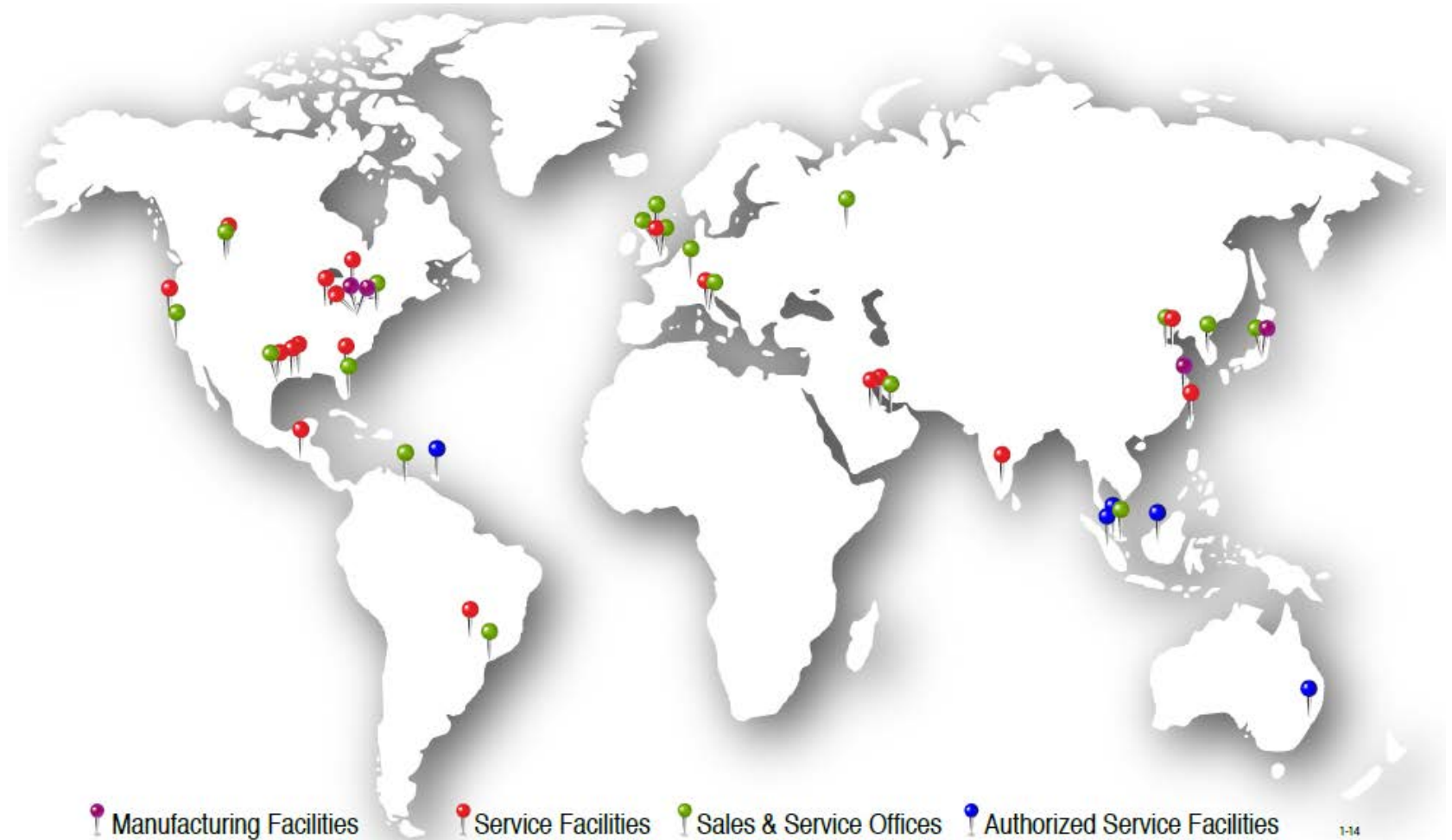


Elliott Global Service Overview



The world turns to Elliott

Elliott Global Service Network



PRODUCTS & SERVICES

Portfolio of services for both Elliott and Non-Elliott Equipment



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Equipment Serviced

- Compressors
- Steam Turbines
- Power Products
- Cryodynamic Products
- Auxiliary Equipment

Regardless of the OEM



DRESSER-RAND

SIEMENS



SULZER



And more.....

Approximately 40% serviced equipment is non-Elliott



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Compressors

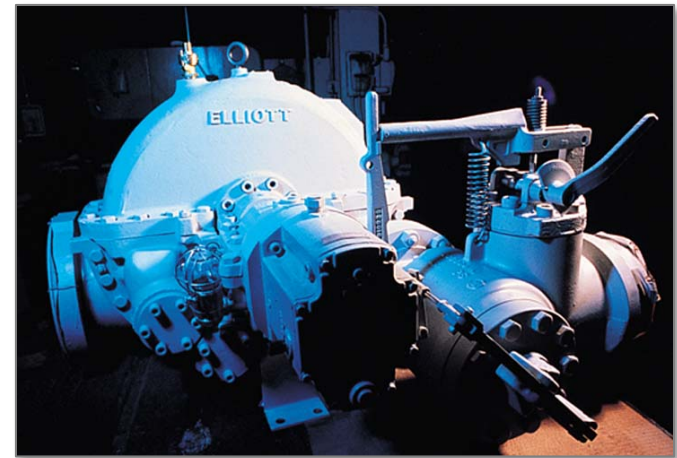
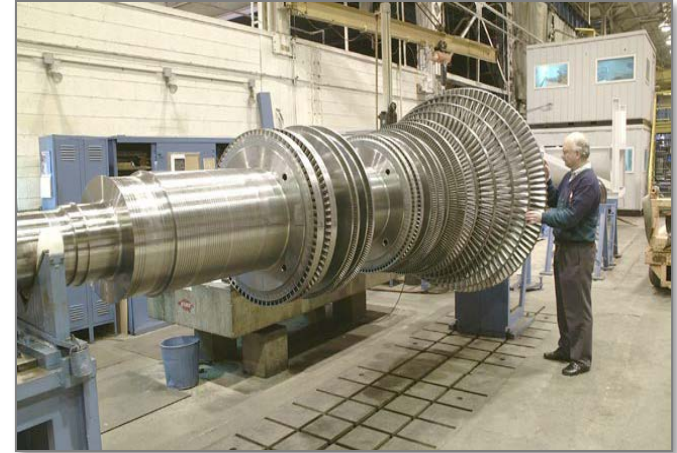
- Centrifugal Compressors
 - API 617
 - State-of-the-art aerodynamics
 - Horizontally & vertically split casings
 - Flows to 270,000 cfm (458,700 m³/hr)
 - Pressures to 10,000 psig (690 barg)

