



AVEVAWORLD

ACCELERATE INDUSTRIAL INTELLIGENCE

Improving Electrical Work Efficiency with AVEVA Engineering and E3D

Takeshi Nanjyo

The Hakodate Dock Co., Ltd.

Agenda

- 1. Company Introduction**
 - 2. History and Current Use of AVEVA**
 - 3. Background and Objectives**
 - 4. Project Initiatives**
 - 5. Expected Benefits and Challenges**
 - 6. Conclusion**
- Appendix. Use Cases of AVEVA XR Viewer**

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5. Expected Benefits and Challenges

6. Conclusion

Appendix. Use Cases of AVEVA XR Viewer

Company Profile

- Company Name : THE HAKODATE DOCK CO.,LTD.
- Established : November 7th, 1896
- Number of Employees : approx.550
- Group Company : NAMURA SHIPBUILDING CO., LTD.
SASEBO HEVY INDUSTRIES CO., LTD.

Hakodate Shipyard



New Shipbuilding Business



Ship Repair Business



Steel Structure
Machinery Business



Muroran Manufacturer



**HAKODATE
DOCK**

北海道から世界へ。ここにしかない「ものづくり」。

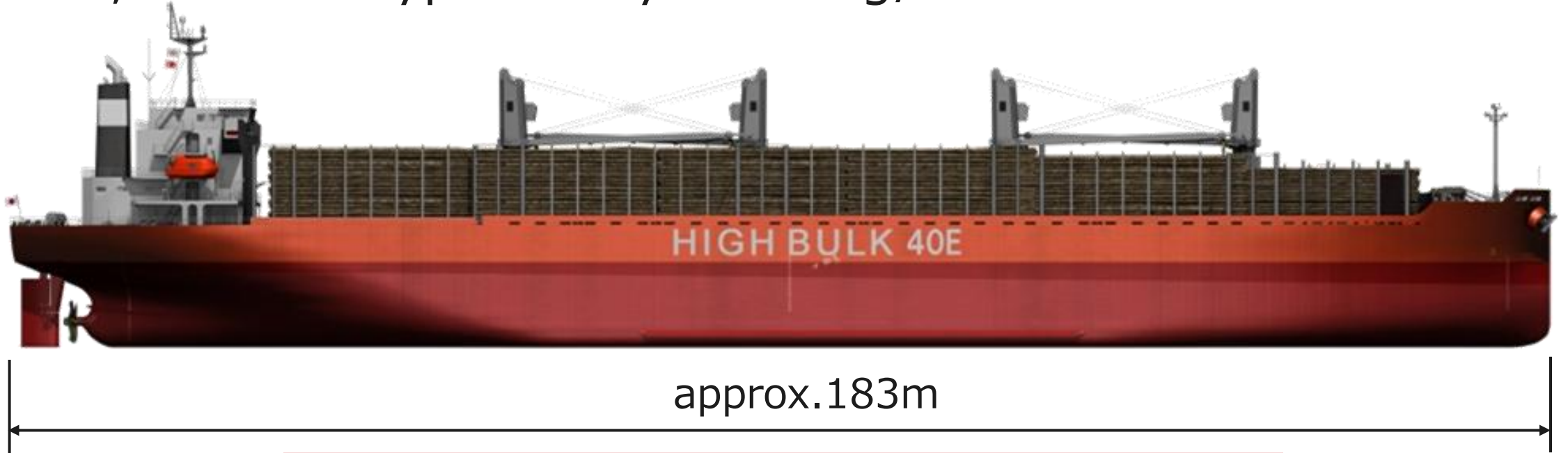


Hakodate, a port city gracing Hokkaido's southernmost tip.

Main Product

HIGH BULK 40E

40,000DWT Type Handy Size Log/Bulk Carrier



Number of Components

Cable : approx. 2,100

Pipe : approx. 7,800

Equipment & Panel : over 2,000

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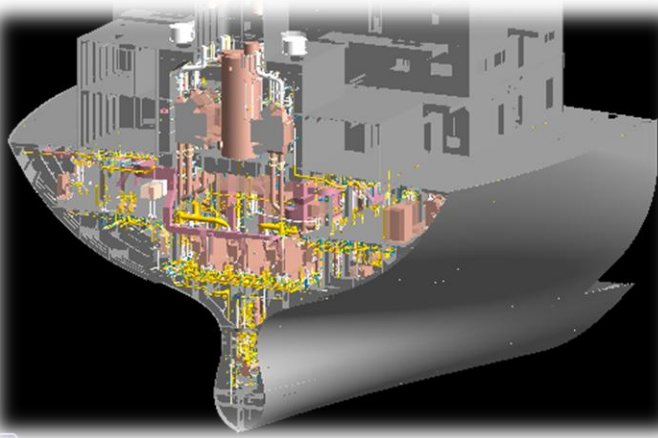
4. Project Initiatives

5. Expected Benefits and Challenges

6. Conclusion

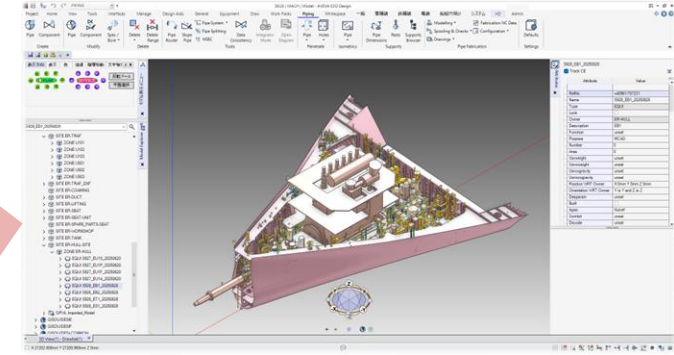
Appendix. Use Cases of AVEVA XR Viewer

History of AVEVA in Hakodate Dock



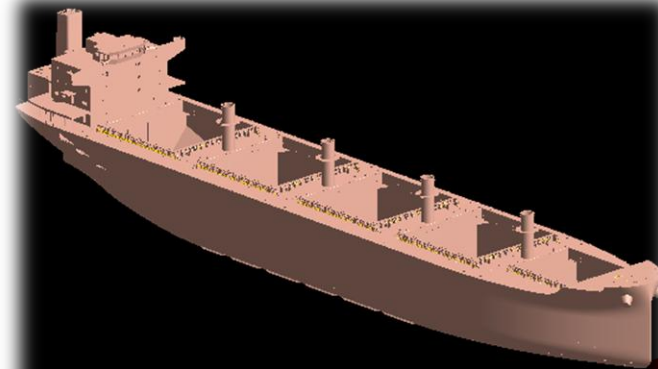
**2021-Expansion of Operational Scope
(Engine Room)**

2024-Migration from AVEVA Marine to E3D



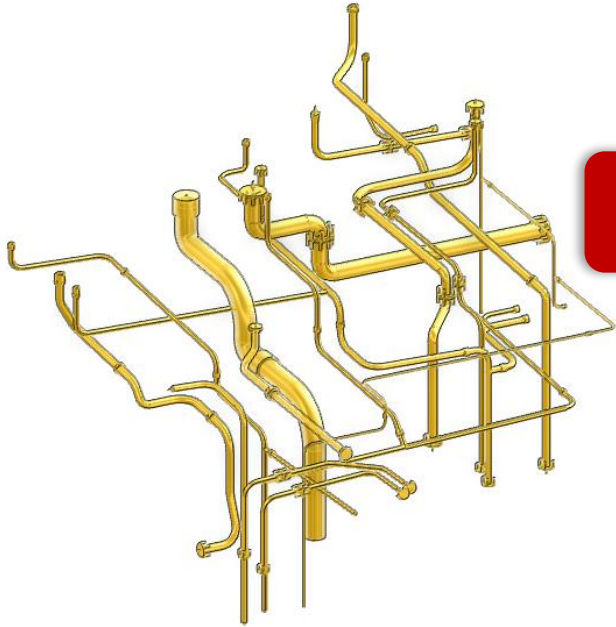
**2023-Expansion of Operational Scope
(All Areas)**

**2022-3D Viewer Implementation
(Third-Party Software)**

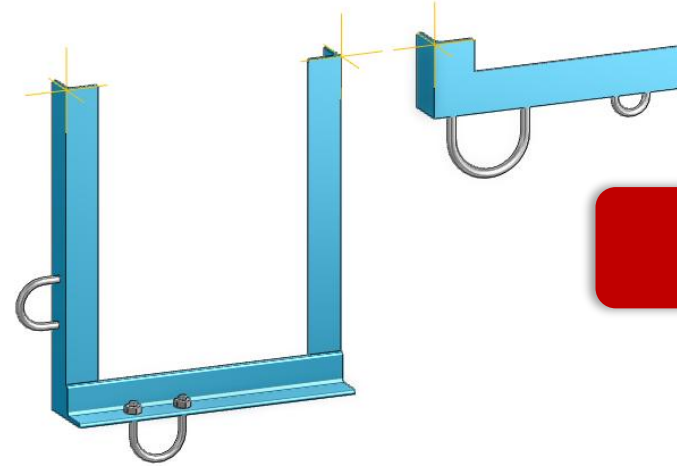


2018-AVEVA Marine Implementation

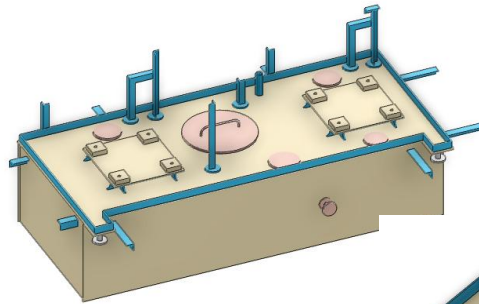
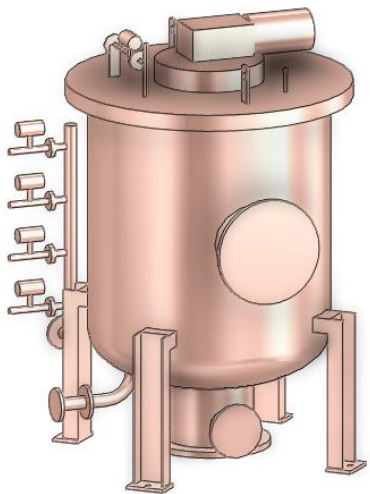
AVEVA Usage Situation (E3D)



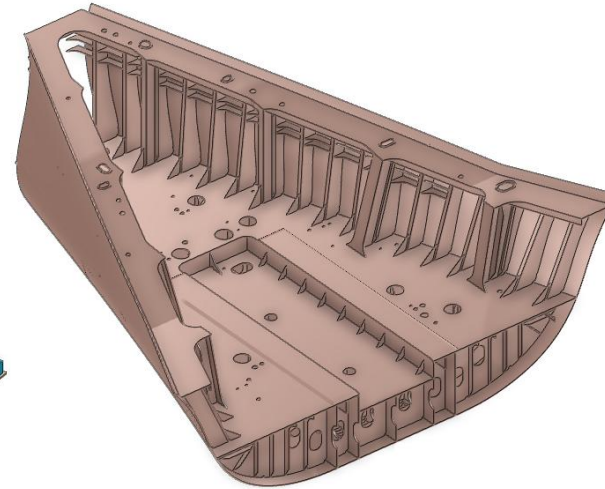
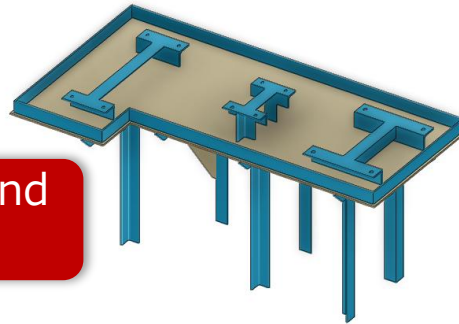
Piping



