

An aerial photograph of the FPSO CLOV offshore oil rig. The rig is a large, complex structure with multiple levels of yellow and red metal frameworks, pipes, and equipment. It is situated on a dark red hull. The rig is surrounded by blue water, and a tall, slender tower is visible on the right side. In the background, there are distant landmasses under a clear blue sky.

SIEMENS

Ingenuity for life

Siemens PLM Software

PLM for Shipbuilding

A holistic approach for optimizing
shipbuilding productivity

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PLM for Shipbuilding integrates the extended shipbuilding enterprise by aligning shipyard operations, ship service and product support, including the supplier network.





Meeting the shipbuilding challenges of the 21st century

The shipbuilding industry is being presented with a unique opportunity as operators aggressively upgrade their fleets to meet the need for more energy-efficient, reliable and environmentally-friendly ships with better overall performance and lower total operating costs.

Designing and building highly-complex ships and stationary platforms while facing intense global competition and price pressure as well as meeting operational requirements over the lifespan of a ship is a daunting task. Vessels and stationary platforms must withstand the long-term effects of deep water environments. They are built in small production runs, are highly customized and require an enormous amount of scientific knowledge and production technology.

What's more, the cost of maintaining and refitting advanced ships can be several times the purchase price, so new shipbuilding programs must satisfy total cost of ownership as well as operational requirements for performance, endurance and payload.

Future Fleet

We call this new, more efficient approach that enables shipbuilders to take advantage of the fleet modernization trend: Future Fleet.

To capitalize on these opportunities, shipbuilders must pursue productivity improvements across the enterprise by achieving operational alignment as well as optimizing the processes used in managing ship design, construction, delivery and service. By creating a seamlessly-integrated and synchronized enterprise that links designers, engineers, production specialists, support teams, partners and suppliers, shipyards

can optimize performance, maximize lifecycle productivity and sustain competitiveness. We call this new, more efficient approach that enables shipbuilders to take advantage of the fleet modernization trend: Future Fleet.



PLM for Shipbuilding

The Siemens PLM Software holistic product lifecycle management (PLM) solution, PLM for Shipbuilding, helps shipbuilders transform business processes to align with the Future Fleet. This solution takes advantage of groundbreaking 4th-generation technology for accelerating development of ships and off-shore structures, driving innovation, collaboration and competitiveness.

The PLM for Shipbuilding solution enables a holistic approach to shipbuilding that will improve total enterprise collaboration, synchronization and productivity as well as lifecycle ship service and support by optimizing the following processes:

Shipbuilding program and process management

Leading shipbuilders around the world have established new program launch records using PLM for Shipbuilding by leveraging ship design software with embedded templates that accelerate ship delivery, boost team productivity and facilitate the use of proven best practices that mitigate potential risks and eliminate program delays. In addition, by leveraging configuration management, shipyards can seamlessly track the configuration of a ship from concept development through production and across the ship's entire operating lifecycle.



PLM for Shipbuilding, helps shipbuilders transform business processes to align with the Future Fleet.



Without a proven and open PLM system, shipbuilders are at an overwhelming disadvantage in the marketplace.

Ship design and engineering

Shipbuilding features some of the most challenging design and engineering problems from a scalability standpoint. With PLM for Shipbuilding, this next-generation industry solution takes advantage of ground breaking 4th-generation design technology for accelerating development of modern ships and offshore structures, driving shipbuilding innovation and facilitating global collaboration. By using this shipyard-design solution, designers and engineers can create and maintain 3D models in context of key work groups, such as major ship modules, compartments, systems and locations.

Digital ship construction

To limit the cost of development and production as well as mitigate related risks, shipyards must optimize their facilities and processes across an entire lifecycle by leveraging shipyard production process solutions. By digitally simulating complete ship assemblies and their associated processes, you can optimize process flows before production begins, implement lean practices at the start of new programs and avoid the cost of building expensive physical models.

