Case Study: Industrial Electrical Load Management System

Provider Name: KALKI Communication Technologies (P) Ltd.

Client Name: MNC Automation OEM

Project Title: Industrial Electrical Load Management System for Metal Industries

The Problem/Requirement

The client, a Major Utility Automation Multinational required to develop an Industrial Electricity Load Management System for a customer in Metal Industry. The end user, a Major Aluminum Manufacturer, has 2 captive power plants (CPP) and 2 load centers in their network which is connected to the state electricity board grid. CPP#1 has 4 generators of 67.5MW and CPP#2 has 4 generators of 135MW. Load centre 1 has 2 bulk loads of 110MW and Load center 2 has a single load of 430MW. When connected with the grid all the generators used to run in maximum capacity and normally in power export mode to the grid. Due to any disturbances in the grid, if the system gets islanded from the grid, the whole plant will face a total blackout. The customer required a Load Management System, which shall maintain the power balance during grid isolation and maintain system voltage and frequency.

Kalki EMS team, with its vast experience in Industrial Energy Management Solutions, sat with the client team to understand the end customer requirement and carried out the initial design and pre sales support. Kalki EMS team took the project on turnkey basis from the client, the scope involved PLC Field drawings, HMI development, IO list creation, implementation of Energy Management Functions in IEC61131-3 programming tool, testing, commissioning, and hand-over at site.

The Solution

The following Resources were utilized to carry out the Engineering and Design tasks:

1. Client's Sub-Station SCADA Platform
2. Clients PLC Platform
3. Kalki's MIS Software
4. End-Customer specifications
5. Communication Topology and Interconnect details

The requirement consisted of one redundant SCADA server and client stations located at 4 different sites. The PLC's were connected to the SCADA Control server through a industrial Ethernet network. The entire drawings, Engineering and Single Line Diagrams (SLD) and system configuration were carried out in the development center. The Energy management functions and Interlocks were programmed in the 8 no's of EMS PLC nodes using IEC61131-3 programming tool and the SLD as per the specification developed on the OEMs SCADA. The load management system comprised of the following functionalities:

1. Grid Active/Reactive power exchange control
2. Fast load shedding in case of sudden generation losses
3. Fast generation shedding in case of sudden load throws.
4. Frequency/Voltage control in the isolated network by controlling governors and AVRs of generators
5. Breaker Synchronization to connect the network back to the grid.
6. Alarm management, reporting and Management Information System.

The fully configured system was made available for Factory Acceptance Test (FAT) by the end-customer. After approval the system was shipped to site. At site, based on the detailed startup and commissioning plan, Kalki EMS team made a action plan to complete the EMS implementation, field-wiring and loop checking. These steps were carried site in the order of readiness of the different sites. Once these were completed, the system was ready for Site Acceptance Testing (SAT) and hand-over.

Tools Used:

- OEM Sub-Station SCADA
- IEC 61131-3 programming tool
- Windows 2003 Operating System Utilities for service management

Highlights:

- The IELMS system is operational since October2006
- The customer twice survived system blackout due to grid isolation after commissioning of the ILMS system and thereby saved production loss and thereby Crores of rupees.