THE MARINE INDUSTRY IN 2030

BUILDING A SMART SHIP

Tumultuous doesn't begin to describe the maritime economy. Trading relationships may be strained, cordial, or openly hostile, with cargo ships caught in the middle. Cruises may be the ideal vacation for many—or not, as contagious illnesses create fear and uncertainty in the traveling public. Manufacturers idled as economies closed down during the COVID pandemic, leaving raw materials in ports and on vessels—and then demanded them instantly, as production resumed. Consumer demand is up then it's down. During early 2020, container utilization rates dropped to 8%[1], an unsustainable level that led carriers to cancel sailings to reduce capacity and increase their ability to charge higher freight rates. Vessel economics, the lack of trained crew, and changing regulations all add to a mix of uncertainty that pervades the commercial shipping world.

UNCERTAINTY IS THE NEW NORMAL

In such an environment, tight control of vessel operations is critical. Understanding cost drivers, minimizing time in port (and, especially, waiting at anchor before loading or unloading), and de-risking operations as much as possible become core strategic objectives of owners and operators.

Creating a digital twin of a ship—a virtual representation of critical onboard systems, if not the entire vessel—is often a starting point for such efforts. Still, a truly "Digital Ship" takes advantage of many technologies available today in operating the ship and its management company.

SCHNITGER CORPORATION

APRIL 2021

A digital twin typically starts during design, when the first concepts are created and then added to as the design progresses. If possible, the twin is updated during construction to create an as-built digital twin that matches the delivered vessel as much as possible. Then, during operations and maintenance, the twin continues to be modified to reflect equipment upgrades and other changes.

Connecting this twin to onboard sensors that provide real-time or delayed access to operating data can be used to analyze many facets of the vessel's performance. These analytics can improve ship and fleet operations by, for example, planning maintenance to balance wear on equipment with downtime and the use of maintenance materials and labor. Analytics can also be used in route planning to optimize fuel use against speed and idle time at anchor. Today's ships already create gigabytes of data that is rarely used; it is not a matter of generating this data but of gathering it and then making sense of it.

Another key to managing risk and reducing operating costs is to assist human crew members in doing their jobs more effectively. Entirely autonomous vessels are still in the future, but assistive technologies are already in use on many bridges for collision avoidance. Simpler technologies can help with maintenance tasks by providing the crew with training before the task and information while doing the job. Such virtual and augmented reality tools (VR and AR) can radically upskill crew members on board, and provide valuable data to colleagues onshore, who may be able to lend their expertise as well.

Advanced analytics such as artificial intelligence (AI) and machine learning (ML) can help operators "see" what may not be evident to humans. One example is in route planning, where AI, based on location data, 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.

The maritime industry has often been slow to adopt new technologies. That must change if operators are to become more efficient and sustainable in the face of uncertainty.

NEW PROBLEMS CALL FOR NEW METHODS

In many ways, the basis for this change is the digital twin, whether it is of a critical system or the entire vessel and whether it is a static or dynamic replica of the physical object. Designers have the earliest input into the digital twin, creating it for the ultimate operator.

The yard can add as-built updates, and the operator must then keep the twin as current as possible. Once it's validated as matching the real world, the twin can be used in simulations to gather insight, find and resolve non-optimal situations, and plan future use scenarios.

But a digital twin is just one aspect of digitalization. Digital technologies must become a core strategic pillar that informs many areas of a business's operations. This may mean using machine learning to look at operating data from across a fleet of vessels to identify areas of efficiency and inefficiency, digging for root causes, and applying lessons learned across the fleet to increase average performance. Maritime enterprises must be digitally savvy—for current operations and to attract future workers—and aware of emerging trends.

GET READY FOR 2030

Operating a smart ship begins with connecting data to resources that can analyze it and help operators maximize uptime and profit. This can extend into the supply chain, for just-in-time maintenance, bunkering and other operations.

Even if you aren't a ship operator, these concepts can create new opportunities for your business. You can build your intellectual property into information-based products, such as a digital twin of the equipment that you can sell, along with AR or VR-based training alongside the physical gear.

Smart ships are the marine industry's future, enabling you to operate with greater certainty and lower risk.

TRANSFORM HOW YOU WORK, ENABLED BY DIGITALIZATION

Schnitger Corporation created this brief at the request of Siemens Digital Industries Software, Inc. For more information or to comment, please visit www.schnitgercorp.com

[1] Q1 2021 report, https://plattsinfo.spglobal.com/always-on-shipping.html