- Axial Compressors
 - API 617
 - High flow capacity, low pressure
 - Flows to 396,000 cfm (673,000 m³/hr)
 - Pressures to 100 psig (7.0 barg)



Steam Turbines

- Multi-Stage Steam Turbines
 - API 612 specifications
 - Pressures to 2,000 psig (138 barg)
 - Temperatures to 1,005 deg F (540 deg C)
 - Powers to 135,000 HP (100,000 kW)
 - Speeds to 14,000 RPM
- Single-Stage Steam Turbines
 - API 611 specifications
 - Pressures to 900 psig (62 barg)
 - Temperatures to 900 deg F (480 deg C)
 - Powers to 3,500 HP (2,600 kW)
 - Speeds to 7,000 RPM



Power Equipment

- Power Recovery Expanders
 - Reliable and durable
 - Over 30 successful installations
 - 4 frame sizes
 - Powers to 60,000 HP (45,000 kW)
 - 3,000-6,700 rpm



Cryodynamic Equipment

- Submerged Liquefied Gas Pumps
 - Retractable (In-Tank)
 - Suction Vessel Mounted
 - Marine Cargo Handling
 - Aggressive Fluid
- Cryogenic Liquid Expanders
 - Used as a bypass loop to Joule-Thompson valve
 - Lowers pressure of liquefied gas to allow for suitable transport
 - Reduces vaporization in the let down process, resulting in higher liquid production.



Packaged Systems

- Turbine-Generator Sets
 - 50 kW – 30,000 kW
 - Pressures to 900 psig (62 barg)
 - Temperatures to 900 deg F (480 deg C)
- Auxiliary Systems
 - API 614 specifications
 - Lube oil systems
 - Control oil systems
 - Seal oil systems
 - Fuel gas and fuel oil manifolds
 - Dry gas and buffer gas seal packages
 - Accumulators and draining packages
 - Interconnecting process piping



Global Service Products and Services

- Service Centers
 - Repairs for Elliott and Non-Elliott Equipment
- Field Service
 - Technical Advisors and Service Engineers
 - Project Managers and Labor
- Service Parts
 - Entire Elliott Product Range
- Rerates, Engineering Services & Modifications
 - Redesign equipment to change flow, horsepower, etc.
 - Reapplication of Used Equipment
 - Engineering Studies
 - Modifications and Upgrades



SERVICE CENTERS

Repair of Elliott and Non-Elliott equipment



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Service Center Locations



Click a location for specific Service Center details.



Service Centers

- 18 global service centers
- Experienced service teams
 - Engineers
 - Metallurgists
 - Technicians
 - Welders
 - Machinists
 - Mechanics
- Wide-range of repair services
- Rotor storage
- At-speed balance



Service Centers

Services

- Inspection, repairs, overhauls
- Component restoration/replacement
- Custom parts manufacturing
- Specialty machining
- Heat treatment / Stress relieving
- Full non-destructive testing
- Dynamic rotor balancing
- Vibration Analysis
- Coatings
- Rotor Storage
- ISO 9001:2000 certified

Typical Repair Scope

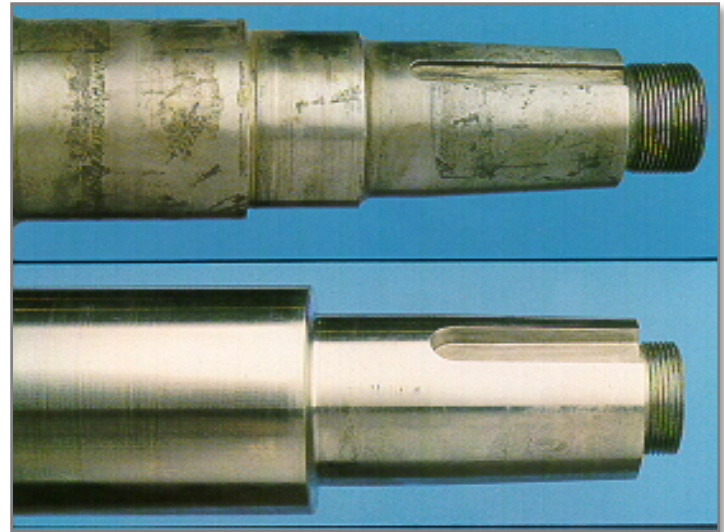
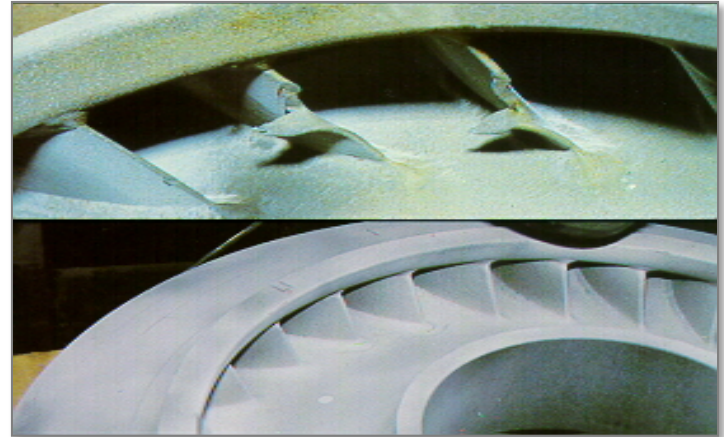
- Unit disassembly, inspection, repair, and re-assembly
- Component repairs/reconditioning, modifications, parts replacement
- Repair using welding, machining, chrome plating, metal spray, and mechanical fix techniques
- Balancing



