

Thesis Title	A design study and development of Chamomile drying oven for Royal Project Foundation at Sa-Ngo
Thesis Credits	12
Candidate	Mr. Sayompon Srina
Thesis Advisor	Dr. Atikorn Wongsatanawarid
Program	Master of Engineering
Field of Study	Mechanical Engineering
Department	Mechanical Engineering
Faculty	Engineering
Academic Year	2013

Abstract

This research aims to study and design a drying oven by using indirect heating through a heat exchanger to generate hot air for Chamomile drying. Recently, the drying oven of Sa-Ngo Royal Project Development Center was simply built without any engineering design that made the distribution of the temperature and air flow inside the oven non uniform. During the drying process, the oven has to be opened to rearrange the trays due to a big variation of temperature in the chamber that leads to high energy consumption and takes very long time for processing. The design study applied Computational Fluid Dynamics (CFD) technique to study the disadvantage of the conventional drying oven and improve the air flow distribution. The model was verified by measuring air velocity distribution inside the oven compared with the experimental results from model dryer. After that, the prototype oven was built. The oven dimension was 1.1 m in width, 1.6 m in length and 1.08 m in height with 12 trays. In Chamomile drying, Chamomile 60 kg at initial moisture content 82.3 % wet basis was dried to 6.8 % wet basis at the average drying temperature of 55.4 °C. The drying rate was 2.72 kg water evap./h and the drying time was 18 hours. The specific energy consumption was 16.94 MJ/kg water evap. and the drying cost was 37.80 Baht/kg.

Keywords: Computational fluid dynamics / Drying / Indirect heat / Chamomile / Specific energy consumption