NEW CONCEPTS IN ONLINE SOOT CLEANING TECHNOLOGIES

Mrs. Advaita Shedge

Head Projects & Planning.

Trust Well Group of Companies.

Existing Types of Soot Blowers

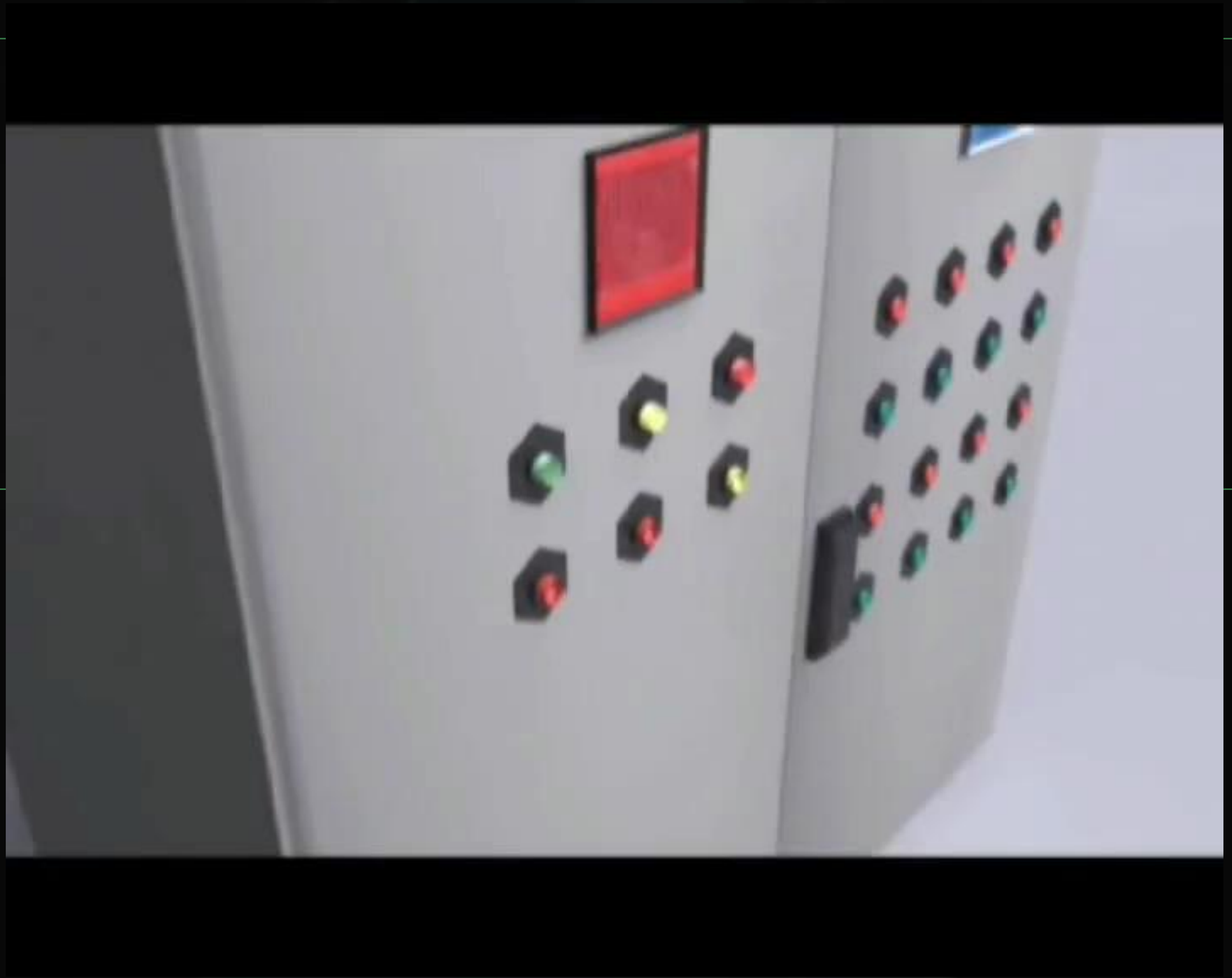
Generally there are 3 types of existing Soot Blowers used in the industries.

1) Long Retractable Soot Blower (LRSB)

2) Rotary Motorised Soot Blower (MRSB)

3) Wall Blowers / Wall deslaggers.

