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Presentation UDOM & SUZA - Tanzania

INFRARED THERMOGRAPHY: FUNDAMENTALS AND APPLICATIONS

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INTRODUCTION

Fundamentals of infrared thermography

1. Infrared thermography is a technique that allows the visualisation of **thermal images in real time** and without direct contact.
2. Infrared thermography is used in **many areas of maintenance** since many incidents are manifested thermally.

FUNDAMENTALS

Instrumentation for non-contact temperature measurement

- **Optical pyrometers:**
  - They allow temperature to be measured at a only point.
  - They are suitable for working safely in places that are difficult to access, with electrical voltage or very high temperatures.

- **Thermographic cameras:**
  - They obtain a thermal image using an array of sensors.
  - They allow quick visual checks of the surface temperature of bodies.

FUNDAMENTALS

Features of infrared thermography

- **No need for direct contact**
  - It keeps the user out of danger.
  - It is non-intrusive. Does not affect in any way the target being measured.
- **It is two-dimensional**
  - It allows easy comparison of different areas of the object being characterized.
  - It provides a global image of the object under study.
- **It is carried out in real time**
  - It allows very fast visualisation of stationary targets.
  - It enables the capture of transient thermal processes.

APPLICATIONS

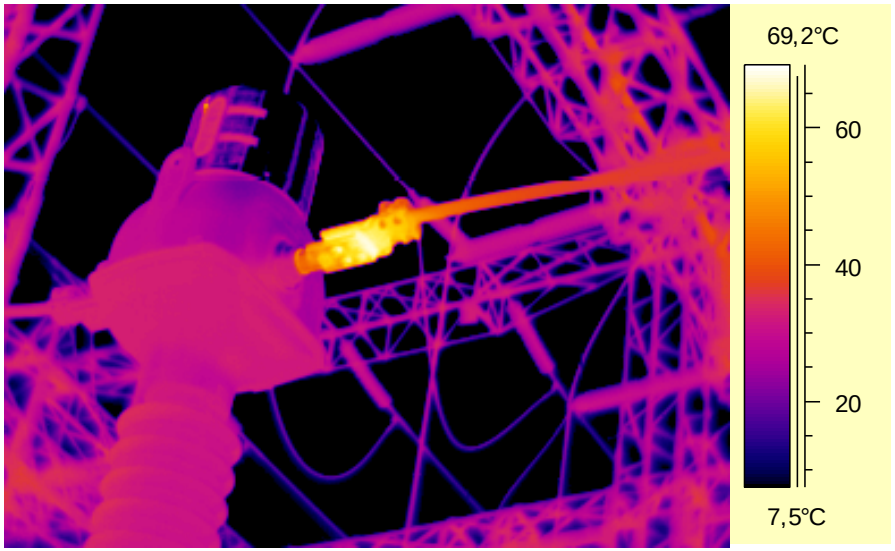
- **Maintenance.**
- Investigation and development.
- Medicine and veterinary.
- Quality control and process monitoring.
- Non destructive tests.
- And many more...

APPLICATIONS

- **Maintenance**
  - Electrical maintenance.
  - Edification.
  - Furnaces and boilers.
  - Mechanics and friction.
  - Flow visualization.
  - Tanks and reservoirs.

APPLICATIONS

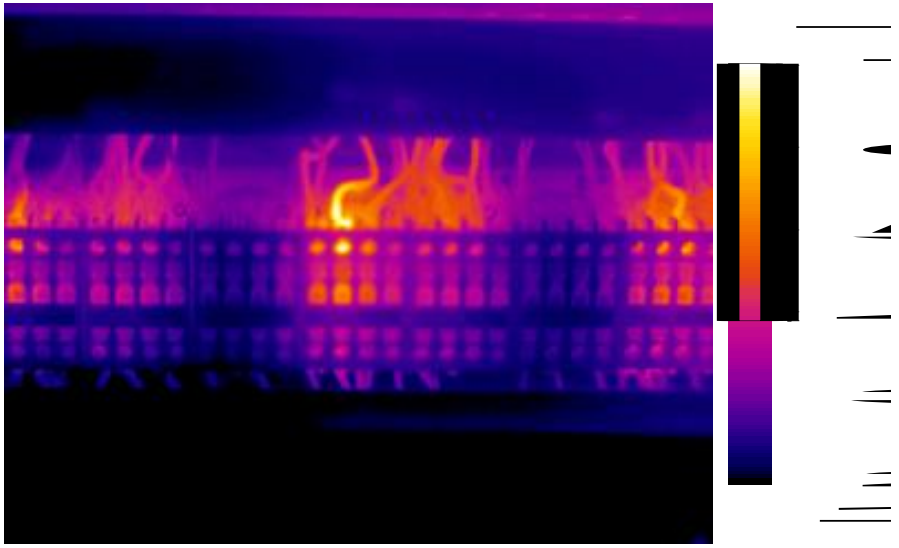
High voltage electrical substation



* Connection at excessive temperature.

