TJ SUMMARIES

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JANUARY

PULPING

Impact of wood chip leaching pretreatment on wood chemical composition
Ricardo B. Santos, José Lívio Gomide, and Peter W. Hart

Examines the effect of wood chip acid leaching pretreatment on non-process elements removal and its impact on wood chemical components. Acid leaching treatments were carried out using two different acid pretreatment approaches: (1) acidified water and (2) filtrate from an acidic bleaching stage. Optimization experiments were performed to identify the most suitable leaching conditions with regard to non-process elements removal and chemical oxygen demand generation. Incorporation of an acid leaching stage significantly reduced the non-process elements content in the wood chips.

BLEACHING

Life cycle assessment of ECF bleaching sequences with focus on carbon footprint
Pia Jour, Karin Halldén, and Eva Wackerberg

This study presents a life cycle assessment (LCA) of bleached eucalyptus kraft pulp production in Brazil. The entire production system was investigated, starting with forestry and ending with bleached pulp at the gate of the pulp mill. Alternative bleaching sequences were compared for three different scenarios using somewhat different elemental chlorine-free (ECF) sequences: Dhot(EPO)DD, Dhot(EPO)DP, and aZeDP.

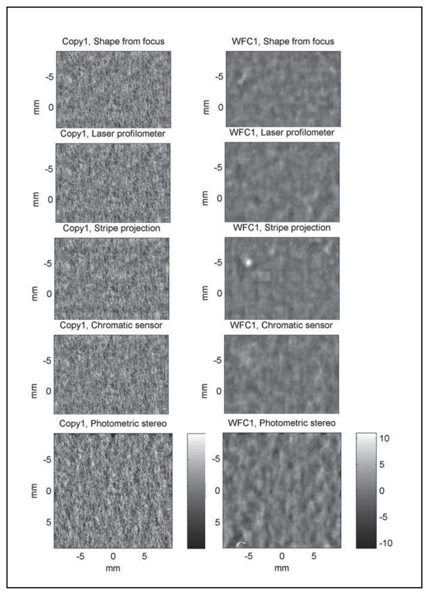
For each scenario, the alternative bleaching sequences studied resulted in similar carbon footprints of the bleached pulp. A comparison of the data from the different scenarios showed a large range of carbon footprints for the chemicals used for pulp bleaching. Although the focus has been on carbon footprints, the contributions to other environmental effects commonly included in LCAs were also assessed and only minor differences between the alternative bleaching sequences were found.

PAPERMAKING

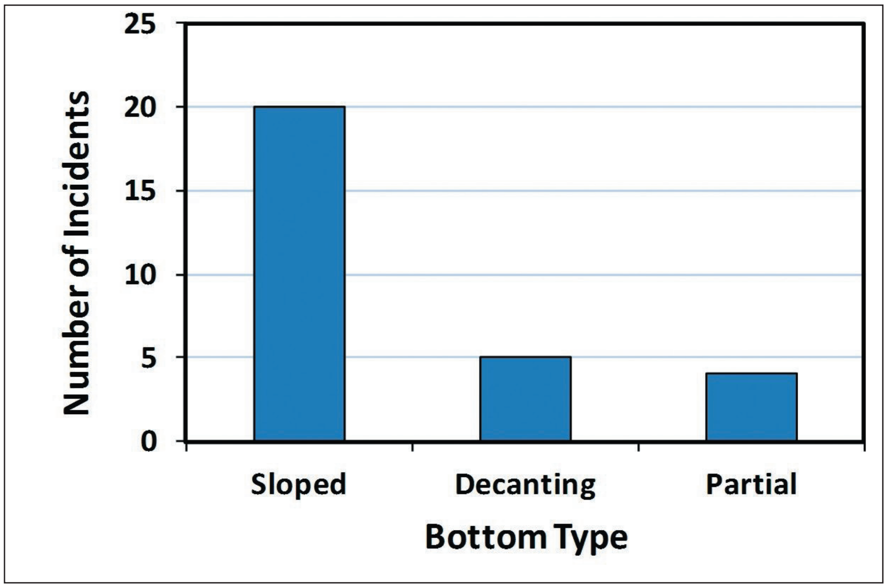
A comparison of five optical surface topography measurement methods
Marja Mettänen and Ulrich Hirn

The results of optical surface topography measurement techniques have been questioned in the past because of possible measurement artifacts due to light penetration into the paper. This study compared the topography measurement results from five optical techniques: laser profilometry, shape-from-focus, stripe projection, chromatic sensing, and photometric stereo. These techniques were tested on coated and uncoated papers with a PPS roughness range from 0.7 µm to 7.7 µm.

