The challenge of changing outfitting detail design methods

Avoiding wasted work with a new approach to shipbuilding

Tateishi Tatsuhiro
Namura Shipbuilding
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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• Action
• Benefit
• Future prospect
• Conclusion
Namura Shipbuilding Co., Ltd.

Group Companies

Osaka Head Office

Tokyo Branch Office

Hakodate Shipyard & Works

Imari Shipyard & Works

Sasebo Shipyard & Works

London Liaison Office

Unithai Shipyard & Engineering

Thailand

London
Construction volume by company in Japan in 2021

10,780,000GT
429 ships

Our Group Companies

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

Namura Shipbuilding Co., Ltd.
Imari Shipyard & Works

Site area : abt.720,000m²  Construction ability : abt. 8 ships / year
Dock : Semi-tandem  Employee : abt.1000
Goliath crane : 800t × 2, 300t × 1  (Design section : abt.200)
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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

38,000m³
LAG/LPG Carrier

87,000m³
LPG/Ammonia Carrier

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Products

LNG fueled ship
Building and designing now
Joint research

Hydrogen fuel cell ship

Ammonia fueled ammonia carrier

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History of AVEVA™ in Namura

Hull
- TRIBON: 1999
- VM: 2007
- AM: 2007
- VM: 2009
- AM: 2014
- E3D: 2020

Outfitting
- Other 3D CAD
  - VM: 2007
  - AM: 2009

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

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Usage situation

3D Model for production design

- Hull

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

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Usage situation

Outfitting

3D Model

for detail design and production design

Clash check
Connection check
Make Production Drawing
Quantity totaling

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Contents

• Company introduction
• Objective
• Action
• Benefit
• Future prospect
• Conclusion
It is difficult to secure human resources.

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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

1. Design by 2D
2. Modeling
3. Check and modify
4. Feedback
5. Make drawing
6. Make drawing

Arrangement drawing

3D model

Installation drawing

Production drawing of pipe (in-house system)

Production drawing of support

Report

Manual
Semi auto
Automation

5. Some report are created by manual

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New Method of Piping Design

1. Design by 3D

2. Make Drawing

3. Make Drawing

4. Output

Arrangement drawing (Simple)

Installation drawing (Simple)

3D model

3D Viewer

Production drawing of pipe (in-house system)

Production drawing of support

Report

Semi auto

Automation

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Contents

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

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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.
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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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.
Even in the same section, the designer is different depending on each outfitting.
Each designer creates the models at their own timing.
Drawing copy between projects

Depending on the timing, the necessary model may not be available when creating the drawing for the next ship.
DB Listing cannot be copied unless there is a model used in the original drawing.
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

Viewer (third party)

Shape
Attribute

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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 creation time by simplifying installation drawings

Old drawing

Simplifying drawing
Partially changed to 3D based design method

Arrangement drawing
(Simple)

Installation drawing
(Simple)

3D model

Production drawing of pipe
(in-house system)

Production drawing of support

Report

3D Viewer

Namura Shipbuilding Co., Ltd.
Contents

• Company introduction
• Objective
• Action
• Benefit
• Future prospect
• 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

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Benefits

✓ Detail design information was unified

Which is correct?

Model is always correct

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Benefits

✓ Easier to communicate with other designers

2D drawing base

3D model base

Pipe
Seat
Benefits

✓ Design quality was improved

Before using AVEVA

Re-manufacturing rate of pipe (≒Defect)

Average 2.1%
Maximum 6.6%
Benefits

✓ Design quality was improved

Recently

Re-manufacturing rate of pipe (≒Defect)

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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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Contents

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

Cooperation with procurement system

Procurement system
(in-house system)

3D model

Material
Quantity

Arrival status
Supplier etc.
Future prospect

Auto routing
Future prospect

Auto routing

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Future prospect

Auto routing

Current function is not sufficient
Expect functional improvement!
Future prospect

Utilization of 3D models from initial design

Initial design

3D Model

Manual

Auto link

Detail design

Production design

3D model

Time

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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!
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?
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State your name and company.

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

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