

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



Multiplier Event (ME1) – Edibon International S.A., Madrid, Spain 25 April 2024

# Applied research teaching methods for additive manufacturing in industrial design

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European Network for Additive Manufacturing in Industrial Design for Ukrainian Context



#### **Poznan University of Technology TEAM**



PhD Remigiusz ŁABUDZKI Assistant Professor/ PUT AMAZE Coordinator



**PhD Student Natalia WIERZBCKA** Assistant



PhD Adam PATALAS Assistant



**PhD Student Paweł ZAWADZKI** Assistant



PhD Student Jakub Gapsa











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## PhD Remigiusz ŁABUDZKI

#### Assistant Professor/PUT AMAZE Coordinator













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### Position – senior lecturer in Planning Technology Department of PUT

**INTERESTS:** 

- Technology planning
- CAD/CAM in Manufacturing Systems
- Enterprise Logistics
- Vision Systems in Manufacturing Processes
- Rapid Prototyping techniques in Manufacturing







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## **Experience (projects):**

## BRIGHT

- Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period

## EMERALD

- European network for 3D printing of biomimetic mechatronic systems





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## PhD student Natalia WIERZBICKA

Faculty of Mechanical Engineering Institute of Mechanical Technology Department of Technology Design

Completed higher education: Biomedical Engineering - Poznań University of Technology, Faculty of Mechanical Engineering

Topic of doctoral dissertation: Tribological properties of polymer- and silicone-based composites with inorganic additives













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### Manager of tribological laboratory

Our device:

- Anton Paar step 700 with the micro-tribo tester MCT<sup>3</sup> and the nano-scratch tester NST<sup>3</sup>
- Brucker UMT Tribometr
- Alemnis In-Sem Mechanical tester
- Fischer Picodentor HM500
- Fischer XRF Spectrometer
- Brookfield Viscometer
- Adhesion tester Positest AT-A
- Microhardness tester FM-700
- 3 original tribology testers













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Position – Assistent in Technology Department of PUT

**INTERESTS:** 

- Tribology
- CAD/CAM in Manufacturing Systems
- Rapid Prototyping techniques in Manufacturing
- Robotics
- Biomedical Engineering







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### **Experience (projects):**

### BRIGHT

- Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period

### EMERALD

- European network for 3D printing of biomimetic mechatronic systems

### CONFERENCE OF BIOMEDICAL ENGINEERING

- Coordinator of the event organized for student by student and University Staff, a conference which aim is to connect the worlds of science, industry and medicine













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List of publications from the last 3 years. The total score is 15 items.

- 1. The friction of the composite based on polyethylene with inorganic additives/ **Natalia Wierzbicka** (WIM), Rafał Talar (WIM), Karol Grochalski (WIM), Adam Piasecki (WIMiFT), Miłosz Węgorzewski and Adam Reiter // Materials 2023 (140pkt)
- 2. Influence of dispersed phase content on the mechanical properties of electroless nanocomposite Ni-P/Si3N4 and hybrid Ni-P/Si3N4/graphite layers deposited on the AW-7075 alloy/ Kazimierz Czapczyk, Paweł Zawadzki (WIM), **Natalia Wierzbicka** (WIM) //Applied Surface Science (140pkt)
- 3. Tribological properties of hardened surfaces constituted by various methods of mechanical processing / Paweł Zawadzki (WIM), Natalia Wierzbicka (WIM), Rafał Talar (WIM), Łukasz Burysz //TRIBOLOGIA 2021, vol. 298, no. 4, s. 57-72 (70pkt)
- 4. The Friction of Structurally Modified Isotactic Polypropylene / Natalia Wierzbicka (WIM), Tomasz Sterzyński, and Marek Nowicki (WIMiFT)// Materials 2021, vol. 16, no. 15 (140pkt)
- 5. Microstructure and Properties of Electroless Ni-P/Si3N4 Nanocomposite Coatings Deposited on the AW-7075 Aluminum Alloy / Kazimierz Czapczyk, Paweł Zawadzki (WIM), Natalia Wierzbicka (WIM), Rafał Talar (WIM) // Materials 2021, vol. 14, no. 16 (140pkt)
- 6. Evaluation of deterioration of engine oil properties in the function of mileage / Natalia Wierzbicka (WIM), Dominika Szadkowska, Adam Patalas (WIM), Rafał Talar (WIM), Remigiusz Łabudzki (WIM), Paweł Zawadzki (WIM) // Journal of Physics: Conference Series 2020, vol. 1426 (40pkt)
- The construction of an automated bicycle parking / Remigiusz Łabudzki (WIM), Rafał Talar (WIM), Paweł Zawadzki (WIM), Adam Patalas (WIM), Natalia Wierzbicka (WIM), Dominika Szadkowska // Journal of Physics: Conference Series 2020, vol. 1426 (40pkt)