Pipe Supports



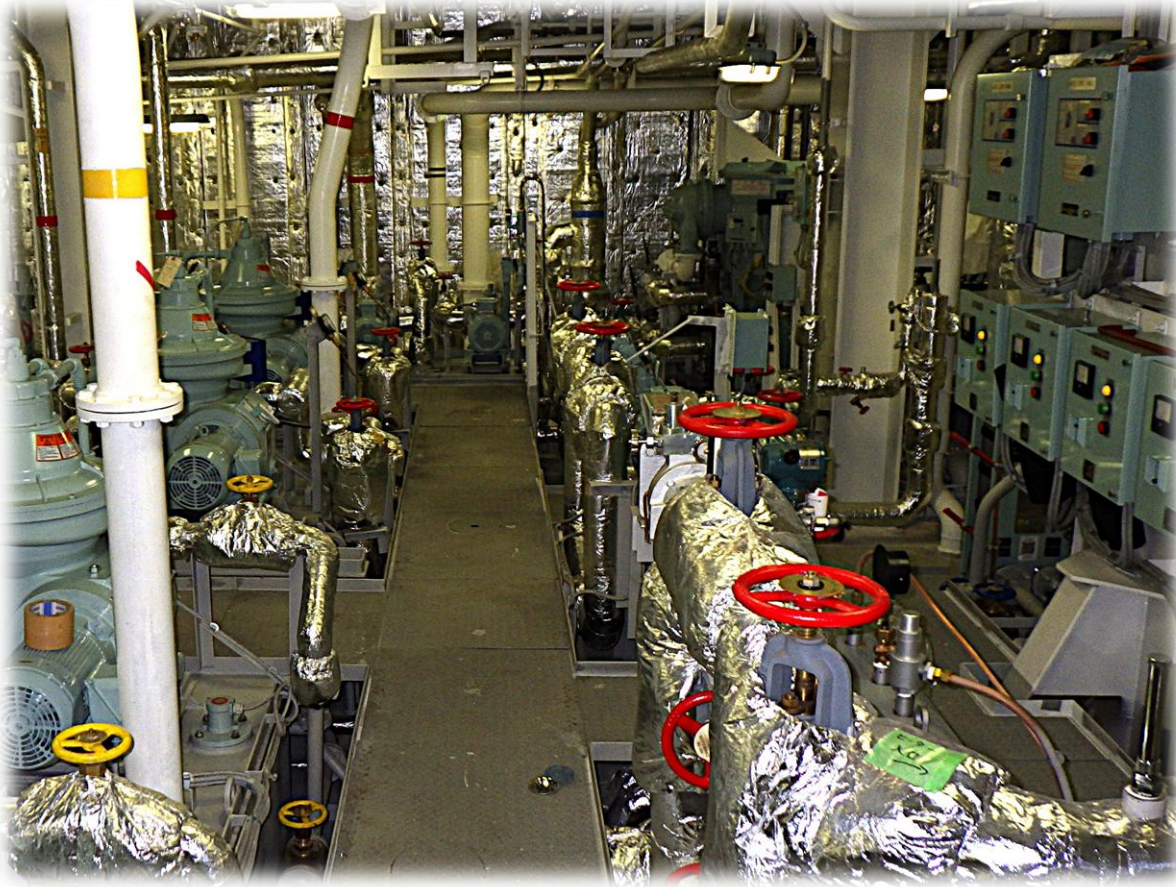
Outfitting Items and Equipment



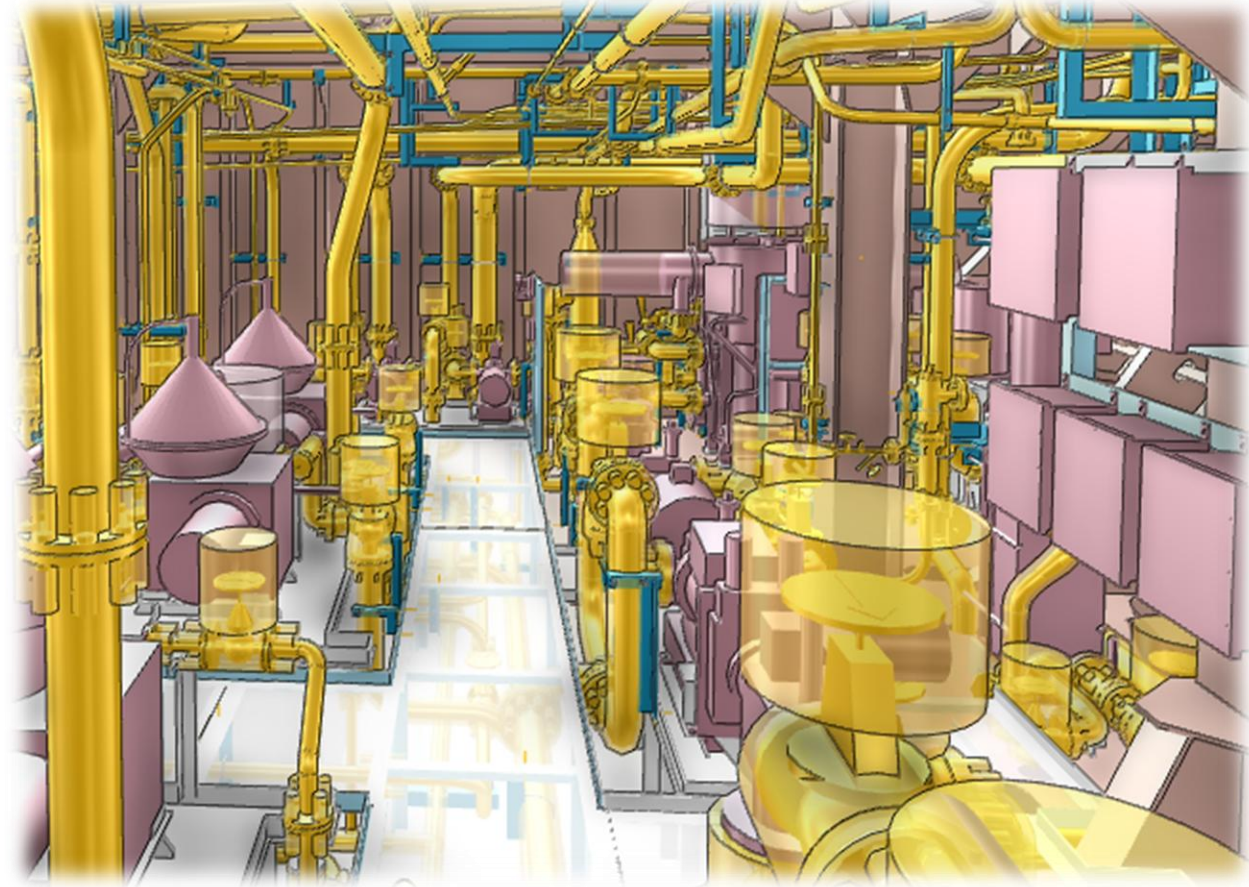
Hull Structure

Imported from
Third-Party 3D CAD

AVEVA Usage Situation (E3D)



Actual Photo
(Part of Engine Room)



E3D Model

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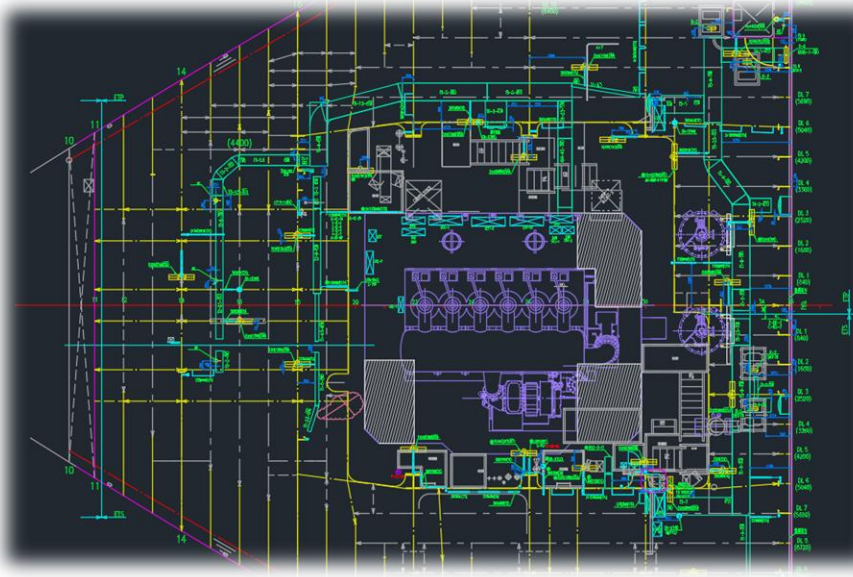
6. Conclusion

Appendix. Use Cases of AVEVA XR Viewer

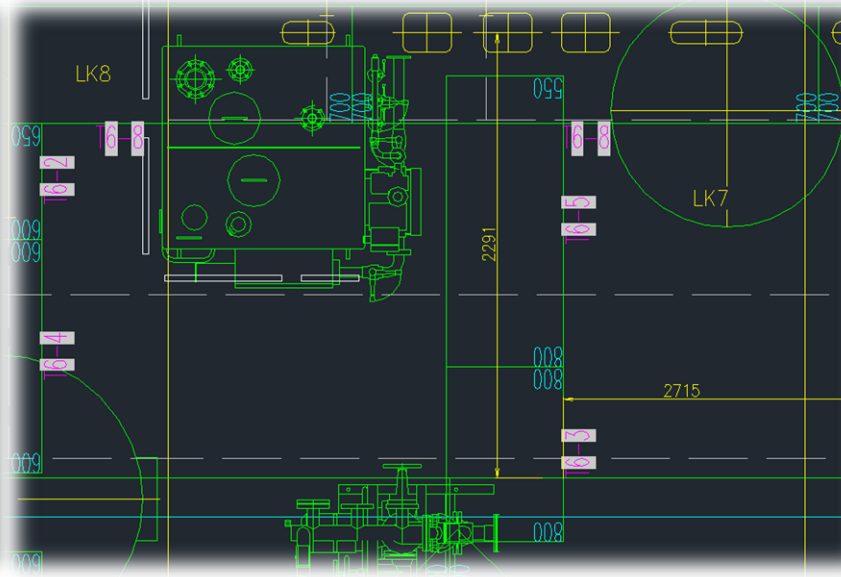
Overview of Electrical Outfitting Work

Electrical Outfitting Model : Not Created

2D-Based Design



Cable Length :
Manual Calculation



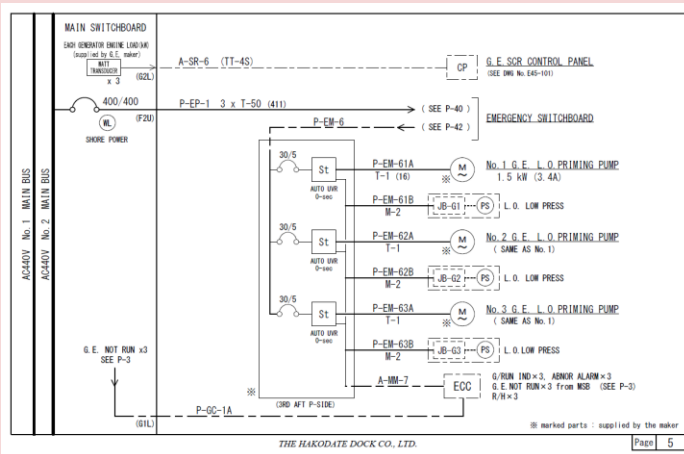
Cable Waste :
Relatively High



Conventional Electrical Outfitting Work Flow

1D & 2D

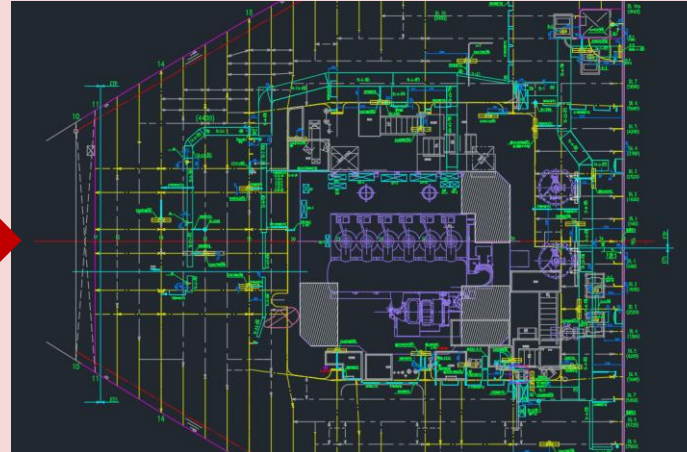
- **Planning**
- **Electrical Diagrams**



