



Boiler along with DSS compressor automated by PLC and SCADA

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ABSTRACT:The paper presents the design of boiler along with DSS compressor automated by PLC and SCADA .The boiler is a device used to create steam by applying heat energy to water which intern rotates the turbine to generate electricity. The DSS compressor is used to remove the dust particles. 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. The paper is outlined based on the human errors which can overcome unreliable readings. The paper focuses on design and development of boiler automation system along with DSS compressor using PLC,SCADA and sensors so as to maintain the required coal level in boiler drum. SCADA system is used to monitor the boiler coal level using different sensors and the respective output of sensors is given to the PLC controller which controls the boiler , stem rate and level. Boiler automation ladder diagram is designed using RS logix500 and SCADA design is done by INTOUCH Software.

KEYWORDS:DSS compressor, PLC, SCADA, Boiler, Conveyer

I.INTRODUCTION

The power plants or any other industries having boiler equipment's 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 stem generation. The high coal level leads to improper stem generation. In order to automate the system and minimize human errors, stem & drum level is both critical and difficult to measure and maintain. The DSS compressor is used to suppress the dust in the coal industry while travelling through the conveyer and along with the protection ware. The precise control of the water level in the drum is important factor. 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. The industrial equipment are dangerous to handle

so overcome these effects of people working near the boilers to boil the coal in which the coal produces a lot of dust and radiation. Apart from this the radiation causes great damage to the people standing near or around it. It affects both the physical and mental inhabits so to reduce the effects of the physical and mental inhabitants we have induced the new technology for the controlling all the system by single person more effectively an efficiently by the PLC.

A.BOILER DRUM LEVEL CONTROL

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

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 2, February 2018

II.BLOCK DIAGRAM

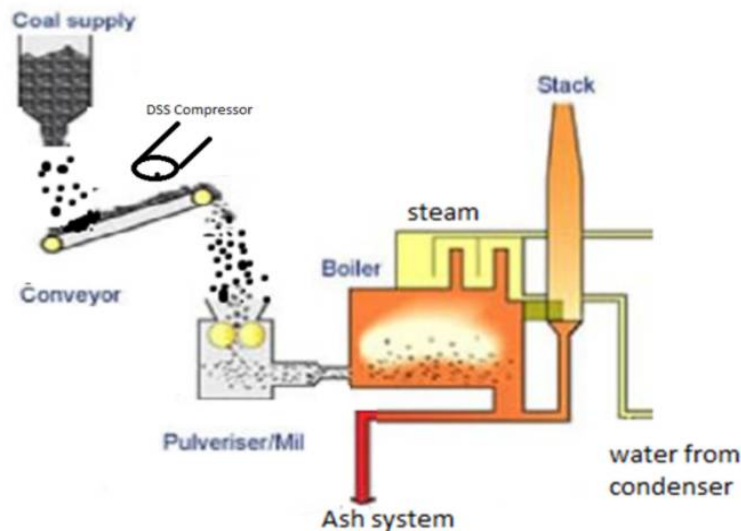


Fig 1. DSS suppressor block diagram

III.EXISTING SYSTEM

The paper refers to how manual operation of boiler is converted in to a Atomized Industrial equipment using PLC and SCADA. The paper is outlined how human errors can be avoided such unreliable readings, poor inspection. SCADA system is used to monitor the boiler coal supply, steam flow rate and is given to the PLC controller. If the level inside the boiler drum exceeds or drops below critical value then the entire system is shut down.

