

DESIGN AND FABRICATE MULTIPURPOSE PORTABLE DESK

MUHAMMAD ZULFADLI BIN CHE ZAKARIA

A report submitted in fulfillments of the requirements
for the award of
Diploma of Mechanical Engineering

Faculty of Mechanical Engineering
Universiti Malaysia Pahang

NOVEMBER 2008

SUPERVISOR DECLARATION

I hereby declare that I have read this project report and in my opinion this project report is sufficient in term of scope and quality for the award of the Diploma of Mechanical Engineering.

Signature :

Name of Supervisor : EN JAMILUDDIN BIN JAAFAR

Position :

Date :

STUDENT DECLARATION

I declare that this project entitled “Design And Fabricate Multipurpose Portable Desk” is the result of my own idea except as state in the reference. The project has not been accepted for any degree and is not concurrently submitted in candidate of any other degree.

Signature :

Student Name : MUHAMMAD ZULFADLI BIN CHE ZAKARIA

Date :

DEDICATION

Firstly thanks to my beloved parent Che Zakaria Bin Mohamad and Tuan Ruzema Binti Tuan Yusoff and also my family without whom lifetime effect, my pursuit of higher, education would not have been possible and I would not have chance to study in a mechanical course.

Also I wish to express my sincere appreciation to my supervisor, En Jamiluddin Bin Jaafar and mechanical staff because of the guidance without whose wise suggestions, helpful guidance and direct assistance, if could have neither got off the guard nor even been completed.

A special thanks to all my friends and other who help me finish this project on time. Their views and tips are useful to me. Finally to individuals who has involved neither directly nor indirectly in succession of this thesis. Indeed I could never adequately express my indebtedness to all of them. Thank you.

ACKNOWLEDGEMENTS

I am grateful and would like to express my sincere gratitude to my supervisor En Jamiluddin Bin Jaafar for his germinal ideas, invaluable guidance, continuous encouragement and constant support in making this project possible. He has always impressed me with his outstanding professional conduct, his strong conviction for engineering, and his belief that a Diploma program is only a start of a life-long learning experience. I am truly grateful for his progressive vision about my training in engineering, his tolerance of my naive mistakes, and his commitment to my future career.

My sincere thanks go to all my lab mates and members of the staff of the Mechanical Engineering Department, UMP, who helped me in many ways and made my stay at UMP pleasant and unforgettable.

I acknowledge my sincere indebtedness and gratitude to my parents for their love, dream and sacrifice throughout my life. I cannot find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to attain my goals.

ABSTRACT

The study of manufacturing was very important in order to carry out this project to ensure that the student understand on what are needed to do. This project is about designing and fabricate “Multipurpose Portable Desk” to help people easy to bring anywhere. This project involves the process of designing the table by using considering some of factor such as shape and ergonomic for people to use. After the design is complete, it was transformed to real product where the design is used as a guideline. This project also required to ensure the safety for indeed of publishing. Methods and process involve in this project for instance joining using welding, rivet, shearing, bending and drilling. This project is mainly about generating a new concept of multipurpose and portable desk that would make easy to bring anywhere and more function. After all process had been done, this desk may help us to understand the fabrication and designing process that involved in this project.

ABSTRAK

Pembelajaran mengenai pembuatan adalah penting untuk menjalankan projek ini bagi memastikan pelajar memahami tentang perkara yang perlu dilakukan. Projek ini adalah mengenai merekabentuk dan membuat meja serbeguna bagi memberi kemudahan kepada pengguna untuk membawa kemana-mana sahaja. Projek ini melibatkan proses reka meja tersebut berdasarkan bentuk dan ergonomik bagi memudahkan pengguna untuk menggunakannya. Selepas proses ini siap, meja tersebut dihasilkan berdasarkan reka bentuk yang telah dibuat. Projek ini juga melibatkan ciri-ciri keselamatan bagi pengguna untuk tujuan pemasaran. Kaedah dan proses yang terlibat dalam projek ini bagi penyambungan segera menggunakan proses mengimpal, rivet, memotong besi, pembengkokak dan menebuk lubang. Projek ini sebenarnya melibatkan proses menjana konsep baru dalam menghasilkan meja mudah alih dan mempunyai banyak fungsi. Selepas semua projek ini siap, meja mudah alih ini akan membantu kita tentang pemahaman proses merekabentuk dan penghasilan yang terlibat dalam projek ini.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	SUPERVISOR DECLARATION	ii
	DECLARATION	iii
	DEDICATION	iv
	ACKNOWLEDGEMENT	v
	ABSTRACT	vi
	ABSTRAK	vii
	TABLE OF CONTENTS	viii
	LIST OF TABLES	xi
	LIST OF FIGURES	xii
	LIST OF APPENDICES	xiv
1.	INTRODUCTION	1
	1.1. Project Title	1
	1.2. Project Synopsis	1
	1.3. Project Background	2
	1.4. Project Objective	2
	1.4.1 General Objective	2
	1.2.2 Specific Objective	3
	1.5. Problem Statement	3
	1.6. Project Scope	4
	1.7. Project Gantt Chart	5

