OVERHEAD SYSTEM MEETS THE HIGH SPEED CHALLENGE

Safety, reliability and innovation were three of the key criteria for the new overhead line system on the test track facility for IEP trains for the Great Western Main Line and East Coast Main Line. The UK's first Rigid Overhead Conductor Rail System for high speeds from Furrer+Frey formed an important part of the scheme in a key tunnel section. **Noel Dolphin** of Furrer+Frey explains how the system works.

Testing of the new Hitachi IEP stock is now underway on the Old Dalby test track near Melton Mowbray, including through the key Stanton Tunnel, which opened on time in March 2015. The test track has a long tradition of testing new railway technology, stretching back to the 1960s when it was used to test the Advanced Passenger Trains of the time.

It is used to test prototypes and new technology away from the constraints of the active network and without the limitations of operating only in 'engineering hours'. It features gradients, tunnels and curves of a typical mainline railway, so provides an ideal test bed for traction and rolling stock.

The refurbishment of the 1.2km-long Stanton Tunnel part of the line has recently been completed, and features Furrer+Frey's high-speed Rigid Overhead Conductor Rail System (ROCS). It has been fitted here for the first time in the UK at higher speeds, although it has been installed on more than 1,900 track km worldwide and tested at up to 302kmph line speeds.

As the Furrer+Frey ROCS system is based on a rigid bar design, not the traditional tensioned overhead line, there is a significantly reduced likelihood of a de-wirement or snapping of overhead contact line. Absence of mechanical tension also means a reduced number of components and much reduced loads on the support structures. Because of these reasons it is particularly suited to installation in tunnels due to its intrinsic improved reliability, safety and overall performance.

Furrer+Frey's engineering manager Ankur Saxena, who has literally lived at the Stanton Tunnel for the duration of the project to ensure its smooth and timely completion, said: "This really is the ultimate 'fit and forget' system. There are no moving parts and no tensioning, so there is a very significantly reduced risk profile compared to traditional OLE systems. In addition, with no moving parts, the ROCS system needs much less maintenance, which can often prove problematic in tunnels."

To add to its impressive safety credentials, the system has been tested to withstand fire for more than half an hour – as opposed to traditional contact wire, which can snap in less than five minutes in fire conditions. This can allow enough time to move a train out of the tunnel in the critical timeframe, significantly reducing the risk profile compared to traditional OLE systems.

Behind the deceptive simplicity of the rigid system lies a raft of innovation and engineering ingenuity, which make the system so effective even on high speeds and ballasted track. A specialist Furrer+Frey drilling rig allows the high degree of accuracy and precision that are vital for high-speed systems. A transition bar allows for smooth interface between the conventional OLE and the Furrer+Frey ROCS system at higher speeds, while state-of-the-art expansion joints accommodate movements caused by temperature variations. The system is manufactured with stainless steel components for better performance in corrosive environments, with additional protection covers for areas where water ingress is likely.

The benefits of the system are not lost on the client, Network Rail. Network Rail's project manager, Graham Denny, has welcomed the opportunity to see innovation in action at Stanton Tunnel. "The installation of conductor beams through Stanton Tunnel has provided Network Rail with the opportunity to work alongside leading industry partners to trial high-speed running on ballasted track under the ROCS, which is a much more reliable overhead contact system," he said.

"This will build on previous UK experience of conductor beams, which have only been used for low-speed tracks. In addition to gaining valuable experience about installation techniques, including automated drilling, it also provides the opportunity for the new IEP trains to be introduced to this novel infrastructure."

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