Integrated Building Management System for Hyderabad Metro Rail

Overview

Country or Region: India
Industry: Infra

Customer Profile

L&T Metro Rail (Hyderabad) Limited (HMRL) is a Special Purpose Vehicle incorporated by Larsen & Toubro (L&T) to implement Hyderabad Metro Project on Design, Build, Finance, Operate and Transfer (DBFOT) basis. The Company is a subsidiary of L&T Infrastructure Development Projects Limited (L&T IDPL), an infrastructure development arm of L&T. It has to its credit, 50 successful projects across many sectors comprising metros, railways, highways & expressways, bridges, seaports, terminals, airports, urban infrastructure, rope ways, water supply projects, sanitary engineering projects, bulk material handling projects, power transmission utilities, gas/oil pipelines, hydel power and nonconventional energy projects.

Need

India is experiencing a rapid rate of urbanization, which is expected to grow 40% by the year 2030. With the growing population in Metro cities, it becomes very important to provide sustainable infrastructure to withstand the growing demands.

Hyderabad is one such city, which is on the verge of tremendous growth in population and traffic. Being the capital city of Telangana state, it has emerged as the hub of IT/ITES, Biotech, and Pharma and Tourism sectors and expanded over 70 kms. Hence its requirement for a quick means of transport that would reduce the travelling time of passengers.

The government therefore decided to set up a well-planned public transportation infrastructure through Hyderabad Metro Rail Project to meet Hyderabad's rising public transport needs and escalating vehicular traffic. From amongst the various public transport options available, it emerged that high-capacity rail-based metro systems were ideally suited to meet Hyderabad's emerging need in urban areas. Metro rail is preferred over other means of transport since it provides faster, cost effective, convenient, secure and comfortable travelling at lower costs.

L&T was awarded the prestigious task of implementing this project of national importance. It comprised three high-density Metro corridors covering a total distance of 71.16 km, involving 66 ultra-modern station buildings, state-of-the-art depots and complete infrastructure.

For assisting the railways in achieving their technological needs, L&T Electrical & Automation's Control & Automation (C&A) Business Unit joined hands with HMRL to deliver Integrated Building Management System (IBMS) at all its 66 stations, Admin Operation Control Centre (OCC) and 2 Depots at Uppal & Miyapur.

Solution

For the convenience, comfort and better security of travellers, each station/depot of HMRL has various systems such as HVAC, Power Distribution System, Fire Alarm and Protection Systems, Lighting, PHE, UPS, Lifts and Escalators, Automatic Fare Collection System (AFC), CCTV and various other electrical and mechanical systems.

In pursuit of flexibility, interoperability and efficiency, HMRL sought an intelligent Building Management Solution that would support new and improved operations and customer services over the life span of the

Metro services and thus benefit the public, operators and the L&T team.

C&A was responsible for the design, engineering, supply, installation, testing, commissioning & life cycle support of the Integrated Building Management System (IBMS) at 66 ultra-modern stations and 3 depots, including the setting up of an OCC and Back up Control Centre (BCC).

C&A has delivered its state of the art ***iVision***$_{max}$ SCADA suite along with RTUs configured in redundant architecture at each of the stations and depots for monitoring and controlling of various parameters of the station building. At OCC and BCC, ***iVision***$_{max}$ SCADA suite is implemented in redundant architecture along with ORACLE RDBMS based Historian, in disaster recovery configuration.

C&A's ***iVision***$_{max}$***-IBMS*** solution controls and monitors 63000+ I/Os, 321 control panels and 1600+ instruments spread across all stations. It monitors and controls lighting as well as equipment such as lifts and escalators, Fire Alarm System, HVAC, STP/ETP, PHE, UPS, VFD, DG Sets, Energy Meters, Electrical System so as to provide better comfort for passengers at stations by effective utilization of ventilation & air conditioning and electrical installations.

