

# Accelerated temperature mapping for mission critical components

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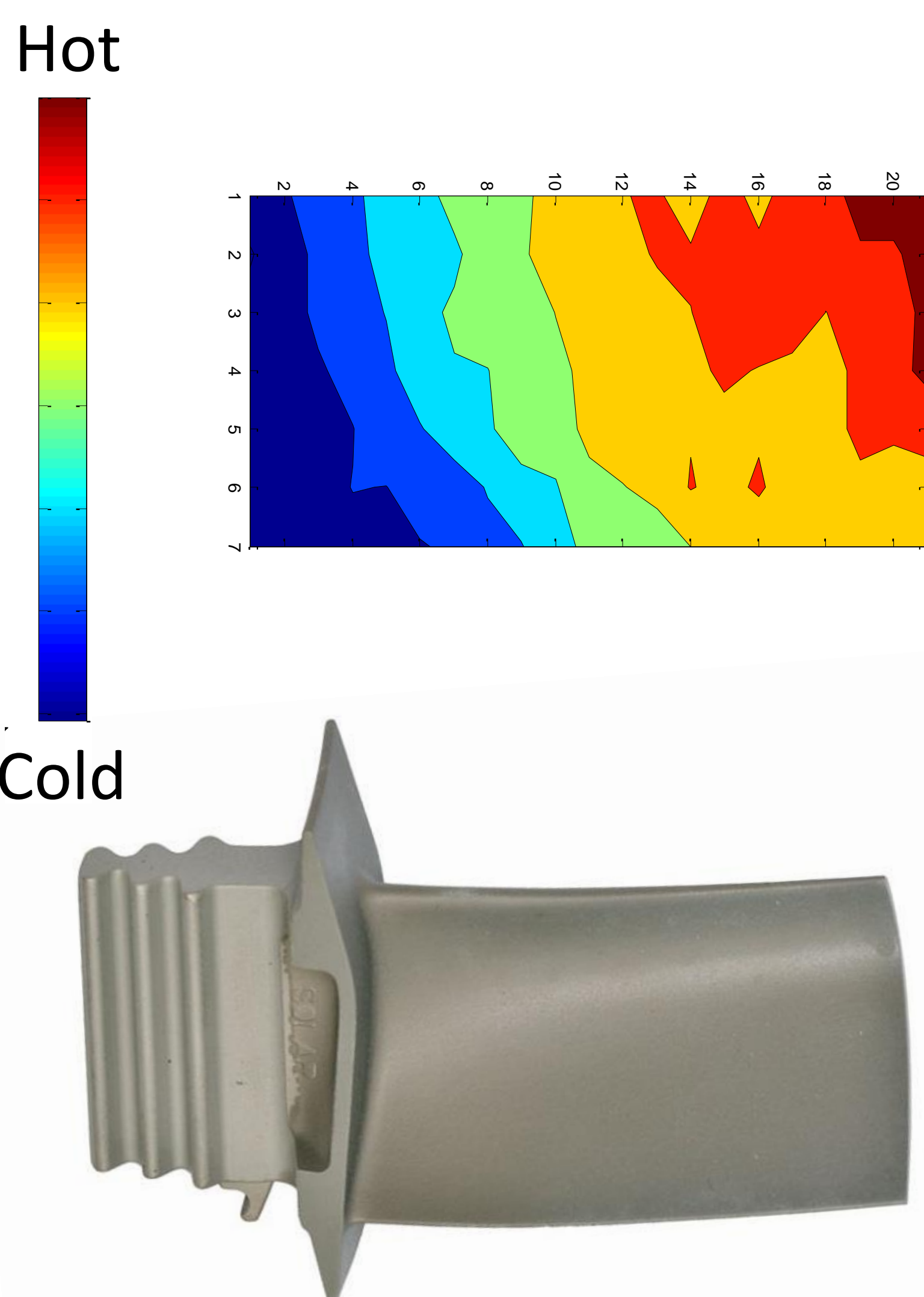
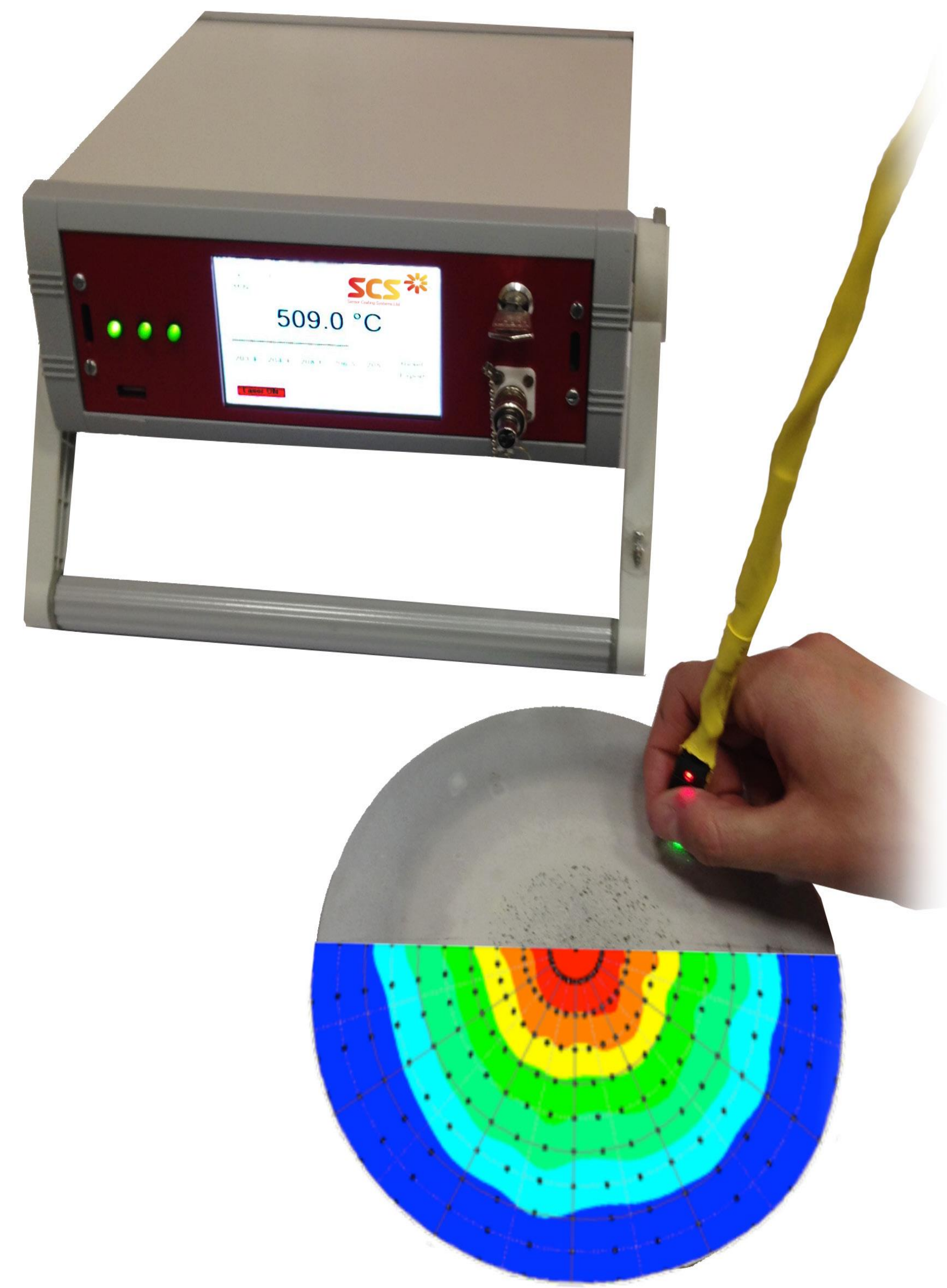
Skills for Breakthroughs: enabling technology to reduce CO<sub>2</sub> emissions

## How it works

This project involves the development of novel *Thermal History Paints* (THPs). These coatings are able to deliver offline temperature measurements using smart materials.

They are composed of rare-earth ceramic pigments in a binder. The coating experiences permanent changes in its luminescence behaviour depending on the exposure temperature. After operation, these changes are measured with an optical device and linked back to the maximum temperature of exposure. Benefits over existing technologies include:

- Portable, **objective** measurement system
- **Automated surface** measurements
- **Non-toxic**, durable coatings (REACH compliant)
- Coating has survived **engine tests** in UK and US



## Technology Drive and Applications

The aviation industry aims to reduce CO<sub>2</sub> emissions. A key aspect of improvement will be the area of propulsion. It is critical to have a detailed, accurate knowledge of component surface temperatures in order to run engines more efficiently.

This innovative technology has applications in several key areas, including

- **Component design and development:** THPs allow for rapid evaluation of temperature conditions, providing faster, more accurate ( $\pm 10^\circ\text{C}$ ) results than current technologies
- **Improved maintenance procedures** for long-term applications e.g. optimised maintenance schedules.
- **Warranty tool** for overheated components.
- **NDE** – early failure recognition

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