

Thesis Title Design and Testing of a Vibro-Fluidized Bed Paddy Dryer

Thesis Credits 12

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Abstract

The objective of this research was to design a vibro-fluidized bed paddy dryer with a capacity of 2.5-5 tons/h. Drying conditions were : air flow rate $1.72 \text{ m}^3/\text{s}$ (1.91 kg/s), bed velocity about 1.37 m/s and drying air temperature $130\text{-}150^\circ\text{C}$. Residence time of paddy was approximately 1 minute, fraction of air recycled 85 % (1.62 kg/s) and bed heights 12 and 15 cm. Moisture content of paddy was reduced from 26 % dry-basis to 23 % dry-basis. Vibration of intensity was 1 (frequency 7.28 Hz and amplitude 5 mm). Electrical power consumption and average fuel oil consumption were $9,646 \text{ W}$ and 17.54 l/h , respectively. Primary energy consumption was 723.05 MJ/h of which 87.58 was electrical primary energy and 635.47 was heat. Average moisture evaporated was $117.56 \text{ kg-water evap./h}$ and specific primary energy consumption was $6.15 \text{ MJ/kg-water evap.}$. For 12 hours operation/day, paddy drying cost was $1.49 \text{ baht/kg-water evap.}$ (fixed cost $0.48 \text{ baht/kg-water evap.}$, and operation cost $1.01 \text{ baht/kg-water evap.}$)

Keywords : Paddy drying / Fluidization / Vibro-fluidized bed