



WHITE PAPER

Competing on Complexity

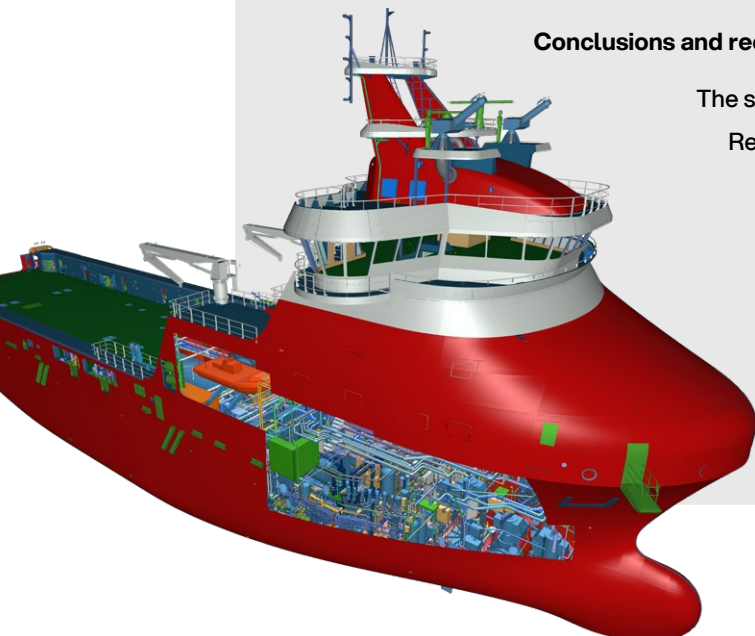
How specialized shipyards win through integrated design and information management



Feel Empowered

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Ship model courtesy of Wärtsilä

Executive summary

Specialized shipyards occupy a structurally challenging position in the global maritime market. These yards provide new build and MRO (maintenance, repair, and overhaul) services for commercial vessels, support vessels, and rigs, working across vessel types such as offshore support vessels, patrol craft, research vessels, dredgers, and specialized industrial ships. They are large enough to tackle sophisticated tonnage, yet too lean to absorb the efficiency losses that come with fragmented, manually coordinated design and production workflows.

This white paper examines the operational and competitive pressures facing specialized yards today, and how integrated ship design and information management software can serve as a genuine enabler of efficiency, quality, and throughput.

Key findings:

- Design rework and information gaps between engineering and production are among the highest-impact, most addressable cost drivers in specialized shipbuilding
- The ability to run more concurrent projects with the same team is a decisive competitive differentiator. Yards that have transitioned to integrated 3D-based workflows report measurable efficiency gains: one yard documented 30% faster design throughput and a 43% increase in concurrent project capacity with the same team
- Information management platforms that bridge engineering and production, replacing paper drawings or disconnected systems, deliver measurable reductions in defects, delays, and supervisor workload
- Yards that select software built specifically for shipbuilding, rather than generic engineering tools adapted for marine use, report better implementation outcomes and stronger ongoing support

The challenge facing specialized shipyards

A market defined by competing pressures

Specialized shipyards are not a homogeneous group. A yard building offshore platform supply vessels faces different constraints than one constructing research vessels or naval auxiliaries. But across this segment, a set of structural pressures is consistent.

The competitive landscape has narrowed. Larger yards are moving into vessel segments once considered too complex or too customized for volume production. At the same time, owners and operators in oil and gas, marine infrastructure, and government procurement are demanding shorter delivery schedules, tighter tolerances, and more comprehensive digital deliverables at handover.

Labor markets compound the challenge. Experienced shipbuilding personnel are difficult to retain, and the transfer of institutional knowledge from senior engineers to newer staff is a persistent vulnerability. Yards that depend on individual expertise rather than systematized, data-driven processes carry significant continuity risk.



Offshore support vessel in dry dock alongside its 3D design model

Where efficiency losses occur

Across specialized shipbuilding, the same efficiency losses appear repeatedly. They fall into a small number of distinct pain points:

- Rework costs: Design errors that propagate into production
- Manual transfer of design data to production teams via printed drawings creates version control failures, field interpretation errors, and delays when revisions occur mid-build
- Parallel projects drawing on the same design resources stretch teams thin and create bottlenecks at review and approval stages
- Subcontractor and supplier coordination adds layers of information exchange that, without a common data environment, degrade into email chains and disconnected document management
- The gap between engineering completion and production readiness is a major driver of schedule overrun. It occurs when drawings are not available in time or when production teams cannot quickly locate or interpret them.

