



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND SIMULATE AUTONOMOUS STEAM IRON STAND

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Mechanical Engineering Technology (Automotive) with Honours.

by

AHMAD FAISAL BIN LIE

B071510105

930628-12-6639

FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING

TECHNOLOGY

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

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BLOK D LOT 5 GROUND FLOOR


TAMAN ANGGERIK JALAN

LINTAS SIBUGA 90000 SANDAKAN

SABAH

Tarikh: 8/1/2019

Disahkan oleh penyelia:



.....

MOHAMMAD RAFI BIN OMAR

Cop Rasmi Penyelia


MOHAMMAD RAFI BIN OMAR
Jurutera Pengajar
Jabatan Teknologi Kejuruteraan Mekanikal
Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan
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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Automotive) with Honours. The member of the supervisory is as follow:

Signature:



Supervisor :

MOHAMMAD RAFI BIN OMAR

Signature:



Co-supervisor:

PROFESOR MADYA TS. DR.
MUHAMMAD ZAHIR BIN HASSAN

ABSTRAK

Ringkasan yang boleh dibuat daripada projek ini ialah seterika stim beroperasi secara automatik. Projek ini hanya memberi tumpuan kepada reka bentuk pendirian untuk menggantung seterika stim pakaian dengan memperbaikinya dengan sistem automatik semasa beroperasi. Ini adalah kerana untuk mengelakkan kesan fizikal seperti keletihan semasa mengosok pakaian jika menyumbang masa mengosok yang panjang untuk menghilangkan kedutan atau lipatan pada pakaian. Perisian CATIA V5R21 telah digunakan untuk mencapai objektif projek ini. Proses reka bentuk akan merangkumi reka bentuk lakaran, reka bentuk bahagian dan pemasangan untuk setiap komponen bagi tiga produk yang berbeza. Analisis RULA pada perisian ini digunakan untuk mengkaji postur ergonomik manusia semasa mengendalikan produk ini dari sebarang kecederaan atau ketidakselesaan kepada pengguna daripada keputusan yang didapati bahawa reka bentuk 3 adalah yang terbaik dari segi postur. Selain itu, perisian ini juga menyediakan analisis struktur untuk data tingkah laku mekanikal apabila daya tekanan terhadap keseluruhan produk ini untuk menguji kekuatannya dan menunjukkan reka bentuk 3 mendapat factor keselesaan yang baik. Selain itu, data yang dikumpul dari analisis ini akan menentukan faktor keselamatan pada reka bentuk. Keputusan yang didapati melibatkan keselesaan melalui RULA analisis dan factor keselamatan reka bentuk tersebut.

ABSTRACT

The summary that we can made from this project is the autonomous steam iron stand. This project only focuses on designing the stand for hanging garment steam iron by improved it with automatic system while operating. This is because to prevent the physical effect such as fatigue while ironing clothes if contributes a long period time to remove the wrinkles or crease on the clothes. CATIA V5R21 software has been used to archive the objective of this project. The design process will include the sketching, part design and assembly design for every component of the three different product. RULA analysis on this software been used to study about ergonomic posture of human while handling this product from any injuries or uncomfortable to consumer. This analysis will produce the best final score for human body is design 3 that get 3 score. Other than that, this software also provide the structural analysis for the mechanical behavior such as the strength of the design after the force being applied between the overall assembly parts get best result of factor of safety also on design 3 which is 2. Moreover, the collected data from this analysis will specify the factor of safety on the design. The result finding from this project is the ergonomic posture of the consumer during ironing for the RULA analysis and structural analysis is more focus on the design strength which is presented the factor of safety of the design.

DEDICATION

I dedicated my work to my lovely family, lectures and friends. To complete my bachelor degree project I realize that every of challenging work need a self- effort and helps from lecturer. Also, a special appreciation to my beloved parents, Lie bin Aklah and Rohana Binti Harris whose give moral support, prayer of a day and night. I also dedicate my work to my supervisor Encik Mohammad Rafi Bin Omar and co-supervisor Profesor Madya Ts Dr Muhammad Zahir Bin Hassan who have guided me to do the real of work-self until finish this project. Encouragement and advice from them I am able to get such a success.

