

Latest Soot Cleaning Technologies

Presented by :

Mr. Dilip V Ambekar
Director

Trust Well Engineers India Pvt Ltd.
BTU Technologies



Types of Soot Blowers

Presently there are 3 types of Soot Blowers that are 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 steam and 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.

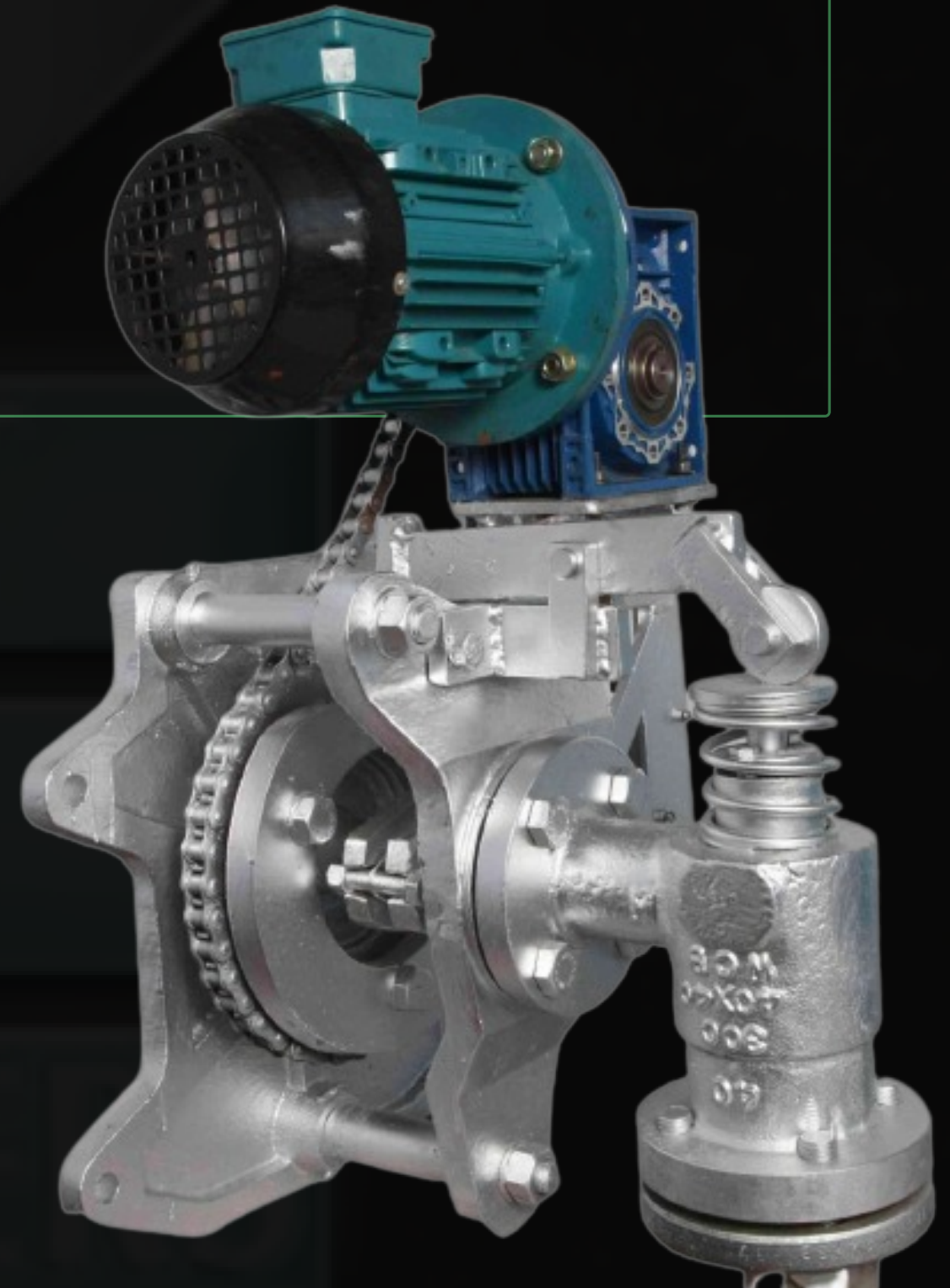
05

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 continuously feeds the steam/ air to the lance pipe till it comes back to the parking position.

Rotary Motorized 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.

