# CHAPTER I

# INTRODUCTION

## 1.1 Background

In present times, the accelerating growth of automation and the disadvantage of excessive downtimes in production equipment have prompted the importance of maintenance manual by using an advanced Web technology to increase constantly. In the meantime, hundreds of 3D CAD (Computer Aided Design) models are generated in a design stage which still has not been optimally used for other purposes in product life cycle. Since it has a lot more potentialities for a wide range of application areas, 3D modelling tools have been developed to fully realise the product lifecycle management over the years. This makes the techniques for Web-based 3D interactive manual an innovative opportunity within the maintenance area. As a result, many engineers have to make an effort to always be up to date with the latest development of Web-based 3D technologies and take advantage of the enhanced techniques for carrying out maintenance activity using an interactive and collaborative virtual 3D maintenance manual as solutions for a more effective and efficient maintenance process.

To ensure that maintenance is as cost-effective and efficient as possible, Aha et al [1] suggested that detailed information concerning breakdowns in certain part of production equipment must be obtained. Once this information is collected, savings in maintenance sector can be realised. Moreover, the information must also include other product support information such as the roles and responsibilities of maintenance personnel, job streams, and database structures and the regular activities which are essential to the support and maintenance of a production equipment in a streamlined information system. An easy access at any time and any place to the integrated set of information provided in virtual 3D maintenance manual allows maintenance personnel to find the information necessary to maintain a system more effectively. This information system is also designed to support engineers to engage in a collaborative virtual environment from which maintenance practitioners can retrieve on-demand maintenance

manual for a rapidly accessible decision-support regarding proper maintenance activities for all stakeholders.

The animated 3D simulations of maintenance in the virtual 3D maintenance manual will clearly communicate complex mechanical procedures. The 3D data speeds up product documentation development and results in better product manuals at a fraction of the cost. 3D manuals encourage visual knowledge transfer rather than reading comprehension, minimizing misunderstanding issues and improving information retention. Therefore, an interactive and collaborative virtual maintenance manual based on Web3D technologies is certainly required by maintenance practitioners for a more streamlined maintenance process.

## 1.2 Objectives

This final project is addressed to achieve the following objectives:

a. to produce an interactive and virtual maintenance manual from 3D CAD models.

b. to produce on-demand maintenance manual which allows users or other third parties to collaborate at any time and any place.

## 1.3 Significance of The Study

The benefits of this final project are as follows:

a. Making maintenance activity much easier to learn and carry out with the help of the information obtained from virtual 3D maintenance manual, which is quickly accessible through Web.

b. Provide a cost-effective and interactive interface for users and other third parties to virtually interact in solving a problem in maintenance process.

## 1.4 Limitation of Problem

The limitation of problem that will be discussed are as follows:

a. Product data of a production equipment from a particular manufacturing company.

b. Product support information of the production equipment such as component description, maintenance problem, maintenance procedure and other attributes.

c. Technology to demonstrate animated virtual 3D maintenance manual by using Virtual Reality Modelling Language (VRML).

## 1.5 Systematics of The Writing

The writing systematics of this final project report is essentially written as follows:

Chapter I Introduction, this chapter provides the background, objectives, outcomes, limitations of problem and systematics of the writing. Chapter II describes the theory related to the writing of the report. Chapter III, in this chapter there will be a brief outline of every step performed during the research. Chapter IV gives an in-depth description of this final project results and analysis. Chapter V, this chapter encompasses conclusions based on the results obtained during research and suggestions for further potential work in the field.