Using Microsoft Visio

2D

- **Electrical Equipment Layout**
- **Main Circuit Design**



Using AutoCAD

1D & 2D

- Cable Length Calculation
- Cable List Preparation

925			発電機コース								
星	T	1	P-G1-1 x 4	T-120	115		MSB/D		NQ 1 MAIN GEGE		1
星	T	2	P-G2-1 x 4	T-120	105		MSB/E		NQ 2 MAIN GEGE		1
星	T	3	P-G3-1 x 4	T-120	98		MSB/F		NQ 3 MAIN GEGE		1
星	T	4	P-G1-2	D-2	29		MSB/D		NQ 1 MAIN GEGE		1
星	T	5	P-G1-3	T-2	29		MSB/D		NQ 1 MAIN GEGE		1
	T	6	P-G1-4	D-1	29		MSB/D		NQ 1 MAIN GEGE		1
	T	7	P-G2-2	D-2	27		MSB/E		NQ 2 MAIN GEGE		1
	T	8	P-G2-3	T-2	27		MSB/E		NQ 2 MAIN GEGE		1
	T	9	P-G2-4	D-1	27		MSB/E		NQ 2 MAIN GEGE		1
	T	10	P-G3-2	D-2	25		MSB/F		NQ 3 MAIN GEGE		1
	T	11	P-G3-3	T-2	25		MSB/F		NQ 3 MAIN GEGE		1
	T	12	P-G3-4	D-1	25		MSB/F		NQ 3 MAIN GEGE		1
	T	13	A-AC-2	M-2	30		EOC/I		GENE.		1
	T	14	O-AQ+54	M-2	30		EOG		3RD GENE	LHF	1
	T	15	A-LF-1C	M-2	28		OE		GENE ENG.	12CMベール	1
	T	16	C-AE+8	M-2	30		OE		GENE.		1
	T	17	P-IG-9E	M-7	24		MSB/A		NQ 1,2 COMP		1
	T	18	L-K-13A	D-1	15		L-K		LJ-63		1

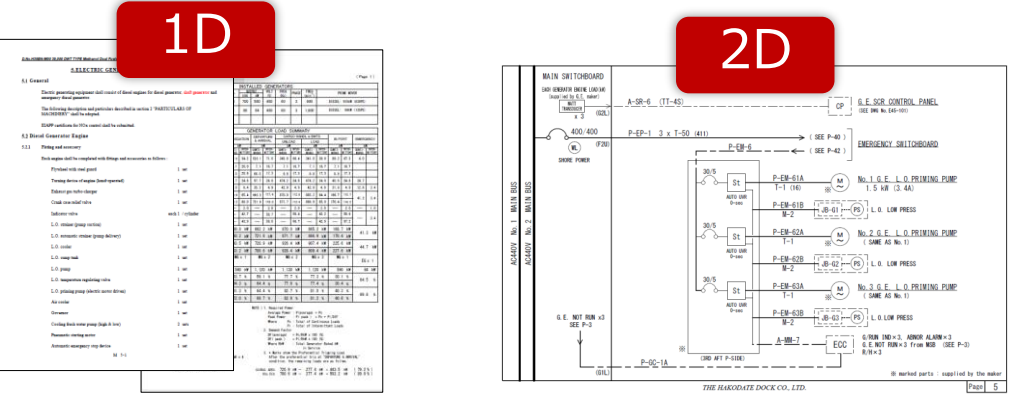


Using AutoCAD & Microsoft Excel

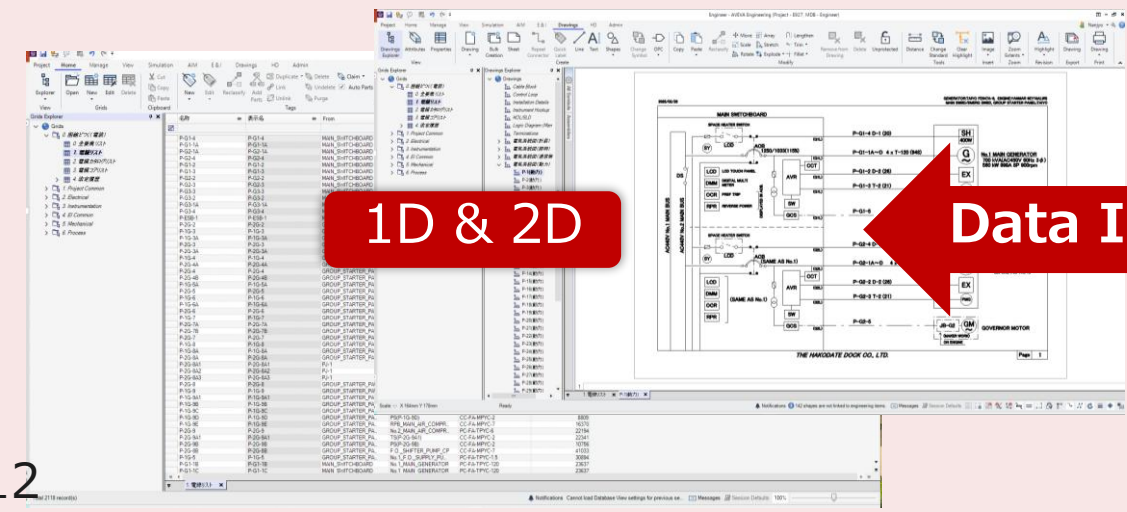
Objectives

Performance Design

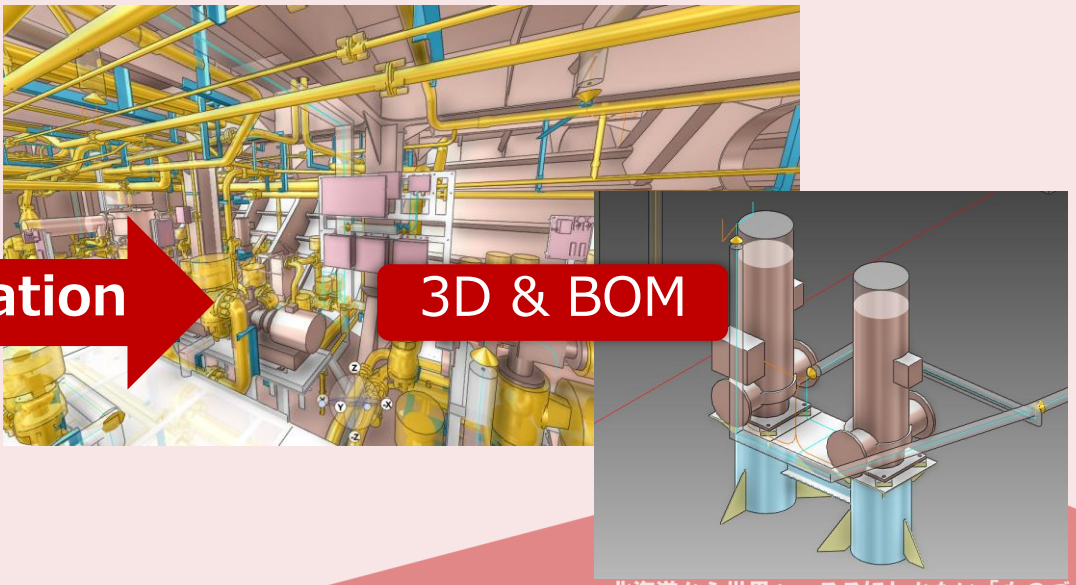
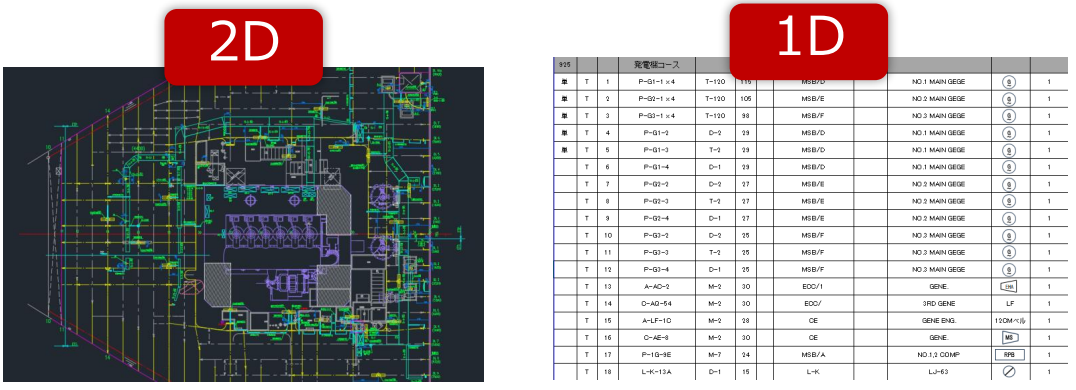
As-Is (File-based)



To-Be (Database-based)



Detailed Design



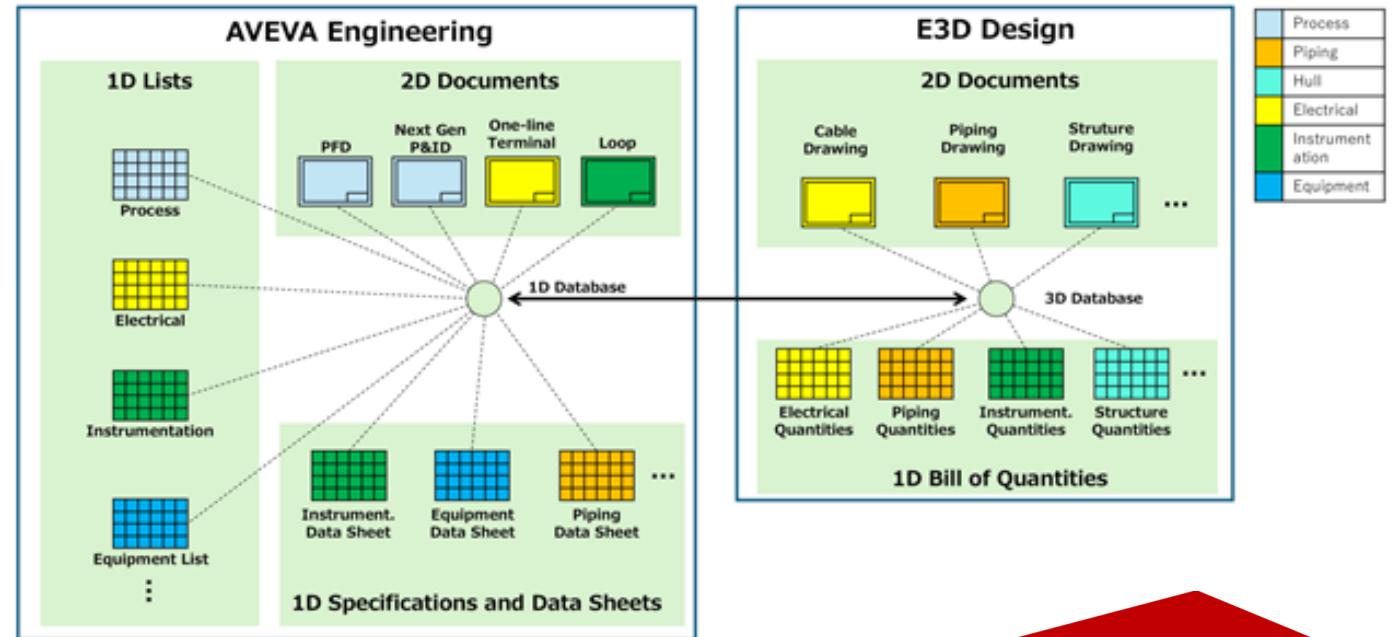
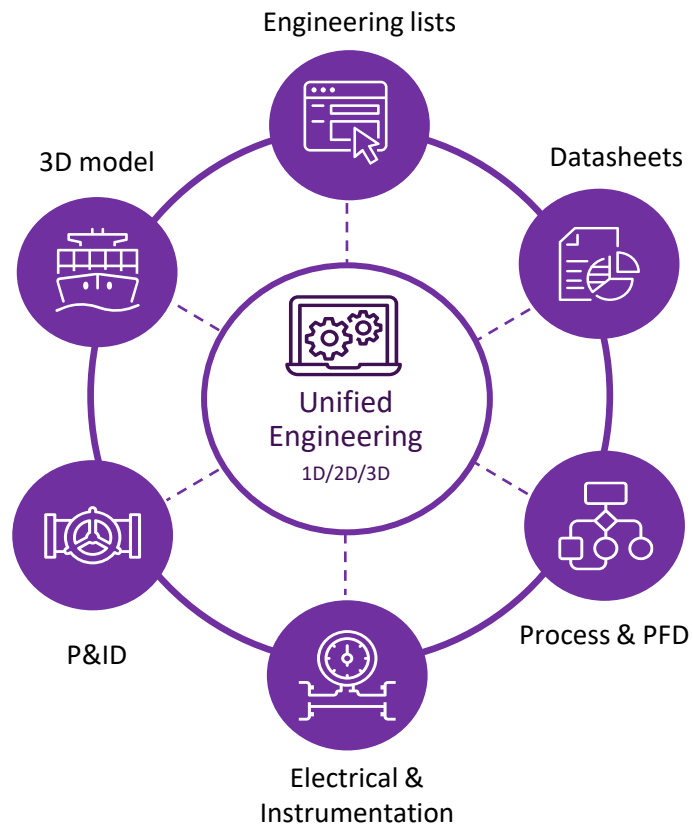
Background of AVEVA Engineering Adoption

