Co-funded by the European Union

Erasmus+ Programme Key Action 2 Cooperation Partnerships for Higher Education (KA220-HED)

Agreement number 2023-1-RO01-KA220-HED-000155412

European Network for Additive Manufacturing in Industrial Design for Ukrainian Context

AMAZE

SUMMER SCHOOL – hosted by Politehnica Bucharest 8 – 17 July 2024

Assoc. Prof. Dr. Eng. Băilă Diana-Irinel

National University of Science and Technology POLITEHNICA Bucharest, Romania

Faculty of **Industrial Engineering and Robotics**

Co-funded by the European Union

Erasmus+ Programme Key Action 2 Cooperation Partnerships for Higher Education (KA220-HED)

Agreement number 2023-1-RO01-KA220-HED-000155412

European Network for Additive Manufacturing in Industrial Design for Ukrainian Context – Acronym AMAZE

Project Partners:

1- National University of Science and Technology Politehnica Bucharest (Romania) – Project Coordinator: Assoc.Prof. Diana Băilă

2- Yuriy Fedkovych Chernivtsi National University (Ukraine) – Mr. Dean Prof. Igor Fodchuk

3- Poznan University of Technology (Poland) – Project Responsible Mr. Prof. Remigiusz Labudzki

4- Edibon International S.A. (Spain) – Project Responsible Mrs Mirian Judit Bonilla

Project activities– www.amaze2023.eu

AMAZE kick-off meeting

Bucharest
27-29 Nov 2023

Flyer
Agenda
Minutes
Dissemination

1st Multiplier Event

Madrid, Spain
25 Apr 2024

Flyer
Agenda
Minutes
Report

Staff training session

Madrid, Spain
7 - 10 May 2024

Flyer
Agenda
Minutes
Report

Transnational Kick-off meeting Report

1st Multiplier Event Report - Madrid, Spain, 25 Apr 2024

Staff training session Report - Madrid, Spain - 7..10 May 2024

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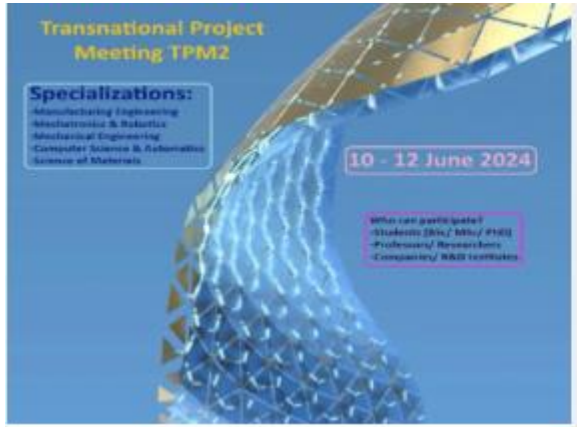
European Network for Additive Manufacturing in Industrial Design for Ukrainian Context

Project activities– www.amaze2023.eu



To come ...

2nd Transnational Project Meeting

Poznan, Poland
10 -12 Jun 2024

Flyer

Agenda

To come ...

2nd Multiplier Event

Bucharest, Romania
18 Jun 2024

Flyer

Agenda

To come ...

3rd Multiplier Event

Chernivtsi, Ukraine
20 Jun 2024

Flyer

To come ...

Summer School

Bucharest, Romania
8 - 17 Jul 2024

Flyer

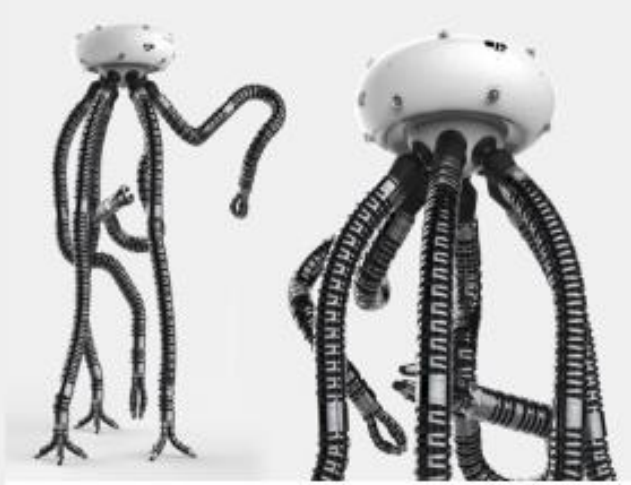
Project activities– www.amaze2023.eu

To come ...

3rd Transnational Project Meeting

Madrid, Spain
4 - 6 Sep 2024

Flyer



To come...

4th Multiplier Event

Poznan, Poland
4 Nov 2024

Flyer

Project activities– www.amaze2023.eu - TPM1 – Kich off Meeting, Romania, on 27-29 Nov 2023

Project activities– www.amaze2023.eu - ME1 – Edibon International S.A. Madrid, Spain, on 25 April 2024

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European Network for Additive Manufacturing in Industrial Design for Ukrainian Context

Project activities– www.amaze2023.eu - STTE – Edibon International S.A. Madrid, Spain, on 7-10 May 2024

Project activities– www.amaze2023.eu – TPM2 Poland, on 10-12 June 2024

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Project activities– www.amaze2023.eu – TPM2 Poland, on 10-12 June 2024

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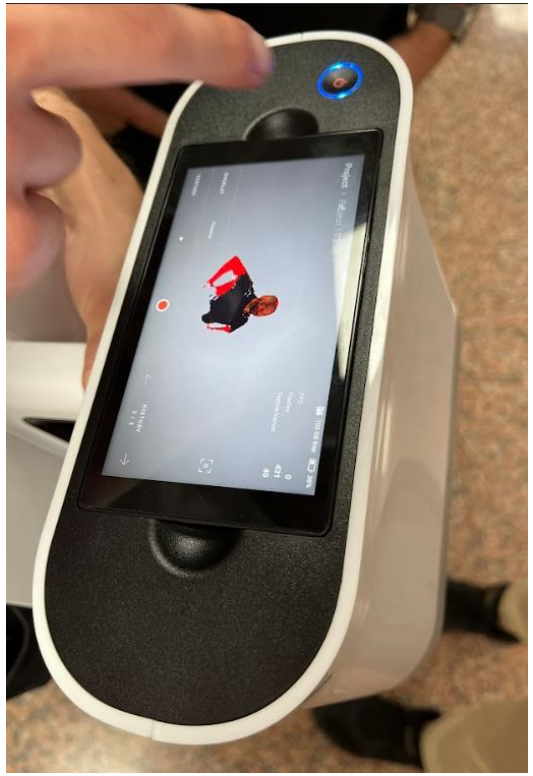
European Network for Additive Manufacturing in Industrial Design for Ukrainian Context

Project activities– www.amaze2023.eu – ME2, Romania, on 18 June 2024



Project activities– www.amaze2023.eu – ME3, Ukraine, on 20 June 2024

Kick off Meeting – Transnational Project Meeting TPM1 – UNSTPB Bucharest, 27-29 nov 2023

Project Results:

Results: What project results and other outcomes do you expect your project to have?

