

Understanding Thermography

Introduction to thermography

Thermography is a non-contact imaging technique that captures and visualises the infrared radiation emitted by an object or a surface. This technology is based on the fact that all objects with a temperature above absolute zero (-273.15 degrees Celsius or -459.67 degrees Fahrenheit) emit infrared radiation. Thermography, also known as thermal imaging or infrared imaging, is widely used in various fields for detection, measurement, and visualisation of temperature variations.

Here's a brief introduction to key aspects of thermography:

Principle of Operation:

Infrared Radiation: All objects emit infrared radiation in proportion to their temperature. Thermographic cameras detect this radiation, which is not visible to the human eye.

Temperature Variation: Thermography is particularly useful for identifying temperature differences. Hotter objects emit more infrared radiation than cooler ones.

Equipment:

Thermal Cameras: Specialised cameras equipped with infrared sensors capture the thermal radiation emitted by objects. These cameras convert the radiation into a visual image, where different colours or shades represent varying temperatures.

Applications:

Building Inspections: Thermography is used for identifying energy inefficiencies, insulation problems, and water leaks in buildings.

Electrical Inspections: It helps in detecting overheating in electrical systems, identifying faulty components, and preventing potential failures.

Medical Imaging: Infrared imaging is used in medical diagnostics, such as breast thermography, where temperature variations can indicate abnormalities.

Industrial Processes: Thermography is employed in monitoring and optimising industrial processes by identifying heat-related issues.

Benefits:

Non-Destructive Testing: Thermography allows for non-invasive inspections without the need for physical contact.

Time Efficiency: It provides quick and real-time results, making it efficient for various applications.

Safety: In situations where direct contact is dangerous, such as electrical inspections, thermography ensures the safety of inspectors.

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Engineering

Automation

Electronics

Safety systems

Pollution prevention

Gas detection

Metrology

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Challenges:

Environmental Factors: External factors like sunlight, wind, and humidity can impact the accuracy of thermal imaging.

Training: Interpreting thermal images requires training and expertise to accurately identify temperature variations and potential issues.

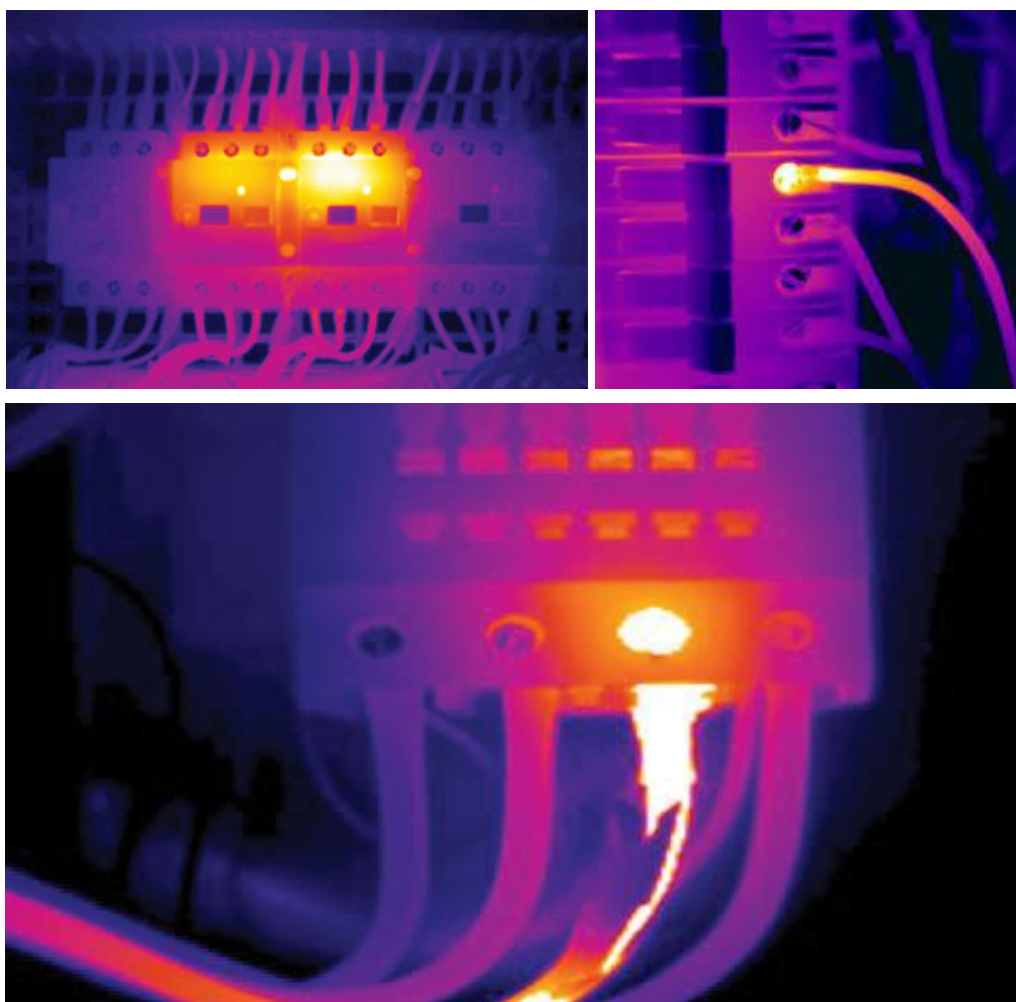
Future Developments:

Integration with AI: Combining thermography with artificial intelligence can enhance the analysis and interpretation of thermal images.

Miniaturisation: Advancements in technology may lead to smaller and more portable thermal imaging devices.

In conclusion, thermography plays a crucial role in various fields, offering a valuable tool for detecting anomalies, monitoring processes, and ensuring the efficient operation of systems. The continuous development of technology is likely to expand its applications and improve its accuracy and accessibility.

Example



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