

[< Back to results](#) | [< Previous](#) 6 of 32 [Next >](#)[Download](#) [Print](#) [Save to PDF](#) [Add to List](#) [Create bibliography](#)*International Review of Mechanical Engineering* • Volume 15, Issue 7, Pages 355 - 364 • July 2021**Document type**

Article

**Source type**

Journal

**ISSN**

19708734

**DOI**

10.15866/IREME.V15I7.20794

[View more](#)

## Sem characterization and tensile properties of alkali treated single coir fiber with drying procedure variation

Windyandari, Aulia<sup>a,b</sup>; Kurdi, Ojo<sup>a,c</sup>; **Sulardjaka<sup>a</sup>**; Tauviquirrahman, Mohammad<sup>a</sup>[Save all to author list](#)<sup>a</sup> Mechanical Engineering Department, Engineering Faculty, Diponegoro University, Semarang, 50275, Indonesia<sup>b</sup> Industrial Technology Department, Vocational School, Diponegoro University, Semarang, 50275, Indonesia<sup>c</sup> National Center for Sustainable Transportation Technology, Indonesia

22

Views count

[View all metrics](#) [Full text options](#) [Export](#) [Abstract](#)[Author keywords](#)[SciVal Topics](#)[Metrics](#)[Funding details](#)**Abstract**

– This study has aimed to analyze the effect of alkali treatment and drying method on the surface morphology and tensile properties of single coir fibers. The treatments of the coir fibers have been configured on the concentration of alkali solution, the soaking period, and the drying method. Furthermore, they have been soaked in 2 wt% and 6 wt% sodium hydroxide solution at room temperature for 1-and 2-hours soaking periods. The drying procedures adopted have been air, oven, and sun-drying. Observations with a scanning electron microscope (SEM) show that the coir surface is coarser, especially on fibers treated with 6 wt% sodium hydroxide solution. The properties such as tensile strength and strain, as well as tensile modulus of the different samples have been measured. The results have showed that the treated coir fiber with the 2 wt% concentration alkali solution has lower tensile strength than the untreated one. The treated coir with 6 wt% sodium hydroxides has the most considerable tensile strength. The effect of the soaking period on the tensile properties has been influenced by the drying method. Therefore, the appropriate combination of the soaking period and the drying method increase single coir fibers tensile properties. Slow drying (air-drying) has generated better tensile properties than the fast method (oven and sun-drying). © 2021 Praise Worthy Prize S.r.l.- All rights reserved.

**Author keywords**

Modulus of elasticity; Single coir fiber; Stress and strain diagram; Surface morphology; Tensile strain; Tensile strength

[SciVal Topics](#) [Metrics](#) [Funding details](#)

Cited by 0 documents

Inform me when this document is cited in Scopus:

[Set citation alert >](#)**Related documents**

The morphology of coconut fiber surface under chemical treatment

Arsyad, M. , Wardana, I.N.G. , Pratikto (2015) *Revista Materia*

Influence of the soaking time on the mechanical properties of coir as a natural composite reinforcement

Arsyad, M. , Soenoko, R. , Arman, A. (2020) *Fibres and Textiles in Eastern Europe*

Effect of Microwave Treatment on Mechanical Properties of Coir Fibers

Bakri, B. , Naharuddin , Putra, A.E.E. (2018) *IOP Conference Series: Earth and Environmental Science*[View all related documents based on references](#)[Find more related documents in Scopus based on:](#)[Authors](#) [Keywords](#) **References (22)**[View in search results format >](#) All [Export](#) [Print](#) [E-mail](#) [Save to PDF](#) [Create bibliography](#)

- 1 Waifelate, A.A., Abiola, B.O. (2008) *Mechanical property evaluation of coconut fibre*. Cited 19 times. Master's Degree Thesis, Department of Mechanical Engineering Blekinge Institute of Technology, Sweden

**INFORMATION**

- [For Readers](#)
- [For Authors](#)
- [For Reviewers](#)

**FONT SIZE**

**USER**

Username   
 Password

Remember me



**Praise Worthy Papers**

[Most cited papers](#)



[Highly commended papers](#)

[Commended papers](#)

**Most Popular Papers**

[MILD Combustion: the Future for Lean and Clean Combustion Technology](#)

N. Noor et al.  
4129 views since: 2014-01-31

[A Review of Piezoelectric Vibration Energy Harvesting Techniques](#)

H. Xiao et al.  
2450 views since: 2014-05-31

[Integrated Oil Palm Fruit Digester-Separator-Screw Press Maching](#)

N. Nduka  
2272 views since: 2013-07-31

[Evaluation of Mechanical Properties of Aluminium Alloy 7075 Reinforced with Tungsten Carbide and Fly-Ash](#)

P. Vivekanandan et al.  
1973 views since: 2014-01-31

[A Parametric Optimization of FSW Process Using RSM Based Grey Relational Analysis Approach](#)

