Industrial Energy Management System

Under the Energy Conservation Act, 2001 , the Bureau of Energy Efficiency is spearheading the improvement of energy efficiency of the economy by establishing and prescribing energy consumption norms and standards for energy intensive industries. It has, hence, become imperative for Industries and Commercial Establishments to establish systems to measure, monitor, implement and verify efficient use of energy & its conservation and EMS is the first right step in this direction.

Introduction

Process and manufacturing industries today are under pressure to deliver high quality outputs at lowest cost. Global manufacturing centers are reaping the benefits of scale. The need for Indian industry is therefore to implement cost saving measures immediately, in order to remain competitive.

Electrical energy is one of the major consumables, which form a large cost component. Particularly in industries like cement, steel and many others the rate at which power is made available can make all the difference in cost of the end product. It is no wonder therefore that organizations are making strenuous efforts to conserve energy and explore other alternative like captive power plants, wind power etc., to bring down the unit of cost power, which has a direct effect on the bottom line.

The Electricity Bill has a fixed component (proportional to the sanctioned Maximum Demand) and a variable one (proportional to the units consumed). We need to look at both when trying to cut costs.

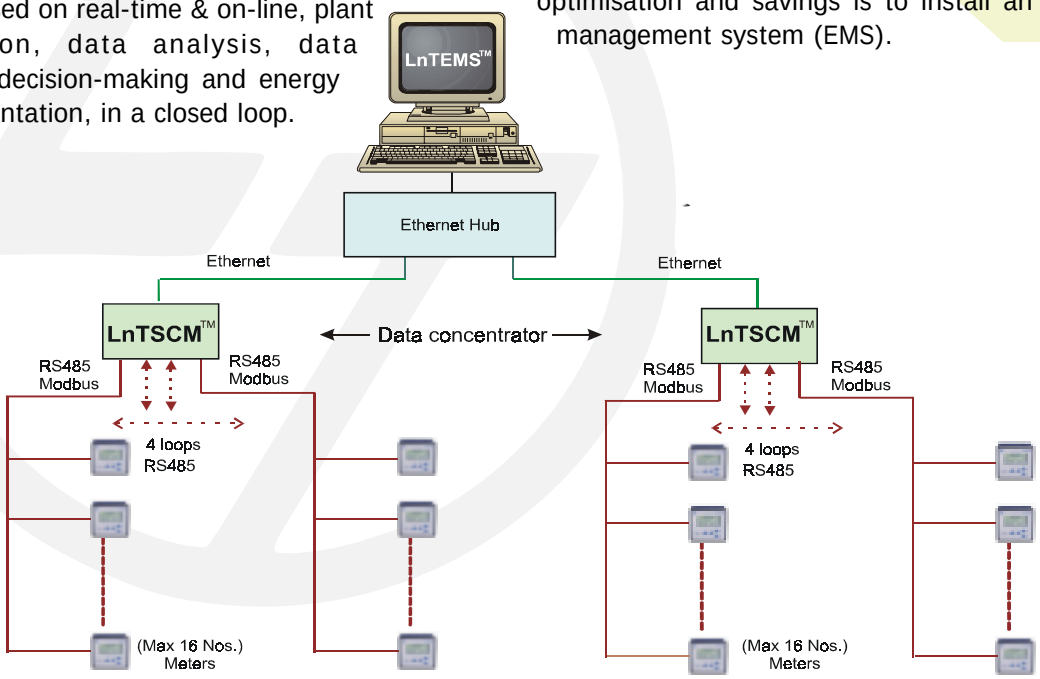
Before one attempts optimisation of machinery and processes it is essential to have consumption data and trends on which improvement techniques can be applied. Only then, can one have, a continuous Energy improvement programme based on real-time & on-line, plant data collection, data analysis, data interpretation, decision-making and energy saving implementation, in a closed loop.

The problem starts here. Industry today has lagged behind in basic techniques of measurement and centralised data collection and need to quickly correct this situation.

Some of the problem areas are:

- Use of analog meters, which are inherently not as accurate as digital metering.
- A few standalone KWH meters are provided while many other essential parameters like PF, V, I , VAR are not measured / monitored.
- There is no provision / system for on-line measurements; readings are taken by manual logging. The off-line monitoring of energy parameters is not synchronised in real-time with the production data. This leads to errors in energy readings. Also, there can be human errors in reading or writing of energy readings.
- Greater emphasis on process efficiency than on energy efficiency. Energy optimisation is not a p art of the control loop.
- Many of the equipment capacities are overrated by a factor of 3 or higher, to ensure continuous production with little concern for energy consumption.

What needs to be done in order to take action for optimisation and savings is to install an on-line energy management system (EMS).



Typical Configuration of Plant EMS for 128 Meters

Components of an Energy Management Network

The main components of a modern EMS include:

a) A computer system with the desired Energy Management Software (LnTEMS™).

b) Remote meters, which constitute the main electrical data generators (like Quasar, ER300P, ER300N)

c) Network components like data cables, data converters, data repeaters and data concentrators (LnTSCM™) as the physical media.

Today, electric meters are microprocessor-based and available in a variety of configurations, which give information of multiple parameters, which were earlier unimaginable with conventional meters. A typical industry standard meter like the Quasar reads voltage, current, active / reactive /apparent energy and power, power factor, phase angles, frequency, power demand (max), voltage & current fundamental and distortion etc. with display for local monitoring.

The meters will be located at remote locations like load centres, power control centres, main receiving station and motor control centres. They read the desired electrical data pertaining to that feeder and send the data to the centralised computer software via the network cables. These meters support industry standard open protocol like Modbus, which allows the LnTEMS™ software to read and configure the meters. The computer receives the data and delivers it to the Energy Management Software, which processes the data and gives the required reports for decision making. LnTEMS™ is based on a Windows Operating System, user-friendly & easy to learn graphic user interface and menu-based configuration. It uses a back-end database for storage and has a robust communication engine for data acquisition with real time capabilities.

The salient features of LnTEMS™ are:

a) Historic trend chart

b) On-line trend charts

c) Performance reports

d) Energy reports

e) Cost reports

f) Budget reports

g) Alarm reports

h) Specific energy consumption reports

i) Run hour reports

EMS indicates the areas of energy saving and helps in identification of specific nodes (locations/users/processes) on which improvements are required. Data collected by the EMS can be suitably used for Energy Management, and hence provides an effective indicator of the industry's energy efficiency.

In a nutshell LnTEMS™ benefits the Organisations by:

- Eliminating manual logging of periodic meter data & authenticity of data is unquestionable.
- Increased efficiency and cost saving by cutting down technical / non-technical losses, improvement in power factor and load factor.
- Elimination / Reduction of demand penalties. Advance warning to initiate load shedding of non-critical loads.
- Constantly monitoring system health conditions and invokes alarms for abnormal conditions like overloading, sustained fault conditions, low power factor, under and over voltages.
- Energy Consumption costs.

Other Advanced EMS applications:

- Automated Meter Reading and Billing for Commercial Purposes.
- Remote polling of meters from distant locations using wireless devices like GSM / GPRS or carrier communication like PSTN, PLCC or dedicated networks.
- Connection of control devices for load shedding like breakers / MCCB's and intelligent electronic devices using LnTSCM™ / LnTPRO™ and LnTEMS Plus.
- Control & Balance of captive power generation vis-à-vis purchased power to achieve lowest net cost per unit in Vertical Industries.
- Energy Audits and Consumption pattern prediction.
- Transport of data to enterprise busyness systems.

Conclusion

With advances in Information Technology and the need of energy saving, such solutions are indeed beneficial, economical, profitable and can be deployed in a matter of days.

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