

DIGITALIZATION PUSH IN THE SHIPBUILDING SECTOR



European shipbuilders are experiencing incredible success at the moment. This success is built on their specialization in the construction of complex vessels like cruise ships, a market segment where demand remains extremely strong, and on their edge in expertise in the highly industrialized production of such ships. Use of digital technologies is playing a key role here, both by increasing the efficiency of internal processes and in terms of supply chain integration. European shipbuilders began the process of digitalizing their business processes earlier than their competitors in the East Asia did, though their lead is shrinking. This is why they need to launch a new digitalization push focusing on the digital product model.



Challenges of digitalization

European shipyards as well as their suppliers and partners will have to digitalize all their processes for them to maintain their edge over international competitors. For example, there continue to be gaps in the flows of digital information, especially at the interface between development and production, in the exchange of data with partners and suppliers, and during the transfer of ship-related documentation to the owner or operator. A lot of information is still exchanged in the form of drawings or even paper-based documents, thus requiring the recipient to scan them for capture in their IT systems. This process is time-intensive, subject to error, and increases the amount of time spent on coordination.

To be able to use digital data across all processes, shipbuilders will need to more effectively integrate their heterogeneous IT system landscapes. One of the main challenges here relates to the exchange of data between mechanical CAD systems and specialized shipbuilding applications like AVEVA Marine, CADMATIC, and NAPA. The former generates and saves components and modules as an explicit geometry, while the latter charts how the geometry was created. This is how the term 'intent-driven system' came about.

The different system philosophies present an obstacle to the horizontal exchange of data between various CAD systems and downstream applications for production control, for example, and prove to be an impediment to vertical integration with company-wide PDM and ERP applications. Vertical integration is necessary to uniformly manage files, transparent document changes, and to establish relationships with other information objects of the digital ship model.

The goal being pursued with digitalization in the shipbuilding sector is to develop a universal digital product model that reflects the precise progress of construction of the vessel across all development phases. This digital master, which is subsequently used to create the digital twin of the delivered product, assists in optimizing existing business processes and, in conjunction with operational data, makes it possible to develop new value-added services and service-oriented business models.

Strategies for a digitalization push

What type of measures should European shipbuilders take to ensure they can quickly benefit from the positive effects of digitalization? PROSTEP sees three key steps that are necessary for a successful digitalization push: A digital platform needs to be created (1), end-to-end digitalization needs to be ensured (2), and the company's processes need to be digitalized (3).

Creating a digital platform

The integration of the various IT systems creates the foundation for the efficient flow of information and the continuous synchronization of information. To this end, PROSTEP developed a data hub. All common CAD and PDM/PLM systems, as well as many specialist shipbuilding systems, can be quickly connected to this. The standard solution makes it possible to manage data relevant to shipbuilding with commonly used PDM/PLM systems like 3DEXPERIENCE, ARAS, and Teamcenter, as well as to transfer models back and forth between mechanical and intent-driven CAD systems. It forms the centerpiece of a digital platform that supports cross-system configuration lifecycle management (CLM) and collaboration between different companies. CLM provides transparency regarding changes made to the digital master over time.

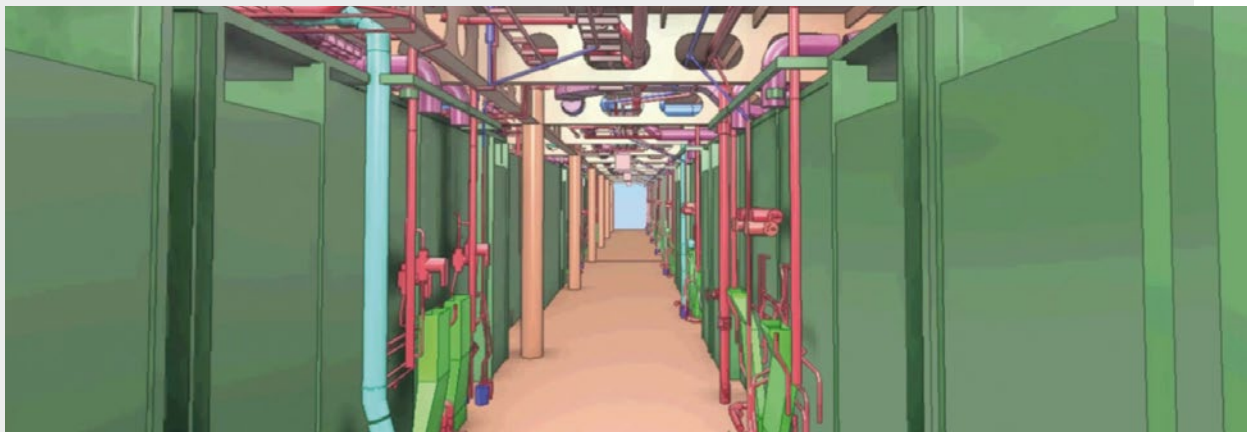
Ensuring end-to-end digitalization

Creating a digital platform does not automatically mean that digital information objects will be used consistently and across the board. For this to happen, it is necessary to identify which information objects are required where, who supplies them, and where there are media disruptions that hinder their transfer. PROSTEP uses a standardized method to evaluate the flows of information and identify redundancies, bottlenecks, and disruptions, similar to value stream analysis. The results of the analysis can be used to define measures for improvement.

The basis to implement digital continuity are the standardized tools and functions for CAD conversion that are part of PROSTEP's digital platform described in paragraph *Creating a digital platform*. They support the efficient implementation of measures to improve digital information flows in shipbuilding PLM landscapes.

Digitalization of business processes

Solutions for digitalizing of business processes can be developed and implemented based on the results. PROSTEP has developed solutions for processes such as drawing-free manufacturing, 3D assembly planning, and creating electronic spare parts catalogues that are also suitable for use in shipbuilding. The company is presently working with major shipyards to use 3D PDF containers to provide 3D models from development along with the business logic for planning construction phases, quality assurance, and other downstream processes. Also, first steps are being taken to digitalize the paper-based class approval process using 3D PDF technology.



From the digital ship model to the digital twin

Classification societies as well as operators have a growing interest in collecting digital ship data for further processing and to enrich their own data. It is necessary to protect the intellectual property of all companies in such an exchange. PROSTEP has the expertise and technology necessary to e.g. transfer the shipyard information that the operator needs and to protect it using suitable security mechanisms.

The digital models of ships already delivered to customers serve as the basis for creating digital twins. Using these models offers advantages to all stakeholders involved in the development, construction, operation, and use of ships, provided they are willing to share information. Digital twins make it possible:

- for operators to more efficiently operate and maintain ships;
- to provide a new customer experience thanks, for example, to virtual tours offered by cruise ship operators;
- for classification societies to develop new value-added services such as remote assessment of ship condition or predictive maintenance;
- for shipyards to provide services for spare parts logistics or to optimize the next generation of ships based on operational data.

Shipbuilders, shipping companies, and classification societies will therefore need to agree on a joint approach to tackling the challenges presented by digitalization so that all parties benefit. The required technical solutions are already available now.

PROSTEP can provide marine companies with professional support in defining their digitalization strategies and in implementing the necessary measures. The PLM consulting and software firm is a recognized partner of the marine industry. Its customers include high-profile companies such as DNV GL, Lürssen Group, Meyer Group, and thyssenkrupp Marine Systems (tk MS).

