UNIVERSITI TEKNIKAL MALAYSIA (UTeM)

Design and Development of Seating or Escalator for Double Storey House

Dissertation Submitted of the Faculty of Manufacturing Engineering in Partial Fulfillment of the requirement for The Awards of the Degree of Bachelor of Manufacturing Engineering (Manufacturing Design)

Prepare by:

Khairuddin Bin Mahalil

APRIL 2008

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS TESIS*

JUDUL: Design and Development of Seating or Escalator for Double Storey House

SESI PENGAJIAN : 2007/2008

Saya: KHAIRUDDIN BIN MAHALIL (B050410063)

mengaku membenarkan tesis (PSM) ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Tesis adalah hak milik Universiti Teknikal Malaysia Melaka .
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (√)

☐	SULIT	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	TERHAD	(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☐	TIDAK TERHAD	

Disahkan oleh:

_____ (TANDATANGAN PENULIS)

_____ (TANDATANGAN PENYELIA)

Alamat Tetap:
NO 51 Pt BARU,
KAYU ARA PASONG,
82010 PONTIAN,JOHOR D.TA'ZIM

Cop Rasmi:

Tarikh: 8hb Oktober 2007

Tarikh: _____

* Tesis dimaksudkan sebagai tesis bagi Ijazah Doktor Falsafah dan Sarjana secara penyelidikan, atau disertasi bagi pengajian secara kerja kursus dan penyelidikan, atau Laporan Projek Sarjana Muda (PSM).
** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh tesis ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I hereby, declared this thesis entitled "Design and Development of Seating or Escalator for Double Storey House" is the results of my own research
Except as cited in references.

Signature	:	…….
Author's Name	:	KHAIRUDDIN BIN MAHALIL (B050410063)
Date	:	8th October 2007

APPROVAL

This Projek Sarjana Muda (PSM) submitted to the senate of UTeM and has been as partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Design). The members of the supervisory committee are as follow:

……

(Mr. Zulkeflee Bin Abdullah)

(Official Stamp & Date)

ABSTRACT

This report will be discussed about the final year project (PSM). This research is focused on design and development of seating or standing escalator for double storey house. Manufacturing engineering is about fundamental of CAD software, and knowledge of product design concept. Product design concept is important to produce a good product in manufacturing engineering applications. It also will touch a little bit in Quality Function Deployment (QFD), design for manufacture and assembly (DMFA) and also in virtual designs from computer aided design (CAD).

ABSTRAK

Laporan Projek Sarjana Muda ini akan membincangkan serta memfokuskan pembangunan dan rekabentuk penggunaan eskalator (medium bergerak) untuk kegunaan berdiri atau duduk didalam kegunaan sesebuah rumah teres dua tingkat. Kejuruteraan Pembuatan adalah asas kepada kejuteraan berbantu komputer dan juga pengetahuan dalam konsep merekabentuk sesuatu produk. Rekabentuk produk adalah sesuatu yang amat penting untuk menghasilkan produk yang berkualiti didalam sektor pembuatan. Laporan ini juga akan menyentuh sedikit tentang pengaplikasian QFD dan DFMA serta merekabentuk menggunakan rekabentuk maya CAD.

ACKNOWLEDGMENTS.

"For Allah the Almighty"

TABLE OF CONTENTS

APPENDICES

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS, SYMBOLS, SPECIALIZED NOMENCLATURE

U.S.	(United State of America)
URL	an Internet address
PLM	Product Life cycle Management
CAD	computer aided design
CAM	computer aided manufacturing
CAE	computer aided engineering
3D	tree dimensional.
DFMA	Design for manufacture and assembly
DFM	Design for Manufacture
DFA	Design for Assembly

CHAPTER 1

INTRODUCTION

1.1 Introduction.

Escalator in house is a new system number of factors affect escalator design, including physical requirements, location, safety considerations, and aesthetic preferences. Foremost, physical factors like the vertical and horizontal distance to be spanned must be considered. These factors will determine the pitch of the escalator and its actual length. The ability of the building infrastructure to support the heavy components is also a critical physical concern.

