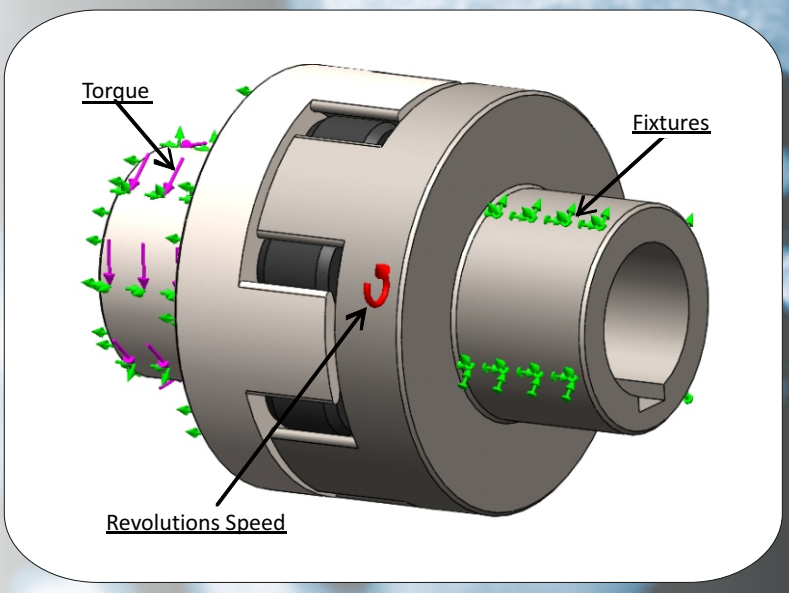
International journal for science, technics and innovations for the industry

MACHINES TECHNOLOGIES MATERIALS

YEAR XI Issue 7 / 2017 ISSN PRINT 1313-0226 ISSN WEB 1314-507X



Published by
Scientific technical
Union of Mechanical Engineering "INDUSTRY 4.0"

MACHINES. TECHNOLOGIES. MATERIALS

INTERNATIONAL SCIENTIFIC JOURNAL

ISSN PRINT 1313-0226, ISSN WEB 1314-507X, YEAR XI, ISSUE 7 / 2017

EDITORIAL BOARD FOREIGN MEMBERS			
Prof. Adel Mahmoud	IQ	Prof. Marian Tolnay	SK
Prof. Ahmet Ertas	TR	Prof. Mark Easton	AU
Prof. Andonaq Londo	AL	Prof. Mart Tamre	EE
Prof. Andrei Firsov	RU	Prof. Maryam Ehteshamzade	IR
Prof. Andrzej Golabczak	PL	Prof. Michael Evan Goodsite	DK
Prof. Anita Jansone	LV	Prof. Movlazade Vagif Zahid	AZ
Prof. Aude Billard	CH	Prof. Natasa Naprstkova	CZ
Prof. Bojan Dolšak	SI	Prof. Oana Dodun	RO
Prof. Christian Marxt	LI	Prof. Oleg Sharkov	RU
Prof. Dale Carnegie	NZ	Prof. Páll Jensson	IS
Prof. Ernest Nazarian	AM	Prof. Patrick Anderson	NL
Prof. Esam Husein	KW	Prof. Paul Heuschling	LU
Prof. Ewa Gunnarsson	SW	Prof. Pavel Kovac	RS
Prof. Filipe Samuel Silva	PT	Prof. Per Skjerpe	NO
Prof. Francisco Martinez Perez	CU	Prof. Péter Korondi	HU
Prof. Franz Haas	AT	Prof. Peter Kostal	SK
Prof. Genadii Bagliuk	UA	Prof. Juan Alberto Montano	MX
Prof. Georg Frey	DE	Prof. Raul Turmanidze	GE
Prof. Gregory Gurevich	IL	Prof. Renato Goulart	BR
Prof. Haydar Odinaev	TJ	Prof. Roumen Petrov	BE
Prof. Hiroyuki Moriyama	JP	Prof. Rubén Darío Vásquez Salazar	CO
Prof. Dr. Ilir Doci	Ko	Prof. Safet Isić	BA
Prof. Iryna Charniak	BY	Prof. Sean Leen	IE
Prof. Ivan Svarc	CZ	Prof. ShI Xiaowei	CN
Prof. Ivica Veza	HR	Prof. Shoirdzan Karimov	UZ
Prof. Jae-Young Kim	KR	Prof. Sreten Savićević	ME
Prof. Jerzy Jedzejewski	PL	Prof. Stefan Dimov	UK
Prof. Jean-Emmanuel Broquin	FR	Prof. Svetlana Gubenko	UA
Prof. Jordi Romeu Garbi	ES	Prof. Sveto Cvetkovski	MK
Prof. Jukka Tuhkuri	FI	Prof. Tamaz Megrelidze	GE
Prof. Katia Vutova	BG	Prof. Tashtanbay Sartov	KG
Prof. Kazimieras Juzėnas	LT	Prof. Teimuraz Kochadze	GE
Prof. Krasimir Marchev	USA	Prof. Thorsten Schmidt	DE
Prof. Krzysztof Rokosz	PL	Prof. Tonci Mikac	HR
Prof. Leon Kukielka	PL	Prof. Vasile Cartofeanu	MD
Prof. Mahmoud El Gammal	EG	Prof. Yasar Pancar	TR
Prof. Manolakos Dimitrios	GR	Prof. Yurij Kuznetsov	UA
Prof. Marat Ibatov	KZ	Prof. Wei Hua Ho	ZA
Prof. Marco Bocciolone	IT		

