

The following slide set, is a cross-section of work undertaken over the past academic year across different disciplines within the School of Technology and Design.

Slide 2 is a compilation of slides 3 to 17 to give an impression of how the poster will look.

## Introduction



The idea was inspired by a chance discussion with a group of students studying **Architectural Technology** who wanted to determine the temperature gradient within a room.

We could do with a **Thermal Imaging Camera** as it would have numerous uses for your course.



## Opportunity

In April 2003 there was an opportunity to bid for funding under the auspices of the **New Technology Institute**. We were successful and subsequently took delivery of a camera in late August.



*However it wasn't without it's difficulties !!*

## The Camera

**ThermaCAM™ P40** infrared camera manufactured by **FLIR Systems**.

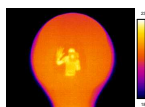
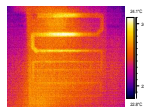
Focal plane array 320 x 240 pixels.



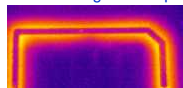
Temperature range  
-40° → +120°C  
or 0° → +500°C

Thermal Sensitivity

Numerous initial problems had to be overcome. One of which was reflections that would impair readings.



One of greater importance was emissivity.



The track of a printed circuit board, carrying current, looks colder than the board it's mounted on!

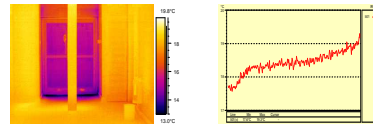


University College  
NORTHAMPTON

## Visualising Complex Engineering Concepts using Modern Imaging Techniques

Alan Casey  
Phil Picton

### Work with Architectural Technology students

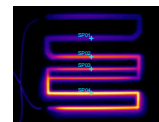


Using a thin paper strip hanging from the ceiling to measure the temperature gradient from floor to ceiling.

A very successful demonstration and fun to do! with 17yr old students on a visit day.

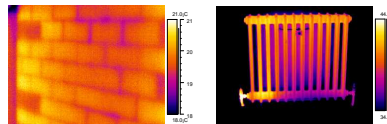
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The live image (a far better quality than this!) was headed up onto a screen using a data projector and the students were asked to predict the hottest track.



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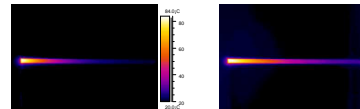
### Work with Architectural Technology students



Plastered external wall - revealing the block-work underneath and the mortar joints.

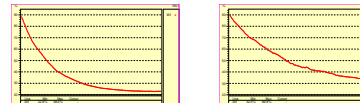
Cast iron radiator - showing the heat distribution.

### Another live demonstration - Thermal conduction

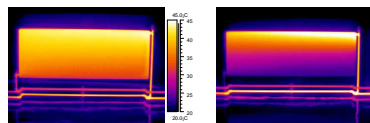


Steel bar

Copper bar



### Work with Architectural Technology students



Panel radiator - connected to the flow and return

Panel radiator - connected to the flow only

### Comparing 3 domestic lamps with same rated luminance Another school activity day in July.



40w tungsten 11w energy saving 9w energy saving

The task also included comparisons in our dark room and energy consumption.

### Work with Mech. Eng. students

Temperature comparison of an electrical motor drive unit running correctly and with overloaded end bearings.

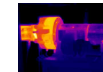
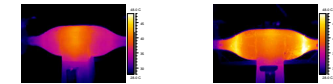
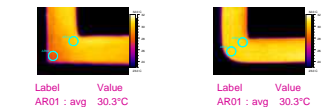


Image of the platen and screw feed. Taken during a visit to an injection moulding plant.

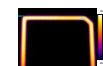
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Temperature comparison of a 15mm x 1mm thick copper strip between square and radiused corners.



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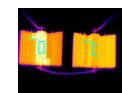


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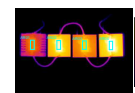
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Temperature comparison with and without heat-sink compound.



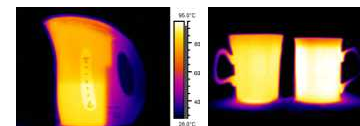
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Temperature comparison of differing styles of main processor heat-sinks.



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### Work with Product Design students



Investigations involved good kettle design.

Comparison of materials and styles used for the

manufacture of coffee mugs.

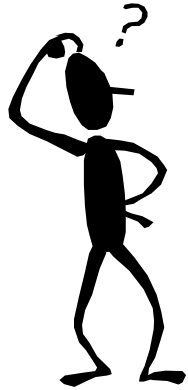


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# **Visualising Complex Engineering Concepts using Modern Imaging Techniques**

**Alan Casey**  
**Phil Picton**

# Introduction



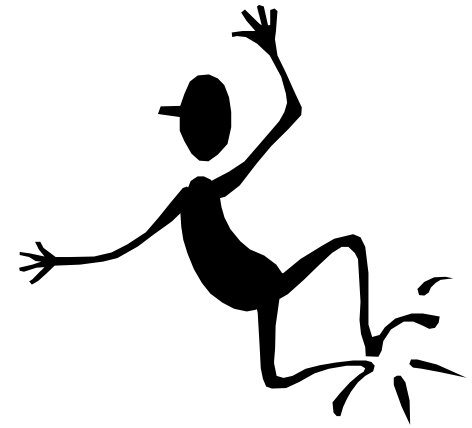
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Focal plane array **320 x 240** pixels.



