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# EDITORIAL

## Why work with us?

Rovsing Dynamics support our clients in getting the most out of their operational assets to increase revenue and profit and decrease operational risks & costs. Or in other words: We provide easy-to-understand overviews on how machines are performing, and simple tools, which – based on advanced monitoring methods – empower decision makers to take the right, timely decisions to ensure asset availability & reliability.

In this issue of Dynamic News we share a number of value examples from our clients. All



verify that a well implemented condition based maintenance strategy based on a predictive maintenance information system gives value for money.

The fact that we can ensure multiple pay back on investment was a deciding factor when entering new markets and industries.

**In China**, despite heavy investments and two-digit growth rates in **power generation** facilities, demand is still significantly higher than supply. This requires efficient operation of existing plants to avoid unscheduled downtime and minimize scheduled overhaul. Predictive maintenance information technology is one way to achieve this. After Rovsing Dynamics and our Chinese partners have secured proof of concept through our first installations in Mainland China we now experience intensive demand for our advanced monitoring solutions.

Uptime, reliability and availability are also crucial for the **oil & gas** industry. Here the proved value from upstream monitoring solutions on a North Sea platform paved the way for our first downstream project: a refinery in Central China.

Also in the **maritime** sector, where condition monitoring is relatively new, the demand for integrated, predictive solutions is rapidly developing. The industry is driven by ship owners looking for savings, and engine designers pushing forward the recommendations to omit open-up inspections to reduce maintenance downtime. As approved vendor of dedicated vessel monitoring solutions Rovsing Dynamics cooperate closely with both ship owners, engine designers and builders plus classification societies to make these visions come through.

It might seem complicated when **a condition based maintenance** program is not yet integrated into an organization. But as soon as it is incorporated, the routines and outcome proves to be straight forward: The right people now know the exact condition of the key production assets (monitoring). They are notified about developing problems well in advance (predictions) and can take necessary actions in due time (decisions) to avoid failure, downtime and revenue loss. Nice and easy – that's how we see it. And with our know-how and experience we also offer to guide our clients on their journey from time based to condition based maintenance.

Bon voyage!

A handwritten signature in blue ink that reads "Annette Risberg".

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.

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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Front cover photo:  
**From the bridge of a Hapag-Lloyd container ship. Courtesy Hapag-Lloyd.**

# RAPID & DIVERSIFIED EXPANSION IN CHINA

A lot has happened since Rovsing Dynamics entered the Chinese market in 2006. Our key partner EMOL has established a solid base of condition monitoring customers in the Southern and Northern part of China and now expands into other regions.

Our first efforts were centered around the rapidly growing power generating industry, where our monitoring solutions support the focus on increased reliability, availability and utilization. Similar demand comes from other industries in China.

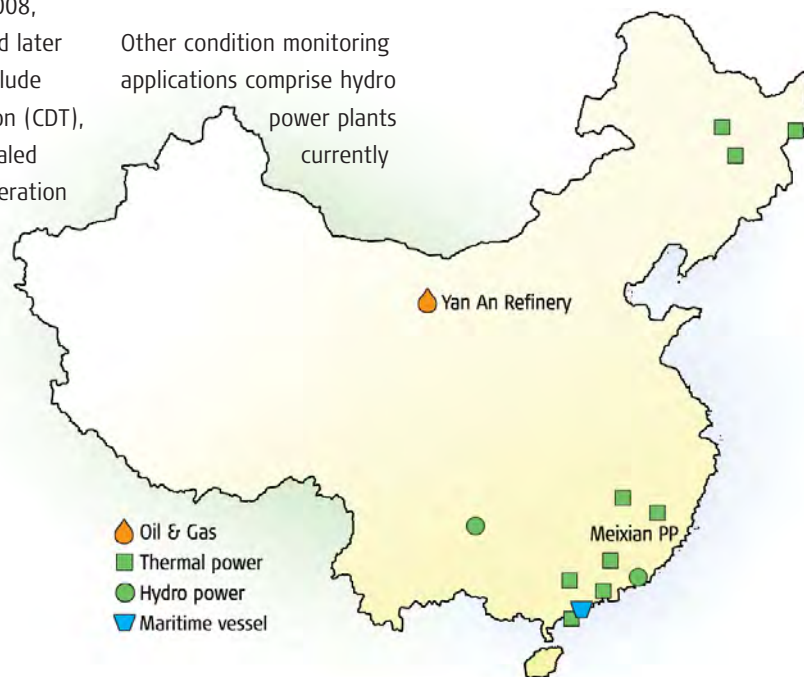
Today, we count more than a dozen OPENpredictor™ customers across China in different industry segments.

