SCADA Implementation for Power Generator Performance and Condition Monitoring System

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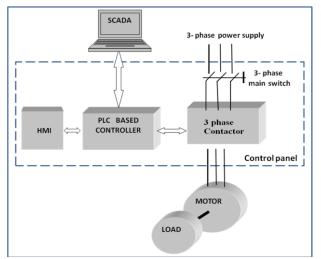Assistant Professor, Dr. Daulatrao Aher College of Engineering, Karad[3]

Abstract: The "SCADA Implementation for Power Generator Performance and Condition Monitoring System" is mostly applied in new technologies. Network component, application, features, and function of SCADA system has been discussed in this paper, also the working of SCADA software discussed with merits and demerits. PLC has been discussed in this project which include working, features, automation purpose and also architecture, programming of PLC with its all components like programming devices and program control instruction. This paper focuses on performance of 3 phase power generation and monitoring of parameters through SCADA and PLCs are used for controlling purpose.

Keywords: SCADA, PLC, Human Machine Interface (HMI), Contactor, Motor, Power Generator.

I. INTRODUCTION

SCADA is one of the most widely used technology implement to get main functions: Power generation and Condition Monitoring. A properly designed SCADA system saves time and money by eliminating the need for service personnel to visit each site for inspection, data collection.

In this system we will work on generating the power by rotating induction motor in clockwise and anti-clockwise direction. The status of motor is being displayed on Real time software SCADA which provides a supervisory control for the system. PLC is an industrial computer control system that continuously monitors the state of input devices and makes decisions based upon program to control the state of output devices. The program is downloaded into the PLC from a PC with RS-232 serial interface.

II. PROPOSED SYSTEM

Fig. 1: Block diagram of SCADA system

(A) SOFTWARE

1) SCADA (Supervisory Control and Data Acquisition)system

SCADA system is used to monitor and control equipment in industrial process. It usually consist of Remote Terminal Units (RTU), Programmable Logic Control and one or more field data interface devices which interface to field sensing devices. This system mainly used to transfer of data between a SCADA central host computer and a number of RTU. It has two main functions such as: First is to display information about the current operating conditions of a system and second is to allow supervisory control of the system by personnel.

(B) HARDWARE

1) PLC (Programmable Logic Control)

PLC is most advanced system and simplest forms of control system basically used to control automated systems in industries. Also used to control industrial computers. It continuously monitors input states of the system depending on the program and control the output states of the device. The program is downloaded into PLC by using RS 232.It works on a four basic steps such as input scan, program scan, output scan, Housekeeping (communication with programming terminals).PLC is widely used because they are easy to operate, fast and suitable for automation in industries also have biggest benefit is ability to change the operation while communicating vital information.

2) Contactor

Contactor is mainly used to start the motor. A contactor is controlled by a circuit which has a much low power level than the switched circuit. The contactor has AC/DC supply driven coil input. This coil will mostly be control by lower voltage PLC and motor. When current is passed through

the contactor, the electromagnet starts to built up, producing a magnetic field. Thus the core of the contactor starts to wind up. This process helps in energizing the moving contact. Thus the moving and fixed contacts make a short circuit. Thus the current is passed through them to the next circuit. The armature coil brings in high current in the initial position. Thus produces as soon as the metal core enters the coil. When the current is stopped, the coil gets de-energized and thus the contacts get open circuited.

3) HMI (Human Machine Interface)

A HMI (Human Machine Interface) device is connected to PLC by an Ethernet cable for manual controlling of the motor in case of emergency that can be controlled by supervisor at control room.

4) Induction Motor

The three-phase induction motors are the most widely used electric motors in industry. They run at essentially constant speed from no-load to full-load. The speed is frequency dependent and consequently these motors are not easily adapted to speed control. We usually prefer dc motors when large speed variations are required. Nevertheless, three phase induction motors are simple, rugged, low-priced, easy to maintain and can be manufactured with characteristics to suit most industrial requirement. A three-phase AC induction motor is the only type where the rotating magnetic field is created naturally in the stator because of the nature of the supply. DC motors depend either on mechanical or electronic commutation to create rotating magnetic fields.

III. WORKING OF SYSTEM

The system involves combined assembly of SCADA and PLC, power is generated by using induction motor as shown in fig. 1, 3-phase power is given to PLC and SCADA monitors the progress and status of generated power using PLC. In case of any fault on any line of 3-phase it can be troubleshoot by using PLC. Relays can be used for electro-mechanical switching for automation purpose in order to rectify the faults. Monitoring section also equipped with HMI device that is connected to PLC by an Ethernet cable for manual controlling of the motor in case of emergency that can be controlled by supervisor at control room.

IV. FUTURE SCOPE

This project is widely used in industrial process for continuously monitor the system if the system has any fault then it control the output state. From this project used to avoid the damage of machines. If the monitoring system can be connected to the internet then system control from the anyplace.

V. ADVANTAGE

1) The SCADA system can often be accessed   remotely on the office computer or laptop.

2) It has biggest advantage that improved the operation of the plant and safety of the system.

VI. CONCLUSION

In this system monitoring and control system is designed for control of three phase induction motor. Also with increase of load current the speed either in clockwise direction or in anticlockwise direction, in both cases the speed decreases. This project is well designed by using SCADA software. This system is developed by using advanced technology to get high amount of flexibility and efficiency. Also the monitoring system gives the facility of analyzing the operation of motor in any mode (on and off) which makes the system to be safe from any fault.

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