



**Materials  
Processing  
Institute**



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# The Materials Processing Institute

Chris McDonald  
Chief Executive Officer

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Excellence in Materials & Process Innovation

# Contents

1. Overview of the Institute
2. Key Facilities and Expertise
3. Organisation, Funding and Governance
4. Capabilities

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# Overview

The Materials Processing Institute is independent and not-for-profit.

- 100% of profits invested back in the business
- Societal and ethical mission supporting local community

The Institute carries out industrial research and development in:

- Advanced materials
- Low carbon energy
- The circular economy
- *Underpinned by digital technologies*

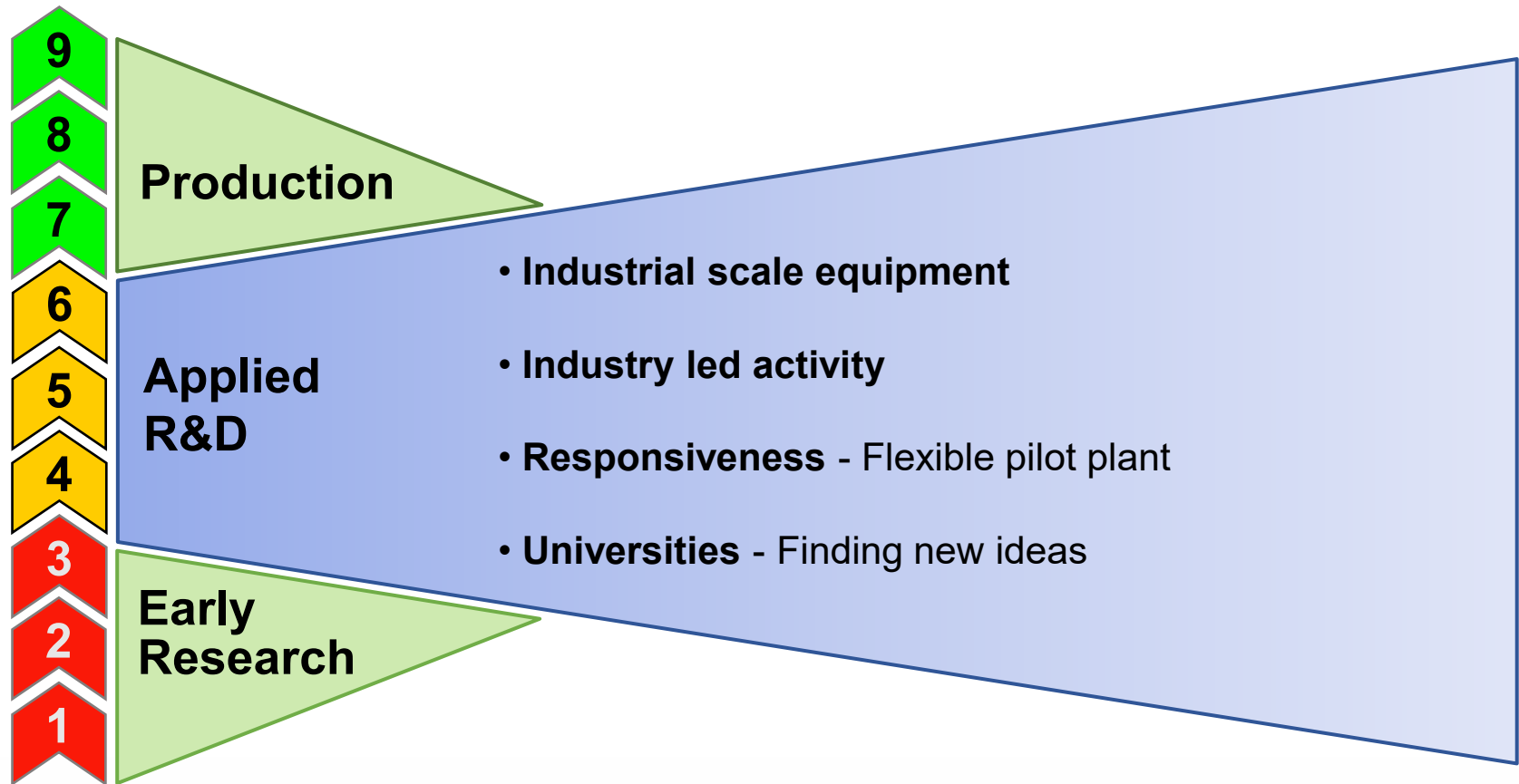
The Institute works with:

- SMEs locally
- The materials industry nationally
- The steel industry internationally

# Materials Processing Institute



# Innovation Landscape





# Unique Capabilities



# Services

## 1. Research Services

- Private, or collaborative research programmes
- Specialist testing, e.g. product failure analysis

