OCTOBER 26, 2023

The challenge of changing outfitting detail design methods

Avoiding wasted work with a new approach to shipbuilding

Tateishi Tatsuhiro

Namura Shipbuilding

AVEVAWORLD

Challenge of changing outfitting detail design methods

Tateishi Tatsuhiro
Namura Shipbuilding Co., Ltd.

Contents

- Company introduction
- Objective
- Action
- Benefit
- Future prospect
- Conclusion

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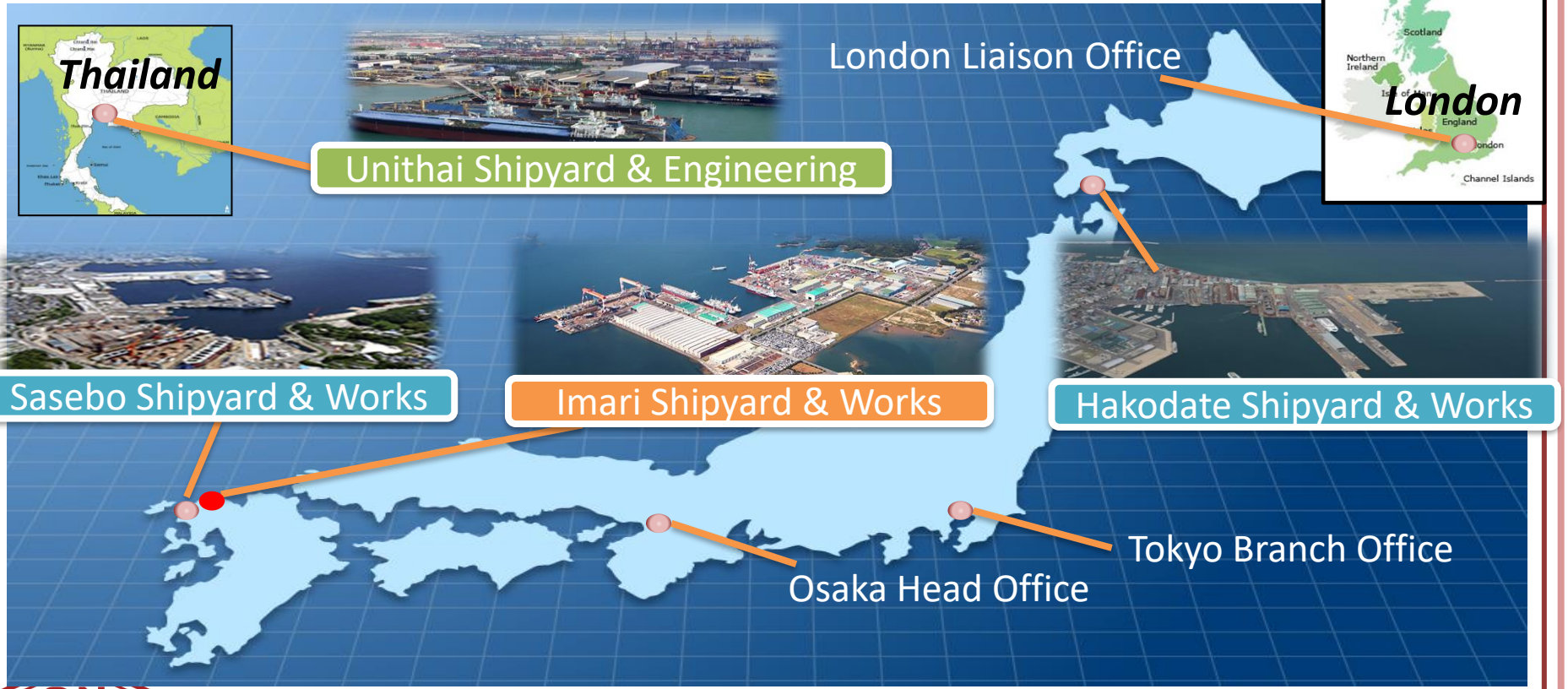
Group Companies



Group Companies

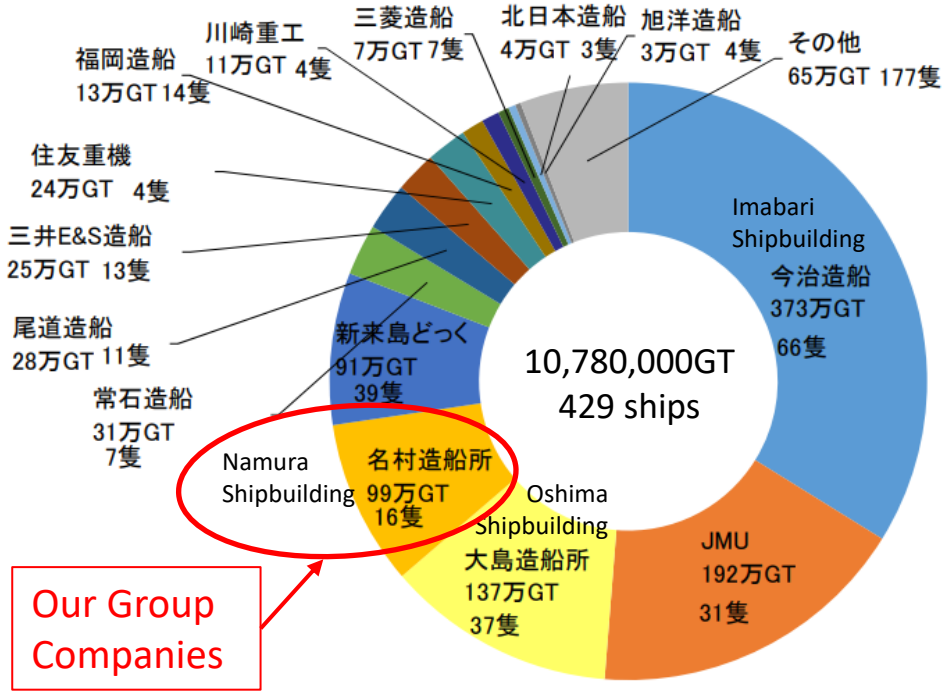
Sasebo Shipyard & W

ce

odate Shipyard & Works

okyo Branch Office

Construction volume by company in Japan in 2021



Our Group Companies

https://www.mlit.go.jp/maritime/content/001614700.pdf

Namura Shipbuilding Co., Ltd.

Imari Shipyard & Works

Site area : abt.720,000m^2
Dock : Semi-tandem
Goliath crane : 800t × 2, 300t × 1

Construction ability : abt. 8 ships / year
Employee : abt.1000
(Design section : abt.200)

Namura Shipbuilding Co., Ltd.

Products

Bulk carrier

34,000DWT

100,000DWT

182,000DWT

208,000DWT

250,000DWT

Products

Oil tanker

115,000DWT

310,000DWT

Namura Shipbuilding Co., Ltd.

Products

Gas carrier

38,000m^3
LAG/LPG Carrier

87,000m^3
LPG/Ammonia Carrier

Products

LNG fueled ship

Building and designing now

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Joint research

Hydrogen fuel cell ship

Ammonia fueled ammonia carrier

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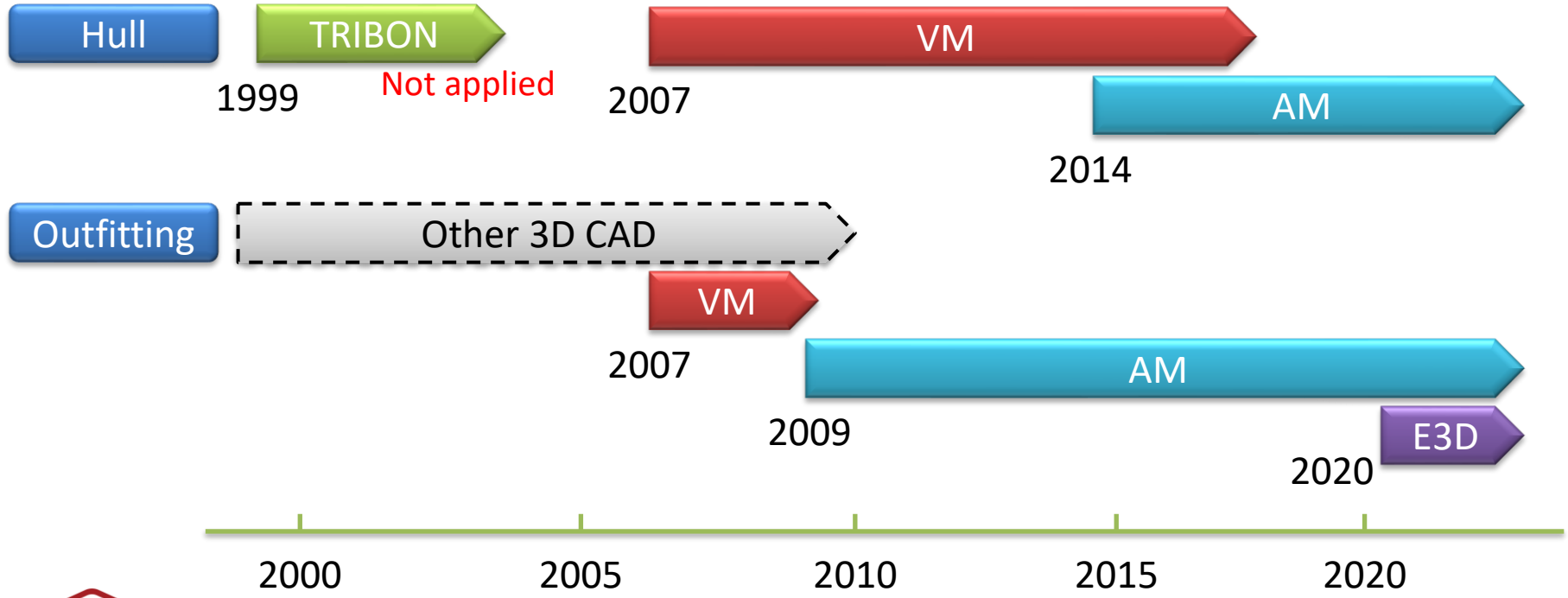
History of AVEVA™ in Namura

