

# PULP & PAPER SOLUTION GUIDE

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## How to save steam and improve run time on a Recovery Boiler

### Background

Sootblowers in a recovery boiler consume a significant amount of valuable high-pressure steam. Although paramount to keep the recovery boiler running at its full capacity without plugging the gas passes, sootblower steam usage can be excessive—and costly. This cost cannot be passed to consumers, requiring mill engineers to continuously look for opportunities to reduce costs for improved profitability.

While it is impossible to completely eliminate sootblower steam consumption, current technology advancements have successfully reduced the sootblower steam usage to a level well below 5% of the total boiler steam production. Our experience with the solutions listed in this guide has shown a sootblower system is able to achieve 2.5% of the boiler MCR.

# CLYDE SOLUTIONS

## 1) High Performance Contoured Fully Expanded Nozzle (CFE III)

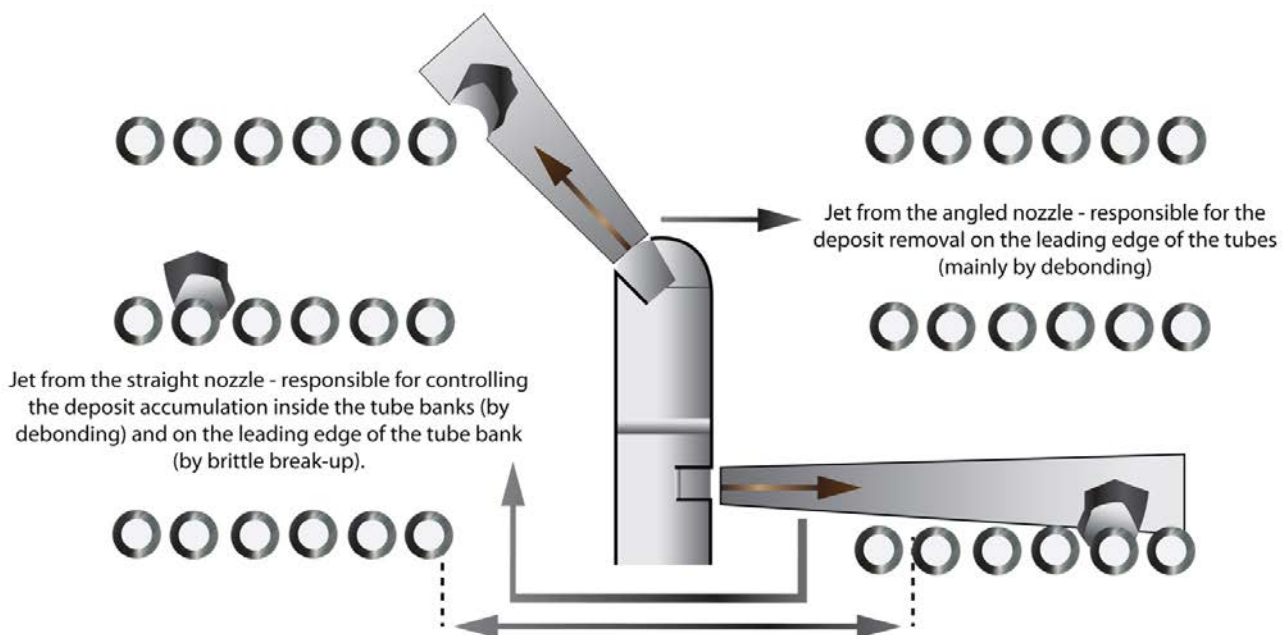
An ideal nozzle is able to fully expand the blowing medium to the ambient pressure and thereby convert the pressure completely into velocity. But in practice, it is impossible to achieve 100% efficiency. A conventional nozzle generally has low nozzle efficiency (less than 50%), so the amount of steam consumed by a conventional nozzle has to be increased in order to compensate for the lower nozzle efficiency.

