

## MINIMISE DOWNTIME AND INCREASE THROUGHPUT



OIL & GAS INDUSTRY

Profit from online  
condition monitoring of  
critical machinery:

- Reduce downtime
- Increase throughput
- Reduce operation risk
- Save on O&M budget



## INCREASE PROFITABILITY WITH OPENpredictor™

The OPENpredictor™ Condition and Performance Monitoring System provides an on-line assessment of critical rotating machinery in the oil and gas industry.

OPENpredictor™ provides automated fault diagnosis and forecasting. The combined function of mechanical and performance assessment makes the system a powerful tool for complete machine health assessment for the oil & gas industry. Increased throughput combined with O&M savings and increased manpower efficiencies result in short payback time.

### **MAXIMISED net present value, RAPID return on investment**

A case study by BP Netherlands has proven that their gas compressing station in the Dutch North Sea sector now operates at 5% higher efficiency after the installation of OPENpredictor™. The value of this efficiency gain is worth approximately € 10.000 per day.

The net present value is typically several millions of Euros allowing Return On Investment

in less than one year. Reduced downtime accounts for 80% and reduced maintenance costs for 20% of the resulting economic benefit.

### **OPENpredictor™ application:**

OPENpredictor™ is ideal for: off-shore platforms, floating production units, on-shore terminals, pipeline compressor stations, gas gathering stations, LNG plants, GTL plants, power plants, refineries and chemical plants.

### **Machinery suitable for monitoring**

- Gas turbines
- Steam turbines
- Motor drivers
- Speed increasing gearboxes
- Variable speed drives
- Generators
- Pumps
- Compressors (axial, centrifugal, screw, reciprocal)
- Expanders
- Blowers/fans

### **Sub-systems**

- Lube oil systems
- Seal gas systems
- Hydraulic control systems
- Unit control systems

### **OPENpredictor™ increases throughput and reduces costs of planned interventions resulting in:**

- Increased uptime
- Minimised scheduled and unscheduled downtime
- Reduction of number of spurious trips
- Increased efficiency
- Optimisation of machine wash policies and filter exchange
- Reduction of emissions from combustion turbines
- Prevention of hiring expensive external expertise for ad hoc problems
- Increased independence from machine vendor Long Term Service Agreements
- Objective evaluation of maintenance contractors work package
- Increase of in-house expertise on machine performance
- Savings on O&M budget

### **Monitoring functions - OPENpredictor™ executes three types of monitoring:**

#### 1. *Advanced condition monitoring*

Involves measurement, automated diagnosis and forecasting of mechanical condition. This function is designed to minimise operation risk, maximise machine reliability and optimise availability.

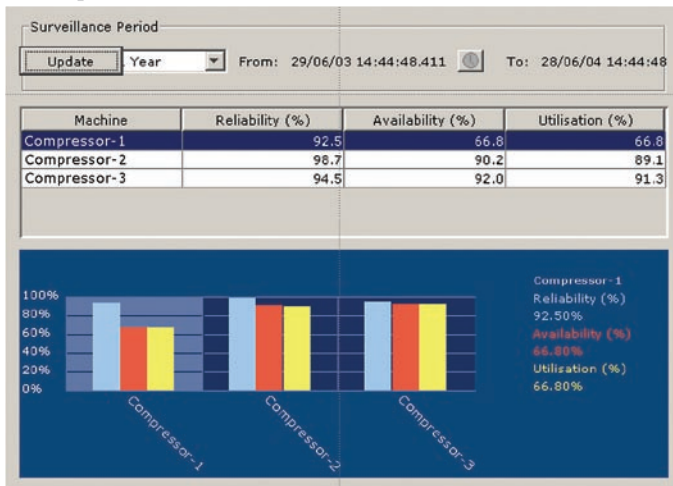
#### 2. *Performance monitoring*

Involves measurement, automated diagnosis and forecasting thermodynamic condition.

This function is designed to maximise machine efficiency and performance.

#### 3. *Reliability data monitoring*

This module automatically logs all on-off data from important machines together with fault codes from the control system. The statistics provide management information to prioritise and determine improvements, as all downtime causes and operator experiences are readily available.



Performance statistics from RDM module

**Customer statement:**

“BP Netherlands has conducted a thorough evaluation of several systems on the market. As an operator in more than 100 countries on nearly all continents, we have significant experience in monitoring our rotating equipment. BP Netherlands considered the OPENpredictor™ system as the most powerful for the application”.

