

ISSN 2521-1943

Mechanics

and Advanced Technologies



Volume 7 • Number 1

2023



National Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute"

Mechanics and Advanced Technologies

Vol. 7, No. 1, 2023

Founded in 2017

Editor-in-chief

Mukola Bobyr

(Igor Sikorsky Kyiv Polytechnic
Institute, Ukraine)

Deputy editor-in-chief

Oleksandr Lugovskyi

(Igor Sikorsky Kyiv Polytechnic
Institute, Ukraine)

Georgy Krivov

(Ukrainian Research Institute of
Aviation Technology, Ukraine)

Executive editor

Yuriy Danylchenko

(Igor Sikorsky Kyiv Polytechnic
Institute, Ukraine)

The international science-and-technology
journal "**Mechanics and Advanced Technologies**"
is the successor to the reader in mechanical engineering
"**Journal of Mechanical Engineering NTUU "Kyiv
Polytechnic Institute**"
(ISSN 2305-9001, e-ISSN 2409-5966). Year of issue 1967-2017

Registration Certificate

KB №22698-12598PP від 04.05.2017 р.

According to the Ministry of Education and Science of Ukraine
orders №1643 of December 28, 2019 "Mechanics and
Advanced Technologies" was included to the List of academic
editions of Ukraine on technical sciences, category "B"

Advised is published by the decision:

*the Scientific Council of Institute of Mechanical Engineering,
protocol No. 8 of 27 March 2023.*

Editorial Board

Mechanics	Up-to-date machines and the technologies of mechanical engineering	Aviation Systems and Technologies
<p><i>Editors in charge</i> Holm Altenbach (IFME, Otto-von-Guericke- University Magdeburg, Germany)</p> <p><i>Editorial Board</i> Mykhailo Shtern (Institute of Problems in Materials Sciences NAS of Ukraine, Ukraine) Yevhen Nykyforovych (Institute of Hydromechanics NASU, Ukraine) Vladyslav Golub (S.P. Timoshenko Institute of Mechanics, Ukraine) Jaroslav Stryczek (Politechnika Wroclawska, Poland) Vadim Silberschmidt (Loughborough University, Great Britain) Eugene Olevsky (San Diego State University, United States) Valery I. Levitas (Iowa State University, USA) Chunliang Zhang (Guangzhou University, China)</p>	<p><i>Editors in charge</i> Pavlo Tryvailo (RMIT University, Melbourne, Australia)</p> <p><i>Editorial Board</i> Ihor Kryvtun (Paton Institute of Electric Welding Ukraine) Oleksii Kachan (Motor Sich JSC, Zaporozhye, Ukraine) Rostyslav Iskovych-Lototskyi (Vinnitsia National Technical University, Vinnitsia, Ukraine) Ljubodrag Tanovic (University of Belgrade, Belgrade) Mikhael Storchak (University of Stuttgart, Germany) Venelin Stojanov Jivkov (Technical University of Sofia, Bulgaria) Dmytro Orlov (Lunds Universitet, Lund, Sweden)</p>	<p><i>Editors in charge</i> Jacob Kleiman (University of Toronto, Canada)</p> <p><i>Editorial Board</i> Konstantyn Zworykin (Ukrainian Research Institute of Aviation Technology, Ukraine) Piolo Igor (University of Ontario Institute of Technology, Canada) Josef Kaspar (Aerospace Research and Test Establishment, Czech Republic) Haeng Muk Cho (Kongju National University, Korea) Sven Jüttner (IWF, Otto-von-Guericke-University Magdeburg, Germany)) Weiqing Huang (Guangzhou University, China) Josef Kaspar (Aerospace Research and Test Establishment, Czech Republic)</p>

Composition of the advisory board

Vitalii Pasichnyk, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine.
Sergiy Shukayev, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute".
Oleh Yakhno, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute".
Vasyl Strutynskyi, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute".
Viktor Maiboroda, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine.
Yurii Kuznietsov, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine.
Yurii Petrakov, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine.
Viacheslav Titov, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine.
Oleh Korostelov, Luch Design Bureau, Ukraine.
Ihor Kravchenko, SE Ivchenko-Progress, Ukraine.

