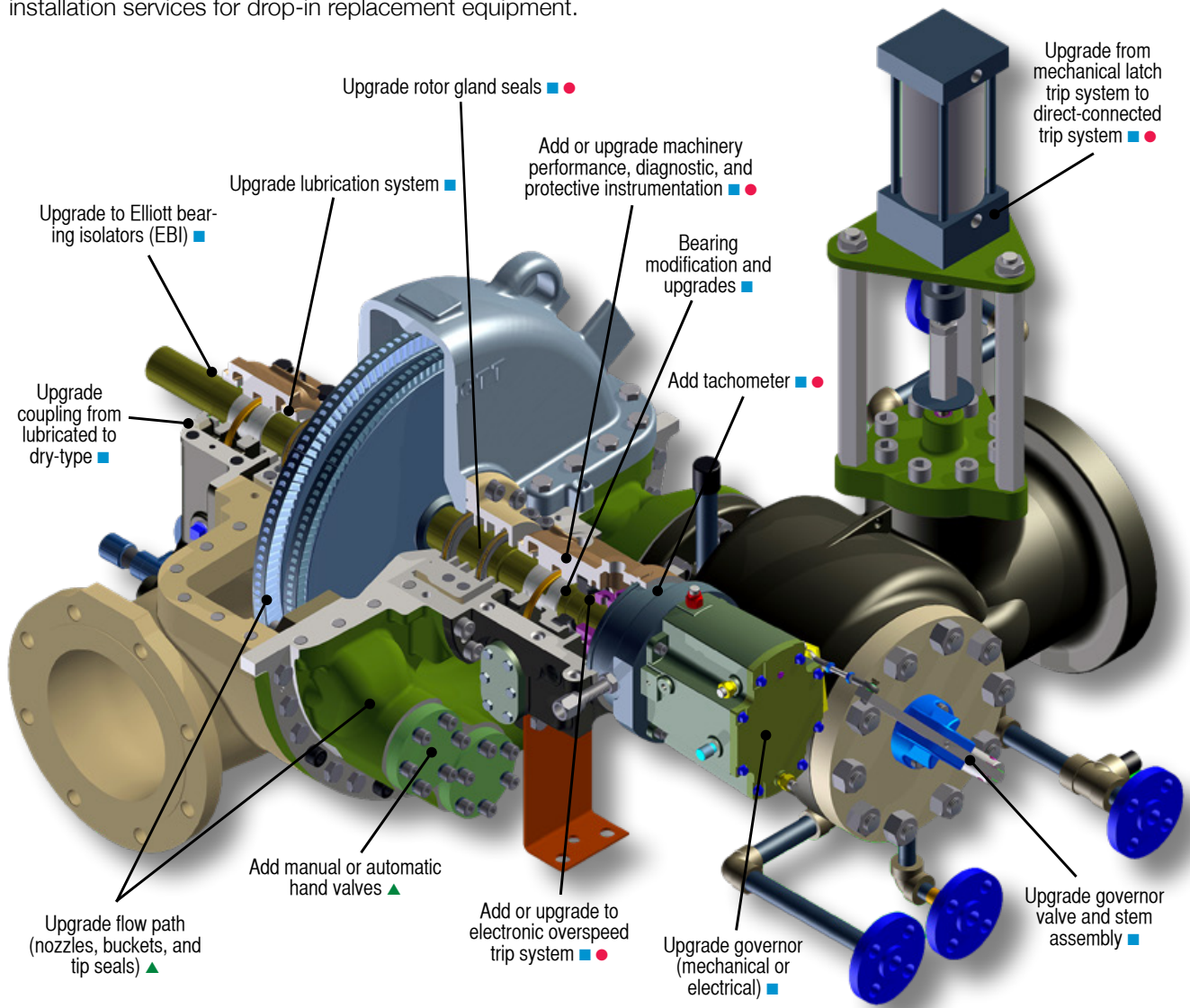




YR Turbine Modifications and Rerates

Elliott YR turbines are powerful workhorses that provide years of exceptional performance with routine maintenance and upgrades. Steam turbine operating conditions often change over time. Different operating conditions or a change in application can affect a turbine's efficiency and increase operating costs. Off-design operating conditions can also cause premature wear of critical components, resulting in higher maintenance costs and increased downtime. Elliott Engineered Solutions can rerate your Elliott YR turbine to increase its efficiency and capacity, while reducing operating and maintenance costs.

