

OPEN predictor™

*Reference
Installation
Oil & Gas*

BP NETHERLANDS

- *Machine reliability improvement from 97 to 98%*
- *Machine availability improvement from 96 to 98%*
- *NPV several Million Euro*
- *ROI within 1 year*

"BP Netherlands has conducted a thorough evaluation of several systems on the market. We have significant experience in monitoring our rotating equipment. We considered the OPENpredictor™ system as the most powerful for the application"

*Rotating Equipment Engineer,
Marthijn Kort (BP Netherlands)*

BP NETHERLANDS

IMPROVED THE OPERATION OF MATURE FIELD



BP Netherlands compresses natural gas from its North Sea fields using gas turbines driving double compressors via a gearbox. Compressor downtime and machine capacity reduction have a direct impact on the bottom line of the operation.

It was therefore decided to install a Condition and Performance Monitoring System for the highly critical gas compression trains. The system provides crucial information to operators, maintenance staff and management about potential machinery faults, reduced capacity and Key Performance Indicators for benchmarking. ROVSING Dynamics and its OPENpredictor™ system were chosen after a thorough evaluation of several systems on the market.

As the machinery on the platform is typically very reliable, manual analysis and monitoring of data is cumbersome and ineffective due to large amounts of unusable and repetitive data. Hence, high emphasis was placed on automated diagnosis and forecasting in order to minimise operational risks and costs.

How OPENpredictor™ Fulfills the Requirements

OPENpredictor is a Condition & Performance Monitoring system which provides automated fault diagnosis and fault forecasts.

OPENpredictor™ executes three types of monitoring:

1. *Advanced condition monitoring* - This function is designed to minimise operation risk, maximise machine reliability and optimise availability.
2. *Performance monitoring* - This function is designed to maximise machine efficiency and performance.
3. *Reliability monitoring* - The statistics from this module provide management information to prioritise and determine improvements, as all downtime causes and operator experiences are readily available.

The combined function of mechanical and performance assessment makes the system a powerful tool for complete machine health assessment for the oil & gas industry.

"The potential within the group for this type of application is for any site operating critical machines, where there is a desire to increase operation efficiency and cut on maintenance costs."

*Rotating Equipment Engineer
Marthijn Kort (BP Netherlands)*

Benefits achieved

Following are examples of benefits achieved by BP Netherlands after the OPENpredictor™ installation

- **Reliability and Availability** increased in 2004 with respectively 1 and 2 % due to reduced scheduled and unscheduled downtime
- **Scheduled downtime** reduced with 2 days for yearly bearing inspections, giving two more days of production
- **Unscheduled downtime** has been reduced due to fewer trips, improving uptime by several hours per avoided trip
- **Focus to key cost drivers** prioritises activities to most important improvement areas
- **Capacity optimisation** due to timely GT washing
- **Minimised travel cost and operation risk** is achieved via remote monitoring allowing flexible use of engineers for commissioning and trouble shooting through the world wide BP network
- **Lower operational cost** through automation of fault identification and AutoDiagnosis™. Engineers efficiently use their time to validate conclusions from the system by having fast access to information from machines that need attention.
- **ROI** was achieved in less than a year.



The OPENpredictor™ system is expanded to the On-shore facilities in Bergen and Alkmaar one year after the successful implementation on the P15D off-shore facility. The goal is to achieve similar benefits as on P15D with low operational costs.



BP Netherlands is producing gas from the North Sea. From the production platforms gas is gathered at P15D (top picture), from which it is compressed to Bergen.

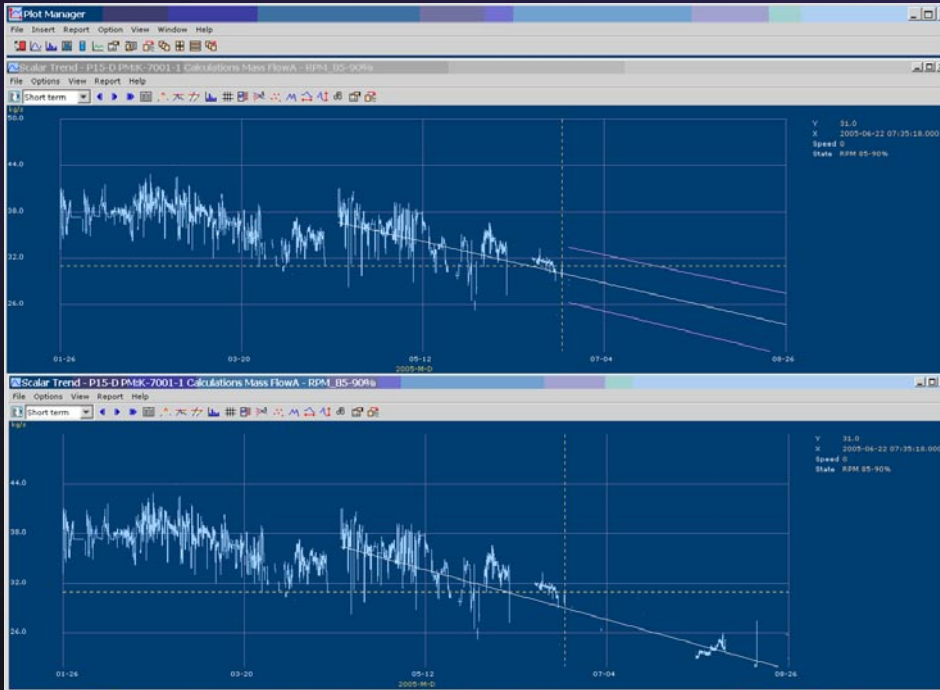
From Bergen (middle picture) the gas is delivered to the gas-grid.

Bottom: At PGI Alkmaar gas is stored in an underground cavity using the same type of gas turbine and compressor as on the P15D platform.

Pictures on this page taken by: Fotostudio Henk Honing.



CASE EXAMPLE: SUBSTANTIAL SAVINGS BY PLANNED CRANK WASHING OF GAS TURBINE



The challenge for every company is to assess its future performance of operation. Therefore OPENpredictor™ incorporates an automated strategy to forecast reduction in performance of critical machines.

The above curves demonstrate and validate the forecasting function for the anticipated production reduction of a gas turbine driven compressor. As the causes of the reduction are also available, the organization can plan the appropriate actions well in advance before a certain reduction will be reached. This results in optimised capacity, reduced fuel consumption and better planning of the activities.

In the above case 8 % improvement of the production capacity was achieved due to a crank wash of the gas turbine compressor. The step change just before the beginning of the forecast curve demonstrates the improvement. The

10 hours downtime (needed for the wash) was earned back after 120 hours improved operation. The days, weeks and months after the wash, the improved operation resulted in a considerable increased profit.

Executing the wash only when it is economically justified optimizes the operation.

Copyright©2005. All rights, title and interest in and the Software, Hardware and Services detailed in this document and all copyrights, patents, trademarks, service marks or other intellectual property or proprietary rights relating thereto belong exclusively to ROVSING Dynamics A/S

Marielundvej 41 · DK-2730 Herlev · Denmark

Tel: +45 46 90 72 00 · Fax: +45 44 84 60 40 · VAT No. 20 05 24 73
e-mail: info@rovsing-dynamics.com · www.rovsing-dynamics.com

 **Rovsing**
DYNAMICS