ON-LOAD BOILER CLEANING SYSTEMS

Effective on-load cleaning of Air Preheaters and Gas-Gas Heaters
Centre of competence for on-load boiler cleaning of Air Heaters and Gas-Gas Heaters

Clyde Bergemann Ltd, is the centre of competence for the provision of on-load boiler cleaning technologies for Air and Gas-Gas Heaters within the Clyde Bergemann Power Group. With years of experience and knowledge in Air Heater markets, we have focused our work on the development and production of efficient solutions for all types of on-load cleaning of heating and reaction surfaces. We offer an extensive range of cleaning devices specifically designed for the different cleaning requirements for Air Heaters and Gas-Gas Heaters. By applying various cleaning mediums such as steam, air, low pressure water or high pressure water jet - combined with correct nozzle configuration and positioning, we can deliver the optimum cleaning of heater baskets.

Technology leader with process expertise

As a pioneer in the industry, we play a vital role in shaping cleaning technology. As such we were one of the first in the market successfully applying on line jet water washing for Air Heaters and Gas-Gas Heaters. Likewise, we were quick to spot the advantages of demand-driven cleaning which is performed according to the actual deposit situation and not following a fixed cleaning scheme. A whole new philosophy has evolved out of the advantages of demand-driven cleaning - with use of sensor feedback intelligent monitoring. This has been developed in conjunction with the Howden Group and supports their proven Enerjet™ concept of on-load cleaning using high pressure (HP) water jets.

Complete solutions & life-long support

We design, manufacture and deliver complete solutions in which hardware, software, shut off and regulation valves, and instrumentation are perfectly coordinated. Our diligence, which is applied by our experts in the design of Air Heaters and Gas-Gas Heaters cleaning systems, is also apparent during installation, commissioning and servicing throughout the long service life of our technology.

Your benefits:

- Extended Air/Gas-Gas Heater availability
- Increased Air/Gas-Gas Heater efficiency
- Effective and Efficient heater cleaning with reduced burden on ID/FD fans.
- Maintaining MW output
- Professional consultation in all boiler cleaning
- Comprehensive aftermarket Service & Support
- Training for your employees by our own experts
- Co-ordinated approach to eliminate unplanned outages due to fouling/plugging in Air Heaters.
- Controlled Jet technology provides enhanced cleaning, eliminating the need to shut down the plant
Latest technological solutions - supported by world class experience and “Know-How”

Customer Compliant Design

Our on-load boiler cleaning systems correspond to national and international safety provisions and our company is DIN EN ISO 9001 certified with fully integrated business processes and the latest 3D CAD and Engineering analysis software in use to validate our designs.

Our business is a fully integrated ERP organisation and is fully coordinated from the order intake, planning and factory control, through to invoicing and aftermarket support with our integrated SAP business management system - ensuring our products and support are managed and coordinated throughout their lead time to achieve 100% on time delivery and customer satisfaction.

All Clyde Bergemann products are designed to be compliant to CE directives and European and International standards and the design can be tailored to suit any specific site or demanding customer specifications.

Technology Know-How

With unrivalled experience in Manufacturing, Designing and Aftermarket Support and our extensive customer base in over 100 countries - our fully skilled team have the capability to provide robust and effective solutions for our customers.

From basic cleaning techniques using air or steam through to the latest high tech multi media and intelligent monitoring solutions - utilising JetBlower™ jet cleaning processes and fully integrated controls. Clyde Bergemann has the experience and knowledge to ensure we can provide standard or customised solutions to provide the solution needed to keep your heater clean.

Our range of products is extensive and our capability is backed up with years of experience and knowledge in Air Heater markets. We use the latest technologies and engineering analysis tools.

Combine this with the extended capability of the Clyde Bergemann Power Group’s multifaceted range of products and capabilities, our relations with the Howden Group and our extensive customer base and reference site list - we have the technology and know-how capability to deliver your required solutions.

Effective Solutions

Understanding customer problems and providing correct solutions is important. Analysis of losses in MW hours from Air Heater problems has shown that over half of losses are attributable to fouling issues and leads to around 1% overall loss in plant MW hours.

