MATERIAL HANDLING SYSTEM DEVELOPMENT IN FACTORY USING CATIA V5 SOFTWARE

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A report submitted in partial fulfillment of the requirement for the award of the degree
of Bachelor of Mechanical Engineering
(Design and Innovation)

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March 2008

I hereby declare that I have read this thesis and in my opinion this report is sufficient in terms of scope and quality for the award of the Bachelor of Mechanical Engineering (Design-Innovation).

Signature   :

Name of supervisor   : Mr. Razali Mohd Tihth

Date   :

I hereby declare that this report entitled "**MATERIAL HANDLING SYSTEM DEVELOPMENT IN FACTORY USING CATIA V5 SOFTWARE** "is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature   :

Author   : Muhammad Faiz bin Mispul

Date   : 27 March 2008

ACKNOWLEDGEMENT

First of all I would like to thank to Lord, Allah for His willingness and mercy that has make me to accomplish this report. I would like also to show my grateful to my supervisors Mr. Shamsul Anuar b. Shamsudin and Mr. Razali Mohd Tihth of Jabatan Rekabentuk dan Inovasi, Fakulti Kejuruteraan Mekanikal Universiti Teknikal Malaysia Melaka and not forgotten to my second supervisor, Mr. Nurfaizey that always guide me, advice me and help me in completing this report.

I would like also to express my gratitude to my both beloved parents for supporting me always. I will always do my best to repay the support that both of you have shown to me. To other parties that involve directly or indirectly, thanks for all the cooperation given.

ABSTRACT

CATIA V5 is one of the Computer Aided Design (CAD) software that offered simulation program through its Knowledgeware application. This report will emphasize on current material handling system used in the industry, the problem or issues related to it and how to develop the simulation program using CATIA V5 Knowledgeware application. One of the problems related to current material handling system is to select the proper system that will suit with the production line. The developed simulation program will be focused on the gravity roller conveyor whereas this type of material handling has been found as the simplest system and has been chosen as the platform for the first step of simulation program for material handling system. In order to get the simulation program functional, the additional applications like Macro and Visual Basic Application must be worked together with the Knowledgeware application. This suggests that by implementing the Knowledgeware application it can offer simulation program that will help to improve material handling system design and development in the industry. The simulation will able to interact with the user by allowing user to key in the parameter they wanted for the material handling system. The final result of the simulation program will show the gravity roller conveyor in 3D concept and shows how its help to simplify the process to people in term of cost and time saved in the process of choosing the appropriate material handling system.

ABSTRAK

CATIA V5 adalah merupakan salah satu daripada perisian Lukisan Berbantu Komputer (CAD) yang menawarkan program simulasi menerusi aplikasi Knowledgeware. Kandungan laporan ini akan memberikan tumpuan terhadap sistem penghantaran barang yang digunakan pada masa kini di dalam industri, masalah yang berkaitan dengan sistem yang sedia ada dan juga kaedah pembangunan program simulasi. Pembangunan sistem simulasi ini akan memberikan tumpuan kepada *gravity roller conveyor* memandangkan sistem in adalah yang termudah berbanding dengan sistem penghantaran barang yang lain dan dapat dijadikan sebagai platform untuk langkah awal dalam pembangunan program simulasi yang berkaitan dengan sistem penhantaran barang. Perisian tambahan seperti Macros dan Visual Basic Application mestilah beroperasi seiring dengan aplikasi Knowledgeware untuk membolehkan simulasi dijalankan. Ini mencadangkan dengan melaksanakan aplikasi Knowledgeware, program simulasi dapat ditawarkan untuk tujuan penambahbaikan terhadap sistem penghantaran barang di dalam industri. Program simulasi ini membolehkan interaksi antara pengguna dengan sistem dijalankan dengan membenarkan pengguna memasukkan segala parameter yang dikehendaki untuk sistem penghantaran barang yang dikehendaki. Keputusan akhir daripada program simulasi ini akan dapat memberikan keputusan dalam bentuk pandangan 3D dan ini akan dapat membantu pengguna dalam usaha menjimatkan masa dan kos untuk memilih sistem yang bersesuaian.

