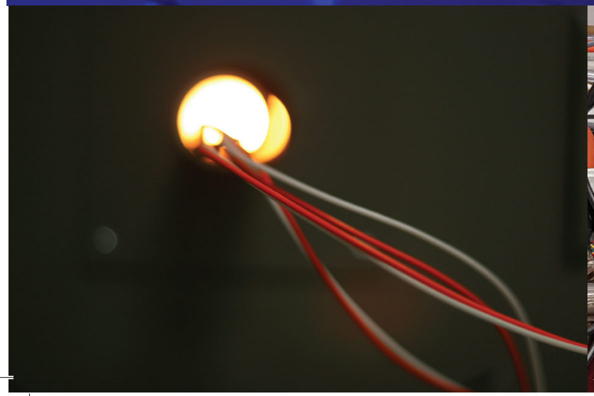

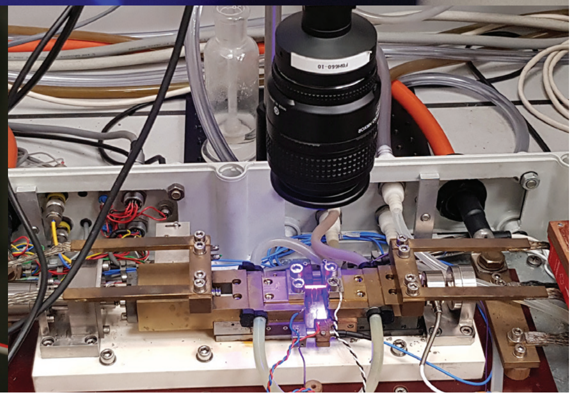

Partners

Twenty-eight partners from the metrology community, high value manufacturing industry, sensor manufacturing and academia.

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High value manufacturing depends on accurate, traceable temperature measurement.

The overall aim of the project is to enhance the efficiency of high value manufacturing processes by improving temperature measurement and control capability. Enhanced efficiency includes improved energy efficiency (and hence reduced emissions); improved product consistency (and hence reduced waste); increased sensor stability, reliability and longevity (and hence reduced operator intervention). This project addresses the four contemporary thermometry challenges where the need for improvement is greatest: namely surface contact temperature probes, thermocouples, combustion thermometry, and optical fibres.

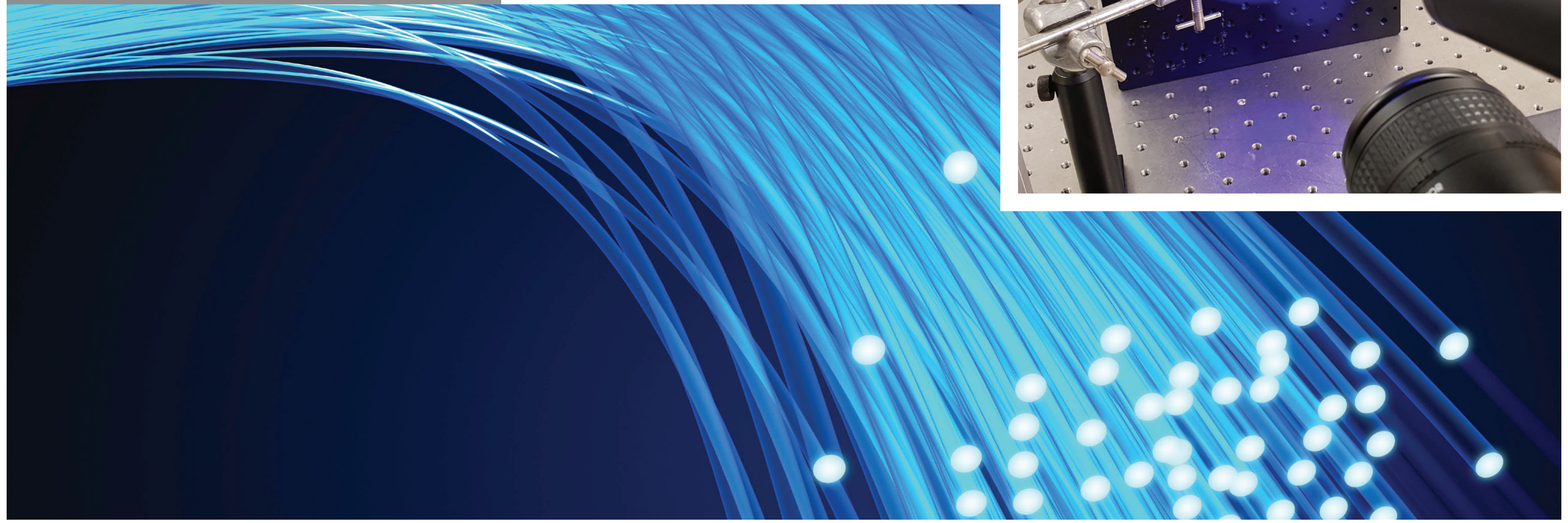
All activities in the project are characterised by the implementation of traceability to the International Temperature Scale of 1990 (ITS-90) in-process. Such traceability is critical to establishing low measurement uncertainty and reproducible process control.

The project is industry-focused with the outputs being trialled in-process during the project's lifetime. In addition, the outputs of this project will provide input to international standards.

By introducing traceability to ITS-90 directly into the process and through developing novel calibration techniques, as well as sensors with immunity to perturbing influences, the uncertainty of thermometry in industry will be substantially reduced, with a corresponding enhancement in the efficiency of the process.

