



Control Systems International®

## Project Profile: Tai Lam Tunnel

UCOS® Provides SCADA Solutions

### Tai Lam

The **Tai Lam Tunnel** is four-point-four miles long but it saves more than forty-minutes of driving time for those traveling between Yuen Long in the New Territories and Hong Kong and Kowloon via Tsing Yi.

Before the Tai Lam Tunnel, motorists would have to travel upwards of 30 miles around the steep mountainous terrain encompassing the New Territories and Yuen Long.

Due to the length of the tunnel and the complex system needed to monitor and control this massive project, the Hong Kong Highway Authority turned to a proven and tested SCADA system.

They chose **UCOS®**, developed by **Control Systems International, Inc. (CSI)**. UCOS is the same system used by the Hong Kong Airport Authority for building management SCADA and tunnel control at the nearby airport terminal.



UCOS runs on Windows NT, an open system that is compatible with most off-the-shelf computing hardware and appropriate third-party software. This allows the Hong Kong Highway Authority to shop around for the best hardware and software prices. It also affords them the luxury of finding the best value for replacement parts.

CSI was responsible for all of the UCOS SCADA development, testing, and installation.

UCOS was installed at the Tai Lam Tunnel to monitor and control tunnel ventilation, power management, lane control, lighting, closed circuit TV, fire service, HVAC, plumbing and drainage, as well as high voltage and low voltage power supply systems.

UCOS monitors and controls more than 5,500 I/O points spanning a distance of more than four miles. Because the distance is so great, CSI engineers installed Phoenix digital fiber optic repeaters which extend the communications range of the GE I/O.

Dual Ethernet networks were installed for additional reliability. All the operator workstations communicate via 10 Base-T Ethernet to Raylan Hubs. The hubs are linked together using Ethernet via Fiber Optics.



### South Portal of the Tai Lam Tunnel

Redundant Windows NT Servers running SQL-compliant databases and DEC clustering handle the historical archiving. One of the data archiver's functions is to document the exhaust levels from the tunnel to make sure they meet government environmental standards.

Using UCOS, CSI engineers also implemented a full manual control system that replaces all automatic control if the operators put the system into manual fallback mode. This mode reforms complete monitoring compatibility, and allows the operators to manually control selected devices inside the tunnel.

Remote control and monitoring is executed via the operator workstations or by a manual fallback panel in the central control room. A mosaic mimic display is also installed in the control room to provide a simple overview of the tunnel ventilation and lighting, as well as high voltage and low voltage power usage.

An engineering workstation installed in the computer room allows engineers to easily and graphically reconfigure devices and device sequences, and then deploy the changes throughout the system.

As the Hong Kong area expands, the dual, three-lane Tai Lam Tunnel will help accommodate the massive traffic flow in and out of the New Territories. Currently, the tunnel is accommodating more than 40,000 vehicles each day and is ably equipped with UCOS to handle considerably more in the future.



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