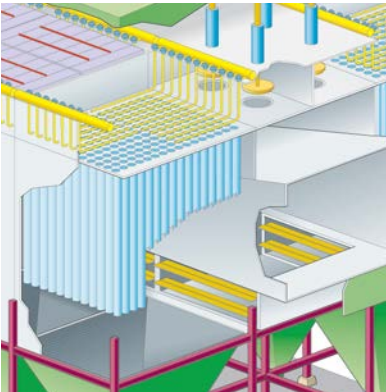


PULSE JET FABRIC FILTERS

Proven technology, expert project execution and extensive experience in the control of particulate, opacity and gaseous emissions



BABCOCK & WILCOX 'S (B&W) EXPERIENCE IN CONTROLLING POWER PLANT EMISSIONS IS UNMATCHED IN THE INDUSTRY. B&W'S PARTICULATE CONTROL EXPERIENCE BEGAN WITH ONE OF THE FIRST COMMERCIAL/ INDUSTRIAL ELECTROSTATIC PRECIPITATORS (ESP) IN THE UNITED STATES (U.S.), INSTALLED IN 1907. WE ALSO PARTICIPATED IN THE FIRST U.S. UTILITY FABRIC FILTER INSTALLATION IN THE 1960s. AS THE OWNER AND OPERATOR OF A COAL-FIRED COGENERATION FACILITY WITH A PULSE JET FABRIC FILTER FOR MORE THAN 20 YEARS, B&W HAS A UNIQUE PERSPECTIVE WHICH INCORPORATES OPERATING EXPERIENCE INTO OUR DESIGN.



Today, B&W combines our proven bag-house technology with our extensive project execution experience to provide cost-effective control of particulate emissions and opacity. Integrating fabric filters with our sorbent injection and flue gas desulfurization (FGD) technologies also provides high removal efficiencies of hazardous air pollutants in a variety of applications.

As a technology innovator and leader, B&W has provided some of the largest pulse jet fabric filters in the world. This includes a single-casing pulse jet fabric filter installed on an 800 MW unit. B&W has also successfully converted an

electrostatic precipitator into a single casing pulse jet fabric filter on a 600 MW coal-fired boiler.

B&W conducts extensive research in laboratory and pilot facilities, as well as at our existing full-scale field installations. We are constantly evaluating performance of individual components such as pulse valves and bag fabrics to find more effective ways to reduce power plant emissions and enhance operation. By applying advanced technologies, such as our pulse jet fabric filter, we continue to maintain coal as a competitive, clean and viable fuel choice for steam generation.

B&W offers various styles for maximum design flexibility to address site-specific arrangement requirements.



B&W successfully converted one of the two 300 MW electrostatic precipitators on a 600 MW coal-fired boiler into a single-casing pulse jet fabric filter serving the entire boiler.



