



Low carbon concrete for High Speed 2 Rail Project

62 PER CENT REDUCTION IN CO₂e PER M³ OF CONCRETE

The challenge

As a key partner to Align, the joint venture delivering the Phase One, the new high-speed rail line in the UK, we are proud to have demonstrated an innovative new low carbon concrete solution. Together, we have a common goal of working towards net zero carbon construction and this new concrete, which is only recently available following extensive laboratory design, offers the potential to help achieve this objective.

Align was quick to provide applications for early demonstration and testing at full scale using one of three Tarmac concrete batch plants at a Chalfont Lane construction site in Hertfordshire.

Our solution

A structural slab forming part of the new viaduct pre-cast factory and a vertical wall were poured. The mixes, designed to Align concrete specification, exceeded expectations in both fresh and hardened properties, and showed that the new concrete can be produced in normal concrete plants and placed via mixer truck and by skip with tremie pipe. The new low carbon concrete has a carbon footprint following industry BSI PAS2050 calculation rules that gives a 62 per cent reduction in CO₂e per cubic metre of concrete, compared to a standard CEM I concrete, meeting the same specification in the same raw materials. The footprint covers all aspects of the concrete production and supply with no carbon off-setting applied, delivering an actual footprint of 133kg/m³ CO₂e. This represents a saving of 220 tonnes CO₂e for every 1000m³ produced.

Results and benefits

This trial demonstrated the potential to use very high ground slag (GGBS) contents in excess of 90 per cent, as an alkali activated cementitious material conforming to BS EN197, the standard for cementitious materials allowed to be used in ready mixed concrete, to significantly reduce carbon emissions, whilst still producing a quality finish and allowing normal construction and demoulding times.

Robert Gossling, our head of commercial engineering solutions, said: "Against the backdrop of the climate emergency, this project underlines the clear benefits which can be unlocked when clients and contractors collaborate, in this case engaging to help understand and accelerate the adoption of this new low carbon concrete solution. Together we've shown this new concrete is fit for purpose in slabs and walls, with good repeatability and works with standard production and construction methods. This product is a great step along the industry zero carbon routemap, and the demonstration will help accelerate adoption of this new concrete."