VM : Vantage Marine
AM : AVEVA™ Marine
E3D : AVEVA™ E3D Design



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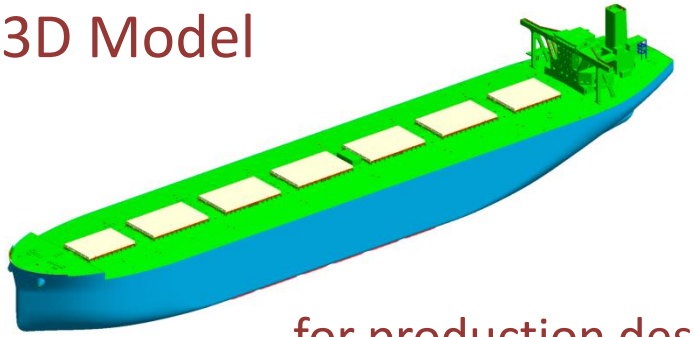
Usage situation

Hull

3D Model



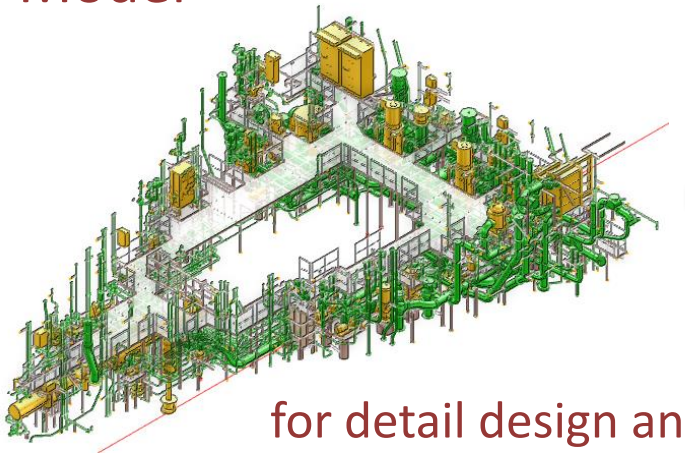
for production design

- Estimate material quantity
- Production information
- Jig consideration for hull plate
- Lifting simulation
- Painting area calculation

Usage situation

Outfitting

3D Model



for detail design and
production design

- Clash check
- Connection check
- Make Production Drawing
- Quantity totaling

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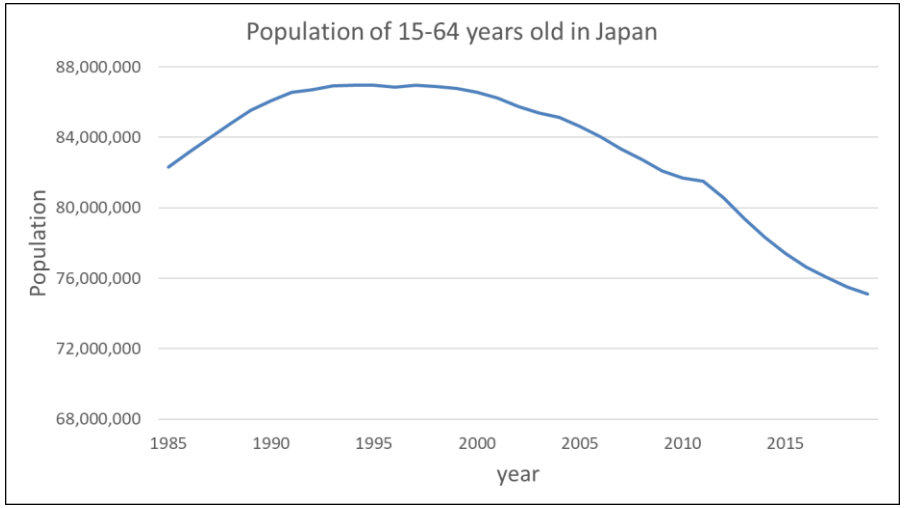
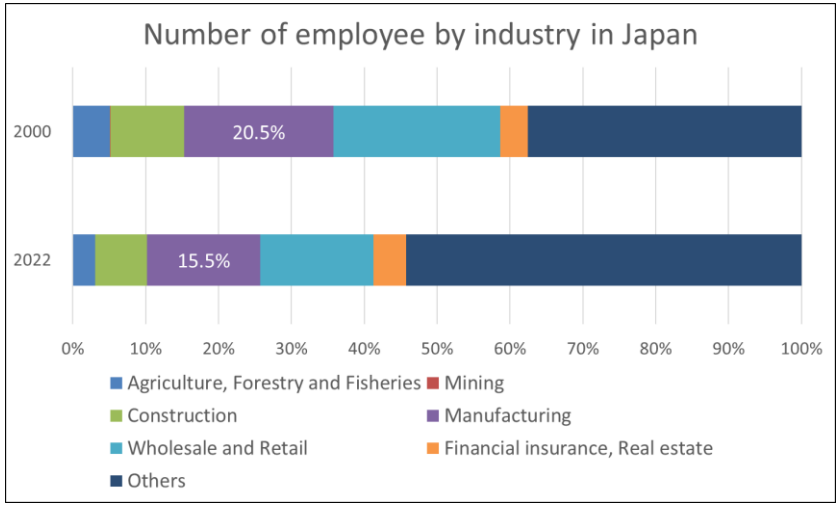
Manufacturing industry situation in Japan





It is difficult to secure human resources.

Company situation

- Maritime cargo movement is increasing.
- It is necessary to develop and build eco-friendly ships.
- It takes more time to develop eco-friendly ship.

We need to develop and build ships efficiently!

Objective

Shorten total design time

- Reduce manual operation
- Reduce feedback work

Unified design information

- Easy to communicate with other designers
- Improvement of design quality

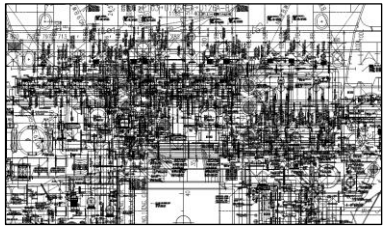
Current Method of Piping Design

Manual

Semi auto

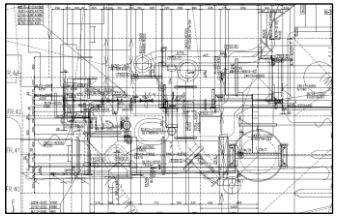
Automation

Arrangement drawing



6. Make drawing

Installation drawing

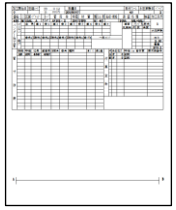


4. Feedback

1. Design by 2D

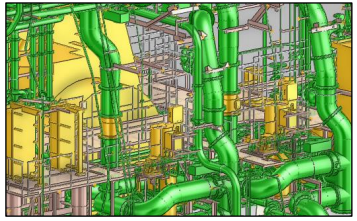
3. Check and modify

5. Make drawing

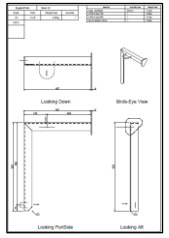


Production drawing of pipe
(in-house system)

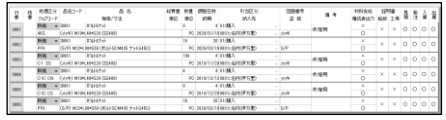
2. Modeling



3D model



Production drawing of support



Report

5. Some report are created by manual

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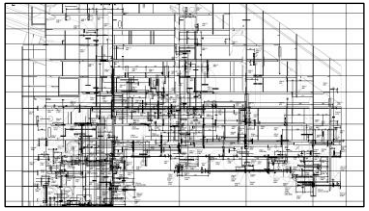
New Method of Piping Design

