Ventilation for workers electrifying the Great Western mainline

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The challenge

Provide a temporary ventilation solution to ensure a safe working environment for the teams working in the tunnel, without restricting machine movement by blocking any of the running rails.

Chipping Sodbury tunnel

- Located on the mainline from London to South Wales
- 4.06 km (2 miles 924 yards) in length
- Constructed around 1900 for the South Wales and Bristol Direct Railway
- It has an arch brick lining and measures some 27'6" across and 20'9" high
- It slopes at a 1:300 gradient

Maintaining a safe air supply throughout a 4km tunnel

As part of the electrification of the Great Western mainline, a solid overhead conductor rail system needed to be installed in the four kilometre Chipping Sodbury Tunnel. The two conductor rails – one above each track – would provide the power for trains to pass through once the line was electrified.

In a tunnel of this length, maintaining air quality for the workers installing the overhead rail was obviously a key priority. Contractors Amalgamated Construction Ltd (AMCO) turned to RVT to assess the site's needs and design an appropriate solution.

The RVT solution

Drawing on extensive experience gained from a catalogue of previous projects, RVT Group designed a plan using powerful centrifugal fans. These develop strong pressure sufficient to force air through long duct runs, and are therefore particularly suited to providing high volumes of air in tunnels. Using this well proven jet air/venturi effect of tunnel ventilation allows the fans to be sited out of the way of machinery entering and exiting the tunnel mouths, enabling non-stop ventilation to be delivered.

Air quality monitoring of the tunnels was carried out by RVT to ensure safe working conditions were maintained at all times. To allow for the unlikely event of a generator or fan breakdown, spare ventilation and power equipment was made available on site for fast deployment.

Benefits of the RVT solution

- Fresh air supply maintained around the clock, providing a safe environment for site workers
- Fans located outside the tunnel entrances so no hindrance to equipment passing in and out
- Intensive work programme was completed on time – only possible thanks to the continuous fresh air supplied by RVT's equipment

Further information

Network Rail – Great Western route

AMCO – Latest news stories

Successful completion

Work in the tunnel proceeded in two phases. During the first phase, from 8 May to 19 July 2017, work proceeded at night using a custom-made rig to drill 4,064 holes in the tunnel roof. Each hole was then fitted with an anchor to support the electrical supply cables.

In the second phase, between 19 August and 15 September 2017, the line was closed and work proceeded around the clock to complete the installation of the electrical supply cables. A further 2,865 holes were drilled in the roof in which the anchors for conductor rail were located.

The work was completed on schedule and the line reopened on 16 September.