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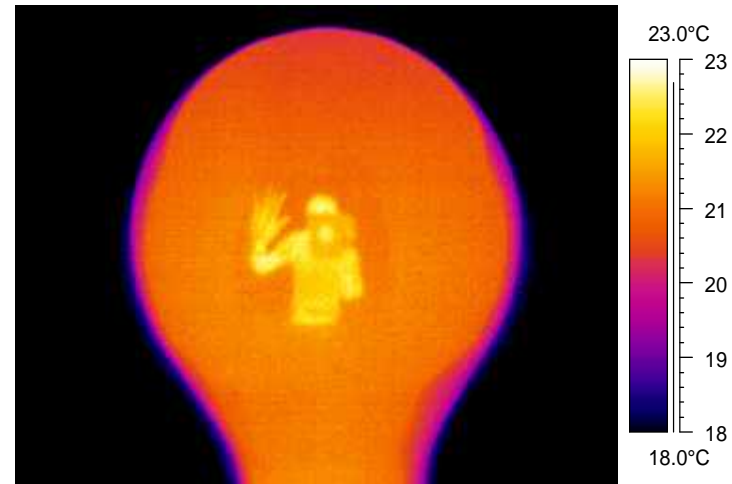
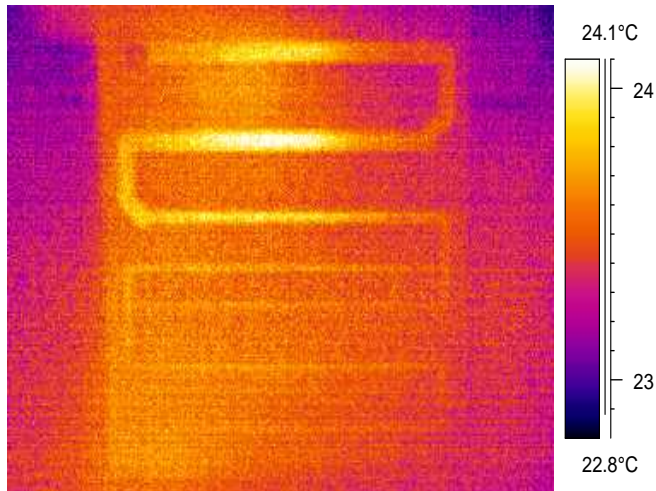
or **0° → +500°C**

Thermal Sensitivity

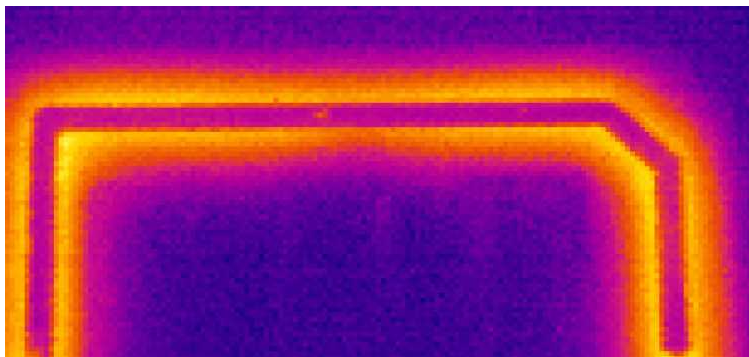
**≈ 0.1°C**

Numerous initial problems had to be overcome.

One of which was reflections that would impair readings.

