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Inspections can detect problems and avoid costly equipment failure.

Thermal imaging has evolved into a valuable diagnostic tool for predictive maintenance. By detecting anomalies often invisible to the naked eye, thermography allows corrective actions to be taken before electrical, mechanical, or process equipment fails. The use of palm computers and database software has improved and speeded up data collection.

An infrared inspection program can provide users with a quick return on investment. One company noted that its inspections usually find one item that will pay for the inspection several times over. Its customers have said they saved a minimum of $20,000 per day through infrared usage.

According to Scott Cawlfield, president of Logos Computer Solutions, Inc., Seattle, on average, for every $1 spent on an infrared electrical inspection there is a $4 return on investment for materials and labor to fix the problem equipment before it failed. Depending on other factors, he suggested, that ratio could be closer to 1:20.

Barriers to adoption

When suppliers in this guide were questioned on what they felt the primary barrier was to the adoption of an infrared thermography program, the majority of responses settled in the financial arena—time, personnel, camera cost, training, or contractor expense.

“Cost is the primary barrier, although a good thermographic inspection process can pay back very quickly by finding problems before they cause equipment damage or a process shutdown,” noted Schneider Electric North American Division. But the most-mentioned aspect of the financial barrier was the “lack of knowledge of the true return on investment,” said Logos Computer Solutions, or the “lack of awareness of the benefits to the bottom line” as FLIR Systems said.

Intermountain Thermal Vision said there is “an inability to translate PM dollars spent, and the huge savings realized. Companies will spend money to replace equipment after it has failed, but they will not put PM money into the budget to maintain it.”

Another barrier mentioned by Jersey Infrared Consultants was “resistance by management.”

Barriers to effective use

Some of the same topics carried over to another question, this one regarding the primary barrier to the effective use of infrared thermography technology. Many answers centered around the cost of high-level education and training.

“High level knowledge” is the barrier, “not only thermography but also other associated topics like materials science, physics, and thermodynamics, plus knowledge of ‘how things work’, from engines and turbines to buildings’ thermal insulation or HVAC units,” according to Expert Infrared Inspections.

One important aspect of the need for well-trained personnel is the safety issues involved in inspections. Both Progressive Maintenance Technologies and Schneider Electric noted that, with work to be done on energized equipment, inspectors need to be qualified as defined by the Occupational Safety & Health Administration and the National Fire Protection Agency. “It is easy to take a picture but the safety and interpretation of the images requires experience and knowledge,” Progressive said.

Software is part of the problem according to some suppliers. Electrophysics Corp. sees a barrier in the integration of infrared with CMMS or asset management software, while Thermal Trend said “the mistake is focusing on the IR image alone. It is also necessary to consider putting a database system in place that allows for the automation of gathering data during the infrared inspection. Focusing on data management methods that help the thermographer to follow up on past problems, reconcile previous findings in the same way as balancing a checkbook, and provide accountability and high quality data is the key to insure the effective use of IR technology.”

Advice for newcomers

The third question asked suppliers what one piece of advice they would offer a manager setting up a first time infrared thermography program. The answers were varied:

- Get proper training was mentioned by several.
- “Understand it or delegate it to someone who has the time and inclination to understand it.” (EMP Engineering Services)

- "Realize that you will not build the program to meet all of your needs at first. You must allow it to be dynamic." (HSB Thermography Services)
- "Document what you were doing previously, meet vendors of services and ask them what they would do—what they would monitor, what time span between checks. Do business with the one with whom you feel the most comfortable (check references also). Do not base your decision on price alone; consider competency and expertise as well as good equipment cost. Document what was found, what are the estimated savings, and find out if it would be worthwhile for your plant to have an in-house service, with your own camera." (Proaxion Technologies)
- "Make sure that your employees or contractors fully comply with safety-related work practices required in NFPA 70E, and are qualified and trained as defined in NFPA 70E." (Schneider Electric)
- Maintain "good record keeping for trending purposes." (IRISYS)
- "Set it up; run it like a business; and expect returns on your investment." (Snell Infrared)

- "Document and communicate to superiors all potential problems found that were repaired that prevented unexpected equipment failures and the costs involved if the piece of equipment had failed unexpectedly." (Thermal Scan Inc.)

Advice for veterans

The final question asked suppliers for the one reminder ("don't ever forget to...") that they would offer a manager with an established infrared thermography program.

Several urged managers to keep to their inspection schedules and revise the IR program as it evolves. "Maintain the schedule of scans. The schedule of scans may reduce in frequency from quarterly to semi-annually, etc., due to results and changes affected by the program and it should be adjusted. However, the commitment to the program must continue," noted Progressive Maintenance Technologies.

A little outside-the-box thinking helps, too. "Remember that there are unique applications for nearly every industry, or even every facility. There are specific applications outside of the traditional uses that your facility can benefit from. Sometimes it takes a little imagination, but the benefits can be staggering," said Intermountain Thermal Vision.

And be sure to communicate what the IR program is contributing to the company. "Tout your program as often as you possibly can in a professional, reasonable way so that when money is tight people will understand your value," was advice from Logos Computer Solutions. "One great way to do this is to use cost benefit analysis reports for all your thermal problem

findings."

What's in a program

The essential elements in an IR inspection program, Cawlfield said, are to:

- Use or create an equipment inventory list to account for what equipment was tested and when.
- Assign a criticality factor to each piece of equipment to prioritize inspection schedules and repairs.
- Determine the pertinent information to be recorded in addition to temperature readings and reference points; other factors such as camera emissivity value, equipment load, wind speed, environment, and manufacturer influence temperature readings.
- Provide consistent data collection procedures.
- Analyze problem areas and generate appropriate reports.

Inspections save money

An infrared thermography inspection program has the potential to save an organization considerable money as well as optimize equipment operation:

- A semiconductor manufacturer saved $275,000 a year when it discovered a heated purified water line was connected directly to a drain.
- FLIR Systems reported a case in which a major steel company discovered a significant temperature rise in one of its 69 kV breakers. If the problem had gone undetected, according to FLIR, it could have cost the company $50,000 an hour in lost time due to shutdown.

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