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# Virtual Reality in Web-Based Training Programs

P. Leibl

Department of Precision Engineering, Munich University of Applied Sciences, Germany

**Abstract**

*This paper illustrates the use of a virtual environment (VE) in universities and private industry educational programs and training. The principles are demonstrated in the field of the design of plastic moulded parts under special consideration of product manufacturability and cost. The main focus of this paper is to illustrate how those in education can understand the concepts associated with such projects more easily.*

**Keywords:**

*Virtual environment (VE), web-based learning, product design, design of plastic parts, education*

Categories and Subject Descriptors: K.3.2 Computer and Information Science Education

## 1. Introduction

Driven by the high level of product development world-wide a need exists for well-educated employees to address the industries needs. The web-based learning environment presents new possibilities for better and more efficient education which is not dependant on schedule or location.

The majority of web-based programs do not utilise the new features available in VE and generally contain only print media. The possibilities of using virtual reality, such as animated processes, are often not considered [1; 2] although such techniques are already wide-spread in product development. [3; 4; 5]

The use of virtual reality enables a better understanding of difficult technical processes, students are more likely to retain the information contained in a VE course compared to a standard lecture format.

## 2. Concept of education program

The first step in using the program is for the user to enter their personal data into the web-page (figure 1). Once completed an initial introduction starts followed by a number of education modules for plastic moulded parts follow. The content of the modules is shown by

Text

Animation and

Video

Followed by a number of exercises. The user is required to complete the exercises successfully in order to continue the course.

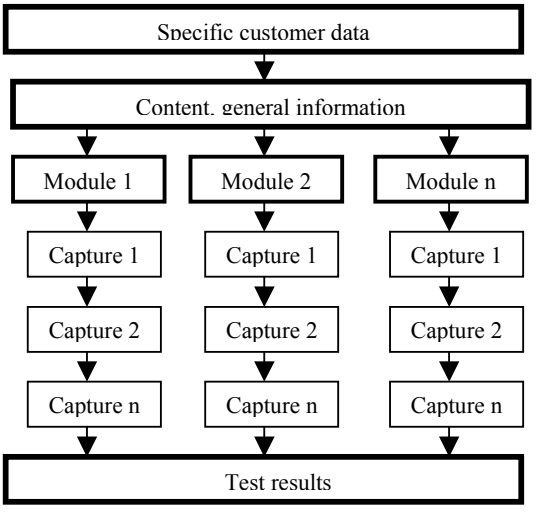


**Figure 1:** *Concept of the education program*

## 3. Examples for the use of VE

A number of examples of the use o VE follow. Many technical employees have little or no experience of technical drawings and therefore have difficulty in visualizing technical products. This often causes failure and confusion.

The overcome this problem the VE course uses 3-dimensional images of the products in place of the 2-dimensional drawings. The images can be rotated and individual aspects focused on by the user allowing them to concentrate fully on the actual content of the course.

To avoid this the course uses not two dimensional drawings but solids. For simpler understanding the parts can be rotated and focused where ever the user want to (figure 2). So they can concentrate really on the content of the course.

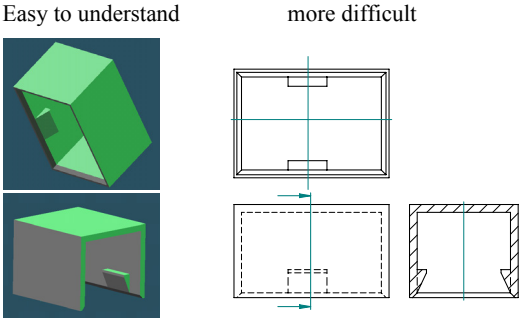


**Figure 2:** Housing with two clips. Easier understanding with solids instead of two dimensional drawings

Even for well trained technical employees it is sometimes simpler to understand more complex processes with the aid of animation. For example, it is not possible to form the clips shown in figure 2 using two halves of a mould. Additional moving parts are required to open the mould because of the clips.

This can be avoided using a simple technical solution. Two punches are used to form the clips (as shown in figure 3), hence simplifying the manufacturing process and reducing the cost of production. An animation is used to demonstrate how this concept works.

## 4. Conclusion

The web-based program described above utilises the various abilities for VE. Complex processes can be explained more easily enabling easier understanding by the user.

Interactive participation with the program will increase the amount of information retained by the user compared with a standard lecture format.

The recently developed program will be completed in 2004. An evaluation is planned to evaluated the success of the web-based learning program compared with standard lectures. After this the real advantages can be quantified by the target groups such as students and employees in industry.

An additional future development could before the user to complete interactive design work which is automatically controlled by the program.

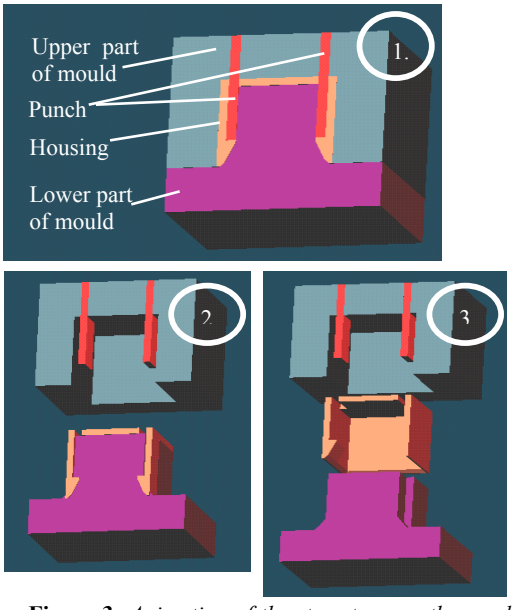


**Figure 3:** *Animation of the steps to open the mould for the housing with two clips*

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