Your Plant Can Thrive with Babcock & Wilcox Aftermarket Products and Services

Boiler Performance Enhancements | Upgrade/Rebuild Projects
Replacement Parts | Construction Services
Your plant can thrive
with B&W parts, upgrades, controls and services for components and equipment

Controls and Diagnostic Systems
- Advanced performance technologies
- Sootblowing controls and intelligent software
- Precipitator controls and software
- Boiler control and monitoring systems

Boiler
- Pressure parts
- Non-pressure parts
- Diamond Power® sootblowers
- Air heaters
- Fans

Post-Combustion NOₓ Control
- Selective catalytic reduction
- Selective non-catalytic reduction

Combustion Systems
- Pulverizers
- Low NOₓ burners
- Igniters and scanners
- Overfire air systems
- Cyclone furnaces

Ash and Material Handling
- Allen-Sherman-Hoff® bottom ash systems
- Allen-Sherman-Hoff® fly ash systems

Illustrations shown in this brochure are representative product offerings and do not depict all products or designs that are available.
Aftermarket Lifecycle Support Products and Services

How do you maintain your competitive edge in today’s market? Are you operating at peak efficiency and maximizing the returns on your assets? Are you partnering with a proven service provider you can rely on to provide ongoing maintenance support, quality replacement parts and new technologies when needed to meet the latest environmental regulations? These are some of the reasons to choose Babcock & Wilcox (B&W) as your preferred one-stop aftermarket supplier for your entire plant.

Mercury, Acid Gas and HAP Control

- Wet scrubbers
- Dry scrubbers
- Dry sorbent injection
- Activated carbon injection

Particulate Control

- Electrostatic precipitators (ESP)
- Fabric filter baghouses
- Dust collectors

In addition to B&W equipment we provide parts, systems and services for all major OEM suppliers, including:

- GE/Alstom/Combustion Engineering
- (Amec) Foster Wheeler
- Mitsubishi Hitachi Power Systems
- Babcock Power/Riley Power
- Doosan
Combustion Systems — Pulverizers

B&W Roll Wheel™ and E/EL Pulverizers

Capabilities/Competencies

- High wear-resistant, severe duty castings
- Rotating throat
- DSVS® rotating classifier
- Wide profile roll wheels
- Erosion-resistant ceramic components

Replacement parts
- Roll wheel rebuilds and exchanges
- Gear box rebuilds and exchanges
- Inventory management programs
- Technical support – inspections, testing, tuning, training

Potential Benefits

- Reduced operating and maintenance costs
- Capacity maintained throughout wear cycle
- Lower pressure drop
- Flexible load-following capability
- Excellent turndown
- Improved component wear life with high wear castings and ceramic protection
- Improved combustion efficiency (reduced unburned carbon) when used with a DSVS classifier
- Ability to achieve optimum fineness when grinding a wide range of coals via online adjustment of roll wheel pressure and classifier speed
CE-Type Pulverizers (GE/Combustion Engineering/Alstom)

Capabilities/Competencies

- Replacement parts for Combustion Engineering (CE) shallow bowl pulverizers and mill size 633 deep bowl pulverizers
- No fee inventory management programs
- Journal rebuilds for all pulverizer sizes
- Extended life journal assemblies
- Xwin® high wear materials technology
- Grinding zone and millsode area upgrades
- Technical support – inspections, testing, tuning, training
- New product development

Potential Benefits

- Enhanced performance and reliability
- Increased mill operating cycles
- Improved availability
- Reduced on-site inventory
- Industry leading technical support

Magotteaux Strategic Alliance

A strategic supplier relationship combines the benefits of Magotteaux’s metallurgical expertise and experience in high wear, abrasion-resistant material with B&W’s expertise in pulverizer and boiler design, operation and optimization.
Combustion System Firing Equipment