These are not new problems. What has changed is the availability of integrated software tools capable of addressing them systematically, and the competitive cost of not doing so.

The concurrent projects constraint

For specialized yards, the ability to run multiple projects simultaneously with a fixed engineering headcount is a significant operational advantage. As the Tersan Shipyard example shows, a transition to integrated 3D-based workflows enabled the same team to manage 43% more concurrent projects – without adding headcount.

This works because the design environment allows multiple designers to work on different systems within the same model simultaneously, without conflicts or administrative overhead. It also means the project hierarchy can adapt as work packages evolve, rather than being locked at the outset.

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Evidence: Tersan Shipyard, Türkiye

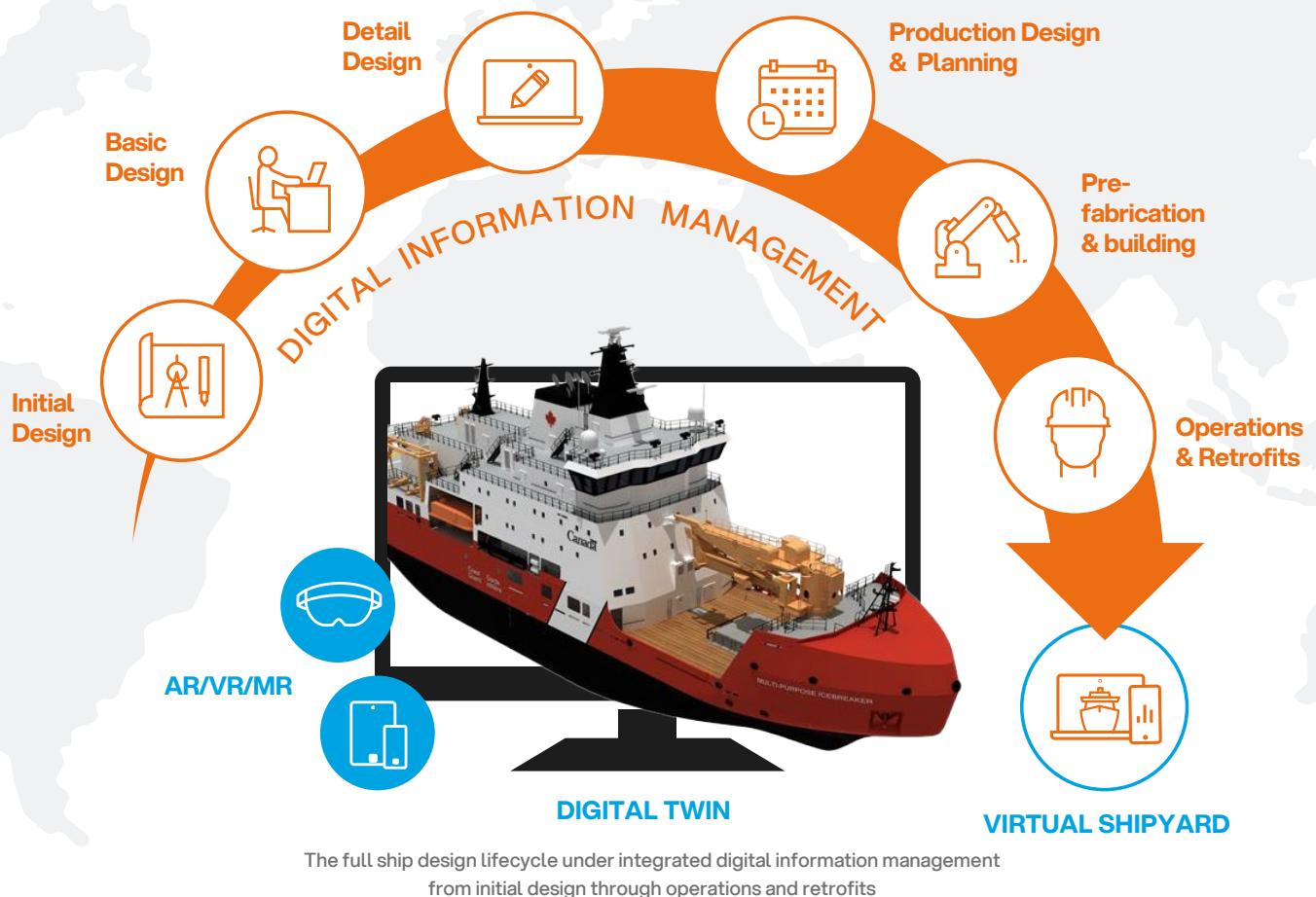
"After changing to Cadmatic, we are 30% more efficient on ship design projects. The concurrent engineering system allows us to run 10 concurrent projects with the same resources that before could only handle 7."