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## In my free time:















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Adam Patalas P.hD. Eng. E-mail: <u>adam.patalas@put.poznan.pl</u>

Institute of Mechanical Technology

Mechanical Engineering Faculty Poznan University of Technology















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### **Education:**

2016/06 – 2022/06 Warsaw University of Technology, PhD, Faculty of Mechatronics, **Biomedical Engineering Discipline** 

- 2015/10 2020/09 Poznań University of Technology, PhD studies, 3rd cycle studies
- 2014/03 2015/06 Poznań University of Technology, **Mechatronics**, 2nd cycle, master's studies (specialization: Mechatronic Structures),
- 2011/10 2015/02 Poznań University of Technology, **Biomedical Engineering**, First-cycle engineering studies,
- 2010/10 2014/02 Poznań University of Technology, Materials Engineering, First-cycle studies, engineering











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#### Experience (projects):

- Currently from 2015/10 Poznań University of Technology Scientific and teaching assistant at the Technology Design Department: Responsible for the following subjects: Spine and limb prosthetics, Computer-Aided Technology.
- Currently from 2019/04 ENforce Medical Technologies Sp. z o.o. Technologist Tasks: Development of a vacuum prosthetic socket intended for use with a foot prosthesis; A prototype of a bionic foot and miniaturized conceptual versions of MR dampers were developed; Development, implementation and validation of a stand for determining the characteristics of MR dampers.
- 2017/09 2015/10 Casimir the Great University in Bydgoszcz Assistant at the Institute of Technology, conducting project classes and seminars on the following subjects: Basics of medical bioengineering, also running laboratories on: Elements of mechatronics, Electrical engineering and electronics, Automation and robotics.





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List of publications from the last 2 years. The total score is 33 items.

- 1. Swathi Raghu, Patrick Hartwich, Adam Patalas, Mateusz Marczewski, Rafał Talar, Christian Pritzel, Manuela S. Killian. 2023. Nanodentistry aspects explored towards nanostructured ZrO2: Immobilizing zirconium-oxide nanotube coatings onto zirconia ceramic implant surfaces Open Ceramics 2023, vol. 14, s. 100340-1-100340-6
- 2. Wojciech Smułek, Maria Ratajczak, Adam Patalas, Adam Voelkel, Ewa Kaczorek, Mariusz Sandomierski. 2023. Agar composites containing Zinc zeolite infused with Quillaja saponins exhibit improved structural properties and anti-Candida activity Environmental Technology & Innovation 2023, vol. 32, s. 103278-1-103278-10
- 3. Paweł Zawadzki, Adam Patalas, Remigiusz Łabudzki, Rafał Talar. 2023. Measurement of thermal conductivity of the cortical bone: experimental studies and comparative analysis Journal of Physics: Conference Series 2023, vol. 2540, s. 012035-1-012035-9
- 4. Zuzanna Buchwald, Mariusz Sandomierski, Wojciech Smułek, Maria Ratajczak, Adam Patalas, Ewa Kaczorek, Adam Voelkel. 2023. Physical–chemical and biological properties of novel resin-based composites for dental applications Polymer Bulletin 2023, vol. 80, iss. 10, s. 11249-11272
- Mariusz Sandomierski, Wiktoria Stachowicz, Adam Patalas, Karol Grochalski, Wiesław Graboń, Adam Voelkel. 2023. Characterization of Magnesium and Zinc Forms of Sodalite Coatings on Ti6Al4V ELI for Potential Application in the Release of Drugs for Osteoporosis. Materials, vol. 16, iss. 4, s. 1710-1-1710-17 (IF: 3,62)
- 6. Mariusz Sandomierski, Monika Zielińska, Katarzyna Adamska, Adam Patalas, Adam Voelkel. 2022. Calcium montmorillonite as a potential carrier in the release of bisphosphonates. New Journal of Chemistry vol. 46, iss. 7, s. 3401-3408 (IF: 3,59)
- 7. Mariusz Sandomierski, Monika Zielińska, Tomasz Buchwald, Adam Patalas, Adam Voelkel. 2022. Controlled release of the drug for osteoporosis from the surface of titanium implants coated with calcium titanate. Journal of Biomedical Materials Research Part B, vol. 110, iss. 2, s. 431-437 (IF:3,37)
- 8. Paweł Zawadzki, Rafał Talar, Adam Patalas, Stanisław Legutko. 2022. Influence of Machining Parameters on Cutting and Chip-Formation Process during Cortical Bone Orthogonal Machining. Materials, vol. 15, iss. 18, s. 6414-1-6414-24 (IF: 3,62)