Initial Interest

Trigger : Attended AVEVA Presentation

Key Insight : Realized the Potential of **1D-2D-3D Data Integration**

Reaction : Gained Strong Interest in Centralized Engineering Workflows



Background of AVEVA Engineering Adoption

Decision to Implement

Action : Participated in MJUG (AVEVA Marine Japan User's Group) Workshop

Outcome : Understood Practical Benefits and Usability

Decision : Chose to Adopt AVEVA Engineering



Project Goals

1. Create Electrical Diagrams in AVEVA Engineering

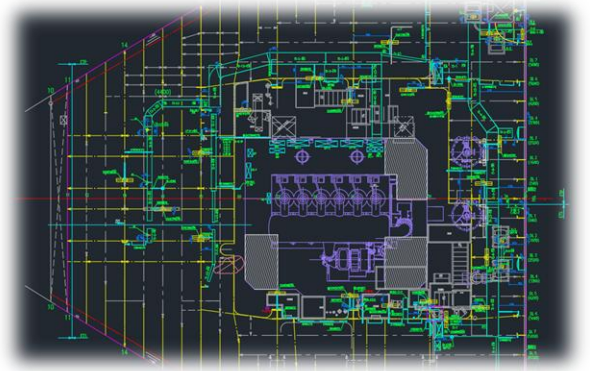
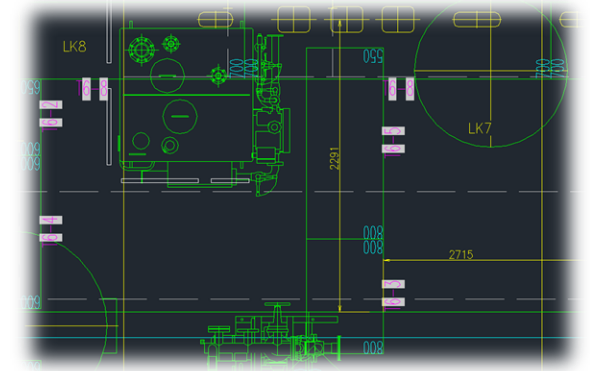
- ▶ Integrate Electrical Diagram Data with E3D

2. 3D Modeling of CWAY and Electrical Items

- ▶ Use the 3D Model for Clash Checks and Automatic Cable Routing

3. Automatic Cable Generation

- ▶ Use the Above Data for Cable Routing and Cable Length Calculation



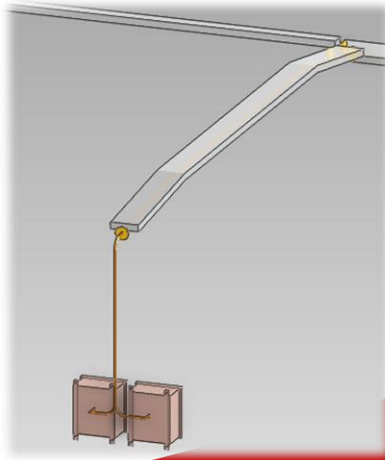
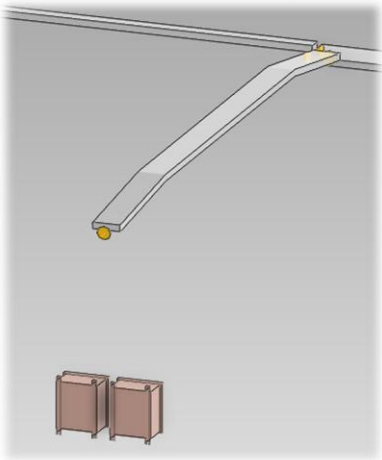
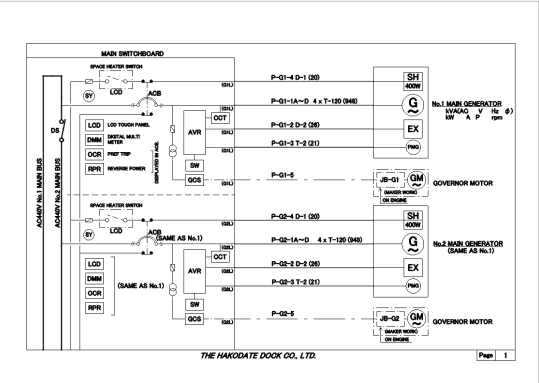
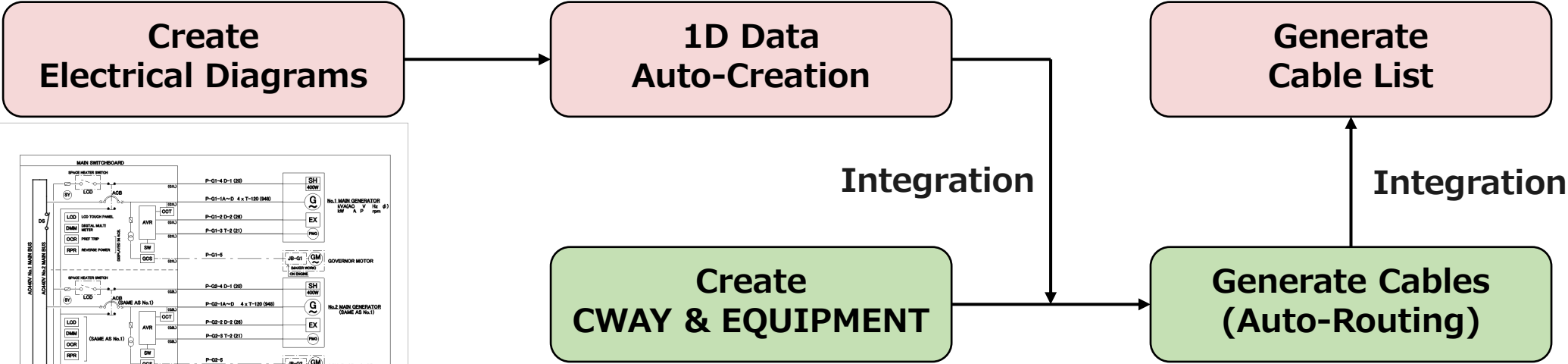
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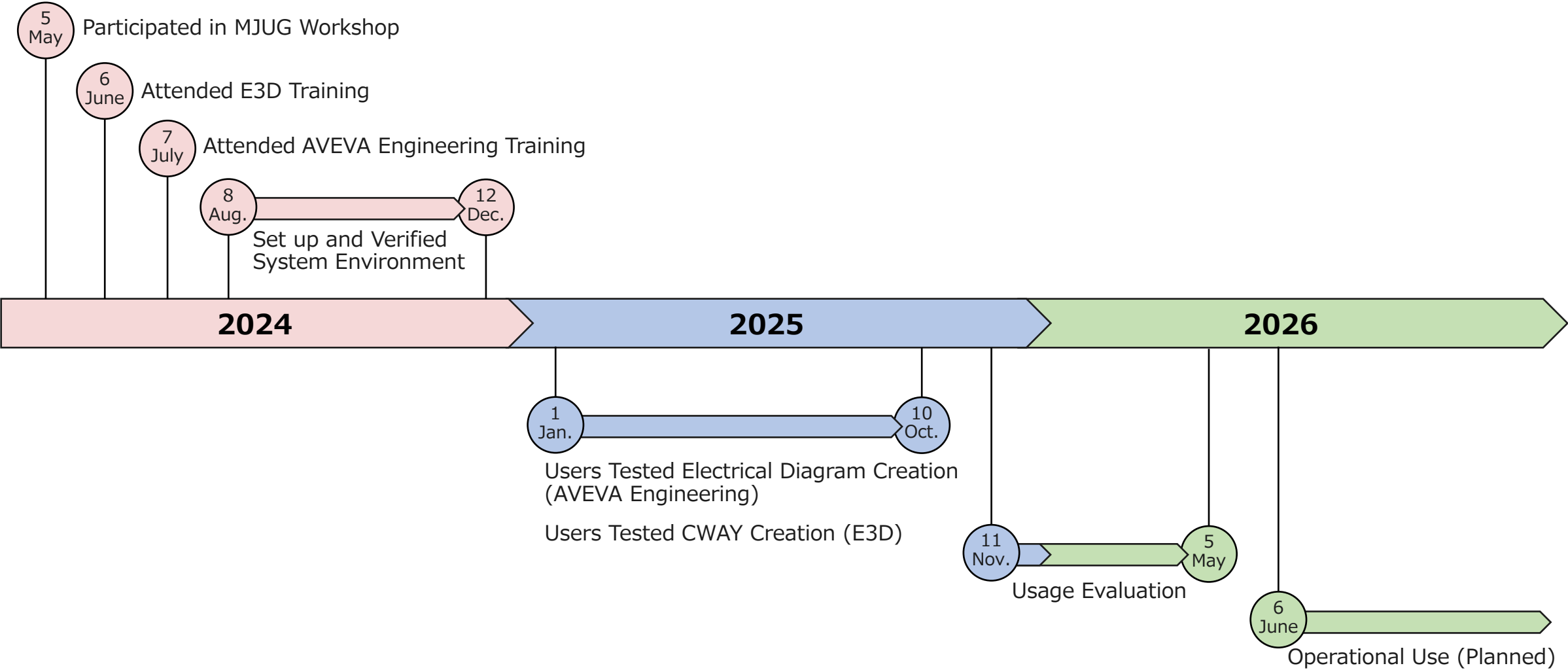
Work Flow

