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DEVELOPMENT OF CONCEPT DESIGN FOR AN IDEAL INTERCITY BUS

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This report is submitted in
partial fulfilment of the requirements for the
Degree of Bachelor of Mechanical Engineering (Design and innovation)

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MAY 2010

DECLARATION

“I hereby, declare this thesis is the result of my own research
except at cited in the reference”

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PENGAKUAN

“Saya akui laporan ini adalah hasil kerja saya sendiri kecuali ringkasan dan petikan yang tiap-tiap satunya saya telah jelaskan sumbernya”

Tandatangan :

Nama Penulis : TOO PHOOI WAH

Tarikh :

*Specially dedicated
to my family and beloved companion*

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ABSTRACT

Bus is a vehicle designed to carry passengers and is well-known as a cost-effective public transport. With the increasingly of customer demand, buses are designed with accessibility features to provide high comfort ability and safety for both the passenger and the driver. This thesis presents the development of concept design for ideal intercity bus where all the specifications and regulations related to the intercity bus design are to be considered. The entire technical data developed included driver compartment, passenger compartment, walkway, entrance and luggage compartment are set according to the Voice of Customer (VOC) as well as Automotive Industry Standard (AIS) and American Public Transit Association (APTA). The presented thesis is conducted to come out with optimum three dimensional bus packaging concept design; hence, evaluations are done to test for the level of human comfort, ergonomic and performances of three dimensional data. Additionally, important parameters of three dimensional data such as seat space, gangway, driver visibility, internal height and so on will be compared with current intercity buses. The particular comparisons conducted are to verify as well as show the usability of three dimensional data generated. Lastly, through the analysis and the comparison carried out, it had successfully proved the three dimensional concept built is capable to fit in most of the bus design available in the market whilst it also able to hold paramount onto the ergonomics as well as comfort.

ABSTRAK

Bus adalah kenderaan yang direka untuk mengangkut penumpang dan dikenali sebagai kos pengangkutan awam yang berkesan. Dengan permintaan pelanggan yang semakin meningkat, bus direka dengan ciri-ciri kemampuan untuk memberikan keselesaan yang tinggi dan keamanan bagi penumpang dan pemandu. Tesis ini menyajikan tentang penghasilan konsep rekabentuk untuk bas ekspres yang ideal di mana semua spesifikasi dan peraturan yang berkaitan dengan rekabentuk bus ekspres harus dipertimbangkan. Keseluruhan maklumat teknikal dibangunkan termasuk tempat memandu, tempat penumpang, pintu masuk dan ruang bagasi akan ditetapkan mengikut kesesuaian daripada Voice of Customer (VOC) serta Automotive Industry Standard (AIS) dan American Public Transit Association (APTA). Tesis disajikan dijangka akan membina konsep rekabentuk tiga dimensi yang paling bersesuaian. Oleh itu, penilaian akan dilakukan untuk menguji tahap keselesaan manusia, ergonomik dan keselamatan rekabentuk tiga dimensi. Selain itu, parameter penting daripada rekabentuk tiga dimensi seperti ruang duduk, pandangan pemandu, ketinggian bus dalaman dan seterusnya akan dibandingkan dengan bas express di Malaysia. Perbandingan tertentu juga akan dilakukan untuk mengesahkan serta menunjukkan tahap kegunaan data tiga dimensi yang dihasilkan. Akhirnya, melalui analisis dan perbandingan, konsep tiga dimensi yang dibina berjaya membuktikan bahawa ia mampu berpadanan di sebahagian besar bas express yang tersedia di pasaran sementara juga mampu menahan penting dari segi ergonomik serta keselesaan.

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LIST OF ABBREVIATIONS

ACX	=	Deluxe Bus
AIS	=	Automotive Industry Standards
APTA	=	American Public Transit Association
CAD	=	Computer-Aided Design
CAE	=	Computation-Aided Engineering
CATIA	=	Computer Aided Three-dimensional Interactive Application
CLR	=	Cabin Luggage Rack
DLX	=	Deluxe Bus
EDA	=	Ergonomics Design and Analysis
NDX	=	Non Deluxe Bus
Pro/E	=	Pro/ENGINEERING
RLC	=	Roof Luggage Carrier
SDX	=	Semi Deluxe Bus
2D	=	Two Dimensional
3D	=	Three Dimensional

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Bus is a major mode of public transport in most countries of the world, especially in urban areas which lack of airline and train services. Bus transportation has long time been an economical and convenient mode of transportation. Regularly scheduled bus service exists between almost every city and town in most countries around the world. Particularly in local public transport, the bus plays a key role after car. Scheduled-service busses take many people to school, to work, shopping, or on leisure outings while busses or coaches take passengers on holiday trips.

Recently, buses are widely used in several applications such as public transportation, private charter, promotion or advertising, transporting school children and tourism as private transport. On the other hand, as for the retired bus, there are mainly used as permanent training buses for driver training, tow bus vehicles which act as tow trucks, static or mobile cafés, historic buses as a tourist attraction, mobile canteen as well as break room and others.

The buses found in countries around the world are different due to the differentiation of local market requirement where it depends on the quality of the local road network and the population density of a country. For example, high floor resilient truck based designs are popularly used in less developed countries due to the tough operating conditions whereas in dense urbanization such as in Japan has led to the adoption of high capacity long multi-axle buses.

Normally, to fulfil the different requirement of customers demand, the types and features of buses have to be developed according to local tradition or market. The chassis and the bodywork of buses have been innovating and modifying from its origin design to accomplish the different levels of targeted market. For example, buses were fitted with technology appropriate to the local climate or passenger needs, such as air conditioning in Asia, or cycle mounts on North American buses.

1.2 Problem Statement

Public transportation service plays a major role in the transportation industry of both industrialized and developing countries although the share of passenger transportation in public transportation service is relatively small compared to private cars. Malaysia like other countries in the world is facing increased transportation demands caused by rapid urbanization.

The work carried out is to develop of concept design for an ideal inter-city bus packaging with a better characteristics and features on certain aspect such as providing ergonomic seats and handles as well as higher comfort-ability to the driver. In today's bus industry, it is very demanding requiring a tight specification, as such that the designed bus should be capable of providing high emphasis on the comfort of both the passenger and the driver but always holding to the highest standard in safety.

In the process of designing the layout of inter-city bus, literature studies and surveys will be done regarding the driver's compartment, passenger environment, luggage volume and the paramount concern is the comfort as well as security for both the passenger and driver. This project is intended to come out with a better design of inter-city bus packaging in Malaysia which can be referred in further design work in future.