Clyde Industries' CFE III nozzle has pushed the envelope with breakthrough nozzle efficiency greater than 90%. This higher nozzle efficiency means that CFE III can generate the same amount of cleaning power as its conventional nozzle counterpart at a much lower steam flow rate. Conversely, it also means that CFE III can generate more cleaning power than a conventional nozzle at the same steam flow rate.

## 2) CFEIII-LE (Leading Edge) Nozzles

CFEIII-LE is the proven nozzle technology that is specifically designed to extend boiler runtime. Deposit bridging occurs at the leading edge of the heat exchangers when the fouling conditions are hard to combat. CFEIII-LE uses a new

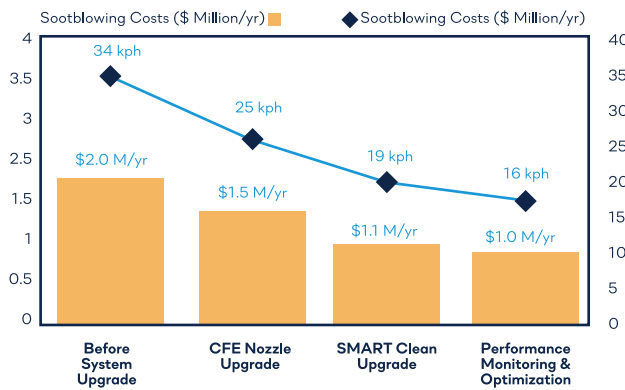
deposit removal mechanism called "debonding" rather than the typical fracture mechanisms and removed heavy deposit by using a torque angle provided by the very deposit itself located at the leading edge of the tube sections.



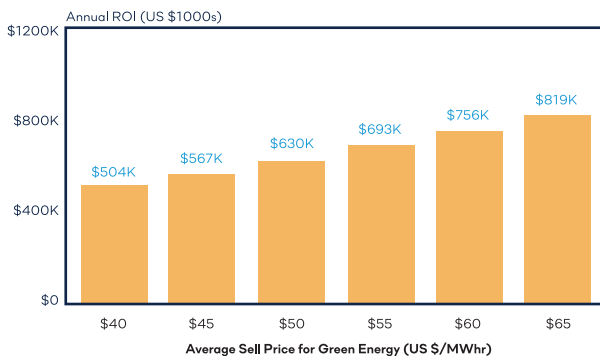
### 3) SMART Clean™ Intelligent SootBlowing Control System (ISB)

SMART Clean™ Intelligent SootBlowing (ISB) is a closed loop control system that uses feedback from the heat exchanger, gathered in real-time during normal boiler operation. This is designated to intelligently manage the sequence of sootblower operation. This enables a targeted cleaning strategy that saves steam by dynamically managing the sootblowing timing and flow.

SMART Clean™ can also identify sootblowers that are located in non-critical areas, where the deposits can be easily removed with a one-way sootblowing strategy. One-way-sootblowing uses the full cleaning power of the sootblower only during the insertion process. The cleaning power is reduced to a minimum level, which is just enough to keep the lance from overheating during the retraction process, further saving valuable sootblowing steam.



Use of complete Clyde Industries solutions with data from recovery boiler 5.0 Mlb BLDS/day



Return On Investment based on 350 days of annual operation and 1.5 MWhr additional green energy generation

### 4) Remote Performance Monitoring & Optimization:

Clyde Industries offers Sootblower Performance Monitoring and Optimization Service for your recovery boilers. Our team of veteran industry professionals has optimized dozens of systems nationwide and can help you:

- Optimize your boiler cleaning system strategy
- Bench mark boiler performance with the rest of the industry
- Generate automated performance and maintenance reports for maintenance planning and asset management

Remote monitoring and optimization are carried out through secure VPN access, in collaboration with the plant's security and information technology team, to obtain critical boiler and sootblower-related performance data. The raw data is then converted into valuable knowledge and used to make informed decisions. A monthly performance report is submitted, and bi-weekly conference calls with plant engineers are enforced to coordinate the action plan and drive improved results.

