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Research area:
General aims/Environmental technology/Water

Keywords:
water quality, water circuit, water consumption, additives, cooling water

Subject:

Qualitative and quantitative requirements on the water supply of internal consumers II

Background/Problem area

When being asked about the water supply of their papermaking units, mill operators usually cite quality characteristics that are close to those of fresh water. In many cases, however, these high demands are not justified because many units could be operated with water of much lower quality. If it were possible to more specifically characterise the quantitative and qualitative requirements on the water supply of their consumers, paper mills could substantially reduce their consumption of expensive high-quality waters such as fresh or superclear water. Moreover, they could reduce their expenditure for water treatment, and enhance the technical and economic efficiency of their recirculated water systems. Last but not least, substituting recirculated for fresh water would allow them to reduce their specific fresh water consumption.

Objective/Research results

The project aims at identifying ways to substitute water of inferior quality for the expensive high-quality waters currently used in paper production. Therefore it is evaluated, if process water from paper mills producing packaging papers can be used for the dilution of additives. The required water quality, the required quantities and fresh water saving potentials are determined. Furthermore, possibilities to reduce the demand of cooling water and the required water quality for cooling purposes are denominated.

For the required water qualities and quantities of water for the **dilution of chemical additives**, research in literature and PTS-Databases was done and a questionnaire was sent to the producers of fluting and liner. Suppliers of chemical additives were asked about equivalent data. Moreover laboratory tests were carried out.

Almost always fresh water is used for dilution, preparation and dosage of chemical additives. Starch, sizing, retention and fixing agents, biocides, defoamer and deaeration agents as well as dies were examined as chemical addtitives. Some of the polled mills successfully substitute fresh water for biogically treated waste water or clarified water. The substitution of fresh water is uncritical for some additives when short storage times are realised or when the additives are dosed immediately. This holds true for e.g. biocides, defoamers, dilution of retention agents or starch to the right dosing concentration and dosing of retention agents with the appropriate technique.

Retention agents and starch are additives with high fresh water consumption. In comparison to other additives there is a high saving potential. Little saving potential for fresh water exists with sizing and fixing agents, biocides, defoamer and dies because of the little fresh water demand. For each of the above mentioned additives recommendations for the use of water are given.

To evaluate typical **cooling water** demands, research in literature and PTS-Databases was done. The most important opportunities for optimisation are in the field of circuit design: stringent collection of all cooling waters and their recycling as process water should have first priority. If warm cooling water is completely reused as process water, no fresh water can be saved in the field of cooling waters.

Steam condensers have the highest share among all cooling waters. Depending on the design of the drying section, there are partly significant saving potentials in water and steam. Strictly maximising the warm water temperature after the coolers allows for quick savings with minimum effort. Doubling the temperature difference between flow and return halves the cooling water demand. Changing the type of oil and thus rising the oil temperature can bring about significant savings of cooling water for oil coolers. More efficient hydraulic systems with frequency controlled oil pumps can reduce the cooling water demand by 15 to 20 %. Critical contaminants for cooling water are denominated with their corresponding critical values. Possibilities for the prevention of problems in cooling waters are pointed out.

Application/Economic benefits

Within the project INFOR 52R investigations with equal goals were carried out for other types of water consumers. The resume of both projects shows: the fresh water demand for showers averages out at 40 % followed by sealing water for shaft sealings (12 %), sealing water for water-ring vacuum pumps (9 %), cooling water (9 %) and dilution of chemical additives (7 %). Experiences of system analyses show that in individual cases fresh water saving potentials can be found in all categories. That means, focusing on one category is not enough, if the fresh consumption shall be reduced. The projects INFOR 52R and INFOR 68R provide the basis for fresh water savings.

Project period: 01.01.2004 – 31.12.2004

Remarks

The INFOR project No. 68R was carried out in cooperation with the department of papermaking and mechanical process engineering of TU Darmstadt. It is sponsored by the German Pulp and Paper Association (VDP).

Are you interested? Then send us this short description with your name and address via fax. The project manager will contact you afterwards.

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