



**ICEEM/03 – ENVIRONMENTAL ENGINEERING
SECTION**

Water Supply and Wastewater Treatment

REDUCING LIQUID EFFLUENTS IN PAPERMAKING

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Abstract

In a paper mill the specific water consumption is about equal with specific volume of liquid effluent, and both are depending on the internal recycling of process water. In order to minimize the water usage and effluent discharge, paper mills are orientated towards closed water systems with ultimate goal of *Zero Liquid Effluent*. The first part of this paper briefly analyzes the general principles and the basic circuit systems of process water in papermaking focusing on the critical aspects related to water circuit closing. In literature, it is well documented that as less fresh water enters the paper machine and more of the water is recycled, various colloidal and dissolved materials (CDM) are accumulating in the process water. High concentration and anionic charge of the CDM are detrimental to both the papermaking process and paper quality, and only way to close the water circuit is a continuous purge of the CDM. At present, the state of art in water circuit design is a 3-loops system, where the tertiary loop uses advanced purification techniques as a *kidney* technology to purge CDM. Second part of the paper presents a lab study aimed to demonstrate that the wet end chemical additives could play an essential role in preventing accumulation of the CDM in short circuit by their retention in paper sheet. The experiments allow us to identify an optimum combination of chemicals to control the retention and drainage processes in papermaking, as an integrated solution to reduce the liquid effluent.

Keywords: papermaking, process water, water loop, closed water circuit, retention and drainage processes, chemical additives

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