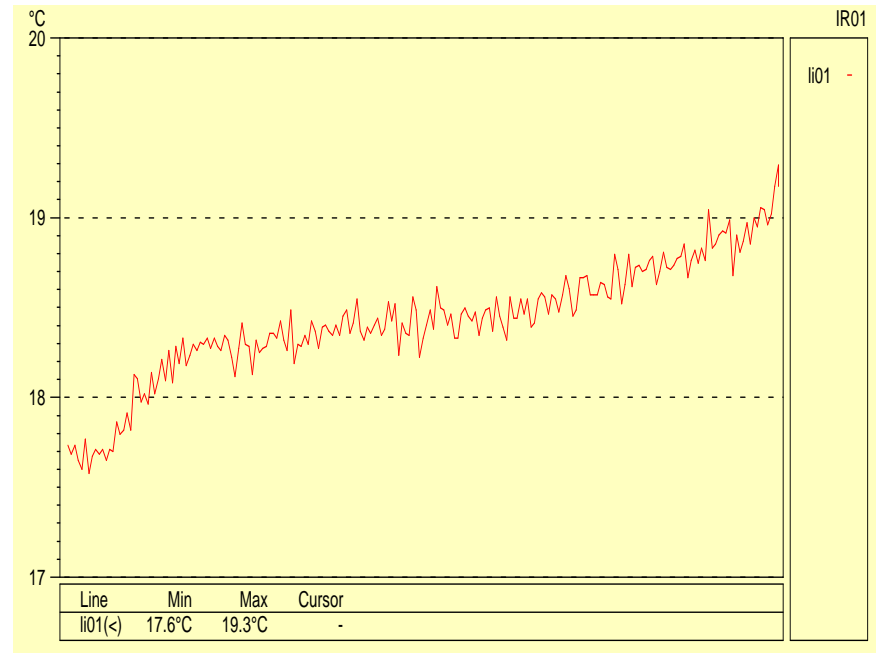
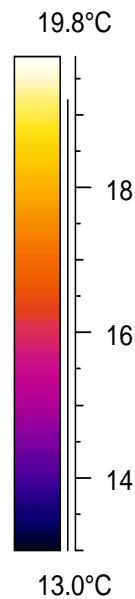
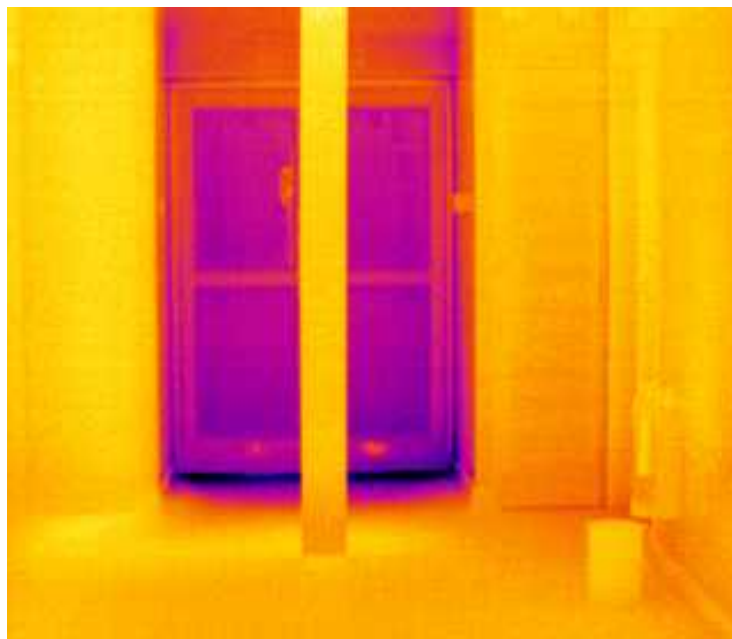


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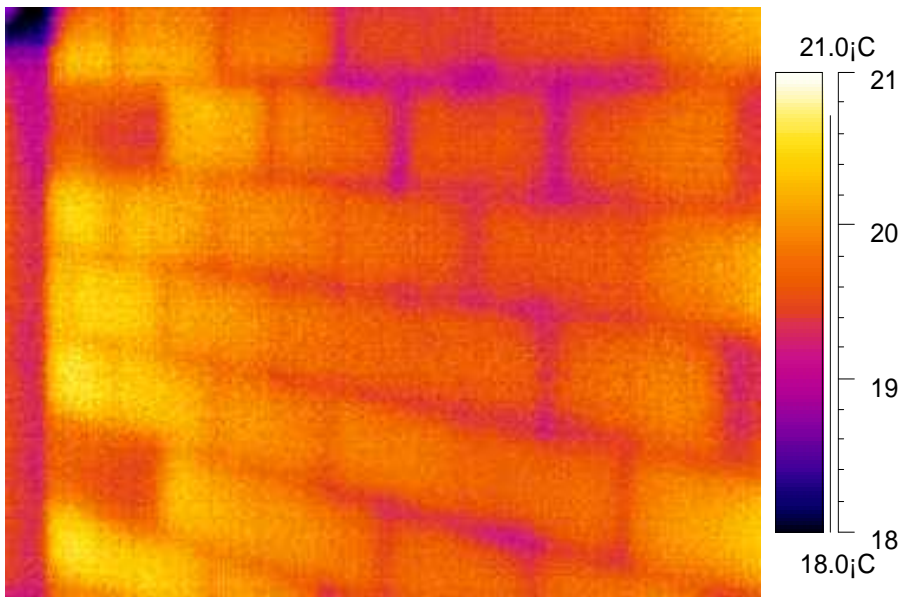
# Work with Architectural Technology students