Advanced technology and experience provide numerous benefits

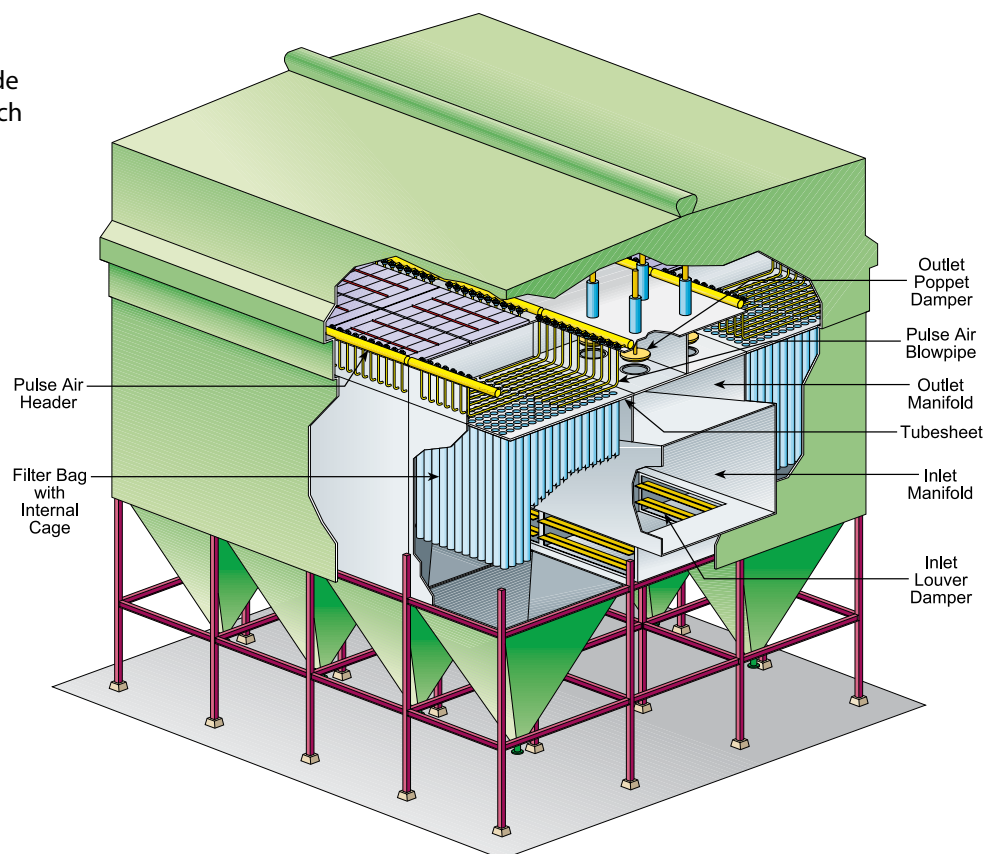
Pulse jet fabric filters are replacing ESPs and reverse gas fabric filters as the workhorse for particulate collection for solid fuel fired power plants and industrial boilers in almost all new installations. This technology provides enhanced particulate emissions control over a wide range of operating conditions. Performance is relatively insensitive to changes in fuel and minor upsets in boiler or upstream emission control equipment operation.

B&W's leadership in fabric filter technology development is maintained through on-going research and development. Through licensing arrangements we can also provide complementary technologies such as the Electric Power Research Institute's (EPRI) COHPAC™ and TOXECON™ technologies.

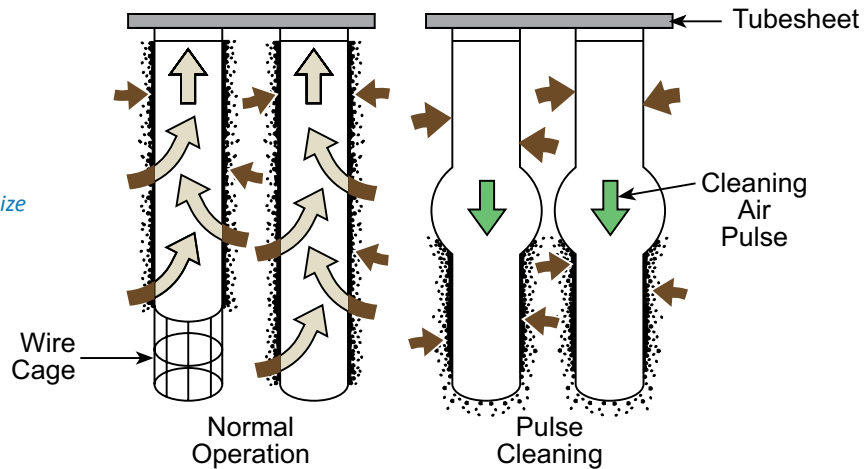
Our considerable installation base is supplemented with vast process knowledge in both solid fuel combustion and emissions control. Product advancements continue through cooperative R&D efforts with existing plant operators as we integrate operating experiences into our equipment design. B&W's experience in pulse jet fabric filter erection and filter bag installation also provides feedback on design elements critical to assuring successful application of the technology.



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Pulse jet technology provides owners with flexible operation and control to maximize availability and minimize maintenance costs.



