



UNIVERSITI TEKNOLOGI MARA

DIPLOMA IN MECHANICAL ENGINEERING

MEC 332 – MECHANICAL ENGINEERING DESIGN

PROJECT:

ULTIMATE STANDING CHAIR

LECTURER:

MISS LIYANA BINTI ROSLAN

SUPERVISOR:

DR AZIANTI BINTI ISMAIL

GROUP:

J4EM1105A

GROUP MEMBERS:

NO	NAME	ID NO
1	AHMAD KHAIRI BIN MOHD ZAWAWI	2015821528
2	MUHAMMAD NIZAMUDDIN BIN MISNI	2015843728
3	FUAD NAJMUDDIN BIN ABDUL RAHIM	2015863744
4	NUR ARISSA AQILAH BINTI MOHD NAZRIN	2015849036

ACKNOWLEDGEMENT

First of all, we are grateful to Allah S.W.T; the author of knowledge and wisdom, for his countless love and establishing us to be able to complete this final year project. Furthermore, the completion of the undertaking could not have been possible without the participation and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged. However, the group would like to express their deep appreciation and indebtedness particularly to the following, Dr. Azianti Ismail, our supervisor for her endless support, kind, and understanding spirit during the completion and finishing process of our project. We are also thankful to our supervisor for lending her time for the purpose of suggesting ideas and solution for the problems that we have faced during the difficulties in finish our project.

We also sincerely thank you our lecturer in Mechanical Engineering Design, Miss Liyana Roslan for the guidance and encouragement in finishing this project and also for teaching us in this course. After that, UiTM's assistant engineer also give us a lot of guidance and suggestion in order to finish our product. We are being honoured because they can spend their time with us. We would also like to take this opportunity to record our thanks to all relatives, faculty members of the Department of the Mechanical Engineering and others who in one way or another shared their support, either morally, financially and physically, thank you.

Last but not least, we would like to place on record our sense of gratitude to our fellow friends and family who has directly or indirectly have lent their helping hands in this venture. We thank you.

ABSTRACT

The *Ultimate Standing Chair* that encourages us to adopt and to sustain an ergonomic working position. The chair supports our body comfortably while it is in standing position. With the contour, it encourages being something akin to the standing meditation pose seen in yoga. The body of the human is supported in three ways: the seat that takes the pressure off the legs, the pressure on the knee is relieved by knee guard, and feet are kept in an angled position by a raised platform. Thus, with these combinations, it surely will help to distribute body weight evenly.

The standing chair is portable. There are some options available terms of materials used for the frame, which can be made from solid oak, carbon fibre or welded steel. Both feature a knee pad or guard made from high density foam and a comfortable seat.

After some research, we have found that lecturers and teachers often face difficulties standing too long that will cause pain in the back. This will interrupt and slows down the flow of the teaching. In the long term, it might affect the posture and even worst will end up in prolonged back pain. The standing chair is a good solution to avoid these consequences. However, in the current market, the standing chair focuses primarily in the manufacturing based environment such as workshop, warehouse, and factory. They are also often very expensive due to the aforementioned characteristics. *Ultimate Standing Chair* addresses this issue as our version is specifically made to be used in the teaching and learning environment with a fairly manageable size, proper aesthetic and affordable cost.

In addition, after a thorough research of all the competing solutions in the market today that is similar to *Ultimate Standing Chair*, we found that our product strikes the best balance in cost, size, and user-friendliness which makes it more accessible for a whole range of customers including normal everyday office workers, surgeons in operation theaters and hobbyists.

CONTENT	PAGE
CHAPTER 1 : INTRODUCTION	
CHAPTER 2 : DESIGN PROBLEM DEFINITION	
<ul style="list-style-type: none"> • Market analysis <ul style="list-style-type: none"> - The general need for a product - Description and estimation of market size - Competitive products and benchmarking - Opportunity for competitive advantage • Physics of the artifact • Criteria for selecting final design concept • Final product design specification 	
CHAPTER 3 : CONCEPT GENERATION AND SELECTION	
<ul style="list-style-type: none"> • Feasible Concept • Morphological Chart <ul style="list-style-type: none"> - Concept 1 - Concept 2 - Concept 3 - Concept 4 - Concept 5 • Selection of Final Concept • Pugh Chart • Discussion 	
CHAPTER 4 : EMBODIMENT DESIGN	
<ul style="list-style-type: none"> • Final Design Concept • Product Architecture • Configuration Design <ul style="list-style-type: none"> - List of Parts - Details Standard Part Selection • Parametric Design For Custom Parts 	

CHAPTER 1 : INTRODUCTION

Mechanical engineering and design is the backbone of modern technology-based economies. Engineering design can be found in many industries ranging from automotive, aerospace, robotics, energy, manufacturing as well as others. Skills and knowledge are required for research, design, and development of mechanical systems, parts and product from their concept stage through all phases of engineering, fabrication, installation, operation, modification and maintenance in addition to computer-aided design such as Autocad, or Solidworks.

For this semester, students are required to do a project with the theme of “Teaching and Learning Aids” most probably for school, university or colleges. Teaching and learning aids are an integral component in any classroom. This will help the learner to have a conducive teaching and learning environment and relieving anxiety or boredom by presenting and receiving information in a new and exciting way. Teaching and learning aids also engage students other sense since there are no limits to what aids can be utilized when supplementing the lesson.

The *Ultimate Standing Chair* is an ergonomic, adjustable chair that makes it easier to alternate between sitting and standing throughout the day. Employers are required to provide suitable seating for employees under health and safety law. This is due to the fact that it risks associated with standing for long periods of time. Most lecturers and teachers spend most of their teaching and learning activities on their feet. Thus, the objective of creating this *Ultimate Standing Chair* is to assist lecturers, teachers or students to reduce the risk of back pain and knee pain due to standing too long during teaching and learning activities. Next objective is to design a suitable standing chair which provides proper movement and ergonomic support that leads to minimizing poor posture and lower back stress.

As for the methodology, the first phase is problem definition in which the objectives of the proposed product is defined. Market analysis is performed to study the responses from the potential buyers on the idea of the proposed product. The second phase is conceptual design. At this phase, selection of the concepts which lead to the specification of the proposed product. The third phase is embodiment design which consists of detailed drawing and engineering analysis of the proposed product. In this phase, proposed product design is refined and optimized through detail drawings of manufactured parts, assembly drawings, exploded drawings, bill of material and costing. Simulation of testing analysis is performed to optimize the design before fabrication. The final phase is fabrication of the prototype. In this phase, proposed product is fabricated and put to test to achieve the objectives.

The team's hope is that the *Ultimate Standing Chair* will benefit as many people as possible, and one fine day it will become a very significant device to help in reducing the risk of back and knee pain. It is beneficial not only in teaching and learning environment but also to other sectors such as medical and manufacturin