



# NUCLEAR MANUFACTURING CAPABILITIES

Critical component manufacturing  
for today's nuclear industry





# **CAPITALIZING ON** **NUCLEAR EXPERIENCE**

Manufacturing capability is a key component in a supplier's total portfolio of product and service offerings. One company stands above others by possessing unparalleled manufacturing experience, proficiency and dedication to the nuclear industry – BWXT Nuclear Energy, Inc.



BWXT possesses unique capabilities and continues to move forward in our commitment to quality. While many organizations lost their nuclear manufacturing proficiency during the decades-long decline in the commercial nuclear market, we applied our technologies to supply the government with critical nuclear components and services. And, we continually invested capital in infrastructure to modernize and upgrade our facilities.

BWXT continues to capitalize on the capabilities of its nuclear manufacturing facilities to meet growing energy demands through nuclear power.

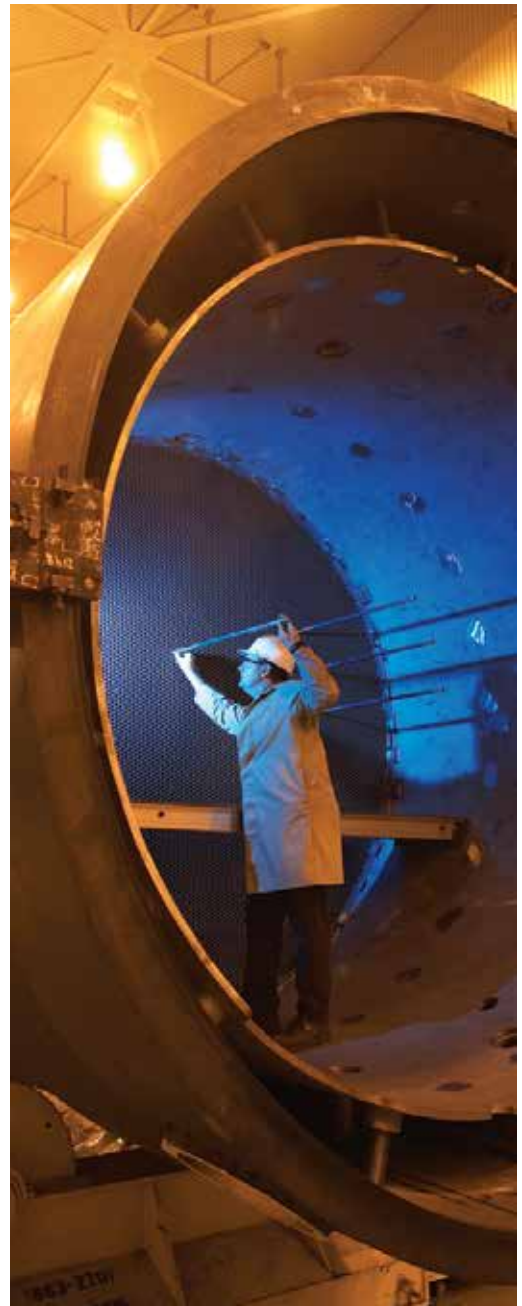
# SPECIALIZED MANUFACTURING SKILLS, RESOURCES AND INFRASTRUCTURE OFFER UNIQUE SOLUTIONS

The unique requirements for nuclear components call for specialized manufacturing methods, equipment and facilities. BWXT maintains its facilities to comply with the rigorous equipment specifications of customers and regulatory authorities, adhering to the most stringent quality assurance requirements in the industry.

State-of-the-art computer numerical controlled (CNC) machining centers, multi-axis large gantry robots and multi-spindle gun drill machines, as well as automated welding machines, are some of the latest equipment utilized to manufacture the critical components for today's nuclear industry.

