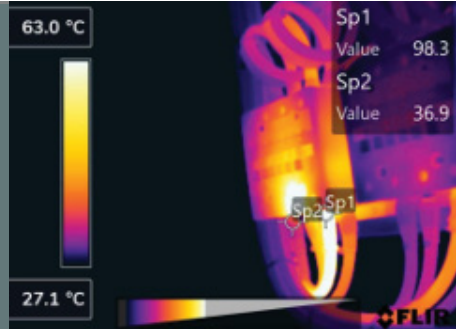


## INTRODUCTION TO INFRARED THERMOGRAPHIC [IRT] INSPECTION



OES are the leaders in infrared thermographic inspection services, completing more than 5,000 surveys over the course of three decades onshore and offshore.

## WHAT IS INFRARED THERMOGRAPHIC [IRT] INSPECTION?

The detection and measurement of emitted thermal energy (heat). This is enabled using an infrared camera which translates the invisible infrared spectrum into a visual format, or what is known as a thermal image. This thermal image can then be interpreted to provide a non-invasive and non-destructive method of identifying building defects and deficiencies. In addition to finding problems, infrared inspections are useful for clearance purposes and to confirm that previously determined issues have been properly corrected or remediated.

Infrared inspections performed on rigs electrical switchboards can be utilized for preceding or strengthening inspections required for regulatory and class required examinations for periodic surveys and Infrared inspections of electrical systems are beneficial to reduce the number of costly and catastrophic equipment failures and unscheduled shutdowns.

The method of Infrared thermography aims to determine the internal/external temperature Hot or Cold spots/Heat loss triggered by:

- Corroded/oxidized/loose electrical connections
- Damaged/failed/missing insulation
- Damaged/malfunctioning electrical/mechanical equipment
- Inadequate cooling Inadequate lubrication
- Misalignment/conditions leading to localized overloading of electrical/mechanical equipment
- Overheated/overloaded electrical/mechanical equipment

## WHEN SHOULD INFRARED THERMOGRAPHIC [IRT] INSPECTIONS BE COMPLETED?

Infrared inspections surveys are best scheduled for when the rig is electrically loaded (Minimum 40%) so to gain the best results. E.g. during drilling operations. This is best practice.

## HOW OFTEN SHOULD INFRARED THERMOGRAPHIC [IRT] INSPECTION BE COMPLETED?

Yes, for offshore units, there is a Flag/Class element for condition-based monitoring [ABS and DNV]. Flag/Class indicate this should be completed at 5-year intervals, and reports be available on board each Modu or Vessel. Onshore drilling units often cover this too since they are subject to many rigs moving activities and vibration, which in turn could cause electrical equipment to loosen over time. Many drilling contractors complete these surveys on average between 2-3 years and include these infrared thermographic surveys into their planned maintenance system. More stringent requirements may be determined by operators as to an annual requirement for this type of inspection.

## IS THERE ANY REGULATION OFTEN SHOULD INFRARED THERMOGRAPHIC [IRT] INSPECTION?

Yes, for offshore units, this is captured by Flag/Class and IMO regulations. These are covered under their condition-based monitoring standards for electrical equipment installation. According to most class authorities, Condition-monitoring plans for electrical equipment are to include examination of equipment such as: Lighting Panels, Navigation Systems, Brake Resistors, Jacking Systems, Variable Frequency Drives (VFD's), Switchboards, Transformers, and other essential electrical apparatus by infrared photographic thermography during each five-year survey cycle while the circuit is energized and under normal workloads.

## WHAT ASSETS CAN UTILISE THIS NON-INTRUSIVE CONDITION-BASED MONITORING INSPECTION?

Infrared Thermography is commonly used in a variety of industries and the oil and gas industry is no different. From exploration and production to transportation and refinement, operators in every stream of the oil and gas industry turn to infrared thermography. Thermal imaging makes the workplace safer, more profitable, and more environmentally friendly. In a facility that relies on an efficient power generation system, thermal cameras bring it all into view to make the job easier.

## WHAT WILL THE INFRARED THERMOGRAPHIC [IRT] INSPECTION DETERMINE?

Regular electrical distribution inspections with infrared cameras help identify incorrectly installed parts, track how long pieces of equipment last so you can plan for repairs, and help prepare you to meet regulations, saving a company's asset time and money. By capturing the temperature variations on the surface of electrical components and analysing these thermal patterns, the surveyor can identify hotspots that may indicate potential problems such as loose connections, overloaded circuits, or faulty components.