## 2. Consultancy

- Technical due diligence
- Capex due diligence
- M&A support (e.g. market or technology assessment)

## 3. Training

- Bespoke, specialist courses, or standard Institute courses

## 4. Specialist Melting

## 5. Library & Information Services

- Patent, IP, literature searches, literature searches
- Alerting bulletins



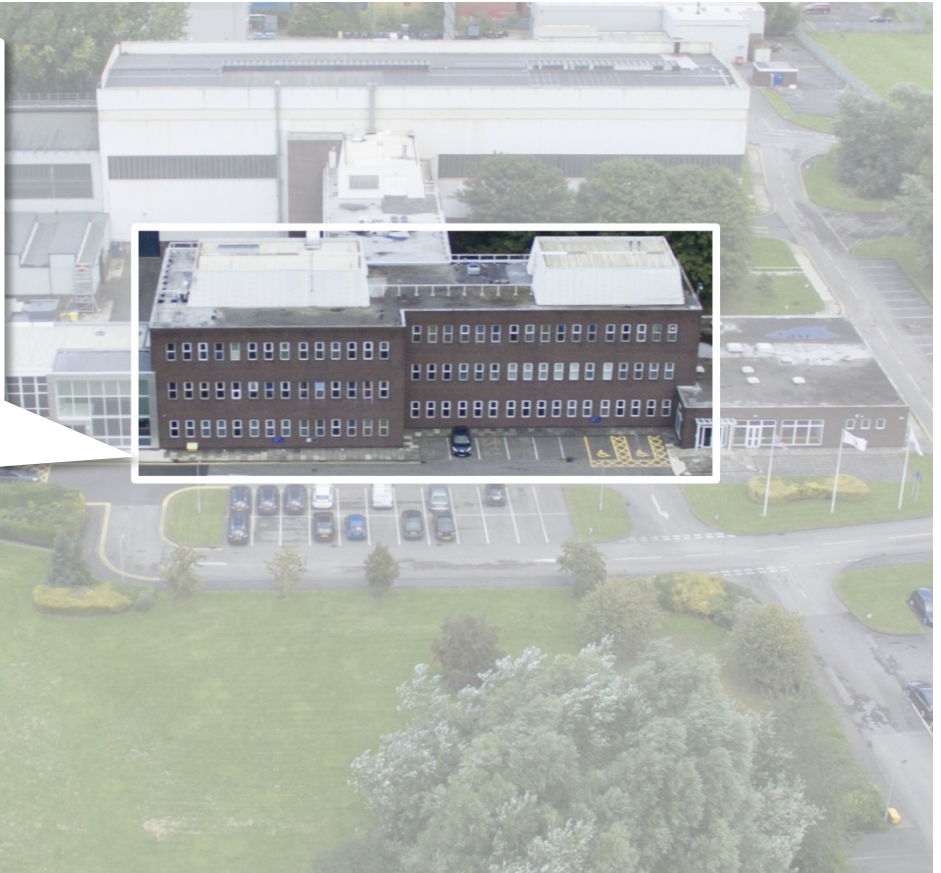
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# Materials Processing Institute



