



Heat Management

HISS for recovery boilers

High Impact Sootblowing System™ - Sootblow more with less steam

SOOTBLOWING ISSUES

Sootblowers in recovery boilers are generally operated non-stop, to keep the flue gas path clean and prevent the fouling and sintering of accumulations on heat exchanger surfaces. An issue with conventional sootblowing is that over 90% of the cleaning effect occurs at the first impact of the steam at the heat exchanger surfaces, which means that the time and steam used on the return stroke mostly go to waste.

HIGH IMPACT SOOTBLOWING SYSTEM

Heat Management's patented High Impact Sootblowing System (HISS™) is a tailored solution for your boiler, which will bring great environmental and economical benefits. The solution includes a software and hardware update together with process follow-up and optimization by sootblowing experts. By using the HISS™ solution, the following results can be obtained:

- Reduce sootblower steam consumption by 30-45%.
- or
- Increase sootblowing capacity (starts per day) by 100%.
- or
- A combination of the above

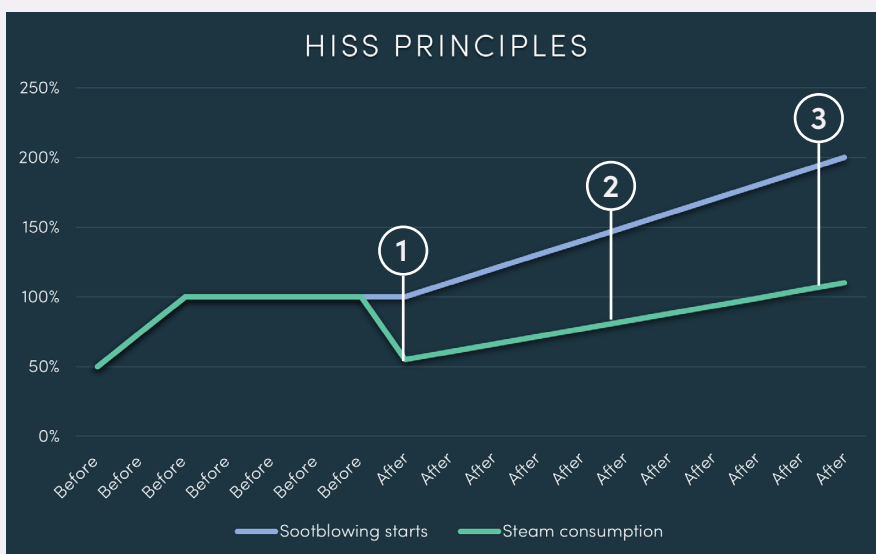


Figure 1. HISS™ system at 3 different settings

1: Steam saving mode: Sootblower starts maintained at 100%, while saving 30-45% steam.

2: Combination: Sootblow more with less steam (can be anywhere between 1-3).

3: Prevent water washes: 200% sootblower starts with maintained steam consumption, to be able to run at maximum load and prevent water washes.

HOW DOES IT WORK?

Heat Management's HISS™ can increase the sootblowing capacity by 100% without installing more sootblowers or consuming more steam. During boiler shutdown, the HISS™ system is fully integrated into the mill's DCS system together with a hardware rebuild of the steam sootblowers, which will achieve overlapping operation of sootblowers (described on page 3). Heat Management's experts will assist the mill in getting the ideal number sootblower starts to fulfill the needs of each customer (see Figure 1).

OVERLAPPING SOOTBLOWING

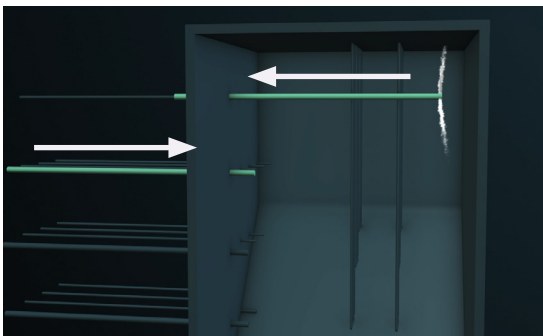
The fact that over 90% of the sootblowing occurs at the first impact of the steam at the heat exchanger surfaces proves that traditional sootblowing is inefficient. Heat Management's HISS™ takes advantage of this and shuts off the steamflow on the entry stroke, to only have steamflow on the retracting stroke. The solution also enables the next sootblower to start when the previous starts to retract, which is called "Overlapping sootblowing", which enables a 100% increase in sootblower starts.