Supply chain management

Shipyards rely on a global supply chain of partners and suppliers to help design, develop, manufacture and test new ship concepts. Leveraging the JT™ data format, support for multi-computer-aided design (CAD) design content and flexible round-trip supplier data exchange, PLM for Shipbuilding allows shipbuilders to exchange data reliably and flexibly with suppliers and partners, some of whom may use a different authoring tool. PLM for Shipbuilding also synchronizes supply chain operations by ensuring the right parts are available at the right time.

Ship service and support

Shipyards also focus on managing sustainability requirements and achieving continuous improvement in fleet availability, reliability and overhaul cycle reduction. PLM for Shipbuilding enables the shipyard to easily develop and publish all handover documentation included in the vessel specifications and contract. Fleet owners and repair yards can better manage all maintenance and regulatory reporting requirements, service planning, execution, service processes, metrics monitoring and reporting in a single environment.

Shipbuilding Catalyst



The Siemens PLM Software Shipbuilding Catalyst accelerates time-to-value for implementing PLM for Shipbuilding, while providing an environment for swift adoption of future shipbuilding solutions and related technologies.

The Shipbuilding Catalyst delivers:

- Industry best practices that function as a reference for PLM across the entire product lifecycle
- Deployment accelerators that include recommended product selections, network design decisions, configuration procedures, deployment best practices and user training

An open and configurable shipbuilding solution that allows you to control the appearance and behavior of an implementation. These include data model extensions, data structures and validation checks.

The Shipbuilding Catalyst provides preconfigured elements for activities such as defining data objects and roles that can be used in automated workflows.

The Shipbuilding Catalyst also supports:

- Departmental schedule management
- Weight information management
- Issue management
- Ship design
- Supply data exchange
- Assembly planning for outfitting
- Electronic work instructions

The Shipbuilding Catalyst enables shipyards to accelerate digital transformation of the enterprise, optimizing productivity with preconfigured

elements for key processes. This allows operators to improve fleet support and achieve greater availability and reliability while reducing total ownership cost.

Ship design and engineering

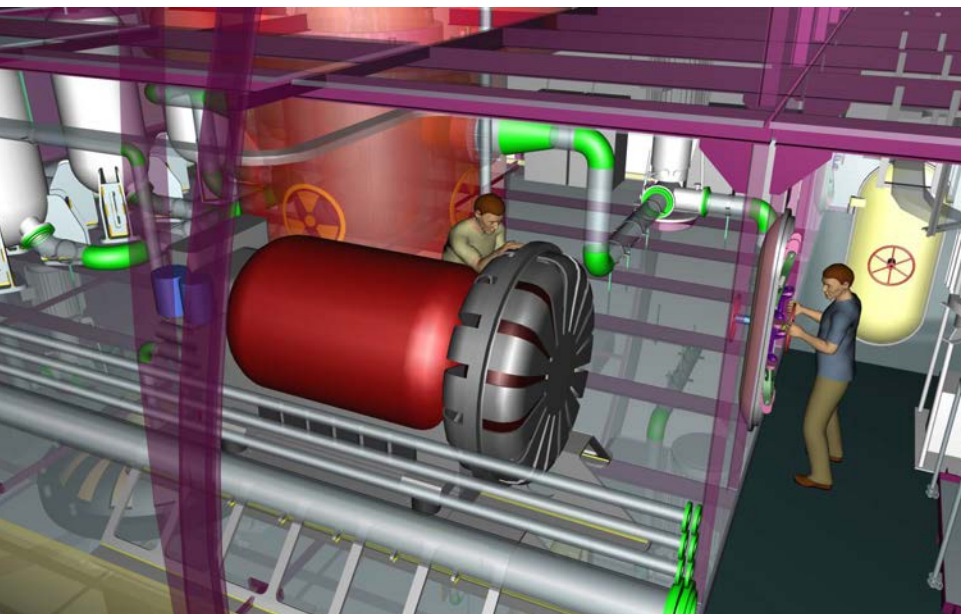
The ship design and engineering process solution is organized by business purpose and managed independently to optimize team performance.

