Investment Information

SIEMENS

NetworkRail

What's happening?

Best Practice on *TLP KO2*

Other design innovations on the Thameslink Programme

Overview:

The Siemens Rail Automation engineering team on the Thameslink Programme (TLP) have looked for design adjustments throughout TLP which would improve efficiencies with regards to installation time, cost, energy and resources. Many of these initiatives have already been captured in other case studies (e.g. Collis light signal posts, HVAC vs. forced air in REBs). The purpose of this case study is to capture the other smaller-scale innovations that have happened during the course of TLP so that they can be learnt from and potentially implemented on future projects.

AWS mounting frame

The Automatic Warning System (AWS) mounting frame has traditionally been made from steel, but on TLP the frames have been developed to be composed of GRP (glass reinforced plastic) beams with some stainless steel. The key benefit for the project of the new design is the faster installation time (i.e. now 15 minutes compared to 2 hours previously). The other sustainability benefit is the reduction in steel use. Steel is one of the highest contributors to embodied carbon in a rail project (in terms of $kgCO_2e$ per kg of material) and therefore initiatives to reduce steel use will likely contribute to a lower embodied carbon footprint.

In total, 260 mounting frames have been installed on TLP. The photos below illustrate the previous design of AWS (figure 1) and the newer version (figure 2).

Figure 1: previous design of AWS

Figure 2: new design of AWS installed on TLP

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Aluminium Wound Transformers

The Aluminium Wound Transformers (AWTs) have previously been made from copper but, due to a new design innovation, can now be manufactured using aluminium. The benefits to the project are that they are lighter and cheaper than the original composition.

Another sustainability benefit is the improved security of supply. Demand for copper is increasing at the same time as global copper production is decreasing. Therefore, switching to a different material, such as aluminium, will mitigate the supply risk in the future and keep costs down.

Other sustainability benefits of the new AWTs (based on information provided by the manufacturer ATL Transformers Ltd) include:

- Ultra High efficiencies > 97%, reducing carbon emissions & environmental impact.
- Reduced Standby losses (up to 62% less wasted energy) and Full-Load losses (up to 45% reduction).
- 1 million hours Maintenance and Service Free Operation
- Ultra-Low Inrush Current – As low as 1.5 times full load current.
- 30% reduction in cost and weight
- Multi Zone Cable Access for efficient installation.
- Legacy brackets available for hassle free installation where legacy back plate installation is required reducing loading stresses on old timber backplates typically found in legacy signalling Location cases.

However, it is worth noting that aluminium has three times as much embodied carbon (per kilogram) than copper, according to the Bath ICE database for carbon. The quantities of aluminium, and previously copper, in the transformers are not known and therefore the embodied carbon footprint was not calculated on this occasion. This is an interesting example of the complexity of sustainability trade-offs in the context of a signalling product development. No further investigation was carried out by Siemens Rail Automation regarding the sustainability credentials of this design change (such as a Lifecycle Assessment, or 'LCA') as the product development has been driven mainly by the benefits of having a lighter and cheaper alternative to the copper wound transformers.

Although this design innovation occurred during TLP, due to timescales, unfortunately it was not possible to install the AWTs on TLP. However, AWTs are being trialled by SRA shortly, and then could potentially be implemented on future projects. Please see figure 3 below for an illustration of the transformer.

Figure 3: illustration of the transformer (image provided by ATL Transformers Ltd)

Meeting TLP objectives and targets

Both initiatives listed in this case study are aligned with TLP Sustainability Strategy Objective 15 to:

- 'Minimise the use of natural resources, water and carbon while increasing the life of materials and avoiding the generation of waste'.