



Mercury guide to:

# Thermal Imaging

## INTRODUCTION

Electrical and Mechanical equipment are the backbone of every business and regular maintenance program are crucial to the efficient, economic and safe operation of these systems. Any unplanned downtime can have serious consequences.

One of the major indicators of impending failure of both electrical and mechanical equipment is heat. Being able to measure the heat of components allows the equipment to be surveyed while fully operational. Thermal imaging (thermography) achieves this by measuring the radiation emitted by an object and converting this measurement into a radiometric image. It is from this image that the temperature of the object can be calculated and analysed. By comparing the measured temperature (and taking into account other factors such as ambient temperature and emissivity) to the manufacturers recommended operational temperature an assessment of the equipment condition can be made.

By conducting regular thermal imaging surveys of critical electrical and mechanical systems while they are at normal working capacity a full overview of the equipment condition can be taken without any disruption to business processes. More importantly as thermal imaging is a non-intrusive procedure, these surveys can be carried out SAFELY.

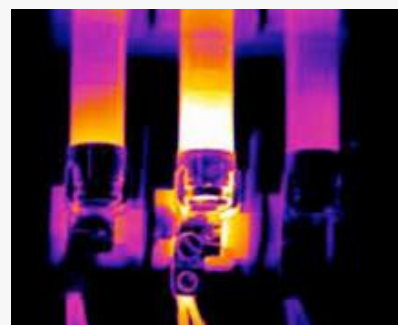
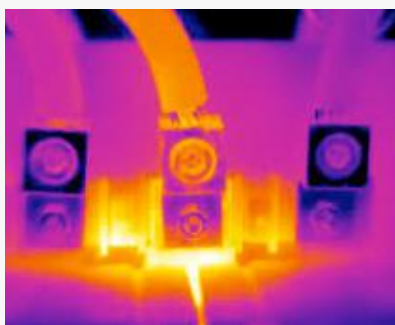
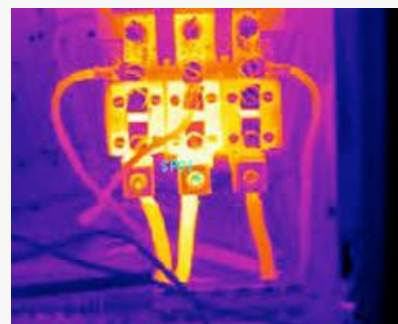
### TOP TIPS

## Thermal imaging in electrical applications

Physically checking the electrical terminations of every switchboard, distribution board, motor etc is both a time consuming and costly process, as well as being disruptive to the operation of the site as individual circuits need to be individually isolated before physical checks can be carried out. Where sites operate 24 hours a day this can be impractical.

Some of the electrical faults that can be identified using thermal imaging:

- Phase Imbalances
- Loose Connections
- Harmonics
- High resistance connections
- Corroded connections
- Internal fuse damage
- Internal circuit breaker damage
  - Recirculating currents



Many of these faults may not be identified by other means. Crucially they may not be found until the equipment fails or catches fire resulting in potential disruption to site operations, stock loss, building fire or personnel injury.

## THERMAL IMAGING IN MECHANICAL APPLICATIONS

Mechanical systems by their very nature will produce heat, however misaligned or failing components can cause increased heat due to friction. This in turn can lead to complete mechanical failure or even worse – fire. Poor lubrication of components such as bearings can cause the failure of the component or associated equipment – a failing bearing can put excessive strain on a motor for example, potentially causing the motor to fail if left unchecked. This type of failure may be difficult to quickly identify in some environments – Thermography addresses this problem.

Any problems identified can be recorded and reported to maintenance staff allowing them to categorise and prioritise the fault. A scheduled shutdown of the equipment can then be carried out to rectify the issue, using standby systems if appropriate to maintain site operations.

Some of the mechanical faults that can be identified using thermal imaging:

- Misaligned or worn bearings
- Motor brush contact wear
- Misaligned conveyor belts/pulleys
- faults in pipework and insulation

