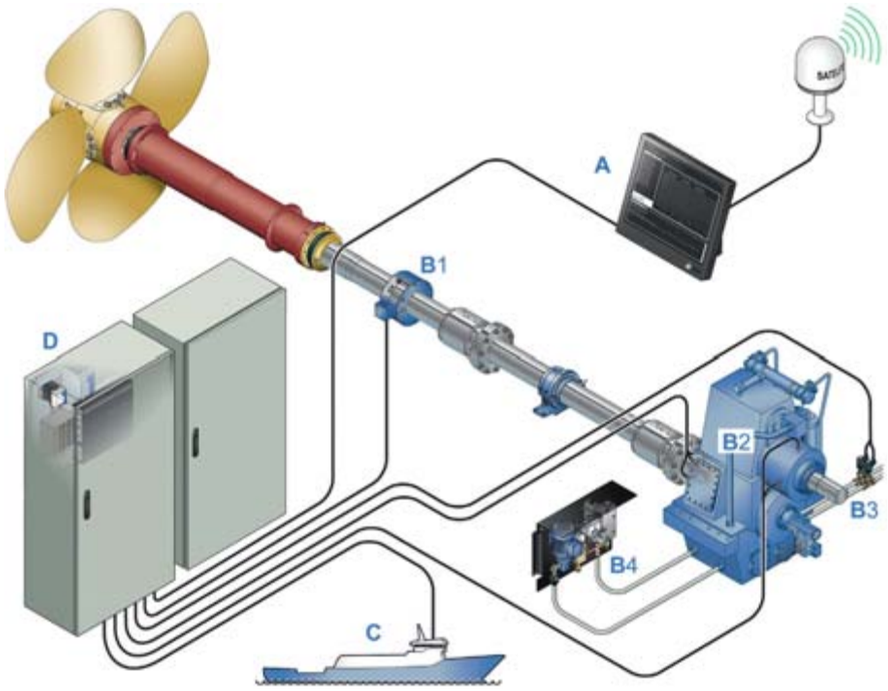
TEXT: RISTO PAKARINEN



A PCMS advisory monitor
B PCMS sensors
B1 High speed torque measurement
B2 Accelerometers
B3 Pressure transmitters in pitch system
B4 Oil monitoring unit in lubrication system
C Monitoring of nautical parameters through IAMS or GPS devices
D PCMS cabinet

The Wärtsilä PCMS system for controllable pitch propeller. PCMS system is available also for other thruster types.

PCMS HELPS

avoid problems and can cut lifecycle costs

Wärtsilä's new Propulsion Condition Monitoring Service (PCMS) helps vessel owners and operators minimise downtime. It is also a source of invaluable data on how propulsion solutions perform.

Just over a year ago, a small team of technical services engineers was assigned the task of creating a system that would enable Wärtsilä and vessel operators to monitor the performance of propulsion equipment in the same way that Wärtsilä monitors engine performance.

"As thrusters are underwater, nobody really knows their condition until they eventually stop working… and then everyone knows," says **Frank Velthuis**, System Development Expert, Wärtsilä. "With this system, we can track the signs which are indicative of future problems and advise our customer to arrange for component replacements. For example, it can take several months for a small crack in a bearing to develop into a major crack, which then leads to a breakdown."

BENEFITS DEPEND ON EFFECTIVE ANALYSIS

"We received both queries from the market and signals about providing improved monitoring," says **Luc Dankers**, General Manager, Sales Support & Product Management, Propulsion, Wärtsilä. "First we investigated the market, then established the critical requirements for our equipment and what needed to be monitored to make sure our propulsion solutions would work in the way they should."

Launched in September 2010, this is exactly what Wärtsilä's new PCMS does. "Configuring the hardware wasn't so hard; it was fairly easy to obtain the right components," says Velthuis. "The challenge was to develop and refine the software so that it works efficiently onboard and can effectively analyse the data."

Wärtsilä PCMS determines the operational condition of a vessel's propulsion equipment by comparing parameters from both measured and database sources in real time. Data from sensors that measure vibration, hydraulic pressures and temperatures are combined with operational parameters of the thrusters such as setpoint and feedback signals, but also the vessel's pitch, speed, rate of turn, and draught.

MONITORING A WIDE RANGE OF PARAMETERS

"PCMS also takes nautical parameters into consideration so that we can relate the measured values delivered by sensors to each thruster's physical

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PCMS advisory monitor.

"The benefits that PCMS offers shipowners are more related to avoiding unexpected **events," says Dankers.**

The internally mounted accelerometers have been tested extensively on the SSCV Thialf.

condition," says Velthuis. "Using only motor or impeller speed (rpm) as a parameter in comparisons - a technique which many systems employ - means that your analysis is shaky because you can't establish why specific peak values are occurring."

"We can now link the data we acquire to both the way in which a vessel is being used, and the equipment's physical performance," adds Dankers. "For example, vibration levels almost always increase as power levels are raised, but abnormal levels of vibration only become visible in a proper context, when you link the correct set of monitoring parameters together."