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TABLE OF CONTENTS

	PAGE
TABLE OF CONTENTS	x
LIST OF TABLES	xv
LIST OF FIGURES	xvi
LIST OF APPENDICES	xix
LIST OF SYMBOLS	xx
LIST OF ABBREVIATIONS	xxi
CHAPTER 1 INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	2
1.3 Objective	2
1.4 Scope	2
CHAPTER 2 LITERATURE REVIEW	3
2.0 Introduction	3
2.1 History of clothes iron	4
2.2 Type of cloth	5
2.2.1 Mangling board iron	5
2.2.2 Charcoal Iron	6

2.2.3	Electric dry Iron	7
2.2.4	Electric steam Iron	8
2.3	Box steam Iron	9
2.4	Hanging garment steamer	10
2.4.1	Working operation	11
2.4.2	Advantages and disadvantages of hanging garment steam iron	12
2.5	Component of hanging steam iron	14
2.5.1	Steam generator (Boiler)	14
2.5.2	Steam hose	15
2.5.3	Steamer Head	15
2.5.4	Water Tank	16
2.5.5	Adjustable Pole	17
2.6	Hanging garment steamer features	17
2.6.1	Quick wrinkles removing	17
2.6.2	Safe using to all type of fabrics	18
2.6.3	Steam levels	18
2.6.4	Dual Steamer nozzle	18
2.6.5	Hanger with hang and lock	18
2.7	CATIA V5	18

CHAPTER 3	METHODOLOGY	20
3.0	Introduction	20
3.1	Feasibility study	21
3.1.1	Current product	21
3.2	Concept design	22
3.2.1	Design 1	22
3.2.2	Design 2	23
3.2.3	Design 3	24
3.3	Design preparation	25
3.3.1	Sketcher	25
3.3.2	Part design	26
3.3.3	Assembly design	27
3.3.4	Drafting	28
3.4	Simulation (DMU kinematics)	29
3.4.1	Designing the mechanism	29
3.5	Analysis data	32
3.6	Design Selection	33
3.6.1	Pugh method	34
3.6.2	RULA analysis	35
3.6.3	Structural analysis	36

3.7	Prepare bill of material	37
CHAPTER 4	RESULT AND DISCUSSION	38
4.1	Introduction	38
4.2	Design 1	38
4.2.1	Design 1 Assembly	38
4.2.2	Design 1 component	39
4.2.3	Design 1 RULA analysis result	41
4.2.4	Design 1 structural analysis	44
4.3	Design 2	47
4.3.1	Design 2 assembly	47
4.3.2	Design 2 component	47
4.3.3	Design 2 RULA analysis result	50
4.3.4	Design 2 structural analysis	53
4.4	Design 3	56
4.4.1	Design 3 assembly	56
4.4.2	Design 3 component	56
4.4.3	Design 3 RULA analysis result	59
4.4.4	Design 3 structural analysis	62
4.5	RULA analysis final score	65
4.6	Overall factor of safety	66

CHAPTER 5	CONCLUSION	67
5.1	Introduction	67
5.2	Conclusion	67
5.3	Recommendation	68
REFERENCES		69
APPENDIX		72

LIST OF TABLES

TABLE	TITLE	PAGE
Table 3-1:	Pugh method	35
Table 3-2:	Bill of material of autonomous steam iron stand	37
Table 4-1:	Design 1 component	39
Table 4-2:	Design 1 data score for male and female	42
Table 4-3:	Design 1 material properties	45
Table 4-4:	Design 1 structural analysis data	46
Table 4-5:	Design 2 component	47
Table 4-6:	Design 2 data score for male and female	51
Table 4-7:	Design 2 material properties	54
Table 4-8:	Design 2 structural analysis data	55
Table 4-9:	Design 3 component	56
Table 4-10:	Design 3 data score for male and female	60
Table 4-11:	Design 3 material properties	63
Table 4-12:	Design 3 structural analysis data	64

LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2-1:	Literature review flow chart	3
Figure 2-2:	Mangling board Iron	5
Figure 2-3:	Charcoal Iron(Gann 2013)	6
Figure 2-4:	Electric dry Iron(Gann 2013)	8
Figure 2-5:	Box steam iron (left) and Hanging garment steamer (right)	8
Figure 2-6:	Box steam iron	9
Figure 2-7:	Steam generator (Boiler)	14
Figure 2-8:	Steam Hose	15
Figure 2-9:	Steamer Head	15
Figure 2-10:	Water tank	16
Figure 2-11:	Adjusting Pole	17
Figure 3-1:	Methodology flow chart	20
Figure 3-2:	Box steam Iron (Left) and Hanging garment steam Iron(Right)	21
Figure 3-3:	Design 1	22
Figure 3-4:	Design 2	23
Figure 3-5:	Design 3	24
Figure 3-6:	Sketcher	25

Figure 3-7: Part design	26
Figure 3-8: Assembly design	27
Figure 3-9: Drafting	28
Figure 3-10: Step 1	29
Figure 3-11: step 2	30
Figure 3-12: Step 3	30
Figure 3-13: Step 4	31
Figure 3-14: Step 5	31
Figure 3-15: Step 6	32
Figure 3-16: Step 7	32
Figure 3-17: Generative assembly structural analysis	33
Figure 3-18: Japanese 95 th man and the Japanese 95 th woman	35
Figure 3-19: Structural analysis	36
Figure 4-1: Design 1 assembly	38
Figure 4-2: Design 1 manikin's postures in hanging form	41
Figure 4-3: Design 1 graph of RULA score for male and female	42
Figure 4-4: Design 1 stress view of design after applied distribute load	44
Figure 4-5: Design 1 Von Mises stress view	44
Figure 4-6: Design 2 assembly	47
Figure 4-7: Design 2 manikin's postures in hanging form	50
Figure 4-8: Design 2 graph of RULA score for male and female	51

Figure 4-9: Design 2 stress view of design after applied distribute load	53
Figure 4-10: Design 2 Von Mises stress view	53
Figure 4-11: Design 3 assembly	56
Figure 4-12: Design 3 manikin's postures in hanging form	59
Figure 4-13: Design 3 graph of RULA score for male and female	61
Figure 4-14: Design 3 stress view of design after applied distribute load	62
Figure 4-15: Design 3 Von Mises stress view	62
Figure 4-16: RULA analysis final score	65
Figure 4-17: Factor of safety	66

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix 1	: Selected design 3 drafting	72
Appendix 2	: Design 1 RULA analysis result	77
Appendix 3	: Design 2 RULA analysis result	78
Appendix 4	: Design 3 RULA analysis result	79
Appendix 5	: Gantt chart	80

LIST OF SYMBOLS

Deg	-	Degree
e	-	Exponential
K	-	Kelvin
Kg	-	Kilogram
N	-	Newton
m	-	Meter
mm	-	Millimetre

LIST OF ABBREVIATIONS

CATIA	Computer Aided Three-Dimensional Interactive Application
RULA	Rapid Upper Limb Assessment

CHAPTER 1

INTRODUCTION

1.1 Background

Cloths iron it's one of the basic tools in home that has been used by people to remove wrinkles or do finishing on their clothes. According to (Gann 2013) laundry finishing tools has been used until late 1870s called the sad iron. This iron was made completely heavy and electricity will heated directly the sheet metal so it used to remove wrinkles. Clothes iron being heated by using external sources such as charcoal and electricity (B.F. Parr 1949). The development of clothes iron is to improved and minimize the time consumption on ironing clothes and minimize the physical labor for the user. For the dry type clothes iron its fully being heated by the electricity to the soleplate with no assist from any additional system. According to (Kennon 2008) the pressing process also help to remove the unwanted wrinkle or creases on the clothes that can make smooth surface also giving satisfaction and giving attractive to the consumers. Modern technology for clothes iron was being published by additional improvement to the dry clothes iron with helps from steam to give more quality of the clothes finishing (Kumar 2014). According to (Kumar 2014) those modern clothes iron was invented not only for the quality of removing wrinkle but it also being made by improvement on the safety issues and the energy saving while operating. According to (Carrubba 2005) the invention of garment steamer provides the improvement in flexibility and efficiency of finishing for clothes.

