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**Benefits of new applications of infrared thermography include improved savings and safety.**

TThe past decade has shown a significant increase in the use of thermography as a predictive maintenance tool. In part, this is due to the development of focal plane array (FPA) imagers that reduce the possibility of error, are more reliable, and are much less cumbersome than previous cameras.

Using an FPA imager, a trained thermographer can identify problems that may result in unexpected catastrophic failure, loss of electricity, or electrically induced fires. The benefits of this testing have become so well known that most insurance carriers now require thermal scans at least twice per year.

As a thermographer for a predictive maintenance service company, I have served a variety of industries. While the majority of problems, such as loose or corroded connections, overheated bearings, eroding insulation, structural breakdowns, etc., are common throughout many industries, there are exceptions that are more prevalent to specific manufacturing processes.

Cross-industry training has been valuable for identifying unsuspected anomalies that could remain hidden to a less-experienced thermographer. Two examples I have encountered recently include a rarely discovered or discussed problem known as inductive heating and a unique application on a crane.

**Inductive heating**

During a thermal scanning of electrical cable trays for overheated phase wires, an iron support brace was identified as "glowing" due to the extreme temperature. Glowing describes an object thermally emitting high levels of energy. Further investigation showed that the brace was erroneously mounted in between phases and directly below a transformer on the floor above. When the transformer was in operation, it produced a magnetic field inducing a current flow through the high-resistance iron support brace.

Since the brace was merely for cable support, the problem was easily remedied by moving the brace to a different location away from the phases. In doing so, the iron brace was reduced to a safe ambient temperature and the problem was eliminated.

However, had this brace not been removed from in between the phases, several problems may have resulted. Ultimately, the high temperatures created would have raised electrical costs, melted the insulation, shorted the phase to ground, and/or destroyed the transformer. Each potential failure has significant financial consequences, but perhaps most important, any direct contact by an unsuspecting electrician may have resulted in serious burn injury even though there was no electrical connection.

**Crane feeder rails**

While thermal scanning of cranes is not a new practice in predictive maintenance, there appears to be little attention or documentation toward crane feeder rails. Most thermographers can attest to finding anomalies on the crane motors, bearings, and even the wheels, but seldom are thermal scans performed on the rails. These rails are the power supply for the cranes, usually comprise three sections, and are butted together with a shoe (a rail splice) to form one continuous rail. To supply power to the actual rail, electrical connections are tied to the rail throughout its length.

Two problems were found and repaired. The first involved a loose mechanical connection on the rail splice; more specifically, the shoe holding the rails together was loose. The second problem was found in several instances in the rail tie-in, which is the connection between the rail and the power source. Vibration in the rails over time caused wires to separate and insulation to break down. Ultimately, this caused high resistance and resulted in higher power consumption through heat dissipation.

Had either of these problems gone undetected, the crane would likely have failed unexpectedly, making equipment repairs and/or the transfer of product virtually impossible. In many large manufacturing companies, the facilities department relies on large overhead cranes to move product from one location to another or to repair or replace very large parts and equipment. If a crane fails, product is not shipped and repairs are not performed, and this translates directly into lost time and money. Also, since cranes move over the heads of the work force, the proper operation of this equipment is paramount to ensure safety. Failure of this equipment during use could potentially result in disaster.

Thermography is one of the few predictive maintenance tools that provide immediate payback and results. Unlike vibration and oil analysis, extensive data need not be reviewed, nor compared to previous results to determine a potential problem. A trained

and knowledgeable thermographer has the ability to scan both mechanical and electrical components and provide immediate feedback on areas of concern. As the technology continues to improve and as thermographers document and publicize their results, the applications in this field will be limitless. It is only a matter of time before all manufacturing facilities require thermographic scanning as part of their predictive maintenance programs. **MT**

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