## WHAT BENEFITS DOES THIS INFRARED THERMOGRAPHIC [IRT] INSPECTION PROVIDE?

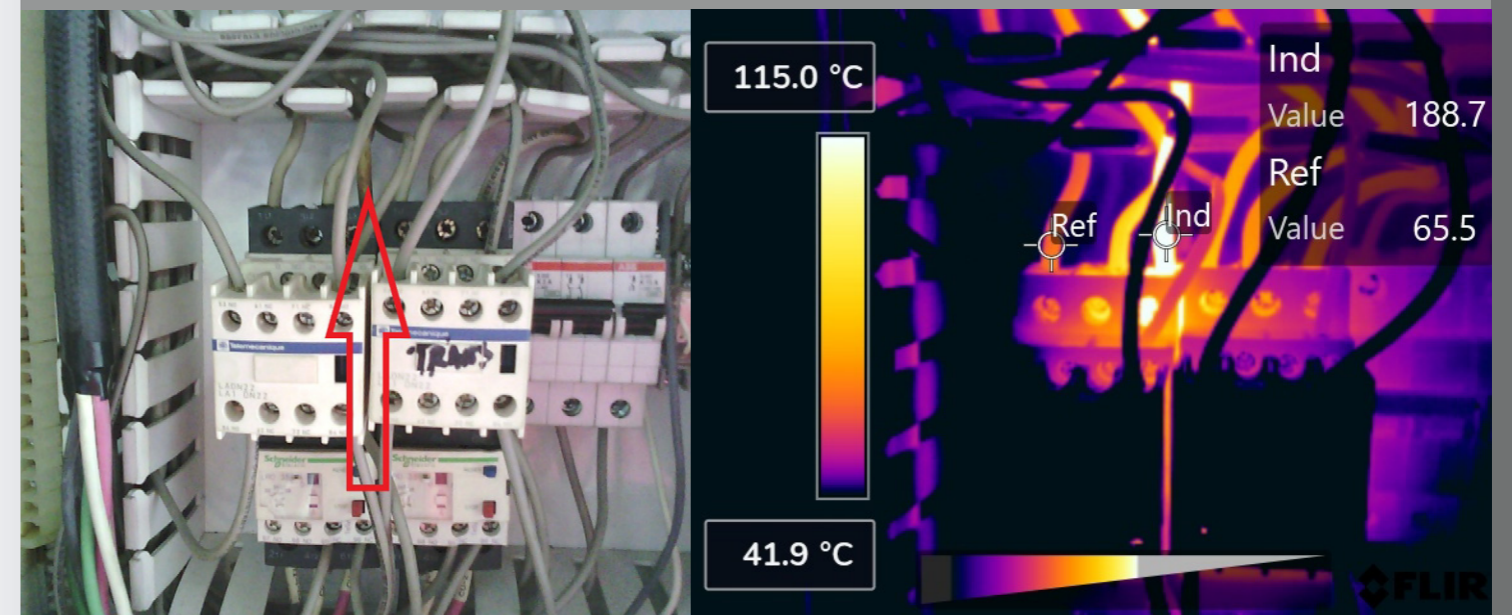
Infrared thermography is one of the most effective and cost-efficient non-destructive testing (NDT) programs available to companies today. It provides peace of mind that the electrical equipment installed has been inspected by non-intrusive methods and any issues have been identified by the OES team before a catastrophic failures occur, or issues are encountered eliminating any downtime.

## ARE OES PERSONNEL TRAINED TO PERFORM THESE INFRARED THERMOGRAPHIC [IRT] INSPECTIONS?

Yes, Infrared inspections are completed by highly qualified personnel with many years of experience within the industry and within this specific field of inspection. Each OES team member has the necessary external certification and trained under the British Institute of Non-destructive Testing (BINDT). OES employees are trained to ASNT SNT-TC-1A and in line with ISO 18436-7.

## WHAT ARE THE CLIENT BENEFITS?

A detailed report of all equipment and systems examined is provided, along with a portfolio of high-resolution images taken with state-of-the-art thermal imaging cameras. This provides the necessary evidence of elevated or normal thermal heat signature patterns across terminals and their associated conductors, and depending on these results, each item of equipment will be categorized and determined to have 'Passed' or 'Failed'. For offshore MODU's in accordance with Flag/Class Regulations, a report will be issued which should be available on each unit upon completion of the survey, describing the inspection results of all electrical equipment as described previously.



