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# LEACHING PROCESS OF NATA DE COCO: AUTOMATION SYSTEM DESIGN AND IMPLEMENTATION

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A project report submitted in partial
fulfillment of the requirements for the award of the
Degree of Bachelor Mechanical Engineering (Design & Innovation)

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MAY 2009

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***Special dedicate to***

***my family, supervisor, my friends, and all that help me to finish my thesis.***

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# ABSTRAK

Projek ini adalah berkaitan dengan rekabentuk dan pemupukan system automasi dalam proses peneutralan Nata de Coco. Untuk kajian ini, cara kawalan berdasarkan sifat dinamik system digunapakai. Pada awalnya, sifat dinamik untuk sistem pengawalan cecair dikaji dengan menggunakan cara matematik and simulasi. Kajian untuk sifat dinamik sistem pengawalan cecair dibuat dengan mengambilkira tiga kes iaitu sistem dengan satu tangki, sistem dengan dua tangki dan sistem dengan tiga tangki. Sistem untuk proses peneutralan Nata de Coco direkabentuk dengan berdasarkan kes yang sistem itu mempunyai sifat dinamik yang paling bagus. Satu experiment dijalankan untuk membandingkan keputusan simulasi dan experimen. Untuk kajian kawalan pH, experimen juga dijalankan. Sistem automasi dicadangkan dan penerangan kasar terhadap sistem automasi dibuat. Rekebentuk sistem automasi adalah berdasarkan data yang diambil dari kajian experiment dalam kerja ini. Prototaip untuk proses peneutralan Nata de Coco dibuat. Sistem automasi dipasang pada prototaip yang telah dibuat. Sifat dinamik untuk cecair system adalah tak linear. Perbandingan antara keputusan experiment dan simulasi membuktikan kesahihan experiment dan simulasi. Sistem automasi beroperasi berasaskan penukaran antara “on” atau “off” status untuk injap, dan masa untuk penukaran status adalah berdasarkan data experiment kajian ini. Cara kawalan berdasarkan sifat dinamik system yang diguna pakai mempunyai kebaikan dari segi kos yang rendah.

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## ABSTRACT

This project is about automation system design implementation on Nata de Coco leaching process. The dynamic behavior based control approach is implemented in this work. Initially, study on dynamic behavior of the liquid level system is done with mathematical modeling and simulations. The system is studied by considering three cases; single tank system, two tanks system and three tanks system. The water level system for Nata de Coco leaching process is designed by considering the case which the system has best dynamic behavior. Experiment is implemented to compare simulations results and experimental results of the dynamic behavior of liquid level system. For the study of pH control, experiment is also implemented. An automation system is proposed and a brief overview of the proposed automation system process is also included. The automation system is designed based on data obtained from experiment in this study. The prototype for Nata de Coco leaching process is fabricated. The automation system is implemented on the prototype. The dynamic behavior of the liquid level system is found to be highly non linear. The comparison of simulation results and experimental results validated both the simulation and experiment on liquid level system. The automation system is found to be operated on the basis of switching between on and off status of the valves at different time interval, and the on off switching time is obtained from experiments that had been done in this study. The dynamic behavior based control approach that has been used in this study has the advantage of low cost.

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