- Work in AVEVA Engineering
- Work in E3D

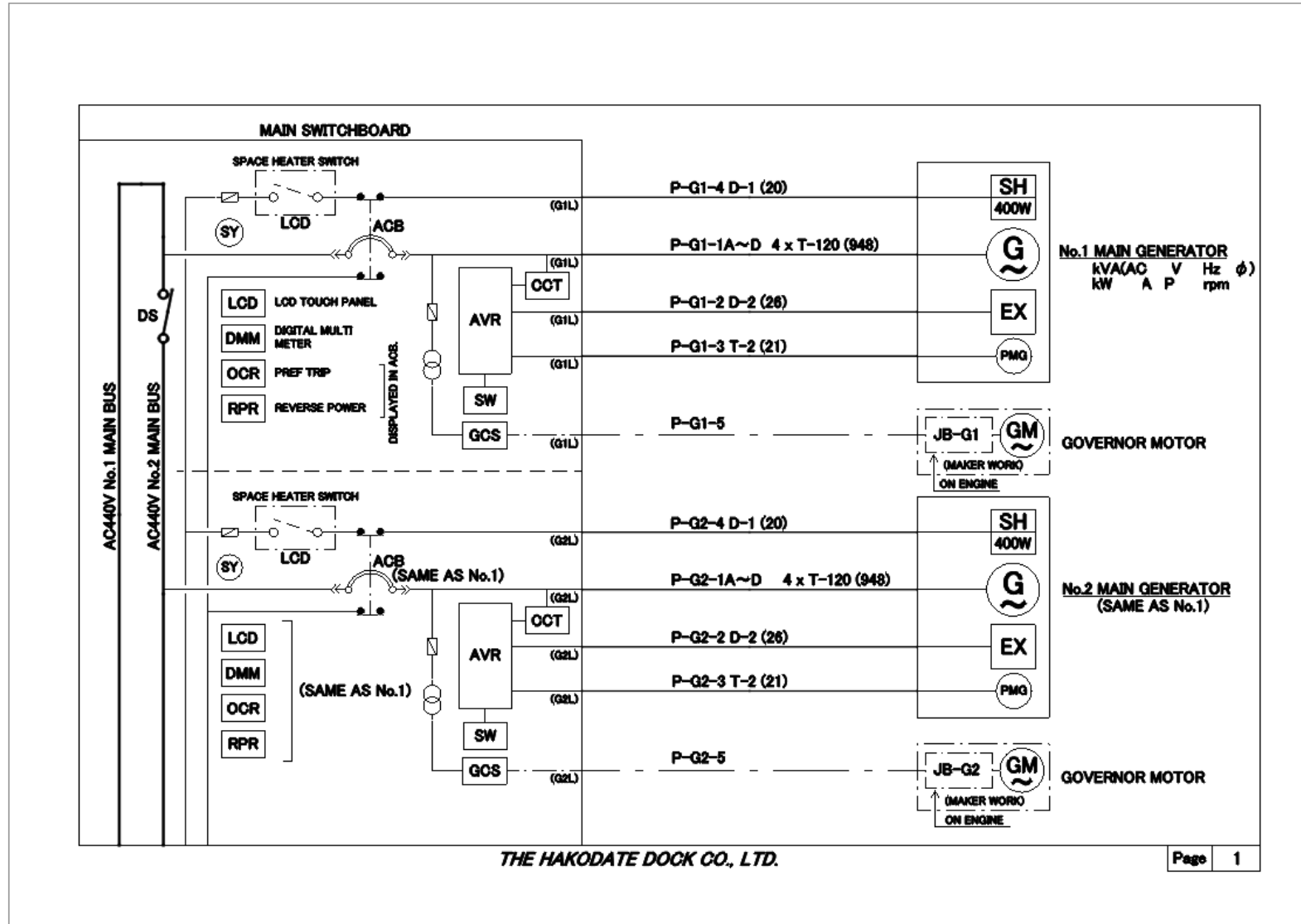
From	To	使用電線カテゴリ	Design Length
MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-DPYC-1.5	26988
MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-TPYC-120	26367
MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-TPYC-120	25320
MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-DPYC-1.5	25240
MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-DPYC-2.5	26998
MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-TPYC-2.5	26852
MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-DPYC-2.5	25405
MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-TPYC-2.5	25303
MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-TPYC-2.5	23052
MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-DPYC-2.5	23028
MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-TPYC-120	23070
MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-DPYC-1.5	23106



Project Overview

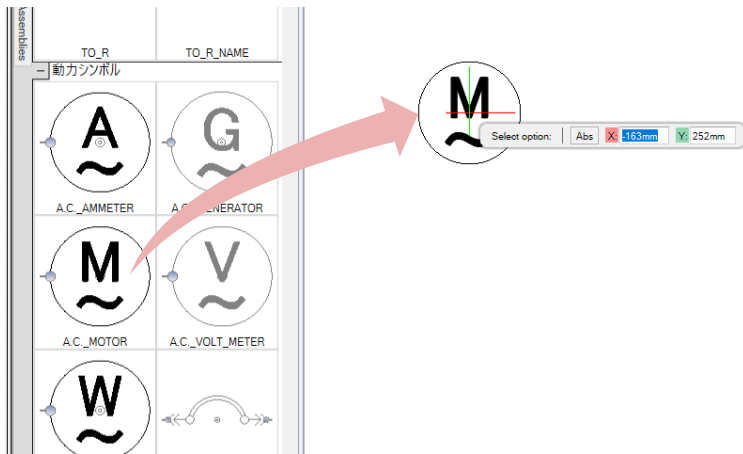


Users Tested Electrical Diagram Creation (AVEVA Engineering)

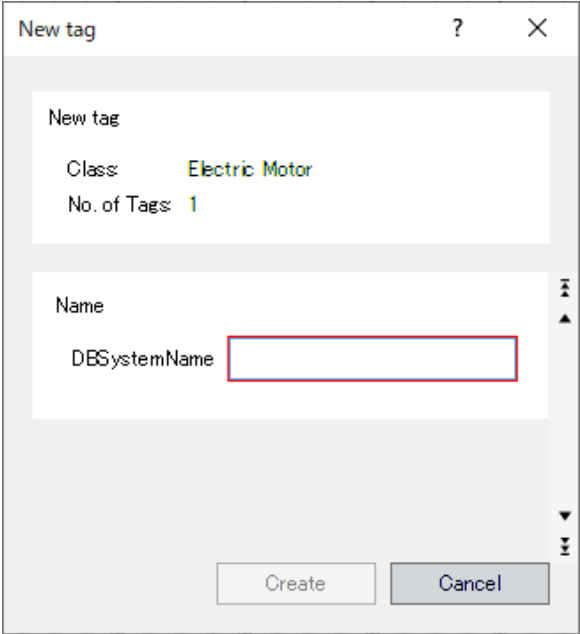


Steps for Creating Electrical Diagrams

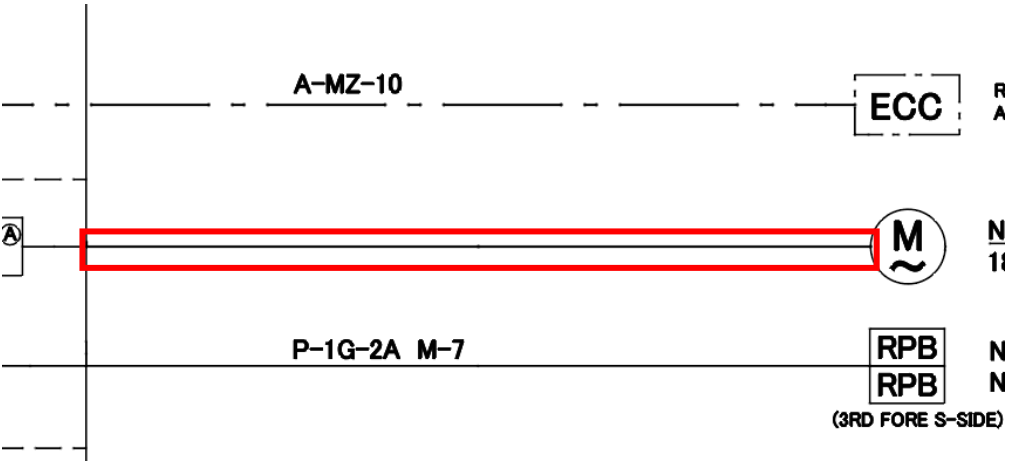
Step 1: Drag a Symbol from the Symbol List and Drop it onto the Canvas



Step 2: Enter the Tag Name (Equipment Name)

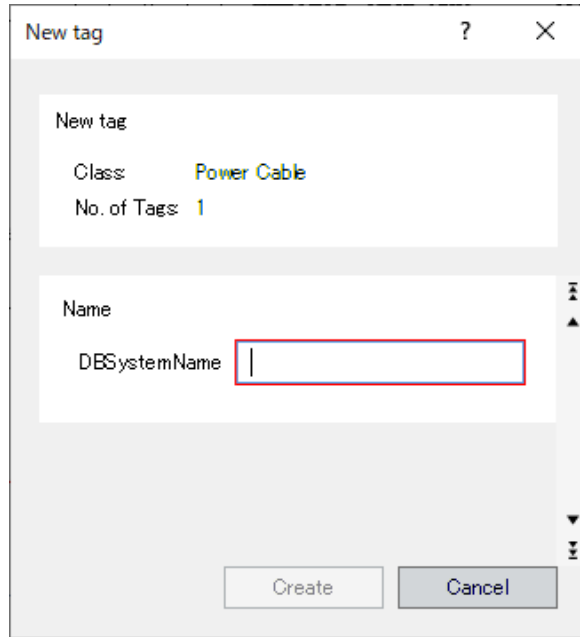


Step 3: Connect Symbols Using Connector (Cable)



Steps for Creating Electrical Diagrams

Step 4: Enter the Tag Name (Cable Name)