– Burak Anik, Design Manager, Tersan Shipyard

The case for data-driven shipbuilding

From drawing-centric to model-centric operations

The transition from drawing-centric to model-centric shipbuilding is primarily an operational decision, not a technology one. The 3D model becomes the single source of truth: all design information, production data, and as-built records derive from and return to it. This eliminates the version fragmentation that occurs when 2D drawings, 3D models, and production documents are maintained as separate, only loosely synchronized artifacts.



In practice, data-driven shipbuilding means:

- Design changes propagate automatically across all derived documents and production data, rather than requiring manual updates across multiple file types
- Material takeoffs, cut lists, spool drawings, and assembly instructions are generated from the model rather than produced as separate manual exercises
- Inspection records and as-built deviations can be linked directly to the relevant model components, creating an auditable digital trail
- Production supervisors can access the current state of any component – its design specification, procurement status, and installation sequence – through a single interface, on site

The role of the digital twin: Cadmatic eShare

Cadmatic eShare is Cadmatic's digital twin software for shipbuilding. Where many tools stop at 3D visualization, eShare functions as a live, linked repository of all vessel data – structural, outfitting, electrical, procurement, and production – that any authorized user can interrogate at any point in the project lifecycle.

For specialized yards, the practical value of eShare concentrates on two areas: production preparation and owner deliverables. On the production side, supervisors and foremen who previously relied on paper drawing packages can instead access color-coded, 3D-visualized work packages on tablets directly on the shop floor. On the owner side, eShare provides a structured handover deliverable of growing commercial value, particularly in the offshore and government vessel segments where lifecycle data management is a priority.

40+

Years of
shipbuilding expertise

1100+

Customers in
the marine industry

60

Countries with Cadmatic
users in the marine industry

69

New marine customers
added in 2025

The persistent gap in information flow

Most yards have invested in 3D CAD. The persistent gap is in the flow of information from engineering to production, not in design capability itself. A well-constructed 3D model that does not reliably communicate its data to the shop floor has not captured most of its potential value.

Three information flow failures are most common:

- Work package status is available in ERP systems but disconnected from the 3D model, so production teams receive textual status updates with no spatial context
- Equipment weight and lifting requirements are known to procurement but not surfaced to installation teams until late in the process, causing unplanned crane scheduling and, in some cases, hull cuts
- Nesting and cutting status for hull panels is tracked separately from the design model, so designers cannot see what has been cut, welded, or inspected without requesting reports from production

Each of these failures has a known, addressable solution in modern information management platforms that link ERP data, procurement records, and production status to the 3D model through a web-based interface accessible on tablets and workstations alike.

“

“With eShare, the production supervisors can use touchscreen tablets to access production drawings, spool and ISO drawings, project planning and the building strategy. eShare is also linked to our ERP system so all the required information contained in drawings and details about purchasing and project progress are available with a single click. This is very useful and saves time.”

– Arun Sidharthan, Lead Engineer, Damen Shipyards

What specialized yards should evaluate in design software

Selecting ship design and information management software is a long-term decision. The following criteria are most consequential for specialized yards:

How concurrent engineering capability affects throughput

The work sharing model determines how many designers can work simultaneously on the same project without creating conflicts or requiring complex administrative setup. Evaluate:

- Whether the work sharing hierarchy must be defined at project start, or can be modified as the project evolves
- How quickly new designers or teams can be added to an in-progress project
- Whether the system degrades in performance as the number of concurrent users and objects increases

Integration across disciplines

Hull and structural design, outfitting, piping, and electrical systems each have their own data and drawing requirements. Systems that require different tools for different disciplines introduce synchronization overhead and version risk. Evaluate whether a single platform can cover the full design scope without requiring mid-project exports to external tools.

Production information flow

The software must bridge engineering and production without paper as the primary medium. Evaluate:

- Whether the platform can link to the yard's ERP system and surface procurement and work package data in a 3D-visualized interface
- Whether production supervisors with no CAD training can access and navigate the interface on site
- Whether hull nesting and cutting status can be viewed within the design environment

2D drawing integration

2D drawings remain the standard deliverable in most classification society plan approval processes, though leading societies including DNV and Bureau Veritas are beginning to accept 3D model-based approval as an alternative. In either case, the ability to produce and manage 2D drawings directly from the 3D model, with automatic labelling and change management, eliminates the need to maintain a separate 2D drafting environment.

