

Thermal and Transient Analysis of Boiler Chimney to Improve the Performance and Efficiency

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Abstract: *A boiler is an essential part of industrial power sector which works continuously for many days. This creates many flue gases which send to the surroundings through chimney. A chimney is an integral part of boiler system which provides ventilation for the hot flue gases while boiler working. Characteristic problem of chimneys is that, they develop deposits of creosote on the walls of the structure when used with wood as a fuel. Deposits of this substance can interfere with the airflow and more importantly, they are combustible and can cause dangerous chimney fires if the deposits ignite in the chimney. Heaters that burn natural gas drastically reduce the amount of creosote buildup due to natural gas burning. Disconnected or loose chimney fittings caused by corrosion over time can pose serious dangers for residents due to leakage of carbon monoxide into the home. Thus, it is recommended and, in some countries, even mandatory that chimneys be inspected annually / monthly and cleaned on a regular basis to prevent these problems. While cleaning it causes shut down of whole plant during cleaning which comes with the economic costs due to loss of production. The Main Objective of this project work is to survey and analysis of causes and remedies major type of corrosion i.e., fouling in industrial boiler chimney. Two modifications have been suggested, first divide the chimney cross section in two halves so that one will be used for operation while other for cleaning. This will induce certain pressure variation on surface of section plate and chimney. Second performing transient analysis for flue gases and to evaluate time taken to pass to surroundings. The mechanism proposed here if velocity of flue gases increased it will reduce the time taken by flue gases to contact with boiler surface that will reduce the problem off fouling. Finally, to find out the effective solution to overcome this problem either by modification in design parameters or change in working methodologies.*

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