New tag

Class: Power Cable

No. of Tags: 1

Name

DBSystemName

Create Cancel

Step 5: Select the Cable Catalog to Use



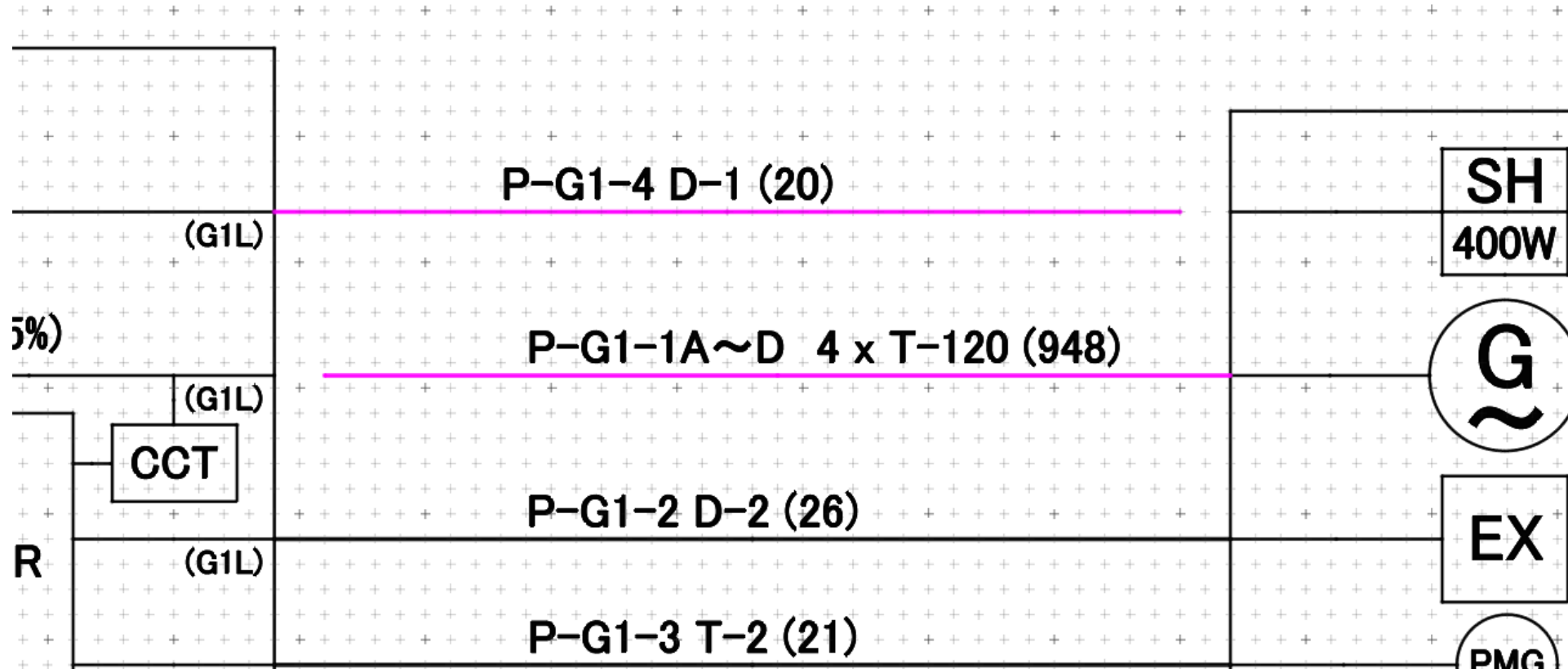
名称	表示名	From	To	使用電線カタログ	Design Length [mm]
P-1G-1A	P-1G-1A	GROUP_STARTER_PA...	PS(P-1G-1A)	CC-FA-MPYC-2	
P-2G-1A	P-2G-1A	GROUP_STARTER_PA...	RPB_MAIN_L.O._PUMP	CC-FA-MPYC-7	
P-2G-1	P-2G-1	GROUP_STARTER_PA...	No.2_MAIN_L.O._PUMP	PC-FA-TPYC-25	
P-1G-2	P-1G-2	GROUP_STARTER_PA...	No.1_M.E._JACKET_CO...	PC-FA-TPYC-6	
P-1G-2A	P-1G-2A	GROUP_STARTER_PA...	RPB_M.E._JACKET_CO...	CC-FA-MPYC-7	
P-2G-10	P-2G-10	GROUP_STARTER_PA...	No.2_BALLAST_PUMP	PC-FA-TPYC-25	
P-1G-11B	P-1G-11B	GROUP_STARTER_PA...	AE(P-1G-11B)	CC-FA-MPYC-4	
P-1G-11	P-1G-11	GROUP_STARTER_PA...	No.1_FIRE_&_G.S._PUMP	PC-FA-TPYC-25	
P-1G-11A	P-1G-11A	GROUP_STARTER_PA...	RPB_FIRE_&_G.S._PUMP	CC-FA-MPYC-7	
P-2G-11	P-2G-11	GROUP_STARTER_PA...	No.2_FIRE_&_G.S._PUMP	PC-FA-TPYC-25	
P-2G-11B	P-2G-11B	GROUP_STARTER_PA...	AE(P-2G-11B)	CC-FA-MPYC-4	
P-2G-11A	P-2G-11A	GROUP_STARTER_PA...	CE	CC-FA-MPYC-12	
P-1G-12	P-1G-12	GROUP_STARTER_PA...	No.1_G.E._M.G.O._SUPP...	PC-FA-TPYC-1.5	
P-1G-12A	P-1G-12A	GROUP_STARTER_PA...	RPB_G.E._M.G.O._SUPP...	CC-FA-MPYC-7	
P-2G-12	P-2G-12	GROUP_STARTER_PA...	No.2_G.E._M.G.O._SUPP...	PC-FA-TPYC-1.5	
P-1G-10	P-1G-10	GROUP_STARTER_PA...	No.1_BALLAST_PUMP	PC-FA-TPYC-25	
L-SL-1	L-SL-1	BCC	MAST_HEAD_LIGHT(L-S...	PC-FA-DPYCY-1.5	
L-SL-2	L-SL-2	BCC	MAST_HEAD_LIGHT(L-S...	PC-FA-DPYCY-1.5	



Repeat Steps 1 Through 5

Addition of Connector Verification Setting

Unconnected Connectors Are Highlighted in Color

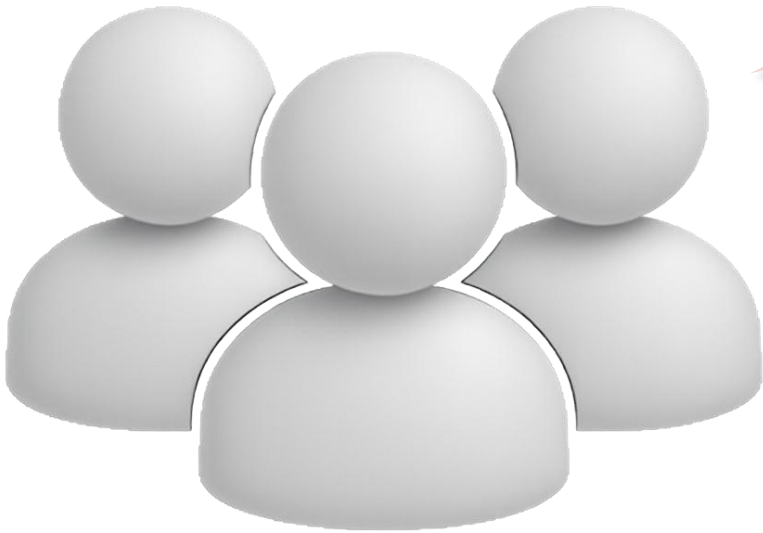


User Feedback (Electrical Diagram Creation)

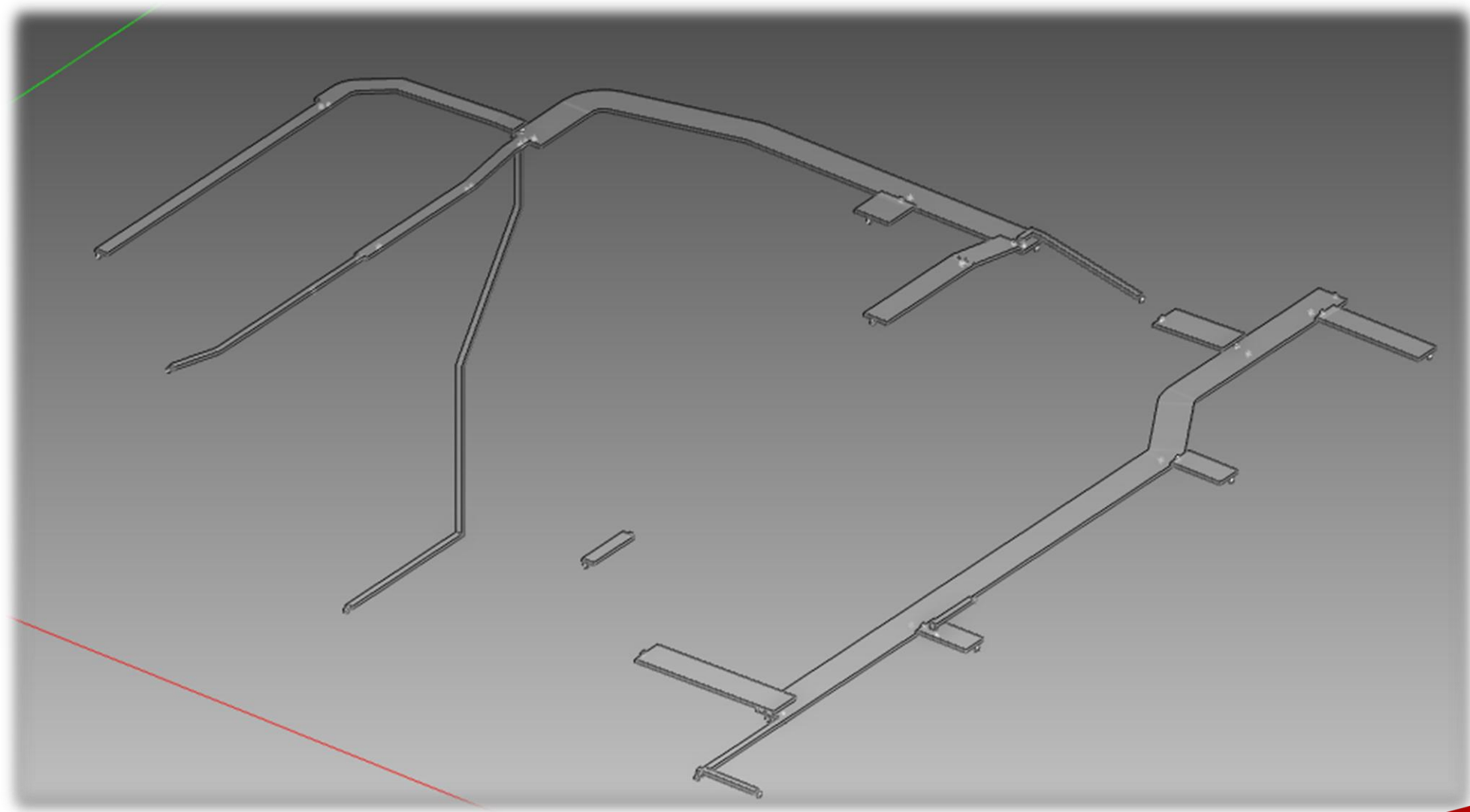
"Aligning symbols and connecting connectors takes a bit of practice, but it gets easier overtime."

"It was more work than Visio because they need to enter tag names."

"Equipment and Cables now show up in the grid, making it easier to summarize."



Users Tested CWAY Creation (E3D)

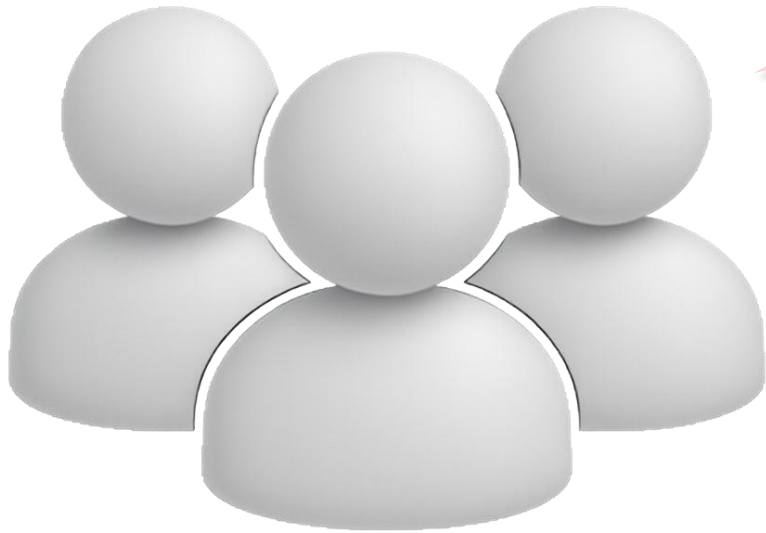


User Feedback (CWAY Creation)

"If you've done PIPE modeling, CWAY modeling feels easy."

