



Hanson Crossrail Credentials
Tunnelling and Sprayed Concrete

Case study

Hindhead Tunnel

Cement from Ketton was used in sprayed concrete on the £371m A3 improvement scheme at Hindhead in Surrey.

- £3m contract with Balfour Beatty to supply ordinary Portland cement from Ketton.
- Cement was used to produce sprayed concrete to form the structural lining of the 1.8km twin-bore tunnel under the Devil's Punch Bowl.
- Sprayed concrete was applied at high pressure to roofs and other structural shapes.
- Cement from Ketton was found to be best for the project, with minimum wastage and easiest application.

Hanson's involvement with the Hindhead Bypass continues with the remaining single carriageway of the A3, between London and Portsmouth being due for completion in 2011.



Hanson Sprayed Concrete with Cement from Ketton

Case study Strood and Higham Tunnel Lining Project, Kent

HeidelbergCement and Hanson have over 30 years of experience in developing concrete mixes for tunnelling projects worldwide.

Specifically, Hanson UK has developed technical and product capability that has been proven in tunnelling projects throughout the UK.

Our Ketton plant manufactures a unique and stable cement that is used in sprayed concrete tunnel linings.

Hanson Cement combined with Hanson Aggregates and specific admixtures ensure that the final mix for the base, primary and secondary coats deliver:

- Reduced bounce-back
- Minimal waste
- Time saving
- Rapid and successful adhesion
- Consistent high quality

Hanson sprayed concrete can also allow for given proportions of micro silica, polypropylene or steel fibres as required by the sprayed concrete specification.

Our expertise in sprayed concrete gives us an understanding of in situ testing and performance to ensure that our mix designs are compliant.

In January 2004 Hanson UK was chosen as the concrete supplier to line the 1,400m Higham tunnel and the 2,129m Strood tunnel on behalf of Network Rail.



This project showed Hanson's technical capability in:

Sprayed Concrete Mix Design:

- Specific mix of concrete, consisting of a C40 self-compacting concrete, with a minimum cement content of 400kg/m³, a water/cement ration of 0.40, and the addition of plastic fibres.
- A special superplasticiser was used to counter thermal and drying shrinkage.

Application expertise:

- The temperature variation within the tunnels required Hanson to provide a solution that ensured consistent quality and delivery times.
- This was achieved through varying the dosage of retarder applied in each area.
- This project used 900m³ of sprayed concrete, applied to a structural thickness of 200mm. Hanson's technical knowledge and ability to deliver in challenging conditions fulfilled the client's requirements.

Case study

Channel Tunnel Rail Link (CTRL)

Hanson UK was involved in the manufacture of the tunnel lining segments for CTRL 250 in 2002, producing over 80,000m³ of concrete.

The CTRL 250 project demonstrated Hanson's expertise in:

Specialist concrete

- Developed specialist concrete for steel and polypropylene fibre reinforced segmental tunnel linings.
- Mix Design incorporating GGBS to reduce micro-cracking and to better prevent the diffusion of chlorides and other aggressive agents.

Tunnel segments

- Dispensing polypropylene and steel fibres into the concrete mix using vacuum blowing and an Incite AB shaker system.
- Excellent supply chain management, including dedicated concrete trucks discharging directly into moulds.
- Prevention of freezing through use of steam generator on aggregate bins.

Sprayed concrete

- Sprayed concrete using cement from Ketton in various sections of the tunnel.
- Hanson UK was able to provide specialist technical solutions to maximise efficiency.



Case studies

Our global tunnelling capability

Hanson has proven expertise and capabilities in tunnelling projects throughout the world. These are just a few examples:



1. Tyne Tunnel

Country: UK

Place: Newcastle-Upon-Tyne

Project: Cast four 90m long, square concrete tubes in a dry dock to form the new Tyne Tunnel. Each tunnel tube is nearly 4000m³. Sections thickness 1m. Each tube was cast in four sections, base cast first then 8m high walls and roof. The job ran from Nov 08 to July 09. Hanson GGBS was used as a key ingredient in the mix design to deal with cracking, sulphate and chemical issues associated with the tunnel construction and location.

2. Canary Wharf Box

Country: UK

Place: North Quay, Canary Wharf, London

Project: Canary Wharf Crossrail Station incorporated the use of high GGBS mixes and water-tight technology using Hanson's unique concrete floating platform.

3. Hanson and CSI

Country: USA

Place: Ohio

Project: Tunnelling Segments

Overview: Hanson working with JV partner CSI on tunnelling projects across the USA.

4. Eglinton & Sheppard

Country: Canada

Place: Toronto

Project: Eglinton & Sheppard Subways

Overview: The Eglinton West subway was the East-West subway line in Toronto, Canada using 60,000m³ concrete.

5. Barcelona Subway Line

Country: Spain

Place: Barcelona

Project: Barcelona Subway Line

Overview: Concrete volume – 650km³ tunnelling at a depth of 80m.

6. Blanka City Tunnel Project

Country: Czech Republic

Place: Prague

Project: BLANKA City Tunnel Project

Overview: Concrete volume – 800,000m³ for over 5km of twin, two-lane tunnels.

7. Penchala Tunnel

Country: Malaysia

Place: Kuala Lumpur

Project: Penchala Tunnel

Overview: The Penchala Tunnel is the widest highway tunnel in Malaysia. This 700m tunnel, located on the Sprint Expressway's Penchala Link, connects Sungai Penchala to Mont Kiara in the Klang Valley.

8. Clem 7 Tunnel

Country: Australia

Place: Brisbane

Project: Clem 7 Tunnel

Overview: Concrete volume – 280,000m³ for 4.8km of twin, two-lane tunnels. 38,000 tunnel lining segments.



Hanson UK

14 Castle Hill
Maidenhead
SL6 4JJ

Tel: 01628 774 100

www.hanson.co.uk