

IF IT WORKS – DON'T FIX IT AVOID OPEN-UP INSPECTIONS



“Online condition monitoring of critical vessel machinery – an essential tool for condition based maintenance and high vessel reliability” was the title of a presentation with guest speakers from MAN Diesel and Lloyd’s Register, hosted by Roving Dynamics and our Greek agent Internava in Athens.

Many Greek ship owners took part in the dialogue, and encouraged engine designers and classification societies to make condition monitoring mandatory.

“We attended to stay updated on new technologies and to find out more about condition monitoring systems,” says Nikos Makris, Chief Operation Officer of Eletson Corporation. “The presentation covered all sides of the subject because all parties involved were present, i.e. the engine maker, the condition monitoring system supplier and the classification society. We have only experienced such a team on rare cases in the past. We believe that this type of technology will become common practice in the maritime industry in the years to come.”

The engine designer’s requirements for online bearing wear monitoring as part of a condition based maintenance (CBM) strategy was presented by Superintendent Niels Nøjgaard from MAN Diesel R&D. They are strongly in favour of CBM instead of open-up inspections, which they consider to be the single most common reason for malfunctioning bearings. Therefore, they aim to substitute opening up with effective condition monitoring and stored data log available for class survey. Since 2002, they have tested and approved various bearing wear monitoring methods including OPENpredictor™.

MAN Diesel is about to implement new inspection instructions to avoid unnecessary open-up inspections of diesel engines. “If it works, don’t fix it,” Niels Nøjgaard stated. “It is not logic to perform regular open-up inspections, when these identify <1% of severe damages under development – while at the same time generating >2% open-up induced damages or malfunction from incorrect

assembling, foreign particles etc. There should be a reason to open-up the engine, based on condition, oil analysis or so”.

Besides avoiding costly, time consuming bearing damages, Niels Nøjgaard mentioned other factors increasing the need for online monitoring:

- Less time for overhauls
- Changed bearing materials and higher bearing loads
- Demands for higher vessel reliability
- Efficient documentation of condition

Condition based maintenance - ensuring dependability whilst satisfying the regulators

According to Roy Cheney from Lloyd’s Register’s Marine Consultancy Services “condition based maintenance is beginning to gain more interest in the maritime sector. Other industries have adopted it to great benefit, and regulators have systems in place to comply with changed maintenance schemes.”



Lloyd’s Register supports and advises ship owners on change of maintenance strategy. To get full benefit of condition monitoring and CBM, Roy Cheney stressed the importance of developing an efficient (performing tasks well) and effective (performing the right tasks) maintenance strategy, accepted by all stakeholders. Equally important is adequate education of the technical personnel to ensure awareness of not only how to do things but also why we do it and how it fits with the overall management strategy.

He emphasized that moving from scheduled to condition based maintenance requires class approval of the way condition monitoring is planned, implemented and reported. Lloyd’s Register’s requirements for a CBM scheme, relying on machinery condition monitoring, includes

- Description of monitoring methods, frequency and limiting values
- Software/hardware details
- Instrument calibration methods and frequency
- Vibration monitoring equipment providing trends over time, FFT frequency spectrum for each vibration signal and details on staff training

They also have specific requirements for condition-based surveys of crankshaft bearings, including description of scope and frequency of inspection, monitoring →

NEW PRODUCT

BASIC BEARING WEAR MONITORING

Since Rovsing Dynamics introduced the OPENpredictor™ Advanced Bearing Wear Monitoring for diesel engines, numerous ship owners have installed the system. To meet demand for a cost-attractive and less comprehensive system, we have developed a new solution limited to bearing wear only.

The new Basic Bearing Wear Monitoring system uses the same monitoring method: The system frequently measures the distance between the engine's crosshead location in relation to the engine frame at the so-called bottom dead centre. It also offers all the unique OPENpredictor™ features: Automatic, early detection of slowly and rapidly developing bearing wear, prediction of lead

time to inspection, integration with vessel alarm system etc.

Main differences

- The Basic system is limited to monitoring two-stroke diesel engine bearings. It has a sample frequency of up to 6,000 times/second and up to 32 channels per data acquisition unit (DAU). If required, it can be extended to also include lube oil temperature measurements for classification of operational state.
- The Advanced solution is scalable and fully expandable for online and offline monitoring of other machinery (turbochargers, thrusters, gearboxes, pumps and fans) with one and the same system. It also integrates data from control system, maintenance management system etc.

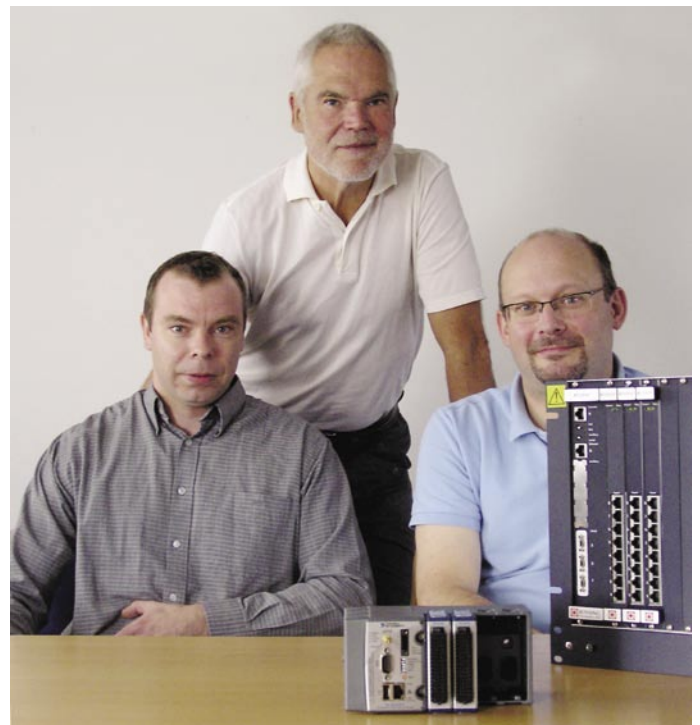
The sample frequency is up to 48,000 times/second and a signature processing unit (SPU) with up to 80 channels is included.

"We created a less costly, basic bearing wear monitoring solution mainly by introducing a 32-channel standard data

acquisition unit (DAU) as an alternative to our own advanced 80-channel signature processing unit", says Rovsing Dynamics' Product Development Manager Lars Glæsel.

For further information, please contact info@rovsing-dynamics.com.

The team behind the new Basic Bearing Wear Monitoring system, left to right: Steen A. Kristensen, Ole Døssing and Lars Glæsel (not present Alain Migeon), and the new Data Acquisition Unit, and the advanced Signature Processing Unit (right).



→ arrangements and guidance on criteria used to determine needs for opening the main bearing.

Condition monitoring pays off

Rovsing Dynamics presented

OPENpredictor™ as a cost-efficient tool for condition monitoring of multiple vessel machinery with one system only. Case stories included bearing wear monitoring of a 14-cylinder two-stroke engine

on the world's largest container ship and a VLCC tanker, whose owner chose OPENpredictor™ for online monitoring of the main engine and turbochargers plus offline monitoring of 170 machines. The objective is to avoid bearing and turbocharger inspections, thus saving 7 days off-hire worth approx. USD 430,000 during a 5 years maintenance cycle.

Since the event several Greek ship owners have shown strong interest in implementing online condition monitoring, recognizing the economic benefits of increased availability as a derived effect of condition based maintenance.



Bearing totally damaged due to steel-to-steel contact. Such a damage, with repair time up to 6 months, as well as damage and costs statistics from a large ship insurer clearly demonstrated the need for condition monitoring.