2.	LITERATURE REVIEW	6
	2.1. Introduction	6
	2.2. Review Current Product	7
	2.3. Basic Parts	10
3.	METHODOLOGY	11
	3.1 Introduction	11
	3.2 Project Flow Chart	12
	3.3 Design	14
	3.4 Drawing	15
	3.5 Sketching and Drawing Selection	15
	3.5.1 Concept 1	15
	3.5.2 Concept 2	16
	3.5.3 Concept 3	16
	3.5.4 Concept 4	17
	3.6 Metrics Chart	19
	3.7 Pugh	20
	3.8 Design Specification	22
	3.9 Fabrication process	23
	3.10 Process Involve	24
	3.11 Process Procedure	28

4.	RESULTS AND DISCUSSION	29
4.1	Introduction	29
4.2	Results After Finishing	30
4.3	Product Specification	32
4.4	Discussion	33
4.4.1	Type of Defeated	33
4.4.2	Problem in Progress	34
4.5	Product analysis	36
5.	CONCLUSION	37
5.1	Conclusion	37
5.2	Recommendation	38
5.3	Future Work	39
	REFERENCES	40
	APPENDICES A-C	41

LIST OF TABLE

TABLES	TITLE	PAGE
1.1	Project Gantt Chart	5
3.2	Comparison Concept	18
3.3	Metric Chart	19
3.4	Pugh	20
3.5	Design Specification	22
4.1	Product Specification	32

LIST OF FIGURE

FIGURES	TITLE	PAGE
2.1	Winsome Folding Computer Desk	7
2.2	Carolina Cottage	8
2.3	Easy Fold Portable Computer Desk	9
3.1	Project Flow Chart	12
3.2	Concept 1	15
3.3	Concept 2	16
3.4	Concept 3	16
3.5	Concept 4	17
3.6	Overall View of the Design	21
3.7	Personal Protect Equipment	23
3.8	Material	24
3.9	Measuring and Marking	25
3.10	Floor Cutter Disc	25
3.11	Bending Process	26
3.12	Drilling Process	26
3.13	Welding Process	27
3.14	Grinding Process	27
4.1	Complete Multipurpose Portable Desk (side view)	30
4.2	Complete Multipurpose Portable Desk	30
4.3	Desk Easy to Bring Anywhere	31
4.4	Desk can be Fold	31
4.5	Bead Defect	33
4.6	Gap Defect	34
4.7	Result Analysis (Arm)	36
A1	Isometric View	41
A2	Dimetric View	42
B1	2D Drawing	43
C1	Bending Machine	44

C2	Shearing Machine	45
C3	Apparatus MIG Welding Machine	45
C4	Floor Disc Cutter	46
C5	Portable Hand Drill	46
C6	Grinding Machine	47

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	3D Solidwork Drawing	41
B	2D Drawing	43
C	Figure and List of Machine	47

CHAPTER 1

INTRODUCTION

1.1: Project Title

My project title is design and fabricate multi-purpose portable desk. The fabrication of the table is concern to strength, durability, and more function. New concepts require improving portable multipurpose function such as easy to use.

1.2: Project synopsis

This project is design and fabricates a Multipurpose Portable Desk. The project involved the design and fabrication. This desk can be adjusts to different heights and angles and folds away too. Multi-purpose Portable Desk instantly turns a chair or sofa into an eating, entertainment or work center. The desk must be sturdy and portable so it can use for flat for eating, writing, and doing paperwork.

Skill requirement during making this project is AutoCAD, mechanical design, welding and basic machining such as shearing machine, bending machine and drill machine.

1.3: Project Background

At this moment desk in market have various type, specification, and shape. Table used as place to put anything on them. Beside that table can used to study and making many works such as writing note, make assignment, and can do the drawing.

As we know, desk is large, difficult to move and sometime not using friendly. In order to solve this problem, the desk that I design is considering all of current weakness. This desk design is more compact, user friendly due to we can adjust the height and angle, portable and multipurpose.

1.4: Project Objective

Project objective divide by two. It is general objective and specific objective for the title of project.

1.4.1: General Objective

The objective of diploma final year project is to practice the knowledge and skill in problem solving using academic research, in order to become a good engineer that have been enough knowledge and skill.

This project also important to train and increase student capability in research, analysis and problem solving. These projects also educate the student in communication like in presentation and educate them to define their research in presentation.

This also can produce and train student to capable of doing work with minimal supervisory and more independent in searching, detailing and expanding the knowledge and experiences.

The other objective is generating student that have capability to make a good research report thesis form or technical writing.

1.4.2: Specific Project Objective

The main objective of this project is:

- i. To design and fabricate a multipurpose portable desk.
- ii. Fabricate desk can be adjust to different height, angle and can fold.
- iii. To design a desk that is suitable to it application.
- iv. Introduce and fabricate new concept of desk.
- v. Fabricate the desk with minimize the manufacturing cost.

