

SMART TECHNOLOGY BRINGS ENERGY SAVINGS AND MORE TO MAERSK-DRURY

NEW INTELLIGENT SEA WATER COOLING SYSTEM CONTROLLER OFFERS GREEN OPTION FOR SHIP OWNER

A strong commitment to conservation and the environment led ship owner Reederei Stefan Patjens GmbH & Co. K. G. to retrofit one of its 5,000 TEU container ships – the Maersk Drury - with a new marine industry innovation. The Drury was recently equipped with CIRCOR's Smart Technology CM-1000 Series intelligent controller for sea water cooling systems.

The result: variable speed operation that provides the seven-year-old vessel with energy savings on the main sea water pumps of approximately 70 percent, increases system uptime and delivers safe, consistent pump operation and performance.



AN INDUSTRY LEADER THAT SETS A GREEN EXAMPLE

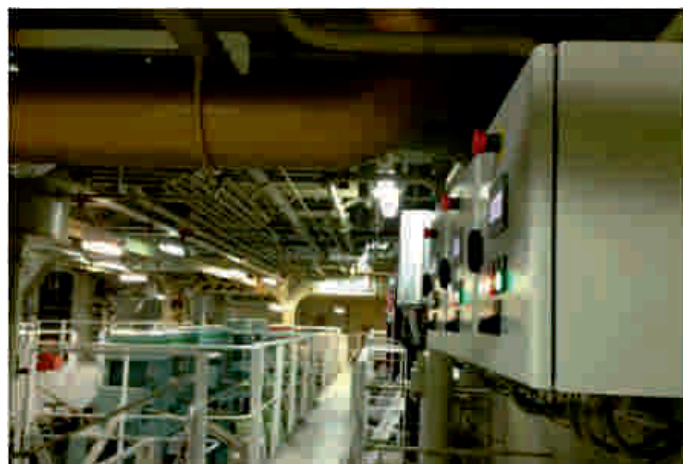
Based in Drochtersen, Germany, Patjens has been in operation since 1999. The company owns 13 vessels that range in size from 950 TEU to 5,000 TEU. All of the ships are chartered to commercial carriers, and Maersk is the company's largest customer.

Patjens faces the same challenges that all ship owners, builders and operators face, with increasing environmental regulatory pressures and fluctuating fuel costs. But the company has long been a leader in seeking out sustainable solutions. Patjens has invested in state of the art energy efficient engines and emission systems, as well as installing generators that can utilize a variety of energy sources. Constantly looking for methods to improve operations and deliver value to customers, Patjens prides itself on collaborating with customer ship crews and industry technology leaders to determine potential areas of improvement. Ideas become solutions, and all of the vested partners work together to meet operational expectations.

Patjens also recognizes the need to make sure that its vessels are as efficient as possible not only when it comes to fuel



consumption. The company works diligently to provide customers with fuel and energy efficient vessels to help them manage the ever fluctuating costs that can affect profitability.



IMPROVING SEA WATER COOLING OPERATION

The ship's sea water cooling system on an existing vessel offers a ship owner and operator the potential for energy savings as well as operational and maintenance savings. Aware of Patjen's strong commitment to sustainability, CIRCOR approached the company with the concept of the Smart Technology CM-1000 Series intelligent controller to realize these savings. Patjens studied the CM-1000 benefits and agreed to test it on the Maersk-Drury.

The sea water cooling system is operated by centrifugal pumps that send ambient sea water into a heat exchanger connected with the vessel's freshwater cooling system. The freshwater cooling system cools the engines, generators, other cooling loops and auxiliary equipment on board that consume significant amounts of energy. Sea water that has taken on heat from fresh water is then pumped back into the ocean as cooler ambient sea water is drawn in. This continuous operation is vital to the ship's operation.

The Maersk-Drury's sea water cooling pumps are arranged in a 3 x 50% configuration, meaning that two of the pumps are in parallel operation, each providing 50% of the required flow, while the third pump is redundant. The required cooling flows, however, do not always need to total 100%; this percentage is dependent on the temperature of the sea water that is drawn into the system and the heat load by consumers on the freshwater side. When the vessel operates in an area where sea water temperatures are low enough or not all consumers need max. cooling, reduced flow rates are employed through the CM-1000 Series' variable speed operation, thus providing energy savings. Due to the slow steaming operation, the system is almost always oversized.

Additionally, the Maersk-Drury is utilizing exclusive CM-1000 functionality to enhance the opportunity for energy savings,

with possible efficiencies up to 85%. Active Valve Control allows the system's valves to open and close automatically for enhanced flow control, without undershooting minimum pressure level. This maximizes the pumps' operating range, so the duty point is always adjusted for optimal performance without operating the pumps outside the limits and so reducing the risk of cavitation.

Because the Maersk-Drury utilizes the 3 x 50% pump arrangement, an intelligent cascading pump operation can be achieved. Whenever operation may be more efficient, the second pump is shut off. And because valve adjustments are made automatically, the CM-1000 eliminates potential error through incorrect manual settings which typically lead to pump damage due to cavitation.

Pump and motor lifetimes may be extended too, as the pumps run only at the level needed to provide the necessary system cooling. In addition to maintenance savings, this means Reederei Patjens will almost certainly need to replace this equipment less frequently and has reduced risk of unplanned downtime. Furthermore the 3-way valve on the fresh water side for by-passing is not any more in operation since the installation of CM-1000.

The CM-1000 also offers condition monitoring features that provide significant maintenance savings, with projections up to 50 percent annually. It provides the ability to detect misalignment; coupling, bearing and shaft seal damage; leakage monitoring; and protection against dry running. Early warning alerts help to prevent catastrophic breakdown. By preventing such damage to fairly inexpensive components, it reduces the potential for extreme damage to expensive components such as pump shafts and impellers. Also greatly reduced is the need for regularly scheduled physical



monitoring by the ship's 22-man crew, who are freed to perform other tasks unless a fault condition exists and action required.

Operation monitoring performed by the CM-1000 increases mean time between failure (MTBF), avoiding a pump's partload and overload operation. With the decrease in bearing load and cavitation instances comes more consistent performance and safer operation.

RETROFITTING ON THE FLY

The Maersk-Drury experienced no downtime during installation. CIRCOR and shipboard personnel installed the CM-1000 as the vessel continued operations, with at least one pump always operating.

When a frequency converter – a small but vital part – did require replacement during installation, the team arranged for the part's delivery at an upcoming port of call and installation took place immediately, allowing the vessel to maintain operations. No downtime has occurred since installation.

PROVEN SAVINGS WITH AN EYE ON THE FUTURE

With the CM-1000 in operation, cooling system energy savings on the Maersk Drury approached 70 percent. Patjens believes that installation of an intelligent sea water system controller may allow future vessels to be equipped with smaller generator sets, thus saving additional costs for equipment and allowing for overall greener operations.

"We started with the CM-1000 Series to get experience with such equipment," said Heino Eckerich, Technical Director, Reederei Stefan Patjens. "We hope to be prepared to install these for potential new building. Once we are certain of the energy savings factor, we can offer it to our customers as an ability to save fuel and minimize costs. Additionally, we believe that this capability allows us to operate for a longer time between overhauls, resulting in less downtime."

"The crew had been fully briefed before implementation," he said. "In general, CIRCOR made it quite simple, and nobody really had to be afraid of the systems. All of the work is done automatically, no special attention is required. It should be possible to easily integrate such a system into the standard routines of vessels."

Commercial Marine Products & Services

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