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TITLE: INDUSTRIAL POWER MONITORING AND LOAD MANAGEMENT SYSTEM

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Abstract

The systems are now so intelligent that real time energy monitoring and cost allocation is possible which allows the actual energy cost which is to be official to departments and products. A power management system allows for centralize monitoring control of energy use across industrial system.The monitoring provides an easier approach to deal with minor interruption to the most hazardous failure.In other words, An Optimal monitoring setup used to maintain the reliability of distribution transformers. Today is the world of automation, automation mostly used in industries.When we are talking about automation we must think about PLC. We can control the important industrial load which plays very important role, so working of load done by use of PLC. This paper providesan automatic switching mechanism that transfers the industrial load to power source.Power monitoring system operates around the clock, they can provide comprehensive historical data that helps end users reduce the energy delivered to and consume by electrical system in their facilities.The potential of the develop monitoring system are mainly the advantages of virtual instrumentation flexibility lower build cost and high performance as well as high accuracy for power management.

INDEX TERMS: *DG Diesel Generator ,PLC Programable logic control etc.*

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1. INTRODUCTION

Electricity is the major factor it plays vital role in economic development of the nation.Factories and other industrial facilities use a lot of energy. Often there are no system to place to monitor and control energy usage and various parameters in industry,which leads to industry wide inefficiency. This paper have been introduced to switch power supply automatically and monitoring system for measuring the energy consumption of electrical devices in the industrial areas the load parameters are continuously changes according to the load,these load parameter are continuously monitor and according to the requirement we can priorities the load. We studies these and other challenges faced by manufacturing industry. So weare designing a unique industrial power management system thatwill provide the information needed to efficiently manage electricity consumption. In this paper we introduce one of the textileindustries, Raymond. The supply to the industry is provided by multiple sources through DG set and through MSCB and for a lightning purpose solar plant is also used. Today.it is normal for industries, particularly in process sectors, to collect huge amount of real time data from automated control systems, including programmable logic controllers (PLCs). The captured data is shared and analysed in an orderly and precise way that identifies problem areas and provide solutions. Nowadays power shut down is major problem and it occurs because a lot of power is wasted in industry, in this paper energy monitoring system deals with this problem in a simple and effective way by auditing the energy usage in industries. In this paper we proposed a model which is based on the three phase supply, coming from MSEB and DG set. Basically we are taking supply from MSEB in case of any failure in main source, alternative sources of supply to meet up with the energy demands are used , for that we used DG set as a backup supply and also for lightning purposepower generated from the solar power plant are used.The main objective of this monitoring system is to centralised overall industrial parameters which will be display on single screen of pc.We perform all these operations in an automated process in energy monitoring system energymeters; PLCs and PCs are used for performing its operations. An energy meter with a single PLC which in turn connects with a pc. Serial communication is used to facilitate the communication between the PLC and pc. The network is obviously connected using RS485 cables and RS232 cables butPCs are only comfortable with RS232.

1.1. What is energy management?

Management is the process of collecting information about where, when, how and why energy is being used within an organisation so you can increase efficiency, reduce cost and improve sustainability. The process usually involves collecting

accurate, real time energy usage data using datalogger. The electric power industry involvement in power distribution automation has been principally focused on remote monitoring and control of the distribution system and there equipment.

1.2. Importance of power management:

Energy management have a most importance in every organisation because it has following benefits:

1. Today's energy cost is drastically increasing implementing energy management system in the organisation helps to reduce the cost as you will be only charged for what you used
2. As the consumption of energy are more the chances of various risk such as increase in energy price or delay in the power supply, power shortage etc. This risk will result in disturbances or loss in functionally and will your organisation at stake.
3. By using energy monitoring system our dependence on the use of rare fossil fuel is highly reduced.

The energy management system includes the monitoring and controlling system in which monitoring includes the information can be monitored locally and centrally. Access to the IMCS is protected and the user must login to gain access to functionality. The controlling of the system is limited while the system is based on monitoring purposes and given recommendation messages for the operator.