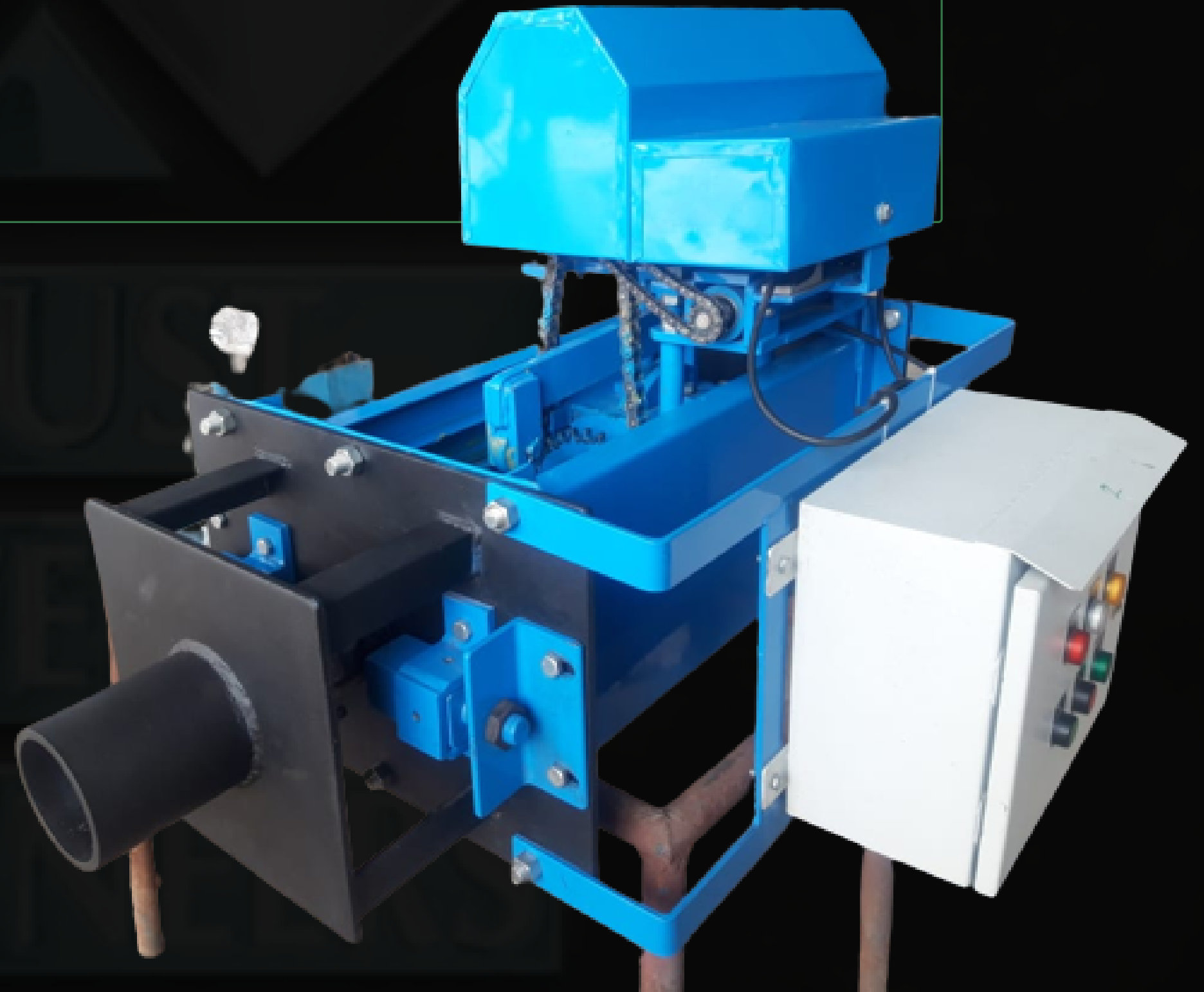
03

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 blow the steam only on to the side wall tubes.