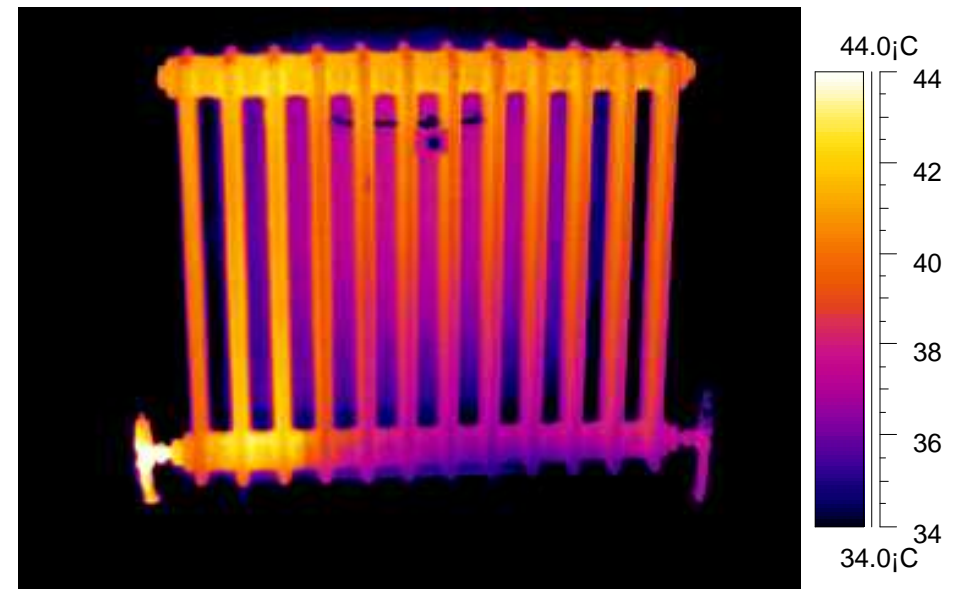
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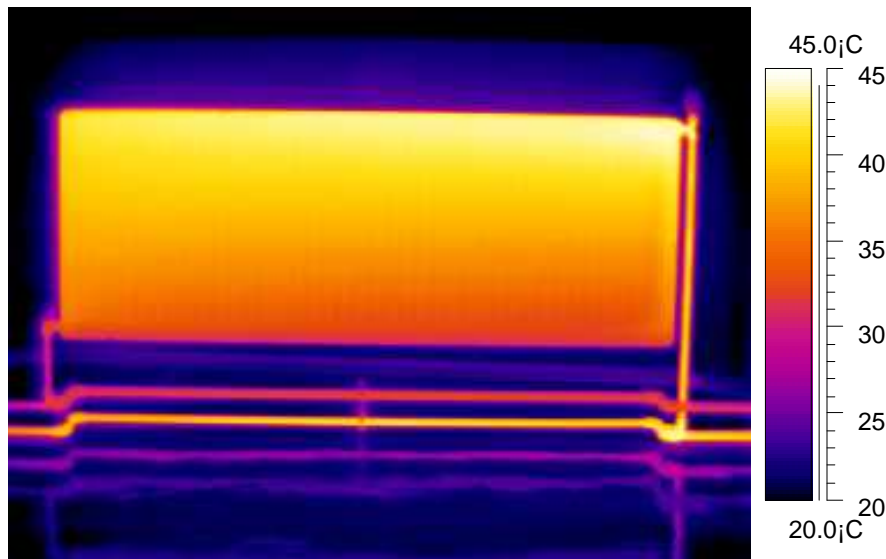


Plastered external wall - revealing the block-work underneath and the mortar joints.

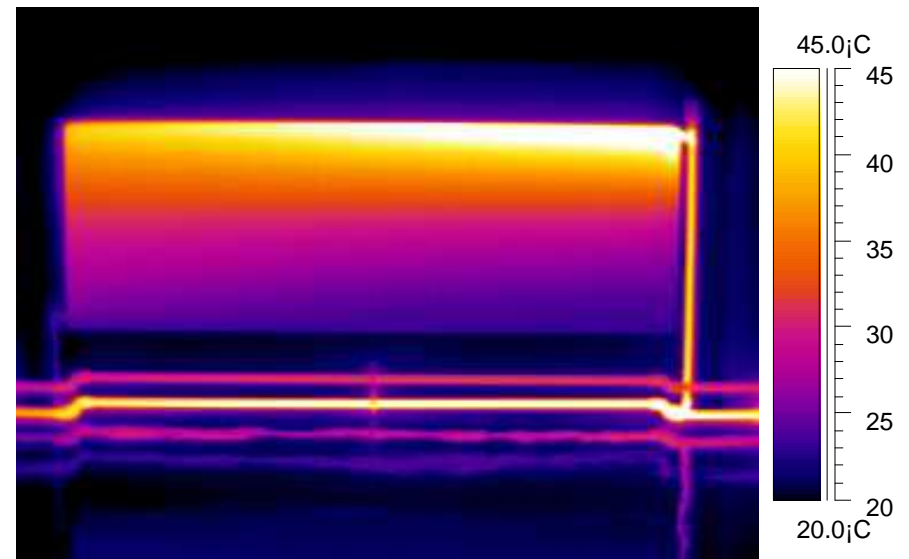


Cast iron radiator - showing the heat distribution.

