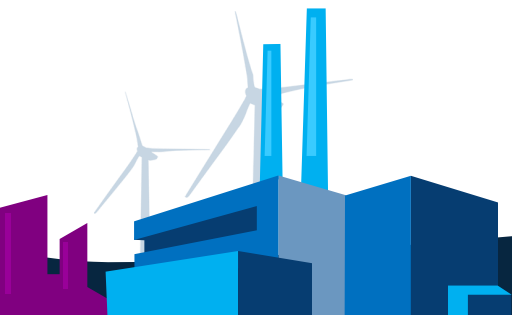
Model Coordination

- Clash detection kan udføres når model-filerne er tilføjede til Shared folder
 - Review, Create issues, assign to team members
 - Der kan laves ekstra views hvis det er nødvendigt
 - Issuen kan spores og følges fra Insight Modulet (project home page)



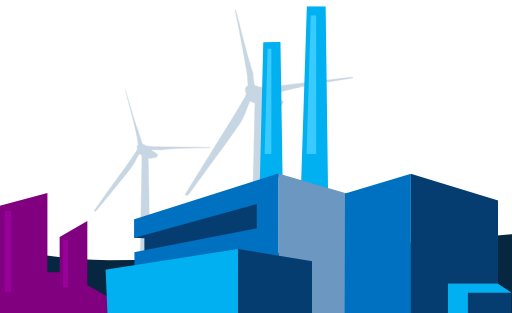
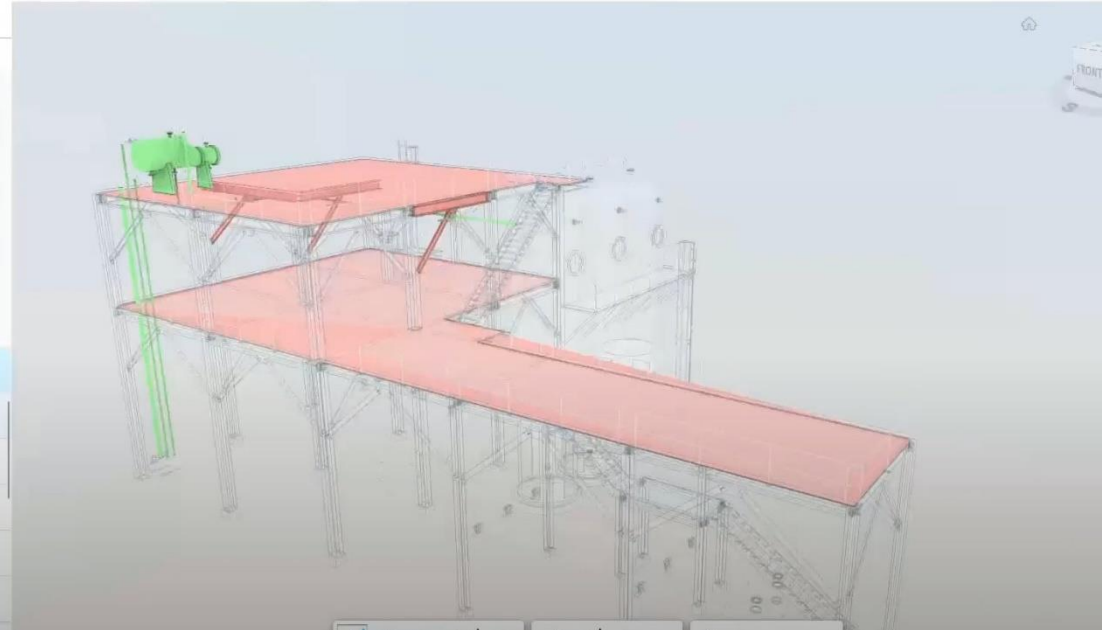
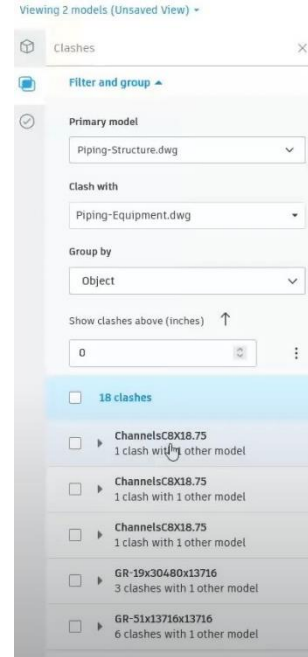
The screenshot shows the Autodesk Construction Cloud interface for Model Coordination. The left sidebar contains navigation options: Models, Clashes, Views, Meetings, Reports, and Members. The main area is titled 'Clashes' and shows a matrix of clash groups between three models: Building.rvt - Building, Piping-Equipment.dwg, and Piping-Structure.dwg. The matrix displays the number of clash groups for each pair of models.

