

TE 129941

# # 4171489121 : MAJOR CHEMICAL ENGINEERING

KEY WORD: OPTIMIZATION / MASS INTEGRATION / RINSING / GAMS / ZINC PLATING

WATCHARAPONG SILALERTRUKSA : WATER - WASTEWATER MANAGEMENT  
OF A ZINC PLATING PLANT BY THE OPTIMIZATION TECHNIQUE. THESIS  
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BOONYANANT, 120 pp. ISBN 974-03-1462-7.

Wastewater, one of significant environmental aspects of chemical industry, is normally generated by processes and their utility systems. Water reuse is one method of pollution prevention to reduce the generating of wastewater and process freshwater consumptions. The objective of this work is to model a water and wastewater management network with respect to mass conservation. A mass integration for segregation, mixing, reusing and direct recycling is set up to model the water-wastewater use as a whole plant concept. Discharged water from each unit as well as freshwater feed are considered to be segregated, mixed, allocated to other units. This set of allocation equations is then combined with process constraints and solved as an optimization problem with an objective function of minimising the amount of freshwater feeds to the system. This optimization problem is formulated as a Non-linear Programming (NLP) and solved by the high-level modeling language GAMS. A case study of Zn - Cr plating is implemented. Simulation results had demonstrated can be reduces the amount of freshwater input in rinsing units by a proper rinsing water flow rate control; 7.45 percent reduction of freshwater usage (588 cubic meters per year) is obtained.