Long Retractable Soot Blowers



Long Retractable Soot Blowers

01 In LRSB there are 2 / 4 nozzles that blow steam according to the decided path

02 These nozzles are conversion type nozzles which blow the steamand covers the desired area

03 Lance pipe goes inside the boiler or fired heater and moves in a clockwise direction and comes back in an anticlockwise direction

04 Approximately 5 to 6 meters of lance travel is recommended for LRSB to maintain deflection of a maximum of 25 mm.

05 The Gearbox, Trolley box assembly is rotated by various arrangements like chain type/ Rack and pinion type, and lead screw type;

06 The feed pipe continuesly feeds the steam/ air to the lance pipe till it comes back to the parking position.

Rotary Motarized Soot Blowers

Rotary Motorised Soot Blowers

01 The lance pipe is always inside the boiler or economizer. There are a number of nozzles that are provided on the lance pipe.

02 These nozzles are placed in between the tubes for e.g. if there are 20 tubes the number of nozzles will be 19.

03 The poppet valve is common for LRSB and MRSB

04 The angle of rotation for MRSB can be decided according to the needs of the user.

Wall Blowers

Wall Blowers

01 The wall blower is used to clean the side wall tubes of a power boiler or process boiler.

02 In a wall blower, the lance pipe travels inside the boilers hardly 300 mm long and the nozzles are welded in an inclined position.

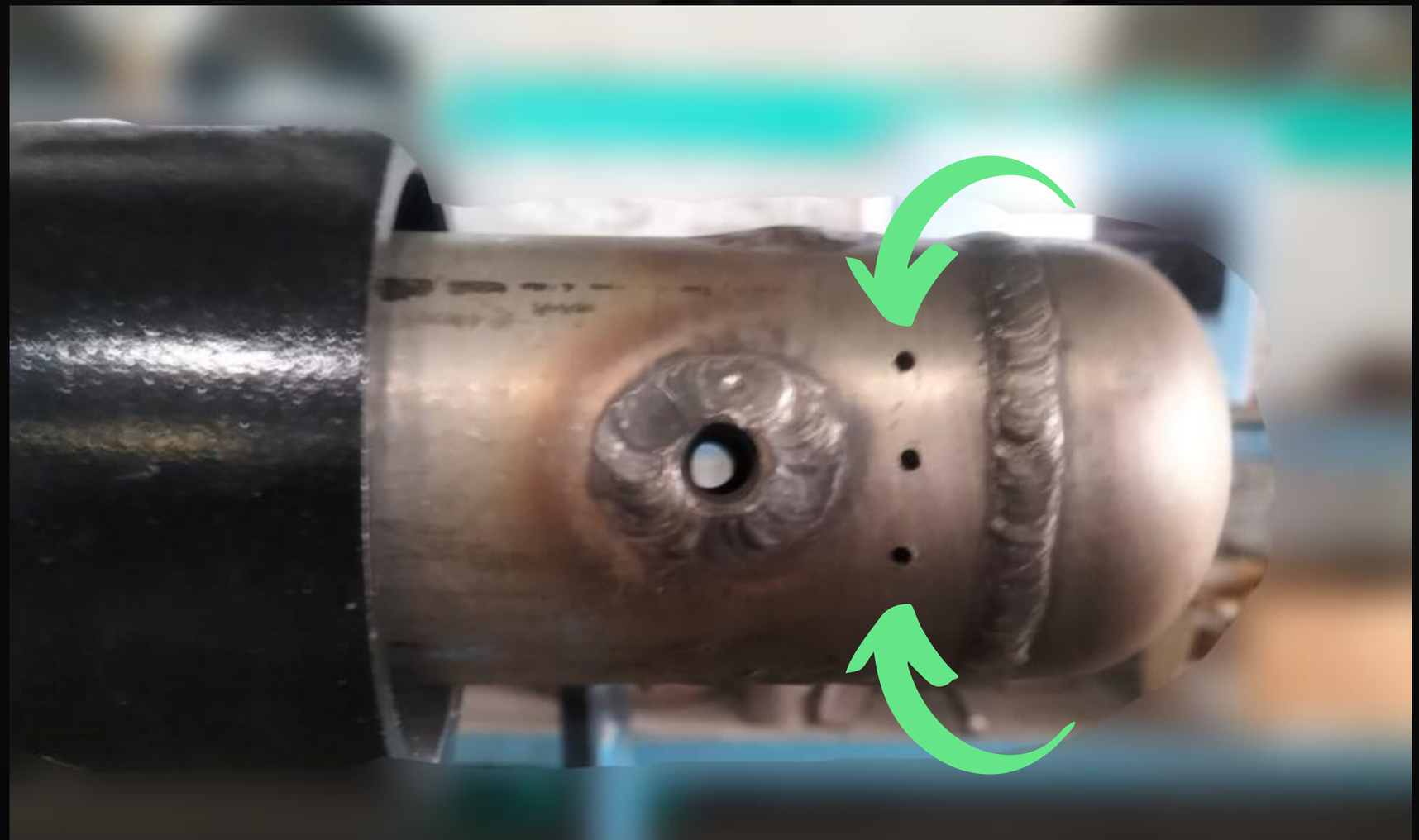
03 The angular welded nozzles blowes the steam only on to the side wall tubes.

