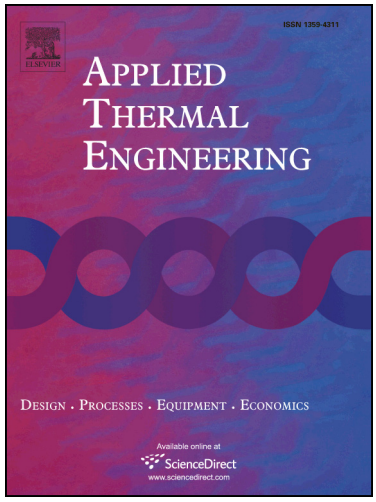
Accepted Manuscript



Research Paper

Dynamic Simulation Studies for Boiler Draft

Dhaval Dave, William Arnold, Shawn Timothy, Michael Reed

PII: S1359-4311(17)31655-1
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.03.043
Reference: ATE 10047

To appear in: *Applied Thermal Engineering*

Received Date: 26 July 2016
Accepted Date: 10 March 2017

Please cite this article as: D. Dave, W. Arnold, S. Timothy, M. Reed, Dynamic Simulation Studies for Boiler Draft, *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.03.043

Dynamic Simulation Studies for Boiler Draft

Dhaval Dave*
Sr Consultant
Schneider-Electric
Houston TX

Robert McHugh
Principal Consultant
Schneider-Electric
Carlsbad CA

William Arnold
Advisory Engineer
Babcock & Wilcox
Barberton OH

Shawn Timothy
Project Engineer Senior
Ray Nixon Power Plant
Fountain CO

Michael Reed
Sr Mechanical Engineer
Stanley Consultants
Centennial CO

* All communication should be directed to Dhaval.Dave@Schneider-Electric.com

Abstract

Increasingly strict NOx and SOx emission limits demand the fossil and fuel fired power industry to upgrade their gas treatment system with Flue Gas Desulphurization (FGD) and Selective Catalytic Reduction (SCR) equipment. To compensate for the additional pressure drop the new equipment introduces into the flue gas path due, the existing induced draft (ID) fans need to be replaced with higher head fans or new booster fans. This requires new duct work to connect the equipment. While the new duct work can be designed considering the new operating conditions, the existing duct work may not have been designed with these unanticipated changes and hence may be at risk of implosion and mechanical damage. This paper examins how a high-fidelity process and control model of the air, furnace, and flue gas path of a coal fired power plant is developed for a transient analysis study by using a dynamic simulation platform – DYNSIM. Also included is a case-study which evaluated the processes dynamics of a 225 MW unit. The objective of the study was to ensure design safety by evaluating the process dynamics of the unit prior to retrofitting the unit's draft system. The model, validated with historian data and design data, was used to evaluate the air and flue gas system pressure fluctuations in response to upsets such as fan trips and runaways. The resulting pressures were then available for use as a basis for the duct work design.

Keywords

Power Plant, Dynamic Simulation, DYNSIM

Research highlights

- Dynamic model of 225 MW coal fired power plant consisting of FD Fan, Air Heater, Furnace, prepared with dynamic simulation platform – DYNSIM.
- Demonstration of dynamic model for evaluating the stability of the system

Disclaimer

Various values and numbers used in this paper has been modified for this publication and do not represent the actual operating plant.