APPLICATIONS

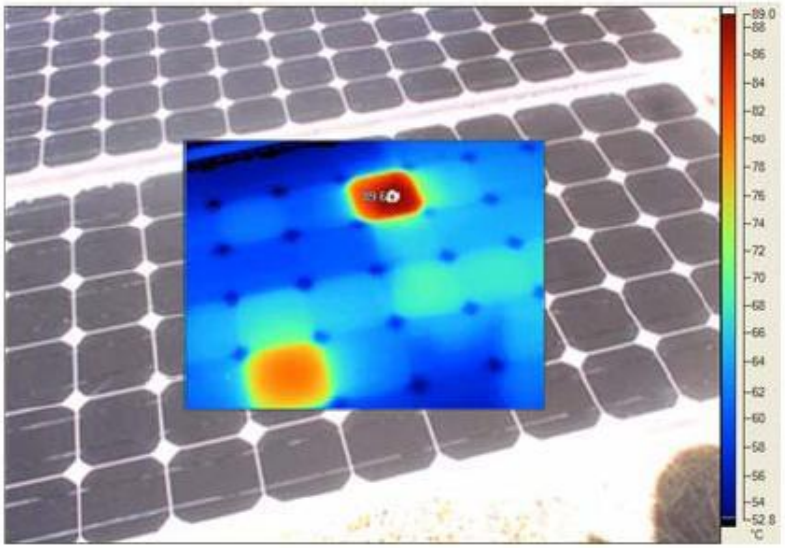
Low voltage (indoors)



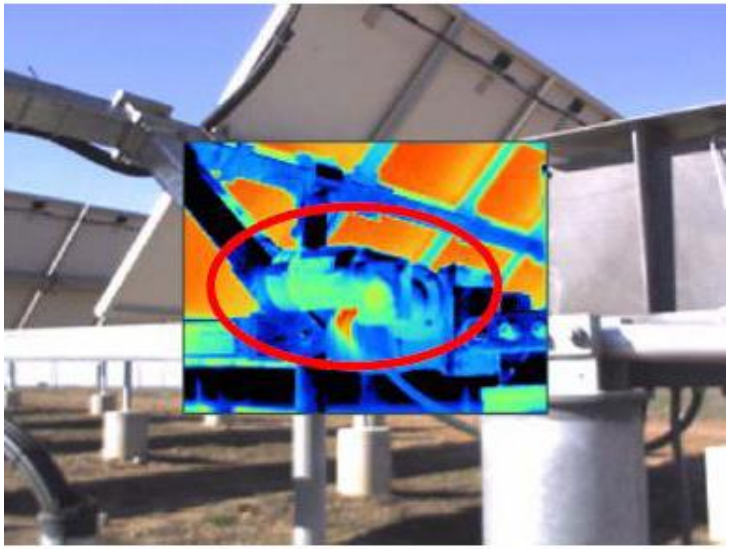
- Locating problems impossible to find with other techniques due to high concentration of wiring.

APPLICATIONS

Photovoltaic installations



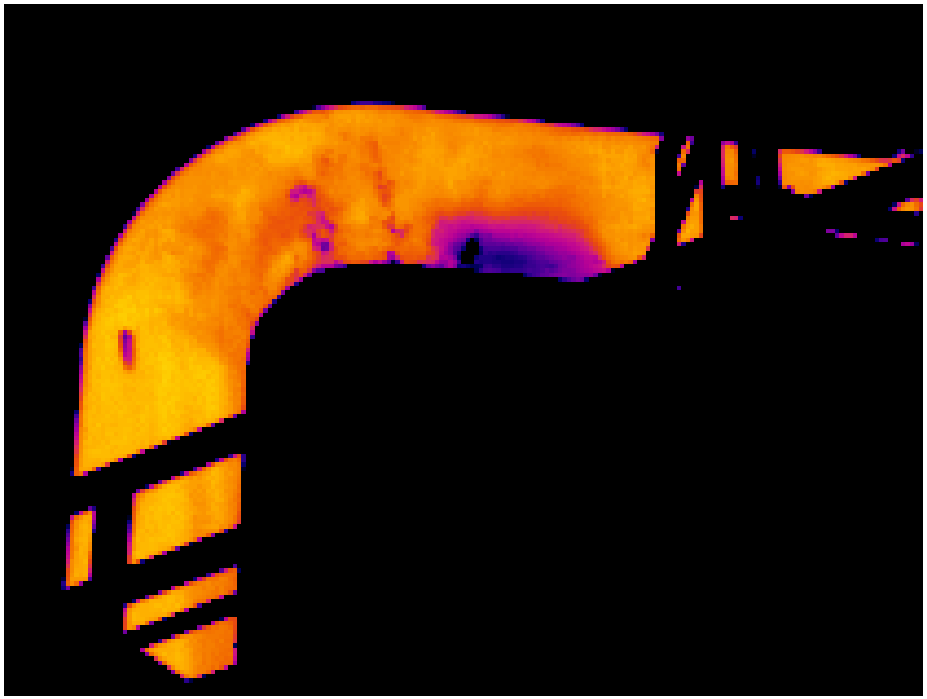
* Hot cells in photovoltaic module.