04 The steam is passed over side wall tubes approximately 1.2 meters in radius. The quantities of the Wall blowers are more compared to LRSB and MRSB.

Design Considerations for all Soot Blowers:

- Nozzle Design Calculations
- Poppet valve design
- Steam and Flue gas side pressure drop calculation
- Flue gas side Parameters.
- +ve/ - ve & Balance Draft.
- Jet of steam from Nozzles
- Fouling Factors on tubes
- Properly designed support for LRSBs
- Removal of Condensate from inlet steam piping and lance pipe.

Simple Method to remove the condensate in the lance pipe



Construction of a Composite Boilers

Composite Boiler Overview

- Dumping of fuel on traveling or pulsating grates.
- The flue gas Passage in between side wall panels and through first and second pass.
- Heat absorption by side wall panels, transferring it to shell and tube boiler section.
- Flue gasses passes through the tubes in shell and tube boiler & Heated water in the shell generates the steam.
- The steam generated in the shell is given to process as per requirements.

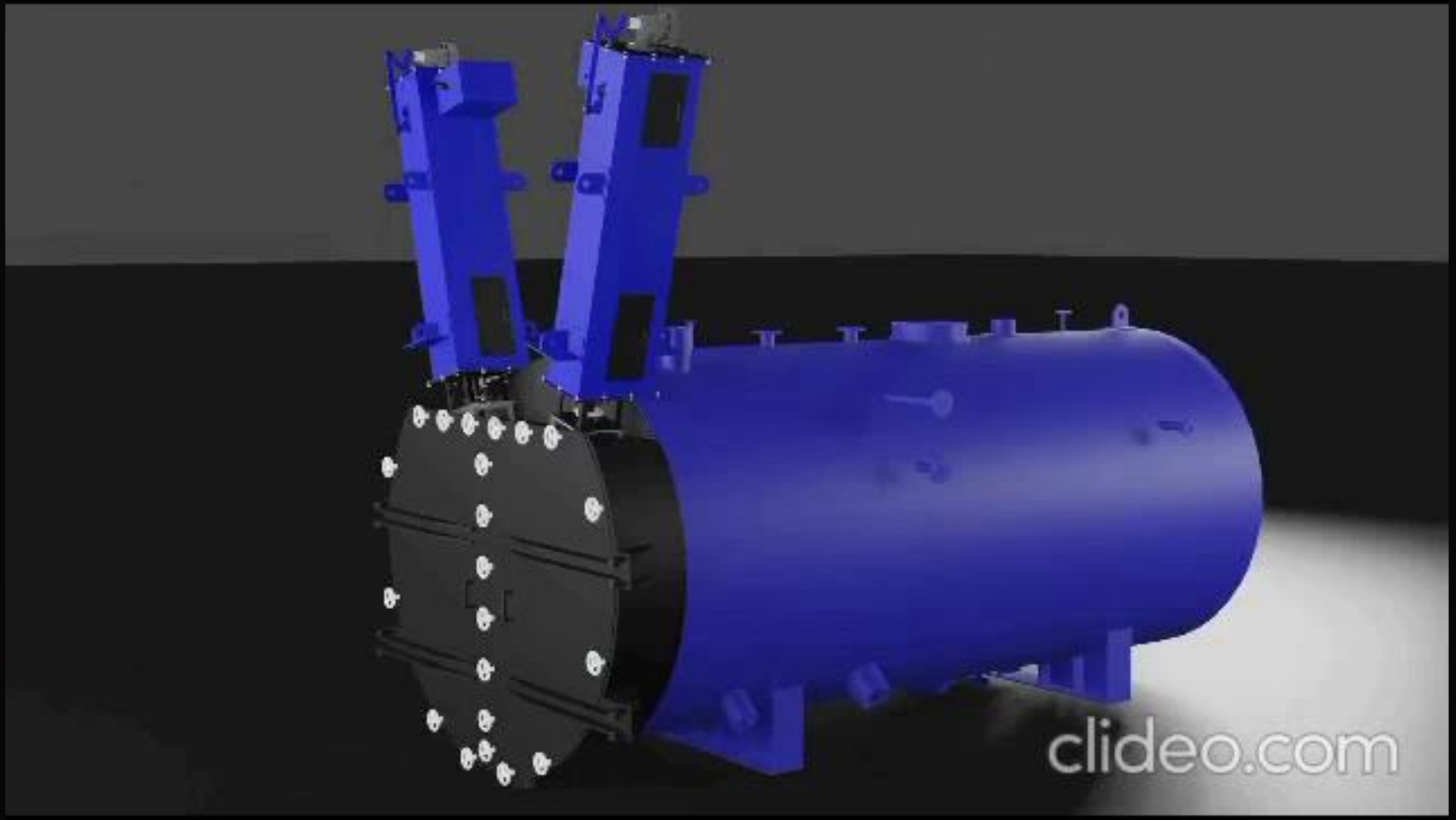
Challenges of Combustion for Boiler Users

