Industrial Steam Turbines
Advanced Technology for Improved Output and Reliability
Which One Fits Your Needs?

GE Energy has created a full range of value packages to help achieve optimum performance from your existing steam turbine system. Drawing on GE’s advanced technology and worldwide resources, our Industrial Steam Turbine application engineers have the required expertise to re-evaluate and reconfigure your unit to meet your current or future operating needs.

Valuable Packages

GE’s skilled team of application engineers work closely with you to determine the value package that best suits the needs of your plant. Offerings include:

- **Efficiency Upgrades.** Many older units experience performance losses as a result of changes in nozzle and bucket throat areas and blade profiles, as well as deterioration of finishes and increased clearances. By rebuilding the turbine with modern high efficiency components—usually nozzles, buckets, valves, and seals—our efficiency upgrade recovers the degradation while improving efficiency levels by 4-6% above original unit performance. For a unit running over 30 years, these efficiency features can recover 10% degradation and increase performance 5% beyond its original level.

- **Reliability Upgrades.** History has shown that steam turbine reliability decreases after 20 years of service. For a typical unit the forced outage rate can increase by 3-4% every 10 years. To arrest this trend, GE’s reliability upgrade rebuilds your turbine with high reliability components that modernize your unit—while providing significant life extension and operational reliability well into the future. This upgrade usually involves steam path replacement using new generation nozzle, bucket and rotor components or other engineered systems.

- **Plant and Process Changes.** Plant changes may require the turbine to be redesigned or re-rated to accommodate changes in plant or process parameters, such as new throttle, extraction, admission and/or exhaust conditions. GE will evaluate the new requirements to determine modifications required for optimal operation at the new conditions. Specific conversions include:
  - Uprates. Modifying the steam path for increased power or flow
  - Derates. Optimizing steam path performance for reduced power or flow needs
  - New process condition. Modifying the turbine for new throttle flow, extraction demand, steam conditions, or speed

- **Reapplication or Change of Use.** GE will evaluate if an existing turbine can be re-applied at a different site or to a different plant application. Our dedicated team of specialists will determine if the existing turbine can be reapplied without modifications—or identify all the necessary changes required for the new application.

GE’s experienced Industrial Steam Turbine engineers can customize a value package to meet the specific needs of your plant.
Extend the Life of Your Steam Turbine
Advanced Technology Component Packages for Enhanced Performance

To restore aging industrial steam turbines to modern standards—even after 20 to 40 years of operation—GE’s Industrial Steam Turbines team developed Engineered Advanced Technology Component Packages that can be adapted to your specific plant needs.

From individual components to turbine sub-systems or total machine redesigns, GE can provide you with reliable and efficient plant operation at the new process conditions, ratings, or applications your system requires.

Modernize Your Turbine with GE Advanced Technology Upgrade Packages

To restore aging industrial steam turbines to modern standards—even after 20 to 40 years of operation—GE’s Industrial Steam Turbines team developed Engineered Advanced Technology Component Packages that can be adapted to your specific plant needs.

From individual components to turbine sub-systems or total machine redesigns, GE can provide you with reliable and efficient plant operation at the new process conditions, ratings, or applications your system requires.
GE’s Industrial Steam Turbine Application Center

A Dedicated Technology Center Focused Entirely on Maximizing Your Plant Value

To provide a dedicated technology group which serves only our steam turbine customers, GE Energy has developed an Industrial Steam Turbine Application Center staffed by a team of highly-skilled innovators—supported by industry-leading technology and a continually growing knowledge base.

With a core team of 20 engineers drawn from every technical turbomachinery discipline (for a total of over 600 man-years of experience on GE industrial steam turbines), the Application Center has the resources to serve all of your turbine needs. This veteran team is further reinforced by their access to the original OEM drawings, design and history data, and analytical tools—which enable us to provide you with the highest quality solutions.

Integrated Design System (IDS) Analysis Program

Our engineering team utilizes GE’s proprietary Integrated Design System (IDS) to provide them with the most effective turbine design. This automated design program uses selection criteria and algorithms to “assemble” components into a complete turbine. Performing stage-by-stage thermal and mechanical analysis, the IDS is calibrated to forty-four (44) ASME field tests and eighteen (18) laboratory-tested sections for accuracy.

The IDS program also runs “real” operating points and establishes maximum stage conditions—as well as performing mechanical analysis of the total steam and generating performance curves and stress summaries. Supported by OEM drawings and design records, proposed turbine designs are thoroughly analyzed to ensure that resulting modifications will correctly fit the turbine the first time.

Our engineering expertise—combined with the Application Center’s innovative design tools, computer aided design and solid modeling facilities—enable us to evaluate solutions across your total turbine system. By working closely with the customer, GE’s Industrial Steam Turbine specialists can optimize reliability, capacity, maintainability and plant life-cycle costs.

Integrating Turbomachinery Expertise, Tools, and Data

EXPERTISE:

- Plant and Process Studies
- Thermodynamics Analysis
- Mechanical Design
- Heat Transfer
- Machinery Design
- Noise and Vibration
- Fracture Mechanics
- Strength of Materials
- CAD/CAM
- FEA - Static/Dynamic
- Control Systems
- Solid Modeling
- Rotor Dynamics Analysis

DESIGN TOOLS and DATA:

- Integrated Design System
- Maintenance History
- Electronic Records and Drawings
- Bill of Material
- Original Design Records
- Six Sigma Methodology
- ISO 9001 Procedures
- Unigraphics 3-D CAD