



**TECHNICAL UNIVERSITY OF MALAYSIA
MALACCA**

**Design Improvement of Portable Writing Chair
Suitable For Both Left-Handed and Right-
Handed User**

Thesis submitted in accordance with the partial requirements of the
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By

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS TESIS*

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ABSTRACT

Portable writing chair constructions have long been used by a variety of institutions since they offer the obvious advantage of providing a seating surface to be occupied by a person along with a writing surface associated therewith on which notes or the like may be taken. Heretofore, such chair-desk combinations have been universally designed for right-handed persons apparently due to the fact that the percentage of the population that is right-handed greatly exceeds the percentage of the population that is left-handed so it is uneconomical for business entities manufacturing such writing chair to manufacture constructions specifically designed for left-handed persons. Consequently, left-handed persons using conventional chair-desks are handicapped in writing with the same. It is the aim of the invention to provide a new and improved writing table chair that can be used with equal facility by either left or right-handed persons. Thus, a few activities are done to accomplish this aim. First is the study of the current design of portable writing chair, concerning the structural and the ergonomics aspects of the current design. Then collecting information data through a survey to the major users of such chair and finally is performing the improvement design by using SolidWorks® software. As a result, a new and improved design of portable writing chair suitable for both right and left-handed users is produced. This new design comes with a movable writing table construction which can be used by both kinds of users. Moreover arm rests are also provided to support the users' arms. This new and improved design provides a construction that may be economically manufactured and which does not require separate tooling.

ABSTRAK

Kerusi tulis mudah alih telah lama digunakan oleh pelbagai institusi contohnya seperti di sekolah, di bilik kuliah, di dalam dewan dan sebagainya. Ini kerana kerusi ini bukan sahaja menyediakan tempat duduk malah turut dilengkapi dengan meja tulis yang memudahkan pengguna. Walaubagaimanapun secara amnya kerusi tulis ini hanya direka untuk mereka yang menggunakan tangan kanan memandangkan secara keseluruhannya peratus pengguna yang menggunakan tangan kanan adalah lebih besar berbanding mereka yang kidal. Keadaan ini telah menyebabkan pengguna yang bertangan kidal terpaksa menggunakan kerusi tulis yang sedia ada walaupun berasa kurang selesa. Justeru, objektif kajian dan projek ini adalah untuk menghasilkan satu rekabentuk kerusi tulis yang diperbaharui supaya dapat digunakan oleh kedua-dua golongan pengguna ini. Untuk mencapai matlamat kajian ini, beberapa prosedur telah dijalankan. Pertama sekali ialah dengan menjalankan kajian terhadap rekabentuk kerusi tulis yang telah sedia ada. Langkah seterusnya ialah mengumpul data dan maklumat dari pengguna melalui satu tinjauan bagi mengenalpasti kriteria-kriteria yang diperlukan dalam rekabentuk baru tersebut. Akhir sekali ialah menghasilkan rekaan tersebut menggunakan *software* SolidWorks®. Melalui prosedur ini, rekabentuk baru kerusi tulis tersebut dapat dihasilkan. Dalam rekabentuk baru ini meja tulisnya telah diubahsuai supaya dapat digunakan oleh kedua-dua golongan pengguna. Meja tulis ini dapat digerakkan ke kanan dan ke kiri mengikut keselesaan dan kesesuaian pengguna. Tambahan lagi, rekabentuk kerusi ini turut menyediakan tempat untuk merehatkan tangan bagi pengguna. Secara spesifikasinya objektif projek ini juga adalah untuk menghasilkan kerusi tulis yang ekonomi yang mana tidak memerlukan set alat yang berasingan.

DEDICATION

For my family, my father; Mr Amir bin Mimbar, my mother; Mrs Nusida bt Omar and my lovely sisters and brother; Norhanim, Norbalqis, Nurjannatun Aliah and Amir Iman

To my very supportive supervisor; Mrs Ruzy Haryati bt Hambali

Special dedication to my dear friends; Norashikin, Salmiah, Syazwani, Muhammad Iskandar and Sujanuriah

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CHAPTER 1

TITLE:

Design Improvement of Portable Writing Chair Suitable for both Left-Handed and Right-Handed User

1.0 INTRODUCTION

Chapter 1 is about the introduction of this study. To give more understanding, the first topic discussed in this chapter is a detail definition about the title of this study. It includes the meanings and explanations for a few keywords. Furthermore this chapter also stated the problem statement of the study and elaborated its main purpose and reasons. The most important thing discussed in this chapter is a detail explanation and information about the product studied; Portable Writing Chair. This chapter also contains a brief preface to a few subtopics that related in this study. Moreover the aim and objectives of this study also mentioned at the end of this chapter.

1.1 Definition

Design, usually considered in the context of the applied arts, engineering, architecture, and other such creative endeavors, and is used as both a noun and a verb. “Design” as a verb refers to the process of originating and developing a plan for a new object (machine, building, product, etc.). As a noun, “design” is used both for the final plan or proposal (a drawing, model, or other description), or the result of implementing that plan or proposal (the object produced). Designing normally requires considering aesthetic, functional, and many other aspects of an object, which usually requires considerable research, thought, modeling, iterative adjustment, and re-design. Design as a process can

ake many forms depending on the object being designed and the individual or individuals participating (Anon).