	Building.rvt - Building	Piping-Equipment.dwg	Piping-Structure.dwg
Building.rvt - Building 1 clash group			1
Piping-Equipment.dwg 12 clash groups			12
Piping-Structure.dwg 14 clash groups	4	10	



Model Coordination

- Clash detection kan udføres når model-filerne er tilføjede til Shared folder
 - Review, Create issues, assign to team members
 - Der kan laves ekstra views hvis det er nødvendigt
 - Issuen kan spores og følges fra Insight Modulet (project home page)



Filer

Mapper

Opbevaringsområde

🗑 Slettede elementer

⚙ Indstillinger ▾

✓ 📁 Projektfiler

✓ 📁 Model Exchange Folder

✓ 📁 From AutoCAD Plant 3D

✓ 📁 Plant 3D Models

📁 Equipment

📁 Piping

📁 Steel

📁 From Revit

> 📁 P3D Demo

📁 Revit project

🔄 Overfør filer

📄 Eksportér ▾

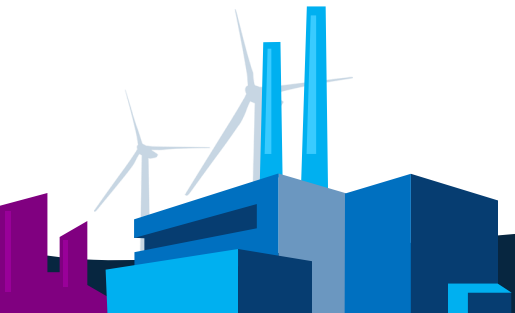
🔍 Søg og filtrer

🗃 ☰

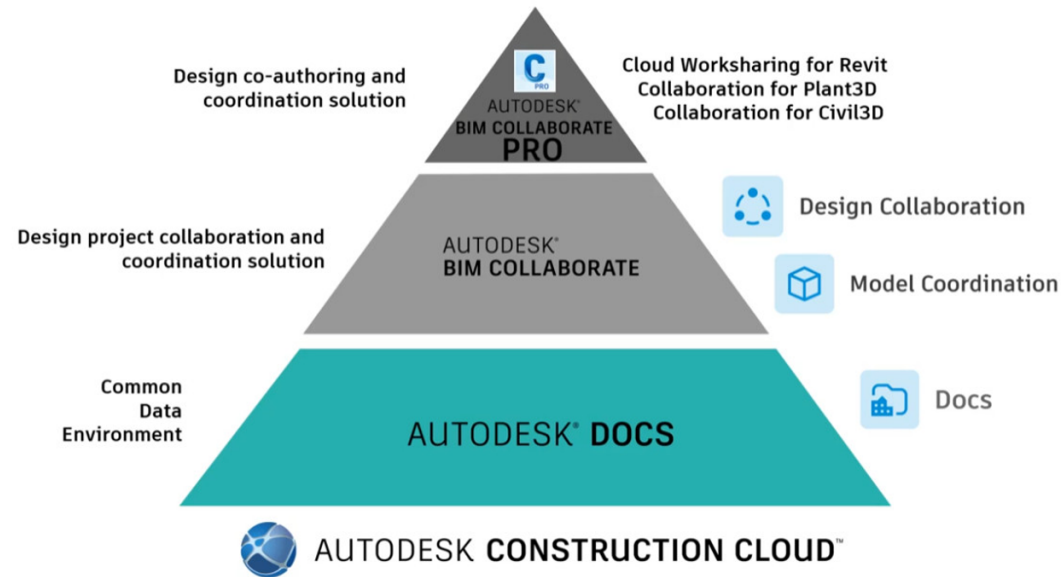
<input type="checkbox"/>	Navn	Beskrivelse	Version	Indikatorer	Markering	Størrelse	Senest opdateret	↓	Opdateret af	⚙
<input type="checkbox"/>	📁 From Revit	--	--		--	--	30. okt. 2023 17:41		👤 Per Damsgaard	⋮
<input type="checkbox"/>	📁 From AutoCAD Plant 3D	--	--		--	--	29. sept. 2023 13:57		👤 Per Damsgaard	⋮