- Increasing Cost of Coal and Bagasse.
- Availability of Coal with less Ash Percentage.
- Availability of bagasse due to co-gen plants running for 8 to 10 Months
- Getting good quality Biomass Fuel.
- Need for innovative solutions in Online Cleaning technologies.

Main Challenges with Biomass Fuels

- Huge Dust accumulation on the Front tube sheet.
- Dust Load is high as compared to other fuels.
- The particles/Fibers are more & difficult to carry along with Flue Gasses.
- The fibers stuck up in the gas path resulting blockages in Flue Gas Path.
- This Results in Extensively Increase in Pressure Drop on gas side resulting in frequent Boiler Failures.
- Possibility of Backfire of Boiler is More.

New Concept of Soot Cleaning Systems for Fire Tube /Composite Boilers (Front Tube Sheet)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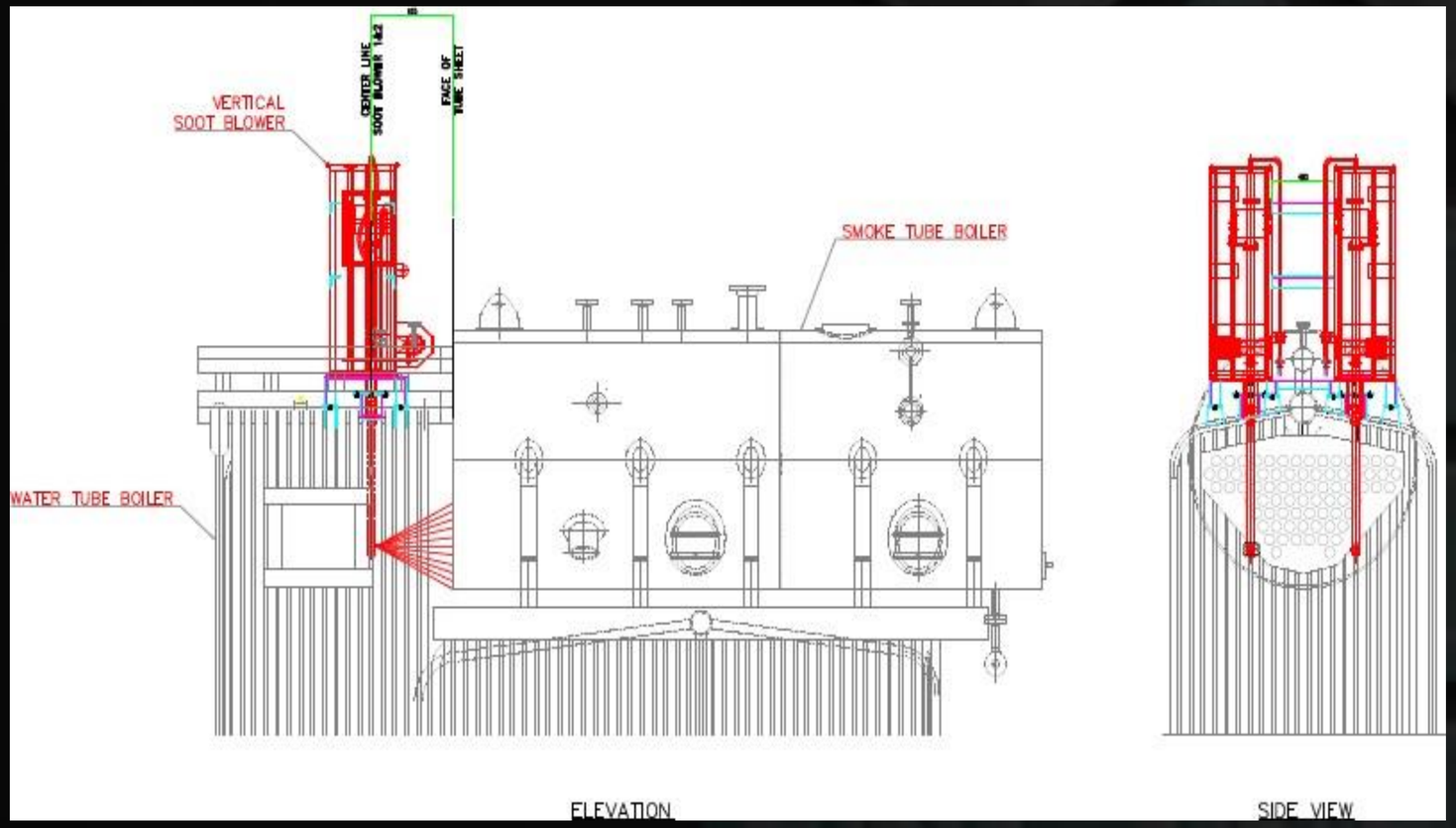
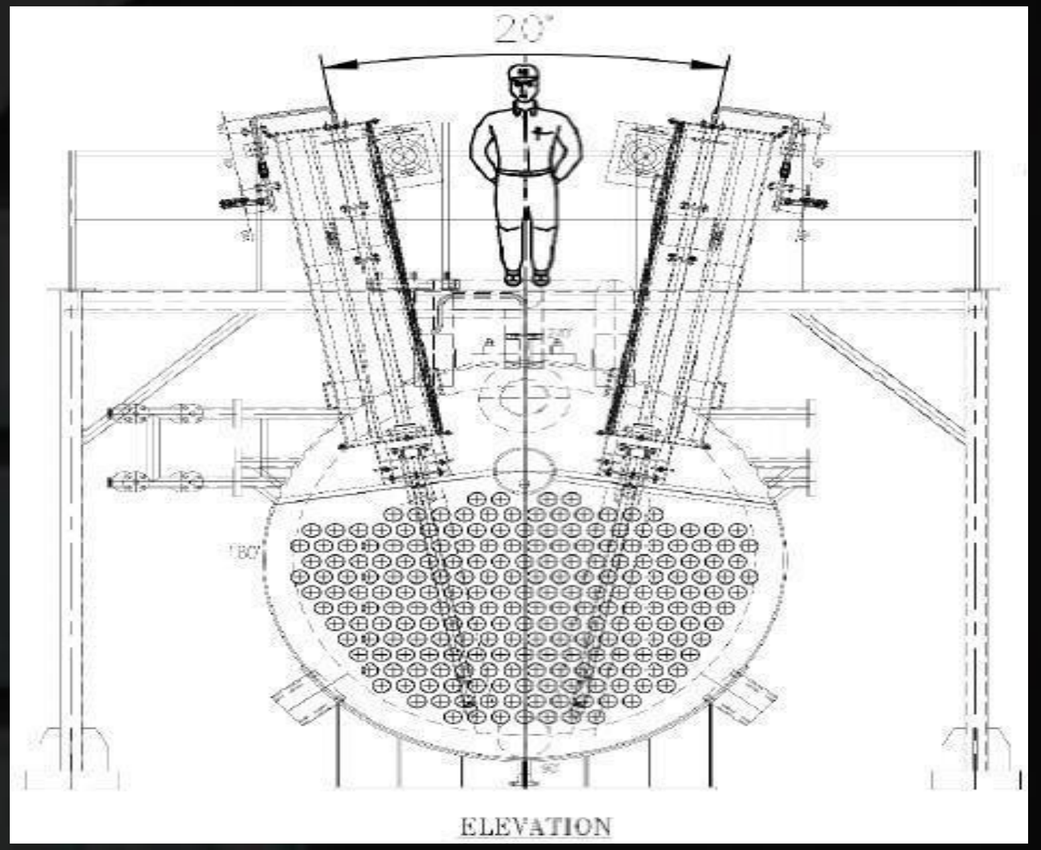




