APPLICATION STORY INPROTEC IRT

MOBILE THERMOGRAPHIC MONITORING OF BELT CONVEYORS HELPS AVOID FIRES

Mitteldeutsche Braunkohlengesellschaft mbH (MIBRAG) is a modern high-tech mining company based in Saxony-Anhalt, Germany. One of the primary focuses of approximately 3,100 employees who work for the company is brown coal mining. At about 20 million tons per year, MIBRAG mines no less than ten percent of the raw brown coal mined in Germany at its strip mines in Profen (Saxony-Anhalt) and Vereinigtes Schleenhain (Saxony). Major customers include the power plants in Schkopau and Lippendorf.

The FLIR A310 thermal imaging camera

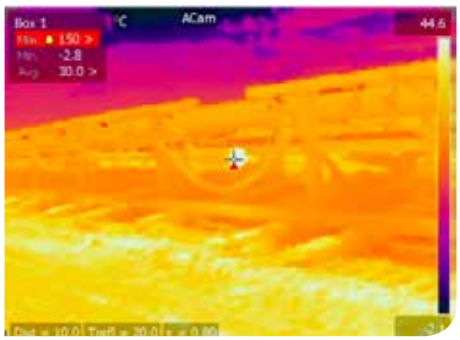
At its strip mines, MIBRAG operates approximately 70 km of belt conveyors, which include steel rollers and idlers with rubber or polyurethane support rings. Wear on the bearings can cause overheating, which can ignite the lubricants and support rings of the lower rollers. Even the upper steel rollers can heat up to the point that the steel starts to glow. Especially when a belt conveyor is at a standstill, a large fire hazard can arise after just 10 to 15 minutes.

By implementing fire-resistant idlers with polyurethane support rings, preventing dirt from entering the system and having the company fire department regularly monitor the entire conveyor lines during operation, it was possible to reduce the number of fire incidents caused by overheated rollers to about 100 per year. But this figure was still so high that MIBRAG continued to look for solutions.

In the past, the fire inspection team discovered potential fire hazards only due to smoke or high noise levels. Obviously this method left much to be desired and could have even had a negative impact on employee health, as windows had to be kept open throughout the drive regardless of the weather conditions. The fire inspection team therefore tested a hand-held thermal imaging camera (from another manufacturer) to help them inspect the conveyor belts, but this proved to be quite impractical. The image recorded by the camera could not be viewed by the driver while driving, nor was an acoustic warning issued.

That's when MIBRAG turned to Klaus Flocke at the engineering firm Inau (www.inau.de). He suggested trying a

Monitoring with the tablet PC



This belt conveyor has a temperature of over 150 degrees Celsius

Belt conveyors at the mine in Profen

Defective lower support roller of a belt conveyor

permanently installed thermal imaging camera from the FLIR A series. The FLIR A310 was mounted on the bed of an SUV and pointed in about a 45-degree angle to the direction of travel. Among other things, a special housing unit was required to securely mount the FLIR A310. The thermographic camera system can operate without any cable connection, because it includes a battery power supply and a wireless communication unit.

Klaus Flocke recommended a wide-angle lens to cover as much of the conveyor belts as possible while passing by. The A310 transmits the camera image via Wi-Fi to a tablet PC installed in the driver's cab. If a preset alarm temperature is detected, this tablet PC emits an acoustic warning signal. Only then the driver (who otherwise focusses entirely on driving about 20 km/h at a distance of 2-15 meters away from the conveyor belts) checks the image on the monitor and locates the overheated section of rollers on the conveyor belts.

For approximately 3 weeks, the FLIR A310 was used for the endurance test. "On the one hand, it was important to us that the driver of the test vehicle would be able to fully focus on driving," explains Klaus Flocke. "And at the same time, we eliminated the potential health risk caused by the open window." The fact that any temperature can be set as an alarm trigger was technically advantageous, because summer temperatures and sunshine can cause the supporting structures and surrounding area to heat to approximately 60 degrees Celsius. Under these conditions, the alarm threshold is set to > 60° C and then it can be adjusted again on cloudy days, in tunnels or in the fall and winter. The alarm threshold is generally set to 50° C for preventive inspection. Emergency measures are not required in this case, but rollers are merely categorized in the roller replacement schedule.

When monitoring to prevent fires, on the other hand, the alarm threshold was set to 90° C based on IBExU (Institut für Sicherheitstechnik GmbH) recommendations pertaining to the inflammation point of rubber or polyurethane materials. All of the test drives with this alarm threshold detected only the overheated idlers as well as smouldering fires near the cross pit conveyors.

The duration of the test, 12 overheated bearing points could be discovered and the rollers were replaced. Company fire fighters did not have to be deployed due to overheated bearings during this period. Klaus Flocke is therefore very pleased with the course of the test: "The risk of fires on belt conveyors can be greatly reduced by detecting overheated roller bearings early on. With this camera system, we have developed a thermal imaging camera system that can be used on the go with a tablet PC in vehicles and is suitable for the safe and mobile thermal monitoring of all conveyor belt systems."

Due to the success of the test, the mobile thermographic monitoring solution will be implemented as the new standard at MIBRAG in the areas of mining and strip mining in Profen and Vereinigtes Schleenhain starting in December 2015. But Klaus Flocke from Inau still has some work to do: "Due to the fact that the test was so successful, we are already preparing a test run in the power stations and the dust factory." Klaus Flocke and MIBRAG thus continue their commitment to security - and at FLIR, we are also proud to be able to contribute to this endeavour.

The FLIR A310 was mounted on the pick-up in a special protective housing

The images displayed may not be representative of the actual resolution of the camera shown. Images are for illustrative purposes only.

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