D. Vijayan et al.  
1632 views since: 2014-03-27

HOME	PRASE WORTHY PRIZE	ABOUT	LOGIN	REGISTER	PWP ONLINE LIBRARY
CURRENT	ARCHIVES	ANNOUNCEMENTS	OTHER JOURNALS	DOWNLOAD ISSUES	
SUBMIT YOUR PAPER		SPECIAL ISSUE			

Home > **International Review of Mechanical Engineering (IREME)**

## International Review of Mechanical Engineering (IREME)



**Editor-in-Chief:**

Prof. **Ethirajan Rathakrishnan**  
 Department of Aerospace Engineering  
 Indian Institute of Technology Kanpur - INDIA

**Editorial Board**

ISSN: 1970-8734  
 e-ISSN: 2532-5655  
 CD-Rom: 1970-8742

**Supports Open Access**

**Submit Your Paper**

**Journal Aims**

The **International Review of Mechanical Engineering (IREME)** is a peer-reviewed journal that publishes original theoretical and applied papers on all fields of mechanics. The topics to be covered include, but are not limited to:

kinematics and dynamics of rigid bodies, vehicle system dynamics, theory of machines and mechanisms, vibration and balancing of machine parts, stability of mechanical systems, computational mechanics, advanced materials and mechanics of materials and structures, plasticity, hydromechanics, aerodynamics, aeroelasticity, biomechanics, geomechanics, thermodynamics, heat transfer, refrigeration, fluid mechanics, energy conversion and management, micromechanics, nanomechanics, controlled mechanical systems, robotics, mechatronics, combustion theory and modelling, turbomachinery, manufacturing processes, new technology processes, non-destructive tests and evaluation, new and important applications and trends.

**IREME** also publishes letters to the Editor and research notes which discuss new research, or research in progress in any of the above thematic areas.

The **International Review of Mechanical Engineering (IREME)** currently has an acceptance rate of 35%. The average time between submission and final decision is 38 days and the average time between acceptance and publication is 21 days.

**Frequency:**

published monthly, appearing on the last day of every month.

**Abstracting and Indexing Information**

**IREME** is covered by the following abstracting/indexing services:

Cambridge Scientific Abstracts (CSA/CIG)  
 Academic Search Complete (EBSCO Information Services)  
 Elsevier Bibliographic Database - SCOPUS  
 Google Scholar  
 ProQuest  
 CAB Abstracts  
 CAS Database  
 Scilit



**PRASE WORTHY PRIZE HOMEPAGE**

**SUBSCRIPTION**

Login to verify subscription  
[Give a gift subscription](#)

**NOTIFICATIONS**

- [View](#)
- [Subscribe / Unsubscribe](#)

**JOURNAL CONTENT**

Search

All

**Browse**

- [By Issue](#)
- [By Author](#)
- [By Title](#)
- [Other Journals](#)



**INFORMATION**

- [For Readers](#)
- [For Authors](#)
- [For Reviewers](#)

**FONT SIZE**

**USER**

Username

Password

Remember me



**Praise Worthy Papers**

[Most cited papers](#)



[Highly commended papers](#)

[Commended papers](#)

**Most Popular Papers**

[MILD Combustion: the Future for Lean and Clean Combustion Technology](#)

M. Noor et al.  
4129 views since: 2014-01-31

[A Review of Piezoelectric Vibration Energy Harvesting Techniques](#)

H. Xiao et al.  
2450 views since: 2014-05-31

[Integrated Oil Palm Fruit Digester-Separator-Screw Press Maching](#)

N. Nduka  
2272 views since: 2013-07-31

[Evaluation of Mechanical Properties of Aluminium Alloy 7075 Reinforced with Tungsten Carbide and Fv-5ch](#)

P. Vivekanandan et al.  
1973 views since: 2014-01-31

[A Parametric Optimization of FSW Process Using RSM Based Grey Relational Analysis Approach](#)

D. Vijayan et al.  
1632 views since: 2014-03-27

HOME   PRAISE WORTHY PRIZE   ABOUT   LOGIN   REGISTER   PWP ONLINE LIBRARY  
CURRENT   ARCHIVES   ANNOUNCEMENTS   OTHER JOURNALS   DOWNLOAD ISSUES  
SUBMIT YOUR PAPER   SPECIAL ISSUE

Home > About the Journal > **Editorial Board**

## Editorial Board

### Editor-in-Chief

[Ethirajan Rathakrishnan](#), Department of Aerospace Engineering Indian Institute of Technology, [India](#)

### Editorial Board members

[Jeongmin Ahn](#), Department of Mechanical and Aerospace Engineering- Syracuse University, [United States](#)

[Jan Awrejcewicz](#), Technical University of Lodz Department of Automatics and Biomechanics, [Poland](#)

Prof. Dr. Ali Cemal Benim, Duesseldorf University of Applied Sciences, [Germany](#)

[Stjepan BOGDAN](#), University of Zagreb - Faculty of Electrical Engineering and Computing, [Croatia](#)

[André Bontemps](#), LEGI/CEA- Greth Universite Joseph Fourier, [France](#)

[Felix Chernousko](#), Institute for Problems in Mechanics of the Russian Academy of Sciences, [Russian Federation](#)

