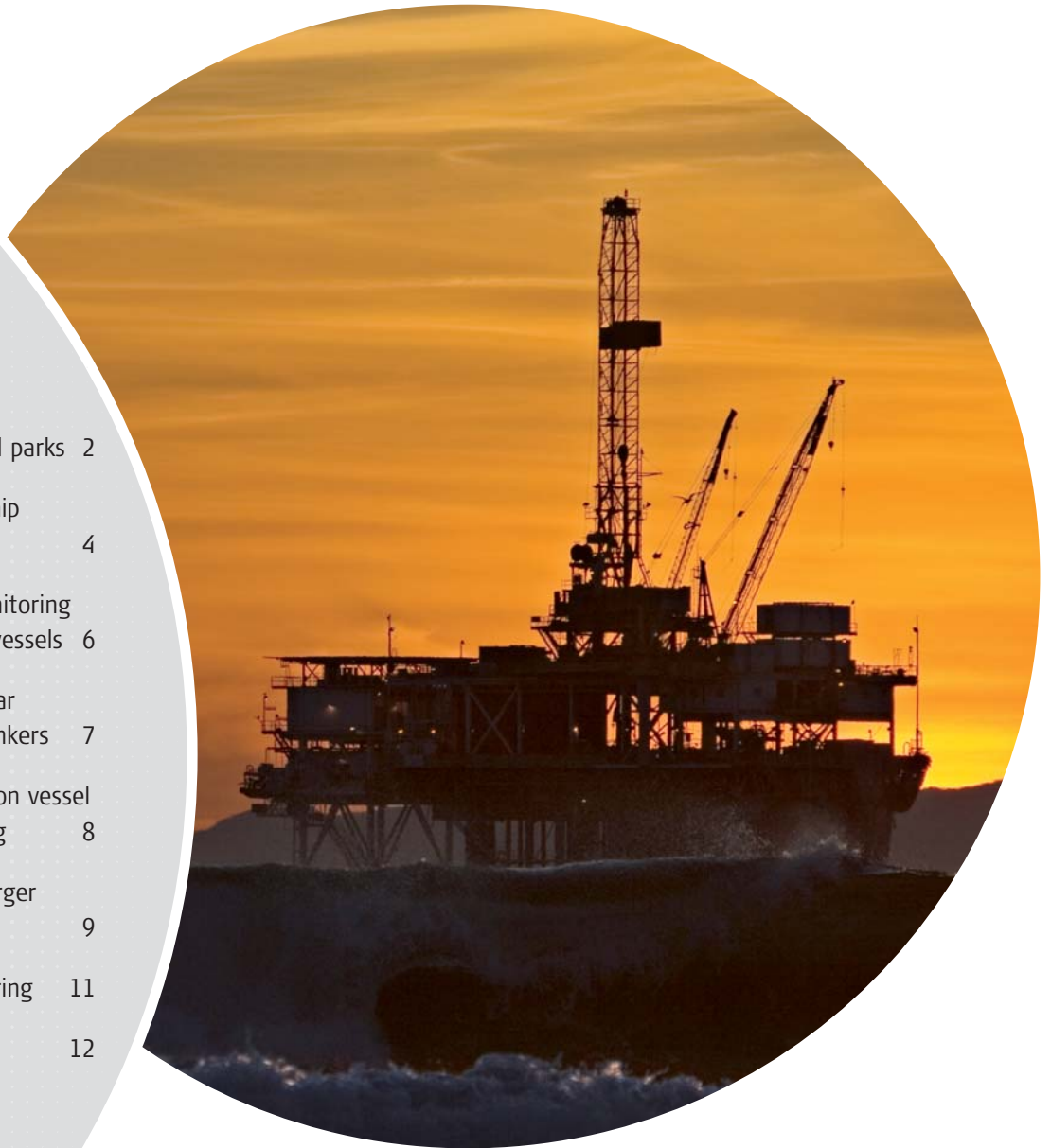


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# CONDITION DIAGNOSTICS FOR WIND PARKS FROM WINERGY BASED ON OPENpredictor™

POWER



**Winergy partners with Rovsing Dynamics to develop their new Predictive Condition Diagnostics solution for wind turbines. The objective is to increase the availability and facilitate Condition Based Maintenance to reduce wind park owners' total cost of ownership.**



Winergy, a German based leading supplier of innovative drive systems to the international wind power industry, presented its new Condition Diagnostics System for gear boxes and other critical wind turbines components at the recent Husum WindEnergy trade show. The first system was recently put into operation.

## **Automated solution for high availability & low lifecycle costs**

"To fulfil wind park owners requests for high turbine availability, optimized maintenance planning and low lifecycle costs, we wished to extend our offerings with more than just a simple alarm system," says Dr. Volker Kreidler, Winergy's Chief Technology Officer. "We want a predictive monitoring solution which forecasts developing turbine faults and predicts lead time to action. It must be an intelligent solution with automated diagnosis based on software, not people, doing the cumbersome analysis of vast amount of real-time data on component health. Remote monitoring of large wind parks with advanced user-oriented reporting possibilities are other key requirements. All these

features are paramount for cost-efficient monitoring of wind parks. With support from Rovsing Dynamics we have now reached this goal."

