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Research area: Process aims

Paper and paperboard production // Stock preparation

Key words:

separate refining, co-refining, pulp characterization, cost minimization

Title:
Directed adjustment of the co-refining conditions for chemical pulps by a simulation tool

Background/Problem area

Of co-refining generally one speaks if different chemical pulps of different origin, i.e. different wood and/or different pulping conditions are jointly refined. If several chemical pulps are to be used for a paper grade, then co- (or mixed) refining represents an economically meaningful alternative to separate refining, i.e. separate refining of each single pulp grade.

If one regards the simultaneous presence of fibre fractions and different mean fibre length in the pulp suspension during refining as characteristic for co-refining, then co-refining is strictly taken already present when refining softwood pulps, since these contains long and short fibre fractions in a pronounced way. Therefore it is meaningful to define co-refining more comprehensive, i.e. as simultaneous refining of different fibre fractions with the same refiner.

Concerning observations of effects of co-refining results are preferably present to paper properties and only few to fibrous material characteristics. Multiple experiences make clear that it cannot be decided priori pro and cons by separate and co-refining. A correct selection of the refining method is only possible before the background of concrete requirements to the paper properties, the available technique and economical resources.

Objectives/Research results

The goal of the project is developing in addition of the already available numeric algorithms of the separate refining of chemical pulps also such for refining of mixed chemical pulps. With the availability of a model-supported know-how to both refining strategies it is possible to advise the enterprises of the paper industry on basis of detailed simulation calculations comprehensively when planning refining processes in stock preparation.

The algorithms of co-refining to be developed are to cover exactly the prediction of the change of the same fibrous material characteristics, as they are possible for single chemical pulps already. Thus the models which will be developed become linkable also with those algorithms, which permit a estimation of the change of paper properties.

In order to understand and describe specific effects of the co-refining, the fibre fractional composition of a pulp must be characterized more exactly. Actually it must be assumed however the allocation of the specific refining energy is dependent on the fibre fractions not proportionally to their mass portions but also from the mean fibre length in each fibre fraction.

Application/Economic benefits

Decisions to the selection of pulps and/or of refining conditions for the production of papers are made so far almost exclusively on the basis of experiences as well as extensive lab scale, pilot scale and industrial trials. In contrast to it the requested project aims at the development of calculable and/or algorithmizable relations between refining conditions and refining results.

This predictability puts users for the first time into the position to control the area of conflict "fibrous material - process - paper properties" software-supported. Thus it would be possible in the future by substantial reduction of the expenditure of experimental lab scale or pilot scale trials,

1. to predict paper properties on the basis the raw materials at an early time,
2. to consider changed requirements to the paper properties by a careful selection of raw materials and an appropriate adjustment of refining conditions,
3. to react to changes regarding the raw material characteristics in order to ensure a constant quality of the produced paper
4. to optimize pulp selection and refining conditions in order to achieve energetic goals as well as minimizing cost expenses.

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Remarks

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