Numerous case studies conclude that eliminating as little as one outage would easily fund a typical cleaning solution - achieving payback almost immediately. By selecting the optimum cleaning solution you will improve plant optimisation and overall effectiveness.
Engineering – key for effective boiler cleaning

Every system and every deposit build-up is distinctive and requires comprehensive design planning. Decades of experience in a wide range of applications show that careful product choice will lead to the best cleaning results.

Choosing the right cleaning system

The chemical composition of fuel influences the formation of slagging and fouling. Ash deposits carried over, sintered and fused deposits on the elements and loose ash as well as acid corrosion all have to be considered in designing a solution. The more detailed the information available, the best cleaning device or combination of devices for a coordinated overall system can be selected. Selection factors such as boiler design, flue gas conditions, operating pressures, blowing medium conditions and physical and operating restrictions, etc all contribute to ensuring optimum product choice.

Design of parameter for the cleaning system

Economic arrangement of the sootblowers is important. They should provide complete coverage of the fouled surfaces whilst avoiding overlaps to prevent the danger of damage from over-cleaning. The sootblower cleaning range must be verified depending on the geometries of the surfaces to be cleaned, the heater size and design.

We use our knowledge, experience and empirical data from previous projects and combine it with the fundamental laws of thermodynamics and fluid mechanics to optimise the design of the cleaning device to ensure design planning quality.

This consistent approach makes every design objective replicable, suitable and matched to requirements.

Types of Cleaning Device

Clyde Bergemann have a selection of devices which can be used to clean your Heater. Choosing your solution depends on the size and type of the Air Heater and application conditions. Selection is important and correct choice will deliver optimal performance.

Air Heaters typically use part retractable devices as there are generally less corrosive by-products present. Choice is determined by heater size and the cleaning medium required. In some cases air or steam cleaning will be adequate - however, for example, where “Ammonia Slip” occurs, a multiple media approach using low or high pressure water cleaning would be the better solution.

Where flue gas conditions are problematic such as high temperature or corrosive, a fully retractable device is recommended. Gas-Gas Heaters would normally use such a device with special materials to ensure components can cope with the corrosive conditions.

Other features can be included such as integrated control systems, smart cleaning, air sealing, hazardous area solutions and so on - essentially tailoring the solution to our customers’ needs.

The main difference between the Air/Gas-Gas Heaters is that the latter operates in relatively low temperatures with hi-sulphur content. This combination creates highly corrosive operating conditions and the solution must be designed to cope.
A comprehensive range of Air / Gas-Gas Heater sootblowers for cleaning with steam, air or water

<table>
<thead>
<tr>
<th>Description</th>
<th>Product Type</th>
<th>Cleaning Travel</th>
<th>Principle of Function</th>
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<tbody>
<tr>
<td>Short Part-Retractable Axial Sootblowers</td>
<td>LIX</td>
<td>0.25m</td>
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<tr>
<td>→ Cleaning of Air Preheater baskets up to size 24</td>
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<td>→ Single lance, part-retractable, axial movement</td>
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<tr>
<td>Part-Retractable Axial Sootblowers - Single Media</td>
<td>VX</td>
<td>0.3 - 2.5m</td>
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<td>→ Multi-jet cleaning of Air Preheater baskets of all sizes,</td>
<td>PS</td>
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<td>specifically suitable for restricted exterior space</td>
<td>RK</td>
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<td>→ Steam, air, low pressure and high pressure water capabilities</td>
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<td>→ Single lance, part-retractable, axial movement</td>
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<tr>
<td>Part-Retractable Axial Sootblowers - Multi Media</td>
<td>VX</td>
<td>0.3 - 2.5m</td>
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<td>→ Twin lance design multi media solutions (steam, air, low</td>
<td>PS</td>
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<td>pressure and high pressure water combination)</td>
<td>RK</td>
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<tr>
<td>→ Cleaning of heat exchange surfaces, Air Preheaters</td>
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<td>→ Can be Tailored to meet hostile environments.</td>
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<td>→ Part retractable movement, twin lance, axial movement</td>
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<tr>
<td>Fully Retractable Multi Media - JetBlower™</td>
<td>JetBlower</td>
<td>0.5 - 10m</td>
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<tr>
<td>→ Multi media cleaning device (steam, air, low pressure and</td>
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<td>high pressure water combination)</td>
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<td>→ Advanced long retractable sootblower / Jet wash cleaning</td>
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<td>system</td>
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<tr>
<td>→ Intelligent monitoring capability and variable speed /</td>
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<tr>
<td>stepping approach cleaning</td>
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<tr>
<td>→ Designed for hostile environments, e.g. Gas-Gas Heaters,</td>
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<td>high temperatures, sulphur content</td>
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As well as the range of Air and Gas-Gas Heater products above, Clyde Bergemann has the capabilities to design and manufacture customised product designs to fit any specialised customer requirements.
JetBlower™ - high pressure water jet cleaning

