

**ANALISIS TEKNIS PENGARUH SUHU DAN KECEPATAN UDARA  
PENGERING PADA *PNEUMATIC CONVEYING RECIRCULATED DRYER*  
TERHADAP SIFAT FISIK TEPUNG UBI JALAR PUTIH (*Ipomoea batatas*)**

**INTISARI**

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Indonesia menempati peringkat pertama sebagai negara pengimpor gandum terbesar di dunia, dengan 8,7% total impor gandum dunia pada tahun 2017. Di sisi lain, Indonesia memiliki komoditas lokal seperti ubi jalar yang dapat ditepungkan dan untuk mensubstitusi gandum. Namun dalam pengolahan tepung ubi jalar, produsen mengalami kendala dalam proses pengeringan ubi jalar ketika musim hujan tiba. Sehingga untuk mengatasi permasalahan tersebut, maka dibutuhkan pengering mekanis yang tepat agar proses pengeringan menjadi efisien. Dewasa ini, telah berkembang pengering mekanis yang mengkombinasikan perpindahan panas, massa dan pengangkutan secara *pneumatic* dan teresirkulasi yang disebut *Pneumatic Conveying Resirculated Dryer* (PCRD). Pengeringan tepung ubi jalar menggunakan PCRD harus mampu mengurangi kadar air tanpa menurunkan kualitas tepung. Penelitian ini bertujuan untuk mengkaji pengaruh suhu pengeringan dengan kecepatan udara pengering terhadap kualitas fisik tepung ubi jalar hasil pengeringan menggunakan *Pneumatic Conveying Recirculated Dryer*. Variasi suhu yang digunakan adalah 75°C, 100 °C dan 125 °C serta kecepatan 15 m/s, 28 m/s dan 31 m/s. Proses pengeringan dilakukan menggunakan sampel 1,5 kg dengan kadar air 50-60% sampai dengan kadar air dibawah 13%. Dalam penelitian ini, dilakukan analisis mutu hasil pengeringan meliputi kadar air akhir, *whiteness*, densitas, *fineness modulus* dan diameter bahan. Selain itu dilakukan analisis proses pengeringan meliputi *Specific Energy Utilization*, efisiensi pemanasan, efisiensi pengeringan, efisiensi produksi, *Heat Utilization Factor*, *Coefficient of Performance*, *Effective Heat Efficiency*, dan kinetik laju pengeringan. Secara umum hasil dari penelitian ini antara lain mutu hasil pengeringan meliputi kadar air akhir berkisar antara 4 – 10 %, *whiteness* berkisar antara 82-86, densitas gembur berkisar antara 0,42 – 0,49 g/cm<sup>3</sup>, densitas padat berkisar antara 0,5 – 0,58 g/cm<sup>3</sup> dan diameter bahan berkisar antara 0,13 – 0,17 mm. Analisis proses pengeringan meliputi *Specific Energy Utilization* berkisar antara 13 – 26 MJ/kg, efisiensi pemanasan berkisar antara 79 – 97%, efisiensi pengeringan berkisar antara 6 – 14 %, efisiensi produksi berkisar antara 75 – 85 %, *Heat Utilization Factor* berkisar antara 71 – 81%, *Coefficient of Performance* berkisar antara 19 – 29 %, *Effective Heat Efficiency* berkisar antara 62 – 77 %, kinetik laju pengeringan berkisar antara 2,6 x 10<sup>-5</sup> hingga 8,3 x 10<sup>-5</sup>.

Kata kunci: Analisis teknis, *Ipomoea batatas*, Suhu Pengeringan, Kecepatan Udara Pengering, *Pneumatic Conveying Recirculated Dryer*

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**TECHNICAL ANALYSIS ON INFLUENCE OF TEMPERATURE AND DRYING VELOCITY IN PNEUMATIC CONVEYING RECIRCULATED DRYER AGAINST PHYSICAL CHARACTERISTICS OF SWEET POTATO FLOUR (*Ipomoea batatas*)**

**ABSTRACT**

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Indonesia's wheat grain import was rank the first in the world, with 8,7% of total grain import in 2017. In the other hand, Indonesia have got its own commodities such as sweet potato. Sweet potato can be powderized and potentially substitute wheat flour. But, drying process of sweet potato flour becomes problematic in rainy season. In the recent years, a drying machinery Pneumatic Conveying Recirculated Dryer (PCRD) combines the principles of mass transfer, heat transfer, and pneumatic system. One of advantages of PCRD is that it will not degrade the quality of the flour while still manage to reduce water content. The purpose of this research is to evaluate the correlation between temperature and drying velocity against physical properties of sweet potato flour. The variation of drying temperature are 75, 100 and 125 °C, while the variation in drying velocity are 15, 28, and 31 m/s. The drying process uses 1,5 kg sample with water content 50-60%. The drying process is to reduce the water content down to 13%. In this research, the drying process cover Specific Energy Utilization, drying efficiency, heating efficiency, production efficiency, Heat Utilization Factor, Coefficient of Performance, Effective Heat Efficiency, drying rate kinetics, and physical properties such as water content, whiteness, density, fineness modulus and diameter. The research shows that on average final water content ranged between 4 – 10 %, *whiteness* ranged between 82-86, uncompact bulk density ranged between 0,42 – 0,49 g/cm<sup>3</sup>, compacted bulk density ranged between 0,5 – 0,58 g/cm<sup>3</sup>, diameter ranged between 0,13 – 0,17 mm, SEU ranged between 13 – 26 MJ/kg, heat efficiency ranged between 79 – 97%, drying efficiency ranged between 6 – 14 %, production efficiency ranged between 75 – 85 %, *Heat Utilization Factor* ranged between 71 – 81%, *Coefficient of Performance* ranged between 19 – 29 %, *Effective Heat Efficiency* ranged between 62 – 77 % and drying rate kinetics ranged between  $2,6 \times 10^{-5}$  –  $8,3 \times 10^{-5}$ .

Keyword: Technical Analysis, *Ipomoea batatas*, Drying Temperature, Drying Velocity, Pneumatic Conveying Recirculated Dryer

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