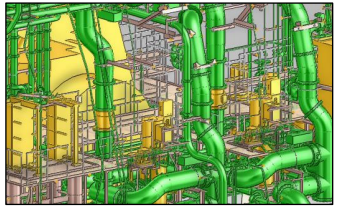
Semi auto

Automation

Arrangement drawing
(Simple)



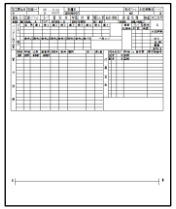
1. Design by 3D



3D model

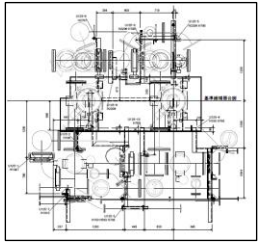
3. Make Drawing

2. Make Drawing

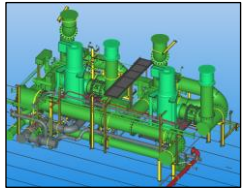


Production drawing of pipe
(in-house system)

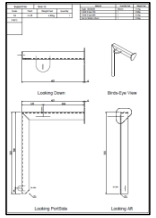
Installation drawing
(Simple)



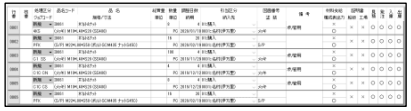
4. Output



3D Viewer



Production drawing of support



Report

Namura Shipbuilding Co., Ltd.

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Organize assignments

Insufficient design capability

- Insufficient capability to design in-house due to the number of personnel on the premise of using design outsourcing.

Drawing creation using 3D models

- Draft of AVEVA Marine is harder to use than AutoCAD.
- Difficult to copy drawings between projects.

Action plan

Enhancement of check function

- Enhanced check function for insufficient design capability

Investigation of drawing creation using 3D model

- Migration to E3D for taking advantage of the enhanced DRAW function
- Drawing copy between projects

Use 3D viewer

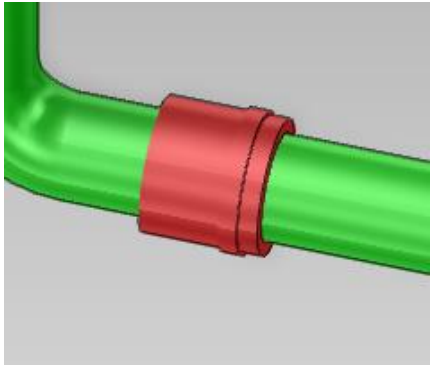
- Use 3D Viewer to simplify drawings

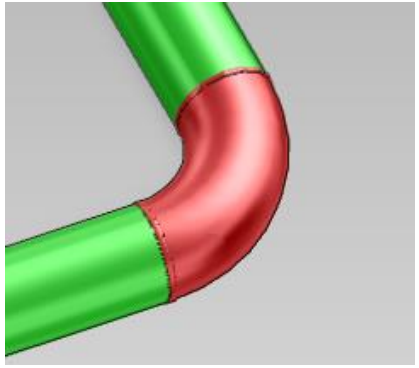
Enhancement of check function

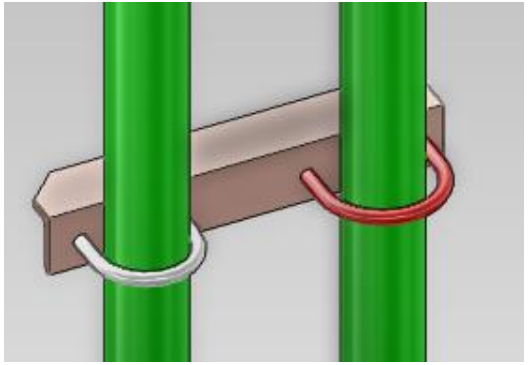
Check items : 181

For example

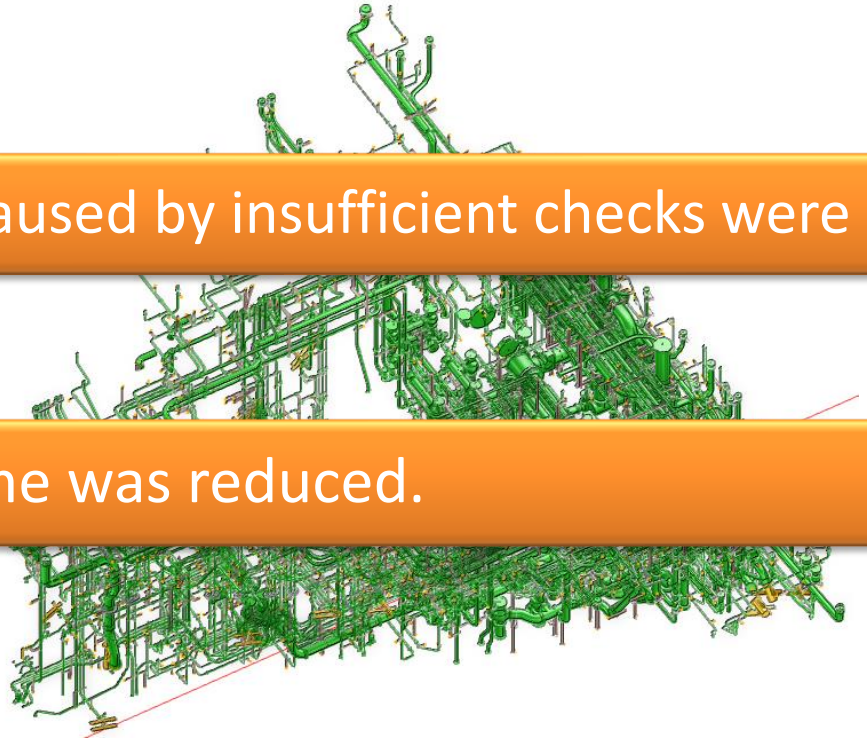
- ✓ Sleeves on polyethylene lined pipes
- ✓ Elbows with bend angles greater than 90°
- ✓ U-bolts and pipes size mismatch







Enhancement of check functions



Defects caused by insufficient checks were reduced.

Check time was reduced.

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Migration to E3D for using DRAW function

Compared standard functions of AVEVA Marine and AVEVA E3D Design

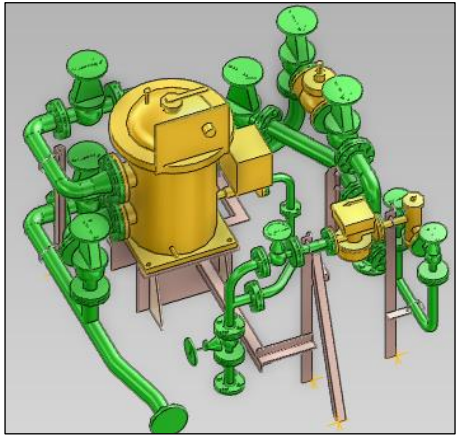
- ✓ Functions that can basically do the same are prepared
- ✓ Create a program because there is no “Ship Reference”

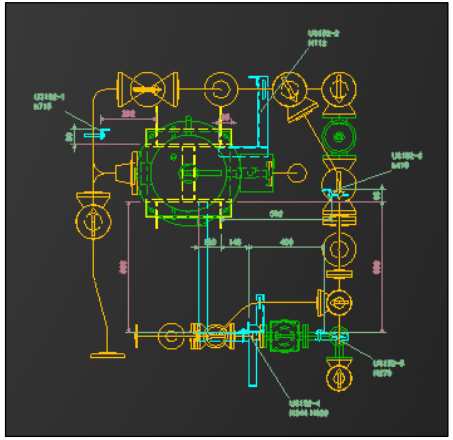
Operation check of customized programs

- ✓ Some programs need modifications for E3D

Migration to E3D for using DRAW function

Drawing can now be created efficiently using the DRAW function





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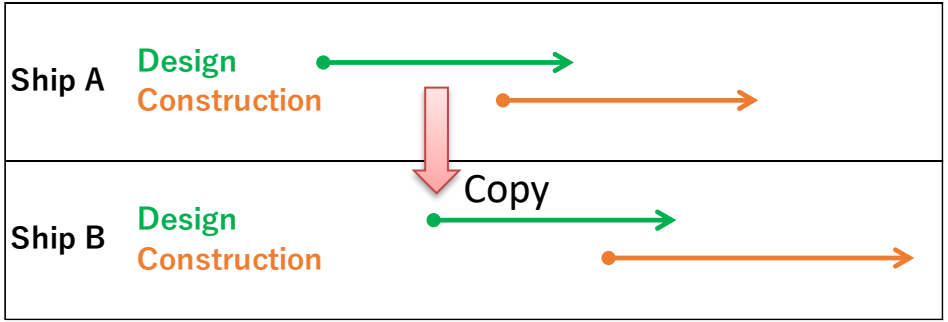
Drawing copy between projects

- Shipyards build many similar ships.
  Copies of models and drawings are required.
- Depending on the construction schedule, the design of next ship must be started (copying of the model) before the design of the original ship is completed.