## **Standard products adapted to suit the needs of wind parks**

The Predictive Condition Diagnostic solution is based on standard products, which have proved themselves in daily operation world wide.

Rovsing Dynamics' advanced OPENpredictor™ signal processing software and patented AutoDiagnosis™ with automated fault identification and prediction have been adapted to suit the needs of wind turbines and embedded into a strong Siemens hardware platform. The solution had to pass several tests to fulfil a range of tough requirements specific for wind power

applications:

- Compact hardware due to the limited space inside the wind turbine
- Able to withstand harsh weather conditions: cold, heat, vibrations due to storm
- Remote monitoring with automated warnings about developing problems. This enables few operators to keep overview of large, land based and offshore wind parks with up to more than 100 turbines from distant, more convenient locations.

## **Combining know-how**

"To meet the booming wind power industry's requests for predictive health diagnoses, it was ideal for us to partner with Winergy rather than developing our own solution," says Rovsing Dynamics' CEO Thea Larsen. "Experts from both companies worked together on the new

dedicated wind turbine solution and combined the best from two worlds: Winergy's unique know-how and more than 25 years' experience from supplying wind power drive systems for one out of two of the world's wind turbines plus Rovsing Dynamics' unique experience in advanced signal processing and automated machinery health diagnostics. We see it as a yet another quality stamp that a leading German manufacturer like Winergy chooses to lean on our OPENpredictor™ technology."

#### Flexible approach for new wind turbines & retrofit

Winergy's new diagnostics system can be supplied for new wind parks or retrofitted

to existing ones. The overall approach is modular and flexible. It can be applied to gearboxes and other turbine components like e.g. generators, rotor blades and pitch systems for wind turbines from 1 MW to 5-6 MW.

Typical, critical wind turbine problems to be diagnosed:

- Gear wear & tooth damages
- Rolling element bearing wear & defects
- Rotor unbalance & misalignment
- Generator asymmetry.

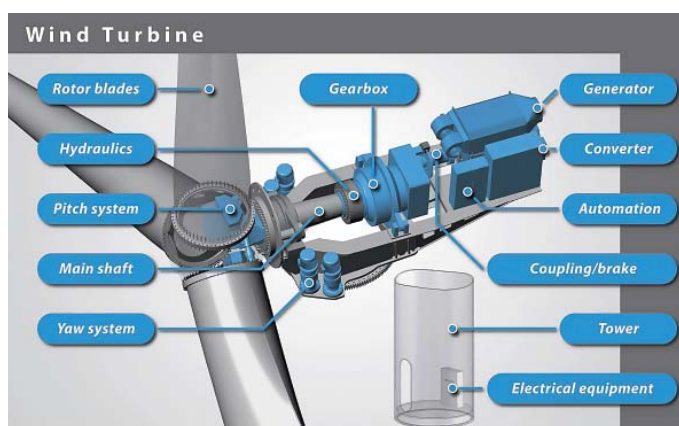
#### Prevented downtime saves costs

Early warnings about developing component faults prevent

downtime and lost revenue, and extend wind turbine lifetime. Wind park owners and operators benefit from a user-friendly overview of health information on all turbines plus better maintenance planning and spare parts procurement. This is especially beneficial in today's rapid expansion of large wind parks in remote locations.

If e.g. an offshore wind turbine is hit by a damage and harsh weather and/or spare part delivery prevents immediate repair, the result could be two months downtime plus repair costs and lost electricity production amounting to EUR 400,000 or more.

Read more: [www.winergy-ag.com](http://www.winergy-ag.com)



## HIGH GROWTH IN WIND POWER

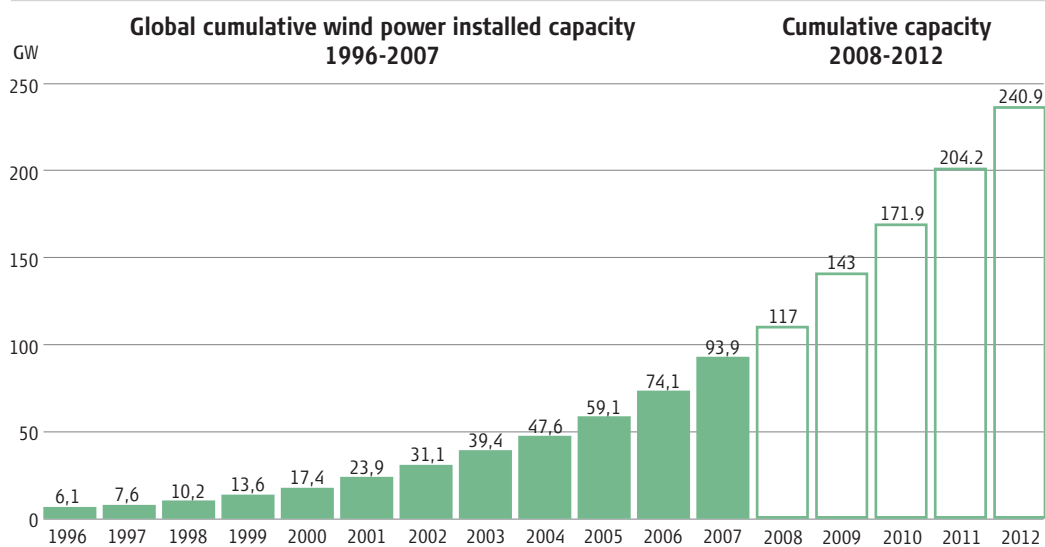
The use of wind power is increasing rapidly to fulfil many nations' goal of a much higher percentage of power from

renewable energy. The European Union has introduced a legally binding target for 20% of the region's energy to come from

renewable sources by 2020. Today wind power accounts for about 1% of the global electricity coverage.