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Panel radiator - connected  
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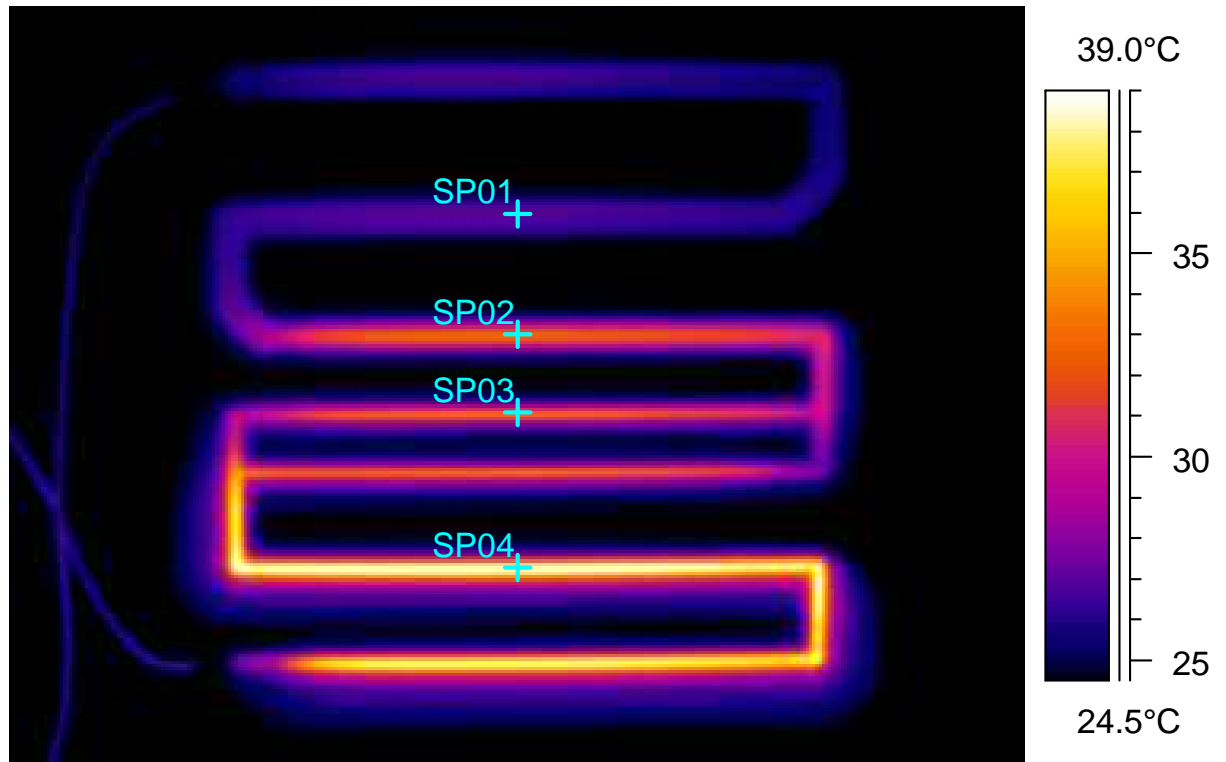


Panel radiator - connected  
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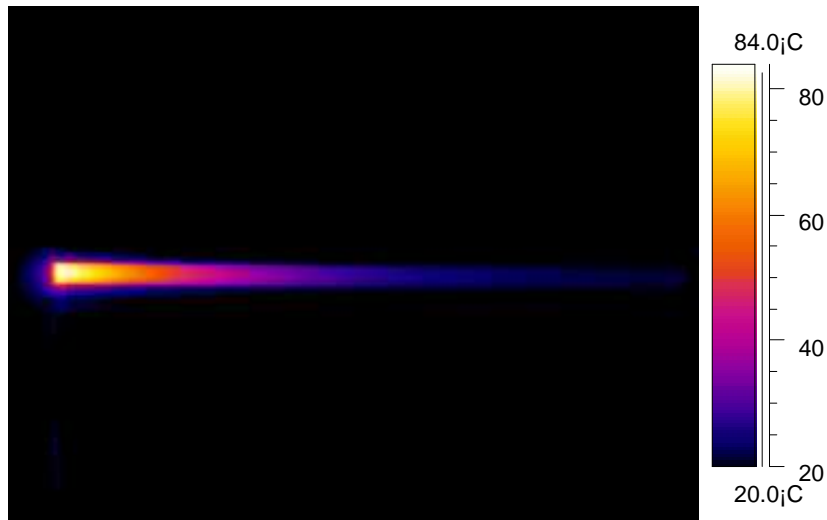
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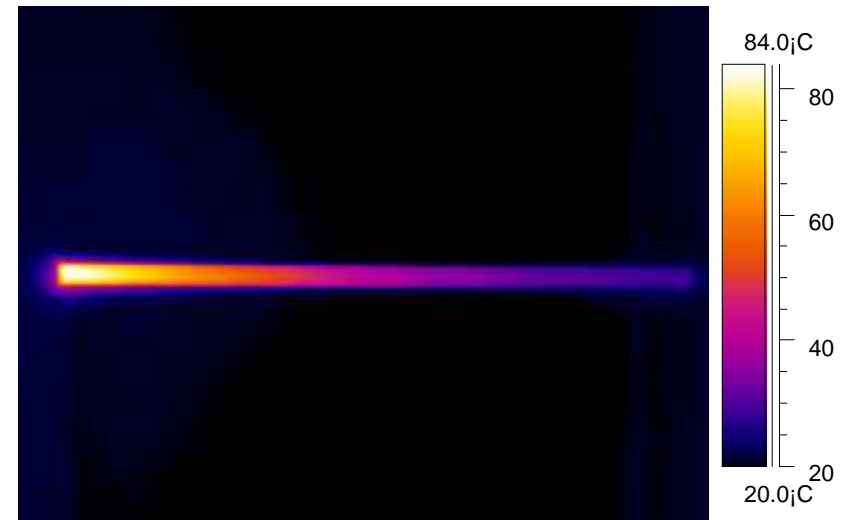
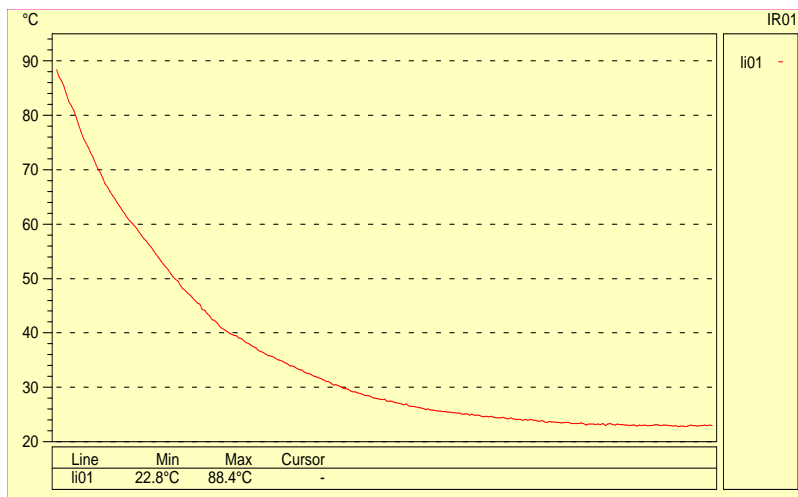