Laboratories



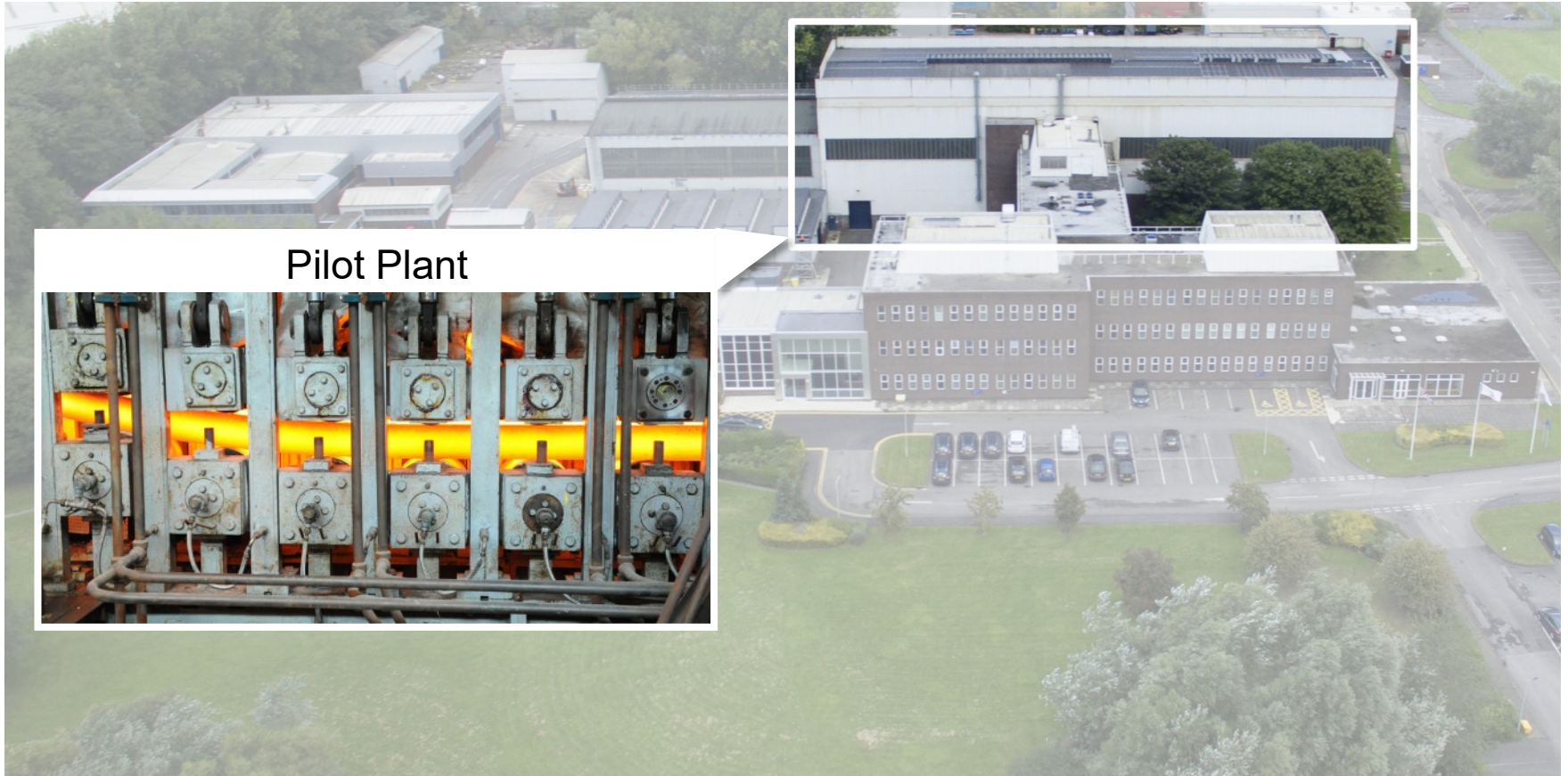
# Laboratories



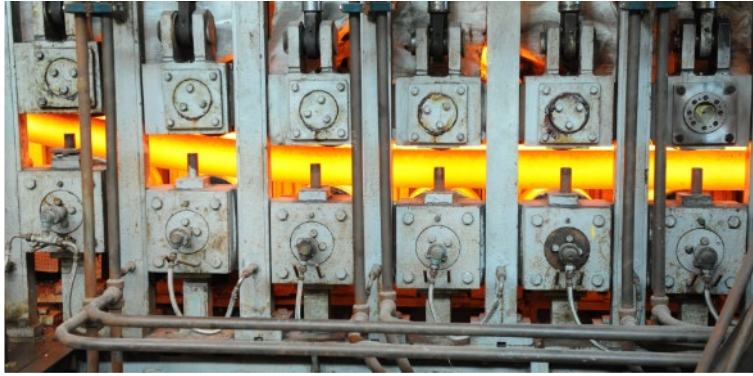
- Petrography and coke analysis
- Ferrous materials/ agglomeration
- Refractories: hot and cold testing
- Thermodynamics: empirical
- Fluid dynamics: physical modelling
- Simulation: CFD, FEM, DEM, numerical, thermodynamics
- High Temperature: slags and powders
- Metallography: SEM, SEM-Tensile, optical, macro
- Instrumentation: design and prototype



# Materials Processing Institute



Pilot Plant



# Pilot Plant – Main Facilities



- 7T AC Electric Arc Furnace
- Combined vacuum degassing and ladle furnace
- Continuous casting
  - Billets and mini-slab
  - Up to 20m cast length
  - Suitable as direct mill feed
- Ingot casting: slab, 5T and 5.9T square
- 100kg Vacuum Induction Melting
- Up to 250kg air induction melting
- 750kg moveable wall coke oven



# Core Expertise for the Steel Industry

## Iron

- Ferrous materials and agglomeration
- Coal and coke: value in use, blend design, low cost materials
- Blast furnace: flow modelling, chemical thermodynamics
- Refractories: Quality assurance and value in use

## Steel

- Oxygen steelmaking: process control, yield, raw materials
- Electric steelmaking: scrap, quality, yield, residuals
- Alloying and secondary metallurgy: product development, cleanliness

## Casting

- Slab bloom and billet casting process
- Heat transfer, fluid flow, modelling, instrumentation
- Mould fluxes
- Near net shape – twin roll, etc.