* Maintenance of electric motors in installations with solar tracking.

APPLICATIONS

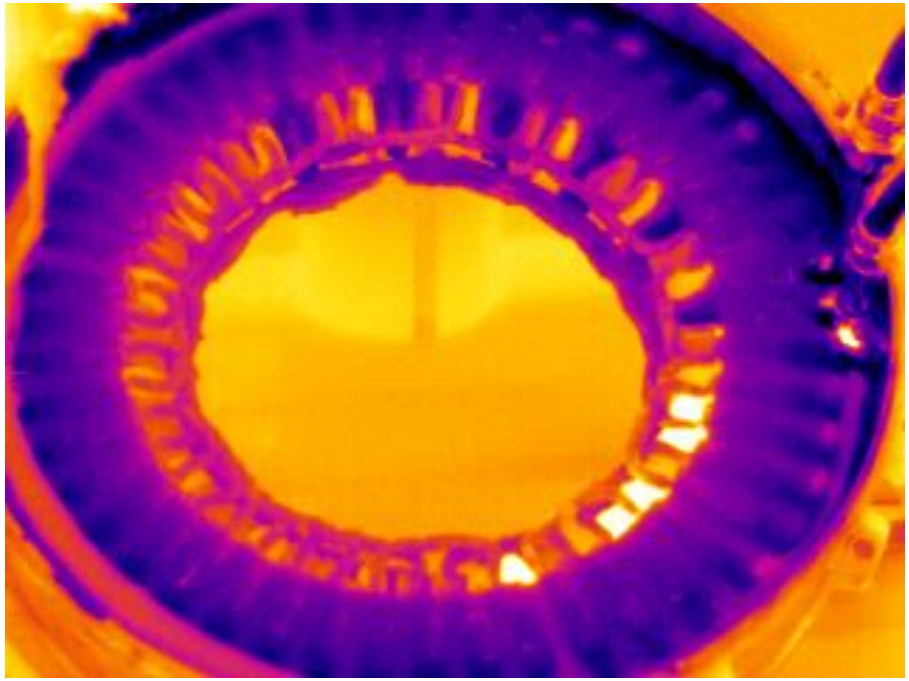
Sedimentation in pipelines



* Sedimentation in pipes is shown as a zone at different temperatures.

APPLICATIONS

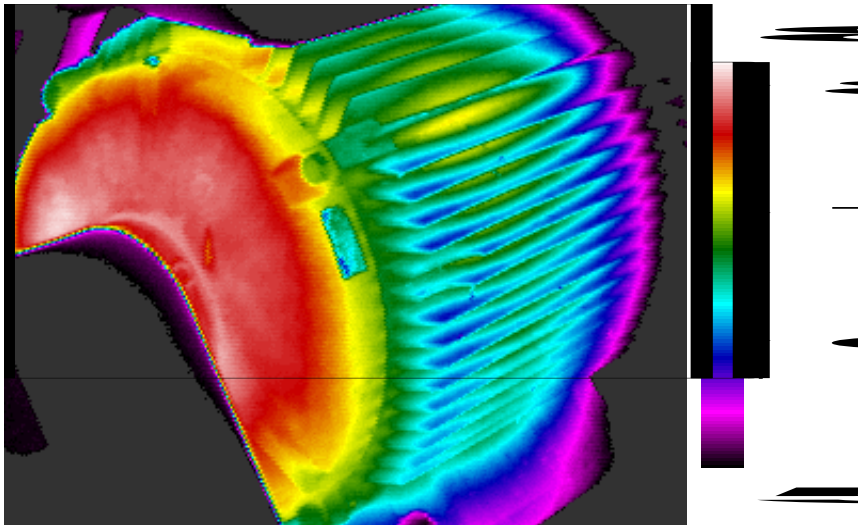
Electric motor windings



- Hot spots and short circuits in the winding.

