

INFRARED

A primer

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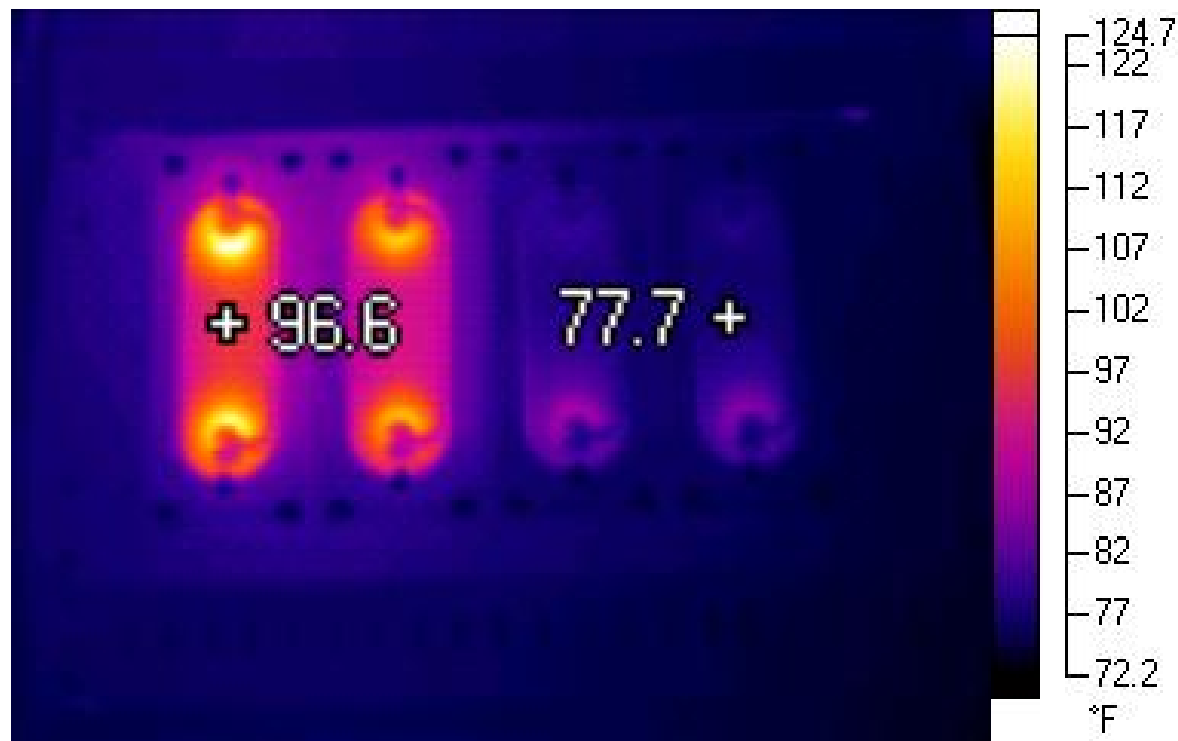
www.hobbsconsulting.ca



Agenda

- Infrared (IR) and Emissivity
- Spot Radiometers aka Infrared Thermometer
- IR Camera
- Samples
- Discussion

An Infrared scan provides a pictorial representation of the heat of an object

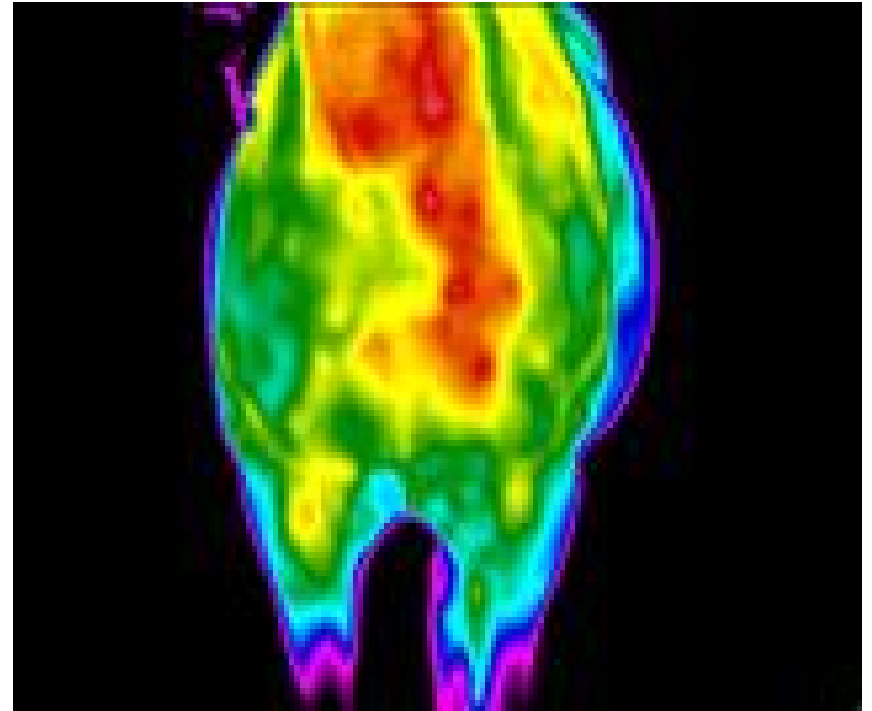


IR Applications

Home Energy Audits



Large Animals



Benefits of Infrared Scans

- Easily detect potential problems before they become service affecting
- Non-intrusive
- Meets requirements of NFPA 70B
- Sets a benchmark for future comparisons
- **SAFE** for personnel and equipment if NFPA 70E requirements are adhered to

