



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DESIGN AND FABRICATION OF BED CHAIR WITH
FRONT REST FOR CHRONIC PATIENT**

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

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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:

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ABSTRAK

Projek ini menerangkan tentang kerusi tidur dengan rehat depan untuk pesakit kronik. Untuk projek ini, kerusi ciptaan ini lebih tertumpu terutamanya pada pesakit kronik yang mempunyai gangguan tidur. Kebanyakan pesakit kronik yang mempunyai penyakit sistem pernafasan mempunyai masalah tidak boleh tidur secara normal. Hal ini kerana ketika mereka berbaring, sistem pernafasan mereka terganggu dan menyebabkan tidur mereka tidak selesa. Oleh itu, kerusi tidur ini dicipta untuk mengatasi masalah yang dihadapi oleh pesakit kronik supaya mereka dapat tidur tanpa masalah pernafasan. Sebelum kerusi tidur ini dibuat, terdapat beberapa kajian dan penyelidikan tentang kerusi tidur dan pesakit kronik. Daripada penyelidikan mendapati bahawa kerusi tidur dengan rehat depan masih belum ada di pasaran. Seterusnya, objektif projek ini dibuat iaitu, untuk merekabentuk, untuk mencipta dan menganalisis kerusi tidur untuk pesakit kronik. Jadi, kajian dibuat untuk mencari bahan dan reka bentuk yang sesuai untuk pesakit kronik. Proses fabrikasi dilakukan seperti pemotongan, menggerudi dan kimpalan. Selepas proses fabrikasi, kerusi tidur ini diuji dengan sensor CONFORMat. Data dari ujian ini kemudiannya dianalisis. Sebagai kesimpulan, projek ini telah mencapai objektif dan menunjukkan bahawa orang yang mempunyai berat di bawah 100kg akan lebih selesa dan ergonomik apabila menggunakan kerusi tidur ini.

ABSTRACT

This project presents the bed chair with front rest for chronic patient. For this project, this invention chairs more focuses especially for chronic patient with sleep disorder. Most of chronic patient with respiratory system disease have problem which is cannot sleep normal. This is because when they lie down, their respiratory system disturbed and causing their sleep not to comfort. Thus, this bed chair was created to overcome problems faced by chronic patient so that they can sleep without breath problem. Before the bed chair was created, there was some research and literature review about the bed chair and chronic patient. From the research found that the bed chair with front rest still not have in the market. Then, the objectives of this project were made which is, to design, to fabricate and to analyze the bed chair for chronic patient. So, the further research was made for finding the material and design suitable for the chronic patient. There were three design was sketched. Design three was selected because meet specified criteria. Fabrication process was performed such as cutting, drilling and welding. After fabricating, the bed chair was tested with CONFORMat sensor. The data from this test then was analyzed. As a conclusion, this project has achieved the objectives and justify that people with weight below 100kg will have comfort and ergonomic when using this bed chair.

DEDICATION

This dissertation is dedicated to all my family members and friends. It has always been my beloved parents Mr Razali Bin Mohamed and Mdm Masura Binti Mat Daud who nurture me with affection, trust and moral support whenever any challenges get tougher. Their unconditional love reminds me that I could not easily disappoint them and even trying harder. All my fellow friends are deserved to be partnership in my success of the project especially my supervisor mates. They have provided me a lot of miscellaneous aids and words of encouragement which make me to think in a positive manner when things go wrong. I also want to dedicate this dissertation to my Supervisor, Mr Mohammad Rafi Bin Omar and Co-Supervisor, Prof. Madya TS. Dr. Muhammad Zahir Bin Hassan who willing to teach and assist me in any part of the project which I had trouble with.

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LIST OF SYMBOLS

Kg	-	Kilogram
Kpa	-	Kilo Pascal
m	-	Meter

LIST OF ABBREVIATIONS

CAD	Computer Aided Design
CAE	Computer Aided Engineering
CAM	Computer Aided Manufacture
CATIA	Computer Aided Three-Dimensional Interactive Application
CHF	Congestive Heart Failure
COPD	Chronic obstructive pulmonary disease
OSA	Obstructive Sleep Apnea
PDS	Product Design Specification
PVC	Polyvinyl Chloride
TIG	Tungsten Inert Gas

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will provide the introduction for this project. Essentially, it begins the background study of the project, review about this project stated in project overview, some issue of this project that is in the problem statement, the objectives of this project and the project scopes are to ensure the project can be run smoothly.

