



SSIWSC 2024

Design. Build. Maintain. Connect.

Enabling the Digital Thread for Shipbuilding Enterprise Environments

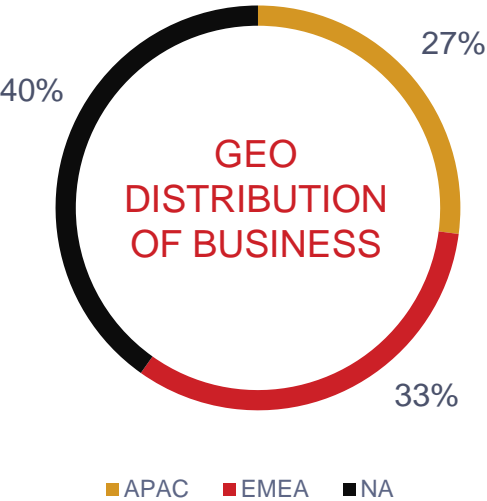
Kevin Richard | Aras, Director of Product Management

Bruno Benevolo | SSI, Director of Enterprise Solutions

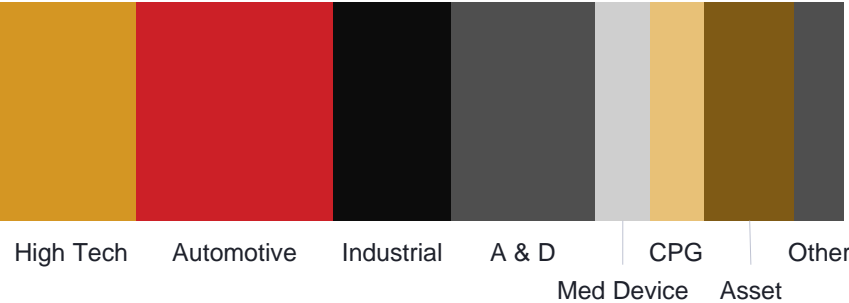


Aras at a Glance

Aras delivers an open and adaptable platform for building PLM and digital thread solutions that empowers digital engineering and product teams to unlock innovation across their organizations.



VERTICAL DISTRIBUTION OF BUSINESS



800
EMPLOYEES

600+
CUSTOMERS

1.6M+
USERS



ANDOVER, MA USA | TOKYO | MUNICH | LYON | LONDON | POLAND | NETHERLANDS | SWEDEN | DENMARK

A Leader in Product Lifecycle Management

TOP RATED PLM SOLUTION

by Peer Review Sites



Aras Innovator



Aras Innovator



RECOGNIZED AS A LEADER

by Industry Analysts

Aras positioned as technology
LEADER
in 2023 Forrester Wave
PLM For Discrete Manufacturers

FORRESTER®

Aras positioned as technology
LEADER
in 2023 SPARK Matrix
for PLM



Aras is a Mindshare
LEADER
for 2023

CIMdata

Unlocking Innovation @ Seaspán



Challenges

- Needed a single source of truth
- Management of multiple project phases at one time
- Change Management across lifecycle
- Needed to collaborate across geographically dispersed teams

Solution

Deployed Aras Innovator with two-pronged approach: Create a unified data source and deploy effective change management

Outcomes

- Embraced document-centric, then product-centric PLM
- Centralized resource planning
- Effective change management
- Improved dispersed workforce management
- Single source of truth for data within Aras Innovator
- Traceability across the product lifecycle

Together, SSI and Aras Innovator help shipbuilders to:



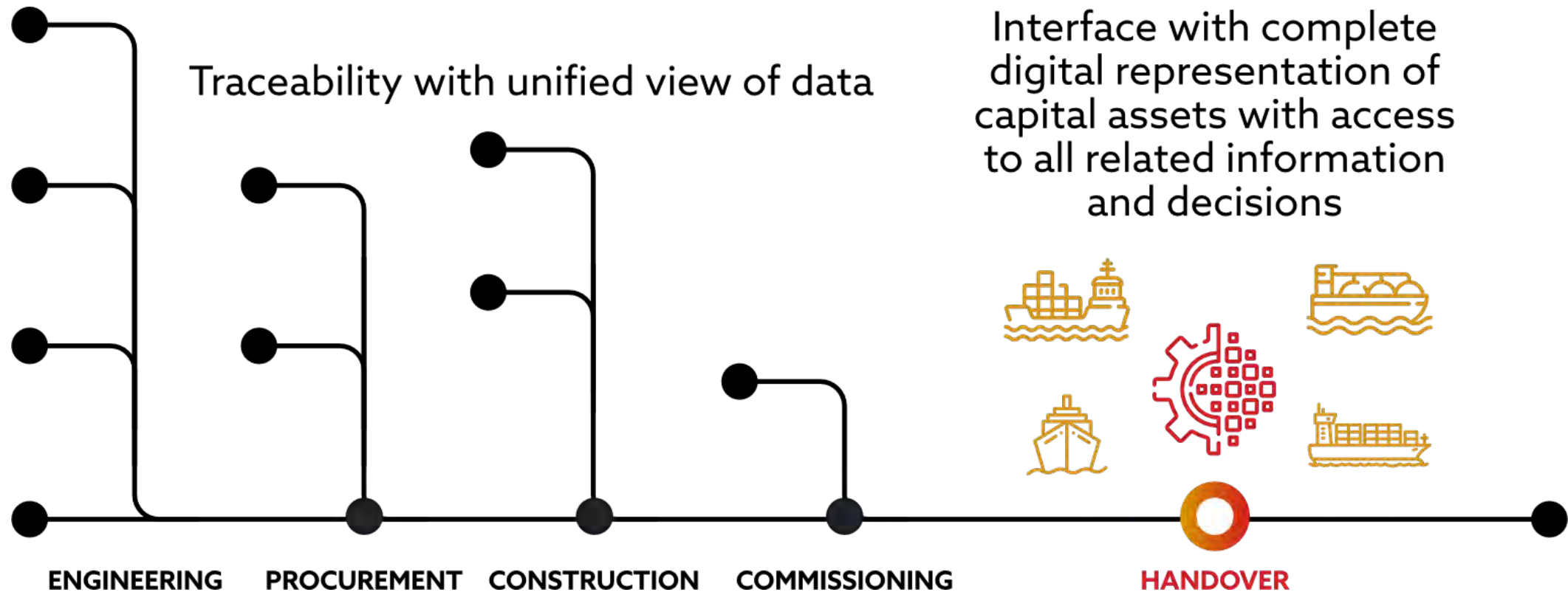
- ***Utilize Low-code Platform*** to tailor core functions to the unique needs of the shipbuilding community
- ***Extend the Digital Thread*** for the full shipbuilding Lifecycle
- ***Leverage the Configuration Management Services*** for the shipbuilding data model
- ***Incorporate the 3D Visualization and Collaboration***



INGALLS
SHIPBUILDING
A Division of HII



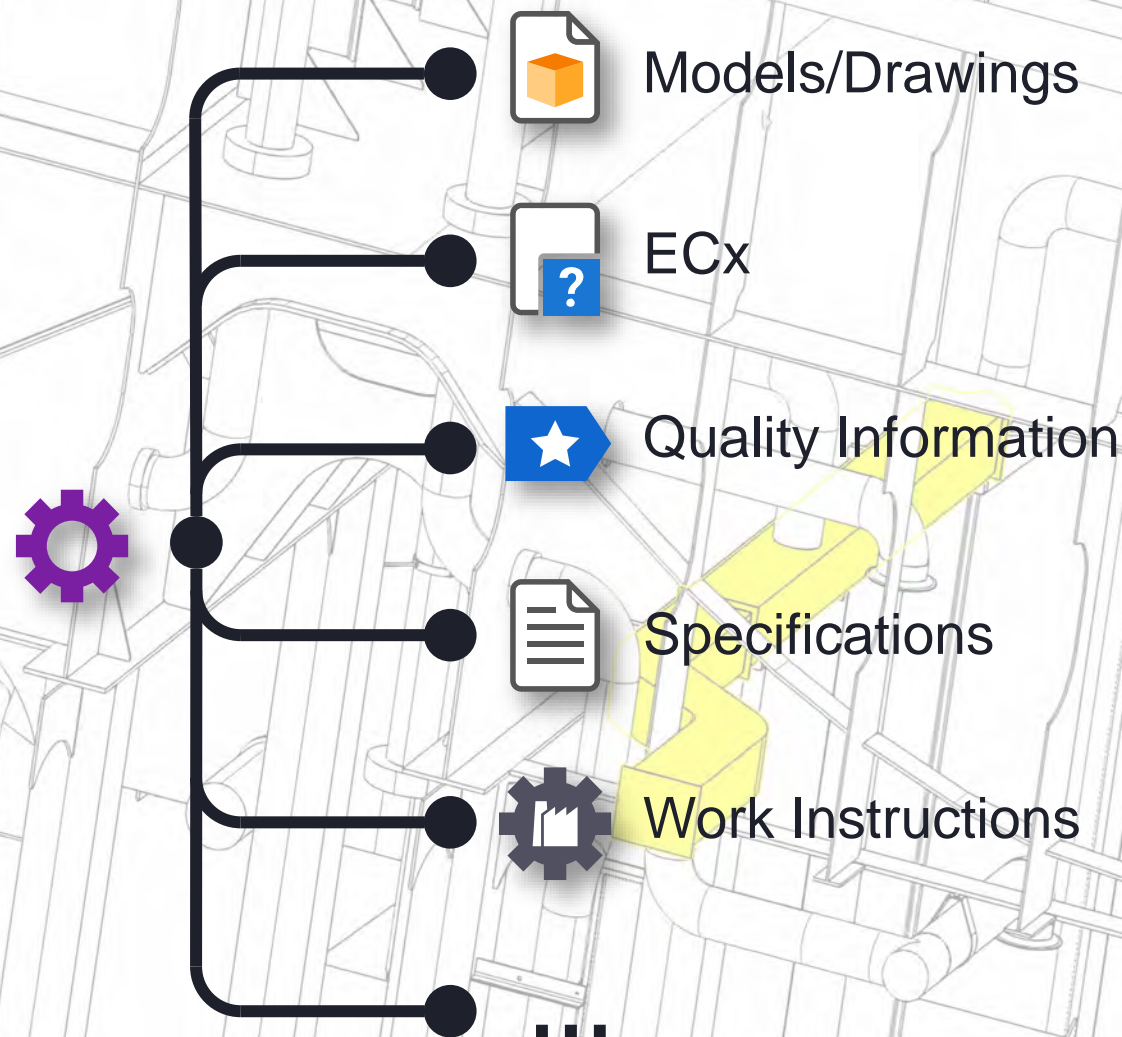
The Power of the Digital Thread for Shipbuilding Lifecycle



Aras 3D Visualization Enhances Your Digital Thread

PLM and 3D Visualization provides:

- Graphical Product Navigator
- Direct linkage to Product Properties
- Dynamic Resolution and Digital Mockup
- Cross-team Collaboration
- Access Control
- Multi-CAD
- Web browser only
- Tailoring through configuration & APIs
- Markup / Discussion Thread



Business Cases – 3D Visualization



Conduct Design & Mfg Reviews

- *View entire assembly*
- *Link with related ECx*
- *Use color/transparency to highlight areas*



Analyze FFF

- *Measure to confirm dim./placement*
- *Use analysis tools*

Generate Technical Illustrations

- *Explode/reposition geometry*
- *Link to related Product Properties*



Support Quality Reviews

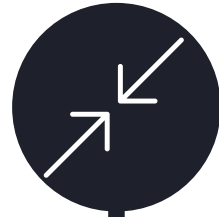
- *Reference 3D Views for context*
- *Link to related Corrective Action Plan*



Business Cases – 3D Visualization (Cont.)

Protect Intellectual Property

- *Hide inner components*
 - *'Alienation' geometry*
- *Server-side rendering*



Support Procurement Operations

- *Use Attributes to associate cost / Make/Buy*
- *Use color for rendered geometry to identify cost ranges*



Requirements Review

- *Link to related Requirements documents*
- *Use analysis tools to reference curvature, volume, relative placement*



Learn More About Aras and Digital Thread for Shipbuilders

- Download Digital Thread for Capital Intensive Industries eBook from aras.com
- Listen in to [Revolutionizing Capital-Intensive Industries with Large-Scale Digital Transformation](#) thought leadership discussion about pulling the digital thread
- Request a customized demo or trial at aras.com





SSIWSC 2024

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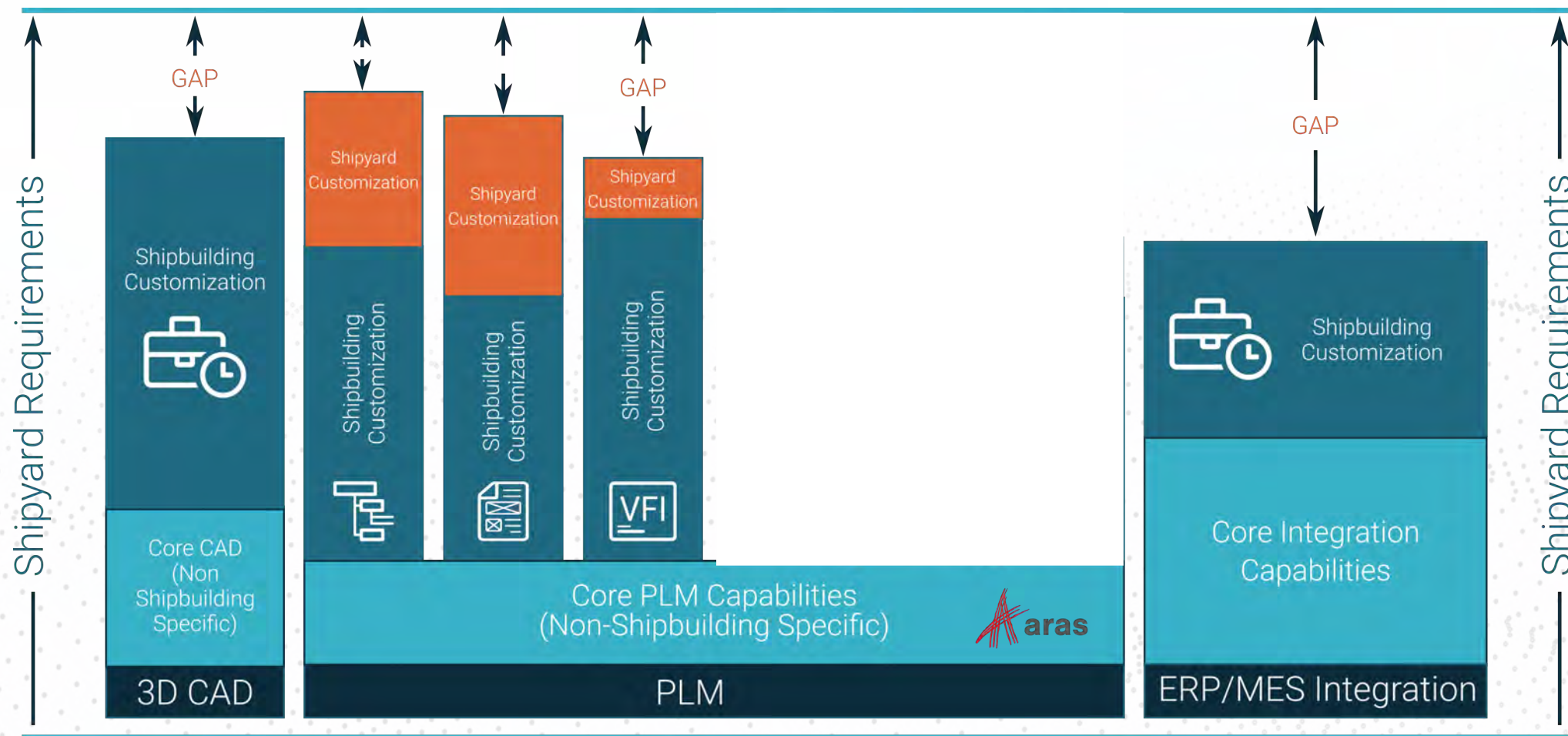
Enabling the Digital Thread for Shipbuilding Enterprise Environments