APPLICATIONS

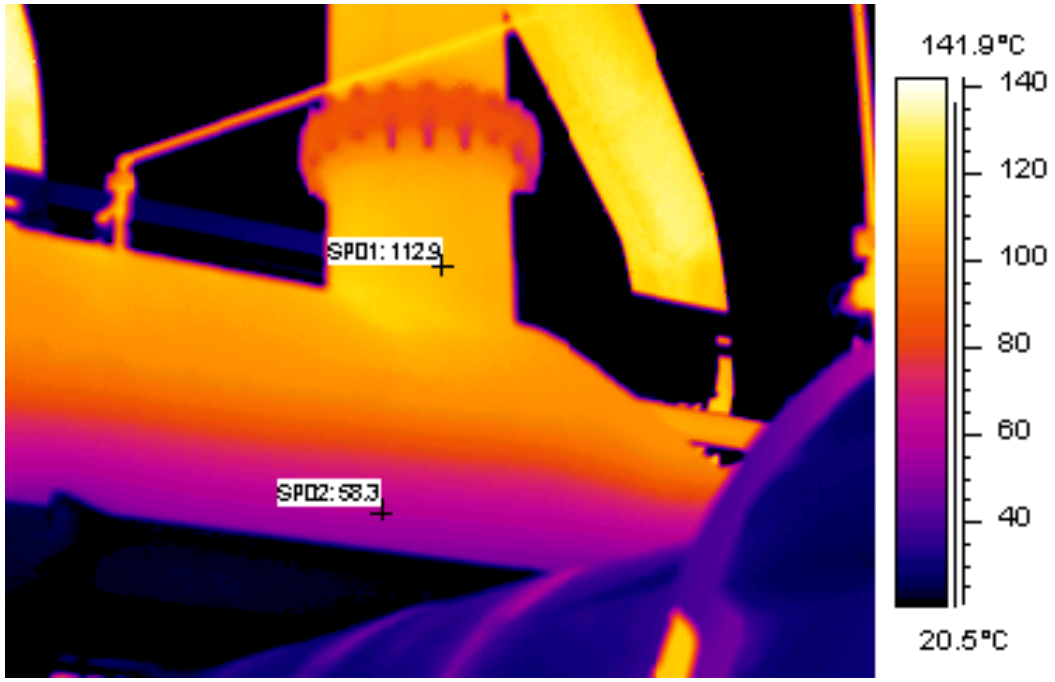
Electric motor bearings



- Bearings of an overheated engine.

APPLICATIONS

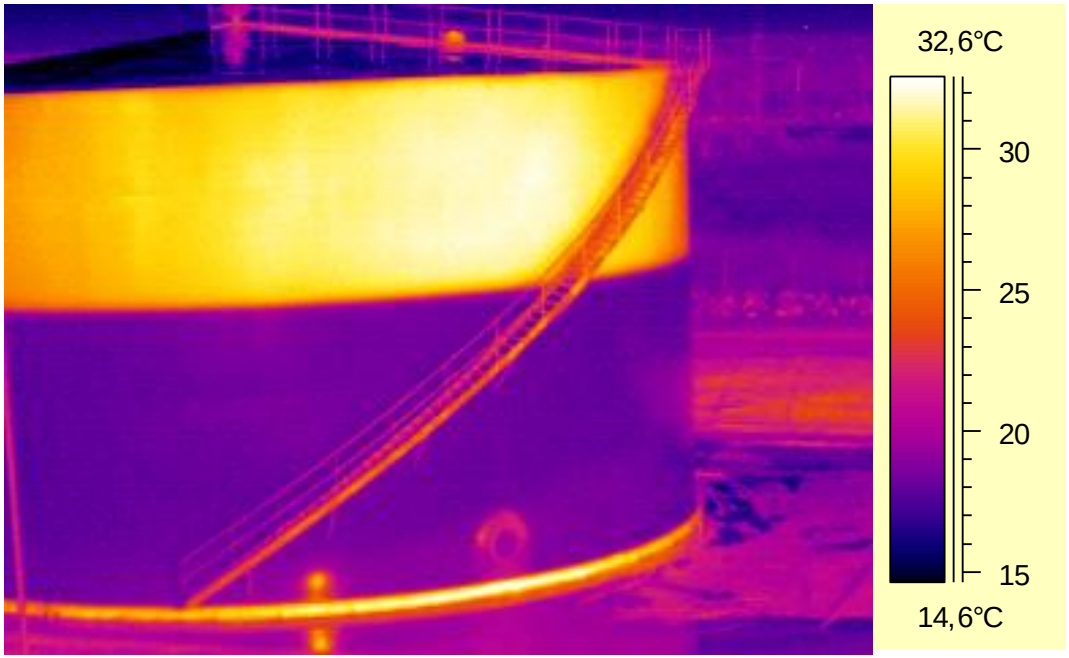
Sedimentation in pipelines



- Sedimentation is shown as a colder zone along the length of the pipe.

