THE MARINE INDUSTRY IN 2030

NAVIGATING A DIGITAL FLEET

Shipowners and operators walk many tightropes. They must have sufficient cargo or passenger capacity to meet reasonable demand, but not so much that they must decommission vessels when demand falls. Ship propulsion systems must be efficient, using as little fuel as possible while still meeting schedules—and while costing as little as possible to install and maintain. More regulation means more documentation. In all, it's not easy to run a modern shipping fleet.

Fluctuating demand for goods and travel, global trade tensions, and other factors outside the ship operator's control create an uncertain environment for cargo and passenger capacity. Industry watchers don't see this smoothing out. If anything, they expect the maritime industry to become even more challenging.

BETTER CONTROL MEANS MORE PROFIT

Given this overall environment, tight control of vessel operations is critical, and enlarging that view to examine the entire fleet's operations can create a significant advantage. Understanding cost drivers, minimizing time in port (and, especially, waiting at anchor before loading or unloading), operating each vessel at its most efficient, and de-risking operations as much as possible become core strategic objectives for ship managers.

Creating a digital twin of each ship's critical elements—a virtual representation of critical onboard systems, if not the entire vessel—can be extended to creating a twin of the

whole fleet and takes advantage of several emerging technologies available to operators.

A vessel's digital twin is an accurate mirror of the ship afloat, reflecting its continuously updated as-built and as-maintained status. As one example, an operator can use this information to plan the vessel's route to ensure an on-time port arrival without exceeding a hull's most efficient speed. It can also be used to apply advanced maintenance strategies using simulation to identify when service must be carried out instead of when a schedule determines that it should be done. If the digital twin is connected to onboard sensors, it can be used to compare the as-modeled data to actuals, leading to even greater insights into each vessel's operations.

But there's even greater value to be gained by looking across a fleet. Vessel A might require engine maintenance at a different frequency and intensity than Vessel B—why? Vessel C typically has fuel costs 10% higher than Vessel D—why? Once these facts become known, the operator can analyze the underlying data to identify trends. Perhaps a less experienced crew on Vessel A does more maintenance than needed. Maybe Vessel C typically operates faster than the designed hull speed.

Ships create gigabytes of data that operators can analyze to improve operations.

SMART TECHNOLOGY CREATES INSIGHTS

Innovative ship operators use technology to capture expertise from skippers, chiefs, and others to supplement more recent hires' skills. This could mean building augmented reality tools to aid in maintenance, remote piloting to assist onboard crew, creating algorithms to guide maintenance and operations, or examining shipboard data to identify and promote strategies for the most efficient processes.

Creating, maintaining, and analyzing digital twins is just the beginning. Advanced analytics can help operators identify opportunities to fine-tune the fleet to achieve competitive advantages. One example; guaranteeing a specific arrival time in port. This requires modeling the vessel, its speed, and seakeeping on the projected route and weather conditions—all predictable but not often analyzed together— to find the optimal route.

Guaranteeing an arrival time can lead to new and better relationships between the cargo line and its clients. The vessel operator becomes a strategic asset to the shipper, fully

vested in the upside of meeting the schedule, rather than penalized for being late.

Extending this route optimization example, Artificial Intelligence (AI) and machine learning can help operators "see" what may not be visible to humans. Based on location data, AI can enable ships' masters to predict future positions, movements, and maneuvers hours in advance. They can use this to game out routes, avoid collisions, limit fuel consumption and, of course, enhance safety.

Applying this across an entire fleet, the operator can position vessels when and where they need to be to maximize utilization, minimize costs, manage crew levels, and optimize the system as a whole. One possible outcome of such an analysis is a rebalancing of the fleet, fine-tuning the vessels required to meet the owner's business objectives. Another could be using the results of this analysis as inputs in the design of new ships.

GET READY FOR 2030

These types of analyses can yield incredible value and provide actionable information for decision-making. It starts by optimizing one system on a single vessel, then more systems on more ships until the operator can model aspects of the entire fleet and make concrete, fact-based decisions.

Ship operators need to balance capacity utilization, operating cost, time at sea, and delivery targets to be as profitable as possible in an uncertain overall economic climate. Freight shippers want reliable, accountable partners. The only way to meet all of these objectives is by gathering data, analyzing it to discern patterns—and then acting to improve overall effectiveness.

TRANSFORM HOW YOU WORK, ENABLED BY DIGITALIZATION

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