1.5: Problem Statements

Basically this project is base on these problem statements:

- Existing desk in the market only has limited function.
- Many desks right now fit for their height and angle.
- Difficult to change the place because the desk not portable or can't be fold.

1.6: Project Scope

- Literature review
 - Consideration on the multipurpose and portable of the desk.

- Design product
 - Sketching and CAD drawing
 - Mechanical design application

- Fabrication product
 - Process involving basic machining and joining.

- Test and evaluation
 - Aspect to consideration:
 - Strength, safety, ergonomic
 - No error from fabrication

1.7: Project Gantt Chart

Table 1.1: Project gantt chart

Works	Week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Held a meeting with adviser	Plan	Plan													
	Actual	Actual													
Literature review			Plan	Plan											
			Actual	Actual											
Design the product					Plan	Plan									
					Actual	Actual									
Confirm design stage					Plan	Plan	Plan								
					Actual	Actual	Actual								
Mid presentation								Plan							
								Actual							
Fabrication process from the best design								Plan	Plan	Plan	Plan	Plan			
									Actual	Actual	Actual	Actual	Actual		
Report preparation											Plan	Plan	Plan		
											Actual	Actual	Actual		
Final year project presentation														Plan	Plan
														Actual	Actual

 Plan
 Actual

CHAPTER 2

LITERATURE REVIEW

2.1: Introduction

Table used as place to put anything on it. Beside that table can be used to writing, study and making many work such as doing drawing, making homework and others. We already know many table have a big size and difficult to move at other place and bring it. So many designs right now become fordable table that have more easy to use, can fold, move to other place and bring it. Foldable table is thing that can fold from large to become a small size such as briefcase, box and others. Fordable table is the most interesting to people used to camping, picnic because easy to bring it. Many products at the market have different specification, shape and type when manufacture by different manufacturing company. Research review about fordable table is to get data to make a new concept of foldable table.

2.2: Review Current Product

2.2.1: Winsome Folding Computer Desk



Figure 2.1: Winsome Folding Computer Desk

Product Information

This computer desk is perfect for smaller spaces. Crafted of solid beech wood with a Honey Pine finish and classic Mission styling, it features a pull-out keyboard tray and folds up when not in use. Other coordinating shelves and desks are available separately.

Product Features

- Keyboard tray
- Solid beech wood
- Fold up

2.2.2: Carolina Cottage



Figure 2.2: Carolina Cottage

Product Information

This unique folding desk comes in a beautiful chestnut finish and carved, turned legs. The simple, traditional design is great for any room.

Product Features

- Turned leg.
- Chestnut finish.
- Can fold it.

2.2.3: Easy Fold portable computer desk

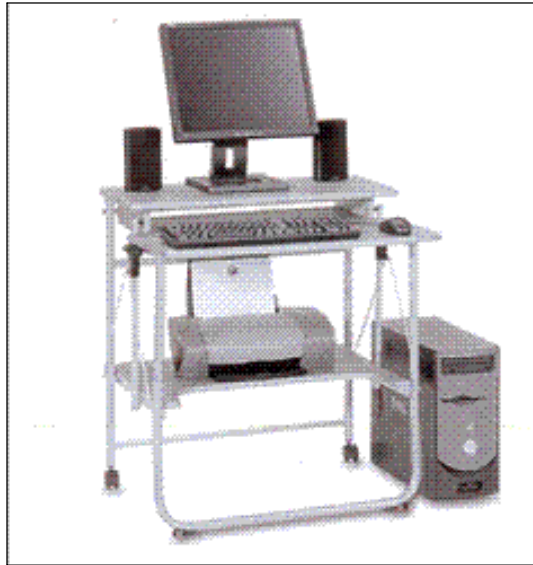


Figure 2.3: Easy Fold portable computer desk

Product Information

Foldable desk provides an added work area in the home or office while taking up little floor and storage space. This stylish desk features a highly functional design with a durable metal frame and laminate shelves for holding a monitor, keyboard, and printer. Dual single-touch lock/release clamps allow for easy setup or storage, making it the perfect laptop, bill paying, or study desk. Also includes rear casters for convenient mobility.

Product Features

- Durable metal frame.
- Dual single-touch lock.
- Rear casters.

2.3: Basic Parts

The basic parts of table are dividing by three parts are :

- i. Surface Table : Usually this made from wood. For new technology surface table using sheet metal, plastic and aluminum that joined with bolt and nut, rivet and welding with steel frame and leg steel.
- ii. Arm : Arm is function to lock leg table and make table become stable. Usually arm shape like a small rectangular bar or sheet metal. It is join with surface table and leg table.
- iii. Leg Table : This part using steel because it has good strength to up heavy loaded that place on the surface table. It is joining with frame surface table or directly with surface table.