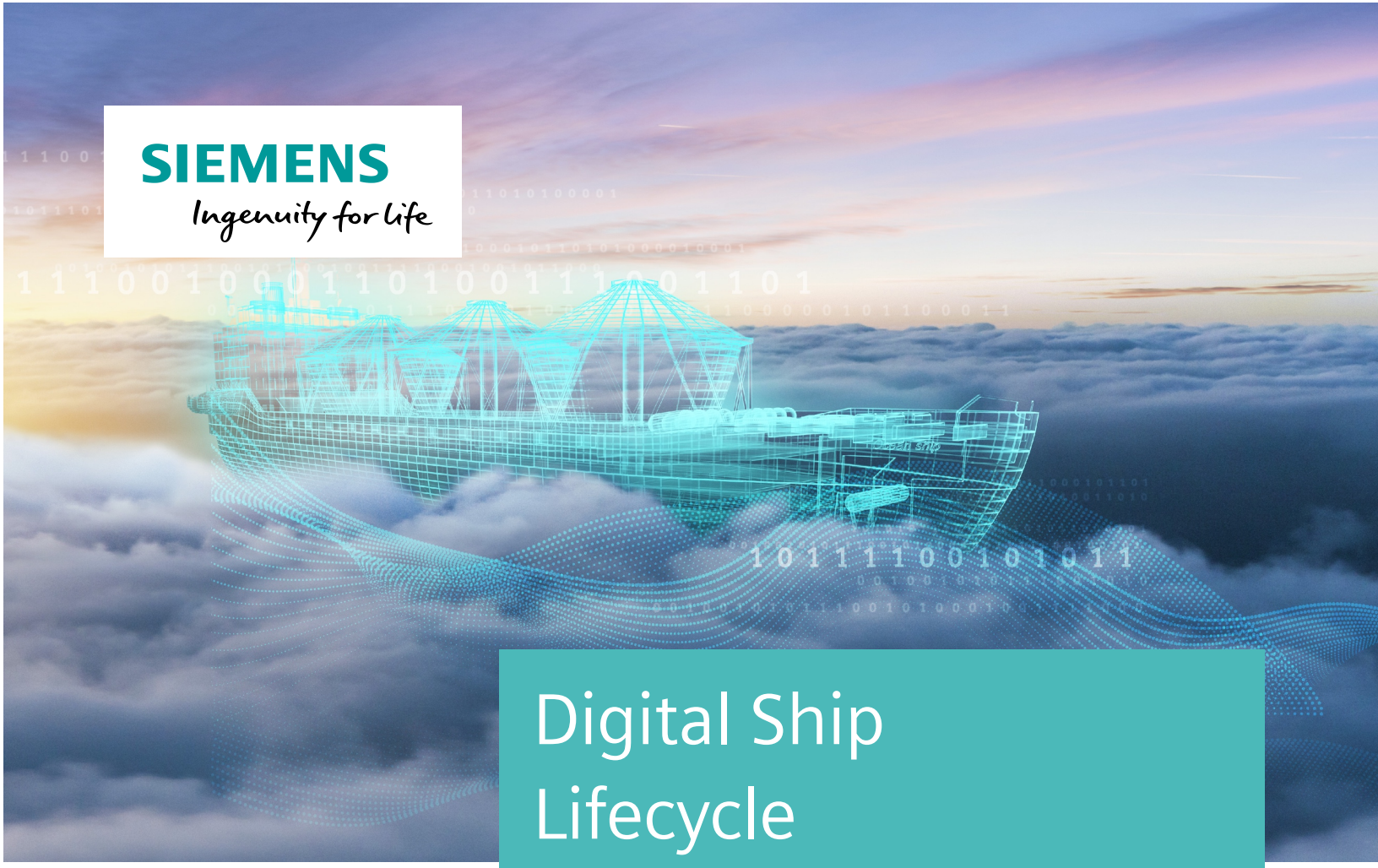

SIEMENS
Ingenuity for life

Digital Ship Lifecycle Management

Setting the course for the future of ship lifecycle management

The importance of robust ship lifecycle management

To meet today's regulations and market demands, ships need to be greener, safer, smarter, more cost-effective, more connected and more adaptable than ever before. As new functionalities are added to what is already a highly complex product, more parties (for example, suppliers, subcontractors, co-makers) need to be involved in the design, manufacturing and maintenance processes. Bearing in mind that ship service lives can reach 40 years for a commercial vessel and 50 years for a naval one, it becomes apparent that robust ship lifecycle management is not optional; it is critical.