In the last decade the total global use of wind power has increased dramatically from a total capacity of 6,100 MW to 93,864 in 2007 with average annual cumulative growth rates of over 32%. Last year another 19,865 MW capacity (27%) was added. Germany, the US, Spain, India and China are hosting most of the installed capacity today.

Over the coming five years, wind power capacity is expected to grow with around 20% each year. Offshore wind parks' relative share of the installed wind power capacity is anticipated to increase from 1% last year to over 3 % by 2012.



Sources: Global Wind 2007 Report, Global Wind Energy Council; BTM Consult

# PARTNERSHIP WITH YOKOGAWA EUROPE INTEGRATED ASSET MANAGEMENT SOLUTIONS

OIL & GAS

**Yokogawa Europe and Roving Dynamics team up to assist oil & gas producers achieve operational excellence through automated, intelligent operation and asset management solutions.**



Yokogawa Europe, a leading supplier of industrial automation, and Roving Dynamics recently announced their partnership to provide automated intelligence solutions for the up- and downstream oil & gas industry.

Our unique OPENpredictor™ solution for machinery health prediction is now offered as an integrated part of Yokogawa's VigilantPlant® concept for complete industrial automation.

The cooperation covers solutions for

- offshore oil & gas production
- FPSOs
- Downstream LNG production
- Refineries
- Onshore gas compression

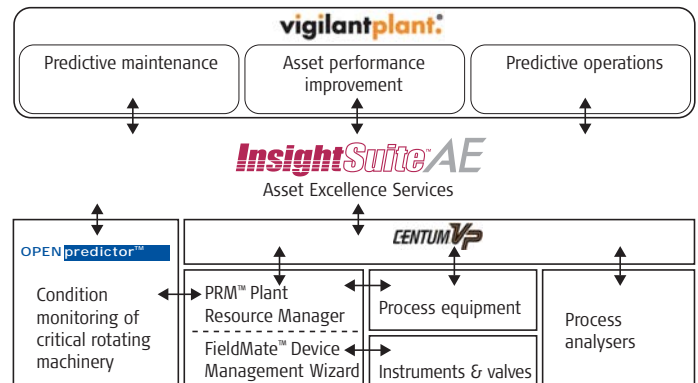
## From reactive to pro-active: Swift, predictable plant management

The oil & gas industry faces the challenges of shorter reaction time to adapt to changing market demand and lack of skilled and experienced people. This increases the need for automated operation and maintenance solutions, where tailored information easily can be retrieved and presented according to different users' needs.

Traditional stand-alone condition monitoring systems and operational management systems need to integrate and exchange information. OPENpredictor™ incorporated into VigilantPlant® provides a comprehensive solution to achieve best-in-class asset availability.

## Integrated operational & predictive maintenance information

OPENpredictor™ condition monitoring solutions provide automated fault diagnostics and



The base for Asset Excellence

predict lead time to inspection for rotating machinery.

"The system's embedded 'knowledge' of machine components' individual failure modes interprets measurements and recognizes and warns about abnormal behaviour and risk development," says Henk Smith, Roving Dynamics' Key Account Director Europe. "Such business critical information helps users improve process uptime and availability through minimized downtime of critical machinery, thus increasing revenue while reducing operational risk and cost. In other words: Reliability Centred Maintenance gets real body with OPENpredictor™."

VigilantPlant® is Yokogawa's unique industrial automation concept for safe, reliable, predictable and profitable plant operations. Based on their integrated production control system CENTUM VP, and plant asset management system PRM™ (Plant Resource Manager), the VP concept also embraces dedicated solutions for asset management (InsightSuite™), safety and

production excellence as well as partner solutions like OPENpredictor™.

OPENpredictor™ integrates information about machinery health, performance and reliability with Yokogawa's PRM™ and InsightSuite AE modules to achieve operational and asset excellence. It also uses process data from CENTUM VP to supply operators and maintenance engineers with predictive operation and maintenance information.

Information from sub-systems is incorporated using common data transfer standards and presented in a unified, intuitive user interface with integrated workflow management. Easy accessible, integrated operational and predictive maintenance information enables an ongoing state of operational excellence where plant personnel are attentive, well-informed, and ready to take actions that optimize plant and business performance – and can adapt to shifting market conditions quickly and efficiently.



### One-stop shop to achieve operational excellence

"Rovsing Dynamics' unique predictive and pro-active monitoring solution for the mission critical and capital intensive equipment supplements Yokogawa's portfolio to improve Customer asset availability," says Harry Hauptmeijer, President of Yokogawa Europe. "Our two companies share the common vision of fulfilling customers' objectives for safety, asset

and production excellence. Through our committed partnership, we are now able to deliver a complete asset management solution with asset predictability."