MSc. Eng. Paweł Zawadzki, PhD

Faculty of Mechanical Engineering Institute of Mechanical Technology Department of Technology Design

Completed higher education: Biomedical Engineering - Poznań University of Technology, Faculty of Mechanical Engineering

Topic of doctoral dissertation: A method for precise shaping of bone surfaces















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#### **SCIENTIFIC INTERESTS**

**Biomedical engineering:** design of implants and endoprostheses, development of surgical equipment

**Machining:** biomaterials processing, hard and soft tissue processing, wear of cutting tools

**Tribology:** biotribology, biomimetics in tribological issues, micro and nanotribology, surface engineering









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Scientific articles published in journals such as:

- WEAR
- Scientific Reports
- Journal of Orthopedic Trauma
- PLOS ONE
- Veterinary and Comparative Orthopedics and Traumatology
- Materials
- Journal of Functional Biomaterials

#### Patents:

- endoprostheses
- surgical instrumentation















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#### Polish folk traditions



Production of traditional folk instruments: greater poland bagpipes, violins, drums and basses.











AMAZE







## Msc Eng. Jakub Gapsa

PhD Student / Junior Unity Developer

Member of the team working on VR technologies at Poznan University of Technology, PhD student at PP Doctoral School (2nd year) – Faculty of Mechanical Engineering















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#### **Experience** (projects):

- Contractor in the project "Flexible system for increasing the competences of technical service employees using virtual reality techniques" (beneficiary: Enea Operator) project completed with the implementation of the system
- VR specialist in the project "Innowacyjne kształcenie elektryków dostosowane do branży energetycznej" (Component III, Institutional cooperation for improving the quality and relevance of vocational education and training (VET) and continuing education, beneficiary: CKZiU Elektryk Nowa Sól) project completed with implementation of the system
- VR specialist building the Avatar Scoliosis 3D application in the project "Longitudinal assessment of changes in psychosocial functioning of patients with adolescent idiopathic scoliosis before, during and after treatment. A quantitative and qualitative study." (National Science Center, beneficiary: Medical University of Poznan), an activity completed with the implementation of an application for the study of patients in an orthopedic hospital

"Scoliosis 3D" - A Virtual-Reality-Based Methodology Aiming to Examine AIS Females' Body Image

https://doi.org/10.3390/app13042374

















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### VR specialist, conducting classes and trainings for students of technical schools, in the measure "Czas zawodowców BIS-zawodowa Wielkopolska"











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## In my free time:

- board games
- fantasy books
- disc golf





Poznan University Of Technology





## WELCOME TO POZNAN UNIVERSITY OF TECHNOLOGY

#### **POZNAN UNIVERSITY OF TECHNOLOGY**





Poznan University of Technology (PUT) was established in **1919** as a **State Higher School of Mechanical Engineering**.

#### Since 1955 it has been named **Poznan University of Technology**.

One of the leading technical universities in Poland which has become one of the most recognized landmarks of the region.



#### Great combination of

tradition & innovation





UNIVERSITY OF CALIFORNIA

OF CALIFORNIA



#### POZNAN UNIVERSITY OF TECHNOLOGY



#### Cunicc EUROPEAN UNIVERSITY

## European University for Customised Education

- **PUT** Poznan University of Technology <u>leader</u> of EUNICE Alliance
- **BTU** Brandenburg University of Technology Cottbus-Senftenberg
- UMONS University of Mons
- UC University of Cantabria
- UNICT University of Catania
- UPHF Université Polytechnique Hauts-de-

France

- UVA University of Vaasa
- **UoP** University of the Peloponnese
- IPV Polytechnic Institute of Viseu
- KU Karlstad University



## **PUT IN NUMBERS**

- 9 faculties
- more than 14 thousand students

(more than 1000 of them are international)

- more than 40 fields of study
- 8 BSc programs in English
- 22 MSc options in English
- 324 labs
- 2368 employees
- 1342 academic staff
- more than 2000 places in dormitories





#### POZNAN UNIVERSITY OF TECHNOLOGY

## **PUT IN RANKINGS**

Poznan University of Technology maintained its position (1201-1500) in **WUR 2024**, achieving 15th place among Polish universities.