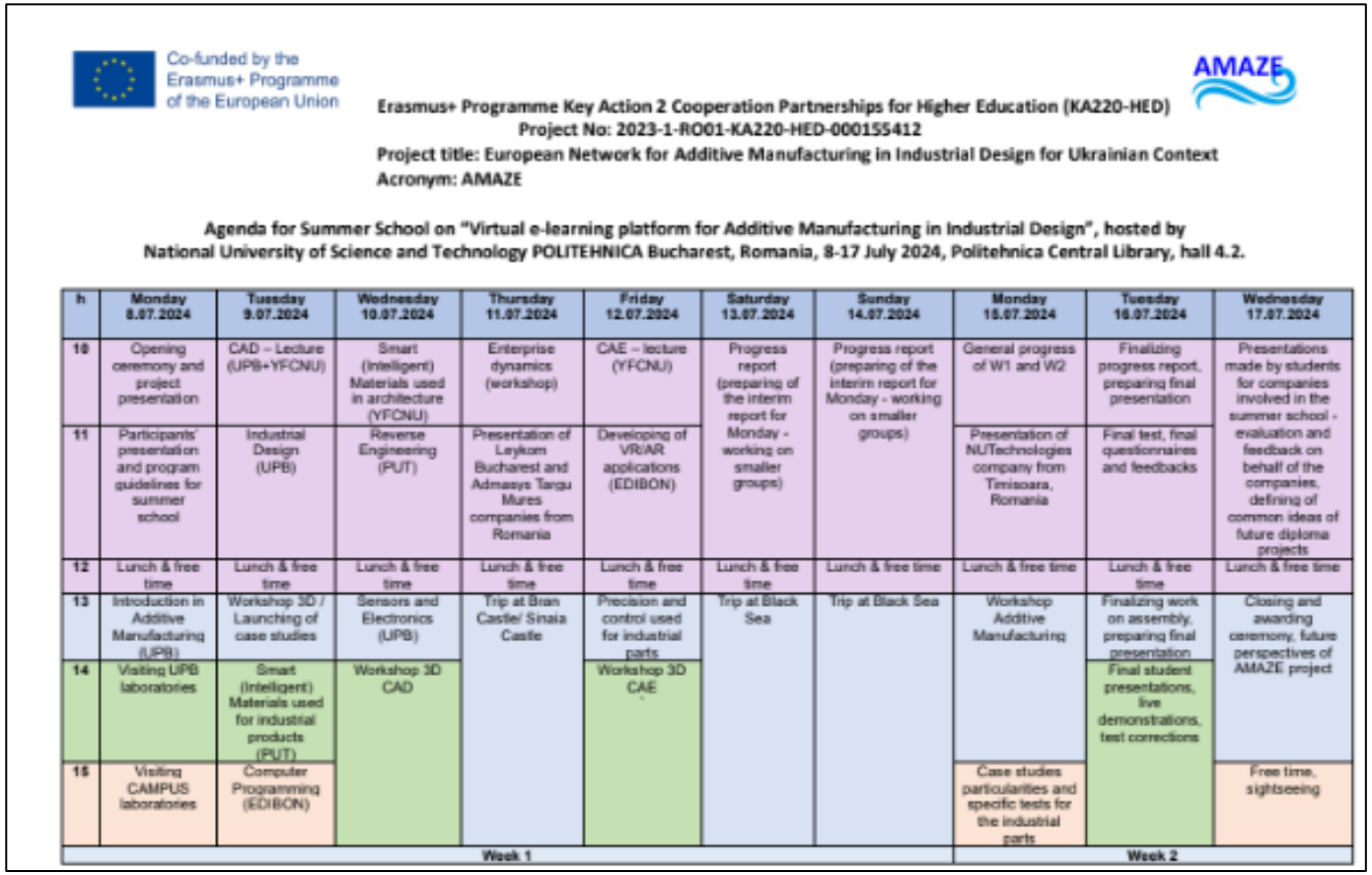
The project will achieve the following results: IO1 – AMAZE e-book for developing of complex design industrial parts, IO2 – AMAZE e-toolkit manual for digital learning in producing of complex design industrial parts, IO3 – AMAZE e-learning VR/AR platform, IO4 – AMAZE e-case studies.

-1 open acces book

-1 open acces toolkit manual

-2 academic papers (in journals with high visibility, open-acces) and 2 papers in International Conference open-acces and 1 patent submitting application.

Project activities– www.amaze2023.eu – Summer School, hosted by Politehnica Bucharest, on 8-17 July 2024



Co-funded by the Erasmus+ Programme of the European Union

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Erasmus+ Programme Key Action 2 Cooperation Partnerships for Higher Education (KA220-HED)
Project No: 2023-1-RO01-KA220-HED-000155412
Project title: European Network for Additive Manufacturing in Industrial Design for Ukrainian Context
Acronym: AMAZE

Agenda for Summer School on "Virtual e-learning platform for Additive Manufacturing in Industrial Design", hosted by National University of Science and Technology POLITEHNICA Bucharest, Romania, 8-17 July 2024, Politehnica Central Library, hall 4.2.

h	Monday 8.07.2024	Tuesday 9.07.2024	Wednesday 10.07.2024	Thursday 11.07.2024	Friday 12.07.2024	Saturday 13.07.2024	Sunday 14.07.2024	Monday 15.07.2024	Tuesday 16.07.2024	Wednesday 17.07.2024
10	Opening ceremony and project presentation	CAD – Lecture (UPB+YFCNU)	Smart (Intelligent) Materials used in architecture (YFCNU)	Enterprise dynamics (workshop)	CAE – lecture (YFCNU)	Progress report (preparing of the interim report for Monday - working on smaller groups)	Progress report (preparing of the interim report for Monday - working on smaller groups)	General progress of W1 and W2	Finalizing progress report, preparing final presentation	Presentations made by students for companies involved in the summer school - evaluation and feedback on behalf of the companies, defining of common ideas of future diploma projects
11	Participants' presentation and program guidelines for summer school	Industrial Design (UPB)	Reverse Engineering (PUT)	Presentation of Leykom Bucharest and Admasys Targu Mures companies from Romania	Developing of VR/AR applications (EDIBON)			Presentation of NUTechnologies company from Timisoara, Romania	Final test, final questionnaires and feedbacks	
12	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time
13	Introduction in Additive Manufacturing (UPB)	Workshop 3D / Launching of case studies	Sensors and Electronics (UPB)	Trip at Bran Castle/ Sinaia Castle	Precision and control used for industrial parts	Trip at Black Sea	Trip at Black Sea	Workshop Additive Manufacturing	Finalizing work on assembly, preparing final presentation	Closing and awarding ceremony, future perspectives of AMAZE project
14	Visiting UPB laboratories	Smart (Intelligent) Materials used for industrial products (PUT)	Workshop 3D CAD		Workshop 3D CAE				Final student presentations, live demonstrations, test corrections	
15	Visiting CAMPUS laboratories	Computer Programming (EDIBON)						Case studies particularities and specific tests for the industrial parts		Free time, sightseeing
	Week 1							Week 2		

Co-funded by the Erasmus+ Programme of the European Union

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Erasmus+ Programme Key Action 2 Cooperation Partnerships for Higher Education (KA220-HED)
Project No: 2023-1-RO01-KA220-HED-000155412
Project title: European Network for Additive Manufacturing in Industrial Design for Ukrainian Context
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12	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time
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14	Visiting UPB laboratories	Smart (Intelligent) Materials used for industrial products (PUT)	Workshop 3D CAD		Workshop 3D CAE				Final student presentations, live demonstrations, test corrections	
15	Visiting CAMPUS laboratories	Computer Programming (EDIBON)						Case studies particularities and specific tests for the industrial parts		Free time, sightseeing
	Week 1							Week 2		

SUMMER SCHOOL – POLITEHNICA Bucharest,

8-17 July 2024, https://upb.ro/summer-school-proiect-eramsus-amaze/

Participants:

From PUT - Poland

- 1. Teachers
- - Prof. Natalia WIERZBICKA
- - Prof. Remigiusz LABUDZKI
-

- 2. Students
- - Ms Iryna KACHURA-ZHECHYTSKA.
- - Ms Klaudia Jańczak
- - Ms Emilia Smolarek
- - Mr Jakub Gapsa
- - Mr Sebastian But

From YFCNU - Ukraine

1. Teachers
- Dean. Igor FODCHUK
- Prof. Mariana BORCHA

2. Students
- Ms. Auryte Anastasiia
- Ms. Bazyniak Vita
- Ms. Kolodrivska Sofiia
- Ms. Pauk Volodymyra
- Ms. Panivnyk Nataliia