"We are excited to become a partner in Yokogawa's integrated VigilantPlant@ concept. We can now meet customers' demand for one common solution from one supplier," says Thea Larsen, CEO of Rovsing Dynamics. "Oil & gas producers will benefit from the combined strengths of our two companies: Yokogawa's recognition as a dedicated, reliable total solution provider, and Rovsing Dynamics' specialized know-how in condition monitoring."

*Harry Hauptmeijer, President of Yokogawa Europe*



### About Yokogawa

Yokogawa is a global supplier of cutting-edge research and innovation and solution for industrial automation and control, test and measurement, information systems and industry support. In Europe Yokogawa have its own sales, service and engineering operations with subsidiaries and distributors to support specific customer needs.

### VigilantPlant@ services

In addition to the integrated operation and asset management platform, Yokogawa also offers various VigilantPlant@ services to identify improvement opportunities in oil and gas production using the Six-Sigma model:

- **Opportunity Identification** to reduce capital and

operational expenditure with Free Plant Analysis, Comparative Effective Analysis, Industry Benchmarking & Overall Equipment Efficiency Assessment.

- **Solution Implementation** to realize identified improvement potential in production efficiency, asset performance and safety e.g. through diagnostic tools to identify actual and future health of critical assets, bottlenecks etc.
- **Lifecycle Effectiveness** with support, maintenance and parts management and analysis to maintain & improve the effectiveness of the installed industrial Automation solutions.

*Read more on: [www.yokogawa.com](http://www.yokogawa.com)*

## YOKOGAWA USER CONFERENCE: DELIVERING THE PROMISE OF OPERATIONAL EXCELLENCE



The partnership with Rovsing Dynamics was announced during Yokogawa's User Conference

in Spain in September. The event provided about 300 of Yokogawa's customers (oil &

*The conference included a TecFair, where Henk Smith (right) from Rovsing Dynamics' presented our solutions for Condition, Performance and Reliability Monitoring of critical oil and gas machinery. The fair offered a complete overview of all the Yokogawa and partner solutions, which together form the VigilantPlant@ concept for safe, reliable and profitable plant operations.*

gas producers), partners, press representatives and employees with a unique opportunity to

- build relationships and exchange information
- learn more about Yokogawa and its business partners' solutions, and how these support safe, reliable and profitable operations.

At the conference Henk Smith from Rovsing Dynamics presented a case with examples of the significant values, one of our customers has gained from using our OPENpredictor™ online monitoring solutions to optimize their operations and maintenance of a mature gas compression field.

# TRICO MARINE SERVICES TO MONITOR 8 NEW OFF-SHORE SUPPLY VESSELS

MARITIME



**Trico Marine Services, Inc. chose a combined Roving Dynamics solution to monitor business critical tunnel thrusters and gears on 8 new off-shore supply vessels for subsea operations.**

Trico Marine Services Inc., a leading US provider of marine support vessels to the offshore oil and gas industry, is to install advanced online condition monitoring solutions from Roving Dynamics on its 8 new multi-purpose vessels (MPVs).

The new 2,900 dwt supply vessels will be dedicated to subsea installations for e.g. floating production, storage and offloading vessels (FPSOs).

OPENpredictor™ will monitor the condition of 4 tunnel thrusters plus the main reduction gear on all 8 vessels with only one online system per vessel.

According to Ray J. Hoover, Trico's Global Director of Technical Services,

OPENpredictor™ was chosen not only due to its ability to automatically detect machinery faults at an early stage, but especially because its early warnings are accompanied by prediction of lead time to inspection. Early warnings about problems will prevent lost revenue from off-hire and increase availability.

#### **Warnings to ensure availability & meet customer requirements**

"We want to get advance warnings about developing problems in our most business critical, expensive machinery to ensure that we can meet our customers' requirements, and to avoid losing charter hire due to unscheduled repair," says Ray Hoover. "In the past we have experienced problems with tunnel thrusters. The thrusters and the main reduction gear are crucial for the dynamic positioning of our offshore supply vessel during customers' subsea operations e.g. when lowering down equipment with

a crane. In view of the very long lead times on spare parts, a thruster or gear problem can easily put a vessel out of operation for several months. Beside the immense repair costs and lost hire of several million dollars, we also risk losing credibility with our customers."

#### **Higher revenue with less dry docking & off-hire**

Normally, an off-shore supply vessel goes to dry dock 2-3 times over a 5 year period for planned overhauls. Online condition monitoring enables Trico to pursue a more proactive, condition based maintenance strategy, and achieve the goal of having the vessels available to clients up to 120 consecutive days. If possible, they would like to reduce dry docking to the class notation - only once every 5 year - thus increasing vessel availability and revenue significantly.

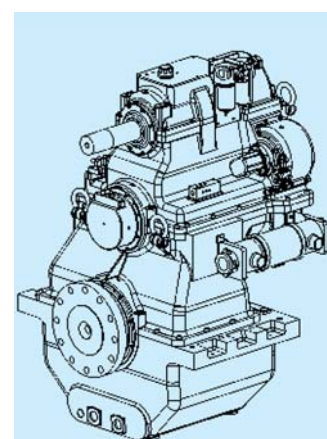
"Condition monitoring and predictive maintenance increase

*Trico Sabre is one of Trico Marine Services' eight new multi-purpose vessels, where OPENpredictor™ will monitor 4 Kawasaki tunnel thrusters (2 x 590 KW on the stern, 2 x 800 KW on the bow) and the Mekanorg main reduction gear.*

our comfort level as well as vessel reliability and availability. With prior knowledge about deteriorating components we can plan repairs in between charters and reduce the number of off-hire days. And we avoid losing revenue and enhance the possibility of reaching our target of 90-95% utilisation," Ray Hoover concludes.