AutoCAD Plant 3D – PID & Revit

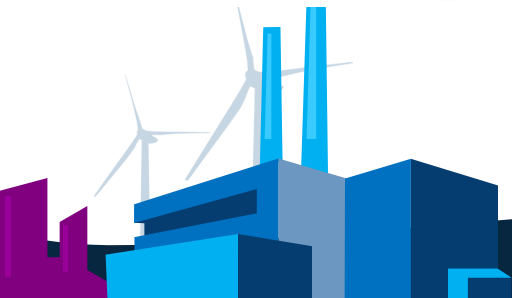
- **P&ID Modeler for Revit** sikrer sammenhæng mellem P&ID-tegningen og Revit-modellen.
- Brug P&ID Modeler til Revit til at:
 - Giver overblik over P&ID tegninger – inkl data, direkte i Revits brugerflade.
 - Valider overensstemmelse mellem P&ID tegningen og 3D-modellen.
- P&ID Modeler til Revit er beregnet til at erstatte den manuelle arbejdsgang med at skabe en 3D-model med udgangspunkt i en en printet P&ID-tegning.
Bruges til at skabe en 3D-(rør)model direkte fra en P3D P&ID.



AutoCAD Plant 3D – PID & Revit



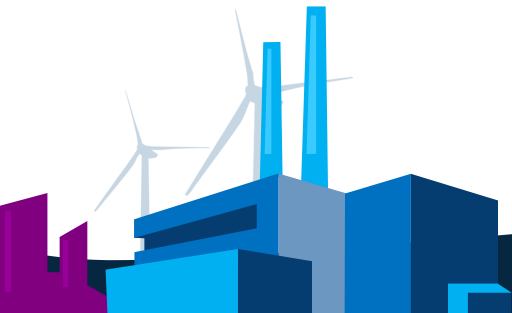
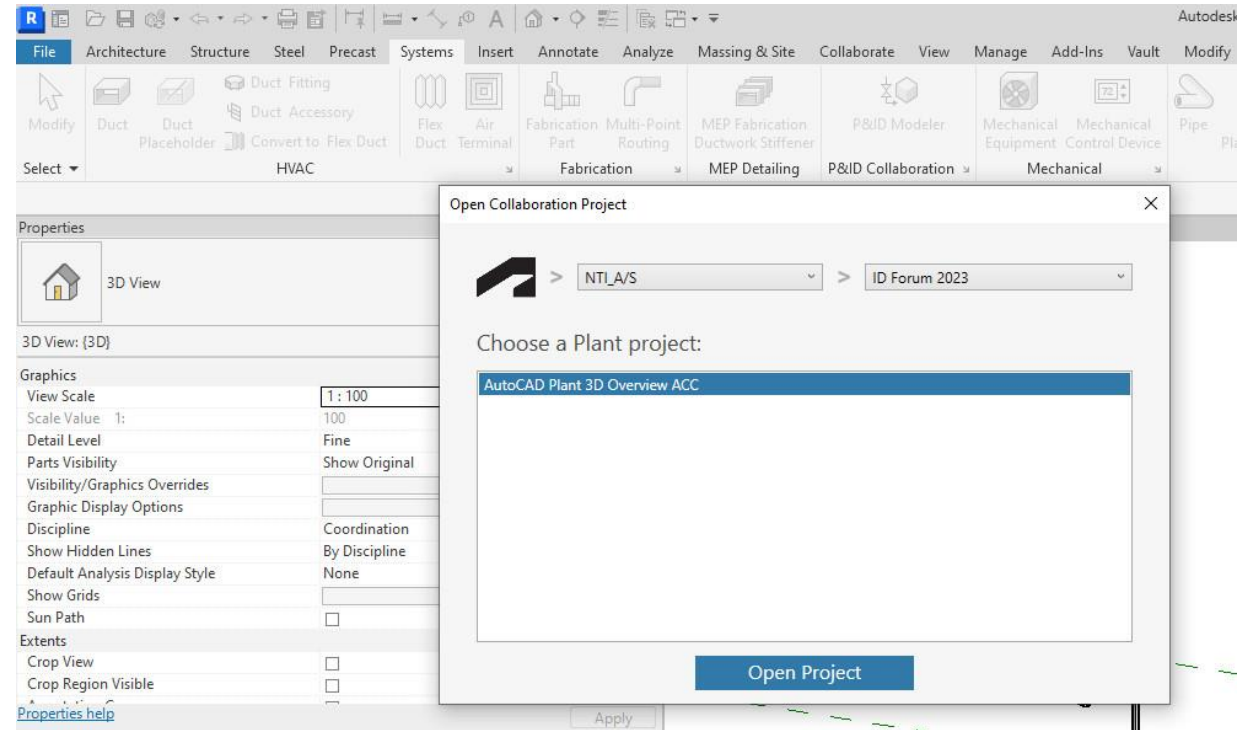
- Kræver ACC
- AutoCAD Plant 3D benyttes til at skabe P&ID
- Plant 3D projektet skal være i ACC - Det kræver en BIM Collaborate PRO licens



