

APPLICATION NOTE

How using thermal imagers for predictive maintenance can save time and money

Predictive maintenance involves measuring key indicators on critical equipment at regular intervals, documenting those measurements, trending those results over time, and looking for changes—particularly those that cross a threshold known to damage equipment. This approach is designed to help predict a failure before it occurs so that it can be headed off with scheduled maintenance. Preventive maintenance doesn't use trending and threshold alarms to the same degree, but does involve regular, planned equipment inspection and maintenance and, in some cases, planned equipment replacement.

In the past, industrial facility maintenance programs based their level of preventive maintenance on the degree of risk and consequences. Basically that meant "How likely was a failure, and how much damage would it cause?" If the answer to either was "little", many facilities opted for a more casual and reactive approach to maintenance.

Part of the reason for taking this approach was because predictive maintenance required significant expertise and complex equipment and software. However, two things have changed since then. One, manufacturing now runs so lean that the impact of downtime is high enough—even on average—to incentivize at least preventive maintenance practices. Two, inspection technology has improved significantly, lowering the cost and the skill set required for meaningful predictive maintenance (PdM) programs.

Many companies are finding that predictive maintenance is more cost effective and efficient

than preventive maintenance because they don't have crews performing unnecessary preventive maintenance on machines that don't have a problem. PdM is still a relatively new practice, but it has already produced results. According to the U.S. Federal Energy Management Program, unplanned downtime due to equipment failure costs manufacturers up to 3 % of their revenue. Predictive maintenance can achieve an 8 % to 12 % savings over typical reactive maintenance methods. A predictive maintenance program employs several different inspection techniques, ranging from thermal imaging to vibration testing, ultrasound, condition-based monitoring, basic electrical testing, and more. This article specifically addresses PdM applications for thermal imagers.



Top FIVE

Areas where PdM can have a significant positive impact where practiced.

1. Utilities
2. Chemical processing
3. Data centers
4. Nuclear power plants
5. Discrete manufacturing
6. Financial operations

More effective PdM

These cameras feature a full 180 degree articulating lens and the largest 5.7 inch touchscreen LCD in its class¹ with 150 %² more viewing area to make it easy to see even subtle changes and details right on the camera.

For predictive maintenance inspection applications in critical and/or potentially hazardous situations such as utilities, chemical processing, nuclear power plants, data centers, and financial operations, you need as much diagnostic information as you can get to identify subtle changes. That means you need a high resolution thermal imager such as the Fluke TiX Expert Series line of thermal imagers. Recognizing the challenges in those extreme environments, these new thermal imagers were designed to provide a high level of detail as quickly and easily as possible.



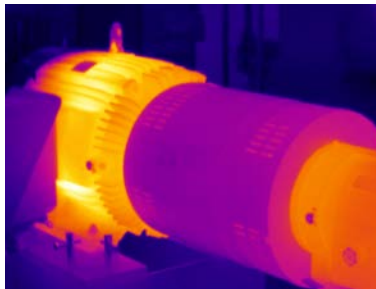
Fluke TiX560 and TiX520 thermal cameras provide the first line of defense

- 1 Ergonomic 180° articulating lens** gives you maximum flexibility and makes it easy to navigate over, under, and around objects so you can see the image before you capture it. It allows you to verify that the image is in focus before you record it, unlike a pistol-grip camera that can be very difficult to focus when you're in an awkward position. This allows technicians to work in more ergonomically agreeable positions for all day use.
- 2 The only 5.7 inch responsive touchscreen** in its class¹ delivers 150%² more viewing area to make it easy to see even subtle changes and details right on the camera. Quickly finger scroll through saved thumbnail images on the screen, zoom in and out, and access shortcuts to save time and increase productivity.

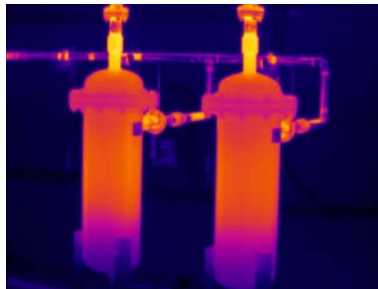
- 3 Enhanced image quality** and temperature measurement accuracy allow you to increase 320 x 240 images to 640 x 480 in SuperResolution mode to find subtle anomalies faster.
- 4 LaserSharp® Auto Focus** at the touch of a button takes the guesswork out of precision focus. The built-in laser distance meter calculates the distance to your designated target and then automatically focuses to produce the optimum image.
- 5 Filter mode** achieves Noise Equivalent Temperature Difference (NETD) as low as 30 mK to detect very slight temperature differences.

- 6 Hot and cold spot markers** highlight the hottest and coldest pixels on the image and displays their temperature values at the top of the screen for quick identification of anomalies.
- 7 On-camera storage, editing, and analysis** allow you to store thousands of images in memory and bring them up in the field to edit, add digital images, text or voice annotations, and analyze right on the camera.
- 8 Fluke Connect™** wireless compatibility enables you to see, save, and share live video, still images, and measurements with team members who have the Fluke Connect™ mobile app on their smart phones. Just push the shortcut button to connect.

