H. T. I.

MECHANICAL ENGINEERING COURSE

DIPLOMA PROJECT

COMPUTER VISUALISATION TECHIQUES WITH COMPUTERS

M/908

ANTONIS J. YAKIS

JUNE 2000

Product Visualisation Techniques With Computers

By

Antonis J. Vakis

Project Report Submitted to

the Department of Mechanical Engineering

of the Higher Technical Institute

Nicosia Cyprus

in partial fulfilment of the requirements

for the diploma of

TECHNICIAN ENGINEER

In

MECHANICAL ENGINEERING

June 2000

List Of Contents

Acknowledgements

I would like to express my sincere thanks to Mr Paraskevas Demetriou who, through his friendly advice and valuable help, has enabled this author finish this project the way he intended to. I would also like to thank Dr Ionas Angeli for his willingness and in general all at the Higher Technical Institute – stuff and classmates for their support.

I would also like to extent my thanks to my family for their support and tolerance through the writing of this project.

I dedicate this project to my father.

Summary

This project aims at analysing the uses of computers for Product Visualisation. In addition some of the basic techniques for presenting ideas for new products are also presented. However, greater emphasis is given on Product Visualisation Techniques With Computers.

The requirements of the computer hardware and software are also discussed. The programs used were AutoDesk AutoCAD 2000 and Kinetix 3D Studio MAX 2.5 – their requirements are presented at Chapter 2 of this project. These are important in the sense that a designer who wants to work on a computer to create design drawings and models, must know the requirements of the basic tools used, so that his computer is correctly configured for such use.

Finally, two models – a caster wheel and a pump – were created using AutoCAD and 3D Studio. The basic primitives were created in the former while 3D Studio was used to render these images as well as create animations showing the two products' basic functions.

Introduction

Product Visualisation Techniques With Computers

The objectives of this project are:

1. To study the various ways for presenting ideas of new products
2. To investigate the computer requirements for preparing 3D models
3. To prepare models of locally made products

Given that new technological standards are set every day, it would be impossible to present a complete work on the latest methods and techniques for idea presentation or product visualisation.

This project targets the area of idea presentation as it exists today, keeping however in mind that used data could be obsolete in the near future. The use of computers in this field is common, if not necessary, therefore a briefing on computer hardware and software used for modelling purposes is mandatory.

Of course, prior to using the computer as the definitive tool in idea presentation and modelling, other methods have constituted the mainstream approach to this need. The main of these methods are also presented in the following sections of this project.

There are two main categories to choose from as far as the subject Product Visualisation Techniques with Computers is concerned. One such category involves the visualisation of products that are ready to be produced, whilst the second category refers to the visualisation of products during the design stage. The latter is now an easy task, using computers.

However, visualisation techniques are mere tools for preparing a preconceived idea of a product; therefore the challenge is not the visualisation but the conception of the idea. That is a field where the computer cannot be of

much assistance – it is up to the designer to develop an innovative, functional product.

The use of CAD software is the basis on which product visualisation is built, especially when it comes to engineering applications. CAD, standing for Computer Aided Design, covers the vast area of design and manufacturing related computer software used in industry today. The development of CAD was very fast – considering the short history of computers – from the early programs used for detail drawing, it has evolved into a powerful tool that can create, apart from detail drawings, 3D models as well as perform elaborate calculations concerning stress analysis et al. These complex features however – Finite Element Analysis – are not needed for Product Visualisation.

Prior to the optimisation phase, the product will not have been given its final dimensions and therefore 3D computer models can be created that do not need to be of great accuracy; accuracy would have been a time consuming affair. On top of this, accuracy cannot obviously be obtained during the conception of the product. This enables the designer to be free of boundaries that would limit his creative drive.

There is a major advantage regarding the use of CAD software for product design: it is fast. Where an engineer would need several hours or days even to manually construct detail drawings and three-dimensional models, CAD software can create both in record time. In fact detail drawings may be obtained from three-dimensional models and vice-versa.

Product Visualisation Techniques with Computers is a subject that lends itself to further development and experimentation. Do not be surprised if in the near future man is not necessary for the design stage as well – since this much progress can only trigger such pessimistic previews of the future. Still, as long as computers are still of assistance, let it be.