

Risk information – Property

Thermographic scanning of electrical components

Introduction



Everything in our environment radiates a particular intensity of thermal energy. With an infra-red imaging instrument the thermal energy surrounding us can be detected, imaged, measured and stored for analysis. The pictures below illustrate the heat generated by the human body.

It is recognised throughout the insurance and fire protection industries that electrical failure is one of the most common sources of fires within commercial buildings.



A report prepared for the U.S. Department of Commerce, National Technical Information Service (NTIS) indicates the percentage of common sources of electrical fire resulting from:

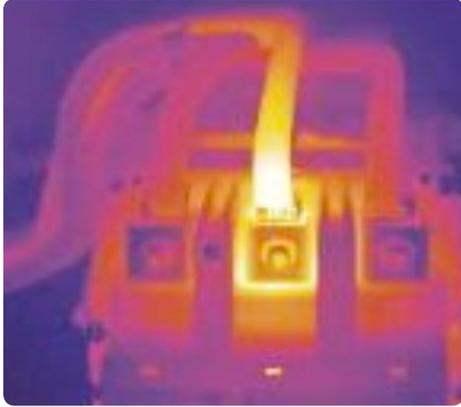
- ▼ Mechanical damage 20%
- ▼ Loose or faulty connections 26%
- ▼ Overloaded equipment 20%
- ▼ Defective or worn insulation 9%

Application to electrical components

Infra-red thermography, commonly known as thermographic scanning, is a condition monitoring technique used to remotely gather thermal information for monitoring the condition of virtually all electrical components of an entire system. It is simply a picture of the heat generated by the component.

No electrical system is 100% efficient. Current flowing through an electrical system will generate a small amount of heat because of electrical resistance. With time, the components and contact surfaces of the electrical system begin to deteriorate leading to increased resistance and therefore increased heat. Eventually the component will fail. Fluctuating and high loads, vibration, metal fatigue, age and specific operational environments such as extreme ambient temperatures, wind, chemicals or dirt in the atmosphere will increase the speed of degradation and the number of faults in electrical systems. These defects, if not found and taken care of, can lead to electrical fire, component failure, unplanned shutdowns and losses of production.

Defects will normally alter the thermal signature of the surface due to the change in the amount of heat generated and the heat transfer properties of the component. With an infra-red imaging instrument the thermal energy can be detected, imaged, measured and stored for analysis.



Increased resistance at the bolt connection is identified as a 'Hot Spot'.

The benefits of thermographic scanning

Safety

Failure of electrical components can lead to injury and even death of employees, contractors and potentially the public. Electrical faults, resulting in electrical fire, invariably occur after hours and are responsible for many total losses.

Reduced outage costs

Locating the problems prior to failure greatly reduces un-scheduled outages, associated equipment damage and down time. The cost of an emergency outage is significantly greater than planned maintenance.

Improved and less expensive maintenance

- ▼ Precise pinpointing of problems minimises time required for preventative maintenance.
- ▼ Maintenance efforts directed to corrective measures rather than looking for the problem.
- ▼ Repair only what requires repairing, reducing repair time and replacement of good components.

Reduced operational costs

With the system up and running for longer periods of time, the reduction and improvement of inspections, maintenance, spare parts inventory and outages will reduce the overall cost of operations.

Thermographic scanning as preventative maintenance

Infrared thermographic scanning is a valuable resource in implementing preventative maintenance and maintaining electric services to machinery. It can also reduce the risk of an electrical fire.

Scanning should be performed on a regular basis (annually as a minimum) to allow trending of results. Collection of data and interpretation requires specialist training and should only be conducted by competent personnel, preferably from a recognised thermal imaging company.