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Development and Creation of Multimedia Programs for Manufacturing Engineering Teaching

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Development and Creation of Multimedia Programs for Manufacturing Engineering Teaching

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ABSTRACT

There is a big need to implement new methods to the educational process in technical universities. Information technologies such as Internet and Intranet applications, e-learning, Web Learning System, Web Based Training and multimedia programs seem to be good candidates for improving the teaching and make the educational process more effective. The paper deals with multimedia programs oriented on production engineering and special attention is given to the program for CNC programming.

KEYWORDS: *Multimedia programs, Manufacturing*

INTRODUCTION

Economic pressures urge manufacturers to make more customised products of high quality, in smaller series, with shorter lead time and of course, without increased costs. Manufacturing engineers have expertise in a wide range of manufacturing technologies and computer and management control systems. Manufacturing engineering is a speciality of professional engineering which requires such education and experience as is necessary to understand, apply, and control engineering procedures in manufacturing processes and methods of production of industrial commodities and products.

The Department of Machining and Automation, University of Zilina educates the students in accredited study program "Automated Production Systems". The topics of the study programs are the following:

- Computer Aided Systems and Technologies,
- Development of intelligent CA /Computer Aided/ systems,
- NC and CNC systems, Industrial robots and manipulators,
- Flexible manufacturing systems, Intelligent manufacturing systems,
- Automation of manufacturing enterprises, Microelectronics.

All these topics activities are also transformed to the individual educated subjects. Apart from lectures, lessons and laboratory sessions the Department utilises modern form of information technologies such as Internet and Intranet applications, e-learning, Web Learning System, Web Based Training and multimedia programs.

There are created and developed several multimedia programs oriented for engineering activities for production such as Multimedia software for Computer Aided systems and Technologies, Multimedia software for CAD/CAM systems, Multimedia software for NC/CNC programming, Multimedia software for robots and robot programming, Multimedia software for Flexible Manufacturing Systems /FMS/, Multimedia software for Production engineering.

The developed programs were created as a support for engineering study for students and distance learning. The programs provide a broad range of topics ranging from development and design, to manufacturing tools and production management.

CREATED MULTIMEDIA PROGRAMS

The department of Machining and Automation created several multimedia programs. Thereinafter only 1 multimedia program will be introduced /Fig.1. 2/ – Multimedia *program for NC/CNC programming of machine tools*. The others program have similar structure and they were created by similar SW packages.
The multimedia programs were created with support of the following softwares:

- Programming language - DELPHI (BORLAND International),
- Software for creating the text - Microsoft Office,
- Visual program - 3Dstudio MAX Release 2
- CAD/ CAM system - Pro/ENGINEER,
- Program for video cutting - Adobe Premiere,
- Program for program design - Adobe PhotoShop,
- Sound editor - GoldWave.

The developed multimedia programs consist of individual educational steps, which allows for student to obtain wide range of knowledge – from basic and introduction information to the advanced and expert knowledge. NC (Numerical Control) and CNC (Computerised Numerical Control) machines tools are necessary equipment for flexible manufacturing systems. The CNC machine tools are controlled by instructions which are saved in digitised documentation – NC program. It is very important to have knowledge about creation of the NC program. Therefore there was created multimedia program for NC/CNC programming of CNC machine tools /Fig.1, 2/. The created multimedia program support the teaching on training machines Emco Maier Compact 5CNC which is utilised on the Department and is known in European technical universities.

Students can obtain the general information about how to prepare data for CNC machine, how to utilise individual instructions of machine and how to effective prepare optimised instruction program for CNC machine.

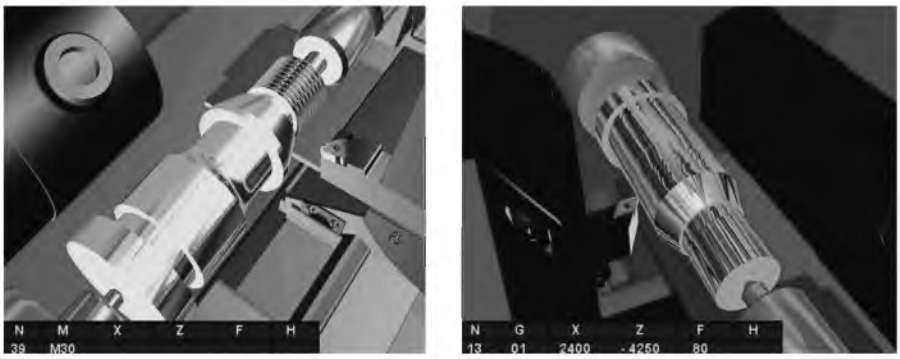

Fig. 1. *Simulation of created NC program*

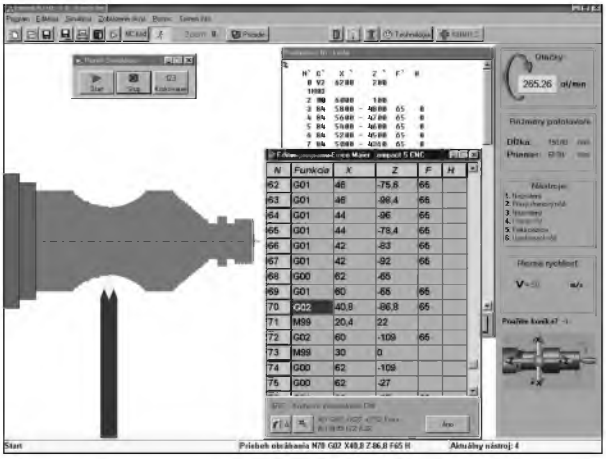

Fig. 2. *Interactive module for NC programming*

The multimedia program consists of the following modules:

- general information on CNC machine tools,
- general information on programming of CNC machine tools,
- command and instructions for CNC machine tools,
- structure of NC programs for machine control,
- concrete programming of Emco Maier machine tools,
- simulation of created NC programs.

IMLEMENTATION AND UTILISATION

The multimedia programs are especially determined for lessons. Students can obtain information about machine tools and corresponding processes forward outside of the laboratory with real machine tools. The simulation programs enable the

eliminate time spend at the machine. The teaching process is more effective and especially flexible.

BENEFITS, OUTPUTS

Many of the created multimedia programs are utilised for training for people from industry. The education process is low cost and very flexible. Students can realise all processes on the machine in framework of simulation module. The students obtain good experiences and knowledge about the machine out side of the concrete workshop. The prepared students, with simulated processes go to the concrete laboratory with concrete machine tools. The operating the machine tools are more simple as the students obtain the knowledge and experiences from simulation and multimedia program. The multimedia program offer also evaluation of knowledge. The evaluation is realised in several steps with various level of required knowledge.

INTERNATIONAL COLLABORATION

The Department of Machining and Automation has a wide international collaboration with other foreign universities /especially in Poland, Romania, Sweden, Germany, Czech republic/. The department is also coordinator of international project oriented on educational processes in area of production engineering. The aim of the project was creation of networks of cooperated universities. The created multimedia programs are also utilised in framework of the awarded project. The multimedia programs bring to students and teachers the advantages such as effective educational process, individual access to the students, greater area for individual educational, etc.

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