Representative case study

While rotary Air Preheaters play an important part in the recovery of 10-15% of the heat input to a boiler, they are also subjected to heavy dew point condensation and associated fouling. Although such Air Preheaters hold an advantage over recuperative heat exchangers in that their thermal performance does not deteriorate with fouling, the steady increase in pressure drop associated with such fouling can increase the fan power requirements and if the fans operating at 100% this will restrict the MW power output.

Studies have shown that such fouling in rotary regenerative Air Preheaters typically causes an average loss of around 1% in unit availability, equivalent to a loss of 2-3 days of generated output per year. A 1-day availability loss in a medium sized power plant would represent a revenue loss of as much as $0.3-0.5M. It can be seen that even a small reduction in this loss will rapidly recover the cost of an effective cleaning system. If Heater fouling leads to a single unplanned outage, the associated cost can easily double or treble the figure above.

Working with the Howden Group, their Enerjet™ concept has been developed to produce a holistic approach to improving Air Heater availability. In conjunction with this approach and choosing the correct cleaning solution we clearly believe our customers will benefit from a cost effective and an invaluable solution, for plant maintenance managers aware of the high cost of both availability loss and increased fan power.

Key features:

- Fully tested and proven technology
- Integrated sootblowing and washing
- Comprehensive element cleaning without any break in service
- Fully redesigned high pressure delivery system
- Eliminates problems associated with water cleaning
- Typically repays investment in under one year
- Reduces fire risk by preventing dangerous build-up of inflammable contaminants
- Works with almost any element profile or manufacturer

Howden is a worldwide recognised leader in the design, supply and support of Air Preheater and Gas-Gas Heater Products.
In-house competence in automation & controls - safe area to hazardous area requirements

Complete solution from a single source

For optimal operation of each on-load boiler cleaning system, it is important that the control equipment is aligned with the system according to its specific requirements.

For this reason we develop and generate dedicated controls solutions. After detailed consultation on inclusion of your individual requirements, the plans are carefully put into practice by experienced employees - saving you extensive interface coordination between the boiler cleaning system and the control system.

Our controls are designed to be flexible in order to adhere to the requirements of a modern power plant operation under changing load. The order and sequence of controlling the individual cleaning devices can be changed at any time.

Complete Technical Support

Our internal FAT area offers full testing facilities with mimic panels to simulate complete operating sequence including associated pipeline valves and instrumentation.

We offer a range of site services for control systems including installation, commissioning and maintenance. Our experienced site engineers are fully trained to perform in accordance with international standards.

A full documentation package is provided which will include: logic/flow diagram, internal/external layouts, wiring schematics and certification.

Technical Highlights

- Flexible modular design to meet customers’ immediate and future requirements
- Specific design to customer requirements (e.g. outdoor, coastal, refinery environments, etc)
- Enclosures can be combined (modular system)
- Different materials available for enclosures
- Multiple operating mode (local / remote / DCS)
- User interface via push buttons or a graphical HMI (Human Machine Interface)
- Communication to DCS (Distributed Control System) via volt free contacts for start / stop and common alarms or via Modbus, Profibus or DH+ protocols
- Intrinsically Safe (IS) barriers fitted to the control panel to provide IS circuits for using sootblower proximity switches and IS steam pipework instrumentation if required
- Industry standard PLC’s for reliable operation and common understanding of control logic and PLC program
- Explosion protection standards including: ATEX, CENELEC, IEC, NEC, GOST, CCOE, NFPA
Clyde Bergemann is represented in over 40 countries worldwide.

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