Construction Schedule Image



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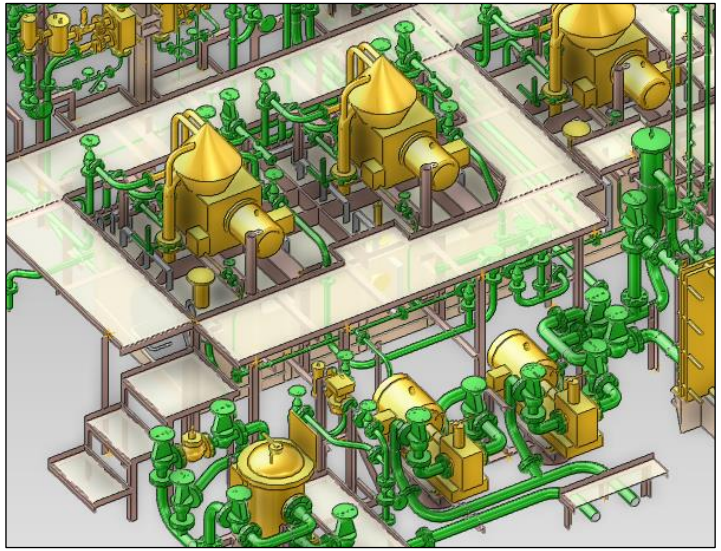
Drawing copy between projects

Even in the same section, the designer is different depending on each outfitting.



Equipment ⇒ Designer A

Piping
Pipe Support ⇒ Designer B

Seat ⇒ Designer C

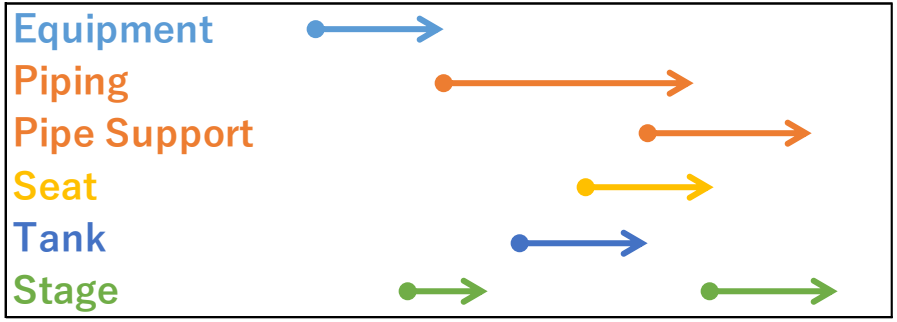
Tank ⇒ Designer D

Stage ⇒ Designer E

Drawing copy between projects

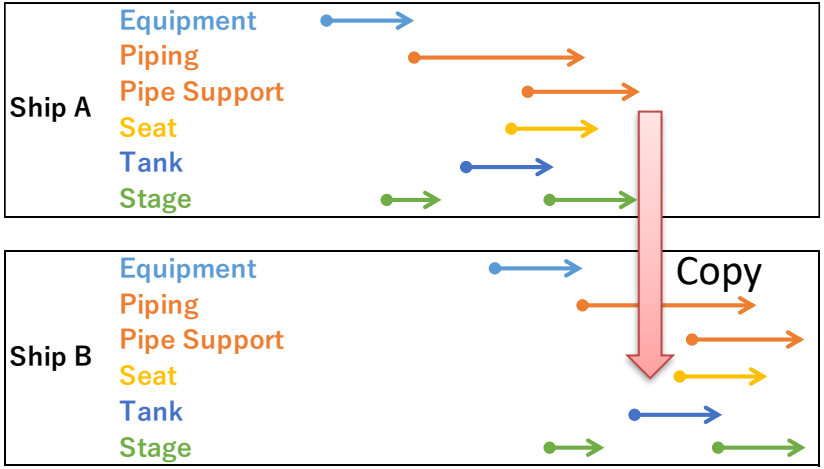
Each designer creates the models at their own timing.

Modeling Schedule Image



Drawing copy between projects

Depending on the timing, the necessary model may not be available when creating the drawing for the next ship.



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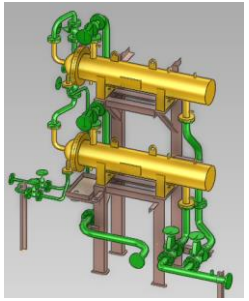
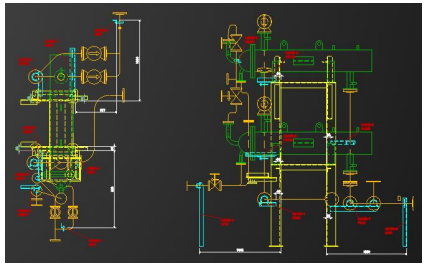
Drawing copy between projects

DB Listing cannot be copied unless there is a model used in the original drawing.

Ship A

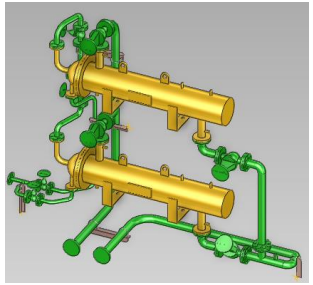


Create Drawing

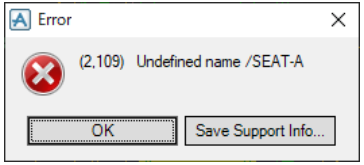


Ship B

Copy and modify



Copy



Cannot copy!

Drawing copy between projects

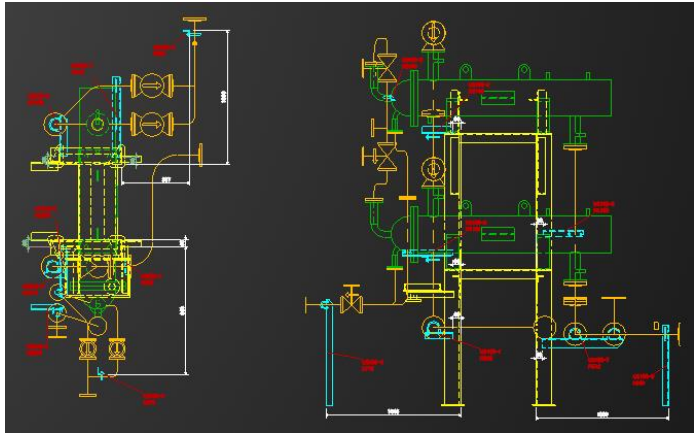
Created a program to copy drawings

- ✓ Does not stop even if an error occurs
- ✓ Replace the dimensions with a model that is close to the original drawing
- ✓ Change the color of changed dimensions

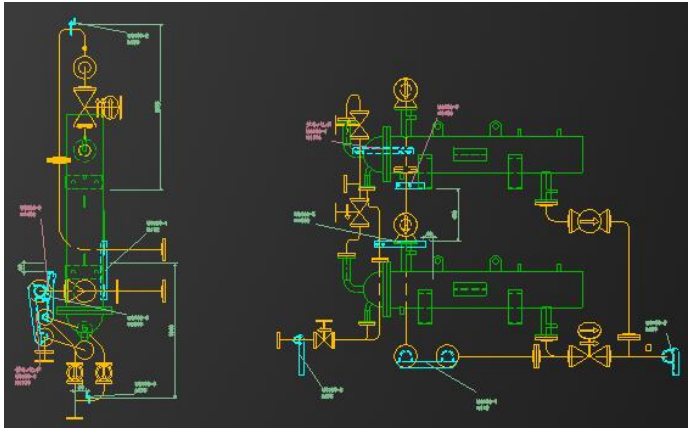
Drawing copy between projects

Possible to copy drawings between projects

Ship A



Ship B



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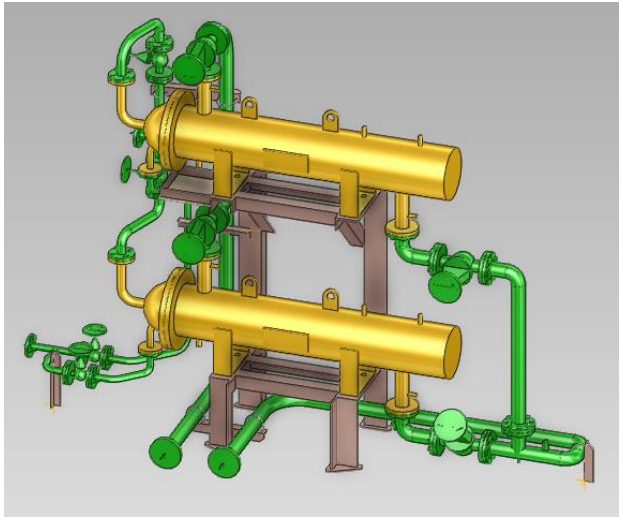
Use 3D viewer

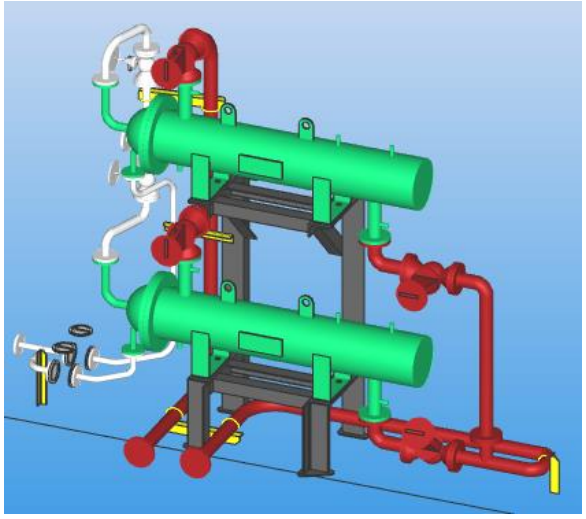
Output 3D model to viewer

AVEVA



Shape
Attribute

Viewer (third party)



Use 3D viewer

The 3D Viewer is used for outfitting installation work.