The key features of monitoring and controlling are:

1. It identifies the inefficiency in your system.
2. It will help to reduce peak demand.
3. It notifies you about the impending maintenance
4. It ensures safety
5. It saves cost

1.3 .Problem identification:

1.over loading :

While running on multiple sources there could be an event of one or more sources going down. Results in overloading on other running sources. But at the time of tripping which loads are to be shed & which are the ones that are absolutely pivotal to the current process.

2.Failing to monitor environmental factor :

Peoples are overlook the importance of monitoring environmental equipment not keeping the observation on how HVAC system and various sensors are perform without having a backup plan which leads to the quickly outage.

3.Human error :

Mistakes in the power management are one of the most common issue that can affect the system performance .

2. PROPOSED SYSTEM

This paper is based on industrial power management system in which we are implementing the monitoring system on one of the textile industry which is Raymond. IntheRaymond industry we are taking a data on the two sections which is weaving and spinning.

The Raymond industry supplied by MSCBE and in case of power failure we can use a alternate power supply switching technic and for that purpose DG set used as a backup supply all the power required for spinning and weaving are coming through the separate bush bar which is protected by circuit breaker, CT& PT are used for protection all the data related to the power, voltage, current, power factor and frequency are collected over a period of time.

Data logger is a device which is used for the collection of data over a period of time. Data logger system typically monitor a process using sensor link to the computer, most data logging can be done automatically under computer control And that data about power is calculated by energy meter who include RS 232 Protocol in the DM 52 series 3 phase electronic energy meter while using RS 232 protocol which is used up to the distance 50 fts.by using that protocol all data is wirelessly transfer which we get on a monitoring screen and that data and reading about voltage, frequency ,power factor and current are control by using PLC.

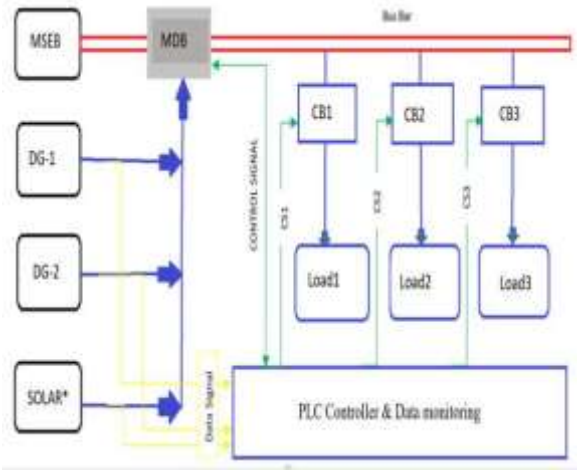


Fig. (1) proposed system for monitoring and controlling .

3.OBJECTIVE

The main objective of this proposed system is

- easiest way for energy auditing process
- to develop and deploy a (HMI) human machine interfacing
- Online energy consumption calculation
- Centralise the overall system parameters on a single pc.
- Complete information about the plant (circuit breaker status, source of feeding, and level of the consumed power).
- For measuring various system parameters like voltage,frequency, power, current.

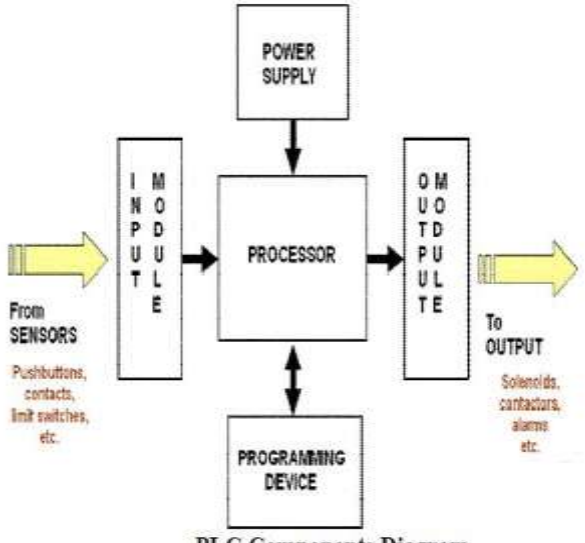
4. COMPONENTS OF THE SYSTEM :

