

DIGITALIZATION IN INDIAN SHIPYARDS

Integrated Product Development
Environment (IPDE) A promise for
Digital Transformation in Indian Shipyards



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Abstract

This paper explores the digitalization of Shipyards, focusing on Shipyard 4.0 solutions and technologies that address traditional challenges such as low digital adoption, inefficiencies in production, and quality control issues. By embracing digitalization, shipyards can streamline shipbuilding processes, enhance ship quality, and achieve comprehensive lifecycle management for vessels.

Introduction

The Indian shipbuilding industry is on a growth trajectory, supported by government investments, strategic advantages, and a focus on niche markets. With projected market growth from USD 90 million in 2022 to USD 8,120 million by 2033, the industry faces increasing complexity. Digital transformation in shipyards is essential to overcome these challenges and achieve sustainable growth.

Problem Definition

Shipbuilders face mounting pressure to deliver projects on time, within budget, and to specification. Traditional project planning and execution cannot adequately address challenges posed by complex ship designs and economic uncertainties. Innovations such as the **Digital Thread Approach** and **Shipyard 4.0**, aim to integrate key systems across the shipyard, reduce production costs and maintain quality, enabling shipbuilders to meet evolving market demands.



High-Level Solution

The **Digital Thread Approach** revolutionizes ship construction, by integrating key systems into a unified ecosystem. Each system enhances the Shipyard 4.0 ecosystem:



Enterprise Resource Planning (ERP)

Acts as the operational backbone, managing financials, human resources, and supply chain processes. It ensures that all resources are accounted for and allocated efficiently.



Product Lifecycle Management (PLM)

Tracks a ship's lifecycle from design, manufacturing, service, and disposal. PLM is crucial for maintaining the integrity of the ship's specifications throughout its construction and beyond, up to services and maintenance.



Manufacturing Operations Management (MOM)

Optimizes production processes by ensuring real-time monitoring, and adherence to plan.

Integrating these systems enables seamless collaboration, aligning design, engineering, production, and logistics functions for a cohesive workflow.



Solution Details

Integrated Product Development Environment (IPDE) represents a transformative approach in shipbuilding, driving efficiency and collaboration across the entire project lifecycle. By seamlessly integrating critical systems such as PLM, ERP, and MES, IPDE establishes a cohesive digital ecosystem. Below are the key components and their contributions:

1. PLM as the Single Source of Truth



- **Bi-directional Integration with ERP:** Facilitates real-time data sharing, including material management, equipment orders, cost details, inventory levels, and MBOM details. This integration aids the planning team in tracking, updating, and revising the ship's project plan dynamically.
- **Enhanced Project Monitoring:** PLM integration generates critical reports such as S-curves, weight comparison reports, and progress metrics, equipment lifecycle dashboard, Inspection dashboard ensuring close monitoring of project milestones.

2. MES-PLM Integration for Manufacturing Insights



- **Fabrication and Resource Tracking:** Integrates metrics like fabrication tonnage, manpower usage, and maintenance schedules into monthly progress reports, providing a holistic view of manufacturing operations.
- **Streamlined Reporting:** Enables automated generation of essential reports to monitor progress, optimize workflows, and ensure adherence to project schedules.

3. MES-ERP Data Exchange



- **Production Planning and Inventory Management:** Facilitates data synchronization between MES and ERP systems, optimizing production activities and inventory control.

4. Secure Collaboration Through Standardized Formats



- **ISO-Compliant Data Exchange:** Implements secure collaboration standards using JT™ data formats, 3D PDFs, and JT plus PDFs, enabling efficient sharing of 3D multi-CAD models with strategic partners.
- **Reduced Re-engineering Needs:** Ensures seamless integration of design data, minimizing rework and accelerating the shipbuilding process.

This comprehensive IPDE solution will not only streamline operations but also act as a catalyst for future ship designs, driving global adoption of digitalization in shipyards. By leveraging these integrations, shipyards can significantly improve project outcomes, reduce re-engineering, enhance collaboration, and achieve sustainable growth in a competitive market.

Business Benefits/ Best Practices

By implementing an IPDE solution we can get:



Increased Efficiency

Streamlined workflows minimize redundancy and accelerate production timelines.



Enhanced Quality

Consistent and real-time data improve the accuracy of the build process.



