

P&ID부터 3D 기계 설계와 클라우드 협업까지 한번에!

SCK Autodesk 설계 혁신 웨비나



이경미 부장 SCK

- SCK Autodesk AEC 엔지니어
- 前 포스코 엔지니어링 화공
BIM Manager

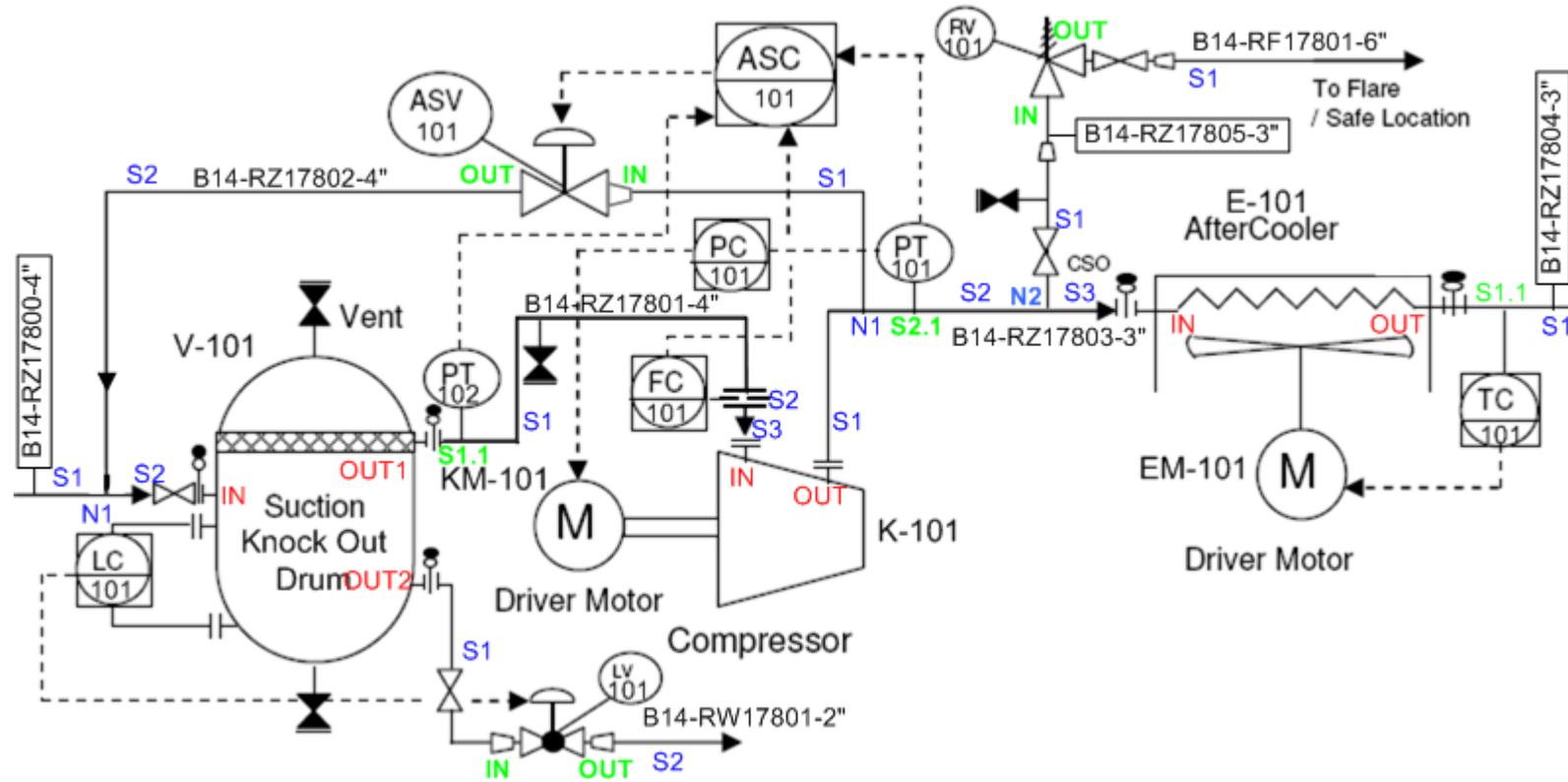


이승열 차장 SCK

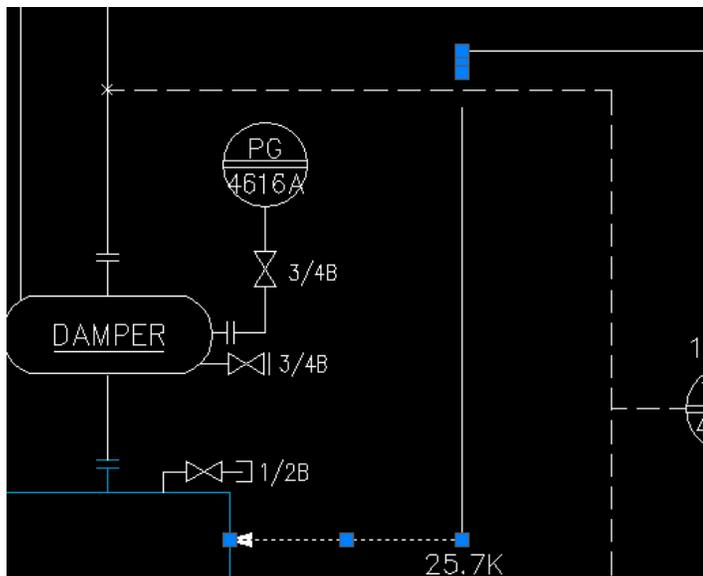
- SCK Autodesk D&M 엔지니어



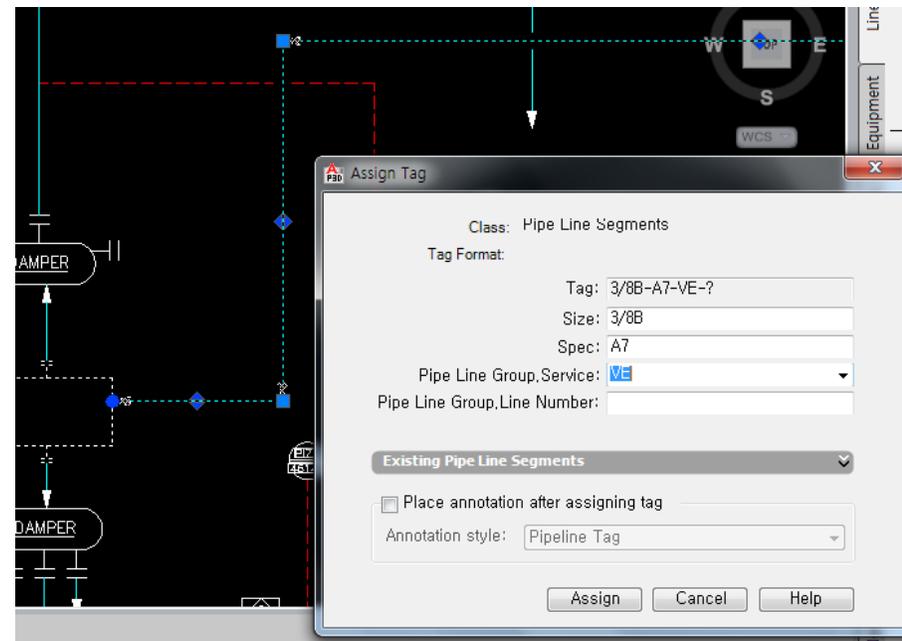
P&ID (Piping and Instrumentation Diagram)



