Water Cost Savings in Paper Manufacturing

Client
Knowlton Technologies is a sheet and paper material manufacturer in Watertown, NY. The company produces specialized filter paper and special property sheet materials. They use large volumes of water both from the city and from the Black River for their processes. For certain paper products requiring high whiteness, city water must be used in order to avoid paper staining. City water use varies from year to year based on production demand but typically requires up to 87 million gallons of city water at a cost of $240,000 per year.

Opportunity Area
There is a significant opportunity for water cost savings if river water could be used instead of city water. This would allow all processes to use the same water source rather than having to switch sources depending on the product being run.

Objectives
Determine the components of the river water that result in paper staining and the cost-effective technologies that could be utilized to eliminate these contaminants from the river water.

Work Performed
The NYSP2I, in collaboration with CITEC Manufacturing &Technology Solutions (CITEC) developed a baseline of water use for the paper operation requiring city water. River water was analyzed for hardness and tannin. It was determined that the river water contained tannins which stain paper in low concentrations. Tannins are naturally occurring substances that come from the partial decomposition of leaves and other plant material in river water. Various filtration technologies were tested to determine the most efficient and cost-effective process for the removal of tannins.

Results
Nanofiltration, a filtration technology using membranes similar to reverse osmosis membranes, proved to be the most effective in removing tannins from river water. Successful implementation of nanofiltration at Knowlton should virtually eliminate city water use in the summer months, and has the potential to reduce or eliminate city water use in the winter months. The annual anticipated cost-savings are $180-240,000/year.