Purpose of edition is to get acquainted with the latest achievements in mechanical engineering, the results of scientific achievements and improved methods of calculation and planning of elements in mechanical engineering constructions. The edition is intended for scientists and scientific and technical specialists in the branch of mechanical engineering.

Articles have been presented in author's version.

The journal publishes only peer-reviewed articles.

The Editorial Board reserves the right to place the authors provided information in different databases.

The collected article is included into general state abstract database "Ukrainika scientific) and international scientometric databases: DOAJ, Index Copernicus, Google Scholar, Open Academic Journals Index (OAJI), WorldCat, BASE, EBSCO.

Editorial office

Igor Sikorsky Kyiv Polytechnic Institute,
 building 1, Ave. Peremogy, 37,
 Kyiv, 03056, Ukraine
 Tel. (+38 044) 204-95-37
 E-mail: mmi_2@ukr.net
<http://journal.mmi.kpi.ua/>

Editor
Iryna Babiienko

Desktop publishing
Victoria Lysenko

CONTENTS

A. Sagalovych, V. Popov, A. Kononyhin, V. Sagalovych, S. Dudnik, A. Prokopenko Vacuum plasma erosion resistant 2D nanocomposite coating Avinit for compressor blades of gas turbine engines of aircraft engines	7
V. Kabanyachyi, S. Hrytsan, S. Yankovskyi Taking into account a location of aircraft's center of mass during motion cuing	16
K. Balushok Experience of designing and implementing integrated system of technological preparation of production for manufacturing new aircraft engines	24
P. Loboda, V. Zvorykin, C. Zvorykin, E. Vrzhyzhevskiy, T. Taranova, V. Kostin, L. Zvorykin Features of the welded seam material crystallization in Ti-TiB alloy under electron-beam welding conditions	36
V. Solovei, A. Karvatskii Technology and mechanical properties of reinforced continuous fiber 3D-printed thermoplastic composite	43
Yu. Petrakov, Ya. Romanov Ensuring accuracy of contour milling on CNC machines	51
V. Maiboroda, D. Dzhulii, K. Zastavskiy Analysis of the forces acting from the side of the magneto-abrasive tool on parts being machined during magneto-abrasive machining in conditions of the annular bath with large working gaps	61
V. Kaliuzhnyi, V. Levchenko, O. Kaliuzhnyi, S. Sytnyk Options of crimping in a container and matrices of a special profile of axisymmetric hollow billets made of C60 steel	68
N. Strelenko, V. Kovalenko, R. Mastenko Methodology for evaluation of slag crust separation during surfacing of low- and medium-carbon steels	75
D. Panevnik Simulation of asymmetrical rotational flow in the flow part of a well jet pump	84
I. Orynyak, I. Kostyushko, R. Mazuryk Semi-analytical implicit direct time integration method for 1-D gas dynamic problem	91
I. Belmas, O. Bilous, H. Tansura, A. Shvachka Ensuring the supply of current to one end of the cable with different wire rope parameters	100
L. Lobanov, P. Ustymenko, Yu. Sydorenko, M. Pashchyn Progressive technologies of electrophysical treatment for regulation of stress-strain states of elements of welded structures	106
H. Vorona, M. Ananchenko, O. Makhnenko Automation of the procedure for determining the admissibility of erosion- corrosion wear in pipelines of nuclear power plants made of carbon steels	113
V. Kovalev, O. Shibaev, Chenyu Chenyu Numerical modeling of internal flows in tanks with baffles	122
S. Strutynskiy, R. Semenchuk Study of linear and angular oscillations of the moving platform of the ground robotic complex	123