Import performance and interoperability

Specialized yards frequently work with vessel designs or model components from external design offices, owner-furnished equipment suppliers, or subcontractors using different software. The ability to import external models without performance degradation, maintaining navigation and modelling fluency, is a practical operational requirement.

Vendor expertise and support model

Generic engineering software vendors with marine modules are structurally different from vendors whose entire product portfolio and support organization is organized around shipbuilding. When issues arise – and in a live production environment they will – the availability of support personnel who understand the shipbuilding context, not just the software interface, determines how quickly problems are resolved.

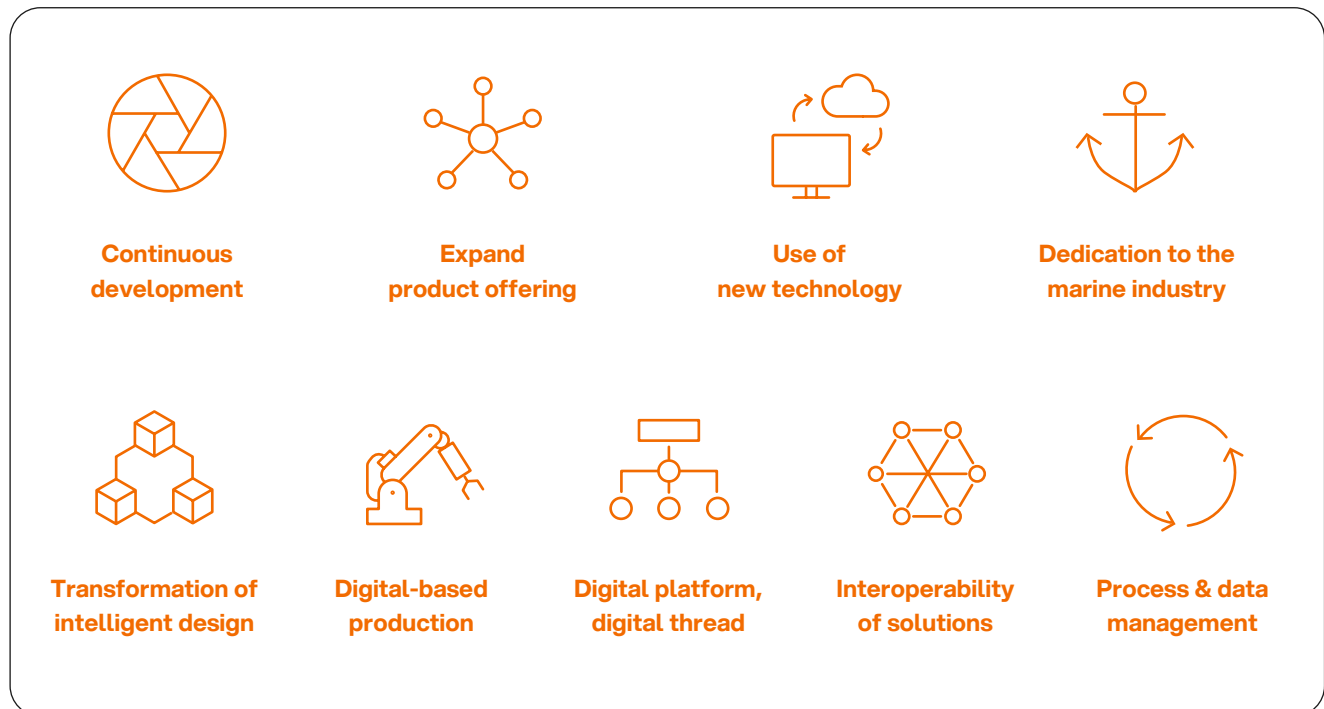
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“Cadmatic has enabled us to advance to a much higher level of 3D design maturity earlier in the project. The high level of data integration between 2D drawings, 3D model, and the parts library has resulted in fewer quality problems and more effective data management.”

– Adam Law, Chief Engineer, Vancouver Shipyards Co. Ltd

How Cadmatic addresses these requirements

Cadmatic has developed its product portfolio exclusively within the shipbuilding and ship design domain over more than four decades. Its solutions cover the full design lifecycle – hull and structural design, outfitting and piping, electrical and automation, and information management – within a single, integrated environment.