Unit assembly

Installation to upside down block

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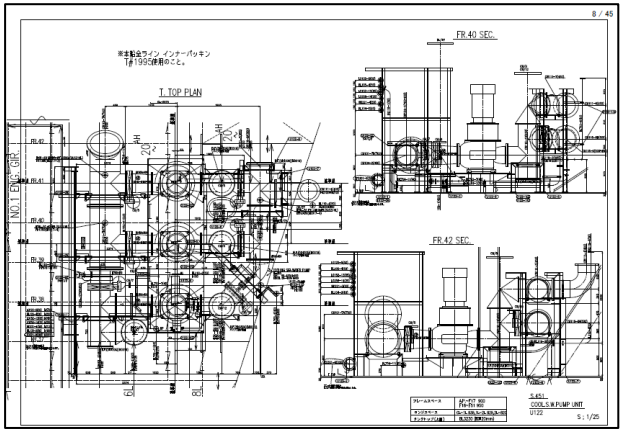
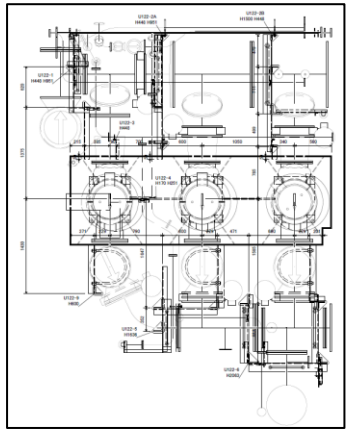
Use 3D viewer

Reduce drawing creation time by simplifying installation drawings



Old drawing



Simplifying drawing

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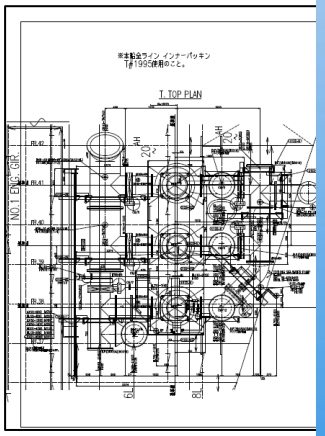
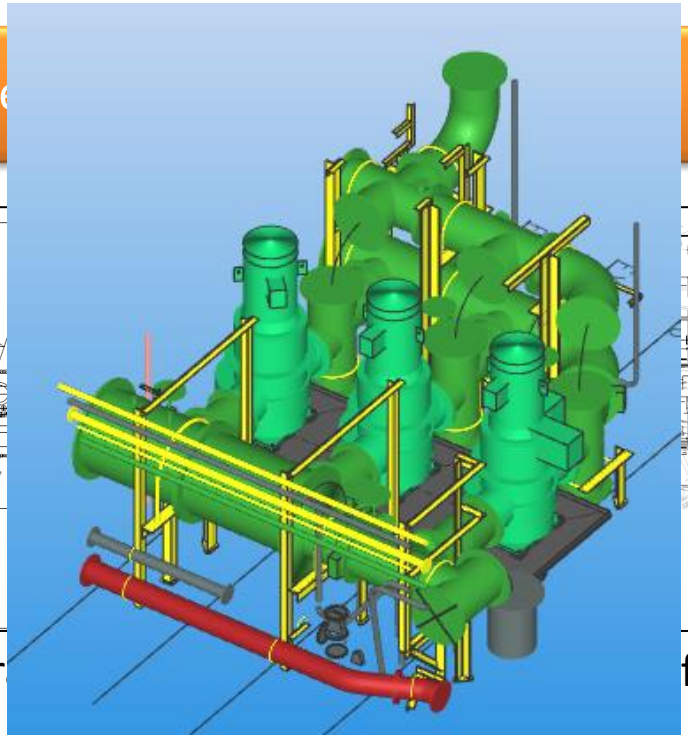
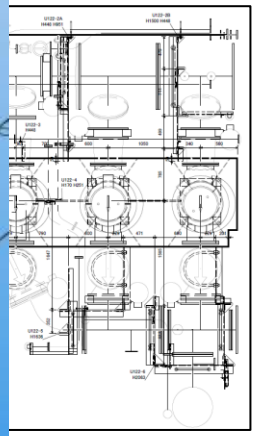
Use 3D viewer

Reduce drawing cre lation drawings



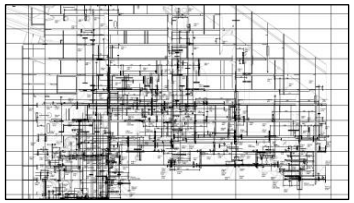




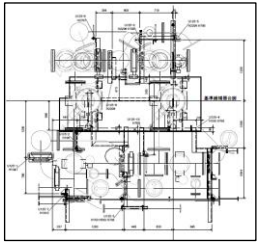
Old dr fying drawing

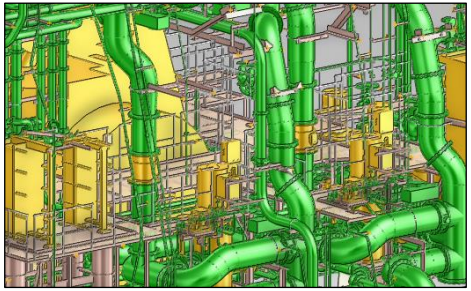
Partially changed to 3D based design method

Arrangement drawing
(Simple)

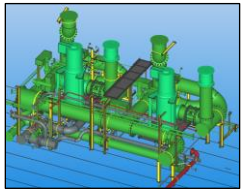


Installation drawing
(Simple)

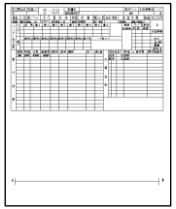




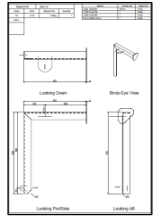
3D model



3D Viewer



Production
drawing of
pipe
(in-house system)



Production
drawing of
support

Report

Namura Shipbuilding Co., Ltd.

Contents

- Company introduction
- Objective
- Action
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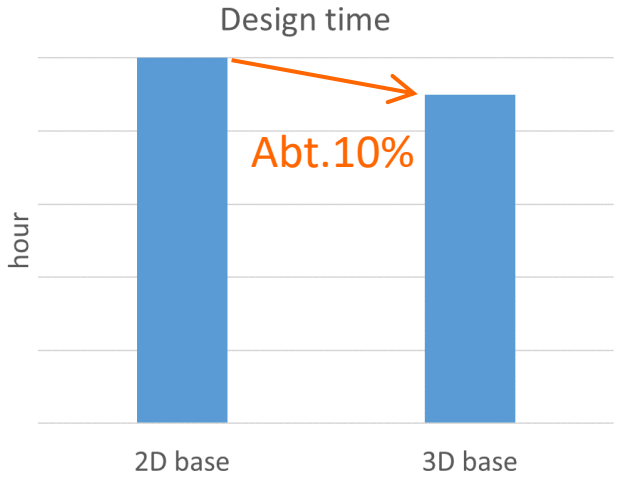
- Conclusion