New Concept of Soot Cleaning Systems for Fire Tube /Composite Boilers (Front Tube Sheet)

01 The Oscillating Soot Blower is located on the top or side of the front tube sheet. Lance comes down from the top of the boiler, and ambient air at high pressure is blown onto the tube sheet to clean the front tube sheet.

02 special types of nozzles where the air is at a very high velocity i.e. 35 to 45 m/sec. can be blown

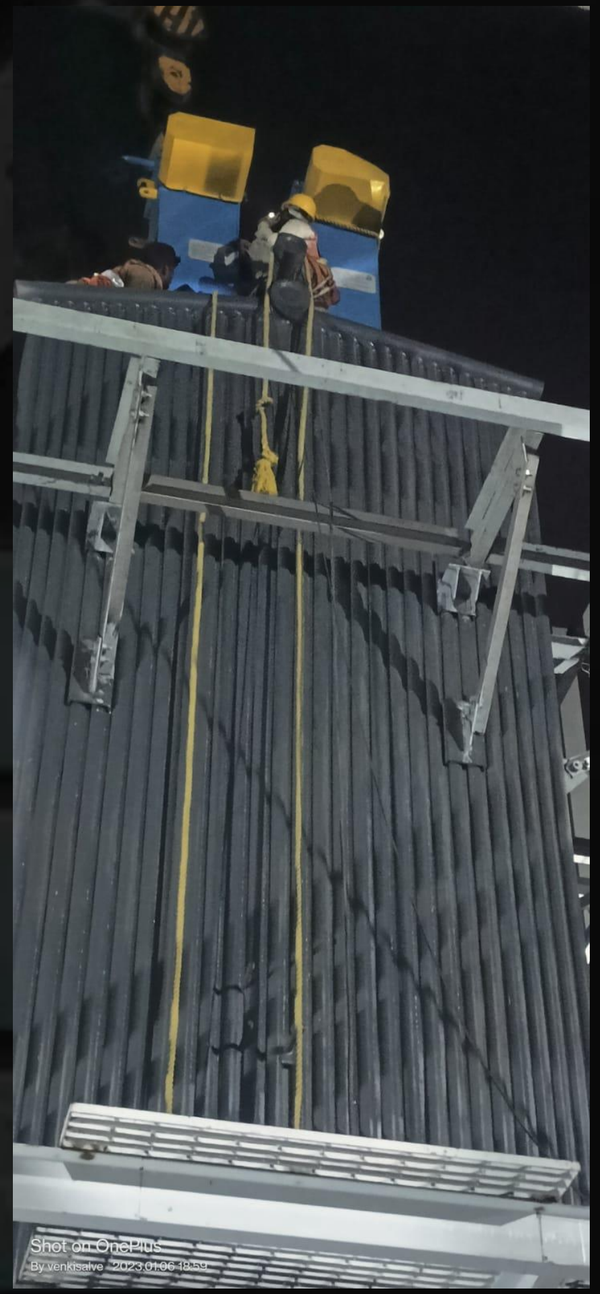
03 Pressurized air up to 10 kg/cm2 pressure from a compressor and reservoir is recommended for this application

04 specially designed nozzles can take air up to 4 meters inside the tubes also and deposited soot inside the tube can be blown away