#### WUR 2024 by subject:

- Business and Economics (601–800)
- Computer Science (801–1000)
- Engineering (801–1000)
- Physical Sciences (801–1000)

#### **QS WORLD UNIVERSITY RANKINGS 2024.TOP**

**GLOBAL UNIVERSITIES**: PUT was among 22 Polish universities classified in the list of the best universities in the world and was ranked 5th among Polish technical universities

**47 Researchers from PUT** are on the list of the world's most cited researchers - top 2% list prepared by Stanford University (in cooperation Elsevier)











## **PUT FACULTIES**

FACULTY OF ARCHITECTURE FACULTY OF CIVIL AND TRANSPORT ENGINEERING FACULTY OF CONTROL, ROBOTICS AND ELECTRICAL ENGINEERING FACULTY OF COMPUTING AND TELECOMMUNICATIONS FACULTY OF MATERIALS ENGINEERING AND TECHNICAL PHYSICS FACULTY OF ENVIRONMENTAL ENGINEERING AND ENERGY FACULTY OF ENGINEERING MANAGEMENT FACULTY OF MECHANICAL ENGINEERING FACULTY OF CHEMICAL TECHNOLOGY



#### **POZNAN UNIVERSITY OF TECHNOLOGY**



## CAMPUS

 on the banks of the Warta River

 10 minutes from the Old Market Square

5 minutes to Malta Lake



## **OPENING OF KAKOLEWO CAMPUS** (Sept. 2022)





## **HIGHER EDUCATION SYSTEM at PUT**





## **PROGRAMS** IN ENGLISH

Currently PUT offers 8 B.Sc. Programs in English





B.SC. PROGRAM IN AUTOMATIC RE > CONTROL AND ROBOTICS >



B.SC. PROGRAM IN ELECTRONICS AND TELECOMMUNICATIONS >





B.SC. PROGRAM IN CHEMICAL TECHNOLOGY >



B.SC. PROGRAM IN SUSTAINABLE BUILDING ENGINEERING >



+ NEW B.Sc. Program in **Biomedical** Engineering



## **PROGRAMS** IN ENGLISH

and 22 options at M.Sc. level in English (1):

- Civil Engineering Construction Engineering and Management
- Civil Engineering Structural Engineering
- Computing Cybersecurity
- Computing Software Engineering
- ➤ Architecture
- Product Lifecycle Engineering
- Chemical Technology Composites and Nanomaterials
- Electronics and Telecommunications Information and Communication Technologies
- Engineering Management Managing Enterprise of the Future (+Double degree option with Université Lille 1, France)
- Mechanical and Automotive Engineering Product Engineering



## **PROGRAMS** IN ENGLISH

and 22 options at M.Sc. level in English (1):

Logistics - Logistics Systems

> Automatic Control and Robotics - Smart Aerospace and Autonomous Systems

- Transport Sustainable Transport
- Green Energy<sup>new</sup>
- Artificial Intelligence
- Electrical Engineering Drive Systems in Industry and Electromobility<sup>new</sup>
- Electrical Engineering Electrical Systems in Industry and Vehicles<sup>new</sup>
- Electrical Engineering Lighting Engineering<sup>new</sup>
- Electrical Engineering Microprocessor Control Systems in Electrical Engineering<sup>new</sup>
- Electrical Engineering Smart Measurement Systems<sup>new</sup>
- Biomedical Engineering<sup>new</sup>
- > Mechatronics<sup>new</sup>



**POZNAN UNIVERSITY OF TECHNOLOGY** 

## **COOPERATION** WITH INDUSTRY





## PUT INTERNATIONAL STUDENTS COME FROM OVER 60 COUNTRIES





**POZNAN UNIVERSITY OF TECHNOLOGY** 

## **INTERCULTURAL EVENTS**

PUT around the world Intercultural Café

Would you like to meet PUT students from all over the world and learn about other cultures?

Come along PUT Intercultural Café, spend great time and expand your horizons! More information: https://www.facebook.com/putpoland











