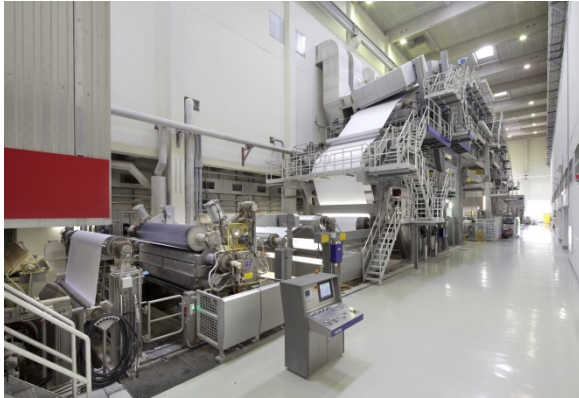


PRESS RELEASE

08/09/2016



A condition monitoring system installed on a paper coating machine has enabled the Mitsubishi HiTec Paper Europe plant in Bielefeld, Germany to switch from time-based to condition-based monitoring, helping to avoid unnecessary machine shutdowns. Enabling the new system is a Mitsubishi Electric L-series PLC that operates as a bidirectional gateway between the controller and sensors.

Thermal paper gets its characteristics from a special coating. It is typically used for sales receipts and tickets. At the Mitsubishi HiTec Paper Europe plant in Bielefeld, Germany (MPEB), around 300 tonnes of thermal paper goes through one of the coating machines every day.

The four-storey machine has a maximum operating speed of up to 1730m/min. Coating Machine 3 has 26 fan units, each consisting of a supply fan and an exhaust air fan. These ensure contactless drying of the coated paper. The air supply fans blow hot air at up to 250°C into the drying hoods. In the process, the surface of the thermal paper must not be heated above 68°C, otherwise the paper will react and an undesirable discolouration will occur.

Jürgen Heitland, Head of Electronics and Measurement and Control Technology (EMSR) at MPEB, explains: *"On Coating Machine 3, we finish the raw paper with a pre-coat and a top coat to give it its thermal characteristics.*

In order to guarantee the perfect coating, the paper which can be up to 2.9 metres wide must be dried without contact. That critical task is carried out by a total of 13 hot air drying hoods, each with two large radial fans for supply and exhaust air."

The fans have a diameter of just over 1m and weigh around 100kg, while the exhaust air fans are slightly smaller and lighter. With the fan also rotating at a speed of 1500rpm, there can be a slight imbalance, which over time can prematurely wear the bearings. If that imbalance is not detected and rectified in time, the result will be a production shortfall. If one of the first four hot air drying hoods is affected, production will come to a standstill.

Three years ago, when an imbalance in Coating Machine 3 was not detected in time, it resulted in the complete failure of a fan. Besides the bearing, attachment parts were also heavily damaged. This resulted in a short system shutdown which led to a reduction in the rate of production.

"That fan failure was the catalyst for our decision to look for a way to switch from time-based to condition-oriented maintenance," says Heitland. "We wanted to be able to detect imbalances or damage to roller bearings early before they became apparent through noise or an increase in temperature – by the time the temperature rises in the bearing, it is usually too late for a scheduled component replacement. Replacement parts are often not immediately available, meaning that the failure of the fan goes on for even longer."

To counteract this problem, 26 FAG SmartCheck sensors from Schaeffler now monitor those fans by carrying out vibration measurements. An FAG SmartController - based on a Mitsubishi Electric PLC from the MELSEC L-series - operates as a bidirectional gateway between the controller and sensors.

As a result, unscheduled machine shutdowns can be avoided.



PRESS RELEASE

08/09/2016



Condition monitoring aims to indicate in good time when limit values will be exceeded. FAG SmartCheck systems have a status indicator based on a traffic light system: if the status changes from green to yellow (preliminary-alarm status), a predefined limit value has been exceeded. However, the machine can still continue to operate for the time being. A red alarm indicates an urgent need for action.

The operator can access each individual sensor via an integrated web server and display detailed information. As the system can issue an initial warning via the yellow preliminary alarm up to three months in advance, that leaves sufficient time to schedule a system shutdown and order replacement parts, thus avoiding bearing damage in the process. As a result, machine availability and process reliability have improved.

"Unscheduled shutdowns are always costly," says Arkadius Schostak, Service Manager at Werthenbach the company responsible for the development and implementation of the FAG SmartCheck condition monitoring system. "We have used the FAG SmartCheck before, but the size of this project at MPEB took it to a new level."

Six months after the discovery of the problem, the new solution was put into operation. Firstly, Werthenbach produced a complete set of documentation. Then an offline vibration measurement procedure was carried out on all the fans and the data collected and evaluated. Based on the results Schaeffler compiled a list of recommended measures and drew up an action plan. After examination by engineers from MPEB, Werthenbach was awarded the contract and the system was put into operation.

With support from Mitsubishi Electric Europe, the network communication - the actual integration of the comprehensive monitoring system into the customer's system - only took a few hours.

