

THE DESIGN OF LOW SPEED WIND TURBINE

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THE DESIGN OF LOW SPEED WIND TURBINE

By

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of the requirements for the degree
of Bachelor of Engineering



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Thank you.

DECLARATION SHEET

I hereby declare that my Final Year Project Thesis is the result of my research work under supervision of PROF DR ISMAIL BIN DAUT. All literature sources used for the writing of this thesis have been adequately referenced.

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MEREKABENTUK KINCIR ANGIN PADA KELAJUAN RENDAH

ABSTRAK

Projek ini adalah merekabentuk sebuah turbin angin kelajuan rendah yang mampu menghasilkan tenaga elektik untuk mengecas bateri 12 V. Angin merupakan tenaga boleh diperbaharui boleh menghasilkan tenaga elektrik. Dalam projek ini, focus utama ialah jenis Savonius dari Turbin Angin Berkedudukan Menegak (TAKM). Jenis Savonius dipilih kerana sangat sesuai untuk digunakan pada kawasan angin yang berkelajuan rendah. Objektif projek ini adalah untuk merekabentuk sebuah turbin angin yang sesuai untuk kelajuan angin rendah, yang mampu menghasilkan tenaga elektrik dan merekabentuk sebuah penukar arus terus, AT (Penaik AT-AT). Kemudian Turbin angin jenis Savonius dilekatkan pada rotor arus ulang-alik(AU). Proses ini adalah penukaran dari tenaga kinetik ke tenaga elektrik. Tenaga yang dihasilkan oleh rotor diubah ke AT sebelum dinaikkan ke 12 V AT dengan rangkaian pengubah AT yang telah di reka. Projek ini merangkumi dari rekabentuk turbin Savonius hingga 12 V AT dan mampu mengecas bateri 12 V. Prestasi dari voltan output dengan menggunakan rekabentuk turbin ini telah meningkat dan boleh di komersialkan. Di pasaran, rekabentuk turbin ini mampu bersaing dengan produk-produk yang telah sedia ada di pasaran. Ini kerana rekabentuk lebih murah dan berpatutan jika dibandingkan dengan rekaan turbin yang berada di pasaran. Rekaan projek ini telah terbukti kemampuannya untuk digunakan sebagai salah satu produk untuk menghasilkan elektrik, berdasarkan hasil yang dicapai dalam projek ini.

THE DESIGN OF LOW SPEED WIND TURBINE

ABSTRACT

This project is to design a low speed wind turbine which it able to produce an electricity to charge 12 V of battery. Wind is a renewable energy which able to generate electrical energy. In this project, Savonius type of Vertical Axis Wind Turbine (VAWT) is mainly focused. Savonius type is choosing because it is most suitable to operate at low speed of wind area. The objectives of this project are to design a suitable wind turbine for low speed; which able to generate electricity and design a direct current, DC converter (DC-DC Booster). The design of Savonius wind turbine is then attached to alternative current, AC rotor. This process is conversion energy from kinetic to electric. The energy produced by the rotor is rectifying to DC before it boosted up to 12 V DC by the DC converter circuit designed. This project has covered from the Savonius turbine design until 12 VDC is produced and able to charge a nominal 12 V battery. The performance of the output voltage using this design had improved and can be commercialize. In market, this design able to compete with existing products on the market. This is because the design is cheaper and affordable compared with the existing design in the market. This project design has proven its ability to be used as one of the products to generate electricity, based on the results achieved in this project.

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LIST OF SYMBOL

HAWT	Horizontal Axis Wind Turbine
VAWT	Vertical Axis Wind Turbine
DC	Direct Current
AC	Alternating Current
m /s	meter per second
PV	Photovoltaic
kV	kilovolt
kW	kilowatt
RPM	Revolutions Per Minute
TSR	Tip Speed Ratio
ω_s	Angular velocity of Savonius rotor
R_s	Radius of Savonius rotor



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