The FEDERATION OF THE SCIENTIFIC ENGINEERING UNIONS (FSEU)

in Bulgaria is a professional, scientific - educational, non-governmental, non-political non-profit association of legal entities - professional organizations registered under the Law on non-profit legal entities, whose members are engineers, economists and other specialists in the field of science, technology, economy and agriculture.

FSEU performed bilateral cooperation with similar organizations from many countries.

FSEU brings together 19 national associations - Scientific and Technical Unions / STU /, 34 territorial associations, which have more than 15 000 professionals across the country.

FSEU is a co-founder and member of the World Federation of Engineering Organizations (WFEO).

FSEU a member of the European Federation of National Engineering Associations (FEANI), and a member of the Standing Conference of engineering organizations from Southeast Europe / CO.PICEE /, Global Compact, European Young Engineers (EYE). The Federation has the exclusive right to give nominations for the European Engineer (EUR ING) title.

Contacts:

108 Rakovsky Str., Sofia 1000, Bulgaria

web: www.fnts.bg

e-mail: info@fnts.bg

MACHINES. TECHNOLOGIES. MATERIALS

INTERNATIONAL SCIENTIFIC JOURNAL

PUBLISHER

SCIENTIFIC TECHNICAL UNION OF MECHANICAL ENGINEERING "INDUSTRY 4.0"

108, Rakovski Str., 1000 Sofia, Bulgaria
tel. (+359 2) 987 72 90,
tel./fax (+359 2) 986 22 40,
office@stumejournals.com
www.stumejournals.com

ISSN PRINT 1313-0226, ISSN WEB 1314-507X, YEAR XI, ISSUE 7 / 2017

EDITOR-IN-CHIEF

Prof. D.Sc. DHC Georgi Popov,
President of Bulgarian Scientific and Technical Union of Mechanical Engineering

EDITORIAL BOARD

MEMBERS	SCIENTIFIC COMPETENCE
Prof. Dimitar Damyanov	Automatisation of production
Prof. Dimitar Karaivanov	Mechanics of machines
Prof. Dimitar Stavrev	Technologies and materials
Prof. Dimitar Yonchev	National and industrial security
Prof. Galina Nikolcheva	Machines tools and technologies
Prof. Hristo Shehtov	Automatisation of production
Prof. Idilija Bachkova	Automatisation of production
Prof. Ivan Kralov	Mechanics of machines
Prof. Ivan Parshorov	Technologies and materials
Prof. Ivan Yanchev	Machines and technologies
Prof. Ivo Malakov	Automatisation of production
Prof. Kiril Angelov	Industrial Management
Prof. Lilo Kunchev	Transport Equipment and Technology
Prof. Lubomir Dimitrov	Machines and technologies
Prof. Miho Mihov	Agricultural machinery
Prof. Miroslav Denchev	Ergonomics and design
Prof. Mladen Velev	Economics and Marketing
Prof. Nikolay Diulgerov	Technologies and materials
Prof. Ognyan Andreev	Production management
Prof. Petar Kolev	Transport Equipment and Technology
Prof. Roman Zahariev	Robotics
Prof. Sasho Guergov	Robotic systems and technology
Prof. Tsanka Dikova	Technologies and materials
Prof. Vitan Galabov	Mechanics of machines

