Operational excellence achieved through unsurpassed system operation reliability

With a mission to cover the whole of Delhi with a Metro Network by 2021, the Delhi Metro Rail Corporation is striving for world class standards in safety, reliability, punctuality, comfort and customer satisfaction. Over a ten-year period since the start of the Metro project in Delhi, Honeywell has, through various EPC contractors, delivered a number of Tunnel Ventilation Systems (TVS), Environmental Control Systems (ECS)-Building Management Systems. The result is a first-class affordable solution encompassing all the safety, security and reliability standards of a world-class Metro system.
Installation and commissioning, together with ensuring that the Honeywell solution would work with other, third-party systems, had to be conducted over a limited timescale, considering the size and complexity of the project.

Operational expectations were to achieve system commissioning within the timescale; to achieve centralized monitoring and control of all systems and amenities from the confines of the station control room; and to provide a user-friendly GUI with high system operation reliability.

Honeywell Building Solutions were selected by DMRC EPC contractors to undertake the project because of:

- Their proven track record
- The quality and reliability of the products and solution
- The ability of the Honeywell system to meet all safety requirements
- Local Customizing

From an operational perspective the DMRC specifications requirements were that the products installed must be robust and reliable, and that after project completion a reliable commissioning programme should be implemented to ensure the system functioned properly without any breakdown.

Cost-saving expectations were, specifically:

- Centralized monitoring and control of the distributed system from the station control room.
- Maintaining the appropriate temperature and humidity level to achieve a comfortable environment inside the station for commuters.
- Energy saving by managing the chiller system load with respect to the external climate conditions.
- Logging of various data required for energy management.
- Logging of data useful for maintaining the system.
- Daily tracking and rectification of faults occurring during operation.
- Reduction of operational and maintenance manpower deployed through monitoring of services from one location.
- Round the clock efficient system monitoring and control.

THE CUSTOMER

Delhi Metro is a world-class metro. To ensure reliability and safety in train operations, it is equipped with the most modern communication and train control system. Ticketing and passenger control are through an Automatic Fare Collection System, the first of its kind in India. Travelling the Delhi Metro is a pleasurable experience enhanced by contactless tokens and ‘smart-cards’ facilitating controlled entries and exits to stations.

A unique feature of Delhi Metro is its integration with other modes of public transport, enabling commuters to conveniently interchange from one mode to another via feeder buses until the entire network is completed. The Delhi Metro is a trendsetter in India and other cities throughout the South Asian region will be looking to follow suit.

THE CHALLENGE

Honeywell Building Solutions was tasked with providing a solution to monitor and control all electrical, (station lighting, hydraulic systems, DG sets, UPS etc.), ventilation and air conditioning systems under both normal and emergency conditions in all stations. Under emergency conditions, the new system was also expected to function in tandem with emergency systems such as the tunnel ventilation system.

Below left: Track exhaust fan.
Below: Motor Control Center (MCC).
THE SOLUTION

Tunnel Ventilation System (TVS)

TVS SCADA project entailed the installation and commissioning of:

- Honeywell Experion HS Software.
- Honeywell SIL 3 PLCs with associated components as system main heart.
- PCs for Human Machine Interface (HMI).
- Dell Laptops.
- Ventilation control Panels with Sixnet RTUs.
- Local Control Panels for hardwired connectivity for executing different modes locally near PLCs.
- Sensors such as Temperature sensors, DPS (Air), Pressure Transmitter and temperature scanners etc.
- Industrial Lan Network Switches.

- Operational Command Center (OCC) system like CTUs at OCC Level and RTU at Station Level.
- HP servers and Machines for Human Machine Interface at OCC.

THE SOLUTION

Environment Control System (ECS)-BMS

ECS-BMS project entailed the installation and commissioning of:

- Experion process control HS with 5000 SCADA points license.
- 8 PLC panels per stations connected through dedicated LAN covering appx 1500 IO points at each station.
- Two redundant Servers per station for monitoring and control.
- One Laserjet and two dot matrix printers installed with all servers/workstations per station for report generation, archiving and log printing for analysis.
- Temperature transmitters, RH transmitters, differential pressure sensors, network switches etc.

Honeywell Building Solutions provided a customized GUI and central group control (Mode) command to tackle various emergency and normal operation scenarios.

The customized Graphical User Interface, or GUI, facilitates the control and status of the entire system from one PC/Server point – the Human Machine Interface, or HMI. From this point a controller can operate the entire system and assess its status, reducing the need for additional manpower and minimizing maintenance. Controllers also have the ability to perform multiple commands by way of initiating a ‘mode’ – a one-click action that triggers a number of simultaneous events. For example, ‘IN Mode’ for the supply of air to a tunnel might open a series of dampers and activate a fan in a given direction. Modes are activated under both normal and emergency conditions.

Customisation of the Experion HS scripting and database was designed to achieve some exceptional features in SCADA, while alarms, events and reporting functionalities were tailored to suit the customer’s desired format.
BUSINESS BENEFITS

HBS delivered on time, having met all the stringent requirements and without disrupting the Delhi Metro Rail Corporation’s daily operations and business systems.

The successful delivery of this project has provided the customer with a roadmap that can be used when establishing new Metros in other cities in India.

Honeywell’s system performance played a vital role in obtaining a rail safety certificate and DFS (Delhi Fire Service) occupancy certificates within schedule.

The comfortable environment has also helped towards the smooth operation of the station as a whole.

The Delhi Fire Service inspects all the installations of the Delhi Metro. In order to obtain their approval, Honeywell Building Solutions successfully demonstrated their system during the visit to underground stations where the system was operational at station level and at DMRC Operational Command Center.

Being a safety related system, validation of the TVS SCADA system for SIL2 was required from an independent third party (TUV), which conducted testing in August 2010. The system was successfully tested at station level and from the DMRC Operational Command Center level and, consequently, validated.

The Commissioner of Railway Safety finally inspected the system and validated it on 2nd September 2010, during which the entire system was operational well within the required timescale.

Other business benefits include:

- Reduction in operational costs.
- Utilisation of logged-in data for a continuous improvement process.
- Timely maintenance of spares by tracking the fault / failure records.
- Source of primary and secondary data for various analysis. The outcome of same will be utilized for various metro projects globally.

On delivering such a vast, complex project within the allotted timescale, Honeywell Building Solutions demonstrated proven capabilities and strengths which will only serve to garner customer confidence while tendering for similar projects globally.

Honeywell’s proven track record, the quality and reliability of the new system and its ability to meet all safety requirements were crucial factors in the decision-making process.