Capabilities/Competencies

- Low NOx, coal, oil, natural gas, and industrial process gas firing equipment
- Complete overfire air systems specifically designed for your operating conditions, fuels and furnace envelope
- Integrated combustion systems design approach
  - Fuel delivery and preparation system
  - Flame safety and burner management system
  - Combustion controls
  - Evaluation of downstream impact to boiler cleaning equipment, ash handling systems and emissions control equipment

Overfire Air Port

AireJet® Low NOx Coal Burner
Potential Benefits

Multiple burner equipment options customized to fit your needs
- Unstaged low NOX burner systems to minimize furnace corrosion potential firing high sulfur fuels (DRB-4Z burner)
- Minimize SCR reagent costs
- Maximize unit turndown
- Minimize unburned combustibles in fly ash to improve boiler efficiency and support sale/beneficial use

Consistent emissions performance with set-and-forget burner adjustments

Burner equipment specifically designed for minimal maintenance costs
- Simple fuel element geometry to minimize flow disturbances including integral erosion protection
- Burner designs do not rely on flame holder devices prone to overheating and coking to maintain flame stability and achieve emissions performance

Pioneers in Low NOX Combustion Systems

Our low NOX combustion technologies have been successfully applied to a broad range of B&W and non-B&W boilers with varying fuel characteristics and boiler arrangements.
Combustion Systems — Igniters and Scanners

Igniters — Wall-fired Boilers

Capabilities/Competencies

- Fossil Power Systems (FPS®) oil and gas igniters
- Flexible application of PLC logic to meet burner management system requirements
- Comprehensive analysis for customized control to meet individual design and operational requirements
- Elimination of moving parts allowing a near maintenance-free igniter
- Integral flame rod detector which senses only the igniter in any burner/boiler configuration
- Horn igniters for corner-fired applications
- Complete line of scanners for all fuels in utility and industrial applications

Potential Benefits

- Proven performance
- Lower opacity
- Reliable ignition
- Superior flame stability
- Integral flame detection
- Fuel savings during startup
- Fixed position; no moving parts
- Low cost plug-in designs
- Low maintenance
- Proven mechanical reliability and operation
- Reliable flame recognition

FPS Gas Igniter

FPS Oil Igniter
Igniters — Corner-fired Boilers

Gas Horn Igniter

Oil Horn Igniter

Scanners

FO2 Angled Fiber Optic Scanner Head

Direct Sighted Scanner Head

FO2 Angled Fiber Optic Scanner Viewing Area

Wall Fired Low NOx Coal Burner

Direct Sighted Scanner Viewing Area
Boiler Upgrades and Replacement Components

Capabilities/Competencies

- Modifications, improvements and in-kind replacements
  - Pressure parts
  - Non-pressure parts
- Boiler capacity increases
- Conversions from base load to cycling operation
- Circulation improvements
- Fuel conversions and repowering
- Air heaters and fans, replacement in-kind or upgrades
- Corrosion and erosion protection
- Emissions reductions

Potential Benefits

- Improve ramp-up and turn-down capabilities for rapid grid response
- Solve existing maintenance or operational issues
- Design for fuel flexibility and cost savings
- Optimize plant efficiencies
- Lower maintenance costs

Engineered Upgrades for most OEMs

Our experience with non-B&W boilers includes Foster Wheeler, GE/Alstom/Combustion Engineering (CE), Babcock Power/Riley to name just a few
Diamond Power® Boiler and Air Heater Cleaning

Capabilities/Competencies

- Designed for low maintenance, reliability, versatility and maximum cleaning performance
- Industry’s largest installed base, providing proven performance
- Available in steam/air, high pressure water, and dual-media air heater cleaning configurations
- Custom designs for each unique online cleaning requirements
- Extended duty upgrades available including PowerTrain® carriages, Diamonized® feed tubes, live-load gland (LLG) and EAPC™ poppet valves
- Complete array of replacement parts, including poppet valves, high performance nozzles, carriage assemblies and drives, and lance tubes

Potential Benefits

- Optimized boiler cleaning systems — a key ingredient in improving boiler heat rate
- Superior cleaning effectiveness
- Optimized boiler cleaning systems
- Improved system performance, generating greater return on assets
- Aids in reduction of boiler tube fouling/sludging
- Regional service centers provide ongoing support and quick turnaround times on carriage and poppet valve upgrades, rebuilds and repairs

