

A thermal imaging camera is shown in a dark blue, semi-transparent overlay. The camera's screen displays a thermal image of a building with various temperature readings and technical data. The text 'RISK RESILIENT' is prominently displayed in white, bold, uppercase letters across the center of the screen. Below it, the subtitle 'Thermal Imaging: Electrical & Mechanical Applications' is also in white. The background features a light blue geometric pattern of interconnected lines forming a mesh. At the bottom right, there are stylized blue lines forming a triangular shape.

RISK RESILIENT

Thermal Imaging:
Electrical & Mechanical
Applications

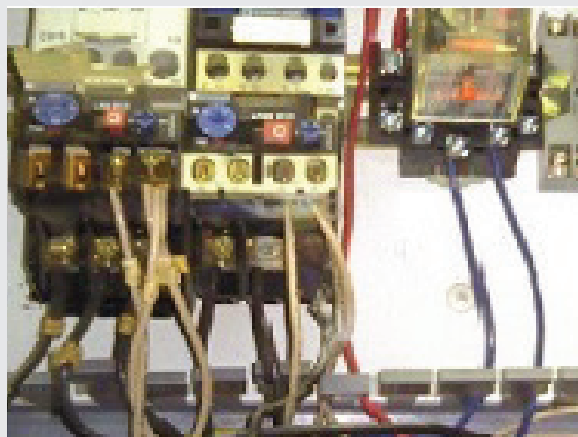
Excess heat in electrical and mechanical systems is often a sign of trouble. That's why thermal imaging is a critical tool in your organization's preventative maintenance program.

Thermography is the process of using a specialized camera to measure infrared radiation (heat) emitted by a given surface and converting that data into a two-dimensional image with a unique colour gradient that relates to fluctuations in temperature. It's an effective diagnostic tool used in a variety of applications, including preventative and predictive maintenance, to help identify problems that might otherwise go unnoticed.

Abnormal connection of wire



Shows no visual signs of concern



Preventative Maintenance:

- An electrician simply had to tighten the connector screw.

Potential Outcome:

- Saved the plant an unscheduled breakdown on a piece of equipment.

Source: "Thermal Imaging," Paone Electric, Retrieved April 13 2022 | <http://www.paone-electric.com/thermal-imaging/>

For business and facility owners, thermal imaging can be used to identify a host of issues, such as air leaks and insulation problems, heating and plumbing issues, water damage, and electrical faults. This technology can help detect defects before they lead to more serious issues like fires or major equipment breakdowns. These in turn can result in catastrophic losses, safety risks to employees, business interruptions and downtime, decreased productivity, and unexpected labour or maintenance costs.

Know the Risks

Electrical Inspections

When current flows through a circuit, the energy is converted into heat, which is normal. Problems arise in electrical systems when there is abnormal heating associated with excessive current flow or high resistance.

An infrared imaging camera gives visibility to the heat patterns associated with a high resistance connection long before the connection is hot enough to cause an outage or explosion. The temperature will appear elevated compared to similar load conditions of similar connection types. Once a problem is located, other test methods, as well as experience and common sense, are used to better understand the problem and its risk potential.

There are two basic thermal patterns associated with electrical failures:

Contact surface problem

- Heat is produced by current flowing through a single point of electrical contact with high resistance.
- These types of problems are typically associated with a switch contact or a connector.

Overload or imbalance problem

- Heat is produced by high current flow and/or high resistance through a portion of the circuit or phase of the circuit.
- These are generally associated with undersized conductors, overloads, and phase imbalances.



Mechanical Inspections

Potential problems in mechanical systems can provide early warning signs of failure. Some of the issues thermal imaging can pinpoint are:

- Bearing and gears: excessive friction
- Motor drive couplings: misalignment
- Belt and chain drives: wear and misalignment
- Refractory insulation: erosion and failure
- Pipe insulation: damaged or missing
- Clogging or blocked pipes

While each piece of equipment and associated motors operate with different and specific characteristics, there are telltale signs that can help identify a cause for concern.



Be Prepared

With regular infrared inspections, potentially hazardous heat buildup can be identified. A licensed qualified thermographer can collect data and interpret thermal images, helping to mitigate hidden risks to your business.

Several basic conditions are necessary to successfully inspect electrical and mechanical equipment. Here are a few ways to prepare:

- Determine which systems and units to inspect. Review and prioritize the equipment based on the impact its failure would have on your operations. For example, equipment might be prioritized as: items that can create bottlenecks; equipment whose failure can lead to widespread damage; and items that can significantly disrupt production.
- During the survey, the inspector will need access to the internal areas of panel and service boxes, control panels and main electrical areas. Identify potential issues regarding personnel, safety, security and special access, and plan for the visit accordingly.
- Electrical equipment should be operating with a minimum of 40% of the typical load – lighter loads do not produce much heat, so it's harder to detect problems. This includes motors, drives, wiring, fuses and transformers.
- The best time to conduct the survey is when the majority of circuits, equipment and motors are running at normal operating capacity.
- Panels and other connections should be checked with the covers off. It's recommended to have a licensed qualified electrician on site during the survey to open panel covers. They can also address any concerns or perform repairs as they're encountered during the survey.
- Consider and plan around environmental conditions that might adversely impact the results of the inspection. For example, wind and air currents cool abnormal hot spots, often below the threshold of detection. In hot weather, the sun can heat up equipment while cold weather can mask overheating. The inspector will record relevant data on ambient environmental conditions.

A trained thermographer will identify potential risks and detail corrective actions that need to be taken before costly or dangerous failures potentially occur. They can help explain their findings and create actionable steps to help you mitigate those hidden risks in your workplace.

Visit [sovereigninsurance.ca](https://www.sovereigninsurance.ca) to learn more or contact your broker to find out how to schedule a thermal imaging inspection.

Resources

"Thermal imaging cameras explained," Grainger.com, Sept. 1, 2015

<https://www.grainger.com/know-how/equipment-information/kh-thermal-imaging-applications-uses-features-345-qt>

"Electrical inspections with a thermal camera," Electrical Industry News Week, Jan. 10, 2021

<https://www.electricalindustry.ca/latest-news/7731-electrical-inspections-with-a-thermal-camera>

"Thermal imaging guidebook for industrial applications," FLIR, 2011

https://www.flirmedia.com/MMC/THG/Brochures/T820264/T820264_EN.pdf

"Thermal imaging in preventative maintenance programs," Fluke

<https://www.fluke.com/en-ca/learn/blog/thermal-imaging/preventive-maintenance>

"Infrared thermography for electrical distribution systems," Testguy.net, Dec. 22, 2018

<https://testguy.net/content/291-Infrared-Thermography-for-Electrical-Distribution-Systems#procedures>

"Preparing for an efficient infrared inspection, SPR

<https://www.srpnet.com/pq/infrared/prepare.aspx>

"9 steps in building an effective infrared program," The Ram Review, Oct. 31, 2019

<https://theramreview.com/9-steps-toward-an-effective-ir-inspection-program/>