



TJ SUMMARIES

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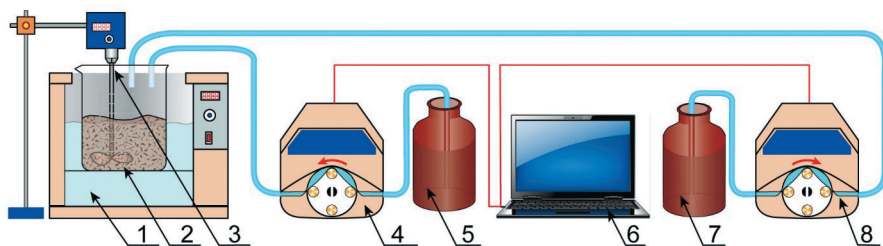
JUNE

BLEACHING

Improving the efficiency of hydrogen peroxide bleaching of chemimechanical pulp by continuous replenishment of bleaching chemicals

Xianqi Sun, Qingxi Hou, Bingxu Zhang, and Guanting Zhao

Hydrogen peroxide (H_2O_2) is commonly used to bleach chemimechanical pulp. A decrease in the concentrations of the bleaching reagents throughout the bleaching process results in low bleaching efficiencies. In this study, chemical solutions were



The apparatus for continuous chemical supplement bleaching.
1: thermostatic bath; 2: reactor; 3: stirrer; 4: peristaltic pump for H_2O_2 ; 5: plastic container for H_2O_2 ; 6: computer; 7: plastic container for $NaOH$; 8: peristaltic pump for $NaOH$.

continuously added into the pulp slurry during the bleaching process to maintain constant concentrations of H_2O_2 and total alkali in the bleaching system to improve bleaching efficiency.

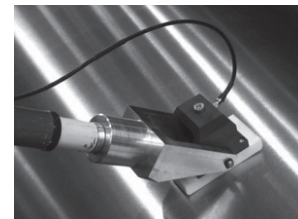
The results showed that when the H_2O_2 and total alkali concentrations were maintained at 4.5 g/L and 0.79 g/L, respectively, for 50 min, the bleaching efficiency reached 16.79, which was much higher than 7.38 obtained by using the high-consistency bleaching method. The results confirmed that continuous replenishment of chemical solutions into the bleaching system to maintain the constant chemical concentrations improved H_2O_2 bleaching efficiency of the chemimechanical pulp.

Mills could use the bleaching method proposed in this study to reduce bleaching chemical costs. New equipment would be developed to meet the needs of practical production.

PAPERMAKING

Finite element analysis of the thermal bending of a chilled cast thermo roll

Thomas Widmaier, Jukka Pirttiniemi, Esa Porkka, Panu Kiviluoma, and Petri Kuosmanen



Run-out measurements in the soft calender were based on a sliding pad with an accelerometer.

A previously-created roll model based on the ultrasound measurements of a chilled cast iron thermo roll of a soft calender was used to create a finite element (FE) model of the same roll. The FE analysis was used to simulate the behavior of the roll when heated and in changing operating conditions. The main interest was to study the thermal bending of the roll model.

The simulated behavior was consistent with known behavior of the thermo rolls in general, and when compared to actual measurements carried out in the calender, the simulation results showed similar behavior between the roll model and the actual roll. The main difference was in the absolute value of the bending, but the bending directions were practically the same. These results are promising for future research to develop methods for avoiding or minimizing the negative effects of the thermal deformations in thermo rolls.

This research is relevant to finding the cause for some calender-related problems. Roll suppliers and mills will find it useful in the manufacturing of improved thermo rolls.

NONWOOD PULPING

Pulping and bleaching of Malaysian oil palm empty fruit bunches

Robert W. Hurter and Medwick V. Byrd

Oil palm empty fruit bunch (EFB) was evaluated as a raw material for papermaking pulp production.

The EFB was chopped, screened, and washed before cooking. Preliminary bench-scale trials were carried out using soda and soda-anthraquinone cooking, followed by bleaching using elemental chlorine free and totally chlorine free sequences. Pilot-scale soda cooking was carried out in a 2300 L spherical digester using the soda process, followed by a three-stage elemental chlorine free bleaching sequence.

Unbleached and bleached EFB pulps were tested for physical and optical properties. Comparisons were made between the properties of the EFB pulps and bleached kraft eucalyptus pulp. The EFB unbleached and bleached pulps were acceptable for papermaking. For mills located near oil palm plantations, EFB could be a low-cost fiber resource for pulping.