Elliott knows how to optimize your turbine's performance. An Elliott engineering audit clearly and objectively identifies appropriate performance modifications and safety enhancements. Typical efficiency improvements include adding or upgrading hand valves, replacing nozzles or blades, and adding tip seals. Common safety enhancements include updating mechanical governors to a more modern mechanical design, upgrading from mechanical to electronic governors, and overspeed trip system upgrades. Elliott also offers engineering, drafting, manufacturing, and installation services for drop-in replacement equipment.



- Reliability
- ▲ Efficiency
- Safety Controls

Other Modifications

- Add microswitch ■ ●
- Add remote trip solenoid ●

Elliott Engineered Solutions

Elliott Engineered Solutions has one focus – to help customers obtain the highest value from their critical rotating equipment. Elliott has more than 100 years of experience in engineering, manufacturing repairing, and modifying all types of turbomachinery. Elliott Engineered Solutions specializes in the following areas:

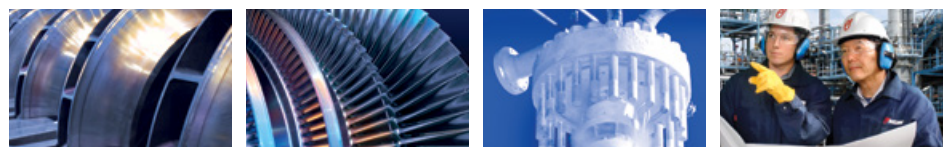
- ♦ Modifications and rerates of turbomachinery to increase the operational life and value of your investment by optimizing performance and reducing downtime.
- ♦ Reverse engineering and comprehensive analytical studies such as lateral and torsional rotor analysis, root-cause failure analysis, mechanical evaluation analysis, finite element analysis (FEA), and aerodynamic analysis.
- ♦ Reapplication of previously owned equipment for emergency installation or cost-effective replacement.
- ♦ Equipment configuration designs to precisely fit existing footprints.

Enhancement	Category	Benefit
Add manual or automatic hand valves	Efficiency	Adjust steam consumption at reduced loads
Add or upgrade machinery performance, diagnostic, and protective instrumentation	Reliability. Safety	Improve machinery performance, health monitoring and protective instrumentation
Add or upgrade to electronic overspeed trip system	Reliability. Safety	Increase trip speed accuracy and dependability
Add tachometer	Reliability. Safety	Provide local speed indication and more precise speed adjustment
Bearing modifications and upgrades	Reliability	Increase service life
Upgrade coupling from lubricated to dry-type	Reliability	Eliminate oil requirements; Improve rotor dynamics
Upgrade flow path (nozzles, buckets, and tip seals)	Efficiency	Increase performance or capacity
Upgrade from mechanical latch trip system to direct-connected trip system	Reliability. Safety	Maximize trip system reliability
Upgrade governor (mechanical or electrical)	Reliability	More precise speed control
Upgrade governor valve and stem assembly	Reliability	Decrease leakage
Upgrade journal bearings to directed lube, offset pivot, or chrome copper pads	Reliability	Improve rotor stability at running speeds; reduce oil requirements, bearing temperature, and bearing heat generation
Upgrade lubrication system	Reliability	Improve bearing protection
Upgrade rotor gland seals	Reliability. Safety	Reduce steam leakage
Upgrade to Elliott bearing isolators (EBI)	Reliability	Improve oil purity; Maximize bearing life
Upgrade thrust bearings to directed lube, offset pivot, or chrome copper pads	Reliability. Efficiency	Reduce oil requirements, bearing temperature, and bearing heat generation



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T H E W O R L D T U R N S T O E L L I O T T



C O M P R E S S O R S ■ T U R B I N E S ■ C R Y O D Y N A M I C S ■ G L O B A L S E R V I C E