Cadmatic's strategic focus areas across product, technology, and industry commitment

Integrated 3D design environment

Cadmatic's 3D CAD solution is built for concurrent multi-user environments. Unlike systems where the work sharing hierarchy must be locked at project initiation, Cadmatic's model allows teams and designers to be added at short notice, without requiring complex administrative restructuring. A high-quality rendered visual environment and smart cursor together with assistance points helps users navigate and select the required entities with ease and accuracy.

2D drawings created in Cadmatic P&ID stay in sync with Electrical and the 3D model in Cadmatic Outfitting, so any change in the model flows through to P&ID and 2D drawings automatically. Structural design in Cadmatic Hull links directly to outfitting, keeping collaboration smooth across disciplines as the model evolves. The result is a connected design environment where drawing updates are handled by the system, not the engineer.

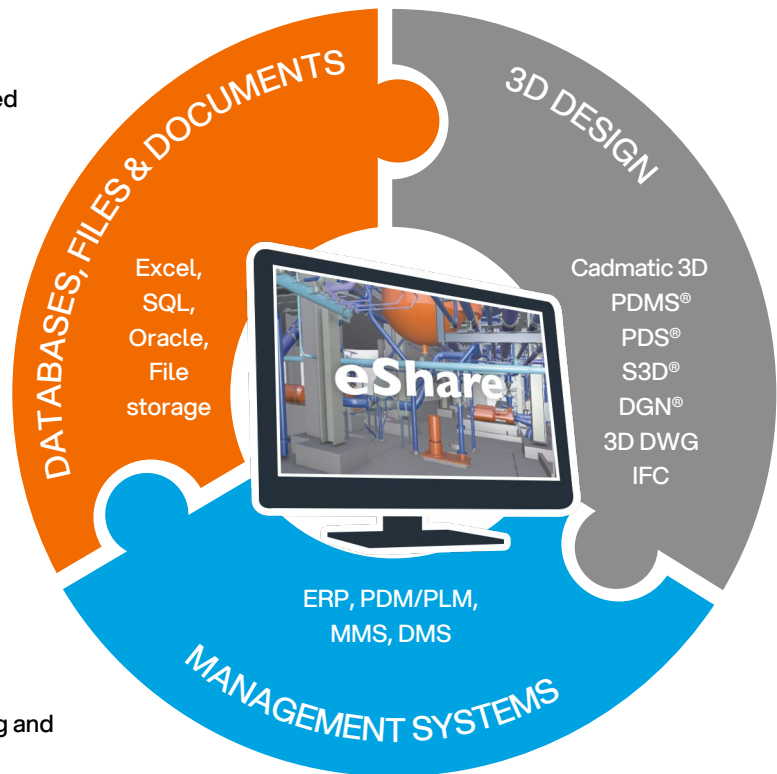
Cadmatic design solutions support both on-premises and cloud deployment, so shipyards can align their setup with their data control and information security requirements.

Bridging engineering and production

Cadmatic eShare is a digital twin and information management software. It functions as a web-based portal that links, visualizes, and shares any ship-related information via the 3D model, accessible desktop workstations, tablets, and augmented reality devices on the shop floor.

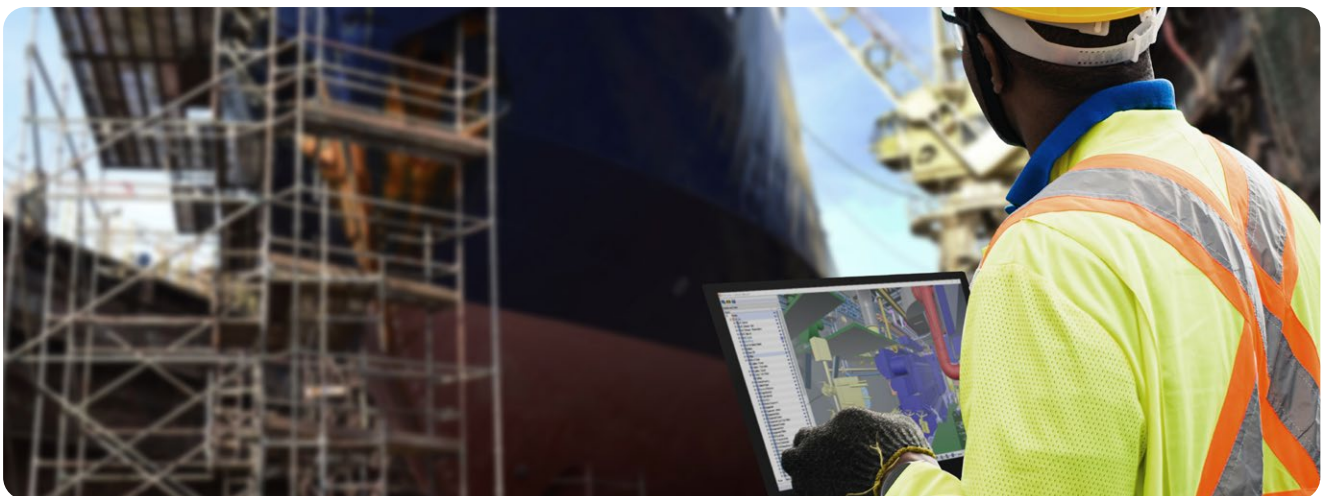
For production supervisors, eShare provides 3D-visualized work packages that combine data with ERP-sourced procurement and making that information directly usable on applications include:

- Piping work package tracking, merging engineering data with delivery status from pipe shops and suppliers
- Equipment weight visualization for installation planning, reducing unplanned crane scheduling and hull cuts
- Hull build progress monitoring, linking nesting and cutting status directly to the 3D structural model



Cadmatic eShare integrates 3D design data, management systems (ERP, PDM/PLM, MMS, DMS), and databases into a single interface accessible across the yard

eShare operates without cloud storage or data relocation requirements, which is a relevant consideration for yards working on vessels subject to export control or information security constraints.



Production personnel accessing 3D-visualized work package data on a tablet directly on the shop floor

Automated assembly planning

Beyond design and information management, Cadmatic's offering extends into automated assembly planning, one of the most labor-intensive aspects of shipbuilding production. The assembly planning toolset replaces manual, experience-based planning with a rule-based system that integrates 3D design data with structured work breakdown sequences. At Seaspan Shipyards, this approach has automated 75% of the planning workload, allowing planners to focus on review and optimization rather than repetitive part selection.

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“Automated planning has allowed our planners to focus on what they do best. By significantly reducing manual effort, they can now thoroughly review the output and ensure the plans truly support production efficiency – with parts sequenced and installed at the right stage.”

– Matthew Taylor, Senior Manager, Design Build, Seaspan Shipyards

Support by shipbuilding experts

Cadmatic's support model emphasizes direct contact with personnel who have shipbuilding domain knowledge, rather than tiered general technical support. Support engagements are tracked through to full resolution. The company conducts annual customer satisfaction surveys across its support services and uses the results to drive continuous improvement.

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“The link between Cadmatic eShare and nesting software means we can see exactly what parts have been imported and cut. Everyone can check the progress without the need to request this information from elsewhere.”

– Paul Buijs, Cadmatic Hull Administrator, Scheepswerf SLOB

Conclusions and recommendations

The strategic imperative

For specialized shipyards, integrated design and information management software has moved from aspiration to operational baseline for yards that want to compete. The yards that have already made this transition are running more projects with the same headcount, delivering fewer defects to production, and offering owners a more complete digital deliverable at handover.

The gap between digitally integrated yards and those still operating on drawing-centric, manually coordinated workflows is widening. The cost of closing that gap through software investment is substantially lower than the accumulated cost of rework, schedule delays, and lost project capacity that a fragmented workflow produces.

Recommendations for specialized yards

- Audit the current information flow between engineering and production. Quantify how much production supervisor time is spent locating, verifying, or waiting for design information. This is typically the highest-return area for improvement.
- Evaluate concurrent engineering capability against your actual project mix. If your yard runs three to ten projects simultaneously, the work sharing model of your design software is a primary throughput constraint.
- Prioritize ERP integration in any platform evaluation. A digital twin that cannot surface procurement and work package data in 3D has limited production value.
- Evaluate whether your software vendor's entire organization is built around shipbuilding or whether maritime is one vertical among many. The difference shows up during implementation and whenever support is needed.
- Consider the owner's deliverable requirements of your target market. If you are building for offshore operators, government clients, or technically sophisticated ship managers, the quality of your digital handover package is an increasingly differentiating factor.

Next steps

Cadmatic's full product portfolio for ship design and information management is available for evaluation. Contact Cadmatic to discuss requirements specific to your vessel types and project profile.



Image courtesy of
GONDAN Shipbuilders



Cadmatic is a leading developer and supplier of 3D design and information management solutions for the marine, process, energy, and construction industries. Founded over 40 years ago with a dedicated focus on shipbuilding, Cadmatic serves more than 1100 customers across the marine industry globally. More than 45% of shipyards with active orders in commercial shipbuilding have chosen Cadmatic as their design and information management platform.

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