PALL

Power Generation

Case Study

Pall Filters Help Recover Lost Megawatts and Lost Revenue

The Problem

A major Midwestern power plant continuously experienced losses in power generation capacity, typically 27,000 MWh per year, due to the deposition of copper onto the turbine blades. Near the end of a twelve month fuel cycle, the station was derated by 30 MW, resulting in an average of $30,000 per day of lost generation revenue. The station was forced to decrease turbine rotation speed due to copper deposition, and imbalance of the turbine blades.

As MW output decreases due to copper deposition, the plant must increase heat rate (fuel consumption) to maintain a consistent energy output at a lower efficiency. The plant then loses revenue as costs rise per MW generated.

The copper plating that occurs on the turbine is typically removed either by mechanical or chemical cleaning. Mechanical cleaning requires complete turbine disassembly, rotor removal, grit blasting of the parts with deposits, and re-assembly. This can take up to six weeks and cost more than $350,000 for a 400 MW steam turbine. Chemical cleaning has the potential of contaminating the intermediate pressure and low-pressure turbines, heaters, and the condenser. Neither method addresses the action of minimizing or eliminating the deposition process in the first place.

Industry standards require specific hold points for Copper, Iron, and Silica. Attaining these guidelines is usually the determining factor for startup duration in plants that adhere to EPRI or similar criteria.

Pall Ultipleat® High Flow is a full-flow condensate filtration system that provides a cost-effective, long-lasting platform to minimize metallic, silica, and all particulate transport in the condensate flow.

Filtration. Separation. Solution.SM

The Solution

The station investigated upgrading their existing condensate polisher to reduce copper carry-over. Pall Corporation provided a more economical solution with the Ultipleat High Flow startup filtration system.

After conducting several pilot tests to determine optimum equipment selection, Pall proposed an assembly consisting of a 38″ diameter filter housing containing 19 Ultipleat High Flow filter cartridges.

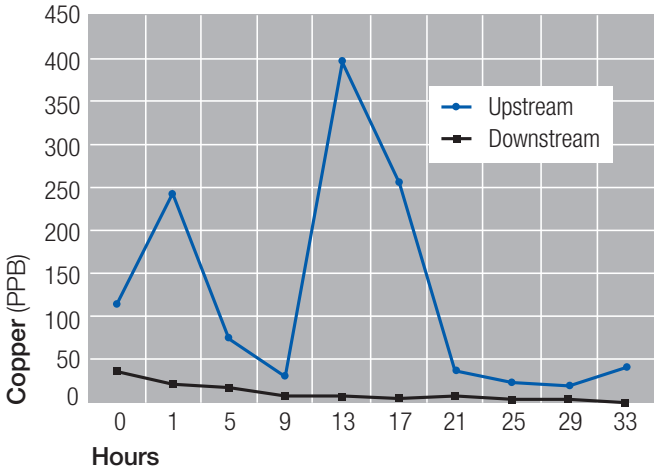
Since the installation, the condensate system has undergone 5 startups. The unit has consistently achieved the EPRI startup guidelines for Copper, Iron, and Silica in 15-20 hours compared with the >35 hours prior to the installation.

Since installation there have been no power derates due to copper deposition on the turbine blades.

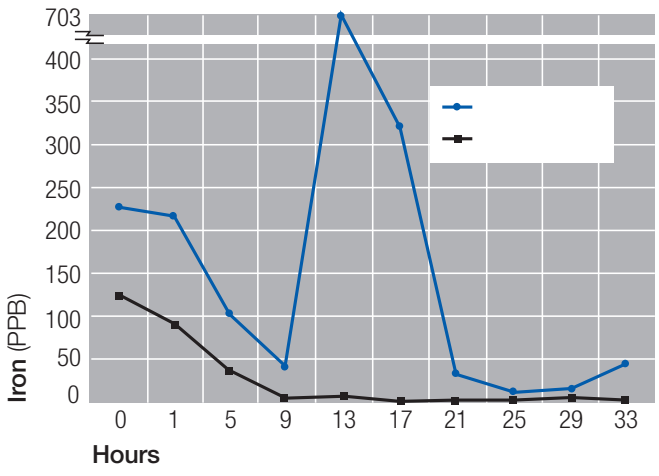
The Benefits

- Reduced chemical holds
- Reduced chemical feed
- Reduced boiler blow down
- Faster return to the grid
- Increase in revenue generation for the plant
- The cleaner condensate effluent from the filter has helped minimize the resulting problem of copper deposits on turbine blades and under deposit corrosion of boiler tubes due to iron
- Reduced risk of boiler tube water wall failures due to under deposit corrosion
- Increased efficiency of existing condensate polisher due to better removal of particulate copper and iron prior to the demineralizer bed

Concentration of Copper Up and Down-Stream of Pall UHF Filters During Condensate Start-Up



Concentration of Iron Up and Down-Stream of Pall UHF Filters During Condensate Start-Up



PALL Power Generation

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