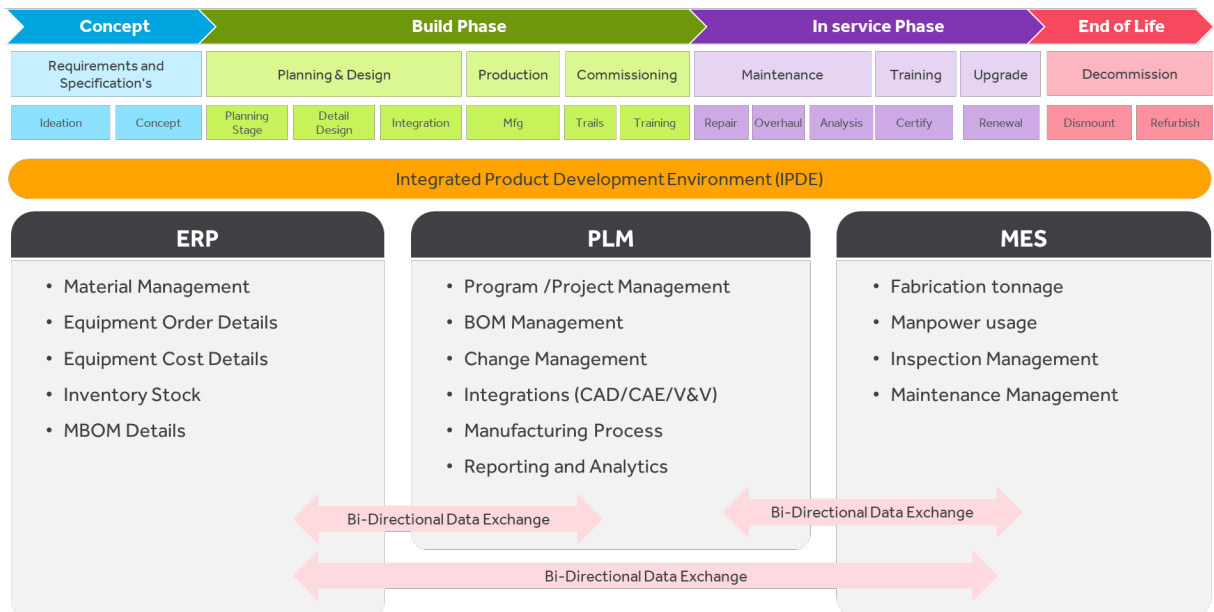
Cost Savings

Optimized resource management leads to reduced waste and lower operational costs.



Agility

The ability to quickly adapt to changes in design or market demand.



A Closed Loop system wherein data exchange and integrations are there across vertical and horizontal domains.

Fig1. IPDE Solution.

Use Case

Problem Statement:

Indian shipyards faced tracking and monitoring shipbuilding programs due to fragmented data and manual processes. There was a pressing need for a digital monitoring solution that could provide real-time visibility into project progress and support proactive decision-making through intuitive dashboards and automated workflows.

Solution Details:

Cyient developed and implemented a custom **"Project Monitoring System"**, integrating advanced tools and technologies, including:

Teamcenter and Active Workspace PLM Platform

Served as the central platforms for managing product and project data, ensuring consistency and accuracy across all teams.

MS Project Integration

Enabled controlled workflows and streamlined scheduling to improve planning efficiency.

Dashboards and Reports

Custom dashboards provided a unified view of project progress, while detailed reports (e.g., S-curves, weight comparison, equipment and inspection dashboards and task completion metrics) facilitated data-driven decision-making.

Automated Notifications

Notifications and task prioritization ensured timely completion of activities, reducing manual intervention and enhancing team productivity.

Business Benefits

- All stakeholders could monitor and analyze the progress of the shipbuilding program in real-time, empowering them to make informed decisions.
- Automated workflows and notifications reduced manual effort, improving task efficiency by approximately 80%.
- The system reduced complexity in tracking and monitoring project activities by around 75%.

Outcome

The implementation of this digital monitoring system marked a significant step toward the adoption of Shipyard 4.0 principles in Indian shipyards. By leveraging advanced integration and analytics, Cyient enabled these shipyards to improve operational efficiency, meet project deadlines, and enhance overall productivity.



Conclusion

Digitalization in the Indian shipyards is the need of the hour to match the global standards and market needs. IPDE solutions promise to revolutionize shipbuilding by fostering collaboration, enhancing data management, and driving efficiency across the supply chain. Cyient is contributing multiple shipyards in this transformative journey with its vast expertise in domain knowledge, engineering and product lifecycle management expertise.

About the Author



Mohit holds a Doctorate Program Degree in “Digitalization in Defense”. As a Subject Matter Expert (SME) in marine and shipyards, he focuses on designing and optimizing business processes to enhance customer experience, boost profitability, and maintain a competitive edge using latest technologies and platforms.

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About Cyient

Cyient (Estd: 1991, NSE: CYIENT) partners with over 300 customers, including 40% of the top 100 global innovators of 2023, to deliver intelligent engineering and technology solutions for creating a digital, autonomous, and sustainable future. As a company, Cyient is committed to designing a culturally inclusive, socially responsible, and environmentally sustainable Tomorrow Together with our stakeholders.

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