Workflow

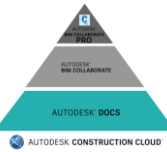
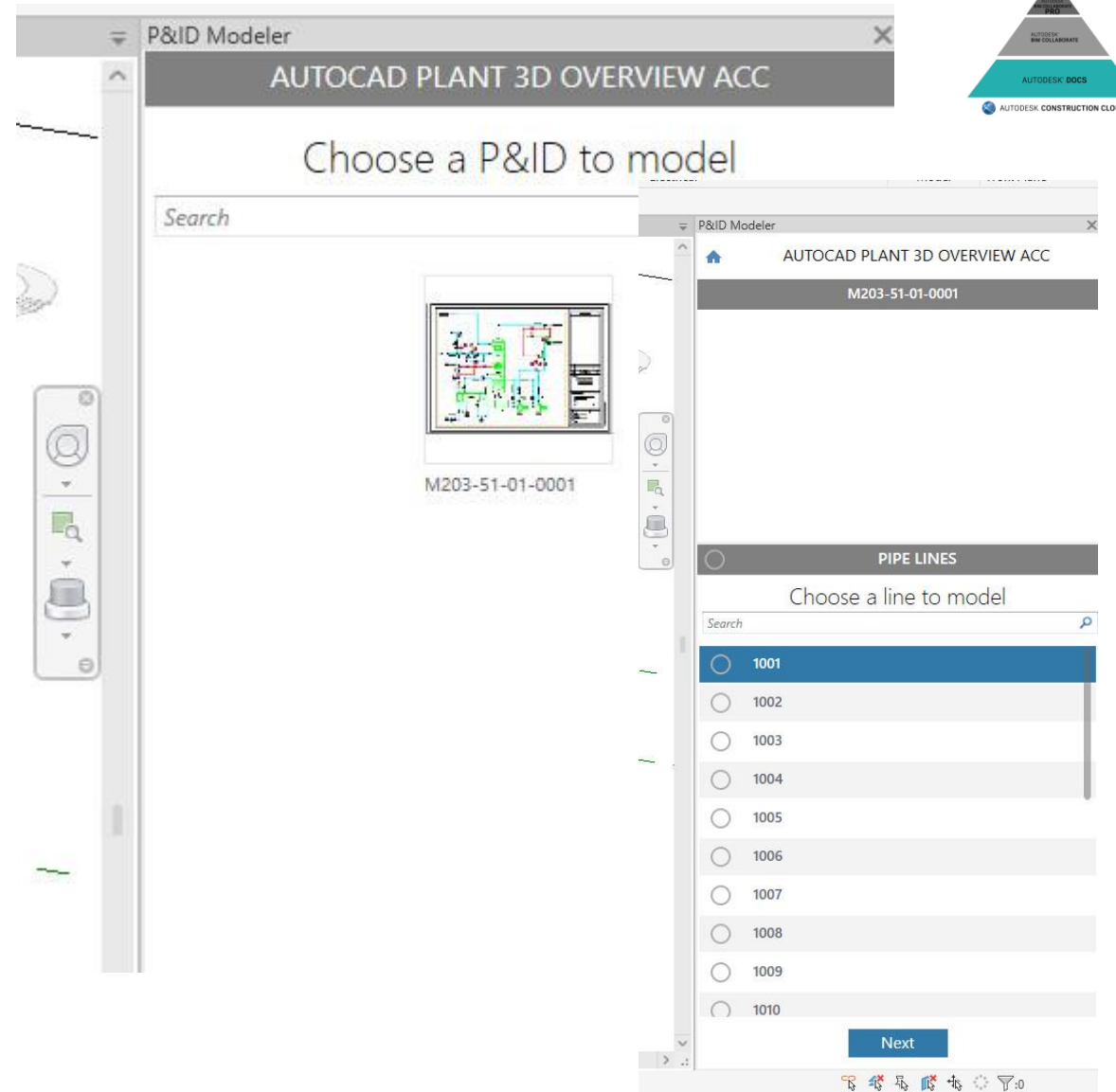


