

Overview

Country or Region: India

Industry: Oil & Gas

Customer Profile

Bharat Petroleum Corporation Limited (BPCL) is an energy company, operates in two segments: downstream petroleum, engaged in refining and marketing of petroleum products, and exploration and production of hydrocarbons (E&P). With its total capacity of refining about 20 MMPTA and network of more than 6550 retail outlets, BPCL meets the demand of nearly 8000 industrial customers, and millions of households for automobile fuels, automotive lubricants and other non-fuel products. BPCL's Mahul refinery in Mumbai processes approximately 9 MMTPA (million metric tons per annum) of crude oil.

iVision_{max}-PMS™ – improves Power availability at BPCL's Mumbai Refinery



The Challenge

Petrochemical facilities are very energy intensive. A power disruption in a refinery could result in several days of lost production, which could translate into millions of rupees of lost revenue. Uninterrupted power supply enables refineries to improve productivity in their operations, but it also helps in reducing operating costs due to improved quality of power. To reduce the gap between supply and demand for power, BPCL has its own captive generation facility, in addition to external power supply sources.

At BPCL Mahul, in-plant generation is in parallel with the external grid. In case of any grid disturbance it affects in-plant generation; causes power failure in the plant and affects production. To avoid this, load shedding and isolation should take place dynamically as per power flow and should help in optimum utilization of in-plant generation.

To meet this requirement, the contract was awarded to the L&T-C&A. It entailed the supply, installation, testing and commissioning of Dynamic contingency

based Islanding & Load shedding System at BPCL Mumbai Refinery, to improve the stability of power system.

In addition to this, L&T-C&A was responsible engineering, customer training, system integration and FAT, installation and commissioning, site acceptance testing and warranty.

Key requirements

- Achieve load shedding scheme in less than 200ms
- Integration with existing numerical relays and energy meters.
- Reduce outage minutes with restoration of major load
- Improve load balancing
- Reduce outages with auto-sectionalizing

The Solution

To maintain reliable power distribution at BPCL refinery, L&T-C&A implemented its **iVision_{max}-PMS™** - a centralized SCADA system which supervises the power system, collects data from substation intelligent

electronic devices (IEDs), Energy Meters, Control circuit breakers, and permits management of the power system from a central location.

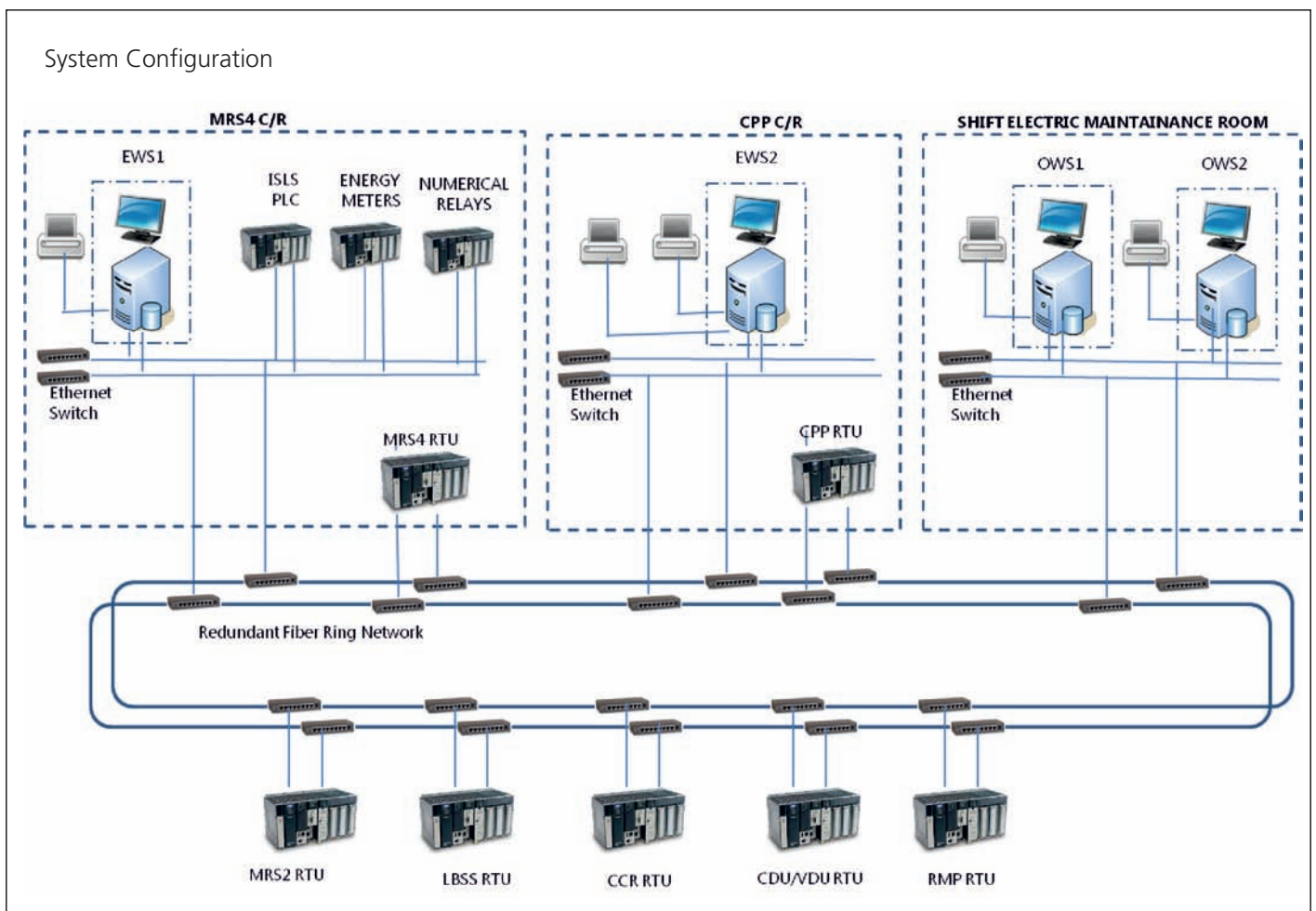
The solution was designed to control and monitor 7 sub-stations, using hot/standby redundant RTU for data acquisition and one hot/standby redundant Islanding & Load Shedding PLC system which is responsible for monitoring and control from the main control room. The solution also consists of one pair of Hot/standby redundant **iVision_{max}-PMS™** SCADA Servers with two clients located in the main control room and two other control rooms for monitoring and control purpose. The PLC system also collects data from 13 numerical relays which monitors the incoming grid supply. The SCADA system collects data from third party devices like energy meters and numerical relays for in depth analysis in case of fault occurrence. The RTU system at 7 sub-stations are communicating using dual redundant Profibus/Ethernet FO network connected in