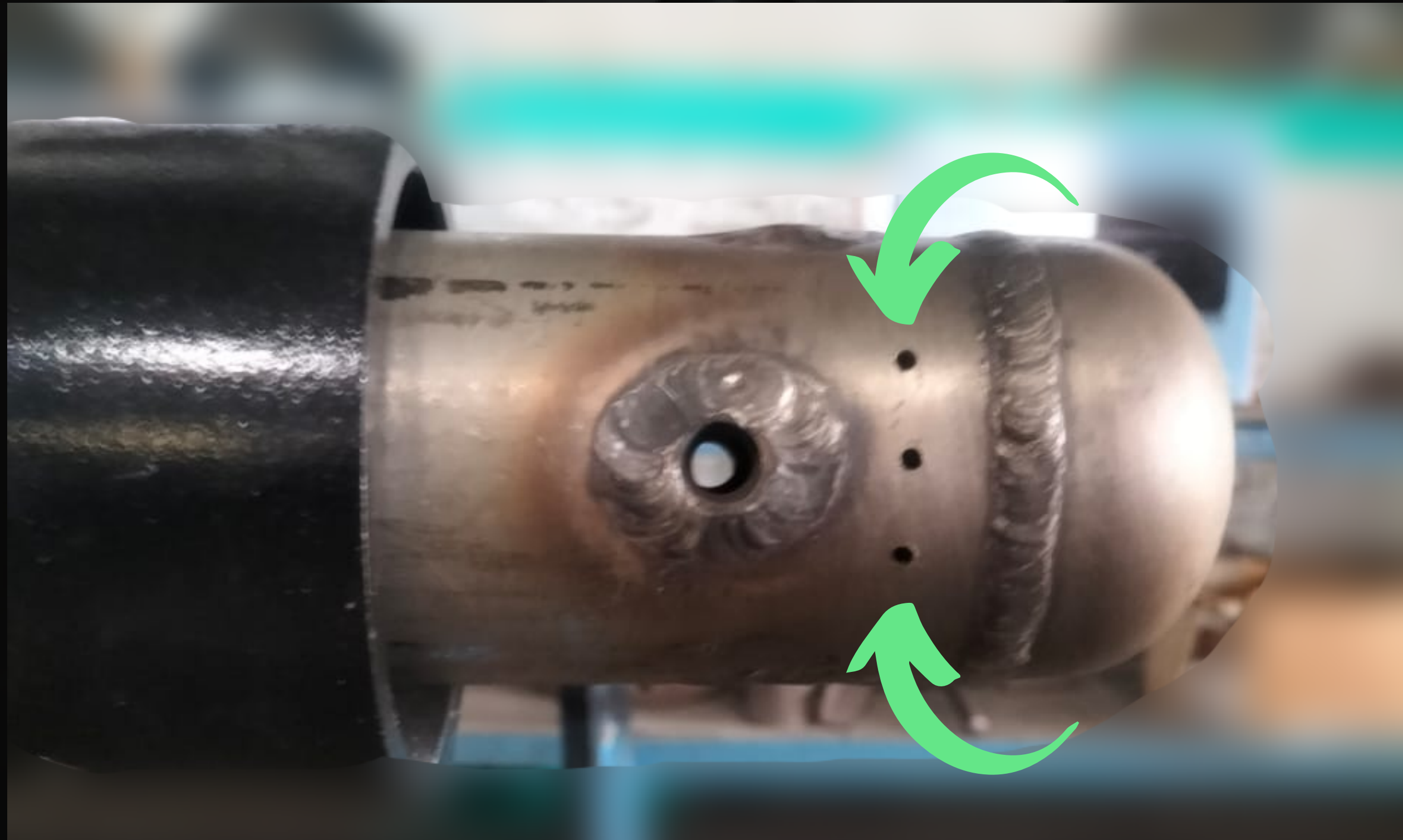
04

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



Types of Upcoming Solid/Liquid Fuels

The increase in the cost of regular and standard fuels like coal and bagasse has led industries to try different fuels

1. Paddy Straw,
2. Mustard Husk,
3. Rice husk,
4. Spent Wash
5. Municipal solid waste

Jamming of Tubes due to Paddy Straw soot.



Upcoming Soot Cleaning Techniques

Presently there are a few upcoming technologies in industries worldwide

1) Rapping/hammering System

2) Horizontal Water cannons

3) Vertical Water Cannons

4) Soot Cleaning Systems for Fire Tube Boilers

Rapping/Hammering Technique



Rapping/Hammering Technique



Soot Cleaning Technologies for Municipal Solid Waste

- In some foreign countries, water cannons are used to clean the tubes.
- Water from one side of the furnace is sprayed through the cannons to the opposite side of the furnace, in a predecided trajectory.
- Nowadays some typical cameras are also fitted which sense the deposited lumps and the water is sprayed only on the area where lumps are detected