To minimise costs, the engineers at MPEB were determined to keep cabling to an absolute minimum. Using Power-over-Ethernet (PoE) meant that the number of cables could be reduced by two thirds.

Thomas Schmitz, Service Manager Condition Monitoring at Schaeffler, explains: *"The retrospective process of laying cables is often complicated, particularly when upgrading an existing machine, and all the more so in the case of Coating Machine 3, which has multiple levels. Thanks to PoE, instead of individual communication, voltage and additional signal cables, a single cable is all that is required. Besides enabling bidirectional exchange of data, the cable powers the whole system and provides a Power-over-Ethernet network connection. Minimal programming was required in the process."*

This monitoring arrangement not only monitors the bearings, but the whole process. Schmitz explains: *"Each FAG SmartCheck system monitors a fan unit for unacceptable vibrations and the two pedestal bearings and the fan impellers each have their own vibration pattern. Based on the data history, trend curves can be produced and used as a basis for drawing conclusions regarding the condition of the machine and processes. So it is often possible to identify when and most importantly why a problem first arose so that the root cause can then be addressed. Based on meaningful data, MPEB is able to track the long-term behaviour of the units despite constantly changing production conditions and to carry out targeted structural improvements."*

The monitoring system proved its worth just a few months after commissioning when it detected anomalies in two exhaust air flotation driers. The Werthenbach service team recorded data and carried out an initial analysis.



PRESS RELEASE

08/09/2016



The experts from Schaeffler went one step further and compiled the results, along with a recommended action plan. The cause was high imbalance combined with damage to an outer ring bearing. Both problems were successfully resolved in good time by carrying out scheduled maintenance, long before the imbalance would have become audible or perceptible, or before damage may have been caused to adjacent components.

As an intelligent gateway between the controller and sensors, the FAG SmartController transmits vibration data and status information from those sensors to the controller, where the data can then be displayed in a SCADA system. It is connected to the FAG SmartChecks as well as the controller via the Ethernet cable by means of PoE switches. The SmartController also distributes individual variable speed-related information from the controller to the individual sensors.

Schaeffler is now a Mitsubishi Electric e-F@ctory Alliance partner. The MELSEC L-series controllers can communicate with all common fieldbus systems and at the control and sensor level via an Ethernet based connection. The SLMP protocol (Seamless Message Protocol) running between sensor and controller is based on Ethernet TCP/IP and therefore permits system access via an integrated web browser in the sensor at the same time as well as bidirectional data communication with the controller.

The whole setup is freely expandable. In the future, it is envisaged that the whole machine will be monitored by a unified system, enabling the behaviour of all the rotating parts to be precisely recorded if the speed is changed. The system will be accessible from any workstation at the plant, while the Werthenbach service team can also access it remotely via a VPN connection. The hardware required for establishing a WLAN connection is also available, so that it will be possible to gain access via mobile terminals at

any time from any location at the site.

The ultimate aim is for MPEB's own technical and operating personnel to build up their knowledge of the monitoring system, so that they will then be able to look after the system themselves.

Werthenbach will assist throughout this learning process by carrying out such tasks as the remote analysis of data. Initial staff training has also been scheduled.

Due to the encouraging results from this pilot project, Mitsubishi HiTec Paper Europe has also decided to install the FAG SmartCheck on the coating machine at its Flensburg site, where the system monitors the vibrations of 11 supply and exhaust air fans.

About Mitsubishi Electric

With over 90 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, Mitsubishi Electric Corporation is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, as well as in products for the energy sector, water and waste water, transportation and building equipment.

With around 124.000 employees the company recorded consolidated group sales of 39.3 billion US Dollar* in the fiscal year ended March 31, 2014. Our sales offices, research & development centres and manufacturing plants are located in over 30 countries.

Mitsubishi Electric Europe, Industrial Automation – UK Branch is located in Hatfield, United Kingdom. It is a part of the European Factory Automation Business Group based in Ratingen, Germany which in turn is part of Mitsubishi Electric Europe B.V., a wholly owned subsidiary of Mitsubishi Electric Corporation, Japan.

The role of Industrial Automation – UK Branch is



PRESS RELEASE

08/09/2016



to manage sales, service and support across its network of local branches and distributors throughout United Kingdom.

Further Information:

Website: gb3a.mitsubishielectric.com/

Website: www.mitsubishielectric.com/

Email: automation@meuk.mee.com

Facebook: www.facebook.com/MEUKAutomation

Twitter: twitter.com/MEUKAutomation

YouTube: youtube.com/user/MitsubishiFAEU

Editor Contact

DMA Europa Ltd: Bob Dobson

Tel: +44 (0)1798 861677

Web: www.dmaeuropa.com

Email: bob@bobdobson.com

Reader Contact

Mitsubishi Electric Europe B.V. Automation

Systems Division: Chris Evans, Marketing &

Operations Group Manager

Tel: +44 (0) 1707 288769

Fax: +44 (0) 1707 278695

Web: gb3a.mitsubishielectric.com/

Email: automation@meuk.mee.com