[Kim Choon Na](#), King Abdullah University of Science and Technology, [Saudi Arabia](#)

[Olga V. Fgurova](#), Department of Robotics and Complex Automation Moscow Bauman State Technical University, [Russian Federation](#)

[Horacio Espinosa](#), Department of Mechanical Engineering Northwestern University, [United States](#)

[Izhak Etsion](#), Dept. of Mechanical Engineering -Technion - IIT, [Israel](#)

[Alexander N. Evorafov](#), Department of Theory of Mechanisms and Machines Peter the Great St.Petersburg Polytechnic University, [Russian Federation](#)

[Torsten Fransson](#), Dept. of Energy Technology - Royal Institute of Technology, Stockholm, [Sweden](#)

[Michael I. Friswell](#), Swansea University - School of Engineering, [United Kingdom](#)

[Nesreen Ghaddar](#), Dept. of Mechanical Engineering Faculty of Engineering and Architecture American University of Beirut, [Lebanon](#)

[Adriana Greco](#), DETEC (Dept. of Energetics, Thermofluidodynamics and Environmental Control), Federico II University, Naples, [Italy](#)

[Carl T. Herakovich](#), Department of Civil Engineering The University of Virginia, [United States](#)

[M. G. HIGAZY](#), Mechanical Engineering Department, Faculty of Engineering, Shoubra, Benha University, [Cairo, Egypt](#)

[David Hui](#), Department of Mechanical Engineering - University of New Orleans, [United States](#)

[Heuy-Dong KIM](#), Andong National University - School of Mechanical Engineering, [Korea, Democratic People's Republic of](#)

[Marta KURUTZ](#), Technical University of Budapest - Department of Structural Mechanics, [Hungary](#)

[Herbert A. Mang](#), Institute for Mechanics of Materials and Structures Vienna University of Technology, [Austria](#)

[Josua P. MEYER](#), University of Pretoria - Dept.of Mechanical & Aeronautical Engineering, [South Africa](#)

[Bijan MOHAMMADI](#), Université Montpellier II - Institut de Mathématiques et de Modélisation de Montpellier, [France](#)

[Hans Müller-Steinhagen](#), TU Dresden, [Germany](#)

[Eugenio Oñate](#), International Center for Numerical Methods in Engineering (CIMNE), [Spain](#)

[Pradipta Kumar PANIGRAHI](#), Indian Institute of Technology, Kanpur - Mechanical Engineering, [India](#)

[Constantine Rakopoulos](#), Internal Combustion Engines Lab.School of Mechanical Engineering National Technical University of Athens, [Greece](#)

[Raul Suarez](#), Institut de Organització i Control de Sistemes Industrials - Universitat Politècnica de Ca, [Spain](#)

[David J. Timoney](#), School of Electrical, Electronic & Mechanical Engineering, University College Dublin, [Ireland](#)

[Georgo TSATSARONIS](#), Technische Universität Berlin - Institute for Energy Engineering, [Germany](#)

[Professor Sharif Ullah](#), Faculty of Engineering, Kitami Institute of Technology, [Japan](#)

[Hiroshi Yabuno](#), Institute of Engineering Mechanics and Systems, University of Tsukuba, [Japan](#)

[Dr. Anil Singh Yadav](#), Mechanical Engineering Department, IES College of Technology, Bhopal, MP 462022, [India](#)

[Tim S. Zhao](#), Center for Sustainable Energy Technology The Hong Kong University of Science & Technology, [Hong Kong](#)

[PRAISE WORTHY PRIZE HOMEPAGE](#)

**SUBSCRIPTION**

Login to verify subscription  
[Give a gift subscription](#)

**NOTIFICATIONS**

- [View](#)
- [Subscribe / Unsubscribe](#)

**JOURNAL CONTENT**

Search

All

**Browse**

- [By Issue](#)
- [By Author](#)
- [By Title](#)
- [Other Journals](#)



**INFORMATION**

- [For Readers](#)
- [For Authors](#)
- [For Reviewers](#)

**FONT SIZE**

**USER**

Username

Password

Remember me



**Praise Worthy Papers**

[Most cited papers](#)



[Highly commended papers](#)

[Commended papers](#)

**Most Popular Papers**

[MILD Combustion: the Future for Lean and Clean Combustion Technology](#)

M. Noor et al.  
4129 views since: 2014-01-31

[A Review of Piezoelectric Vibration Energy Harvesting Techniques](#)

H. Xiao et al.  
2450 views since: 2014-05-31

[Integrated Oil Palm Fruit Digester-Separator-Screw Press Maching](#)

N. Nduka  
2272 views since: 2013-07-31

[Evaluation of Mechanical Properties of Aluminium Alloy 7075 Reinforced with Tungsten Carbide and Fly-Ash](#)

P. Vivekanandan et al.  
1973 views since: 2014-01-31

[A Parametric Optimization of FSW Process Using RSM Based Grey Relational Analysis Approach](#)