Service Centers - Welding

- Weld Repair Technology
 - Impeller blades, covers, hubs
 - Diaphragms, diffusers
 - Turbine disks, blades
 - Casings
 - Shafts

- Weld Processes
 - Tungsten Inert Gas (TIG)
 - Submerged Arc (SAW)
 - Plasma Transfer Arc (PTA)
 - Shielded Metal Arc (SMAW)
 - Gas Metal Arc (GMAW)



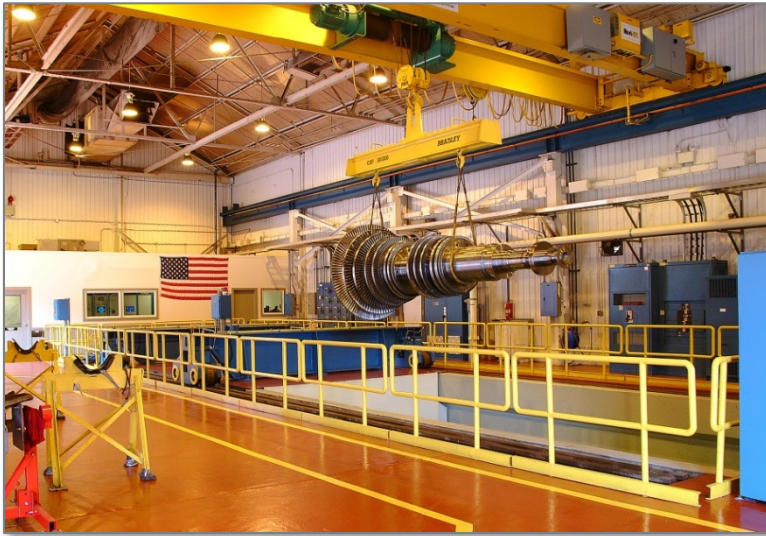
Service Centers - Rotor Storage

- Vertical storage (hanging)
- Climate-controlled environment
- Storage locations
 - Baton Rouge
 - Brazil
 - Edmonton
 - Houston
 - New Orleans
 - San Francisco



Service Centers - Rotor Balancing

- At Speed Balance
 - Contracted through the service center
 - Service provided in our Jeannette facility
 - Verification of mechanical integrity over entire speed range
 - Corrections made on multiple balancing planes
 - Guarantees smooth operation at rated speed



FIELD SERVICE

Service of Elliott and Non-Elliott equipment



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Field Service

- Experienced Field Service teams
 - Project Managers
 - Engineers
 - Technicians
 - Technical Advisors
- Field Service operations
 - Bundled Services
 - Turnkey Projects
 - New Installation/Start Up
 - Equipment Relocation
 - Customer Point of Contact



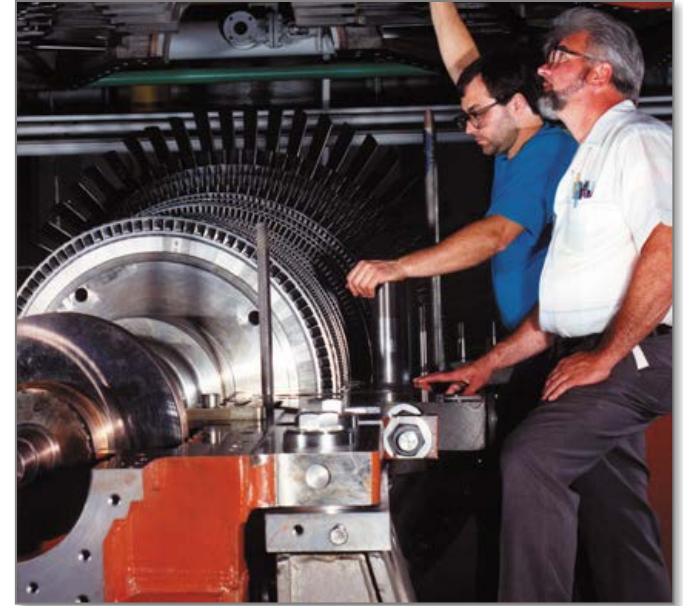
Field Service

- Installation and commissioning
- Routine maintenance and repairs
- Comprehensive overhauls
- Spare parts inventory audits
- Plan outage management
- Turnaround planning
- Troubleshooting
- Resident engineers
- Maintenance contracts
- Field Machining
- Emergency call-out service
- Operator and maintenance training
- Technical support