The ship design and engineering process solution offers designers and engineers as well as production and support teams a significantly more tailored approach to the unique challenges of the shipbuilding industry. No longer does each team need to repeatedly sort through a single, hierarchal and vast data repository to access the information unique to their specific focus and missions. Each team has the ability to create and manage that portion of the ship design and technical requirements that focuses on their specific task and responsibilities. This unique approach to design and engineering allows teams to create and work more efficiently on their specific tasks, greatly facilitate their access to and management of in-context and relevant technical knowledge, and enable multiple teams in all departments and operations to work in parallel to reduce ship development and construction cycle time while maintaining strict compliance with ship requirements, schedules and configuration changes.

The ship design and engineering process solution is organized by business purpose and managed independently to optimize team performance by improving access to current and accurate knowledge. At the same time, the solution ensures overall enterprise synchronization. Specifically, the solution offers shipbuilders:

- Lifecycle ship knowledge management, which is crucial for lowering the total ownership cost of future ships
- Automated, efficient workflows that ensure enterprise harmony and fidelity
- Ship version control over the design evolution, which is essential for large ship classes
- Design re-use, which can further reduce the cost of future ship classes
- An open format that further facilitates data exchange between teams and shipyard operations

PLM for Shipbuilding provides a single, digital, all-encompassing, enterprise-wide environment that enables the rich and full lifecycle management of the most complex, modern and advanced naval and commercial ships.





Digital ship construction

Ship construction efficiency is directly linked to the quality of the build plan. The build plan drives the realization of an ambitious build strategy that is reliable and guarantees balanced resource utilization in the shipyard and overall assembly operation.

Digital ship construction allows you to define and validate in advance the most opportune and realistic build plan in a virtual environment. This guarantees an optimal level of productivity and predictability by avoiding unnecessary margins that account for possible rework and disassembling activities. Using digital ship construction enables you to consider resource availability in the shipyard and introduces a certain amount of automation for repetitive process planning. Offline programming of welding robots and automatic steel assembly planning based on resource availability leads to significant productivity gains in the shipyard.

As a planner, you can then dedicate more attention to other key aspects of planning, such as detailed planning, focused work instruction creation and handling new changes. Digital ship construction supports your decision making by displaying relevant 3D views of the build progress over time. This is especially useful for outfitting planning in crowded compartments where several last-minute changes can happen. You can identify clashes and other negative impacts of re-sequencing with 4D planning that displays the assembly sequence step-by-step and can be complemented by collision analysis.

Digital ship construction also offers shipyards focusing on the repair, overhaul and modernization market the ability to define and validate in advance optimum overhaul plans. As a result, you can reduce the time and cost of overhauls, thereby reducing the time ships are out of service for overhauls and improving the quality and efficiency of overhaul processes.

Supply chain management

PLM for Shipbuilding's supply chain management (SCM) process solution enables shipyards and fleet owners to use integrated supplier solutions to help them engage with their supply chain to manage costs, which can account for more than 70 percent of ship cost. Supply chain management enables a sustained, disciplined and systematic process for reducing the total costs of purchased materials, goods and services while maintaining and improving levels of quality, service and technology. Supply chain management enables suppliers to easily integrate all their data, including 3D, 2D and metadata, thus ensuring that the shipbuilder's design, planning and production staffs have everything they need to perform their tasks.

Supply chain management can also connect the shipyard's procurement and suppliers more closely with engineering and service teams earlier so they can make better decisions and help manage the change process. This solution synchronizes the value chain and leverages suppliers' innovation potential as a strategic weapon in the battle for profitable operations.

Using PLM for Shipbuilding unifies all shipyard operations and enables full communication with back-office applications, bringing together a shipyard's design, process, manufacturing and

service knowledge into a single PLM environment. PLM for Shipbuilding enables you to integrate information and automates processes throughout the product lifecycle to improve efficiency, accuracy and reduce time-to-delivery.

