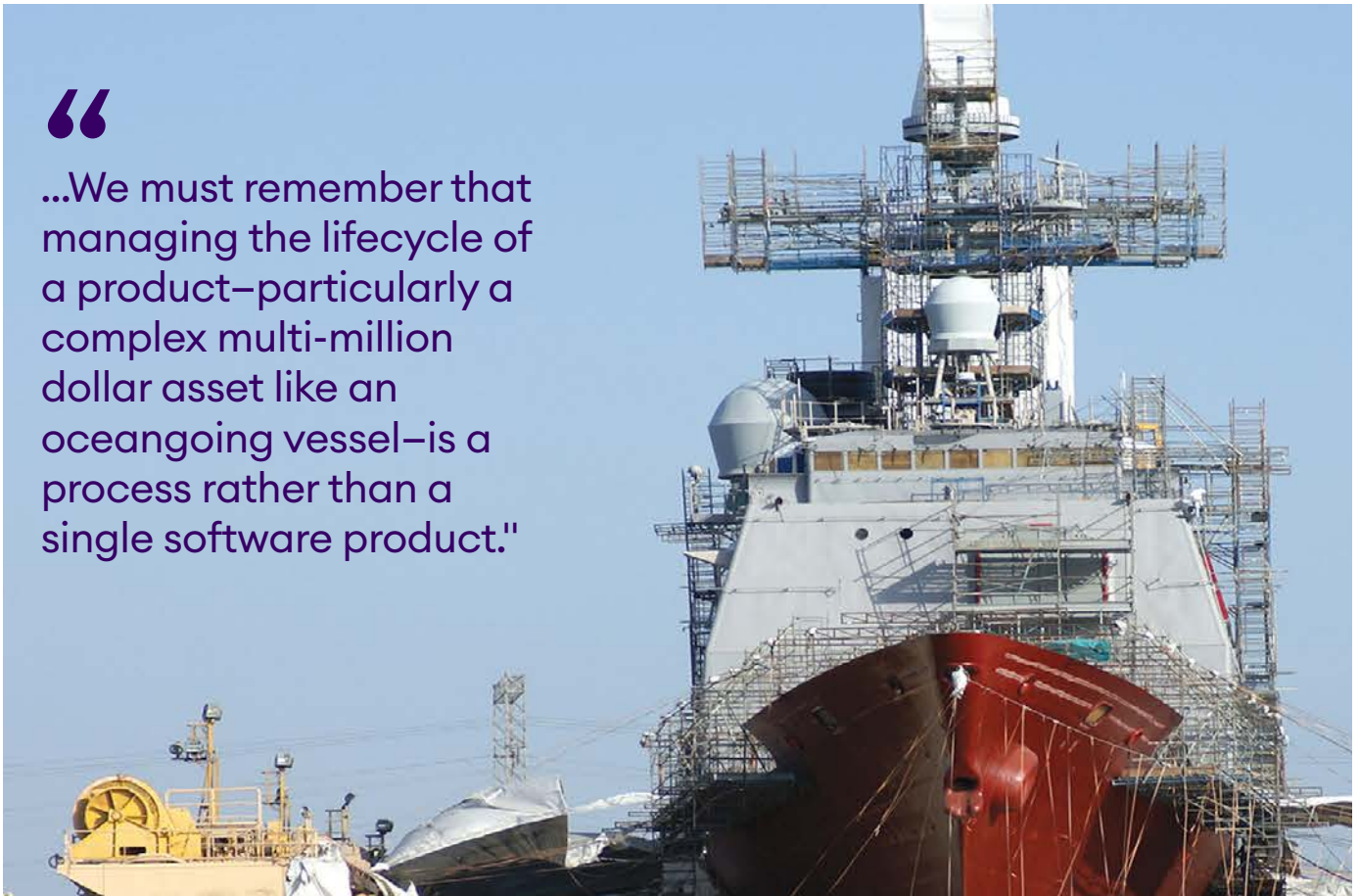


# Selecting ERP for the digital shipyard



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## Digital readiness now is the time.

Major shipyards and product lifecycle management vendors are excitedly talking about the emergence of the digital shipyard—a streamlined operation with improved information sharing and substantial efficiencies over traditional shipbuilding environments.

**Australia for instance is working on an initiative that includes:**

- Connected workers
- Connected ports
- Connected tools
- Connected supply chains

That sounds great. But what are all of these elements of shipbuilding connected by? The primary proponents of the digital shipyard trend are product lifecycle management (PLM) software vendors. But we must remember that managing the lifecycle of a product—particularly a complex multi-million dollar asset like an oceangoing vessel—is a process rather than a single software product. Proper PLM requires a unified approach to data across an operation, and that by definition requires that the system of record—enterprise resource planning (ERP) software—be the primary vehicle for PLM thinking. Best-of-Breed PLM software generally prioritizes CAD design, 3D modeling, Business Information Modeling (BIM) and Virtual Reality. But the product lifecycle extends through manufacturing, fabrication, procurement, commissioning and other activities. After commissioning and handoff, PLM should deal with ongoing support and maintenance all the way through to decommissioning.





