



**Southside Thermal
Sciences Limited**

Innovative Sensor Solutions

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STS proves novel on-line temperature detection system on an operating Rolls-Royce engine

Southside Thermal Sciences (STS) Ltd successfully conducted a gas turbine engine test on a Rolls-Royce VIPER 201 engine using its fully patented sensor coating technology to measure temperatures on-line. The work was conducted under the project 'Sensor Coating System – SeCSy' which is co-financed through the Technology Strategy Board (TSB) and is in cooperation with RWE npower, LAND Instruments and Cranfield University. The VIPER gas turbine is owned by STS and has been specifically modified to enable optical access.

The technology promises remote on-line temperature detection better than 5°C accuracy in harsh environments. Classical temperature detection methods such as the use of thermocouples or of pyrometers come with disadvantages specific to the gas turbine environment. Higher uncertainties in these methods can result in lower operating temperatures in order to maintain a safety margin with the consequence of less efficient operation. STS's sensor coating system provides an on-line monitoring tool which enables more accurate remote detection of temperature on and in the thermal barrier coating (TBC) – a key component in the hot gas path section of a modern gas turbine. This novel capability will lead to a reduction of temperature safety margins and thus to an increase in efficiency.

The technology combines the advances observed in the development of today's high temperature protective coatings with the luminescence properties of ceramics used in TV screens or in energy efficient light bulbs. When illuminating the novel coating with UV light the coating starts phosphorescing and this phosphorescence can be used both to read temperature and detect evidence of ageing in the coating.

The original concept was established as early as 1998 at Imperial College London and has been under development by STS since 2002. The proof of the technology on an engine test bed includes production line sensor coatings and advanced robust optical detection hardware and software.

'The STS team is very excited! This is a major milestone in the development of the technology as all other previous research efforts in the Sensor TBC arena have been done under laboratory conditions' says Dr Jörg Feist, Managing Director at STS.

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