



Corporate Capabilities

Solutions for Heat Exchanger Tube Repair and
Pipe & Pressure Vessel Testing/Isolation

CURTISS - WRIGHT

With a proud legacy spanning 95 years, Curtiss-Wright is a global innovative company that delivers highly engineered, critical function products and services to the commercial, industrial, defense and energy markets. Building on the heritage of Glenn Curtiss and the Wright brothers, we have a long tradition of providing reliable solutions through trusted customer relationships.

Curtiss-Wright EST Group

Established in 1968 and headquartered in Hatfield, Pennsylvania USA, Curtiss-Wright EST Group specializes in the development, and manufacture of tools and systems that greatly simplify maintenance of shell & tube and air-cooled heat exchangers, as well as test plug systems to expedite in-service inspection of open end pipe, piping systems, tubing and pressure vessels.

Our flagship product, Pop-A-Plug® Tube Plugs, are the industry's leading technology for plugging leaking and/or degraded heat exchanger tubes at operating pressures up to 7,000 PsiG (480 BarG) without welding or explosives.

Our GripTight® line of Test & Isolation Plugs provide customers with safe and effective solutions for high pressure hydrostatic testing and isolation of open end pipe, piping systems, tubing and pressure vessels at working pressures up to 15,000 PsiG (1,034 BarG).

EST Group also provides a range of field services to customers, including heat exchanger tube testing, inspection, cleaning, partial retubing, and pipe & pressure vessel inspection and testing, as well as on-site product training.



**Our technologies
increase productivity,
safety and responsiveness.**

Global Presence

Curtiss-Wright EST Group maintains a global footprint, with design and manufacturing in the United States. This is backed by our Sales and Technical Support teams in North America, Europe and Asia, supporting a large network of Distributors and Representatives in over 50 countries.



Applications Experience

EST Group's Pop-A-Plug Tube Plugging System provides a complete range of tube leak detection and repair products, services and replacement parts, covering the life cycle of shell and tube heat exchangers and condensers. Pop-A-Plug Tube Plugs conform to ASME PCC-2 recommended tube plugging repair methods, offering a permanent mechanical solution to safely seal leaking heat exchanger tubes without welding.

Additionally, EST Group's Hydrostatic Test & Isolation Plugs provide products and services to facilitate pressure-testing open end pipe, piping systems, tubing and pressure vessels and their components.

EST Group strives to build a strong relationship with our customers by offering top quality workmanship, excellent customer service and competitive pricing.



Industries Served

Curtiss-Wright EST Group is dedicated to providing a complete range of lifecycle products and services for maintenance and repair of open-end pipe, piping systems, tubing and pressure vessels for the following industries worldwide.

- Petrochemical & Refining
- Oil & Gas Production
- Power Generation
- Design & Build Projects
- Government/DOE

Customers Served

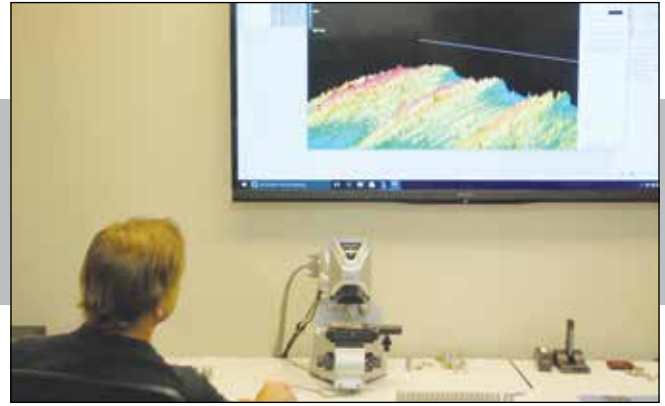
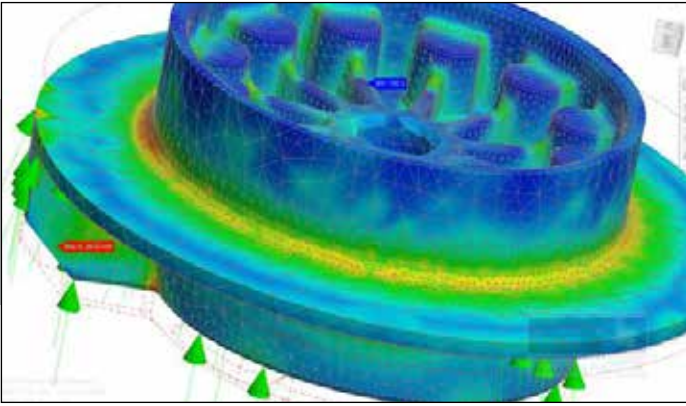
EST Group proudly serves both small and multinational companies such as:

- AG&P
- AMEC/Foster Wheeler
- Bay Ltd
- Bechtel
- Cianbro
- Cimtas
- COOEC-Fluor Heavy Industries
- Dragados Offshore
- Dynamic Industries
- Ersai-Saipem
- Fluor
- Hyundai Heavy Industries
- ICA-Fluor
- KBR
- Kiewit
- McDermott
- Samsung Heavy Industries
- SNC-Lavalin
- TechnipFMC
- Turner Industries
- Wison
- Worley
- Zachry Group
- and many more...

“ The usage of EST Group's plugs was hugely beneficial compared to traditional hydro test end caps, as welding and NDT of the end caps was avoided thus resulting in reduced preparation time and loop readiness. Hydro test work using the supplied plugs was carried out with no incidents. ”

Joe D., Sr. Construction Manager - COOEC Fluor China Heavy Industries

**Pop-A-Plug Tube Plugs
are in use at all Nuclear
Power Plants in North
America & France**



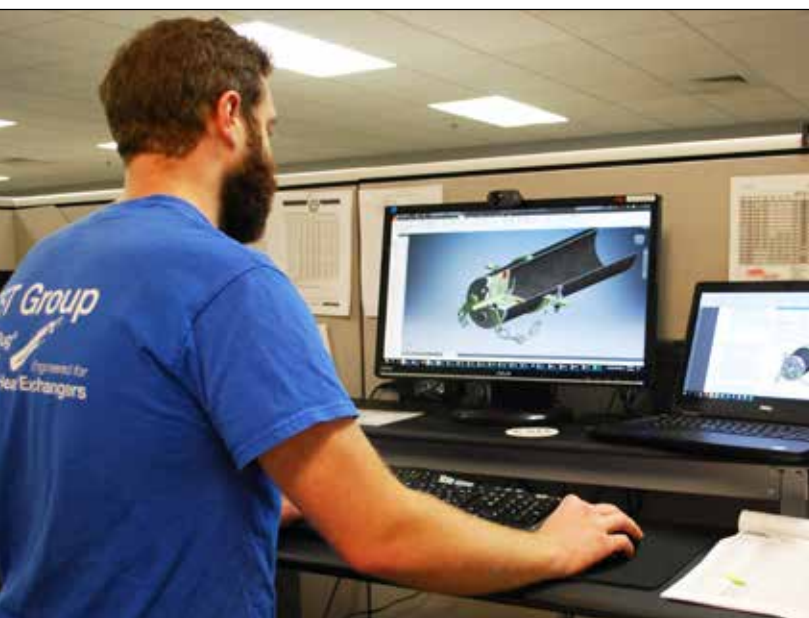
Engineering

Our Engineering team is devoted to providing innovative, precise, and cost-effective solutions to our customers. Extensive knowledge of applications and equipment within the industries we serve, allow our products and services to improve our customers' project scope through reduction in time and cost, while maintaining consistent dependability, and a safer work environment.

Our team continuously utilizes new techniques and technology to improve the quality of our products and influence the industry in a positive way. Precision engineering and expert application support make EST Group the best choice for solving complex pipe testing and isolation challenges.

Our Commitment to Customers

- Reliability & performance
- Same day quote response
- Field support for customer applications



Why Choose Us?