Field Service

- Technical assistance
 - Problem analysis and diagnosis
 - Repair recommendations
 - Technical direction for routine maintenance
 - Keep turbomachinery running more efficiently and for longer periods
 - Planned maintenance programs
 - Consultation and implementation



SERVICE PARTS

OEM and Replacement Parts for Elliott and Non-Elliott Equipment



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Service Parts

- Parts sales and customer service
 - Engineering and technical support
 - Site audits
 - Spare parts kit boxes
 - Quick action center
 - Emergency response
 - Stock a wide variety of raw material
 - Manufacture a variety of small parts/assemblies
 - Supports Elliott manufacturing facilities and service centers worldwide



Service Parts - Audits

- Provided at no cost to the customer
 - Verify physical inventory against the customer's electronic records
 - Compare inventory with Elliott's maintenance parts list (MPL)
 - Inspect inventory condition to ensure parts are suitable for installation
 - Confirm that sealants and elastomers have not expired
 - Identify obsolete inventory
 - Evaluate parts storage locations to ensure protection from damage or corrosion



[Download the *Elliott Parts Audits* brochure to learn more.](#)



Spare Parts Kits

- Standardized packages for routine maintenance spare parts
 - Optimizes spare parts inventory
 - Complimentary parts audit
 - Customized to meet your needs
 - Convenient for maintenance outages and turnarounds
- Kit box features
 - High-strength, industrial grade plastic box designed for your needs
 - Unit-specific parts, organized according to equipment configuration
 - Precision-cut foam to hold parts in place
 - Stackable trays to maximize space
 - Nameplate with kit box part number, short description of contents, and Elliott contact information
 - Labels identify specific parts
 - Reordering instructions included

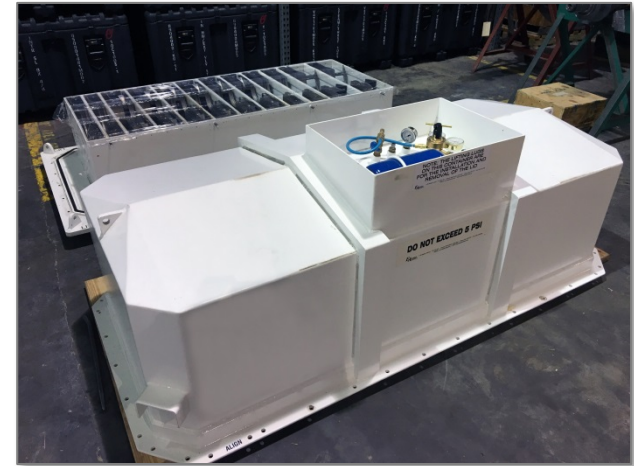


[Download the **Elliott Spare Parts Kits** brochure to learn more.](#)



Rotor and Diaphragm Storage

- Protection for vital components
 - Rotors (horizontal or vertical storage)
 - Diaphragms (horizontal storage)
- Designed for long-term storage and shipping
- Requires no maintenance
- Corrosion resistant
- Protects against ambient conditions
- Suitable for nitrogen purging
- Can be lifted by forklift or crane
- Desiccant packs for moisture absorption



ENGINEERED SOLUTIONS

Re-rates and Modifications of Elliott and Non-Elliott Equipment



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Engineered Solutions

- Experienced Engineered Solutions team
 - Product Engineers
 - Project Engineers
 - Application Engineers
 - Project Managers
 - Drafters
- Engineered Solutions goals
 - Maximize a customer's investment
 - Improve reliability
 - Reduce operational costs
 - Simplify maintenance
 - Shorten turnarounds and reduce unplanned outages



[Download the **Engineered Solutions** brochure to learn more.](#)



Engineered Solutions Services

- Rerates
 - Achieve new process parameters within existing casings
 - Minimal changes to foundations, piping and other connections
 - Site audits to evaluate efficiency and performance
- Modifications and Upgrades
 - Modernize the equipment
 - Enhance equipment performance
 - Control System Conversions
(governors, over-speed trip, anti-surge)
 - Component Upgrades (Couplings, Seals, Bearings)



[Download the *Turbomachinery Modifications and Rerates* brochure to learn more.](#)



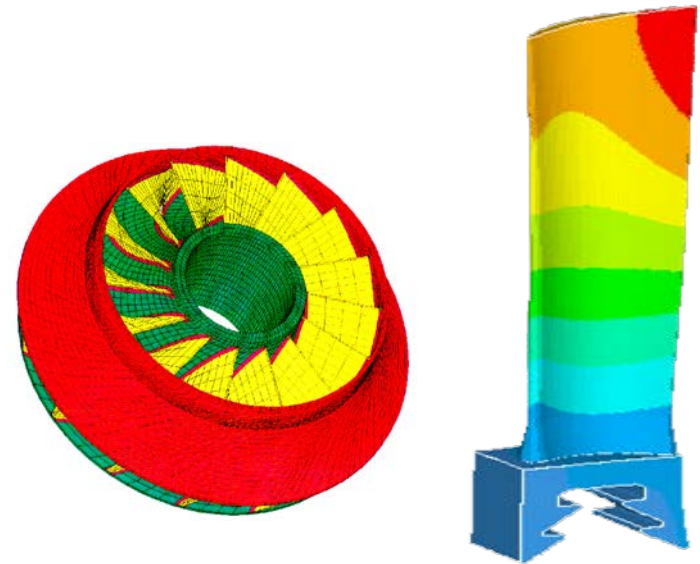
Engineered Solutions Services

- Reapplication
 - Cost-effective, permanent alternative to new machinery in mature operating environments
 - Cost-effective, permanent alternative to new machinery in mature operating environments
 - Shorter delivery than new equipment
 - Reduced outage expense
 - Reconditioned to “like-new” condition
 - Re-engineered to improve design