EDIBON International S.A. – Spain

AMAZE eBook

1. Additive Manufacturing
2. Smart (Intelligent) Materials
3. CAD CAM CAE Design
4. Reverse Engineering
5. Computer Programming
6. Sensors and Electronics
7. Virtual Reality (VR) and Augmented Reality (AR)

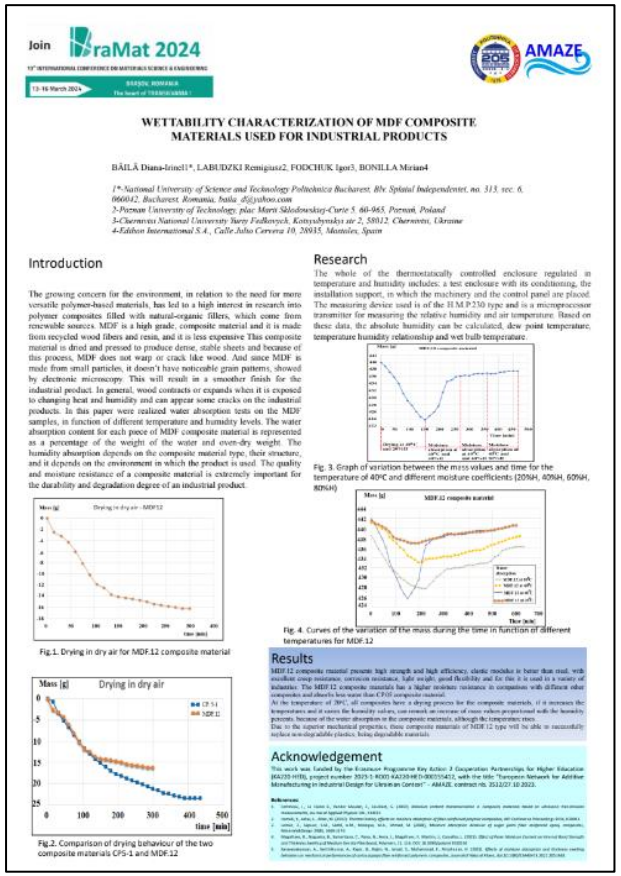
13th International Conference on Materials Science & Engineering - Brasov - 13-16 March 2024

Collection of results of Intellectual Outputs and status of delivery

Project activities– www.amaze2023.eu

E-book – published with e- ISBN – Publishing House Printech Bucharest and update on AMAZE site

AMAZE Project Results



Join BraMat 2024

AMAZE

WETTABILITY CHARACTERIZATION OF MDF COMPOSITE MATERIALS USED FOR INDUSTRIAL PRODUCTS

BĂILĂ Diana-Irinel1*, LABUDZKI Remigiusz2, FODCHUK Igor3, BONILLA Mrian4

1-National University of Science and Technology Politehnica Bucharest, Blv. Splaiul Independenței, no. 313, sec. 6, 060042, Bucharest, Romania, băila_d@yahoo.com*
2-Poznan University of Technology, plac Marii Skłodowskiej-Curie 5, 60-965, Poznań, Poland
3-Chernivtsi National University Yuriy Fedkovych, Kotsyubynskyi str 2, 58012, Chernivtsi, Ukraine
4-Edibon International S.A., Calle Julio Cervera 10, 28935, Mostoles, Spain

Introduction

The growing concern for the environment, in relation to the need for more versatile polymer-based materials, has led to a high interest in research into polymer composites filled with natural-organic fillers, which come from renewable sources. MDF is a high grade, composite material and it is made from recycled wood fibers and resin, and it is less expensive This composite material is dried and pressed to produce dense, stable sheets and because of this process, MDF does not warp or crack like wood. And since MDF is made from small particles, it doesn't have noticeable grain patterns, showed by electronic microscopy. This will result in a smoother finish for the industrial product. In general, wood contracts or expands when it is exposed to changing heat and humidity and can appear some cracks on the industrial products. In this paper were realized water absorption tests on the MDF samples, in function of different temperature and humidity levels. The water absorption content for each piece of MDF composite material is represented as a percentage of the weight of the water and oven-dry weight. The humidity absorption depends on the composite material type, their structure, and it depends on the environment in which the product is used. The quality and moisture resistance of a composite material is extremely important for the durability and degradation degree of an industrial product.

Research

The whole of the thermostatically controlled enclosure regulated in temperature and humidity includes: a test enclosure with its conditioning, the installation support, in which the machinery and the control panel are placed. The measuring device used is of the H M P 230 type and is a microprocessor transmitter for measuring the relative humidity and air temperature. Based on these data, the absolute humidity can be calculated, dew point temperature, temperature humidity relationship and wet bulb temperature.

Fig. 3. Graph of variation between the mass values and time for the temperature of 40°C and different moisture coefficients (20%H, 40%H, 60%H, 80%H)

Fig.1. Drying in dry air for MDF.12 composite material

Fig. 4. Curves of the variation of the mass during the time in function of different temperatures for MDF.12

Fig.2. Comparison of drying behaviour of the two composite materials CPS-1 and MDF.12

Results

Acknowledgement

Project Results: 2 articles accepted for publishing in International Conferences
– BRAMAT 2024, Brasov, Romania, 13-16 March 2024
- KreativEU 2024, Targoviste, Romania, 16-17 may 2024

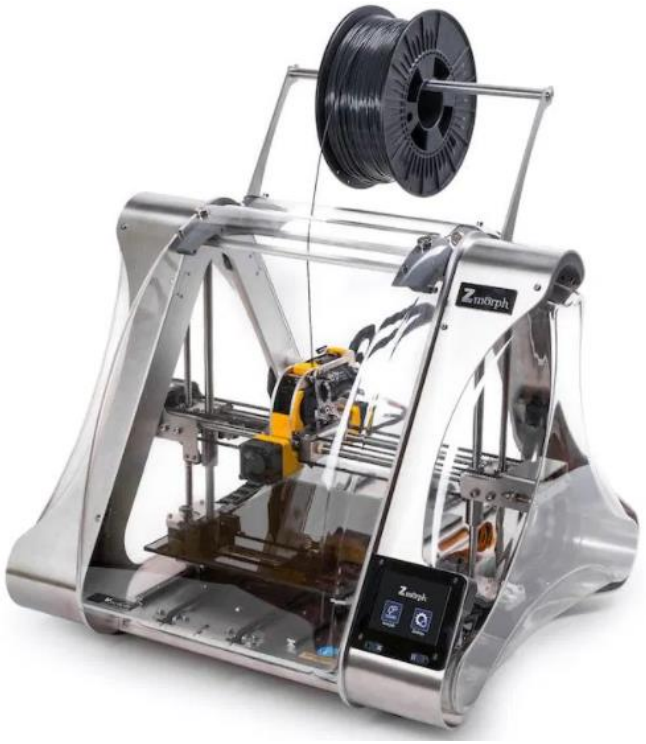
Acceptance Notification

Diana Irinel Băilă
Igor Fodchuk
Remigiusz Łabudzki
Myrian Bonilla

ACCURACY OF SLA AND MATERIAL MORPHOLOGY USED IN ARCHITECTURE

3D Printers that will be used in AMAZE Project - University POLITEHNICA of Bucharest

E-case studies – 3D MODELS for design and 3D Printing



Hybrid 3D Printer Zmorph 2.0 SX Full SET
- FDM (Fused Deposition Modeling)

Photocentric Liquid Crystal
- DLP (Digital Light Processing)

Phenix Systems – PXS&PXM
- DMLS (Direct Metal Laser Sintering) – collaborating company)