## Component capabilities

- Steam generators, both recirculating and once-through
- Heat exchangers
- Pressure vessels
- Pressurizers
- Reactor vessels and closure heads
- Primary piping
- Support structures
- Spent fuel dry storage containers
- Valves and other auxiliary equipment





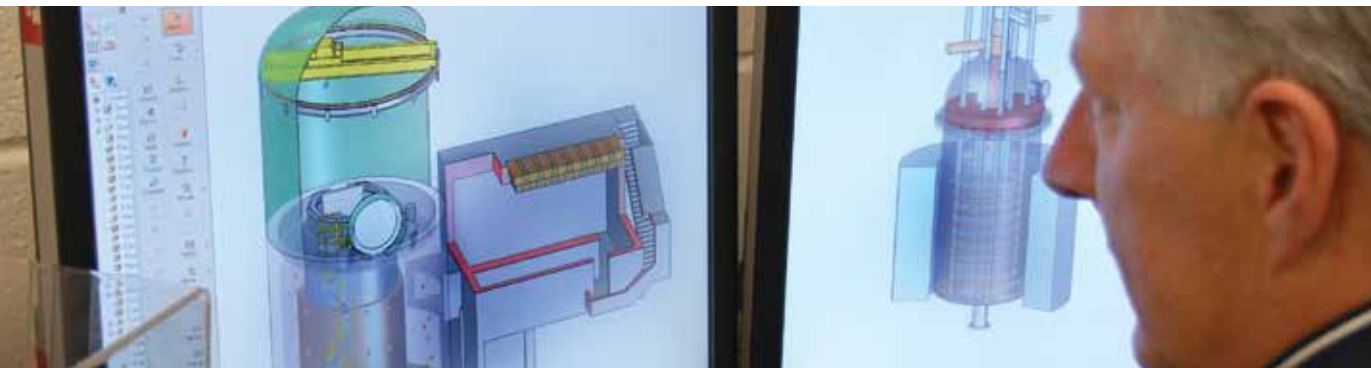
## Equipment highlights

- Various automatic, manual and robotic welding equipment and processes to support capabilities in carbon, alloy, ferritic and austenitic stainless steels, aluminum, nickel, chromium and copper alloys
- Cold and hot plate rolls (horizontal and vertical)
- Computer controlled furnaces for heat treating and annealing
- Multi-axis, large gantry robots
- Full complement of horizontal and vertical boring mills
- Horizontal and vertical multi-spindle gun drill machines
- Multi-spindle CNC broaching machines
- Optical and laser alignment tools
- Specialized nondestructive examination equipment including laser dimensional inspection
- Automatic UT inspection
- Radiation vaults
- Linear accelerators



# NUCLEAR MANUFACTURING PROFICIENCY

BWXT comprehensive in-house engineering expertise provides the backbone for our manufacturing services. Our proficiency in every aspect of nuclear component manufacturing begins with the necessary engineering disciplines – design engineering, welding and robotic engineering, and metallurgy and materials engineering.



## Design engineering capabilities

- Solid model CAD/CAM integrated with manufacturing
- Structural component design to ASME Sections III, VIII and XI
  - Large model linear/non-linear finite element analysis
  - Elastic/plastic component sizing
  - Thermal-mechanical fatigue and fracture mechanics
  - Dynamic analysis and flow induced vibration
- Thermal-hydraulic design of reactor plant components
  - Recirculating and once-through steam generator design and analysis
  - Multi-phase heat exchanger sizing and evaluation
  - Steady-state and transient multi-phase flow analysis
  - Single and multi-phase computational fluid dynamics
- Steam separation equipment design and development
  - High pressure/high flow steam test facility

## Welding and robotic engineering capabilities

- Weld process, procedure and weldability development
- Full range of manual, automatic/robotic weld processes
- Forging overlay
- Extensive materials experience
- Certified to ASME, AWS and Mil Standard Codes
- Narrow groove welding to 12 in. (305 mm) thickness
- In-plant facilities for welding certification



## Metallurgy and materials engineering capabilities

- Materials expertise in high strength, low alloy steels, nickel-based and other materials
- Material procurement of tubing, forgings and weld consumables
- Fully equipped metallographic and chemical analysis laboratory





# DECADES OF EXPERIENCE



For decades, BWX Technologies, Inc. (BWXT), formerly The Babcock & Wilcox Company, has designed, engineered, manufactured, installed and serviced components for nuclear steam supply systems. In addition, we have supplied the government with critical nuclear components, technologies and services. The combination of this vast experience base and our quality assurance programs uniquely qualifies BWXT to fabricate the most complex components for today's nuclear industry.