"CWAY was very easy to create because the controls were intuitive"

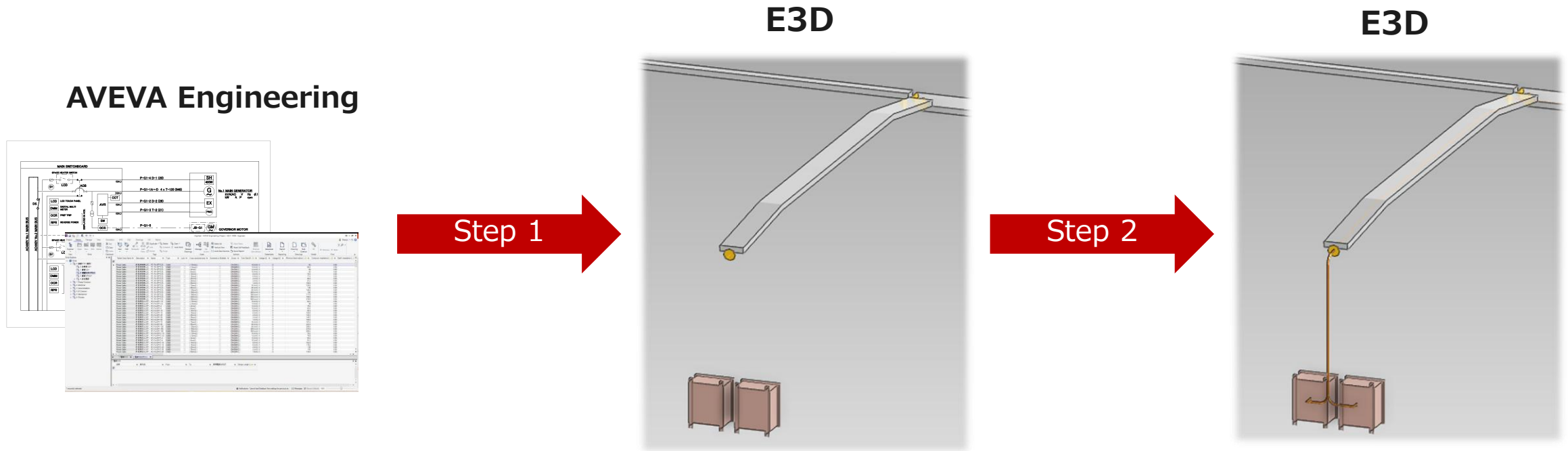
"Using the 2D DXF file to get positions made the process more efficient."



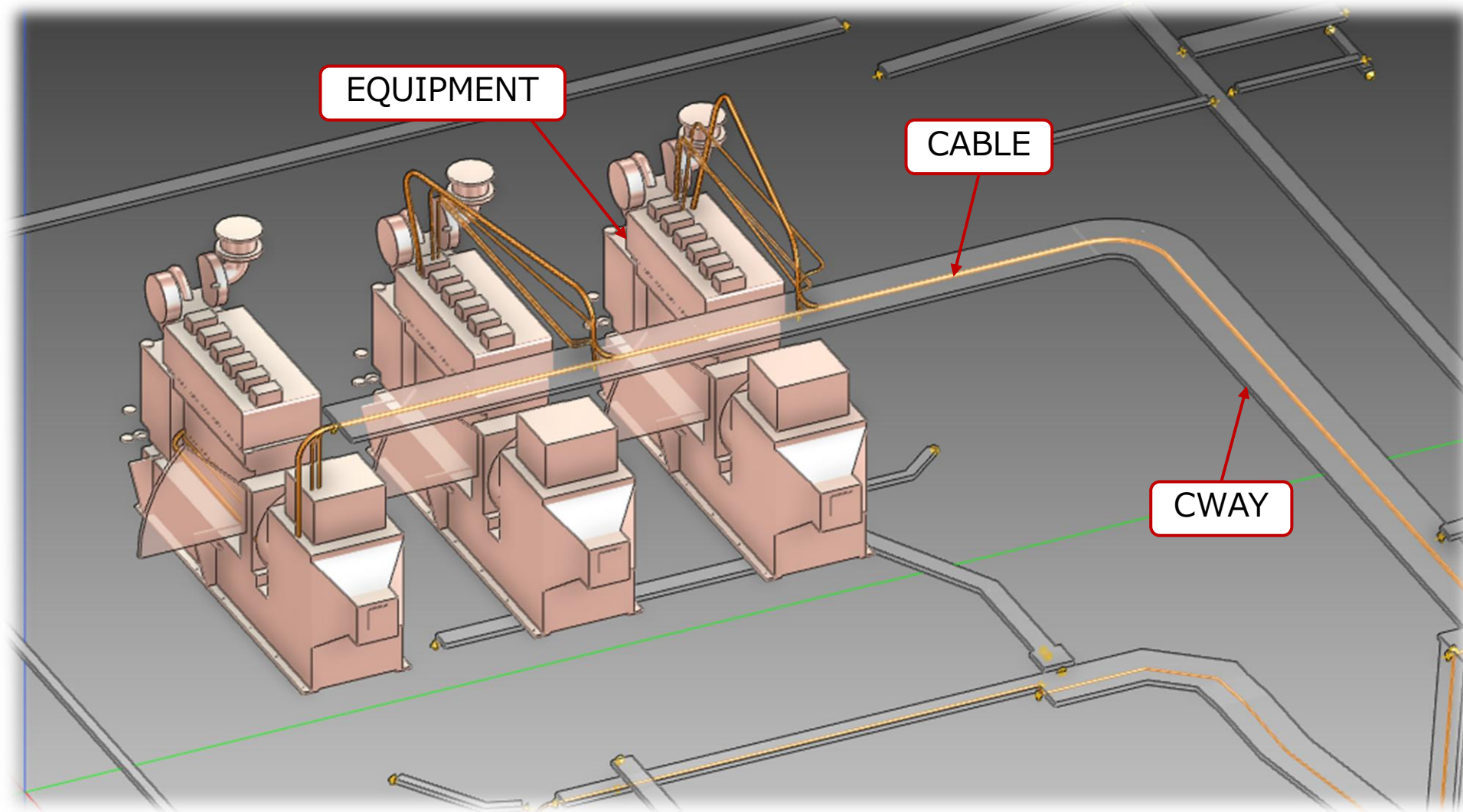
User Tested Generate Cable (Auto-Routing)

Step 1: Integrate Cable Data (Name, From/To, Spec) from AVEVA Engineering with E3D

Step 2: Use the Integrated Cable Data with CWAY and Equipment Models to Perform Auto-Routing



User Tested Generate Cable (Auto-Routing)



Cables Generated by Auto-Routing

User Tested Integration of Cable Data from E3D to AVEVA Engineering

Display Cable Length Data Generated in E3D on the AVEVA Engineering Grid

名称	表示名	From	To	使用電線カタログ	Design Length [mm]
P-G1-1D	P-G1-1D	MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-DPYC-1.5	28158
P-G1-1	P-G1-1	MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-TPYC-120	28607
P-G1-1A	P-G1-1A	MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-DPYC-2.5	28182
P-G1-1B	P-G1-1B	MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-DPYC-2.5	28182
P-G1-1C	P-G1-1C	MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	PC-FA-TPYC-2.5	28198
P-G2-1D	P-G2-1D	MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-SPYC(SUS)Y-...	25888
P-G2-1	P-G2-1	MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-TPYC-120	26725
P-G2-1A	P-G2-1A	MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-DPYC-2.5	26008
P-G2-1B	P-G2-1B	MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-DPYC-2.5	26008
P-G2-1C	P-G2-1C	MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	PC-FA-TPYC-2.5	26030
P-G3-1D	P-G3-1D	MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-DPYC-1.5	23916
P-G3-1	P-G3-1	MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-TPYC-120	24751
P-G3-1A	P-G3-1A	MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-DPYC-2.5	23839
P-G3-1B	P-G3-1B	MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-DPYC-2.5	23839
P-G3-1C	P-G3-1C	MAIN_SWITCHBOARD	No.3_MAIN_GENERATOR	PC-FA-TPYC-2.5	23863
P-G1-2	P-G1-2	MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	CC-FA-MPYC-27	28415
P-G1-3	P-G1-3	MAIN_SWITCHBOARD	No.1_MAIN_GENERATOR	CC-FA-MPYCSLA-2	28125
P-G2-2	P-G2-2	MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	CC-FA-MPYC-27	26207
P-G2-3	P-G2-3	MAIN_SWITCHBOARD	No.2_MAIN_GENERATOR	CC-FA-MPYCSLA-2	25926

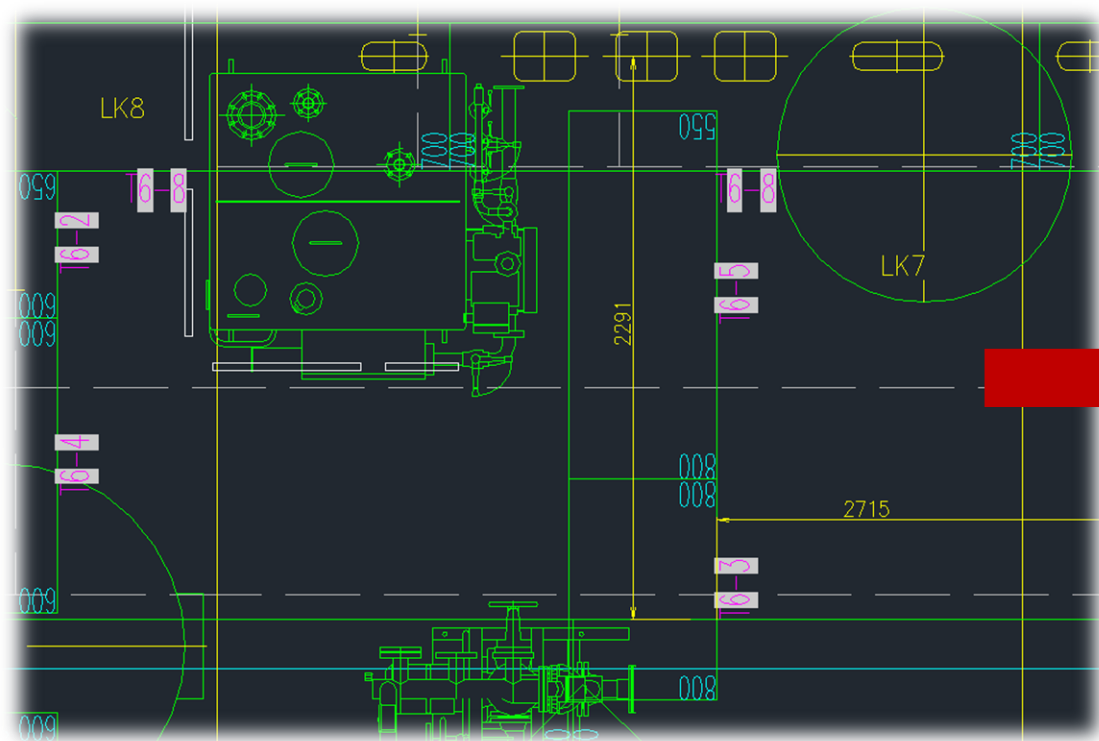
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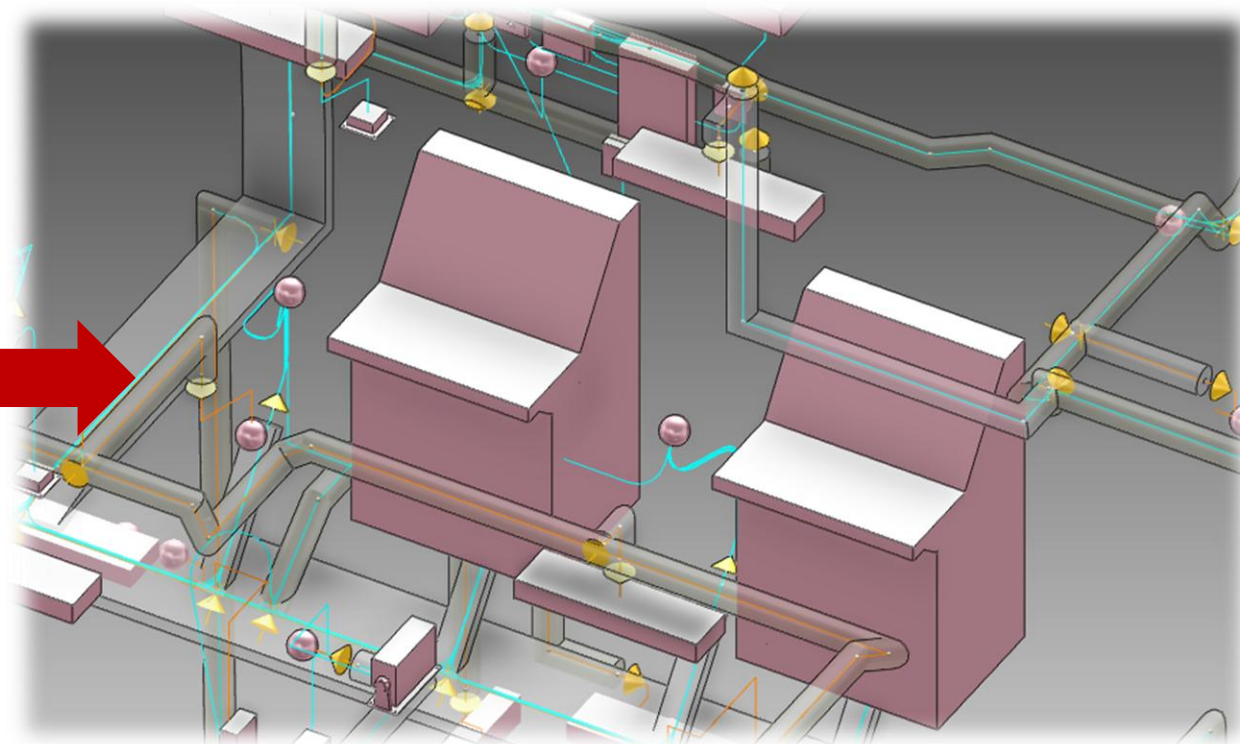
Expected Benefits

