

RANCANG BANGUN MESIN PENGADUK NIRA NIPAH KAPASITAS 30 LITER

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ABSTRAK

Kabupaten Bengkalis, khususnya Desa Pambang Baru di Kecamatan Bantan, memiliki potensi nira nipah yang dapat diolah menjadi gula merah bernilai ekonomis tinggi. Namun, proses pengadukan yang masih tradisional menyebabkan kualitas produk tidak konsisten dan meningkatkan risiko ergonomis bagi pekerja. Perancangan ini menghasilkan mesin pengaduk nira nipah kapasitas 30 liter dengan sistem transmisi sabuk dan *Pulley* yang digerakkan motor listrik 1 HP, dilengkapi *V-Belt* dan *Gearbox* untuk menghasilkan putaran rendah dengan torsi tinggi. Pemilihan transmisi sabuk dan *Pulley* dilakukan karena memiliki keunggulan berupa perawatan mudah, biaya pembuatan rendah, peredaman getaran yang baik, serta fleksibilitas pengaturan rasio putaran. Pengujian menunjukkan mesin bermotor listrik dengan kecepatan poros 29,3 rpm mampu menghasilkan $\pm 5,4$ kg gula merah bertekstur merata, meskipun waktu pengerasan sedikit lebih lama. Sebagai pembandingan, mesin bermotor bakar menghasilkan $\pm 5,2$ kg dengan pengerasan lebih cepat, namun sebagian produk tidak mengeras sempurna dan mudah meleleh pada suhu ruang. Hasil perancangan ini membuktikan bahwa mesin pengaduk bermotor listrik dengan transmisi sabuk dan *Pulley* mampu meningkatkan kualitas dan konsistensi produk, sekaligus mengurangi beban kerja manual serta mendukung keberlanjutan UMKM gula merah di wilayah pesisir.

Kata kunci: mesin pengaduk gula merah, nira nipah, transmisi mekanik, *Pulley-V-Belt*, *Gearbox*, UMKM

DESIGN AND CONSTRUCTION OF A NIPAH SAP STIRRING MACHINE WITH A CAPACITY OF 30 LITERS

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ABSTRACT

Bengkalis Regency, particularly Pambang Baru Village in Bantan District, has abundant nipa sap potential that can be processed into high-value palm sugar. However, the traditional mixing process results in inconsistent product quality and increases ergonomic risks for workers. This design produces a 30-liter capacity nipa sap stirring machine equipped with a Belt and Pulley transmission system driven by a 1 HP electric motor, combined with a V-Belt and Gearbox to deliver low rotational speed with high torque. The Belt and Pulley transmission was selected for its advantages, including ease of maintenance, low manufacturing cost, good vibration damping, and flexibility in adjusting the speed ratio. Testing showed that the electric-motor-driven machine, operating at a shaft speed of 29.3 rpm, produced approximately 5.4 kg of evenly textured palm sugar, although the hardening time was slightly longer. In comparison, the combustion-engine-driven machine produced approximately 5.2 kg with faster hardening, but part of the product did not solidify completely and tended to melt at room temperature. The results demonstrate that the electric-motor-driven stirring machine with a Belt and Pulley transmission can improve product quality and consistency while reducing manual workload and supporting the sustainability of palm sugar MSMEs in coastal areas.

Keywords: brown sugar mixing machine, nipa sap, mechanical transmission, Pulley-V-Belt, Gearbox, MSME