D. Vijayan et al.  
1632 views since: 2014-03-27

HOME	PRaise WORTHY PRIZE	ABOUT	LOGIN	REGISTER	PWP ONLINE LIBRARY
CURRENT	ARCHIVES	ANNOUNCEMENTS	OTHER JOURNALS	DOWNLOAD ISSUES	
SUBMIT YOUR PAPER		SPECIAL ISSUE			

Home > Archives > **Vol 15, No 7 (2021)**

## Vol 15, No 7 (2021)

 Open Access  Subscription or Fee Access







### Full Issue

View or download the full issue

[VOL 15\\_N 7](#) 

### Table of Contents

#### Articles

<a href="#">Prototyping and Study of Jet Systems for Developing Mesh Turbomachines</a>	<a href="#">PDF</a> 
<i>Yuri A. Sazonov, Mikhail A. Mokhov, Inna V. Gryaznova, Victoria V. Voronova, Vladimir V. Mulyenka, Khoren A. Tumanyan, Mikhail A. Frankov, Nikolay N. Balaka</i>	335-345
<a href="#">Effect of Carbon Nanotube on Microstructure and Hardness of Sn96.5Ag3.0Cu0.5 Solder for Microelectronic Packaging</a>	<a href="#">PDF</a> 
<i>Intan Fatimah, Ghazali Omar, Husna A. Hamid, Mohd Azli Salim</i>	346-354
<a href="#">SEM Characterization and Tensile Properties of Alkali Treated Single Coir Fiber with Drying Procedure Variation</a>	<a href="#">PDF</a> 
<i>Aulia Windyandari, Ojo Kurdi, <b>Sulardjaka Sulardjaka</b>, Mohammad Tauviqirrahman</i>	355-364
<a href="#">Analysis of Salinity from Seawater on Physical and Mechanical Properties of Laminated Bamboo Fiber Composites with an Epoxy Resin Matrix for Ship Skin Materials</a>	<a href="#">PDF</a> 
<i>Parlindungan Manik, Agus Suprihanto, Sulardjaka Sulardjaka, Sri Nugroho</i>	365-377
<a href="#">Influence of Cutting Parameters on the Service Life of Twist HSS Drill Bit When Drilling C35 Steel</a>	<a href="#">PDF</a> 
<i>Fouad Afif, Nacer Mokas, Lakhdar Boulanouar</i>	378-384
<a href="#">Influence of Partial Replacement of Cement by Various Percentage of Scoria in Self-Compacting Concrete on Thermal Conductivity in the Jordan Building Construction for Energy Saving</a>	<a href="#">PDF</a> 
<i>Hani A. Al-Rawashdeh, Mohammad Al-Hwaiti, Amani Yaseen, Mohamed Ramadan Gomaa Behiri</i>	385-393

Please send any question about this web site to [info@praiseworthyprize.com](mailto:info@praiseworthyprize.com)

Copyright © 2005-2023 Praise Worthy Prize

**PRaise WORTHY PRIZE HOMEPAGE**

**SUBSCRIPTION**

Login to verify subscription  
[Give a gift subscription](#)

**NOTIFICATIONS**

- [View](#)
- [Subscribe / Unsubscribe](#)

**JOURNAL CONTENT**

Search

All

Browse

- [By Issue](#)
- [By Author](#)
- [By Title](#)
- [Other Journals](#)



**INFORMATION**

- [For Readers](#)
- [For Authors](#)
- [For Reviewers](#)

**FONT SIZE**

**USER**

Username

Password

Remember me


**ARTICLE TOOLS**

- 
- 
- 
- 



Praise Worthy Papers

[Most cited papers](#)



[Highly commended papers](#)

[Commended papers](#)

Most Popular Papers

[MILD Combustion: the Future for Lean and Clean Combustion Technology](#)  
N. Noor et al.  
4129 views since: 2014-01-31

[A Review of Piezoelectric Vibration Energy Harvesting Techniques](#)  
H. Xiao et al.  
2450 views since: 2014-05-31

[Integrated Oil Palm Fruit Digester-Separator-Screw Press Maching](#)  
N. Nduka  
2272 views since: 2013-07-31

[Evaluation of Mechanical Properties of Aluminium Alloy 7075 Reinforced with Tungsten Carbide and TiV-Asi](#)  
P. Vivekanandan et al.  
1973 views since: 2014-01-31

[A Parametric Optimization of FSW Process Using RSM Based Grey Relational Analysis Approach](#)  
D. Vijayan et al.  
1632 views since: 2014-03-27

HOME	PRaise WORTHY PRIZE	ABOUT	LOGIN	REGISTER	PWP ONLINE LIBRARY
CURRENT	ARCHIVES	ANNOUNCEMENTS	OTHER JOURNALS	DOWNLOAD ISSUES	
SUBMIT YOUR PAPER		SPECIAL ISSUE			

Home > Vol 15, No 7 (2021) > **Afif**

 Open Access  Subscription or Fee Access

## Influence of Cutting Parameters on the Service Life of Twist HSS Drill Bit When Drilling C35 Steel

Fouad Afif<sup>(1\*)</sup>, Nacer Mokas<sup>(2)</sup>, Lakhdar Boulouar<sup>(3)</sup>