Bruno Benevolo | Director of Enterprise Solutions, SSI

Kevin Richard | Aras, Director of Product Management



Typical Non-Shipbuilding Specific Implementation

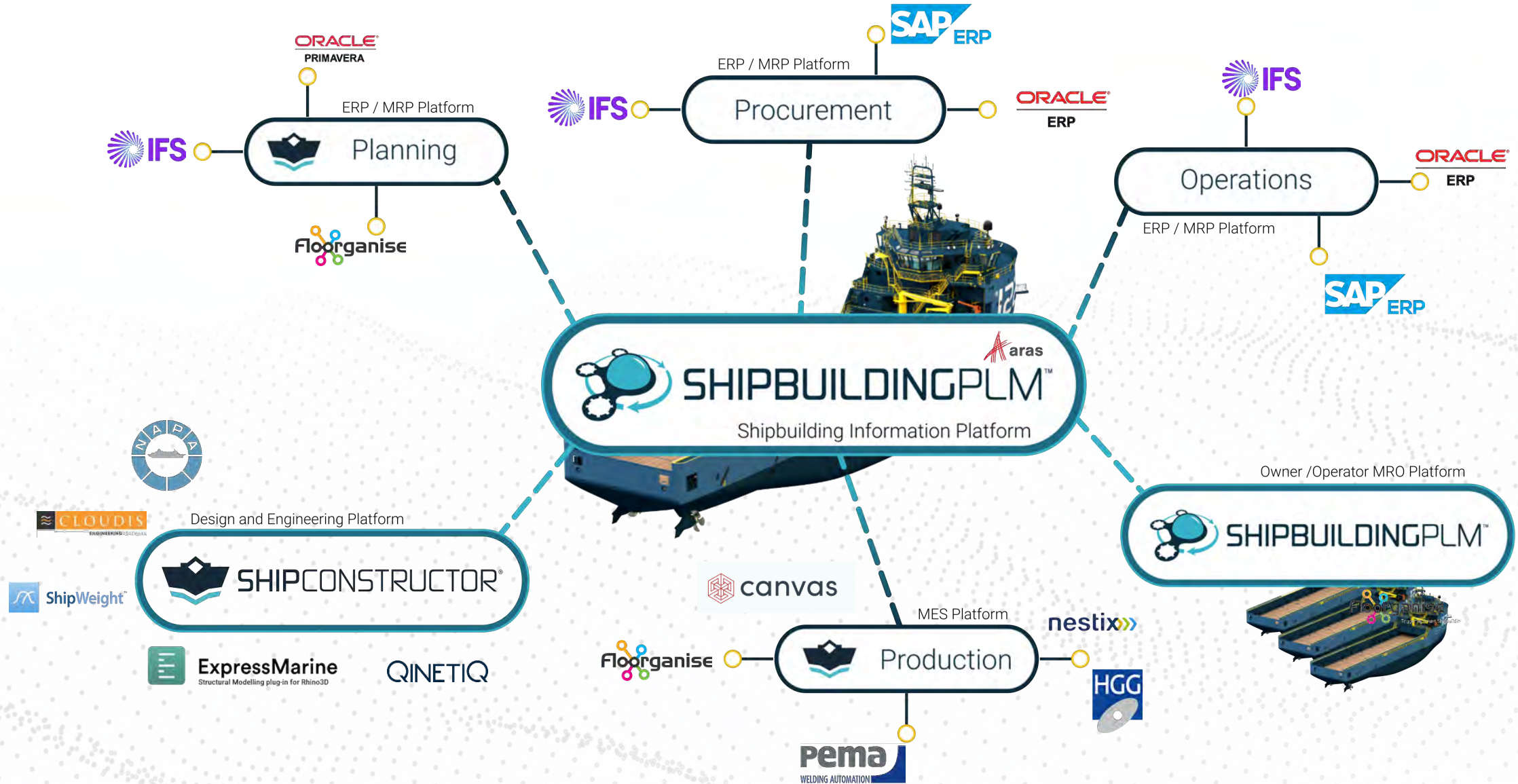


SSI Shipbuilding Specific Implementation



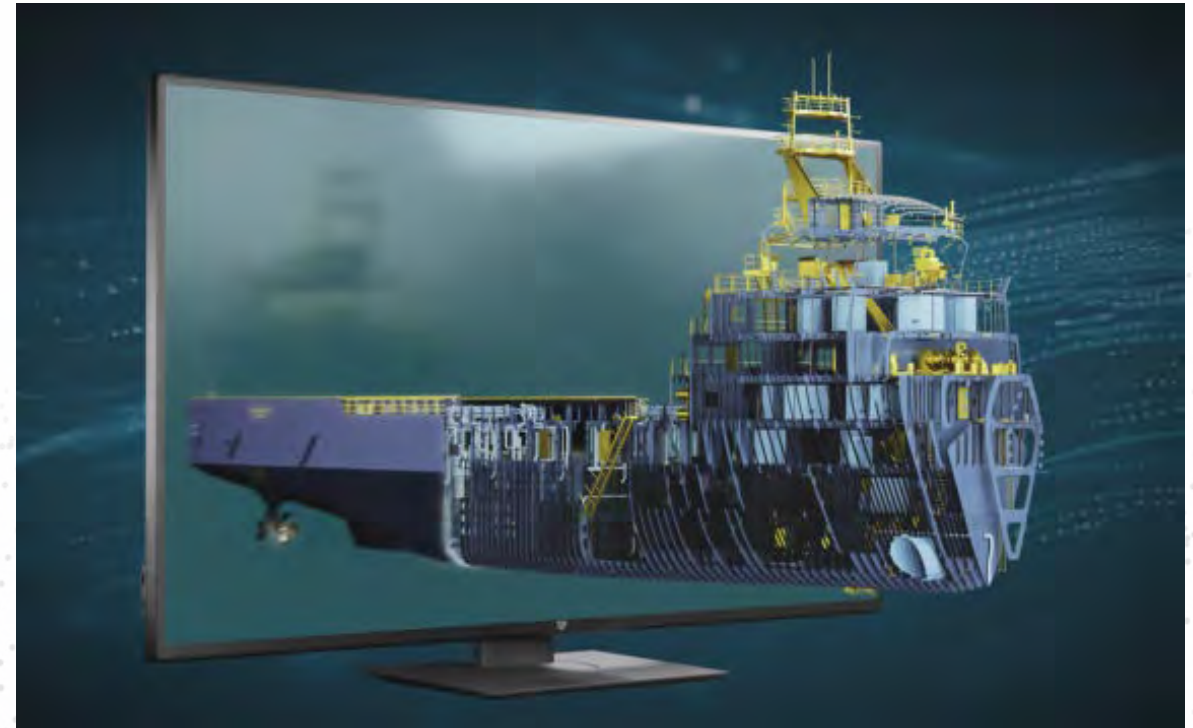
SSI Platform Implementation

An Open Digital Shipbuilding Platform



Shipbuilding Model Based Enterprise (MBE)

- An extended digital thread with part-centric traceability is required to support process improvements in overall shipyard efficiency, handover and fleet sustainment.
- SSI's Model Based Enterprise (MBE) Digital Platform facilitates Digital Thread navigation and Part data traceability throughout the integrated digital shipyard.



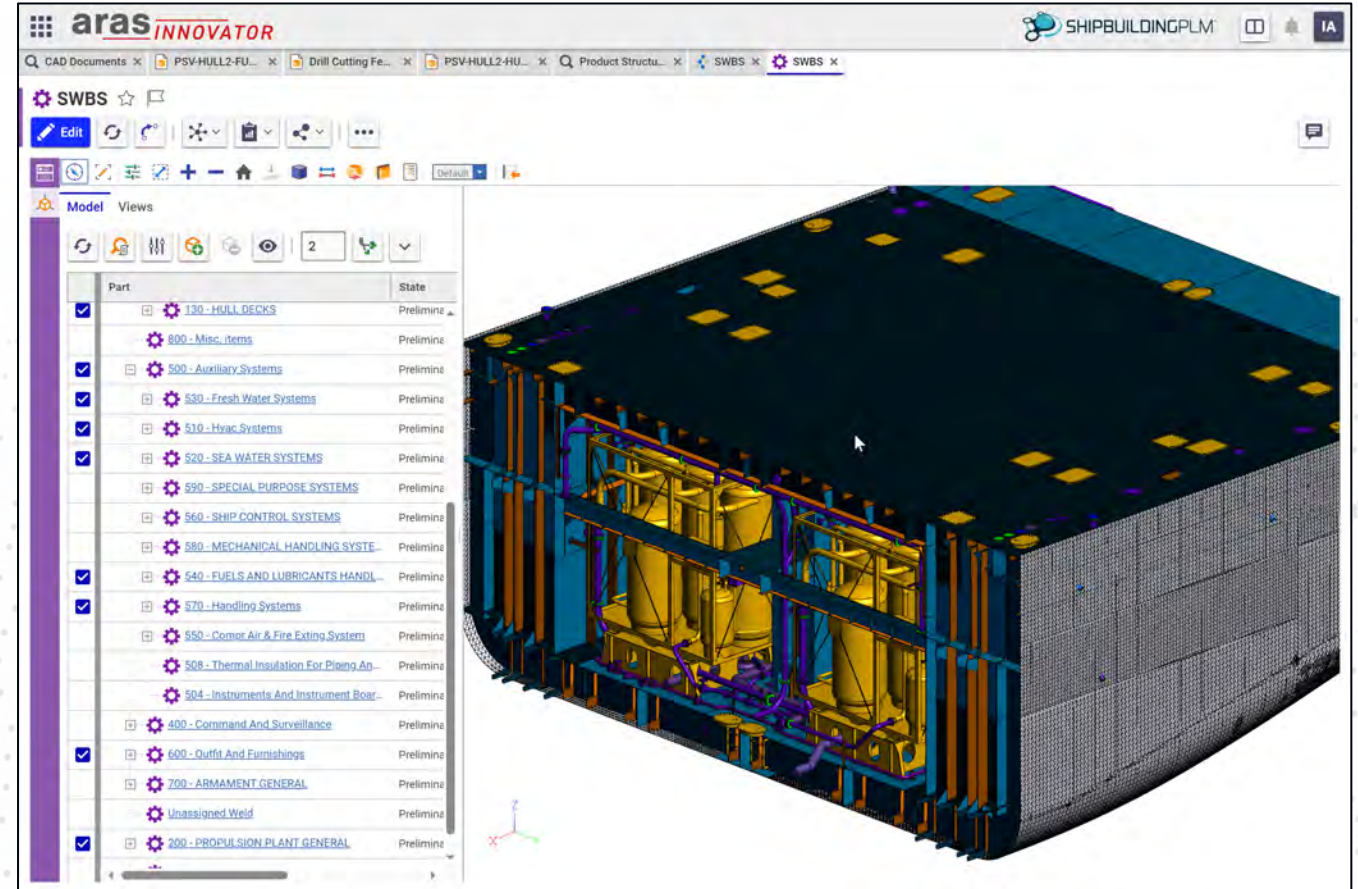
Shipbuilding Model Based Enterprise (MBE)

- Younger workforce demographic
- Challenges understanding 2D Production Drawings
- Raised on 3D gaming platforms.
- 3D visualization is a familiar environment to navigate, retrieve, and action data.

