



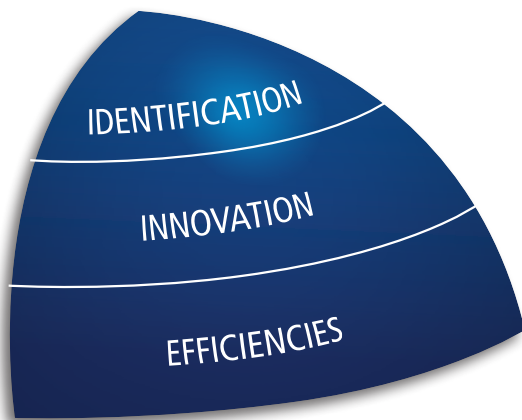
SMARTER BOILERS

Maximizing Your Boiler Performance
to Enhance Your Bottom Line





SMARTER INNOVATION For the Power Industry



Efficiencies

Your company's teams are tasked with ensuring operations run smoothly. However, your company needs an innovative and effective way to maintain, and even improve, operational efficiencies, no matter what plant equipment infrastructure you currently have in place. With this in mind, Clyde Bergemann provides powerfully engineered innovative boiler cleaning and maintenance tools to help you master each of these challenges in a manner that is completely customized to your needs.

Four Critical Megatrends affecting the power industry

Changing Demand

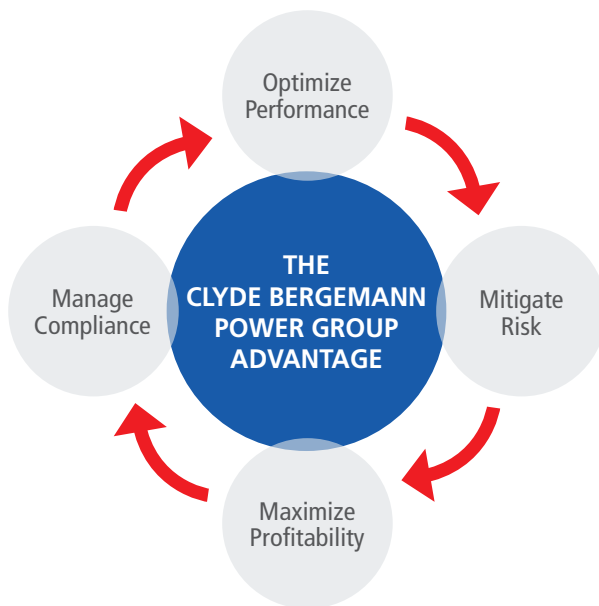
Resource Scarcity

Aging Plant Infrastructure

Increasing Regulations

Each of these factors contributes to enormous pressure on any company trying to maintain its profitability in these markets. The challenge is to meet current power demands without inefficiencies or costly outages.

Clyde Bergemann customers realize an average yearly plant savings of \$1.56 million and avoid 3 days of forced outages.



The Clyde Bergemann Power Group Advantage

Clyde Bergemann Atlanta is part of the Clyde Bergemann Power Group, the largest supplier of boiler cleaning and ash handling technologies in the world. We are dedicated to improving boiler performance through innovative on-line boiler cleaning solutions for operators and manufacturers of boilers in the power generation, pulp and paper, industrial, and waste to energy markets.

With over 20 years of unmatched expertise in over 800 boilers throughout North America, Clyde Bergemann has established a coveted reputation for helping its customers achieve millions of dollars in savings annually.

Optimize Performance

Clyde Bergemann's offerings ensure precisely the right level of cleaning for optimizing your operations. In fact, in just one year, our customers can expect an average 25% cleaning media reduction in some cases as much as 75%.

Mitigate Risk

Clyde Bergemann serves customers in industries where the life cycle of a plant can be as much as 60 years—well beyond their intended life. Our boiler cleaning and maintenance tools ensure the safe operation and maintenance of their long life assets.

Maximize Profitability

With preventable boiler down time being one of the greatest causes of outages, it is no wonder customers turn to Clyde Bergemann for a full range of products to reduce boiler-incurred outages to almost zero – saving millions of dollars annually.