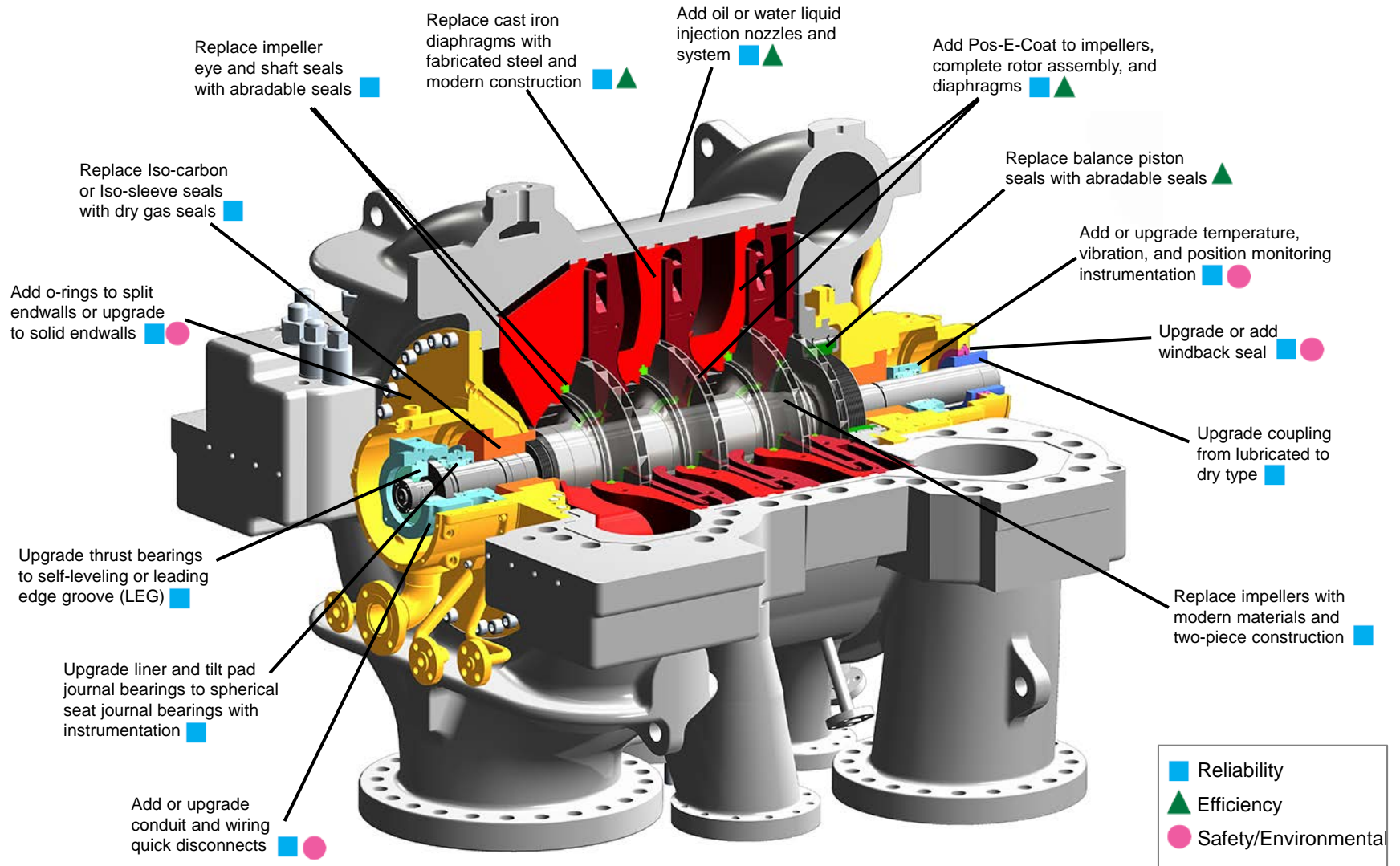


Engineered Solutions Services

- Drop-in replacement equipment
 - Reduces discovery repair work
 - Eliminate disassembly, installation, and alignment of new internal parts
- Analytical capabilities
 - Site audits
 - Advanced engineering studies
 - Remaining life assessment
 - Rotor dynamics
 - Stress analysis
 - Failure analysis
 - Reverse engineering
 - Repair and welding technology