IV.PROPOSED SYSTEM

The project "PLC BASED PROTECTION, CONTROL AND INTERLOCKING OF DSS COMPRESSOR" deals with the controlling and protecting the DSS compressor by giving interlock, with the help of PLC. When this DSS compressor is controlled manually, the amount of air compressed tends to be greater than or less then the amount required leading to variation in quantity of air water mixture for dust suppression produced. Hence to reduce errors and man PowerPC is used. A Programmable Logic Controller (PLC) or Programmable Controller is a digital computer used for automation of electromechanical processes. It can be programmed using ladder logic diagram to suit our requirements. It can handle or carry out function here is to monitor crucial process parameters and adjust the process operations accordingly. The DSS compressor is a screw type modern compressor that is used especially for dust suppression, manufactured by Kirloskar Pvt. Ltd. The control here is done over switching on and off, air pressure monitoring, over load current, temperature and cooling fan operation. On violation of any criteria the compressor should trip and must be isolated and the plant should shutdown .Hence the limits are tracked, maintained and monitored to control the plant using PLC. The protection system here is used to protect the overloading of the compressor motor, smooth running of compressor, air pressure and temperature and cooling fan monitoring. In the plant, three compressors are used for effective control and protection. When one compressor is active the two will be on standing. The boiler is controlled by Variable Frequency Drive (VFD) to put in action the required processes to be carried out at the boiler. Thus the entire cycle is carried out as a paper and at various stages each phase is detailed out. This paper has provided to be very efficient practically as the need for automation grows day by day.

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V.HARDWARE AND SOFTWARE SPECIFICATIONS

Communication Cables, Programmable Logic Controller (PLC), Power Plant, Supervisory Control And Data Acquisition System (SCADA).

A.PLC:

A Programmable Logic Controller (PLC) or Programmable Controller is an industrial digital computer which has been fogged adapted for the control of manufacturing processes, such as assembly lines or robotic device or any activity that requires high reliability control and ease of programming and process fault diagnosis. They were first developed in the automobile industry to provide flexible, ruggedized and easily programmable controllers to replace hard-wired relays, timers and sequencers. Since them have been widely adopted as high-reliability automation controllers suitable for harsh environments.



Fig 2. Diagram of PLC

B.DSS:



Fig 3. Diagram of DSS

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Dust Suppression System suppresses dust at source by preventing it from becoming air borne or by returning it to the main material. The system utilizes water nozzles that produces fine mist droplets. The fine droplets suppress dust through agglomeration. Chemical based system are used for improved retention and efficiency.

C.SCADA:

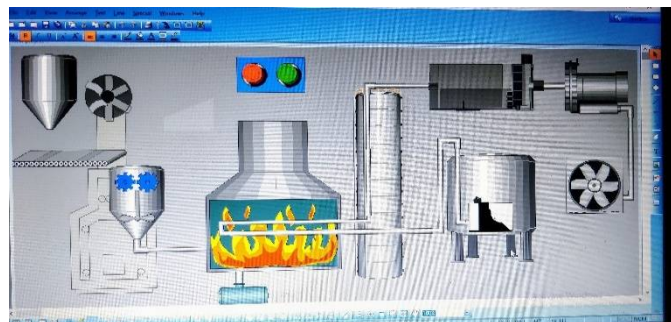


Fig 4. Diagram of SCADA

A Supervisory Control And Data Acquisition (SCADA) is a control system architecture that uses computers, networked data communications and graphical user for high-level process supervisory management, but uses other peripheral devices such as programmable logic controllers to interface to the machinery.

VI.RESULTS

The system we use is to suppress the dust in coal industry and to avoid black lung cancer along with radiation .To control the system effectively, the PLC and SCADA is used to control the system. The protection system here is used to protect the overloading of the compressor motor, smooth running of compressor, air pressure and temperature and cooling fan monitoring. Hence, the limits are tracked, maintained and monitored to control the plant using PLC.

VII.APPLICATIONS

Industrial Air Compressor Applications. Applications of compressed air include: Aerospace, Automotive, Chemical Manufacturing, Electronics, Food and Beverage, General Manufacturing, Glass Manufacturing, Hospitals/Medical, Mining, Pharmaceuticals, Plastics, Power Generation, Wood Products and many more.

VIII.CONCLUSION AND FUTURE SCOPE

In this paper, Boiler 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, stem 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 stem flow exceed predefined value in the entire setup will shutdown and automatic check valves are opened to release the steam and pressure.

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