Previously, Roving Dynamics has supplied an OPENpredictor™ solution for Azimuth thrusters, which has been operating on a Scandlines ferry for more than a year.

Read more: [www.tricomarine.com](http://www.tricomarine.com)



*The main reduction gear (above) and tunnel thrusters are crucial for the dynamic positioning of Trico's offshore supply vessels during customers' subsea operations.*

# PRISCO TO MONITOR OIL TANKERS FOR SAFE, RELIABLE & PROFITABLE OPERATIONS

The Russian tanker operator JSC Primorsk Shipping Corporation (PRISCO) selected Roving Dynamics to supply Bearing Wear Monitoring of the MAN B&W engines for new Ice Class crude oil carriers.

The eight crude oil carriers are part of an ambitious new building programme, which will increase PRISCO's fleet with 15 tankers from 2008-10. Two of these are 166,000 dwt Suezmax tankers with 6-cylinder MAN engines. Six are 104,000 dwt Aframax tankers with 7-cylinder MAN engines.

## Condition Based Maintenance to ensure engine works 24/7

According to Technical Director Konstantin Globenko, PRISCO decided to install OPENpredictor™ Bearing Wear Monitoring for several reasons.



"The main engine is critical for our tanker operations, so we want to

make sure that it works around-the-clock without problems. We are also looking to change our maintenance strategy to Condition Based Maintenance to avoid open-up inspections. These are critical for our operations, and we experienced problems due to crew or ship-repair yard mistakes during inspections."

## Safety & Reliability

The investment in condition monitoring is in line with



OPENpredictor™ Bearing Wear Monitoring has been successfully installed on PRISCO's new 104,000 dwt Aframax tanker "Zaliv Amurskiy". Its seven sister ships will be equipped with similar systems. Photo: Courtesy of PRISCO.

PRISCO's mission statement, which includes safe and high-quality transportation of bulk liquid cargo plus searching for new efficient and economically sound shipping technologies.

"PRISCO pays special attention to reliability and safety of its vessels," Mr. Globenko emphasizes. "We believe that with installation of bearing wearing monitoring PRISCO will not only get economic benefits, but – and this is even more important – our fleet will be provided with an additional system to ensure safe and environmental friendly tanker operation."

## Protect image & reputation

When speaking at Roving Dynamics' recent vessel condition monitoring seminar in Hamburg, Mr. Globenko summarized their goals:

- Increase fleet efficiency & safety
- Prevent main engine damage

- leading to long, costly repair
- Maintain image & reputation
- Avoid indirect expenses/ losses: demurrage, loss of hire, delayed delivery of customer cargo
- Go from Planned to Condition Based Maintenance and take necessary actions to prevent problems

## Training & integration with maintenance planning system

The first OPENpredictor™ system was installed in July 2008 on the new Aframax tanker "Zaliv Amurskiy".

According to mr. Globenko, the crew find it useful and checks for alarms daily. The crew will report to the superintendents

in office. These will periodically check information about bearing condition, plan maintenance plus monitor trends for individual vessels and compare with other vessels in their group. Training of the staff onboard the tankers as well as in office is therefore essential.

PRISCO intends to integrate information from the monitoring system with their maintenance system DANAOS. "We want to have all data in one global system for control of vessel condition and condition based maintenance planning," mr. Globenko explained.

Read more: [www.prisco.ru](http://www.prisco.ru)



Periodical engine inspections can lead to damage in case of incorrect maintenance or assembling. So PRISCO prefers not to touch engine components if they are in good condition.

# KNOWLEDGE SHARING ON VESSEL CONDITIONING MONITORING

MARITIME

All seats were sold out, when Rovsing Dynamics in September gathered key players in the maritime industry for seminars during the SMM trade

fair to exchange views and experiences on Vessel Condition Monitoring for Condition Based Maintenance – What to gain and how to get there.”



“The seminar was very informative. I like your focus on customers’ experience and challenges instead of the typical sales presentations at similar events I have attended. This kind of event makes it possible to establish collaboration between

the different business parties and ship owners across borders. It was really nice to hear third parties like classification societies and their implementation experience. It all created good discussions.”

*Paal Gilde, Dyvi, Norway.*

“I joined to hear about the situation in online monitoring in the maritime industry. The combination of several lectures from class and examples of maritime use of condition monitoring was very useful and

fulfilled my expectations. The seminar was also worthwhile with respect to networking. I established new contacts and am now going to meet with other Dutch companies also interested in this topic.”

*Harry Lijzenga, Royal Dutch Navy.*

## SHIP OWNERS MOTIVATION - What to gain?

Three of the ship owners who have implemented OPENpredictor™ monitoring solutions from Rovsing Dynamics shared their goals and experience.