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LIST OF ABBREVIATION

3D   3 Dimension

CAD   Computer Aided Design

RFID   Radio-Frequency Identification

PLM   Product Lifecycle Management

VR   Virtual Reality

KBE   Knowledge-based Engineering

VBA   Visual Basic Application

LIST OF APPENDICES

NO	TITLE
A	GANTT CHART PSM 1
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E	ASSEMBLY OF THE CONVEYOR
F	SAMPLE QUESTIONAIRE FOR CONVEYOR DEVELOPMENT

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Projek Sarjana Muda (PSM) can be defined as one of the literature and scientific research that related to the study field in the faculty. It is a compulsory for each final year student to accomplish the PSM in order to fulfill one of the Bachelor Degree's requirements.

1.1 INTRODUCTION TO THE PROJECT

Material Handling System Development in Factory Using CATIA V5 Software is a project that needs to be developed using one of the tools provided in CATIA V5 which is known as Knowledgeware. By developing this system, it has an ability to represent the developed system in 3D view which will give better and clear view to the user. As an extra advantage, it's offer real-time simulation. By the end of this project, student should come out with solution on related problem in material handling systems.

1.2   AIM OF THE PROJECT

The aim of this project is to develop the simulation program of the chosen material handling system; conveyor. The simulation program should able to receive feedback from the user by filling the digital form appeared on the monitor. Once all the information needed has been keyed in, the simulation program will run and the   result will come out as needed or requested by user in the form of 3D solid modeling data.

1.3   OBJECTIVES

1. To know the definitions of material handling
2. To study about the material handling system and the simulation program or concept related to it.
3. To concentrate /specific the research on conveyor system especially gravity roller conveyor.
4. To develop the concept and final design of the simulation program for gravity roller conveyor.
5. To study the Knowledgeware application in CATIA V5.
6. To study the programming software needed in the development of the simulation program.

1.4   SCOPE

Scope of the project can be defined as what will be covered in the research and project developed. The scope of this project is material handling definition, concept, process and type, automation material handling, CATIA V5

Knowledgeware application and programming, programming procedure, programming code and finally the test on programming developed.

1.5   FLOWCHART OF PSM I

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                    │  INTRODUCTION   │
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            ┌───────────────────────────┐
            │   LITERATURE REVIEW       │
            │     1.  BOOKS             │
            │     2.  INTERNET          │
            │     3.  JOURNALS          │
            └───────────────────────────┘
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            ┌───────────────────────────┐
            │   CONCEPT DEVELOPMENTS     │
            └───────────────────────────┘
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                │   REPORT WRITING    │
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                │   PRESENTATION      │
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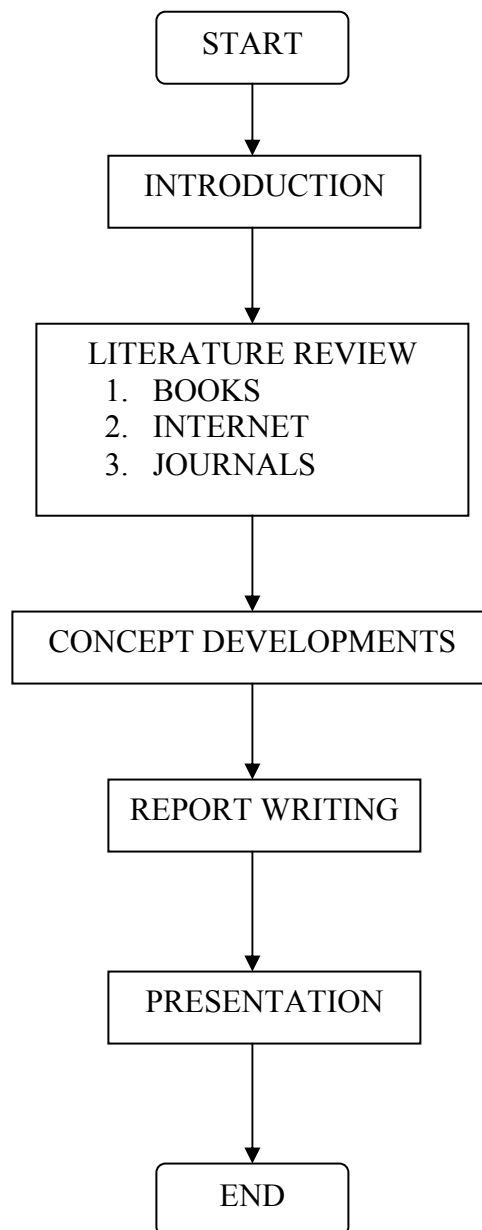
Figure 1.1 : Flowchart for PSM 1