PROCESS CONTROL

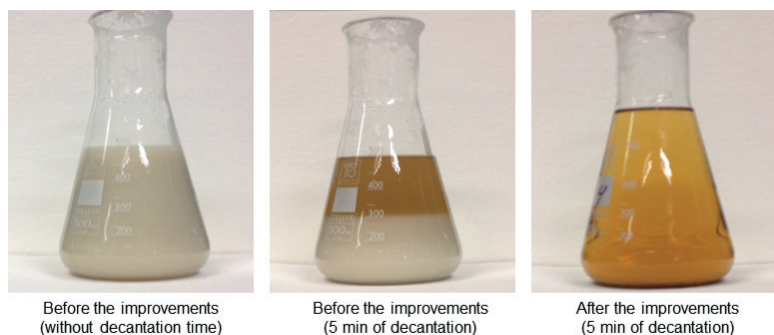
Reduction of alkali loss in an ash leaching system

Carla Célia Rosa Medeiros, Flávia Azevedo Silva, Saulo Godoy Pignaton, Estanislau Victor Zutautas, and Kleverton Figueiredo

There are many points in a kraft mill where the alkaline compounds are purged from the process. Several effluents, solid waste, and air emissions contain alkali, which leads to the necessity of chemical makeups to maintain the liquor balance.

The main loss of alkali at the Veracel mill in Eunápolis, Brazil, is present in the wastewater from the recovery boiler; more precisely, it is from the ash leaching system, which represents 80 percent of the total losses. To minimize alkaline losses while controlling the chloride level in the recovery cycle, a project was developed at Veracel to adjust the control loops of the ash leaching system, mainly on slurry density and purge control. These adjustments decreased alkali losses and increased treated ash, while keeping the chloride level of recovery boiler dust at 2.6 percent.

This research demonstrates how mills can reduce alkaline losses with automation solutions in the ash leaching system.



Purge density and solids content were reduced with the control adjustments.

RECYCLING

How old are fibers in paper for recycling and what is their life expectancy? A contribution to the life cycle assessment of wood fiber-based products

Gert Meinel, Lydia Tempel, Mike Schiefer, and Constanze Seidemann

Mean fiber age or MFA (i.e., the mean number of production cycles that fibers in a given paper material have undergone so far) can be calculated theoretically on the basis of mass flows in a given paper recycling loop. MFA distributions can be calculated in multiple, connected recycling loop systems, which are typical of countries and regions with high recovered paper utilization and recycling rates.

Paper Sector	MFA	MNU	MFA+MNU-1
Newsprint	1.97	2.13	3.10
Other graphic papers (including woodfree and mechanical coated)	1.14	1.84	1.98
Case materials (for corrugated board manufacturing)	2.98	2.25	4.23
Other paper and board for packaging (cartonboard, wrappings, etc.)	1.84	2.07	2.91
Sanitary and household	1.24	1	1.24
Other paper and board for industrial and special purposes	1.86	1	1.86

Newsprint and case materials had the highest utilization rates in the study.

The calculation uses a graph theory approach. The same approach shows there is a second important value that highlights another aspect of the circular economy: the mean number of future material uses (MNU). This value quantifies how often fibers in a given paper product will be used on average till their end of life. Put simply, MFA describes the past and MNU describes the future of fibers in a paper or board product.

Calculated results for the European region are presented in this study and compared for MFA and MNU. Both values add up to a total number of material uses (MFA+MNU-1) and should be used together.

Using these calculations, mills will have information for comparing resource efficiency of their wood fiber-based paper products with those of other mills and other sectors. This helps solve allocation problems in life cycle assessment.

LIGNIN

Evaluation of the particle size of organosolv lignin in the synthesis of resol resins for plywood, and their performance on fire spreading

Electra Papadopoulou, Sotiris Kountouras, Konstantinos Chrissafis, Mikelis Kirpluks, Ugis Cabulis, Pavla švíglerová, and Bouchra Benjelloun-Mlayah

For this paper, researchers studied the potential of using Biolignin—a trademarked organosolv lignin from straw—in the synthesis of phenol-formaldehyde (PF) resins. Before its use, Biolignin was further purified and subjected to mechanical treatment for reduction of its particle size to increase its reactivity, and the treatment's effectiveness was verified by atomic force microscopy. Resol phenolic resins were prepared with various substitution levels of phenol up to 80 percent, but their synthesis process was smooth only up to the 50 percent substitution level. Properties of the resins were determined with typical lab analysis. Their thermal behavior was studied with differential scanning calorimetry and thermogravimetric analysis, and their bonding ability was evaluated via their application in production of three-layer plywood panels that were prepared following a simulation of the industrial process. Panels were tested for their properties according to relevant European standards, while their performance relative to fire was studied with cone calorimetry measurements.

All results were compared with that of a typical PF resin. It was found that the particle size of lignin affects the performance of the resins, while lignin-based PF resins are suitable for the production of plywood panels and have somewhat better performance relative to fire than typical PF resins.

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Other research appearing in TAPPI Journal's June 2017 issue:

NONWOOD PULPING

Kinetics of sulfur dioxide-alcohol-water (SAW) pulping of sugarcane straw (SCS)

Asif Masih Sharazi, and Adriaan Van Heiningen

Other research appearing In Tappi Journal's July 2017 Issue:

PULPING

Low consistency refining of mechanical pulp—system design

Christer Sandberg, Jan-Erik Berg, and Per Engstrand



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