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Boiler Tuning and Combustion Optimization

Microfusion has extensive experiences in boiler combustion tuning and steam header optimization in the Process and Utility Industries.

Some typical boiler tuning projects are described below.

Boiler MACT, and Steam Header Optimization–

The No.3 and No.4 boilers at a Panama City pulp mill have experienced many years of airflow control problems due to lack of proper air curves and less than desired combustion control logics. No.3 PB is a 300kpph, 1250psig at 940degF boiler burning a combination of wood residuals, fuel oil, and natural gas. No.4 PB has a steaming capacity of 330kpph, 1250psig at 940degF that burns a mixture of coal, wood residuals, and is co-fired with fuel oil and natural gas.

As a result of a Microfusion investigation, advanced control logics were implemented that enables both boilers to run completely in automatic and reduced steam venting to a minimum. The advanced control logics include:

- New OFA and under-grate air curves and air flow control logics that track closely to boiler loads.
- Designed and implemented fuel priority selection that during load incase, the lowest cost fuel will be used first, and the highest cost fuel will be reduce first when decreasing load.

- Design and implemented boiler masters that coordinated both of the power boilers to permit faster response to steam demand changes and maintain a more stable system pressure.
- Implemented the steam header optimization logics that minimize steam venting from high pressure headers by coordinating extraction steam turbines and pressure reducing valves to transfer excess high pressure steam to the lower pressure headers during a header pressure excursion, allowing more time for power boilers to back down, preventing wasteful steam venting.

Recovery Boiler Master and Combination Boiler Master Design and Tuning-

The Recovery Boiler and Combination Boiler DCS upgrade completed at a pulp mill in Hopewell, Virginia provided new platforms for better boiler combustion controls.

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Based on the upgraded DCS, Microfusion has designed the improved combustion control strategies that included the handling of various combustion control mode changes, air curve calibrations, and O2 controls. In addition, a combination boiler master is programmed to use fuel costs to prioritize fuel usage and maintain mill steam header stability.

Biomass Boiler Combustion Optimization -

Microfusion has improved the steam header stability and improved the boiler MW control by improved and simplified the overly involved original combustion logics for a recently converted biomass 63MW power generation unit. The improvements include air curve and O2 changes, air to fuel cross limit changes, Overfire and under-grate air curves recalibration, and the proper fuel master to boiler master integration.

350MW Unit Boiler Master and Tuning–

Due to the excessive delay in steam header response to fuel change, the power block could not operate in Boiler Following Mode to produce the precise MW output required by the grid for power transmission. At the request of the station, Microfusion implemented a pressure predictive boiler master that minimized the steam header swings caused by turbine load change. This reduction and steam heater swing allowed the power block to operate in Boiler Following Mode that allows the boiler steam output to match closely the turbine generator MW output.

In addition, the primary, secondary, and tertiary air curves are re-calibrated to track fuel changes to allow correct range for O2 controls, and for NOx reduction.