Electrical Predictive Maintenance Using Infrared Thermography

Infrared thermography uses specialized equipment to detect and visualize infrared wavelengths emitted by heat. When used for scanning electrical distribution equipment, thermography can proactively identify potential electrical deficiencies so they can be addressed before they result in catastrophic failure. For example, the hot spots identified by using a thermographic imager may indicate loose or worn connections, overloaded equipment, inadequate cooling or other deficiencies that warrant preventive maintenance.

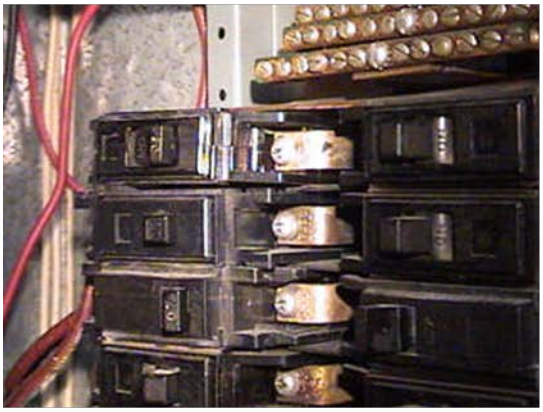
The following information highlights the benefits of thermographic surveys as a beneficial tool for predictive maintenance.

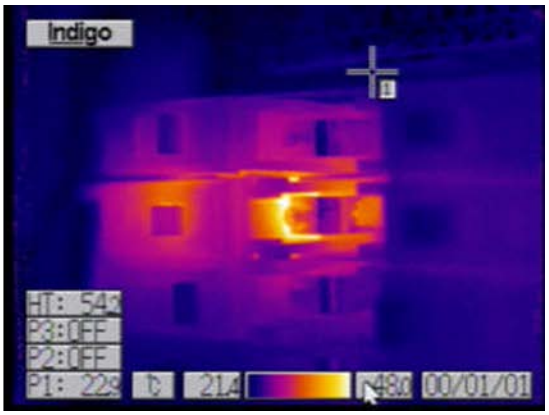
Advantages of Thermographic Inspections

- Thermography is a noninvasive testing method that can help detect electrical problems not identified by other preventative maintenance practices
- Corrective maintenance for issues identified through testing can be scheduled to coincide with other maintenance activities, minimizing production downtime.
- A detailed history of thermographic inspections makes trend analysis possible, which can help identify reoccurring problems or issues that develop over time.

Using Infrared Thermography as a Predictive Maintenance Resource

Thermographic inspections are nondestructive tests that are performed while equipment is running at or near capacity. This practice has proven to be a valuable predictive maintenance tool. A thermal imaging device can detect infrared energy emitted from an object and then display the infrared readings as an image representing temperature distribution. The images can then be used to determine if the observed equipment is operating at abnormal temperatures and the severity of the problem based on identified temperatures and temperature differentials. The thermographic image below highlights an electrical hotspot not observable by regular visual inspection.





Infrared scan showing abnormal heat being generated in a molded case breaker.

Developing a Thermographic Inspection Program

A thermographic inspection program can help identify potential problems and associated risks while minimizing down time. The frequency of thermographic inspections may depend on factors such as the type of equipment, environment, working load, age, type, and operational importance of the equipment. Thermographic inspections should be performed by qualified personnel or technicians.

It is important to identify key equipment to be inspected, procedures for testing, and a method for recording and trending results. Examples of key equipment to include in a thermographic inspection program include:

.

Electrical Predictive Maintenance Using Infrared Thermography

- Incoming electrical distribution equipment not owned by the utility.
- Transformers, main electrical switchgears, switchboards, load centers, and critical panelboards.
- Electrical busses and bus ducts.
- Motors and motor controllers.
- Electrical equipment critical to business operations or that pose a potential prolonged business interruption scenario.

It is important to maintain a detailed and well-documented history of equipment tested, frequency, and results. This practice can help identify potential issues that can develop over the life of the equipment.

Deficiencies identified during a thermographic inspection should be corrected promptly. All work completed and subsequent repair activities should be documented and recorded.

Other Applications

Although this document focuses on the use of infrared inspections to evaluate electrical distribution equipment, infrared inspections can also be used to identify potential problems with other equipment and systems, including:

- Leaks in steam driven equipment, steam traps, radiators and insulation
- Hot bearings in facility equipment
- Conveyor systems (drive trains and belts)
- Hydraulic systems, gear boxes, and pumps
- Equipment cooling systems

The Travelers Indemnity Company and its property casualty affiliates. One Tower Square, Hartford, CT 06183

The information provided in this document is intended for use as a guideline and is not intended as, nor does it constitute, legal or professional advice. Travelers does not warrant that adherence to, or compliance with, any recommendations, best practices, checklists, or guidelines will result in a particular outcome. In no event will Travelers or any of its subsidiaries or affiliates be liable in tort or in contract to anyone who has access to or uses this information. Travelers does not warrant that the information in this document constitutes a complete and finite list of each and every item or procedure related to the topics or issues referenced herein. Furthermore, federal, state or local laws, regulations, standards or codes may change from time to time and the reader should always refer to the most current requirements. This material does not amend, or otherwise affect, the provisions or coverages of any insurance policy or bond issued by Travelers, nor is it a representation that coverage does or does not exist for any particular claim or loss under any such policy or bond. Coverage depends on the facts and circumstances involved in the claim or loss, all applicable policy or bond provisions, and any applicable law.

© 2021 The Travelers Indemnity Company. All rights reserved. Travelers and the Travelers Umbrella logo are registered trademarks of The Travelers Indemnity Company in the U.S. and other countries. 212-bre