APPLICATIONS

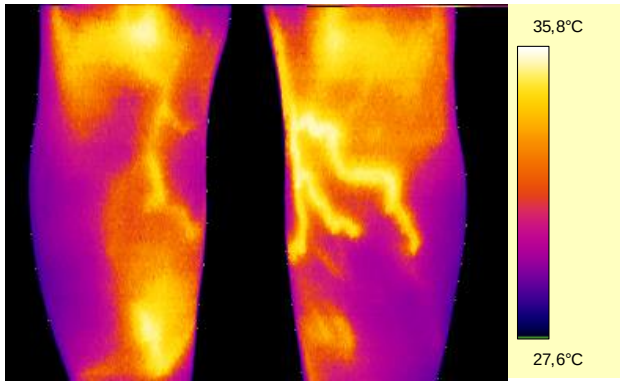
Level of tanks

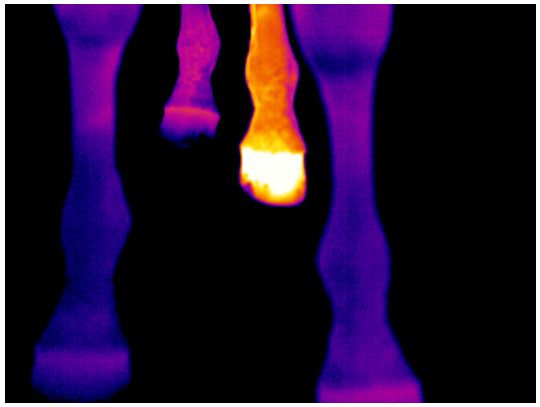


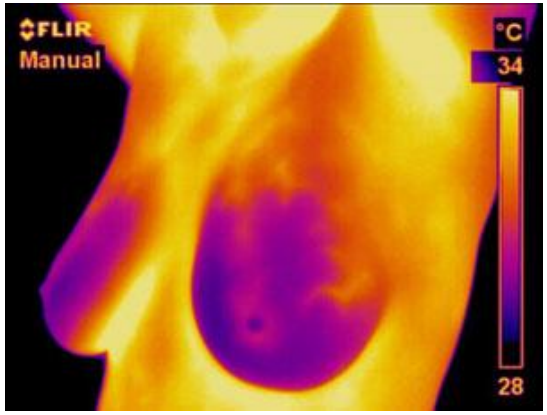
* Visualisation of the liquid level in a storage tank.

APPLICATIONS

Medicine and veterinary



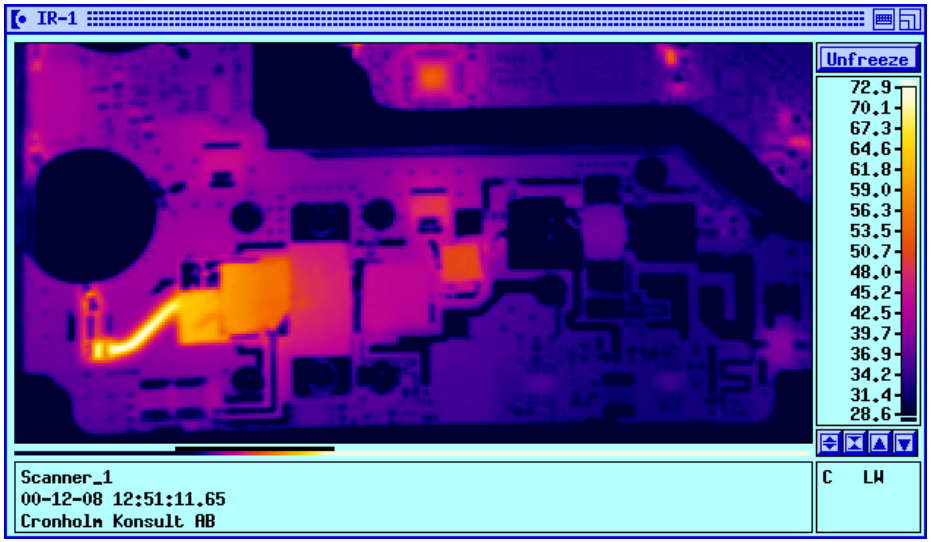




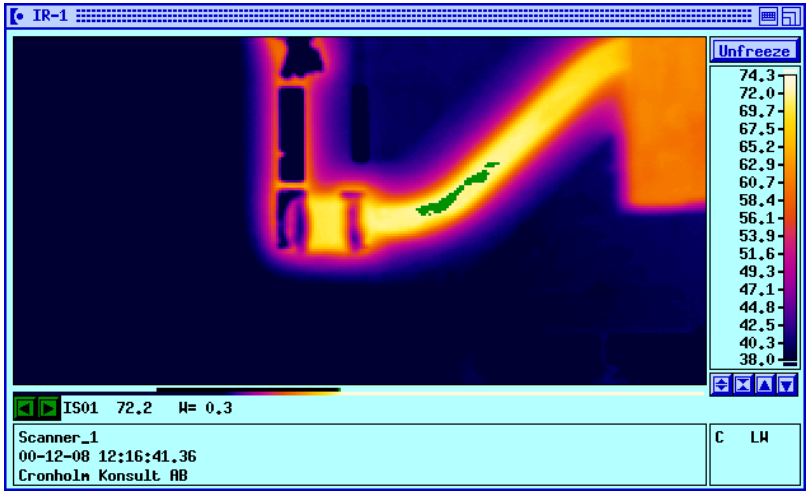
- Diagnosis of varicose veins and breast pathology.