- **Design & Manufacturing** – 50+ years of experience in tools and systems design and manufacturing that greatly simplify maintenance of shell & tube and air-cooled heat exchangers, as well as test plug systems that expedite in-service inspection of pipe, pipelines, piping systems, and pressure vessels.
- **New Product Development** – Our commitment to technology development is critical for maintaining and strengthening technological leadership in the marketplace.
- **Application Engineering & Custom Product Design** – When an application requires a solution beyond the capabilities of standard products, our team of Application Engineers are ready to develop, design and manufacture a custom solution to accomplish your goals.
- **State-of-the-Art Test Lab** – Equipped for 30,000 PsiG (2070 BarG) pressure testing capabilities, temperature cycling, fatigue analysis, creep testing, and data analysis
- **Quality** – Our quality program is integrated into each element of our operation – manufacturing, supply chain, engineering, and sales. Each process is audited and reviewed to ensure our products exceed the demand of our customers. Compliant with several QA Systems, including:
 - ISO 9001:2015
 - ASME, ANSI N45.2, NQA-1, 10 CFR 50 App. B
 - U.S. Navy Level 1/SUBSAFE
- **Finite Element Analysis (FEA)** – Mechanical static and dynamic simulations, thermal and stress analysis, multiphysics and vibration
- Application analysis and concept development
- Conceptual and detail design: CAD 3D models, drawings, verifications



Manufacturing

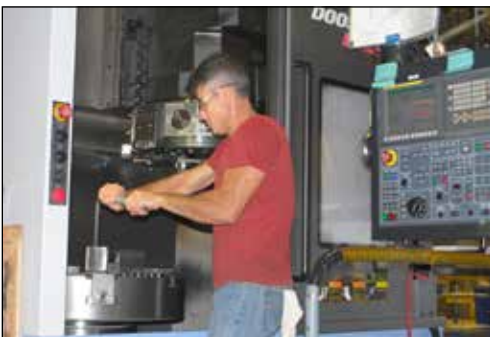
EST Group is a leader in the design and manufacturing of hydrostatic testing and isolation plugs and heat exchanger testing and plugging solutions. Serving industry for over 50 years, we are equipped to handle any type of machining in a wide range of materials.

Our state-of-the-art equipment gives us the flexibility to work with virtually any component material our customers' specifications require. Our manufacturing floor is fully equipped with a variety of CNC lathes, including Swiss-type, CNC mills, 4 & 5 axis,

conventional turret, and secondary operation machines, laser engravers and other equipment that was specifically developed to improve quality of our products and efficiency of manufacturing processes.

EST Group utilizes traditional techniques in addition to advanced CNC programming and state-of-the-art machinery to manufacture critical components with accuracy and efficiency. Our dedication, passion for safety, and expert skills are representative of EST Group's teamwork and culture.

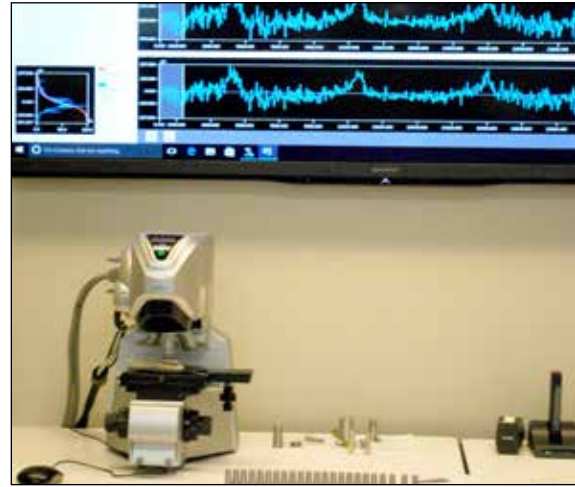
We pride ourselves on superior quality and best-in-class turnaround and customer support. With more than 50 different materials in stock, extensive machining capabilities and multi-million dollar inventory of finished products, we are confident we have the solution you need! Our best-in-class on-time delivery rate and commitment to same-day shipping, makes EST Group your go-to supplier for emergency needs.