- I Revit benyttes funktionen P&ID Modeler
- Projektet med P&ID åbnes og PID tegningerne vises.



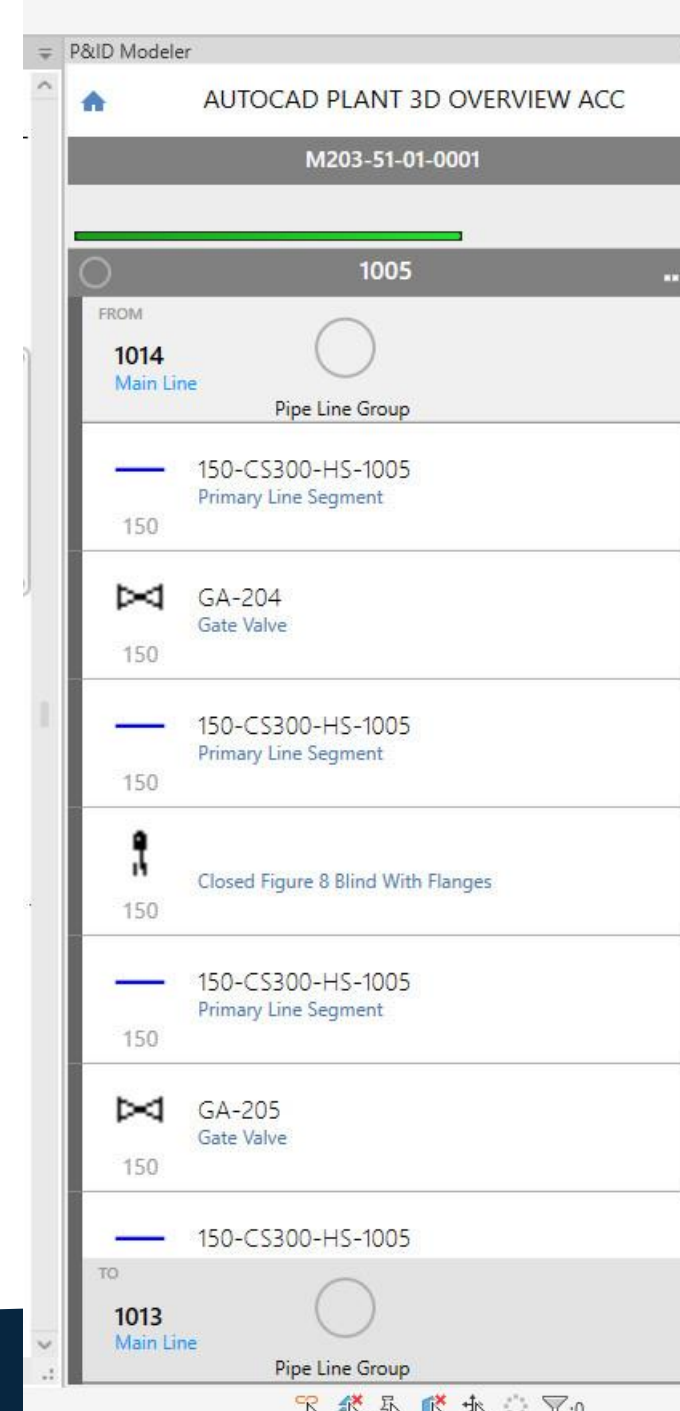
Workflow

- I Revit benyttes funktionen P&ID Modeler
- Projektet med P&ID åbnes og PID tegningerne vises.
- Når en tegning vælges fremkommer en liste med alle proces-linjerne.
- Når en proces-linje vælges kommer alle del-elementerne i listen.



