



Case study Meir Tunnel

Location
Philip Lighting

Stoke-on-trent
TotalTunnel® T-line



PHILIPS



“I would highly recommend the installation of the T Line LED system. Since the installation of the T line LED lighting I have reduced my overall maintenance costs, saved a substantial amount of money in energy costs, reduced the carbon footprint and reduced the risks for the operatives.”

Paul Diamond, Meir Tunnel Planning Manager Operations, Amey



Upgrading the lighting in the A50 Meir Tunnel in Stoke-on-Trent to LED light sources has delivered energy and maintenance cost savings of around 82%, whilst improving visibility for drivers. The estimated payback period for the project is less than three years.



Facts

Customer

Amey on behalf of the Highways Agency

Location

A50 Stoke-on-trent

Philips lighting solution

600x T-line LED luminaires

Project partner

SPIE WHS

Project realization

2013

Background

Prior to the upgrade, the lighting in the 284m Meir Tunnel was designed to comply with an older standard for tunnel lighting - BS 5498:7. This was achieved using a combination of fluorescent and high pressure sodium light sources, resulting in a relatively energy-inefficient system with high maintenance costs. The latter was an important consideration as frequent re-lamping was causing regular closures and disruption to the public.

The decision was therefore made to take advantage of the latest LED technologies to improve environmental performance and the quality of the lighting for motorists whilst also reducing lifecycle costs. The work was carried out by the Industrial Services North West division of SPIE for AMEY, the principal contractor for the Highways Agency. It involved completely stripping out the existing lighting system and replacing it with over 600 Philips T-line LED luminaires.

The fast-track project was carried out on a rolling night shift, with the tunnel's traffic management system removed every morning to allow normal traffic use during rush hour. The SPIE team completed the work one week ahead of programme, thereby saving substantial traffic management costs.

The Solution

The new system has been designed to BS 5489:2 2008 and uses two versions of the Philips T-line road tunnel luminaire to provide a true linear lighting scheme with exceptional uniformity and greatly improved colour rendering compared to the previous scheme. A key benefit of using a linear lighting design is in the very unlikely event that a luminaire should fail, it would have very little effect on the overall scheme. In contrast, a point-source installation can fall below minimum lighting levels if only one or two lamps fail.

LED light sources also delivers instant start-up following a power failure, eliminating the potentially dangerous re-strike period required for high pressure sodium lamps. Furthermore, the LED light sources are less susceptible to low ambient temperatures, which can significantly

reduce the lumen output of fluorescent lamps. The LED light sources are fully dimmable.

Two versions of the T-line luminaires have been used to achieve the required luminances within the tunnel. Levels in the threshold zones of approximately 156 cd/m² were achieved by using 13,545 lm T-line luminaires, while the interior zone uses 5,265 lm T-line luminaires to provide a luminance of >2.0 cd/m² in the day, dimming to >1.5 cd/m² at night.

The lighting is dimmed continuously during daylight hours in line with the dynamic external luminance (L20). As natural daylight levels increase, so too does the light output of the tunnel lighting to maintain a critical ratio that avoids drivers approaching a 'black hole'. At night a lower light level is maintained by dimming selected luminaires to complement the street lighting level on the approach roads. Wall mounted control panels in each plant room display status and alarms and allow maintenance reports to be generated.

Lifecycle Savings

The result of the upgrade project is that the annual energy consumption of the tunnel lighting has been reduced from 660 MWh to 154 MWh, cutting carbon emissions by 275 tonnes per annum with a financial saving on energy costs of nearly €76,000.

A further benefit is the reduced maintenance costs, as the original light sources had a life of around two years. The new LED light sources have a projected life of 20 years. This is expected to save a further €33,300 per annum, so that the total financial savings will be around €109,500. The predicted fiscal savings over a 20 year lifecycle are predicted to be nearly €1.011,500.



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