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INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يونيورسيتي إسلام أنتارابنسا ملايسيا

A CONCEPT DESIGN OF A MOTORBIKE WITH 3D MODEL

BY

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A thesis submitted in fulfilment of the requirement for the degree of Master of Science (Built Environment)

Kulliyyah of Architecture and Environmental Design
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ABSTRACT

Although motorbikes are used widely in Malaysia there isn't a published ergonomic and anthropometric studies concerning the Malaysian body user also the motorbikes designs need to be more friendly, in our study we present ergonomic and anthropometric survey and experiment which is concerning the Malaysian user the data was firstly gathered through a questionnaire which invests the uncomfortable positions for the Malaysian motorbike drivers and their aesthetic tends about design its form shape volume and colour as an elements of the new concept for the motorbike design according to their three different ethnicities Malay Chinese and Indian. Also an experimental trail was used to choose the best position of measurements for the Malaysian, and after collecting the mentioned data it would be analysed to get the result which is considered the final 3d model. These results were used to build the prototype with industrial clay.

ملخص البحث

على الرغم من ان الدراجة النارية مستخدمة بشكل واسع في ماليزيا ليس هناك قدر كاف من الدراسات المنشورة حول خصاءص المستخدم الماليزي كذلك التصاميم الموجودة تحتاج لان تكون اكثر تالفا مع الطبيعة فى هذه الدراسة يتم جمع المعلومات الخاصة بالمسنخدم الماليزي و الجماليات المتعلقة بثقافته من خلال اداة الاستبيان. كذلك يتم اجراء دراسة تجريبية للقياسات الءنسب لجسد المستخدم الماليزي بفءاته الثلاث الملاوي الصيني و الهندي, فى المرحلة النهائية لهذه الدراسة يتم استخدام المعلومات المحللة لتنفيذ نموذج للدراجة النارية.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it confirms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science Built Environment.

.....
Waleed faris
Supervisor

13/8/09
.....
Abdul Razak Sapian
Supervisor

I certify that I have read this study and that in my opinion it confirms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science (Built Environment)

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Examiner

This thesis was submitted to the Department of Industrial Design and is accepted as a fulfilment of the requirement for the degree of Master of Science (Built Environment)

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.....
Mansor Ibrahim
Dean,
Kulliyyah of Architecture and
Environmental Design

DECLARATION

I hereby declare that this thesis is the result of my own investigation, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Mhd Yaser Al omari

Signature ..... Date 13/08/2009

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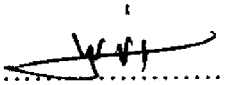

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Signature Date

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CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

Styling is one of the most important engineering tools in industrial design. It started to gain its importance with the introduction of cars and motorcycles for the public, Also the main objective of any design is to serve both the customers needs and as well as to serve the general standards.

Motorcycles are one of the most widespread means of transportation all over the world, and it has many uses from leisure to police activities, in this study we try to set up a new ergonomic design of motorcycles that will suit the Malaysian taste and have an international flavor.

There are a number of factors related to the styling process of motorcycle design and industry, which cause great changes in design such as the affordable materials and their descriptions, ability of industry and the development of technology and casting ways to ease the standardizations and uniformity.

1.1 BACKGROUND

Many factors related to the styling process affect the design of motorbike, such as the affordable materials etc. In addition to the Advancement in science and technology has transformed styling and design from imagination to reality to be easier for designers hat they can develop their concepts and sights through the high ability of industry technology.

Ergonomic studies are very important in the design of motorcycles. They are concerned with the determination of the best dimensions between motorcycle parts, which are in direct contact with the driver's body. Ergonomics studies have been done in European countries, however little has been done on the ergonomic characteristics of Asian driver. This study seeks to find out the Asian drivers' ergonomic characteristics in order to improve driving comfort.

Styles of motorcycles vary depending on the task for which they are designed, such as long distance travel, navigating congested urban traffic, cruising, sport and racing, or off-road conditions.

The inspiration for arguably the first motorcycle was designed and built by the German inventors Gottlieb Daimler and Wilhelm Maybach in Bad Cannstatt (since 1905 a city district of Stuttgart) in 1885. The first petroleum-powered vehicle, it was essentially a motorized bicycle, although the inventors called their invention the Reitwagen, (Wiki).

