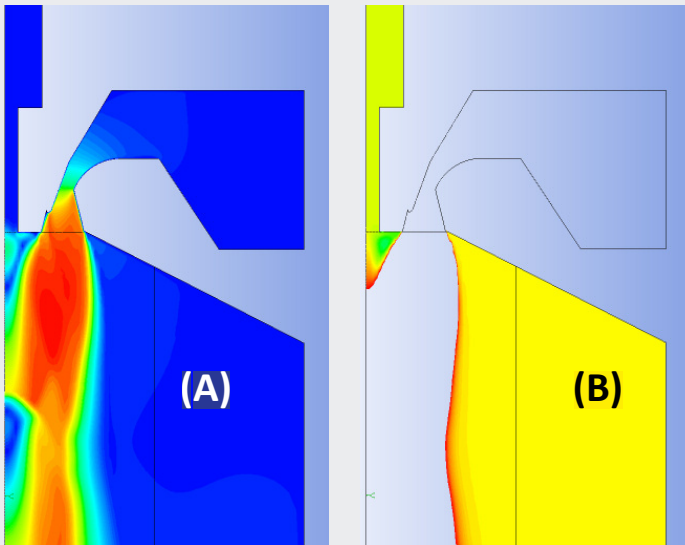




Dandy Project - Modelling and Simulation

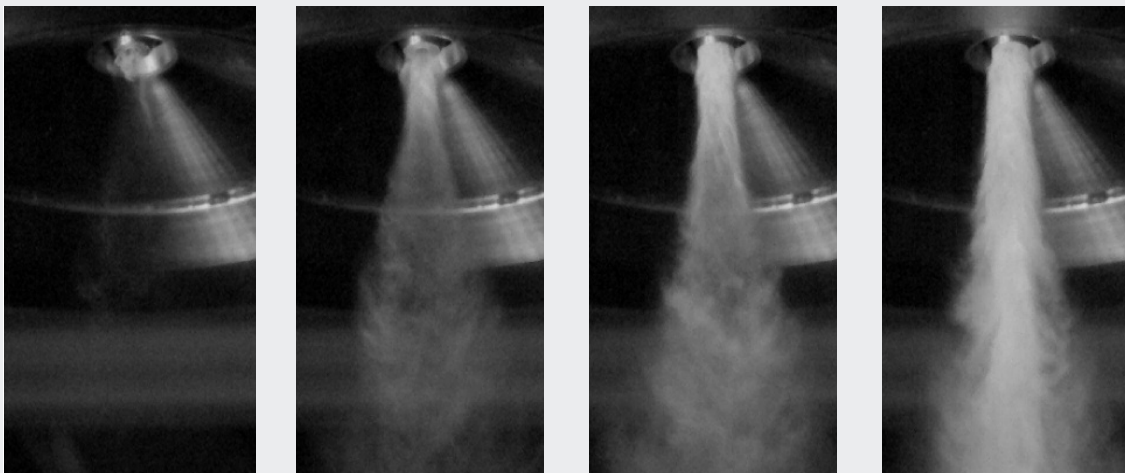
SIMULATION IMAGES SHOWING (A) VELOCITY AND (B) PRESSURE (CLIPPED TO MAXIMUM OF ATMOSPHERIC PRESSURE)



COMPUTER SIMULATION

- Gas flows
- Input variability study
- Geometry changes
- Cross-validate aspiration pressure with plant measurements, within 0.1 bar
- 2 phase flows next step

IMAGES SHOWING LIQUID SPRAY DEVELOPMENT ON MODEL



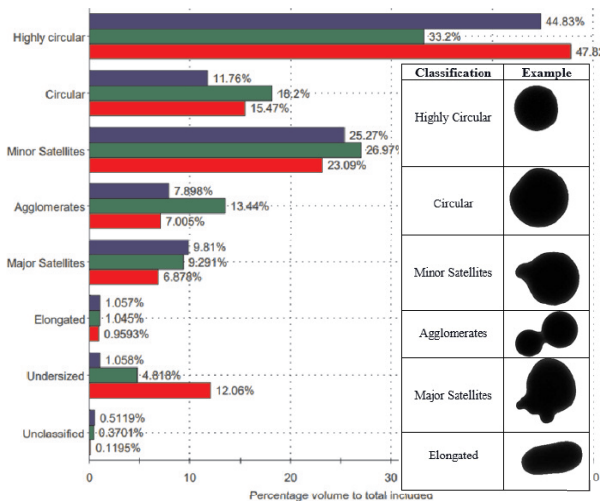
EXPERIMENTAL MODELLING

- Modelling of spray development using high speed camera
- Checking for overall spray profile



Dandy Project - Powder Characterisation & Quality

EXEMPLAR POWDER MORPHOLOGY RESULTS

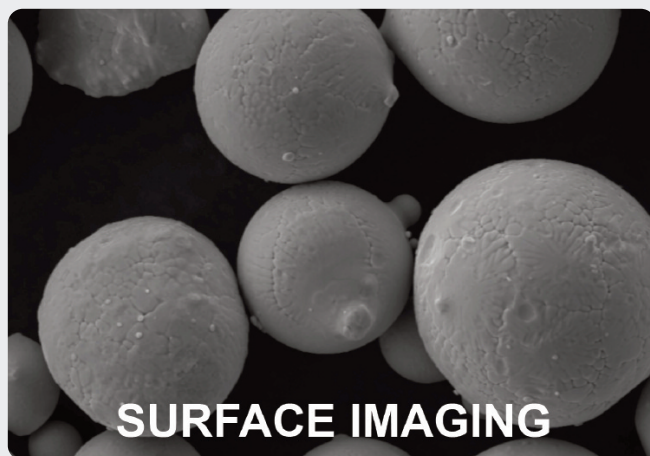


PROJECT ACTIVITIES

- Supporting powder characterisation and quality
- Supporting the development of standards
- Test piece production on the Concept Laser Powder Bed Fusion 3D printer
- Engineering support for powder sampling during production

