FBC BOILER – BIOMASS FUELS
Automatic Combustion Control with Manual Fuel/Air Ratio Adjustment

SYSTEM DESCRIPTION

Boiler Master
The boiler master control loop receives the drum pressure signal from the drum pressure transmitter and compares it to the operator-entered setpoint. The controller modulates its output in order to eliminate any difference between the signal and the setpoint. The output of the controller represents the boiler demand for steam, and is sent to the variable speed drives on the feeders or distributors if automatic feed control is used. It is also sent to the fuel/air ratio station. The operator may adjust the setpoint in automatic or place the controller in manual to fire the boiler manually. The controller rejects to Manual on bad signal quality. A high/low pressure alarm is shown.

Fuel/Air Ratio Adjustment
The fuel-air ratio is determined by a lookup table entered into the controller during commissioning once the combustion test has been performed. The means of trimming, or fine-tuning, the fuel-air ratio is provided via a faceplate display on the controller which allows the operator to enter a value for the fuel-air ratio, based on observation and/or a sample from a portable combustibles or O2 analyzer. This value will modify the demand for airflow by multiplying the position signal from the boiler master with a correction factor, limited to +/-10% for safety. The signal is sent to the fuel-air ratio lookup table and then to the VFD on the FD Fan. It is also sent to the furnace pressure control loop as a feedforward adjustment.

Furnace Pressure
The furnace pressure control loop receives the signal from the furnace pressure transmitter, compares it to the operator-entered setpoint and generates a correction signal. The total air flow demand output from the fuel/air ratio is characterized in order to linearize the FD to ID speed or position, and is then added as a feedforward signal to the furnace pressure control output. The result is sent to the VFD on the ID Fan.
Overfire Air
The overfire air control loop receives its input signal from the boiler master control loop, adjusted as a ratio of the main air flow via a 10-point lookup table. It compares this signal to an operator-entered setpoint and generates an output signal to the overfire air (OFA) fan.