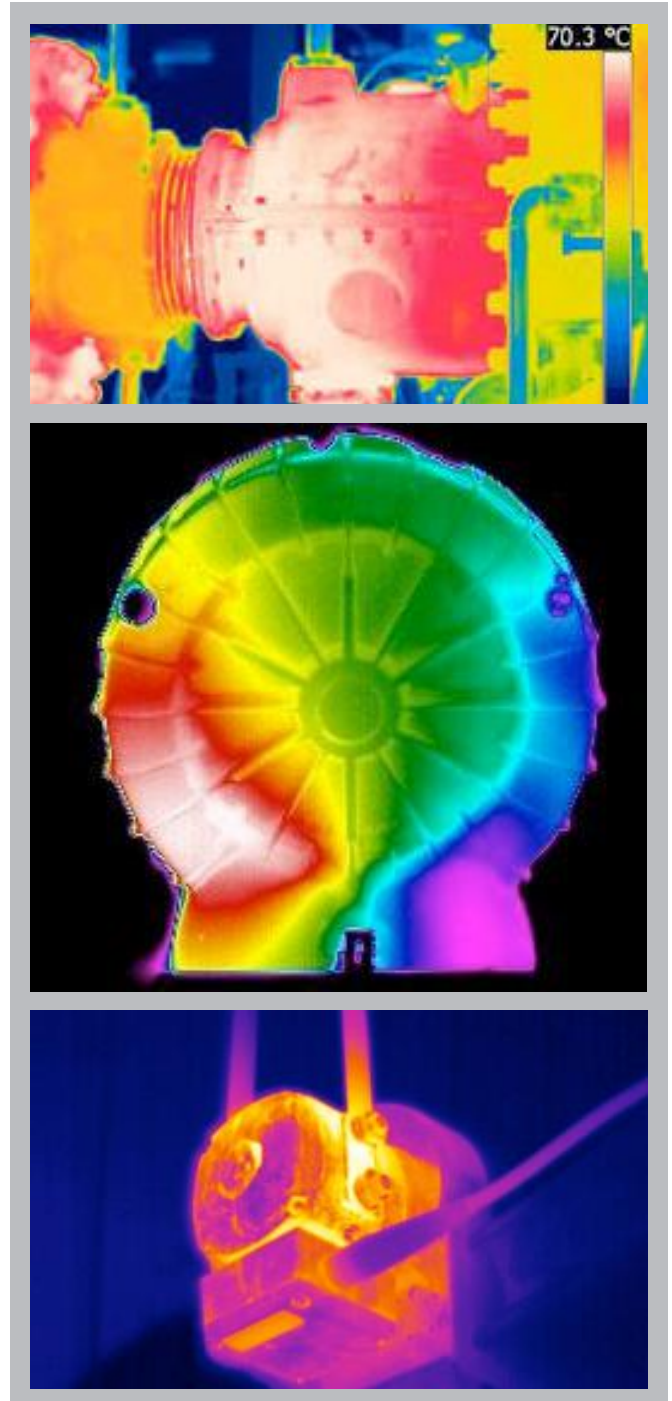
### Historical condition recording

By tracking and recording the condition of every item of equipment over a set period of time (typically 3, 6 or 12 months) diagnosis of the cause of faults is made easier and in some circumstances can be pinpointed to a specific site process or working condition. Thermographic surveys can be scheduled at specific times of year to coincide with increased seasonal workloads (such as the run up to Christmas) to assess the condition of equipment at peak times.

By utilising qualified thermographers and state of the art thermal imaging equipment whole sites can be checked in as little as one day with no disruption to site operations. Reliance on site maintenance staff is kept to a minimum allowing them to carry out their normal daily duties.

### A Cost Effective Solution

System downtime is inconvenient and costly. By avoiding the reliance on site maintenance staff, labour costs can be considerably reduced. By taking a proactive rather than reactive approach to maintenance tasks the repair of equipment can be scheduled to avoid unnecessary down time not only are the site processes able to operate more efficiently; the need for out of hours working is greatly reduced.



### Safety first

Thermographic surveys provide a safe means of equipment inspection by removing the need for contact based or intrusive inspection methods with the advantage of surveying the equipment during peak operating periods. The addition of infrared windows can improve the safety of inspections even further.

## CHOOSING A THERMOGRAPHY COMPANY

As in any industry there are many companies that offer thermography, some good some bad.

- 1 As a minimum thermographers should be trained to a minimum Level 1 standard as defined by BS 18436.
- 2 Ensure your thermographer is covered by suitable public liability and professional indemnity insurance
- 3 All surveys should include at the very least a printed report detailing site specific information including equipment, location, temperatures, emissivity values and details and recommendations for any defects found. Printed reports are not an optional extra!
- 4 Your chosen thermography company should provide a written quotation for your site and should ask pertinent questions regarding the site and equipment to be surveyed. The quotation should clearly state what is and is not going to be covered by the survey.
- 5 Your chosen thermography company should maintain a record of your surveys for comparison in any future surveys.

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