

ABSTRAK

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Judul Laporan Akhir : Rancang Bangun Alat Pembangkit Listrik Tenaga Angin (Proses Perawatan)

(2025: xiii + 63 Halaman, 20 Gambar, 22 Tabel + 7 Lampiran)

Laporan akhir ini membahas proses perancangan dan pembuatan alat pembangkit listrik tenaga angin skala kecil yang dilengkapi dengan sistem perawatan (maintenance) untuk menunjang kebutuhan penerangan, khususnya di wilayah yang belum terjangkau jaringan listrik konvensional. Dalam proyek ini, digunakan turbin angin sumbu vertikal karena efisiensi pemanfaatan angin dari berbagai arah serta kemudahan perawatan. Proses perancangan mencakup pemilihan komponen seperti generator, solar charge controller, power inverter, akumulator, dan sistem kelistrikan pendukung lainnya yang dirancang agar sederhana, ekonomis, dan fungsional. Metodologi yang diterapkan meliputi studi literatur untuk memperoleh dasar teori, observasi lapangan guna menentukan spesifikasi komponen yang sesuai, serta bimbingan teknis bersama dosen pembimbing agar rancangan memenuhi standar teknis yang diperlukan. Tahapan pembuatan meliputi perakitan rangka berbahan besi siku, pembuatanudukan generator, pemasangan baling-baling, hingga integrasi sistem kelistrikan. Setelah proses perakitan selesai, dilakukan pengujian dengan menggunakan hembusan angin. Hasil pengujian menunjukkan bahwa alat mampu menghasilkan energi listrik untuk beban ringan seperti lampu dengan efisiensi yang cukup baik, meskipun performanya bergantung pada kecepatan angin. Selain proses perancangan, laporan ini menekankan aspek perawatan preventif untuk menjaga keandalan sistem. Disusun jadwal pemeliharaan berkala dan prosedur pencegahan kerusakan pada komponen penting seperti baling-baling, bearing, generator, dan inverter. Dengan penerapan perawatan ini, umur pakai alat dapat diperpanjang dan risiko kerusakan dapat diminimalkan. Secara keseluruhan, rancangan ini diharapkan menjadi solusi energi alternatif yang ramah lingkungan, mendukung pemanfaatan energi terbarukan, serta dapat dijadikan sarana edukasi teknologi pembangkit listrik sederhana di daerah terpencil.

Kata Kunci: pembangkit listrik tenaga angin, turbin vertikal, energi terbarukan, rancang bangun, perawatan preventif.

ABSTRACT

Design and Construction of Wind Power Generator (Maintenance Process)

(2025: xiii + 63 pp. + 20 Figures + 22 Tables + 7 Attachments)

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DIPLOMA-III MECHANICAL ENGINEERING STUDY PROGRAM
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This final report discusses the design and construction of a small-scale wind power generator equipped with a maintenance system to support lighting needs, especially in areas not yet covered by conventional electricity networks. This project uses a vertical-axis wind turbine due to its efficiency in utilizing wind from various directions and its ease of maintenance. The design process includes the selection of components such as a generator, solar charge controller, power inverter, accumulator, and other supporting electrical systems designed to be simple, economical, and functional. The methodology applied includes literature studies to obtain a theoretical basis, field observations to determine appropriate component specifications, and technical guidance with a supervisor to ensure the design meets the required technical standards. The manufacturing stages include assembling the angle iron frame, making the generator mount, installing the propeller, and integrating the electrical system. After the assembly process is complete, testing is conducted using wind gusts. The test results indicate that the device is capable of generating electrical energy for light loads such as lamps with fairly good efficiency, although its performance depends on wind speed. In addition to the design process, this report emphasizes the aspect of preventative maintenance to maintain system reliability. A periodic maintenance schedule and procedures for preventing damage to critical components such as propellers, bearings, generators, and inverters have been developed. Implementing this maintenance can extend the lifespan of the equipment and minimize the risk of damage. Overall, this design is expected to be an environmentally friendly alternative energy solution, support the use of renewable energy, and serve as an educational tool for simple power generation technology in remote areas.

Keywords: wind power plant, vertical turbine, renewable energy, design, preventive maintenance.