



Paisley Canal ‘Low Cost’ Transformer: Network Rail & First Scotrail

Background:

Diesel trains operating between Glasgow Central to Paisley Canal could not meet the tight timetable because they were too slow. This led to a poor performing line which had knock-on delays to other services. Converting the Paisley Canal route to electric operation would deliver a better standard of service, improve reliability and use the existing fleet of electric trains more efficiently. However, the expected cost of £28m was too high for the Scottish Government to meet so Network Rail had to find a way of reducing this whilst providing a safe, reliable and efficient rail infrastructure for freight and passenger use. Furthermore, aware that other routes in the area ran electric trains, the team were keen to transform the diesel line to electric to streamline the service.

Development:

Working alongside Scotrail and Babcock, Network Rail had to significantly reduce the costs before the project could proceed and submitted their innovation to the Institution of Engineering and Technology (IET) winning the 2012 Transport Award. By researching the lowest point they could safely install a 25kV wire, Network Rail discovered that this depended on the type of train passing underneath. Brian Sweeney, asset engineer for electrification in Scotland, Network Rail, says: “As only Scotrail Electric trains normally use the route, a wire height lower than standard was possible. This meant five bridge reconstructions could be removed from the scope, and the remaining four could be dealt with by lowering the track slightly by between 50mm and 150mm rather than full reconstruction, reducing the costs dramatically.”



Another issue that the team had to resolve was that the project was not able to restrict the route to Scotrail electric trains as Network Rail has a licence obligation to all passenger and freight train companies. Therefore, Network Rail still had to find a way to accommodate ‘large’ freight or engineering trains that may need access to the route. Sweeney continues, “The answer to this dilemma turned out to be simple; switch the power off. The innovative part of the project was we were able to find a quick, safe and automatic way of switching off the power whenever a large freight train needed the route, which was a first for Network Rail in the UK.” This was achieved by implementing a system that enabled the overhead lines to be earthed remotely before a ‘large’ train used the route. This unique method of working requires a freight or engineering train to stop at a notice board to obtain the ‘Authority Key’ before it can proceed.

Transport





Results:

The advantage of the customised electrification system resulted in overhead live wires being safely installed approximately 135mm lower than the standard on the UK rail network, consequently eliminating the need for expensive bridge reconstruction. This ensured the cost of electrifying the route was sustainable and affordable for the Scottish Government, reducing the cost by more than 50% thus making the project affordable and allowing it to go ahead.

Additionally, more efficient acceleration and deceleration has allowed the trains to run to timetable, significantly improving timetable performance and the reliability of the service. The scheme, in the long term, will also lead to less maintenance work for the track as electric trains are lighter than their diesel equivalent, as well as creating less noise pollution, and will have a positive impact on carbon footprint which is better for the environment.

Sweeney says, "With the Paisley Canal electrification, Network Rail has shown that looking at things from a different perspective and taking a different approach can result in more efficient delivery of projects and ongoing savings for the industry, delivering a better performing railway."

"Winning the 2012 IET Innovation Awards has allowed Network Rail to increase its profile and reputation, demonstrating that the UK rail industry can deliver value for money, build trust and subsequently result in more projects in the long term", continues Sweeney.

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The Future:

As the rail industry is quite fragmented, projects such as the Paisley Canal 'Low Cost' Electrification need around 30 different people to approve it. The current project is now going through final tests and Railway Safety Case approval to demonstrate that it's safe. Once given the green light, the challenge will be to apply the 'Authority Key' on other routes around the UK where electrification is considered cost-prohibitive. With Network Rail spending over £4 billion on electrification by 2019, the Welsh Valley lines are considered ideal candidates for this approach.

Sweeney concludes, "Through working with the IET, Network Rail has been able to gain an understanding of the challenges to enable us to prepare, with confidence, an electrification process for railways throughout the UK. The Paisley Canal 'Low Cost' Electrification allows the railway service to be much more efficient, thus building confidence in Network Rail, and the IET has been a key part this process."