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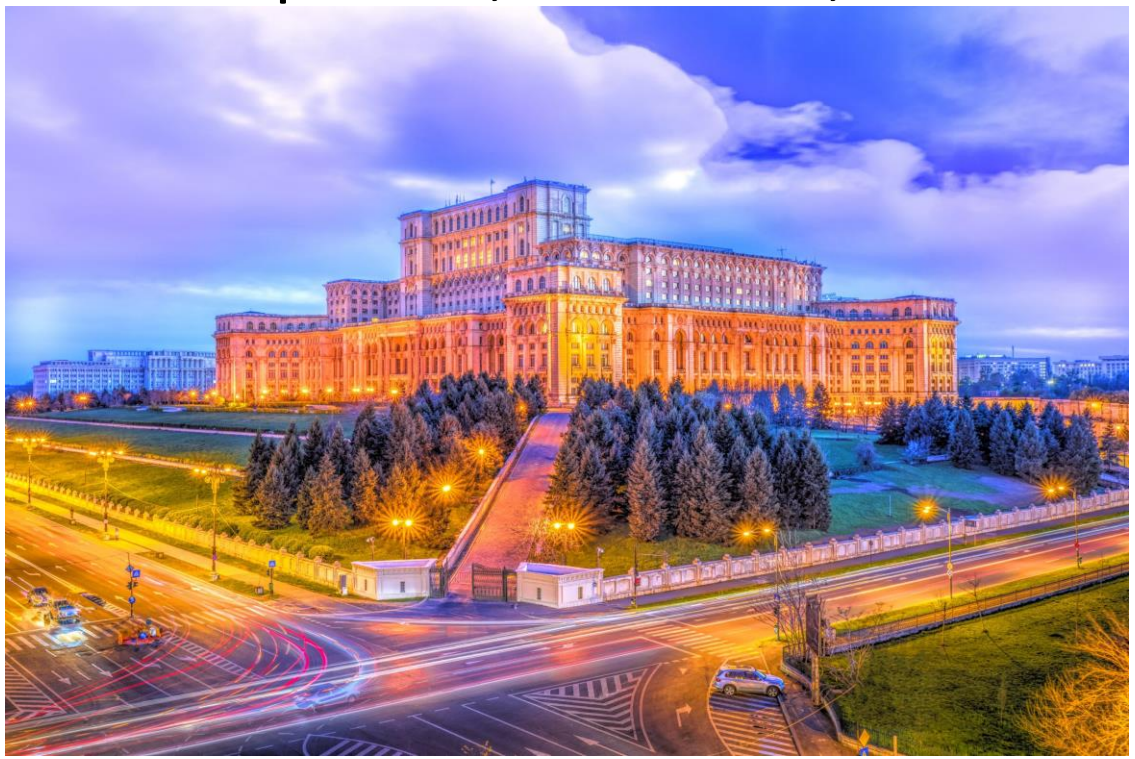
European Network for Additive Manufacturing in Industrial Design for Ukrainian Context

AMAZE

Summer School – Bucharest- **8-17 July 2024**

Casa Poporului, Bucharest, Romania



Castelul Kretulescu, Bucharest, Romania

Summer School – Bucharest- **8-17 July 2024**

Dracula Castle – Bran, Romania

Summer School – Bucharest- **8-17 July 2024**

Peleș Castle – Sinaia, Romania

Summer School –

Bucharest- **8-17 July 2024**

Black Sea

Project Budget

Expenditure	Grant (Euro)
1, Project management and implementation	23978
2. Short term transnational mobility activities of ind	40382
3 Intelectual outputs	43040.00
4, Multiplier events	12600
5. Special needs	0
6, Exceptional costs	0
Total requested from EEA Grants 2014-2021	120000.00

Kick off Meeting – Transnational Project Meeting TPM1 – UNSTPB Bucharest, 27-29 nov 2023

Project workpackages:

IO1 - AMAZE e-book for developing of complex design industrial parts (15.11.2023 – 14.03.2024) – Leading organisation - UNSTPB

IO2 - AMAZE e-toolkit manual for digital learning in producing complex design industrial parts (15.03.2024 – 14.06.2024) – Leading organisation CHNU

IO3 - AMAZE e-learning VR/AR platform for virtual laboratory (15.06.2024 – 14.09.2024) - Leading organisation Edibon International S.A.

IO4 – AMAZE e-case studies for project-based learning method used in developing, testing and manufacturing of customized industrial parts by Additive Manufacturing technologies (some 3D models, cases of design or architectural models) (15.09.2024-14.11.2024) – Leading organisation PUT

Project Management and Dissemination Results (15.11.2023 – 14.11.2024)

Kick off Meeting – Transnational Project Meeting TPM1 – UNSTPB Bucharest, 27-29 nov 2023

Project workpackages:

IO1 - AMAZE e-book for developing of complex design industrial parts (15.11.2023 – 14.03.2024) – Leading organisation – UNSTPB
comprising the next module courses:
1-Additive Manufacturing (UPB); - UPB
2-Smart (Intelligent) Materials (YFCNU+PUT); - YFCNU
3-CAD/CAM/CAE design (YFCNU);
4- Reverse Engineering (PUT);
5-Computer Programming (Edibon);
6-Sensors and Electronics (UPB); - UPB
7-Virtual Reality/Augmented Reality (Edibon)

Multiplier EVENT ME1 -1 day (40 persons from different companies and 8 foreigners) – EDIBON International S.A. – 25th April 2024

Kick off Meeting – Transnational Project Meeting TPM1 – UNSTPB Bucharest, 27-29 nov 2023

Project workpackages:

IO2 - AMAZE e-toolkit manual for digital learning in producing complex design industrial parts (15.03.2024 – 14.06.2024) – Leading organisation CHNU

comprising the next toolkit modules:

1-Additive Manufacturing (UNSTPB);
2-Smart (Intelligent) Materials (YFCNU+PUT);
3-CAD/CAM/CAE design (YFCNU);
4- Reverse Engineering (PUT);
5-Computer Programming (Edibon);
6-Sensors and Electronics (UNSTPB);
7-Virtual Reality/Augmented Reality (Edibon)

Multiplier Events:

ME2 – 1 day hosted by UNSTPB (ROM) (20 persons out from UNSTPB) and 18 June 2024
ME3 – 1 day hosted by YFCNU (UKR) (20 persons from outside of university) – 20 june 2024
Training staff feedbacks EDIBON (SP) during 4 days, participating from each partner institution 4 persons (in total 16 persons) – 7 may – 12 may 2024
For TPM2 –hosted by PUT (POL) will participate 2 staff, professors, key persons by each institution involved in project (Total 8 pers) and others – 3 days (10 – 12 June 2024)

Kick off Meeting – Transnational Project Meeting TPM1 – UNSTPB Bucharest, 27-29 nov 2023

Project workpackages:

IO3 - AMAZE e-learning VR/AR platform for virtual laboratory (15.06.2024 – 14.09.2024) - Leading organisation Edibon International S.A.