Manage Compliance

Staying ahead of compliance issues is easier with the Clyde Bergemann set of offerings, providing our customers an average yearly CO₂ emissions reduction of 1.88 tons/hour. The costs of compliance can be offset against the performance savings Clyde Bergemann provides.

SMART Answers for Mitigating Risk



When boilers are unreliable the probability of outages, as well as millions of dollars in lost revenue put companies at great risk. Efficient, intelligent products from Clyde Bergemann address every area of boiler maintenance to ensure optimum operational performance throughout the life of the boiler.

⚡ Boiler Reliability

Problem

Derates/Load Shedding

Derates and load shedding can occur when the fouling inside the boiler becomes too problematic for the existing sootblower system to clean.

Answer

In order to minimize, or even eliminate, the root cause for derating or load shedding, proper cleaning of the furnace is a must. SMART Cannons can increase the surface area cleaned of the furnace up to 80% of the total area, as opposed to the 30% typically cleaned by conventional wall blowers.

Problem

High Plant Heat Rate

Conventional sootblowing systems do not target the areas of the boiler where ash is building up, lowering heat transfer and boiler efficiency, and causing tube erosion from over cleaning.

Answer

SMART Clean™ technology can recognize where exactly in the boiler the deposits are in real time and can initiate the proper cleaning device based on where the build-up is occurring, when it is occurring, and with the proper cleaning intensity.