Depending on the needs of the mill, the customer may want to increase the sootblower starts with 100% which will prevent fouling on heat exchanger surfaces, and in turn, enable a load increase and improve the availability of the boiler. Another option is to maintain the same number of sootblower starts and save 30%-45% steam. The customer will be able to control the number of sootblower starts to maximize the load and minimize the steam consumption. To determine the ideal number of starts, Heat Management offers a service called Cleanability Control, which is described on the next page.



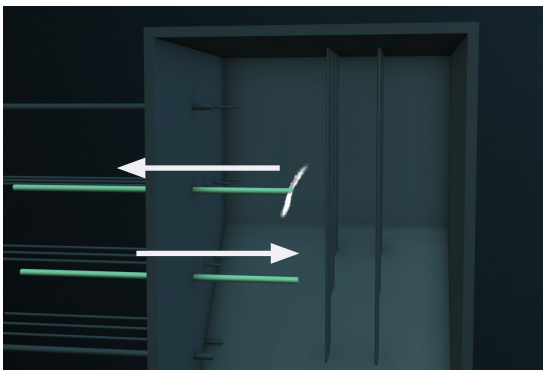
Sequence 1

Sequence 1: *The first lance enters the boiler. Instead of having full steam flow, HISS™ adds a cooling flow at the entry stroke: steam heats the lance while condensate is purged at low pressure.*



Sequence 2

Sequence 2: *Full steam flow and pressure on the first lance as it retracts, and the next sootblower starts to enter the boiler with a cooling flow. No condensate formation in the lance - less wear on heating surfaces and nozzles, and twice as fast*



Sequence 3

Sequence 3: *The sequence continues. Individual control of steam flow and motor drive: disturbance-free sootblowing pressure, by synched steam flows.*

HISS™ CLEANABILITY CONTROL

The solution does not only include a hardware and software update, it also includes process follow-up and optimization. Heat Management's experts will keep a constant dialogue with the customer and will analyze operational data after the commissioning to maximize the benefits of the system. The process follow-up includes the determination of the optimal number of starts to meet the customer's needs.



Finding the perfect number of starts is crucial to maximize the profitability of the system. An increase in the number of sootblower starts prevents sintering on heat exchanger surfaces and in turn, increases the availability of the boiler and enables a load increase. Sootblowing too often will waste unnecessary steam. Heat Management's experts will guide the mill into finding the perfect number of sootblower starts. The full HISS™ solution has proven amazing benefits regarding energy optimization, load increase, and sustainability. References can be found below and on the next page.