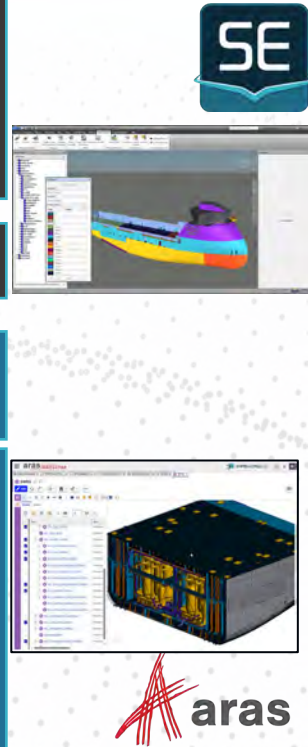
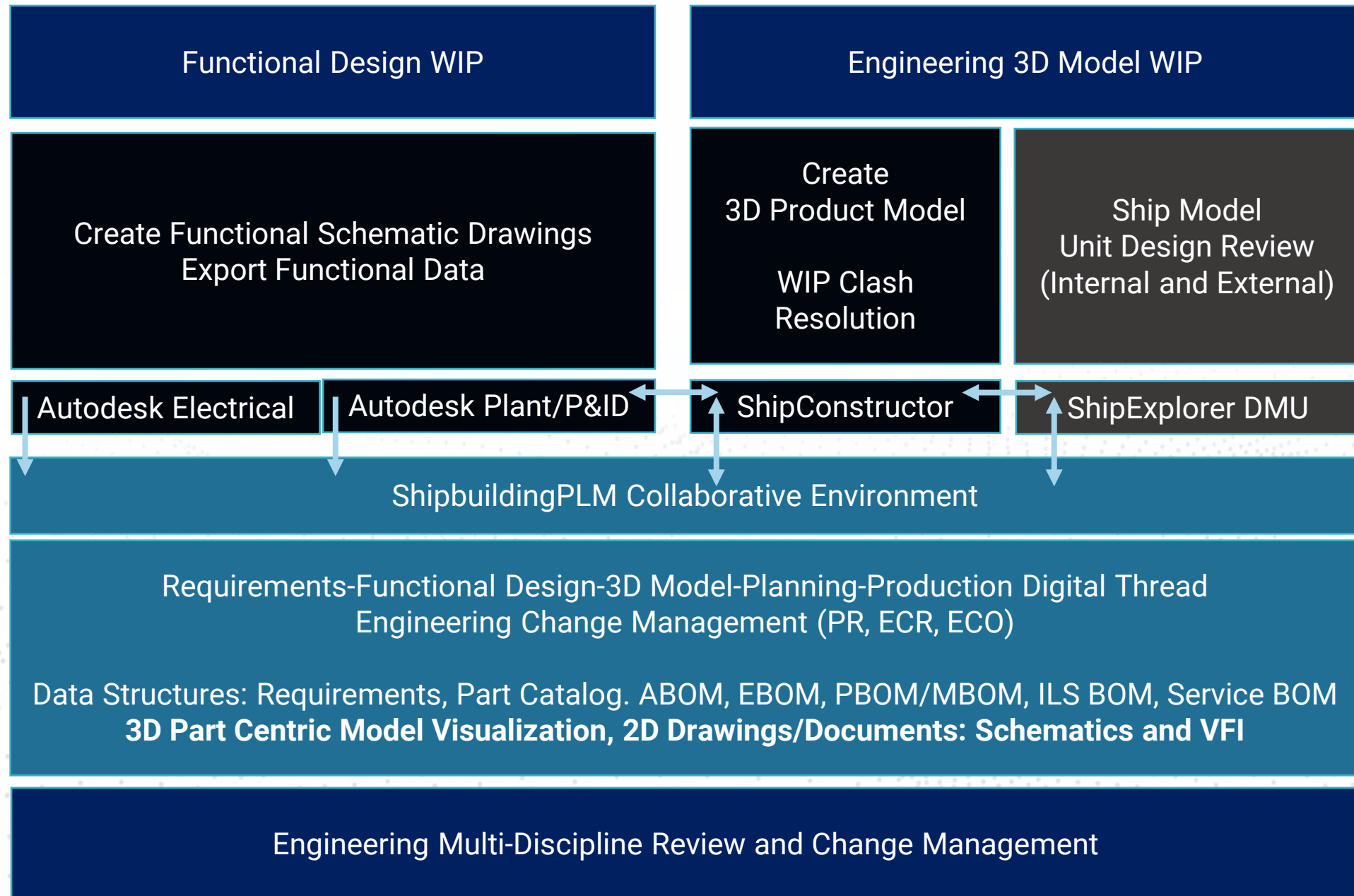


Shipbuilding Model Based Enterprise (MBE)

- Client and Industry expectations
- 3D model reviews are now the shipbuilding industry standard
- 3D model data usage in fleet sustainment / operations still evolving
- Already widely adopted in other industries: Oil & Gas, Offshore, Industrial and Nuclear Plant.

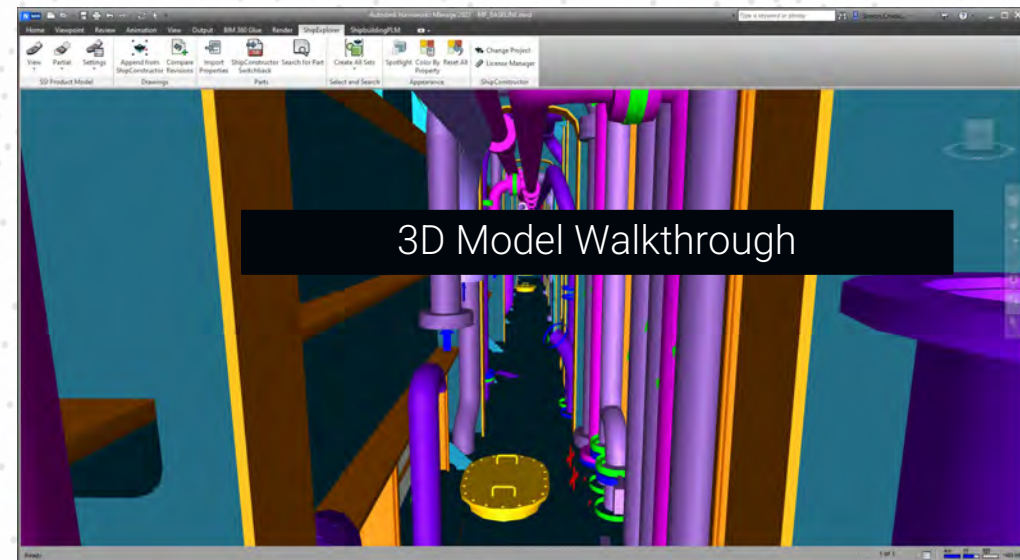
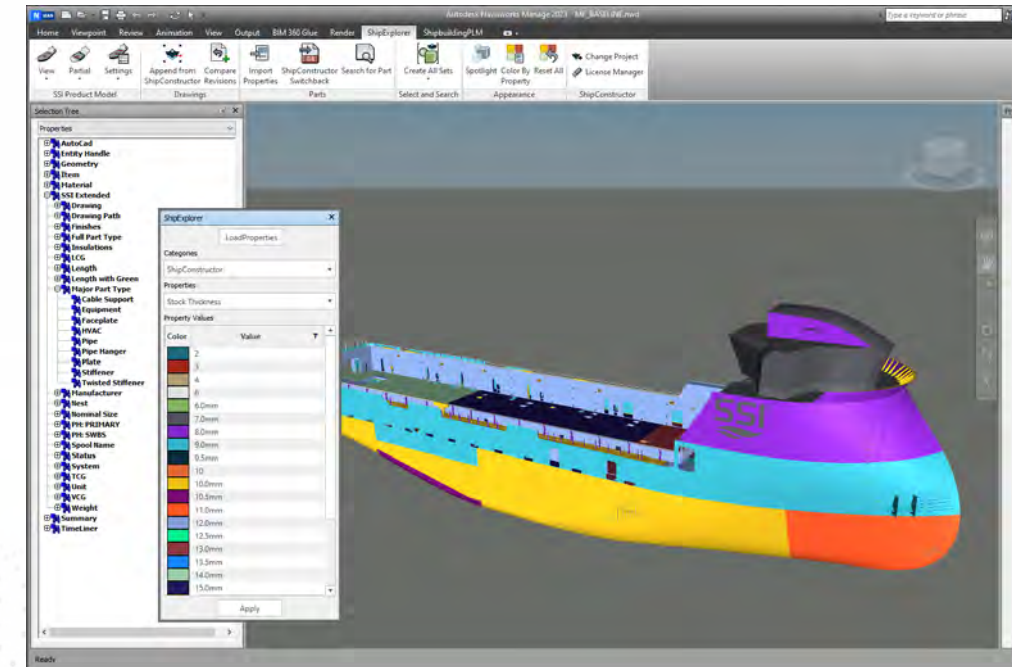


SSI Shipbuilding Platform

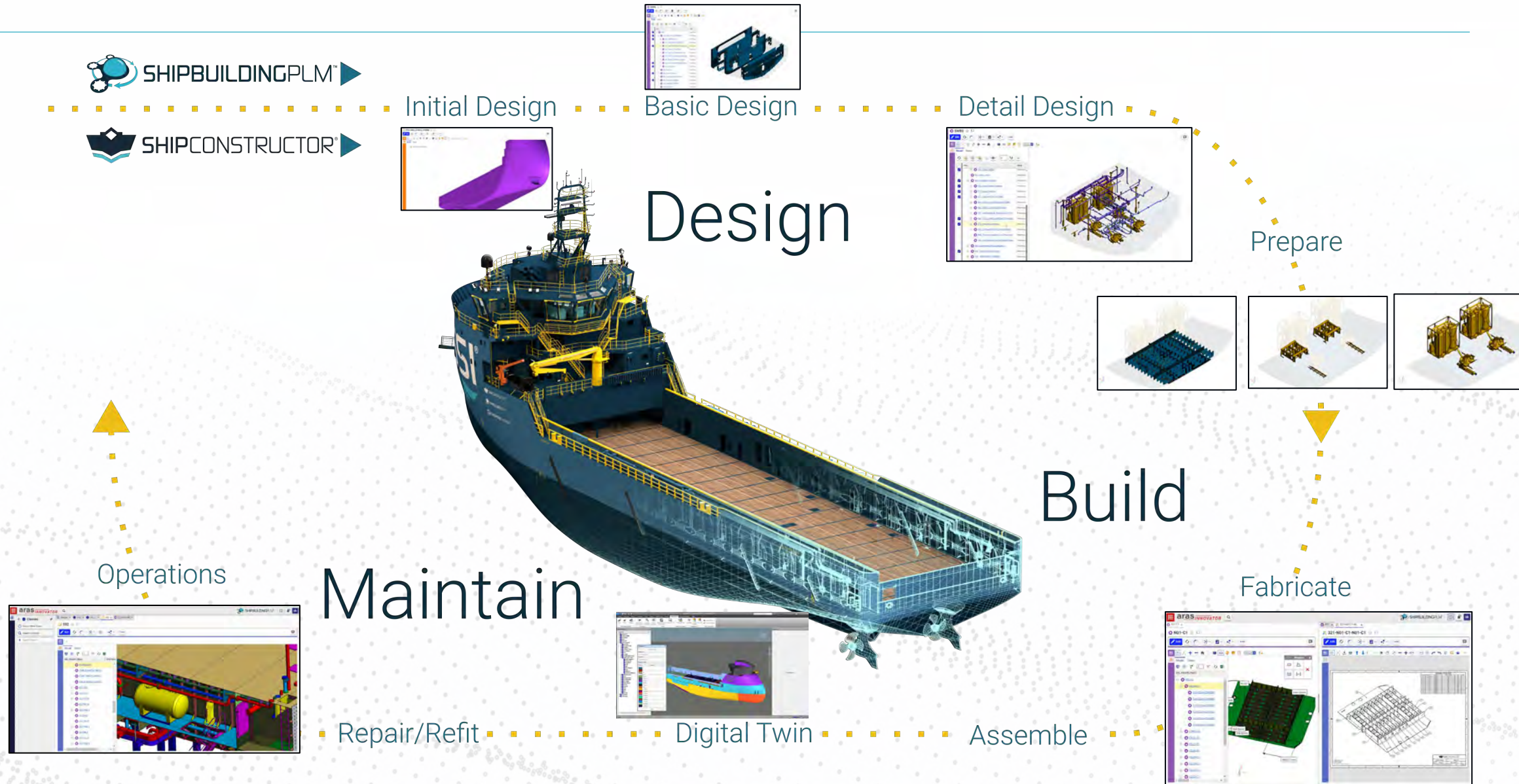


ShipExplorer

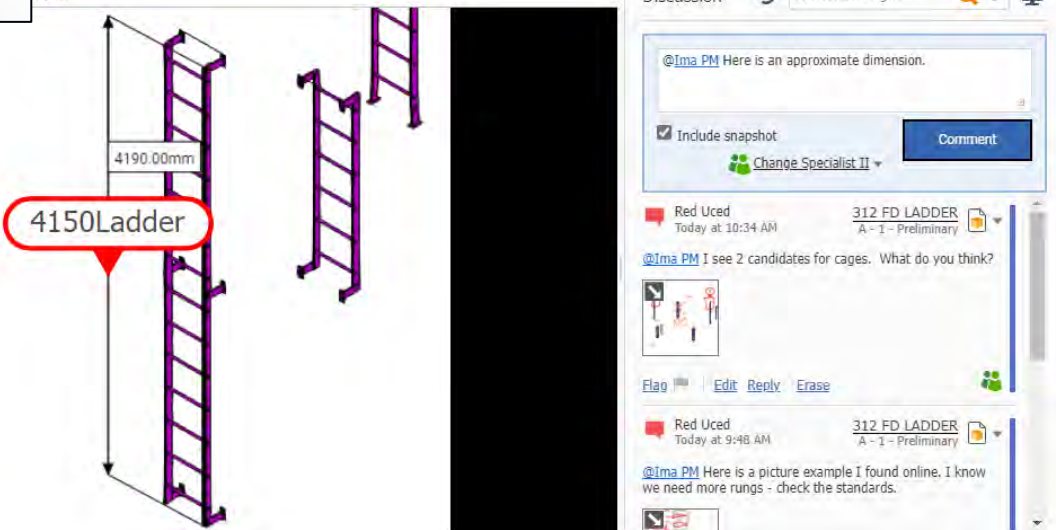
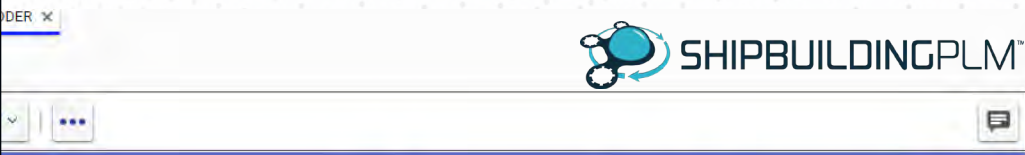
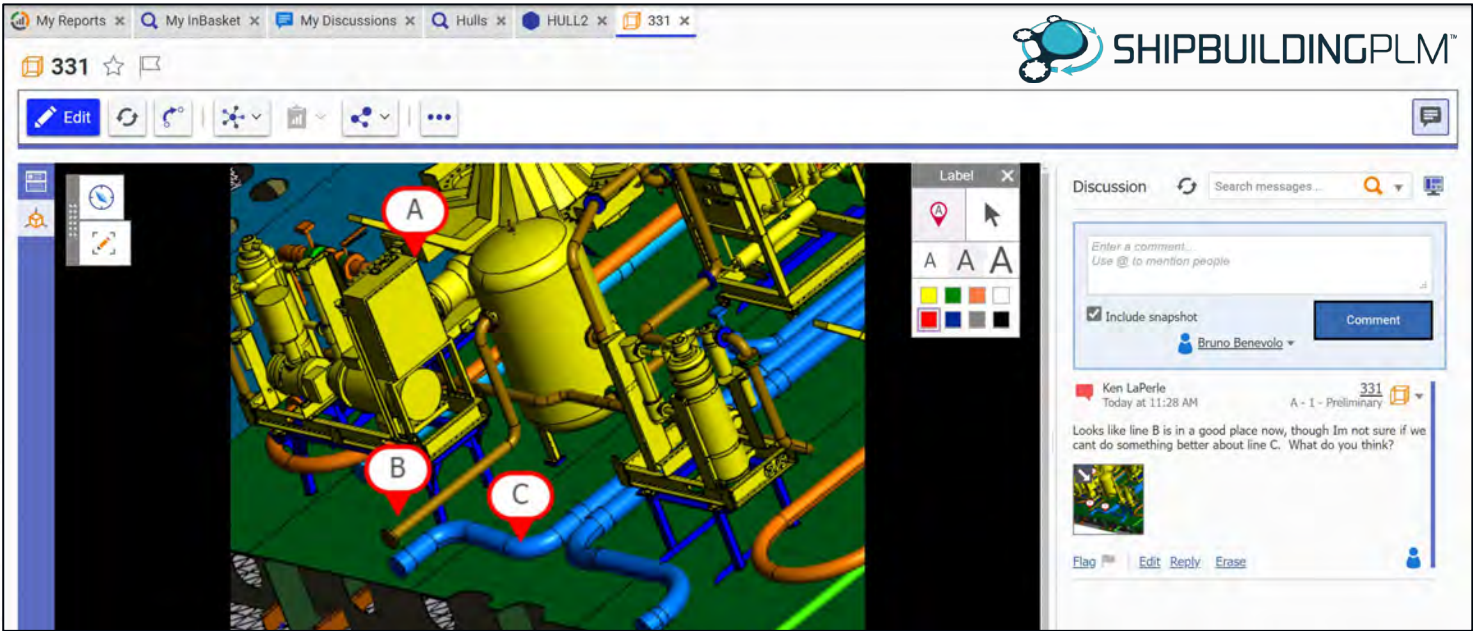
- ShipExplorer is SSI's DMU (Digital Mockup) desktop application, powered by Autodesk Navisworks.
- ShipExplorer can be used for WIP review of ShipConstructor projects as well as formal Ship Model and Unit Reviews (online and offline).
- AR/VR support for configured Ship Model stored in ShipbuildingPLM
- Features include:
 - ShipConstructor Specific Search Sets
 - Compare Model Revisions
 - Multi-Discipline Interference Review
 - (requires Navisworks Manage)
 - Walkthrough visualization