Benefit industries / In-process trials

- Welding
- Forging & forming
- Heat treatment
- Furnace manufacture
- Automotive (brake disks)
- Glass manufacture
- Steel manufacture
- Waste incineration
- NO_x processing
- Fire resistance testing
- Nuclear / Ionising radiation
- Magnetic fields
- Plasma storms
- Silicon processing



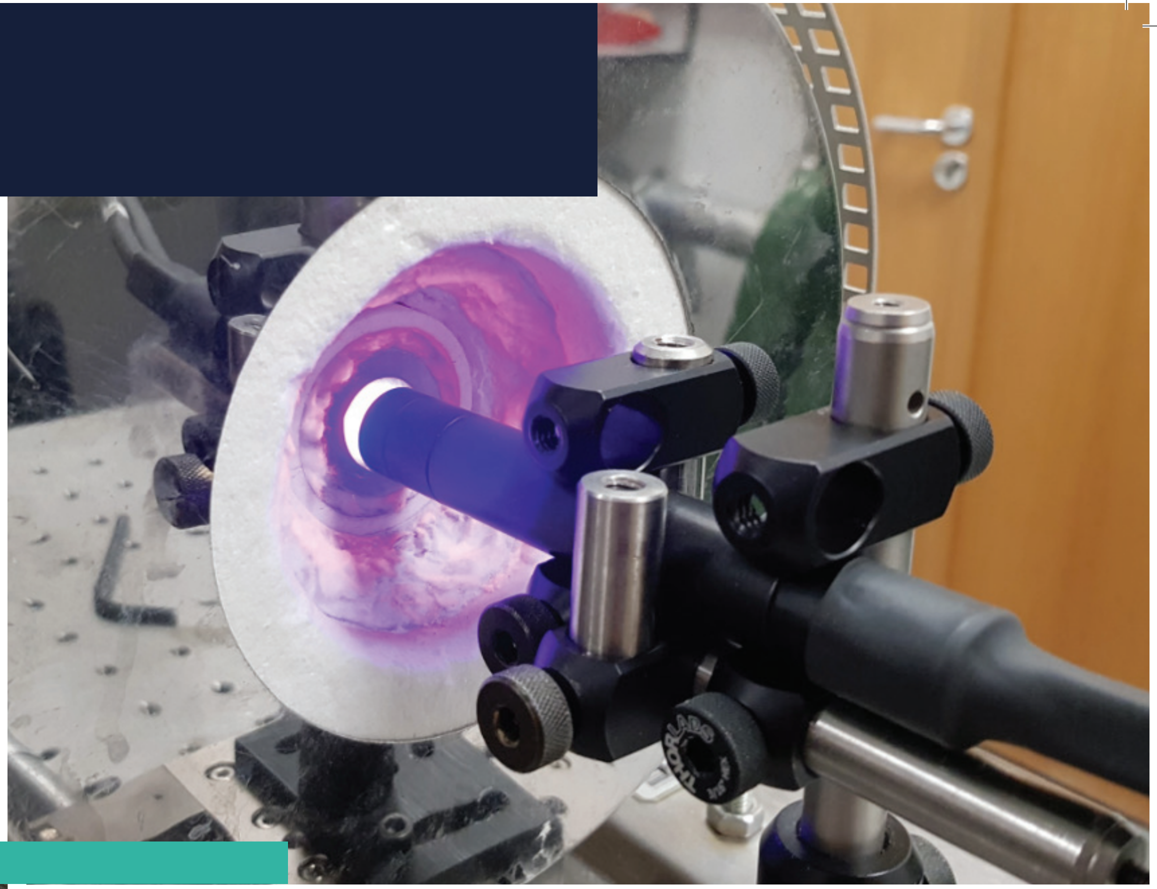
Specific objectives

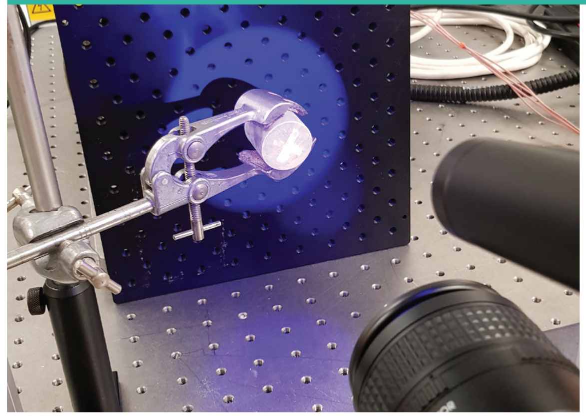
WP1 Implement traceable surface temperature measurement in-process

By developing accurate methods for phosphor thermometry for temperatures up to 1000°C. Such methods will also be combined with quantitative thermography in order to determine emissivity for temperature measurements over wide fields of view. The in-process target uncertainty for these techniques is less than 3°C at 1000°C.

WP2 Reduce uncertainty of temperature measurement in-process

Through developing and implementing improved and traceable low-drift temperature sensors for enhanced process efficiency and improved temperature control. This will address the traceability of optimised Pt-Rh thermocouples, and a reduction in the uncertainty of new in-process temperature sensors such as the double-walled mineral-insulated, metal sheathed thermocouples through mitigating insulation resistance breakdown and drift effects. The uncertainty will be less than 3°C up to 1500°C (1300°C for the mineral-insulated, metal sheathed thermocouples).





WP3 Implement *in-situ* traceable combustion thermometry

By validating an *in-situ* combustion reference standard (standard flame) of known temperature with an in-process target uncertainty of less than 0.5%. In addition, to use the combustion reference standard to evaluate the linkage between portable standard reference flames, improved process temperature control, and an enhancement in process efficiency.

WP4 Introduce traceable fibre-optic thermometry

By developing reliable, accurate and validated methods for demonstrating the traceability of at least two different types of fibre-optic thermometry in hostile environments. In addition, to develop novel methods for fibre-optic thermometry, validated in at least one harsh environment with a target uncertainty of better than 5°C up to 500°C.