1.6 FLOWCHART OF PSM 2

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              │   CONTINUE LITERATURE REVIEW      │
              └────────────────┬─────────────────┘
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              │      CONCEPT DEVELOPMENTS         │
              └────────────────┬─────────────────┘
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                    │   DETAIL DESIGNS   │
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                 │  DEVELOP SIMULATION   │
                 │      PROGRAM          │
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                          PROGRAM ◇
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                    │    REPORT     │
                    │    WRITING    │
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                    │ PRESENTATION  │
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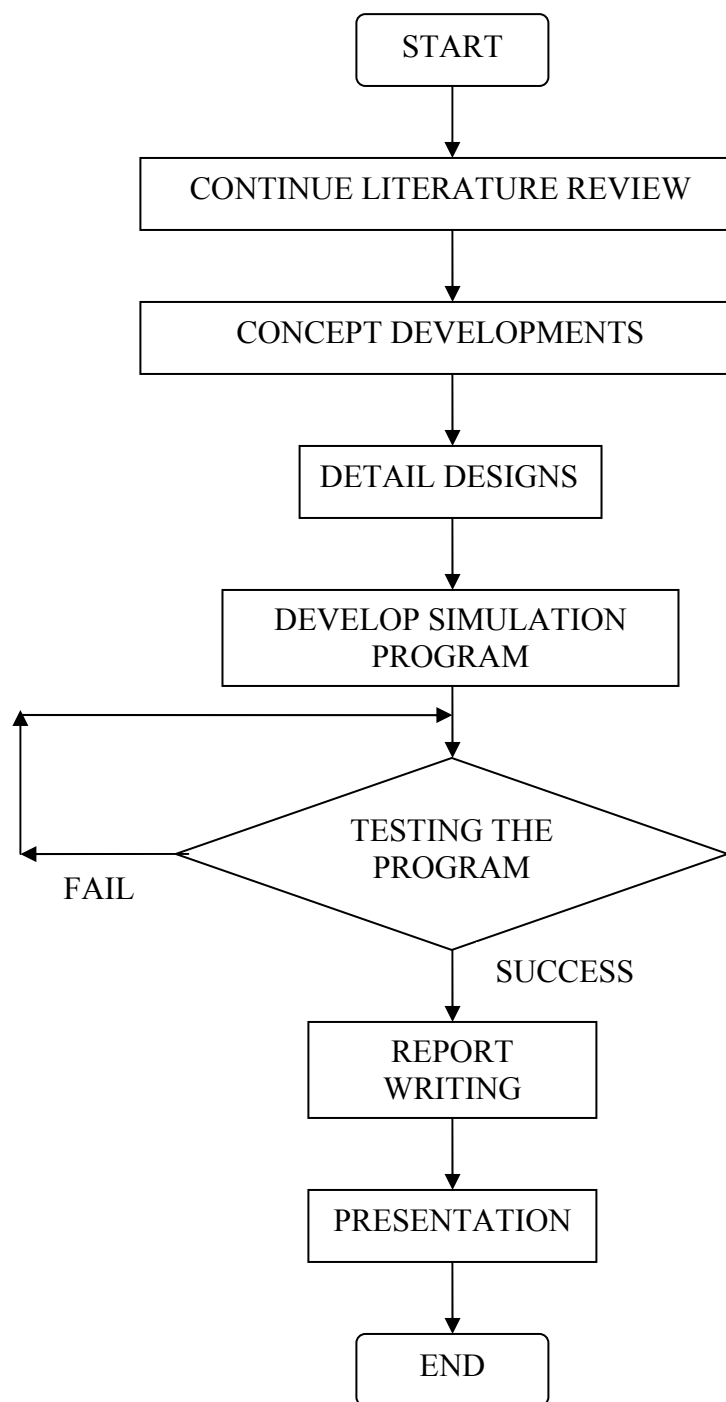**Figure 1.2 : Flowchart for PSM 2**

