

Lube Oil Varnish Removal & Prevention

Combustion turbines (CTs) utilize lubricating and hydraulic control fluids for a wide range of applications. CTs with combined lube and hydraulic control reservoirs (GE Frame 6/7) are susceptible to varnish deposit formation which leads to unit trip and fail-to-start conditions especially in the growing population of peaking gas turbines. Group I lube oils have given way to Group II base stock oils which have lower solubility characteristics. Lower solubility means that the newer Group II lube oils cannot hold the same levels of soluble or insoluble oxidation and thermal degradation by-products in the oil thus leading to more problems with sediment, sludge and deposits. The SVR (Soluble Varnish Removal) removes oxidation by-products in solution to remove varnish deposits and to prevent varnish from ever forming.

Applications: Combustion Turbines, Steam Turbines, Hydro, Nuclear



Main Bearing Lube Elements & Non-Sparking Element Upgrades



Filter element sparking is now a recognized source of thermal fluid degradation along with pressure induced dieseling in CT lube and hydraulic control circuits. Improvements in filter media efficiency coupled with higher flow rates and more resistive Group II oils has brought filter element spark discharge to the forefront in many power plants. A common reaction to sparking has been a migration to coarser filter media selections (i.e. 25~40 micron nominal) to minimize the chance of sparking. Although the likelihood sparking might be reduced with such choices, fluid cleanliness and bearing surfaces suffer as ISO Codes trend higher over time. CFI offers a full range of NSD (Non-spark discharge) filter elements for any lube or hydraulic application that maintain low ISO Codes and mitigate the thermal fluid degradation associated with element spark discharge.

Applications: Combustion Turbines, Steam Turbines, Hydro, Nuclear

Cooling Tower Gearbox

Service often comes with confined space requirements. Changing the oil by traditional gearbox drain and refills can and should be avoided by using portable or permanent dedicated filtration systems that feature particulate and water removal filtration. Avoid premature gearbox rebuilds and replacements, keep cooling towers turning, and avoid premature fluid replacement with a of off-line fluid conditioning solutions for gearboxes.

Applications: Combustion Turbines, Steam Turbines, Nuclear

Bulk Fluid Handling



Dedicated filtration and breathers on bulk storage tanks for lube and hydraulic oils and standby diesel fuels is the first line of defense in preventing one of the worst sources of particulate and water contamination, new fluids. Bulk storage tanks collect contaminants from delivery vehicles and through ineffective breather arrangements. Eliminate this source of contamination before transferring new fluids into critical power plant operating systems. Filter carts are also a valuable tool for keeping fluids clean when transferred from storage to critical systems.

Applications: Combustion Turbines, Steam Turbines, Hydro, Nuclear

Compressors

Large compressors typically utilize the same turbine oils used in the turbine lube reservoirs and are susceptible to various forms of contamination including varnish, particulate, and water contamination. CFI offers a number of solutions available to improve compressor reliability including DFE rated element upgrades, water removal elements, varnish mitigation and acid removal.

Applications: Combustion Turbines, Steam Turbines, Hydro, Nuclear

FD and ID Fans

DFE rated filter element upgrades work to ensure reliable fan operation and drastically lower ISO Codes. Dedicated off-line filter panels and skids are also suitable where fans are not fitted with sufficient contamination control. The V1 portable mini-vacuum dehydrator is ideal for solving water issues on FD and ID fan reservoirs.

Applications: Combustion Turbines, Steam Turbines, Hydro, Nuclear

Boiler Feed Pumps and Seal Oil

Many BFP or Seal Oil systems utilize antiquated filtration with coarse wire mesh filtration leaving ISO Codes excessively high for optimum reliability. Upgrade filter elements to DFE rated elements, and housings to DFN series duplex filter assemblies or MF3 simplex housings featuring DFE rated high efficiency glass media elements for years of reliable performance.



Applications: Combustion Turbines, Steam Turbines, Hydro, Nuclear

Hydraulic Control Element Upgrades

DFE rated elements yield cleaner fluid in EHC systems in pump discharge and servo pilot filters. Prevent servo valve failures caused by contamination related failure. Dynafuzz element upgrades feature stainless steel fiber media that is impervious to the effects that acid formed in phosphate ester can have on some glass medias. DFE rated non-sparking Dynafuzz elements provide superior fluid cleanliness and solve media migration issues in phosphate ester EHC fluid.