Location is important because escalators should be situated where they can be easily seen by the general public and also for own usage such as at home. This project is especially for people with disabilities and the eldest as well. They only need to seat or standing on the escalator to move goes up and down stairs at home.

1.2 Objective of the project

1. To find the need of a standing or seating escalator in a double storey house.
2. To explore of the customers need.
3. To study the stairs structure at common double storey house designs
4. To study escalator system for use in small confined space, at various angles depending on the stairs design.
5. To generate product concept
6. To develop prototype /simulation of the product using Solid work/CATIA solid modeling.

1.3 Scope of the project.

An escalator either for standing or seating position is a good solution so that old people and people in the double storey house can easily ride to go upstairs and downstairs. These will ensure that they enjoy their house and not only use upstairs for storage. This project is divided into two parts. The fist part was accomplished by the end of the semester of the first semester of the final year while the other part was accomplished by the end of the second semester of the final year. The scope of the first part of this project was to gain as much information about the product concept and also to get familiarized with product design for the home escalator and Solid work software for the drawing purpose. The objective for the first part has been achieved successfully.

The purpose of the second part of this project was to implement all the knowledge gained during the first part of this project. All the knowledge and information were used to make the product design for the develop prototype and generated product concept.

1.4 Problem statement

Old people and even not so old people find that it is a hassle to climb the stairs in their double storey house. This is due to osteoporosis and other ailment with the legs. Usually they end up just staying downstairs and would not use the 2nd floor as much they would like to.

Falls are the leading cause of fatal and nonfatal injuries to older people in the U.S. (United State of America) each year, more than 11 million people over 65 fall one of every three senior citizens.

Treatment of the injuries and complications associated with these falls costs the U.S. $20.2 billion annually. A serious national problem now, falls could reach epidemic levels as the population ages in the future. Therefore this project is to develop the new concept of escalator.

(Reference: http://www.luhs.org/depts/injprev/Falls/adult.htm)

Categories:

- older women especially Caucasians and Asians
- seniors unable to stand on one leg for more than five seconds
- users of multiple prescription and over-the-counter drugs
- Elderly people who live alone.

Venue:

- 60 percent: home
- 30 percent: community
- 10 percent: in institutions, such as nursing homes

A fall can be a major life changing event, decreasing your mobility and independence. It can lead to hospitalization. Forty percent of nursing home admissions are due to falls. The number of falls and the severity of injury increase with age.

(Reference: http://www.luhs.org/depts/injprev/Falls/adult.htm)

1.5 Background of the project

An escalator either for standing or seating position is a good solution so that old people and people in the double storey house can easily ride to go upstairs and downstairs. These will ensure that they enjoy their house and not only upstairs for storage. For dream house has elevators or escalators people can moving from the outside. The escalators have to go up and down. For the dream house has lots of stairs. In this house, the stairs only go up, and crawl down the stairs yet. That's what the escalator is for.

An escalator is a conveyor transport device for transporting people, consisting of individual, linked steps that move up or down on tracks, which keep the treads horizontal. The benefits of escalators are many. They have the capacity to move large numbers of people, and they can be placed in the same physical space as one might install a staircase. Also escalator can helps to solve the problems during transit the new furniture goes inside in the house.

1.6 Gantt chart for final project Design and Development of Seating or Escalator for Double Storey House

Project Activities		Week													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
project proposal, synopsis & Schedule submission & discussion.	P														
	A														
case study analysis of machine function & specification	P														
	A														
DESIGN and development analysis	P														
	A														
process analysis	P														
	A														
literature review	P														
	A														
Conceptual design	P														
	A														
Report Writing & Submit	P														
	A														

Table1.6: Gantt chart for final project Design and Development of Seating or Escalator for Double Storey House (PSM 1).

P = planning.

A = Actual

CHAPTER 2

LITERATURE REVIEW.

2.1 About the literature review.

This chapter will discuss all about the reviews from sources for help also support all the facts in this final project report. In this chapter every sources and ideas is elaborated from pass designers and researchers. This chapter will discuss about theory, old design, and literature reviews similar with the objective in this final project report.