The researchers made the measurement results directly comparable by measuring exactly the same regions on the paper samples and registering the resulting



▲ **PAPERMAKING.** In copy paper, different measurement techniques produce similar aligned surface topography maps, but for the smoother WFC grade, the images are not as alike.



▲ **RECOVERY BOILER.** Analysis of dissolving tank explosions caused by heavy smelt runoff shows that sloped floor recovery boilers are most vulnerable.

topography maps. They then calculated the point-wise Pearson correlation between the maps at different wavelength bands to obtain quantitative values for the similarity of the measurement results at different structure sizes. The correspondences between the measured topography maps were also examined through multivariate linear regression and roughness indices evaluated at two different structure sizes. Surface topography measurements from different optical techniques deliver largely different results for smooth paper grades. For rough papers, however, the results match quite well.

RECOVERY BOILER

Understanding recovery boiler smelt runoff phenomena

Honghi Tran, Andrew K. Jones, and Thomas M. Grace

There is considerable interest in the nature and causes of heavy smelt runoff from recovery boilers because of the role it has played in numerous dissolving tank explosions and for personnel safety around the dissolving tank. Most mills have experienced runoff problems, which can be caused by cleaning plugged spouts, burning down a large bed, low sulfidity smelt, startup with a bed in the unit, and improper firing practices.

The geometry of the lower furnace plays a significant role in runoff events. Sloped floor units are more vulnerable to smelt pool buildup and heavy runoff when released. Decanting bottom units are inherently more tolerant of smelt pool buildup.

Low sulfidity results in smelt with a high melting temperature, making the smelt easy to freeze and difficult to flow. Sulfate-rich slag/deposits falling on the hearth from the upper furnace can contribute significantly to runoff problems by causing dams and spout plugging, increasing the load of smelt pool to be removed, decreasing bed temperatures, and lowering the sulfidity of the smelt leaving the furnace.

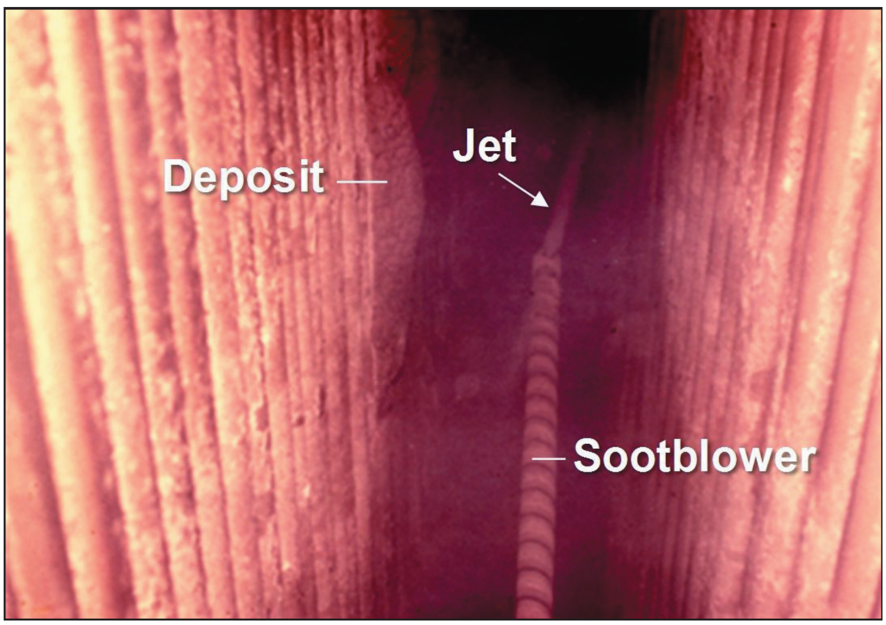
RECOVERY BOILER

Recovery boiler sootblowers: History and technological advances

Honghi Tran and Danny Tandra

This review of sootblower history helps mills understand the important technological advances that were made in the past three decades. Since 1991, intensive research and development has focused on sootblowing jet fundamentals and deposit removal in recovery boilers. The results have provided much insight into sootblower jet hydrodynamics, how a sootblower jet interacts with tubes and deposits, and the factors influencing its deposit removal efficiency, and have led to two important innovations: fully-expanded sootblower nozzles that are used in virtually all recovery boilers today, and the low pressure sootblowing technology that has been implemented in several new recovery boilers.

The availability of powerful computing systems, superfast microprocessors and data acquisition systems, and versatile computational fluid dynamics (CFD) modeling capability in the past two decades has also contributed greatly to the advancement of sootblowing technology. High quality infrared inspection cameras have enabled mills to inspect the deposit buildup conditions in the boiler during operation, and helped identify problems with sootblower lance swinging and superheater platens and boiler bank tube vibrations. 360



▲ **RECOVERY BOILER.** Sootblower in action in a recovery boiler.