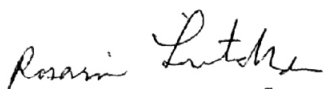


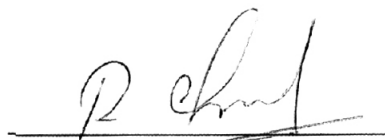
Rosarin Smitabhindu 2008: Optimization of a Solar-Assisted Drying System for Drying Bananas. Doctor of Engineering (Industrial Engineering), Major Field: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Associate Professor Peerayuth Charnsethikul, Ph.D. 212 pages.

This paper presents a mathematical model for optimal design of a solar assisted drying system and the optimization model consists of a simulation model of a solar assisted system combined with an economic model. The simulation model consists of two systems of differential equations: one of the collector and other for the dryer cabinet and these systems of the differential equation are solved using the finite difference method. Values of the parameters of the model are determined experimentally. A computer program in FORTRAN is developed to simulate the model. The model was validated by comparing the simulation results with the experimental results and agreement was good. This simulation model was used for the optimization of solar assisted drying system.

The economic model is a mathematical model of the annual drying cost and the optimization problem is defined as the optimization of the dryer geometry and drying process so as to minimize the drying cost per unit product dried. Currently used collector area and the air recycle factor were considered as the parameters for basic mode of operation of the dryer and adaptive pattern search technique was adopted to find the optimum values of the solar collector area and the recycle factor. The optimum value of the collector area is  $26 \text{ m}^2$  and the recycle factor is 90%. The computer program developed in this study can be used to optimize similar drying systems.



Student's signature



Thesis Advisor's signature

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