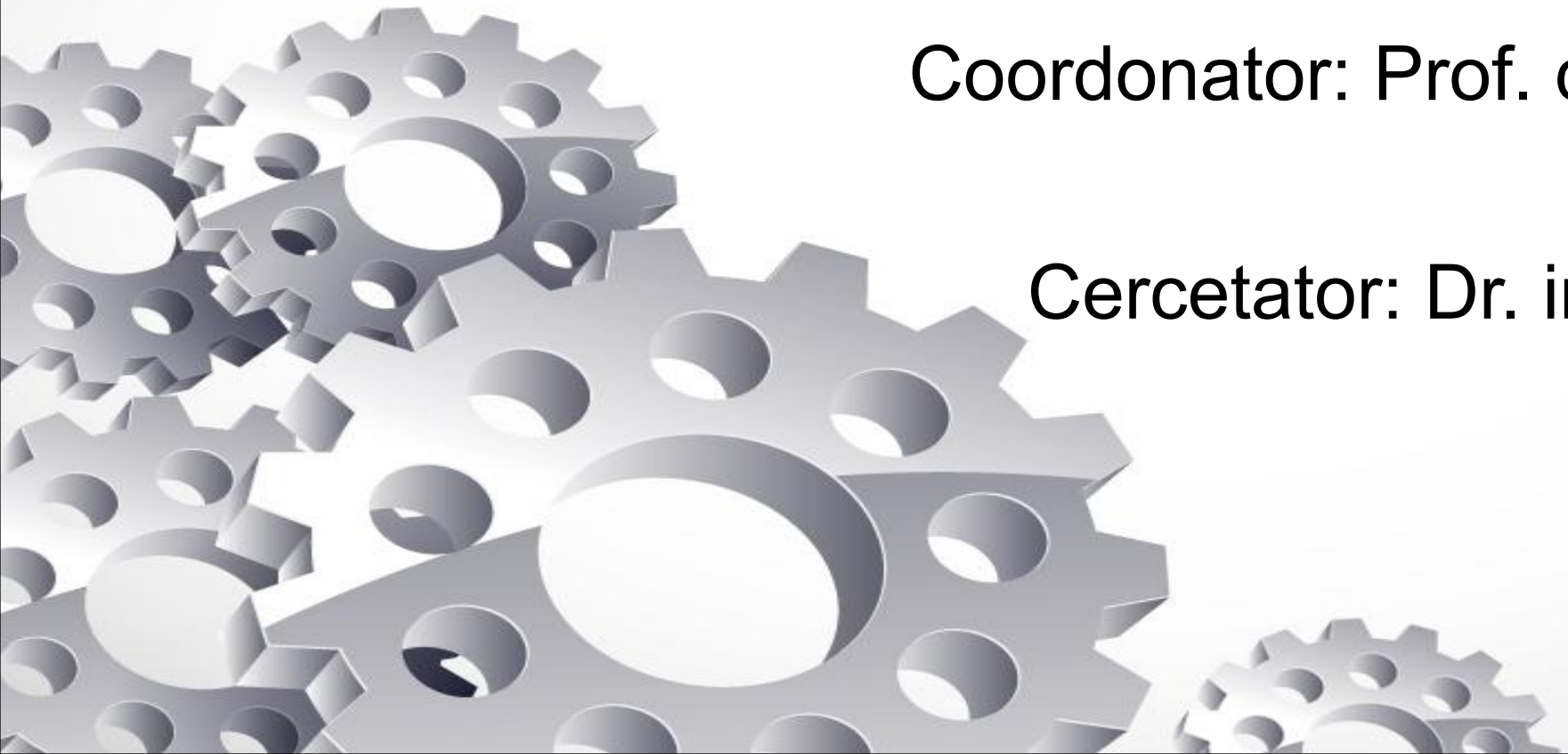
TECHNICAL UNIVERSITY OF CLUJ-NAPOCA ROMANIA

