

# HS2 chooses ArcelorMittal steel fibres for pre cast tunnel lining segments, 80 metres below the Chiltern Hills, UK

## Project overview >

Steel fibre reinforcement for tunnel lining segments along 16km twin bore tunnels for HS2.

**Project title:** HS2 C1 - Chiltern Tunnels

**Internal diameter of the tunnels:** 9.1m

**Investor:** HS2

**Segment thickness:** 400mm

**Clients:** Align JV, TARMAC Ltd.

**Segment width:** 2.00m

**Location:** Chiltern Hills, UK

**Ring segmentation:** 7+0

**Working environment:** 80m beneath the Chiltern Hills, through a mix of chalk and flint

**Duration:** 2021 – 2024

**Distance:** 16km. Twin bore tunnels

**ArcelorMittal Fibres used:**  
15,234 tonnes of HE++ 90/60

**Dosage:** 40kg/m<sup>3</sup>

“Tarmac and ArcelorMittal worked closely together at tender stage to ensure the end technical specifications could be met. This long phase of relationship and technical development allowed us to build an effective working relationship as we moved into the delivery phase of the project. ArcelorMittal have shown a great ability to flex to changing customer demands and always work effectively to plan ahead and ensure supplies of fibres are delivered on time and as required. We look forward to continue our working relationship with ArcelorMittal into the future.”

Adam Cox  
Commercial Manager - SE RMX Major Projects, Tarmac.

## The challenge >

HS2 is Britain's new high speed rail line. The new line will link London, the Midlands and the North, serving eight of Britain's 10 largest cities. In Phase One, the high-speed trains will travel between London and Birmingham along 134 miles of dedicated track. The high speed line will pass through 31 miles of tunnels and over 10 miles of viaducts, delivering faster journeys on more trains with more seats. Phase One will open between 2029 and 2033.

The first two TBMs will be operated by the HS2's main works contractor for the Central Section C1. The two TBMs, named Cecilia, in honour of the astronomer and astrophysicist Cecilia Payne-Gaposchkin, and Florence, after nursing pioneer Florence Nightingale, are excavating the 16km long, north and southbound twin tunnels, 80 metres beneath the Chiltern Hills, through a mix of chalk and flint.

The 2000 ton TBMs are 170 metres long, 10.26m in diameter, and they are the largest TBMs ever used in the UK. Tunneling started in 2021 from the South portal, operating 24/7 and with an advancement rate of around 15 metres per day, Cecilia and Florence will complete their journey in 2024.

The north and southbound tunnels will be lined with 112,000 precision engineered steel fibre reinforced concrete segments, all manufactured at the south portal next to the M25

Each ring will consist of 7 segments and will measure 9.1m diameter x 2m wide x 400mm thick with a concrete volume of 382,000 cubic metres.

The works also include construction of cross passages between the two tunnels and 5 ventilation shafts.



## The solution >

ArcelorMittal's new ++ generation of high performance premium quality steel fibres provide optimum levels of residual flexural strength for the reinforcement of tunnel lining segments.

The HE++ 90/60 has been developed using a new quality steel with ultra-high tensile strength, above 1900 N/mm<sup>2</sup>.

ArcelorMittal provided the necessary on-site technical expertise, and the production and logistical support to enable contractors to meet the highest quality standards and a demanding construction schedule.

## The result

15,234 tons of ArcelorMittal HE++ 90/60 steel fibres, for use in the reinforcement of 112,000 tunnel lining segments were manufactured and delivered to the largest infrastructure project in the UK.

The purpose built concrete production facility at the south portal and the UK manufacturing of the steel fibres, enabled reinforced tunnel lining segments to be manufactured in close proximity to the tunnels, significantly reducing the CO<sub>2</sub> impact of the project.

Our Technical Support Team have been on hand every step of the way, from providing important technical advice on dosing and mixing and assisting with the production start up process, to ongoing support, ensuring project progress.

# The world is building on our expertise.

Contact: [fibresupport@arcelormittal.com](mailto:fibresupport@arcelormittal.com)

Visit: [www.arcelormittal.com/steelfibres](http://www.arcelormittal.com/steelfibres)

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