



Fluid Handling

Power Generation and
Industrial Solutions
Allweilerstraße 1
78315 Radolfzell
Germany
Tel: +49 (0)7732 86-343
Fax: +49 (0)7732 86-99 343
www.colfaxcorp.com

Temperature and leak monitoring boosts safety and reliability

Amcor Flexibles Singen GmbH is a manufacturer of printed and unprinted aluminum-based packaging materials and an experienced technical applications specialist. Its plant in Germany, equipped with rolling mills and finishing equipment, turns out approximately 200 million square meters of aluminum foil in various grades every year. High-performance drying equipment is essential for Amcor's production process. After application of coatings, warm air dries the foil, which moves through the drying equipment at a speed of up to 600 meters per minute.

High pump requirements

Having centralized thermal oil pumps that operate safely and dependably is critical for the drying process. One aspect of this is the high loads placed on the pumps. Secondly, failure of a pump can have serious consequences, especially if hot oil escapes. This makes operators of heat transfer systems very sensitive to leakage. For this reason, engineers walk a fine line when designing shaft seals in heat transfer pumps. While water normally escapes through the sealing clearance as a vapor, escaping heat transfer oil is always readily visible. Consequently, leakage must be minimized as much as possible but without overloading the seal. The unusually high loads on the pump are the result of high temperatures and temperature differentials as well as decomposition reactions that may occur when the heat transfer liquid is subjected to excessive thermal loads. In particular, the chain-like hydrocarbons decompose over time into "low boilers" and "high boilers". If the proportion of low boilers is too high, the pump may cavitate. High boilers appear in many forms, from bitumen-like consistency to extremely hard carbonized products, and accelerate wear on the pump. Both threaten the pumps' bearings and shaft seals. Amcor Flexibles Singen uses synthetic thermal oils to reduce the formation of low and high boilers, but the low viscosity and low lubricity of these materials mean that they have disadvantages as well. Tribological loads on the gliding components of mechanical seals are particularly high.

Continuous monitoring

Special pumps move heat transfer oil at 320 to 330 °C in order to warm the air in the drying duct. Pumps of the ALLHEAT® series are deployed in the main train where they are in service around the clock, six days per week. These pumps move 15,000 liters of “Therminol 66” through the primary loop every hour and at a pressure of 6 bar. They are configured as a redundant twin unit, ensuring reliable, continuous operation even when service is required. In addition, the “Allready® Box” from Allweiler monitors the temperature of the bearing and detects any leaks at the pumps. Allready Box reacts with warnings and alarms (for the first and second thresholds, respectively) when the temperature deviates or when a leak is detected. Status is indicated directly at the pump in the form of a “traffic light” so pump operators can react quickly. “Green” indicates normal operation; “yellow” signals elevated temperature or a leak; “red” indicates the need for immediate intervention. During the past 18 months, the Allready Boxes went into “yellow” status on two different occasions, alerting the operators to impending seal failures. Both seals were replaced before the pumps were damaged and without interrupting operation. Instead of a costly repair, the operator simply needed to replace a seal.

In most cases, “yellow” simply means that service must be planned for the pump. Elevated leakage or bearing temperature (approximately 92 °C or higher) indicates that the seal is beginning to wear or that the bearing should be replaced. Replacement can then be planned for a time when it will not interrupt production, such as on a Sunday when the plant is idle. If the operator is forced to interrupt production, it will take two to three hours just for the system to cool down to a temperature where it can be handled safely.

The 54 distributor pumps in the secondary loop must also stay in continuous operation. These are not twin units and have no redundancy. If one of these pumps fails, production will come to a standstill. The ALLHEAT pumps distribute heat transfer oil to the drying line at a pressure of 4 bar.

Positive experiences

Amcor Flexibles Singen is currently using the Allready Box on a trial basis with individual pumps in the primary and secondary loops. Their experiences thus far have been positive: “In the past, it took a keen sense of hearing or good eyes to assess the pumps. Unsurprisingly, we often detected damage too late,” according to Karl Dreher, who is responsible for operational maintenance, service, and planning of pump systems on the finishing line. According to his experience, investment in the Allready Box quickly pays for itself. The company plans to equip additional pumps with Allready Boxes and connect them directly to

PCs in the master control station. This will significantly reduce the need for an employee to inspect all of the pumps each day. Simply glancing at the master control panel will assist in monitoring status of every pump in the plant. Mr. Dreher has had positive experiences with the pumps themselves as well. The pumps and the monitoring equipment have been running since early 2009. Working in collaboration with the manufacturer, the seals were optimized and now increase – potentially, up to four times -- the original service life. Lead times between bearing replacements may increase to just once a year. Double couplings equalize temperature differences that occur during shutdowns for operational reasons. “The pumps must remain in alignment even when they are cold,” according to Mr. Dreher.

Long-term savings

Another benefit of using Allready Box may be realized over the next few years. Since it reliably detects when the seal has actually worn to a critical level, preventive maintenance is significantly reduced. Allready Box gives operators the ability to fully exploit the long service life of high quality pumps. As a result, typical maintenance costs for pumps in heat transfer systems are reduced by up to 50%. For this reason alone, this simple yet effective system pays for itself within a short period of time and gives operators of heat transfer systems the security of knowing that they have everything under control at all times.

Allready Box is compatible with all Allweiler heat transfer pumps of the NTT series as well as ALLHEAT NTWH and CTWH. This monitoring device can be mounted on new pumps or retrofitted to older pumps at any time.

Requirements

Safe and reliable operation of thermal-oil pumps, early indication of wear, avoidance of downtime caused by precautionary maintenance.

Solution

Allweiler thermal-oil pumps equipped with the Allready Box automatic monitoring system.

Results

Significant and long-term savings, optimized planning of maintenance times.



Caption:

Allready Box on a pump in the primary loop. The “green” lamp indicates that temperature and leaks are in the acceptable range.



Caption:

Allweiler heat transfer pump with Allready Box in the secondary loop. These units also have a green light.



Caption:

Karl Dreher, responsible for heat transfer pumps on the finishing line at the Amcor Flexibles Singen plant: "The Allready Box makes our work easier, gives us greater peace of mind, and significantly reduces damage by detecting wear before it's too late."

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