Boiler Automation using PLC and SCADA

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Abstract

Boiler is one of the most important equipment in any power plants, chemical industries, pharmaceutical industries which require continuous monitoring and inspection at frequent intervals. And this paper refers to how manual operation of boiler is converted in to a Atomized Industrial equipment using Programmable Logic Controller (PLC) and Supervisory Control And Data Acquisition (SCADA) system. and how it is effective than convectional methods. The paper is outlined how human errors can be avoided such unreliable readings, poor inspection etc[1]. The paper focuses on design and development of boiler automation system using PLC, SCADA and sensors so as to maintain the required water level in boiler drum. SCADA system is used to monitor the boiler feed water flow, steam flow rate and water level using different sensors and the respective output of sensors is given to the PLC controller which controls the boiler feed water and stream flow rate and water level. If the water level inside the boiler drum exceeds or drops bellow critical value then the entire system is shut down and respective emergency alarm can be raised.. Boiler automation ladder diagram is designed using RS Logix 500 and SCADA design is done by Factory Talkview software.

Keyword: Powerplant, PLC, SCADA, boiler

1.   INTRODUCTION

Power plants or any other industries having boiler equipments require continuous monitoring and inspection at frequent time intervals. In boiler there are many different sections to be controlled at same time, primary sections such as boiler drum which is basically a boiling section produces the high temperature water for steam genration.Too high water level leads to improper steam generation. In order to automate the system and minimize human errors, Steam & Drum Level is both critical and difficult to measure and maintain. Precise control of the water level in the drum is important factor[2]. It can be done with by developing a PLC &SCADA system that helps to reduce the errors caused by humans and able to provide the better control and monitoring of the plant or process operations through SCADA system which is a centralized system used to supervise a complete plant and ongoing process and provide the require data respective to process changes

1.1 Boiler Drum Level Control.

The purpose of the drum level controller is to bring the drum up to level at boiler start-up and maintain the level at constant steam load or at a predefined values . A sudden dropping in this level may damage tubes boiler tubes by exposing them t to be overheated. An increase in this level may interfere with the process of separating moisture from steam within the drum, thus reducing boiler efficiency.

1.2 Three Element Drum Level Control

The feed water control system is a three element type, which is basically designed to monitor changes in steam flow, water flow and drum level. Drum level indicates the amount of water present in the boiler. With changes in boiler workload (steam flow), steam and water flow become unstable and water level results in deviation from the normal position. In such an event, the process changes water flow to the extent important to restore the balance between steam flow and feed flow and take back the water level to normal.   .

2.0   PROGRAMMABLE LOGIC CONTROLLER.

Programmable Logic Controller (PLC) is a digital computer used for the automation with ability to re-programmed the logic as per requirements of user in industries
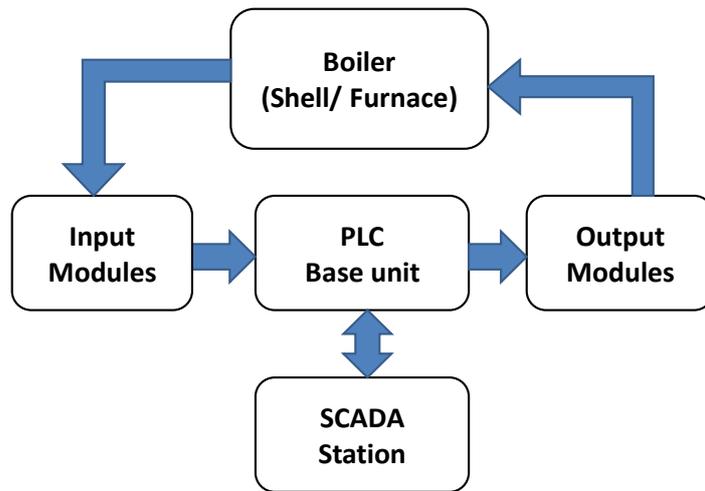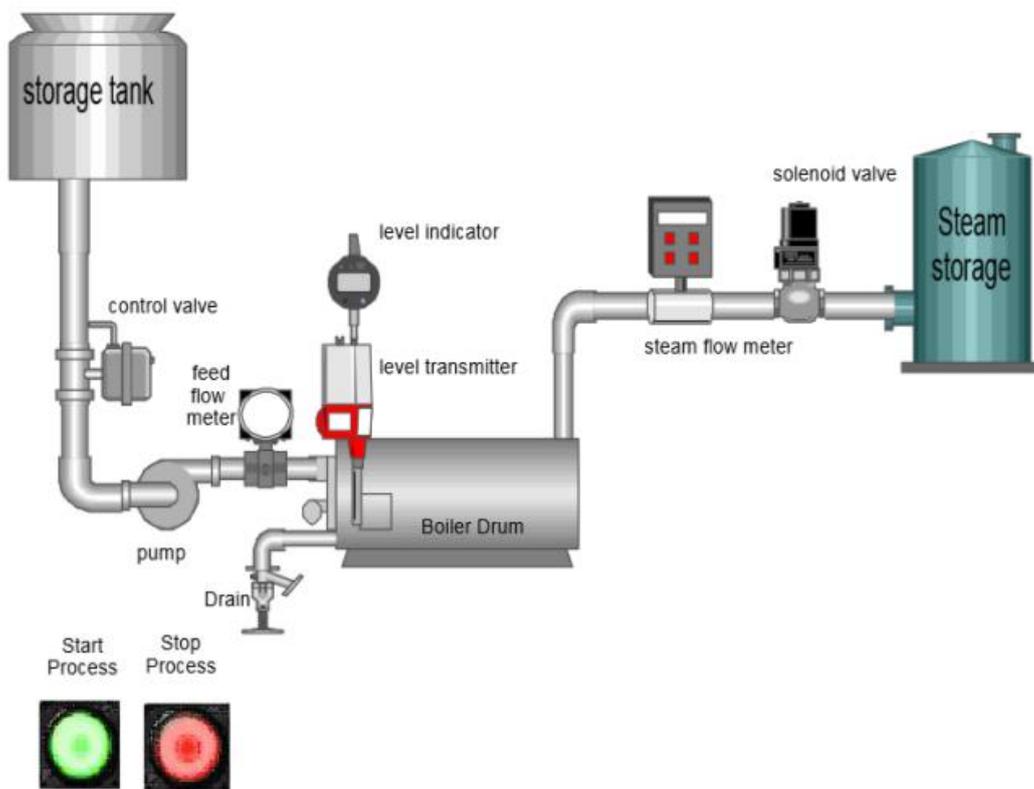
Fig 1-. General Interfacing of system

Fig 2: Implementation of SCADA.

4.0   CONCLUSION

In this paper, Boiler Drum Automation using PLC and SCADA is designed and implemented in respective software's for real time monitoring. Different sensors and field devices are used to measure the critical parameter such as water flow, steam flow rate water level. SCADA visuals are used to monitor the parameters and PLC used to control the operation. If the feed water flow rate, water level and steam flow exceed predefined value then the entire setup will shut down and automatic check valves are opened to release the steam and pressure.

5.   ACKNOWLEDGEMENT

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