

Case Study: Industrial Electrical Load Management System

Provider Name:	KALKI Communication Technologies (P) Ltd.
Client Name:	Multinational Utility Automation OEM
Project Title:	Industrial Active Reactive Power Management System for Cement Industry

The Problem/Requirement

The electrical network at the end customer plant consists of 132 KV switchyard with 4 no's of 132/11 kV transformer incomer lines connected to 11 KV substation. The Captive power plant has one 30 MW coal fired steam turbine generator (STG) and 4 no's of 5 MW diesel generators (DG). In the absence of an Intelligent centralized control to manage the power requirement, the plant faced frequent black outs during generator tripping or during Islanding which resulted in huge material loss and production loss. With highly fluctuating nature of loads in the cement plant the Substation and CPP Operators were not able to supply required power demand without violating Maximum demand limits and were not able to take advantage of the incentives given by the State Electricity Board for various off-peak time slots. The requirement was to understand customer needs, and develop an Active Reactive Power Management System and an islanding scheme to manage the instability in the system.

Kalki's Engineering Services group, helped the client to carry out the design of 132kV switch yard control, 11kV substation breaker controls, tie line control, maximum demand control, 4 X 5MW DG and 30MW STG Automatic Generation Control to be implemented in distributed PLC SCADA architecture. The nature of the load switching and the small size of generating units called for a very fast acting intelligent controller to avoid blackouts and to stabilize the system during islanding and generator tripping.

The Solution

The following Resources were utilized for the implementation of the system:

- High end redundant SCADA development platforms,
- High integrity redundant PLC.
- Engineering platforms with optimally designed functional blocks and
- Communication interface for energy meter measurement.
- The HMI is provided with easy to use graphical user interface, report generation trends and Alarms /Events for critical Digital inputs.

Functional solution

1. Multi-level priority based fast load shedding schemes.
2. Maximum Demand control
3. Islanding function
4. Load sharing of generators/group control
5. Slow generator active /reactive power control

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6. Synchronization of bus couplers/Grid incomer
7. Breaker control /On load tap changer control

Kalki Engineering Services group carried out the entire engineering, FDS preparation, FAT approval, Erection and commissioning activities at site and eventual hand-over.

Tools Used:

- OEM Sub-Station SCADA Software
- IEC61131-3 programming tool
- Multifunction Protection relays
- Remote monitoring and control unit (IEC-870-5-101)

Highlights:

- The system was put into operation during September 2004
- The Black outs during normal operation has being avoided.
- Max demand violation was completely averted after the installation of the system