Pulse jet technology provides owners with flexible operation and control

In a pulse jet fabric filter, a wire cage in each bag keeps it from collapsing during normal filtration. As the flue gas passes from the outside of the bag through the fabric, the particulate forms a cake on the surface of the bag. Cleaning the filter bags is accomplished by introducing controlled pulses of compressed air into each filter bag through a blowpipe and orifice assembly mounted just above the filter bag. These short-duration pulses of air exit the blowpipe orifices and travel down the filter bags. The accumulated dust cake is dislodged by the resulting shock wave and falls into the hoppers.

The dust is conveyed from the hoppers away from the fabric filter by an ash transport system for beneficial re-use or disposal.

Operation and control of the fabric filter impacts overall plant availability and maintenance costs as well as emissions. B&W's fabric filter control system provides plant operators with the flexibility to select the best combination of operating modes and cleaning logic to maximize availability and minimize maintenance costs. Various cleaning modes include on-line, off-line and manual.

B&W's PULSE JET FABRIC FILTERS FEATURE DESIGN INNOVATIONS THAT PROVIDE BENEFITS NOT AVAILABLE FROM OTHER SUPPLIERS

Feature	Benefits
Long Bag Technology	<ul style="list-style-type: none"> • Reduces equipment footprint • Reduces field construction time and costs • Lowers maintenance costs • Fewer ancillary components (e.g., dampers and valves) • Lower emissions
Integral Gas and Dust Distribution Devices	<ul style="list-style-type: none"> • Even gas flow distribution maximizes use of installed filtration area • Even distribution of particulate over the full bag height eliminates overloading and reduces potential bag-to-bag abrasion • Enhances acid gas removal and reagent consumption in integrated dry FGD applications • Minimizes mechanical pressure losses
Enhanced Pulse System Design	<ul style="list-style-type: none"> • Improves cleaning efficiency • Reduces pressure loss • Reduces compressed air use and power consumption • Increases bag life
On-line Maintenance Access	<ul style="list-style-type: none"> • Eliminates forced outages for fabric filter maintenance • Clean-side maintenance minimizes personnel exposure to flyash and sorbents
Various Roof Configurations - Roof hatch w/optional weather enclosure - Walk-in plenum - Enhanced walk-in plenum	<ul style="list-style-type: none"> • Provides design flexibility to address site-specific arrangement requirements
Design for Constructability and Modularization (Shop and Field)	<ul style="list-style-type: none"> • Lowers installed cost • Reduces project lead time • Minimizes potential for casing leaks • Minimizes tubesheet deflection to maintain bag alignment
Optional Bypass	<ul style="list-style-type: none"> • Minimizes impact to filter media due to excursions or abnormal operating conditions

Our experience in pulse jet fabric filter design, erection and filter bag installation enables B&W to select the appropriate bag fabric for optimum cleaning performance.



B&W's pulse system design offers benefits such as improved cleaning efficiency, reduced pressure loss, reduced compressed air use, lower power consumption, and increased bag life.

Optimum cleaning performance

B&W's experience gives us the knowledge to select the optimum bag fabric for each specific application.

Normal operation requires few adjustments. However, after initial startup and once the bags become seasoned, some adjustment to the cleaning procedure may be required to optimize the fabric

filter operation for a specific application and gas flow.

Adjustable settings (stop, start, pressure, duration and recovery period) give the operator more flexibility. The cleaning system is designed to clean the filter bags as thoroughly as possible while optimizing system performance without damaging the bags.



Working with Babcock & Wilcox Construction Co., Inc., B&W engineers design for constructability to minimize on-site labor requirements, increase safety, and reduce construction costs.

Integrated project execution for a variety of applications

Project management and construction

Successful project execution is equally important as choosing the right technology and equipment. B&W's experienced environmental project managers are experts in utilizing modern project control methodologies and working within a team organizational structure to achieve the safe, successful and timely completion of your project.

B&W project teams provide value through the use of the following management, scheduling and project control tools:

- Advanced 3D modeling
- Knowledge-based design engineering tools
- World sourcing and supply management
- Earned value scheduling and cost control
- Web-based project communications
- Electronic data transfer

Co-located at B&W's headquarters, specialized construction services are available through its subsidiary, Babcock & Wilcox Construction Co., Inc. (BWCC). Working closely with BWCC, B&W engineers design for constructability – an advanced construction concept that minimizes on-site labor requirements, increases safety, reduces construction costs and lead time, and achieves product design features which are properly applied for optimal performance.