2.2 Background of the escalator.

An escalator is a conveyor transport device for transporting people, linked steps that move up or down on tracks, which keep the treads horizontal. As a power-driven, continuous moving stairway designed to transport passengers up and down short vertical distances, escalators are used around the world to move pedestrian traffic in places where elevators would be impractical.

Principal areas of usage include department stores, shopping malls, airports, transit systems, convention centers, hotels, and public buildings. The benefits of escalators are many. They have the capacity to move large numbers

of people, and they can be placed in the same physical space as one might install a staircase. They have no waiting interval (except during very heavy traffic), they can be used to guide people toward main exits or special exhibits, and they may be weather proofed for outdoor use. (Reference: http://en.wikipedia.org/wiki/Escalator)

2.3 Design, components, and operation

Figure2.3: escalator

Courtesy: Self Made by Xiaphias December 2004

2.3.1 Operation of an escalator.

Usually an escalator is powered by constant-speed alternating current motors and move at approximately 1–2 feet (0.3–0.6 m) per second. The maximum angle of inclination of an escalator to the horizontal floor level is 30 degrees with a standard rise up to about 60 feet (18 m).Modern escalators have single-piece aluminum or steel steps that moves on a system of tracks in a continuous loop. Escalators are typically used in pairs with one going up and the other going down, however in some places especially European stores and metro

stations - there are no escalators going down, the escalators only go up. Some modern escalators in have transparent side panels that reveal their gearings.

Escalators are required to have moving handrails that keep pace with the movement of the steps. The direction of movement (up or down) can be permanently the same, or be controlled by personnel according to the time of day, or automatically be controlled by whoever arrives first, whether at the bottom or at the top (of course the system is programmed so that the direction is not reversed while a passenger is on the escalator).

2.3.2 Design and layout considerations

A number of factors affect escalator design, including physical requirements, location, traffic patterns, safety considerations, and aesthetic preferences also the uniqueness. Patterns must also be anticipated in escalator design. The number of passengers is important because escalators are designed to carry a certain maximum number of people .The carrying capacity of an escalator system must match the expected presuming that passengers ride single-file.

For example, escalators used in train stations must be designed to cater for the peak traffic flow discharged from a train, without causing excessive bunching at the escalator entrance.

It is preferred that staircases be located adjacent to the escalator if the escalator is the primary means of transport between floors. Finally, consideration should be given to the aesthetics and the uniqueness of the escalator. Sizes and typical use

Standard escalator step widths				
Size	**Width (Between Balustrade Panels), in Millimeters**	**Width (Between Balustrade Panels), in Inches**	**Single-step capacity**	**Applications**
Very small	400 mm	16 in	One passenger, with feet together	An older design, extremely rare today
Small	600 mm	24 in	One passenger	Low-volume sites, uppermost levels of department stores, when space is limited
Medium	800 mm	32 in	One passenger + one package or one piece of luggage.	Shopping malls, department stores, smaller airports
Large	1000 mm	40 in	Two passengers one may walk past another	Mainstay of metro systems, larger airports, train stations, some retail usage

Table2.3.2: Standard escalator step widths

Courtesy: http://en.wikipedia.org/wiki/Escalator

2.3.3 Components of the escalators.

(a) Top and Bottom Landing Platforms

These two platforms house the curved sections of the tracks, as well as the gears and motors that drive the stairs. The top platform contains the motor assembly and the main drive gear, while the bottom holds the step return idler sprockets. These sections also anchor the ends of the escalator truss. In addition, the platforms contain a floor plate and a comb plate. The floor plate provides a place for the passengers to stand before they step onto the moving stairs. This plate is flush with the finished floor and is either hinged or removable to allow easy access to the machinery below. The comb plate is the piece between the stationary floor plate and the moving step. It is so named because its edge has a series of cleats that resemble the teeth of a comb. These teeth mesh with matching cleats on the edges of the steps. This design is necessary to minimize the gap between the stair and the landing, which helps prevent objects from getting caught in the gap.