

The Technology Consortium, Ltd.

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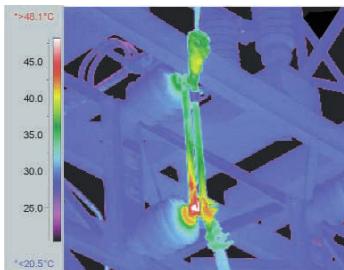
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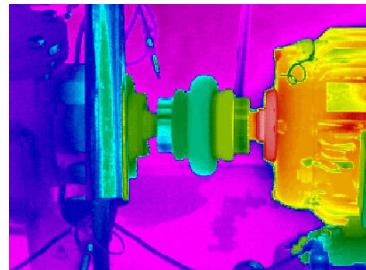
Thermography in the Mining Industry...

Advantages of Thermal Imaging Predictive Maintenance:

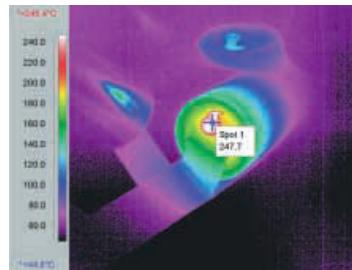
- ◆ Eliminates failures that result in shutdowns...
- ◆ Predicts electrical and mechanical failures...
- ◆ Decreases utility consumption...
- ◆ Identifies efficiencies, and opportunities...
- ◆ Increases facility safety...
- ◆ Low Cost and High Return...



The white areas shown here indicate overheating on one of the fingers of this disconnect switch.



Thermography can easily identify all types of impending drive problems during plant operation.



A series of failing idlers on the coal handling line were located by using a Thermographic system.

Predictive Maintenance Prevents Lost Revenue

Because mines run 365 days a year, downtime is equivalent to lost revenue. Mining operations have an extensive inventory of equipment requiring uninterrupted service for operation; an unscheduled shutdown is a disaster. To prevent such losses, mechanical and electrical components must remain in operation. Bearings, motors, pumps, compressors, conveyor idlers, driveline components, circuit breakers, transformers, fuses, disconnect switches, and panels are all prone to untimely breakage.

This is where Thermography excels; this "Real-time" preventive system scans components for abnormal hot spots. These "Hot spots" are the precursor to failure; therefore, the best indications are observed while the facility is in operation. Thermography not only informs you of impending failures, but it identifies the efficiency of the operation. This data is invaluable when you are planning and evaluating facility upgrades.

A common use for Thermographic inspections is in electrical systems. As electrical connections become older, they eventually get loose. This produces corrosion that increases resistance; ultimately, connections will become hot. Eventually these connections will fail resulting in unplanned outages, equipment breakage, and potential personnel injury. In addition, prior to failure, the efficiency of the electrical grid becomes low because energy is spent generating heat, causing unnecessary losses. This is an unnecessary operational cost.

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Thermography and Mechanical Systems in Predictive Maintenance

While electrical surveys are very popular for infrared inspections, they are by no means the only use of this equipment in the mining industry. In mines, the mechanical systems are the backbone of operations. An unexpected shutdown of even a minor piece of equipment could cripple production. Most mechanical systems will heat up due to age, improper lubrication, corrosion, or overloading. Again, Thermographic equipment will pinpoint heat in the early stages, before irreversible damage occurs.

Thermography Complements Other Forms of Predictive Maintenance

Thermographic inspection of motors and the respective bearings is an excellent way to predict failures. When comparing banks of motors, Thermographic inspection equipment can instantly identify minute changes in temperatures on the bearing and couplings. Even minor rises in temperature need to be monitored closely. Thermography can detect temperature differences as small as 0.07°C. Since typical electrical and mechanical failures occur when there is temperature rise of over 50°C, Thermography will detect these problems well in advance of a failure. Temperature measurements of these connections allow you to determine an objective prioritization of future repairs.

In the majority of mining facilities, there are tremendous lengths of conveyor systems, which are the plants lifeline. Typically, the availability of these conveyor systems can determine the plants ability to produce product; downtime is measured in thousands of dollars per hour. Since these conveyors can be miles long, and have literally tens of thousands of rollers, a vibration analysis program of idlers would be difficult, if not impossible to implement. In many instances, these conveyor lines are adjacent to an access road. Thermography can scan idlers while traveling along an access road. Idlers can be replaced during a planned outage and well in advance of failure, unlike the traditional method of identifying failed idlers: listening to how loud they squeal!

Thermography Meets Mining Maintenance Challenges

Thermography is state-of-the-art technology; this "Real-time" system is utilized during normal facility operation. It is an invaluable predictive maintenance tool for the mining industry. There is no other predictive maintenance system that can match its cost vs. benefit abilities.

Maximizing Efficiency Provides Return on Investment

The mining industry incorporates an extensive array of mechanical and electrical equipment for daily production. Therefore, an aggressive and scheduled predictive maintenance program is necessary for survival. Thermography has proven to be an invaluable resource combined with or in place of other forms of predictive maintenance. Thermography will locate potential problems well in advance of failure and yield an immediate payback on investment.