

Industry: Rail /// Building Management

Products Used: Modular PLCs /// Networks /// SCADA

Ventilation control for London Underground extension

Passengers on London Underground's Jubilee Line extension, which goes to the Millennium Dome, are protected by 44 Mitsubishi A Series Programmable Logic Controllers (PLCs) connected to a wide area network (WAN), which runs throughout the entire length of the line providing Supervisory Control and Data Acquisition (SCADA) functions.



This huge network controls a host of other subsystems as well as all the ventilation control throughout the line and at its stations. The ventilation system is normally set for maintaining comfort, but in an instant can switch into an emergency control mode.

Specifications laid down by Her Majesty's Railway Inspectorate, included that the system be easy to use for all levels of operator, and that high systems reliability and availability requirements were ensured. A key criterion for the system designers was to keep network traffic as low as possible to prevent data transmission overload from the various subsystems during times of high activity (like an emergency), so a special Mitsubishi Ethernet driver (EDI) was used to create an efficient communications interface from the SCADA network to the PLCs.

Additional and independent alarm handling and logging is built into the SCADA system, and this can lead to immediate action by the PLCs to reset airflow criteria should the need arise. The EDI driver optimises communication between the PLCs and SCADA by making the most efficient use of the full bandwidth of the WAN.

There have been a number of incidents in transportation tunnels in recent years; Kings Cross, the Channel Tunnel, in transalpine tunnels, and further afield on other continents. Vital lessons have been learned and performance criteria laid down for incident containment and emergency evacuation. All these have been implemented for the Jubilee Line extension, and many practise runs have proven the effectiveness of the solution developed.

In the event of an incident (either at a station or within a section of tunnel) an alarm activates at the operational control centre and the operator deploys a decision support system. This considers key information such as incident type, location and direction of evacuation and interrogates a database via the SCADA system's browser. Appropriate action instructions are then downloaded to each affected location, and the PLCs reset the ventilation fans and dampers accordingly to create the required airflow pattern through the incident area.

Application story first released March 1997 by Mitsubishi Electric UK