Research Institute:

PTS Heidenau
Pirnaer Str. 37
01809 Heidenau

Internet: www.ptspaper.de

Head of the research institute:

Dr. Frank Miletzky

Project leader:

Lutz Hamann
Tel: 03529 / 551-657
Fax: 03529 / 551-899
E-Mail: lutz.hamann@ptspaper.de

Research area: Process aims

Paper and paperboard production // Stock preparation

Key words:

Cavitation, broke treatment, sonotrode, venturi

TITLE:

Enhancement of machine availability and improvement of paper properties by optimized broke treatment with cavitation technology

Background/Problem area

To meet the demands of their customers, many paper producers must offer a broad variety of grades and realize increasingly smaller lot sizes. The paper grades made on a single machine are sometimes used for several different applications, which limits the choice of suitable raw materials and treatment methods, and certification requirements for e.g. food contact can make it difficult to realize several different grades on the same production line within short periods.

The frequent grade changes required in this situation result in constantly growing amounts of broke. Mills can use these broke materials only for lower-quality products which must be sold at markdown prices. The reason for this is the additives, coating binders, optical brighteners and other aids contained in broke. Once added to achieve the desired optical, barrier, sizing or wet strength effects, the chemicals end up as sticky contaminants or dirt specks in the paper or cause frequent web breaks in mills using high amounts of broke.

Starting point of the project is the fact that cavitation effects offer great potential for the treatment of internal stock flows. However, the requirements and input parameters of stock preparation plants vary greatly - the material flows to be treated can have so different compositions that treatment aims and technologies must be specifically selected or adapted for each application.

Moreover, it is necessary to look at the economic side, i.e. the profitability and treatment effects achievable by a technology for the desired throughput and with the investment/operating/maintenance costs required for each application, which can vary greatly as well. Generally, one must distinguish between hydrodynamic cavitation (venturi tubes or perforated plates, even though the latter seem less suitable here) and acoustic cavitation (ultrasound, using rod transducers or flow cells).

Objectives/Research results

Aim of the research project is the use of hydrodynamic and acoustic cavitation effects for efficient desintegration of wet strength paper broke. In that way a new technology alternative for breaking down wet strength paper flocs into single fibers is tested. Suitable working parameters for lab scale devices for acoustic and hydrodynamic cavitation are worked out. Possible side effect can be the reduction of optical brigthener in the final paper by detaching these substances from fibers surface by cavitation effects.

The corresponding effects of acoustic and hydrodynamic cavitation processes will be compared to assess their economic efficiency as basis for future investment decisions. First results showed a fast flake reduction by acoustic and hydrodynamic cavitation.

Application/Economic benefits

The use of a simple technology that requires little investment like cavitation jets for the optimised treatment of internal broke flows will enable paper producers to stabilize their productions and minimize variations in the quality characteristics of their products. Besides increasing the plant availability and technically feasible production output, this will also enable them to use further fixing agents and other aids.

Project period: 01.07.2015 – 30.09.2016

Remarks

The RTD project INFOR 190 is being funded by the curatorship of research and technique of the pulp and paper industry within VDP e. V.