Image Acquisition of Flue gas in a boiler through LAB VIEW

K.GanpatiShrinivas Sharma*[1], Surekha Bhusnur[2]
Research Scholar[1], Professor[2]
Dept. of ET&T[1], Dept. of EEE[2]
Bhilai Institute of Technology, Durg, Chhattisgarh, India[1, 2]
ganpatishrinivas01@gmail.com[1], sbhusnur@yahoo.co.in[2]

Abstract

In any kind of Power Industries flue gas monitoring plays a vital and this will protect environment degradation of unwanted gases in environment, safety and protect a shell of nature. Few advanced sensors are used to measure such kind of gases which measure temperature, pressure and various kinds of gases, these sensors provide information regarding measurement of boiler flue gas for analysis by acquiring images of various gases exhausted from furnace.It will be a visualization of complete combustion process.Above method is defined by Flue Gases ImagesFGI technique. The images of various gases are given after acquiring images in between economizer and preheater section. Simulation is done using LAB VIEW.

KEYWORDS: Power Plant, FGI (Flue Gases Images), Lab VIEW, Boiler

1. Introduction

Once combustion process is started all process is executed simultaneously, it is needed to avoid and reduce harmful effect of gases released during combustion on global environment and minimize effect of thermal radiation by providing proper value of oxygen content for efficient combustion.Theemissions ofvariousflue gaseslikeNOxCO_2,SOxandCOshouldbewithinlimits toreducetheenvironmental problem.The chemical composition is involving all above exhaust gases and we acquire images of the gases for identifying values. In this paper image acquisitionand identification of those images with Lab VIEW software has been discussed [1].

In previous work scientists have studied about all Combustion processes and energy radiations to find optimal performance of boiler.In order to completely burn the fuel a particular amount of oxygen is required, however the conditions that prevail during combustion are different from ideal and therefore excess air is supplied to the boilers.

- 10 to 20 % additional air is supplied in Power plant boilers
- Only 5 percent excess airis required in Natural gas-fired boilers
- Pulverized coal-fired boilers my use 20 % excess air.
- Gas turbines use up to 300 % excess air [11].

Boilersaretherefore firedwithexcessair, by adjusting burner knobs todecreaseemissions ofCO_2,SO_X,COandNO_X.This will affect output flow of flue gases.Formation of NOxinaboiler isdue toexcess air,the excess value of nitrogenandoxygeninthecombustionairenteringtheflame willcombinetoformthermalNOx.Lowexcessairfiring involveslimitingtheamountofexcessairthat is enteringthe combustionprocessinordertolimittheamount ofextra nitrogenandoxygenthatenterstheflame[2].

Many power plant steam production is essential part to rotate the turbine blades and steam is generated by boiler section and power for boiling of water ignition process is started by using Natural gas (Methane, CH4) [13]. In this boiler, the water is heated with the steam temperature (520 0C) and it is transmitted through heat resistive pipes to the turbine. It causes of auxiliary equipment to burn, it is expensive, so a separate ignition control Liquefied Petroleum Gas (LPG) is used. The natural gas has various advantages such as auxiliary cost for igniting the fuel is low. The monitoring and controlling is done using PLC with Lab VIEW Environment.The Boiler is filled with natural gas. Steam from the boiler passes through a flow meter and then to the turbine.

Suitable taps are provided with pipes, it determines the quality by measuring the pressure and temperature. A main valve is used to control the flow rate of the boiler. The output shaft of the turbine is coupled to the alternator. A panel mounted tachometer is provided to measure the turbine speed.

Primarily a control signal is sent from the controller to check the residual air stuck up in the line, for that the vent valves are turned ON. It also makes sure there is no any previous air stuck inside. Then the main Natural gas line starts, the receiving pressure is 10kg/cm2. A pressure gauge and a pressure transmitter are used for monitoring and control of the Fuel Supply system. By using a mass flow meter the flow is measured, and the pressure is adjusted to 5kg/cm2, by using control and diaphragm valve.

Another part goes to a series of pressure switch, which connected to the controller and the pressure maintains to 1kg/cm2. It goes to the two boilers. This fuel meets up with ignite, which already been lighted and fired up the boiler. The status of the flame is monitored using a film scanner and controlled using a solenoid valve. One boiler consists of two drums, where the lowered drum is heated and the steam goes to the top one, where, the residual condensed water held in the second drum is sent back this process is continues it also called as a cyclic process. Thus the water is converted to steam by using Natural gas as a fuel and the turbines are rotated to produce energy. An Automatic/Semiautomatic Control scheme saves the operational costs and operational time. Therefore, minimizing operating costs and improving efficiency are key objectives of the operation and maintenance of power plant. The test ring consists of a steam turbine coupled to an alternator both mounted on a suitable base plate [2].