By bringing relevant product information together into automated processes, shipbuilders can better synchronize efforts, increase productivity and achieve greater innovation.

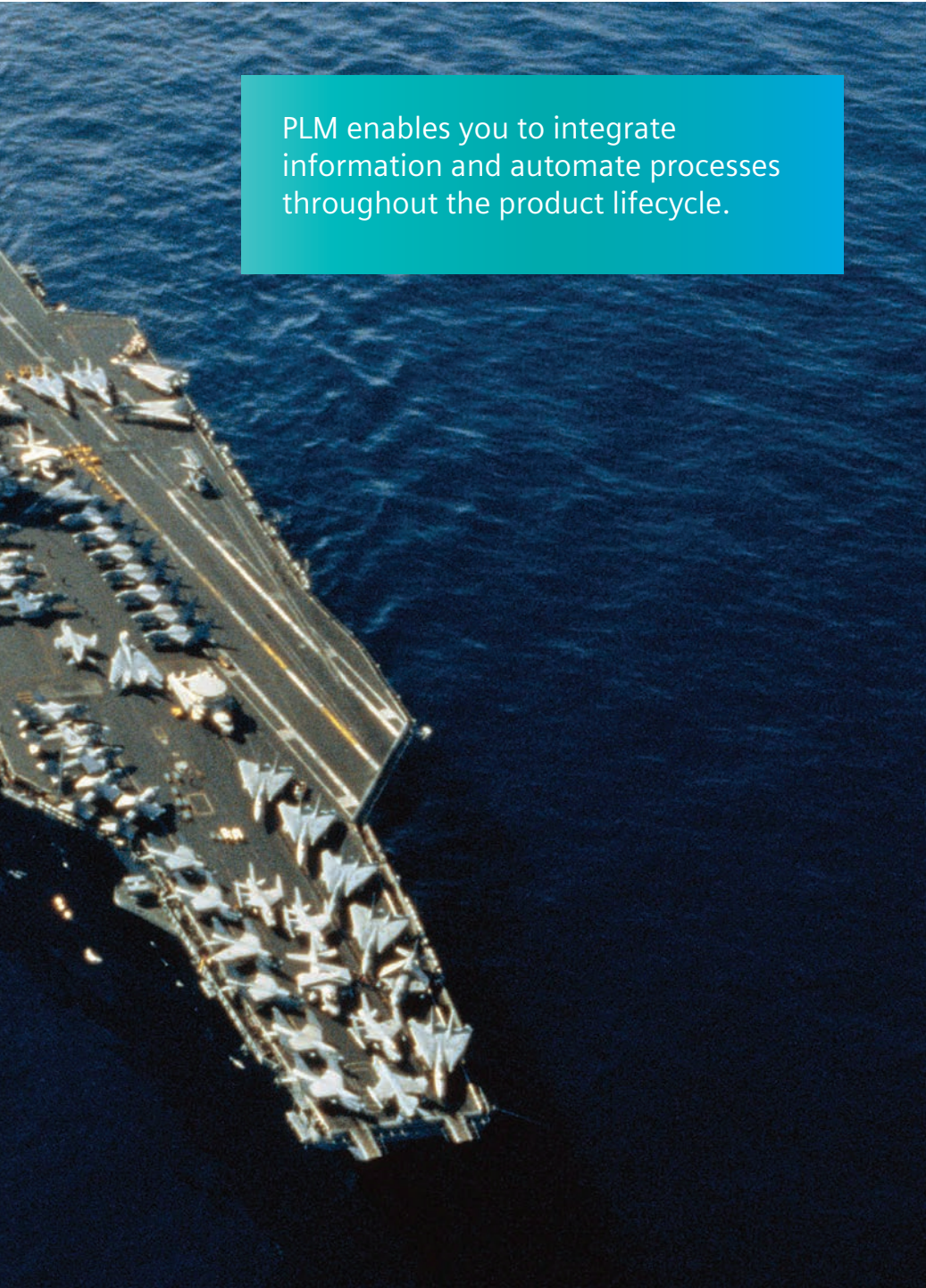


Ship service and product support

When ship maintenance costs can be 70 percent of the total lifecycle cost and fleet owners and operators are facing significant budget reductions, never before has lifecycle service and support been more important for both government and commercial fleets.