CAD P&ID vs Intelligent P&ID | 배관 라인의 비교

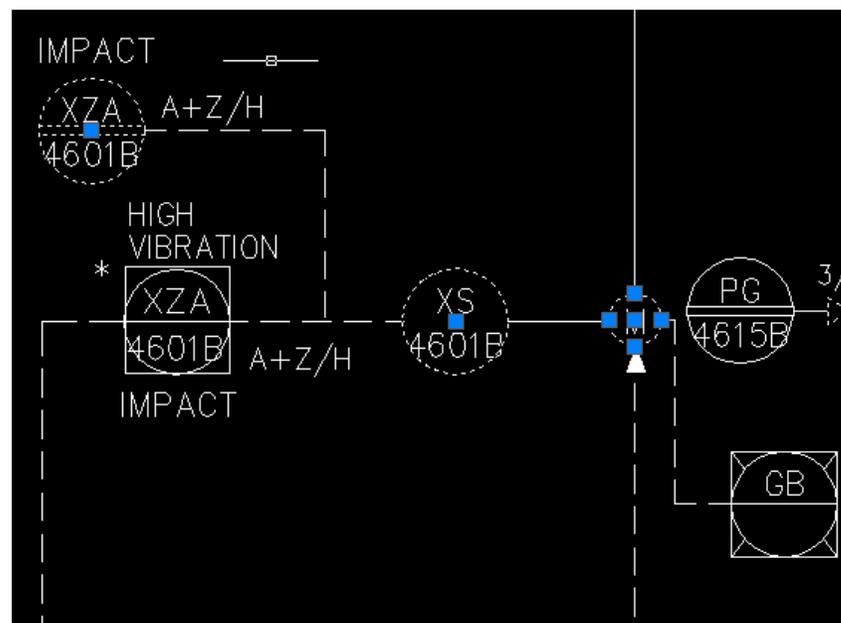


CAD P&ID

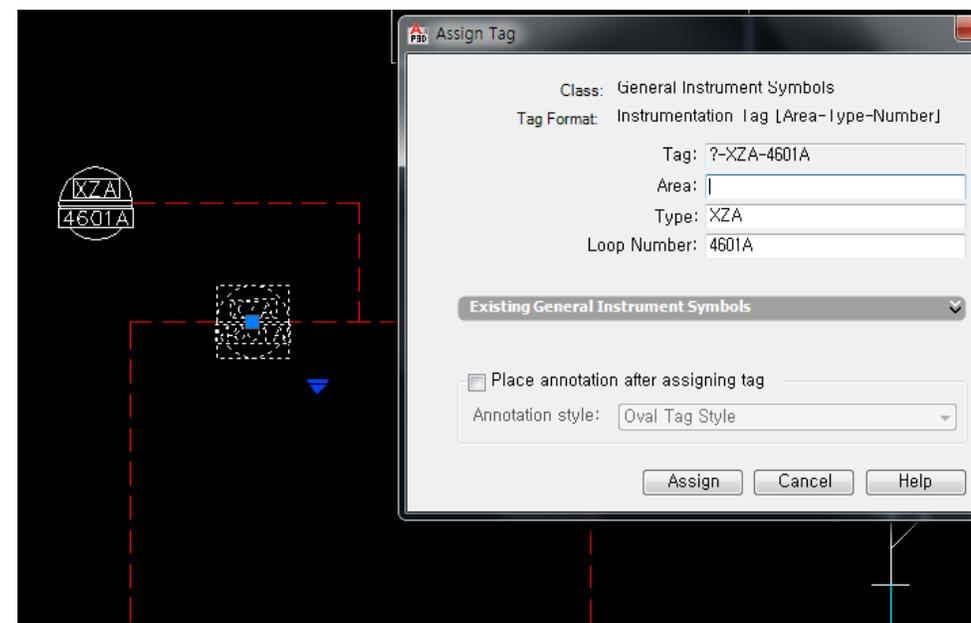


Intelligent P&ID

CAD P&ID vs Intelligent P&ID | 계장 심볼의 비교

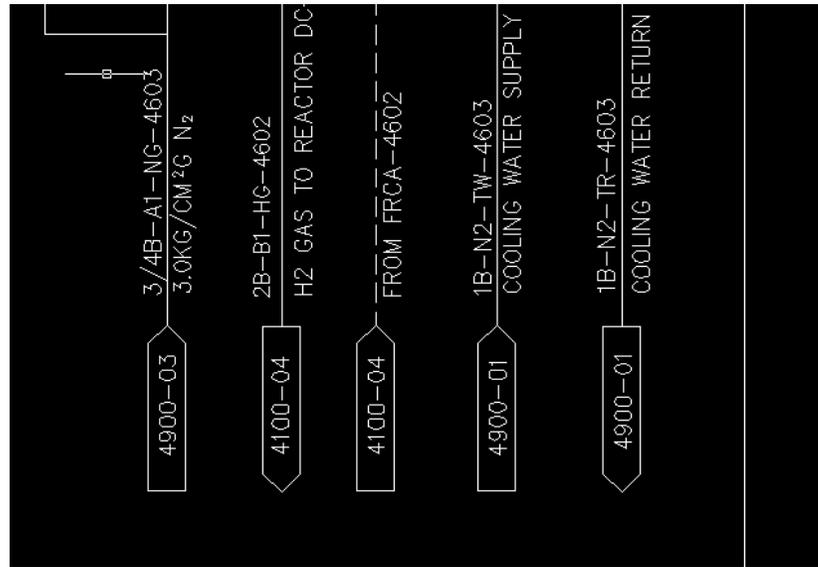


CAD P&ID

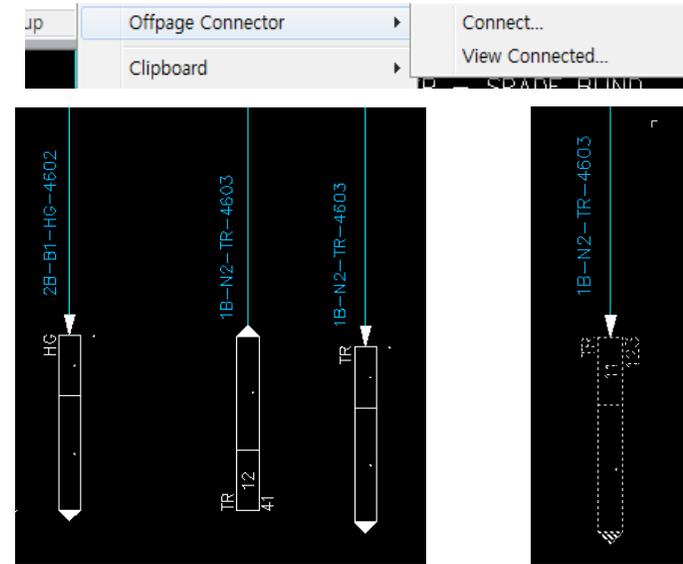


Intelligent P&ID

CAD P&ID vs Intelligent P&ID | OPC 비교 (Off-Page Connector)



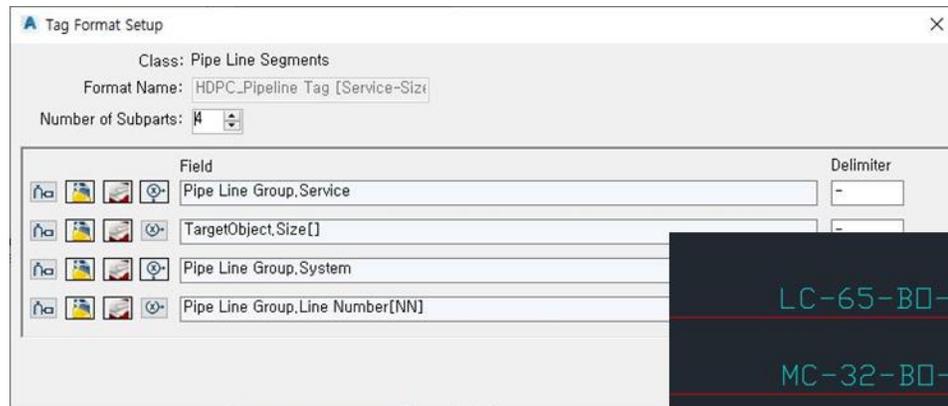
CAD P&ID



Intelligent P&ID

왜 AutoCAD Plant 이어야 할까?

고유 객체 Tag 지정을 통한 객체관리 실현



LC-65-B0-01

MC-32-B0-01

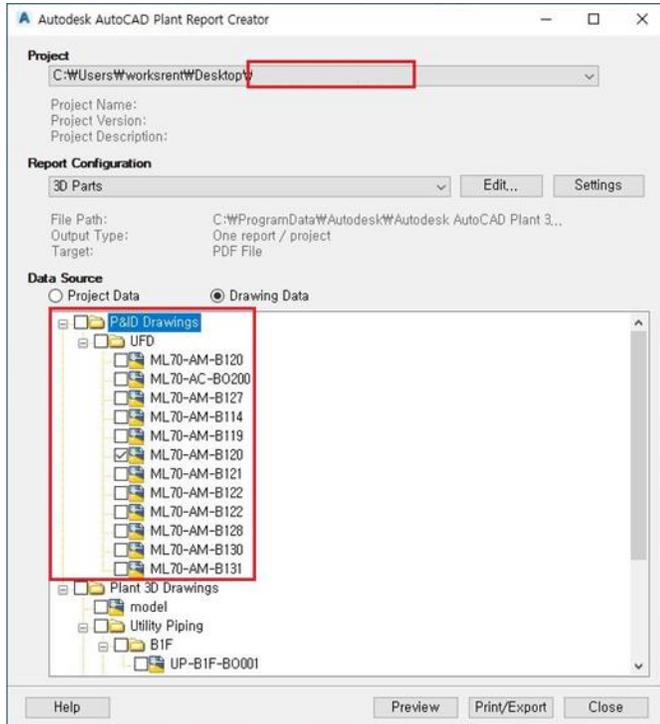
HC-50-B0-01

LC-25-B0-02

LC-25-B0-03

왜 AutoCAD Plant 이어야 할까?

Report 모듈을 활용한 Output 산출



Linelist

Project:

| Tag | From | To |
|-------------|------------------|------------------|
| CW-15-BO-02 | CONCENTRIC REDUC | CONCENTRIC REDUC |
| CW-15-BO-02 | CONCENTRIC REDUC | CONCENTRIC REDUC |
| CW-20-BO-01 | CONCENTRIC REDUC | CONCENTRIC REDUC |
| CW-25-BO-01 | CONCENTRIC REDUC | TK-202 |
| CW-25-BO-01 | CW-50-BO-01 | CONCENTRIC REDUC |
| CW-25-BO-01 | CW-25-BO-01 | CW-25-BO-01 |
| CW-25-BO-01 | CW-25-BO-01 | CW-25-BO-01 |
| CW-25-BO-01 | CW-25-BO-01 | CW-25-BO-01 |
| CW-25-BO-01 | CW-25-BO-01 | SE-201 |
| CW-25-BO-01 | CW-25-BO-01 | SE-202 |
| CW-25-BO-02 | CONCENTRIC REDUC | CONCENTRIC REDUC |
| CW-25-BO-02 | CONCENTRIC REDUC | TK-203 |
| CW-25-BO-02 | CW-25-BO-02 | CW-25-BO-02 |
| CW-25-BO-02 | CW-25-BO-02 | CW-25-BO-02 |
| CW-25-BO-02 | CW-25-BO-02 | CW-25-BO-02 |
| CW-25-BO-02 | CW-25-BO-02 | CONCENTRIC REDUC |
| CW-25-BO-02 | CW-50-BO-01 | CW-25-BO-02 |
| CW-32-BO-01 | CW-40-BO-01 | CAP |
| CW-32-BO-01 | CW-32-BO-01 | CW-32-BO-01 |
| CW-32-BO-02 | CONCENTRIC REDUC | B-201B |
| CW-32-BO-02 | CW-32-BO-02 | CONCENTRIC REDUC |
| CW-32-BO-02 | CW-40-BO-01 | CAP |
| CW-32-BO-02 | CW-32-BO-02 | CW-32-BO-02 |
| CW-32-BO-03 | CW-32-BO-03 | CW-32-BO-03 |
| CW-32-BO-03 | CW-32-BO-03 | CONCENTRIC REDUC |
| CW-32-BO-03 | CONCENTRIC REDUC | B-201C |
| CW-32-BO-03 | CW-40-BO-01 | CAP |
| CW-32-BO-04 | CW-32-BO-04 | CAP |
| CW-32-BO-04 | CONCENTRIC REDUC | B-203A |
| CW-32-BO-04 | CW-40-BO-02 | CONCENTRIC REDUC |
| CW-32-BO-04 | CW-32-BO-04 | CW-32-BO-04 |
| CW-32-BO-05 | CW-32-BO-05 | CW-32-BO-05 |
| CW-32-BO-05 | CONCENTRIC REDUC | B-203B |
| CW-32-BO-05 | CW-40-BO-02 | CONCENTRIC REDUC |
| CW-32-BO-05 | CW-32-BO-05 | CAP |
| CW-32-BO-06 | CW-40-BO-02 | B-202A |
| CW-32-BO-06 | CW-32-BO-06 | CW-32-BO-06 |

Bill of Material

Autodesk

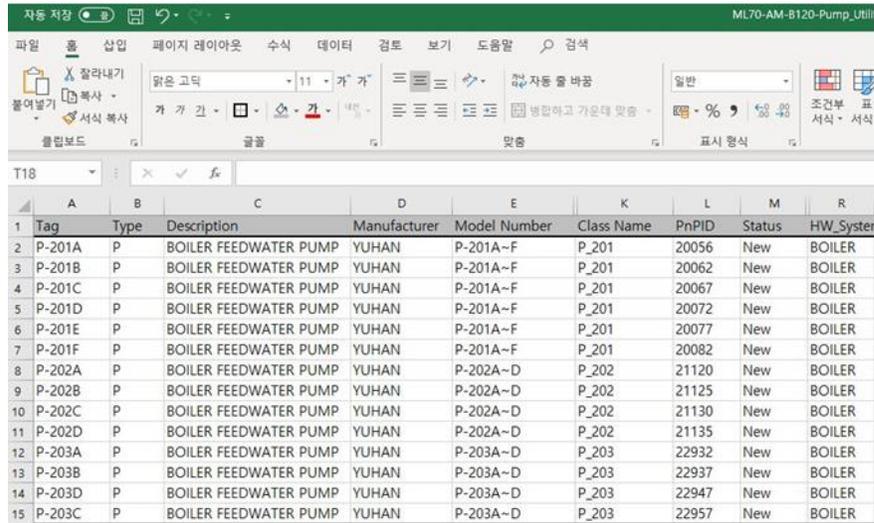
Project:

Note: Fixed-length pipes are not included in pipes.

