

Monitoring the Dartford Crossing



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Simon Burras

Highways construction and re-development projects can take many years to reach the tender stages. Up until this point the monitoring and evaluation (M&E) suppliers involved will usually have had very little influence over the design and consultation phases. Simon Burras, director at Applied Industrial Systems Ltd, discusses the role of the M&E system integrator

Although being late to the design table doesn't really affect the M&E supplier and their ability to do the job required, it can have consequences for ongoing asset management, with potential implications for operations, safety, maintenance and therefore, cost of ownership. As our experience has verified, this is especially true where the role of the supplier is to provide system integration services and make a variety of disparate M&E systems work together.

Dartford Crossing safety upgrades

AIS supply the SCADA system that monitors and controls the Dartford Crossing tunnels. Through the foresight of the tunnel operator (Le Crossing and then Connect Plus Services) and the Highways Agency (now Highways England), our team was given the chance to demonstrate where and how the benefits of early M&E involvement can be realised.

As a result of a European Union Directive for new minimum safety requirements for Trans European road network tunnels, a detailed safety assessment was undertaken. This highlighted a need to upgrade existing ventilation systems to replace ageing equipment and provide greater granularity of control, install a new Fixed Fire Fighting System (FFFS) for fire suppression to protect the tunnel infrastructure and aid self rescue and way finding signage to direct users towards fire exits more effectively. In addition, a new CCTV system (for

automatic incident detection) was required to enable the location of a fire to be more accurately assessed.

Adding these essential new monitoring systems to the complex M&E systems infrastructure at Dartford highlighted another challenge. Simply installing the new safety systems was not enough, they would only be effective if they could be deployed reliably and quickly. Rather than trying to interface new 'stand alone' systems with the existing site wide SCADA system, it was necessary to identify a way to reconcile the different systems into one overall safety system with a single, coherent user interface.

Perhaps most importantly in terms of improving longer term asset ownership and management, was the decision to adopt a single, integrated control system for all of the life safety M&E systems. This came about as result of a close and early collaboration with Jacobs, the project consultants, Le Crossing, then operators of the Dartford Crossing and the Tunnel Design and Safety Consultation Group (TDSCG), which included representatives from the fire services and Highways Agency (now HE) engineers and consultants.

The resulting integrated Life Safety Control System (LSCS), was developed in close liaison with the operators and operates in stand alone mode for safety functions, but was also integrated with the site wide SCADA system for maintenance and diagnostics.

Another benefit of taking a collaborative design approach and our early involvement was the appointment of an independent safety consultant to undertake a single, overall safety (SIL) determination. This recommended

SIL (Safety Integrity Level) 2 safety requirements in accordance with the safety standard BS EN 61508, which became a first for this type of system in a UK road tunnel. The approach also meant suppliers were working together earlier to address requirements and interfaces.

Collaboration at Dartford

For the operators responsible for managing the Dartford crossing, a collaborative approach offered both commercial and technical benefits. Firstly, having a single control system rather than several disparate systems was key to achieving the required integration between the FFFS, ventilation systems and active exit signage. Secondly, the design process supported further innovation resulting in a dedicated fixed CCTV camera being installed for automatic incident detection and this became part of the overall LSCS. Thirdly, the user interface was designed in conjunction with the operators required to monitor, and in the event of fire, operate the system. This resulted in greater system acceptance and formed a key part of the safety case. Finally, operational and lifetime ownership costs were reduced by basing the life safety system on a single type of control hardware, which in turn reduced spares holding and maintenance complexity.

Insights from our involvement in the Dartford Crossing development demonstrate the clear advantages of early M&E contractor involvement to asset management. In addition to improving cost management, this approach also ensures the systems are delivered fully integrated and provides better overall coordination of the different project phases. ☺