Thus, fleet operators and shipyards are focused on building future modern fleets that are less expensive to service and support. At the same time, they are implementing technology to more efficiently support the existing ships which can have service lives of 30-to-50 years.

The PLM for Shipbuilding ship service and product support process solution provides shipyards and fleet operators with a single source of service knowledge that increases accuracy and coordination throughout the global service network, facilitating fleet upgrades, enhancements and alterations that can be crucial to overall fleet performance.



PLM enables you to integrate information and automate processes throughout the product lifecycle.

The service and support solution enables lifecycle traceability from service requirements through service activities, which can reduce errors and improve fleet reliability and availability.

The synchronized service knowledge – including requirements, resources, documentation and ship configuration – increases effectiveness and reduces fleet lifecycle total costs.

The ship service and product solution supports configuration-driven service planning, forecasting and execution, which in turn can reduce service events, turnaround time, and increase compliance and safety.

Finally, the service and support solution automates the electronic distribution of technical service information, work instructions and service bulletins that are aligned with the latest design changes, new requirements and in-service reliability problems.

PLM for Shipbuilding has enabled shipyards to cope with the most complex and challenging ship designs.





Leading shipyards turn to Siemens

Leading shipyards in the world have implemented Siemens PLM Software's PLM for Shipbuilding to improve productivity and enterprise collaboration, building better and more affordable ships in less time and for less money. From nuclear-powered aircraft carriers and submarines to top-of-the-line surface combat ships, mega-yachts and deep sea work boats and drilling ships, PLM for Shipbuilding has enabled shipyards to cope with the most complex and challenging ship designs. And now the Shipbuilding Catalyst allows shipyards to realize these benefits even more quickly.

PLM for Shipbuilding

This holistic solution spans the entire shipbuilding enterprise and lifecycle.

Shipbuilders can now use PLM for Shipbuilding and the Shipbuilding Catalyst to develop, build and maintain the next generation of ships in less time and for less money.

PLM for Shipbuilding will benefit future fleets by enabling them to:

- Achieve greater performance, lower ownership cost, higher fleet availability and reliability, and greater quality and compliance with the latest marine safety and regulatory requirements
- Make ships easier to build and repair, lowering construction, service and total ownership costs

Shipbuilders will have verified and trusted suppliers linked with shipyard and service personnel with production schedules and 3D models of all aspects of the design.

Shipbuilders will also benefit from the many new work set options that provide immediate access to just the right relevant data; and service teams will benefit from links to the appropriate supply chain to reduce service and overhaul cycle times.

Shipyards will have the designs and technical data from successful ship classes and ship designs to minimize the design and engineering costs of future classes of ships.

This holistic solution spans the entire shipbuilding enterprise and lifecycle to enable shipbuilders to integrate their organizational knowledge, automate processes throughout the product lifecycle and improve efficiency, accuracy and execution to reduce time-to-delivery.





“To deploy truly innovative product lifecycle management, we have implemented Siemens PLM Software, which allows integrated management across the whole process of sales, design, production and after-sale services.”

Seung-Seok Kim
General Manager
Hyundai Heavy Industries

About Siemens PLM Software

Siemens PLM Software, a business unit of the Siemens Digital Factory Division, is a leading global provider of product lifecycle management (PLM) and manufacturing operations management (MOM) software, systems and services with over 15 million licensed seats and more than 140,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with its customers to provide industry software solutions that help companies everywhere achieve a sustainable competitive advantage by making real the innovations that matter. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

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