

# TEI

SERVING THE NUCLEAR POWER INDUSTRY



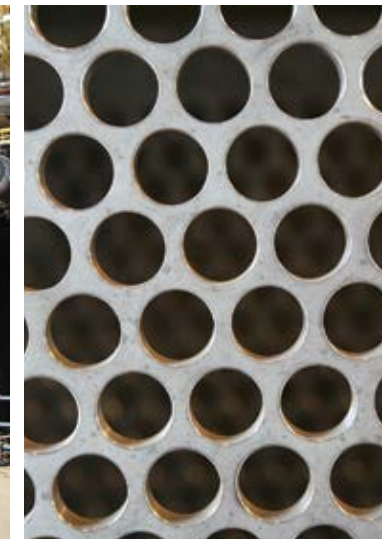


## INTRODUCTION TO TEI

SPECIALISTS FROM THE EARLY YEARS

With 30 countries around the globe now operating 437 nuclear reactors—a number of which will soon need to be upgraded—and 71 new power plants under construction, the need for expert technology, highly skilled manufacturing, and dependable service is escalating.

A trusted supplier to the nuclear industry since 1964, THERMAL ENGINEERING INTERNATIONAL (USA) Inc. (TEi), a Babcock Power Inc. company, offers sound solutions that merge cutting edge technology with worldwide, world-class service. From feedwater heaters, condensers, condenser modules, moisture separator reheaters (MSRs), CCW heat exchangers and more, TEi will deliver. TEi can provide hands-on design and engineering; domestic and international in-house and out-sourced manufacturing through their close working relationships with subcontract manufacturing partners; turnkey solutions that include installation support, site services, and OEM support; and engineering consulting for product and system solutions.



## FORERUNNERS OF INDUSTRY

For nearly a century, TEi has developed and provided energy solutions that have set the standard for product, installation, aftermarket, and service to the evolving power industry.

The innovator of notable “firsts”—including the introduction of advanced MSR technology for the early nuclear plants—the company continues to seek new products and methods to improve daily operations and to position the industry for the future.

## HISTORY

THERMAL ENGINEERING INTERNATIONAL (USA) INC. (TEi) began as Southwestern Engineering in 1916. Since then, TEi has been building on its solid base, reshaping its product line, and setting the pace for the world’s changing power generation needs. In 1985 the company purchased Perfex (Berlin, WI) and was acquired by Senior Engineering Company in 1987. TEi was formed in 1997; two years later, it merged with Blacke Dürr in Germany to form BDT Engineering. In 2002 the company purchased the soft assets of EFCO and became part of the newly formed Babcock Power Inc., which purchased the soft assets of Struthers Wells in 2004.

Over time, the company became a well-respected pioneer. In 1955, it introduced a line of feedwater heaters; in 1968, it shipped the first steam surface condensers. Six years later, the company introduced its advanced MSR technology to the nuclear industry, followed in 1977 by the delivery of the first condenser modules to the U.S. nuclear fleet.

*TEi maintains headquarters in Los Angeles, California; global customers are served by numerous facilities and through established working relationships with various fabrication companies in key international locations.*



## TEi PRIMARY SERVICES

In addition to providing the design, manufacturing, and service of heat transfer equipment for the nuclear industry, TEi offers comparable services for coal, gas, solar, and biomass power plants. It also works closely with other companies under the TEi umbrella to provide the best possible solutions for customers, and owns the feedwater heater (FWH) intellectual properties of:

- Struthers Wells
- Marley
- Perfex
- Westinghouse
- EFCO
- Senior Engineering
- BDT Engineering
- Southwestern Engineering

A founding and active member of the Heat Exchange Institute (HEI) for over 40 years, the company has placed a key priority on highly demanding and large nuclear projects. To date, TEi has supplied over 60 condenser modular change outs (12 in nuclear plants), over 700 feedwater heaters in nuclear plants and has MSR equipment operating in over 120 reactor units around the world. In addition, since 1975, a total of 148 MSR vessels have been fabricated and installed.

## TRANSPORTATION

Beyond design, manufacturing, and service, a critical component to success is transportation management. TEi has expertise in safely transporting MSRs, FWHs, condensers, and heat exchangers by special truck and trailer equipment, modular vehicles, rail, barge, and secured vessels around the world.

## SOLUTIONS FROM A SINGLE SOURCE

TEi's capabilities encompass all aspects of heat transfer equipment (Section VIII and Section III) for nuclear power plants, including:

- Design
- Manufacture
- Repair
- Modification
- Installation

Mostly, the company provides innovation through its extensive services of consulting support and hands-on, on-site analysis in order to resolve any situation that can confront daily operation.

## IN-HOUSE DESIGN

"One-stop shopping" at TEi includes an all-inclusive product line of:

- Moisture Separator Reheaters (MSRs)
- Feedwater Heaters
- Steam Surface Condensers
- Condenser Modules
- Shell and Tube Heat Exchangers
- Aftermarket parts and services for any OEM's equipment

## COMPREHENSIVE CAPABILITIES

One of TEi's primary strengths is experience. With knowledge generated over the years, and the vast resources provided through being an integral part of the network of Babcock Power companies, TEi offers full capabilities to handle:

- Power Uprates
- Life Extension
- Upgrades / Optimizations
- Electric Gain (MWe)
- Site Installations / Replacements / Modifications
- Steam Cycle Analysis and Improvement Implementation
- Testing / Troubleshooting
- Thermol Hydraulic Evaluation
- Equipment Model Testing
- Revitalization
- Re-Certifications

## ENGINEERING CONSULTING

Engineering is not only about innovative, functional design. Consulting services performed by TEi include:

- Performance Analysis
- Model Testing
- FEA Analysis
- Heater Train Studies
- Vibration Analysis
- Repair vs. Replace Planning
- Equipment Modifications
- Training Seminars



## DOMESTIC FABRICATION – JOPLIN PLANT

Twenty acres of land in Joplin, Missouri houses the TEi in-house fabrication plant with over 100,000 square feet under one roof.