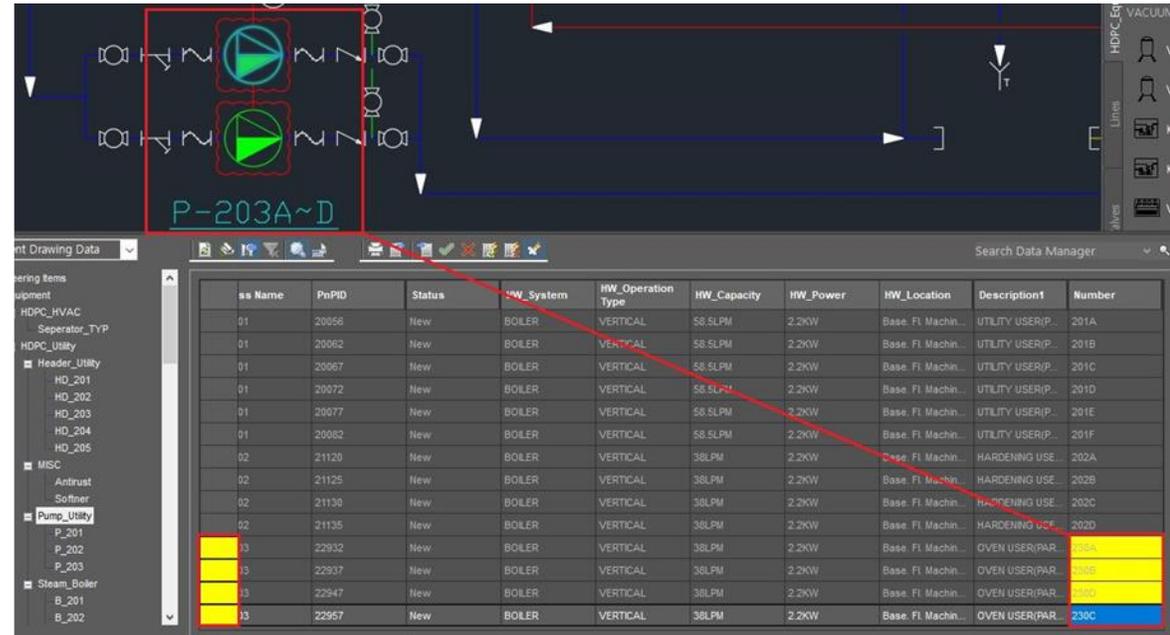
| Quantity | Unit | Description | ND | Standard | Schedule | Material | PN | Angle |
|--|------|---|-------|------------|----------|----------|-----|-------|
| Type: PIPE | | | | | | | | |
| 5203 | mm | PIPE, 65 ND, PL | 65 mm | JIS G 3452 | | | | |
| Type: BEND 90 LONG | | | | | | | | |
| 2 | | BEND 90 LONG, 65 ND, BV | 65 mm | JIS B 2311 | | | | |
| Type: FLANGE SO | | | | | | | | |
| 4 | | FLANGE SO, RF, 150 LB, JPI 7S 15 | 65 mm | JPI 7S 15 | | | 150 | |
| Type: BOLT SET | | | | | | | | |
| 4 | | MACHINE BOLT M16 X 90 LG, DIN 976 W/1 HEX. NUT M16, DIN 934, 2 WASHE | 65 mm | | | | 150 | |
| Type: GASKET, NONMETALLIC, FLAT, RING | | | | | | | | |
| 4 | | GASKET, NONMETALLIC, FLAT, RING, DN 65, 1.5 MM THK, 10K, RF, JIS B 2404 | 65 mm | JIS B 2404 | | | 150 | |
| Type: SlipOn | | | | | | | | |
| 4 | | SlipOn | 65 mm | | | | | |
| Type: BALL VALVE | | | | | | | | |
| 1 | | BALL VALVE, 65 ND, 150 LB, RF, JPI 7S 48, HandLever, H=155", W=400" | 65 mm | JPI 7S 48 | | | 150 | |
| Type: GLOBE VALVE | | | | | | | | |
| 1 | | GLOBE VALVE, 65 ND, 150 LB, RF, JPI 7S 46, HandWheel, H=379", W=250" | 65 mm | JPI 7S 46 | | | 150 | |

왜 AutoCAD Plant 이어야 할까?

엑셀을 활용한 P&ID 데이터 일괄 변경관리



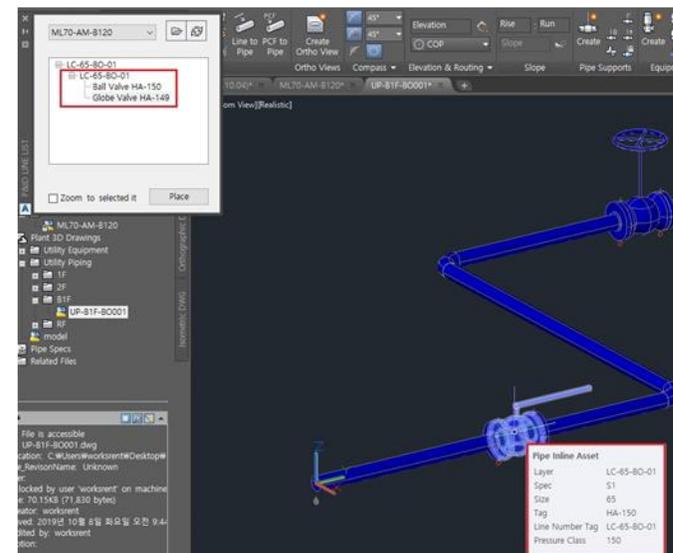
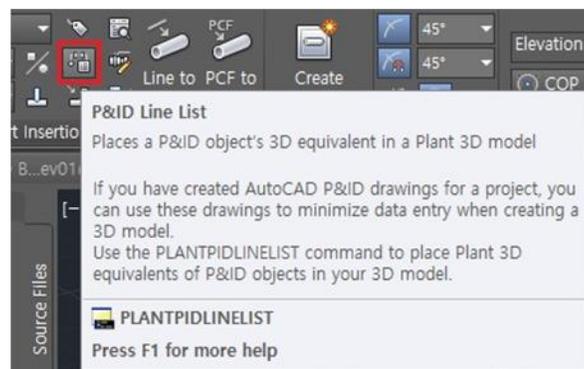
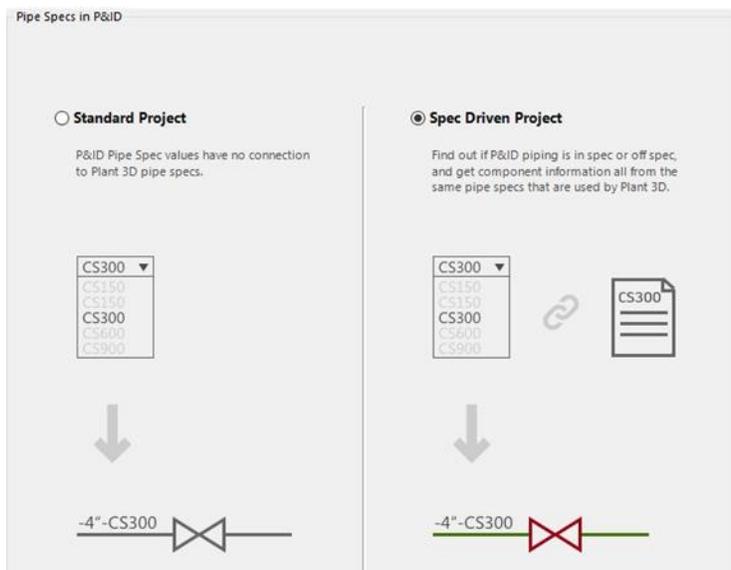
| Tag | Type | Description | Manufacturer | Model Number | Class Name | PnPID | Status | HW_System |
|--------|------|-----------------------|--------------|--------------|------------|-------|--------|-----------|
| P-201A | P | BOILER FEEDWATER PUMP | YUHAN | P-201A~F | P_201 | 20056 | New | BOILER |
| P-201B | P | BOILER FEEDWATER PUMP | YUHAN | P-201A~F | P_201 | 20062 | New | BOILER |
| P-201C | P | BOILER FEEDWATER PUMP | YUHAN | P-201A~F | P_201 | 20067 | New | BOILER |
| P-201D | P | BOILER FEEDWATER PUMP | YUHAN | P-201A~F | P_201 | 20072 | New | BOILER |
| P-201E | P | BOILER FEEDWATER PUMP | YUHAN | P-201A~F | P_201 | 20077 | New | BOILER |
| P-201F | P | BOILER FEEDWATER PUMP | YUHAN | P-201A~F | P_201 | 20082 | New | BOILER |
| P-202A | P | BOILER FEEDWATER PUMP | YUHAN | P-202A~D | P_202 | 21120 | New | BOILER |
| P-202B | P | BOILER FEEDWATER PUMP | YUHAN | P-202A~D | P_202 | 21125 | New | BOILER |
| P-202C | P | BOILER FEEDWATER PUMP | YUHAN | P-202A~D | P_202 | 21130 | New | BOILER |
| P-202D | P | BOILER FEEDWATER PUMP | YUHAN | P-202A~D | P_202 | 21135 | New | BOILER |
| P-203A | P | BOILER FEEDWATER PUMP | YUHAN | P-203A~D | P_203 | 22932 | New | BOILER |
| P-203B | P | BOILER FEEDWATER PUMP | YUHAN | P-203A~D | P_203 | 22937 | New | BOILER |
| P-203D | P | BOILER FEEDWATER PUMP | YUHAN | P-203A~D | P_203 | 22947 | New | BOILER |
| P-203C | P | BOILER FEEDWATER PUMP | YUHAN | P-203A~D | P_203 | 22957 | New | BOILER |



