



THE CHALLENGES AND LIMITATIONS OF INFRARED THERMOGRAPHY

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In the world of inspection and diagnostics, Infrared Thermography or IR Thermography stands as a game-changer. Offering non-invasive assessments, this technology has found applications from electrical systems to building diagnostics. However, like all technologies, IR thermography isn't without its challenges and limitations. Understanding these can help professionals optimize its use and interpret results more accurately.



THERMOGRAPHY

Before diving into the challenges, it's essential to grasp infrared thermography's fundamental principles. At its core, IR thermography detects infrared radiation emitted from an object. Every material emits infrared radiation based on its temperature, and this radiation is captured by infrared cameras to produce thermograms – visual representations of temperature variations. Factors like emissivity (how effectively a material emits infrared radiation) play a crucial role in accurate readings.



Here at IIRT we help you understand what all these mean with hands-on practicals as well as theory in our Level-1 Infrared Thermography Certification Course! >>

CHALLENGES IN INFRARED THERMOGRAPHY



EMISSIVITY

Different materials have different emissivity values. For instance, shiny metals often have a low emissivity, making them challenging to assess with IR Thermography. Misinterpreting or failing to adjust for emissivity can lead to inaccurate temperature readings.



REFLECTIVE SURFACES

Infrared radiation can be reflected off shiny surfaces. This reflection can lead to 'false positives' or misleading readings, especially if the camera detects the reflected infrared radiation from a hotter object nearby.



AMBIENT CONDITIONS

Environmental factors, such as sunlight, rain, or wind, can influence the surface temperature of an object. For example, direct sunlight warming a wall can mask underlying issues like insulation gaps.



DEPTH LIMITATIONS



SEE IT IN ACTION

In our Level-1 Certification Course, get to see reflection in action and how to avoid them!



always detect issues deep within walls or machinery.



! USER EXPERTISE

Like any sophisticated tool, an infrared camera's effectiveness lies in the hands of its operator. Properly interpreting thermographic images requires training, experience, and an understanding of the inspected object's characteristics.

MATERIALS THAT BLOCK INFRARED: A CLOSER LOOK

Certain materials act as barriers to infrared (IR) radiation, either reflecting it, absorbing it, or both. Here are 4 surprising objects or materials that typically do not allow infrared radiation to pass through or severely limit its passage:

- **Glass:** Regular window glass is largely opaque to long-wave infrared radiation. This is why greenhouses trap heat: visible light enters, gets absorbed by objects inside, and re-radiated as infrared that cannot escape through the glass.
- **Water:** Water absorbs infrared radiation effectively, which is one reason why bodies of water can be used to store heat.
- **Plastics:** While some thin plastics can be transparent to certain infrared wavelengths, many plastics, especially thicker ones, do not allow IR to pass through.
- **Some Paints and Coatings:** There are paints and coatings specifically designed to reflect or absorb IR radiation, effectively blocking it.

LIMITATIONS TO CONSIDER

Qualitative, Not Always Quantitative

Doesn't Replace Physical Inspection



Thermography offers a qualitative visual representation of temperature differences. It's more about spotting anomalies rather than precise measurements.

traditional inspection methods. While it can highlight potential problem areas, physical inspection or other diagnostic tools might be necessary to confirm and assess the extent of an issue.

OPTIMIZING INFRARED THERMOGRAPHY USAGE

Understanding these challenges and limitations doesn't diminish the value of infrared thermography. Instead, it underscores the importance of using the technology judiciously.

Here are a few steps professionals can take to maximize the accuracy of their IR Thermography Inspections:

Training and Education:

[Invest in comprehensive training courses.](#)

Knowledge about emissivity, reflective interference, and other critical factors can enhance inspection accuracy.

Calibrate and Maintain Equipment:

Regularly calibrate infrared cameras and ensure they're in good working condition.

Use in Conjunction with Other Tools:

Combine IR thermography with other diagnostic tools for a holistic inspection approach.

Choose the Right Time:

To minimize environmental interferences, conduct inspections at times when external factors like sunlight or rain are least likely to influence results.

CONCLUSION

Infrared thermography is a powerful diagnostic tool, offering insights that many other inspection methods can't. However, its efficacy is intertwined with an understanding of its challenges and limitations. By acknowledging these factors and proactively addressing them, professionals can harness the full potential of IR thermography, ensuring safer buildings, more efficient systems, and the continued evolution of inspection methodologies.



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