Summer School feedbacks given by students and staffs involved in AMAZE project – UNSTPB – 10 days (staffs and students) – 8-17 July 2024

TPM3 (3 days), hosted by Edibon company (8 persons – 2 persons/institution) – 4-6 sep 2024

Kick off Meeting – Transnational Project Meeting TPM1 – UNSTPB Bucharest, 27-29 nov 2023

Project workpackages:

IO4 – AMAZE e-case studies for project-based learning method used in developing, testing and manufacturing of customized industrial parts by Additive Manufacturing technologies (some 3D models, cases of design or architectural models) (15.09.2024-14.11.2024) – Leading organisation PUT

Multiplier Event ME4 realized at PUT (POL), having invited 20 persons from different companies, universities, research centers (out of PUT) and 5 foreigner's participants – 4 nov 2024

Dissemination Results

SLS – material PA12
FDM – PEEK, PLA, PLA Silk Rainbow, PLA Silk Like Kingfisher Rainbow Colours (Silicone properties)
DLP, SLA – biocompatible photopolymer resins
DMLS/SLM – Ti6Al4V, superalloys INCONEL and Co-Cr

Analysis Test recommended for the materials used for the components:
SEM (Scanning Electron Microscopy)
TEM (Transmission Electron Microscopy)
EDAX (Energy Dispersive X-ray Analysis)
XRD (X-Ray Diffraction)
FTIR (Fourier Transform Infrared Spectroscopy)
RAMAN (Raman Spectroscopy)
AFM (Atomic Force Microscopy)
Contact angle test
Mechanical tests

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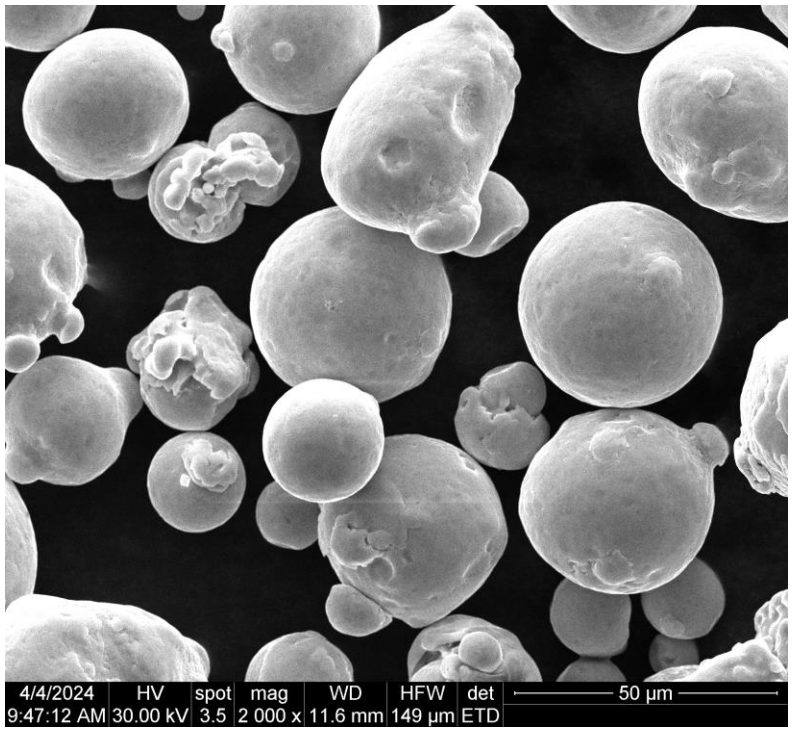
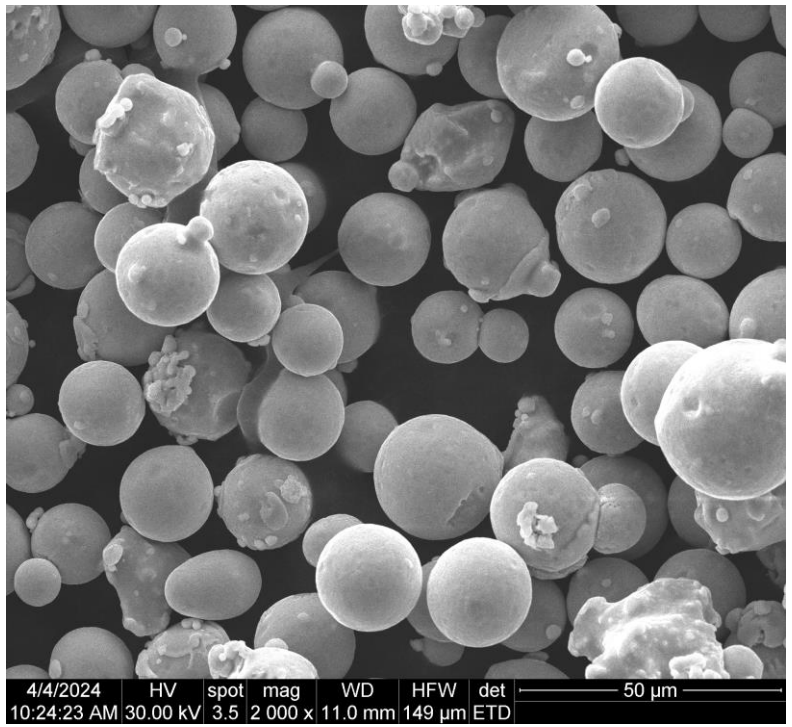
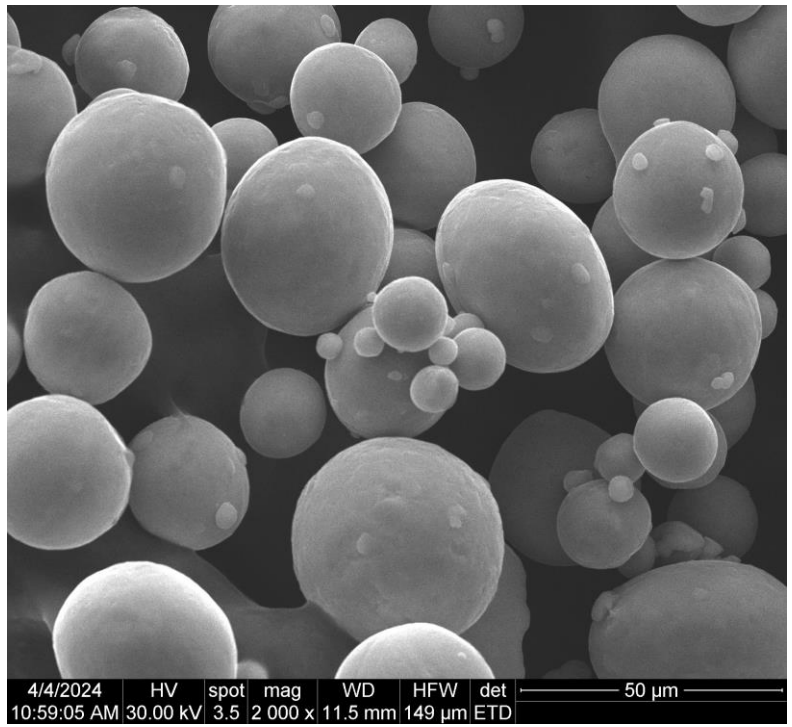
Metallic powders used in SLM (SELECTIVE LASER MELTING)