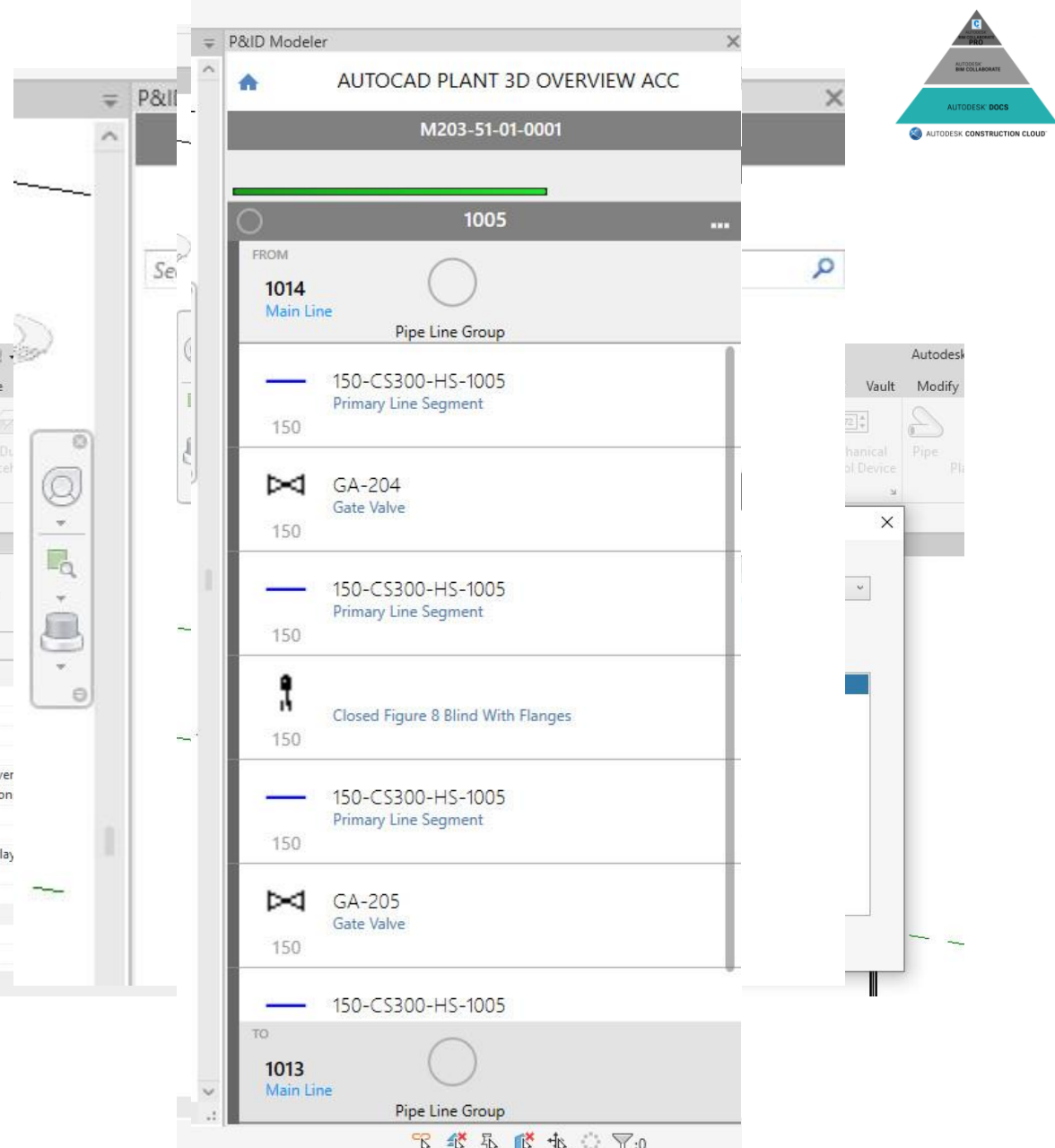
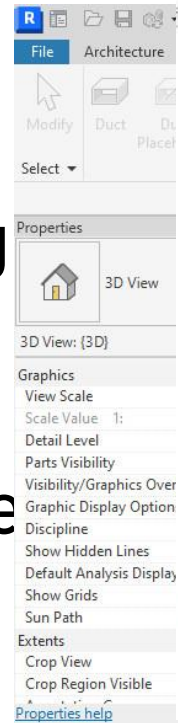
Workflow

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Workflow

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AutoCAD Plant 3D – PID & Revit

■ Opsætning

P&ID Modeler Settings

Systems Type

Object Mapping

Property Mapping

For each P&ID Service, specify a Revit System Type.

