REUSE OF PULP PRODUCTS IN THE MANUFACTURE OF PAPER

INTRODUCTION

The pulp and paper industry is in a significant transition period with demands for certain paper products beginning to level off (Figure 1A). This in turn, is reducing the number of paper manufacturers in the U.S. (Figure 1B). In order to maintain profitability and ensure continued sustainability and growth, remaining pulp and paper establishments are encouraged to improve efficiencies in their manufacturing processes wherever possible. For example, lignin, which is removed from the wood at the beginning of the pulp manufacturing process is often maintained and combusted to produce on-site energy.

In paper production, it is believed that high solids concentrations present in the wastewater of paper manufacturing can allow the recovery of potentially valuable wood fibers from the waste stream for re-introduction into the paper manufacturing process. The result would be additional yield of the final paper product.

The Salsnes Filter system is a combined rotating-belt filtration and dewatering system designed for efficient solids removal and production of compact and easily managed sludge for both municipal and industrial wastewater applications. The technology utilizes a patented process in which solids are separated from a wastewater stream and accumulated on a specialized filtermesh with the subsequent filtrate being removed from the mesh and concentrated through a simultaneous dewatering mechanism.

As described in the following report, the unique properties of paper wastewater effluent can be harnessed and would-be wasted wood fibers effectively recovered by Salsnes Filter systems for re-introduction into the paper production process.

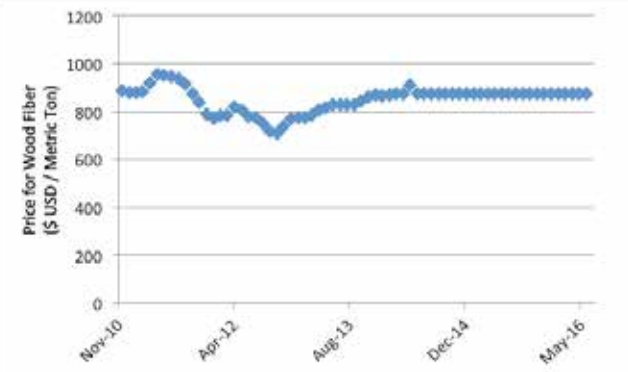

Figure 1A. Commodity Price of Wood Products. (World Bank)

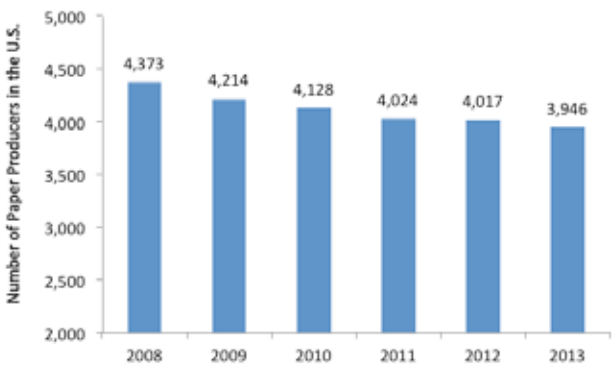

Figure 1B. Number of Paper Production Establishments in the United States. (US Census Bureau-County Business Patterns)

USING SALSNES FILTER TO RECOVER WOOD FIBER

Salsnes Filter, headquartered in Namsos, Norway, carried out a pilot study to evaluate use of rotating-belt filtration systems in the recovery of wood fiber resources. The overall objective of the study was to confirm that use of this technology would efficiently remove enough useable fiber from the wastewater stream so that additional paper products could be created.

PILOTING METHOD

Piloting was carried out on both softwood and hardwood wood fibers (See Figure 2 for various applications). Increasing numbers of 300 mm x 210 mm (11.8 in x 8.3 in) sheets of dry fiber were mixed in 600 liters of hot water (60°C) and mixed thoroughly until completely dissolved. A Salsnes Filter SF1000 (Figure 3) model was employed with the resulting wood fiber slurry being added to the filter system at different flow rates in order to ensure generation of a filter cake. The rate at which the slurry was added to the Salsnes Filter system was increased incrementally until the maximum influent flow rate that would maintain optimum treatment was evaluated.

Inlet samples as well as filtrate samples were collected and send to a third-party laboratory in Norway for analysis.

Figure 2. Sources and Applications of Various Wood Fibers.

Type of Fiber	Examples	Uses
Softwood	Oaks, Birch	Paper and Writing Material
Hardwood	Pine, Spruce	Cardboard

Figure 3. The Salsnes Filter SF1000 Rotating-Belt Filtration System.

PILOTING RESULTS

The results showed that when using slurries containing greater than 300 mg/L of total solids, the Salsnes Filter system was capable of removing between 95% to 99% of solids, producing an effluent stream with solids concentrations of 10 mg/L or less (Table 1). In addition, it was determined that the high efficiency of the Salsnes Filter system ensured that 64 l/s of softwood influent could be treated per m^2 of filter mesh. For hardwood influent the flow efficiency was 46 L/s per m^2 filter mesh used.

Table 1. Influent and Effluent Concentrations of Pulp Material.

	Softwood	Hardwood
Minimum TSS at Influent (mg/L)	78	120
Resulting TSS at Effluent (mg/L)	3	3
Maximum TSS at Influent (mg/L)	312	360
Resulting TSS at Effluent (mg/L)	3	10

CONCLUSIONS FROM THE PILOT

Salsnes Filter systems are able to efficiently recover greater than 95% of wasted wood fibers from the paper manufacturing process. While the majority of wasted wood products in pulp and paper processes consist of sand, bark and other wood residues that are typically non-reusable, it is still estimated that approximately $700,000 USD a year can be saved for a typical paper manufacturer, producing 250 L/s of wastewater. In addition, the pilot was able to evaluate the maximum water flow through the Salsnes Filter system to maintain maximum solids removal. This knowledge is vital for the design of rotating-belt filtration systems at paper production facilities hoping to improve their commercial efficiency in response to the changing market dynamics in the pulp and paper industry.

SUCCESS STORIES

WESTERN AUSTRALIA

A woodchip company which was challenged to improve its internal wastewater treatment processes, recently installed a Salsnes Filter system in an effort to reduce solids loading on anaerobic digestion downstream of an existing primary clarifier. The clarifier was replaced with the Salsnes Filter system for a four week trial period which yielded the following results:

- 40-60% of solids were removed from the raw water influent resulting in significantly less stress being placed in downstream treatment processes.
- As a result of the decreased solids, the use of chemicals was significantly reduced leading to savings in operating costs.
- The dewatering system provided a sludge consisting of 20-30% dry matter. This compact sludge was a significant improvement over the 1-2% sludge generated by secondary clarifiers at the original facility.

OVERALL CONCLUSIONS

Salsnes Filter systems have the capacity to ensure recovery of wood fibers present in the wastewater effluent of paper manufacturing processes. This is accomplished through the aggressive removal of solids which can be returned to the head of manufacturing processes and reused. This has the capacity to provide significant savings in operating costs for paper manufacturers by reducing the amounts of virgin wood products needed. The efficiencies driven by Salsnes Filter can provide a significant advantage in the highly competitive pulp and paper industry.

salsnes Filter™

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