If upgrading systems comes at a high price, doing nothing will have an even higher cost

A patchwork of disjointed legacy solutions

The marine industry was one of the first to widely adopt 3D computer-aided design (CAD), engineering (CAE) and manufacturing (CAM) tools when they became available in the 1980s. Yet shipyards today are still relying on paper documents and digital spreadsheets to supplement these computer-aided tools. This lack of centralized data management system makes finding, updating and sharing information across teams and with third parties laborious, especially as vessel complexity increases. Considering that shipyards, design offices, subcontractors, partners, clients, suppliers and class societies are frequently located across several continents (and time zones), ensuring that the right information can be accessed at the right time and the right place for schedules to be met is, at best, challenging.

Shipyards are aware that their current approach is limited. They know that without a system that automatically holds and updates all product data as changes are made, they will not be able to efficiently locate and distribute the information needed for product development, manufacturing decisions, class approval procedures and risk mitigation. However, many are unsure of where to start and are wary of the return on investment associated with upgrading technology solutions.

The better way for ship lifecycle management

What shipyards don't realize is that if upgrading systems comes at a high price, doing nothing will have an even higher cost. As vessel complexity increases, efficient handling of product information and processes is the only way that requirements, contracts, configurations, changes, earned value, risks, costs and schedules can be properly managed. Without a good data flow, inefficiencies in collaboration and compliance across departments will negatively impact profitability, cause penalties for late delivery, lead to delays in other projects on the yard and put new orders at risk.

Most 3D CAx tools today are closed systems. Until now, shipyards have been accepting the lack of integration capabilities of those tools as status quo. Therefore, CAx vendors had no real need to provide effective data exchange links. So while most shipyards use a host of software tools for ship design, engineering and construction, they have no mechanism in place to manage all the data in a single integrated environment, not to mention the business processes in which all this data is used.

Investing in future success

The only way to ensure accurate bill-of-materials (BOM) and configuration management, efficient supply chain management, robust change management, and global scalability and extensibility is to use a product lifecycle management (PLM) system as the backbone between disjointed software tools. The efficient handling of product information and processes in a centralized, PLM-based environment should span the full lifecycle of the vessel, from inquiry to decommissioning. Only then can the complexity of the lifecycle be truly managed, including all stages of design, engineering, manufacturing, operations, maintenance and services. This can be achieved by leveraging a single source of truth via a comprehensive digital twin model of the vessel and by sharing relevant parts of the model with all parties involved, including ship owners/operators, class societies and repair yards.

With a single source of truth maintained in a centralized system, globally distributed teams can work with a common set of data, tools and processes. Clients or project partners such as design houses, yards, suppliers, subcontractors and class societies can pull information when and where they

need it, as opposed to the main shipyard pushing it – providing it on request (which may cause delays) or providing it at regular intervals (with no certainty that the last version received is still up-to-date). This as-needed access not only facilitates cross-team collaboration, but also prepares shipyards for future business opportunities, for example transitioning from a product-only to a product-and-service-oriented business model by offering service and maintenance in addition to production and sales.

Adopting an integrated approach to ship lifecycle management enables requirements, weight, configuration and multi-domain BOM management across the full lifecycle of the vessel. It also allows for closed-loop change management: Having an integrated data management system ensures that real-time changes are accurately and transparently recorded and efficiently managed. This is critical to eliminating workflow inefficiencies, optimizing end-to-end process execution, and improving business agility.

The PLM backbone can be used for knowledge capture, management, and re-use. Having a readily available repository for ideas, data, methods and best practices can help alleviate the skill shortage caused by today's aging workforce. It also enables the re-use of lifecycle knowledge to optimize the development of future projects.

Finally, by leveraging the Internet of Things (IoT) and a low-code application development platform in combination with the digital twin, shipyard employees with no software development experience can build customized apps to address specific business needs. For example, information can be extracted from PLM, enterprise resource planning (ERP), and enterprise planning tools (EPT) systems to create multi-domain dashboards that can further streamline operations and maximize productivity.

Conclusion

Today more than ever before, shipyards must deliver on time, on budget and on quality if they are to remain competitive. As vessel complexity increases and the shipbuilding environment expands across many geographies, it becomes critical for the right information to be accessible in the right place at the right time. By bringing together all product information and processes into one centralized, integrated system, shipbuilders can effectively manage the complexity of their ships' lifecycles and be agile enough to respond to future market, regulatory and technological changes.