1.2 Background

A chair always consists of a back support that bent and vertical upright back support. The seat support also has lower and upper leg portions that can adjust downwardly or upwardly depends on the user comfort. The back support can move downwardly and rearwardly, to counter a downward force exerted on the leg portion. In addition, the chair contains a stabilizer set between the upper and lower leg portions of the seat support and to provide stability during downward relative deflection of the upper leg portion. The chair further contains strong stiffening member and a tension control mechanism. The stiffening member is set between the seat support upper and lower leg portions and functions to increase resistance to relative deflection of the upper leg portion. The tension control mechanism is movably mounted relative to the lower leg portion of the seat support for adjustable with the stiffening member to adjust the same resistance to relative deflection of the seat support upper leg portion (T. Chadwick and R. Glass, 1988).

Chronic patient in this project is a people with health condition or disease that is unrelieved in its effects that comes with time. Common chronic disease generally cannot be prevented by vaccines or cured by medication. In this project it will be more focus on chronic patient that have sleep disorder problem with respiratory system such as obstructive sleep apnea, chronic obstructive pulmonary disease (COPD) and congestive heart failure.

The point of this invention is to create a chair with a front rest that can help chronic patients with sleep disorders, sleep comfort without breathing problems. The special in this invention is the chair will have adjustable front rest. This project will use existing chair that have back rest, arm rest and leg rest and will be adding front rest that can give comfort for who use it. For the design of the front rest, CATIA V5 software was chosen. It makes use of knowledge capabilities to create design features and to convert generation of sketch-based profiles, pads and thick surfaces. It is the ideal tool for quickly designing product assemblies for the tooling, aerospace, shipbuilding and plant design industries. All commands share a constant Windows graphical interface which minimizes training time and is easy to use.

1.3 Problem Statement

Nowadays, there are many types of chair was invented by industries. Every chair has their own features and most of the chair invented more likely with previous chair such as have back rest, arm rest and leg rest. For this project, this invention chairs more focuses especially for chronic patient with sleep disorder. Most of chronic patient with respiratory system disease have problem which is cannot sleep normal. This is because when they lie down, their respiratory system disturbed and causing their sleep

not comfortable. This is also called as ‘orthopnea’ - an abnormal condition in which a person must keep the head elevated to breathe deeply and comfortably or wakes up suddenly in the middle of the night short of breath. In Malaysia, this disease is underestimated and maybe because of this the bed chairs for sleeping disorder patients not being expanded by any industry. In order to achieve an ergonomically correct sitting position for chronic patient, the bed chair with front rest is constructed. So, with this invention, chronic patient can sleep comfortably without any worries of breath disturbed. Figure 1.1 shows an example of patient with sleep disorder sleeping posture.

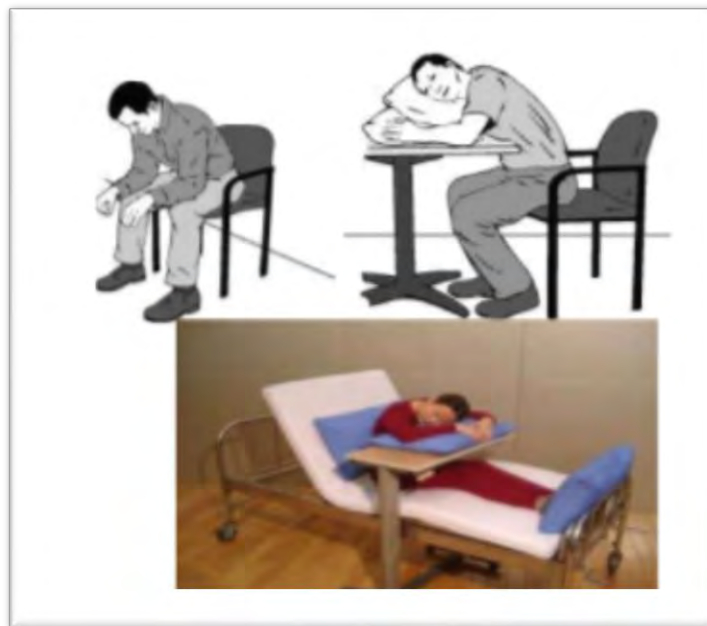


Figure 1.1: An example for chronic patient with sleep disorder sleep posture

1.4 Objectives

The main objectives of this project are:

- i. To design the bed chair with front rest for chronic patient to have a better sleep.
- ii. To fabricate a product of bed chair with front rest for chronic patient.
- iii. To analyse the bed chair by using CONFORMat Sensor.

1.5 Work scope

In this project, there is several works need to cover to complete the project in sequence to get the perfect result follow the objectives. The work scopes of this project are:

- a) Study the behaviour of chronic patient on chair that cannot sleep lie down.
- b) Design the bed chair with front rest by using CATIA V5 software.
- c) Fabricate a product of bed chair with front rest.
- d) Analysing and testing bed chair by using CONFORMat sensor.