## A solid history

- Dedicated and knowledgeable workforce
- Strong heritage with defense-related programs
- More than 50 years of experience in fabricating heavy pressure vessels for the U.S. government
- Completed and contracted for over 300 commercial nuclear steam generators since 1960
- Shipped more than 1,100 components for the U.S. government
- Sole manufacturer of large, heavy nuclear pressure vessels in North America







## Quality assurance

- ASME Section III Code stamps
  - N, NPT, NA certificates of authorization
- CSA National Board R certification
- ISO 9001 Design & Fabrication of Boilers and Pressure Vessels
- Section I and Section VIII S, U, U2, U3 and R stamps
- Quality assurance program satisfies ASME Sections I and VII, Mil-Q-9858 and QRC-82
- Nondestructive examinations
  - Radiographic (RT or x-ray)
  - Dye (liquid) penetrant (PT)
  - Magnetic particle (MT)
  - Ultrasonic (UT)
  - Eddy current (ECT)
  - Hydrostatic (water pressure)
  - Visual (VT - 1X or magnified)
  - Helium leak
  - Portable coordinate and laser measurement systems
- Proven safety programs and standards

# DEDICATED FACILITIES AND RESOURCES

BWXT operates manufacturing facilities in Mount Vernon, Ind., Euclid and Barberton, OH and Cambridge, Ontario. These facilities are N-Stamp certified by the American Society of Mechanical Engineers (ASME).



## Mount Vernon, Indiana Capacity and features

- 580,000 ft<sup>2</sup> (53,822 m<sup>2</sup>) of indoor manufacturing space
- Main manufacturing bay is serviced by two 500-ton (454 t<sub>m</sub>) cranes, which extend over a barge dock on the Ohio River. The total capacity of 1,000 tons (907 t<sub>m</sub>) is the largest lift capability on the Ohio River. Capable of docking ocean-going barges.
- Main bay has a 77 ft (23.5 m) lifting capacity under the rail
- Direct rail service access
- 25 acres (10.1 ha) of outdoor working and storage area





## Cambridge, Ontario

### Capacity and features

- 275,000 ft<sup>2</sup> (25,548 m<sup>2</sup>) of indoor manufacturing space
- 15 acres (6.1 ha) of outdoor working and storage area
- Various overhead cranes with capacities up to 650 tons (590 t<sub>m</sub>)
- 36,000 ft<sup>2</sup> (3,344 m<sup>2</sup>) nuclear clean room is the largest in North America
- Two 10-ton (9 t<sub>m</sub>) elevated tubing tables
- Rail service with four 300-ton (272 t<sub>m</sub>), heavy-duty rail cars





**BWXT'S MANUFACTURING PROFICIENCY AND EXPERIENCE,  
ALLOWS US TO HELP MEET THE GROWING ENERGY DEMANDS  
THROUGH NUCLEAR POWER.**

**NUCLEAR ENERGY    GOVERNMENT SERVICES    ADVANCED TECHNOLOGIES**

Headquartered in Lynchburg, Va., BWX Technologies, Inc. (BWXT) is a leading supplier of nuclear components and fuel to the U.S. government; provides technical, management and site services to support governments in the operation of complex facilities and environmental remediation activities; and supplies precision manufactured components and services for the commercial nuclear power industry. BWXT has more than 5100 employees and significant operations in Lynchburg, Va.; Erwin, Tenn.; Mount Vernon, Ind.; Euclid, Ohio; Barberton, Ohio; and Cambridge, Ontario, as well as at more than a dozen U.S. Department of Energy sites around the country. Follow us on Twitter @BWXTech and learn more at [www.bwxt.com](http://www.bwxt.com).

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