SIMULATION OF INJECTION MOLDING

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DECLARATION

I hereby declare that this project report entitled

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is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT : HAZRATI BT HUSNIN May 2005

SUPERVISOR: EN ZULISMAN B MAKSOM Date: 24 May 2005

DEDICATION

To my beloved parent, family and friends

ACKNOWLEDGEMENT

In the name of Allah SWT, I thank Him, as for His bless, I was able to finish this Projek Sarjana Muda report.

Along my involvement in the process of writing this report, I was helped and support by all parties in terms of moral, spiritual and technical support. I would like to thank my PSM Supervisor, Encik Zulisman B Maksom for his patient in supervising and managing me along this period.

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ABSTRACT

The use of multimedia technology to provide resources and tools for learning has emerged. One of the first activities was to convert traditional encyclopedia and reference works into a multimedia form. The original material was enhanced by the addition of good quality graphics, sound, and video. Resources based learning has been proposed as a framework for exploiting those new opportunities. A resource can be almost anything, and resources based learning does not specify how the materials are to be used. Resources can be used either to enhance or to replace traditional teaching. Simulation is used as a framework in this project. This thesis is basically to study on how simulation can enhance the learning process of engineering student towards injection molding topic. Besides, it is also to reduce constraint during student's learning process, such as equipment constraint and time constraint. It is also to introduce a new learning method for them (which have different education background). Simulation of injection molding is focused on step by step simulation to show students how does the process happens, which can be seen and cannot be seen when handling the machine in lab.

ABSTRAK

Penggunaan teknologi multimedia dalam menyediakan bahan dan alat bantuan mengajar dalam pendidikan semakin meluas. Antara aktiviti pertama ialah menterjemahkan ensiklopedia tradisional dan rujukan ke dalam bentuk persembahan multimedia. Bahan asal telah ditambah nilai dengan unsur grafik, bunyi dan video yang berkualiti. Pembelajaran berasaskan bahan dan alat bantuan ini adalah kaedah yang disyorkan dalam mengeksploitasi peluang baru ini. Bahan dan alat bantuan boleh terdiri daripada pelbagai bentuk. Ia boleh digunakan samada untuk menambah nilai ataupun menggantikan kaedah pembelajaran tradisional. Di dalam projek ini, aplikasi multimedia yang tertumpu kepada simulasi digunakan sebagai bahan dan alat bantuan mengajar. Tesis ini secara keseluruhannya adalah untuk mengkaji bagaimana simulasi mampu meningkatkan proses pembelajaran pelajar Kejuruteraan Pembuatan dalam topik Penyemperitan. Selain itu, hasil akhir projek ini adalah untuk mengurangkan kekangan peralatan di makmal dan kekangan masa yang wujud ketika meraka di makmal. Ini juga adalah untuk mendedahkan para pelajar kepada kaedah pembelajaran yang baru memandangkan mereka dating daripada latar belakang pendidikan yang berbeza-beza. Simulasi ini tertumpu kepada simulasi berperingkat, di mana ia akan menerangkan langkah demi langkah yang akan dilalui oleh pelajar semasa di dalam makmal. Simulasi ini juga merangkumi proses yang dapat dilihat sewaktu mengendalikan mesin dan sebaliknya.

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LIST OF ABBREVIATIONS

KUTKM	Kolej Unversiti Teknikal Kebangsaan Malaysia
FTMK	Faculty Information and Communication Technology
FKP	Faculty of Manufacturing Engineering
2D	Two Dimensional
3D	Three Dimensional
CD ROM	Compact Disc Read Only Memory
JPEG	Joint Photographic Experts Group
BMP	Bitmap
MPEG	Motion Pictures Experts Group
GIF	Graphics Interchange Format
GHz	Giga Hertz
MHz	Mega Hertz
RAM	Random Access Memory
PC	Personal Computer
DPI	Dots per Inch
VR	Virtual Reality

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CHAPTER I

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INTRODUCTION

1.1 Project Background

The innovation of technology that always changes through time has affected the learning process in engineering study as it requires engineering students to seek for a new learning method which is more effective and less time consuming.