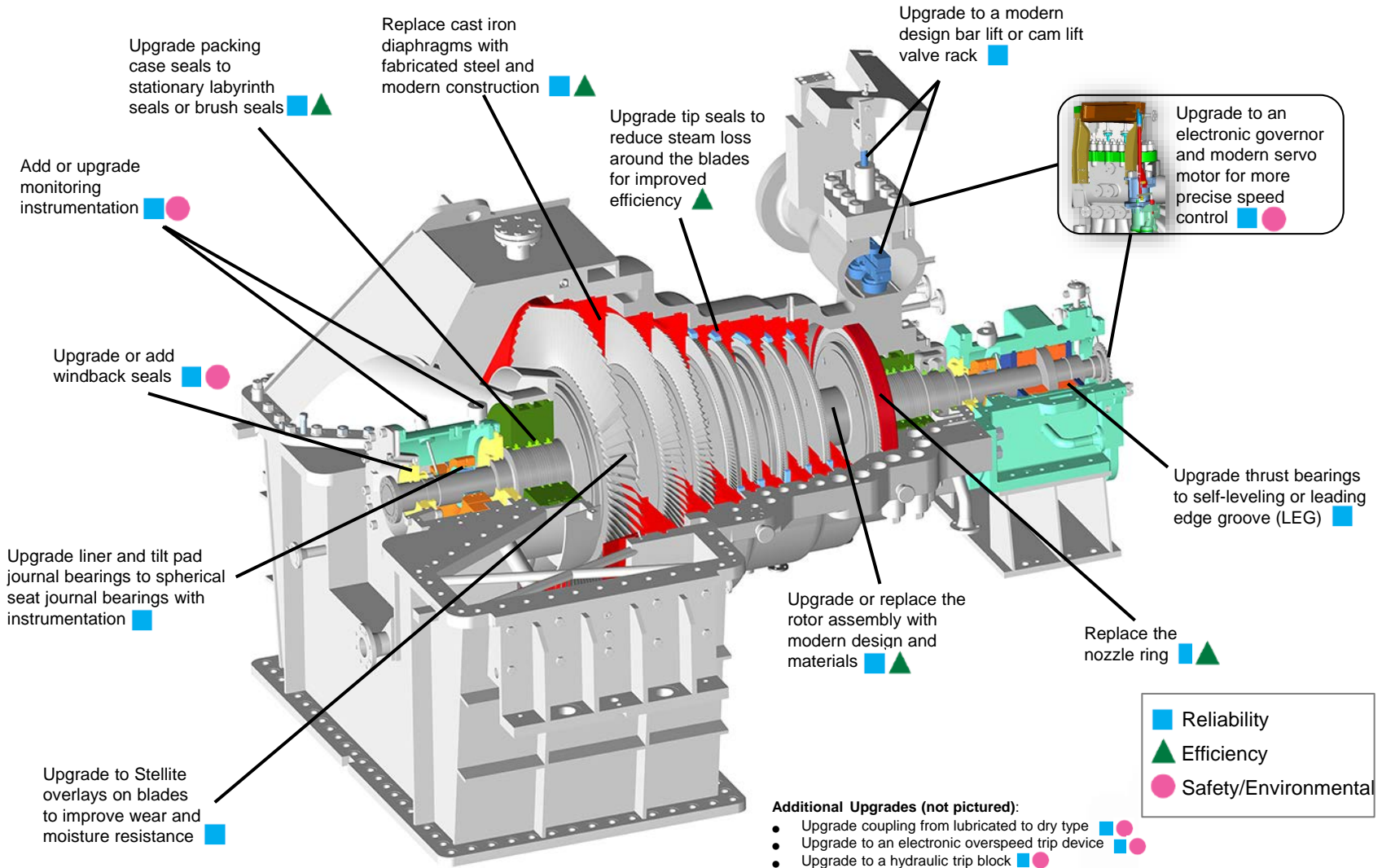
Compressor Rerates and Modifications



Click on the compressor image to link to the interactive graphic on elliott-turbo.com.