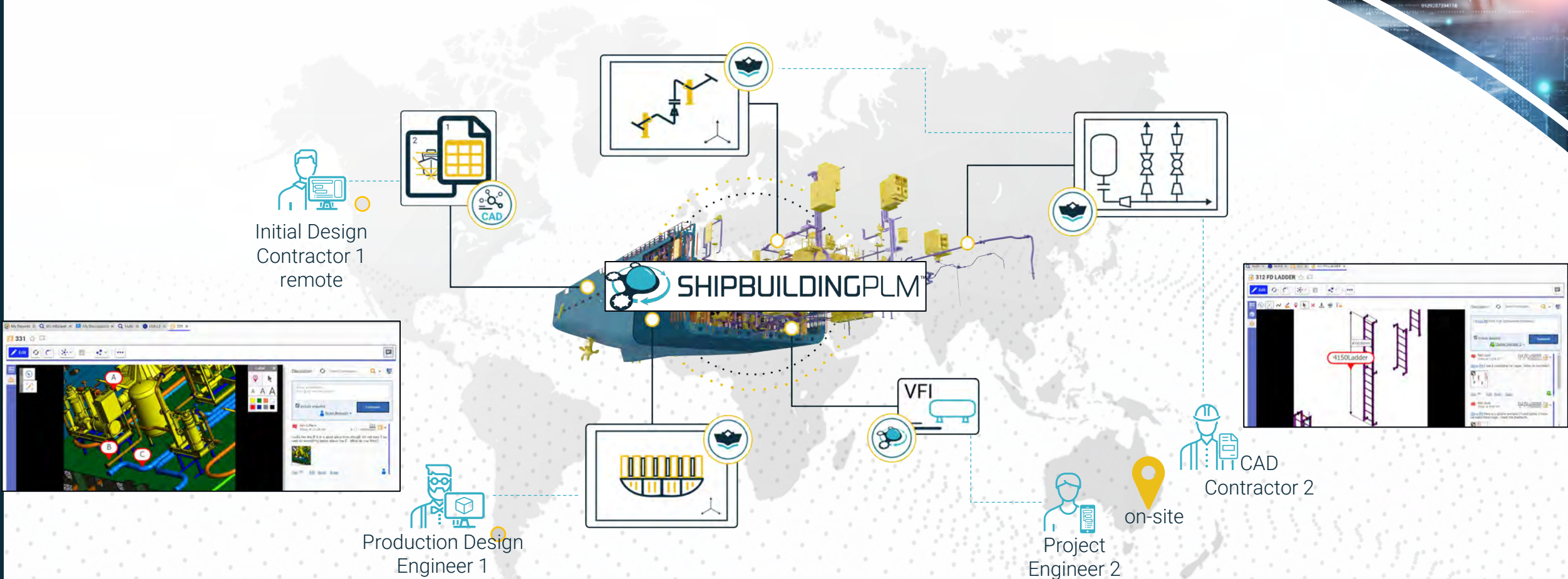
3D model data can (and should) be used throughout the lifecycle



