Compact Solution Creates Impact

Water purification system benefits Canadian pulp manufacturer

By Clark Briggs

Each spring, the quality of the process water at a pulp mill in eastern Canada would suffer when snowmelt generated large volumes of runoff into a nearby lake and its tributaries, pushing additional debris, dirt and iron into the facility's aging clarification system.

This cost the company hundreds of thousands of dollars per day in lost revenue because the pulp it was producing did not meet the strict prime brightness standards for the manufacture of rayon for the textile industry, the highest value end use for the highly purified form of cellulose made from wood. The brightness reduction of the pulp product was directly correlated with the wash and process water containing higher-than-normal levels of iron and other naturally occurring colorants.

To meet its process water quality specifications, mill officials had to slow down the flow rate of the clarification system due to inadequate filtration capacity from both their gravity and sand filter systems to deal with the added iron and particulate loading. However, this reduction in flow resulted in the facility not having enough filtered water for its other processes. To meet the needed flow rates, mill officials were forced to open a filter bypass, causing severe degradation in the brightness of the finished product.

Mill officials initially were hesitant to explore outsourced solutions, assuming that any solution to their water quality problems would be extremely costly because the facility requires as much as 16,000 gal per minute (gpm) of purified water, up to half of which is highly filtered for pulp production. The balance of the flow is used for cooling, which also benefits from higher-quality water via more efficient heat exchange at lower contaminant levels.

Moreover, the company was unable to shut down its water purification system for repairs or inspection. A shutdown in early spring could risk the water system piping inside the plant freezing. Additionally, pulp manufacturing is a commodity business subject to the vagaries of spot marketing pricing. Even a brief outage can have a significant financial impact in this capital-intensive, small-margin industry.

The system treated a portion of the mill's water, which then was blended back into water from existing filtration.

Cost-Effective Purification System

The core of the challenge was to design and implement a cost-effective water purification system that would enable the mill to meet its quality and flow requirements, helping the company to capture the full value of the pulp it produces for the rayon manufacturing industry—without interrupting production.

After receiving the call at its logistics center in Ohio, MPW's Industrial Water division developed a proposal for the mill within hours and was ready to deploy the solution within two days. The plan included three trailer-mounted media

filtration units capable of producing up to 2,500 gpm with water quality of less than 1 ntu.

The plan was to treat only a portion of the water generated by the mill's clarifier, effectively closing the bypass valve. In addition, MPW recommended the mill operate its sand and gravity filtration system at a slower rate by making use of its full capacity, improving the quality of water it generates. Nonetheless, the water from the sand and gravity system during spring runoff can have turbidity between 2 and 4 ntu. The theory was that combining the highly polished water from media filtration with water from the reduced-flow sand and gravity systems would meet requirements to produce prime-grade brightness pulp.

The MPW trailers featured automated backwashing, reducing equipment and labor costs. The system also could inject chemicals, if needed, to meet the mill's quality requirements even with extreme inlet water quality up to 50 ntu. All controls for operations, chemical injection, online turbidity and other devices were capable of being operated remotely via the Internet. The system required one MPW employee per day on site during the day to monitor operations and verify customer flow rate demand. This employee also was able to operate the system remotely from his or her laptop or tablet. The logistics center also could operate the system.

The filtration system can be operated remotely via laptop computers or tablets. The logistics center also can operate the system.

Results

The solution exceeded expectations for water quality and flow rates. The media filtration units met the challenge without the use of chemical injections for the approximately two months MPW was on site. Treating a portion of the mill's water to a high degree and then blending it back into water from the existing gravity and sand filtration system resulted in product brightness above grade for the entire deployment, and gains in the customer's bottom line.

MPW now is called upon regularly to augment the mill's water purification processes, for example, in the fall, when feedwater conditions are similar to springtime. MPW also has refined its processes and coordination with the mill, and the company now dispatches two trailers and no chemical injections have been required. **WQP**

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