

Abstract

The objective of this investigation was to utilise water pinch analysis as a tool for the optimisation of fresh water use in an integrated pulp and paper mill. The investigation was carried out at Mondi Paper in Merebank, south of Durban.

The pulp and paper manufacturing process is a large consumer of fresh water and minimising the amount of fresh water used in the processes is beneficial from both a cost and environmental point of view. There are examples of mills which have “closed” their water systems to the extent that fresh water make up is minimal and most of the water is recycled and reused in a closed loop. These examples provide guidance on the basis of proven methods for reducing water consumption in the pulp and paper industry and can be used as a reference for mills wishing to reduce water consumption by making use of tried and tested methods. This investigation sought to provide an alternative method to identifying potential savings in fresh water consumption by making use of water pinch analysis.

This was done at Mondi Paper by analysing individual parts of the mill and then a larger section of the mill which included both pulp and paper production. Flowrates of water streams and fibre content in those streams were obtained from plant data, where available, and this data was used to produce a mass balance using the Linnhoff-March software, Water Tracker. The balance produced using Water Tracker provided the missing flow and fibre content data and this data was used as the input for the Linnhoff-March software, Water Pinch, to perform the water pinch analysis.

The results achieved when analysing the individual parts of the mill did not demonstrate potential for significant savings in fresh water consumption, however the analysis of the integrated section of the mill identified a potential reduction in fresh water. It was found that the application of a single contaminant analysis to the larger section of the mill identified a possible reduction in the fresh water requirement of 8.1% and a reduction in effluent generated of 5.4%. This is a savings of R1 548 593 per annum based on 2003 costs of fresh water and effluent disposal.

This analysis was conducted using the most simplified representation possible to produce meaningful results in order to evaluate the effectiveness of water pinch analysis in optimising the fresh water consumption in an integrated pulp and paper mill. It is demonstrated that water pinch analysis is potentially a useful tool in determining the minimum fresh water requirement of a site.