Benefits

- Manual operations were reduced
- Feedback works were reduced

  ✓ Design time was reduced about 10%

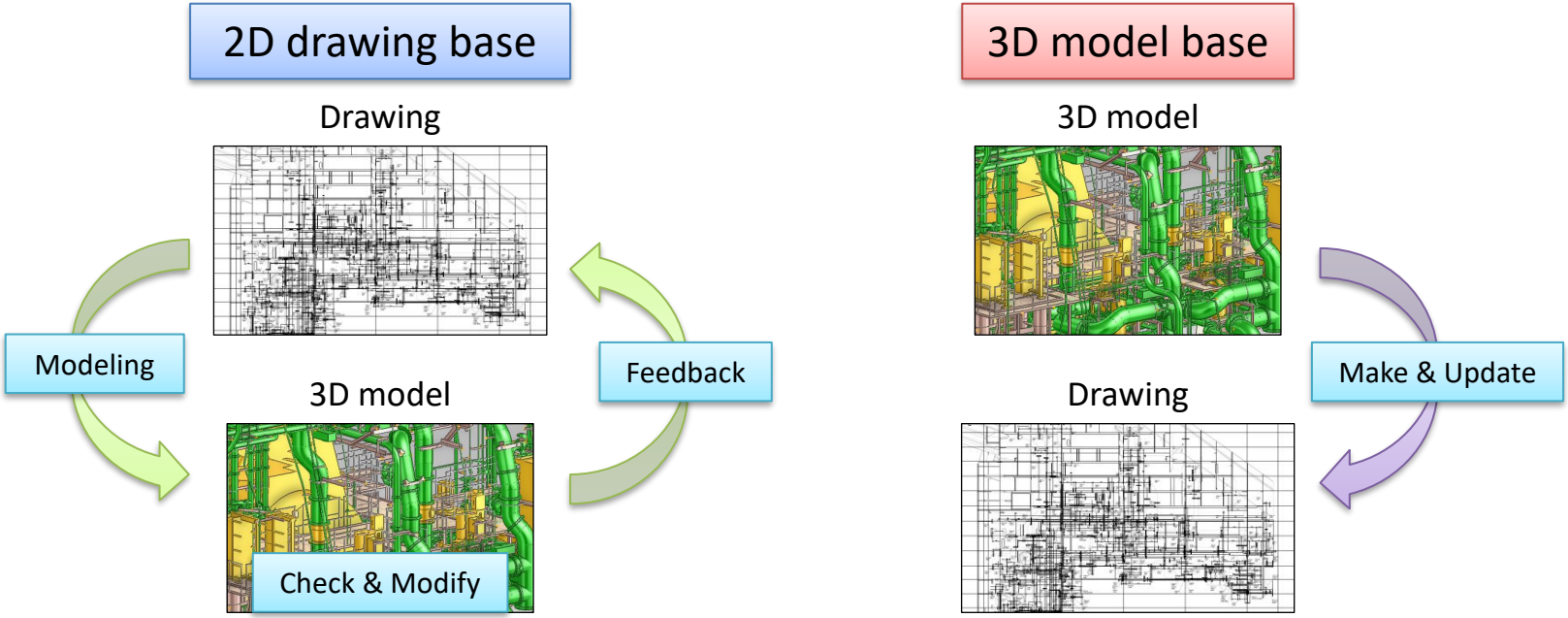


× Total design time was not shortened

Need to change as a whole

Benefits

✓ Detail design information was unified



Which is correct ?

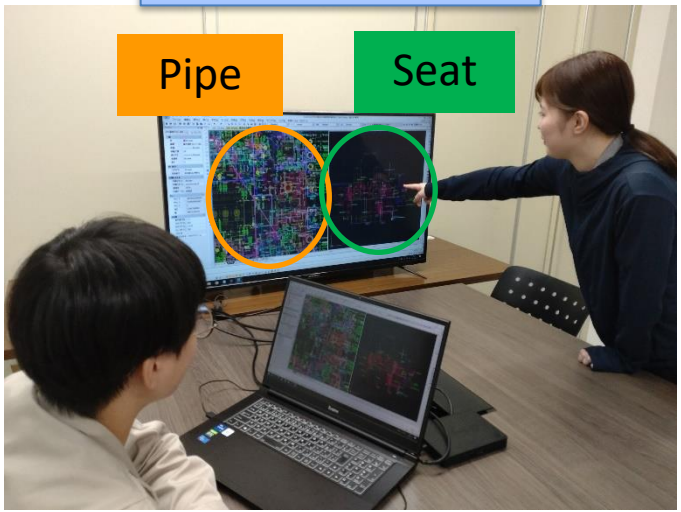
Model is always correct

Namura Shipbuilding Co., Ltd.

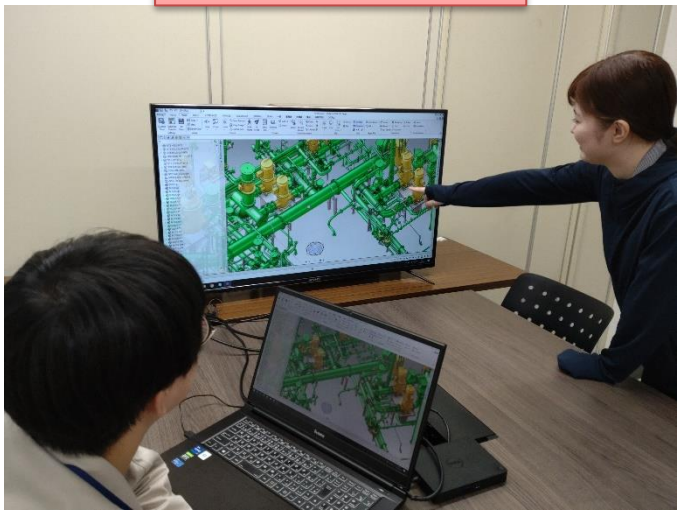
Benefits

✓ Easier to communicate with other designers

2D drawing base



3D model base



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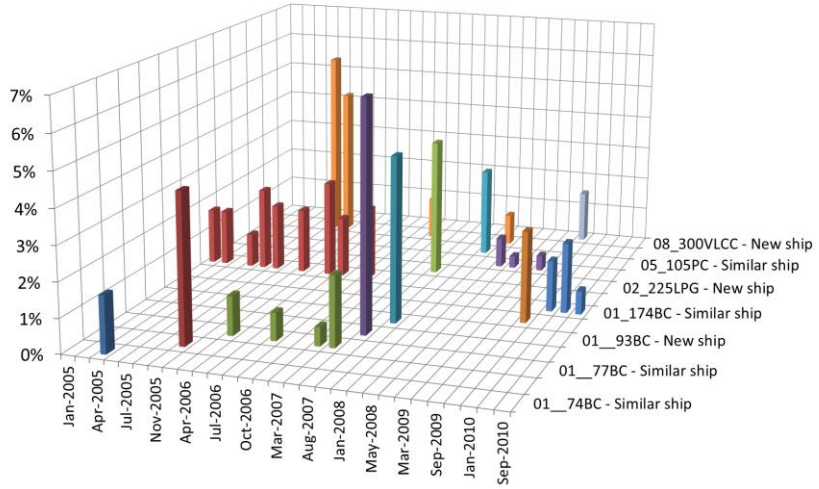
Benefits

✓ Design quality was improved

Before using AVEVA

Re-manufacturing rate of pipe (≒Defect)



Average 2.1%
Maximum 6.6%

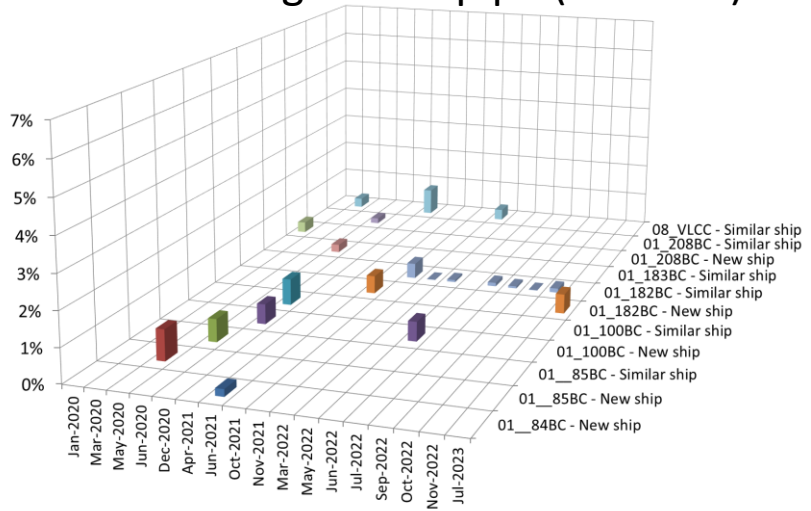
Namura Shipbuilding Co., Ltd.