Data collected is transmitted to Wärtsilä on a daily basis. "Customers receive a monthly PCMS report, which details the condition of their equipment," says Velthuis. To ensure that the data analysis process is effective and that nothing important is overlooked, most of the data analysis routines are automated. Appropriate service recommendations are then communicated to the customer by experienced product specialists, all of whom have ISO certificates in vibration analysis.

AVOIDING UNWELCOME SURPRISES

Use of PCMS means that damage can be prevented before it occurs, that time-consuming and costly physical inspections can be avoided, and that the lifecycle costs associated with shipowners' assets can be significantly reduced.

PCMS has been adapted from the remote-monitoring architecture developed by Wärtsilä for its engine monitoring service. **It's the first of its kind in the marine propulsion market.**

The need to keep costs under tight control is an important factor in decisions made by shipowners and operators. **Early problem detection helps minimise operational risks and also reduces equipment lifecycle costs.**

Keeping machinery in optimal operational condition also yields other benefits such as **reductions in fuel consumption and reduced emissions of greenhouse gases.**

"The benefits that PCMS offers shipowners are more related to avoiding unexpected events," says Dankers. "Our aim is to prevent unnecessary and unplanned downtime."

"For example, as drilling platforms carry several engines, one can be shut down and the rig can still operate normally," he says. "With propulsion equipment, that's simply not possible. Major maintenance operations have to be carried out in sheltered locations if the work is to be carried out in the water."

"Offshore platforms often have 6-8 thrusters used in rotation with either one or two spare thruster units. With PCMS, maintenance programmes can be condition-based, significantly increasing availability and reliability."

NON-WÄRTSILÄ EQUIPMENT CAN ALSO BE MONITORED

The heart of PCMS is newly developed software, the set of algorithms used in data analysis. "We're using existing technology, and we haven't manufactured any new physical components," says Velthuis. "Technological developments mean that data acquisition devices such as vibration sensors are now readily available at a reasonable cost."

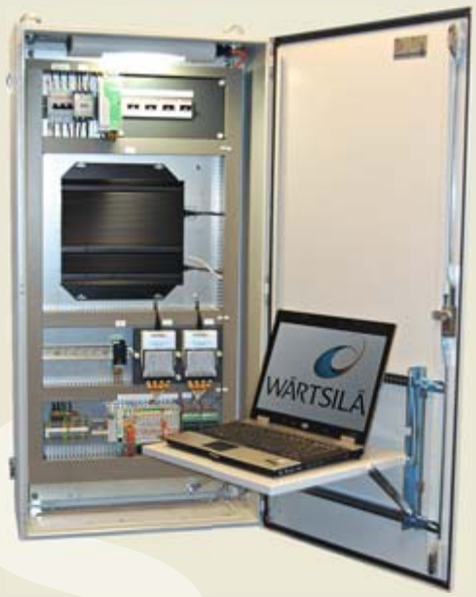
Wärtsilä PCMS is available for controllable pitch propellers, steerable thrusters, transverse thrusters, electric thruster pods and waterjets, and the items of equipment being monitored do not have to be made by Wärtsilä. PCMS installations can be completed in just a few days without requiring a visit to dry dock, and provided that the propulsion equipment is not actually in operation, there's no need for the vessel to be in harbour.

LEADING THE FIELD

The benefits of PCMS for vessel owners are clear, but Wärtsilä also gains useful information with every new system. As the data which the company accumulates improves, analysis of the strengths and weaknesses of different propulsion solutions will also improve.

Competitors will of course be keeping an eye on the system's success. "It wouldn't surprise me at all if someone tries to copy what we are doing," says Dankers. "But the algorithms that combine all the information being collected give us a good head start. The biggest strength of Wärtsilä PCMS is that we have the power required to convert all that data into useful information."

"Now that we have good monitoring systems for both engines and propulsion solutions, the next step is optimising the performance of our customers' assets by building risk-based maintenance systems for entire installations," says Velthuis.



PCMS cabinet.

Safeguarding propulsion equipment in the offshore industry

WÄRTSILÄ'S PROPULSION CONDITION Monitoring Service was launched in the autumn of 2010. Jasper Drilling Pte, a Singapore-based offshore operator, has decided to retrofit the new solution to Jasper Explorer, a drilling vessel with five 12-cylinder Wärtsilä 32 engines in V-configuration.

"AFTER CONSIDERING THE vessel's operational profile, we came to the conclusion that a condition-based monitoring system was essential. It's an extremely effective way of safeguarding the ship's propulsion equipment and keeping it in proper running condition," says Hans van Royen, CEO of Jasper Drilling Pte.

"WÄRTSILÄ PCMS IS also being used to monitor equipment supplied by other companies, such as the vessel's two azimuth thrusters," he says. Propulsion equipment on the Jasper Explorer includes two steerable thrusters, two controllable pitch propellers, and five transverse thrusters. As it is a deep-sea drilling vessel, it has to remain at sea for long periods and is often far from the nearest port. Reliability is key to successful operation of the vessel.

"PCMS CAN BE expected to attract a lot of interest in offshore markets because having full control of onboard equipment is vital. It's a growing market and we see many potential applications for this new solution," says Luc Dankers, General Manager, Sales Support & Product Management, Propulsion, Wärtsilä.

PCMS installations can be completed in just a few days **without requiring a visit to a dry dock.**