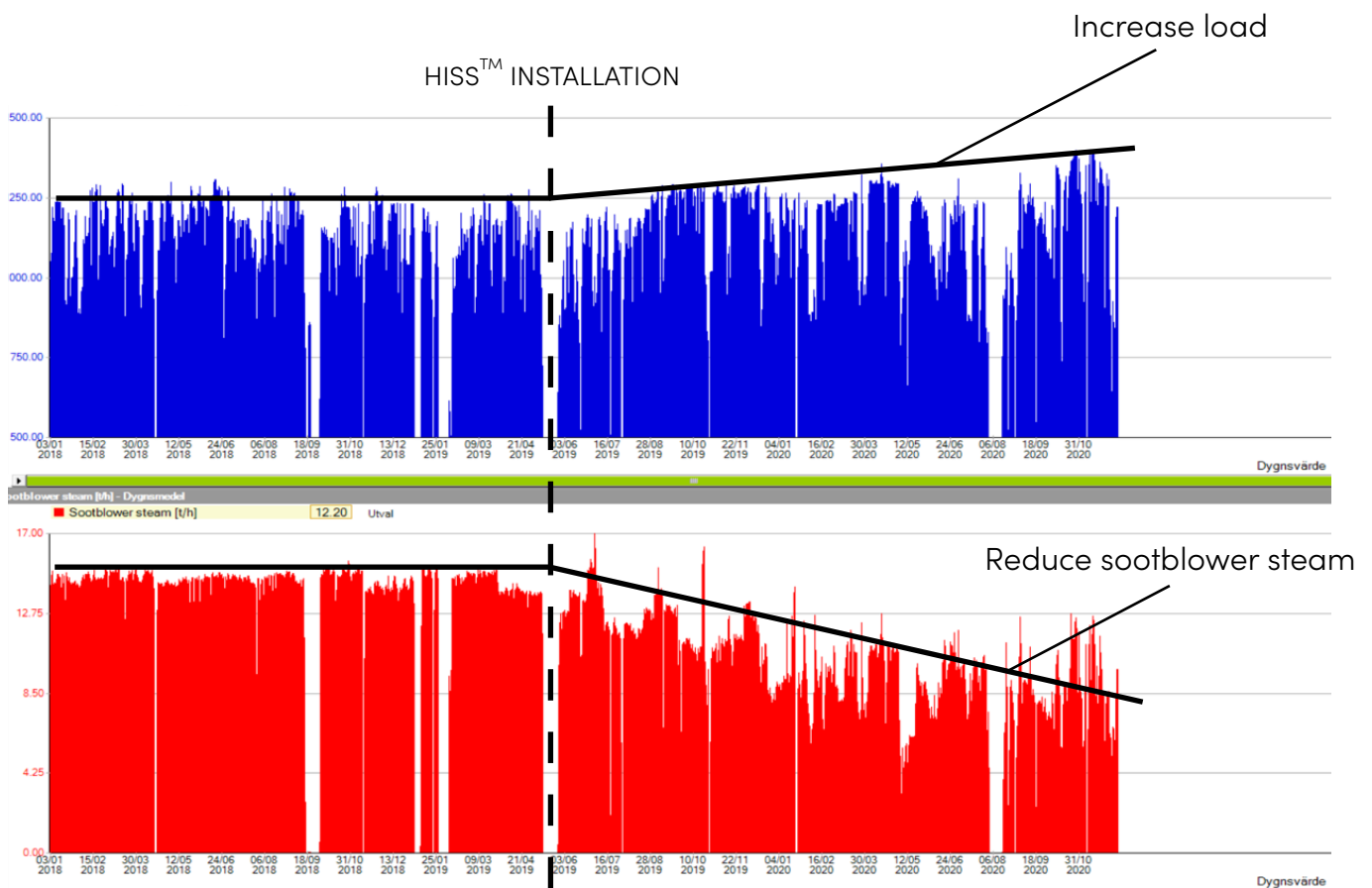


Figure 2. HISS™ reference, showing the system's ability to increase the load and save steam at the same time

HISS™ reference list

Location, startup	Recovery boiler maker	Boiler size, (tDS/day)	Number of sootblowers	Steam saving (%)	Increased sootblowing (%)	Other results
South East Asia (2021)	Valmet (Kvaerner)	4 100	94	TBD	TBD	Start-up Oct-2021. Guaranteed minimum steam saving 103 000 ton/year . Improved cleanability.
Swedish pulp mill (2021)	Valmet (Tampella)	2 000	74	TBD	TBD	Guaranteed minimum steam savings of 55 000 ton/year . Improved cleanability.
Swedish pulp mill (2021)	Andritz	4 600	108	TBD	TBD	Guaranteed minimum steam savings of 128 000 ton/year . Customer goal: 4800 tDS/day.
Swedish pulp mill (2020)	Andritz	2 400	92	TBD	TBD	Replace OEM sootblowing automation with HISS Cleanability Control. Prevented one water wash annually and saved a lot of steam.
Austrian pulp mill (2020)	Andritz	2 600	80	30	TBD	30% saved steam on sootblowing, this led to 1,5 MW increased electricity production. Generating 12 750 MWh annually.
Swedish pulp mill (2019)	Valmet (Götaverken)	1 400	60	37	<10	Increased boiler black liquor throughput by 15 % , now operating at 1 300 tDS/day . Steam savings 46 000 ton/year . Improved process (smelt) stability.
Swedish pulp mill (2016)	Valmet (Metso)	2 700	80	35	30	Increased boiler black liquor throughput by 7 % . Steam savings 65 000 ton/year . April 2018 – Sept 2019 completed 18 months season for first time. Improved cleanability.
Swedish pulp mill (2011)	Valmet (Tampella)	2 400	100	23	50	Increased production with remained boiler up-time in combination with saving steam. Improved cleanability.
Swedish pulp mill (2011)	Valmet (Götaverken)	800	24	0	100	Extended time between water wash and increased production. Improved cleanability.
Swedish pulp mill (2010)	Valmet (Götaverken)	1 050	23	0	100	Elimination of stops for cleaning between planned revision stops. Improved cleanability.
Swedish pulp mill (2009)	Valmet (Götaverken)	1 500	64	35	30	Production increase 5 %, while saving 26 000-ton steam/year, Improved cleanability.



Heat Management

Heat Management was founded in 2016 following a merger between Infracore 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 customers are found in power and heating plants, pulp and paper mills, cruise- and shipping industry, cement plants, refineries and carbon capture applications. Today, Heat Management supports our 500+ customers with unique, patented solutions in a large number of applications around the world.



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