TECHNIQUES AVAILABLE

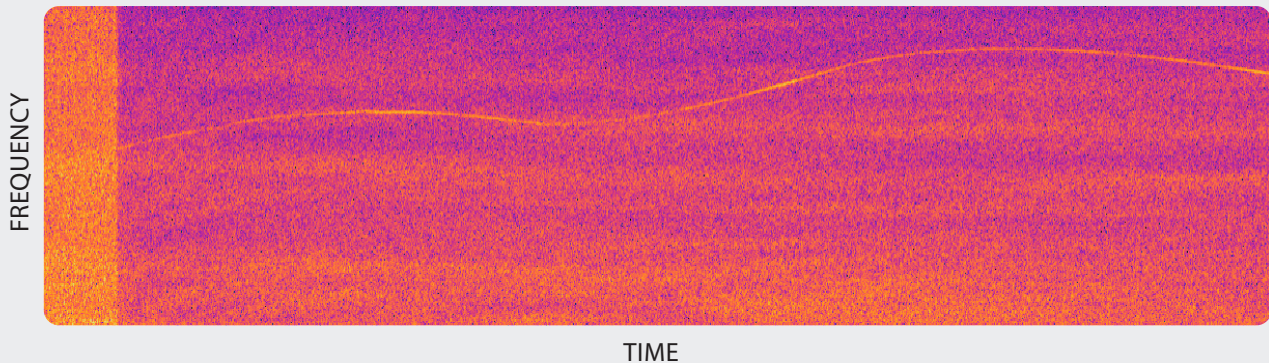
- Tap density
- Cohesion
- Flowability
- Surface Imaging & Porosity
- Particle Size Distribution & Morphology
- 3D Printed Test Pieces and Mechanical Testing





Dandy Project - Other Support

ANALYSIS OF VIBRATION MONITORING FROM PLANT TRIALS



Audiometric and vibration monitoring of plant trials to provide real time process feedback and control:

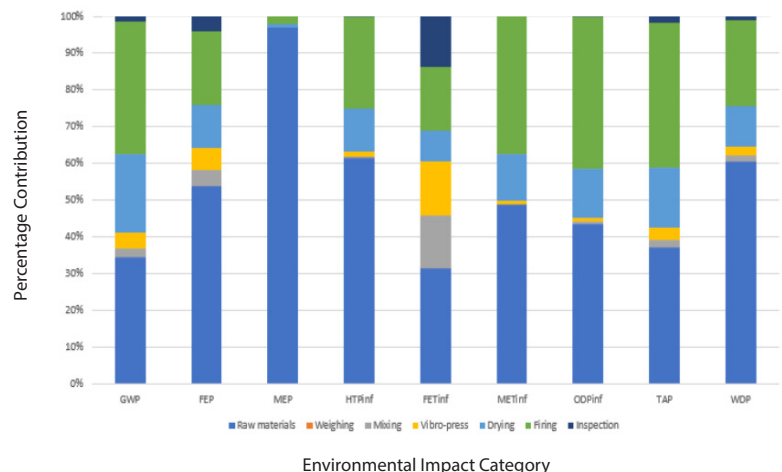
- Building upon experience from traditional steelmaking systems
- Also using experimental model

LIFE CYCLE ASSESSMENT

A Life Cycle Assessment (LCA) has been conducted to calculate the environmental impacts across the life cycle of steel production from cradle-to-gate. The aspects below have been compared:

- Powder metallurgy and additive manufacturing
- Standard nozzle vs optimised nozzle
- Material A vs Material B
- Powder metallurgy and additive manufacturing vs conventional casting and machining
- Demonstrated by “dog bone tensile test samples”

Percentage contribution of inputs to each impact category for the production of the original nozzle





Materials Processing Institute - Introduction

ABOUT THE INSTITUTE

- Independent and not for profit organisation
- Developing New Technologies, Process Improvement and Steel Grades
- Global Customers



ADVANCED MATERIALS

Research in advanced materials to understand how they can be used more efficiently and effectively and develop new and innovative materials.



INDUSTRIAL DECARBONISATION

Working to reduce carbon emissions through enhanced use of energy to develop a low-carbon future globally.



DIGITAL TECHNOLOGIES

Utilising digital technologies to optimise industrial processes and develop advanced materials.



THE CIRCULAR ECONOMY

Research to minimise resource usage, waste, emissions and energy leakage through improved design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling.

SERVICES

- Bespoke Contract Research
- Collaborative Research
- Consultancy
- Training
- Specialist Melting
- Library and Information Services

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A programme of Research & Innovation for the UK Steel & Metals Sector

OBJECTIVE

To help improve the competitiveness of the steel and metals sector by providing funding through the Materials Processing Institute for research and innovation services in the areas of:

- Transition to a Low Carbon Economy
- Digitalisation
- Circular Economy in Metals

Programme Features	Programme Benefits
Projects are relevant to specific partner needs, not tailored to meet a specific call	Accessibility is increased, preparation costs reduced
Reduced red tape leads to faster implementation	Shorter return on investment
Technology Readiness Levels 4 – 7 (demonstration, scale-up & commercialisation)	Revenue from implementation & commercialisation
Applies to the whole UK Metals Sector supply chain	Larger challenges can be addressed, more partners mean lower individual costs
Sharing & dissemination of results according to project agreement	Commercially Confidential

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