Project title: A new ultrasonic flow enhancement technology applicable to cold-runner and hot-runner injection moulding to save energy and increase productivity: Sonimelt

Main applicant: Matrix Moulding Systems Ltd

Technology developer: Matrix Moulding Systems Ltd

Industry partners: Barkley Plastics Ltd

Demonstration capital cost: £711,490.40

Funding awarded: £436,973.20

Project timeline: August 2019 – February 2021

Photo:

Project description: The project aims to demonstrate the three forms of Matrix Moulding Systems' Sonimelt technology, covering a wide range of applications in the injection moulding sector. The technology aims to decrease energy consumption through reduced melt and cooling electrical load, as well as reducing pressure requirements for the moulding of plastic parts on cold and hot runner systems.

The technology can be retrofitted to existing moulding machines and will be installed and demonstrated at Barkley Plastics' Birmingham site.

The project will characterise the ultrasonic parameters for a range of thermoplastic polymers with different melt temperatures in different types of moulding tools to demonstrate energy and cycle time savings through melt temperature reduction. The demonstration project aims to validate Matrix Moulding Systems' Sonimelt technology's range of capabilities across all injection moulding sectors.

Size of target market: The UK injection moulding industry has a turnover of £13.5billion per year, comprising of an estimated 950 sites, operating approximately 10,000 machines.

The primary target market sector is thermoplastic injection moulders producing parts across a range of sectors, including: single use/food packaging, domestic and electrical goods, medical products, automotive components and the construction sector.

As the technology targets the fundamental aspect of temporarily reducing the molten polymer viscosity during injection, and hence reducing the energy required to inject a part, it will benefit all sectors, and all tooling configurations: cold-runner, single-drop hot-runner and multi-cavity multi-drop hot-runner.

Barrier to market: Increased global competition from developing economies has presented new challenges to the industry in recent years. It is a price driven, technology differentiated market, and moulders need to be able to continually reduce costs, seek ways to differentiate their business offering and create USPs with new technology. When seeking to introduce new technology, demonstrating the technology making representative case study parts and being able to demonstrate cost savings, is critical to success. These demonstrations will show real life parts being moulded, validating both energy saving and commercial benefits through reduced cycle times.

Initial TRL: TRL 5/6

Targeted final TRL: TRL 8

Estimated energy and carbon savings: The project expects to demonstrate more than 13% electrical energy savings for a typical injection moulding process, achieved through a temporary reduction in viscosity, which enables injection at lower temperatures, reducing heating and cooling electrical load.

A typical hard working 250t mid-size injection moulding machine may consume 175,320 kWh/year. Retrofitting Sonimelt to this machine could achieve savings of 23,000 kWh/year.

Additionally, this technology can unlock the potential to achieve greater savings through enabling thinner mouldings to be produced. Currently a limiting factor in injection moulding is the flow path length, with long flow paths being difficult to achieve without overcompensation of plastic volume with thicker walled mouldings and higher melt temperatures. This technology enables an increased flow path to wall thickness ratio, resulting in less volume of plastic and reduced cooling times.

Why IEEA funding was important to this project: IEEA funding has not only enabled activities to validate the technology's benefits to take place, but is also enabling the high profile demonstration of the technology with three different tooling layouts typical of the majority of mouldings produced, dramatically increasing the industry profile of the technology and accelerating the industry take up.