Most of these are thermal power plants, where the first system has been operating since February 2007 at the Meixian Power Plant in the Guangdong province. Three more were delivered first half of 2008, and five will be delivered later this year. Customers include China Datang Corporation (CDT), one of the five large-scaled state owned power generation enterprises, with

systems for two plants so far, and the large regional power producer Guangdong Yudean Group, who until now has chosen OPENpredictor™ for five power plants.

under construction in Southern China, bearing wear monitoring of the main engine of a maritime vessel and, most recently, a refinery in Central China.

Other condition monitoring applications comprise hydro power plants currently



## YAN AN REFINERY IN CHINA, OUR FIRST IN DOWNSTREAM PETROCHEMICALS

As part of our fast and diverse expansion in China, Rovsing Dynamics in June received our first order for a condition monitoring solution for a refinery to be delivered in September 2008. The Yan An Refinery in the Shaan'xi province in central China has been operating since 1988 and processes 8 million ton crude oil into petrol for cars, diesel oil, liquefied petroleum gas (LPG), solvent oil, benzene per year. It is owned by the Yanchang Petroleum Group, China's fourth

largest oil producer with a production of around 300,000 barrels/day from 3 refineries and 21 oil exploration firms.

OPENpredictor™ is going to perform online condition monitoring of three steam turbine driven centrifugal gas compressors and other compressors. The solution will also provide automated fault diagnostics (AutoDiagnosis™) with prediction of lead time to inspection. Such business critical information will help the

refinery's staff improve process uptime through minimized downtime of critical machinery, thus increasing revenue while reducing operational risk and cost.

"The Yan An refinery project is a significant milestone for us," says Rovsing Dynamics' CEO Thea Larsen. "Not only is it our first of this kind in China and the first together with our new partner Beijing Air Emission Technology Development Co (BJAETDCO). It also marks our

entry into the downstream petrochemical industry. Here producers face the same challenge of shorter reaction time to adapt to changing market demand as our upstream customers. And like these, refineries can gain significantly from integrating predictive operation and maintenance information and change from a re-active to a pro-active asset management strategy."

See examples from offshore gas compression on page 9 and 11.

# HAPAG LLOYD PARTNERS WITH ROVSING DYNAMICS FOR CONDITION BASED MAINTENANCE

MARITIME



**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-up 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-Lloyd 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 Roving 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 Roving

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.*

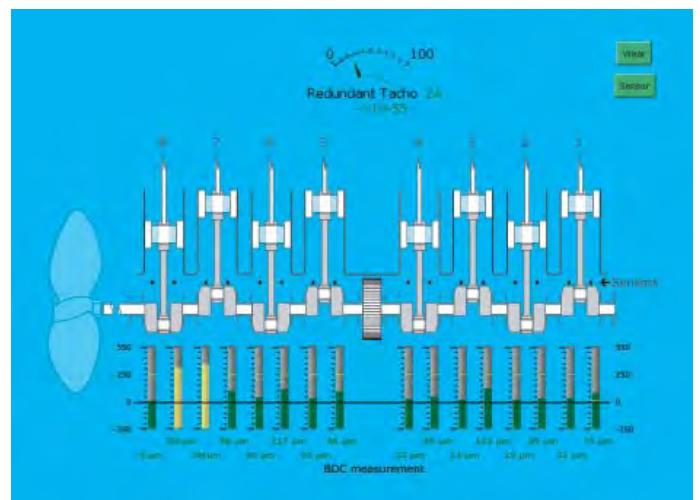
*OPENpredictor™ provides the crew with an overview of the condition of the main engine bearings. If bearing wear increases beyond e.g. 250 µm the bars turn yellow and later red, and an warning message is issued.*

### 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. Roving 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

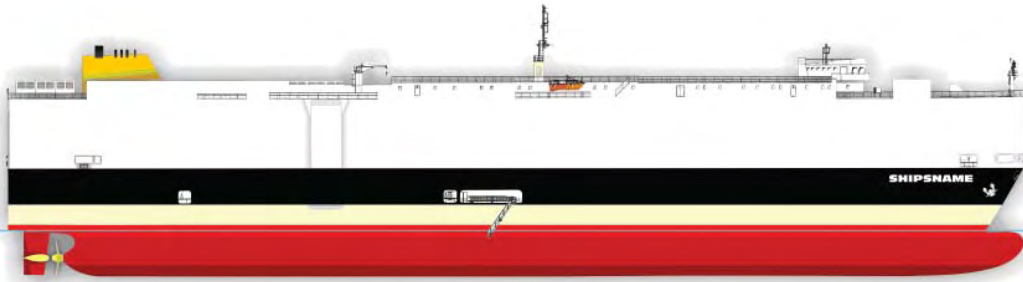
- Classifying measurements according to the vessel's operating state
- Compensating for temperature related structural changes in the engine's A-frame
- Eliminating background interference such as vibrations from sea waves or neighbouring equipment.