(\*) Corresponding author

Authors' affiliations

- (1) Badji Mokhtar University, Annaba, [Algeria](#)
- (2) Badji Mokhtar University, Annaba, [Algeria](#)
- (3) Badji Mokhtar University, Annaba, [Algeria](#)

DOI: <https://doi.org/10.15866/ireme.v15i7.21174>

**Abstract**

This work aims to understand the influence of cutting parameters on the twist high-speed steel (HSS) drill bits wear when drilling C35 steel before and after quenching. An experimental investigation has been conducted using the planning experience methodology (L8) on C35 steel in the annealed and hardened states. The input parameters are cutting regime elements, cutting speed ( $V_c$ ), feed rate ( $f$ ), and drill diameter ( $D$ ), while the output parameters are the tool wear related to its tool life. The most interesting phenomenon is the controversial effect of cutting speed when drilling C35 steel in hardened conditions. The drilling life increases with increasing cutting speed for different cutting regimes (1 to 8). In addition, the 20 mm diameter drill related to the high value of the depth of cut ( $f$ ) has given better life before and after hardening, contrary to the literature on cutting tool life. The analysis of variance (ANOVA) has showed that the feed rate ( $f$ ) is the most significant factor in the annealed state while it is the depth of cut ( $ap$ ) in the hardened state. The correlation coefficients  $R^2$  determined by the ANOVA before, and after quenching, are very satisfactory, and testify the good adequacy of the proposed model.

Copyright © 2021 Praise Worthy Prize - All rights reserved.

**Keywords**

C35 Steel; Cutting Parameters; Hardening; Tool Life; Twist HSS Drill Bit; Wear

**Full Text:**



**References**

Tonshoff, HK. Spintig, W. Konig, W. Neises.An, Machining of holes developments in drilling technology, CIRP annals,43,2,551-561,1994,Elsevier.  
[https://doi.org/10.1016/S0007-8506\(07\)60501-0](https://doi.org/10.1016/S0007-8506(07)60501-0)

Junjie Zhou, Jianbo Yu, Chisel edge wear measurement of high-speed steel twist drills based on machine vision, Computers in Industry 128 (2021) 103436,  
<https://doi.org/10.1016/j.compind.2021.103436>

Ce Han, Ming Luo, Dinghua Zhang, Baohai Wu, Mechanistic modelling of worn drill cutting forces with drill wear effect, ScienceDirect, Procedia CIRP 82 (2019) 3-7  
<https://doi.org/10.1016/j.promfg.2019.04.332>

Byrne,G. Dornfeld,D. Denkena.B, Advancing cutting technology, CIRP Annals,52,2,483-507,2003,Elsevier.  
[https://doi.org/10.1016/S0007-8506\(07\)60200-5](https://doi.org/10.1016/S0007-8506(07)60200-5)

Ezugwu, EO. Key improvements in the machining of difficult-to-cut aerospace superalloys, International Journal of Machine Tools and Manufacture,45,12-13,1353-1367,2005,Elsevier.  
<https://doi.org/10.1016/j.ijmactools.2005.02.003>

Astakhov, Viktor P. Metal cutting mechanic, 1998,CRC press.  
<https://doi.org/10.1201/9781466571778>

S. Niketh, G.L. Samuel, Surface texturing for tribology enhancement and its application on drill tool for the sustainable machining of titanium alloy, 2017, Journal of Cleaner Production  
<https://doi.org/10.1016/j.jclepro.2017.08.178>

Prassan Shah, Navneet Khanna, Anil Kumar Singla, Anuj Bansal, Tool wear, hole quality, power consumption and chip morphology analysis for drilling Ti-6Al-4V using LN2 and LCO2, Tribology International,163 (2021) 107190  
<https://doi.org/10.1016/j.triboint.2021.107190>

Andreas Baumann, Ekrem Oezkaya, Dirk Schnabel, Dirk Biermann, Peter Eberhard, Cutting-fluid flow with chip evacuation during deep-hole drilling with twist drills, European Journal of Mechanics / B Fluids 89 (2021) 473-484, Elsevier.  
<https://doi.org/10.1016/j.euromechflu.2021.07.003>

Sultan, AZ . Sharif, Safian . Kurniawan, Denni. Chip formation when drilling AISI 316L stainless steel using carbide twist drill, Procedia Manufacturing, 2, 224-229, 2015, Elsevier.  
<https://doi.org/10.1016/j.promfg.2015.07.039>

David A. Stephenson\*, Ethan Hugheya, and Aleem A. Hashamb, Air flow and chip removal in minimum quantity lubrication drilling, Procedia Manufacturing 34 (2019) 335-342.  
<https://doi.org/10.1016/j.promfg.2019.06.171>

Tejas Na, Rahul M. Cadambia, Effect of Point Angle in Twist Drill Bit on Delamination in CFRP, Materials Today: Proceedings 21 (2020) 1278-1282, Science Direct, Elsevier.  
<https://doi.org/10.1016/j.matpr.2020.01.118>