APPLICATIONS

Electronic components

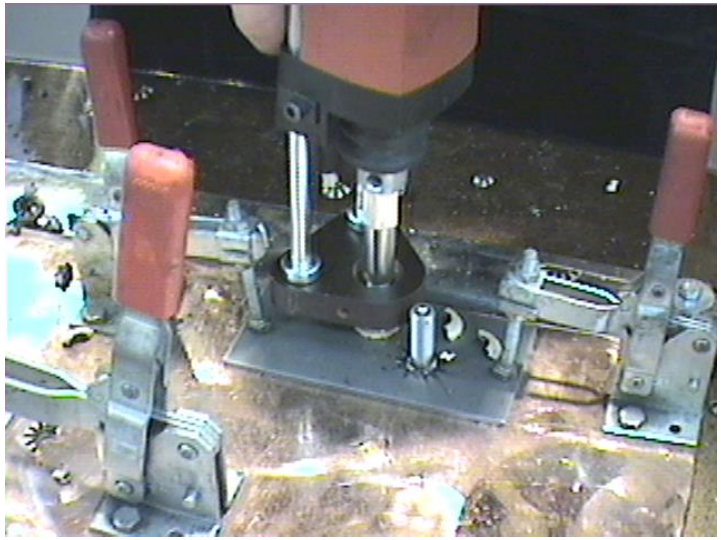


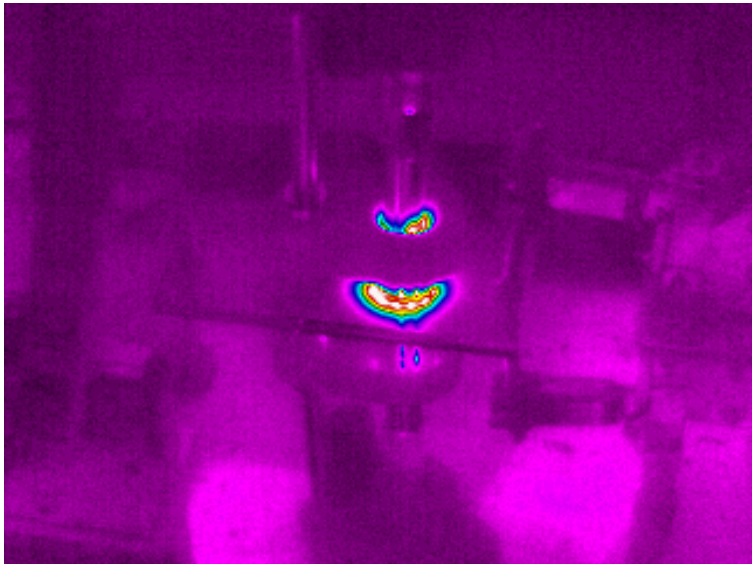
- Track of an overheated printed circuit board.



