

## Rapid Prototyping Laboratory

Department of Manufacturing Engineering

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[http://www.utcluj.ro/english/machine\\_building/catedra\\_tcm.php](http://www.utcluj.ro/english/machine_building/catedra_tcm.php)

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Fig.1. Sinterstation 2000

### Fields of expertise

#### Research goals and technological development

- Research regarding the rapid prototyping (RP) technologies of complex parts
- Optimization of the production processes
- Research regarding the TDC (tools-devices-checkers) for small batch production and prototypes
- Research regarding the development of new materials machinable on rapid prototyping systems

#### Management, training and offered services

- Prototypes made by LOM, FDM and SLS technologies
- 3D modeling for assemblies and prototypes
- CAD/CAM/CAE training courses
- CNC programs for parts manufactured in the RP laboratory or provided by customers
- Casting models (master models or lost-foam models)
- Medical models and personalized implants taken from computer tomography.

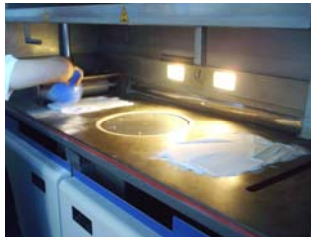


Fig.2. SLS rapid prototyping system

### R&D infrastructure

#### Hardware

- LOM 1015 rapid prototyping system
  - raw material is a glue paper, the final parts having the consistency of a wood model!
  - the technology is recommended for massive models without fine details or thin surfaces
- FDM 1650 rapid prototyping system
  - raw material is a wire ABS plastic
  - the technology is recommended for shell models without fine details
- DTM Sinterstation 2000 rapid prototyping system
  - raw material is powder (plastic, polystyrene, metallic, ceramics, etc.)
  - the technology is recommended for complex models with fine details; in case of plastic powders or polystyrene, the wall thickness is up to 0.5 – 0.6 mm



Fig.3. LOM 1015 rapid prototyping system



Fig.4. FDM 1650 rapid prototyping system

#### Software

CAD: CATIA V4, Pro/Engineer, Pro/Desktop, Mechanical Desktop, SolidWorks, SolidEdge, MSC VisualNastran Desktop

CAM: SURFCAM, SOLIDCAM, MIMICS



Fig.5. Medical applications

## Facilities

The team has 2 professors, 1 associate professor, 1 senior-lecturer and 6 PhD students. The members of the team are highly qualified in the rapid prototyping field.

## Access to lab facilities

The consultancy, cooperation and access to the research facilities are made on contractual bases. The costs of the parts manufactured on the rapid prototyping systems for external jobs depends on the quantity of the material used, on the machining time and on the labor work involved, for the consultancy and applied research.

## 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. LOM parts manufactured in RP laboratory

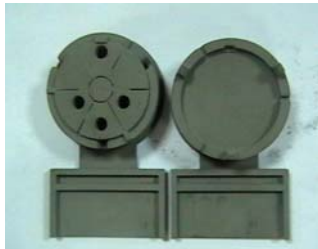


Fig.7. Active elements of an injection mould tool made by SLS

## Research projects

1. "Innovative Manufacturing Network" – Contract CEEX nr.41/2005 (budget 1.420.000 RON), director: Prof.dr.ing. Petru Berce
2. "Multiple users research base" – World Bank contract - 2001 (budget 400.000 USD), Director: Prof.dr.ing. Petru Berce
3. 3 years European Project : "National Pilot Centre for Continuing Education in Rapid Prototyping", finished in 2001 (252.000 €) (Coordinator: Prof. P. Berce, Contractor: Dr. N. Bâlc);
4. CNCSIS Contract (3 years): "Research regarding the rapid prototyping technologies in medical implantology" – (25.000 €) (Director : Prof.dr.ing. Petru Berce) ;
5. "Center for Manufacturing" – funded by the KOICA (KOREAN INTERNATIONAL COOPERATION AGENCY), 2005, (budget 325.000 USD), Director: Prof.dr.ing. Petru Berce
6. "Theoretical and experimental research regarding the LOM, FDM and SLS rapid prototyping systems" – ALSTOM GENERAL TURBO S.A BUCHAREST (Director : Prof.dr.ing. Petru Berce)
7. "Theoretical and experimental research regarding the LOM, FDM and SLS rapid prototyping systems" – PLASTOR S.A. ORADEA (Director : Prof.dr.ing. Petru Berce)
8. "Theoretical and experimental research regarding the LOM, FDM and SLS rapid prototyping systems" – S.C. HIDROTECH CLUJ-NAPOCA (Director : Prof.dr.ing. Petru Berce)

The current project (2005-2008) of excellence (contract 41/2005) is focused on research within the innovative manufacturing network, coordinated by the Technical University of Cluj-Napoca. The partners are as follows:

The Transylvania University from Braşov, The Polytechnic University of Timisoara and The University for Medicine and Pharmacy from Cluj-Napoca. Project manager: Prof.dr.ing. Petru Berce; Scientific coordinator: Dr. Nicolae Bâlc.



Fig.8. General views of the laboratory (rooms G14 / G19)