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Steel bar - 300mm long x 10mm dia

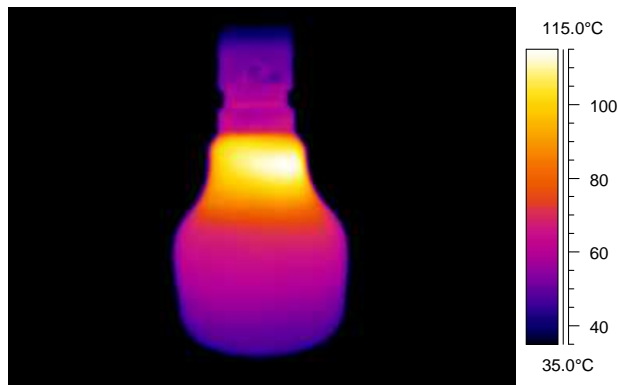


Copper bar - 300mm long x 10mm dia

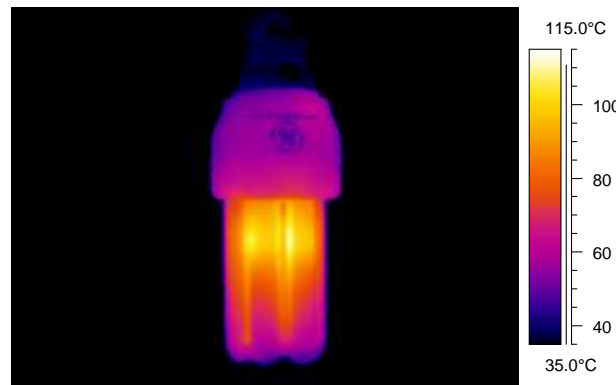


# Another school activity day in July.

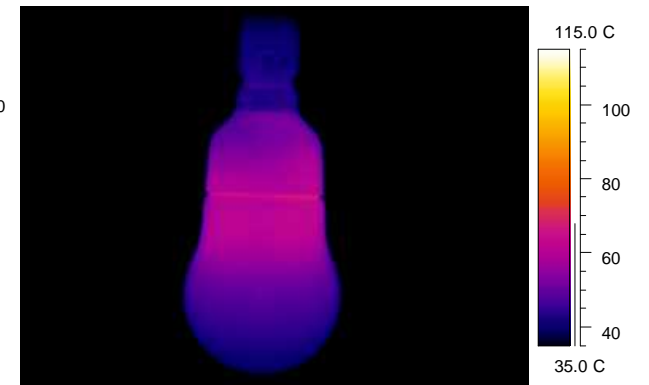
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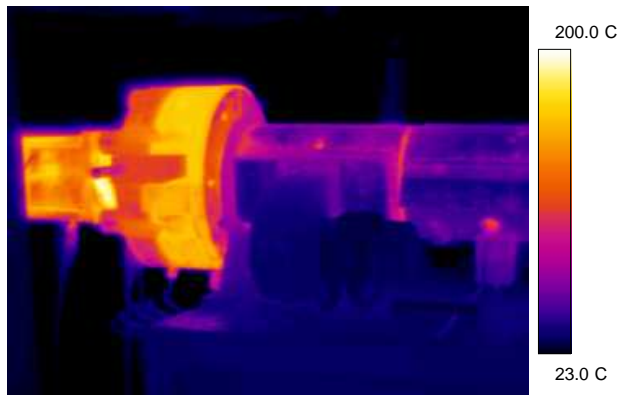