| Asset Name | PnPID | Status | HW_System | HW_Operation Type | HW_Capacity | HW_Power | HW_Location | Description1 | Number |
|------------|-------|--------|-----------|-------------------|-------------|----------|---------------------|-------------------|--------|
| 01 | 20056 | New | BOILER | VERTICAL | 58.5LPM | 2.2KW | Base. Fl. Machin... | UTILITY USER(P... | 201A |
| 01 | 20062 | New | BOILER | VERTICAL | 58.5LPM | 2.2KW | Base. Fl. Machin... | UTILITY USER(P... | 201B |
| 01 | 20067 | New | BOILER | VERTICAL | 58.5LPM | 2.2KW | Base. Fl. Machin... | UTILITY USER(P... | 201C |
| 01 | 20072 | New | BOILER | VERTICAL | 58.5LPM | 2.2KW | Base. Fl. Machin... | UTILITY USER(P... | 201D |
| 01 | 20077 | New | BOILER | VERTICAL | 58.5LPM | 2.2KW | Base. Fl. Machin... | UTILITY USER(P... | 201E |
| 01 | 20082 | New | BOILER | VERTICAL | 58.5LPM | 2.2KW | Base. Fl. Machin... | UTILITY USER(P... | 201F |
| 02 | 21120 | New | BOILER | VERTICAL | 38LPM | 2.2KW | Base. Fl. Machin... | HARDENING USE... | 202A |
| 02 | 21125 | New | BOILER | VERTICAL | 38LPM | 2.2KW | Base. Fl. Machin... | HARDENING USE... | 202B |
| 02 | 21130 | New | BOILER | VERTICAL | 38LPM | 2.2KW | Base. Fl. Machin... | HARDENING USE... | 202C |
| 02 | 21135 | New | BOILER | VERTICAL | 38LPM | 2.2KW | Base. Fl. Machin... | HARDENING USE... | 202D |
| 03 | 22932 | New | BOILER | VERTICAL | 38LPM | 2.2KW | Base. Fl. Machin... | OVEN USER/PAR... | 203A |
| 03 | 22937 | New | BOILER | VERTICAL | 38LPM | 2.2KW | Base. Fl. Machin... | OVEN USER/PAR... | 203B |
| 03 | 22947 | New | BOILER | VERTICAL | 38LPM | 2.2KW | Base. Fl. Machin... | OVEN USER/PAR... | 203D |
| 03 | 22957 | New | BOILER | VERTICAL | 38LPM | 2.2KW | Base. Fl. Machin... | OVEN USER/PAR... | 203C |

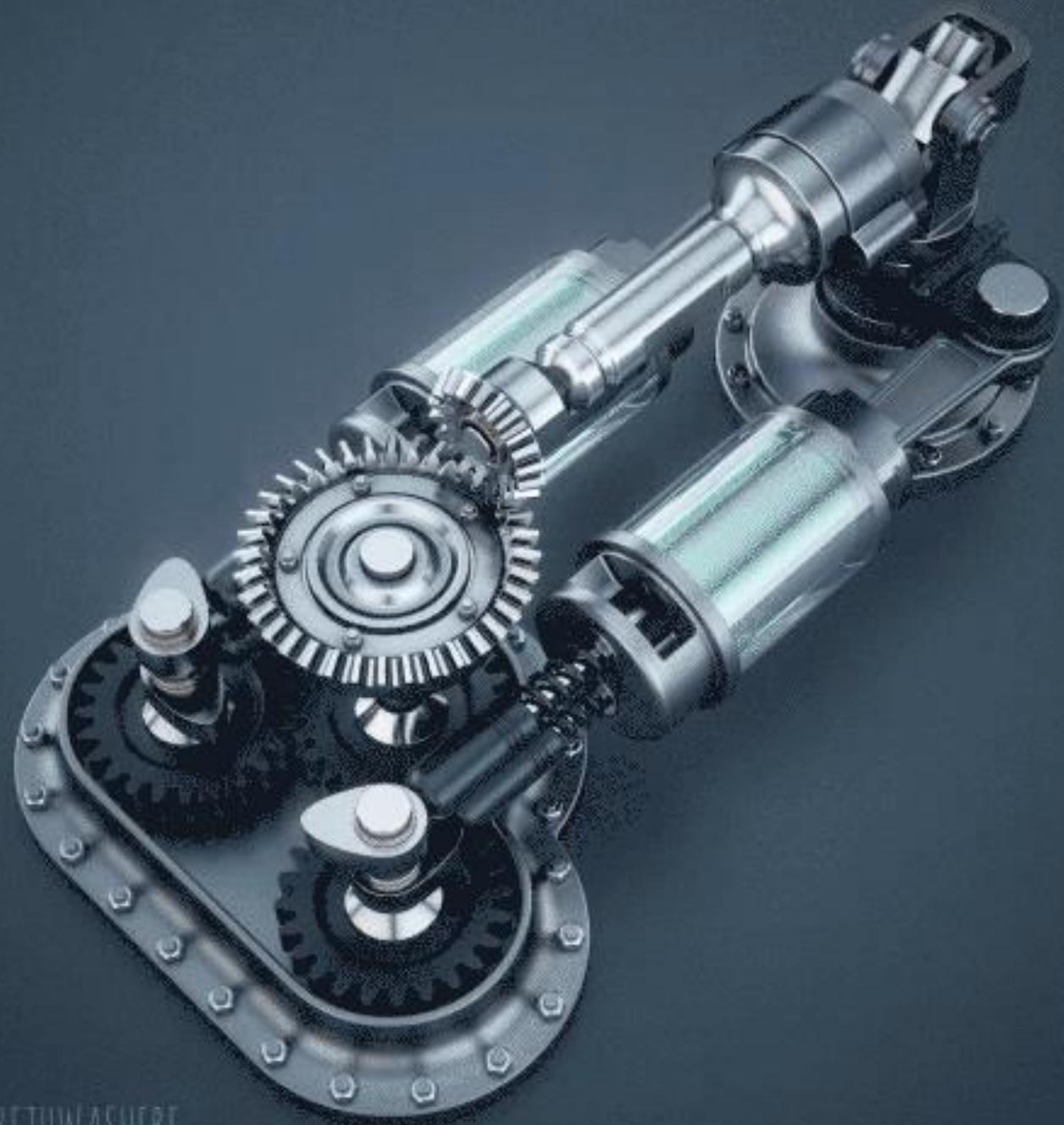
왜 AutoCAD Plant 이어야 할까?

P&ID to 3D Model 데이터 링크

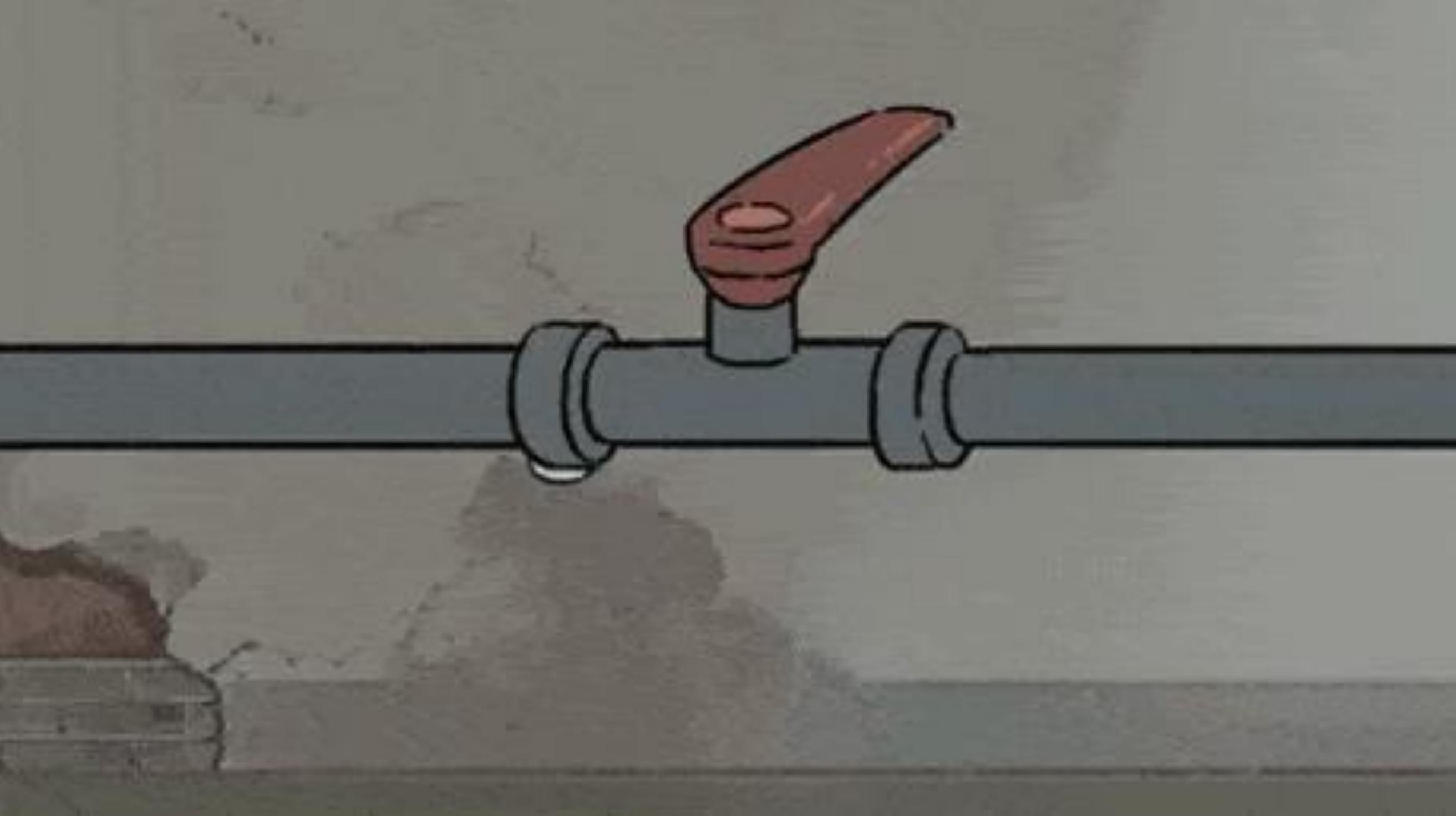


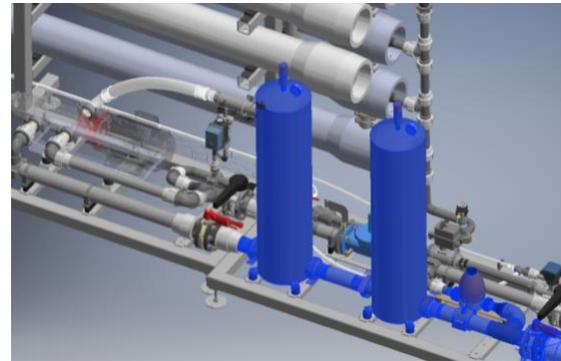
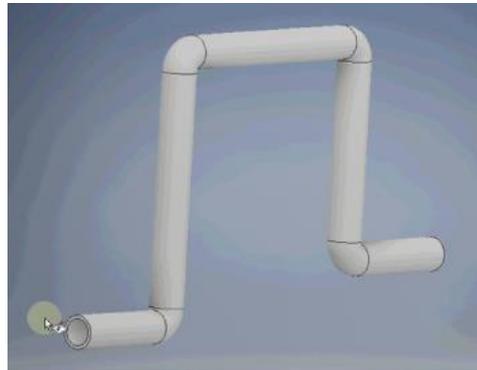
A high-quality 3D rendered image of a car's interior, showing the steering wheel, dashboard, and seats. The image is semi-transparent, allowing the text to be overlaid. The background features a geometric pattern of overlapping triangles in shades of gray and white.

