TURBINE SELECTION FOR WIND FARM POTENTIALS IN EAST LIBYA

THESIS

Organized to meet a part of the requirements to achieve the master degree of Mechanical Engineering

By

ABDELKARIM ALI SALEM

S951302502

POSTGRADUATE PROGRAM

SEBELAS MARET UNIVERSITY

SURAKARTA

2015

TURBINE SELECTION FOR WIND FARM POTENTIALS IN EAST LIBYA

THESIS

By

ABDELKARIM ALI SALEM

S951302502

Supervisor Board	Name	Signature	Date
Supervisor I	D.Danardono D.P.T, S.T., M.T., PhD. NIP 196905141999031001	.....	Februray 2015
Supervisor II	Prof. Dr . Dwi Aries H., ST., MT. NIP.197403262000031001	.....	Februray 2015

Fulfill the Qualification

On Date February 2015

Head of Master Program in Mechanical Engineering

Postgraduate Program of Sebelas Maret University

Dr. Techn. Suyitno, S.T., M. T.

NIP 197409122001121002

TURBINE SELECTION FOR WIND FARM POTENTIALS IN EAST LIBYA

THESIS

By

ABDELKARIM ALI SALEM

S951302502

Examiner Board

Title	Name	Signature	Date
Head	Dr. techn Suyitno, ST ., MT. NIP. 19740902200112102	.....	Februray 2015
	Agung Tri Wijayanta,S. T .,M.Eng.,Ph.D. NIP. 19710831199702100l	.....	Februray 2015
Member	D.Danardono D.P.T, S.T., M.T., PhD. NIP 196905141999031001	.....	Februray 2015
	Prof. Dr .Dwi Aries H., ST., MT. NIP.197403262000031001	.....	Februray 2015

Examination on

Date February 2015

Director of Postgraduate Program of Sebelas Maret University

Prof. Dr. Ir. Ahmad Yunus,M.S.

NIP. 196107171986011001

Head of Master Program of Mechanical Engineering

Dr. techn Suyitno, ST., MT.

NIP 197409022001121002

ORIGINALITY AND PUBLICATION STATEMENT

We declared that:

1. Thesis entitled: "**Turbine selection for wind farm potentials in East Libya** "is my work and free of plagiarism, and there is no scientific papers that have been asked by others to obtain academic degrees and there is no work or opinion ever written or published by another person except in writing used as a reference in this text and a reference source as well as mentioned in the bibliography. If at a later proved there is plagiarism in scientific papers, then I am willing to accept sanctions in accordance with the provisions of the legislation (Permendiknas No 17, tahun 2010)
2. Publication of some or all of the contents of the Thesis or other scientific forums and permission must include the author and the team as a supervisor. If within at least one semester (six months after examination of the thesis) I did not make the publication of part or entire of this thesis, the Program in Mechanical Engineering of UNS has the right to publish in a scientific journal published by Study Program in Mechanical Engineering of UNS. If I violate of the provisions of this publication, then I am willing to get an academic sanction.

Surakarta, Februray 2015

Student,

ABDELKARIM ALI SALEM

S951302502

ABDELKARIM ALI SALEM, NIM: S951302502, 2014. ***Turbine selection of wind farm potentials in East Libya:*** . Supervisor I: **D.Danardono D.P.T., S.T., M.T., Ph.D**.

Supervisor II: **Prof.Dr. Dwi Aries Himawanto, S.T., M.T**. Thesis, Postgraduate Program in Mechanical Engineering. **Sebelas Maret University, Surakarta, Indonesia.**

Abstract

In this study, the wind speed characteristics and energy potential in the selected location Al-Fattaih-Derna in the eastern part of Libya have been investigated. The wind speed data was measured in 2003 at height of 50 m. The results shows that the annual mean wind speed is 8.21 m/s, Weibull distribution results has been used to accomplish the analysis, the two parameter of the Weibull statistics is found to lie between $2.39 \leq k \leq 5.77$ *and* $5.36 \leq k \leq 7.8$. The possibilities are high because of 8010 hours are available with the reasonable wind velocity values varied between 3-23 m/s, which is equal to 92.47 % . Further the result shows the annual value of the most frequent wind speed is 7.5 m/s, while the annual value of the wind speed carrying maximum energy is 8.5 m/s. The performance of the three selected wind turbine models (with rated power of 225, 1650 and 3300 KW) in this site is examined. The annual energy output for these turbines is determined. It is considered very promising as a renewable energy resource at this location.

Keywords; average wind velocity, weibull distribution, wind power density, east Libya, wind turbine.

PREFACE

My sincere thanks and gratitude are due to Supervisor I: D.Danardono D.P.T., S.T., M.T., Ph.D. Supervisor II: Prof.Dr. Dwi Aries Himawanto, S.T., M.T. who supervised this study, discussed the thesis and whose keen interest and valuable comments were essential for its success. I am deeply indebted to Dr. Danardono for his valuable suggestions and comments. Further thanks go to the head of mechanical engineering department Dr. techn Suyitno. Also I want to say thanks to the Libyan's Renewable Energy Council (LREC) for their help and for providing the needed information to accomplish this thesis.

Also I will not forget to thank all the stuff in the university who support and help during my study. I would like to thank my colleagues in the master degree program for their valuable feedback and support. It gives me great pleasure in acknowledging them for their continuous help and encouragement.

Finally, I will take this opportunity to express my profound gratitude to my beloved family my wife and kids and especially for my parents and siblings for their moral support, patience, and prayers during my study, and who were with me in each step to complete this master thesis.

CONTENT

FIGURE LIST

TABLE LIST