



UNIVERSITAT ROVIRA I VIRGILI
Escola Tècnica Superior
d'Enginyeria Química



Debottlenecking of the drying system in the paper machine number six at Essity Valls.

**Master's thesis presented by Adrián Fernández
Córdoba** to obtain the master's degree in chemical
engineering from the Universitat Rovira i Virgili

Company supervisor: Aitor Odina Bastida
URV supervisor: Joan Ramon Alabart Córdoba

Tarragona, June 2024

SUMMARY

Tissue is a particular type of lightweight, soft, and absorbent paper that is made from virgin or recycled cellulose fibers. It is used in both household and professional hygiene and cleaning products due to its superior convenience and cleanliness of use when compared with traditional (i.e., reusable) products. It is made in large-scale facilities called tissue paper mills. The largest company in the Spanish province of Tarragona by revenue is Essity's paper mill near Valls. There, paper is produced in large and continuously operating tissue machines with yearly productions exceeding 65 000 tons each and is then converted into domestic and professional tissue products such as toilet paper or paper towels. Tissue paper is a commodity product worldwide with an estimated global market size of 20.85 billion USD in 2024.

Tissue paper starts its production process as a diluted water and cellulose slurry called pulp that needs drying to be transformed into its familiar white, soft and dry form. In this work, the drying system of the paper machine number six at Essity's Valls mill is explored with the objective of achieving a higher drying capacity (as this is a bottleneck in the process when producing certain varieties of tissue paper).

The complex drying system, composed of a steam heated cylinder and a hot air blowing hood around it, was deeply analyzed. This work focuses on the drying hood and its working principles. In different sections, its current physical state and mass and energy balances were studied prior to applying any optimization strategies.

Once any found deficiencies were solved (or in the way of being solved) debottlenecking strategies based on lowering the pulp moisture before entering the drying section and varying the behavior of its control loops were explored with moderate but promising results.

This work focused on modifications not requiring major physical changes but thanks to the understanding that the author gained through its development, some very promising areas of improvement in both the drying hood and the papermaking process were found in terms of increasing the drying capacity. Some of these require costly modifications in the process and were included in the department's mid-term improvement plans. These are explored in the future work section of this thesis.

This master's thesis contains confidential information. In case more information is required please contact:

Student: Adrián Fernández Córdoba
Email: adrian.fernandez@essity.com
Phone: 663 15 35 52

Project Supervisor: Aitor Odina Bastida
Email: aitor.odina@essity.com
Phone: 630 58 53 71

Company: Essity Spain S.L.
Address: Ctra. Valls-Puigpelat km 2, 43812, Puigpelat, Tarragona
Phone: 977 03 06 00