기계설계 프로그램에서의 배관 모델링



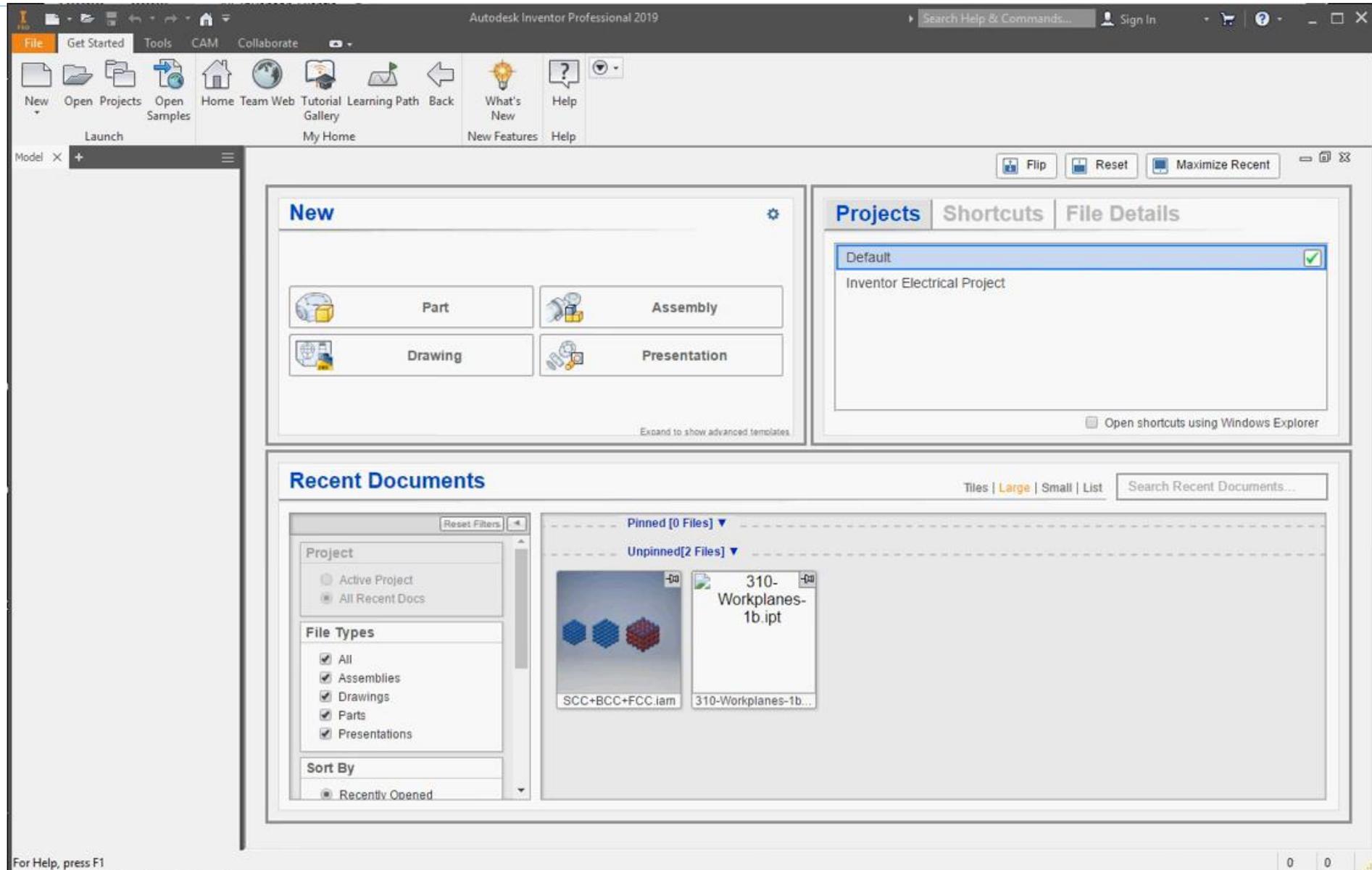
GARETH WASHBURN



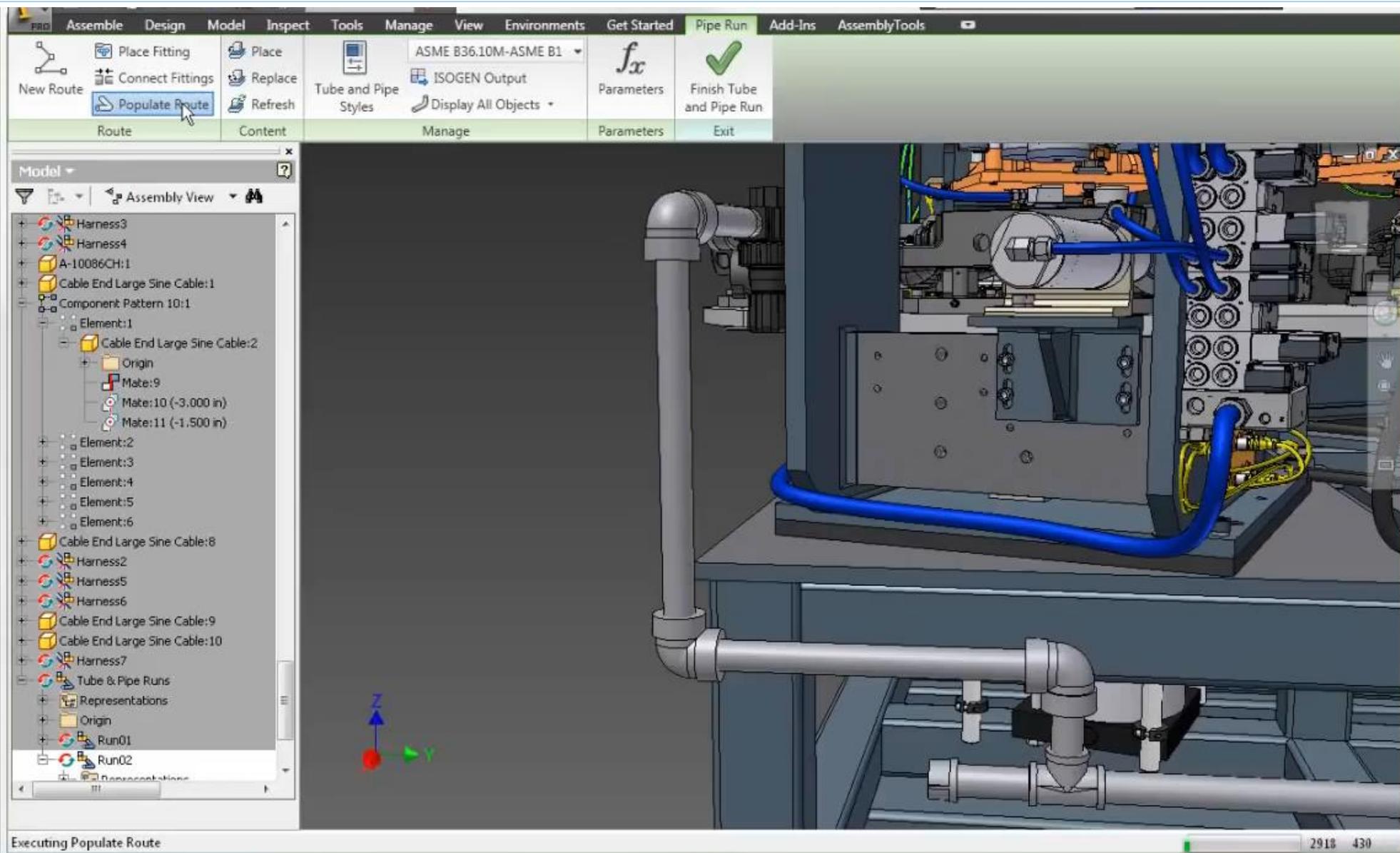


| | 기본기능 활용 | 기본기능 활용 | 기본기능 활용 | Plant 프로그램 활용 |
|---------|------------------------------------|--------------------------------------|--------------------------------|------------------------|
| 활용 프로그램 | Autodesk Inventor • Sweep 기능 활용 | Autodesk Inventor • Tube & Piping | Autodesk Inventor • i-Logic | • Autodesk Plant 3D |
| 장점 | 사용하기 쉬움 | 수정이 용이함 | 사용하기 쉬움 | P&ID, ISO 데이터가 모두 연동 됨 |
| 단점 | 수정과 편집에 많은 시간 소요 | 라이브러리 정의가 필요 | 조금의 개발(?)이 필요 | Inventor에서 데이터 활용 어려움 |

