



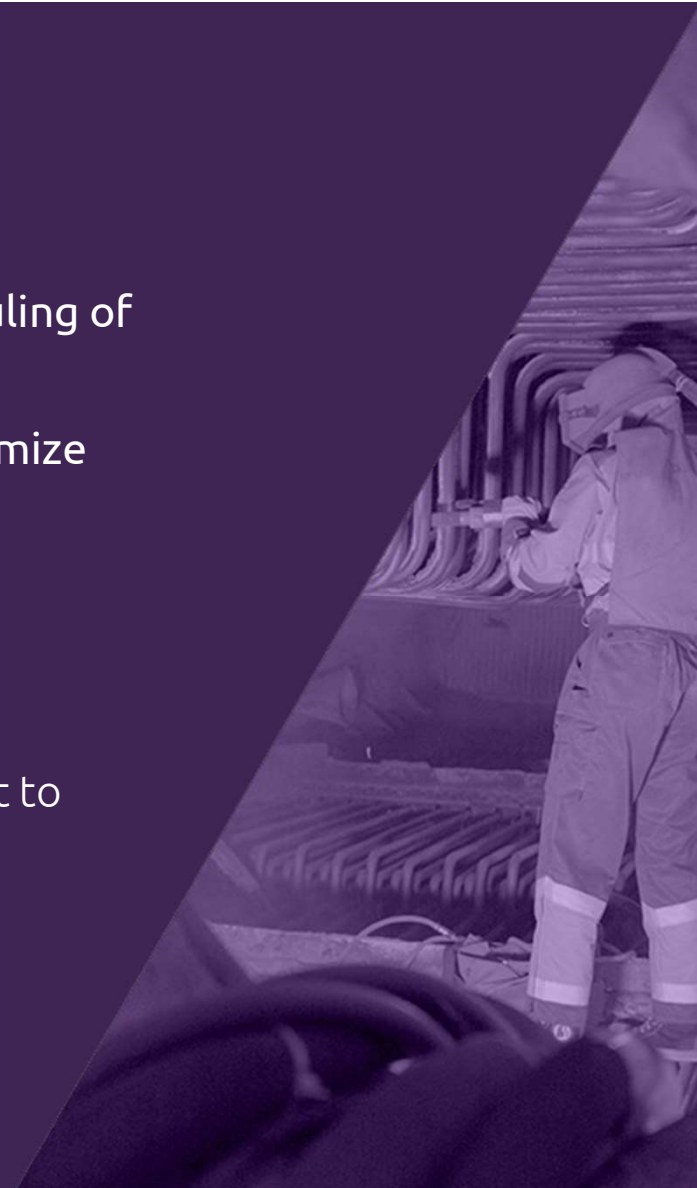
Clean Steel

Maximising Boiler performance

Vesa Railamaa

Clean Steel in a nutshell

- ▶ Clean Steel is a service company specialised in controlling fouling of heat transfer surfaces.
- ▶ Our business idea is simple: Clean boilers efficiently and minimize fouling-based problems
- ▶ The core of the company is patented Smart Blasting™ boiler cleaning technology
- ▶ Smart Blasting™ is done by trained professionals
- ▶ We know boilers and understand schedule pressures - we want to deliver the best result consistently.
- ▶ The company is established in year 2011
- ▶ Born in Finland, operating globally