The Main Components of the system are:

4.1. PLC
4.2. RS 232
4.3. Energy Meter
4.4. Monitoring Screen
4.5. Data logger
4.6. CT and PT

4.1.PLC

- PLC is a device having main function of performing the logic functions. In the past times these functions were accomplished by relays, timers etc.
- These relays and timers are bulky systems,errors chances are more and if the fault occurs in these systems then it is more time consuming to find the fault in these systems.
- This problem is overcome by PLC. PLC stands for programmable logic controller.
- RICHARD E. MORLEY invented the first PLC in 1969. The PLC programming procedure replaced the wiring of the relays, timers etc.
- High level language is used to write the PLC programming, which is easier for understandable of the more people.
- Any machine can be controlled automatically by use of PLC. For automatic control of machines the first make the program in the software according to the working process of the machine, then transfer the program to the PLC and after that connect the PLC to the machine.
- A single PLC can control many machines at same time given that their working procedure is same. The PLC has capability for handling multiple inputs and outputs signal.



PLC Components Diagram
Fig (2): PLC component diagram

4.2. RS 232

- RS232 is standard communication protocol which links computer and its peripheral devices allowing serial data exchange.in simple terms RS232 defines the voltage for the path used for data exchange between the devices.
- It specifies common voltage and signal level, common pin wire configuration and minimum amount of control signals.
- The term RS stands for Recommended Standard and the number 232 specifies the version.
- There are various types of serial communication systems which are designed to transfer the information over large distances through some variety of information cable.
- In telecommunications, this RS232 port is a standard serial communication transmission of data. Formally, it describes the signal connecting between dataterminal equipment and a data circuit terminating equipment. HereDC is a modemwhereas DT is a computer terminal.

4.3. DM 52 series Energy meter

- An electricity meter or energy meter is a device that measures the amount of electric energy consumed by commercial or electrically powered devices.
- These electricity meters are typically calibrated in billing units, the most common one being the KWh.
- In setting, when energy savings during certain periods are desired meters may measure demand, the maximum use of power in some interval isin DM 52 series.
- A direct measurement of energy consumption, no external multiplication factor required .while noting the energy readings depending upon the multiplication factor the nine digit energy reading need to be taken including the decimal point.

4.4 .Data logger

- A data logger (also data logger or data recorder) is an electronic device that functions for recording data over time or with respective to location either with a built in instrument or sensor or via external instruments and sensors.
- Increasingly but not entirely, they are based on a digital processor (or computer). They usually are small, battery powered, portable, and equipped with a microprocessor, internal memory for data storage, and sensors.
- Data loggers interface with a personal computer, andsoftware is used to activate the data logger for viewing and analysing the data that is collected.
- The ability of data loggers to automatically collect data on a 24-hour basis is one of the primary benefits of using data loggers.

- Upon activation, data loggers are typically deployed and left unattended to measure and record information for the duration of the monitoring period.
- Improvement in technology has impacted on the cost of data loggers, which has been declining over the years.
- Basic single channel data loggers cost as little as $25.But asthe complicity of loggers increase thecost may rise to hundreds or thousands of dollars.

4. 5. CT

- Current transformers are generally used to measure currents of high magnitude. The current to be measured is stepped down bythese transformers making it possible to be measured with a normal range ammeter.
- A Current transformer has only one or very few number of primary turns. The primary winding may be just a conductor or a bus bar placed in a hollow core (as shown in the figure). The secondary winding has large number turns accurately wound for a specific turn ratio. Thus the current transformer steps up (increases) the voltage while stepping down (lowering) the current. Now, the secondary current is measured with the help of an AC ammeter. The turns ratio of a transformer is $N_P / N_S = I_S / I_P$
- Secondary is 120 volts when primary voltage is 600 volts.