Sootblower Parts and Upgrades

- PowerTrain® carriage
- Sootblower tubular products
- Diamonized feed tubes
- Heat transfer sensors
- Gemini nozzles
- EAPC externally adjusted poppet valves
- Progressive helix mechanism
**Allen-Sherman-Hoff® Bottom Ash Systems**

**Capabilities/Competencies**
- Custom designed bottom ash systems
- Submerged chain conveyor for under-the-boiler ash removal from water-impounded hopper
- Submerged grind conveyor
- Remote dewatering systems for bottom ash dewatering and water recycling
- Hydrobin® dewatering systems
- Dry bottom ash conveyor system
- Wet to dry conversions
- Control systems
- Clinker grinders, hopper gates, hydro-ejectors, erosion-resistant piping, valves, and other system components
- Outage and rebuild kits
- Repair center rebuilds
- Inventory management programs

**Potential Benefits**
- Eliminate ash storage ponds
- Designed for ease of maintenance and system reliability
- Low operating costs
- Coal combustion residual (CCR) and Effluent Limitation Guidelines (ELG) solutions
- Rebuild kits and stocking program reduce downtime and inventory requirements

**Bottom Ash Parts and Upgrades**
- Gates
- Gaskets
- Bottom cone sections
- Floating and stationary decanters
- Permissive controls
- Hydraulic packages
- Clinker grinders
- Grinder rolls
- Valves

**Allen-Sherman-Hoff® Ash Handling**
B&W provides the complete line of Allen-Sherman-Hoff® ash and material handling systems, upgrades and replacement parts, field service and outage planning support, and replacement for competitors’ equipment.
Allen-Sherman-Hoff® Fly Ash Systems

Capabilities/Competencies

- Conventional fly ash and scrubber byproduct material handling systems for recirculation, beneficial use or disposal
- Fly ash conveying systems — vacuum, pressure and combination systems
- DenseASH™ dense phase pressure system
- Wet to dry fly ash system conversions
- Control systems
- Valves and other system components
- Silo storage and unloading expertise
- Optimized ash conditioning for transport and disposal
- Outage and rebuild kits
- Inventory management programs

Potential Benefits

- Proven designs for reliable operation
- Low maintenance and increased wear life
- Low lifecycle cost
- Minimizes use of plant process water
- Provides an economical way to utilize FGD wastewater as an ELG solution
- Fugitive emissions compliance solutions
- Rebuild kits and stocking program reduce downtime and inventory requirements

Fly Ash Parts and Upgrades

- Pugmills
- Airlocks
- Material handling valves
- Airlock refurbishment and upgrade kits

Piping and Fittings

- Ceramic-lined pipe and fittings
- Replaceable wear-back fittings
- Integral wear-back fittings

Vacuum Pressure Fly Ash Transport System

![Diagram of Vacuum Pressure Fly Ash Transport System]
Electrostatic Precipitators

Capabilities/Competencies

- New installations
- Engineered upgrades, rebuilds and conversions
- Wet and dry technologies
- Collector plates
- Rapper components and parts
- Discharge electrodes
- Insulators
- Single- and 3-phase power supplies and controls
- Access doors and door seals
- Electrical performance enhancement hardware and software
- 24/7 remote diagnostics

Potential Benefits

- Decreased emissions
- Reduced operating and maintenance costs
- Improved reliability and safety
- Enhanced performance and efficiency
- Parts availability for quick turnaround and reduced downtime

Particulate Control

Wet Electrostatic Precipitator

Dry Electrostatic Precipitator

Engineered Upgrades

Designed to reduce operating and maintenance costs, improve reliability and safety, and enhance overall performance and efficiency, regardless of OEM. Our experience includes B&W PrecipTech™, Joy Western, Buell, BHA and GE, to name just a few.
Fabric Filters

