Upgrading boiler pretreatment increases reliability and reduces cost at Canadian pulp and paper mill

CASE STUDY | Pulp & Paper

| Challenge

This pulp and paper mill produces high-pressure steam for use in the paper production operation as well as driving a steam turbine for electricity generation. Raw water for the mill comes untreated from the river, where variable TOC and color resulted in performance problems of poor quality effluent and increased operating costs. Frequently, influent became so difficult to treat that purchased municipal water was used to reduce the burden on the pre-treatment plant. High cost of clarification, demineraliser regenerants (caustic and sulphuric acid), and frequent brine squeezes of the organically fouled anion resin were some of the results. As feedwater is used for attemperation of steam prior to the steam turbine, fouling of the turbine blades was noticed within two weeks of returning to service after cleaning. Typically turbine cleanings were every two years, with performance of the unit degrading by over 15% in that period.

| Solution

The poorly performing clarifier was taken out of service, and two single-pass reverse osmosis machines were installed after a 5-micron cartridge filter and before the existing demineralizer plant.

The ROs are automatically cleaned, sanitized, and preserved on alternating evenings. They provide not only 95% dissolved ion removal but a similar removal of TOC and color. The RO effluent with resultant low ionic load and low fouling potential are then polished of the remaining contaminants via the existing ion exchange equipment.

| Results

The pre-treatment water has now reached unprecedented levels of quality, reliability, and reduced cost.

Application: Boiler Pretreatment

Location: Dolbeau, Quebec, Canada

Capacity: 400 L/m

Configuration: Sand filter, 5 micron cartridge, single pass RO, existing organic trap, SAC/SBA demin

Commissioned: 2004

| Quality

As shown in Figure 1, conductivity is now >0.5 mmhos 99% of the time. Figure 2 shows silica levels moving from an average of 429 ppb to an average of 22 ppb. This resulted in improved turbine performance that has been seen continuously since start-up of the RO in 2004.

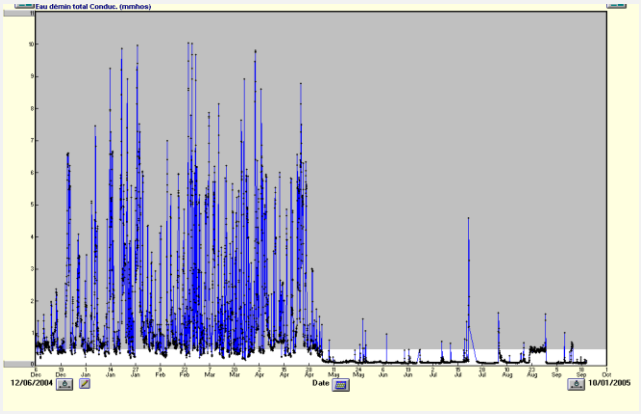

Figure 1: Conductivity Stabilization

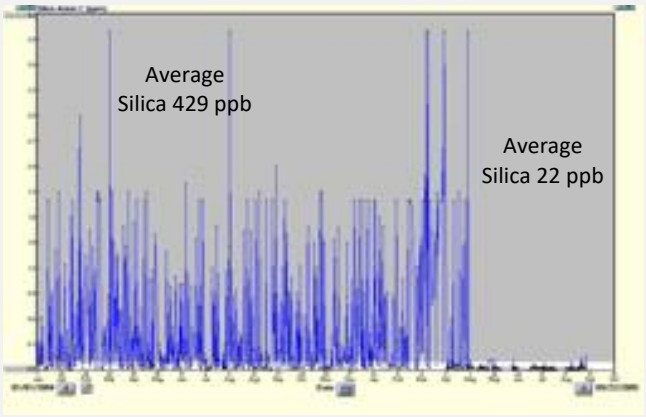

Figure 2: Silica Level Reduction

| Cost

Chemical savings from the clarifier alone are US$100,000. Caustic and sulphuric acid savings are over 75%. Figure 3 shows prior and current run-length extension with RO. Maintaining energy production represents over $1,000,000 annually in savings to the mill from avoided electricity purchases.

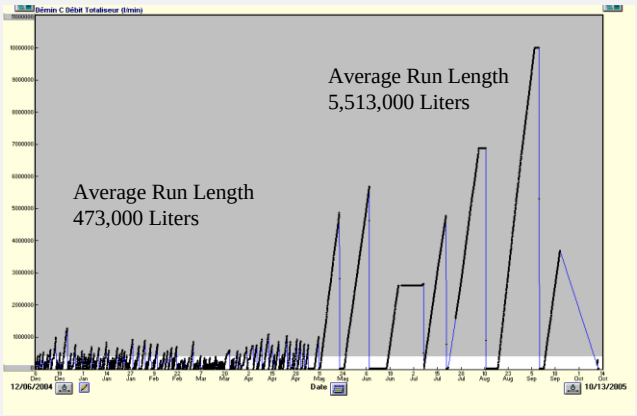

Figure 3

| Reliability

The new pre-treatment plant is highly capable. Utilizing PRO Series RO has resulted in virtually zero requirement for municipal water purchases (see Figure 4).

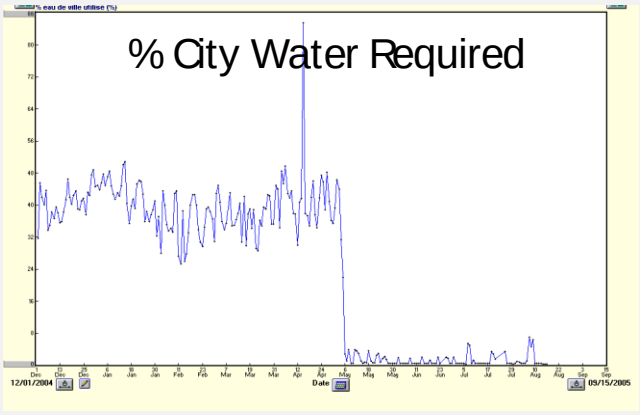

Figure 4

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