a ring with PLC system in the main control room.

In consultation with BPCL, C&A designed, tested and implemented around 800 scenarios of Load shedding schemes as it was a critical requirement of the project. Less than 200ms response time was achieved to preserve the system operation and in order to preserve the system, loads must be taken offline fast enough to compensate for the lost generation, maintain the system frequency, and ensure that the effects of the event are mitigated in the **iVision_{max}-PMS™**.

Further to load-shedding system, L&T-C&A also implemented Islanding System to monitor 25 different loads, calculate dynamic power flow and make optimum use of in-plant generators.

Around 36 nos of power transducers were installed to monitor and calculate the power flow through various loads which gives additional flexibility while islanding and load shedding. All system is time



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.

*LARSEN & TOUBRO
Control & Automation
Electrical & Automation Campus,
Shil Mahape Road, Navi Mumbai, India.
Tel : 91-22-67226300
E-Mail: CNA-marcomm@LnTEBG.com
Web Site: www.LnTEBG.com*

Our Integrated Electrical & Automation Solutions:

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- Iron & Steel making E&I
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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 suppression solution
- Access Control
- Lighting Control

synchronized with GPS for better diagnostic purpose.

Benefits:

With the implementation of **iVision_{max}-PMSTM**, BPCL refinery has successfully sustained major grid power outage conditions. **iVision_{max}-PMSTM** SCADA system monitors and control the plant for any contingencies. As system implemented with automatic real time trigger detection, load shedding and generation shedding protects the plant under different contingencies. It ensures fast load shedding at any time as well as power to all critical loads in the plant and switching off non-essential load in case of shortage of power in the plant with response time less than 200 ms, which provides fast and optimum load management under actual operating conditions.

Additional Features

- Interfaced with the existing switchgear
- Monitoring the 25 different loads to calculate dynamic power flow. This dynamic power flow will give additional flexibility while islanding and load shedding

- Load shedding for block loads as well as individual loads which results in flexibility. This is achieved by using RTUs
- Up to 800 cases monitored for load shedding. Power calculations and possible load to be shed updated dynamically
- Time critical application: Total operating time less than 200ms
- Redundant transducers used for critical power calculations
- Priority based load shedding. Priorities can be easily modified through HMI
- Import export limiter is configured to control the GTs
- Remote closing and tripping for various loads directly through HMI
- Real time network monitoring for HMI and RTU loops
- Communication with Energy Meters for EMS
- MIS Reports
- Safely completed all erection related work without any accident and failure
- Shutdown based activities are completed well within time.