Capabilities/Competencies

- New installations
- Engineered upgrades and rebuilds
- Variety of configurations to accommodate site-specific requirements
- Integrated solutions with FGD and sorbent injection provides additional criteria and/or hazardous air pollutant (HAP) removal
- Flexible control systems to optimize operating modes and cleaning logic
- Upgrades and modifications
- ESP conversions to fabric filter technology
- Replacement filter bags

Potential Benefits

- Low emissions over a wide range of operating conditions
- Reduced maintenance and operating costs
- Pulse jet technology provides owners with flexible operation and control

Pulse Jet Technology

Provides improved cleaning efficiency, reduced pressure loss, lower compressed air use and power consumption, and increased bag life.
Wet Scrubbers

Capabilities/Competencies

- New installations
- Engineered upgrades and rebuilds
- Lime, magnesium-lime, limestone or sodium chemistries
- Inhibited or forced oxidation systems
- Absorber tray retrofits
- Optimized absorber spray coverage (headers and nozzles)
- Control system upgrades
- Tuning, inspections, training and operation evaluation

Potential Benefits

- Increased $\text{SO}_2$ removal efficiency
- Increased reliability and performance of existing systems
- Eliminate or reduce flue gas bypass
- More precise process control for varying unit load and reduced low load operation
- Reduced limestone consumption
- Reduced off-spec gypsum
- Minimized or eliminated wastewater effluent stream

Wet FGD Experience

B&W wet FGD technology is installed on more than 127,000 MW of generating capacity.
Mercury Control

Capabilities/Competencies

- Powdered activated carbon injection systems
- Calcium chloride fuel injection systems
- Absorption Plus (Hg)® injection of inorganic sulfide to increase mercury removal in a wet scrubber
- An integrated approach for particulate, mercury and acid gas removal

Potential Benefits

- Reduced mercury emissions
- Low overall lifecycle cost
- Optimizes PAC consumption

Absorption Plus (Hg)® Mercury Control

Activated Carbon Injection
Dry Scrubbers — Spray Dryer Absorbers

Capabilities/Competencies

New installations
Engineered upgrades and rebuilds
Control logic and instrumentation upgrades
Tuning, inspections, training and operation optimization
Atomizer and atomizer motor servicing
Atomizer component upgrades
Replacement GEA Niro atomizer parts
Gas disperser component updates and replacement
Back-up atomization systems
Spray chamber reinforcement, rebuild and replacement
Gas flow distribution optimization

Potential Benefits

Reduced lime consumption
Easily integrated with an existing fabric filter (pulse jet or reverse air)
Increased acid gas (SO₂, SO₃, HCl, HF) removal efficiencies
Increased reliability and performance of existing systems
Elimination of wastewater streams
More precise process control for varying unit load and reduced low load operation
Dedicated parts warehouse for fast delivery and reduced downtime
Dry Scrubbers — Circulating Dry Scrubbers

Capabilities/Competencies

- New installations
- Engineered upgrades and rebuilds
- Controls system upgrades
- Gas flow distribution optimization
- Tuning, inspections, training and operation evaluation
- Solutions for material handling issues

Potential Benefits

- Simple process control and maintenance
- Increased acid gas (SO₂, SO₃, HCl, HF) removal efficiencies
- Increased reliability and performance of existing systems
- Reduced lime consumption
- Elimination of wastewater streams

Dry Sorbent Injection Systems

Capabilities/Competencies

- Flexible designs to capture SO₂, SO₃ and HCl
- Designed to utilize a variety of reagents (hydrated lime, sodium bicarbonate or trona)
- CFD modeling to optimize sorbent-to-gas distribution with static mixer/lance design and configuration

Potential Benefits

- Low cost multi-pollutant solution
- Optimized reagent utilization
- High reliability of storage, conveying and injection system
- Improved performance of existing emissions control systems (SDA/PJFF or wet FGD)
Post-Combustion NO\textsubscript{x} Control