J. Fernández-Pérez, J. L. Cantero, J. Díaz-Álvarez and M. H. Miguélez, Tool wear and induced damage in CFRP drilling with step and double point angle drill bits, Procedia Manufacturing 41 (2019) 610-617.  
<https://doi.org/10.1016/j.promfg.2019.09.049>

Ashrith, HS. Doddamani, Mrityunjay. Gaitonde, Vinayak. Effect of wall thickness and cutting parameters on drilling of glass microballoon/epoxy syntactic foam composites, Composite Structures, 211, 318-336, 2019, Elsevier.  
<https://doi.org/10.1016/j.compstruct.2018.12.022>

Lukyanov, AD. Onoyko, TS. Najafabadi, TA. Optimization of processing conditions when drilling deep holes: Twist drills, Procedia Engineering, 206,427-431,2017,Elsevier  
<https://doi.org/10.1016/j.proeng.2017.10.496>

Avinash D. Bagul, Dharmendra Kumar Dubey, Effects on hardness by various heat treatments processes on HSS tool bit, Materials Today: Proceedings 43 (2021) 694-699.  
<https://doi.org/10.1016/j.matpr.2020.12.619>

R. Periyasamy, V. Gopinath, G. Selvakumar, R.A. Kingsilly, S. Logeshwaran, Evaluation of the effect of cryogenic treatment of HSS drills in drilling SS310, Materials Today: Proceedings 37 (2021) 449-452.  
<https://doi.org/10.1016/j.matpr.2020.05.426>

R. Hari Nath Reddy, Mathew Alphonse, V.K. Bupesh Raja, K. Palanikumar, D.R. Sai Krishna Sanjay, K.V. Madhu Sudhan, Evaluating the wear studies and tool characteristics of coated and uncoated HSS drill bit - A review, Materials Today: Proceedings 46 (2021) 3779-3785, Elsevier.  
<https://doi.org/10.1016/j.matpr.2021.02.022>

Tomas, P. Smith, R and others. The wear failure of titanium nitride coated drills, Third International Conference on Manufacturing Engineering, 1986 Technology for Manufacturing Growth; Preprints of Papers, The 49,1986,Institution of Engineers, Australia.

Nitin P. Sherje, Sameer A. Agrawal, Ashish M. Umbarkar , Martins Paulo Sergio. Carneiro. Jose Rubens Gonaves Carneiro. Ba, Elhadji Cheikh Talibouya. Vieira, Vitor Ferreira. Study on roughness and form errors linked with tool wear in the drilling process of an Al-Si alloy under high cutting speed using coated diamond-like carbon high-speed steel drill bits, Journal of Manufacturing Processes, 62, 711-719, 2021, Elsevier.  
<https://doi.org/10.1016/j.jmapro.2021.01.006>

Okay S, Kaplan Y, Motorcu AR, Nalbant M. Evaluation of Cutting Tool Wear Characteristics and Removed Chip Volumes in Drilling of AISI D2 and AISI D3 Cold Work Tool Steels AISI D2 ve AISI D3,2013, 7th International Advanced Technologies Symposium (IATS'13), 30 October-1 November 2013, Istanbul, Turkey.

Kayhan, Mehmet. Budak, Erhan, An experimental investigation of chatter effects on tool life, Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture, 223, 11, 1455-1463, 2009, Sage Publications Sage UK: London, England.  
<https://doi.org/10.1243/09544054JEM1506>

Kaplan, Y., Motorcu, A.R., Nalbant, M. et al. The effects of process parameters on acceleration amplitude in the drilling of cold work

**PRaise WORTHY PRIZE HOMEPAGE**

**SUBSCRIPTION**  
Login to verify subscription  
[Give a gift subscription](#)

**NOTIFICATIONS**

- [View](#)
- [Subscribe / Unsubscribe](#)

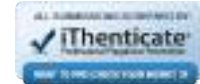
**JOURNAL CONTENT**

Search

All

**Browse**

- [By Issue](#)
- [By Author](#)
- [By Title](#)
- [Other Journals](#)



INFORMATION

- For Readers
- For Authors
- For Reviewers

FONT SIZE

USER

Username   
Password

Remember me

ARTICLE TOOLS

- 
- 
- 
- 



Praise Worthy Papers

[Most cited papers](#)

[Highly commended papers](#)

[Commended papers](#)

Most Popular Papers

[MILD Combustion: the Future for Lean and Clean Combustion Technology](#)

*N. Noor et al.*  
4129 views since: 2014-01-31

[A Review of Piezoelectric Vibration Energy Harvesting Techniques](#)

*H. Xiao et al.*  
2450 views since: 2014-05-31

[Integrated Oil Palm Fruit Digester-Separator-Screw Press Machine](#)

*N. Nduka*  
2272 views since: 2013-07-31

[Evaluation of Mechanical Properties of Aluminium Alloy 7075 Reinforced with Tungsten Carbide and Fly Ash](#)

*P. Vivekanandan et al.*  
1973 views since: 2014-01-31

[A Parametric Optimization of FSW Process Using RSM Based Grey Relational Analysis Approach](#)