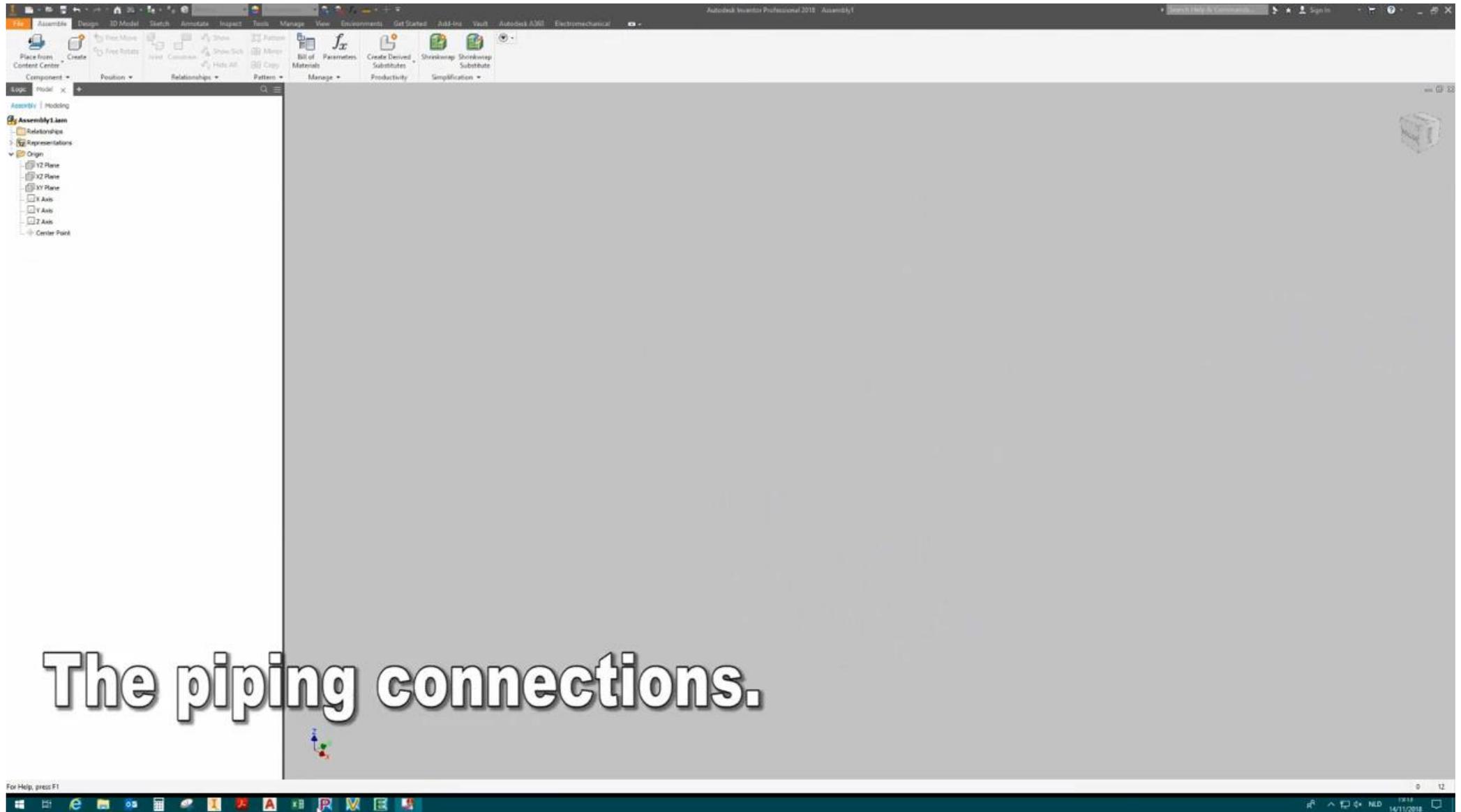
Inventor / Sweep



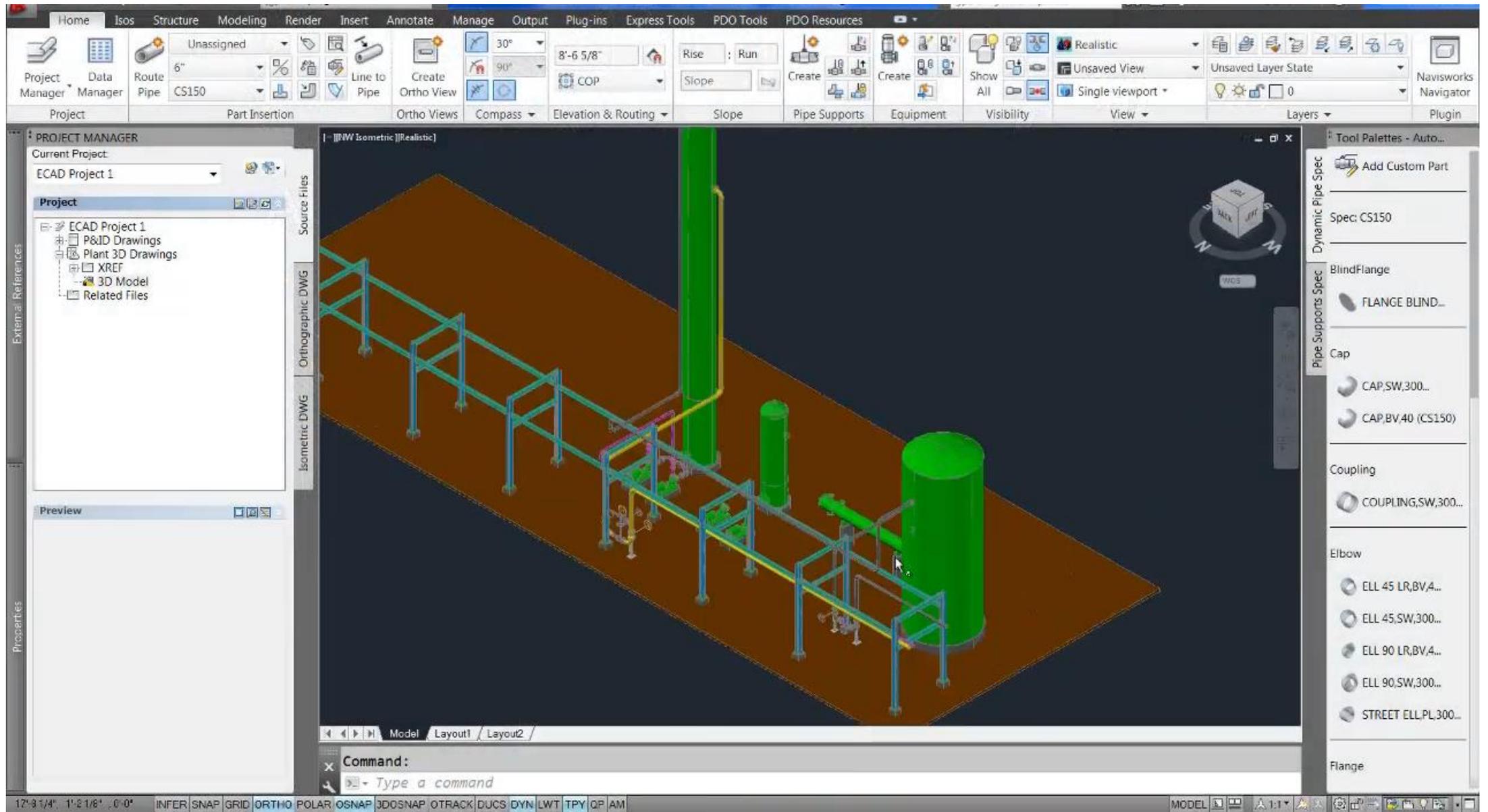
Inventor / Tube & Piping



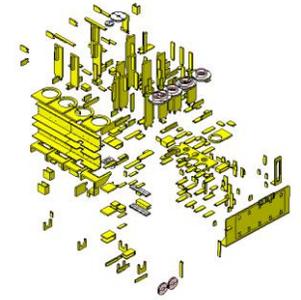
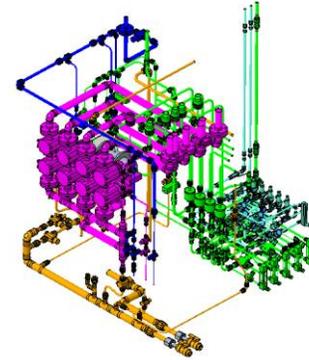
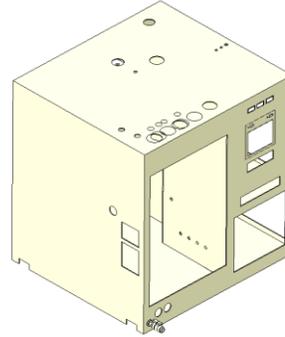
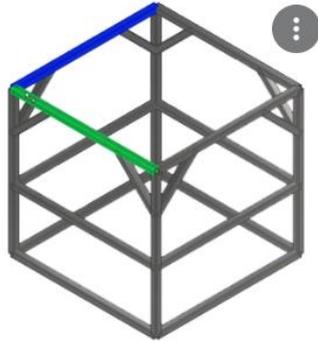
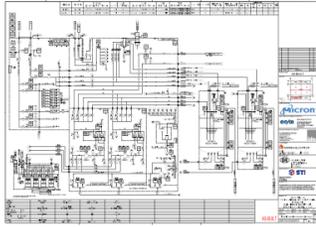
Inventor / i-Logic



AutoCAD Plant 3D / Plant 프로그램 사용



As-Is vs To-Be

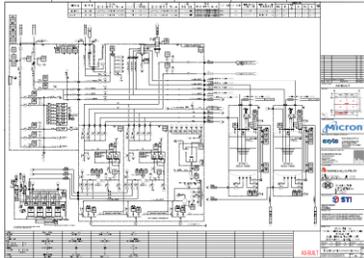


| | P & ID 작성 | Frame Model | Body Model | Piping Model | Support Model |
|--------------|--|---|---|--|---|
| 설계내용 | <ul style="list-style-type: none"> • P&ID 설계 및 Draft • 속성 데이터 입력 | <ul style="list-style-type: none"> • Frame 설계 및 모델링 | <ul style="list-style-type: none"> • Body(판재) 설계 및 모델링 • 기타 액세서리 설계 및 모델링 | <ul style="list-style-type: none"> • Piping 설계 및 모델링 | <ul style="list-style-type: none"> • Support 설계 및 모델링 |
| 설계성과품 | <ul style="list-style-type: none"> • P&ID Drawing • Part BOM | <ul style="list-style-type: none"> • 제작도면 • BOM | <ul style="list-style-type: none"> • 제작도면 • BOM | <ul style="list-style-type: none"> • ISO Drawing • BOM • 제작도면 | <ul style="list-style-type: none"> • 제작도면 (배치도 및 단품도) • BOM |
| As-Is | AutoCAD (2D CAD) | Autodesk Inventor | Autodesk Inventor | Autodesk Inventor | Autodesk Inventor |
| To-Be | AutoCAD Plant 3D (Intelligent P&ID) | | | AutoCAD Plant 3D | |