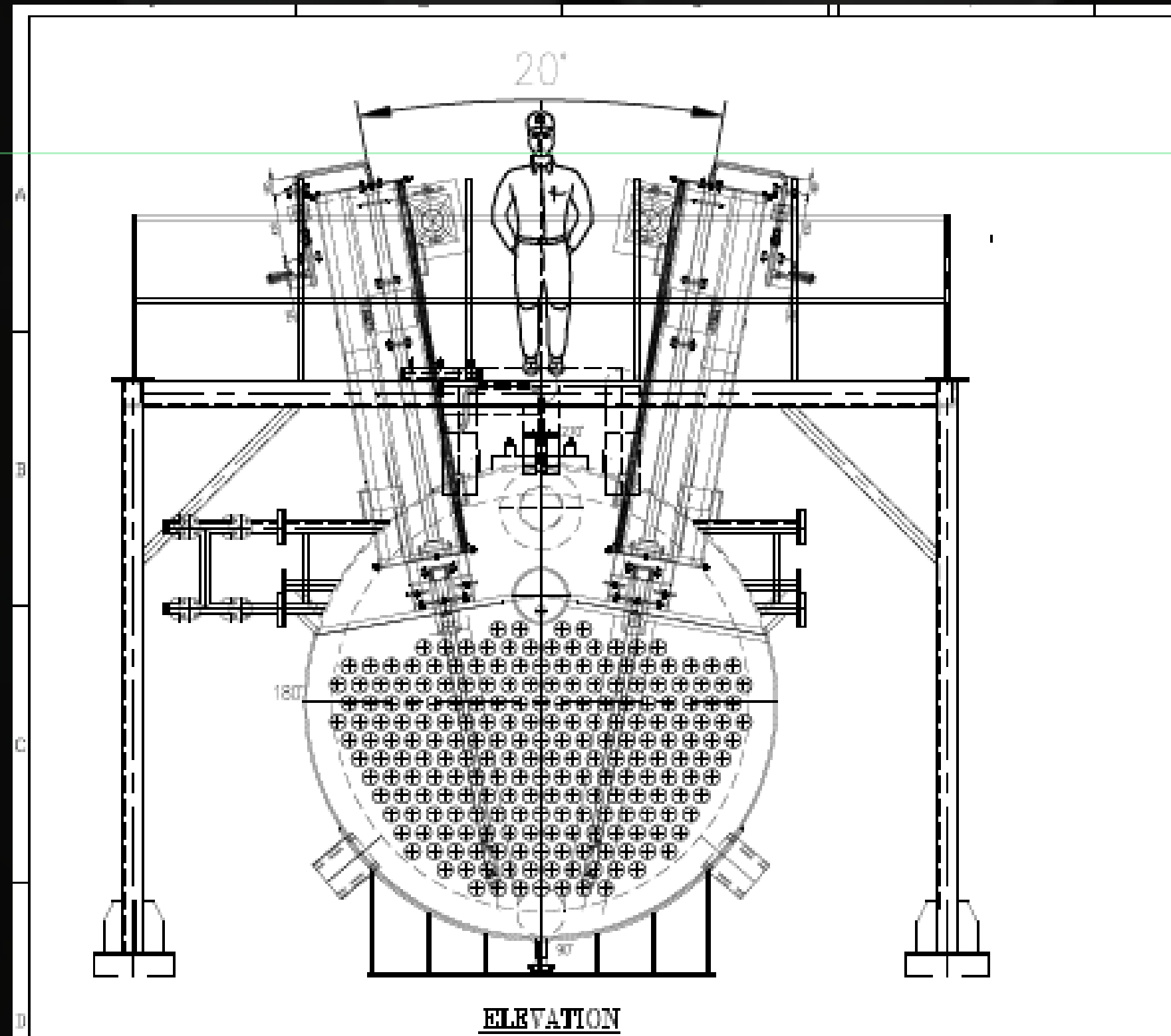
Horizontal Water Cannons

Vertical Water Cannons

Soot Cleaning Systems for Fire Tube Boilers



Soot Cleaning Systems for Fire Tube Boilers



Soot Cleaning Systems for Fire Tube Boilers (Mainly Front Tube Sheet)



Soot Cleaning Systems for Fire Tube Boilers

01

The LRSB is located on the top of the front tube sheet. Lance comes down from the top of the boiler, and air is blown onto the tube sheet, cleaning the 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 tube and deposited soot can be blown away

05

Some Oscillation type Soot Blowers are also in the market in which the lance pipe oscillates up to 180 Degree removing soot in a better manner.

TO SUMMURIZE :-

There are 3 types of Soot Blowers

- 1) Long Retractable Soot Blower (LRSB)
- 2) Rotary Motorised Soot Blower (MRSB)
- 3) Wall Blowers / Wall deslaggers.

There are some design Considerations for all Soot Blowers

Paddy Straw, Mustard Husk, Rice husk, Spent Wash & Municipal solid waste are some of the upcoming fuels.

For these type of fuels there are some new Soot cleaning technologies : Rapping/hammering System, Horizontal Water cannons, Vertical Water Cannons

Soot Cleaning Systems for Fire Tube Boilers

IN CONCLUSION

In conclusion, All the above cleaning systems, if properly used, will definitely increase the efficiency of boilers by 3 %. Which can indirectly save the fuel costs.

Thank You!

Any Questions?