Improvement is change that makes something or someone better [Faderal-Chambers ,2000]. In other words, improvement is the act of changing something into something different in essential characteristics (Anon).

Design improvement is a process of utilizing equity in the design to increase the design's value by adding something which will allow better performance. This process includes making some changes to the particular design such as re-design and adding some different characteristics to the design. Basically, a design of a product is being improved due to the consumer's requests. Therefore, design improvement is necessary to accomplish all of the requirements.

The purpose of this study is to make an improvement to the design of a portable writing chair to become suitable for both right-handed and left-handed users. The study will involve preliminary study on current design of the portable writing chair. From the current design, the study will implicate some research on the structural and ergonomics aspect of the design. There are various types of portable writing chairs but in this study, the aim is the portable writing chair which is mostly being used in schools, hall conference, lecture-rooms and other institutions.

1.2 Introduction to Ergonomic

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance (definition adopted by the International Ergonomics Association in 2000)

Ergonomics are also known as human engineering or human factors engineering. Ergonomics can be defined as the science of designing machines, products, and systems to maximize the safety, comfort, and efficiency of the people who use them. Ergonomists draw on the principles of industrial engineering, psychology, anthropometry (the science of human measurement), and biomechanics (the study of muscular activity) to adapt the design of products and workplaces to people's sizes and shapes and their physical strength and limitations. Ergonomists also consider the speed with which humans react and how they process information, and their capacities for dealing with psychological factors, such as stress or isolation. Armed with this complete picture of how humans interact with their environment, ergonomists develop the best possible design for products and systems, ranging from the handle of a toothbrush to the flight deck of the space shuttle.

1.3 Problem Statement

Chair-desk constructions have long been used by a variety of institutions such as schools, corporations for training sessions and the like since they offer the obvious advantage of providing a seating surface to be occupied by a person along with a writing surface associated therewith on which notes or the like may be taken. Heretofore, such chair-desk combinations have been universally designed for right-handed persons apparently due to the fact that the percentage of the population that is right-handed greatly exceeds the percentage of the population that is left-handed so it is uneconomical for business entities manufacturing such chair-desks to manufacture constructions specifically designed for left-handed persons (Malm, Richard,K. ,1981).

As a consequence, left-handed persons using conventional chair-desks are handicapped in writing with the same since, typically, no support for the writing arm of such person is provided (Malm, Richard,K. ,1981).

1.4 Portable Writing Chair Background Information

1.4.1 Introduction to Portable Writing Chair

The **Writing armchair** has an antique and a modern form. In its antique form it is known as a writing armchair in the United States and as a tablet armchair in the United Kingdom (Anon). These classic chair was first developed with an arm that has been widened for writing and then with a fixed large paddle-shaped writing surface on one side. The writing surface could be positioned on either the left or right-hand side of the seat. The paddle is attached in one of three ways which are with the writing surface substituted for the regular arm, with the paddle attached over the original arm or with the chair and arm designed and constructed as a writing-arm chair from inception(Anon).

It is more often than not a Windsor style armchair with a circular or oval pad or tablet replacing the right arm or mounted above it. Many versions have a drawer built under the pad, to hold writing implements. Other versions have such a drawer under the seat. On some versions the pad is on a hinge, in order to fold it down and facilitate storage, or simply take up less space in a room. In this case it is often called a drop leaf chair, and becomes a close cousin to the mechanical desk.

In its modern form it is, most of the time, the most compact rendition of a school desk or a student desk, and it is manufactured by the millions in metal and plastic. It is available in a very wide variety of sizes to suit the changing needs of growing children. It also differs from the antique form by being relatively ambidextrous: The tablet or pad is available for the right arm or the left-arm, to also suit those who write with their left-hand. Unlike the antique form the arm with no pad is usually completely absent, to ease entry in the chair in the crowded conditions of a schoolroom or lecture hall (Anon).

Many 18th-century businessmen and writers couldn't afford full desks but still needed a place for writing letters and manuscripts. The writing-arm was the solution. These chairs were also used extensively by politicians. It is said that Thomas Jefferson wrote parts of

the declaration of independence in a Windsor writing armchair. Modern designers have offered several contemporary renditions of the writing armchair or the drop leaf chair, but the form has never been very popular in homes (Anon).

1.4.2 The Innovation of Writing Arm Chair



Figure 1.1: Windsor writing arm chair, USA, 1790 ca (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.2: Thomas Jefferson wrote parts of the declaration of independence in this swivel Windsor writing armchair. The original chair is guessed to have been made around 1760 with repairs and reconstructions as late as 1810. (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.3: Wicker chair with writing and storage arm, USA 1810 (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.4: Mark Twain in his writing arm chair (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.5: Mission arts & crafts chair with writing arm, USA, 1870 (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.6: Studio chair with writing arm, USA, 1900 ca (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.7: Rustic armchair with foldable tablet, USA, 1930 ca (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.8: Rustic chair with writing board, Italy, 1930 ca (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.9: Drop leaf chair by Russell Wright, 1950 (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.10: Chair with writing arm by George Nakashima, USA, 1972 (Photo adopted from www.designboom.com/history/transformer/writing.html)



Figure 1.11: Folding chair with writing arm (Photo adopted from www.designboom.com/history/transformer/writing.html)