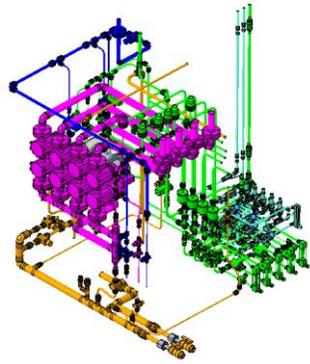
각 제품별 주요 기능 소개

| | AutoCAD Plant 3D (P&ID) | AutoCAD Plant 3D | Autodesk Inventor |
|---------------|--|---|---|
| 1. 프로그램 활용 범위 | <ul style="list-style-type: none"> • P&ID 작성 • 물량 산출 및 리포트 생성 • 캐드 블록 활용하여 라이브러리 생성 가능 • 심볼 구축되면 바로 적용가능 | <ul style="list-style-type: none"> • Piping 모델링 • ISO Drawing 생성 • BOM 산출 • Spec 및 Catalog 구축 되면 바로 모델링 적용 가능 | <ul style="list-style-type: none"> • 프레임 및 바디, 가공품 등 모델링 가능 • 제작도면 생성 가능 |
| 2. 이슈 | | <ul style="list-style-type: none"> • BODY 모델링 불가 • 가공품 모델링 불가 • 제작도면 생성 불가 | <ul style="list-style-type: none"> • AutoCAD Plant 3D 데이터를 직접 가져올 수 없음 |
| 3. 해결 방안 | | | <ul style="list-style-type: none"> • 별도 3rd party를 이용하여 Plant 3D 데이터를 Load 할 수 있음 |

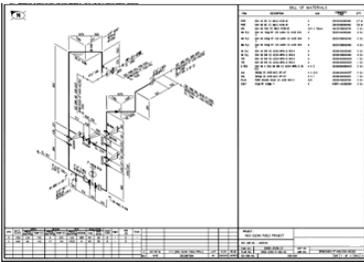
AutoCAD Plant3D



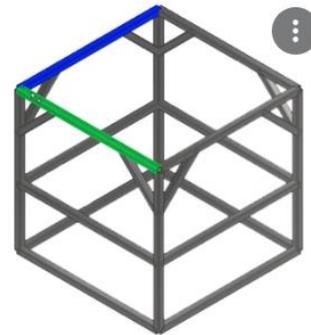
P&ID



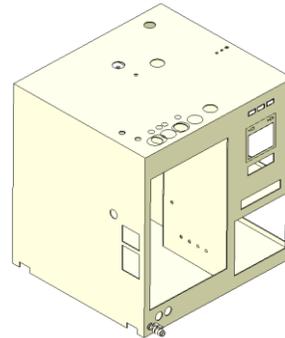
Piping



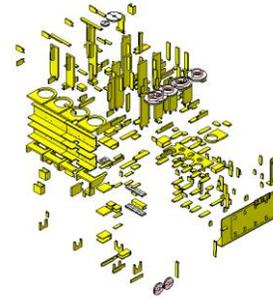
ISO / BOM



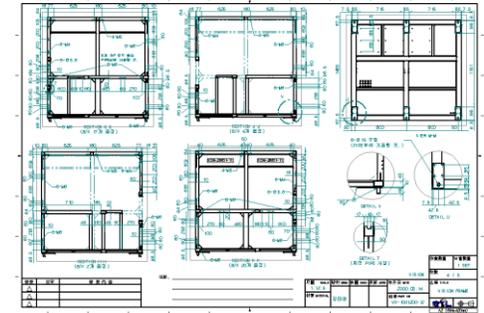
Frame



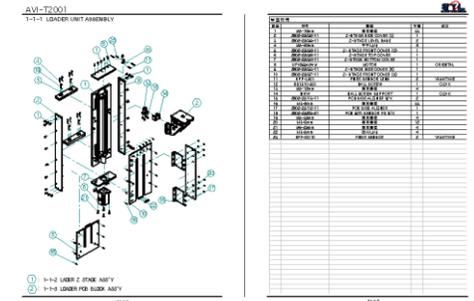
Body



Support



Production DWG

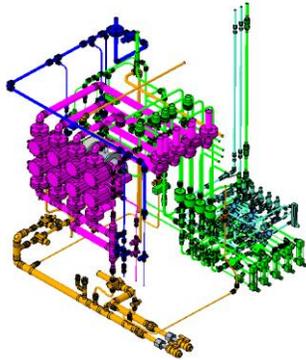
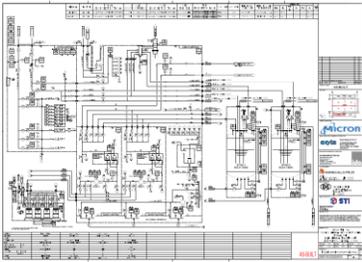


BOM

Inventor

Plant3D – [BIMDeX] - Inventor

AutoCAD Plant3D

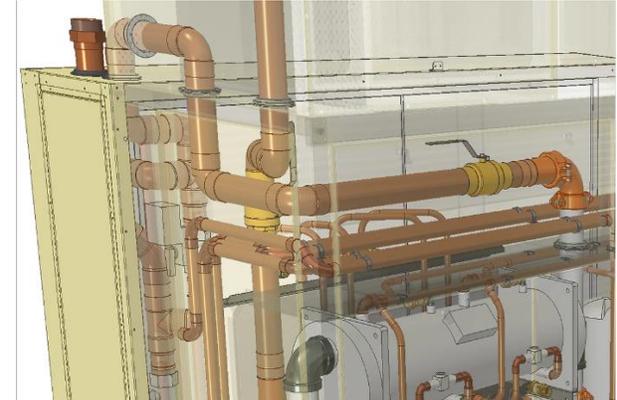


- P&ID Drawing
- Piping Model
- ISO Drawing
- Equipment Model

- Plant 3D – Inventor
데이터 변환(*.BXF)



Inventor



- Frame, Body Model
- Plant 3D data Import (*.BXF)
- Support Model
- BIM Exchange

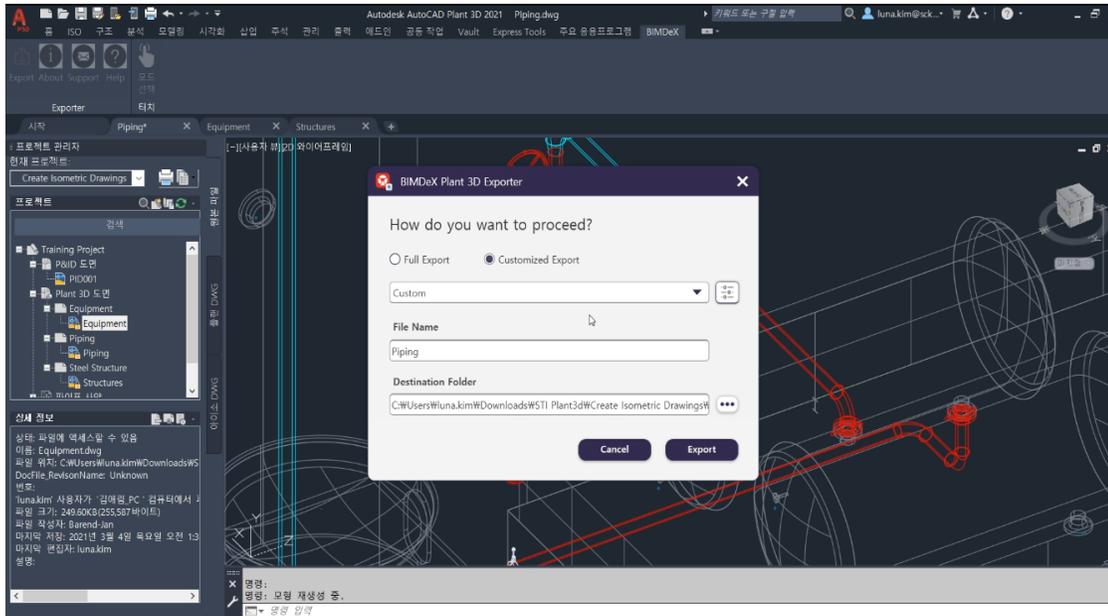
Vault Professional

*.ADSK

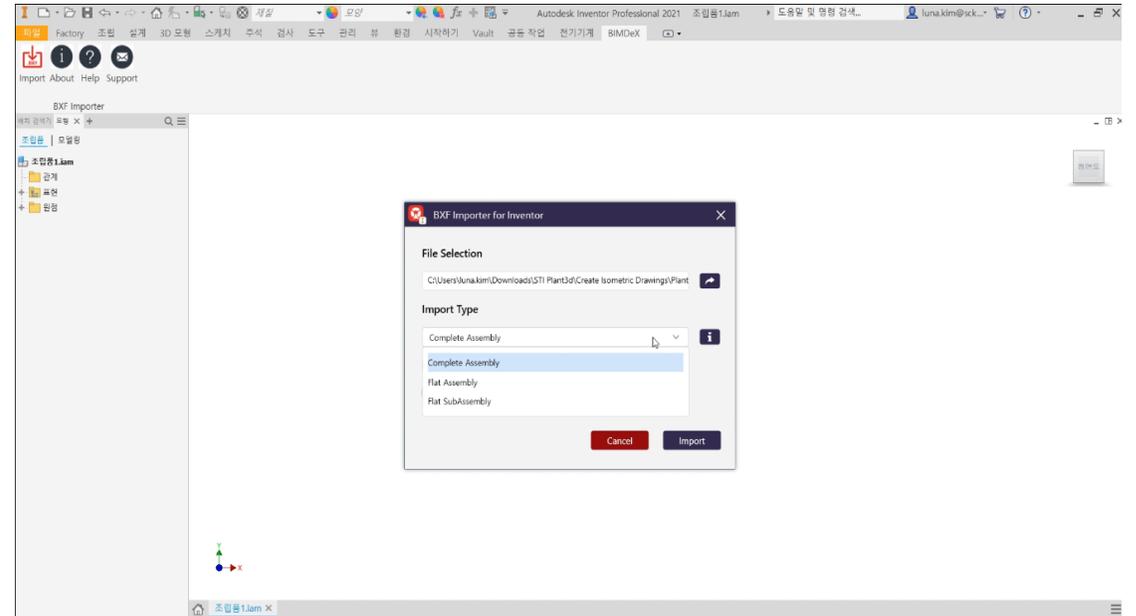
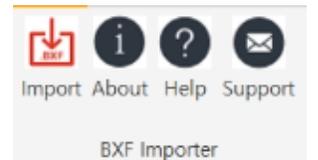
BIMDeX 변환과정

<https://youtu.be/ioLFjqoF9mQ>

Export *.bxf



Import *.bxf



PROJECT MANAGER

Current Project

SampleProject

Project

Search

- SampleProject
 - P&ID Drawings
 - Plant 3D Drawings
 - Pipe Specs
 - Related Files

Details

Project XML: C:\Users\nitesh\AppData\Roaming\Autodesk\Plant 3D\Projects\SampleProject.xml