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A complete ERP package software contains the master records for all of this data. As design is becoming data-driven rather than document-driven, shipbuilding ERP is more gracefully managing the data behind the engineering and design process, and will act as the repository for design data as well. Data in ERP is then used to drive materials and component procurement, fabrication, and employee hiring and equipment rental required to complete a project. That data will still be available as a shipyard offers maintenance repair and overhaul services to its customers.

## Initial steps must be included

In order to drive digital benefits across your shipbuilding operation, you need more than PLM software. You need a single software application that encompasses the key phases where you deliver value and positive service to your customers. This is challenging because of the project-centric nature of shipbuilding and some of the unique steps in your value chain, which includes:

- Design
- Procure
- Construct
- Outfitting
- Sea trial
- Maintain

But ERP must begin addressing the process well before design starts because making the go/no go decision to pursue a contract, estimating and bidding are all complex, time consuming and mission critical. And all of the information added to an enterprise application during these steps should seamlessly flow into subsequent project phases to create one version of truth and avoid duplicate work or poor communication as the process is handed back and forth between users of separate systems like CRM, PLM and manufacturing.

This early stage data must flow into the sales contract, and that contract represents the starting point for the project and contains user requirements subsequent steps must conform to, including specifications or functional mandates for the craft and earned value management or progress-based billing.

Well before a best-of-breed PLM solution will be applicable, the tone for the rest of the project is set. Your enterprise software must encompass these steps or you will be at a disadvantage.

## Design and changes in context

Engineering and design of the asset must be informed by these initial steps taken as the shipbuilder pursues and then secures the contract. And before a blueprint for the vessel is started, the sales contract is the blueprint for the project.

Starting with the design process, contract management functionality in ERP is crucial because it will ensure you deliver according to the agreed requirements. And because design is still somewhat of an iterative process, that means that changes to the design must be communicated from the design tool through to other parties instantaneously.

From the initial design stages, procurement may already be working on long lead time items that must be fabricated to order. As the design changes, specifications for these items may change, and procurement professionals will need to immediately revise active orders or projects with suppliers and subcontractors. Lacking the tools for real-time communication of changes, these long lead time items may push the project schedule out in violation of contract requirements. At the very least, out of pocket expenses will increase due to rework and rush fees.

Manufacturing and fabrication teams will also need real time updates as the design changes, otherwise they too will be consuming time and materials against outdated revisions.

If you are relying on a siloed PLM solution, some labor-intensive and costly integration process will be required to ensure design changes cascade down to the shop floor and procurement teams. It makes more sense to select and implement ERP that encompasses these key areas for the shipbuilding industry.

## **Project finance and management**

As work begins against the contract, most shipbuilders rely on stand alone project portfolio management tools or even Microsoft Excel. There are plenty of reasons this will create risk, add cost and hinder you on your journey towards digital shipyard status.

Each shipbuilding project has two sides—financial and management and operational work/management. Shipbuilding ERP must encompass both a cost breakdown structure and a work breakdown structure. The cost breakdown structure deals with the revenues and costs, when they will be realized, cash flow, project milestones tied to liquidity events and terms and conditions of contracts with suppliers. The work breakdown structure is operational. It encompasses what is done when, and is essential in order to ensure that work is proceeding according to the requirements of the contract.

If you are trying to manage work on the project in a standalone project management tool or in spreadsheets, you will create operational risk because there will be no way to reconcile the work breakdown structure and the cost breakdown structure. What project steps have actually been completed? How do they correspond to project milestones and payment events? How much money have we spent on internal and external resources to date? How much time and money are yet to be expended before the project is complete? Are we protecting the customer experience by meeting or exceeding contractual obligations? Ultimately, are we on track to make or lose money on this project?

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These are important questions that a shipbuilder just cannot reliably answer without fully integrated, project-driven shipbuilding ERP.

Both profitability and either firm commitments to the customer or customer experience are important. If you spend more than anticipated on labor or materials in certain phases of the project and do not realize it until much later, you could find you have run out of budget or internal capacity—including manhours and equipment—to complete the work.

Reporting on achievement of project deliverables takes on additional importance for shipbuilders completing work for defense organizations. They are part of government supply chains where there may be specific types of contract instruments including cost reimbursement and cost-plus contracts, which require rigorous tracking of project or system cost so a standard markup can be applied, up to a set limit. Other contract forms include earned value management, time and materials and even performance based logistics, where the entire project lifecycle must be managed profitably as a project. ERP must provide auditable, reliable tools that can administer each of these billing approaches as required.