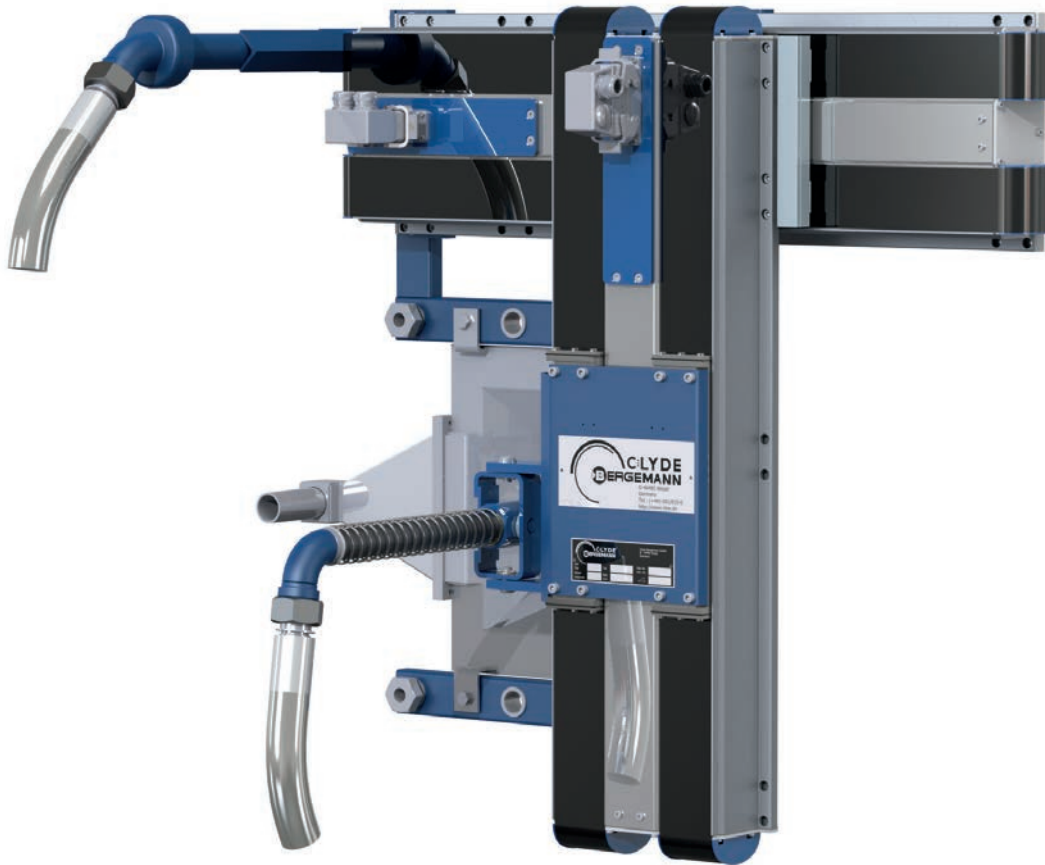
Problem

Tube Leaks

Tube leaks can be a major problem in a boiler, causing forced outages and lost revenue. These can be caused by either undercleaning of the tube banks, or overcleaning of the tube banks, both are results from an ineffective sootblowing system.

Answer

SMART Clean™ technology utilizes feedback from both our SMART Gauge system and an on-line thermodynamic model to determine which sections of the convection pass have ash accumulations, thus reducing the number of blowing events on clean tubes. SMART Retracts can also be used to vary the intensity of individual cleaning events to provide just enough force to clean the ash, but not damage the tube.



Problem

Clinkers

Clinkers can form when ash builds up in the superheated tubes. Once excessive, it falls. This can cause significant damage to the bottom slope tubes, sometimes resulting in a forced outage.

Answer

Clinkers form with excessive furnace temperatures, and if the tubes are undercleaned. Using our SMART Cannon system, you can reduce and control your temperatures to within optimum limits, while our SMART Clean™ system keeps your superheated tube bundles clean using real time feedback from the SMART Gauges and ThermoDynamic Model to monitor ash build-up.



⚡ Boiler Reliability (continued)

Problem

High Spray Flows

High attemperator spray flows are caused by excessive steam temperatures resulting from poor heat transfer in the furnace.

Answer

Our SMART Cannon system will reduce and control your FEGT to within design limits, allowing for proper heat transfer to occur in the superheat tube bundles. With proper heat transfer in the superheat section, the steam exiting the reheat section will be within design limits.

Problem

Ineffective Boiler Cleaning Control System

Troubleshooting and maintaining obsolete, outdated, and unreliable control systems requires a lot of time and technical expertise. In many cases "quick fixes" and "temporary patches" due to time constraints, parts availability, and high maintenance costs lead to greater unreliability and further costs and downtime making otherwise manageable operational issues unmanageable.

Answer

Our SMART Controls™ offers replacement packages and upgrades for all boiler cleaning equipment. Independent of the age, technology, or manufacturer a reliable control system can be provided to handle all your boiler cleaning requirements. State of the art technology, industry recognized components, and proven software ensure you are provided with the most reliable, modern, trouble free boiler cleaning control system on the market.



SMART Answers for Improving Performance

⚡ Reduced Boiler Efficiency

Inefficient boilers reduce output and revenue. With the implementation of SMART Clean™, SMART Furnace or SMART Convection™ products from Clyde Bergemann, most plants can see immediate benefits such as a 0.5% to 1% heat rate improvement annually – worth as much as \$1M for a typical power boiler alone. These efficiency improvements flow directly to a company's bottom line.

Problem

Fuel Switch

Changes in fuel source or blend will cause the fouling characteristics and locations to change, causing problems if the sootblowing system is based on a fixed or static cleaning cycle.

Answer

SMART Clean™ can dynamically identify the new fouling locations and decide which cleaning devices and intensity to use to keep the boiler flue gas and steam temperatures on target. SMART Cannons increase the cleaning coverage and remove tenacious deposits from the furnace effectively for all types of coals.

Problem

Poor Heat Transfer

Deposits on tube surfaces act as insulators and as such, reduce the heat transfer from the flue gas to the steam leading to multiple problems such as high plant heat rate.

Answer

SMART Clean™ offers measurement devices located strategically throughout the boiler to monitor heat transfer in real time to identify areas in which ash build-up is degrading the heat transfer.

Problem

Outdated Sootblowing System

Conventional sootblowing systems are based on timers or operator experience to initiate cleaning events. This leads to ineffective sootblowing that does not target the areas of the boiler where ash is building up, therefore lowering heat transfer and boiler efficiency, as well as tube erosion from over-cleaning tube banks.

