# HAPAG LLOYD PARTNERS WITH ROVSING DYNAMICS
## FOR CONDITION BASED MAINTENANCE




**Top 5 shipping company Hapag-Lloyd chose bearing wear monitoring from Rovsing Dynamics for six new mega containerships after tests of the predictive maintenance solution on three vessels in service. The objective is to save time, cost and manpower by avoiding open-up inspections.**

Hapag-Lloyd has been looking for systems to avoid the regular time consuming and costly open-up inspections. According to Hapag-Lloyd, "online condition monitoring provides a significant potential of saving cost plus reducing the risk and cost of open-op induced damages."

**Tested on vessels in service**

Six months ago Rovsing Dynamics installed an advanced OPENpredictor™ solution on three 4,000 teu Hapag-Lloyd containerships in service since 2002: Dublin Express, Glasgow Express and Liverpool Express. Besides online monitoring of 9-cylinder Wärtsilä engines, the system also monitors the vessels' Napier turbochargers. It detects signs of bearing wear and other machinery faults in an early stage, and issues warnings with automatic fault identification (AutoDiagnosis™) and prediction of lead time to inspection.

Hapag-Lloyd has chosen bearing wear monitoring from Rovsing Dynamics because it enables the crew to plan corrective actions in due time, and because it is more flexible than other solutions. It offers many expansion options like monitoring of other machinery and integration of predictive maintenance information with other systems.

Following the successful field test, Hapag-Lloyd has decided that the 12-cylinder MAN B&W main engines of their six new mega containerships under construction are also to be equipped with OPENpredictor™ bearing wear monitoring.

**Pioneers in environmental friendliness and state-of-the-art technology**

The six new 8,750 teu containerships will be identical to the recently named Kuala Lumpur Express. It is among the world's largest and holds Germanischer Lloyd's "Environmental passport", issued to environmental friendly new buildings with state-of-the art technology. Hapag-Lloyd was the first liner shipping company to reduce the speed of its vessels, which significantly reduces fuel consumption and environmental impact. They were also the first to earn the classification society's newly introduced "GL Excellence – 5 stars award" for high standards of safety and security, environment and quality.

**Spread experience for full flexibility**

Hapag-Lloyd began discussing bearing wear monitoring several years ago, initiated by the engine designer MAN Diesel, with whom they do many projects. To gather as much experience as possible they installed various types of bearing wear alarm systems on different engine types and on containerships in service as well as new buildings – all supervised by different classification societies.

"Our target is to get approval to avoid open-up inspections from all our five classification societies, so we are flexible to make decisions independent of engine maker and classification society", Hapag-Lloyd explains. "We have also installed temperature monitoring, but by the time we get a warning, the bearing has already suffered significant damage. Online bearing wear monitoring has a clear advantage. It is much more precise, and provides much earlier warning plus trending. Electronically supported systems like OPENpredictor™ are extremely useful for the superintendents in charge. Predictive maintenance information enable them to decide required actions in due time, preventing the risk of having a bearing damage at sea."

**Streamlining maintenance and inspection processes**

Hapag-Loyd continues to gather experience with online monitoring of critical machinery. A next step is to integrate bearing wear warnings in the vessels' alarm system.

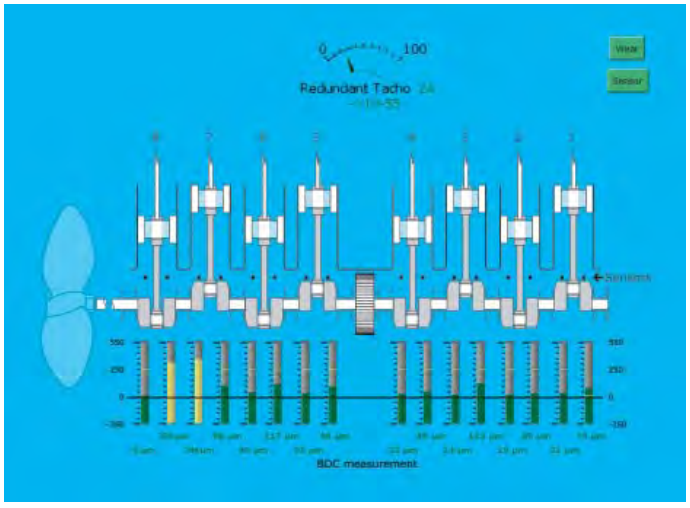
Hapag-Lloyd states, that "if online bearing wear monitoring turns out to be a success, we will consider making it company policy to have it as a standard tool on all new buildings." One engine designer recently announced their decision to make online bearing wear monitoring mandatory on certain engine types.

In close cooperation with Rovsing Dynamics and Germanischer Lloyd Hapag-Lloyd is streamlining their set-up and use of condition monitoring. The predictive maintenance information will not only be used by superintendents to avoid bearing damages and to plan and prioritize maintenance. Equally important: Data about bearing condition will also be an essential tool for class surveyors in the future as an alternative to open-up inspections.

"We are proud that Hapag-Lloyd, one of the pioneers in shipping, once again chose a solution from us," says Rovsing Dynamics' CEO Thea Larsen. "As part of our close cooperation we support our customers' in implementing condition monitoring and getting approvals with the classification society. Both are preconditions of fulfilling the objective: to reduce risk and cost by avoiding open-up inspections and only conduct condition based maintenance."

*Warnings from the bearing monitoring system can be integrated into the vessels' alarm system, and potentially raise alerts on the bridge.*

*OPENpredictor™ provides the crew with an overview of the condition of the main engine bearings. If bearing wear increases beyond e.g. 250 µm the bars turn yellow and later red, and an warning message is issued.*




**Prediction of bearing wear is complex**

OPENpredictor™ performs online monitoring of wear in the crosshead, crank and main bearings on two-stroke diesel engines. These bearings are especially sensitive to wear, which if undetected can lead to crucial and highly expensive damage to the crank shaft and bearings. Rovsing Dynamics' solutions are based on a method, tested and approved by several engine designers. It uses the engine's crosshead location in relation to the engine frame at the bottom dead centre as indicator of bearing wear.

Prediction of bearing wear at sea is complex, as measurements are results of both bearing wear and parameters like crankshaft speed, power etc. OPENpredictor™ takes this into account by

- Classifying measurements according to the vessel's operating state
- Compensating for temperature related structural changes in the engine's A-frame
- Eliminating background interference such as vibrations from sea waves or neighbouring equipment.

*This Rovsing Dynamics article was also published in the June/July issue of Marine Electronics Communication*