Abstract

This project aims at developing detail worked examples of mechanical drawings for students undertaking the course for Engineering Visualization and Modeling. Through this project specific machine parts are modeled using SolidWorks 2001 CAD software. Furthermore appropriate e-learning course materials are developed using Video Capture, Screen Capture and Photo Editor. The principal objective of this project is to develop an appropriate online library of detailed examples with increasing difficulty for students taking Engineering Visualization and Modeling course, hence enabling them to practice and understand the subject as well as the SolidWorks Computer Aided Design software at their own pace.

Method

Examples of drawings from Engineering Drawing with worked examples\(^1\), were selected with increasing difficulty. An initial number of 20 examples were selected and modeled in isometric projection. The models were subsequently converted into fully detailed orthographic views in third angle projection. After some modifications were made whereby geometrical features were added and removed as well as changes in dimensions to suit the models, the 3-D models together with orthographic projections were subsequently remodeled. Figure 1.1 and Figure 1.2 show the final isometric and orthographic projections Indicator Sleeve.

\(^1\) M.A. Parker & F. Pickup (1976), Engineering Drawings with worked examples 1 (3rd edition), Stanley Thornes.
In order to be accessible to users who may not have access to SolidWorks 2001 CAD software, the drawings were converted into e-Drawings. The e-Drawings Viewer\(^2\) being free software developed by SolidWorks Corporation can be downloaded to allow the user to view and publish both the isometric and orthographic projections of design data. Besides it also enable real time animation of the solid.

The next step is to develop an e-Learning interface for the students taking Engineering Visualization and Modeling course. This includes detail descriptions of the steps and different techniques that the student has to undertake to build the model using SolidWorks 2001 CAD software. The description of modeling each model is made to suit first time user of the software. To enhance the readability and understanding, each tutorial is broken down into simple steps. Each step involves is accompanied by pictures and video clips giving full demonstration.

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\(^2\) e-Drawings, version 1.4.1, Copyright (c) 2001 SolidWorks Corporation

The pictures are obtained using a screen captures software, Capture.exe\(^3\), developed by Nestegg software. The program allows selected items on the screen to be captured into Bitmap format and subsequently converted into JPEG format due to space constrain, using Adobe Photoshop 6.0.

To allow the tutorial to be more interactive and to enable the student to have a better understanding, video captures are taken. The software, Cam Studio\(^4\), developed by RenderSoft Software and Web Publishing, enables the video capture of the desired portion of the screen in AVI format. The videos can then be viewed using Windows Media Player or any other players that support AVI format.

Figure 1.3 shows a sample of the Indicator Sleeve write up tutorial showing the steps to follow to obtain the Loft feature of the component. Detailed pictures of the steps involved are presented to enhance the readability and understanding of the student. Similarly at the end of each step, the corresponding video clip represented by [image] is made available to the student. The video clip gives the student the opportunity to have a real time demonstration of how to carry out a specific function. And enable the slow learner to go through the step at his own pace, facilitating the learning experience.

**Discussion**

The examples of the tutorials in the project give fully detailed instructions of how to model the different models. This enables the student to familiarize themselves with the basic skills of the software, SolidWorks 2001 and at the same time encourage the students to find more appropriate techniques to build new unconventional features. It also helps the user to have a greater appreciation and ease to use the SoldWorks 2001 software.

The tutorials proposed in the project provides the student a learning platform for further Computer Aided Design softwares such as Pro-Engineer, Solid Edge, Uni-Graphics and other commercial software where the techniques will follow closely the steps involved in the SolidWorks 2001.

\(^{3}\) ScreenCapture, version 1.4.7, Copyright (c) 1996-1998, Nestegg Software.
http://www.nestsoft.com

\(^{4}\) CamStudio, version 2.00, Copyright (c) 2001-2003, RenderSoft Software and Web Publishing.
http://www.rendersoftware.com/products/camstudio
Figure 1.3 Sample of step of Indicator Sleeve tutorial including screen capture and video capture

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