625 INCONEL

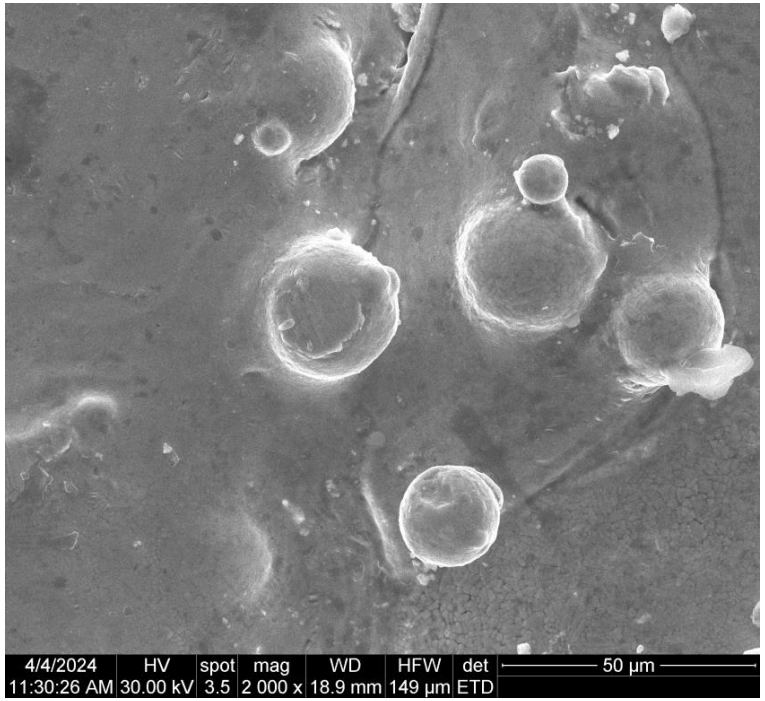


718 INCONEL

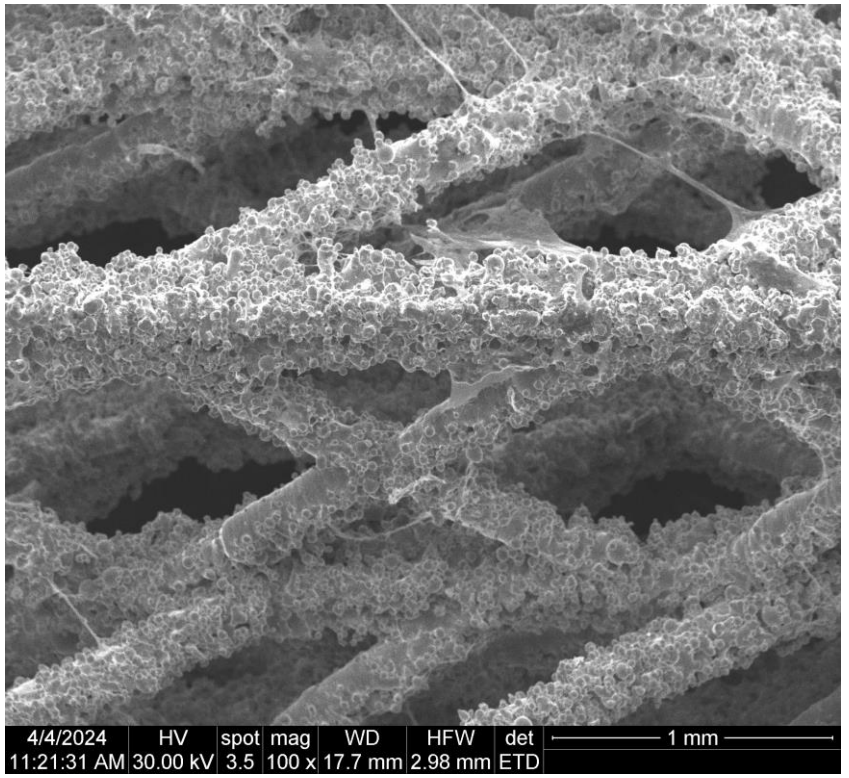


Ti6Al4V

Sintered parts used in SLM (SELECTIVE LASER MELTING)



