



Services Portfolio

# Sustainable Cement and Concrete



# Sustainable Cement and Concrete

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## Product Development

### **Novel cements and concrete design and development**

In-house capabilities to design and develop novel concrete mixes using various materials, including industrial and energy by-products and admixtures, from the laboratory to the pilot scale.

### **Nuclear waste immobilisation**

Undertake and support research into nuclear waste immobilisation and test their durability and other properties.

### **Circular construction**

Convert local waste into construction materials. Increase recycled content in concrete while ensuring that strength and durability specifications are met. Replace natural aggregate and lock in CO<sub>2</sub> while valorising residues.

### **Materials testing and characterisation**

Bespoke research and testing capability to conduct physical, mechanical and durability tests on concrete and mortar samples, enabling exploitation of new technologies and materials.

### **Technology proofing and scale-up**

New product concept validation/proof of principle through bench-scale testing and feasibility analysis. Prototype development and process proofing, pilot production, field testing, and market demonstration.



## Process Improvement

### **Derisking trials**

Produce pilot-scale melts in a 7T EAF furnace to obtain cementitious slags and derisk the process, mitigating operational issues and improving slag quality.

### **Slag cooling trials**

Undertake a range of experiments to investigate slag cooling for cement and concrete applications.

### **Bulk materials processing**

Specialised equipment for particle size reduction and homogenisation, e.g. jaw crusher, ball mill and pan mixers. Practical applications include the recovery of high-quality aggregates from demolished concrete and the preprocessing of materials for use in new concrete.

### **Process optimisation**

Apply statistical analysis and a machine learning platform in cement and concrete formulation design and fine-tune experimentation. Reduce the number of experiments, minimise waste, and improve final product properties. Enable additive manufacturing with reduced binder CO<sub>2</sub>.

### **Process improvement**

Enable process improvements to achieve ultra-high performance at lower clinker usage. Derisk scale-up from lab to ready-mix/precast products and support R&D to develop clinker-free binders.

# Full Services Portfolio

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## Advanced Metals & Green Steelmaking

- Green Steel
- Product Development
- Process Improvement
- Extra

## Advanced Materials Development

- Custom Alloy Development
- New Steel
- Supporting R&D
- Additive Manufacturing & Powder Metallurgy
- Additional Services

## Characterisation and Analysis

- Characterisation and Analysis

## Critical Raw Materials

- By-product Valorisation
- End of Life Process Development
- Mine Tailing Valorisation
- Piloting /Testbed Hosting
- Process Scale-up
- Process Optimisation

## Sustainable Cement and Concrete

- Product Development
- Process Improvement

## Powder Analysis and Additive Manufacturing

- Powder Analysis
- Additive Manufacturing
- Powder Processing

## Energy and Process Decarbonisation

- Feasibility Studies
- Energy and Emission Optimisation
- Process Optimisation
- Leveraging Facilities

## Facilities and Equipment

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# Full Services Portfolio

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## Training

### Processes

- Ironmaking
- Desulphurisation or Iron
- Steel Plant Raw Material
- Primary Steelmaking
- Secondary Steelmaking
- Ladles
- Practical Steelmaking
- Stainless Steelmaking
- Electric Arc Furnace (EAF) Steelmaking
- Continuous Casting
- General

### Supplementary

- Engineering
- Metallurgy
- Environmental Protection
- Management
- Research

### Applications

- Circular Economy
- Digital Technology
- Analytical Techniques

### Products

- Finished Goods

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