Benefits

✓ Design quality was improved

Recently

Re-manufacturing rate of pipe (≒Defect)



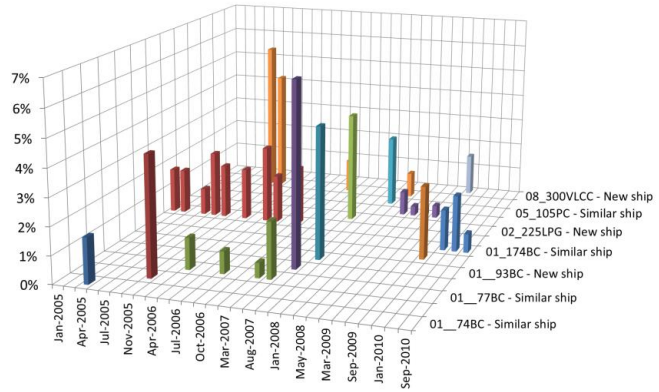
Average 0.4%
Maximum 0.9%

Benefits

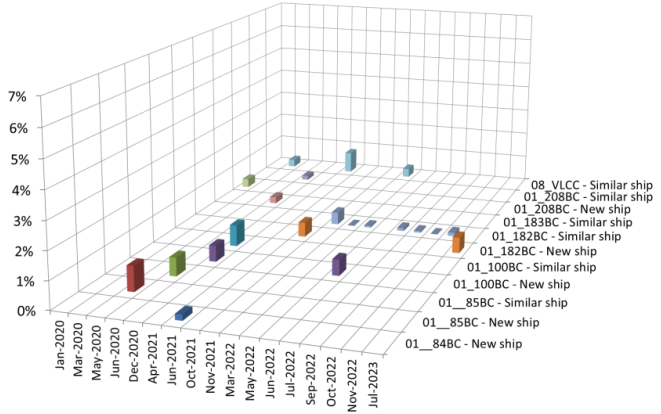
✓ Design quality was improved

Re-manufacturing rate of pipe (≒Defect)

Before using AVEVA



Recently



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Future prospect

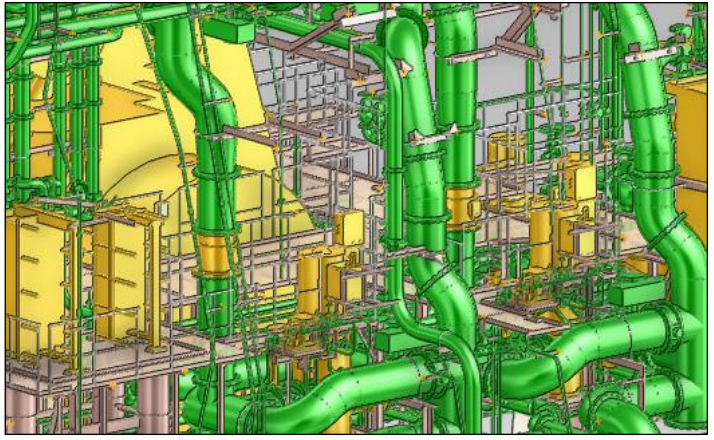
Cooperation with procurement system

Procurement system
(in-house system)

Material
Quantity

Arrival status
Supplier etc.

3D model



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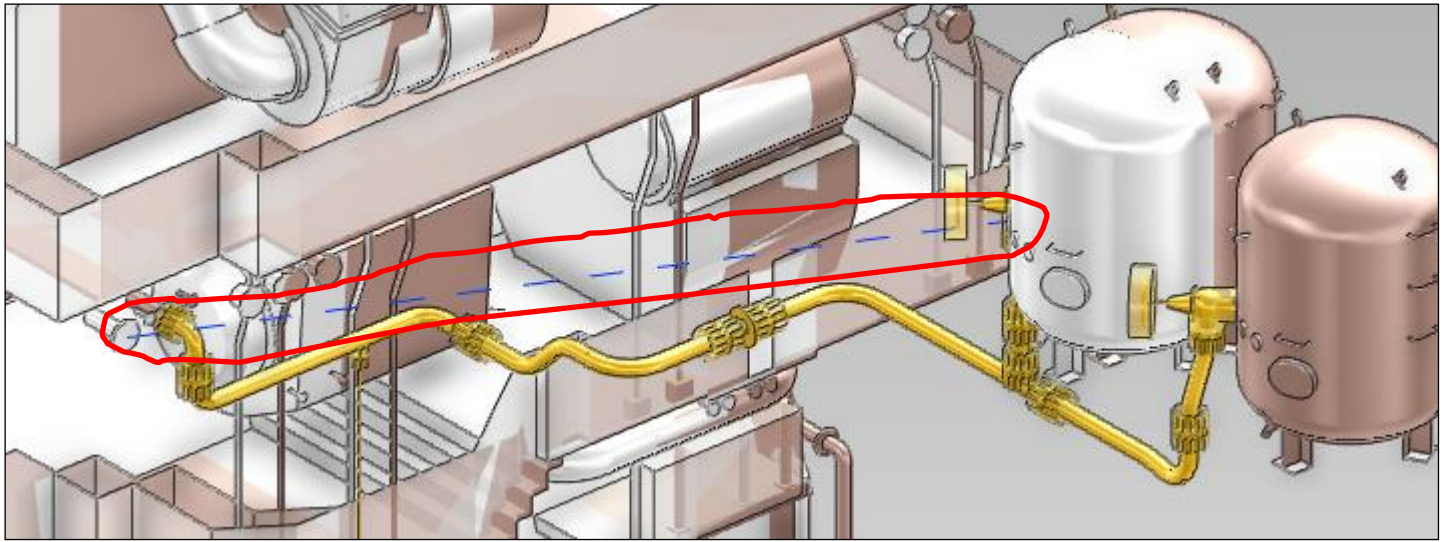
Future prospect

Auto routing



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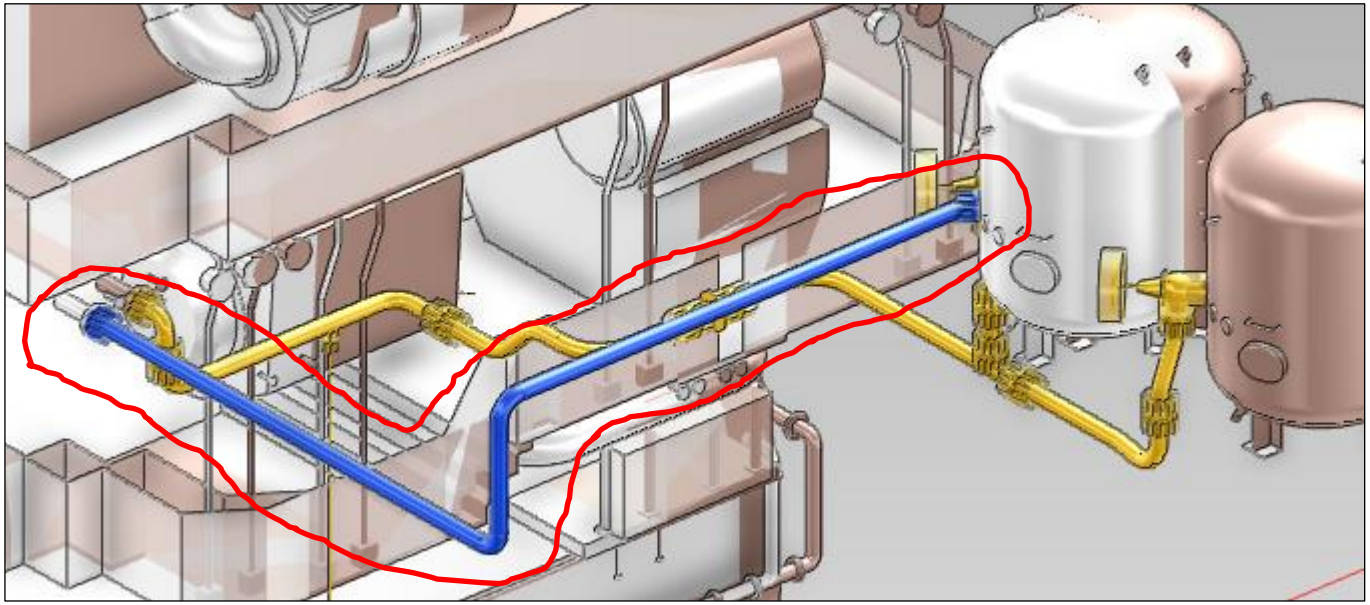
Future prospect