Infrared scans allow us to detect:

- Overheating/overloaded DC and AC fuses and breakers
- Overloaded cables
- Poor quality connections in fuses, breakers and cables
- Imbalance in phase conductors
- Detectable heat anomalies
- High resistance battery inter-cell connections

Items scanned must be under load to identify problems



Infrared Radiation

- IR radiation is given off by everything around us
- Sometimes we feel IR as heat, e.g. sitting in front of a fire
- If we measure IR then we can determine the temperature of an object without physical contact
- We can measure surface temperature by using a Spot Radiometer or an IR Camera.

PROBLEM: substances emit IR differently

EMISSIVITY (e) is the ability of a substance to radiate energy

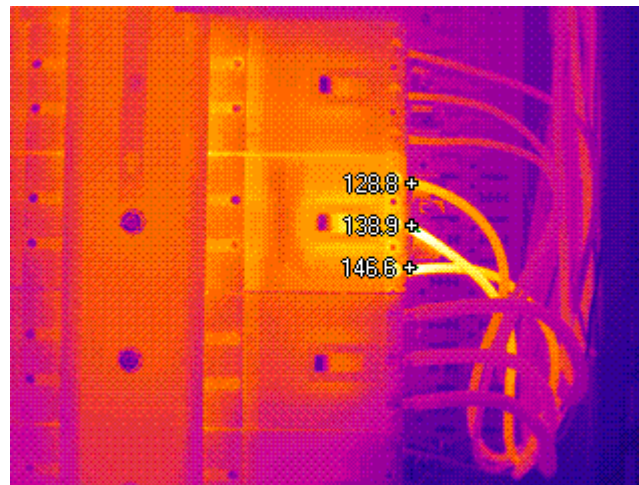
- Shiny substances retains IR energy and reflect background IR
- Polished aluminum has an e of .05 —95% of the IR from the aluminum is reflected and only 5% is from the aluminum itself

Typical Emissivities

- Human skin .98
- Electricians Tape .94
- Oxidized lead .52
- **Copper oxidized .68**
- Copper polished .02

IR Camera vs Spot Radiometer

- Our camera captures 19,200 temperature points in each picture
- Radiometers display average temperature over a viewing circle



IR Camera

- 19,200 temperature points
- Adjustable for reflectivity
- Record or baseline with picture
- Visual plus IR picture provided

Spot Radiometer

- Average temp in viewing area
- No correction for reflectivity
- Manual record of scan
- No picture or record of measurement

Camera



Requirements for Infrared Scan

- Trained personnel
- Qualified personnel for AC panels, etc
- Adhere to requirements of NFPA 70E for Safety/ARC FLASH protection
- Local maintenance person must be in attendance

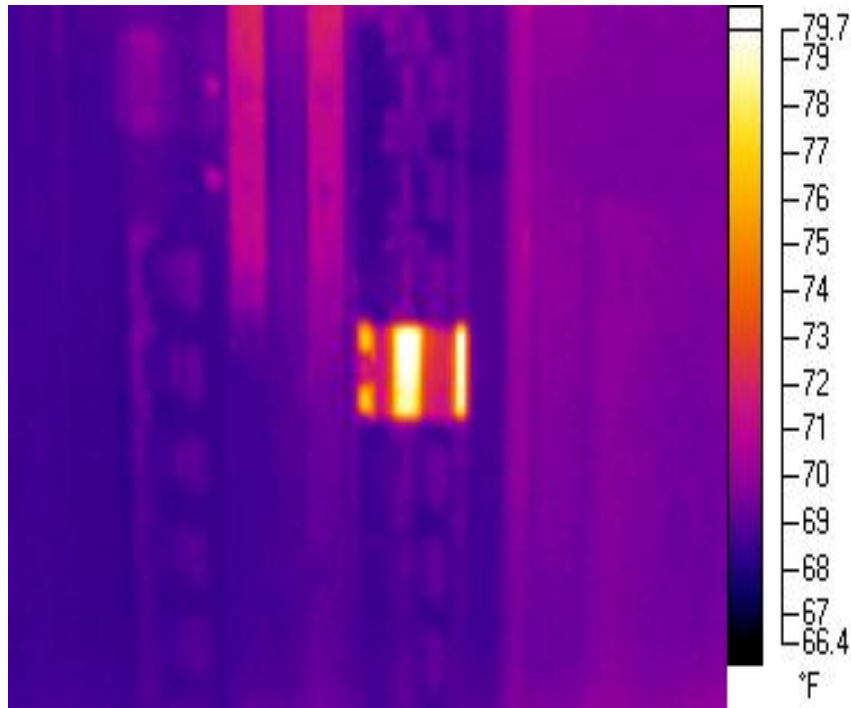
Cautions Using Radiometer

- Operate at 90° to surface
- Observe behind—Is there a high IR source?
- Operate at the correct distance to optimize the focal length for the object of interest
- Operate in a safe environment (NFPA 70E or equivalent)
- Assess the type of surface being measured

Use a Reference for Comparison



Breaker Overheating?



SOFTWARE DEMONSTRATION AND SAMPLE SCANS