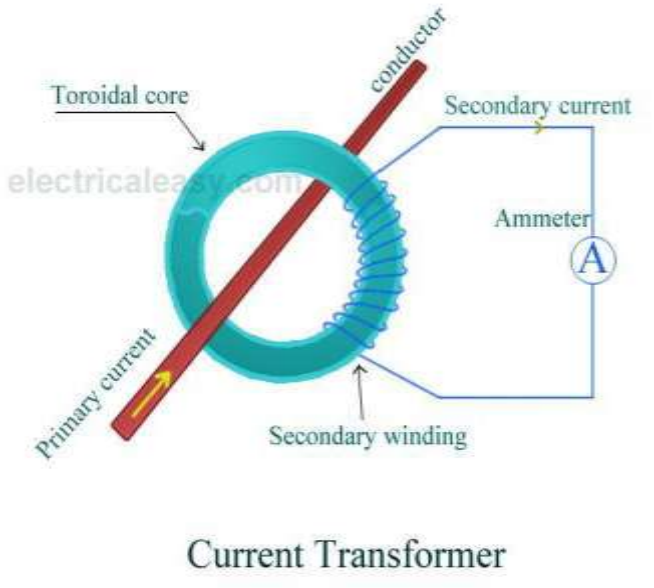


Fig. (3) Current Transformer

4.6. PT

- Potential transformers are also known as **voltage transformers** and they are basically step down transformers with extremely accurate turn's ratio.
- The high magnitudevoltageis stepped downto a lower voltage by Potential transformers, which can be measured with standard measuring instrument.
- These transformers have large number of primary turns and smaller number of secondary turns.
- A potential transformer is typically expressed in primary to secondary voltage ratio. For example, a 600:120 PT would mean the voltage across

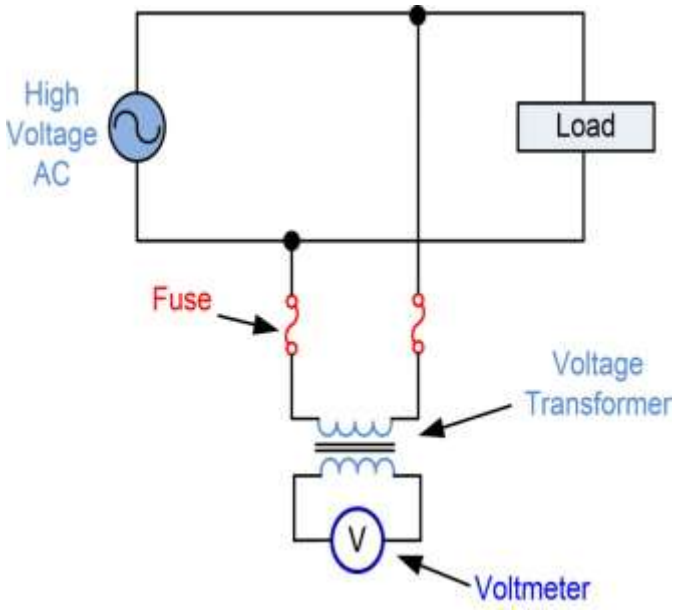


Fig. (4) Voltage Transformer

5.APPLICATION:

1. More and more operations can be performed with each set up and less lead time is required for set up but machining is required compare to conventional methods
2. Machine adjustment is easy to make with microcomputers.
3. As templates and other fixtures are not required.Tooling costs are reduced.
4. Operation flexibility is improved, along with the ability to produce complex shapes with good dimensional, accuracy, repeatability, reduce scrap loss, high production rates.
5. Less project work is involved.
6. Required operator skill is less than that for a qualified machinist and the operator has more time to attend to other task in the work.

6.CONCLUSION:

The proposed system is used to monitor the energy usage in different section of the plants. Lie comparison of energy used is monitor on computer screen. System also makes help in improving the existing system by analysing the changes in the energy consumption of the plant section. It highlights the wastage of the energy usage by comparing with the standard requirement of energy consumption. Propose system also help to alert the unwanted emergency situations or accidents in the plants and improve safety.

7. ACKNOWLEDGEMENT :

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