## WORLDWIDE MANUFACTURING

Extending the breadth and depth of global experience, TEi has established working relationships with fabrication companies in Korea, Canada, Portugal, Czech Republic, Mexico, Italy, Spain, Taiwan, Israel and other countries for all heat transfer equipment. This has enabled the company to maintain fabrication volume without constraints.

In addition, TEi's partners and subcontractors are able to fabricate specialized pressure vessels to ASME Code (Section VIII & Section III), European Standards, and/or any local governing code.



## ON-SITE HEAT TRANSFER EQUIPMENT CARE

Whether for planned maintenance or for an emergency situation, TEi has a team of on-site, highly skilled technicians available around the world. Their services include:

- Repair
- Installation
  - Condensers
  - Condenser Modules
  - FWH
  - MSR
- Retubing
- Explosive Tube Plugging / Welding
- Tube Mapping
- Field Technical Advisory Service
- Field Oversight
- Preventive Maintenance
  - Diagnostic Testing
  - Internal Inspection
  - Mechanical Integrity
  - Equipment Evaluation

## INSTALLATION AND TURNKEY CAPABILITIES

TEi has extensive experience installing and assembling its equipment on-site. This service typically includes rigging and piping work in the removal of old equipment.



## WORLD CLASS TECHNOLOGY

TEi engineers have established unparalleled technical competence in design, testing, fabrication, installation, analysis, and modification of new and existing MSR equipment—combined with a global reputation for getting the job done right.

The horizontal MSR design philosophy demands the highest possible efficiency. TEi's moisture separator systems achieve complete separation and removal of moisture with minimum pressure drop, are structurally sound and virtually maintenance free.

The originator of the finned tube design, TEi has incorporated approximately 20 million feet of this tube in the company's worldwide MSR installations.

## FEEDWATER HEATER TECHNOLOGY

Global leaders in design and manufacturing of heat transfer equipment, TEi has developed numerous proprietary software programs for thermal and mechanical design of feedwater heaters. The application of nearly 60 years of experience and the use of these state-of-the-art thermal design programs allow for design optimization as well as a complex thermo-hydraulic evaluation of a complete string of feedwater heaters at any operating conditions.

TEi's comprehensive designs, together with high quality manufacturing standards, provide top of the line equipment required for safe and extended operation in nuclear power plants. Feedwater heaters are designed to exceed the requirements of ASME Code, HEI and TEMA Standards.

The acquisition of intellectual properties of some of the major feedwater heater manufacturers such as Westinghouse, Marley, EFCO, and Struthers has not only enhanced TEi's technology over the years, but also made TEi the number one authority for performance and condition evaluations as well as maintenance, revitalization, refurbishment and spare parts.



## CONDENSER TECHNOLOGY

As a global leader in design and manufacturing of heat transfer equipment, TEi continues to provide the most advanced and proven technology for steam surface condensers. TEi's proven design has been demonstrated by condenser performance and overall plant reliability time and time again. TEi's design strength is evident in Nuclear Power Plants worldwide including one of the largest steam surface condenser (Triple Shell; Quadruple Pressure; 1,200,000 Sq. Ft. Surface Area) in the Southern United States now in operation for over four decades. There are over 23 condensers and / or condenser modules operating in Nuclear power plants globally. TEi is the leader for condenser bundle replacements in the United States and have installations around the world.

## HEAT EXCHANGER TECHNOLOGY

TEi Industrial Products Group (IPX) maintain capabilities to design and manufacture heat exchangers for use in the Nuclear Power Industry in a wide variety of applications. These include but are not limited to:

- RHR (Residual Heat Removal)
- CCW (Component Cooling Water)
- SGBD (Steam Generator Blow Down)
- RFP (Reactor Feed Pump)(Oil Coolers)
- TCW (Turbine Cooling Water)
- RFPMC (Reactor Feed Pump Motor Cooler) (Air Cooled TEWAC)
- GSC (Gland Steam Condenser)
- Motor/Gen Set Coolers (Naval)

TEi (IPX) maintains and is currently compliant with 10CFR50 Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, as directed by USNRC. Standard mechanical design shall be under ASME Section VIII Division I. TEi also offers Section III design using licensee for specific fabrication.



## PARTNERSHIPS

TEi is proud of the partnerships it has built throughout the years—and continues to build to ensure quality and consistency from our vendors and subcontractors. These partnerships have proven to be essential to fine-tuning communications with our manufacturing partners, while at the same time improving their capability to meet and exceed expectations.

When a subcontractor manufactures any components on behalf of TEi, we establish a continuous presence in that location to ensure all aspects of fabrication and quality control requirements are met. We have and will continue to take an active part in every process of our business.

## ABOUT BABCOCK POWER INC.

Thermal Engineering International (USA) Inc. (TEi) is a wholly owned subsidiary of Babcock Power Inc. (BPI). BPI, through its subsidiaries, is one of the world's leading suppliers of technology, equipment, and services to the power generation industry.

# TEI

a Babcock Power Inc. company

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