

Turnaround and Major Capital Project Services



Babcock & Wilcox (B&W) is a leading supplier of turnaround and capital project services for customers in a wide variety of industries, including oil and gas refining, petrochemical, electric utility, pulp and paper, and other industrial process industries. Through experience, unique execution strategies, complex methodologies and specialty services, we have the depth of knowledge necessary to safely deliver a successful project.

We have a reputation for meeting commitments — even with schedule, access or manpower constraints — to get your operation back online sooner.

Safety and Human Performance

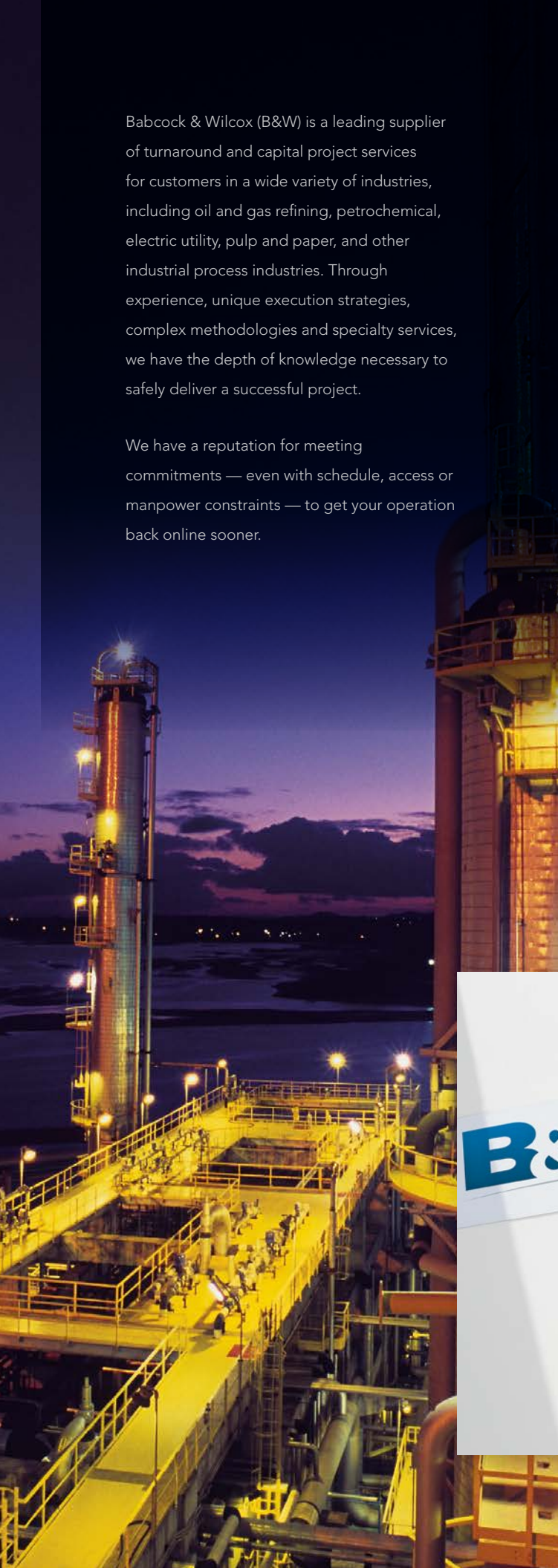
Key to the success of any project is the safe execution of the work by the craft labor and supervisory personnel resulting in an incident- and injury-free performance.

Safety is at the core of our business and is a key element of our culture. With a solid safety vision, our Target Zero program is a comprehensive and successful program that not only treats safety as a priority, but also as a value each and every employee must adopt.

Enforcing rules and requirements is an essential part of any safety program, but exceeding safety targets means going beyond compliance.

- Safety is the responsibility of both management and employees
- Recognition of hazards and positively reinforcing the right behavior are critical to preventing injuries
- Behavior that is driven by a low tolerance (rather than zero tolerance) for risks results in incidents
- Each employee must be in a state of continuous mental risk assessment
- Positive reinforcement promotes repeatable results

B&W supervisory personnel are trained and well versed on specific safe work practices necessary to avoid incidents and to mitigate the hazards inherent in the work we perform.



Capabilities

We have the breadth of expertise and decades of experience to provide multi-trade field services on turnarounds for a wide range of equipment in a variety of industries, including:

- Furnace weld repairs and retubing
- Heat exchanger bundle removal, repair, tube sleeves and liners
- Valve maintenance and refurbishment
- B31.1 and B31.3 piping prefabrication, field installation and routing
- Pressure vessel installation, removal, modifications and repairs
- Distillation tower installation, removal, modifications and repairs including trapping and retraying, tray replacement, nozzle and tray support ring repairs
- Special purpose tanks and silos installation, removal, modifications and repairs
- Power and utility island maintenance
- Heat recovery steam generator services
- ASME Section VIII heat exchangers
- ASME Section VIII pressure vessels
- Environmental equipment services (electrostatic precipitator, scrubbers, fabric filters, selective catalytic and noncatalytic reduction systems, and other air emissions control systems)
- High pressure and heavy wall reactors supporting catalyst replacement, internal reactor tray replacement and nozzle repairs
- Power boilers
- Carbon monoxide boilers
- Package boilers
- Induction heat tube shrink process for retubing boilers and exchangers



Execution for Predictable Results

B&W plans and executes numerous projects with various degrees of complexity.

Execution of turnarounds and major projects requires an attention-to-detail to planning and coordination. We pride ourselves in being well organized and achieving optimal productivity for time on tools.