Quality Assurance

EST Group is focused on continuous improvement and reducing waste at every level within our organization. This ensures that our customers get the best solution to their problem in a timely fashion. Our quality program is integrated into each element of our operation – manufacturing, supply chain, engineering, and sales. Each process is audited and reviewed to ensure our products exceed the demand of our customers.

- Automotive type controls derived from Toyota Production System incorporating A3 and 8D Problem Solving
- Redundant Points of Assurance (POAs) for all Critical Quality Attributes (CTQAs)
- Employee engagement throughout the organization via Empowered Mission Directed Teams (MDW)
- Deep Roots in Six Sigma (Certified Master Black Belt on staff)
- Focused, Formal Problem Solving and Corrective Action process
- Unrelenting dedication to reducing waste (Lean)
- Data driven decisions
- Product traceability



**ISO 9001:2015
Registered Facility**

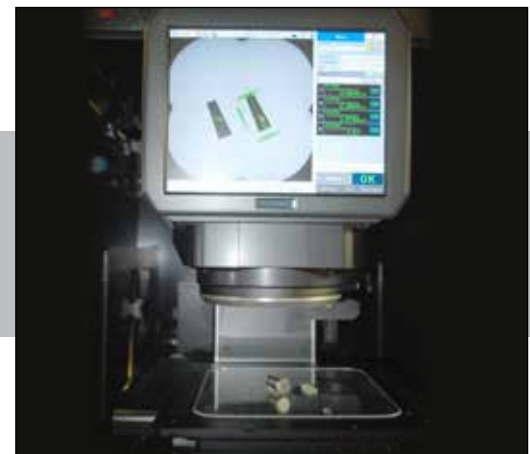
In-House Testing

Compliant with all required quality, safety and testing requirements, EST Group goes the extra mile to perform meticulous quality testing in-house. We are committed to excellence and our goal is to exceed all customer expectations.

Before leaving our facility, Pop-A-Plug® Tube Plugs undergo multiple quality control testing cycles. Quality inspection starts as soon as the raw material arrives at our facility and continues until the last plug is in the box.

When customers make Pop-A-Plug Tube Plugs their tube plugging solution, they chose quality over price, safety over risk, and reliability over instability. The transformation of a piece of metal into our engineered plugs is surrounded by multiple quality control tests:

- **Mill Test Report and Heat Numbers** – all materials are reviewed and verified when received
- **Statistical Process Control** – during fabrication, every component is dimensionally confirmed
- **Breakaway Test Stand** – breakaways are tested, monitored, and adjusted as needed
- **Fabrication Quality Inspection** – after fabrication, all parts are submitted for quality confirmation by supervision
- **Laser Etching** – all plugs are laser etched with size and lot numbers
- **First Piece Inspection** – a formal first piece inspection is completed by an inspector not associated with the previous testing or assembly
- **Air/Hydro Test** – after assembly is completed, an air/hydro testing is conducted
- **Final Testing** – the same plugs used in the hydro test are then tested to failure
- **Final Inspection** – a final inspection from a random sample takes place by another inspector not associated with any previous steps



Product Families

Pop-A-Plug® Tube Plugging System

Suitable for plugging leaking and/or degraded heat exchanger tubes at operating pressures to 7,000 PsiG (480 BarG) without welding or explosives.

- Pop-A-Plug CPI/Perma Medium Pressure Tube Plugs
- Pop-A-Plug P2 High Pressure Tube Plugs
- G-Series Tube Testing Tools
- Hydraulic Ram Packages
- Pop-A-Plug Tube Stabilizers



GripTight® Test & Isolation Plugs

GripTight® Test Plugs provide safe and effective testing at working pressures up to 15,000 PsiG (1,034 BarG).

GripTight Isolation Plugs positively isolates and monitors potentially explosive vapors during hot work, then effectively hydrotest the new weld connection with one tool.

