Honeywell

Case Study

Anmao Highway Manages Tunnels with Honeywell

"We have experienced the powerful functionality of Honeywell MasterLogic-200 PLC, which is simple to use and easy to debug and maintain."

- Project Operations, Anmao Highway Project

Background

As the world's most populous country, the People's Republic of China faces many challenges, including enhancing and improving the country's transportation infrastructure.

Wafangdian Tunnel is one a part of the long and extra-long tunnel network in Western China's highway infrastructure.

As part of the national expressway system, the highway from Ankang to Maoba and then to the border between Shaanxi and Sichuan provinces is an important part of the Baotou-Maoming route, known as the Anmao Highway.

This highly difficult construction features the largest bridge-to-tunnel ratio within Shaanxi Province's expressway network. This highway network includes 23 tunnels, including 4 extra-long tunnels (19.538km) and 5 long tunnels (8.022km).

Challenge

The Anmao Highway Project needed field-level monitoring and management on various types of mechanical and electrical equipment inside the tunnels, with the ability to manage multiple sets of master control PLCs, provide remote monitoring, and provide an industrial level man-machine interface.

Benefits

The benefits from the project implementation include:

- A system architecture for tunnel monitoring, using Honeywell MasterLogic-200 PLC, that is clear and straightforward.
- A configuration that provides the system with high reliability and high availability without additional investment.
- A control system that provides simplification of programming, eliminating the need to program each piece of equipment, thereby reducing workload, error rate, and modification difficulties.

Solution

The tunnel control system provides:

- **Traffic Detection** – The system detects traffic flow conditions in real time, using microwave vehicle detectors at tunnel openings and loop-coil vehicle detectors inside the tunnels. The system is able to detect parameters, such as vehicle type, vehicle flow rate, lane occupancy rate, and average vehicle speed.
- **Traffic Guidance Control** – Divided into manual and automatic control, tunnel management office personnel, using various monitoring workstations, can elect to implement manually operating states preset in the regional controllers. The field regional controllers can carry out automatic control on tunnel areas based on collected data and relevant instructions sent from tunnel management offices.
- **Cross-Channel Automatic Control** – All fire prevention rolling shutter doors and their control boxes are controlled by tunnel firefighting systems and tunnel power supply systems.
- **Automatic Fan Control -** The fan's automatic control manage the number of operating fans, their wind speeds, wind directions and operating times based on visibility, CO concentration and traffic volume date detected, thereby achieving energy-savings and controlled operation, which contribute to optimum

product life. The system also performs corresponding smoke removal handling in case of fire, based on the specific requirements of different locations, ensuring tunnel safety and a comfortable operating environment.

- **Automatic Lighting Control –** Automatic tunnel lighting control can be detected via program computation based on conditions, including outside brightness data, variations in traffic volume, daytime and night time, etc. by tuning lighting circuits on or off, the brightness at entries, exits and inside tunnels can be adjusted to ensure safe and smooth traffic flow, achieve energy saving operation, while satisfying lighting requirements and detect the status of in-tunnel lighting and lighting control equipment.

Results

This project was successfully commissioned and put into operation in December, 2010. The entire highway was formally opened to traffic in March, 2011. This project relies on the powerful functionality of Honeywell MasterLogic-200 PLC, which proved to be simple to use and easy to maintain.

About MasterLogic Programmable Logic Controller (PLC)

MasterLogic PLC is a pocket-sized industrial logic controller powered by a high-speed processor. It can operate in a standalone manner, in a peer-to-peer environment, or in a SCADA topology with Experion® HS. It features a wide range of components (the CPU, power supplies, discrete and analog, I/O modules, network modules, and racks) which are available in different modules to suit many different applications.

MasterLogic PLC takes information from various sensors and uses it to control different machines. A reliable processor makes it intrinsically powerful, and all program instructions are executed at a high speed of 42 ns/step. A dedicated Ethernet-based I/O bus controller supplements the main processor in I/O refresh to achieve high speed scanning, and its redundancy feature ensure high availability, especially for critical applications. Available with standard functions, it also supports creation of new or user-defined functions. It works in a loop-based, user-defined program where it waits for input and output at predefined intervals, and can perform self-diagnostics for system errors and trouble shooting. Built on open network standards, this programmable logic controller is integrated with the Experion platform.

The superior performance of MasterLogic PLC enables faster discrete and sequencing control, while saving space and operations costs with its small and compact modular size.

For more information on how Honeywell's MasterLogic PLC can help you, contact your Honeywell account representative.

For More Information
Learn more about Honeywell's products and services, visit our website www.honeywellprocess.com or contact your Honeywell account manager.

Honeywell Process Solutions
Honeywell
1250 West Sam Houston Parkway South
Houston, TX 77042

Honeywell House, Arlington Business Park,
Bracknell, Berkshire, England RG12 1EB UK

Shanghai City Centre, 100 Junyi Road
Shanghai, China 20051

www.honeywellprocess.com

SS-13-06-ENG
May 2013
© 2013 Honeywell International Inc.

Honeywell