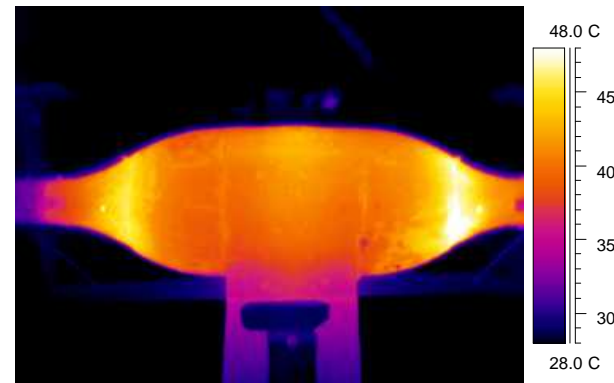
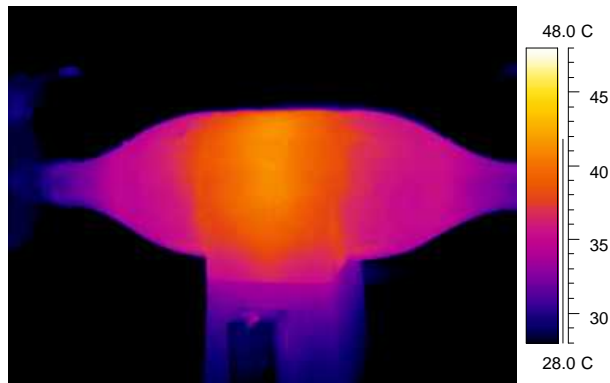
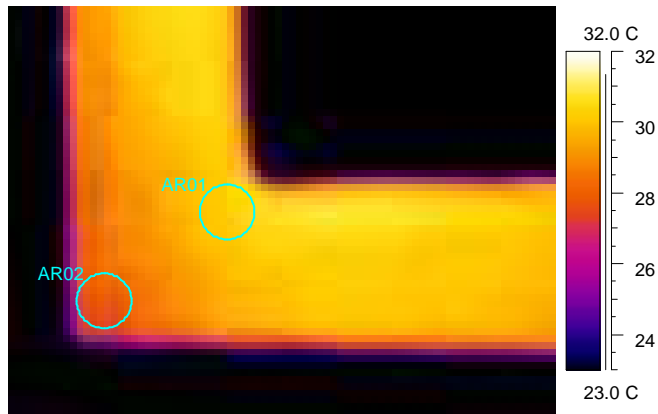


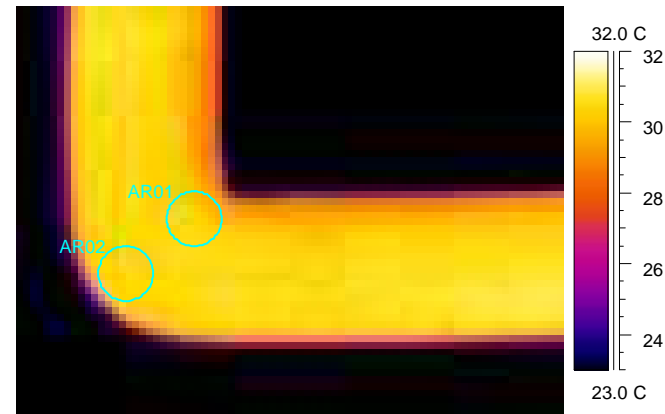
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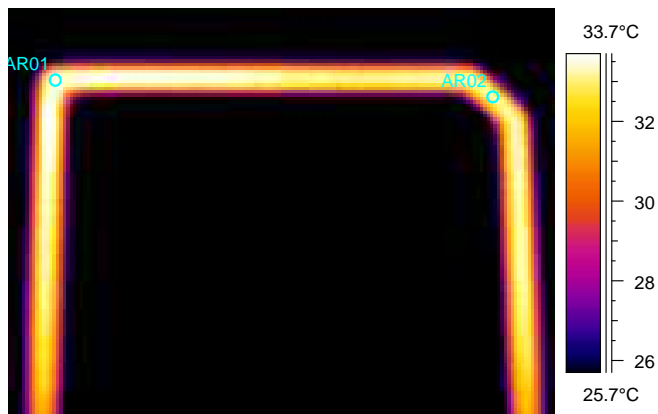
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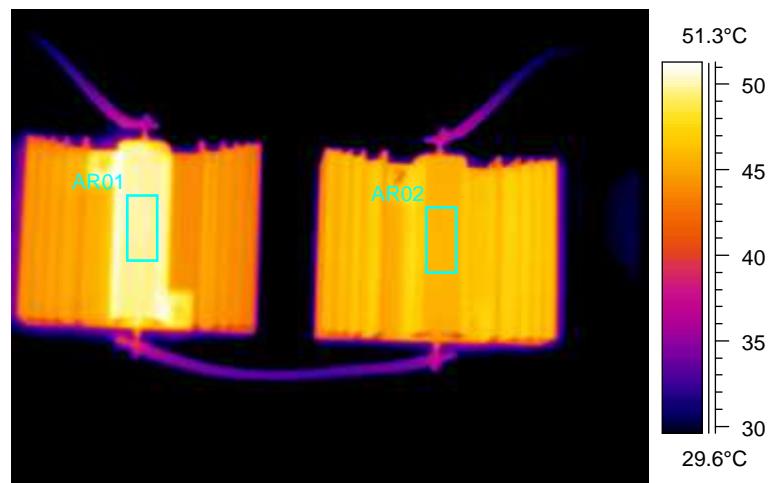