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

# OPERATIONAL SAFETY FOR REEDEREI F. LAEISZ' CAR CARRIERS

MARITIME



When the German shipping company Reederei F. Laeisz gets its eight new state-of-the-art car carriers in 2009, 2010 and 2011, they will all be delivered with an OPENpredictor™ Bearing Wear Monitoring system on their 9-cylinder MAN B&W engine. The 13.398 dwt vessels are pure car and truck carriers (PCTCs), able to transport 5,000 vehicles on 11 car decks between the Far East, Europe and America. These car carriers are the first PCTCs in the Laeisz fleet and form a new segment in the diversified fleet. The vessels are not the largest car carriers, but are categorized in the upper region sizewise.

"We decided to install continuous bearing wear monitoring on our new car carriers for two reasons," says Harald Schlotfeldt, Managing Technical Director of Reederei F. Laeisz. "First and foremost we want to ensure operational safety by avoiding breakdown due to bearing damage. With OPENpredictor™ we can detect developing wear well in advance and plan corrective actions in due time, thereby limiting off-hire and out of service time. A car carrier's time in port is very short with less than a day to move all vehicles in or out. So it is crucial that we reach

ports in time with roll-on/roll-off equipment ready when the planned berthing slot is free at the car terminal."

Secondly, OPENpredictor™ will be used to closely monitor and collect data about the operation of the 9-cylinder engines from the commissioning and through their entire lifetime. This is felt especially important as the 9S50MC-C engine is a relatively long one, which is normally built with a maximum of 7 cylinders only. The selection of the main engine type was of course influenced by the need to have an engine with limited building height underneath the car decks.

"Later we will look into the opportunity to use the predictive maintenance information to avoid open-up inspections. We have therefore initiated a dialogue with our classification society

Germanischer Lloyd about the possibility to change from a time based to a condition based maintenance strategy."

## Integration with ship management system

The shipping company has another future vision: "We also chose OPENpredictor™ because of the possibility to integrate information from the condition monitoring system with our GL ShipManager system, used on all our vessels for maintenance and material management, and for administrative tasks."

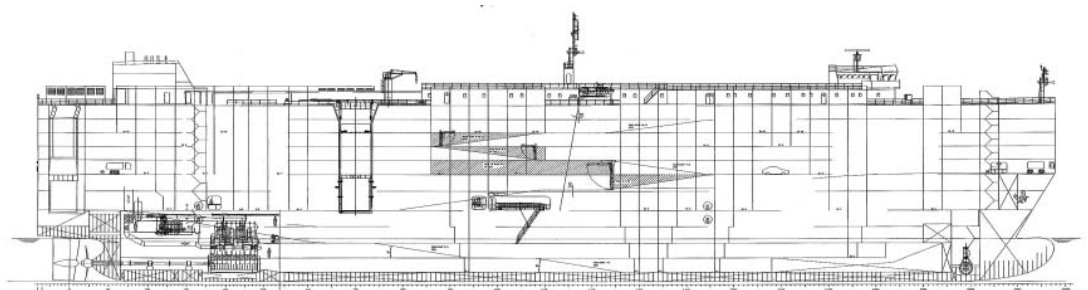
Reederei F. Laeisz manages a fleet of 50 vessels of different types: Container vessels, car, bulk and gas carriers, but also Ro-Ro/pax and research vessels. The company puts great emphasis on safety, quality and environmental protection standards, and was the first German shipping company to adhere to the ISO 14001

environmental management system. In February this year Reederei F. Laeisz was awarded with the GL Excellence 5 Stars certification, as the first shipping company with a diversified fleet.

"We own or manage our vessels for many years and have a long term interest in keeping our fleet in excellent condition," Mr. Schlotfeldt explains. "To ensure this, we always make sure to have enough highly qualified seafarers onboard. We are in the happy position to still have sufficient very qualified shipping people available. Out of our 1600 seafarers more than 500 are Germans. Nearly half of our fleet is flying the German flag."

According to Mr. Schlotfeldt, "the shipping community is often quite conservative and takes long time to adopt new technologies. Why make investments and change things that work, people seems to think. But at Reederei Laeisz we find the idea of condition monitoring and condition based maintenance very interesting, not only to improve our bottom line but more for safer vessel operation."

