



Materials Processing Institute



Research Organisation Name:
Materials Processing Institute

About:

The Materials Processing Institute is a research and innovation centre supporting with organisations that work in advanced materials, low carbon energy, the circular economy, and digital technologies. The Institute provides a range of technology and R&D based services and consultancy. Scientists and engineers apply their expertise to progress innovation, develop materials and improve products and processes. Expertise extends to experimental and computer modelling, thermodynamics, instrumentation and control, materials microscopy, high temperature materials and chemical analysis and digital technologies integration. This is delivered by project teams utilising state-of-the-art equipment, laboratories, workshops, demonstration, scale-up and production facilities.

Location(s): Middlesbrough

Technical Capability:

The Advanced Materials Group offers specialist advice across a number of materials and processes; including metals (ferrous and non-ferrous), glasses, ceramics and cements (including geopolymers). In depth materials knowledge is supported by numerical modelling and excellent characterisation facilities.

The Materials Processing Institute offers a range of steel alloys and revert melting services on a commercial basis. Product is available as ingots up to 6 tonnes, including for specialist applications in sectors such as: nuclear, defence, offshore, aerospace and engineering. The main area of expertise is in melting, alloying, and casting of semi-finished product, produced at the Institute's production facility in Middlesbrough, UK. A complete service can be offered, including downstream processing.

The Industrial Decarbonisation Group has extensive experience in energy and process efficiency for industrial processes, industrial symbiosis, energy recovery and net-zero process solutions. More recently the roles of carbon capture utilisation and storage (CCUS) and hydrogen in the future economy have been identified as vital contributors to deep decarbonisation of the foundation industries. The Institute is playing a leading role to develop hydrogen as a key vector in the future energy mix and as a route to zero-carbon metals processing, deploying its unique, demonstration scale research assets to this challenge.

The Digital Technologies Group develops, customises, and implements systems for measurement, monitoring and control in the harsh industrial environments typical to

the foundation industries. This, combined with knowledge in the areas of data analysis, machine learning and multivariate statistics, means the group is ideally placed to apply its expertise in the emerging technologies that are part of the Fourth Industrial Revolution.

The Circular Economy Group offering is through the knowledge and experience of materials scientists, process engineers and environmental practitioners who have in-depth knowledge of the foundation industries and associated manufacturing processes and the subsequent biproducts that are generated.

Research Areas Relevant to the Foundation Industries:

Industrial decarbonisation

Circular economy & use of waste materials

Digitisation of industrial processes

How to Engage with Materials Processing Institute:

The Institute is a delivery partner in the Tees Valley Business Start-up programme which supports SMEs:

<https://www.mpiuk.com/sme-tc-tees-valley-business-startup.htm>

PRISM, a programme of Research and Innovation for the UK Steels and Metal Sector:

<https://www.mpiuk.com/prism.htm>

Through a partnership programme of research:

<https://www.mpiuk.com/partnership-programmes.htm>

Contact Name and e-mail address:

For general enquiries please e-mail enquiries@mpiuk.com

Case Study:

Many foundation industries operate on brownfield sites, often with legacy equipment and bespoke process models. Applying Industry 4.0 technologies to these sites requires the digitisation of aging kit and improvements to the PLC data logging infrastructure. The project involves creating an industrial demonstrator of the application of Industry 4.0 to brownfield steel sites such as the Institute's Normanton Steel Plant which consists of a 7-tonne electric arc furnace (EAF), combined vacuum degassing and ladle furnace and continuous caster for billets and mini slabs. The project was funded by Innovate UK, the UK's innovation agency, through its Manufacturing Made Smarter Challenge, and part of the government's Industrial Strategy Challenge Fund.

<https://www.mpiuk.com/downloads/case-studies/CS-019-2021-Digital-Technologies-Gap-Analysis.pdf>