

## Additive Manufacturing and Rapid Product Development Research Centre

### Contact details

Name	<b>Additive Manufacturing and Rapid Product Development</b>
Acronym	<b>AMaRaP</b>
Logo	
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### Areas of expertise

**3D Printing (SLM - Selective Laser Melting; SLS - Selective Laser Sintering; FDM - Fused Deposition Modelling); Production Engineering** (Innovative manufacturing for product development); **Rapid Tooling** (Investment Casting, Silicone Rubber Molding, Metal Spray Tooling); **Medical Applications of AM** (Prototypes, Customized Implants, New biocompatible materials); **Industrial Engineering** (Laser Beam Machining, Water Jet Cutting, Electrical Discharge Machining); **CAD/CAM/CAE** (Applied Industrial design for products and technologies); **Concurrent engineering** (Methodologies and software tools in Design for Manufacture and Assembly-DFMA); **Composite Materials** (Manufacturing composite materials, reinforced with carbon/glass fiber).

### Team

Prof. Nicolae Bâlc, Prof. Petru Berce, Prof. Mircea Ancău, Prof. Domnița Frățilă, Assoc. Prof. Alina Popan, Assoc. Prof. Dan Leordean, Assoc. Prof. Alexandru Popan, Assoc. Prof. Paul Bere, Assoc. Prof. Răzvan Păcurar, Assoc. Prof. Emilia Sabău, Senior Lect. Horea Chezan, Senior Lect. Cosmin Cosma, Prof. Adrian Trif, Senior Lecturer Vlad Bocăneț.

### Representative projects

**H2020 – DiCoMI**, „Directional Composites through Manufacturing Innovation”, 2018–2023, TUCN Leader: Prof. N. Balc, <http://www.dicomi.eu>;  
**PP H2020**, Contract 71/2022: “Fabricația inovativă a compozitelor prin tipărire 3D”, 2022-2023, Director Prof. N. Bâlc  
**H2020 – AMaTUC**, „Boosting the scientific excellence and innovation capacity in additive manufacturing of the TUC-N”, 2016–2018, Coordinator: Prof. N. Balc. [www.amatuc.com](http://www.amatuc.com);  
**Erasmus+ KA2 – DigiMan**, „Digital Manufacturing Master Degree to set specialists for the dawn of the Industry 4.0”, 2019 – 2022, TUCN Leader: Prof.N. Balc, <http://www.digimanproject.eu>;  
**FP7 – Adm-ERA**, „Reinforcing Additive Manufacturing research cooperation between the Central Metallurgical Research and Development Institute and the European Research Area”, 2011–2013, TUCN Leader: Prof. N. Balc; <http://www.fp7-admera.org>;  
**PCCDI**, „Implementarea tehnologiilor aditive în fabricarea componentelor complexe și suprasolicitate”, 2018-2020, TUCN Coordinator: Prof. P. Berce;  
**Bridge Grant – Opti-DeP**, Optimizarea tipăririi 3D pentru Aplicații Dentare Personalizate, 2016-2018, Director: Prof. N. Bâlc;  
**Bridge Grant – PreMCo**, „Dezvoltarea posibilităților de prelucrare a materialelor compozite avansate prin tăiere de precizie cu jet de apă”, 2016-2018, Director: Assoc.Prof. Alexandru Popan; <http://www.premco.utcluj.ro>;  
**Bridge Grant**, „Optimizarea materialelor compozite polimerice armate cu fibre și a tehnologiei de fabricație utilizate în construcția elementelor de caroserie pentru vehicule electrice”, 2016-2018, Director: Assoc.Prof. Paul Bere;  
**PP H2020**, “Support AMaTUC”, 2016-2018, Director Prof. N. Bâlc;  
**PCCA – PECIFCO**, „Implanturi cranio-faciale personalizate obtinute prin prototipare inovativa 3D din materiale compozite ranforsate cu fibra de sticla”, 2014-2017, TUCN Coord: Prof. N. Bâlc;

