



INTISARI

Kajian Watak Alir (*Flow Properties*) Bahan Tepung

Watak alir (*flow properties*) bahan tepung merupakan parameter yang menggambarkan tentang kemampualiran (*flowability*) dari suatu fasilitas penanganan bahan padatan curah (silo). Watak alir bahan tepung sangat berperan dalam perancangan silo dimana penentuan watak alir bahan yang akan disimpan tahapan paling awal untuk merancang silo. Untuk alasan ini, telah dilakukan pengujian terhadap 4 sampel bahan tepung, yakni tepung beras, maizena, kanji, dan gandum (terigu). Serta variasi kadar air menggunakan sampel tepung maizena dan variasi gradasi menggunakan sampel tepung beras telah diuji menggunakan alat uji geser *Jenike Shear Cell*.

Secara umum, dari hasil pengujian didapatkan bahwa masing - masing variasi jenis bahan tepung, kadar air dan gradasi mempunyai variabel nilai *flow properties* yang berbeda - beda dan telah dibuktikan oleh analisis statistik. Untuk nilai *effective angle of internal friction* (φ_e) pada masing - masing jenis tepungan didapatkan hasil ; tepung beras: $36,79^\circ$, tepung maizena: $30,04^\circ$, tepung kanji: $29,94^\circ$, dan tepung gandum: $40,52^\circ$. Pada hasil perhitungan variasi kadar air didapatkan hubungan linear antara besarnya kadar air bahan tepung maizena dengan *effective angle of internal friction* (φ_e) yakni $\varphi_e = 0,4431KA + 26,063$ dengan $r = 0,963$. Sedangkan untuk variasi gradasi didapatkan hubungan linear antara *fineness modulus* (FM) tepung beras dengan *effective angle of internal friction* (φ_e) yakni $\varphi_e = -4,4689FM + 44,629$ dengan $r = 0,986$ serta hubungan linear antara diameter rata - rata diameter partikel (D) tepung beras dengan *effective angle of internal friction* (φ_e) yakni $\varphi_e = -18,243D + 44,096$, dengan $r = 0,999$.

Kata kunci : *flow properties*, silo, bahan tepung, dan *effective angle of internal friction* (φ_e)



ABSTRACT

Study of Flow Properties of Powders

Flow properties of powders are parameters which describe its flow ability from a bulk solid handling facility (silo). Flow properties have significant contribution in silo design where measuring flow properties of stored materials are the first step for silo design. For this reason, the tests had been done against 4 sample of powders; rice flour, maize flour, starch, and wheat flour. Also moisture variation using maize flour and gradation variation using rice flour had been tested with Jenike Shear Cell Tester.

In general, from the test of each powder sample implied that powders, moisture, and gradation variation resulted different value of flow properties variable and had been proved by statistical analysis. The value of effective angle of internal friction (φ_e) in each sample of powders resulted; rice flour: 36.79° , maize flour: 30.04° , starch: 29.94° , and wheat flour: 40.52° . Calculation result of moisture variation gave linear relation between moisture (KA) of maize flour and effective angle of internal friction (φ_e) which was $\varphi_e = 0.4431KA + 26.063$ with $r = 0.963$. For gradation variation gave linear relation between fineness modulus (FM) and effective angle of internal friction (φ_e) which was $\varphi_e = -4.4689FM + 44.629$ with $r = 0.986$, and also linear relation between mean particle diameter (D) and effective angle of internal friction (φ_e) which was $\varphi_e = -18.243D + 44.096$, with $r = 0.999$.

Key word : flow properties, silo, powder, and effective angle of internal friction (φ_e)