SCHAEFFLER

Schaeffler Global Technology Solutions

Pulp and paper

Mitsubishi HiTec Paper Europe GmbH, Germany

Condition monitoring on the Path to Industry 4.0

Mitsubishi HiTec Paper Europe produces special papers, which are coated using modern methods and used around the world, at its paper factories in Bielefeld and Flensburg. Coating machine 3 (SM3) at Mitsubishi HiTec Paper Europe GmbH's Bielefeld (MPEB) plant gives thermographic paper its special coating.

Challenge for Schaeffler

SM 3 has 26 fan units that ensure the coated paper can dry without being touched. The fans' high speeds and large mass mean that, over time, they become subject to imbalance. One of SM 3's fans failed due to imbalance that was not detected in time, causing significant damage to both the bearing support and additional components. This resulted in a sudden plant shutdown and consequently a loss of production. In order to identify potential damage at an early stage and prevent unplanned and costly downtimes, the MPEB engineer team needed a solution that would allow them to switch from time-based to condition-based maintenance.

Schaeffler Solution

Together with its authorized sales partner Werthenbach, Schaeffler developed a service concept for the condition monitoring of all of the paper machine's critical components. This solution comprises 26 FAG SmartCheck systems that continuously monitor the vibrations produced by the fans. An FAG SmartController acts as a bi-directional gateway between the customer's control system and the sensors. The use of Power over Ethernet allowed the cabling outlay to be kept to a minimum – the entire system can be supplied with power and communication ensured with just one cable.

Courtesy of Mitsubishi HiTec Paper Europe GmbH

MITSUBISHI PAPER MILLS LIMITED

Technical information on Coating Machine SM 3
Production capacity:
100 000 t/a
Max. speed:
1 730 m/min (world record in curtain coating technology since 2007) / max 1 810 m/min
Number of ventilation units:
26 units comprising supply and extracted air fans
Diameter, mass, and speed per fan:
• Supply air fan impeller: d = 922 mm; m = 103 kg; n=2 115 rpm • Extracted air fan impeller: d = 650 mm; m = 34 kg; n= 2 270 rpm • Airturn fan impeller: d = 650 mm; m = 34 kg; n= 2 480 rpm

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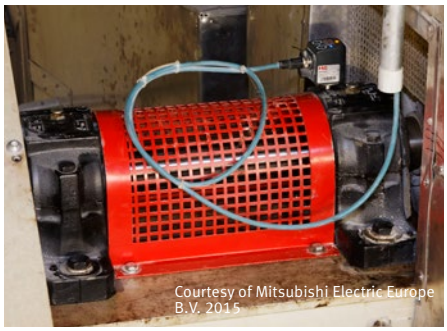
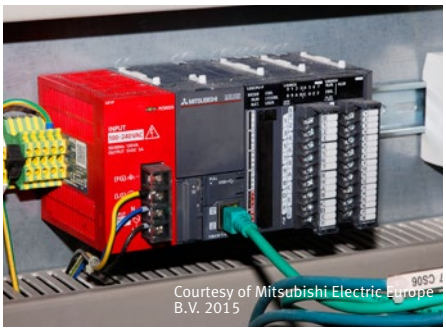


Ventilation unit: The FAG SmartCheck is fitted to the shaft's bearing support



An FAG SmartController acts as a bi-directional gateway between the customer's control system and the sensors

A SCADA system visualizes the vibration data and status information from the sensors in real time

Customer Benefit

Just a few months after being put into operation, the monitoring system demonstrated its abilities and identified irregularities in two of the exhaust air flotation dryers. Werthenbach's service team recorded the data and carried out an initial analysis, after which the experts from Schaeffler delivered a written report containing the results and a set of recommended actions. The irregularities were caused by impermissibly high imbalance and outer ring bearing damage. Planned maintenance allowed both of these problems to be solved quickly. The early warning system makes lead times of up to several months possible before the actual component failure occurs, so the system downtimes that are needed for repair and maintenance work to be carried out can be initiated accordingly. MPEB has a reliable data history at its disposal, which allows the long-term monitoring of the systems' behavior and targeted improvements to the design. This increases machine availability and process reliability while reducing the overall operating costs. The company plans to use this expandable solution to monitor the entire SM 3 machine in future in order to precisely record the behavior of all rotating parts when their speed increases.

What's special

"For us, condition monitoring using the FAG SmartCheck is a decisive step towards Industry 4.0. The FAG SmartController is at the heart of this solution and enables us to forward information from the field-level sensors via the control level and MES to the ERP system where it can be used and to directly implement data from higher levels at the field level",

explains Jürgen Heitland, head of Electronics, Measuring and Control Technology (EMSR) at Mitsubishi HiTec Paper Europe GmbH. On the strength of the good results delivered by the pilot project, Mitsubishi HiTec Paper Europe subsequently decided to equip the coating machine at its Flensburg plant with the FAG SmartCheck as well. The supply and extracted air fans at this plant are now monitored by 22 systems.

Technical Information about the Solution

Number of monitoring systems:

- 26 FAG SmartCheck units
- 1 FAG SmartController based on a Mitsubishi Electric PLC from the MELSEC L series

Power supply:

PoE (Power over Ethernet)

Additional signals:

- Speed (from customer's control system)
- Overall status from FAG SmartCheck to customer control system

Monitored assemblies:

26 fans with 2 plummer block housings and one fan impeller each

Monitored components:

- Bearings
- Imbalance

Monitored operating parameters:

- Temperature
- Speed
- Machine vibrations

Diagnostic methods:

- Speed
- Acceleration
- Envelope

Status display:

Individual visualization by integration of information into the customer's control system using FAG SmartVisual and FAG SmartController

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