## Significant results

### Selected publications in the last 3 years:

1. Popan, IA; Balc, N; Popan, AI; „Avoiding carbon fibre reinforced polymer delamination during abrasive water jet piercing: a new piercing method” International Journal of Advanced Manufacturing Technology, DOI10.1007/s00170-021-08294-7, 2022, (Q1-ISI, FI: 3.226);
2. Cosma, C; Teusan, C; Gogola, P; Simion, M; Gabalcova, Z; Trif, A; Berce, P; Balc, N., “Investigation of the Interface between Laser-Melted CoCr and a Stainless Steel Substrate”, Metals – MDPI 12, 965, 2022, <https://doi.org/10.3390/met12060965>, (ISI, FI: 2.758);
3. Cuc, S; Cosma, C; Leordean, D; Rusu, M; Balc, N; Prodan, D; Ene, R; „Adhesion between Biocomposites and Different Metallic Structures Additive Manufactured” COATINGS, DOI10.3390/coatings11040483, Volume11, Issue 4, Article No. 483, 2021, (Q2-ISI, FI: 3.038)
4. O. Jucan, R. Gadalean, H. Chicinas, M. Hering, N. Balc, C. Popa, “Study on the indirect selective laser sintering (SLS) of WC-Co/PA12 powders for the manufacturing of cemented carbide parts”, Int Journal of Refractory Metals and Hard Materials, Elsevier, Volume: 96, 2021, (ISI-Q1, FI: 3.407); <https://doi.org/10.1016/j.jirmhm.2021.105498>;
5. P. Pradel, R.I. Campbell, N. Balc, „A taxonomy of customers' characteristics influencing product personalisation”, Proceedings of the Romanian Academy Series A-mathematics physics technical sciences information science, Vol 22, Issue 2, pg. 153-161, 2021, (ISI, FI: 1.523);
6. C. Cosma, M. Moldovan, M. Simion, N. Balc, “Impact of laser parameters on additively manufactured cobalt chromium restorations”, J of Prosthetic Dentistry, 2021, (ISI-Q1, FI: 2.76); (<https://www.sciencedirect.com/science/article/pii/S0022391321000330>);
7. Perini, M; Bosetti, P; Balc, N, “Additive manufacturing for repairing: from damage identification and modeling to DLD”, Rapid Prototyping Journal, Publisher: Emerald Group Publishing LTD, UK, Vol. 26, Issue 5, 2020, ISSN: 1355-2546 / eISSN: 1758-7670, (Q1, FI: 3.937); DOI: 10.1108/RPJ-03-2019-0090;
8. Cosma, C; Drstvensek, I; Berce, P; Prunean, S.; Legutko, S; Popa, C.; Balc, N; „Physical-Mechanical Characteristics and Microstructure of Ti6Al7Nb Lattice Structures Manufactured by Selective Laser Melting” Materials, Vol.13, Issue: 18, Art. no. 4123, 2020, DOI: 10.3390/ma13184123, 2020, (ISI, FI: 3.424)
9. Cosma, C; Kessler, J; Gebhardt, A; Campbell, I; Balc, N., “Improving the Mechanical Strength of Dental Applications and Lattice Structures SLM Processed”, Publisher: MDPI, ST Alban-Anlage 66, CH-4052 Basel, Switzerland, Vol.13, Issue 4, Article no: 905, 2020, eISSN: 1996-1944, (ISI, FI: 3.057); DOI: 10.3390/ma13040905;

### Selected Books

10. Berce, P., Bâlc, N., Păcurar R., ș.a., (2014), *Tehnologii de fabricație prin adaugare de material și aplicațiile lor*, Editura Academiei Romane, București.
11. Berce, P., Bâlc, N., Leordean Dan, ș.a., (2015), *Aplicațiile medicale ale tehnologiilor de fabricație prin adăugare de material*, Editura Academiei Romane, București - Awarded with “Henri Coandă” prize at The annual awarding ceremony of Romanian Academy, 15 December 2017, Bucharest (Romania).
12. Nicolae Balc, Dan Leordean, Editors: “Research and Applications in Manufacturing Engineering”, MATEC Web of Conferences – EDP Sciences, France, Volume 299, 2019, ISBN- ISBN: 978-2-7598-9083-5, <https://www.matec-conferences.org/articles/mateconf/abs/2019/48/contents/contents.html>
13. Nicolae Balc, Editor: “Modern Technologies in Manufacturing”, MATEC Web of Conferences – EDP Sciences, France, Volume 137, 2017, ISBN- ISBN: 978-2-7598-9083-5, <https://www.matec-conferences.org/articles/mateconf/abs/2017/51/contents/contents.html>
14. Nicolae Balc, Editor: “Modern Technologies in Manufacturing”, Trans Tech Publications - Applied Mechanics and Materials, Switzerland, Vol. 808, 394 pagini, 2015, ISBN-13: 978-3-03835-653-0, <http://www.scientific.net/AMM.808/book>

### International Patents:

15. „Acting Device”, registered in USA and Germany; N. Balc, D. Leordean, No. US9199358 B2, 2015;
16. Betätigungsvorrichtung – European patent, owner: DE-STA-CO Company, D. Leordean, N. Bâlc, ș.a., No. EP2433750

**Chairman of the International Conference on Modern Technologies in Manufacturing** - MTem 2013, 2015, 2017 and 2019”, held in Cluj-Napoca, Romania - <http://www.mtem.utcluj.ro/>;

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	Design for Competitive Manufacturing of Industrial Products, Rapid Tooling and Additive Manufacturing
Consulting	External evaluation of products/projects
Training	Training for people from industry, in the following fields: - Use modern CAD systems for integrated applied design - Rapid Tooling - Modern Manufacturing Technologies

Last updated: January 2023