2. Methdology

As one Camera is installed with near Sensor Placement area and one Lamp is Introduced where we add one cylinder of reacted chemical purging of that chemical along with flue gases and take a snap of those images of various composite color complex visualinformationprovidedis oflimiteduseasitisbasedontheoperator’s capability to interprettheinformationandreacttoitinanappropriate way. It is an intelligent analysis of other plant [6].

The effect is acquired and optimized along with lab VIEW based software which is a part of computer aided design.Afirststep,theparametersdominatingthe process is identified. These parametersare the primary sourcesofinformation fortheoptimizationsoftwarethatis structured in such a way that it automaticallyadapts to constantly changing processconditions.Following Figure shows a process flow diagram of obtaining data in existing setup[8].

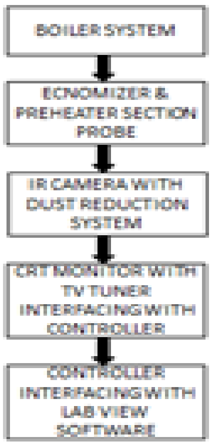

Fig 2.1. Flue Gas Imaging System

3. Method For Advanced Flue Gas Meter

The colored images of different gases in boiler are compared with standard images and finding actual values of gases through Lab VIEW Optimization process and designing a Flue Gas Imaging System.

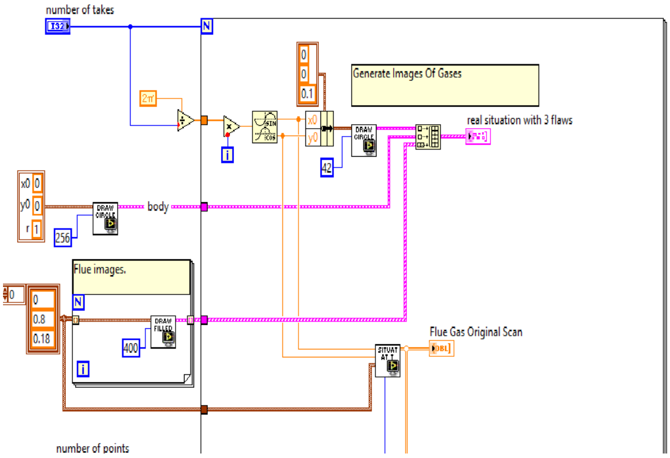

Fig: 3.1 Front Pannel of Flue Gas Imaging System

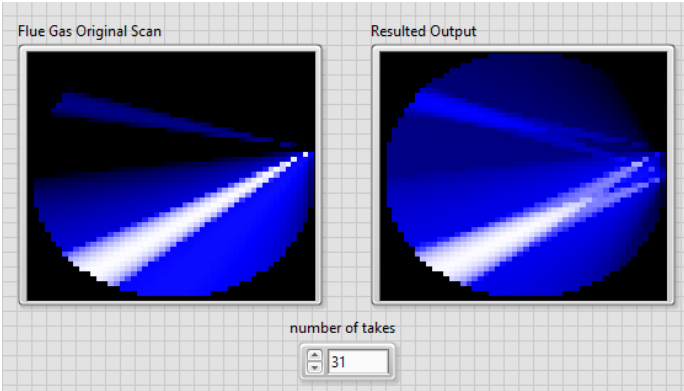

Fig: 3.2 Block Diagram of Flue Gas Imaging System

4. Result And Discussion

Using the Flue Gas Imaging System images of various gases are acquired and compared with real trace of 100 percent value of gases by adopting this technique Fuel usage has been reduced. This FGI in the Thermal power Plant has reduced the several security problems andit also helps to improve the fuel conception in the power plant to 10% compared to the previous system. The Fig.3.1and Fig 3.2 shows the Front panel and blog diagram of real time Gas Imaging Systemby Lab VIEW programming. The flow control helps to decrease the fuel usage and it help to improve the power plant efficiency.

5. Conclusion And Future Work

In themethodology of FGI system,a program with LabVIEWenvironment is used andadmitted gases are measured. Then the test results have been verified.Interfacing of controller with Lab VIEW programmingfor increasing safety and reliability of the system has been discussed. Extending of this project can be done by adding some alarm annunciation of the system when excess of gases is admitted.

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BIOGRAPHY

Mr.K.G.S.Sharma received his M.Tech Degree in Electronics & Telecommunication(Specialization in Instrumentation and Control) Engineering in 2010 from Bhilai Institute of Technology,Durg Chhattisgarh,India. Now he is doing Ph.D. in Electronics and Telecommunication at BIT, DURGAffiliatedtoSwamiVivekananda Technical University,Bhilai, India.His area of interest is Instrumentation and Control.