Direct effects of refining pilot-scale (Andritz Sprout-Bauer) on suspension and hand sheet properties of *Eucalyptus globulus*

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Abstract

The preparation of pulp for the production of paper involves a key unit operation that is known as refining. In this process, the fibers are mechanically beaten in an aqueous medium to gain flexibility, collapsibility and ability to establish hydrogen bonds, which finally gives resistance to paper. This process consumes large amounts of electricity and is therefore an expensive operation, where the energy optimization is essential. One aspect of the subject of controversy, when this operation is applied to commercial *Eucalyptus globulus* kraft pulp, is to know how the refining variables, namely the specified edge load (SEL), the number of cycles, the flow rate, the residence time and the pulp consistency, n affect the development of the properties of the fibers, paper and energy consumptions.

The present work aimed at evaluating the influence of specified edge load (0.05, 0.1 and 0.2 J/m), flow rate (50, 100 and 200 L/min.), specific energy consumption (0, 40, 80 120 KW.h/ton), residence time and consistency (3 and 4%) on the development of fiber and paper properties of *Eucalyptus globulus*.

It was verified that when a relatively high specified edge load is used (0.2 J/m), the result is that mean fiber length (weighed in length) significantly decreases, indicating higher cut of the fibers during the refining. Regarding paper structure, papers with lower density (i.e., higher open structure, higher permeability and lower smoothness) were obtained by beating the pulp with a low specified edge load (0.05 J/m). Papers produced with a specified edge load of 0.2 J/m presented a higher resistance (, burst index and tensile index), but increasing refining energy from 80 to 120 kW.h/ton did not improve of the properties of the paper.

It was found that the papers obtained from refining conditions with the highest flow rate, 200 L/min,. are more resistant and have a lower opacity, while the papers produced with lower flow rates (100 and 150 L/min.) present lower density, i.e., a more open structure, and are more permeable and less smooth.

Key words: *Eucalyptus globulus*; pilot refiner; specific edge load, flow rate, paper potential