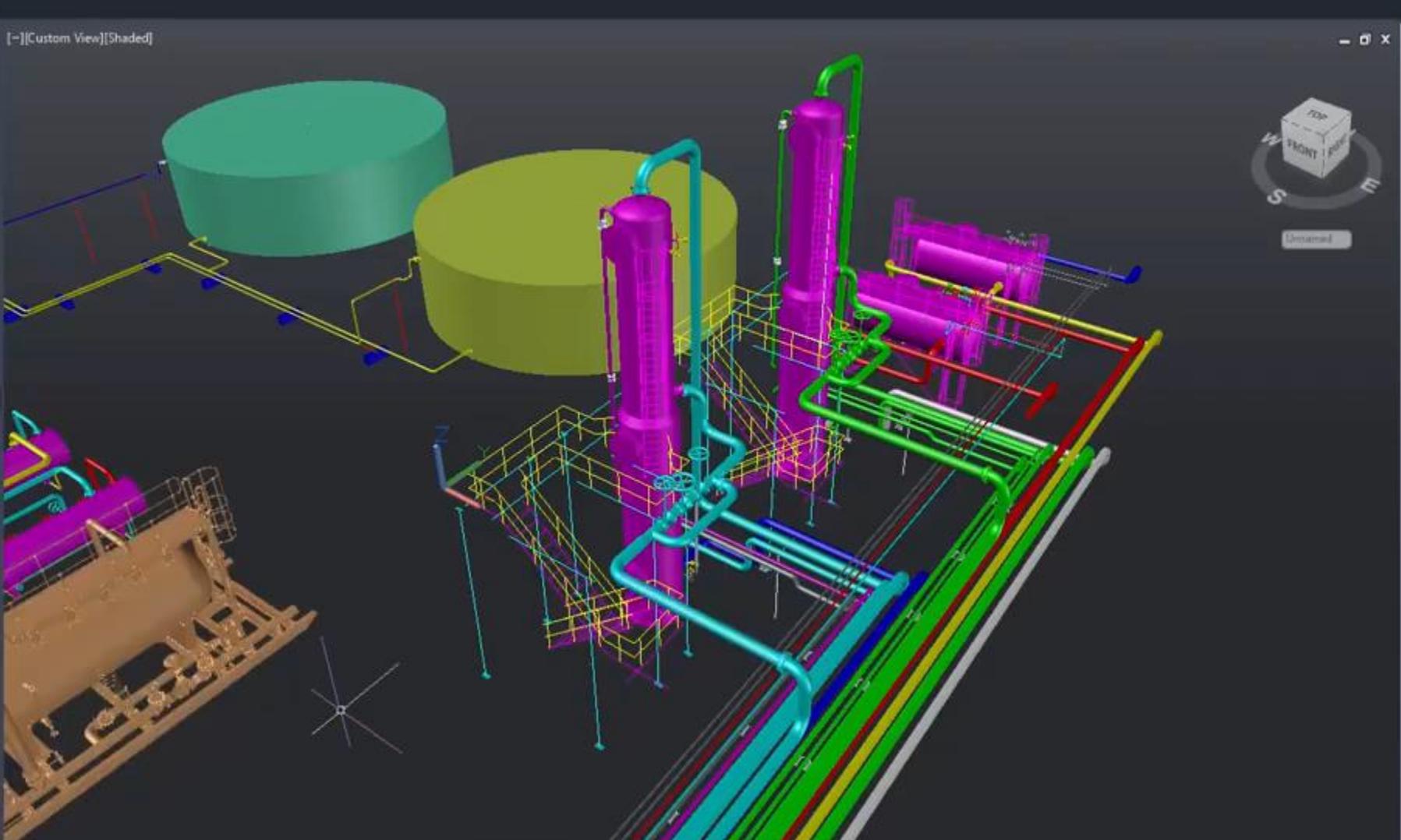
Project name: SampleProject

Project description: Sample Project

P&ID project unit: PIP Imperial

PROPERTIES

No selection



TOOL PALETTES - AUTOCAD

Dynamic Pipe Spec

Spec: CS300

Pipe Supports Spec

BlindFlange

- FLANGE BLIND,FL,RF,300 (CS300)

Cap

- CAP,BV,40 (CS300)

Instrumentation Spec

Coupling

- COUPLING,SW,3000 (CS300)

Cross

- Cross,SW,3000 (CS300)

Elbow

- ELL 45 LR,BV,40 (CS300)
- ELL 45,SW,3000 (CS300)
- ELL 90 LR,BV,40 (CS300)
- ELL 90,SW,3000 (CS300)

Flange

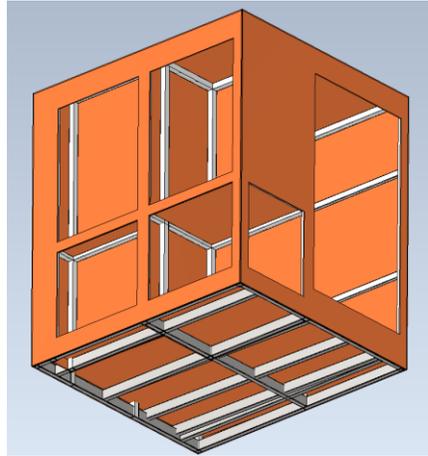
- FLANGE SW,FL,RF,300 (CS300)

[-][Custom View][Shaded]

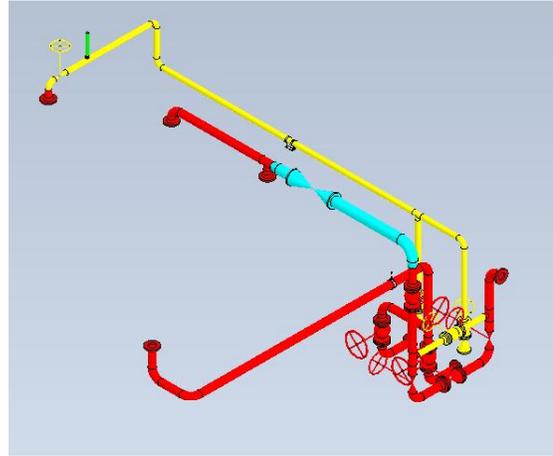
Command: *Cancel*

Type a command

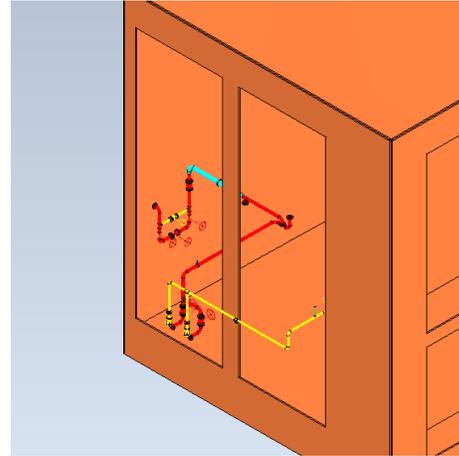
Inventor 와 BIMDeX 데이터를 활용한 설계



Body 및 Frame 설계



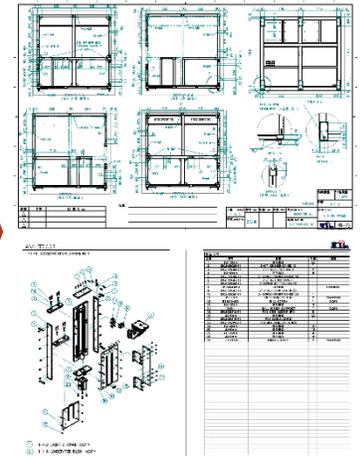
Pipe 불러오기(bxf)



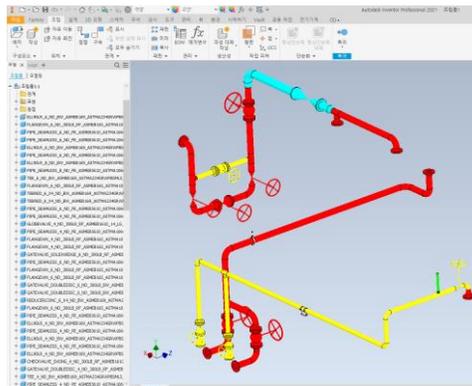
조립



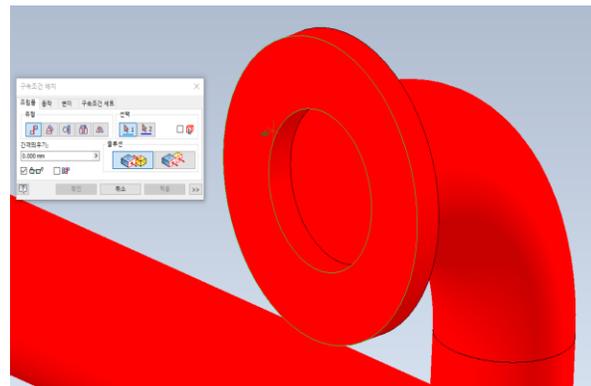
서포트 설계



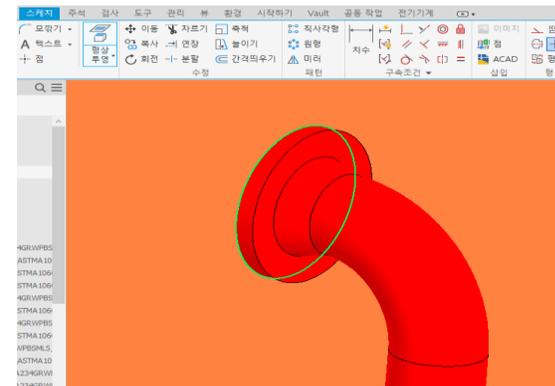
도면/BOM



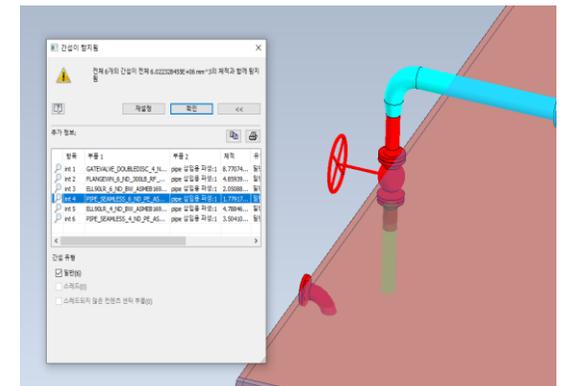
부품 별 Solid 형태로 삽입



구속조건을 통하여 조립 가능



형상 참조 가능



Body와 Pipe 간 간섭체크 가능



ACC (Autodesk Construction Cloud)





Autodesk and the Autodesk logo are registered trademarks or trademarks of Autodesk, Inc., and/or its subsidiaries and/or affiliates in the USA and/or other countries. All other brand names, product names, or trademarks belong to their respective holders. Autodesk reserves the right to alter product and services offerings, and specifications and pricing at any time without notice, and is not responsible for typographical or graphical errors that may appear in this document.

© 2018 Autodesk. All rights reserved.