

REINHOLD ENVIRONMENTAL Ltd.



**2017 APC & Wastewater Round Table
& Expo Presentation**

July 17 & 18, 2017 in Charlotte, NC / Hosted by Duke Energy

All presentations posted on this website are copyrighted by Reinhold Environmental, Ltd (RE). Any unauthorized downloading, attempts to modify or to incorporate into other presentations, link to other websites, or obtain copies for any other uses than the training of attendees to RE's Conferences is expressly prohibited, unless approved in writing by RE or the original presenter. RE does not assume any liability for the accuracy or contents of any materials contained in this library which were presented and/or created by persons who were not employees of RE.



PressureWave Plus Boiler and HRSG Cleaning

Bruce Carlton, Global Product Manager

APC & Wastewater Conference | Charlotte NC | July 18, 2017

© 2017, General Electric Company.

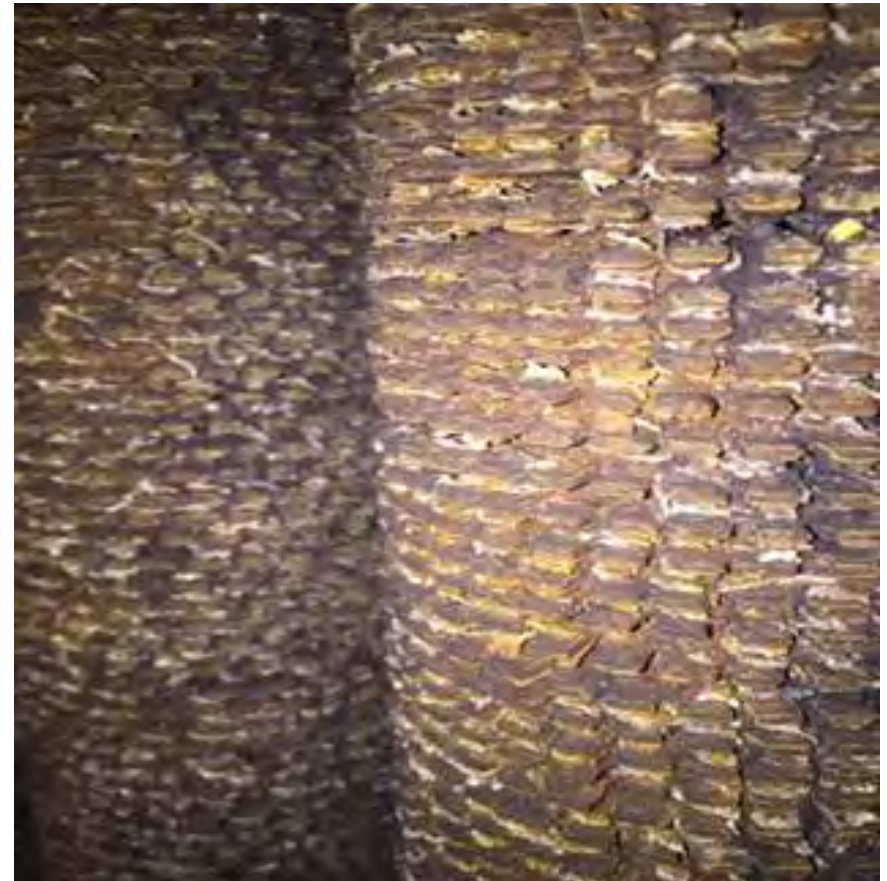
GE Proprietary Information - The information contained in this document is General Electric Company (GE) proprietary information. It is the property of GE and shall not be used, disclosed to others or reproduced without the express written consent of GE, including, but without limitation, in the creation, manufacture, development, or derivation of any repairs, modifications, spare parts, or configuration changes or to obtain government or regulatory approval to do so, if consent is given for reproduction in whole or in part, this notice and the notice set forth on each page of this document shall appear in any such reproduction in whole or in part. The information contained in this document may also be controlled by the US export control laws. Unauthorized export or re-export is prohibited. This presentation and the information herein are provided for information purposes only and are subject to change without notice. NO REPRESENTATION OR WARRANTY IS MADE OR IMPLIED AS TO ITS COMPLETENESS, ACCURACY, OR FITNESS FOR ANY PARTICULAR PURPOSE.



Why Clean Your HRSG?