Solutions for a variety of applications

B&W's pulse jet fabric filters provide emissions reduction solutions for a variety of applications:

Stand-Alone Fabric Filters

- Coal-fired utility power plants
- Solid fuel industrial boilers (stokers)
- Municipal solid waste incinerators
- Fluidized-bed boilers firing opportunity fuels such as waste coal

Multi-Pollutant Integrated Emissions Control

- Downstream of a spray dryer absorber (SDA) for acid gas emissions control
- Sorbent injection
 - Activated carbon for mercury emissions control
 - Alkali injection for sulfur trioxide (SO₃) control

Plant Upgrades

- Pulse jet fabric filter retrofits
- ESP to pulse jet fabric filter conversions

B&W's pulse jet fabric filter may be used as a key component in a multi-pollutant control strategy when coupled with a sorbent injection system.







Fabric filters for multi-pollutant control

With the current emphasis on emissions reduction, fabric filters are increasingly being used as a key component in a plant's multi-pollutant control strategy. This strategy includes both the traditional collection of ash or particulates, as well as hazardous air pollutants.

For example, a fabric filter may be coupled with sorbent injection systems for collection of both gaseous and solid pollutants. Sorbent introduced upstream of the fabric filter is deposited over the entire surface of the filter bags. Flue gas flowing through the sorbent-coated filter bags provides intimate pollutant-to-sorbent contact, thereby enhancing the ability to adsorb hazardous air pollutants such as mercury and condensables such as SO_3 .

Examples of sorbents used with fabric filters include powdered activated carbon for mercury control and trona or lime for control of SO_3 . Trona or lime may also be the economic choice for sulfur dioxide (SO_2) control on certain applications.

Fabric filters are an integral part of B&W's dry scrubber flue gas desulfurization systems and continue to be part of our multi-pollutant control strategy.

Quality aftermarket services

B&W's support for your project doesn't end when installation of your equipment is completed. We provide a total package of aftermarket services, including:

- Equipment enhancements with performance guarantees
- Startup and commissioning
- Performance testing and monitoring
- Equipment tuning and optimization
- Field service engineering
- Replacement parts

B&W field service engineers, located in regional offices throughout North America, are available to provide expert and timely on-site technical support.

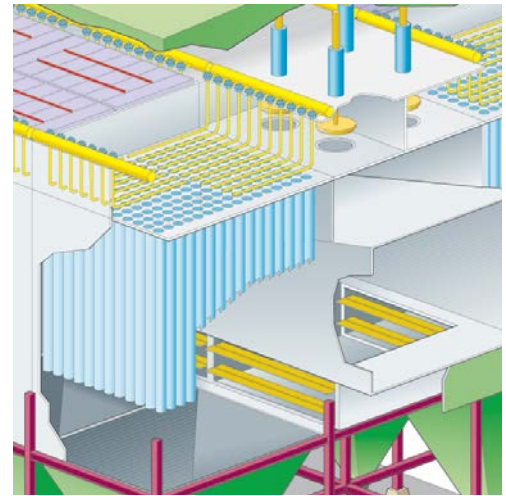
Your regional B&W office should be your first contact when looking to implement new equipment or plant modifications and improvements.

Our fabric filter technology is also available worldwide through various licensees.

A pulse jet fabric filter is an integral component in B&W's dry flue gas desulfurization system, providing enhanced secondary SO_2 removal.

Established in 1867, Babcock & Wilcox is a global leader in renewable, environmental and thermal technologies and services for power and industrial applications.

For more information or to contact us, visit our website at www.babcock.com.



To find out more about our pulse jet fabric filters, contact your regional B&W office, or one of our environmental experts by visiting www.babcock.com.



RENEWABLE | ENVIRONMENTAL | THERMAL

Babcock & Wilcox

1200 E Market Street, Suite 650
Akron, Ohio, U.S.A. 44305
Phone: +1 330.753.4511

www.babcock.com    

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