

2000 **Title:** **Elements of a Successful Bark Boiler Upgrade**

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ABSTRACT:

Mead Coated Board Inc. operates an early 1980s vintage Combustion Engineering Type VU-40 Bark Boiler at its Mahrt mill near Phenix City, Alabama. The mill had an interest in improving the combustion efficiency of the unit by reducing the reliance on burning natural gas for CO control and reducing unburned carbon in the fly ash.

The project was initiated by an engineering site visit and evaluation. The boiler had a history of unstable burning of hog fuel and primary clarifier sludge on the grate, which led to elevated levels of combustible gases in the upper furnace. It was decided to:

- Install a new OFA system,
- Install new air flow measurement devices,
- Improve flue gas O₂ measurement for air trim.

In addition, as part of the project, the mill upgraded the boiler control system strategy to improve control of combustion air, fuel, furnace draft, and steam generation.

Different OFA arrangements were evaluated via CFD modeling. The results showed the limitations of the original tangential system, which precluded mixing of air and combustible gases in the middle of the boiler. Previous evaluations had shown that many, small OFA nozzles on the front and rear walls could not provide the required mixing of air above the grate. Installation of large OFA nozzles on the front and rear walls was given cursory consideration, but was rejected due to all of the interferences (fuel chutes, fuel distributor air, ash reinjection system, downcomers, etc.).

The sidewalls were virtually free of interferences and the CFD model confirmed that placement of the nozzles on the sidewalls gave better combustion than on



the front and rear walls. The CFD model was also used to optimize the number, size, and location of OFA ports.

Installation of the new OFA system was completed in September 1999. Subsequent testing of the boiler showed that it could reliably meet the state emission levels for CO (0.4 lb/MM Btu) and NO_x (0.3 lb/MM Btu) while running at full load on a mixture of hog fuel and sludge.