*Reederei Laeisz' 8 new car carriers will transport 5,000 vehicles on 11 car decks. OPENpredictor™ will monitor bearing wear on the carriers' special 9-cylinder engines to ensure safe operation.*



# FLEET CONDITION MONITORING TAKES OFF & PAYS OFF

MARITIME



Fleet condition monitoring (CM) is rapidly becoming standard on maritime vessels as it has been in e.g. power plants for long. Early adopters like A.P. Moller-Maersk and Hapag-Lloyd have moved from the test phase to implementation programmes for their new buildings too.

## Revenue up, costs down

Owners of containerships, tankers, ferries and car carriers have partnered with Roving Dynamics to monitor critical machinery with various objectives. The potential of avoiding damage and saving millions on repair costs and off-hire is one benefit. Others monitor to increase vessel availability by skipping costly, time-consuming open-up inspections and only conduct condition based maintenance (CBM). In this way a large tanker owner aims to save millions each year.

## Wanted: All-in-one system with predictions

People want more than just an alarm system. Ship owners want predictive maintenance information to optimize planning. Therefore, many

prefer Roving Dynamics' scalable Advanced Bearing Wear Monitoring solution. It can monitor all mission critical machinery, issue early warnings with prediction of lead time to inspection, and integrate seamlessly with alarm, maintenance management and other systems.

The good news is that engine designers and classification societies like Germanischer Lloyd, DNV and Lloyds Register now seem ready to support ship owners, who want to use condition monitoring to adopt a condition based maintenance strategy.

## Germanischer Lloyd ready for Condition Based Maintenance

The classification society Germanischer Lloyd supports ship owners in any maintenance strategy and strives to find the solution that will best suit individual needs.

"We are very engaged in condition monitoring and condition based maintenance, not just on a theoretical level," says Dr. Jörg Rebel, head of Germanischer Lloyd's Machinery

Condition Monitoring Group. "We have concrete proposals on how information regarding machinery condition can be exchanged with class surveyors. In February, updated 'Guidelines for Machinery Condition Monitoring' with examples for different types of monitoring of various types of machinery were issued." More information at [www.gl-group.com](http://www.gl-group.com).

"When a shipping company wishes to adapt their survey arrangement to condition based maintenance, we recommend that they involve us already in the development phase. Then we can contribute with our ideas and experience from previous pilot projects to the specifications of the monitoring, maintenance and survey procedures. An important step towards a GL type approval for a new condition monitoring system is a pilot project where the condition monitoring system is tested to ensure that it provides reliable data."

## Joint forces to harmonize CM requirements?

Before a condition monitoring survey arrangement can be approved and implemented, an agreement among all parties – ship owner, machinery designer/manufacturer and classification society – regarding survey procedures, warning level values, survey data etc. has to be in place. "With MAN Diesel it is easy, because they now have specifications for crank-train bearing wear monitoring," says Dr. Rebel, "but for other

component makers we need to discuss in more detail to approve a CBM scheme".

It seems that each classification society is currently putting energy into creating own individual guidelines in dialogue with ship owners and machinery suppliers. "It would be fruitful for all parties, if classification societies could work together with machinery suppliers to harmonize specifications for exchange of condition monitoring information to facilitate wider implementation of condition based maintenance," Dr. Rebel suggests.

To support customers on their path to CBM, Roving Dynamics cooperate closely with all parties involved.

## OPENpredictor™ approved by MAN Diesel, the first engine designer to omit open-ups

As the first engine designer, MAN Diesel recently issued recommendations to completely omit regular open-up inspections of the crank-train bearings of certain engine types - and only carry out condition based overhaul if the engine features an approved bearing wear monitoring system.

Roving Dynamics cooperates with MAN Diesel, and our OPENpredictor™ Bearing Wear Monitoring solutions are approved by MAN Diesel as standard equipment for new engines as well as engines in service.

For more information, application descriptions etc. contact us at [info@roving-dynamics.com](mailto:info@roving-dynamics.com).

# MAJOR UPGRADE OF OPENpredictor™

A new, upgraded version of the OPENpredictor™ Condition Monitoring software has now been released. Version 2.8.0 is a major upgrade from 2.7.2 and offers two types of changes.

## Basic Upgrade Package

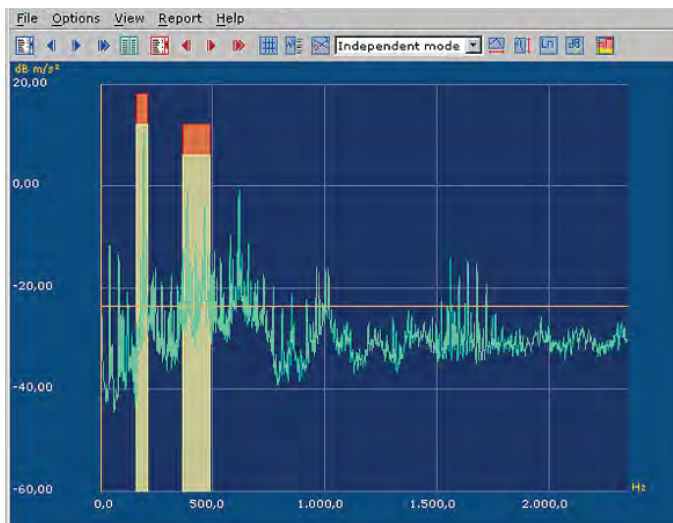
The basic upgrade offers a number of improvements relating to the user interface, infrastructure, speed compensating function plus enhanced integration with Plant Information (PI) system and off-line monitoring.

