


## NATIONAL CENTRE OF INNOVATIVE MANUFACTURING

### Contact details

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### Areas of expertise

**Industrial Engineering** (Laser Beam Machining, Water Jet Cutting, Electrical Discharge Machining, Rapid Prototyping of complex parts and master models for Rapid Tooling, etc.); **Flexible Manufacturing Systems** (CNC Manufacturing Systems); **CAD/CAM Systems** (Applied Industrial design for products and technologies); **Production Engineering** (Innovative Manufacturing for product development and Rapid Tooling technologies); **Automotive Engineering** (Competitive Manufacturing of car components); **Composite Materials** (Manufacturing technologies of complex parts made out of composite materials enforced with carbon fiber); **Engineering and Technologies** (Concurrent engineering, Methodologies and Software tools in Design for Manufacture and Assembly); **Biomedical engineering**, (Prototypes, customized implants, new biocompatible materials); **Operational Research**. Development of algorithms for solving TSP, Flowshop Scheduling, Optimal Nesting etc. **Technology Processes Optimization Development of algorithms** for linear and nonlinear optimization, without/with constraints.

### Team

**Prof. Dr. Eng. Petru Berce**, Prof. Dr. Eng. Nicolae Bâlc, Prof. Dr.Eng. Mircea Ancău, Prof.Dr. Eng. Marius Bulgaru, Assoc.Prof. Dr. Eng. Mihai Damian, Assoc.Prof. Dr. Eng. Alexandru Cărean, Assoc.Prof. Dr. Eng. Domnița Frățilă, Assist. Prof. Dr. Eng. Cristian Caizar, Assist. Prof. Eng. Horea Chezan, Assist. Prof. Dr. Eng. Răzvan Păcurar, Assist. Prof. Dr. Eng. Radu Sever Adrian, Assist. Prof. Dr. Eng. Ancuța Păcurar, Assist. Prof. Dr. Eng. Dan Leordean, Assist. Prof. Dr. Eng. Paul Bere, Assist. Dr. Eng. Nicolae Panc, Assist. Dr. Eng. Emilia Sabău, Assist. Dr. Eng. Alexandru Popan, Assist. Dr. Eng. Alina Luca

### Representative projects

**OP3MET**, “Optical 3D Metrology - Automated in-line metrology for quality assurance in the manufacturing industry”, European FP6 Project, (2006-2008)

**Adm-ERA, “Reinforcing Additive Manufacturing research cooperation between the Central Metallurgical Research and Development Institute and the European Research Area”, European FP7 Project,(2011-2013)**  
**BIOMAPIM, “New Biocompatible Materials for personalized implants made by SLS and SLM”, PCCE, (2010-2013)**  
**“Innovative Manufacturing Network”, (2005-2008)**  
**“Expert Systems for Technology Processes Optimization. The research contracts deals with rapid prototyping and tooling optimization”, PNII, <http://www.esop.utcluj.ro> (2007-2010)**  
**“Research concerning the development of new stochastic heuristic algorithms for solving flowshop scheduling problems”,PNII-Idei,<http://www.ci579.utcluj.ro> (2008-2011)**  
**“AMaTUC – Boosting the scientific excellence and innovation capacity in additive manufacturing of the Technical University of Cluj-Napoca”, HORIZON 2020 – twinning, 2016-2018**

## Significant results

### The most representative publications of the past 5 years:

1. Petru Berce, et. al. Medical applications of Additive Manufacturing technologies, Romanian Academy Publishing House, Bucharest, 2015
2. Leordean, Dan; Dudescu, Cristian; Marcu, Teodora; P. Berce et al Customized implants with specific properties, made by selective laser melting RAPID PROTOTYPING JOURNAL Volume: 21 Issue: 1 Pages: 98-104, Published: 2015
3. Leordean, Dan; Radu, S. A.; Fratila, D.; P. Berce. Studies on design of customized orthopedic endoprotheses of titanium alloy manufactured by SLM INTERNATIONAL JOURNAL OF ADVANCED MANUFACTURING TECHNOLOGY Volume: 79 Issue: 5-8 Pages: 905-920 Published: JUL 2015
4. Petru Berce, et.al., Additive Manufacturing Technologies and their applications, Academy Publishing House, Bucharest, 2014.
5. Brie, Ioana-Carmen; Soritau, Olga; Dirzu, Noemi; P.Berce et al. Comparative in vitro study regarding the biocompatibility of titanium-base composites infiltrated with hydroxyapatite or silicatitanate JOURNAL OF BIOLOGICAL ENGINEERING Volume: 8 Article Number: 14 Published: JUN 19 2014
6. R. Păcurar, P. Berce, "Research on the durability of injection molding tools made by selective laser sintering technology", in Proceedings of the Romanian Academy series A-mathematics physics technical sciences information science, vol. 14, no. 3, pp. 234-241, 2013.
7. M. Ancău, "On Solving Flowshop Scheduling Problems", in *Proceedings of the Romanian Academy*, series A, vol. 13, no. 1, 2012, pp. 71-79
8. M. Ancău, "Main Aspects Concerning PCB Manufacturing Optimization", in *Circuit World (Emerald)*, vol. 38, no.2, 2012, pp.75-82
9. Paul Bere, Petru Berce, Phenomenological fracture model for biaxial fibre reinforced composite, - Composites Part B: Engineering An International Journal, Vol. 43B, Issue 5, (2012), ISSN 1359-8368, p. 2237 – 2243
10. R. Păcurar, A. Păcurar, P. Berce, N. Bălc, O. Nemeş, "Porosity change by resin impregnation in structures obtained by selective laser sintering technology" in *Studia Universitatis Babeş-Bolyai Chemia*, vol. 57, no. 3, pp. 5-13, 2012.

**International Patent** : „Acting Device”, registered in USA and Germany;

### Others:

Competitive Manufacturing techniques transferred to industrial partners and used in commercial contracts with companies from Germany and England

## The offer addressed to the economic environment

Research & development	Develop new materials, suitable for Rapid Prototyping using the SLS and SLM equipment. Development of optimization algorithms. Design for Competitive Manufacturing of Industrial Products. Rapid Tooling and Additive Manufacturing Rapid Prototyping using the well known CNC machines, available within DME-TUCN. Researches concerning the technological processes optimization.
Consulting	External evaluation of products/projects; Select the optimal RP technological route; Consulting in the area of operational research (industrial application of combinatorial optimization: calculation of minimum path length, optimal nesting, flowshop scheduling etc.).
Training	We offer training in the field of Numerical Optimization Techniques in Computer Aided Design. Training for people from industry, in the following fields: <ul style="list-style-type: none"> <li>- Use modern CAD systems for integrated applied design;</li> <li>- Rapid Tooling;</li> <li>- Modern Manufacturing Technologies;</li> <li>- Using the modern RP equipment;</li> <li>- CNC machining;</li> <li>- Metrology and Quality Engineering.</li> </ul>