Answer

The SMART Clean™ closed-loop process transforms your sootblowing system into an automatic, demand-driven, targeted boiler cleaning system that positively affects your boiler efficiency, while eliminating tube leaks, clinkers and other problematic issues.



SMART Answers for Compliance Adherence



Estimates put the total annual cost of environmental CO₂ emission compliance for power and paper plants at about \$10 billion. These costs get passed on to consumers, with electric bills likely to rise approximately 2 to 3 times the current amount per month if certain new regulations take effect by 2015. However, with certain products such as SMART Clean™, CO₂ emissions can be reduced dramatically, effectively addressing a number of compliance issues proactively.

⚡ Emissions Compliance

Problem

High CO₂ Emissions

The level of CO₂ that can be released from a given coal-fired power plant depends on the type of coal burned, the overall efficiency of the process, and the use of air pollution control devices. Of these, the most cost effective is to increase the efficiency of your boiler.

Answer

SMART Clean™ can increase efficiency of a boiler by 0.5% to 1%, reducing CO₂ emissions by about 78,000 tons/year, and lowering fuel costs in the process.

Problem

Lost Efficiency Due To Air Pollution Control Technologies

Dry sorbent injection and fabric filters used to reduce acid gas and particulate matter emissions increase the amount of fan power needed to overcome their pressure drops, acting as a parasitic load on the plant, reducing profits.

Answer

SMART Clean™ can increase the efficiency of a boiler by 0.5% to 1%, virtually regaining all the lost output from installing systems such as dry sorbent injection and fabric filters.



SMART Answers for Maximizing Profit

The utility industry is among the country's most capital-intensive sectors, with many of its costs stemming directly from investments in and maintenance of the power plants and structures that are used to deliver electricity. Utilities typically cannot recover their costs when they are incurred; instead, they are required by regulatory authorities to spread out their costs to customers over the physical life of the investment—sometimes as long as 30 years—under the assumption that there will be a stable customer base. This means that one of the best profit maximizing actions utilities can take is to lower their operational costs wherever possible.

⚙️ High Operational Costs

Problem

Sootblower Maintenance

Conventional and older sootblower systems can run too frequently, leading to higher maintenance requirements, wasting tens of thousands of dollars a year on unnecessary repairs.

Answer

Clyde Bergemann sootblowers are designed with the severe conditions of a power boiler in mind, giving owners the lowest cost of ownership available, with the best warranty on the market. Due to the galvanized housing, we can offer a lifetime warranty on all our retracts, saving plants an average of \$8,000 per sootblower over its lifetime compared to competitors sootblowers. Our rugged design also saves plants \$1,000 to \$2,000 each year in lower maintenance and spare parts costs.

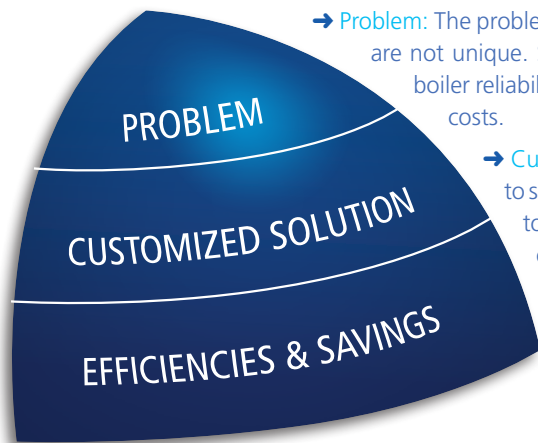
Problem

High Cleaning Media Costs

On-line boiler cleaning based on a fixed interval can be inefficient, leading to high cleaning media usage and wasted money. Because blowing media is not free, plants can save significant money by reducing the usage.

Answer

Clyde Bergemann offers the most efficient sootblower nozzles available. Proven in the field and laboratory tests, our CFEIII nozzle can deliver the most power with lower flow rate and pressures than any other nozzle on the market. Combined with our SMART Clean™, cleaning is only activated when and where it is truly needed, reducing the number of cleaning events per day.