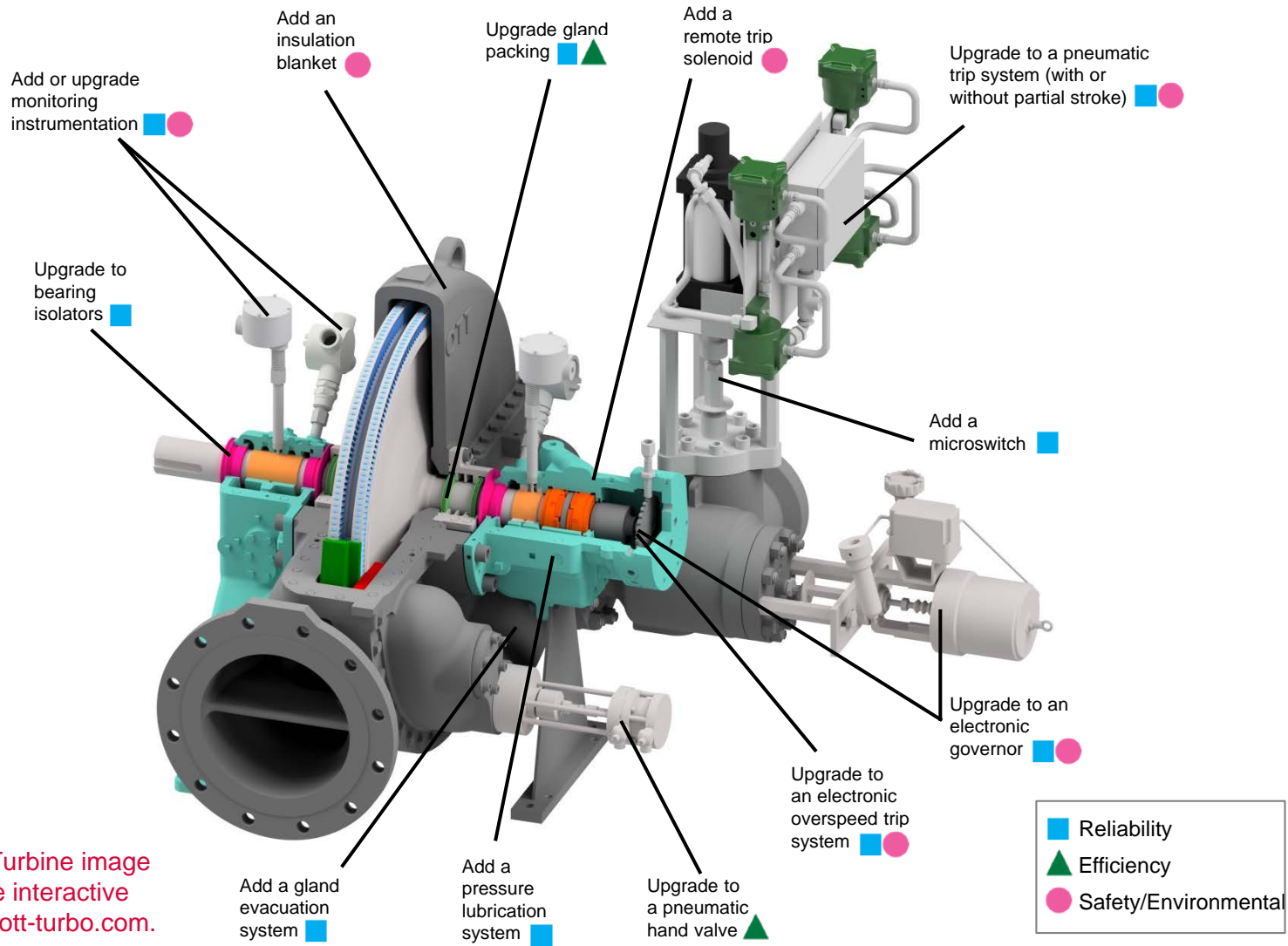
MSMV Turbine Rerates and Modifications



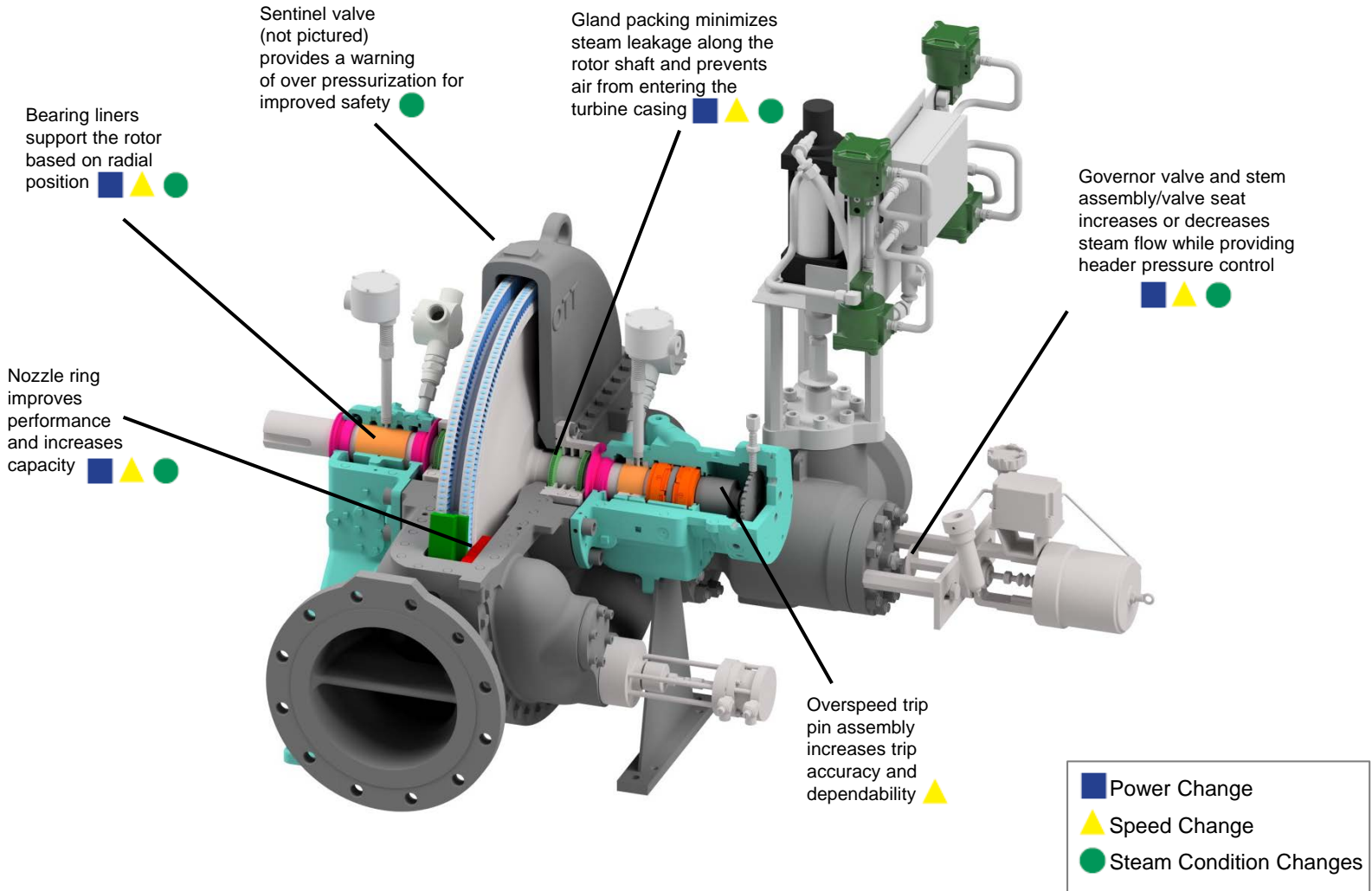
Click on the steam turbine image to link to the interactive graphic on elliott-turbo.com.