There are many changes in motorcycle design aspects or characteristics from its establishment until date. As we can observe in the design of motorcycle through all companies and brands we can decide clear general lines of directions taking action mainly by the development of technology and science of materials and the general education of society and globalization.

1.2 PROBLEM STATEMENT

In Malaysia motorcycles are widely used as the main means of transportation. Currently there are numerous motorbikes in Malaysia. However, current motorbike needs improvement in term of ergonomic and aesthetic conditions through the observation of the author. It was observed that there is an uncomfortable position for

the Malaysian driver of motorbike especially in the position of seat which is not convenience for the back, this is one ergonomic issue which may decrease the concentration on the driving and it can finally cause accidents

In addition, there is no study in open literature that has studied Asian ergonomic and especially Malaysian users, which less the recourses connected to design process to be used by researchers in different directions. Therefore, this study aims at addressing the aforementioned problems.

1.3 THE AIM OF THIS STUDY

Therefore aim of this study is to come out with a new and improved concept of motorbike design for the Malaysian users according to the ergonomic and aesthetics conditions which are drawn from the Malaysian user's, also to publish analyzed data about the ergonomic and aesthetic conditions of the Malaysian motorbike driver.

1.4 RESEARCH OBJECTIVES

In achieving the above aim this laid down three objectives

- Introduce one or more new concept design for motorbikes.
- Carry out an ergonomic analysis for the Malaysian customers related to Motorbikes.
- To produce a 3D model design of a motorbike.

1.5 RESEARCH METHODOLOGY

In conducting this study the methodologies as it shown in (figure1.1) Involves are:

1.5.1 Literature review

A- Reviewing literature on the subject of industrial design, its concept, theories and history.

B- Reviewing literature on the subject of motorbike designs and 3d models.

C- Reviewing literature on the subject of ergonomics.

1.5.2. Surveying on motorbike Malaysian users

A- Questionnaire

B-anthropometric study

1.5.3 Design and 3D model

A- Achieving Design sketches and package drawing:

B- Building the full scale 3 model

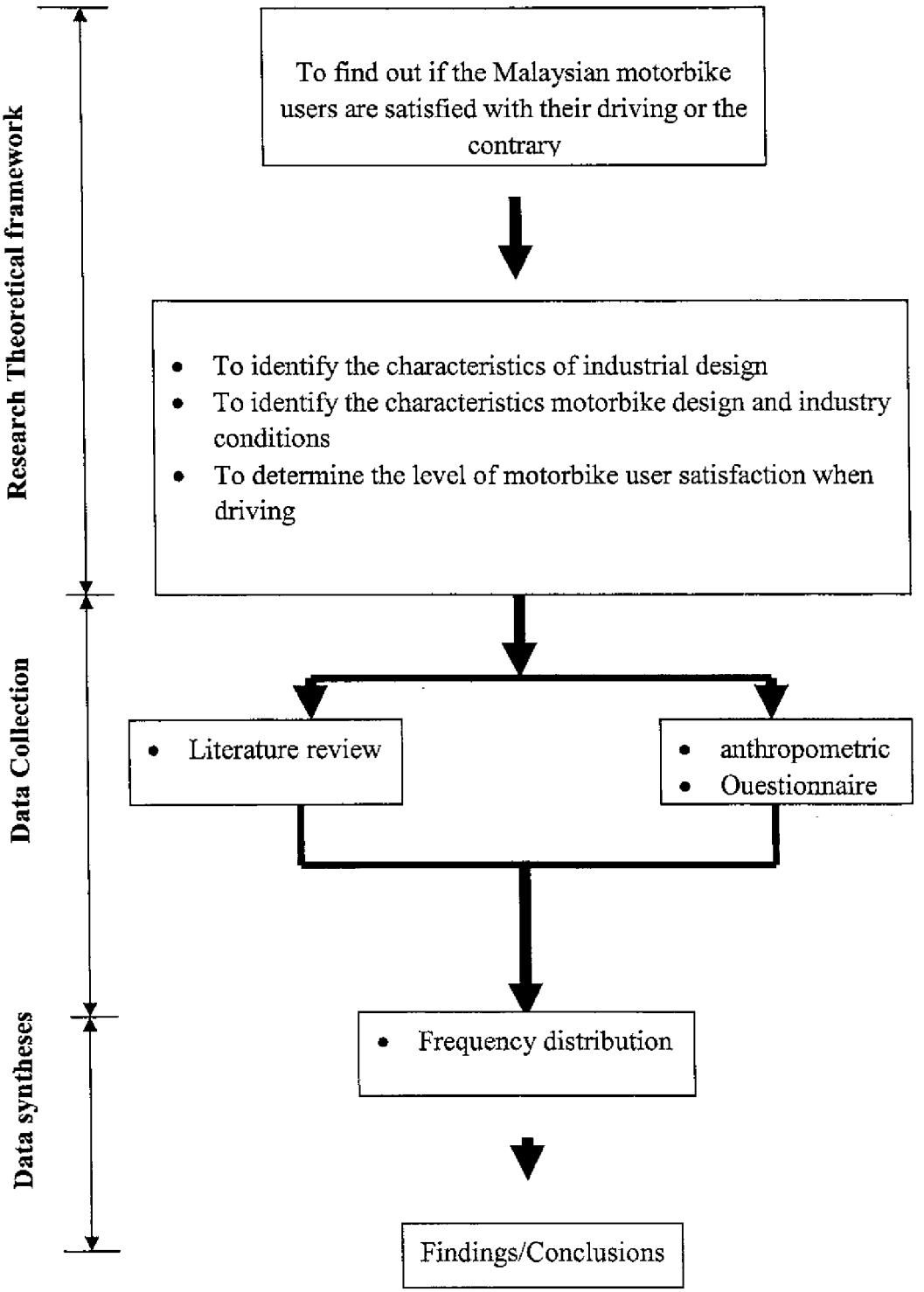

Figure 1.1: Sequence of the research

1.6 RESEARCH SIGNIFICANCE

This research is significant due to the fact that there are no published studies regarding ergonomic and anthropometric motorcycle designs that are suited to the Malaysian user in particular.

This research therefore attempts to fill this gap, and produce an original prototype that targets the Malaysian user based on ergonomic and the anthropometric features identified.

1.7 ORGANISATION OF RESEARCH

The research is sequentially arranged for ease of understanding. The first chapter introduces the research. While the second Chapter centers on industrial design in general, the definition, and other aspects relating to it. In the same chapter there is a review about motorbike industry history and development. The chapter also dealt upon ergonomic method for automotive industry in general and anthropometric, while in the third Chapter the methodology of the research was discussed, describing how each stage of the data collection was carried out. In the forth chapter the results, analysis and findings of the research was presented. Finally in the fifth chapter the concluding part of the research is presented.

CHAPTER TWO

LITERATURE REVIEW

2.0 AUTOMOTIVE AND INDUSTRIAL DESIGN

2.1 INTRODUCTION

How or what we define as 'design' now, is different from what we call 'design' a few hundred years back. In the automotive world, we were and still are taken aback by Leonardo da Vinci's designs and innovative ideas, also Wright Brothers (later in history) and how their supposedly atrocious views on technology and the future of automotive design affected the world. Both paradigms prove to be thinkers ahead of their time. Now, we are all too familiar and are constantly bombarded with hundreds of artists, designers, names and brands, especially in this high media and high technology alert world.

When we refer to any type of design, we have come a long way, not in terms of the physical elements such as economics, social and political, but also the very intricate, delicate and hidden aspect of design, in regard of spiritual, individual and the likes. One must first understand the fundamental understanding and means of design before jumping into automotive design altogether.

Design is more than a plan or drawing produced by designers. It is the art or action of conceiving, producing and making something either with or (especially in today's ever-modern world) without a purpose, plan or intention, when the subject is taken into account of the aesthetic, or form and function of a design. As design students are aware, not all designs have or must have a specific requirement to fulfill all the needs of how an every day product (for example a chair) should be compatible, suitable

and even totally functional to the user. Of course aspects of anthropometrics, ergonomics and the likes are taken into account when consumers and users today stress about affordability, comfort, environmental issues and more humanistic values.