*D. Vijayan et al.*  
1632 views since: 2014-03-27

HOME	PRaise WORTHY PRIZE	ABOUT	LOGIN	REGISTER	PWP ONLINE LIBRARY
CURRENT	ARCHIVES	ANNOUNCEMENTS	OTHER JOURNALS	DOWNLOAD ISSUES	
SUBMIT YOUR PAPER		SPECIAL ISSUE			

Home > Vol 15, No 7 (2021) > Sazonov

## Prototyping and Study of Jet Systems for Developing Mesh Turbomachines

Yuri A. Sazonov<sup>(1)</sup>, Mikhail A. Mokhov<sup>(2\*)</sup>, Inna V. Gryaznova<sup>(3)</sup>, Victoria V. Voronova<sup>(4)</sup>, Vladimir V. Mulenko<sup>(5)</sup>, Khoren A. Tumanyan<sup>(6)</sup>, Mikhail A. Frankov<sup>(7)</sup>, Nikolay N. Balaka<sup>(8)</sup>

(\*) Corresponding author

### Authors' affiliations

- (1) National University of Oil and Gas "Gubkin University", Russian Federation
- (2) National University of Oil and Gas "Gubkin University", Russian Federation
- (3) National University of Oil and Gas "Gubkin University", Russian Federation
- (4) National University of Oil and Gas "Gubkin University", Russian Federation
- (5) National University of Oil and Gas "Gubkin University", Russian Federation
- (6) National University of Oil and Gas "Gubkin University", Russian Federation
- (7) National University of Oil and Gas "Gubkin University", Russian Federation
- (8) CJSC "Russian Company for Shelf Development", Russian Federation

DOI: <https://doi.org/10.15866/ireme.v15i7.21163>

### Abstract

This paper presents a research aimed at developing energy-efficient turbomachines for complicated operating conditions at high gas temperature, high gas, or gas-liquid flow rate, or in the presence of solid abrasive particles in the flow. In the paper, the authors propose to consider possibilities for developing hybrid turbomachines with both jet device and impeller machine properties. The research has been carried out at the junction of two scientific and technical directions. The first one is associated with the field of mesh turbomachinery, while the second direction is associated with the field of jet control systems that enable to control the velocity vector (thrust vector). The software package FlowSimulation (FloEFD) has been used for computer simulation and computational research. The 3D model has been created using the SolidWorks CAD system. Examples show that using a curved mixing chamber, the ejector allows for an energy conversion process similar to the working process in an impeller machine. During the main working time, the gas jet is directed along a curved pipe that serves as a mixing chamber. The hypothesis about the possibility of creating a torque on the turbomachine shaft due to a pulsed reverse flow in the mixing chamber of the ejector located in the turbine rotor cavity has been tested. Based on the results of the computer simulation, conclusions about the prospects of hybrid turbomachines are drawn. Prototypes (micromodels) of the turbine have been developed by using additive technologies. Pneumatic and hydraulic tests of the micromodels confirmed the operability of the proposed technical solution. One of the development directions may be associated with the Euler turbine modernization. It is concluded that the scientific and technical potential of the Euler turbine has not yet been fully disclosed, and research work in this direction should be continued. Findings are applicable in various industries, including energy economy, robotics, aviation, and water transport.

Copyright © 2021 Praise Worthy Prize - All rights reserved.