3D visualization facilitates shipyard collaboration



Integrates a distributed workforce



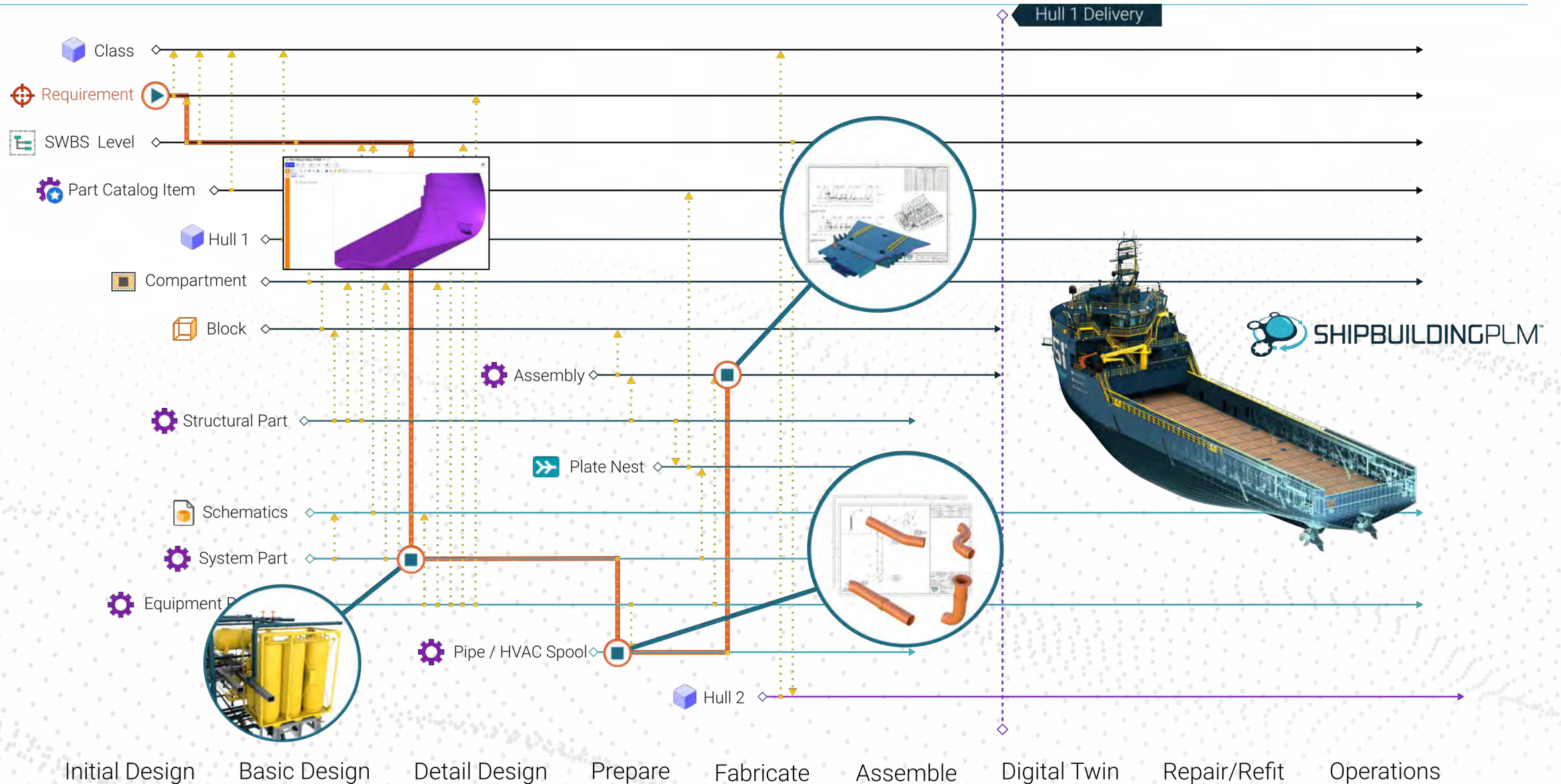
Initial / Concept Design

Basic / Functional Design

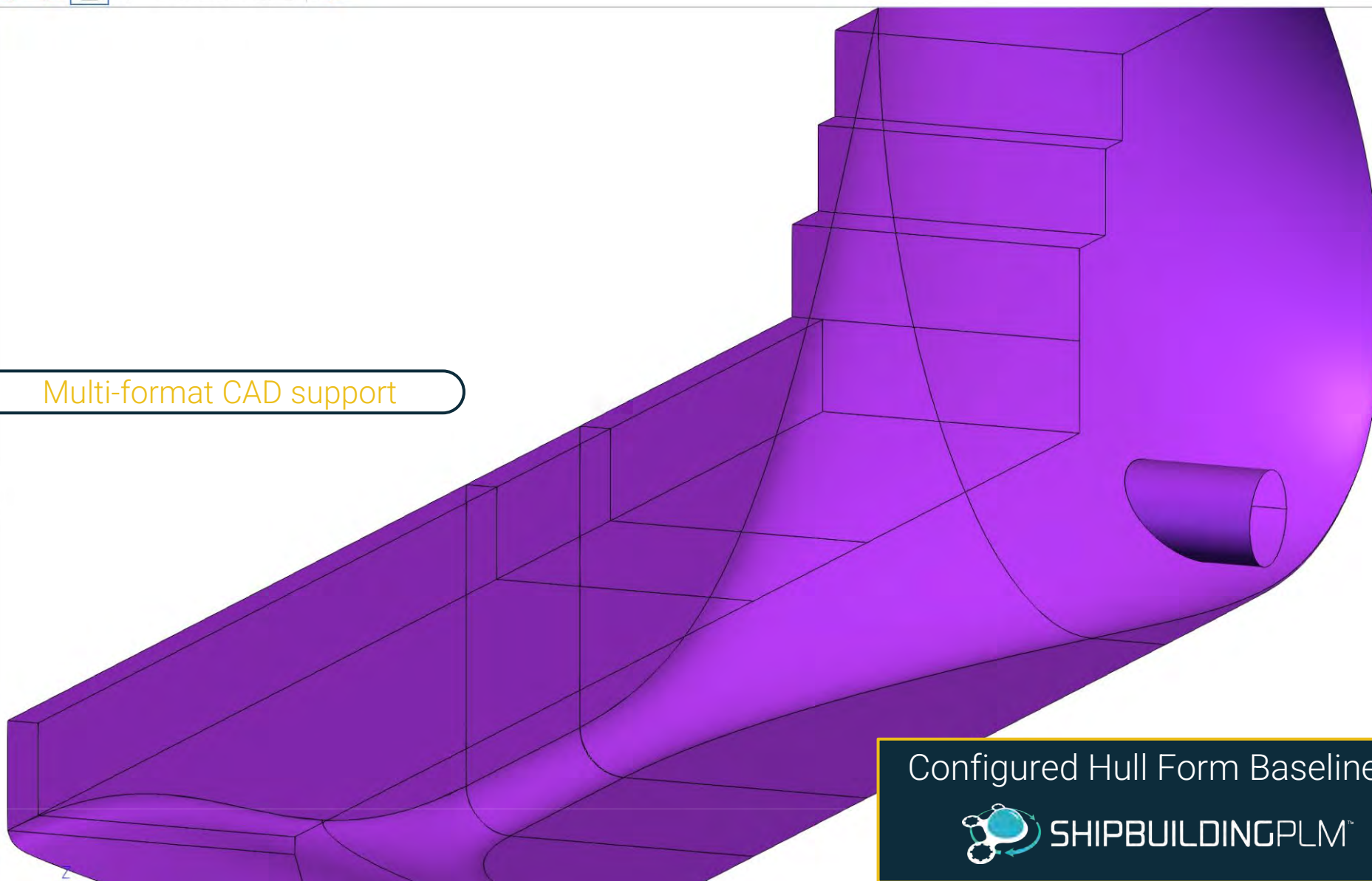
Detail Design & Production

MRO

3D visualization facilitates Digital Thread navigation



Multi-format CAD support



Configured Hull Form Baseline



te structural bulkheads

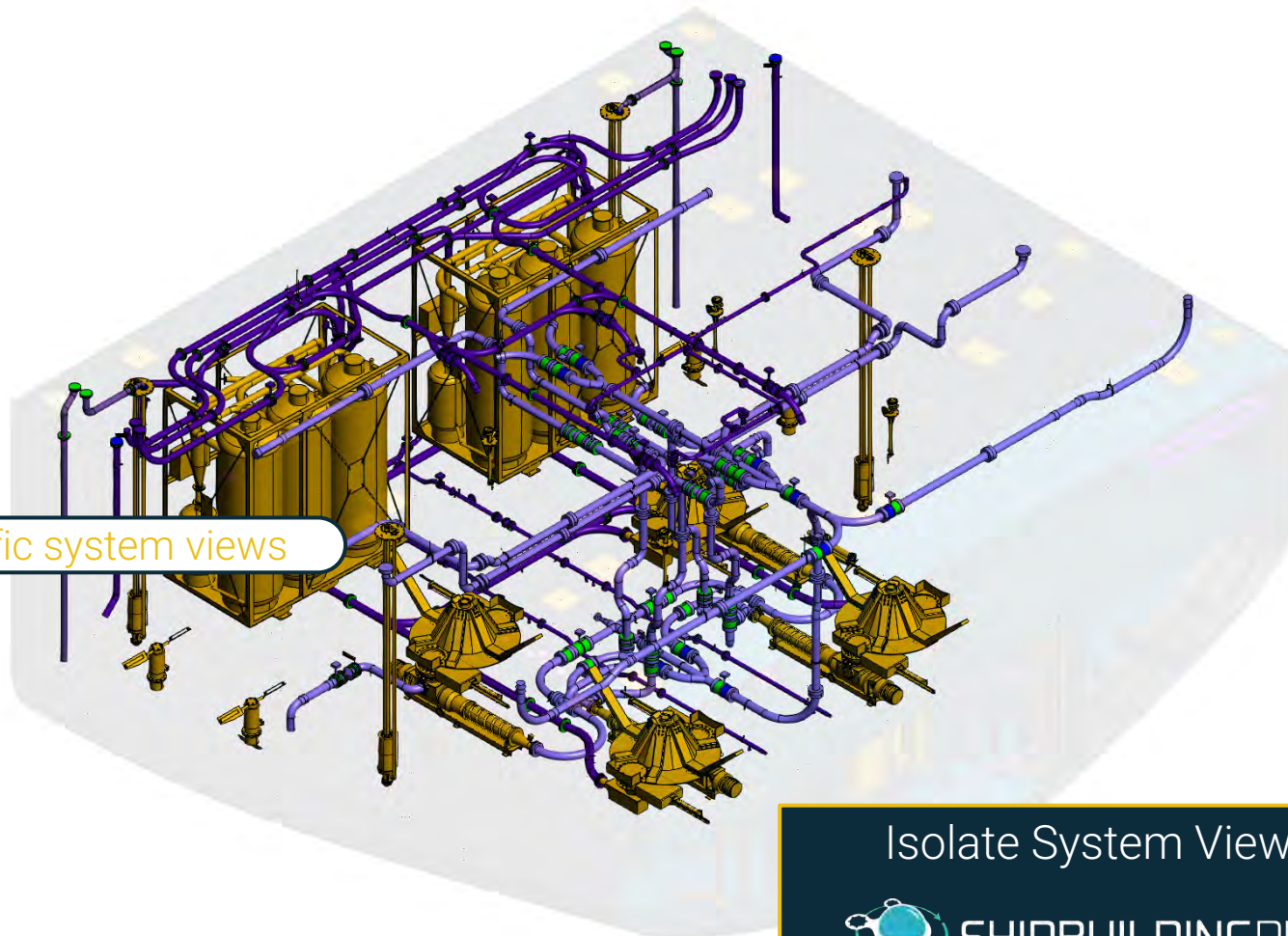
Visualize Discipline Spec



SHIPBUILDINGPLM™

Part	State
<input checked="" type="checkbox"/> 130 - HULL DECKS	Prelimina
<input checked="" type="checkbox"/> 800 - Misc. items	Prelimina
<input checked="" type="checkbox"/> 500 - Auxiliary Systems	Prelimina
<input checked="" type="checkbox"/> 530 - Fresh Water Systems	Prelimina
<input checked="" type="checkbox"/> 510 - Hvac Systems	Prelimina
<input checked="" type="checkbox"/> 520 - SEA WATER SYSTEMS	Prelimina
<input checked="" type="checkbox"/> 590 - SPECIAL PURPOSE SYSTEMS	Prelimina
<input checked="" type="checkbox"/> 560 - SHIP CONTROL SYSTEMS	Prelimina
<input checked="" type="checkbox"/> 580 - MECHANICAL HANDLING SYSTE...	Prelimina
<input checked="" type="checkbox"/> 540 - FUELS AND LUBRICANTS HANDL...	Prelimina
<input checked="" type="checkbox"/> 570 - Handling Systems	Prelimina
<input checked="" type="checkbox"/> 550 - Compr.Air & Fire Exting.System	Prelimina
<input checked="" type="checkbox"/> 508 - Thermal Insulation For Piping An...	Prelimina
<input checked="" type="checkbox"/> 504 - Instruments And Instrument Boar...	Prelimina
<input checked="" type="checkbox"/> 400 - Command And Surveillance	Prelimina
<input checked="" type="checkbox"/> 600 - Outfit And Furnishings	Prelimina
<input checked="" type="checkbox"/> 700 - ARMAMENT GENERAL	Prelimina

Isolate specific system views



Isolate System Views



573 - CARGO H...

Product Structu... x B10050 351V4... x 5193706 x

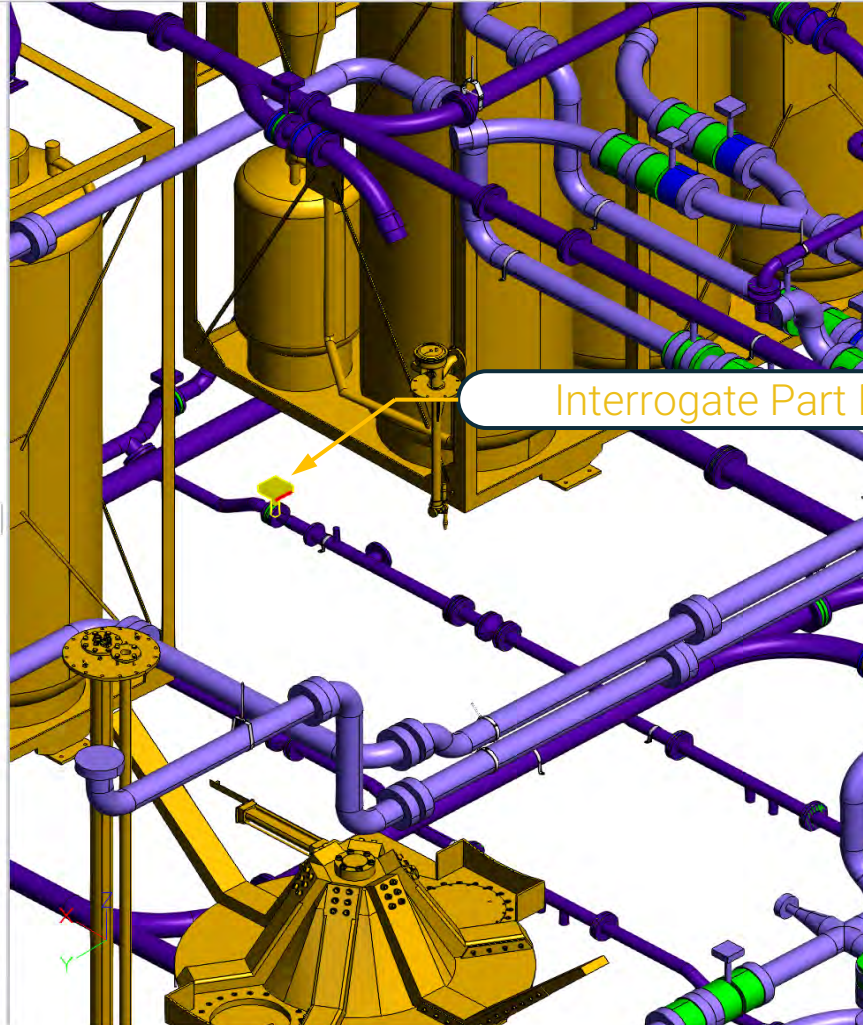
573 - CARGO HANDLING SYSTEMS

Edit

Model Views

2

Part	State	Task
MA-6	Preliminary	
MA-7	Preliminary	
MA-8	Preliminary	
MA-9	Preliminary	
PG-LIQUID...	Preliminary	
PG-LIQUID...	Preliminary	
special pro...	Preliminary	
special pro...	Preliminary	
TANK CLE...	Preliminary	
TANK CLE...	Preliminary	
TANK CLE...	Preliminary	
TANK CLE...	Preliminary	
TANK CLE...	Preliminary	
WASH/STR...	Released	
321-573 B...	Released	ECO-001-01
321-573 B...	Released	ECO-001-01



Interrogate Part Data

5193706

Edit

1 / 16



KEYSTONE BUTTERFLY VALVE PARASEAL RANGE

The ParaSeal range features a proven disc, shaft and seat arrangement designed for use in high pressure and high velocity applications



FEATURES

- Available in wafer, lug
- One piece body design series 20 (DIN 3202 K1)
- Suitable for severe vac (360 psi bubble tight)
- The field replaceable s the body and shaft from
- Bed grooved seat cons shut off at full rated pr of line service
- Suitable for Bördel ani
- A molded-in O-ring in sealing. No flange gas
- Lenticular shaped disc capacity
- Spined, squared or ke disc/shaft connection
- Dry shaft design
- PTFE lined bearings to
- Actuator flange acc. IS
- High solid body coating corrosion resistance
- Lifting lugs are provide and mounting in the pi floor support
- Body locating holes ea centering of the valve t
- Tapped body lugs for n DIN or ANSI drilled fla side only for end of line

GENERAL APPLICATION

Water, food and beverage processing, dry bulk conveying, paper mills, slurry handling, etc.

Approvals
 Veritas, KTW, SNCF, ADR, Lloyds Register of Shipping, EDF, DVGW, Town of Paris, VDS, Office of water authority of Hong Kong, Fire Services Hong Kong, DNV, WRC, Certificate of Foodstuff Quality Potlery Laboratory-France and ABS.

TECHNICAL DATA

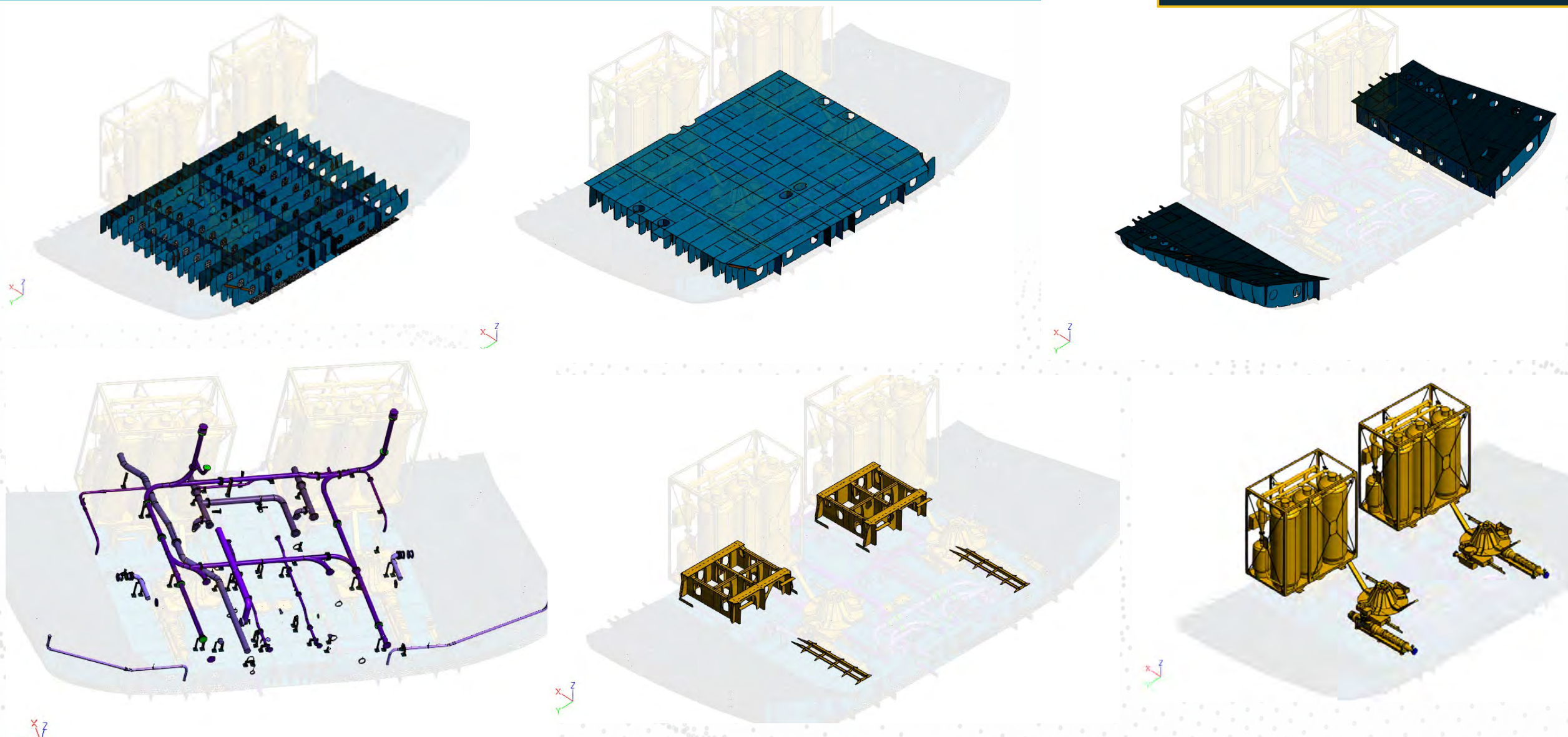
Pressure: 25 bar (360 psi)
 Temperature: -30°C ~ +170°C
 L: -22°F ~ +338°F
 Sizes: DN 50 - 2400 (NPS 2-96)
 Flange accommodation: PN 2.5 / PN 6 / PN 10 / PN 16 / PN 25 / ANSI 150 / AWWA

