

# High-Tech Heat Solutions

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In an industry that demands reliability, availability, and throughput, predictive maintenance can prove highly valuable. Unscheduled downtime, its associated costs of overtime technicians and equipment replacement (versus repair), and the danger that unexpected equipment malfunctions pose to employees is a risk that many manufacturers are unwilling to make.

Once considered too expensive and difficult to incorporate into the average manufacturer's predictive maintenance plan, thermal imagers have proven themselves among the most cost-effective predictive maintenance technologies. Able to detect any equipment malfunction that manifests as heat, thermal imagers require no shutdown time, and are able to access areas that would not otherwise be easily available.

"Thermal imagers help put the 'predict' in predictive maintenance," says André Rebelo, global PR manager with FLIR and Extech Instruments. "Around a plant, there are so many examples of where abnormal temperatures can signal a problem." Overloaded systems, wiring mistakes, and deteriorated lubrication are all problems that can be detected using thermal imaging equipment. "A thermal imager can identify that problem before it escalates into an emergency repair or a jobsite fatality."

Thermal cameras detect radiation in the infrared range of the electromagnetic spectrum and produce heat images, or thermograms. The amount of radiation emitted by an object increases with temperature, so technicians can correlate abnormal equipment temperatures with impending equipment malfunctions.

### Finding A Sweet Spot

While a problem must be serious enough to generate abnormal amounts of heat, Michael Stuart, senior product marketing manager, thermal imaging, Fluke, emphasizes that thermal imaging equipment allows technicians to identify abnormally hot components and fix just the necessary parts before the entire unit fails. Key units, such as motors or drives, can be quickly inspected, without shutting down or disassembling any machinery.

"Manufacturers should consider the complexity of the equipment they are imaging," Stuart says. Equipment with multiple small components can be difficult to assess thermally without a digital overlay to provide the necessary detail to determine the root cause of the detected issue. A thermal image overlaying a digital image can help with the identification of specific potential problem areas.

The complexity of the equipment will also determine the necessary resolution—how fine of an image the application will require. Thermal imaging equipment is now

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available in a wide variety of resolution options, allowing manufacturers to choose the right combination of precision and price for the application. More pixels produce more detail, and better temperature data for diagnostic decisions, though Rebelo says “resolution is far from the end of the story.” Affordable instruments are available today with resolutions of 640x280 pixels, but thermal sensitivity should also be a presiding factor when choosing the ideal thermal imager.

“The smaller the value of a thermal imager’s sensitivity, the more sensitive the camera,” Rebelo says. A measure of resolution found at a standard temperature point and measured in milliKelvins, thermal sensitivity improves the contrast in temperature differences, helping to better isolate problem areas with more detailed images. Thermal imagers are constantly and consistently improving, and today’s entry-level “point-and-shoot” thermal cameras boast a sensitivity of less than one tenth of a degree Celsius.

A fully blended digital and thermal image is now also available on most thermal cameras, which are smaller and lighter than ever, and capable of video recording. On-board options commonly include voice and photo annotation capabilities and compass marking, and data is USB transferable.

Rebelo says there is a “sweet spot” where a manufacturer will find the best value for the thermal imager’s specific applications. The overall range of capabilities now affordably available is helping more users to find the right combination of price and precision for their predictive maintenance plan.

### **Check Early, Often, Safely**

“In most instances, there is enough time — from weeks to months — for the issue to be detected in advance of failure,” Stuart says. He stresses that the best thermal imaging practices enforce regular inspections. A regular inspection route will help to avoid letting a problem go undetected, and allow anyone who uses the camera to become familiar with the equipment’s heat “signature,” so that any changes can easily and immediately be spotted.

Manufacturers need to consider how many people are going to be using the thermal imager, and what level of training they will need. Many infrared camera users are not dedicated thermographers. Says Rebelo, “the camera is there to help them get things done, like find a stuck steam trap or an overheating circuit buried in an overhead cable bus duct. But they still need to know how to use their camera.”

Thermal cameras have become portable instruments that anyone in a facility can access, and require minimal training to use. Learning to use a modern thermal imaging camera can be accomplished with basic instrument training and hands-on practice. In the average facility, it is common for multiple people to use thermal imaging equipment, while fewer are adept in thermal image analysis. Training and certification is available through The American Society for Nondestructive Testing, which promotes nondestructive testing technologies and their safe use — a part of any training program.

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Thermal imagers are often used to conduct non-contact inspections as a means to decrease the risk of electrical shock, which calls for thermographers to take extra precautions. Frequently, energized equipment is being inspected and despite the distance that an infrared camera allows during an inspection, personal protective equipment is still necessary when in the proximity of electrified equipment. These cameras provide an additional measure of security when performing routine inspections, and with recent technology developments, that inspection data can be immediately distributed in an organization.

### Staying Connected

Tools used for predictive maintenance and diagnostics are continually becoming more cohesively related to communications devices, and thermal imagers are no exception. As a result, manufacturers can communicate better information, more efficiently.

“What’s really transformative,” Rebelo says, “is how IR cameras are keeping up with and connecting with the high tech world around us.” Today, Bluetooth can be used to connect with test equipment, and Wi-Fi can be integrated with devices that help predictive maintenance professionals accelerate inspections, improve documentation, and more easily share information with clients or managers. “When they open up an email that was just sent from the manufacturing floor in real-time with a JPG attachment of an overheating motor that would cost thousands more to replace than to repair,” he says, “it’s much easier to get a ‘yes’ for repairs.”

Thermal imaging cameras offer a quick and accurate way to identify hot spots throughout a facility, allowing manufacturers to make faster, better-informed decisions to address critical problems. Rebelo says, “with more IR cameras in the hands of general maintenance technicians, a predictive maintenance team can paint a better picture—quite literally—of a plant’s condition.”

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