## Rolling

- Reheating furnaces: design and optimization for product and environment
- Hot and cold rolling processes: defect elimination, process control
- Deformation modelling and mill measurement





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# Governance

1. The Institute is an independent, not-for-profit, membership based, research and technology organisation – similar to a ‘trust’.
2. Membership is open to clients of the institute (large and small) and selected academic and professional organisations. There is no membership fee, but membership level depends on the amount of business between the Institute and a client.
3. The Institute is an ‘open access’ facility. It is not restricted to members.
4. Membership confers the right to sit on Council, the ultimate governing body of the Institute. Council members have oversight of the Institute strategy and appoint the executive officers (CEO and CFO).

# Funding

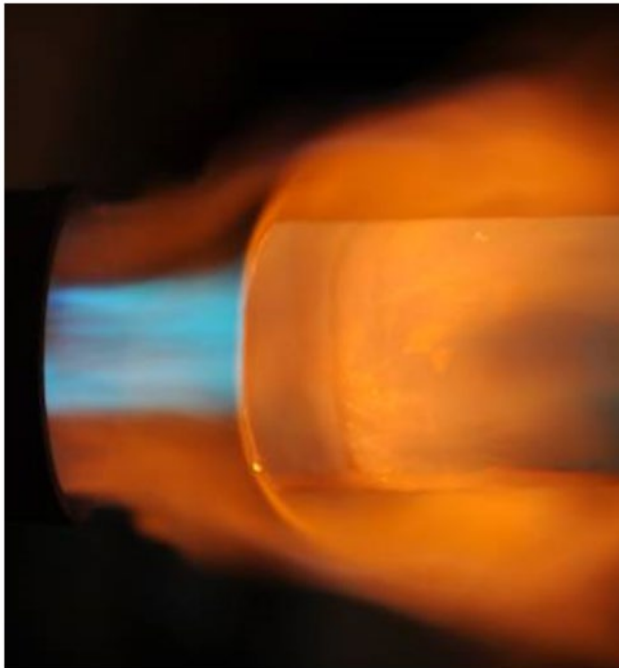
1. The Institute has a revenue turnover of approximately £5.8M per annum, employing 86 staff, plus a number of associate consultants. This income is almost entirely (>90%) from the private sector and is a combination of long term structured programmes, collaborative research projects and fixed price contracts.
2. In the last two years the Institute has invested more than 3M in capital and infrastructure. This funding is almost entirely from the public sector (UK national and regional Government).
3. The Institute operates an SME-Technology Centre with a turnover of approximately £300,000 per year. It is 50% funded by the private sector and 50% by the public sector.
4. The Institute operates a Doctoral Academy, supporting PhD students in UK universities. The turnover of the Academy is approximately £100,000 per year and is 70% funded by the public sector.

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# Process Support

Using the Institute's experience with large items of process plant and equipment, often operating in hot and hostile environments, to deliver simple robust solutions to complex engineering problems.



# New Process Development





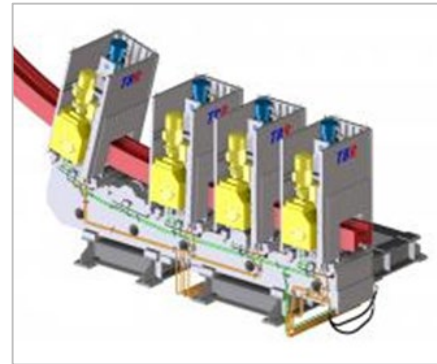
# Supporting Science

Extensive capabilities in mathematical or physical modelling; thermodynamic modelling; mineral, metallurgical and analytical laboratories, and associated techniques and technologies.

- Experimental and Computer Modelling
- Thermodynamics
- Instrumentation and Control
- Materials Microscopy
- High Temperature Materials
- Chemical Analysis
- Materials Testing



70 year track record in turning new ideas into production scale technology suited to industry's needs, using the expertise of the Institute's process engineers and scientists to drive technology from TRL 3 (ex-university or similar) to 7 (successful demonstration in operations) and beyond.



# Specialist Metal Production



Metal melting, refining and casting facilities for new product development or process improvement.

Small batch or trial quantities (10kg to 7 tonnes) of a wide range of metals and alloys.

# Summary of Capability

- Expertise, capabilities and assets to enable clients to:
  - **Explore and develop new materials and processes, and improve existing ones**
  - **Improve process reliability**
  - **Realise lasting improvements in energy and raw materials efficiency**
  - **Enable reduction or reuse of waste**
  - **Reduce the environmental impact of processes**
- Technical and engineering capability backed up with large scale pilot and demonstration facilities, where concepts are developed and proved.
- Supported by engineering, process simulation, modelling and laboratory services.

# Thank You

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