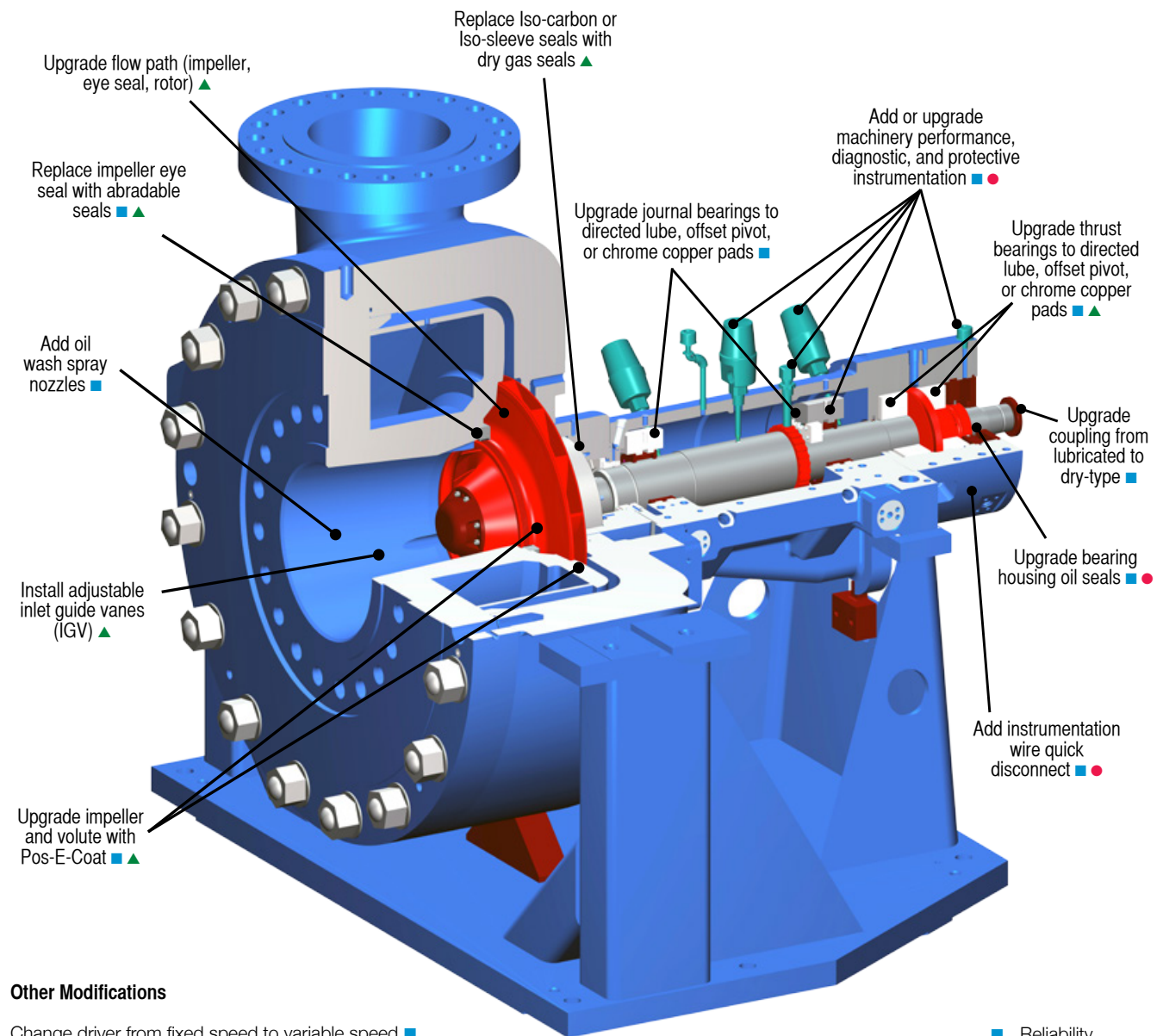


Single-Stage Centrifugal Compressor Modifications and Rerates

Single-stage centrifugal compressors often operate in corrosive, high-temperature conditions in petrochemical plants, refineries, natural gas processing, coal gasification, and power stations. Low maintenance and continuous service are extremely important under these conditions. Elliott Engineered Solutions can upgrade these machines to increase reliability, improve safety, and increase overall efficiency. Upgrades of single-stage centrifugal compressors can also enhance environmental compliance and reduce operating costs.

A site audit by Elliott Engineered Solutions will identify appropriate modifications for improving a single-stage compressor's reliability and efficiency. Upgrading impeller eye seals can minimize internal recirculation. A bearing upgrade can reduce the potential for oil whirl and other associated vibration problems. Installing inlet guide vanes can improve performance on partial-load conditions. Elliott modifications and rerates are designed to keep your turbomachinery performance high and your maintenance costs low.



Other Modifications

- Change driver from fixed speed to variable speed ■
- Perform site audit ■ ▲ ●
- Upgrade control system ■ ●

- Reliability
- ▲ Efficiency
- Safety Controls

Elliott Engineered Solutions

Elliott Engineered Solutions has one focus – to help turbomachinery operators 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.
- ♦ Onsite audits to evaluate turbomachinery efficiency and determine potential reliability improvements to maximize your return on existing equipment.
- ♦ Reapplication of previously owned equipment for emergency installation or cost-effective replacement.
- ♦ Equipment configuration designs to precisely fit existing footprints.

Enhancement	Category	Benefit
Add instrumentation wire quick disconnect	Reliability. Safety	Reduce chance of oil leak; Reduce maintenance time
Add oil wash spray nozzles	Reliability	Reduce/eliminate internal fouling by mechanical cleaning
Add or upgrade machinery performance, diagnostic, and protective instrumentation	Reliability. Safety	Improve machinery performance, health monitoring and protective instrumentation
Change driver from fixed speed to variable speed	Efficiency	Maintain optimal running speeds for peak efficiency; Eliminate suction throttling
Install adjustable inlet guide vanes	Efficiency	Save energy by controlling inlet flow
Perform site audit	Reliability. Safety. Efficiency	Identify areas to upgrade for peak performance
Replace impeller eye seal with abradable seals	Efficiency. Reliability	Improve efficiency by reducing internal seal leakage
Replace Iso-carbon or Iso-sleeve seals with dry gas seals	Efficiency	Save power loss by eliminating oil shear; Reduce oil consumption
Upgrade control system	Reliability. Safety	Keep compressor operating within a safe range
Upgrade bearing housing oil seals	Safety	Reduce oil leaks to atmosphere/Buffered design to eliminate leakage
Upgrade coupling from lubricated to dry-type	Reliability	Eliminate oil requirements; Improve rotor dynamics
Upgrade flow path (impeller, eye seal, rotor)	Efficiency	Increase performance or capacity
Upgrade Impeller and volute with Pos-E-Coat	Reliability. Efficiency	Reduce internal fouling and corrosion effects
Upgrade journal bearings to directed lube, offset pivot, or chrome copper pads	Reliability	Improve rotor stability at running speeds
Upgrade thrust bearings to directed lube, offset pivot, or chrome copper pads	Reliability. Efficiency	Reduce oil requirements, bearing temperature, and bearing heat loss



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