

ABSTRAK

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Menggunakan Sistem Pisau Berputar Dengan
Penggerak Motor Listrik (Biaya Produksi)

(2026: xiv + 78 Halaman, 23 Gambar, 8 Tabel + 7 Lampiran)

Singkong merupakan komoditas pangan strategis di Indonesia yang berperan penting dalam sektor agroindustri, khususnya bagi pelaku Usaha Mikro, Kecil, dan Menengah (UMKM) pengolah keripik. UMKM Keripik Singkong Fira masih menghadapi kendala karena proses perajangan dilakukan secara manual sehingga membutuhkan waktu 2–4 jam untuk mengolah 20 kg bahan baku, menyebabkan kelelahan operator dan membatasi kapasitas produksi. Penelitian ini bertujuan merancang dan membangun mesin perajang singkong berkapasitas 50 kg/jam dengan ketebalan irisan 1 mm serta menganalisis biaya produksinya menggunakan metode *full costing*. Metode penelitian meliputi identifikasi kebutuhan, perhitungan teknis komponen utama mesin yang mencakup daya motor, sistem transmisi, diameter poros, umur *bearing*, kecepatan keliling piringan pisau, dan kekuatan rangka, pemodelan 3D menggunakan SolidWorks, serta proses manufaktur melalui pengelasan, penggerindaan, dan pengeboran. Mesin menggunakan motor listrik 0,5 HP dengan putaran 1.400 rpm yang direduksi menjadi 440 rpm melalui transmisi *pulley* dan *V-belt* berasio 3,18:1 sehingga menghasilkan kecepatan keliling piringan pisau 6,22 m/s. Rangka besi siku ST-37 memiliki tegangan lentur 7,33 MPa yang masih jauh di bawah tegangan luluh material sebesar 240 MPa serta dilengkapi fitur Keselamatan dan Kesehatan Kerja (K3) berupa cover piringan pisau dan *hopper* yang aman. Hasil analisis menunjukkan Harga Pokok Produksi (HPP) mesin sebesar Rp3.635.876 yang terdiri atas biaya material, sewa mesin, listrik, tenaga kerja, dan biaya tak terduga. Dengan margin keuntungan 15%, harga jual mesin ditetapkan sebesar Rp4.181.257. Mesin yang dirancang terbukti lebih efisien, aman, dan ekonomis dibandingkan metode manual sehingga layak diterapkan untuk meningkatkan produktivitas UMKM.

Kata Kunci: mesin perajang singkong biaya produksi, pisau berputar, motor listrik, harga pokok produksi.

ABSTRACT

Design and Construction of a Cassava Slicing Machine using A Rotating Blade System with an Electric Motor Drive (Production Cost)

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**DIPLOMA–III MECHANICAL ENGINEERING STUDY PROGRAM
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Cassava is a strategic food commodity in Indonesia that plays an important role in the agro-industrial sector, particularly for Micro, Small, and Medium Enterprises (MSMEs) engaged in cassava chip production. However, Keripik Singkong Fira MSME still faces operational challenges because the slicing process is performed manually, requiring 2–4 hours to process 20 kg of raw cassava. This results in operator fatigue and limits production capacity. This study aims to design and develop a cassava slicing machine with a capacity of 50 kg/h and a uniform slice thickness of 1 mm, while also analyzing its production cost using the full costing method. The research methodology included needs identification, technical calculations of the machine's main components, including motor power, transmission system, shaft diameter, bearing life, blade disc peripheral speed, and frame strength, followed by 3D modeling using SolidWorks and manufacturing processes consisting of welding, grinding, and drilling. The machine is powered by a 0.5 HP electric motor operating at 1,400 rpm, which is reduced to 440 rpm through a pulley and V-belt transmission system with a 3.18:1 reduction ratio, producing a blade disc peripheral speed of 6.22 m/s. The frame is constructed from ST-37 angle steel with a calculated bending stress of 7.33 MPa, which is significantly lower than the material's yield strength of 240 MPa. In addition, the machine is equipped with Occupational Safety and Health (OSH) features, including a protective blade cover and a safely designed hopper. The economic analysis showed that the total manufacturing cost of the machine was IDR 3,635,876, comprising material, machine rental, electricity, labor, and contingency costs. With a profit margin of 15%, the selling price was determined to be IDR 4,181,257. The results indicate that the proposed cassava slicing machine is more efficient, safer, and more economical than the conventional manual method, making it suitable for improving the productivity and competitiveness of MSMEs.

Keywords : cassava, slicing machine, electric motor, production cost, MSME.