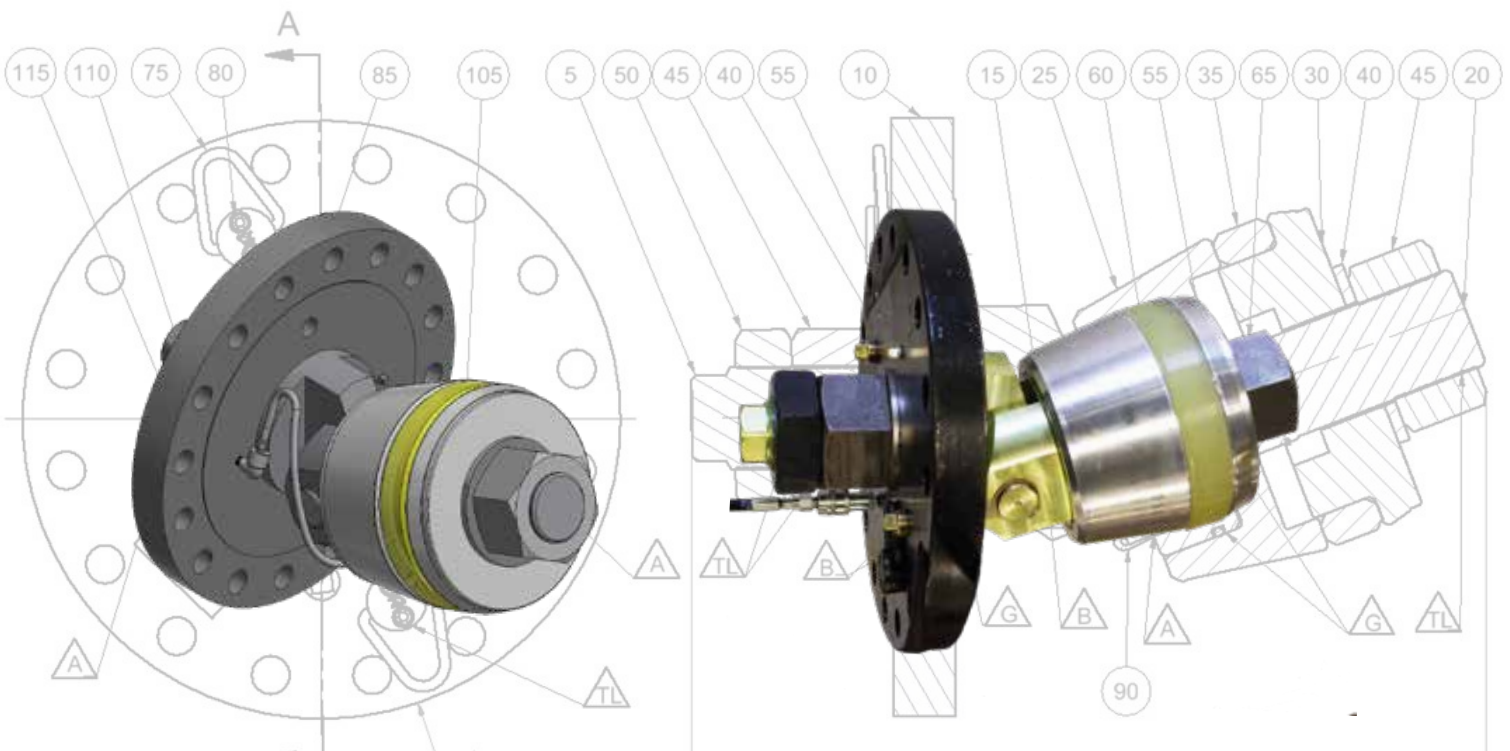
- GripTight MAX Test Plug
- GripTight Elbow Test Plug
- GripTight Reverse Pressure Test Plug
- GripTight Isolation Plug



Custom Products

EST Group has a long-standing reputation as a leader, and quality manufacturer of heat exchanger tube plugging and pressure testing pipe equipment. While we maintain a large inventory of Pop-A-Plug Tube Plugs, and GripTight Test Plugs for a variety of applications, our custom products are what truly set us apart from our competition.

Thorough knowledge of applications across the industries we serve, allow our team of Application Engineers to work closely with our customers to design products to suit their every need, while providing high-level service and support to see projects through to completion.



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Product animations, instructions, and detailed technical information are available on our website: www.cw-estgroup.com

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