Black Liquor Evaporation & Chloride Removal System
Pulp & Paper | Case Study

Smurfit-Stone Container Corp.
Hopewell, VA U.S.A. - Smurfit-Stone Container Corporation is one of the world’s largest manufacturers of packaging products ranging from consumer goods, printed displays and container board.

The Hopewell, Virginia facility is dedicated to providing linerboard for corrugated container end products.

The Client's Needs
The Smurfit-Stone Hopewell mill needed to replace the existing three evaporator trains that were currently in place at this facility with one very highly integrated system.

Due to the age of the current trains, MACT I compliance was necessary in any new design. System efficiency and reducing overall operation costs were also critical for the development of equipment and process design.

Project Description
This project, provided on a design-build basis, showcased the total project management approach and engineering capabilities of Veolia Water Technologies. The engineering disciplines utilized for this installation were in the areas of chemical, mechanical, electrical, civil/foundation and structural.

The entire scope of the project included construction of a new island that would be home to a six-effect, HPD® falling film evaporator train that would produce 74% product solids at an evaporation rate of 897k lbs/hr (407 t/h). The system would also process precipitator slurry, tall-oil brine and other recovered boilout liquor streams.

Other equipment supplied to the evaporator island included an HPD salt cake crystallizer, a soap skimming tank, cooling towers and chemical building, a foul condensate tank, a new MCC facility and control system. Outside of the island, a new indirect black liquor heater system was installed.
High Solids Concentration

The Enhanced High Solids Concentration (EHSC) system was an extremely integral part of the overall system. Veolia utilized HPD® Enhanced Forced circulation black liquor evaporation technology that was developed for producing higher total solids to the recovery boiler. This technology enables turbulence at high viscosity with lower recirculation rates, thus requiring less horsepower than conventional forced circulation.

The turbulence is created by using spiral rib inserts in the heat exchanger tubes. As a result, mixing of the bulk product solids increases heat transfer efficiency to minimize the laminar layer on the tube wall surface to greatly reduce fouling in the heater.

Precipitator Ash Treatment

Another key component of this system was the implementation of an HPD Chloride Removal Process (CRP™) system. Analysis of the precipitator slurry revealed high levels of chloride. If left untreated, unfavorable conditions could develop such as plugging of the super heater, corrosion in the recovery boiler and increased steam demand.

The CRP system removes non-process elements such as chloride and potassium that accumulate in the recovery cycle while recovering sodium to reduce chemical makeup demand. Removal of these elements via the CRP, rather than purging the raw precipitator ash, reduces the amount of purge to achieve the same results.

The Results

This project reflected the total project approach and engineering capabilities of Veolia Water Technologies. All facets of the new evaporator island at the Smurfit-Stone Hopewell, VA mill were designed and built with one point of responsibility.

Designed production rates and operational targets were reached by use of a highly integrated process solution utilizing HPD black liquor evaporation technology. MACT I compliance was attained through optimum condensate segregation that produced high-quality water for reuse in the mill. The evaporator system and peripheral equipment installed proved to be a success.