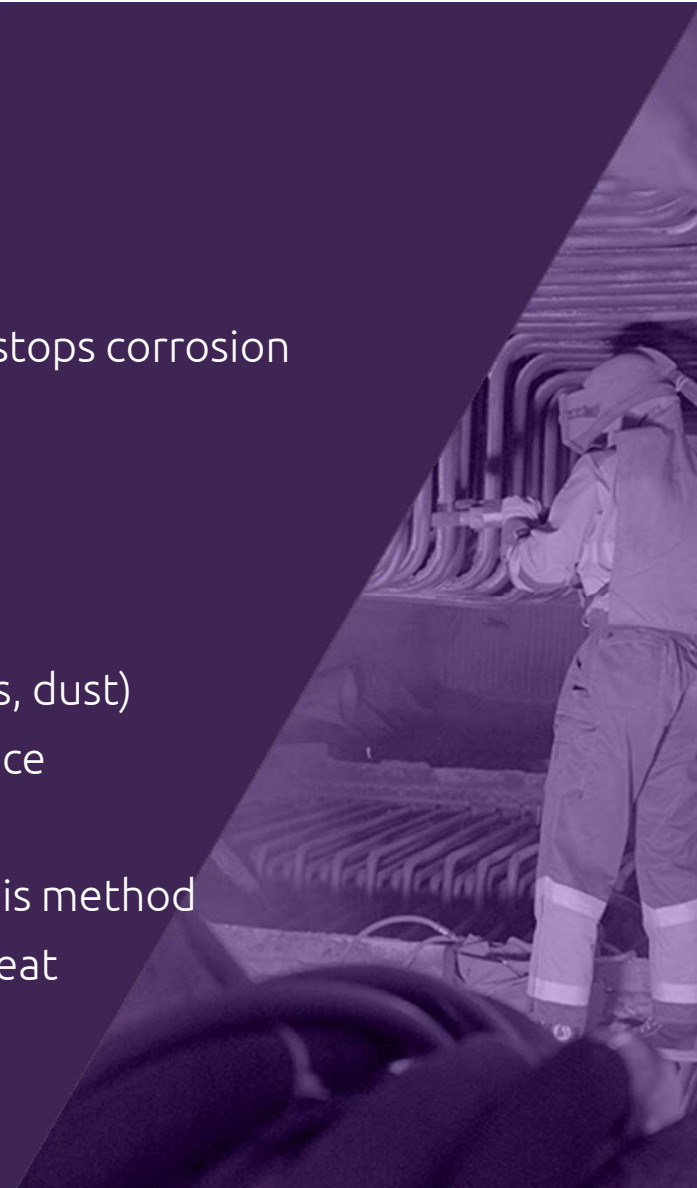
Smart Blasting

Tested and patented
boiler cleaning technology

What is Smart Blasting?

Smart Blasting™ removes slag deposits from power plant boilers, stops corrosion and forms a fouling-resistant layer of chromium oxide.

- ▶ Patented technology to clean heat transfer surfaces
- ▶ Grit blasting by well trained and experienced staff
- ▶ No negative downsides like other methods (corrosion problems, dust)
- ▶ The best possible cleaning result to maximize boiler performance
- ▶ Fastest method available
- ▶ The VTT Technical Research Centre of Finland Ltd has tested this method that removes 100% of the dirt without damaging the boiler's heat transfer surfaces.



100% cleaning result & protective surface

- ▶ According to VTT (Technical research center of Finland) Smart Blasting
 - ▶ Removes all (100%) the slag
 - ▶ Stops the corrosion process
 - ▶ Creates a protective chrome oxide to the metal. This surface remarkably slows down fouling process
- ▶ It is essential to remove all slag from heat transfer surfaces in order to prevent corrosion process and to create a protective surface
- ▶ Smart Blasting enables running the boiler with better efficiency ratio and with higher power if needed still minimizing corrosion problems



Field-tested method

939

**Smart Blasting
-
Projects**

(over 80 projects
in 2022)

7

**Countries
operated**

Finland, Sweden,
Spain, France,
Uruguay, Brazil,
Scotland

4.25

**Customer
Satisfaction**

(CS Customer
satisfaction survey
2020, evaluation 1-5)



Short term benefits

- ▶ Efficiency ratio goes up
- ▶ Less fuel needed
- ▶ Improved heat transfer
- ▶ Better flue gas flow
- ▶ Less sootblowing needed

Long term benefits

- ▶ Better overall efficiency ratio
- ▶ Less corrosion
- ▶ Less erosion
- ▶ Longer life cycles for critical components, super heaters and economizers

This is what you get





Customer Cases

Mälarenergi, Sweden

Fuel: Biomass

Boiler: Power boiler, Valmet



Before Smart Blasting

- Sandblasting once a year
- Varying cleaning result
- Special difficulties with cleaning the economiser section >> blockages resulting in service interruptions
- Sandblasting too time-consuming (140–200 h)

After Smart Blasting

- Thorough cleaning in connection with annual maintenance every 12 months
- Excellent cleaning result
- Required blasting time 72 h
- Mälarenergi and Clean Steel signed a 3-year agreement (2022–2024) after the first cleaning

“Everything worked really well from start to finish!”

Magnus Nyström, Production engineer, Mälarenergi

Luvian Saha Oy / Luvia saw mill

Fuel: Wood-based fuels

Boiler: Tube boiler / Saw mill



Before Smart Blasting

- Tube cleaning 2 times a year (annual maintenance + 1 additional service interruption)
- Varying cleaning result >> problems caused by fouling recurred rapidly
- The mess caused by pressure washing had to be cleaned up + wastewater disposal

After Smart Blasting

- Thorough cleaning in connection with annual maintenance every 12 months
- Excellent cleaning result – no fouling problems
- Required blasting time 12 h
- High operating efficiency throughout the cycle

“Smart Blasting works and its benefits have been clear in terms of both efficiency and reliability”

Timo Arola, Maintenance Manager, Luvian Saha Oy

Enso Energy Garray, Spain

Fuel: Olive tree bark, bark, forest industry by-products

Boiler: Power boiler



Before Smart Blasting

- Water washing 3 times a year
- Varying cleaning result, poor result in cleaning tight tubing and narrow gaps
- Messy and time-consuming process (wastewater management)
- Efforts to increase production efficiency (heat transfer) and reduce water use prompted Enso to look for other alternatives

After Smart Blasting

- Thorough cleaning in connection with annual maintenance every 12 months
- Excellent cleaning result (even with tight tubing and narrow gaps)
- Required blasting time 36 h
- High operating efficiency throughout the cycle

“Perfecto! All our goals were met”

Antonio Campos, Process Engineer, Enso Energy

Why us?

1. Faster & more effective method
2. Proven results
3. Skilled staff – our work is not done until it's done
4. We help you to improve efficiency to gain better business results

