COMPUTER AIDED MANUFACTURING LABORATORY

Department of Manufacturing Engineering

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Fig.1. CNC DMG 63 V Vertical Machining Center

Fig.2. CNC Turning Center Lynx 220

Fig.3. The flexible manufacturing EMCO CNC system

Fig.4. Complex part produced in the Computer Aided Manufacturing Laboratory

Fields of expertise:

The Computer Aided Manufacturing Laboratory has the equipment items required in order to develop the following activities:

- Computer aided manufacturing of parts bounded by complex surfaces
- Technological and constructive computer aided design
- Design of software applications needed for automatic generation of the programs for CNC machine tools
- Developing applications in the field of databases used for recording the resources of the industrial companies or exchanging technical information.

R&D infrastructure:

For supporting the R&D and training activities performed in the Computer Aided Manufacturing Laboratory, a modern computer network consisting in 12 workstations (Pentium IV) running CAD software (Solid Works, Solid CAM, Catia v5, etc.) has been purchased.

For computer-aided manufacturing applications, a CNC DMG 63 V Vertical Machining Center, a CNC Turning Center Lynx 220 and a flexible manufacturing EMCO CNC system have been also acquired. The EMCO CNC system offers the possibility to develop applications in the fields of flexible automatic and computer integrated manufacturing. The system illustrated in Fig.3 contains a turning CNC machine, a milling CNC machine, as well as a Mitsubishi robot for manipulating the workpieces. The students have the possibility to learn and practice not only how to program the CNC machines and the robot, but also to program and automate the entire manufacturing process. They program the interdependence of the system components, too. The robot is programmed to take a part from the workpiece blade, to feed the turning or milling machine, to take the manufactured parts from the machines in order to place them on the finite parts blade. The advantage of the EMCO CNC system is the fact that it offers the practice facilities for integrate programming of the system components: CNC machines, robot, automatic feed devices, sensors, measurement systems, etc.

The DMG 63 V Vertical Machining Center has 4 axes numerically controlled, so, complex parts can be processed on this equipment. The Turning Center Lynx 220 has 2 axes numerically controlled. All the equipment items are recently manufactured and have been acquired during the last 2 years.

Facilities

Virtual geometrical models of complex parts could be developed in our laboratory on the basis of contracts.

If the beneficiary requires, machine-tool programs could be developed or tested and, in the case of prototype parts, the entire manufacturing process could be performed.

Fig.5. Active elements of an injection mould die for eyeglasses produced in the Computer Aided Manufacturing Laboratory

A special component of the laboratory is the training in the fields of programming and operating the CNC machine-tools, and computer-aided manufacturing. The course attendants obtain certificates acknowledged by the Romanian Ministry of Education and Research.
The staff of the Computer Aided Manufacturing Laboratory consists in 5 academic persons and 2 researchers.

Access to lab facilities

The facilities offered by the Technical University of Cluj-Napoca (TUCN) can be accessed on the basis of contracts between the beneficiary and TUCN. The beneficiary could follow the entire manufacturing process, each activity having also a technological transfer character.

In case of developing computer applications or virtual models, the activities could be performed in partnership with the beneficiary.

Certificates

The graduation certificates (acknowledged by the Romanian Ministry of Education and Research) are issued for the training courses attendants, by the Department for Distance Education (DECID) of the Technical University of Cluj-Napoca.

Fig.6. Active elements of an extruded mould produced in the Computer Aided Manufacturing Laboratory

Research projects

1. "Innovative Manufacturing Network" – Contract CEEX nr.41/2005 (budget 1.420.000 RON), director: Prof.Dr.Eng. Petru Berce
2. "Research base with multiple users" – Contract World Bank 2001 (budget 400.000 USD), director: Prof.Dr.Eng. Petru Berce
3. "Center for Manufacturing" – contract financed by KOICA (KOREAN INTERNATIONAL COOPERATION AGENCY) 2005 (budget 325.000 USD), director: Prof.Dr.Eng. Petru Berce
4. Technological transfer and technical assistance regarding the implementation of the computer aided manufacturing of complex parts. Beneficiary: S.C. Rominserv S.A Bucureşti.
5. Studies and research activities concerning the computer aided manufacturing of prototypes, the injection mould die for eyeglasses and the 2nd order tools required for manufacturing by electro-erosion. Beneficiary: S.C. Lenscriss SRL Cluj-Napoca
6. 3D modeling and technological design for tooling needed for the plastic injection of "Coat-hanger L18" and "Coat-hanger L28" parts. Beneficiary: S.C. NAPOCHIM S.A, Cluj-Napoca.

Fig.7. Pictures taken from the Computer Aided Manufacturing Laboratory