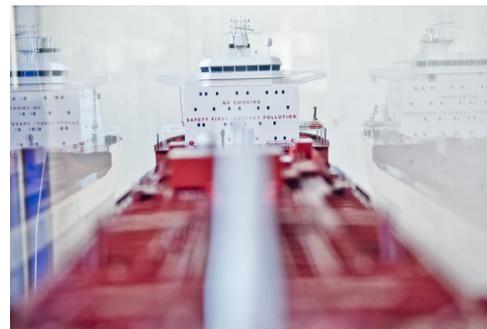


Westcon Power & Automation offers thermographic services to identify thermally related issues on your power distribution system. With an IR-camera, our service technicians can detect abnormalities in temperature. Upon the completion of the survey, a report will be generated to specify risks with recommendations for maintenance/repairs.



This technology is a cost effective solution and a preventive maintenance service to prevent power interruptions and subsequent operational downtime.

WPA has several well-experienced DNV certified technicians.

Thermographic inspections will instantly show risky conditions and allow fast and secure inspections and repairs.



### How does it work?

Thermography uses a camera that detects heat radiation. One can easily see the difference in temperature at a given point/surface.

### ELECTRICAL THERMOGRAPHY

This solution allows the thermography technician to inspect and detect faulty connections in early stages to avoid possible breakdowns.

Pictures will be taken, edited and analysed in a computer in cases where the operator has found the temperature to be too high, the temperature deviation too high, or in any other case where the operator considers it necessary. If the analysis shows it is necessary to check/improve the equipment, then the picture will be included in the report.

Operator make a list over all switchboards and starters on-board and note which equipment is inspected. This way it is easy to see which one is inspected and which one is not. This list is ship specific and will be updated each inspection if there is added or removed some starters.

Some switchboard contain bare copper busbars. It is

difficult to get a good thermal image of these as they reflect the temperatures of the environment.

In such cases only the attached cables and breakers are photographed with the IR camera, and not the bare copper busbars.

We recommend thermographic inspection of ships every 30 months.

Upon the client's request, we can check for hotspots on engines in addition to the thermographic inspection of electrical switchboards and starters. When this type of measurement is required, a separate report will be produced for hotspots on engines.



VISIBLE LIGHT IMAGE

### Fault Condition Classifications

|                    |   |  |
|--------------------|---|--|
| <b>Condition 0</b> | No fault detected   | This is used to document improvement after a repair of a previous fault.   |
| <b>Condition 1</b> | Warning, recommend checking connections / To be checked next time | This is used where a small temperature deviation has been found, but it is not considered to be a critical fault. These faults can be checked again after a few months to see if they have developed or stabilised. Since we recommend thermographic inspections every 30 months, these faults will probably not be inspected with a thermal imaging camera again after a few months, and it is therefore recommended to check/improve these faults as well. |
| <b>Condition 2</b> | Fault, must be checked / repaired                                 | This is a fault and needs to be checked and repaired. Failure to do so will most likely lead to further deterioration and will eventually become a condition 3 fault which will ultimately result in a breakdown of the equipment  |
| <b>Condition 3</b> | Fault, serious must be shut down / repaired                       | When we find a condition 3 fault, we ask the electrician/engineer to shut down the equipment and repair it to avoid a breakdown of the equipment. In many cases where the temperature of the cables exceeds 70-80°C the insulation will become damaged, and it is recommended that the wires are changed. After the fault is repaired, we will take a new thermal image picture to document the improvement.   |



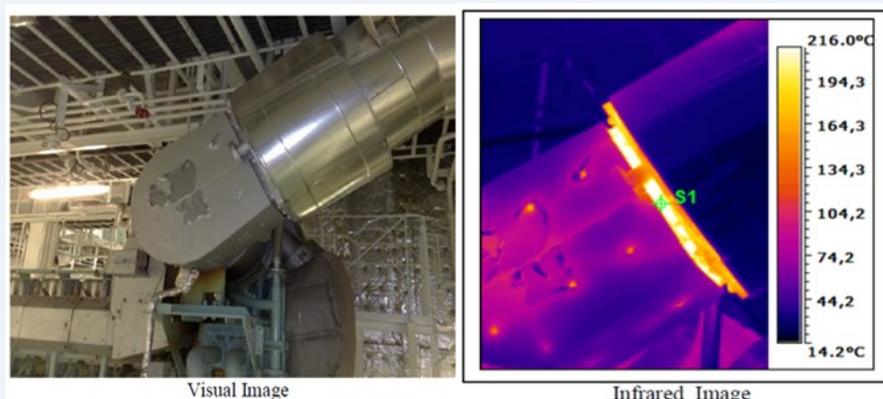
THERMOGRAPHY

**HOTSPOTS**

All temperatures found to be above 220°C will be photographed. For hotspots on engines, we refer to DNV GL rule:

*Pt.4 Ch.1 Sec.3 A*

*406 Surfaces with temperatures above 220°C, which may be impinged as a result of a flammable oil system failure, shall be properly insulated (SOLAS Ch.II-2/Reg.4.2.2.6.1)*



Sample Actual and Infrared Images

It is up to the client to evaluate the pictures and decide what to do with the findings, but we recommend improving all findings and to carry out a new inspection with the IR camera after the repair.

It is recommended to do the inspections within a year to detect faulty system on new installations.

WPA can combine thermography with a general survey on electrical systems with a minimal cost.

As a vital maintenance procedure, it is one of the most effective and efficient solution available to your systems.

**Benefits**

- Increased Safety
- Excellent Documentation of facility's system condition
- Reduced unscheduled downtime
- No service interruption during inspections
- Cost Effective. Lower repair costs.
- Increase Equipment Life

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Westcon Power & Automation offers complete electrical installations for new builds, re-builds, classification, as well as a wide range of other services. Our highly qualified staff and extensive network of partners enable us to provide our customers with customized solutions.

**Our Products & Services**

Our comprehensive portfolio of state of the art products for the maritime industry ranges from complete power and automation systems to stand-alone products and concepts for machine safety.

WPA provides a full range of services within oil and gas, marine and industrial sectors. We are the preferred supplier of electro on all yard stay of Westcon Yard.

**Our Technology**

Significant R&D over the years has helped us to make complex technology easier to achieve. The changing needs of customers present new challenges and techniques that allowed us to be flexible in adapting into the evolving market and continue to develop ideas not only for clientele but also for our continuous growth.