Both technical, financial and image related aspects counted, when the Russian tanker owner **PRISCO**, specialized

in operation in freezing sea conditions, decided to monitor main engine bearing wear on their new Ice Class crude oil carriers. Technical Director Konstantin Globenko said that the company’s key objectives are to

- Increase fleet efficiency & safety
- Prevent main engine damage
- Maintain image & reputation
- Avoid indirect expenses/ losses
- Condition Based Maintenance

For full benefit PRISCO will integrate condition monitoring information with their maintenance planning system DANAOS, and use the knowledge of machinery health to benchmark vessels in their fleet.

For the German



**F. LAEISZ**

**Reederei F. Laiesz** Bearing Wear Monitoring of the long and small 9-cylinder engines of 500 mm bore onboard of their new Pure Car & Truck Carriers is a new tool to improve operational safety, and to meet customers’ high demand for uninterrupted service. Manfred Zimmermann stated that the company sees it as a way to:

- Optimize maintenance planning, vessel reliability & availability
- Reduce time for maintenance & surveys
- Minimize risk, cost & off-hire time, and human factor influence

Condition monitoring is Reederei F. Laiesz’s first step towards Condition Based Maintenance with operational benefits and monetary savings. Next step for the diversified fleet owner is integration into their GL Shipmanager software and AMS planned maintenance system.



**Scandlines**, who operates ferries between Denmark and Germany around the clock, shared experience from 1,5 year’s thruster monitoring.

Compared to an ordinary shaft/propeller arrangement the Aizimuth thruster is more complex and costly to repair. An online monitoring solution was therefore developed together with Rovsing Dynamics and Rolls Royce to:

- Warn before expensive damages
- Avoid loss of direct cost (repair) and indirect cost due to non-availability of a vessel at traffic peaks
- Reduce unplanned overhauls (30% dry-docking and EUR 100-200,000 per year)

Superintendent Henrik Lethin demonstrated how Scandlines use monitoring information to optimize ferry operations. They also learned about quite unexpected machine behaviours.

## Keep your knowledge in-house

Mr. Lethin raised the topic whether to let internal or external people review and analyze monitoring data. His recommendation was clear:

- Measure and analyse using your own tools; Pick-up your operational data, and keep your knowledge in-house to be in control of your assets.
- Ask each equipment manufacturer to offer their own Condition Monitoring philosophy.

He emphasized that Condition Monitoring for Condition Based Maintenance requires a high degree of automation, where all messages in the man-machine interface are uniform.

We also presented **other examples** e.g. a tanker owner, who anticipates annual savings of up to USD 7 million per year

from only conducting condition based overhauls of main engine bearings and turbochargers on their Very Large Crude Carriers.

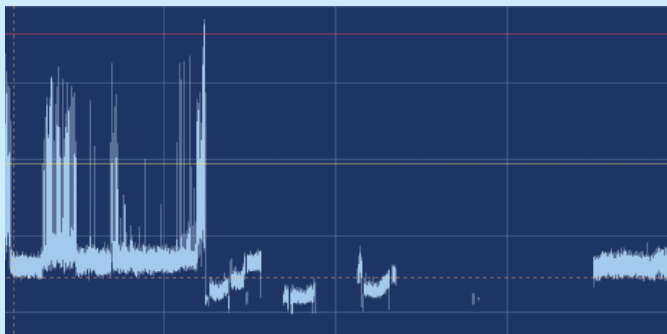
## PREVENTED TURBOCHARGER DAMAGE SAVED HAPAG-LLOYD CONSIDERABLE COSTS

In October 2007 the German shipping company Hapag-Lloyd installed an advanced OPENpredictor™ condition monitoring solution on three 4,000 teu containerships in service since 2002: Dublin Express, Glasgow Express and Liverpool Express. The systems monitor both the vessels 9-cylinder Wärtsilä engines and their Napier turbochargers.

Within 6 months this investment paid off, when OPENpredictor™ detected increased vibration level of one of the turbochargers at Glasgow Express. The warning was fortunately given in due time for the crew to replace the

turbocharger's turbine rotor. Thereby they avoided the risk of significant consequential damage, which could have resulted in significant repair or turbocharger exchange costs.

Following the successful field test on the three vessels in service, Hapag-Lloyd decided to also equip their six new 8,750 teu containerships under construction with an OPENpredictor™ online condition monitoring solution for the 12-cylinder MAN B&W main engines. Read more in our press release and Dynamic News July 2008.



The OPENpredictor™ graph shows how the turbocharger's vibration level increased beyond both the yellow alert level and the red alarm level

### THE ENGINE DESIGNER'S VIEW Why omit open-up inspections?

Torben Wiik and Niels Nøjgaard from **MAN Diesel** explained why they now recommend ship

owners to omit regular open-up inspections of the crank-train bearings of certain engine types and only conduct Condition Based Maintenance supported by various types of monitoring. The overall aim is to increase



Courtesy: Lloyd's Register

vessel reliability and reduce operational costs.

**The human factor** is the main reason why the engine designer advice against open-ups, which are said to only identify <1% of the problems, while generating >2% of the damages. Grave examples of open-up induced engine damages e.g. due to forgotten tools inside the engine were presented along with other cases. Only one hour into her maiden voyage, a brand new vessel suffered severe engine damage and 3 ½ months repair due to wrong assembly of a main bearing after inspection.