### Keywords

Ejector; Energy Conversion; Gas Dynamics; Hydrodynamics; Turbine

### Full Text:

### References

- Yu. A. Sazonov, M. A. Mokhov, Kh. A. Tumanyan, M. A. Frankov, N. N. Balaka, Prototyping Mesh Turbine with the Jet Control System, *Periódico Tchê Química*, Vol. 17, n. 36, pp. 1160-1175, 2020.  
<https://doi.org/10.52571/PTQ.v17.n36.2020.1176> [Periodico36\\_pgs\\_1161-1175.pdf](#)
- Yu. A. Sazonov, Fundamentals of Calculation and Design of Pump-Ejector Installations (SUE "Oil and Gas Publishing House" of the Gubkin University, 2012).
- N. E. Konovalova, Calculation of the Minimum Drag of Lattice Wings and Their Elements and Comparison of the Calculated Results with the Experiment at  $M = 0.6 \div 4.0$ , *Air Fleet Technique*, n. 2 (673), pp. 36-43, 2005.
- S. M. Drozdov, Method of Determining the Full-Scale Aerodynamic Performance of an Airplane with Lattice Wings Based on the Results of Its Model Wind-Channel Tests, *TsAGI Science Journal*, Vol. XXXIII, n. 3-4, pp. 18-29, 2002.
- A. A. Sinyavin, Calculation and experimental study of the interaction of gas flows with permeable boundaries, Ph.D. dissertation, Lomonosov Moscow State University, Moscow, 2010.
- Y. Xue, L. Wang, S. Fu, Detached-Eddy Simulation of Supersonic Flow Past a Spike-Tipped Blunt Nose, *Chinese Journal of Aeronautics*, Vol. 31, n. 9, pp. 1815-1821, 2018.  
<https://doi.org/10.1016/j.cja.2018.06.016>
- C. Anbu Serene Raj, M. Narasimharadhan, N. Vaishnavi, S. Arunvinthan, A. Al Arjani, S. Nadaraja Pillai, Aerodynamics of Ducted Re-Entry Vehicles, *Chinese Journal of Aeronautics*, Vol. 33, n. 7, pp. 1837-1849, 2020.  
<https://doi.org/10.1016/j.cja.2020.02.019>
- A. V. Kostyukov, G. G. Nadareishvili, K. E. Karpukhin, G. S. Tuktakiev, K. O. Azarov, RF Patent No. 2.744.926 "High-Temperature Rotating Disk Regenerative Heater of the Working Body of the Power Plant" (Bul. No. 8, 2021).
- L. J. Orman, Aspects of Complexity of Metal-Fibrous Microstructure for the Construction of High-Performance Heat Exchangers: Thermal Properties, *Aviation*, Vol. 24, n. 3, pp. 99-104, 2020.  
<https://doi.org/10.3846/aviation.2020.12086>
- F. Giuliani, M. Stütz, N. Paulitsch, L. Andracher, Forcing Pulsations by Means of a Siren for Gas Turbine Applications, *International Journal of Turbomachinery, Propulsion and Power*, Vol. 5, n. 2, 9, 2020.  
<https://doi.org/10.3390/ijpp5020009>
- V. V. Kalachev, Jet Pumps. Theory, Calculation, and Design (Filin, Omega-L, 2017).
- V. I. Bogdanov, A. K. Dormidontov, V. V. Yakovlev, RF Utility Model Patent No. 202.545 "Ejector Augmenter" (Bul. No. 6, 2021).
- A. S. Berezhnov, Improving the performance of jet reaction pneumatic unit based on the model update of the work process, Ph.D. dissertation, Sumy State University, Sumy, 2014.
- Yu. A. Sazonov, M. A. Mokhov, Kh. A. Tumanyan, V. V. Voronova, M. A. Frankov, RF Patent No. 203.833 "Motor" (Appl. No.: 2020141544, Bul. No. 12, 2021).
- Yu. A. Sazonov, M. A. Mokhov, Kh. A. Tumanyan, M. A. Frankov, V. G. Timoshenko, RF Utility Model Patent No. 192.513 "Motor" (Appl. No. 2019120602, Bul. No. 26, 2019).
- V. N. Tarasov, Development of rational methods of designing partial pulse turbines, Doctoral dissertation, Bauman Moscow State Technical University, Moscow, 2009.
- A. I. Dovgiallo, A. A. Shimanov, The Possibility of Using a Bidirectional Impulse Turbine in a Thermoacoustic Engine, *Vestnik of Samara State Aerospace University*, Vol. 14, n. 1, pp. 132-138, 2015.  
<https://doi.org/10.18287/1998-6629-2015-14-1-132-138>
- E. I. Konchakov, Improvement of marine partial turbomachinery on small-sized models, Doctoral dissertation, Kuibyshev Far Eastern State Technical University, Vladivostok, 2001.
- E. Boccini, R. Furferi, L. Governi, E. Meli, A. Ridolfi, A. Rindi, Y. Volpe, Toward the Integration of Lattice Structure-Based Topology Optimization and Additive Manufacturing for the Design of Turbomachinery Components, *Advances in Mechanical Engineering*, Vol. 11, n. 8, pp. 1-14, 2019.  
<https://doi.org/10.1177/1687814019859789>
- Y. Zhang, F. Li, D. Jia, Lightweight Design and Static Analysis of Lattice Compressor Impeller, *Nature*, Vol. 10, n. 1, 18394, 2020.  
<https://doi.org/10.1038/s41598-020-75330-z>
- L. Magerramova, M. Volkov, A. Afonin, M. Svinareva, D. Kalinin, Application of light lattice structures for gas turbine engine fan blades, Proceedings of the 31st Congress of the International Council of the Aeronautical Sciences, : ICAS 2018 - CD-ROM PROCEEDINGS, Belo Horizonte, 2018, pp. 1-10.
- E. V. Krasnova, B. P. Saushkin, Additive Shaping of Products from Metals and Alloys by an Electron Beam. Selective Melting (Part 1), *Additive Technologies*, n. 2, 2021.  
<https://additiv-tech.ru/publications/additivnoe-formoobrazovanie-izdeliy-iz-metallov-i-splavov-puchkom-elektronov>
- X. Ding, P. Guo, K. Xu, Y. Yu, A Review of Aerial Manipulation of Small-Scale Robotcraft Unmanned Robotic Systems, *Chinese Journal of Aeronautics*, Vol. 32, n. 1, pp. 200-214, 2019.  
<https://doi.org/10.1016/j.cja.2018.05.012>

PRaise WORTHY PRIZE HOMEPAGE

SUBSCRIPTION

Login to verify subscription  
Give a gift subscription

NOTIFICATIONS

- View
- [Subscribe / Unsubscribe](#)

JOURNAL CONTENT

Search

All

Browse

- [By Issue](#)
- [By Author](#)
- [By Title](#)
- [Other Journals](#)

