

**Project title:** CReATE Carbon Reducing Advanced Thermal Engineering

**Main applicant:** Surface Generation Limited

**Technology developer:** Surface Generation Limited

**Industry partners:** Tiflex Limited

**Demonstration capital cost:** £566,658.99

**Funding awarded:** £313,437.29

**Project timeline:** April 2020 to March 2021

**Project description:** Surface Generation intend to apply technology that is currently used to manufacture high value components used in specialist applications, to the manufacture of general plastic and rubber components, which use injection and compression moulding techniques. These processes are inefficient because of the high thermal mass of the tooling, and long heating and cooling cycle times. The project aims to prove that low thermal mass tooling, used along with a closed loop thermal control system, can reduce energy consumption significantly in this industry.

Surface Generation's PtFS technology uses low mass mould tools with precise temperature control which until now has only been applied to high value applications, such as aerospace, being too expensive for general adoption. Significant energy savings could be achieved in the wider plastic and rubber moulding industries if used economically. The consortium is planning to achieve this by using a modular approach to the manufacture of the tool faces with dedicated software for temperature control.

The demonstration project will be undertaken at Tiflex Limited, a high-volume producer of bonded rubber products, typical of the wider plastics and rubber processing industry. A new production machine will be installed for the demonstration that will use resistance heaters, low-pressure air, lightweight mould structures and custom control hardware, to achieve precise thermal control while demonstrating savings energy from:

- Reduced thermal mass of the tool faces.
- Much faster heating and cooling cycles.
- Increased yield.
- Tighter process management.

**Size of target market:** The technology is being targeted at the compression and injection moulding of fibre reinforced plastic composites. This large and growing industrial sector is expected to have an energy consumption of more than 750GWh in the UK by 2025. If PtFS can be successfully applied to this broader sector, the potential energy savings would be significant.

**Barrier to market:** PtFS is proven in multiple high value industries but remains prohibitively expensive for adoption across the wider manufacturing landscape. This project aims to demonstrate that PtFS can be applied successfully on larger tools while maintaining thermal, mechanical and control performance throughout the cycle. This allows for cost reduction and shows a step change in the economics of polymer and composite parts moulding.

**Initial TRL:** TRL 5

**Targeted final TRL:** TRL 8/9

**Estimated energy and carbon savings:** The project expects to demonstrate that steam use can be eliminated from the moulding process, reducing electricity consumption by nearly 70% and cycle times by 75%, whilst delivering increased product quality. Carbon emissions from these combined efficiencies should be lowered by approximately 80%.

**Why IEEA funding was important to this project:** IEEA funding has allowed the consortium to successfully demonstrate that a technology used in specialist applications can be applied cost effectively across the wider market. The grant provides a unique opportunity to accelerate the pull through of this leading-edge moulding technology into a greater range of applications and sectors.