Interrogate the Digital Thread



3D Visualization of Planning Stages

Visual Planning

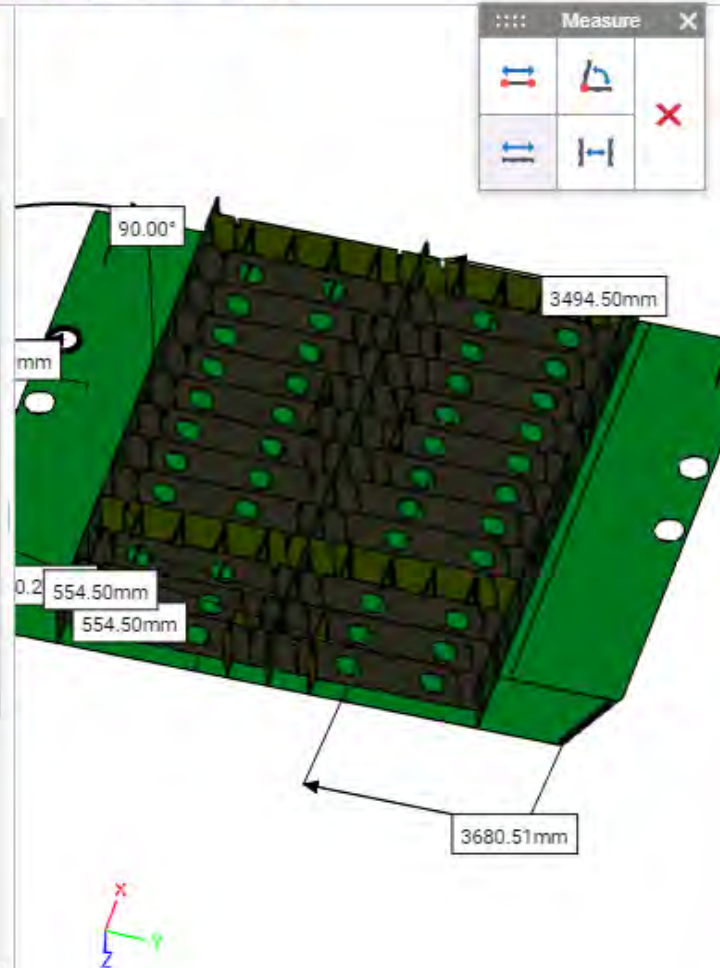


N01-C1 .x

N01-C1 ☆

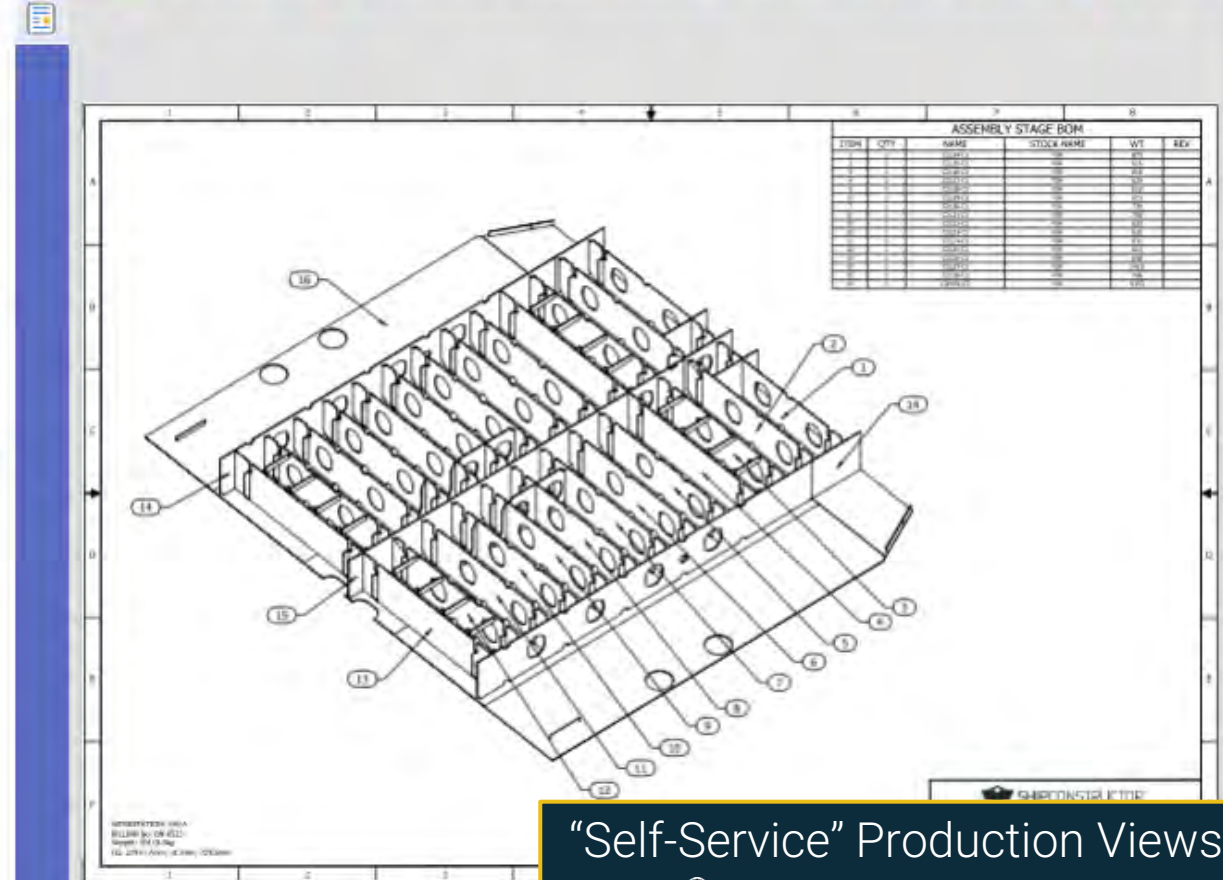


- Model Views
- SSL_View3D_Part2
- N01-C1
 - C2L16-C1
 - 321-C2L16-C1P025P
 - 321-C2L16-C1P025S
 - 321-C2L16-C1S011P
 - 321-C2L16-C1S011S
 - 321-C2L16-C1S012S
 - 321-C2L16-C1S012P
 - C3M01-C2
 - C2L21-C1
 - C2L17-C1
 - C2L25-C1
 - C2L24-C1
 - C2L15-C1
 - C2L27-C1
 - C2L22-C1



N01 x 321-N01-C1-N01-C1

321-N01-C1-N01-C1 ☆



"Self-Service" Production Views

FLOORBOARD

temp / N01

Save

COMPONENT



Link to ShipbuildingPLM 3D Model

TASKS

Ta Mounting

522 : Welding

0%

Ta Mounting

521 : Grinding

0%

Co N01 (Sub Assembly)

37081.623

Component T...	Sub Assembly	Assembly	N01
		Block	321
		Workpackage	321 STRUCTURE ASSEMBLY

Ac Mounting: 8/16/2024 (33) - 11/27/2024 (48)

Window Start	08/16/2024 (week 33)
Window Finish	11/27/2024 (week 48)
Planning Level	lvl4

PROGRESS

% 0%

Hours Budget	445
Hours Worked	0
Hours To Go	445
Progress	0%

Files

321-N01-C...

321-N01-...

321-N01-...

ALL FILES

Related drawings ShipbuildingPLM

Product Breakdown

- Stiffener (150)
- Equipment (8)
- Plate (155)
- Assembly (34)

Connect to Partner Platforms



N01

Model Views

Bill No ↓	MES State
B321N01_004	Start
B321N01_003	Start
B321N01_002	Start
B321N01_001	Start

SS1_View3D_Part2

- C2L02-C1
- Outfit
- 321-BW-4
- 321-BW-3
- 321-BW-2
- 321-BW-1
- 321-OutfitP028P
- 321-OutfitP013S
- 321-OutfitS011P
- 321-OutfitS011P
- 321-OutfitS011S
- 321-OutfitS040P
- 321-OutfitS050P
- 321-OutfitS037S
- A299

Visualize MES State

Outfit

BOM BOM Structure Production Documentation Files Where Used Changes

Parts

Name	Type	Revi...	Gene...	Total Wei...	MES St...	Bill No ↓
321-BW-4	Spool	A	2	36.819	Start	B321N01_004
321-BW-3	Spool	A	2	32.164	Start	B321N01_003
321-BW-2	Spool	A	3	195.921	Start	B321N01_002
321-BW-1	Spool	A	3	117.348	Start	B321N01_001
321-OutfitS011P	Stiffener	A	1	6.407		
321-OutfitS011P	Stiffener	A	1	6.407		
321-OutfitS011S	Stiffener	A	1	6.407		
321-OutfitS040P	Stiffener	A	1	0.838		
321-OutfitS050P	Stiffener	A	1	0.819		
321-OutfitS037S	Stiffener	A	1	0.807		
321-BL-1	Spool	A	1	90.142		
321-BW-5	Spool	A	1	22.268		
321-BL-3	Spool					

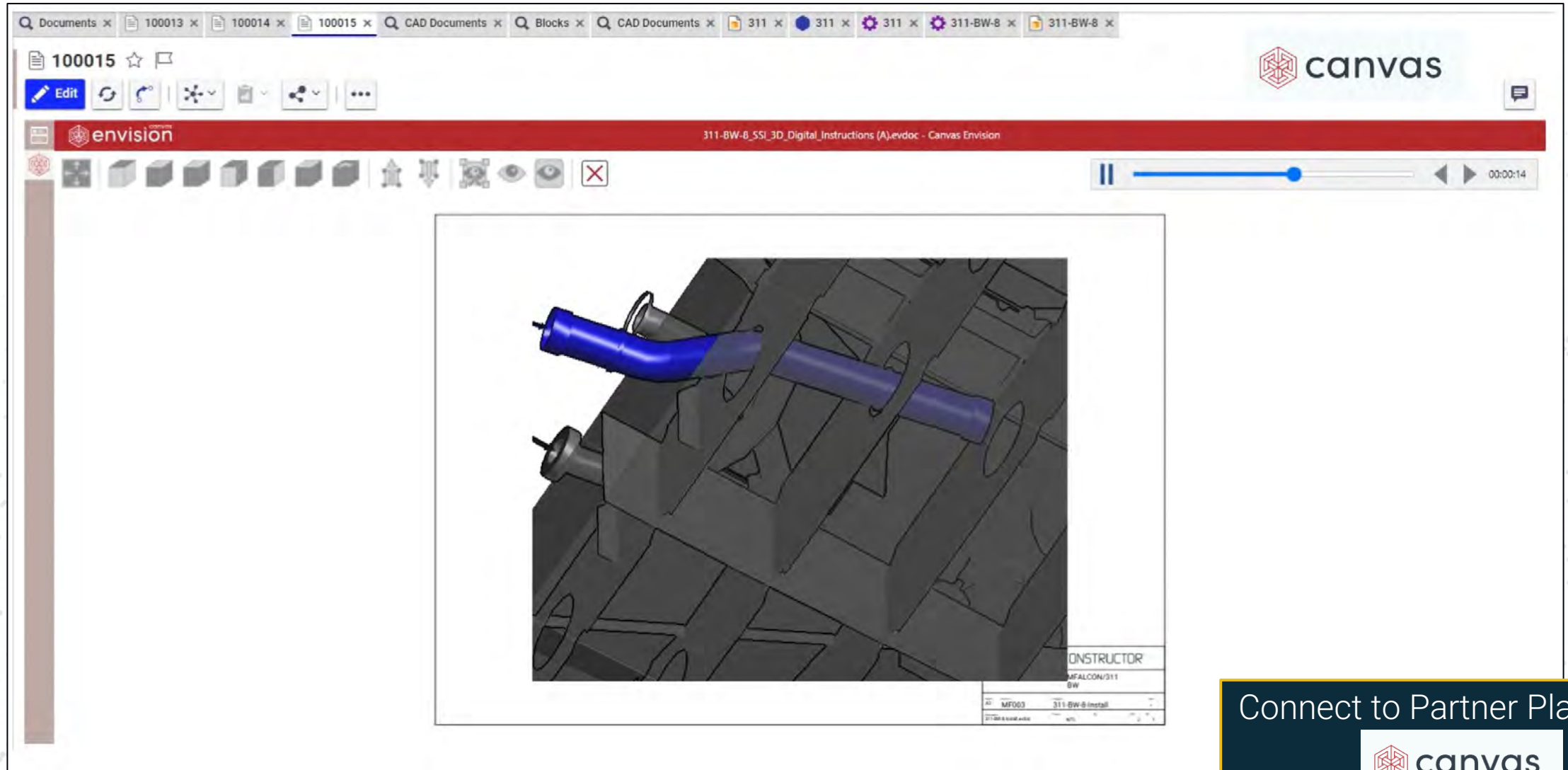
Visualize Sequence

Connect to Partner Platforms

Floorganise

Triggering Smart Shipbuilding

Digital Work Instructions extracted from a configured 3D Model



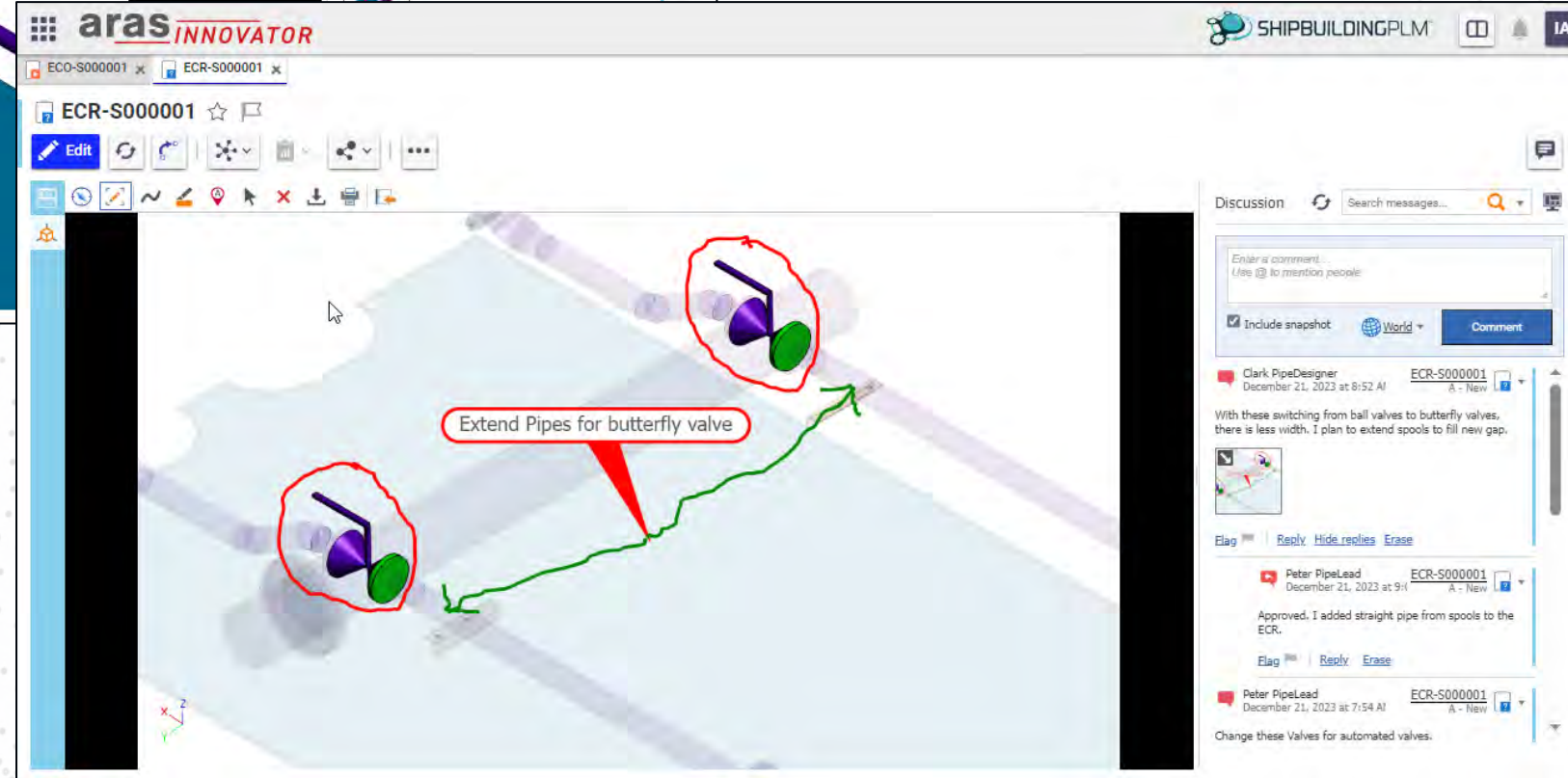
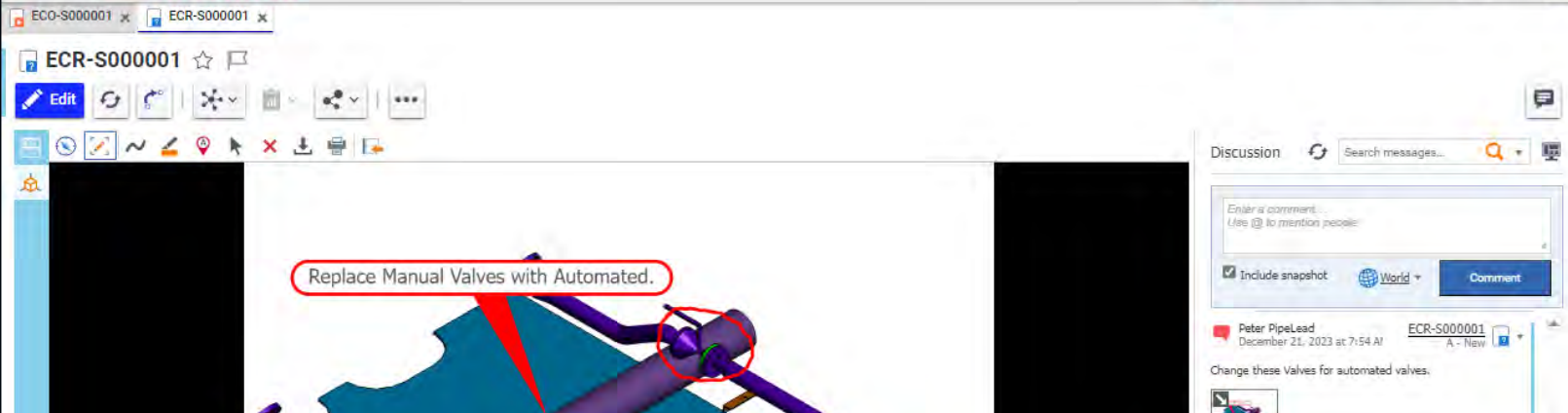
Connect to Partner Platforms



Visualization of Change

A large naval ship, possibly a destroyer, is shown sailing on the ocean. The ship is grey and has the number 98 on its side. The sky is overcast with grey clouds. The text "Change and late product definition account for almost half of schedule slips" is overlaid on the image in white and yellow font.

