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Research area: Process aims

Paper and paperboard production // Papermaking

Key words:

Wet-End, instabilities, homogenization, microshocks, detrimental substances

Title:**A smart homogenization approach improving process knowledge and papermaking competitiveness (SHAKER)****Background/Problem area**

Instabilities in the wet-end system may cause a lot of problems, like deposits, specks and holes in papers and breaks of the paper web, leading to an increase of downtimes and high costs. The causes of an unstable wet-end system can be sudden changes (shocks) in the process conditions (pH, temperature, charge and/or conductivity etc.). Additionally, anionic trash may react by undesired interactions with cationic additives. Process instabilities are also caused by a bad homogenization of pulp and water within storage/dilution tanks. In dead zones of tanks, certain parts of tank walls etc. long residence times occur and create an increase of e.g. biological activity, leading to gradients of microorganisms and degradation products. Additives fed back into the process be re-used process water (water loops) or coming from recycled broke may also become potential contaminants. The most common approach is to solve these problems after they have occurred (corrective action), e.g. in case of corrosion problems the use of a corrosion inhibitor, for scaling the application of a scaling agent, and for stickies the dosage of a fixing agent or deposit control additive.

The current solutions for wet-end problems are not sufficient to solve the wet-end problems as a whole. The instability problems may be solved not by the removal of the disturbing substances or the addition of many additives to the process, but by a sustainable process management wherein the local fluctuations in process flow (local gradients/micro-shocks) are fine-tuned with respect to water demand and supply. To avoid micro-shocks, the mixing of the chest should be maximized towards an optimal mixed system with minimal chest volumes.

Objectives/Research results

The project is aimed at the development of a new concept designed not to solve wet-end problems but to avoid them (preventive action), dealing with their source and not with their symptoms. The wet-end system of paper mills shall be stabilized using a low-cost sustainable management system for stock, energy and water. The scientific objective is to investigate, from an applied point of view, the source and behavior of disturbing substances and the most important causes for sudden „explosions“ of these disturbances within paper mills.

The expected final achievements of the project are:

- To solve the problem of process (wet-end) instabilities of a group of SME paper mills
- Development of an in-mill tested product and process based homogenization concept to be applicable for the paper industry
- Increase of scientific and practical knowledge regarding constant wet-end systems towards a chest-free papermaking process and transfer of that knowledge directly to the industry
- Increase of sustainability and competitiveness of the European paper industry, especially of SME's

The concept will be tested on different paper machines with a broad variation on grammage (18 to 1000 g/m² of paper and board).

Application/Economic benefits

The benefits of the project will come mainly from the reduction in process chemicals and downtimes. The project results may lead to an improvement in runnability, flexibility, productivity, and product quality. A cost reduction of 10 EUR/ton of paper, an increase in paper production capacity (5 – 10 %) and a decrease of off-spec production (30 %) is expected. Additionally, the development of a market of about 10 million EUR/year for the SME suppliers is anticipated.

Project period: 01.10.2006 – 30.09.2008

Remarks

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