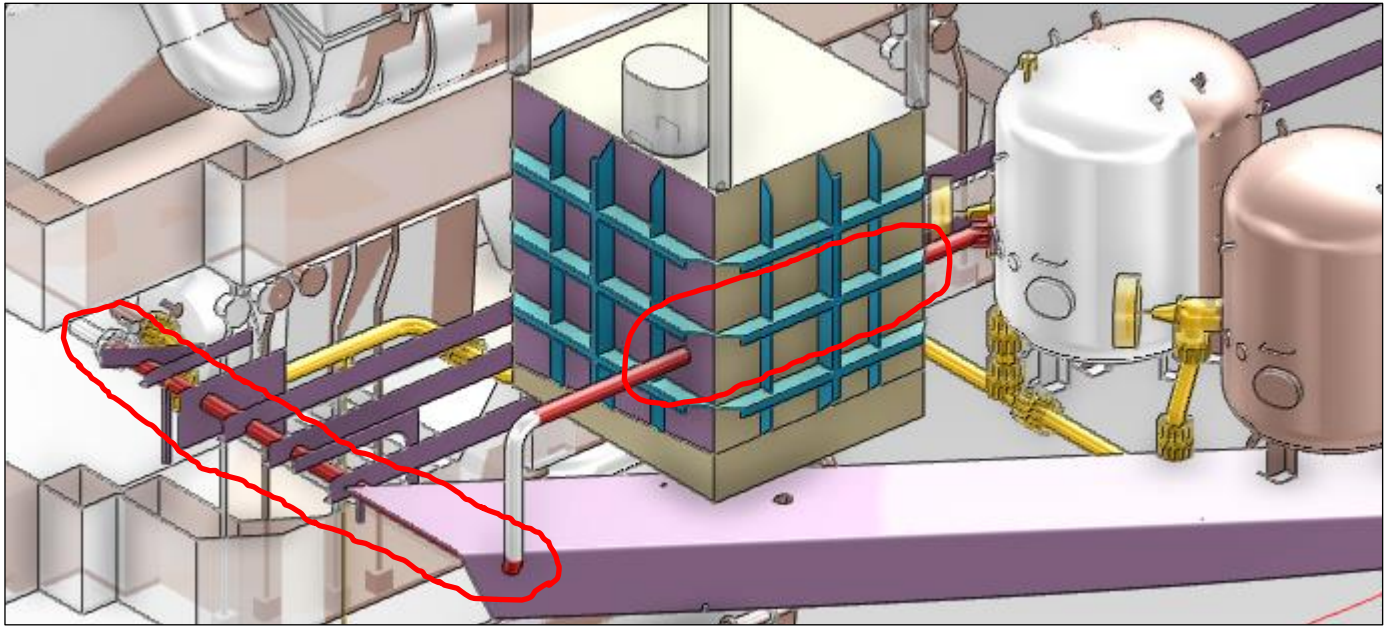
Auto routing



Namura Shipbuilding Co., Ltd.

Future prospect

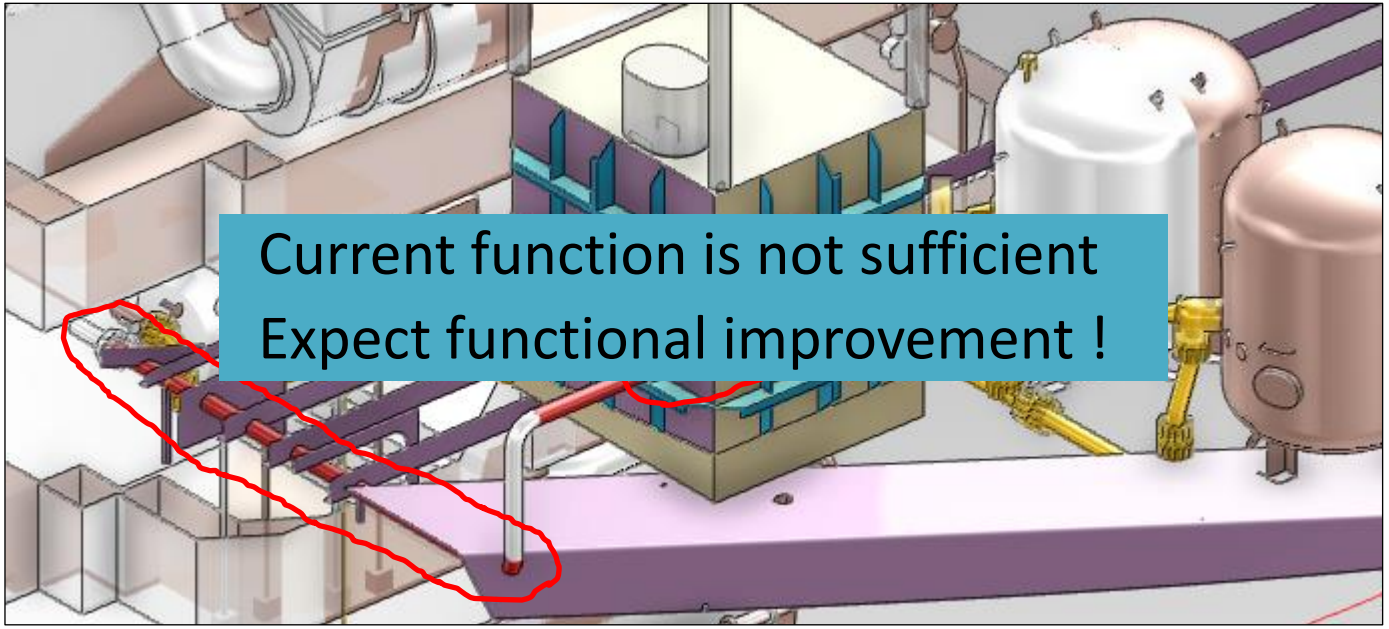
Auto routing



Namura Shipbuilding Co., Ltd.

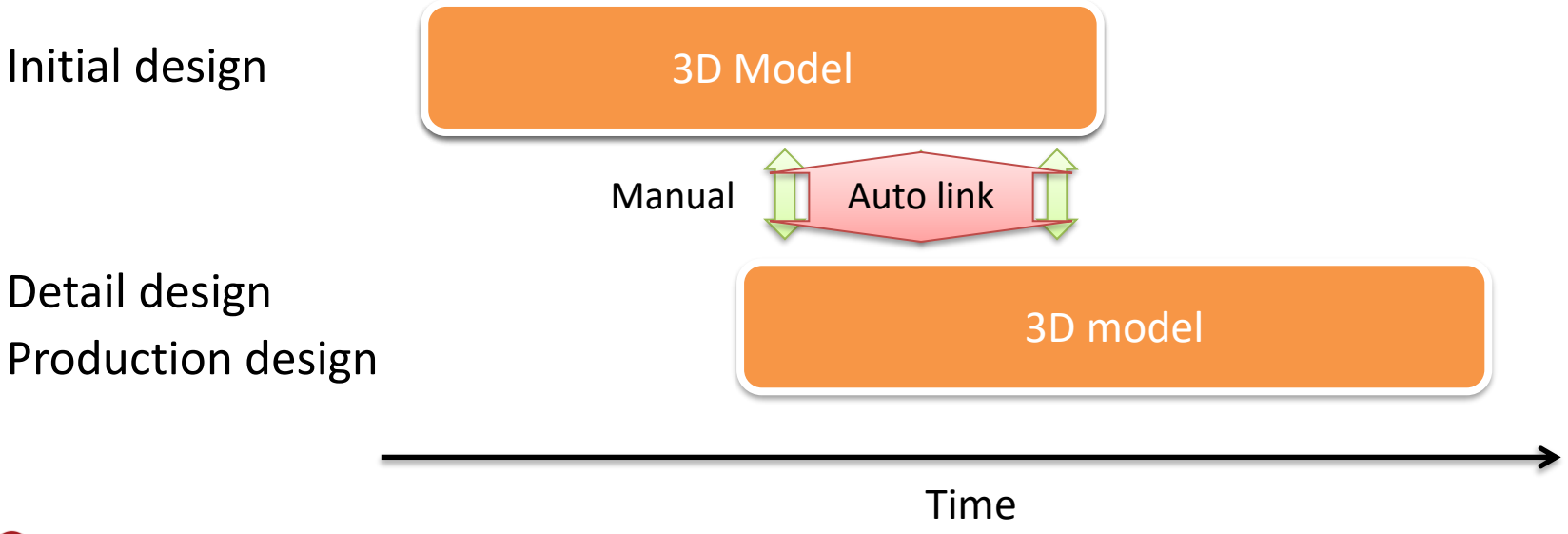
Future prospect

Auto routing



Future prospect

Utilization of 3D models from initial design



Conclusion

- ✓ Partially changed to 3D based design method
- ✓ Design time was reduced abt. 10%
- × Total design time could not be shortened
- ✓ Detail design information was unified
- ✓ Design quality has improved
  Defect of pipe reduced 2.1% to 0.4%

We will continue to change design method to develop and build good ship efficiently !

MARINE | JAPAN

Namura Shipbuilding improves engineering quality and realizes 10% reduction in design time

Challenge

- With maritime cargo movement increasing combined with a growing need for eco-friendly ships, Namura Shipbuilding needed to develop and build ships more efficiently
- Current systems required a lot of manual work, making collaboration difficult
- With multiple ships built at any one time, Namura needed a way to copy drawings between projects to speed up the design process and reduce wasted work

Solution

- Long-time users of AVEVA™ Marine, Namura implemented AVEVA™ E3D Design to provide a central design system that allows for easier collaboration, design checking and automated work across the shipbuilding lifecycle

Results

- **Increased trust since the unified system meant the model's detailed design information is always correct, reducing manual operations and improving feedback loops**
- **Improved collaboration makes it easier to communicate with other designers**
- **Design quality improved with pipe defects reduced from 2.1% to 0.4%**
- **Design time was reduced by approximately 10%**


Thank you for your kind attention

Questions?

Please wait for the microphone.

State your name and company.

Please remember to…

Navigate to this session in the mobile app to complete the survey.

Thank you!

AVEVA

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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

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