“Change and late product definition account for almost half of schedule slips”



ECR-S000001 x ECO-S000001 x



ECO-S000001 ☆

Edit

SSI ECRs Scoped Changes FCOs DCOs RCOs **Changes** Attachments Signoffs

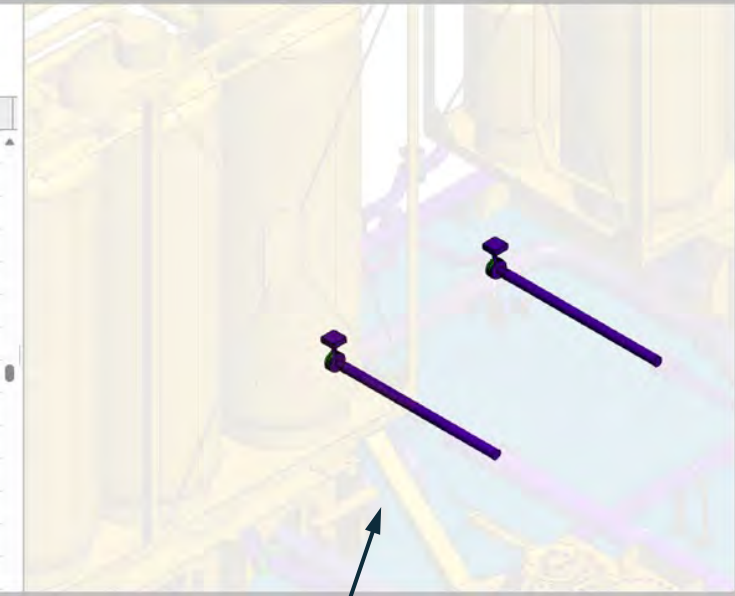
Affected Items ☆

Hidden

	Ty...	Classification	Action	Old Number [...]	Old Rev...	Old Gen...	Interchang...	New Number ...	New Re...
		SWBS	Change	573	A	2	<input checked="" type="checkbox"/>	573	B
		Functional	Change	573-001	A	1	<input checked="" type="checkbox"/>	573-001	B
		Tag	Change	FPN-000029	A	2	<input checked="" type="checkbox"/>	FPN-000029	B
		Tag	Change	FPN-001790	A	2	<input checked="" type="checkbox"/>	FPN-001790	B
		SSI/Assembly	Change	321	A	1	<input type="checkbox"/>	321	B
		SSI/Pipe	Add				<input type="checkbox"/>	321-573 BH-...	A
		SSI/Pipe	Add				<input type="checkbox"/>	321-573 BH-...	A
		SSI/Pipe	Delete	321-573 BH-...	A	1	<input type="checkbox"/>	321-573 BH-...	B
		SSI/Pipe	Delete	321-573 BH-...	A	1	<input type="checkbox"/>	321-573 BH-...	B
		SSI/Assembly	Change	321	A	1	<input type="checkbox"/>	321	B
		SSI/Assembly	Change	Unassigned P...	A	1	<input type="checkbox"/>	Unassigned P...	B
		SSI/Spool	Change	321-573 BH-4	A	1	<input type="checkbox"/>	321-573 BH-4	B
		SSI/Spool	Change	321-573 BH-6	A	1	<input type="checkbox"/>	321-573 BH-6	B
		SSI/Pipe	Change	321-BH-4	A	1	<input type="checkbox"/>	321-BH-4	B

Model Views

Part	State
221-573 BH - Cargo Handling Sy...	Preliminary
221-573 BH - Cargo Handling Sy...	Preliminary
Unspooled Pipe	Released
A3062	Released
A299	Released
322-MA-67	Released
A1931	Released
322-BH-228	Released
322-MA-5	Released
A805	Released
322-FW-22	Released
322-BH-86	Released
A3040	Released
A3034	Released



Visualization of changed parts

Page: 1 of 1 | 27 Results

Tracking Change

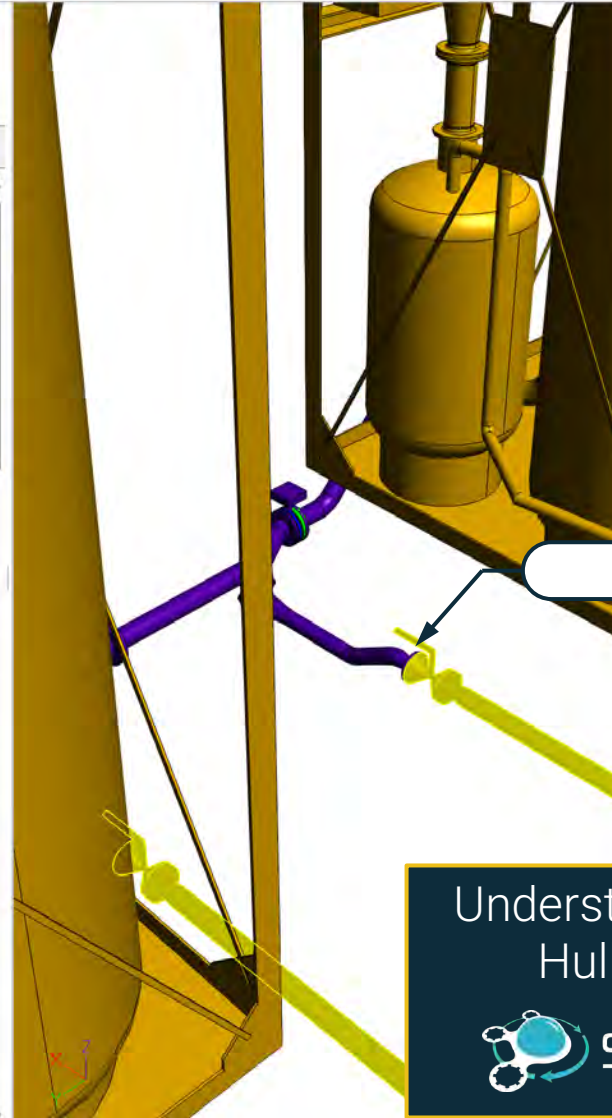


321 BH x

321 BH ☆



Part ↑	State	DPN Status
✓ 321-573 BH - ...	Superseded	
✓ 321-573 BH - ...	Superseded	
✓ 321-BH-1	Released	
✓ 321-BH-3	Superseded	
✓ 321-BH-4	Superseded	
✓ 321-BH-6	Superseded	
✓ 321-BH-7	Superseded	
✓ 322-BH-114	Released	
✓ 322-BH-117	Released	
✓ 322-BH-147	Released	
✓ 322-BH-150	Released	
✓ 322-BH-151	Released	
✓ 322-BH-155	Released	
✓ 322-BH-156	Released	
✓ 322-BH-163	Released	
✓ 322-BH-166	Released	
✓ 322-BH-180	Released	
✓ 322-BH-181	Released	
✓ 322-BH-182	Released	
✓ 322-BH-183	Released	
✓ 322-BH-184	Released	
✓ 322-BH-185	Released	
✓ 322-BH-186	Released	

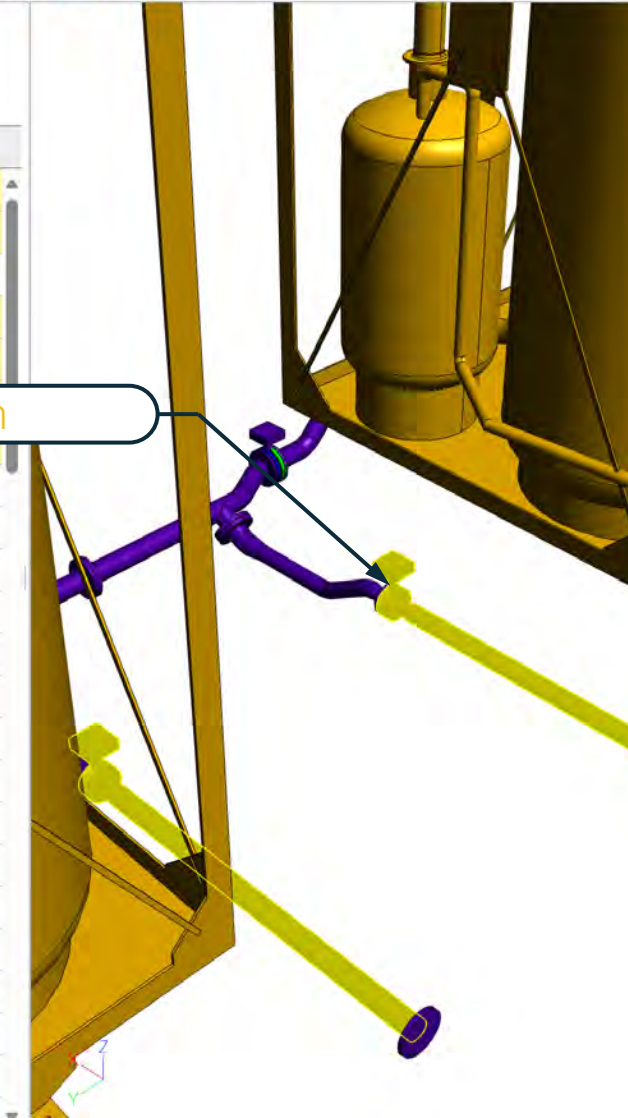


321 BH x

321 BH ☆



Part ↑	State	DPN Status
✓ 321-573 BH - ...	Released	
✓ 321-573 BH - ...	In Change	
✓ 321-BH-1	Released	
✓ 321-BH-3	Released	
✓ 321-BH-4	Released	
✓ 322-BH-114	Released	
✓ 322-BH-117	Released	
✓ 322-BH-150	Released	
✓ 322-BH-151	Released	
✓ 322-BH-155	Released	
✓ 322-BH-156	Released	
✓ 322-BH-163	Released	
✓ 322-BH-166	Released	
✓ 322-BH-180	Released	
✓ 322-BH-181	Released	
✓ 322-BH-182	Released	
✓ 322-BH-183	Released	
✓ 322-BH-184	Released	
✓ 322-BH-185	Released	
✓ 322-BH-186	Released	



