

Paper Mill Water Closure: A Success Story

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ABSTRACT

APC Paper of New York, located in Norfolk, faced a state mandate to reduce the Biochemical Oxygen Demand (BOD) discharged from their process. They considered multiple alternatives to meet the discharge limits before selecting a Mill water closure option. This overview outlines the cost-effective water management strategies that were installed to provide high-rate water reuse. Improving the existing DAF Clarifier performance and installation of efficient www/PURIFIER Microfiltration technology will be discussed.

INTRODUCTION

Today the Pulp & Paper and Wood Products Industries are faced with tightening water quality and volume discharge regulations. Whether discharging to a local treatment facility or discharging to a river the economic impact is substantial. This article outlines a typical situation where the production facility utilized the latest expertise and most efficient equipment to cost-effectively achieve their water management goals.

APC Paper of New York produces specialty Kraft grades from recycled fiber. The Mill was faced with meeting new water discharge standards put in place by the New York Department of Environmental Conservation (NYDEC). The facility met all the new requirements except for Biochemical Oxygen Demand (BOD). To meet these guidelines the Mill commissioned consultants to review the process and determine the most cost-effective strategies to meet the new stringent requirements.

The Mill received recommendations and quotations to install a \$1,200,000-\$1,400,000 treatment system expansion. In addition to upgrading primary clarification, the Mill would be required to install a 500 GPM Secondary (Biological) treatment operation to meet the environmental regulations. After evaluation of the facilities process and regulatory requirements, World Water Works proposed a process water reuse approach that involved upgrading their present process Dissolved Air Flotation (DAF) system and installing advanced Microfiltration. This approach would cut water discharge from 600,000 GPD to 100,000 GPD and effectively meet the discharge limits. The Mill selected the water reuse option for three main reasons:

- The capital costs would be 80% less for the water reuse project as opposed to the effluent treatment option.
- The success of the pilot testing of the www/PURIFIER Microfilter technology.
- Unlike the biological treatment system, which would increase operating costs substantially, the water reuse approach would actually reduce the Mill's cost of operation.

PROCESS WATER REUSE

The process water reuse project required installation of a www/DAF Upgrade (The package included an Advanced Dissolved Air System and Hydraulic Cell Modifications) and a 20 micron www/PURIFIER Microfiltration System; both manufactured by World Water Works. By upgrading the facilities DAF Clarifier to improve water quality, the clarifier effluent water could replace fresh water use in many locations. A portion of the clarifier effluent (150-200 GPM) was processed through the 20 micron www/PURIFIER Microfilter. This high quality water was directed to critical machine showers and pump seals. The specific equipment installations are outlined below.

DAF Upgrade

Over the past several years, fundamental advancements have occurred in DAF technology. For example, World Water Works' www/RESOURCE, a pre-engineered DAF, utilizes innovative hydraulic designs, new air dissolving technology, and unique sludge removal techniques to provide superior performance at lower costs and reduced footprints. Understanding the trend in the industry to get more value from existing equipment, World Water Works applies these technological advancements to existing DAF Clarifiers. Highly successful upgrades have been completed on all brands of circular & rectangular DAF configurations.

APC's Norfolk, NY facility used the www/DAF Upgrade system by incorporating a Dissolved Air and a Hydraulic Separation Zone Upgrade. The "Dissolved Air Upgrade" replaced the Pressure Tank Air Dissolving system that was originally installed with the DAF. The Dissolved Air Upgrade incorporates the use of a proprietary two-stage pump technology and proper system engineering to produce the smallest (30 micron) and most consistent (93%+ saturation efficiency) microbubbles commercially available. Unlike typical DAF air systems, no compressed air is used to operate this Dissolved Air System.

Although many systems can achieve superior results by simply installing a Dissolved Air Upgrade, a Hydraulic Separation Zone Upgrade was also implemented at APC. This was related to the age of the Saveall and the fact that the Mill was exceeding the DAF's original designed flow capacity. The Hydraulic Separation Zone Upgrade was engineered to minimize turbulence and channeling throughout the DAF. This included analysis of the inlet approach piping, the separation zone, water effluent area, polymer feed scheme and the solids removal system. By re-orienting the water flow pattern and minimizing turbulence in APC's DAF; the clarifier performance improved and troublesome upset conditions declined.

The results of the upgrade work improved Clarifier performance substantially. Total Suspended Solids (TSS) were reduced 50%, while polymer use was reduced 35%. In addition to improving water quality for use in paper machine showers and other unit operations, the lower TSS in the clarifier effluent allowed the size of the microfiltration equipment to be reduced (lower capital cost).

Microfilter Installation

APC installed a World Water Works' 20 micron www/PURIFIER Microfilter to filter 150-200 GPM of the DAF effluent. This was installed to reliably provide water with no particles larger than 20 microns to critical paper machine showers and pump seals. Although the high performance www/PURIFIER system can be designed to effectively filter out much smaller particles, the Mill determined 20 microns was ideal.

World Water Works' advanced www/PURIFIER Microfiltration Technology operates with a patented, proven "air backwash" arrangement that insures reliable performance. Depending on the system design, the www/PURIFIER removes particles greater than 40, 20, 10, 5 or as small as 0.5 microns. The major advantages of the www/PURIFIER Microfilter is the proven 10 second "air backwash" and the "no replacement/no maintenance" system design. During the APC start-up of the www/PURIFIER system, Vice President-Operations Mr. Paul Mallet said, "The operation and air backwash are truly impressive".

The key to the APC system is that the short air backwash sequence reliably cleans the filtration surface of the fine particulate typically present in process white water systems. Other filtration systems would typically foul, backwash excessively, or require excessive element replacement.

CLOSING

Identification of the most cost-effective solution to achieving water management objectives is the most important step to insuring a successful project. APC achieved this by commissioning thorough onsite trial testing with proven equipment and an experienced water closure supplier. The DAF Upgrade and Microfilter project met APC's primary goal of satisfying the states regulatory requirements (NYDEC) for the protection of the Raquette River. APC has realized a 35% reduction in polymer use associated with the Upgraded DAF clarifier, while the overall project enabled the recovery of valuable hot water (reducing energy costs) and substantially reduced fresh

water intake and water discharge. Finally, the high machine production efficiencies have been maintained. Mr. Mallet outlined, “APC is very happy with the outcome of the project”. The systems have been operating trouble-free for over 6 months.