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Tackling Varnish Formation in Turbomachinery Which Lead to Maximize Turbine and Compressor Availability

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Abstract

Turbomachinery operators in the power generation, oil, gas and petrochemical industries are seeking ways to reduce their total cost of ownership and maintenance costs by maximising asset availability and reliability.

In addition, driven by the goals of reducing emissions and improving efficiency in the power generation sector, many older coal-fired power plants are being retired and replaced with higher-efficiency, lower-emission, combined-cycle and gas turbine power plants. Such generating capacity is more commonly being used in peaking or cycling duty rather than baseload generation, which is because the increased thermal cycling of the oil and the reduced oil flows and low-temperature conditions in key components such as inlet guide vanes lead to a higher incidence of varnish formation.

To achieve higher operating efficiencies, equipment designs are changing. For example, turbines operate at higher temperatures and have a smaller footprint and lower-volume lubricant oil reservoirs. Meanwhile, operators are seeking longer oil and asset life with less downtime. However, these operating and equipment design changes place additional oxidative and thermal stress on turbine oil that can result in premature ageing and degradation. The formation of oil-soluble and oil-insoluble degradation products, also referred to as varnish or deposits, can lead to operational problems and associated unplanned downtime.