System Highlights

- Helps in automatic fault detection and diagnosis strategies for building energy performance, HVAC sub systems and their control instruments.
- Senses emergency conditions such as fire and executes predefined emergency mode sequences, which in turn ensure that all related equipment at station premises function in safe mode of operation
- Protects against hot and cold temperature extremes. This generally involves running heating or cooling system pumps when external temperature reaches a set level.
- Tracks entire data from all the stations at OCC and BCC in real time, eliminating any chances of possible human error.
- Provides equipment scheduling (operating equipment as required), Optimum start / stop (running of HVAC equipment only during occupancy), Operator adjustment (accessing of set points to tune the system), Monitoring (logging of temperature, trends, equipment start & run time, operator log on etc.), Alarm reporting (notify failed equipment, out of limit temperature / pressure) and status of specialised systems like lighting control, load management, access control, etc.
- Offers high-level dashboards through which operation teams can easily monitor the efficiency, availability, performance, safety and security of the entire facility. It also creates a safer, secure and more comfortable facility which facilitates better building control and lower operating costs.

One of the biggest challenges faced during commissioning, was setting up a high speed network, extending across 70 km covering all stations & depots and OCC & BCC buildings for real time communication. The commissioning team had to manage a vast geographic canvas as the site implementation was carried out simultaneously at multiple locations. It implemented the city wide OFC Network in ring configuration with Network Management System to monitor all the network nodes for robust communication between the various stations and master stations.

For managing the different sub-systems installed at various facilities of the site, integration was another challenge. The IBMS system at each station had to be interfaced with 20+ sub-systems from multiple vendors, with different control philosophies. To address this, C&A used industry preferred standard Modbus protocol to collect precise and accurate data.

iVision$_{max}$***-IBMS*** is also integrated with the Communication system on OPC and Asset management system using MQ/XML, which provides equipment data for maintenance management, asset tracking & utilization and spares management.

The first phase of the project has been completed and the system is already in operation for 7 Stations, Admin OCC and 2 Depots – Uppal & Miyapur. To ensure on-time delivery of the project, site teams have been parallelly working on the project throughout.

About Us

L&T Control & Automation (C&A) is a Strategic Business Unit of L&T Electrical & Automation. It is a part of Larsen & Toubro – the multi-billion India-based conglomerate. L&T's C&A business is market leader in delivering integrated electrical & automation solutions in India and overseas. With over three decades of experience in diverse industry segments, C&A delivers value through comprehensive solutions based on varied technology platforms and incorporates the benefits of its wide-ranging experience. L&T's state-of-the-art Electrical & Automation Campus at Navi Mumbai in India has the latest testing and manufacturing equipment. It incorporates a modular manufacturing unit, an application software laboratory and a fully networked office for engineering and project management.

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Our Integrated Electrical & Automation Solutions:

Minerals & Metals

Cement, Mining, Ferrous & Non-Ferrous

- Cement Plant E&I
- Iron & Steel making E&I
- E&I for Bulk Material Handling
- E&I for Ports

Oil & Gas

Upstream, Midstream and Downstream

- Integrated Process Control
- Pipeline SCADA
- Emergency Shutdown and Fire & Gas
- Terminal Automation & Tank Farm

Power

Generation, Transmission and Distribution

- Integrated controls for Boilers and Turbines
- Station C&I
- E, C&I for CHP, AHP, WTP
- E&I for Solar Plants
- Smart Grid

Infrastructure

Highways, Ports and Metro Railways

- Highway Traffic Management
- Metro Rail BMS & AFC
- Airport Baggage Handling
- Power Management
- Smart City & ITS

Buildings

Hotels, Hospitals, Factories, Malls, Data Centres

- Substation
- MV / LV Power Distribution System
- ELV / CCTV / Fire Detection & Alarm Systems (FDAS) with suppresion solution
- Access Control
- Lighting Control

Benefits

The system architecture perfectly suits Hyderabad Metro Rail's Infrastructure and expansion requirements. This ensures the availability of live data at centralized location with following benefits.

- Ease of operation and improved reliability
- Total system integration with a single interface
- Enhanced service delivery
- Better utilization of power and human resources
- Effective incident management in case of accidents / emergencies
- Clear understanding and control over energy consumption, which helps in cost reduction
- Convenience for operators and passengers, thereby leading to customer satisfaction
- Maximum system availability, reliability through automation integration and optimization of entire subsystems
- Improved operation & maintenance with visualization of all the station parameters and operation data at a centralized location
- Optimized performance and greater control, creating operational synergies and reducing complexity over the lifecycle of Metro facility