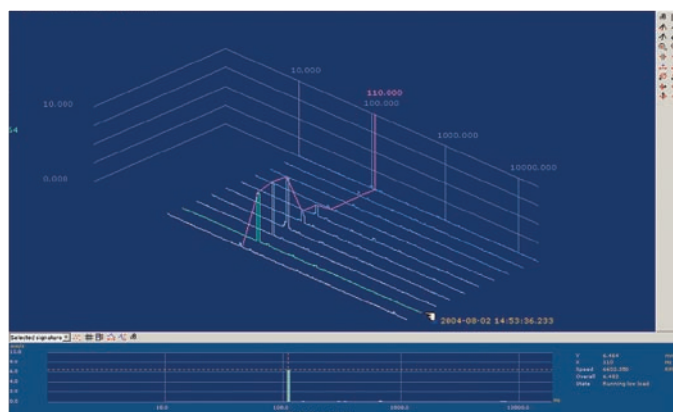
*Rotating Equipment Engineer  
 Marthijn Kort (BP Netherlands)*

**The following important features are among the functions integrated in OPENpredictor™:**

- Total concept for remote monitoring of multiple plants with local and remote alarm functions
- Three dedicated local warning systems: One for condition monitoring, one for performance monitoring and one for reliability data monitoring, related to individual responsibilities of operators, maintenance staff and process engineers in a plant.
- Integration of condition and performance monitoring using the same man machine interface for data retrieval, forecasting and advanced troubleshooting
- Advanced post processing of data for easy and fast data analysis
- Advanced post processing of data for troubleshooting
- Automated reporting - shift and management.

**Case study 1: Gas turbine commissioning fault verified**

A new gas turbine set showed strong vibrations on the protection system, just after installation and startup. The Vendor was asked to investigate and correct the problem. The OPENpredictor™ system was also used to analyse the problem and verify corrections by the Vendor. If the machine had continued to operate, major gearbox damage would have occurred causing several weeks of downtime. The contribution of OPENpredictor™ to solve this problem is quantified as **€ 100.000** due to efficient and objective diagnosis of the problem and confirmation that the problem is really solved.



Case study “Machine commissioning fault verified”: This 3D plot presents the data at startup and shows the improvement after the vendor corrected the problem.

**Case study 2: Gas turbine compressor fouling identified**

Identification of the optimal wash interval for compressors is important to maximise production capacity and minimise fuel consumption. An Off-line compressor wash was executed and the effects documented, showing a 5% increased output.

OPENpredictor™ can now be configured to warn and forecast the capacity degradation. Running the compressor with a 5 % higher capacity increases the revenue by **€ 10.000** per day that this improved capacity is reached. The annual improvement is estimated as **€ 100.000** per compressor train.

**Case study 3: Compressor train trips avoided**

The existing vibration protection system uses sensors, which created spurious machinery trips.

A combination of sensor type and mounting method created excessive vibration values. The OPENpredictor™ system was used to analyse the sensor signals and to conclude about this instrumentation problem.

A temporary trip override has been installed until a new sensor is installed. OPENpredictor™ is used in the meantime to closely monitor the machine in order to minimise operation risk. Each trip of the machine would cause unscheduled downtime and extra equivalent operating hours.

The downtime for each trip is typically several hours due to trip investigation and compressor re-pressurisation. Improved revenue for each avoided trip is **€ 20-40,000**.



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### **How to get started**

The way to condition based maintenance facilitated by continuous online monitoring of critical machinery is fast and straightforward.

Once the decision is taken and we have clarified your monitoring needs, the implementation will be guided by Rovsing Dynamics' ISO 9001:2000 certified management system.

Installation of an OPENpredictor™ solution is easily conducted in connection with new build, retrofit or even on plants in service. We strive to ensure that the installation and roll-out to more machinery is as convenient for you as possible. And user training and after sales service is part of our delivery.

### **Interested?**

If you would like know more about how a predictive maintenance information system can support your business, feel free to contact us for specific information about the different solutions or a demonstration of the OPENpredictor™.

### **About Rovsing Dynamics**

Rovsing Dynamics is a global supplier of online solutions for the monitoring of condition, performance and reliability of critical rotating and reciprocating machinery. These are based on the proprietary OPENpredictor™ technology. The predictive maintenance information system has demonstrated its value at numerous maritime vessels, power plants, off-shore platforms etc. increasing revenue and availability significantly by predicting faults and lead time to inspection. Our customers include some of the world's leading shipping, power generation, and oil & gas companies.

We serve our customers worldwide from our head office in Copenhagen, Denmark, and sales offices in the Netherlands and the United Kingdom, and through partners and agents in Europe, Russia, North and South America, the Middle East, China, Asia and Japan.

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