625 INCONEL



Ti6Al4V

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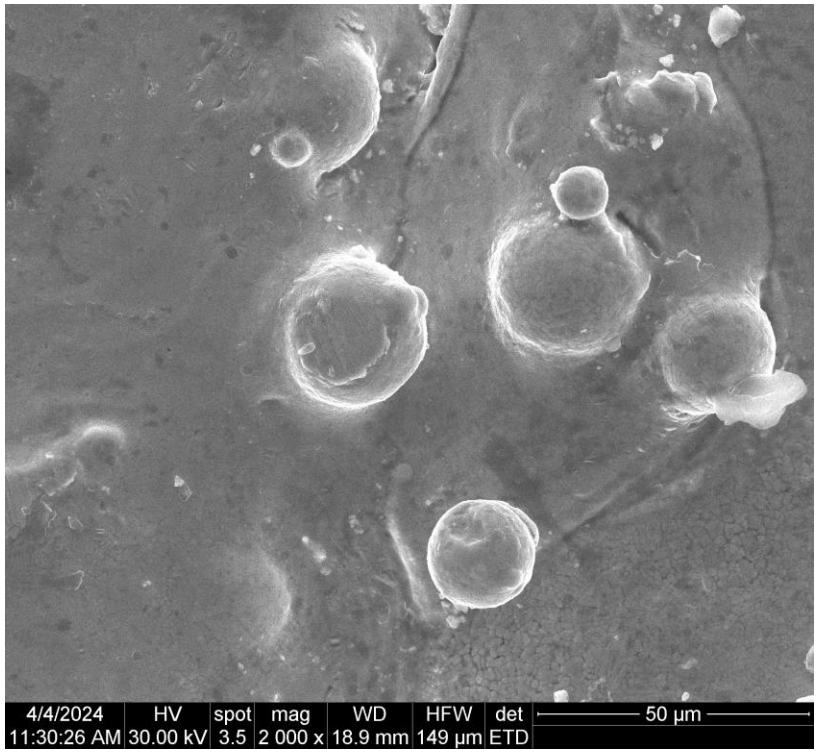
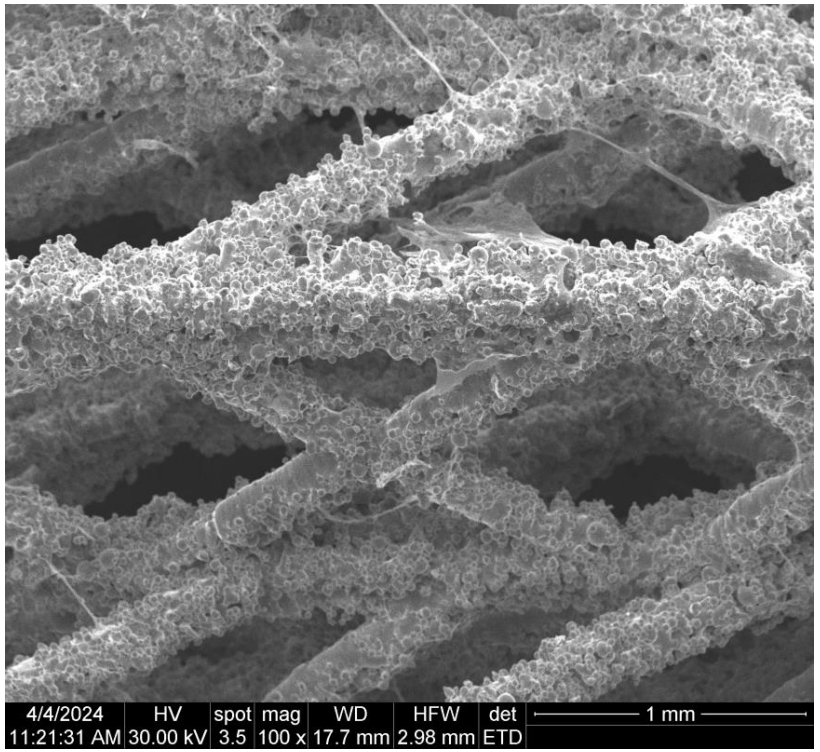
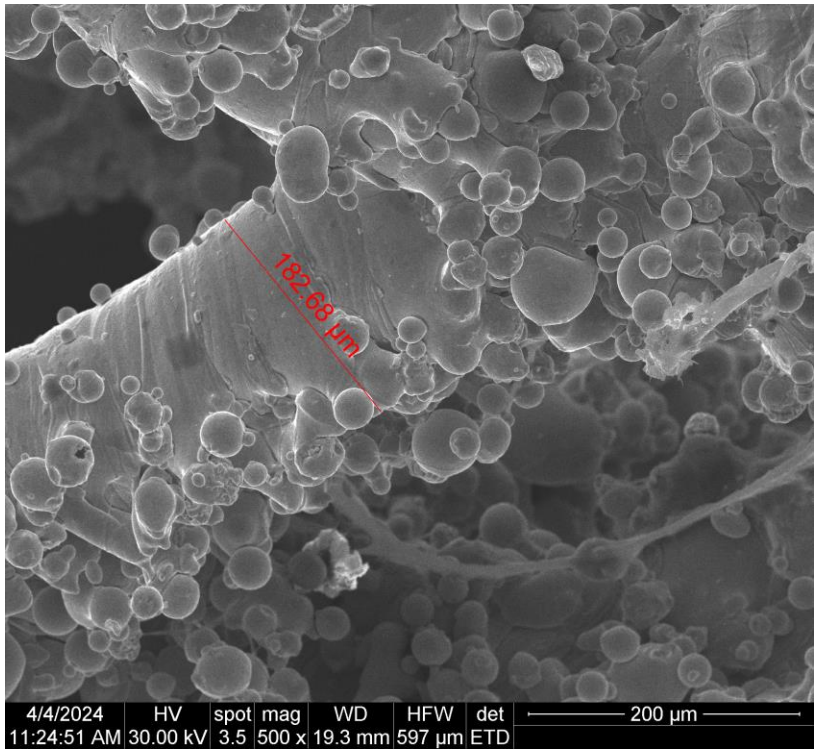
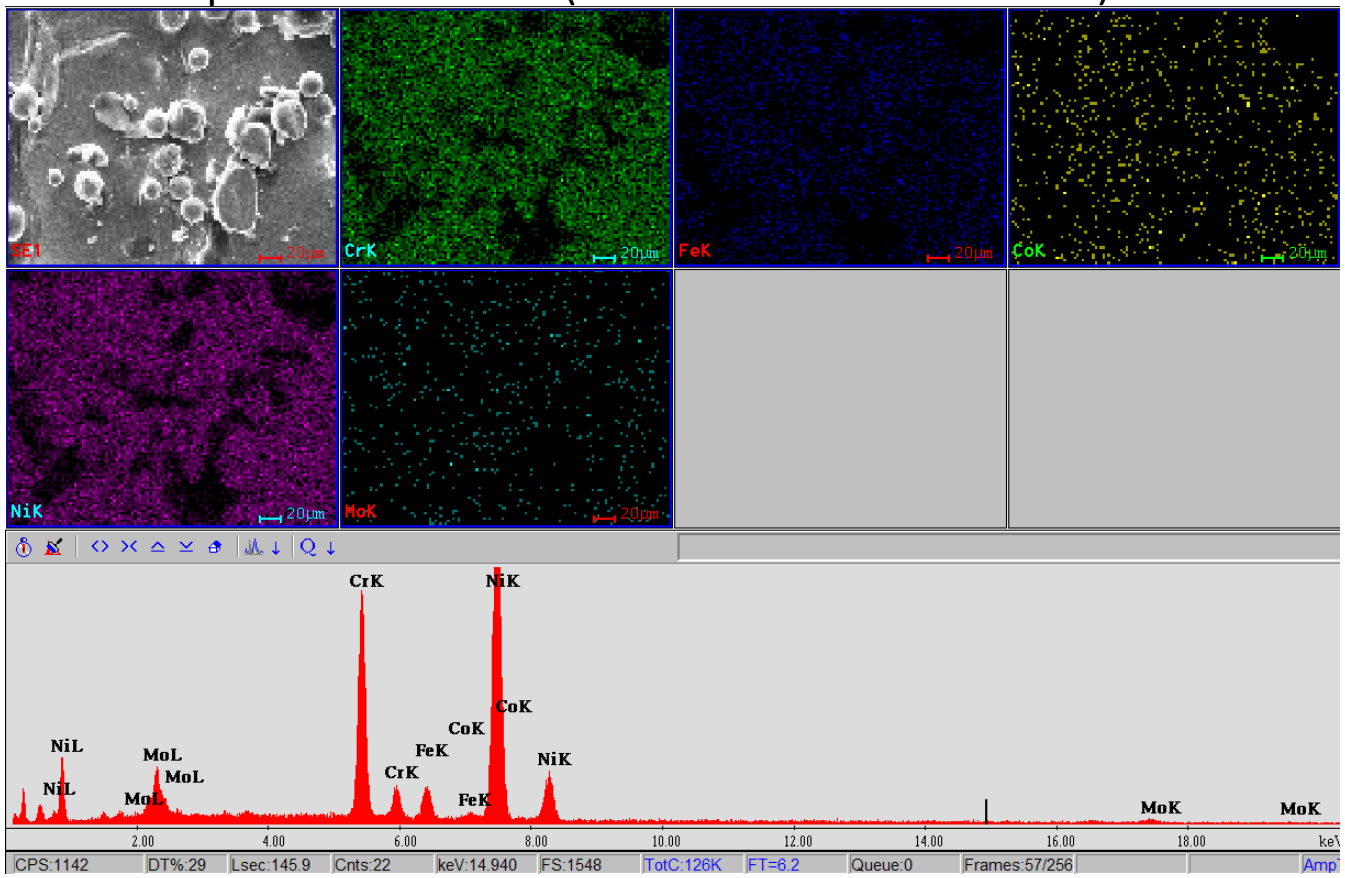






625 INCONEL

Sintered parts used in SLM (SELECTIVE LASER MELTING)



