



**From Left: Andreas Carlsen, product development engineer, and Lars Edin Svaasand, manager of product and development at Metso Marine Automation**

## Energy Management

When the *Quantum of the Seas* is delivered in late October, she will have a new ship-wide energy management system (EMS) developed by Metso and Eniram in cooperation with Royal Caribbean and Meyer Werft. Metso has been responsible for machinery, hotel automation and energy performance optimization and Eniram for voyage optimization.

The EMS provides the operator with an overview of their energy consumption and is a tool enabling them to work more effectively, according to Lars Edin Svaasand, manager of product and development at Metso Marine Automation. “The cruise line sets certain targets, for instance, for fuel consumption, and the system will show whether or not a ship is operating within targets,” he explained. “These can be based on historical consumption or mathematical modeling for optimal operations.”

### Interfaced

The EMS is integrated with Metso’s DNA automation system, its associated Information Management System, and interfaced with Eniram’s Voyage Optimization.

“The system monitors not only the energy producers and consumers onboard, but also takes into account external conditions that impact a ship’s voyage and energy performance,” commented Melvin Mathews, director, maritime for Eniram.

According to Per Syvertsen, senior technical manager of marine automation applications for Metso, Eniram monitors

trim, speed, everything external related to the voyage, while Metso monitors fuel and energy consumption for propulsion, HVAC, steam and water production, galleys – for the whole ship.

“Wartsila has provided specific consumption figures for their engines, which we have programmed into our system, taking temperature, barometric pressure, fuel pressure and more into account, in order to optimize the generation of electricity,” Syvertsen noted.

Svaasand continued: “It is a top-down system with simple light indicators (on the bridge) – green, yellow and red – green means that the ship is operating within the set targets. Yellow or red will alert the ship that it needs to take corrective action.

“The user can easily identify the status of key performance indicators like fuel consumption, propulsion power, service systems, trim, speed and more.”

“From the overall data, the user can go to more detailed information levels,” said Mathews. “By integrating the EMS with the vessel automation system, it gives the user the possibility to go from the top level energy management view down to the performance of each individual component.”

The EMS will also identify deviations from normal operating and consumption patterns once they are established.

“The entire system is based on real-time data,” he added. The speed application, for instance, provides the exact RPMs for just-in-time arrival with maximum fuel efficiency with the course

downloaded automatically from ECDIS, and 16-day weather forecast for wind and wave conditions, as well as ocean and tidal currents.

### Potential for Savings

According to Syvertsen, cruise lines and shipyards have been focusing on hull shapes and propulsion efficiencies for some time, and he said those aspects are pretty much optimized. However, there are many other areas that have significant potential for further savings, such as HVAC and the galley.

“While the HVAC equipment is more efficient, there has been little monitoring to optimize the system and identify more savings,” he said. “There are areas of the ship, such as the main restaurant, where the air conditioning can be turned down when it is not in use. And this can be programmed into the system.”

Performance indicators range from key components, such as the diesel engines and how efficiently steam is produced, taking ambient conditions into account, such as temperature and humidity.

The system calculates fuel energy content, exhaust temperatures, specific fuel consumption, electrical efficiency, heat production and losses, as well as the cost of fresh-water production.

It also calculates total fuel consumption, daily and per passenger.

### Performance Monitoring

Metso’s automation system aboard the *Quantum* has some 17,000 to 18,000 input and output signal units (I/Os) with another 300 to 400 added for the energy management program. “We need extra flow, temperature and kW meters, for instance,” Svaasand explained.

He added: “Basically, this is a tool to monitor performance parameters throughout the ship. Our goal is not to save fuel, but to give operators information enabling them to optimize all the machinery and systems, which in turn may save them fuel. But that is up to them.” – *Oivind Mathisen*