

Sensor Coating Systems Ltd. (SCS)

www.sensorcoatings.com

Press Release

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UK Research
and Innovation

Sensor Coating Systems' new robotic system delivers digitised temperature data overnight, speeding up the engine design process and reducing costs.

London – Sensor Coating Systems (SCS) successfully completes the ARREST (Automated Robotic REadout System) project after 18 months of R&D. The project is co-funded by Innovate UK, part of UK Research and Innovation, through the Government's Industrial Strategy Challenge Fund (ISCF). During the project, an automated readout system for SCS's thermal mapping system was developed. This will enable SCS to provide engine designers with access to temperature test data in a faster and more accurate way than previously possible.

Environmental policies and the motivation to lower operational costs drives engineers to look for innovative ways to develop new engines and lower their energy consumption. In order to improve component design and efficiency, it is crucial to know the exact temperature profile of the part. As such, Sensor Coating Systems has developed a unique temperature measurement system consisting of luminescent temperature memory materials (Thermal History Coatings & Paints) and an associated laser-based readout device. In August 2017, Sensor Coating Systems started the ARREST project with the main objective to improve the readout process by implementing an automated robotic readout system with higher positional accuracy and higher speed.

The robotic arm is a state-of-the-art 6DoF IRB 1200 from ABB. The robot code was generated offline using a specialised software (RoboDK). A sophisticated algorithm, created in Python, computes the different moves and trajectories that the robotic arm follows to reach all the measurement points while preventing collisions and undesired kinematic behaviour. Temperature measurements over the component surface are obtained by means of an optical probe, developed and built by SCS and attached to the end effector of the robot. This fibre optic probe is connected to SCS's detection system in order to perform the corresponding measurements and analysis. A digital interface was created for communication between the instrumentation box and the robot. The complete system was successfully tested using real engine components with complex and irregular surfaces. The data was plotted on a 3D CAD model of the analysed component generating a thermal map.

SCS was able to:

- improve the readout speed by a third
- simplify the measurement of more complex geometries
- increase the number of the measurement points

SCS's technology can be applied in different industries, (primarily aerospace, oil & gas and automotive) to measure components (such as turbine blades, pistons, valves, turbochargers) that operate at temperatures between 200 °C and 1400 °C. The benefit for the end-users is faster and more accurate validation of designs through improved digitalisation.

Dr Jörg Feist, Managing Director at SCS commented: "We are very pleased with the outcome of this project. The robotic technology adds more cutting edge technology to our sensing portfolio. Furthermore it will enhance our capabilities in future projects to provide temperature data more efficiently on highly complex components."

About Sensor Coating System Limited

Sensor Coating System Limited (SCS) pioneers sensor technology based on luminescence materials for engineering applications in demanding environments. Its award-winning technology (British Engineering Excellence Award, Royal Society of Chemistry, American Society of Mechanical Engineers) enables accurate temperature detection, corrosion and erosion monitoring and lifetime predictions and, in doing so, assists in optimising the operation of machinery, lowering fuel costs and maintaining material integrity.

About the Thermal History Technology

The Thermal History Technology is a unique luminescence-based sensing technology which enables engineers to record past temperatures on inaccessible components. The temperature measurement capability reaches from around 150°C to 1,400°C. This makes the technology very useful for the evaluation and design of mission-critical components in harsh environments such as a gas turbine or internal combustion engines.

The materials used in the Thermal History Technology have innate luminescence which permanently changes due to thermal exposure, allowing the temperature to be measured by non-destructive excitation and detection of the luminescence light. The measurement device can be scanned across the surface to produce an accurate thermal profile of the surface. The materials are deposited using techniques pioneered for the most challenging applications and can survive for a long duration under high thermal and mechanical loads, offering both short- and long-term measurement of thermal characteristics.

About UK Research and Innovation

UK Research and Innovation is a new organisation that brings together the UK Research Councils, Innovate UK and Research England into a single organisation to create the best environment for research and innovation to flourish. The vision is to ensure the UK maintains its world-leading position in research and innovation. For more information visit www.ukri.org

About Industrial Strategy Challenge Fund

The Industrial Strategy Challenge Fund aims to bring together the UK's world leading research with business to meet the major industrial and societal challenges of our time. The fund was created to provide funding and support to UK businesses and researchers, part of the government's £4.7 billion increase in research and development over the next 4 years. It was designed to ensure that research and innovation takes centre stage in the Government's modern Industrial Strategy. It is run by UK Research and Innovation.

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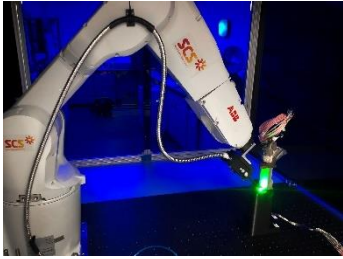
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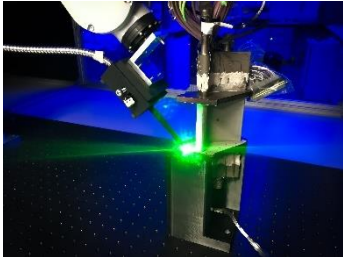
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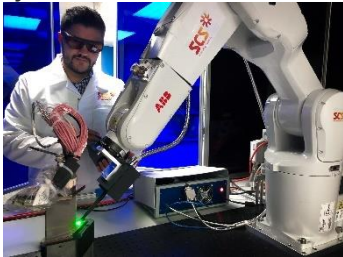
Picture 1: Sensor Coating Systems robotic system



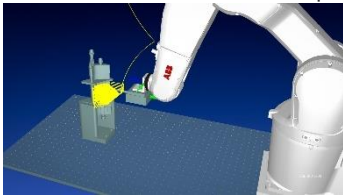
Picture 2: Close-up of temperature measurement by the robotic system



Picture 3: Robotics and Automation Engineer Dr Salvador Pacheco-Gutierrez working with the robotic system



Picture 4: RoboDK software planning different moves and trajectories that the robotic arm follows



Picture 5: 3D Temperature profile of the component

