A Case study from Heat Management

Stevenson, Alabama, USA

Application: Black liquor recovery boiler
Boiler manufacturer: Andritz
Fuel: Black liquor (high sulphur)
Solution: Infrasound cleaning

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General info

Industry: Pulp and paper
Capacity: 649 tDS/day

Infrasound generator

Type: APX2000
Location of installation: Gooseneck and precipitator
Time of installation: 2006

Situation description

The black liquor heat recovery boiler at Stevenson is used in the production process of corrugated paper board. The precipitator of the boiler experienced problems with build-up of dust.
Due to the high sulphidity black liquor, dust pH in the recovery boiler exhaust gas stream was very low, about 3.6, and prone to severe plugging problems. Aggressive sootblowing could keep the boiler and economizer free from severe plugging, but downstream equipment would rapidly plug.



Figure 1 - Infrasound Cleaner installed on "gooseneck"

The so-called "gooseneck" gas duct between the economizer outlet and precipitator inlet would plug and then require an outage for manual water washing every 6 - 7 days. Within that time would the ID-fan speed increase from nominal to maximum and the gooseneck opening would decrease from 7'x8' (2.1 m x 2.4 m) to just 24" (0.6 m) diameter.

Simultaneously, the 1st precipitator field would experience excessive spark rate within 2 to 3 days due to accumulations of the electrodes, then the field would have to be shut off. Subsequently, the 2nd, 3rd, etc. fields would fail. The precipitator required an outage every 20-25 days for manual cleaning. Each outage lasted for at least 24 hours.

The situation was operationally unacceptable, the cost for outages was high and the availability of the boiler was less than 85 %. Due to the poor precipitator performance, full boiler production was not allowed, it was limited to a production of 54,000 lb. DS/hour (24,500 kg DS/hour). The plant had spent more than $5 million over an eight year period on various equipments, trying to solve this problem.

Results

The installation was immediately successful. Outages for water washing of the gooseneck were eliminated and an outage for the precipitator is now done only every 6 months. Stoppage of the Infrasound Cleaner for even one day results in the return of the old plugging and fouling problems. As such, the Infrasound Cleaner has now been designated as a piece of critical process equipment.

- The plugging and fouling issues have been eliminated and the availability of the boiler is >95 %.
- The capital cost of the project was paid back in only a few months of avoided outages.
- The flue gas temperature outlet of the economizer has decreased by some 10°F (5°C), indicating that the sonic cleaner also has a cleaning effect on the economizer.
- Improvement in boiler efficiency from the cleaner economizer.
- In addition to the above payback, the estimated fuel savings to the plant is nearly $300,000 per year.
- All five fields of the precipitator are continuously maintained at maximum high voltage power input.
- The permitted boiler production rate has been increased from 54,000 to 62,000 lbs. DS/hour (28,148 kg DS/hour) after state made stack tests.
- The precipitator has been tested for stack particulate emissions of 0.008 #/MMBTU (0.34 g/GJ). The environmental permit level is 0.036.

Heat Management

Heat Management was founded in 2016 following a merger between Infrafone AB and Soottech AB. The purpose of the merger was to create a world-leading cleantech company with a superior product portfolio in energy conversion adapted for industrial boilers and incinerators.

Heat Management's primary customers include power and heat plants as well as pulp mills and marine companies. Today, Heat Management has patented solutions installed in a large number of applications around the world.

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