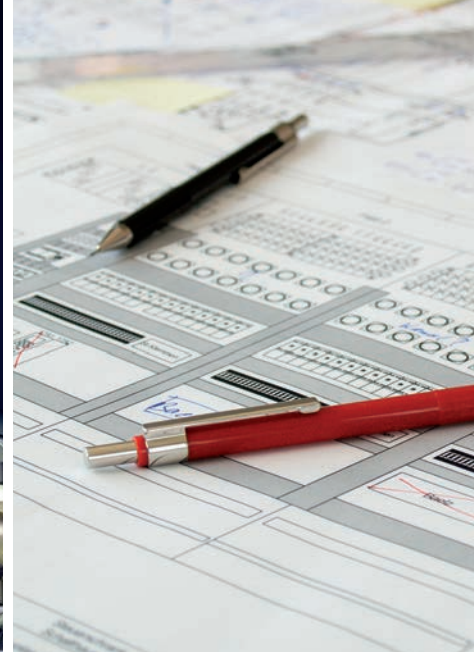
→ **Problem:** The problems that occur over time in power, pulp and paper plant boiler systems are not unique. Sooner or later a plant will begin to experience issue in the areas of boiler reliability and reduced efficiency, emissions compliance and high operational costs.

→ **Customized Solution:** Clyde Bergemann's SMART solutions are designed to specifically address these four key areas of concern, with the adaptability to deliver remarkable operational improvements, regardless of the age of the equipment, or existing processes already in place.

→ **Efficiencies & Savings:** Clyde Bergemann's results speak for themselves, time after time, with improved operations and boiler function that translates directly to the bottom line.

Boiler Reliability

Boiler	Problem	Solution	Result	Yearly Savings
390 MW B&W Sub Critical Lignite	Clinker related forced outages	SMART Convection	"38% reduction in retractable operations (70 operations less / day)"	> \$430,000
800 MW CE Super Critical Sub-bituminous	Reliability issues and tube damage	SMART Convection	10°-15°F Improvement in EEGT, 0.3% heat rate improvement	> \$3,900,000
680 MW CE Sub Critical PRB	Clinker related forced outages and performance issues	SMART Convection	18% reduction in retractable operations (40 operations less / day), 0.5% Heat Rate Improvement	> \$1,770,000



Reduced Boiler Efficiency

Boiler	Problem	Solution	Result	Yearly Savings
350 MW B&W Super Critical PRB	Performance Issues	SMART Convection, SMART Furnace	Eliminated steam consumption of 48 wallblowers, 0.4% Heat Rate Improvement	> \$570,000
350 MW CE Super Critical Lignite	Performance Issues	SMART Convection, SMART Furnace	0.12%-0.14% Heat Rate Improvement	>\$250,000

Boiler	Problem	Solution	Result	Yearly Savings
800 MW FW Sub Critical Bituminous	SCR Temp Control and Fuel Switch	SMART Convection,	15% reduction in retractable operations (35 operations less /day), SCR Flue gas temp controlled below target 760°F at 99% of the time for all fuel blends, 1% Heat Rate Improvement	> \$750,000
1350 MW B&W Sub Critical PRB	Performance Issues and Fuel Switch	SMART Furnace	Eliminated steam consumption of 118 wallblowers, 0.15%-0.17% Heat Rate Improvement	> \$2,480,000

High Operational Costs

Boiler	Problem	Solution	Result	Yearly Savings
868 MW Super Critical CE PRB	Performance Issues and Fuel Switch	SMART Convection, SMART Furnace	"Eliminated 4 days of forced outages out of the year, Eliminated 20MW Fixed Derate, Reduced Air Consumption for 47% in retractable operations (115 operations less /day) and eliminated steam consumption of 60 wallblowers"	>\$9,360,000

Clyde Bergemann is represented in over 40 countries worldwide.



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**QUALITY MANAGEMENT SYSTEM
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