Other damages are: Lube oil contaminated with water, white metal or other foreign particles, thin/thick shell fatigue and steel-to-steel contact.

According to MAN Diesel's statistics, bearing damages registered over the last 7 years have had huge consequences:

- Repair costs of \$ 40 million
- 4.3 years off-hire resulting in losses of \$ 25-50 million

In many cases traditional systems like oil temperature measurement and oil mist detection warned far too late - when bearing damage had occurred - or not at all.

Tests and experience since 2003 has convinced the company that **Bearing Wear Monitoring is a far more dependable solution**, which fulfil their key requirements:

- No false alarms
- Reliable detection of wear of <50% of the bearing lining ~0.5 - 0.7mm
- Integration with vessel alarm & slow-down system

Therefore, MAN Diesel now support omission of open-up bearing inspections for engines with monitoring of

- Bearing Wear
  - Water in Oil
  - Bearing Temperature
  - Shaft Line Earthing Device effectiveness
- as the ideal basis for carrying out Condition Based Maintenance.

*Continued on the next page*

## CLASS PERSPECTIVES ON CBM - How to get there?

Classification societies' views and guidelines for a successful implementation of Condition Monitoring (CM) and Condition Based Maintenance (CBM) were presented by Erik Sanderlien, Dr. Jörg Rebel and Chris Holland from DNV, Germanischer Lloyd and Lloyd's Register. All expressed full support and added more benefits to the list:

- Lower maintenance costs & improved spare parts control
- Reduced fuel consumption from optimized operation
- Reduced crew workload & improved motivation

Each of the three societies has developed guidelines which seem to follow the same **necessary steps for implementation of CBM**:

### Phase I

1. Develop Condition Monitoring system
  2. Field test onboard a ship\*
  3. **Hard ware type approval\***
- \*if required by classification society*

### Phase II

4. Develop CBM concept based on failure mode & cost-benefit analysis incl.
  - Maintenance strategy, training program etc. for **company approval** for owner & operator
  - Description of CM methods, equipment, pre-defined alarms & actions for **vessel specific approval**

5. Implement CM system & CBM procedures

6. Initial CM implementation survey onboard (some requires min. 6 months operation): documentation, crew familiarity with CM system, data interpretation etc. for class approval of survey arrangement.

### Phase III

7. Operating CM & CBM with **annual surveys** to confirm that the system is working as intended, and verify crew familiarity with objectives, CM equipment, routines etc. Examples of monitoring data to be presented:
  - Operating hours
  - Machinery condition status
  - Measurements & trend curves since last survey
  - Log file with warnings etc.
  - Inspection protocols
  - Documentation of maintenance & repair, if any



DNV emphasized that the annual CM survey is credited, not the machinery items, which are only credited after overhaul.



Germanischer Lloyd and DNV shared their experience from field test of various monitoring solutions, comprising e.g. check of long term stability of measuring results, and test of reproducibility of sensor position after exchange for bearing wear monitoring systems for 2-stroke diesel engines.

**Barriers for adoption** of CM and CBM were also mentioned:

- Lack of management commitment
- Failure to change traditional practice
- Concern about acceptance from OEM, insurance & class
- Technical complexity
- Lack of independent advice
- Overworked crew

### Success factors

- Clear maintenance strategy & criticality analysis
- Choose appropriate techniques, measurement intervals & limits
- Work processes & responsibilities
- A CBM company culture
- Training programme, taking into account frequent crew changes, onshore & offshore organisations
- Follow-up on training, analysis, routines & actions taken
- Measure CM performance & follow-up that CBM benefits are achieved. Allow 2-3 years for the new scheme to prove its worth.

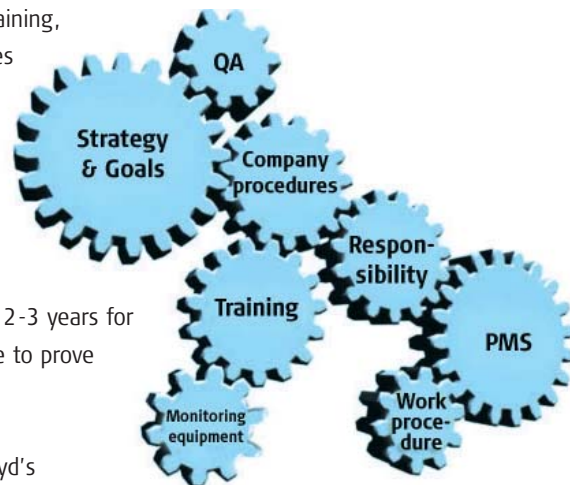


Lloyd's Register noted that classification societies also face challenges e.g. the need to provide industry leadership, clear procedures and surveyor training.

Last but not least, all presenters emphasized that CBM requires **close cooperation among all parties involved**: ship owner, operator, machinery maker, class and condition monitoring system supplier.

### SEMINAR CONCLUSION

The high attendance and lively discussions confirmed that the potential of vessel condition monitoring and Condition Based Maintenance is widely recognized. More and more ship owners request and implement this approach, now actively supported by the first equipment manufacturer, MAN Diesel, and several classification societies. The knowledge sharing sessions showed that a considerable step change has taken place in the maritime industry since last SMM two years ago.



