MODELING AND DESIGN OPTIMIZATION OF FOLDING TABLE FRAME USING SOLIDWORKS SOFTWARE

By

EDUARDO ARDITA 2-1752-034

MASTER'S DEGREE in

MECHANICAL ENGINEERING - MANUFACTURING CONCENTRATION FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY



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Tangerang, Banten 15143 - Indonesia

August, 2018

Revision after the Thesis Defense on 31 July 2018

STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

MODELING AND DESIGN OPTIMIZATION OF FOLDING TABLE FRAME USING SOLIDWORKS SOFTWARE

By

Eduardo Ardita Dena Hendriana, B.Sc., S.M., Sc.D., Advisor Dr. Ary Syahriar, M.Sc., Co-Advisor

SWISS GERMAN UNIVERSITY

To supply the needs of residential house at affordable prices, many residential house are built with a small type. Having a house with a small type will cause new problems in the arrangement of furniture needed, it is necessary to have a furniture engineering that aims to have a furniture can have more than one function or can be folded.

Aspects of someone's experiences are affect in engineering furniture, but these aspects are subjective and different from one and another, depending on the length of time they are in their work, and depending on the complexity of the problems they have solved. Therefore in the implementation need to be supported with aspects of technology and science in order to produce safety standards on furniture has made.

This research attempts to present a concise, simple and comprehensive simulation using SolidWork software. This software can help us to see a possible outcome of a design we have planned through visual simulation, so failure in design creation can be anticipated early. A simulation process is able to reduce lost time, and reduce costs, if we compare it by looking for a result through a direct implementation of the design we have created.

The end result of this research is that when a design is implemented and tested, the prototype is able to achieve all the goals of the design requirements.

Keywords: Steel Frame, Table Frame, Strength of Table Frame, Folding Table, Modeling of table frame, Modeling of folding table.

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DEDICATION

This thesis is dedicated to the development of the world of engineering, especially to support the creation of innovations in the field of furniture engineering in Indonesia which takes into account the safety factor.

ACKNOWLEDGEMENTS

First, I thank God for the health gifts that are always given to me.

To my Parents, Ndari, Filio, Kenjiro and Michelle for your love, support and patience, so I can reach my dream.

I would also like to express my sincere thanks to my thesis adviser, Mr. Dena Hendriana, B.Sc., S.M., Sc.D., Mr. Dr. Ary Syahriar, M.Sc., and all the lecturers of SGU, for their guidance and support throughout my study.

Thanks to my brothers, Ernanto and Ansgarius for your great help.

To all my friends, thank you for your supports when I was drop.

Hopefully this thesis will be the beginning in my life journey.

DESIGN AND IMPLEMENTATION OF SAXOPHONE MOUTHPIECE BY ANALYZE THE AIR FLOW USING COMPUTATIONAL FLUID DYNAMIC TO PRODUCE DIFFERENT SOUND CHARACTER

By

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MASTER'S DEGREE in

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ABSTRACT

DESIGN AND IMPLEMENTATION OF SAXOPHONE MOUTHPIECE BY ANALYZE THE AIR FLOW USING COMPUTATIONAL FLUID DYNAMIC TO PRODUCE DIFFERENT SOUND CHARACTER

By

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SWISS GERMAN UNIVERSITY

Saxophone mouthpiece is the most important part in producing the sound character on a saxophone music instrument. In this research, the focus point is on the interior design of saxophone mouthpiece. The factors that most affect the characteristics of the mouthpiece sound is not on the material of the saxophone mouthpiece, but on the design of baffles and chamber affect the airflow in the mouthpiece. Methods of Research and Development applied this research. This study uses Experimental Design based on R&D method. Using Computational Fluid Dynamics (CFD) in Solidworks additional software, the Flow Simulation. The development in this research is make an experiment by simulating and analyze the air flow velocity, turbulence intensity and accoustical power inside the saxophone mouthpiece, and measure the frequency and loudness level of sound produced by saxophone mouthpiece. With simulation result, the saxophone mouthpiece with ebonit material have faster air flow velocity (23,54 m/s) than mouthpiece with metal material (19,24 m/s), but metal material have maximum louder sound level (108.5 dB) than ebonit material (107.6 dB). But in experimental test, there are just small differences in the acoustic power. Which the metal material have 89 dB in maximum value, and ebonit material have 88 dB in maximum value.

Keywords: saxophone mouthpiece, computational fluid dynamic, flow simulation, flow analysis, mouthpiece baffle, saxophone accoustical element

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DEDICATION

I dedicate this works for:

GOD Almighty, Allah Subhanahu Wa Ta'ala

The Future of The Country I loved, Republic of Indonesia

My Father and Mother, Alm. Tofik Priyatno and Suparni

My Lovely Wife, Diah Wahyuningsih

My Campus, ATMI Cikarang and Swiss German University

All of my Friends that joined as member of cooperation program ATMI - SGU

All of Saxophonist Musicians in Indonesia

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Praise Allah SWT who has mercy, favor and gift, so that the author can completed this thesis with title "DESIGN AND IMPLEMENTATION OF SAXOPHONE MOUTHPIECE BY ANALYZE THE AIR FLOW USING COMPUTATIONAL FLUID DYNAMIC TO PRODUCE DIFFERENT SOUND CHARACTER". The completion and success in the preparation of this thesis is because of guidance, direction, and encouragement from various parties. So that, the authors would like to thank and give the greatest appreciation to the honorable:

- 1. Dr. rer. nat Filiana Santoso, Rector of Swiss German University.
- Dr. Irvan Setiadi Kartawiria, S.T., M.Sc. Dean Faculty of Engineering and Information Technology Swiss German University.
- 3. Dr. Ir. Hanny J. Berchmans, M.Sc. and Dr. Ary Syahriar, DIC. The advisors lecturer who have provided guidance, direction, and motivation in the completion of this thesis.
- 4. The entire lecturers and employees in Mechanical Engineering Department of Swiss German University that have provided useful knowledge.
- All of my friends that joined in fast track cooperation program Swiss German University – ATMI Cikarang.

The author realized that the completion of this thesis is still far from perfect. Therefore, the authors expect suggestions and constructive criticism from readers. And finally, the author expect this thesis can be useful for readers and also the wider community.

Tangerang, June 6th 2018

Bagas Anjar Sadewa

Author

ENERGY CONSUMPTION ANALYSIS TO DETECT PROCESS FAILURE IN RUBBER COMPOUND MIXING PROCESS

By

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MASTER'S DEGREE in

MECHANICAL ENGINEERING – MECHATRONICS CONCENTRATION FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY



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ENERGY CONSUMPTION ANALYSIS TO DETECT PROCESS FAILURE IN RUBBER COMPOUND MIXING PROCESS

By

Agus Triyanto Dr. Widi Setiawan, Advisor Dr. Ary Syahriar, Co-Advisor

SWISS GERMAN UNIVERSITY

Since there is no initial indicator system to detect abnormality in rubber mixing process, the problem can only be detected after the result of rubber production tested by laboratory teams. Abnormality will be late to be anticipated because the result of the test will be appeared after 8 to 10 batch afterwards. The abnormality in mixing process will be detected if the results of testing compound i.e. mooney viscosity, mooney scorch time, and tensile strength are out of the specification. The energy consumption will be measured for every batch by using internal current sensor in AC motor main drive. By reading the figure of measurement, energy consumption character will be identified and the specification standard of energy consumption can be defined. The result of energy consumption analysis is provided.

Keywords: energy consumption, initial indication, abnormality, main drive.

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DEDICATION

By saying thanks to God, I dedicate this little work to:

- 1. Both beloved parents, Mr. Ripto Sugianto and Mrs. Iswati (alm).
- My beloved wife and children, Ade Hepi Septiani, Ghania Farah Saliha and Khalid Maula Shiddiq.
- 3. Education and industrial world in Indonesia.

Thank you so much for everything, hopefully this paper can be useful for the advancement of science in the future.

Aamiin.

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This project would not have been possible without any support from many people. Thank you so much to my adviser, Dr. Widi Setiawan and Dr. Ary Syahriar, who have read my numerous revisions and help me to make some sense of the confusion. And thanks to my committee members, Edy Sujiwo, Bibit Hartono, Heru Priyono, Mulyono, Singgih Aji Wibowo, Sugiarto, Jepi Juli and Adi Setiadi, who have offered guidance and support. Thanks to the Swiss German University for awarding me to complete this project. And finally, thanks to my beloved wife & children, parents, and numerous friends who have endured for this long process with me, always offering support and love.

ANALYSIS AND COMPARISON OF 3D LASER AND SCANNING TECHNOLOGY TO MEASURE THE ACCURACY OF ACTUAL PRODUCTS TO DESIGN

By

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ABSTRACT

ANALIZED AND COMPARISON OF A LASER 3D SCANNING AND CONTACT 3D SCANNING TECHNOLOGY WITH 3-DIMENSIONAL DESIGN IN MEASURING 3-DIMENSIONAL PRODUCT

By

Ardi Nugroho Dena Hendriana, B.Sc, S.M, Sc.D, Advisor Ary Syahriar, B.Sc, M.Sc, DIC, Co-Advisor

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In the mold and dies manufacturing industry, measurements of 3D contours are difficult to measure using conventional measuring instruments. Currently many are using CMM (Coordinate Measuring Machine). However, measurement using CMM is relatively time consuming and less flexible because it must bring the workpiece to CMM.

In this research will be shown another 3 dimensional measurement technique that is using laser scanner. This laser measurement technique is expected to measure the 3D profile accurately.

The results of data scanning from this laser scanner can be reconstructed into three-dimensional images. This allows us to compare directly with the design of the workpiece, so that it can be directly visible visually the result of the dimensions of the workpiece compared to the product design.

Three-dimensional measurements using lasers are also faster and more efficient than using CMM.

Keywords: 3D scanning, laser scanning, reconstruction, 3D image, measurement

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DEDICATION

I dedicate this works for my family, ATMI Cikarang and Indonesia

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I would like to thank my family for supporting me throughout my thesis work and studies at Swiss German University. A special thanks to ATMI Cikarang for letting me use their equipment for my work. I would also like to thank the staff at Swiss German University for making this work possible and big thanks to Mr. Dena Hendriana, B.Sc, S.M, Sc.D as thesis advisor and Mr. Ary Syahriar, B.Sc, M.Sc, DIC as co-advisor for patiently supervising my thesis work.