DESIGN AND MODELING OF WORKING WIND TURBINE

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FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
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DESIGN AND MODELING OF WORKING WIND TURBINE

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A Thesis in partial fulfillment of

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DEPARTMENT OF MARITIME TECHNOLOGY

FACULTY OF MARITIME STUDIES AND MARINE SCIENCE

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DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE

DECLARATION AND VERIFICATION REPORT

FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled: **DESIGN AND MODELING OF WIND TURBINE** By **KHAIRUL DA'I B. ROSIDI,** Matric No. **UK 18406** have been examined and all errors identified have been corrected. This report is submitted to the Department of Maritime Technology as partial fulfillment towards obtaining the **Bachelor Degree of Applied Science (Maritime Technology),** Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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DECLARATION

I hereby declare that this thesis entitled **DESIGN AND MODELING OF WIND TURBINE** is the result of my own research except as cites in the references.

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ABSTRACT

Nowadays, electricity energy consumption has arisen around the world. In Malaysia especially the average electricity tariffs have increased by 7.12. Malaysia has a potential to use the wind as alternative energy in generating electricity because of sometimes the wind speed in Malaysia can reached until 12 m/s. East coast areas such as Kuala Terengganu and Kota Bahru have a potential generate electricity from wind where the annually wind speed 3.1 m/s respectively. Therefore, with the advantage of the high wind speed at east coast Malaysia the used of electricity from wind can became an alternative to overcome the increasing of tariff. The objective of this project is to design and build a suitable working wind turbine which can save and reduce the electricity consumption. A Savonius type rotor has been selected as the basic design. The advantages of the Savonius rotor are it was simple construction, acceptance of wind from any direction without orientation and lack of necessity for over speed control. Savonius type rotor also produces higher torque and has lower cut in speed. A small Savonius type prototype 1 meter tall with a 0.46 meter rotor diameter is designed and built. The materials used to build the rotor choose from the lightweight material to increase the torque of the prototype and make the prototype sensitive with low wind speed condition. Finally the prototype then was tested at selected location. The results show prototype has achieved the objective by save RM 0.12 per month or if ratio using 1000 watt motor the prototype can save RM 192.97 per month.

ABSTRAK

Pada masa kini, penggunaan tenaga elektrik telah meningkat di seluruh dunia. Di Malaysia terutama sekali tarif elektrik telah meningkat secara purata sebanyak 7.12%. Malaysia mempunyai potensi untuk menggunakan angin sebagai tenaga altematif dalam menjana elektrik kerana kadang-kadang kelajuan angin di Malaysia boleh mencapai sehingga 12 m / s. Kawasan pantai timur seperti Kuala Terengganu dan Kota Bahru mempunyai potensi menjana elektrik dari angin di mana kelajuan setahun angin 3.1 m / s. Oleh itu, dengan kelebihan kelajuan angin yang tinggi di pantai timur Malaysia penggunaan elektrik dari angin boleh menjadi altematif untuk mengatasi peningkatan tarif. Objektif projek ini ialah untuk merekabentuk dan membina turbin angin yang boleh mengurangkan penggunaan elektrik. Kipas jenis Savonius telah dipilih sebagai reka bentuk asas. Kelebihan daripada kipas Savonius adalah kerana ia mudah dibina, dapat menerima angin dari pelbagai arah dan tidak perlu menjada stability jika angin kuat. Kipas jenis savonius juga menghasilkan tork yang lebih tinggi dan mempunyai potongan yang lebih rendah dalam kelajuan. Jenis prototaip Savonius kecil 1 meter tinggi dengan diameter 0,46 meter kipas direka dan dibina. Bahan-bahan yang digunakan untuk membina kipas dipilih daripada bahan yang ringan untuk meningkatkan tork prototaip dan membuat prototaip sensitif dengan keadaan kelajuan angin yang rendah. Akhimya prototaip telah diuji di lokasi yang dipilih. Keputusan menunjukkan prototaip telah mencapai objektif dengan dapat menjimat RM 0.12 sebulan atau jika dinisbahkan menggunakan 1000 watt motor prototaip boleh jimat RM 192,97 sebulan.