In manufacturing industry nowadays, there are many manufacturing process such as drawing, blow molding, rolling, forming, injection molding and many more. All these process is the foundation in manufacturing engineering study. The weakness in understanding these processes will cause some of the student being left behind.

"Simulation of Injection Molding 3D approach" is a courseware that will explain and teach the user on the process of injection molding, how to conduct the process as well as notes on injection molding topic. This courseware will use 3D simulation in explaining the process of injection molding such as process that happen in "feed section", "compression section" and "metering section", which cannot be seen in real life during the process of injection molding. All the content for this courseware will be based on Injection Molding module used by Faculty of Manufacturing Engineering in Kolej Universiti Kebangsaan Malaysia.

1.2 Problem Statement

Injection Molding is one of manufacturing processes. Basically, lectures and lab session are the method which been use. In KUTKM, there is only one Injection Molding machine used by student for Plastic Technology subject which is Allrounder injection molding machine. The machine is expensive which cost around RM20, 000 to RM30, 000 per machine. Due to the limited equipment (machine), only five students can handle the machine at one time as there are about 30 students that going to used the machine during the lab session.

Thus, time to learn and handle the machine is too limited and it does not ensure how much have the students learn and understand the process of injection molding as well as how to handle the machine effectively. Besides, students also need to be exposed to a proper training in order for them to understand the process in injection molding instead of learning the theory during lectures.

1.3 Objectives

There are two objectives to be achieved in this project which are:

- To develop a multimedia courseware that simulates the process of Injection Molding by using simulation approach, whereby the simulation will be in 3D.
- To provide content (notes) based on Injection Molding module used by Faculty of Manufacturing Engineering in KUTKM.

1.4 Scopes

This courseware can be used by students of Faculty of Manufacturing Engineering in KUTKM that taken Plastic Technology subject or any subject that involve

injection molding during lab session or in lectures. It is to emphasis on the process of injection molding explanation in 2D and 3D. The courseware will visualize the process of injection molding in details which focus on the inside of the machine when the process is running, which obviously cannot be seen during their lab session. However, this courseware is limited to the machine used by Faculty of Manufacturing Engineering which is Allrounder 370, 420 C with Injection Unit 100/250.

This courseware is a standalone courseware that will be running on normal personal computer using Window platform. English will be the communication language in this courseware. Expected output of this courseware would be in a form of CD application where it is a standalone application.

1.5 Project Significance

Study on injection molding process through theory is not enough as it required hands-on training. Thus, by using this courseware, it will help the student to have an early virtual learning that can be use at home or during lecture before entering lab.

Due to that, it will increase the student's understandability towards the injection molding process during lab session within a short time. Besides, it also to expose the engineering student to a new teaching method of this topic instead of having lectures and labs. By having this courseware at home, students will have a chance to explore the machine virtually, thus it can reduce any risk that might happen during a real life training.

1.6 Conclusion

It can be concluded that, this chapter emphasis of project determination on its scope, objective as well as the study area of this topic. Problem statement also being stated down in this chapter so that this project's significance can be determined. Thus, the

benefit of this project to the user can be measured. This chapter will be used as a guide in order to implement the research on the next chapter which is Literature Review and Project Methodology.

CHAPTER II

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

According to Oliver (2004) the literature review is concerned primarily with the research and writing connected with the main subject matter of the research study". This chapter will consist all the subject matter and research element that related to this case study that will support the project development. It includes the entire research element that relevant to the project as well methodology.

2.2 Fact and Finding

The research element has been divided into Injection Molding Overview, 2D and 3D Simulation Approach in Education, Multimedia Courseware in Education, and Integrating Educational Technology into Teaching.