For seminar presentations or information about vessel condition monitoring contact us on [info@rovsing-dynamics.com](mailto:info@rovsing-dynamics.com).

# FUTURE VISIONS FOR VESSEL CONDITION MONITORING

MARITIME



More than 52,000 people attended the SMM exhibition in Hamburg. Many paid a visit to Roving Dynamics' stand to discuss with Søren Westergren and Mikael Ljungdahl, how our versatile vessel condition monitoring solutions can support their business goals by increasing revenue and decreasing risk and cost.

## Future perspectives

We also discussed future visions with customers and partners. "We see different trends within online monitoring," says Roving Dynamics' Maritime Sale Manager Søren Westergren.

"Some ship owners are still only interested in a simple, low-cost bearing wear alarm system. But today many prefer an automated, integrated, predictive maintenance solution. This provide them with a complete, unified overview of the present and future health of their mission critical machinery - and perhaps in the future also machinery performance, environmental emissions and other data, which are essential for fleet managers for operational excellence.

## OPENpredictor™ SOLUTIONS – ALSO FOR WATER-IN-OIL MONITORING etc.

Since Roving Dynamics launched our first condition monitoring solution for maritime use in 2004, OPENpredictor™ has been chosen for more than 50 vessels by more than 12 ship owners as stand-alone or combined solutions. This is often integrated with the vessel's alarm system and other systems. Some of the unique features are automated fault diagnosis with lead time to action along with

the capability to monitor multiple types of machinery.

Roving Dynamics is one of MAN Diesel's approved vendors of Bearing Wear Monitoring. If required, we can also integrate data from other types of monitoring e.g. Monitoring of Water in Oil, Bearing Temperature and Shaftline Earthing Device effectiveness.



*Bearings damaged as a result of water contamination of the system oil.  
Courtesy: MAN Diesel.*

This autumn Rovsing Dynamics achieved a number of important strategic milestones. This means that we - among other things - have entered strong partnerships with other leading solution providers.

More than a year's dedicated cooperation in the R & D field has resulted in a unique partnership with **Winergy**, the leading global supplier of drive systems for the Wind Power Industry. Winergy launched their new Condition Diagnostics solution for wind parks at the recent WindEnergy fair in Germany where it certainly caught a lot of interest from power generating companies and wind park operators. And I



am proud to say, that Winergy's solution has embedded OPENpredictor™ software.

Excellent teamwork between our two companies made Winergy's vision come true: To fulfil wind park owners' request for high availability, predictability and reduced total-cost-of ownership.

We have also teamed up with **Yokogawa Europe**, a leading supplier of industrial automation, to provide automated intelligence solutions for the up- and downstream oil & gas industry. Rovsing Dynamic's unique solutions for machinery health prediction are now offered as an integrated part of Yokogawa's VigilantPlant@ concept for operational and asset excellence. Together we now offer oil and gas producers a complete asset management solution with asset predictability.

In the **maritime** industry, also one of our strong pillars, we continued the strong growth with still more ship owners choosing our monitoring solutions. We cemented our

industry leadership by gathering key players to exchange views and experience on Vessel Condition Monitoring as the basis for a Condition Based Maintenance scheme. In fact, our seminars held during the global SMM fair were completely overbooked with people who came to hear our customers present their goals and gains, and to get engine designers' and classification societies' perspectives on this topic.

In this time of turbulence and insecurity in the financial and other markets, Rovsing Dynamics feel stronger than ever with a growing order book. Thanks to our dedicated staff, partners and unique solutions, we have a solid foundation to continue helping our customers increase their revenue and decrease risk and cost.

When there is a strong wind blowing, some prefer to hide behind shelters while others take advantage of it.

## MEET US & AND OUR CUSTOMER ELETRONUCLEAR AT CONDITION MONITORING SEMINAR IN BRAZIL

November 24-25 Rovsing Dynamics will attend the seminar "State of the Art Monitoring Systems for Rotating Machines" in Brasilia, Brazil, hosted by the national power utility companies Eletrobras/ Eletronorte. Read more on [www.rovsing-dynamics.com/power/pwrevents/](http://www.rovsing-dynamics.com/power/pwrevents/).

We will give a lecture on 'Asset Excellence in Hydro Power'. Our customer Eletronuclear will present the objectives, features and benefits of the OPENpredictor™ solution installed in 2007 for predictive maintenance information at their Angra 1 nuclear power plant (see Dynamic News September 2007).

Editor-in-chief: **Annette Risberg**, Marketing Manager. Unless otherwise mentioned, all articles are written by Annette Risberg. Comments, suggestions and contributions to our newsletter should be addressed to the editor: [ari@rovsing-dynamics.com](mailto:ari@rovsing-dynamics.com).

Rovsing Dynamics is a leading supplier of Condition and Performance Monitoring Systems and associated services to industries using rotating and reciprocating machinery, e.g. the power generation, the petrochemical and the maritime industry.

The OPENpredictor™ Condition Monitoring System enables our customers to increase revenue while reducing operation and maintenance costs.

Rovsing Dynamics supply and service an international market from the headquarters in Denmark. Furthermore, we have regional representatives, agents and distributors in a number of countries worldwide.

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