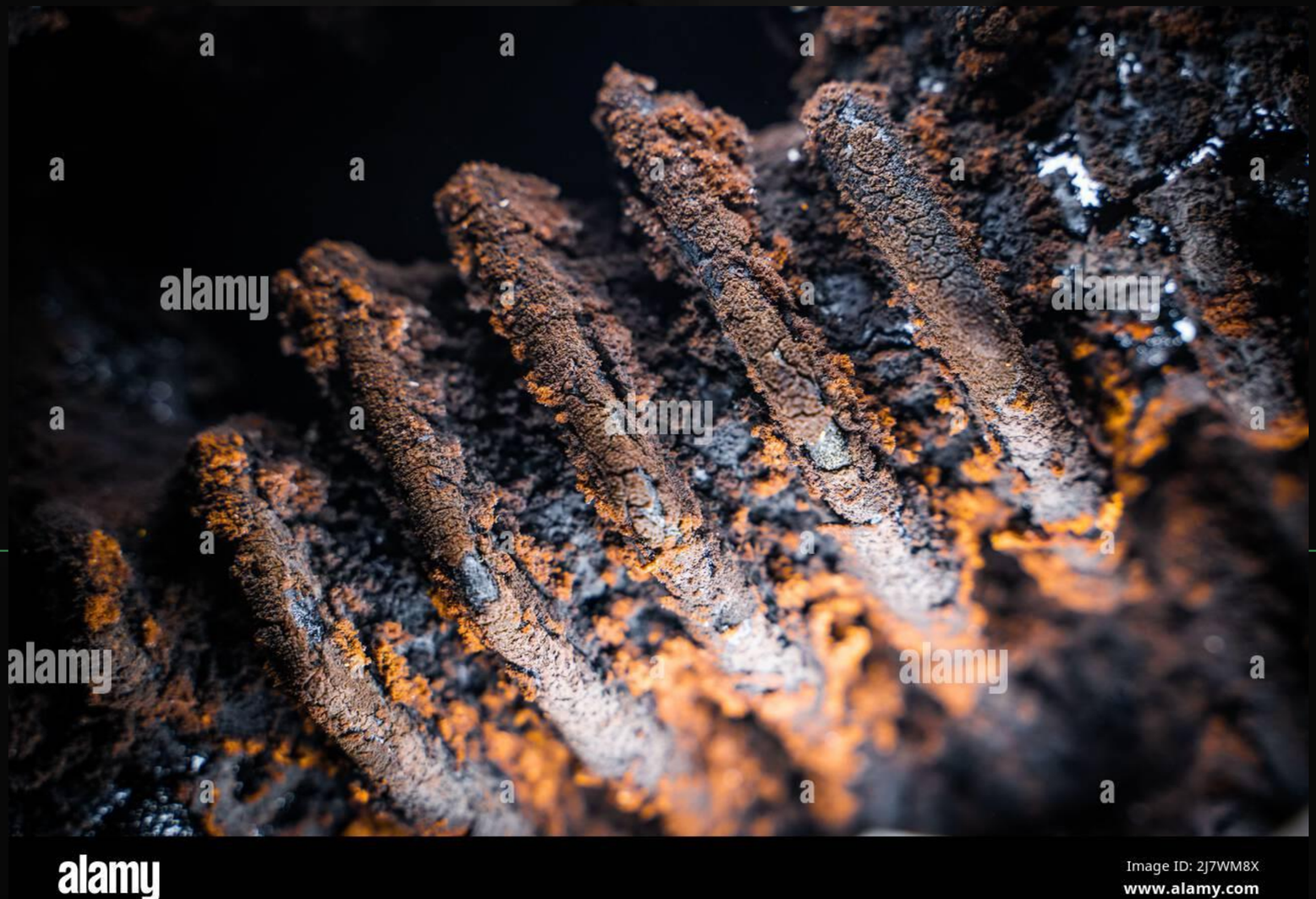
05 It is always suggested to use Sequential Control Panel for Automatic operation of Oscillating Soot blowers particularly in night zone.

Some Installations

Some Installations



Jamming of Vertical Pendant coils because of dirty fuels.



New Concept of Soot Cleaning Systems for Cleaning Vertical Pendant Coils.

Rapping/Hammering Systems.

Rapping/Hammering Technique for vertical pendant coils

Rapping/Hammering Technique

Benefits of Soot Cleaning Systems for Fire Tube /Composite Boilers (Front Tube Sheet)

1. We can Use Oscillating Soot Blowers by using ambient air as a cleaning media to clean front tube sheet.
2. Gas side pressure drop can be reduced.
3. Regular Shutdown frequency can be reduced.

Most Important:

It will definitely reduce shutdown frequency by using online cleaning systems.

IN CONCLUSION

In conclusion, All the above new concepts in online cleaning systems, if properly used, will definitely increase the efficiency of boilers by 3 %. Which can indirectly save the fuel costs in a big way.

Thank You!

Any Questions?