## 5) Steam Saver Sootblowing Technology (RSP-H):

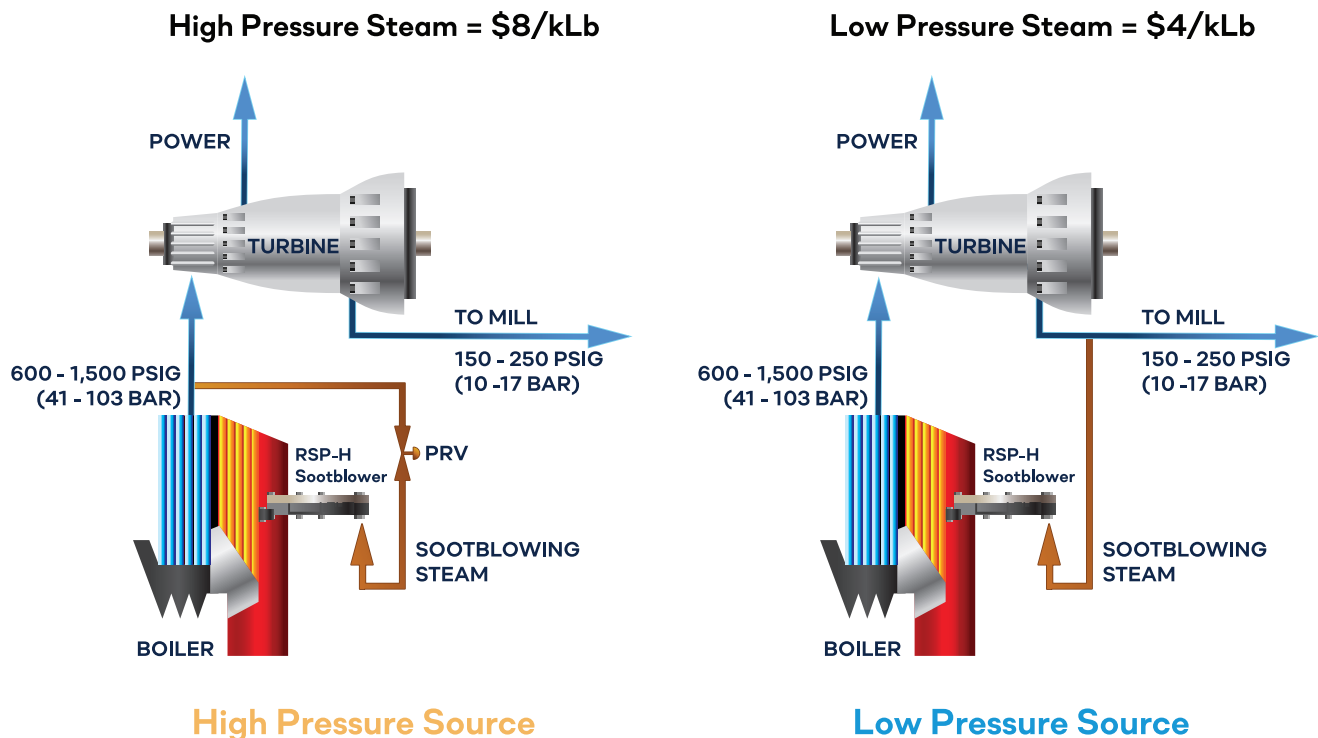
Sootblowers consume a significant amount of valuable high pressure steam produced by the boiler. A tremendous cost-saving alternative is to use lower pressure steam from the outlet of the steam turbine at 150 – 250 psig (10-17) bar.

RSP-H is Clyde Industries's new generation sootblower designed to produce cleaning force equivalent to that of a higher-pressure sootblower. This technology enables the mill to direct all high-pressure boiler steam to a steam turbine

generating additional 1-3 MW power, while the extraction steam from the turbine is used for sootblowing.

Four U.S. pulp mills have used Clyde Industries Steam Saver sootblowing technology to generate more MW and improve profitability. While initial investment is not nominal, the payoffs for this technology, even for retrofits, are extremely significant- more than enough to make the investment worthwhile.

### Steam Saver Sootblowing



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COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV GL  
= ISO 9001 =