Grupul de Cercetare Rapid Prototyping



Coordonator: Prof. dr. ing. Petru Berce

Cercetator: Dr. ing. Cosmin Cosma

Titlul proiectului: „Cercetări privind fabricația prin topire selectiva cu laser, a structurilor metalice complexe pentru industria aeronautica si auto”

Contract de Cercetare nr. 77/2018 axa de finanțare PCCDI, DigiTech

Faza de execuţie Nr. 2/2019

Activități:

Activitatea 2.10: Testarea prelucrabilitatii prin topire selectiva cu laser a diferitelor materiale metalice specifice industriei aeronautice si auto;

Activitatea 2.11: Experimentarea diferitelor scheme de prelucrare (traiectorii laser, viteze de scanare, durata impuls, putere laser) si optimizare suportilor;

Activitatea 2.12: Stabilirea parametrilor optimi de fabricatie in raport cu proprietatile solicitate structurilor fabricate;

Activitatea 2.13: Testarea proprietatilor fizico-mecanice ale pieselor fabricate prin topire selectiva cu laser din diferite materiale si cu diferite structuri.

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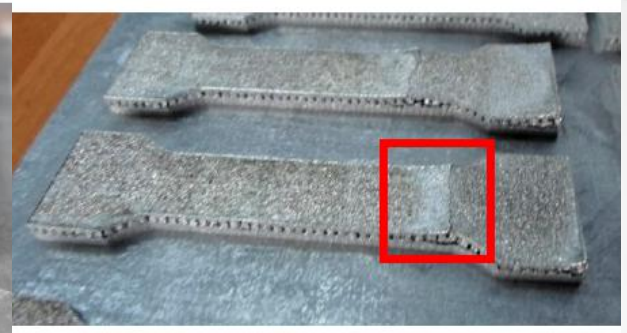
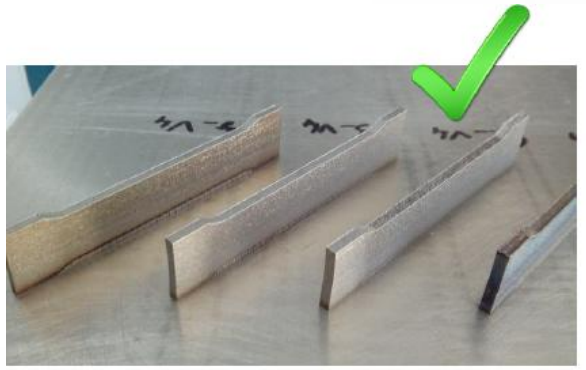
Activitatea 2.10: Testarea prelucrabilitatii prin topire selectiva cu laser a diferitelor materiale metalice specifice industriei aeronautice si auto

Pulberi metalice vizate:

- Titan pur, Grade 1, 99.50% Ti;
- Otel inoxidabil, 316L;
- Aliaj de CoCr.





Activitatea 2.11: Experimentarea diferitelor scheme de prelucrare (traiectorii laser, viteze de scanare, durata impuls, putere laser) si optimizare suportilor

Tabelul 1. Sinteza cu parametrii SLM configurati pentru testarea diferitelor materiale

Material	Laser Power[W]	Scan Velocity [mm/s]	Layer thickness[µm]	Hatch distance[mm]
Ti	100	500	50	0.12
	120			
	140			
	160			
316L	100	500		0.12
	120			
	140			
	160			
	160	350		0.10
CoCr	70	500		0.10
	85			
	90			
	100			

Activitatea 2.12: Stabilirea parametrilor optimi de fabricatie in raport cu proprietatile solicitate structurilor fabricate

Tabelul 2. Parametrii optimi pentru fiecare material

Material	Laser Power[W]	Scan Velocity [mm/s]	Layer thickness[µm]	Hatch distance[mm]
Ti	100	500	50	0.12
	120			
	140			
	160			
316L	100	500		0.12
	120			
	140			
	160			
	160	350		0.10
CoCr	70	500		0.10
	85			
	90			
	100			

Diseminarea rezultatelor (6 articole, 2019):