Tube fouling effects on CCPP performance:

- Increases GT backpressure
- Decreases heat transfer efficiency and steam turbine output
- Can limit output
- Increases heat rate



PressureWave Plus Advantages

Safe: Limited Work in Confined Spaces or at Heights

- No Scaffolding Required
- Deep Cleaning into Tube Bundles w/o tube spreading
- Reduces Outage Time – Less than 1 Week



Background

- **Patented technology** ...introduced in 2001, by Bang&Clean Technologies AG from Switzerland
- **More than 10,000** cleanings worldwide, in different industries
- **Executed by General Electric** in select countries and industries as PressureWave* Plus Boiler and HRSG Cleaning



Process Overview

1. Bag is positioned in unit with lance
2. Filled with gas/oxygen mixture and remotely ignited
3. Resulting pressure wave and tube vibrations dislodge the deposits deep into the bundle (flue gas side)

Lance in boiler

Bag in cone

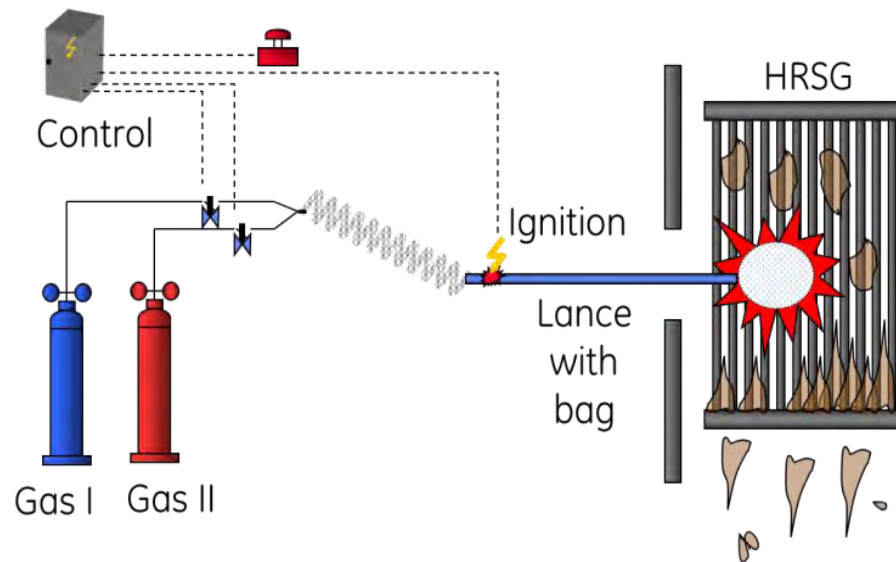
Inflated bag

Bursting bag

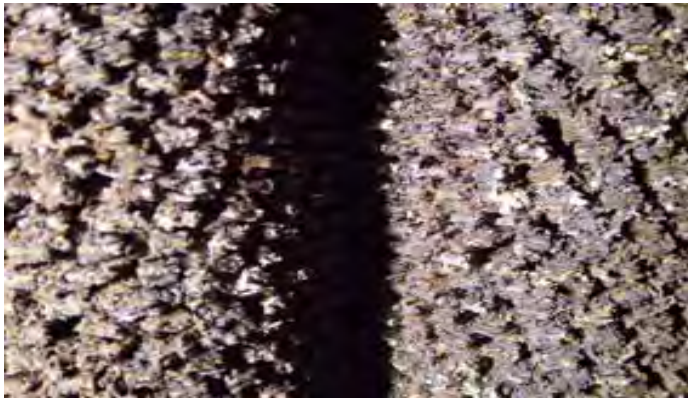


Process Overview - Continued

- Performed with the unit off line
- Flexible lance with bag positioned by rope and pulley in corridor between the pressure part modules
- Approximately 100 -250 shots per corridor, performed in 1-2 shifts per lane



Cleaning Results - Visual



Before

After



Cleanings Results - Metrics

501F site in Canada - 1 unit

- 8,300 lbs debris removed
- Ammonia salts and iron oxide
- 5" backpressure recovered



7F Site in Southeast - 2 Units

- 84,000 lbs debris removed
- Two outages
- Iron oxide
- 8" Backpressure recovered
- 30°F drop in stack temperature



Cleanings Results - Metrics

Two identical units –Southeast

- 4X deposits removed over dry ice blasting
- 3 ½ tube bundles (7 faces) cleaned in 4 shifts
- No scaffolding in HRSG, no additional access points added, no tube spreading
- No visible signs of emissions during cleaning, post clean up, or start up
- No negative effects from cleaning (tube leaks or ancillary damage)