Applications: Steam Turbines, Hydro, Nuclear

EHC Water Removal



With passive breather devices and no continuous exchange of air through the reservoir headspace, the air above the oil will achieve thermal and moisture equilibrium with the oil. At the top of the reservoir headspace the air cools yielding condensation and recontamination of the water into the oil. TMR is an active breather system that maintains the air in the headspace at a dry enough level to ensure that condensation cannot take place. As the dry air transfers through the headspace at $RH < 5\%$ the oil gives up its water striving to achieve equilibrium with the dry air in the headspace. The TMR also promotes air release in the EHC reservoir providing an additional degassing function.

Applications: Steam Turbines, Hydro, Nuclear

EHC Phosphate Ester Fluid Maintenance Solutions

Steam turbine EHC systems typically utilize fire resistant phosphate ester fluids which can present certain contamination challenges resulting in servo valve failure or premature fluid replacement. However, when properly maintained phosphate ester fluids not only provide the safety of fire resistance and years of EHC system operation free of contamination related servo valve failures and long fluid life. CFI has the full solution for phosphate ester to manage and eliminate problems with acid production, dissolved metals, water contamination, sub-micron products of thermal degradation, dark fluid, sludge and particulate contamination.



Applications: Steam Turbines, Hydro, Nuclear

Lube Oil Water Removal by Vacuum Dehydration & Coalesce



CFI offers two primary types of technologies to address the common problem of water entering steam turbine lube oil reservoirs. VUD vacuum dehydrators rapidly remove free and dissolved water to less than 10ppm combining heat, vacuum, and an intuitive design for ease of operation. COT turbine oil coalesce skids remove water from oil with mechanical coalesce and separator filter elements yielding more than 95% single pass free water removal efficiency with a performance guarantee to less than 150 ppm under normal operating conditions. Both the VUD and COT skids include efficient, on-board particulate removal filters to achieve low ISO fluid cleanliness codes.

Applications: Steam Turbines, Hydro, Nuclear

Gearbox Filtration

Break the drain and refill gearbox oil change cycle and improve reliability, extend useful oil life, and avoid premature contamination gearbox rebuilds by installing FSL dedicated off-line filter skids specifically designed for high viscosity lube oils. High flow LF housings are also a good fit for adding high efficiency filtration to existing re-circulation lines on coal mills to control particles and water contamination.



Applications: Steam Turbines

Combustion Turbine Air Intake Misting Systems for Cooling Intake Air

Combustion turbines are equipped with misting/fogging water spray systems for cooling of intake air. High pressure in-line filters are used to protect injector spray nozzles from pump seal debris, pump abrasive debris and contaminated water supply. CT air intake misting systems are typically found on turbines installed in high temperature climates. Upgrade your in-line filter to maximize the life of your injector spray nozzle.

Applications: Combustion Turbines

Desiccant Breathers

Air is often laden with naturally occurring contaminants like water and solid particles. These contaminants can enter lube and hydraulic oils and damage a hydraulic system. CFI offers desiccant breathers with not only dry incoming air, but also filter it via two micron filters at both ends of the breather. Further, these desiccant breathers feature isolation check valve, which isolate the adsorbent from exhaust air to lengthen service life of the desiccant while also protecting it from volatile and splashing fluids. These breathers represent a first line of defense by cleaning the air and keeping harmful contaminants from entering a turbine, making them ideal for power generation applications.



Applications: Combustion Turbines, Steam Turbines, Nuclear

Color Coded Identification



Cross contamination of fluids can be a costly error, so being able to quickly and accurately identify fluids is an important precaution. ColorGuard, a color coded anodized aluminum fitting system, allows users to quickly identify the contents of a reservoir or tube based on the color of the fitting, streamlining maintenance and eliminating handling issues. The ColorGuard system also incorporates adapter kits for quick installation of domed flanges, gearboxes, hydraulic reservoirs, breathers, and drums.

Applications: Combustion Turbines, Steam Turbines, Nuclear