## What will you achieve from upgrading your condition monitoring system?

- Faster data transport and response time
- New 3D, Microsoft XP like look & feel
- More options of individual settings
- Latest versions of Oracle and Java software, providing faster back-up and restoring of the OPENpredictor™ database
- Easier future extension of your system with more applications as well as diagnostic support from Rovsing Dynamics.

Version 2.8.0 supports Microsoft 2000, 2003 and XP.

For customers with a Service License Agreement the basic upgrade package will be installed online by Rovsing Dynamics free of charge. For others it is an optional offer.



**Combustion Pressure Pulsation monitoring:** *Instantaneous Autodiagnosis™ reveals significant changes in the combustor pulsation level. When pulsation frequency exceeds the predefined level (left), an alarm message is immediately sent to the operator.*

## More OPENpredictor™ optional applications

OPENpredictor™ version 2.8.0 also incorporates easy access to three OPENpredictor™ applications, which so far have only been offered to a limited amount of customers:

- **Reliability Data Monitoring** was previously a stand-alone OPENpredictor™ module but has now been merged into the standard OPENpredictor™ platform. The module logs downtime and root causes, and identifies non-performing machinery and KPIs on reliability, availability and utilization. It provides a solid foundation for prioritizing maintenance according to economical impact.
- **Combustion Pressure Pulsation Monitoring** is a cost-effective method to detect critical combustion

pressure pulsation in gas turbines to prevent fatigue, damage and unplanned shutdowns. Whereas traditional pressure sensors typically are mounted inside the combustion chamber, OPENpredictor™ uses accelerometers, which are easily mounted on the outside of the combustor and which can be retrofitted.

- **Oil Analysis Results** can now be imported into OPENpredictor™ to support fault diagnoses, for alarm purposes and to keep an easy accessible track record of history and trends. Data can be imported electronically or manually depending on the format of your analysis results.

These three applications are optional and subject to individual quotation for

all customers. Activation requires additional engineering by Rovsing Dynamics and configuration of the specific machinery to be monitored.

“The upgraded OPENpredictor™ version 2.8.0 offers a number of features and applications, requested, defined and tested by other customers,” says Rovsing Dynamics’ Product Development Manager Lars Glæsel. “We are pleased that all this useful functionality is now made available to other customers as well.”

## More information

If you are interested in upgrading your OPENpredictor™ solution to version 2.8.0 and want more information about the Basic Upgrade Package and the access to new functionalities, contact us on [info@rovsing-dynamics.com](mailto:info@rovsing-dynamics.com).

# RELIABILITY MONITORING FOR OPTIMUM ASSET MANAGEMENT

Reliability and availability are key performance indicators (KPIs) for critical rotating machines in energy production. Every 1% downtime has huge economical impact so it is important to know downtime causes to take appropriate measures to reduce scheduled and unscheduled downtime.

OPENpredictor's Reliability Monitoring module provides

- Automated identification and quantification of downtime
- Downtime & operation statistics for root cause analysis
- KPIs for reliability, availability and utilisation

Such information helps operators focus and prioritize activities to problems that repeat and cause the largest amount of downtime, with maximum economic effect.

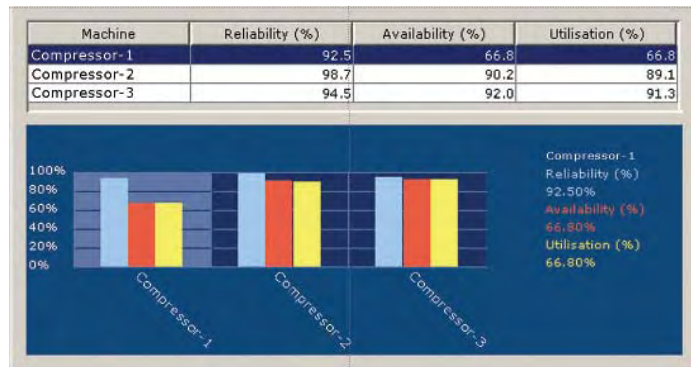
## Data sources & warnings

OPENpredictor™ automatically imports data like downtime and fault codes from existing plant information systems and creates a traceable set of data for root cause analysis.