¹Compared to industrial handheld thermal cameras with 320x240 detector resolution as of March 1, 2015.
²Compared to a 3.5 inch screen.



Monitoring motors and bearings.



Monitoring industrial equipment.



Monitoring industrial processes.

High resolution cameras in action

Applications such as petroleum, chemical, electrical, cement and steel manufacturing that involve extreme temperatures and potentially hazardous conditions can all benefit from the level of detail provided by high resolution infrared images. Some specific examples include:

- Refractory insulation inspection. The heat emitted by refractory structures keep inspectors at a distance, but you still need to be able to see small changes to predict when repairs are needed. A high resolution thermal imager is critical to being able to see changes over time while there's still time to take action before confronting a much bigger problem.

Because these structures tend to be very tall, you need a camera that can deliver clear crisp images of the entire structure, including the very top. Both the TiX560 and TiX520 have LaserSharp® Auto Focus that uses a built in laser distance meter to calculate the distance to the target and then precisely focuses on that target. For longer distances you can add a telephoto lens or use the zoom feature. The high resolution images ensure that you see clear crisp detail of the anomaly such as fissures in structural elements to help you decide whether it needs immediate attention.

Other application areas for thermal imagers include:

- Monitoring and measuring bearing temperatures and condition in large motors or other rotating equipment.
- Identifying leaks and determining fluid levels in sealed vessels and tanks.
- Monitoring insulation performance in process pipes or other insulated processes.
- Finding faulty connections in high power electrical circuits and equipment.
- Locating overloaded circuit breakers in a power panels.
- Identifying fuses that are at or near their current rating capacity or that are improperly installed.
- Identifying problems in electrical switch gear.
- Trending process temperatures.
- Monitoring overall performance of specialized production equipment and systems

The value of using thermal imagers for PdM

The key reason more companies are moving to PdM is that it improves the quality and reduces the cost of maintenance. Infrared inspection is a common place to start. That's because the first indicator of many common electrical and mechanical problems is an increase in temperature. A thermographer can quickly detect potential problem areas by scanning the entire electro-mechanical system with a thermal imager from a safe distance, without interrupting the operation.

Benefits from infrared inspection include:

- **Reduced downtime.** Infrared inspections are done with the equipment running so it saves downtime. Also, problems are typically found early so there is less emergency downtime.
- **Increased production capacity and quality.** Processes are optimized because subtle problems are found and addressed before they have a major impact on production.
- **Safety.** Regular inspections with a high resolution thermal imager can quickly find a wide range of potentially hazardous problems before they cause catastrophic results.
- **Increased revenue.** More uptime means more revenue. And with less maintenance on good components and faster repairs of faulty components, reduced maintenance costs lead to a better bottom line.
- **Reduced parts inventory and spare parts carrying costs.** By better understanding the likelihood and timing of repair or replacement needs, parts inventory can be managed and carrying costs reduced

More reliable predictions. Finding problems early allows the facilities staff to properly schedule corrective maintenance activities when personnel and resources are available.

Multiply your resources with Fluke Connect® wireless capabilities

With the Fluke Connect mobile app you can transmit images and measurements from Fluke Expert Series thermal imagers in real-time to authorized smart phones or tablets that have the Fluke Connect mobile app.



You can easily monitor a process remotely and share results with authorized team members all over the world through a ShareLive™ video call. That can enhance collaboration and help you make adjustments faster. You can also use Smart-View® software included with all Fluke thermal imagers to quickly document findings in interim reports that include thermal images and data.

Fluke Connect is not available in all countries.
***Within providers wireless service area.**

Work faster and easier

Unexplained hot spots could mean trouble for your electrical system. A high resolution thermal imager is the fastest way to get a clear, accurate view of those problems. Fluke TiX560 and TiX520 Expert Series cameras deliver the image resolution, thermal sensitivity and accuracy and ergonomic design to help you find those hot spots before they cause major damage.

To find out more, consult your Fluke sales representative for more information.

Fluke. *Keeping your world up and running.®*

Fluke Europe B.V.
 P.O. Box 1186
 5602 BD Eindhoven
 The Netherlands
 Web: www.fluke.co.uk

For more information call:
 In Europe/M-East/Africa +31 (0)40 267 5100 or
 Fax +31 (0)40 267 5222

Fluke (UK) Ltd.
 52 Hurricane Way
 Norwich, Norfolk
 NR6 6JB
 United Kingdom
 Tel.: +44 (0) 20 7942 0700
 Fax: +44 (0) 20 7942 0701
 E-mail: industrial@uk.fluke.nl
 Web: www.fluke.co.uk

©2015 Fluke Corporation. All trademarks are the property of their respective owners. Smart phone, wireless service and data plan not included with purchase. First 5 GB of storage is free. Compatible with iPhone 4x and up running iOS 7 or higher, iPad (in an iPhone frame on iPad) and Galaxy S4, Nexus 5, HTC One running Android™ 4.4.x or higher. Apple and the Apple logo are trademarks of Apple Inc. registered in the U.S. and other countries. App Store is a service mark of Apple Inc. Google Play is a trademark of Google Inc. Data subject to change without notice. 8/2015 6005227b-uk-en

Modification of this document is not permitted without written permission from Fluke Corporation.