1. A. Pacurar, M. Rau, **C. Cosma**, E. Gutiu, Research regarding the design and manufacturing of hand orthosis by using Fused Deposition Modeling (FDM) technology, International Conference On Modern Technologies In Manufacturing, Cluj-Napoca. (Web of Science).
2. I.Turcin, A. Abdallah, **C. Cosma,** D. Zavec, **N. Balc**, Sweat glands module with integrated sensors designed for additive manufacturing, International Conference On Modern Technologies In Manufacturing, Cluj-Napoca. (Web of Science).
3. **R. Pacurar,** V. Buzila, E. Gutiu, S. Sergiu-Dan, Research on improving the accuracy of FDM 3D printing process by using a new designed caliper part, International Conference On Modern Technologies In Manufacturing, Cluj-Napoca. (Web of Science).
4. **D. Leordean,** T. Ciobanu, Researches on the design of customized femoral implant, International Conference On Modern Technologies In Manufacturing, Cluj-Napoca. (Web of Science).
5. **C. Cosma**, B. Zaharia, **N. Balc**, Design For Additive Manufacturing To Produce Complex Metal Parts, Romanian Journal Of Technical Sciences - Applied Mechanics, vol.64.
6. G. Armencea, **C. Cosma**, C. Dinu, F. Onisor, M. Lazar, **P. Berce, N. Balc**, M. Baciut, S. Bran, Technical queries of a 3D design custom-made implant made from titanium particles for maxillofacial bone reconstruction, Particulate Science and Technology, DOI: 10.1080/02726351.2019.1578846. (ISI 1.4)

Implant complex cu forme anatomice personalizat fabricat din pulbere de Ti pur utilizand procesul SLM

Domeniu chirurgie maxilo-faciala

Partener: Universitatea de Medicina si Farmacie Cluj-Napoca

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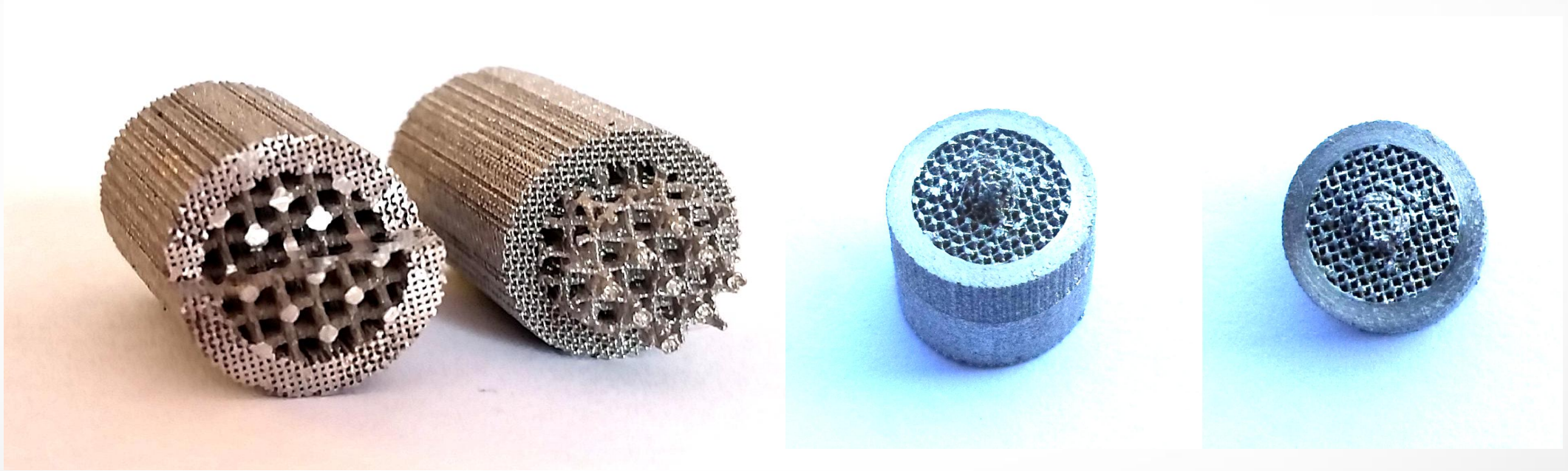
Aplicatii dezvoltate:

- Domeniu medicina regenerativa



Grefe macro-poroase care permit dezvoltarea tesuturilor osoase pe aceste structuri schelet

Aplicatii dezvoltate:

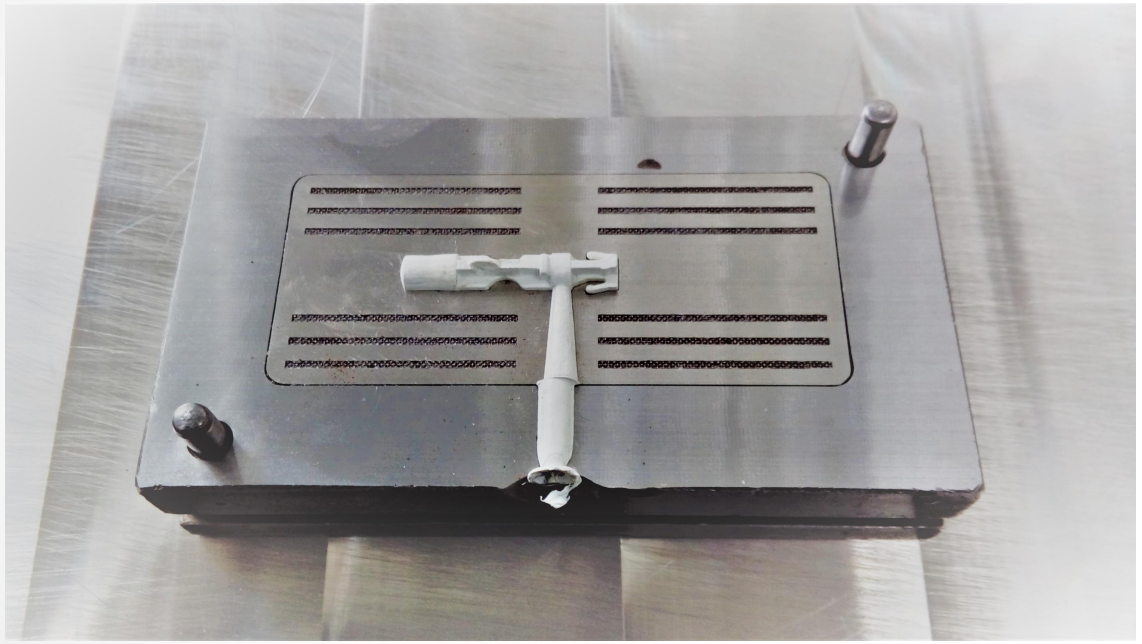
- Domeniu ortopedie

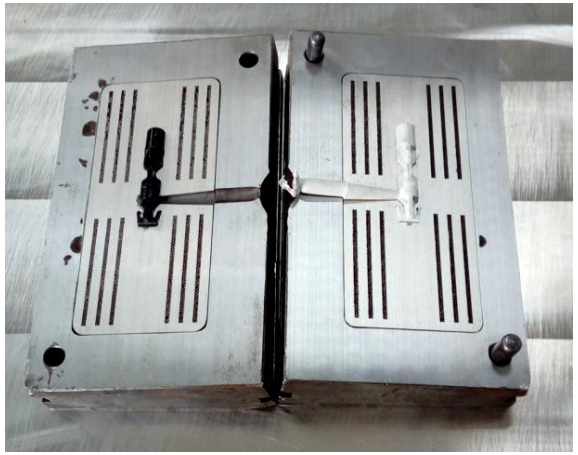
Proteza de genunchi componeta tibiala

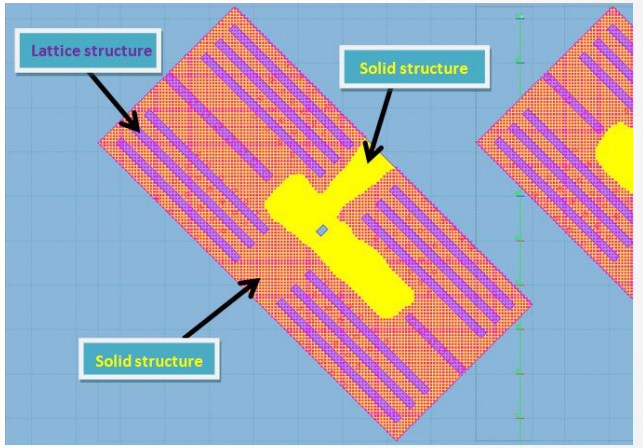
Aplicatii dezvoltate:

- Domeniu automotive

Partener: Dedienne Brasov



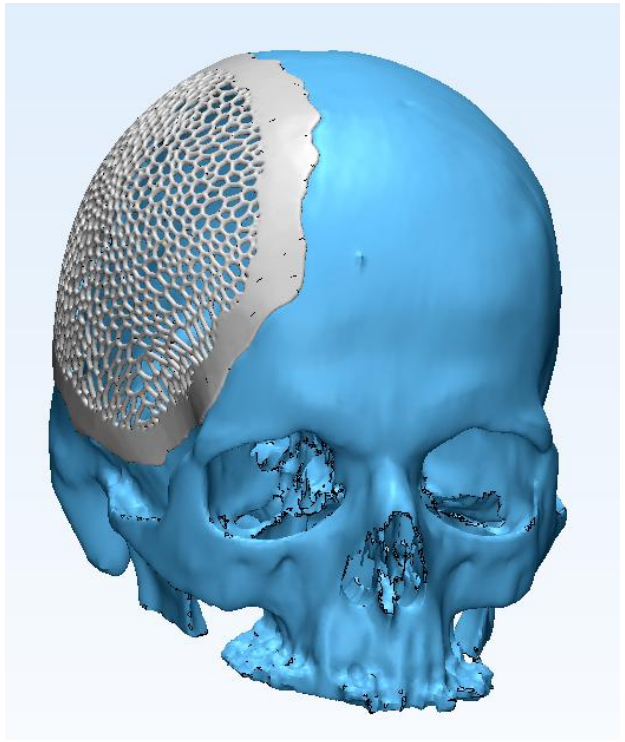


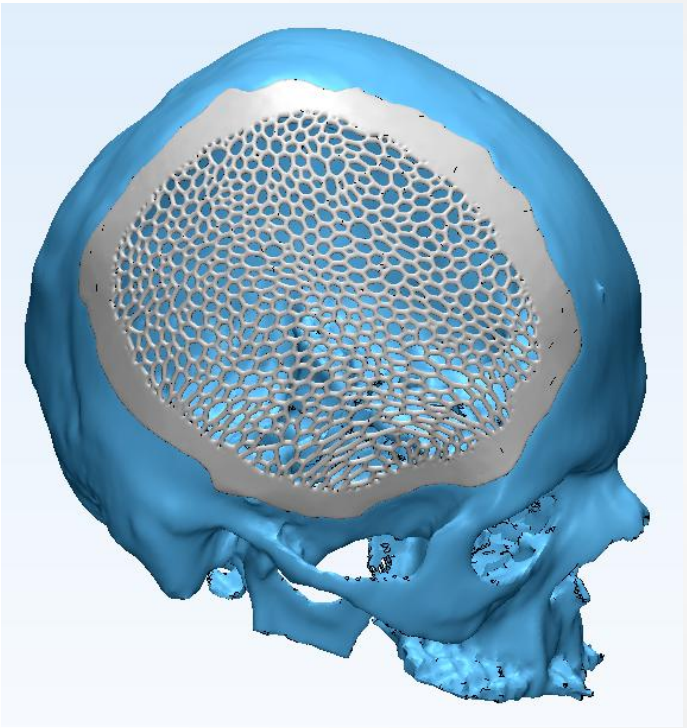


Matrita cu canale de racire integrate pentru imbunatatirea productivitatii

Noi perspective:

- Dezvoltarea tehnologiei SLM care sa permita fabricarea unor reconstructii cranio-maxilo-faciale cu structuri de tip “Voronoi” din Titan.





Va multumesc pentru atentie!

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