Introduction to banah UK Ltd

The banahCEM System

Current Projects

Standards
Introduction to banah

- Formed 2008
- Geopolymer cement manufacturer
- Obtained significant investment 2014
- Construction of production plant – 150,000 tpa
- Expansion of R&D Facilities
  - XRD
  - STA
  - PSD
  - Compression / Tensile Test
- Customer Collaboration
- Standardisation
The banahCEM System

Powder Component banahCEM (a)

Liquid Component banahCEM (b)
The banahCEM system

Future sources of electricity (2013 – 2030)

Source: DECC
Liquid Component - Production

- Two Options Available
  - Modified Commercially-available Silicate Solutions
  - Alternative Amorphous Silica-based Production of Alkali Silicate Solution

- Alternative Option Enables use of By-products Containing Amorphous Silica Source.

- Option Chosen Depends on End-Use

- Alternative Option has Lower Carbon Footprint
Scanning Electron Micrographs

(1 \mu m = 0.001mm)

Portland Cement

banahCEM
• Typical Portland cement concretes will spall at 350°C

• Typical house fire burns at 660°C

• banahCEM Stable to 800°C and Retains Integrity to +1000°C

• Research in this area continuing with University of Ulster (FireSERT)
Acid Resistance

The graph shows the total mass loss over time for different types of cement, including banahCEM, CEM I, CEM II, and CEM I/GGBS. The x-axis represents time in days, ranging from 0 to 30, while the y-axis shows the total mass loss in percentage terms, ranging from 0% to 45%.
Rapid Strength Gain

banahCEM Properties

Compressive strength [MPa]

Testing age

- GPC-37.5
- GPC-60
- PCC-37.5
- PCC-60
banahCEM Properties

CO₂ / tonne cement - 0.8 tonnes

Global cement production per year - 3 billion tonnes

Contribution to annual man-made CO₂ - 2.4 billion tonnes

80% banahCEM reduces this by

or 6% of Global CO₂ based on 2014 figures
CO$_2$ Emissions

![Bar Chart]

- **CEM I, II, III, IV (Avg):** 787 kg
- **banahCEM:** 184 kg
Hole in Ground Factor

Kg Raw Material per Tonne of Product

<table>
<thead>
<tr>
<th>Cement Type</th>
<th>Activator Raw Materials</th>
<th>Clay</th>
<th>Limestone</th>
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<tbody>
<tr>
<td>CEM I</td>
<td>1650</td>
<td>400</td>
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<td>banahCEM</td>
<td>360</td>
<td>770</td>
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University Collaboration

Queen's University Belfast
The University of Sheffield
University of Ulster
KU Leuven
Current Applications

- Sub-sea Installations – anchoring
- Wastewater Infrastructure - pipes
- Tunnel Linings and Fire Refuges
- High Quality Moulding - GRC
- Acid Resistance – Industrial
- Foamed Products - panels
- Sustainable Concrete – Green Building
Standards and Regulation

- PAS
  - PAS 8820 : 2016
  - Nomenclature issues - AACM

- EAD/ETA

- Test Method Development

- REACH Compliance