**Shipbuilding ERP must bring together the operational and the financial sides of the project to help you track two key metrics:**

- Estimate to complete (ETC) by hours which provides forecasted number of hours and dollars to complete the project
- Estimate at completion (EAC) by hours which provides a forecasted cost of the project at completion

**Projects integrated with the enterprise**

**In order to deliver visibility into ETC and EAC however, ERP must encompass the contract itself, project management along with all of the different drivers of cost, including:**

- Materials procurement
- Equipment rental and chargeable use of internal equipment
- Subcontractors
- Employee hours consumed against the project

In order to meet the contractual obligations and satisfy the customer reliably, the different logistical elements that underpin successful project delivery just also be covered by ERP, with inventory management being one of the more challenging elements. Shipbuilders need strong inventory functionality to ensure that stockouts do not push milestones past timelines, which impacts revenue and the customer experience. At the same time, ERP should help a shipbuilder standardize inventory as much as possible.

This will help them move designs towards more standardized content, which saves cost and shortens lead times. Standardized inventory with part numbers, rather than parts designed specifically for each project, can also help shipbuilders identify and eliminate duplicate, identical parts that cause them to bloat inventory levels, tying up capital they could use elsewhere.

Equipment availability and readiness is also critical to a shipbuilder's ability to deliver, so maintenance and reliability of owned equipment like gantry cranes, robotic and manual welders and even the dry docks themselves. Many shipyards are running equipment that on paper has exceeded its useful life, so embedded enterprise asset management (EAM) and maintenance capabilities are crucial.

### **Rapidly changing competition and technology**

Shipbuilders also must adapt to change, and need ERP systems that will help them. These changes may center around the technology they use to on the project, like robotic welders. But more and more it is the technology embedded in the projects they complete for customers that is evolving faster and faster.

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Vessels are becoming more complex, and are more likely to include IoT elements designed to drive condition-based and preventative maintenance. This means a shipbuilder will need to consider how to use data from those sensors as part of an asset lifecycle service program. Over the lifecycle of the asset, data from the IoT and changes made to specifications during maintenance and refits should be added to a digital twin of the asset so the owner has full information that helps them get the most out of their investment.

Vendors to the industry like Rolls-Royce, General Electric and Honeywell—and customers like the U.S. Navy—are also working towards a goal of autonomous surface ships, which are expected to become viable by 2028 according to one report. IBM claims a smart port, fitted with cloud and IoT capabilities, will be ready to host autonomous ships by 2025.

An increased focus among vessel owners and regulators on environmental protection will have engine design implications. Shipbuilders will need to factor in the impact of lubricants, fuel types like liquid natural gas, biofuels and even hybrid engines. They will need to quantify the extent to which vessels pollute less than those with legacy technologies to meet customer demands and qualify for incentives through the Environmental Ship Index (ESI), a program of the World Ports Climate Initiative. Vessels that meet targets for nitrogen oxide, sulphur oxides emissions qualify for lower harbor dues.

Shipbuilders will also need to deal with increased competition. Vessels like bulk carriers are built increasingly in Southeast Asia. Middle Eastern countries are producing tanker ships as they seek to pull more of the capital projects associated with petroleum back within their borders. But products categories like cruise liners are seeing a lot of activity. And it is these vessels, which require extensive consumer insight, innovation and new amenities where higher-wage countries like Italy, Germany, Norway and the United States may see the most opportunity. Shipbuilding ERP will help identify the best revenue opportunities, make go-no-go decisions about pursuing projects and compete on the basis of innovation and quality rather than price.





## Conclusion

Shipbuilders require ERP software designed for their unique and demanding needs. Without the right ERP software, you will be unable to confidently manage customer projects towards a successful, profitable outcome. You will struggle to meet customer requirements for billing and project control. And you will be ill-equipped to meet the demands placed upon you by advancing technology and economic trends.

IFS is your reliable partner in enterprise software designed to meet these challenges and more.

## About IFS

IFS develops and delivers enterprise software for companies around the world who manufacture and distribute goods, build and maintain assets, and manage service-focused operations. Within our single platform, our industry specific products are innately connected to a single data model and use embedded digital innovation so that our customers can be their best when it really matters to their customers—at the Moment of Service.

The industry expertise of our people and of our growing ecosystem, together with a commitment to deliver value at every single step, has made IFS a recognized leader and the most recommended supplier in our sector. Our team of 4,000 employees every day live our values of agility, trustworthiness and collaboration in how we support our 10,000+ customers. Learn more about how our enterprise software solutions can help your business today at [ifs.com](https://ifs.com).