

PETROV MIKHAIL ALEKSANDROVITCH

Research profile (portfolio) of potential research supervisor of post-graduate track participants in the international Olympiad “Open Doors: Russian Scholarship Project”

UNIVERSITY	MOSCOW POLYTECHNIC UNIVERSITY (Moscow Polytech)
Level of English proficiency	Fluent
Courses and fields of studies offered for applicants	15.06.01 Mechanical Engineering (field of studies) 2.5.7 Metal Forming Technologies and Machinery 2.6.4 Metal Forming
List of research projects of the potential supervisor	• “Development of a conceptual model of a mechatronic system, including process technology and equipment, for the manufacture of hollow and filled micro- and macrospheres (0.5–3 mm in diameter) based on aluminum and magnesium alloys,” project period: 2011–2013, joint Russian-German project, State Contract No. 16.740.11.0744. • “Mathematical modeling of fluid flow with phase transitions,” project period: 2012–2013, Russian project, No. 14.B37.21.0743.
List of the topics offered for the prospective research	• Development of stamping technology for carbon-fiber- and glass-fiber-based prepregs; • Development of automated stamping cells using in-line 3D scanning; • Advancement of AR technology for industrial applications; • Development and study of technologies for manufacturing complex parts using metal forming and additive manufacturing methods; • Investigation of the 3D micro-printing process for cellular structures; • Generative design of tools for forming processes made from metals, alloys, and polymer materials; • Study of the application of digital image correlation (DIC) systems in microstamping.



Research supervisor:
Mikhail A. Petrov,
Candidate of Sciences (equivalent
to a PhD)
Dr.-Ing. (equivalent to a PhD),
(Moscow Polytech)

Field of research

2.03.03 **Engineering, mechanical**

2.11.04 **Engineering, industrial**

2.11.06 **Engineering, manufacturing**

Supervisor's research interests:

- theoretical and experimental studies of cold, hot and isothermal stamping processes at different dimensional levels;
- development, research and implementation of technological lubricants and coatings for material forming processes;
- research and development of additive manufacturing technologies;
- research and development of equipment for material forming and additive technologies;
- Computer-aided design (CAD-CAO) and simulation (CAE) of material forming and additive manufacturing technologies;
- educational and industrial application of VR/AR/MR;
- development and investigation of multilevel reverse engineering technologies;
- application of material forming and additive manufacturing technologies in biomedical engineering;
- industrial application and production technologies of cellular structures.

Research highlights:

- laboratory of material forming;
- laboratory for additive technologies;
- PC-pool with a basic set of engineering software (CAD-CAO-CAE).

Supervisor's specific requirements:

Hard skills in computer programs for geometric design (CAD/CAGD) optimization (CAO), strength analysis and modeling of material forming processes and additive manufacturing technologies (CAE).

Supervisor's publications

The total number of publications in journals indexed by Web of Science, Scopus, and RSCI over the past five years:

SCOPUS: 7; Web of Science: 2; RSCI: 23

PIHL/elibrary: 176668 (Author ID)

SCOPUS: 8980725400 (Author ID:)

ORCID: 0000-0002-2324-5057

Web of Science: H-1326-2018, C-5204-2014 (ResearcherID)

Supervisor's main publications

1. El-Deeb, I.S., Petrov, M.A., Grabowik, C., Esmael, E.G., Rashad, M., Ebied, S. (2024). Mechanical Properties of PLA Printed Samples in Different Printing Directions and Orientations Using Fused Filament Fabrication, Part 2: Experimental Research. In: Burduk, A., Batako, A.D.L., Machado, J., Wyczółkowski, R., Dostatni, E., Rojek, I. (eds) Intelligent Systems in Production Engineering and Maintenance III. ISPEM 2023. Lecture Notes in Mechanical Engineering. Springer, Cham. DOI: 10.1007/978-3-031-44282-7_48.
2. M.A. Petrov, D.A. Romashov, V.V. Isakov. Estimation of Sheet Deformation of Aluminium Blank using Non-Contact Methods on the Example of Erichsen Cupping Test (2023). Scientific Visualization 15.4: 124 - 139, DOI: 10.26583/sv.15.4.10.
3. Расчёт и анализ процессов объёмной штамповки с вращающимся инструментом при помощи конечно-элементного моделирования, Петров М.А., Матвеев А.Г., Петров П.А., Сапрыкин Б.Ю. Вестник Московского авиационного института. 2022. Т. 29. № 1. С. 226-244. DOI: 10.34759/vst-2022-1-226-244.
4. Petrov, M.A., Gnevashev, D.A. & Krutina, E.V. Numerical Simulation of the Upsetting of Bronze Samples with Allowance for Changes in Their Relative Density. Russ. Metall. 2022, 1714–1724 (2022). DOI: 10.1134/S0036029522130274.
5. Magerramova, L.; Isakov, V.; Shcherbinina, L.; Gukasyan, S.; Petrov, M.; Povalyukhin, D.; Volosevich, D.; Klimova-Korsmik, O. Design, Simulation and Optimization of an Additive Laser-Based Manufacturing Process for Gearbox Housing with Reduced Weight Made from AlSi10Mg Alloy. Metals 2022, 12, 67. DOI: 10.3390/met12010067.

Results of intellectual activity

1. RU 98957U1 Stamp for the production of rod products with thickening (utility patent model).
2. DE102011103315B3 Einrichtung zur Herstellung von Hohlkugeln und Schalen aus metallischen Schmelzen (Patent for an invention).
3. RU 145529 Device for studying the plasticity of metals and alloys (utility patent model).