625 INCONEL

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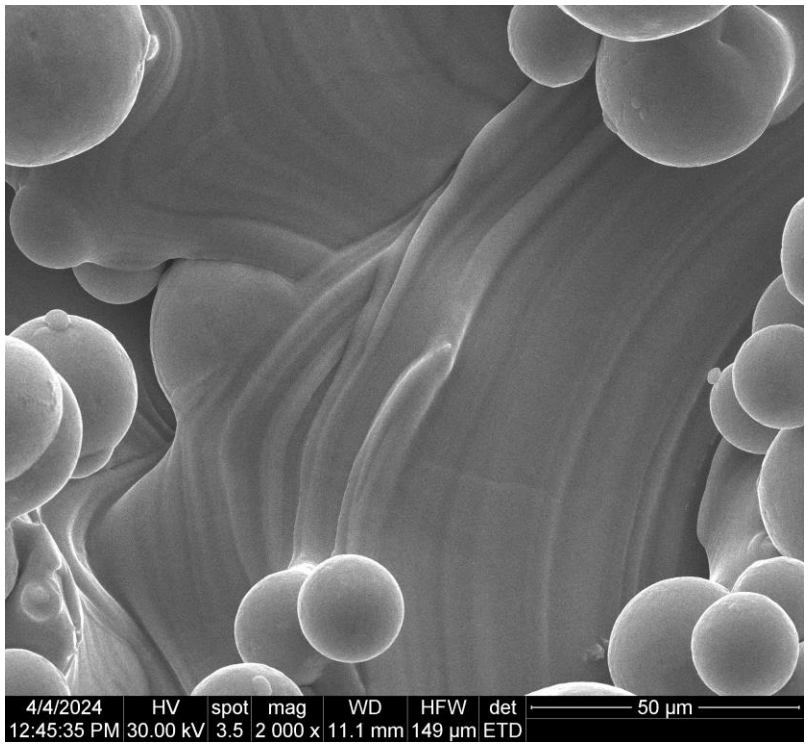
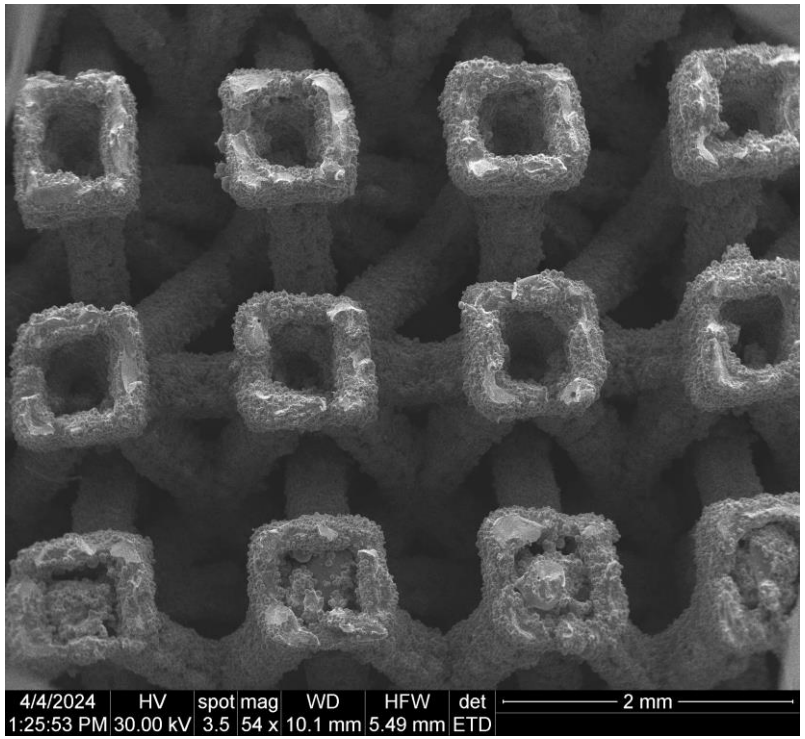
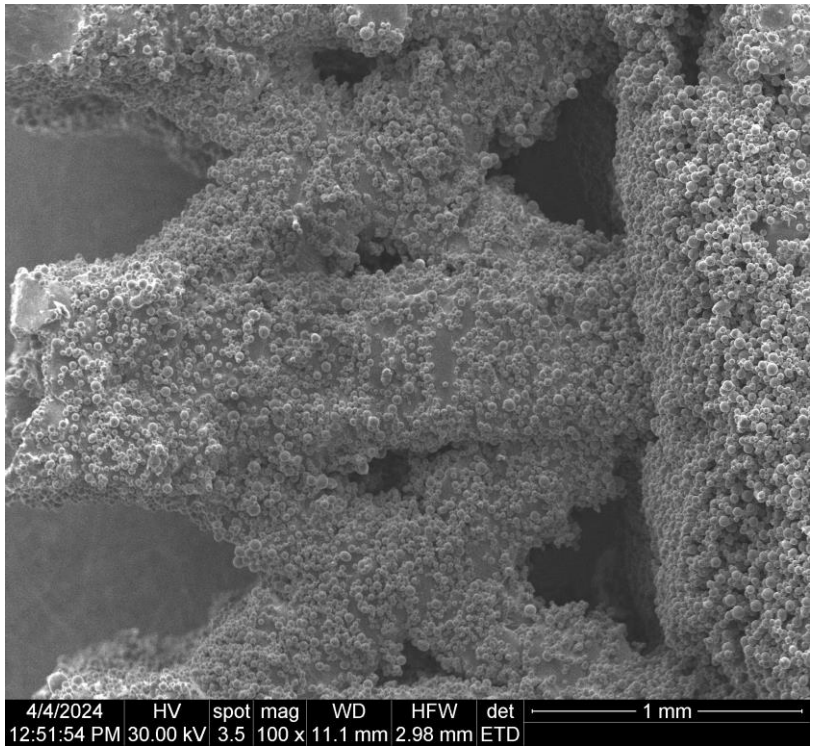
AMAZE

Sintered parts used in SLM (SELECTIVE LASER MELTING)

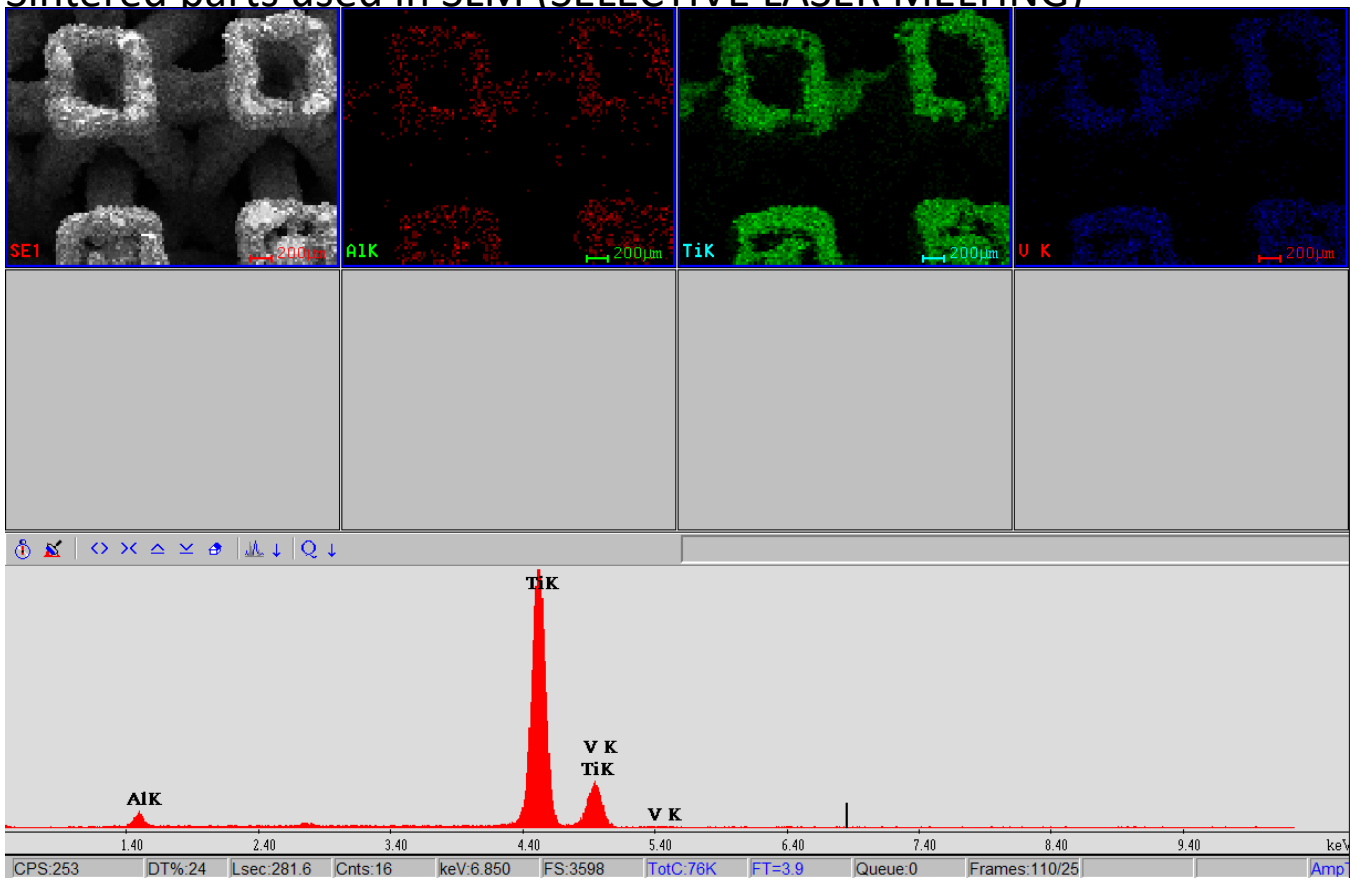






Ti6Al4V

Sintered parts used in SLM (SELECTIVE LASER MELTING)



Ti6Al4V

AMAZE PROJECT - RESEARCH DIRECTIONS

This project will lead to the opening of new topics and research directions that will be capitalized in projects such as:

- HORIZON 2020
- CORDIS EU
- EEA GRANTS
- EUROSTARS (EUREKA)
- TEMPUSV
- ERASMUS-MUNDUS ACTION3, etc.

Thank you!

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