APPLICATIONS

Quality control in welding

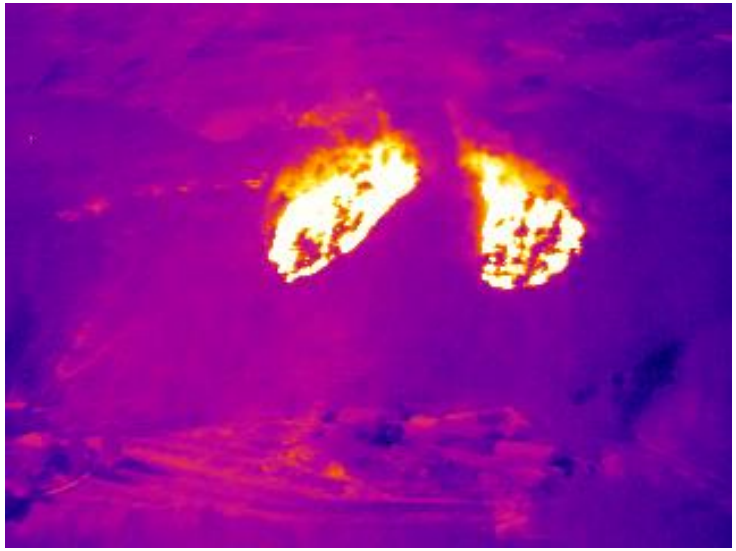




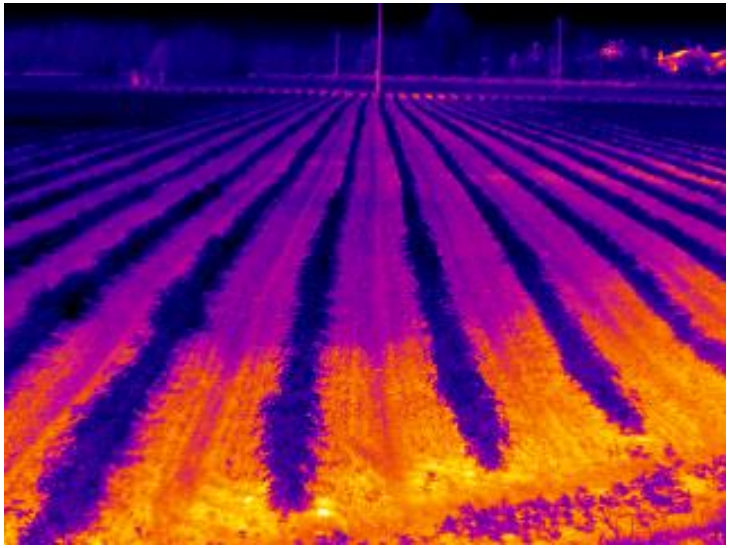
- Welding

APPLICATIONS

Aerial thermography applications



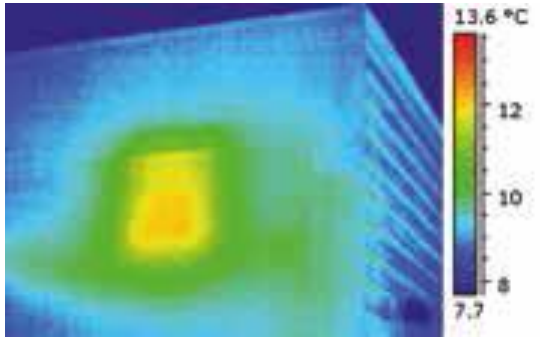
- Detection of forest fires.



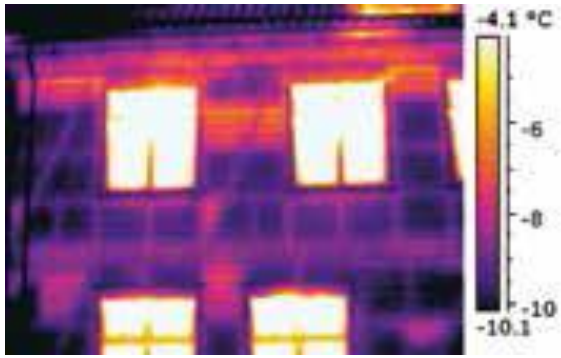
- Irrigation control in fields.

APPLICATIONS

Insulation Defects in edification



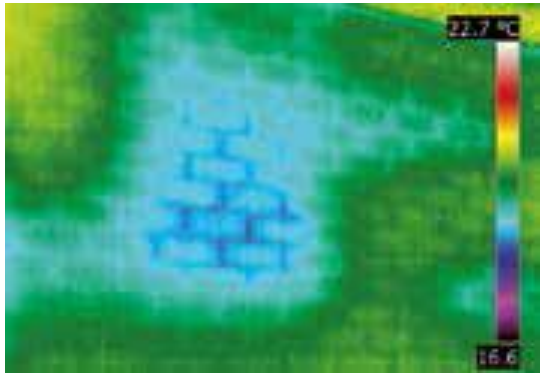
- It is a structure in which a section of insulation is missing.



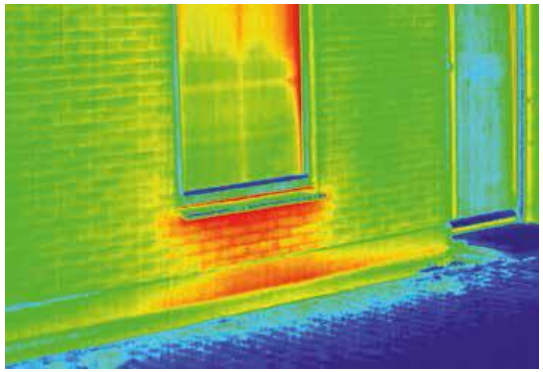
- In many of the sections there is a lack of insulation.

APPLICATIONS

Insulation Defects in edification



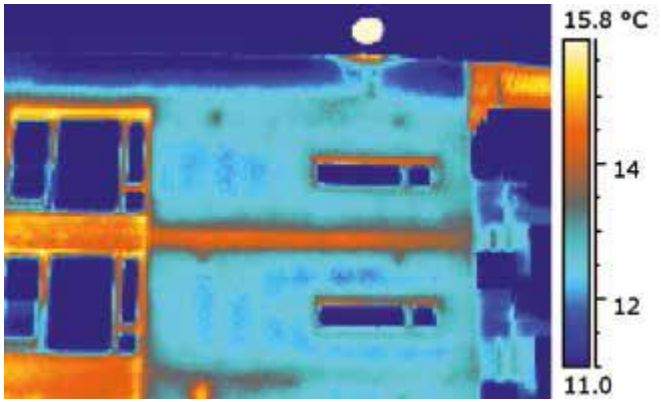
- Lack of insulation in parts of the wall.