When a machine is stopped or reliability or availability drops below benchmark figure, OPENpredictor's warning system prompts the operators to provide information. A warning list gives an overview of duration, nature and downtime cause.

## Root cause analysis

The user can define statistics and observation periods to verify short term problems and conclude on long term trends. With a root cause analysis it is possible to investigate how changes in maintenance can influence the downtime figures.



OPENpredictor™ provides different overviews of reliability, availability, utilisation, ↑ scheduled/unscheduled downtime, operating hours, successful/failed starts plus time causes for a root cause analysis ↓.

| Surveillance           | Downtime Cluster | Unscheduled Downtime | Risk Causes | Performance | Reliability | Availability         | Utilisation        |
|------------------------|------------------|----------------------|-------------|-------------|-------------|----------------------|--------------------|
| Cause                  |                  |                      | Cause Code  |             |             | Total Downtime (hrs) | Total Downtime (%) |
| Unscheduled            |                  |                      | UNK         |             |             | 18                   | 3.9                |
| Preventive Maintenance |                  |                      | PM          |             |             | 70                   | 15.2               |
| Corrective Maintenance |                  |                      | CM          |             |             | 3                    | 0.6                |
| Failed While Running   |                  |                      | FWR         |             |             | 22                   | 4.7                |
| Failed to Start        |                  |                      | FTS         |             |             | 3                    | 0.6                |
| Standby Mode           |                  |                      | STBY        |             |             | 90                   | 19.2               |
| External               |                  |                      | EXT         |             |             | 10                   | 2.1                |



Reliability trend graph with alarm level.

## TAQA MONITORS RELIABILITY TO MEET PLATFORM TARGETS



TAQA Energy, formerly BP Netherlands, use OPENpredictor™ to monitor the reliability, condition and performance of critical gas turbine compressor lines and auxiliary machinery on its mature North Sea gas compression field.

On the offshore platform three operators check operation alerts

from OPENpredictor™ and fill-in the downtime causes. Onshore the automatically generated statistics are useful tools for TAQA's Rotating Equipment Engineer, Neil MacRae, and the managers in Asset Management and Engineering for their operation and maintenance of the gas compression field.

"We use the key performance indicators and statistics on downtime causes to identify the common faults on the machines," says Neil MacRae. "We also compare with the information in our computerized

maintenance management system to ensure that we capture all faults."

"The target for the platform and the asset management team is 97% availability.

Compressor performance is crucial to the operation, so if they are not reliable our annual targets are not met. Thanks to reliability monitoring, we now have more concrete data to work with. Our asset manager uses the monthly reports with analysis and recommendations from Roving Dynamics to check how the machines

are performing. In case of downwards trends in availability we can now easily identify the cause and quickly solve the problems," Neil MacRae concludes.

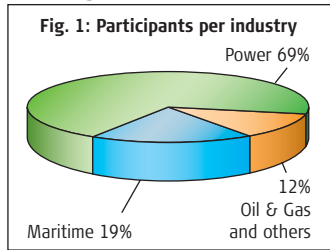
TAQA gained > \$ 5 million by combining information on asset reliability, performance and condition with business objectives among other things due to a 2% increase in reliability and availability of critical production assets.

For more information see [www.roving-dynamics.com/oil\\_gas](http://www.roving-dynamics.com/oil_gas).

# SURVEY CONFIRMS BENEFITS FROM CONDITION MONITORING

Our customers provided valuable feedback on their experience using predictive maintenance information from OPENpredictor™ and working with us in our recent customer satisfaction survey.

For the first time since we launched maritime solutions, a number of ship owners took part. Participants come from the following industries:



The survey showed that 80% use condition monitoring on a daily or weekly basis (fig. 2). Compared to 2006, less uses it daily and more use it weekly. 58% of the users are from Operations and 22% from Maintenance. On maritime vessels users are superintendents and surveyors from classification societies.

70% use OPENpredictor™ to plan maintenance before revision, and to verify machinery condition afterwards. 68% use it for troubleshooting, and 60% use the predictive maintenance information for condition based maintenance and to avoid open-up inspections. Other purposes are monitoring of combustion pulsation and experimentation.

