On-Load Boiler Cleaning with Water

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Chemistry in Energy Technology
Åbo Akademi University
Content

- Selection of Water Cleaning systems
- Cleaning principle for Water systems
- Water Cannon System
- Shower Cleaning System
- Sootblowers operated with water
The cleaning systems at a glance

Superheater/Re-Heater
- Long Retractable Sootblowers
- Oscillating Sootblowers
- Axial Sootblowers
- Jetblower
- Helical Sootblowers
- SMART Helix

ECO
- Helical Sootblowers
- Rake Sootblowers
- Rotating Element Sootblowers

Automation
- SMART CONTROL™
- Remote Control

Optimisation
- SMART CLEAN ISB Platform™

Air heater/Gas heater
- Rake Sootblowers
- Jetblower

Furnace
- Wall Deslagger
- Water Cannon

DeNOx
- Rake Sootblowers
On-load cleaning of empty passes

- Waste incinerators
- Biomass boilers
- Refuse Derived Fuels (RDF) boilers
Water cleaning systems

**Water Cannon (SMART CANNON):**
- Large boilers > 4 m cross section
- Selective cleaning of heating surfaces

**Shower Cleaning System (SMART SCS):**
- „Slim“ boilers < 4 m cross section
- Cleaning of platen-type heaters
- Areas without any access from side walls

**Sootblower operated with water:**
- Superheater areas
- Boilers with severe deposition

**Combinations hereof**
Content

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Cleaning Medium Water

- Water penetrates into the porous deposits
- Water droplets evaporate due to excellent heat transfer
- Sudden expansion
- Deposits break off
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SMART Cannon

On-Load Boiler Cleaning with Water
SMART Cannon

- Concentrated water jet crosses furnace or empty passes
- Cleaning of opposite wall by means of predefined cleaning patterns
- Nozzle size, water pressure and amount are case specific
The System SMART CANNON™
Example from a WtE plant

On-load Cleaning of Empty passes

- Reduced heat transfer in the radiation passes
- High fluegas temperature in front of first superheater
- Heat transfer is shifted to the convectional part of the boiler
WtE Installation – Top View of Boiler

1. pass

2. pass

3. pass

WLB WLB WLB
WtE Installation – The Cleaning Effect

View into 2nd pass
Flue gas temperature in front of superheater

Start: 15 h
Stop:

670 °C
Temperature left side

570 °C
Temperature right sight

Max. boiler load is limited to **90%** of design boiler load because of fluegas temperature in front of superheater (670°C)
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Example from a WtE and CFB boiler

On-load Cleaning of Empty passes
Installation Areas – Shower Cleaning (SCS)

Efficient Cleaning of:
- Boiler roof
- Membrane walls
- Platen heating surfaces

Spray pattern
Flanges / Guiding tubes

Exp.: Spray pattern
Flange with half opened valve
Shower Cleaning System (SMART SCS)

SMART SCS
Höhere Anlagenverfügbarkeit bei der Verbrennung von Abfall, Biomasse und Ersatzbrennstoffen

SMART SCS
Increased availability for waste, biomass and RDF fuelled boiler
SMART SCS Nozzle Designs

Cleaning principle

Umbrella nozzle

Jet Nozzle
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SMART Helix Water

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## Deposit severity

<table>
<thead>
<tr>
<th>Deposit hardness</th>
<th>Moderate</th>
<th>High</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="Moderate Deposit" /></td>
<td><img src="image2.png" alt="High Deposit" /></td>
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SMART Helix Water Superheater Cleaning with Water
SMART Helix Water

- Cleaning modes:
  - „Go-Stop-Clean-Go“ mode

- Flexibility in adjustment of cleaning parameters:
  - axial and rotational speeds
  - blowing angle
  - cleaning intensity
  - oscillating mode
SMART Helix Water Superheater Cleaning with Water
Example Lignite fired Boiler

- Cleaning efficiency

Before

After