

Six-effect Black Liquor Evaporation System

Pulp & Paper | Case Study

Veracel Celulose S.A.

Eunápolis, Bahia, Brazil - Veracel Celulose is located in the extreme southern portion of the Brazilian state of Bahia. The area, rich in eucalyptus, is one of the largest and productive plantations in the world.

The company is a partnership of Aracruz Celulose, the largest producer of bleached eucalyptus pulp and Stora Enso, an integrated producer of paper, packaging and forest products.



The Client's Needs

When the Veracel pulp mill was in the early stages of planning, their primary goal was to become one of the most modern, productive facilities of its kind in the world. With a designed output of 900,000 tons, they would export product to customers in the United States, Europe and Asia.



Efficiency in operation to reach this goal was critical to the design of the facility. Concerns for the environment as well as consideration for resource consumption and safety were also key factors for this project.

The Solution

This is especially true of the black liquor evaporator system which was designed to produce 80% solids from highly viscous eucalyptus black liquor. By generating high solids, recovery boiler operations reach maximum efficiency in the generation of steam and lower use of energy. Evaporation of the black liquor was rated at 2.2 million lbs/hr (1,000 t/h), so water reclamation would also be critical to reduce mill intake.

Veolia Water Technologies was selected as the designer for the evaporation system at this new pulp mill. With a history of success and the experience of providing innovative eucalyptus HPD® black liquor evaporation technology, Veolia's expertise would be beneficial to this project. This highly integrated evaporation train would be designed to accomplish the essential goals of Veracel Celulose.

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Process Description

To meet the rated capacity and customer operational targets, Veolia designed a highly integrated, six-effect HPD® falling film evaporator train that optimizes the use of power and water intake to the mill.

The evaporation system incorporated several features into the process and equipment that were critical to meeting the objectives set forth by Veracel Celulose:

- **A four-body, switching, HPD falling-film concentrator** was designed to minimize fouling with the precipitation of salts at high product solids. With on-line washing capabilities, there is no disruption of production while achieving designed rates. The switching scheme allows one of the four bodies to be in wash cycle while the other three are in production.
- The second effect evaporator is also susceptible to scale as a result of the low critical solids point of eucalyptus liquor and the resulting solids profile of the six-effect evaporator train. To prevent this, **a split-body second effect** was added to allow for on-line washing and switching while the other is in production. This avoids fluctuation in firing solids during washing and keeps temperatures at a stable level.
- Valuable water is recovered by **effective condensate segregation**. Process condensate is separated into three distinct fractions to return one high-quality condensate for use in pulp washing while returning another portion to other mill operations. The third fraction, being foul condensate, is safely processed in the stripper and rectification columns and returned to the mill. Liquid methanol is then incinerated in the boiler.
- **A condensate stripper and methanol rectification system** was integrated into the process which converts the foul condensate fraction to liquid methanol. This feature makes transport of gases easier for incineration with the added feature of further generation of high-quality condensate.
 - The system is also designed with the flexibility to add future enhancements such as a future HPD CRP™ chloride removal system to reduce accumulation of non-process elements that impact efficiency of boiler operations.



The Results

The pulp mill at Veracel Celulose was commissioned in mid-2005. The HPD® black liquor evaporation system, designed by Veolia Water Technologies and installed by Confab Equipamentos S.A., was considered successful at start up.

The system has achieved and maintained the specified rates and capacity since commissioning. The condensate segregation system has produced the quality of water required for optimal reuse in the mill.

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