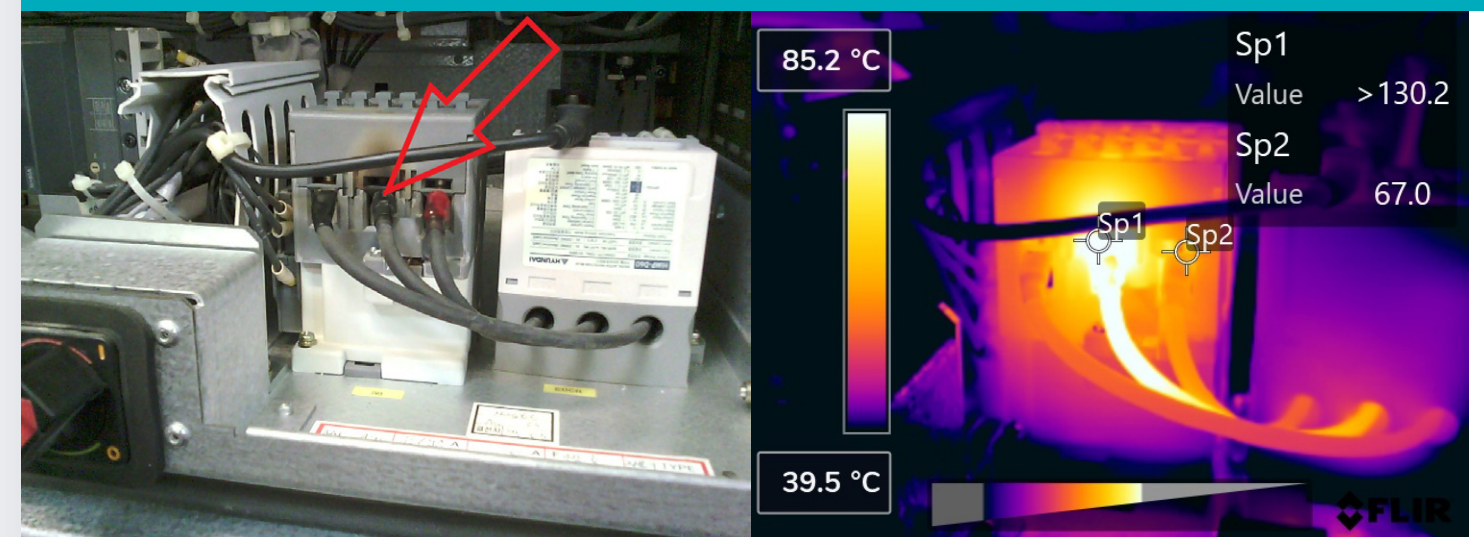


## WHAT ARE THE CONSEQUENCES, IF WE DO NOT PERFORM INFRARED THERMOGRAPHIC [IRT] INSPECTIONS?

In OES's three decades of upstream inspection services, there have been several catastrophic equipment failures and fires caused by faulty electrical equipment which has gone undetected. In summary Infrared inspections have uncovered a multitude of potentially dangerous situations. Proper diagnosis and remedial action of these situations have also helped to prevent numerous major losses.

## EXAMPLES OF DANGEROUS SITUATION THAT CAN BE UNCOVERED BY INFRARED SURVEYS INCLUDE:

- Loose connections that could lead to equipment shutdown and disruption of operations, i.e. loose connections on a thruster motor terminal that causes a short circuit and shutdown of that thruster and potentially damaging the motor.
- Equipment insulation breakdown leading to equipment failure and disruption of operations, i.e. heating on generator windings, breaking down insulation, and eventually short circuit and equipment shutdown.
- SCR Field Supply Fuses directly connected to busbars with loose screws resulting in a fire starting due to the arcing.
- High temperatures may indicate excessive electrical resistance, failing components, ground faults, short circuits, overheating or other common problems in electric or mechanical equipment that can lead to expensive or even catastrophic failures.



For further information on Infrared Thermographic Surveys [ IRT ] Inspection service and benefits to your company's assets, please contact our specialist team at [info@oesgroup.com](mailto:info@oesgroup.com)