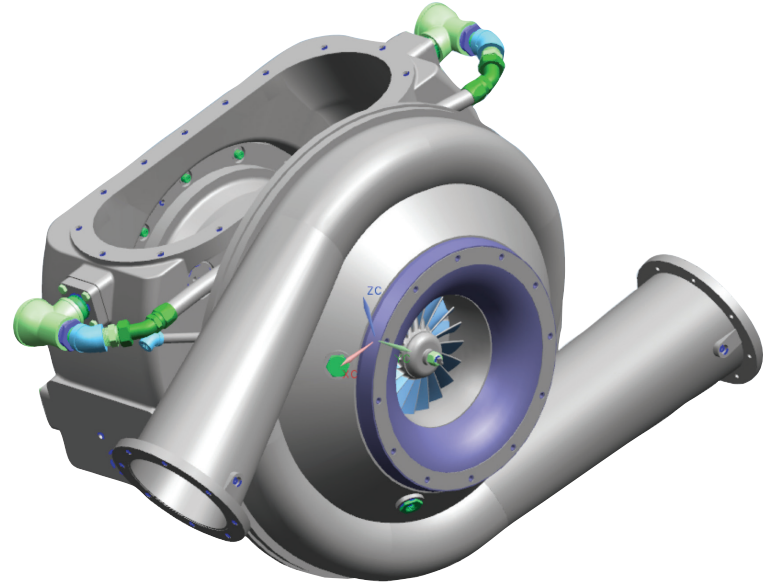


HPO90 UPGRADES

ELLIOTT HPO90 TURBOCHARGERS

The Elliott HPO90 Turbocharger was originally designed for installation on Cooper-Bessemer GMW integral compressor pure-turbocharger in conjunction with high pressure fuel injection. These original HPO90 configurations can be upgraded with new compressor and turbine stage components to improve reliability and efficiency. These original HPO90 configurations were also equipped with a eutectic device for thrust bearing wear detection and now can be upgraded with a new turbine end bearing equipped with a type-J thermocouple for enhanced monitoring of machine health and failure protection.

For full optimization of the Elliott HPO90 turbocharger efficiency, it is recommended to apply all three upgrades.



HPO90 COMPRESSOR STAGE UPGRADES

Benefits

- › Increased reliability through the elimination of impeller failures that have been experienced at some locations
- › Improved compressor efficiency leading to increase in exhaust waste gate margin and increased run-time-between-overhaul
- › Increased range to surge
- › Can be done in conjunction with or separately of a turbine stage upgrade.

Upgrade Summary

- › New compressor inlet casing eliminating struts in front of the impeller that obstruct air inlet flow and decrease compressor efficiency
- › New 5-axis milled forging impeller for increased strength and efficiency
- › New diffuser design for increased efficiency
- › New case design with improved cut-water section for increased efficiency
- › Magnetic pick-up for the tachometer moved into the bearing case behind the impeller to remove the obstruction in front of the impeller, which decreased compressor efficiency
- › Thrust bearing wear detection changed from eutectic device to a proximity probe in the bearing case and/or a thermocouple embedded in the thrust bearing

Interchangeability

Upon completing the compressor stage upgrade, the turbocharger is completely interchangeable with the existing turbocharger other than the need to make the following changes:

- › Modifications required to facilitate the new magnetic pick-up. Magnetic pick-up is of a different design. Lead exits the oil drain cavity of the turbocharger.
- › Modifications required to accept the output of the proximity probe for thrust bearing wear detection, if chosen. Lead exits the oil drain cavity of the turbocharger.
- › Modifications required to accept the output of the type-J thermocouple equipped thrust bearing, if chosen. Lead exits the oil drain cavity of the turbocharger.

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HP090 TURBINE STAGE UPGRADES

Benefits

- › Improved turbine efficiency, leading to increase in exhaust waste gate margin
- › Increased engine operating range
- › Can be done in conjunction with or separately of a compressor stage upgrade.
- › Improved turbine efficiency can be utilized to reduce engine emissions.

Upgrade summary

- › Optimized turbine matching to your application for maximum performance
- › New turbine broach angle design for increased efficiency and optimal flow angles

Interchangeability

- › Upon completing the turbine stage upgrade the turbocharger is completely interchangeable with the existing turbocharger's connection to the engine



HP090 THERMOCOUPLE EQUIPPED THRUST BEARING UPGRADE

Benefits

- › Monitoring of thrust bearing temperature may allow for the detection of lubrication issues prior to a bearing failure
- › The existing eutectic device only allows for the unit to be shut down after thrust bearing failure has already occurred
- › Can be done in conjunction with or separately of a compressor stage upgrade.

Upgrade summary

- › New thrust bearing equipped with a thermocouple is installed
- › Thermocouple lead exits the oil drain cavity and must be routed out of the lube oil drain line to the point of termination
- › The lube oil drain line must be modified to facilitate the installation of a seal where the thermocouple lead exits the drain line
- › Thrust bearing wear detection from eutectic device can be utilized in conjunction with the thermocouple as long as a compressor stage upgrade is not done at the same time

Interchangeability

- › Upon completing the thermocouple bearing upgrade, the turbocharger is completely interchangeable with the existing turbocharger other than the need to make the following changes:
 - Modifications required to facilitate the installation of the thermocouple which include modifying to oil drain line for a seal

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