1.2 Problem Statement

Firstly, this project made details description on design and simulate the autonomous steam iron stand for hanging garment steam iron. Up to now, almost hanging garment steam iron stand in the market not working automatically so the physical effect such as fatigue while ironing clothes will more for the users. Says (Carrubba 2005) the garment steamer has separable rod or stand, the stand have a hanger that can move slightly which is help user to select to any position. This is not suitable if the clothes it too long or high than users because it needs more movement up and down while ironing the cloth. Early method to removed wrinkles or crease by applying the clothes under the heavy weight, stretching and beating, this method needs more energy to users while ironing and it also contributes a long period time to remove the wrinkles or crease on the clothes (B.F. Parr 1949). Garment steam iron has a steam head that contributes the steam to the clothes and also consist soleplate that being move up or down in a vertical motion repeatedly to remove the wrinkles on clothes.

1.3 Objective

- i. To design an autonomous iron stand.
- ii. To simulate structure of the autonomous iron stand.
- iii. To analyze the product comfort using RULA Analysis

1.4 Scope

- i. Analyze the structure of autonomous iron stand using CATIA V5.
- ii. Focus on designing iron stand.
- iii. Simulate for comfortable user by using RULA Analysis.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

To complete literature review, should do a research by reading any of journal, book and website to give more understanding about this project. This chapter begins with introduction to the cloth iron, to give related overview on project title such as the component and function of cloth iron. Finding from the reading material will summarize and be compared with one another to get the related information on project title. This structure of the chapter is shown in **figure 2-1**.

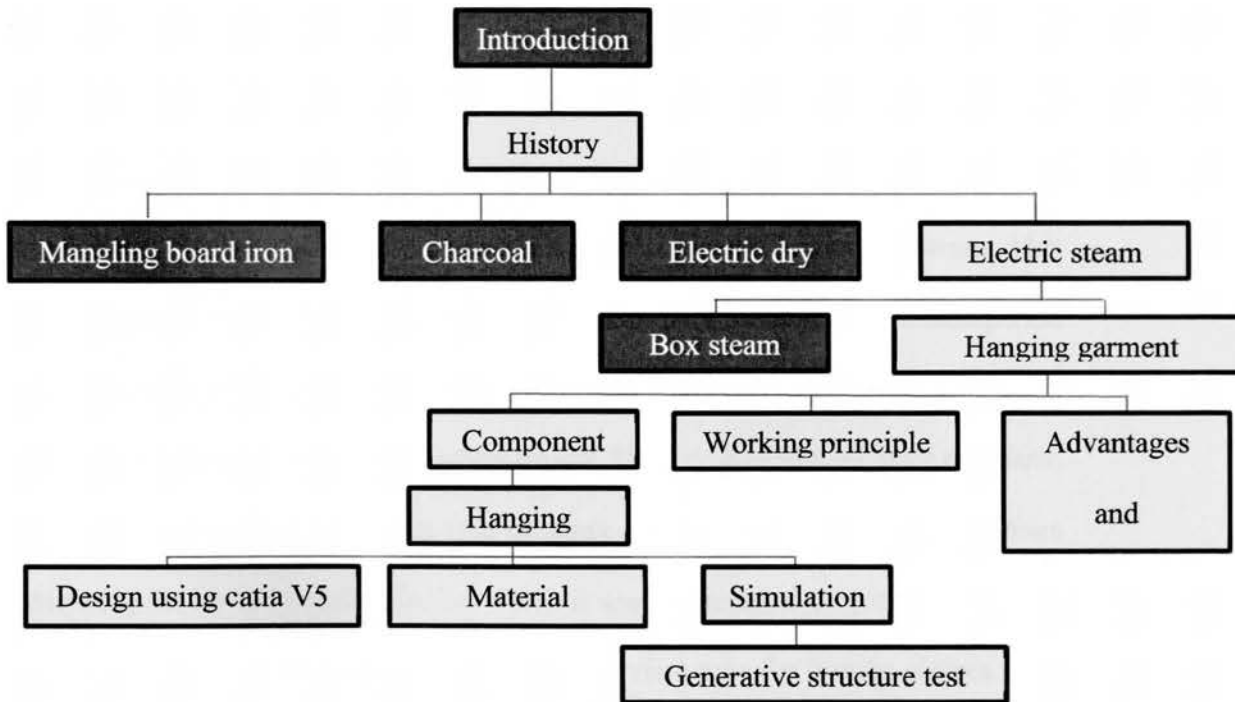


Figure 2-1: Literature review flow chart