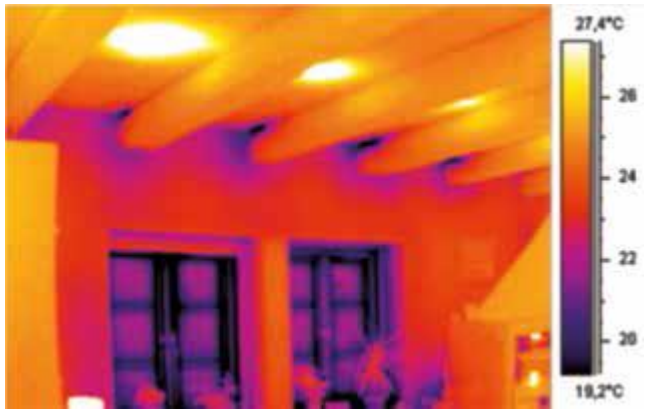
- Missing or faulty insulation.

APPLICATIONS

Thermal bridges in edification



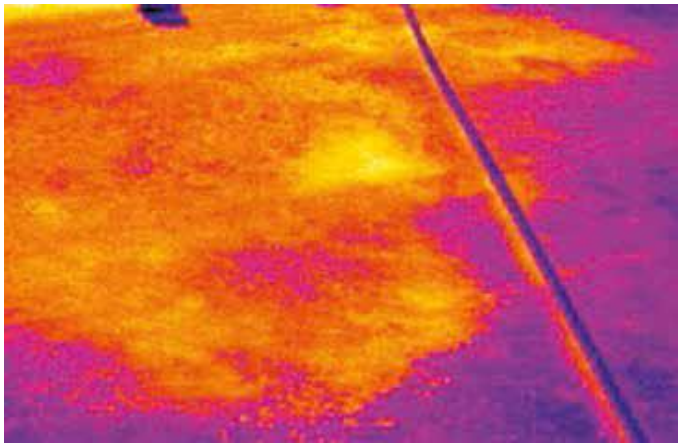
- Thermal bridge in one of the floors.

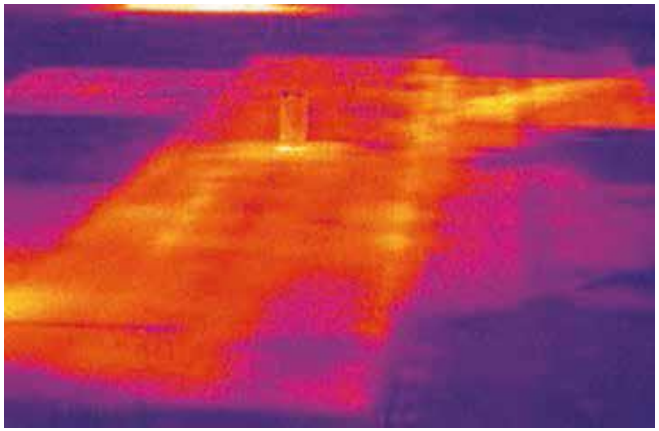


- Thermal bridge between roof joists and adjacent walls.

APPLICATIONS

Roof water leaks in edification





- Water leaks on flat roofs.

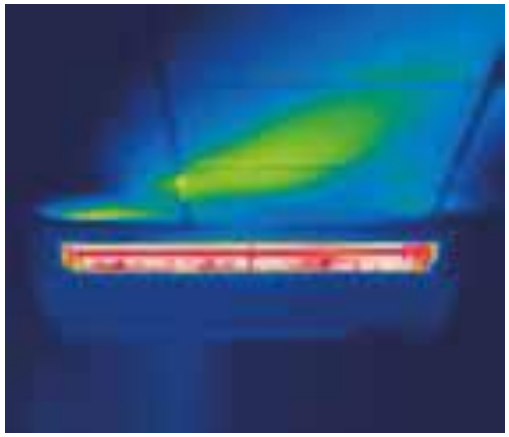
APPLICATIONS

Pipe fault detection

- Detection of blocked or broken pipe problems.

APPLICATIONS

Air conditioning installations



- Maintenance of air conditioning installations.

CONCLUSSION

- **Infrared thermography allows obtaining thermal images to characterize objects superficially.**
- **Its application to maintenance is highly developed but it also has other uses.**
- **Infrared thermography is a versatile and powerful tool.**

Thank you for your attention