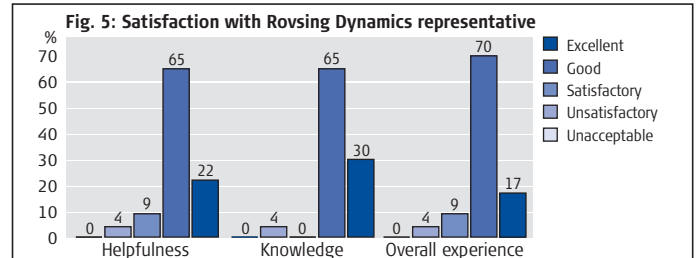
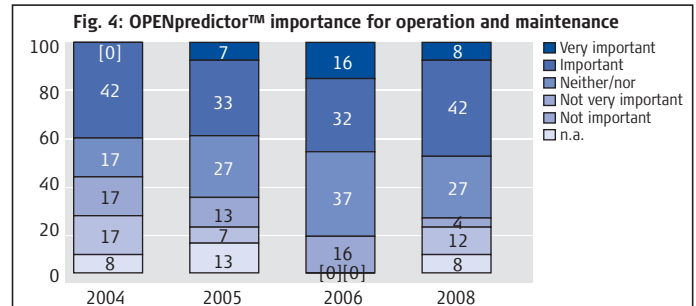
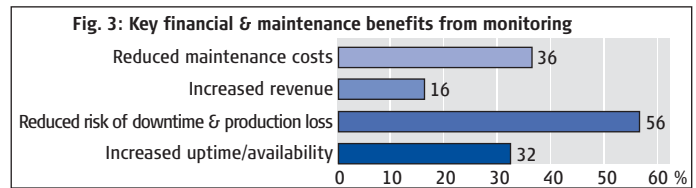
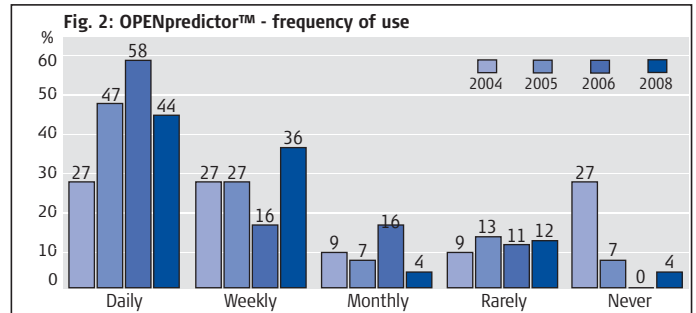
Customers reported significant financial and maintenance benefits from condition monitoring (fig. 3). 56%

reduced their risk of downtime and production loss, 36% had reduced maintenance costs, 32% increased uptime/availability and 16% increased revenue. For 64% of the participants OPENpredictor™ had identified serious machinery faults, an increase from 40% in 2006. Several customers reported significant actual savings – see value examples next page and on [www.rovsing-dynamics.com](http://www.rovsing-dynamics.com).

50% of the participants consider expanding their OPENpredictor™ system to monitor more machinery. 27-39% consider adding Performance Monitoring, Reliability Monitoring or Balancing Software to their solution, or integrating data with other systems.

50% find the importance of condition monitoring 'important' or 'very important' for their operation and maintenance (fig. 4). However, despite the reported benefits and expansion plans, 16% don't consider it very important, reducing this average rating from 3.9 to 3.4.

As for the cooperation with Roving Dynamics, 87% of our customers find their experience with us 'good or excellent' and consider our representatives helpful and good experts (fig. 5). 23% were more satisfied than last survey, increasing the average from 3.9 to 4.0. Half of the participants already have a service agreement with Roving Dynamics. 38% of the rest consider entering a service



agreement with us, and 35% showed interest in outsourcing the weekly surveillance and diagnostic analysis to us.

The overall average rating of OPENpredictor™ and Roving Dynamics decreased from 3.9 to 3.7 (fig. 5). The 5% decline relates to start-up challenges with our first maritime monitoring solutions along with decreased satisfaction with the documentation and training provided. Although 72% find these essential deliveries 'good' or 'satisfactory', some are not quite satisfied and expresses a

need for e.g. documentation in local language or more training.

"We are pleased that customers confirm that they achieve tangible benefits from their monitoring solutions, and that they are satisfied with our mutual cooperation," says Roving Dynamics' CEO Thea Larsen. 'We highly appreciate the honest feedback and concrete proposals on things we can do better, and are in the process of addressing raised issues and requests for additional services and solutions.'

# CUSTOMER VALUE EXAMPLES ON OUR NEW WEB SITE

Earlier this year we launched our new, revamped web site [www.rovsing-dynamics.com](http://www.rovsing-dynamics.com). Besides a new overall design, also reflected in this newsletter, the web site now consists of four different sections.