C O N T E N T S

MACHINES

FLOTATION DEVICE WITH A HIGH FREQUENCY ROTARY PULSATION AERATOR (HFRPA) FOR ENRICHMENT OF FINE-GRADE GOLD-CONTAINING ORES
Dr. Sci. (Eng.), Acad. NAS RoK Zharmenov A., Senior Researcher Khairullina S., Cand. Sci. (Eng.), Leading Researcher Berdikulova F., Senior Engineer Abdimanapov N., Senior Engineer Sarsenbai A. 327

ENERGY ANALISYS AND WASTE HEAT RECOVERY POTENTIAL OF AN AUTOMOTIVE DIRECT INJECTION DIESEL ENGINE
M.Sc. Milkov N. 332

STUDY THE INFLUENCE OF ROTATION SPEED ON DEFORMATION PROCESS FOR FLEXIBLE COUPLER WITH RUBBER ELASTIC ELEMENT
Conf. dr. eng. Ivanova E., Conf. dr. eng. Vasilev T., Conf. dr. Hristov H. 336

SAFETY RELATED ASPECTS OF HUMAN MACHINE INTERFACE REGARDING INVEHICLE ITS AND ELECTRIC VEHICLES
Stevan Kjosevski PhD student, Assoc. Prof. Aleksandar Kostikj, PhD, Prof. Sofija Sidorenko, PhD, Prof. Darko Danev, PhD 340

TECHNOLOGIES

ELECTRIC DISCHARGE METHOD OF OBTAINMENT OF TITANIUM CARBIDE HARD METALS
Prof., Dr. of Science Syzonenko O., Prof., Dr. of Science Shregii E., Dr.hab.inż., PhD, Prof. Prokhorenko S., Lypian Ye., Torpakov A., Cieniek B. 346

DEVELOPING THE TECHNOLOGY OF WASTE SULFURIC ACID LEACHING OF CHRYSOTILE ASBESTOS PRODUCTION
Master's degree in metallurgy, eng. Bedelova Zh. D., Candidate of technical Sciences, senior scientific researcher Tabylganova A. N., Candidate of technical Sciences, leading scientific researcher Homyakov A. P., Master's degree in metallurgy, eng. Dagubaeva A. T. 350

THE EXPERIMENTAL DETERMINATION OF L/D RATIO USING WATER IN MINI CHANNELS TO ANALYSIS OF FLUID TEMPERATURE PERFORMANCE WITH NANO PARTICULATES
Onur S., Assist. Prof. Dr. Kevser D., Assist. Prof. Dr. Gürol Ö., Sadık A. 353

TOOL LIFE MODELING BASED ON CUTTING PARAMETERS AND WORK MATERIAL HARDNESS IN TURNING PROCESS
Nexhat Qehaja , Azem Kyçyku 356

ELECTROCHEMICAL TREATMENT OF WASTE IN THE FORM OF COPPER COATING ON NON-CONDUCTIVE SUBSTRATE TO OBTAIN MARKETABLE PRODUCTS
Ph.D. Maizelis A.A., Prof., Dr. Sci. Bairachniy B.I. 360

MATERALS

EFFECT OF ADHESIVE TYPE ON THE QUALITY PROPERTIES OF PARTICLEBOARD
Prof. Dr. Ayrilmis, N., Prof. Dr. Nemli, G. 364

MICROALLOYED STEEL UNDER TENSION AND BENDING CONDITION
Doc. Ing. PhD. Mihaliková M., Ing. Lišková A., Ing. PhD. Elena Čižmárová E. 366

EFFECT OF POWDER MODIFIERS ON STRUCTURE FORMATION OF IRON-CARBON ALLOYS
Dr. Sc., Prof. Bagliuk G.A., Dr. Sc., Prof. Trotsan A.I,. PhD..Kaverinsky V.V., M.Sc. Sukhenko Z.P., M.Sc. Kurovskyi V.Ya. 370

EFFECT OF RARE-EARTH METALS (Dy, Tb, Sm, Nd) ON STRUCTURE AND MECHANICAL PROPERTIES OF THE Mg-Y-Gd-Zr SYSTEM ALLOYS
Prof. Rokhlin L.L., PhD. Lukyanova E.A., PhD. Dobatkina T.V., Tarytina I.E., Korolkova I.G. 373