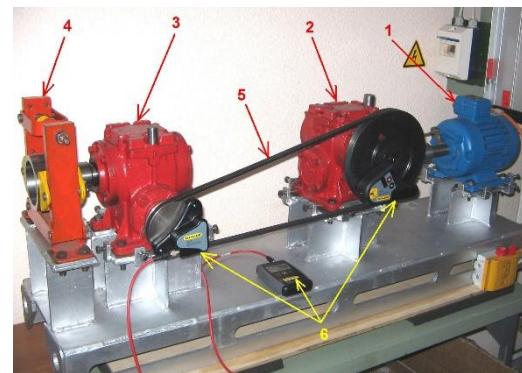


**International journal
for science, technics and
innovations for the industry**

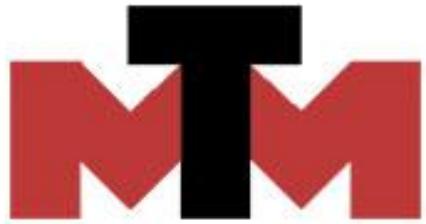


**MACHINES
TECHNOLOGIES
MATERIALS**

YEAR XVI **Issue 2 / 2022** ISSN PRINT 1313-0226
ISSN WEB 1314-507X



**Published by
Scientific technical
Union of Mechanical Engineering**



MACHINES. TECHNOLOGIES. MATERIALS

INTERNATIONAL SCIENTIFIC JOURNAL

ISSN PRINT 1313-0226, ISSN WEB 1314-507X, YEAR XVI, ISSUE 2 / 2022

INTERNATIONAL EDITORIAL BOARD

EDITOR IN CHIEF:

Georgi Popov

MEMBERS:

Abdrakhman Naizabekov
Ahmet H. Ertas
Albert Albers
Andrzej Golabczak
Andrzej Huczko
Dimitar Karaivanov
Emilia Abadjieva
Erdem Camurlu
Eugen Sheregii
Franz Haas
Galina Nicolcheva
Gennadii Bagliuk
Georgii Raab
Gregory Gurevich
Hiroyuki Moriyama
Idilia Batchkova
Ivan Kralov
Ivan Kuric
Julieta Kaleicheva
Katia Vutova
Maria Nikolova
Natasa Naprstkova
Oana Dodun
Ognyan Andreev
Predrag Dasic
Rasa Kandrotaite
Raul Turmanidze
Roumen Petrov
Sergey Dobatkin
Souren Mitra
Svetlana Gubenko
Vedran Mrzljak
Wu Kaiming

Technical University of Sofia	BG
Rudny industrial institute	KZ
Bursa Technical University	TR
Karlsruhe Institut of Technology	DE
Lodz University of Technology	PL
Warsaw University	PL
University of Chemical Technology and Metallurgy, Sofia	BG
Akita University	JP
Akdeniz University, Antalya	TR
University of Rzeszow	PL
Graz University of Technology	AT
Technical University of Sofia	BG
Institute for Problems of Materials Science NAS of Ukraine, Kiev	UA
Ufa State Aviation Technical University	RU
Shamoon College of Engeeniring, Ashdod	IL
Tokai University, Hiratsuka	JP
University of Chemical Technology and Metallurgy, Sofia	BG
Technical University of Sofia	BG
University of Zilina	SK
Technical University of Sofia	BG
Institute of Electronics, Bulgarian Academy of Sciences	BG
Angel Kanchev University of Ruse	BG
Jan Evangelista Purkyne University in Usti nad Labem	CZ
Gheorghe Asachi Technical University of Iasi	RO
Technical University of Sofia	BG
High Technical Mechanical School of Trstenik	RS
Kaunas University of Technology	LT
Georgian Technical University, Tbilisi	GE
Ghent University	BE
National University of Science and Technology "MISIS", Moscow	RU
Jadavpur University, Kolkata	IN
National Metallurgical Academy of Ukraine, Dnipro	UA
University of Rijeka	HR
Wuhan University of Science and Technology	CN

TECHNICAL EDITORS:

M. Sc. Eng. Radoslav Daskalov, M. Sc. Eng. Oleg Mihailov

C O N T E N T S

MACHINES

- Thermodynamic analysis of backpressure and condensing steam turbines from cogeneration system** 44
Mrzljak Vedran, Prpić-Oršić Jasna, Poljak Igor, Gospić Ivan

- Worm gearboxes laser alignment influence on temperature and vibration level of the bearings.** 48
Dmitry Litvinov, Andris Priževaitis

TECHNOLOGIES

- Influence of the forging process in step-wedge-shaped strikers on the destruction nature of the deformable metal** 52
Volokitin A.V., Tolkushkin A.O., Panin E.A., Pishchikov V.

- The effect of different heat treatments on the mechanical properties of the steel forgings** 54
Srba Mladenović, Jasmina Petrović

- Deposition of ZrO₂ thin films obtained by sol-gel method on monolithic composite with layered structure of Nb30Ti/Al** 58
Vladimir Petkov, Mihaela Aleksandrova, Vladimir Blaskov

- Methods for implementing the concept of energy and technological compliance of components in the technology of highly filled composites** 62
Sergey Avdeychik, Alexander Antonov, Alexander Lesun, Vasily Struk, Victor Goldade

MATERIALS

- Numerical analysis of metallographic preparation effect on the hardness of titanium alloy** 66
Slokar Benić Lj., Dr Ivec I., Šimić K., Dr Jandrić I.

- Analysis of mechanical properties and microstructure of ti-al-c composites after spark plasma sintering** 70
Kandrotaitė Janutienė Rasa, Yogesh Ragupathy, Mažeika Darius, Syzonenko Olha, Lypian Evhen Vasylivych,
Torpakov Andrii Serhiiovych, Prystash Mykola Serhiiovych, Dlouhý Jaromír

- Effect of work hardening and recrystallization annealing on structure and properties of low-carbon steel wire** 74
Kaverynskyi V.V., Bagliuk G.A., Verbylo D. G.

- Geopolymers based on natural zeolite clinoptilolite with addition of metakaolin** 82
Aleksandar Nikolov