Capabilities/Competencies

- Selective catalytic reduction (SCR) and non-catalytic reduction (SNCR) technologies
- New installations
- Engineered upgrades and rebuilds
- V-Temp™ economizer system, an innovative and cost-effective method of controlling SCR flue gas inlet temperatures
- CFD modeling for ammonia injection and mixing design
- Combustion additive for enhanced catalyst performance
- New or retrofit applications

Potential Benefits

- Proven NO\textsubscript{x} reduction technologies
- Vast experience — SCRs installed on nearly 33,000 MW of generating capacity
- Extensive PRB coal experience
- Modularized construction limits impact on plant operations and reduces construction costs

SCR Experience

B&W SCR systems are installed on nearly 33,000 MW of generating capacity.
**ZLD Spray Dryer**

### Capabilities/Competencies
- Uses minimal boiler flue gas slipstream to evaporate wastewater
- Results in dry salt product ready for disposal
- Looks and operates like a spray dryer
- Simple, well-understood, equipment
- Minimal boiler efficiency loss
- Carbon steel chamber
- Process engineering and construction expertise

### Potential Benefits
- Elimination of wet FGD wastewater discharge
- May allow more time for implementation depending on final re-enactment of postponed Effluent Limitation Guidelines (ELG)
- Uncomplicated process requires limited operator attention while maintaining high reliability
- Option for fabric filter to save fly ash for sale
- Designed for improved material handling

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**ELG Solution**

Designed as an effective zero liquid discharge solution for wet FGD wastewater
## Controls and Diagnostic Systems

### Capabilities/Competencies

**Advanced Performance Technologies**
- Boiler control systems
- Burner management and combustion control systems
- Flame Doctor® combustion diagnostic system

**Sootblowing Controls and Intelligent Software**
- Titanium™ intelligent sootblowing systems
- Titanium™ advanced sootblower controls
- DCS and PLC systems
- Advanced control systems for boiler cleaning and ash handling

**Precipitator Controls and Software**
- Precipitator Manager™ software
- SQ-300® hybrid automatic voltage control
- PRC-100® programmable rapper control
- Remote diagnostics

**Boiler Monitoring Systems** *(Diamond® Electronics)*
- GasTemp® optical pyrometer for gas temperature measurement
- Drum level gauges for low and high pressure boilers
- Utilicam® AT and Wall-Eye® camera systems
- Heat transfer sensors

### Potential Benefits

- MATS compliance solution options
- Lower emissions
- Improved unit heat rate and system performance
- Higher boiler efficiency
- Reduced fouling and slagging caused by poor combustion
- Reduced auxiliary power consumption
- Seamless integration of automated processes
- Overall system optimization

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### Critical System Performance

Integrated control systems for optimized plant equipment and system performance.
Aftermarket Lifecycle Support

**Construction**

Capabilities/Competencies

- Focus on safety, integrity and ethical business practices
- New construction, plant modifications and retrofits, maintenance and repair
- Design for constructability and modularization
- Extensive experience with large, complex projects
- Flexible contracting methods
- On-time performance with smoother turnover to plant operations

Potential Benefits

- Safely executed projects
- Fully integrated material design and supply optimizes total project costs and schedule and minimizes risks

**Engineering and Field Services**

Support after the sale

- Capacity assessment, upgrade and uprate studies
- Circulation and cycling analyses
- Combustion computational flow modeling
- Commissioning and start-up services
- Condition assessment and unit performance studies
- Construction and project management
- Corrosion analysis
- Engineering studies
- Field engineering support
- Plant operation and maintenance
- Technical training

**Target Zero**

Finish each and every day injury- and incident-free

**Our People Make the Difference**

Rely on B&W’s team of field and resident service engineers and service specialists – trusted advisors for your boiler, emissions control system and entire power plant.
Partnering with B&W for your projects means you’ll receive the added benefit of working with a supplier who has the breadth of technical expertise and proven capabilities to provide solutions for virtually all boiler designs, manufacturers, auxiliary and environmental systems at a power plant.

We also have the flexibility, responsiveness and agility to provide personalized service and attention to your specific application … before, during and long after the sale.