## Dedicated industry sections

The first three sections offer industry specific information about our monitoring solutions, news, events, contact info,

publications etc. for the key industries we serve:

- Power generation
- Maritime
- Oil & gas

In the grey section you will find general information about Roving Dynamics:

- 'Why work with us' explains how we create value for customers by empowering their business decisions

through integrated business and predictive maintenance information as well as organizational behaviour

- 'What we do' describes our working methods
- 'How we do it' provides short descriptions of all our monitoring solutions
- General company news and press releases with opportunity to subscribe.

## Customer value examples

In the industry sections you will find the below value examples, where our customers tell about the financial and other benefits they gain from working with Roving Dynamics and using OPENpredictor™ condition monitoring solutions.

We hope our new web site will be useful for you, and welcome your comments and ideas.

### POWER



**DONG Energy** saved € 2 million on 2% higher plant availability and avoided damages at its Skærbæk thermal power plant. This was achieved through to insight into machinery health and predictive information on future fault development.



**Neubrandenburger Stadtwerke** minimizes production loss due to cyclic maintenance. Gas turbine performance monitoring enabled them to extend compressor wash intervals, saving downtime and costs for 2 washes/year.



**EOC (Tanjong Energy)** maximizes uptime with monitoring and Condition Based Maintenance at the Suez Gulf and Port Said thermal power plants in Egypt, operated by the Egyptian Operating Company (EOC).

Read more at [www.rovsing-dynamics.com/power](http://www.rovsing-dynamics.com/power)

### MARITIME



**Scandlines** aims reduce unplanned off-hire for passenger ferries with up to 30% and reduce docking costs with up to € 200,000/year by being able to predict unscheduled overhauls and extend overhaul intervals.

**Major shipping company** reduces risk to keep the fleet in service. Bearing Wear Monitoring informs about negative developments and helps plan corrective actions plus avoid open-up inspections as part of a Condition Based Maintenance strategy.

Read more at [www.rovsing-dynamics.com/maritime](http://www.rovsing-dynamics.com/maritime)



**Hapag-Lloyd** chose bearing wear monitoring from Roving Dynamics for six new mega containerhips after tests on three vessels in service with turbocharger monitoring as well. The objective is to save time, cost and manpower by avoiding open-up inspections.



**EDF's** remote monitoring of rotating machinery helps optimise operation and maintenance of their power plants. Condition monitoring of steam turbines during commissioning identified serious problem.



**Egemsa** hydro power in Peru avoided production loss of \$ 6 million. Predictive information about machinery health increases availability and revenue plus saves operational and repair costs.

### OIL & GAS



**TAQA Energy**, formerly BP, gained more than \$5 million from 2% increase of the availability and reliability of their mature North Sea gas compression field.

Read more at [www.rovsing-dynamics.com/oil\\_gas](http://www.rovsing-dynamics.com/oil_gas)

## POSIDONIA 2008



Rovsing Dynamics participated at the major shipping industry event POSIDONIA 2008 in Athens Greece June 2-6 together with our local representative Internava Ltd.

More than 1700 companies from +80 countries exhibited at the biannual event.

Feedback from many leading shipping companies on the

Greek market confirms that continuous condition monitoring is quickly becoming an industry standard with substantial economical benefits for improved fleet utilization.

Engine manufacturers like MAN Diesel have recently issued recommendations to completely avoid open-up inspections as these tend to generate more problems than they solve.

*Visitors at Rovsing Dynamic's section of our greek representative Internava's stand at POSIDONIA.*

## VISIT US AT SMM IN HAMBURG

Once again Rovsing Dynamics will be present at SMM, the world's leading international trade fair for shipbuilding, machinery and marine technology held every second year. SMM will take place in Hamburg, Germany, from September 23-26, 2008. More information about SMM on [www.SMM2008.com](http://www.SMM2008.com).

You will find us together with the Danish Marine Group in hall B1.EG on stand 731.

Here we will present our wide range of stand-alone and integrated condition monitoring solutions for maritime vessels, which enable ship owners to

- Optimize maintenance planning
- Optimize vessel reliability and availability
- Reduce time for maintenance and surveys
- Minimize risk, costs and off-hire time

### Meet early adopters & classification societies

During SMM Rovsing Dynamics will host a number of short open seminars around the topic of vessel condition monitoring and condition based maintenance.

- Ship owners who have already adopted condition monitoring share their objectives and experience
- Classification societies tell about requirements and procedures for implementing condition monitoring to support a condition based maintenance strategy.

More information on the individual seminars will be posted on [www.rovsing-dynamics.com/maritime](http://www.rovsing-dynamics.com/maritime).

If you would like to receive more information about the seminars or book a meeting with us during SMM, please contact us on [info@rovsing-dynamics.com](mailto:info@rovsing-dynamics.com).

**See you at SMM September 23-26 in Hall B1.EG stand 731**