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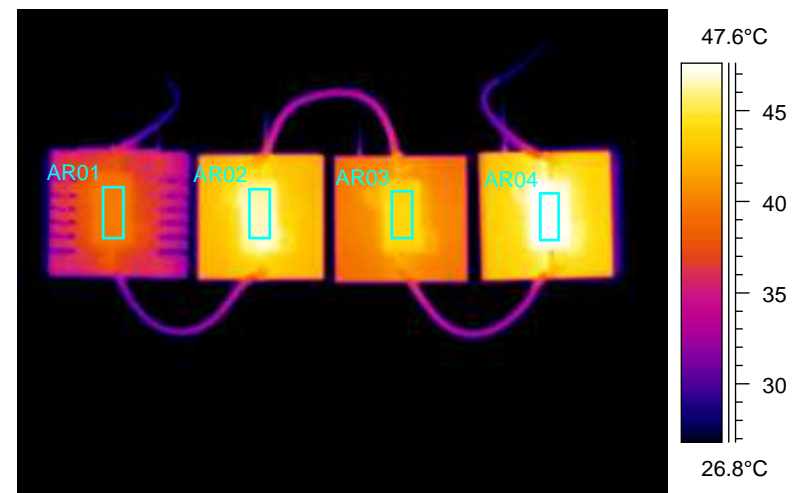
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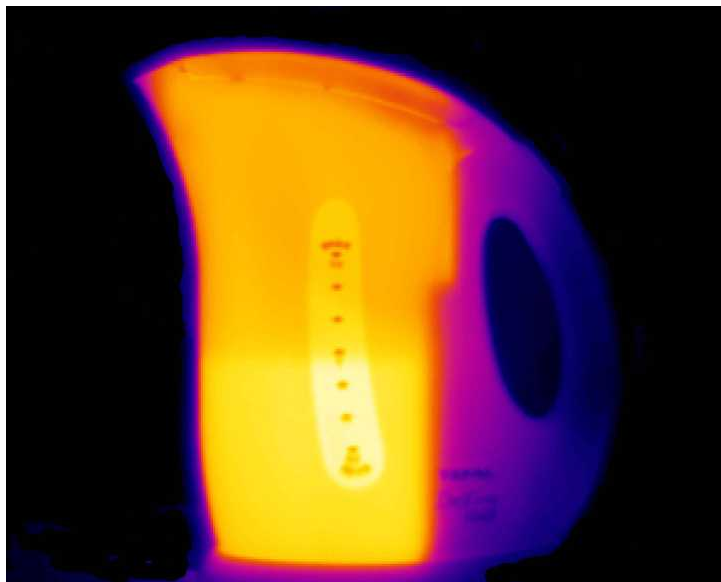
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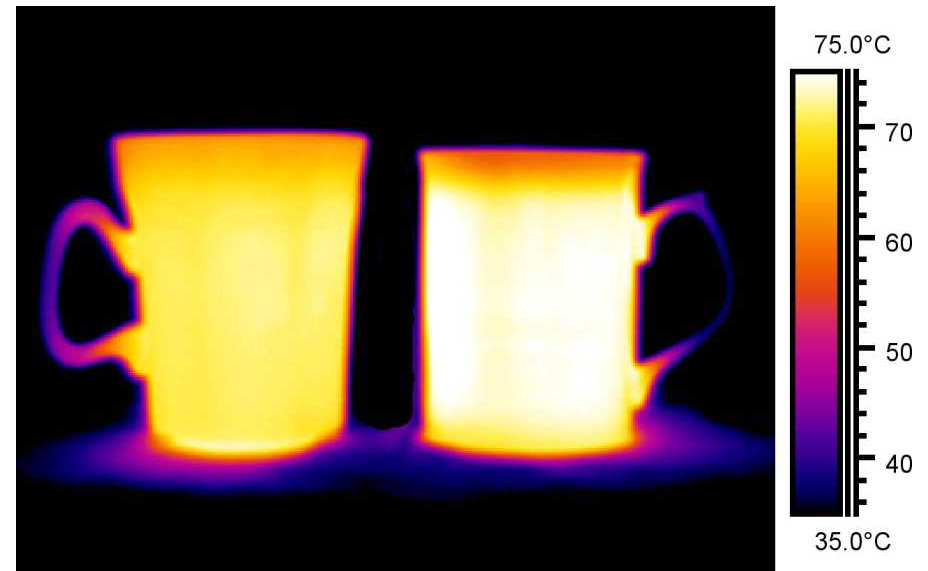
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