We execute the following standard practices to achieve project success:

- Early engagement and commitment to scope development and review
- Pre-turnaround planning
- Development of sound methodologies to meet project constraints
- Establish baseline control estimates
- Integrated scheduling
- Constructability reviews
- Readiness reviews
- Development of detail manpower loaded schedules
- Manpower tracking and timekeeping per customer requirements

Performing major project activity under very tight time constraints makes control and change management a required core competency. The project manager's utilization of Primavera® Enterprise software provides a continuous overview of the project's health through:

- Detailed scheduling of activities
- Resource loadings
- Cost reporting and reconciliation
- Critical path management
- Earned value reporting

Through the development of execution plans and the use of project controls, we can deliver projects with predictable results that are on time and on budget. Our execution strategies utilize proven methodologies which result in the reduction of risk, cost and project span.

Turnkey Solutions

B&W can engineer, manufacture, procure, transport, construct and commission the entire scope of your turnaround project.

We provide value by developing an integrated plan that encompasses a full complement of disciplines to deliver a total turnkey solution.

Design and Performance Engineering

B&W is experienced in the application of a wide range of standards and codes for equipment design, manufacture and installation, including:

- Stress analysis piping and mechanical design, including thermal expansion effects
- Proprietary heat transfer and thermal hydraulic design and performance
- Metallurgical analysis including failure mechanisms of tubes, pipes and vessels
- Structural engineering
- Cold temperature steel design
- Life extension technologies
- Feasibility studies for performance and capacity upgrades
- Finite element analysis and CFD modeling, including ANSYS® software and proprietary code (COMO™ software)
- 3D component and plant modeling
- Reliability engineering
- Application of API, ASME, ASTM and CSA code requirements
- CSA N285 and N286
- Emissions control engineering for NO_x, SO_x, CO, Hg, HAPs, carbon, particulates, VOCs, odor and solvents
- Boiler island engineering, including process design and P&IDs of fuel, air, feedwater and flue gas systems
- Combustion engineering, including combustion of residuals and heavy oils, low Btu/residual gases, etc.
- Pressure vessel redesign and rerate



Field and Technical Services

- Inspection and nondestructive examination (NDE) services with certification to CGSB
- ASME Section V (NDE)
- Condition assessment and trending analysis
- Technical advice and guidance
- Preventive and predictive maintenance programs
- Chemical cleaning
- Hydrostatic testing
- Operator assessment and training
- Boiler and combustion tuning

Manufacturing Services

Our manufacturing capabilities for forming, machining and welding pressure boundary materials, heat exchanger fabrication, and fabrication know-how of alloy and exotic materials align with the needs of refineries and the petrochemical industry, utilities, and other process industries.

Construction Technology

- Extensive heavy lift, rigging and jacking experience
- Module constructability and assembly knowledge
- Logistics and planning for heavy load transportation and material handling
- Temporary structural reinforcements to handle load changes during construction
- Construction engineering utilizing the latest design and modeling software for:
 - Specialized rigging
 - Structural supports for construction systems
 - Interference analyses
 - Determination of loads and forces

Weld Engineering

Our extensive history of product and technology development has cultivated expert in-house welding techniques and procedures for specialized applications. We can execute a variety of weld procedures for a wide range of ferrous, non-ferrous and exotic materials, including:

- Stainless steels
- Chrome moly alloys
- Titanium
- Hastelloy® alloys
- Incoloy® alloys
- Inconel® alloys
- Monel® alloys
- Nickel alloys
- Multiple bi-metallic



Quality and Operational Excellence

The B&W brand is synonymous with quality and reliability. We strive to protect this reputation with every product and service we deliver.

We maintain active Operational Excellence and Human Performance Improvement programs, engaging all employees in continuous improvements. Eliminating errors and waste, improving efficiency and communication, and maximizing productivity to deliver the quality our customers expect is all part of our culture.

Customer feedback is taken seriously and drives lessons learned and process improvements. Our fully integrated Quality Assurance program provides the necessary foundation to achieve compliance with regulations, codes and project specifications on every project we execute.



B&W Certifications

B&W is certified by various external regulatory authorities and jurisdictions to design, fabricate and install boilers, pressure vessels, and piping as follows:

■ Provincial Jurisdictions (Various jurisdictions across Canada* – TSSA, ABSA, TSASK, etc.)

CSA B51 – Boiler, pressure vessel, and pressure piping code

* Note: Design and fabricate certified by TSSA

■ ASME (American Society of Mechanical Engineers)

'S' – Boilers (ASME Section I)

'PP' – Piping (B31.1 – Boiler External)

(Additionally – B31.1 – Non-Boiler External Piping and B31.3 – Process Piping)

'U' – Pressure Vessels (ASME Section VIII – Division 1)

■ B&W is certified to perform repairs to boilers, pressure vessels, and piping under the following certificates:

Provincial (Various jurisdictions across Canada)

- CSA B51 – Boiler, pressure vessel, and pressure piping code

NBIC (National Board Inspection Code)

- 'R' – Repairs

- 'NB' – National Board

Additional Certificates

- ISO (International Standards Organization)

- ISO 9001 (Quality Management System)

CWB (Canadian Welding Bureau)

- CSA Standard W47.1 – Division 1 – 'Certification of Companies for Fusion Welding of Steel – for the fabrication of structural and miscellaneous steel for buildings'

ABSA (Alberta) and TSASK (Saskatchewan)

- Performance qualification testing of pressure welders and machine welding operators at field sites





Regional Service and Construction Centers

B&W regional sales, service and construction offices are located across North America to provide you with timely response and superior service during planned and forced turnaround projects. These regional offices are your single point of contact to all of the capabilities that B&W has to offer. For a complete list of our regional offices, visit our website at www.babcock.com.

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