2.2 THE DEFINITION AND THEORIES OF INDUSTRIAL DESIGN

2.2.1 Introduction

Industrial design encompasses a variety of tools utilized in our built environment. Design is no longer directed towards individual objects, but towards systems, structure, framework, pattern, and network. This implies that man humanization somehow influences innovation and technologies There was always an either conscious or unconscious dialogue between aesthetic and utility through critical process that developed and shaped the way of designing product. The primitive man himself did not think about the approach of pursuing and analyzing design to the extent of developing it, but without awareness was able to begin something. Thus, the primitive man was establishing the first aspects of industrial design slowly through a long period of time. (Lawson, 1997)

That dialogue between aesthetic and utility has always been affected by different factors that are brought necessarily through social needs, scientific approaches, political directions, economic tendencies and theories of philosophy. (International design conference in aspen, 1996).

2.2.2 Design Theory

It's found the next tendencies about the design theory

1. **Design Theory as Mapping**: To distinguish apparently the function needs and the aesthetic aspects and how the relation should be led or programmed.
2. **Ergonomic as Design Theory**: Ergonomic function is to adapt the product efficiency and size etc to the user needs and descriptions and to decide the scope distinctly that make it more suit to the users.
3. **Design theory as the theory of interface**: This is too close to the ergonomic theories
4. **Design theory as communication theory**: To cretin the importance in our time of the knowledge and its role of developing the product as visual communication rather than verbal. (Herausage Ben Vom, 1996).

2.3 HISTORY OF INDUSTRIAL DESIGN DEVELOPMENT

2.3.1 Introduction

Industrial design as a focused method of specialization is new, however it started to be an open argument at the beginning of the twentieth century. Moreover, the concept of industrial design accelerated, growing with the huge development of philosophical theories and its action on the aesthetic, society and economy. Revolution in science, and its subsequent effect on technology and industry process, also sped up the progress of industrial design. However, its aspects grew along with industrial revolution roots in the eighteenth century in Europe.

2.3.2 Nineteen century

The issue of industrial design and the rule of aesthetic value can be traced back to the end of the nineteenth century. International exhibitions of industry and connected arts were released at the great exhibition of art and industry at hide park London in 1851. This exhibition was an eminent meeting of different methods made by artists, manufacturers and critics. This trend continued in other exhibitions namely; Exposition Universelle ET Internationale (Paris, 1900), Das Englische Hans, Hermann Muthesius 1904, St Lois (1904) and, Munich exhibition 1908. (David Raizman, 2003).

The international industry exhibitions were a productive ground for communication among artists, manufacturers and critics. Subsequently, these exhibitions led to the development of methods of industrial design. (Hilary Beyer & Katherine MC Dermott, 2002).

Eventually, manufacturers started to be aware of the importance of the rule of aesthetic value in their product design; this greatly affected the trade competition.

Initially, manufacturers with an engineering, architectural or other related background, designed products that were dependent and stressed more on utility factors of the design. In addition, manufacturers concentrated on the ease of industrialization and mass production that was mainly focused on maximization profits. Manufacturers now depend more on the art designer and this way took its rule to be evidently speaking out excessively, other than for the sake of aesthetic value. . (David Raizman, 2003).Increasing industrialization in England led to social restrictions.

2.3.3 Twenty century

Starting from the beginning of the fifties, the English reformed the traditional paths of training both as followed by artisans and as enshrined in art academies. (Raizman, 2003).

The workshop movement by Morris represented a practical kind of social Utopia, the economic interest's underling these educational reforms where very much down to earth. England still wanted to keep leading handicrafts. (Peter Rietbergen, 1999)

Years later numerous artisans' guilds have been established, seeking to integrate economic purpose with a life style, Morris reformative ideas were having only limited success; he embraced socialism and became one of the most important voices in the socialist movement in England in the eighties and nineties. (Magdalena Droste, 1990)

Culture, by and for the people has been the relaying cry of virtually every new cultural movement since time began. (Roto Vision SA, 2005).

Europe attempted since the seventies to follow England's success in product industry. In Vienna, the Austrian museum of arts and crafts was opened. Another museum founded in Berlin in 1871 (Stefan Lenguel, 1999). . The patron was the empress Augusta Anglophile wife of Wilhelm. These museums collected and housed handicraft products for study purposes and were affiliated with schools. In the nineties wave of reform came to Germany from England, this marked the arrival of Jugendstil; the German form of art Nouveau. (Peter Rietbergen, 1999)

The Prussian Government in 1896 sent Hermann Muthesius to England for six years to study English success in product industry. As a result of his recommendations, in all Prussian handicraft schools workshops were introduced and modern artists