1.7 SUMMARY

This chapter has provided information on the introduction to PSM and the project, aim, objective and scope of the project. This chapter has also show the planning of activities through the previously shown flowchart.

CHAPTER 2

LITERATURE REVIEW

This chapter will explain about the literatures that related to the topic. The source of this literature review was taken from online journal database including Sciencedirect, Emeraldinsight and other related journal database. Some of sources also have been taken from reference books and websites which have been listed in the references section.

2.0 INTRODUCTION

The material handling has a big affect in the production line and profit of a company especially in the manufacturing line. Applying the right method and good maintenance of this section will ensure that the objective of having production on schedule and increasing the profit of the company achievable. This chapter will give a brief description on the material handling, type of material handling and other issues related to the safety of workers in this section. This chapter will also explain how to improve the traditional method used today by implementing the digital factory concept. The concept of digital factory that related to the material handling section will also be defined and explained in this chapter.

2.1 MATERIAL HANDLING

2.1.1 Definition

According to Groover in his book entitled *Automation, production systems, and computer-integrated manufacturing*. 2nd Edition, the function of material handling is to move the right material to the right place, at the right time, in the right amount, in sequence and in the right position or condition in order to achieve minimum production cost. The principles of material handling and control systems must be understood. In the modern material handling systems, the material control system is an integral part. In order to keep and ensure the industrial is moving, requirement of part numbering systems and other systems are the must.

Material handling can be broadly defined as all movement of materials in a manufacturing environment. At the other hand, the definition of material handling by American Society of Mechanical Engineers (ASME) is "the good art and science involving the moving, packaging and storing substance in any form. Material handling may be thought as five distinct dimensions: movement, quantity, time, space and control". The term of material handling by FKI Logistex is "the movement, storage, control and protection of materials, goods and products throughout the process of manufacturing, distribution, consumption and disposal which is focusing on the methods, mechanical equipment, systems and related controls used to achieve this functions." FKI Logistex is a leading global provider of automated material handling solutions, supplying its customers with an integrated set of leading-edge technologies in high-speed sortation, conveyor systems, robotic and conventional palletizing, paperless pick products, AS/RS, controls, order

processing software, RFID implementation and warehouse control systems. The other definitions of material handling is loading, moving and unloading of materials using hundreds of different ways to handling materials whereas are generally classified according to type of equipment used.

Movement involves the actual transportation or transfer of material from one point to the next point. The primary concerns of the efficiency movement as well as the safety factor in the dimensions need to be taken into count. The type and nature of the material handling equipment, the cost per unit for the goods conveyed are dictated by the quantity of goods per move. The material movement through the facility is determined by the time dimensions. The amount of the work in process, excessive inventories, repeated handling of material, and order delivery lead times are affected by this aspect; the material handling system. The required space for storage of the material handling equipments and its movement, queuing or staging space for the material itself are the space aspect that needs to be concerned. For the control dimensions aspect, it includes the material tracking, positive identification and inventory management. Besides, the materials handling system is one of the integral parts that needed to be considered in planning the plant layout. Any changes done on the materials handling system will cause the changes in the plant layout.

Material can be moved manually or automatically, once at one time or more and can be placed in fixed or random location. The proper material handling equipment choice is the key point in this section. The contribution of optimum material handling system in the industrial today can be seen through reducing drudgery of work, cost of production and work life quality improvement. However, it is also contributes more than one half of industrial accidents, therefore the safety factor need to be sternly taken into account.