YR Turbine Modifications



Off-Design YR Turbine Rerates



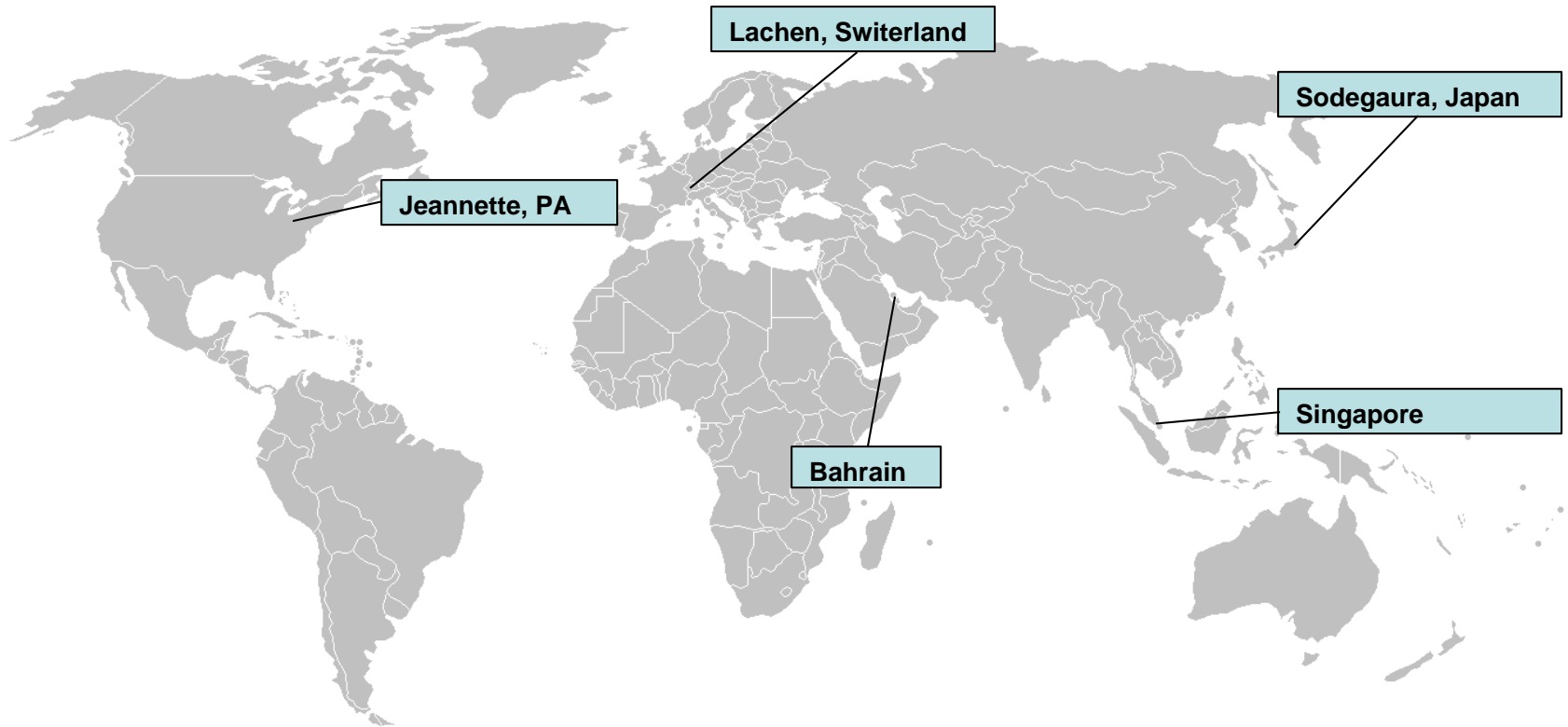
TECHNICAL SERVICE

Customer Technical Support



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Technical Service Global Network



Technical expertise and resources located around the world to support our customers with rotating equipment products and services.



Technical Service

- Installation and Commissioning Support
 - Expertise to support on-site Elliott Field Service personnel for trouble free commissioning
 - Expertise to remotely support customer coordinated activities
 - Controls engineering capabilities for start up support and performance tuning
- Advanced trouble shooting & root cause failure analysis of field issues
 - On-site process reviews & machinery investigations
 - Vibration data acquisition and advanced analysis
 - Structural and Modal finite element analysis (FEA)
 - Complete metallurgical analysis
- Development of specialized repair procedures to be executed by Elliott Field Service and Service Centers
 - Repair & extend equipment lifecycle without sacrificing reliability or performance
- Management of Elliott Technical Service Letters
 - online technical content about Elliott products available for customer use
- Management & administration of critical quality processes
 - Warranty process for all products & services
 - Feedback process to drive continuous improvement to Elliott's products & services



OTHER GLOBAL SERVICE PROGRAMS



Training Programs

- Professional Elliott Training
 - On-site and factory training
 - Training facilities in Jeannette, PA and Tuggen, Switzerland
 - Hands-on YR turbine workshops
 - Promotes a safer work environment
 - Improves operating efficiency
 - Reduces maintenance costs
- Available training programs
 - YR turbines
 - Multi stage, multi valve steam turbines
 - Centrifugal compressors
 - Lube and seal systems
 - Customized on-site or factory training



Long-Term Service Agreements (LTSA)

- Predictable and affordable monthly expense for fleet
- Improved reliability through periodic equipment inspections from an experienced Elliott Service Engineer
- Routine maintenance parts included
 - Other parts provided at discounted rate
- Extended warranty opportunities
- Semi-annual, 5, or 10 year terms
- Global agreements preferred, site specific available



Bearing Manufacturing

- Types
 - Tilt Pad Journal
 - Thrust
- Services
 - Centrifugal casting with ASTM B-23 babbitt
 - In-house re-babbitting and bearing repair
 - Lead sealing and repair
 - Fully certified ultrasonic and dye penetrant testing
 - Coordinate measuring machine (CMM) inspection
 - CNC and manual machining of parts up to 120 inches

