Brüel & Kjær Vibro

Application Note

Case study – Successful predictive maintenance at ICI Holland BV

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ABSTRACT

An ICI Holland BV, Dutch daughter company of British concern Imperial Chemical Industries pic, has 900 employees at its production complex in Rozenburg. The products produced at Rozenburg's four modern factories comprise raw material and semi-finished products for the plastics processing industry, and raw material for polyurethane chemicals. The efficient running of these factories has involved two successful decades of predictive maintenance. The Brüel & Kjær Vibro COMPASS system is their latest acquisition.

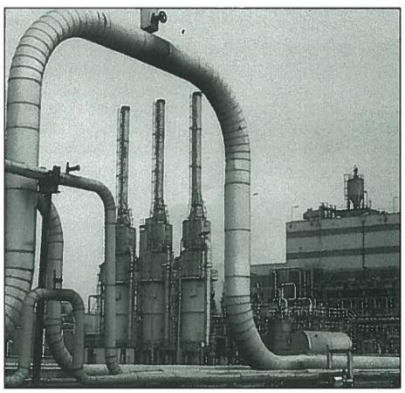

Figure 1. ICI's Rozenburg site in Holland.

Background

In 1972, the Engineering Department at ICI Rozenburg in Holland set up a small unit to regularly monitor the condition of the most important machines on the site. The aim was to extend the time between overhauls.

The Engineering Dept. is now responsible for monitoring some 360 machines, varying from 25kW - 750kW pumps and 400kW - 500kW extruders to complicated gearboxes and 90MW gas and steam turbines. This involves collecting readings from some 2400 off-line measurement points (45% of them in explosive areas) located around the four factories at Rozenburg.

Condition monitoring is an important part of the Rozenburg preventative maintenance policy and has led to conservatively estimated cost savings of over US$500000 per year. Examples of these savings include:

- The number of overhauls performed on ten gear boxes was reduced from once every four years to approximately every ten years (depending on the measured condition of the gearbox). A cost saving of US$33000 per overhaul.
- Close monitoring of the condition of three critical fans has allowed bearing failures to be predicted and replacement to be planned well in advance.

This planned replacement removes the risk of fire (which often occurs if the bearings fail) and saves on one day's lost production (some US$25 000) due to unplanned downtime.

Prioritisation for optimum monitoring

Machinery at ICI Rozenburg is divided into three groups and prioritised as A, B or C machinery depending on their criticality and their spare parts availability:

- Group A machinery is given top priority and contains some 50 machines, the breakdown of which would cause the entire shutdown of a factory's production. Because of the criticality of these machines, measurements are taken at two week intervals.
- Group B contains an additional 60 machines, the breakdown of which would cause an unscheduled shutdown in only part of a factory's production. These machines are also considered critical but measurements on these machines are taken periodically every month.
- Group C is the lowest priority machinery and consists of approximately 250 machines. Parts for these machines are readily available in stock, and are quickly and easily replaced.

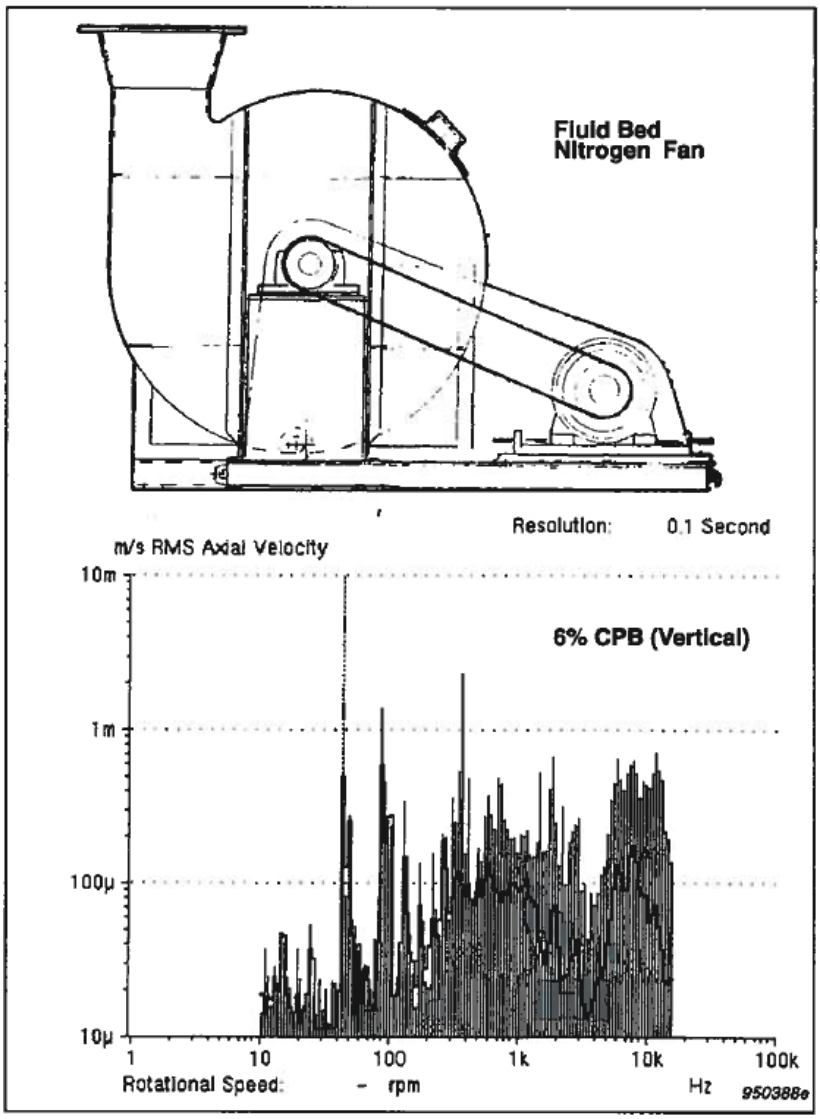

Figure 2. This 75 kW fluid-bed fan from the Melinar factory is used to put a layer of N_2 over the product to increase its resistance to oxidisation. The COMPASS system alerted maintenance personnel to a problem of high frequency vibration on both the horizontal and vertical CPB readings from measurement points located on one of the fan's bear ings. Attributed to a bearing defect, an inspection found fretting corrosion on the outer race.

This group does not constitute critical machinery and is consequently monitored every two months.

Then and now

Originally vibration measurements were manually collected and analysed. This activity required the services of two full-time analysts.

Due to ever increasing economic constraints and a desire to further extend the time between machine overhauls, Rozenburg decided to implement an automatic, on-line computer-based system as part of their preventative maintenance strategy.

COMPASS was chosen and a monitoring strategy applied that is based on automated CPB spectrum comparison. Since implementation, both system and strategy have produced significant results. During the first two years of its operation, COMPASS successfully detected approximately 40 machine problems at an early stage of development. These included unbalance, coupling defects, bearing faults, several gear-wheel problems, and many more.

Added benefits

Consisting of an intrinsically safe Brüel & Kjær Vibro Data Collector, the Rozenburg COMPASS system compares CPB vibration spectra and automatically analyses the result, alerting the analyst only if a predetermined increase in vibration is detected. The analyst is therefore only involved in the analysis of the data if there is clearly a problem.
This has allowed the work to be done by one analyst instead of the original two. An additional benefit is that business interruptions are considerably fewer, promoting better customer relations.

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