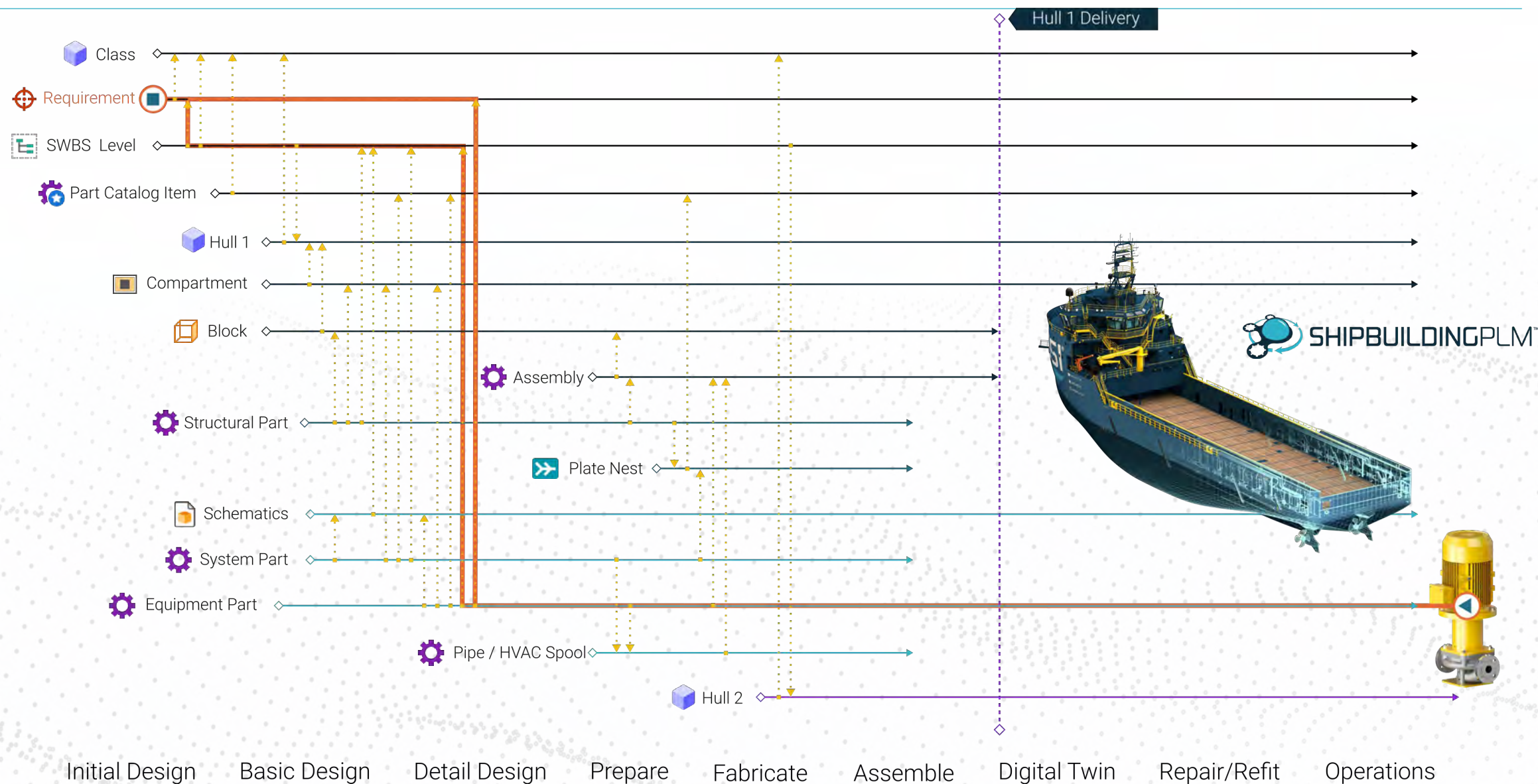
old configuration

new configuration

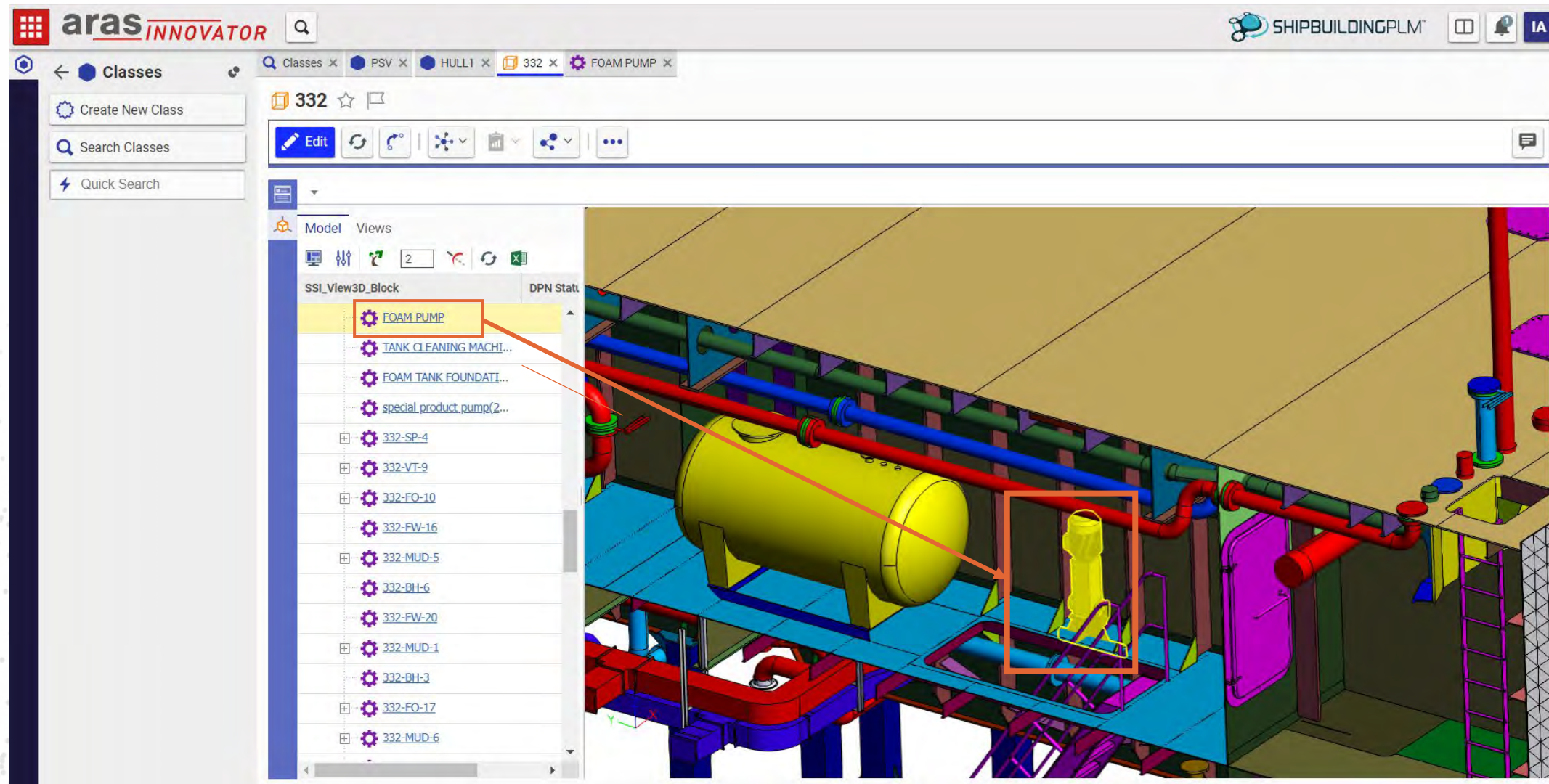
Understanding Change and Hull Configurations



Digital Ship handover



Fleet Sustainment, Digital Asset visualization



Asset Digital Thread



- Specifications
- Functional diagrams
- 2D Drawings
- 3D Models
- Quality & Test Reports
- Maintenance procedures
- Real images, Maintenance animations, ...

FOAM PUMP

Piece Type
Equipment

Stock Name
FOAM PUMP

Weight
100

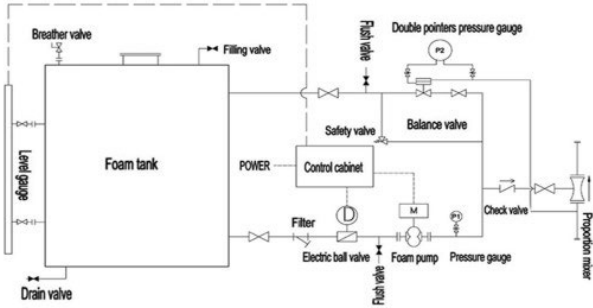
CG (LCG, TCG, VCG)
(34138, -3715, 5310)

Functional Links

Catalog
[10549](#)

Functional
Parts
None

Compartment
[3DZ0](#)



CAD Documents Production Documentation Files Where Used Changes						
Model Drawings						
Model Drawing [...]	Type	Revision	Generation	State	Last Imported [...]	Last Modified [...]
332 FOAM PUMP	Equipment System Mo...	A	1	Preliminary	10/8/2022 6:04:38 PM	10/8/2022 4:02:36 AM

MAY 02 2006 21 ENGINEERING DATA TRANSMITTAL

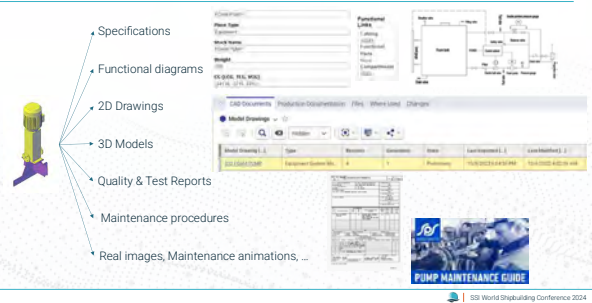
1. Test (Manufacturing)	2. Draw (Manufacturing)	3. Material (Mfg)
4. Test (Mfg)	5. Draw (Mfg)	6. Material (Mfg)
7. Test (Mfg)	8. Draw (Mfg)	9. Material (Mfg)
10. Test (Mfg)	11. Draw (Mfg)	12. Material (Mfg)
13. Test (Mfg)	14. Draw (Mfg)	15. Material (Mfg)
16. Test (Mfg)	17. Draw (Mfg)	18. Material (Mfg)
19. Test (Mfg)	20. Draw (Mfg)	21. Material (Mfg)
22. Test (Mfg)	23. Draw (Mfg)	24. Material (Mfg)
25. Test (Mfg)	26. Draw (Mfg)	27. Material (Mfg)
28. Test (Mfg)	29. Draw (Mfg)	30. Material (Mfg)
31. Test (Mfg)	32. Draw (Mfg)	33. Material (Mfg)
34. Test (Mfg)	35. Draw (Mfg)	36. Material (Mfg)
37. Test (Mfg)	38. Draw (Mfg)	39. Material (Mfg)
40. Test (Mfg)	41. Draw (Mfg)	42. Material (Mfg)
43. Test (Mfg)	44. Draw (Mfg)	45. Material (Mfg)
46. Test (Mfg)	47. Draw (Mfg)	48. Material (Mfg)
49. Test (Mfg)	50. Draw (Mfg)	51. Material (Mfg)
52. Test (Mfg)	53. Draw (Mfg)	54. Material (Mfg)
55. Test (Mfg)	56. Draw (Mfg)	57. Material (Mfg)
58. Test (Mfg)	59. Draw (Mfg)	60. Material (Mfg)
61. Test (Mfg)	62. Draw (Mfg)	63. Material (Mfg)
64. Test (Mfg)	65. Draw (Mfg)	66. Material (Mfg)
67. Test (Mfg)	68. Draw (Mfg)	69. Material (Mfg)
70. Test (Mfg)	71. Draw (Mfg)	72. Material (Mfg)
73. Test (Mfg)	74. Draw (Mfg)	75. Material (Mfg)
76. Test (Mfg)	77. Draw (Mfg)	78. Material (Mfg)
79. Test (Mfg)	80. Draw (Mfg)	81. Material (Mfg)
82. Test (Mfg)	83. Draw (Mfg)	84. Material (Mfg)
85. Test (Mfg)	86. Draw (Mfg)	87. Material (Mfg)
88. Test (Mfg)	89. Draw (Mfg)	90. Material (Mfg)
91. Test (Mfg)	92. Draw (Mfg)	93. Material (Mfg)
94. Test (Mfg)	95. Draw (Mfg)	96. Material (Mfg)
97. Test (Mfg)	98. Draw (Mfg)	99. Material (Mfg)
100. Test (Mfg)	101. Draw (Mfg)	102. Material (Mfg)



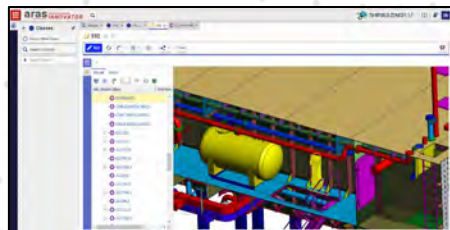
3D model data can (and should) be used throughout the lifecycle



Asset Digital Thread

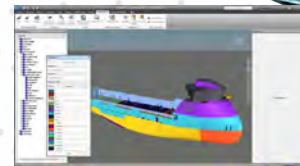


Operations



Maintain

Repair/Refit

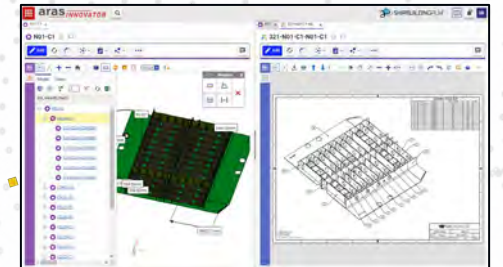


Digital Twin

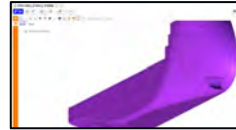
Assemble

Build

Fabricate



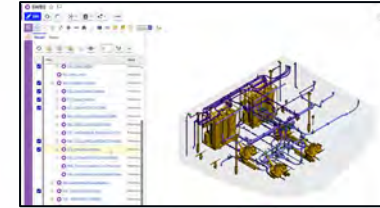
Initial Design



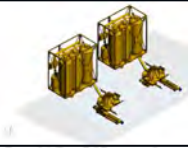
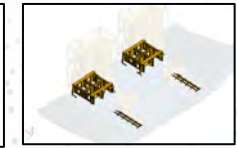
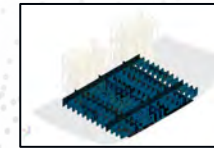
Basic Design



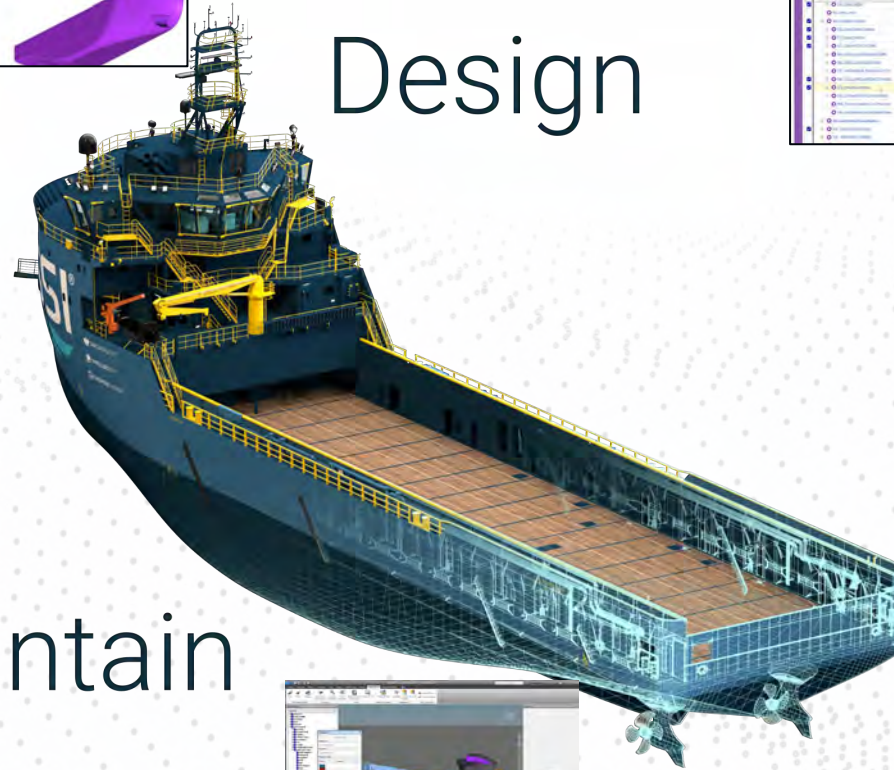
Detail Design



Prepare



Design



SSI's Shipbuilding MBE Digital Platform Empowers Digital Thread Navigation

Enhanced Digital Ship models will become an industry standard deliverable

3D visualization is a key enabler for a part-centric shipyard architecture

MBE drives business transformation, facilitating shipyard integration

3D visualization empowers a younger workforce to be more productive



SHIPBUILDINGPLM™



SHIPCONSTRUCTOR®





Questions?

Thank you!