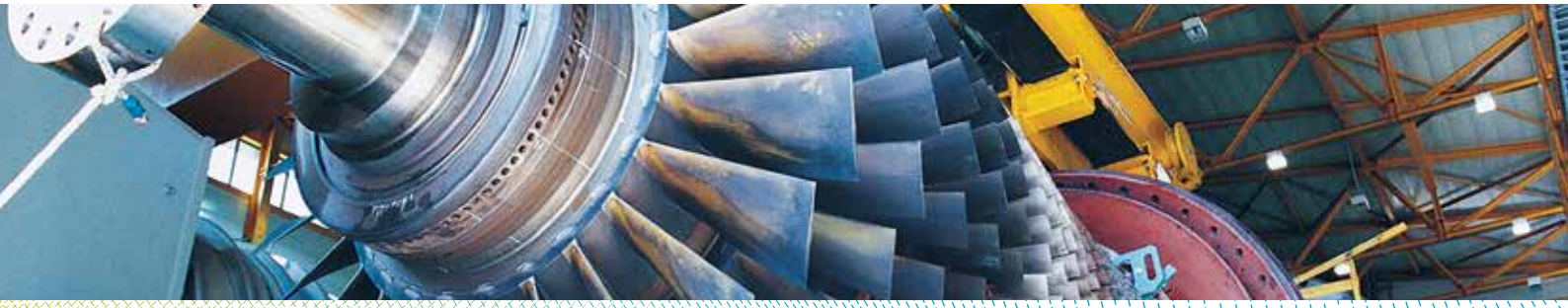
Mobil Serv℠
Lubricant Analysis

Gas and steam turbine extended service analysis



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This extended service analysis helps determine oxidation stability, identify potential varnish buildup and monitor system condition.

Description

Using lubricant analysis to monitor turbine performance can help improve unit reliability and maintenance metrics. This service offers a more extensive level of testing designed to support equipment reliability decisions for critical turbine applications.

Extended service turbine analysis provides comprehensive data that can be paired with visual inspections and operational knowledge to help determine oxidation stability, identify potential varnish buildup and ensure proper system performance.

Potential benefits

- Improved equipment reliability by identifying potential failures before they occur
- Increased productivity through reduction of unscheduled downtime
- Reduced parts replacement and labor costs
- Minimized lubricant consumption and disposal with optimized drain interval

Analysis options — Gas and steam turbine extended service

	Suitability for continued use	Varnish analysis*	Maximum service*
Demulsibility	✓		✓
Foam Test Sequence 1	✓		✓
Membrane Patch Colorimetry (MPC)**		✓	✓
Metals	✓	✓	✓
Nitration	✓	✓	✓
Oxidation	✓★	✓★	✓★
Particle Count	✓	✓	✓
Particle Quantifier (PQ) Index	✓	✓	✓
Rotation Pressure Vessel Oxidation Test (RPVOT)	✓		✓
RULER - Amine		✓	✓
RULER - Phenolic		✓	✓
Total Acid Number (TAN)	✓	✓	✓
Ultracentrifuge	✓	✓	✓
Viscosity at 40°C and 100°C	✓	✓	✓
Viscosity Index	✓	✓	✓
Water Vol % Karl Fischer (KF)	✓	✓	✓

Key

✓ Included test

★ TAN in lieu of oxidation for select synthetic products

*For select gas and steam turbine lubricant products only. Contact your ExxonMobil representative for details. Analysis may vary by laboratory, product supplied or oil condition.
** The MPC has a sample preparation time of at least 96 hrs. as prescribed per ASTM method.

Sample frequency
Sample at OEM recommended frequency or, for general guidance, begin with: **Quarterly**.
Adjust frequency based on asset's economic impact, operating environment, machine age, oil age or sample results trend.

Gas and steam turbine extended service analysis

Test	Purpose	Importance of test
Demulsibility	To measure the ability of an oil to separate water	Steam turbines often expose the turbine oil to water from condensed steam. The ability of the oil to shed water will have a direct impact on its long-term oxidative stability and equipment rust
Foam Sequence I	To measure the potential of an oil to build and maintain foam	Foam can lead to operational issues like improper oil level indication or reservoir overflow
Membrane Patch Colorimetry (MPC)	To measure color change of a filter patch due to varnish vs. clean patch as energy change (ΔE)	Color and light blockage from lubricant deposits on a membrane patch can indicate the presence of varnish in the oil
Metals	To determine the presence and levels of metallic content in the oil, including contaminants and wear particles	The level of wear metals helps determine if equipment components are wearing or if harmful contamination has entered the oil. The level of metals that are part of the additive chemistry is also reported
Nitration	To measure the amount of nitrogen by-products in the oil	Nitration results from the rapid compression of entrained air. As a result, if unchecked, nitrogen and oxidation precursors might form sticky varnishes.
Oxidation	To determine the level of lubricant oxidation and deterioration	Oxidation can mean: ▪ Increased wear and corrosion ▪ Shorter equipment life ▪ Increased viscosity ▪ Excessive deposits and plugging
Particle Count Analysis	To measure the level of particulate contaminants in the oil	▪ Cleanliness is a critical factor in the running of turbine oil systems ▪ Debris can interfere in the fine tolerances of the systems, pumps and valves or cause premature wear
Particle Qualification (PQ) Index	To determine ferrous metal fatigue failures and metal-to-metal contact not usually detectable with some spectrographic analysis	PQ Index can detect at an early stage: ▪ Anti-friction bearing wear ▪ Plain bearing wear ▪ Gear wear
Remaining Useful Life Evaluation Routine (RULER) - (Linear Sweep Voltametry)	To measure individual antioxidant concentration in oil compared to a new oil reference (%)	Understanding antioxidant reserve in turbine oils can be helpful in predicting end of oil life and may provide insight on varnish formation
Rotating Pressure Vessel Oxidation Test (RPVOT)	To measure the remaining oxidation stability of an oil	Oxidation stability is a key performance feature in turbine oils. As an oil oxidizes, the equipment is more prone to build varnish
Total Acid Number (TAN)	To measure acidic oil oxidation byproducts	An elevated number may indicate increased oil acidity resulting from increased oil oxidation
Ultracentrifuge	To measure level of insoluble deposit formation in oil	Elevated deposit formation can signify increased potential for varnish formation or represent debris, dirt or dust contamination
Viscosity	To determine the oil's resistance to flow	▪ An increase in viscosity may be due to high insoluble content, water contamination, or admixture with higher viscosity lubricant ▪ A decrease in viscosity may be due to water contamination or admixture with lower viscosity lubricant ▪ Both high or low viscosity may result in premature equipment wear
Viscosity Index	To measure the change of viscosity with temperature	Higher VI demonstrates wider operating range. Monitor for cross contamination. Monitor for viscosity shear.
Water	To detect presence of water contamination	Water contamination may cause severe corrosion and subsequent wear, poor oil film thickness or hydrogen embrittlement