Reduction in Cable Length Calculation Time

Manual Process

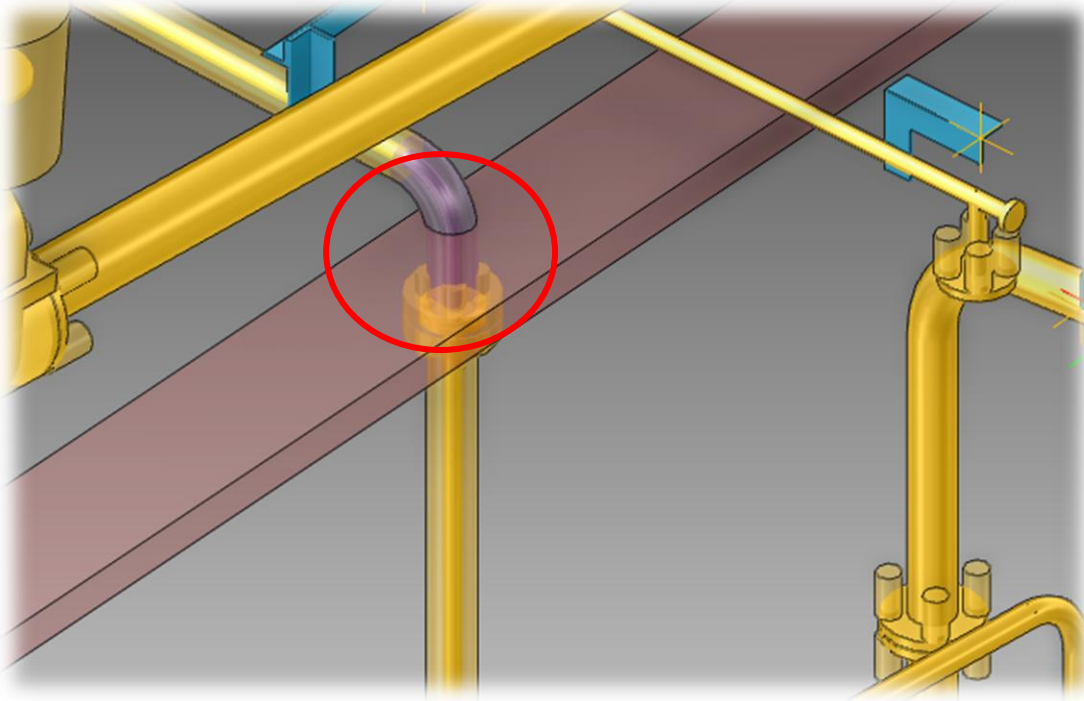


Automated Process

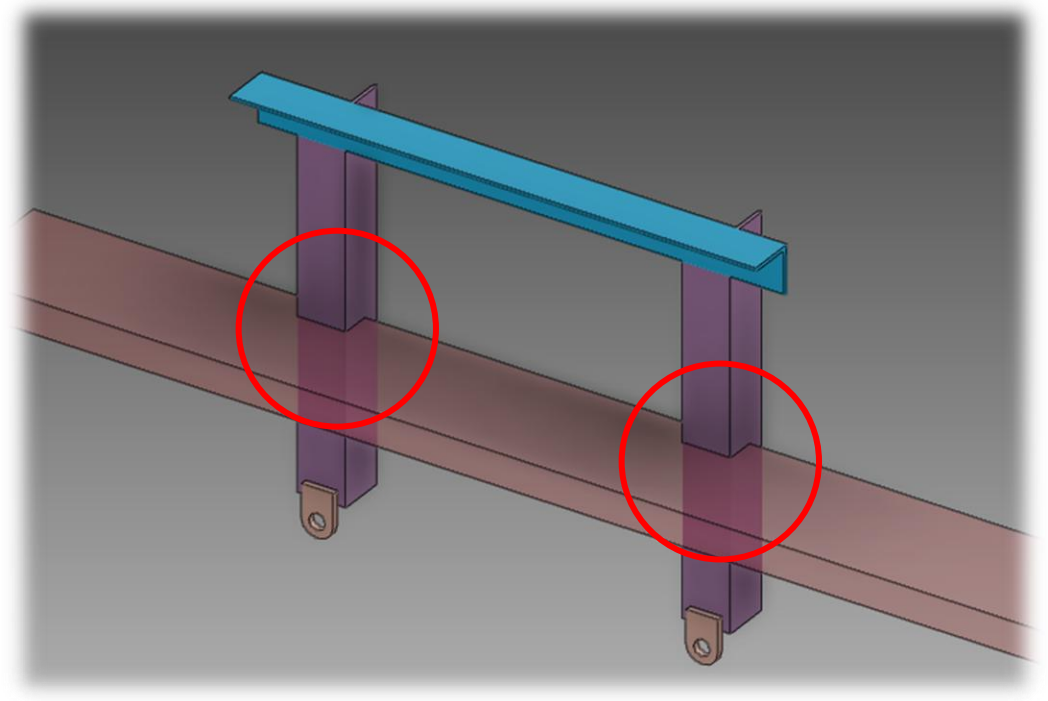


Expected Benefits

Reduction of Clash Issues



e.g. CWAY vs. Pipe



e.g. CWAY vs. Lifting Piece

Expected Benefits

Reduction of Cable Scrap

Sample Table

Cable No.	Cable Type	Manual Length	E3D Length	Difference
W-NV-2	FA-TTPYCSLA-1	19 m	18 m	1 m
W-RP-2	FA-MPYCYSLA-7	30 m	25 m	5 m
P-2M-33	FA-TPYC-16	191 m	179 m	12 m
W-RM-3	FA-TTPYCSLA-1	40 m	29 m	11 m
W-RT-7	5C-2VC	27 m	22 m	5 m

Expected Benefits

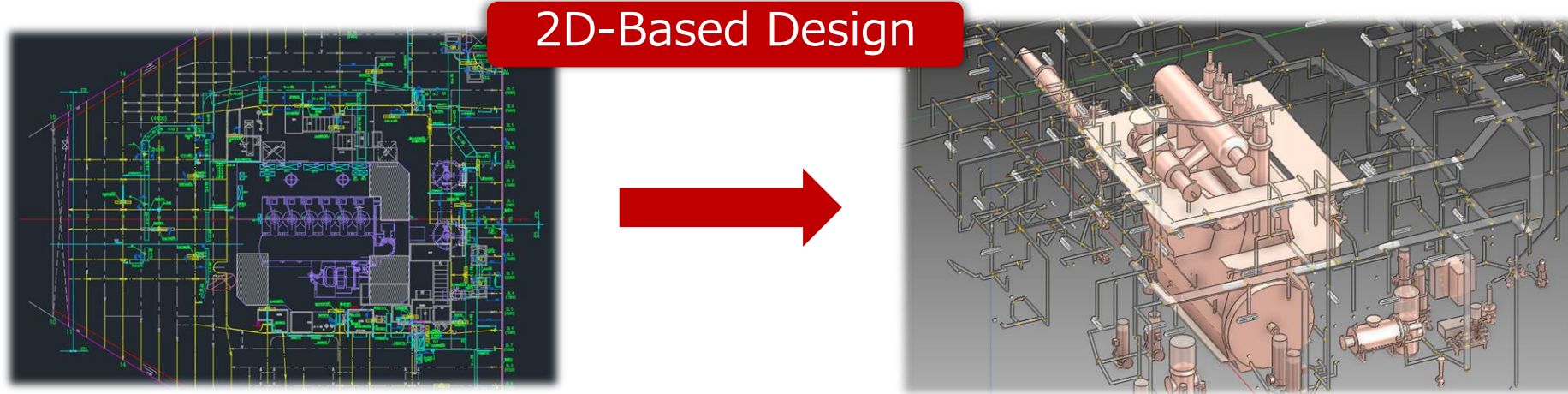
Improved Work Efficiency by Using a 3D Viewer



Future Challenges

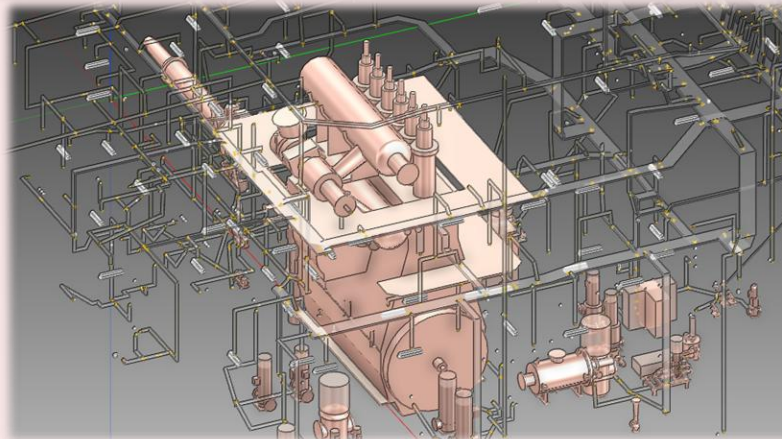
Cable Auto-Routing Requires Equipment Models for From/To Connections and CWAY Models. To Meet the Deadline, the Design Work Procedures Must Be Reviewed.

As-Is



To-Be

3D-First Design Approach



Agenda

1. Company Introduction
 2. History and Current Use of AVEVA
 3. Background and Objectives
 4. Project Initiatives
 5. Expected Benefits and Challenges
 - 6. Conclusion**
- Appendix. Use Cases of AVEVA XR Viewer

Conclusion

The Project Is Still **In Progress**,
But Our Evaluations Show That It Can Greatly Improve Electrical Work Efficiency.

Reduction in Cable Calculation Time



Reduction of Clash Issues



**DRAMATIC
RESULTS**

Reduction of Cable Scrap



Improved Work Efficiency
with 3D Viewer



Agenda

1. Company Introduction
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Use Cases of AVEVA XR Viewer

2025-AVEVA XR Viewer Implementation



VIVE Cosmos

Game Controller



Use Cases of AVEVA XR Viewer



Internship



Career Fair Booth

In the Future, We Plan to Apply It More Broadly,
Including in Internal Reviews and Client Review Meetings.

OUR MONODUKURI

The Japanese art of manufacturing

Thank You

The Hakodate Dock Co., Ltd. improves electrical work efficiency

Challenge

- Design and on-site operations were primarily 2D-based, and digitalization had not progressed
- Interference between electrical components was checked manually, which led to missed issues
- Cable lengths were calculated manually, which required significant time and effort

Solution

- Deploying AVEVA Engineering and E3D for data management, interference checking, automatic cable routing, and cable length calculation

Results

- Eliminating design errors through E3D interference checking
- Reducing cable length calculation time with automatic cable routing
- Reducing cable scrap through accurate length calculation
- Improving cable-laying efficiency through on-site 3D model utilization

