Meir Tunnel (A50 Stoke-on-Trent)
Derbyshire, England

Engineers install state of the art Tunnel Control System

Core Control Solutions Deliver a Fully Integrated ICONICS based Tunnel Control System

Synopsis
Core Control Solutions (CCS), an agile and growing control systems integrator based in Ilkeston, Derbyshire have delivered a state-of-the-art Tunnel Control System (TCS) complete with a fully integrated Supervisor Control and Data Acquisition (SCADA) system based on ICONICS' GENESIS64™ software.

Introduction
Meir is a suburb in Stoke-on-Trent, Staffordshire, and home to a 284 meter long road tunnel located on the A50, a major trunk road running almost 100 miles from Warrington to Leicester. The Meir area is a heavily congested urban district that connects Uttoxeter, Nottingham and the East Midlands with Stoke-on-Trent city center and the M6 Motorway, the UK's longest and possibly busiest non-stop motorway. The self-ventilating, dual-lane tunnel was built in 1997 to allow free flow traffic to bypass the Meir junction on the A50 and continue towards the M6 Motorway.

Kier Highways, one of the UK's leading highways management and maintenance teams, operate the tunnel on behalf of Highways England. The tunnel is served by an unmanned Tunnel Service Building (TSB) adjacent to the tunnel and is controlled and monitored from the main control room located in Coventry. In March 2015, Kier identified the need to upgrade their incumbent SCADA system, future proof their asset management prerequisites and drive engineering response time efficiencies. Working with their in-house teams Kier undertook a detailed tunnel control system review and subsequently identified a series of suggested control strategy changes and value propositions that were presented to Highways England for consideration.

Selection of Core and ICONICS
An ITT was released for the supply of a new TCS and CCS were awarded the contract to deliver the new system. The decision to award the contract to CCS was based on their expertise in Tunnel Control Systems, their flexible and collaborative approach and the unique technical offering from the ICONICS GENESIS64™ SCADA System.

The TCS safety systems are critical to the operation of the tunnel and ensure a safe environment for the daily

road users that travel through the Meir Tunnel. Given the strategic importance of the tunnel location and the impact closures would have on the travelling public the challenge was set to upgrade the system while returning the tunnel to service every day. It was in fact Core Controls' unmatched tunnel control system experience that helped mitigate the risks involved in delivering a system that required zero system or infrastructure 'downtime'.

The project scope included:
- CCTV Integration
- VAID Integration
- VMS Integration
- Lighting Integration
- Vehicle Monitoring
- Energy Control
- New Fibre Network
- Emergency Control
- New PLC System

The new TCS deployed a hot-standby PLC system complete with distributed I/O and RTU's that communicated via a GPRS data network. The TCS upgrade included the design and installation of a new resilient fibre-optic network configured in a ring typology throughout the estate providing connectivity for the tunnel assets. The tunnel assets controlled and monitored by the new TCS include but is not limited to; tunnel lighting, Variable Message Signs (VMS), Emergency Escape Lighting, Linear Heat Detection, LV Distribution, Standby Generators, Sumps and Pumps and local traffic light interfaces.

Both Kier and Core Controls recognised the GENESIS64™ platform as being the perfect fit for the Meir Tunnel TCS upgrade. The platform provided state-of-the-art system architecture with HTML5 technology being able to provide the essential visualisation of the system from any mobile platform.

TCS SCADA Mimics
The new TCS incorporated a feature rich SCADA GUI utilising the GENESIS64™ platform:

Main Overview

CCTV Integration

Facilities Integration

Energy Integration

VMSS Integration

Lighting Integration

The new TCS also incorporated a feature rich mobile application powered by ICONICS' HTML5 technology.
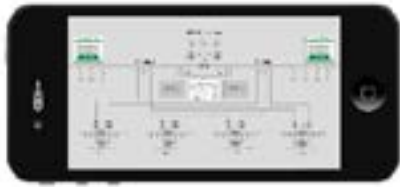

Main Overview

Emergency Escape Lighting

Facilities Integration

Energy Integration

VMSS Integration

Lighting Integration

Project Delivery

Core Control Solutions executed the project delivery using their comprehensive delivery model that has been developed to meet the demands of mission critical systems. A detailed system design specification was produced with client consultation throughout. The system build and configuration was completed ahead of programme to the clients exacting standards and tested comprehensively before site deployment. CCS created state-of-the-art Graphical User Interfaces (GUIs) that were operator focused and ergonomically designed complete with mobile responsive displays utilising HTML5 technology. Kier representatives were invited for factory acceptance testing and pre-delivery training to ensure a smooth transition into service could be guaranteed.

The Benefits

Kier now have a future proof traffic management system with substantially improved data visualisation and a refurbished control strategy. 360° asset awareness has been achieved. Although the original 12 tunnel signs, energy consumption statistics, and air quality metrics in and around the tunnel are not novel to the operators, the data is being collected faster and more efficiently than ever. Just as importantly, that data is being presented cleaner and smarter than before; they've turned data into intelligence. Kier are able to swipe through dashboard screens on their phones, and see live video feeds on their desktop from Coventry. The business value lies in Kier's new-found ability to be able to respond quicker to any situation at this unmanned tunnel.

Future Plans

The TCS will be enhanced with the addition on VAID CCTV including IR technology that will be incorporated into the SCADA GUI and mobile application. The VAID system will facilitate automatic operator awareness to abnormal conditions within the tunnel. These will include pedestrian detection, stopped vehicles, smoke and slow vehicles. As the tunnel is unmanned the system will provide text and e-mail alerts and provide visual indication via the mobile platform. The new power monitoring and additional controls will be utilised to undertake an energy study and implement energy saving schemes through the efficient use of the TCS and associated subsystems. CCS are working with ICONICS to offer high-level KPI Dashboard screens for Kier management offering further intelligence to the tunnel assets with a future view to optimising asset maintenance and availability.

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