P&ID Service	System Type
AV (ATMOSPHERIC VENT)	
BA (BREATHING AIR)	
BD (BLOWDOWN)	
BFW (BOILED FEED WATER)	
BRR (BRINE RETURN)	
BRS (BRINE SUPPLY)	
CC (CONTAMINABLE CONDENSATE)	
CF (COLD FLARE)	
CHS (CHEMICAL SEWER)	
CV (COLD VENT)	
CWR (COOLING WATER RETURN)	
CWS (COOLING WATER SUPPLY)	CWS - COOLING WATER SUPPLY
DMW (DEMINERALIZED WATER)	
DR (DRAIN)	
DS (DILUTION STEAM)	
DW (DRINKING WATER)	
ER (ETHYLENE REFRIGERANT)	CWS - COOLING WATER SUPPLY
FF (FLUSHING FLUID)	
FG (FUEL GAS)	
FO (FUEL OIL)	
FW (FIRE WATER)	
GLR (GLYCOL RETURN)	
GLS (GLYCOL SUPPLY)	
H (HYDROGEN)	
HC (HIGH PRESSURE STEAM)	

How do I map P&ID content with Revit family content?

OK Cancel

P&ID Modeler Settings

Systems Type

Object Mapping

Property Mapping

Pipe Pipe Accessories Equipment

For each P&ID Class Name, specify a Revit Family.

P&ID Class Name	Revit Family
Detonation Safeguard Pipelines	
Diaphragm Valve	
Diverter Valve	
Excess Flow Valve	
Flashback Arrestor	
Flow Limiter With Orifice Plate	
Four Way Valve	
Freezing Section	
Gate Valve	Gate Valve - 2-12 Inch
Gate Valve Pprogressive Adjustment	
General Cooling Trap	
General Sound Absorber	
General Valve	
General Vapour Trap	
Generic Rotary Valve	
Globe Valve	
Hose Clamp	
Inspection Glass	
Knife Valve	
Lift Check Valve	
Louver Damper	
Mixing Section	

How do I map P&ID content with Revit family content?

OK Cancel

P&ID Modeler Settings

Systems Type

Object Mapping

Property Mapping

To display P&ID properties in Revit, for each P&ID Property, specify a Revit Property.

P&ID Property	Revit Property
Equipment	
Tag	
Pipe Accessories	
Tag	

How do I map P&ID content with Revit family content?

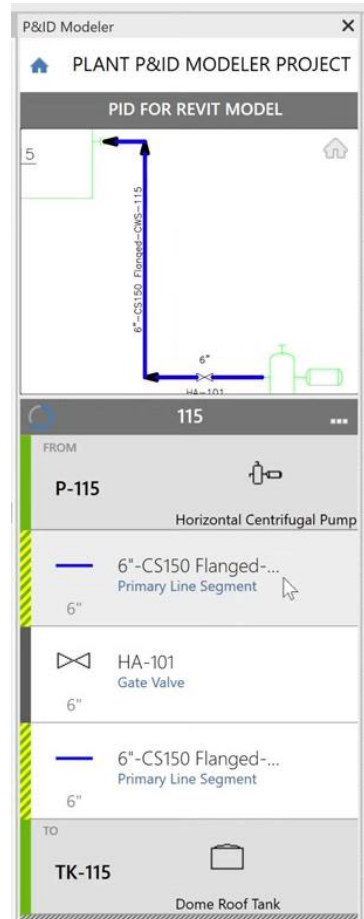
OK Cancel



AutoCAD Plant 3D – PID & Revit

■ Pro

- AutoCAD Plant 3D er udviklet til arbejde med P&ID Diagrammer med tilhørende data / lister mm.
- Fint visuel feed-back i Revit vedr. status
- En samlet model i Revit.



■ Con

- Stort arbejde vedr. komponenter (familier) og mapning af properties.
- Komponenter kan indsættes flere gange.
- Der er lidt knas med tilslutninger, pakninger, bolte mm.
- Ingen ISOmetri tegninger.

