



ISSN 1454-9166

**ANNALS  
OF THE UNIVERSITY OF PETROSANI**  
*MECHANICAL ENGINEERING*

**VOL. 20 (XLVII)**

**UNIVERSITAS Publishing  
PETROȘANI – ROMANIA  
2018**

**EDITOR OF PUBLICATION**  
**Prof. PhD. Eng. Sorin Mihai RADU**

---

**ADVISORY BOARD:**

**Prof.Eng. Moise-Ioan ACHIM Ph.D.** - "1 Decembrie 1918" University of Alba-Iulia, *Romania*;  
**Prof.Eng. Iosif ANDRAȘ Ph.D.** - University of Petroșani, *Romania*;  
**Prof.Eng. Nicolae-Napoleon ANTONESCU Ph.D.** - "Petroleum-Gas" University of Ploiești, *Romania*;  
**Prof.Eng. Alexandru BOROIU Ph.D.** - University of Pitești, *Romania*;  
**Prof.Eng. Ioan CĂRȚIȘ Ph.D.** - Politechnical University of Timișoara, *Romania*;  
**Prof.Eng. Ion CIUCĂ Ph.D.** - "Politehnica" University of București, *Romania*;  
**Prof. Eng. Pascu-Mihai COLOJA Ph.D.** - "Petroleum-Gas" University of Ploiești, *Romania*;  
**Prof.Eng. Predrag DAŠIĆ Ph.D.** - High Technical Mechanical School R. Krstića, Trstenik, *Serbia*;  
**Prof.Eng. Sorin DIMITRIU Ph.D.** - "Politehnica" University of București, *Romania*;  
**Prof.Eng. Valeriu DULGHERU Ph.D.** - Tech.University of Moldova, Chișinău, *Republic of Moldova*;  
**Assoc.Prof.Eng. António GONÇALVES-COELHO Ph.D.** - Universidade Nova de Lisboa, *Portugal*;  
**Prof.Eng. Otto GRIGOROV Ph.D.** - National Technical University of Kharkov, *Ukraine*;  
**Prof.Eng. Anatoli GHRABCHENKO Ph.D.** - National Technical University of Kharkov, *Ukraine*;  
**Prof.Eng. Nicolae ILIAȘ Ph.D.** - University of Petroșani, *Romania*;  
**Prof.Eng. Ioan-Iulian IRIMIE Ph.D.** - University of Petroșani, *Romania*;  
**Prof.Eng. Iosif KOVACS Ph.D.** - University of Petroșani, *Romania*;  
**Assoc.Prof.Eng. Krzysztof KOTWICZA Ph.D.** - AGH University of Science and Technology, *Poland*;  
**Assoc.Prof.Eng. Gábor LADÁNYI Ph.D.** - University of Miskolc, *Hungary*;  
**Assoc.Prof.Eng. Traian MAZILU Ph.D.** - "Politehnica" University of București, *Romania*;  
**Prof. Eng. Mihai MINESCU Ph.D.** - "Petroleum-Gas" University of Ploiești, *Romania*;  
**Prof.Eng. Marin-Silviu NAN Ph.D.** - University of Petroșani, *Romania*;  
**Assoc.Prof.Eng. Mircea NICOARĂ Ph.D.** - Politechnical University of Timișoara, *Romania*;  
**Prof.Eng. Gyula PATKO Ph.D.** - University of Miskolc, *Hungary*;  
**Prof.Eng. Eugen PAY Ph.D.** - North University of Baia-Mare, *Romania*;  
**Assoc.Prof.Eng. Eugen PĂMÎNTAȘ Ph.D.** - Politechnical University of Timișoara, *Romania*;  
**Prof.Eng. Șerban RAICU Ph.D.** - "Politehnica" University of București, *Romania*;  
**Prof.Eng. Janusz REȘ Ph.D.** - AGH University of Science and Technology, *Poland*;  
**Prof.Eng. Alexei TOCA Ph.D.** - Technical University of Moldova, Chișinău, *Republic of Moldova*;  
**Prof.Eng. Raul R. TURMANIDZE Ph.D.** - Technical University of Tbilisi, *Georgia*;  
**Prof.Eng. Nicolae UNGUREANU Ph.D.** - Technical University of Cluj-Napoca, *Romania*;  
**Prof.Eng. Ioan VIDA-SIMITI Ph.D.** - Politechnical University of Cluj-Napoca, *Romania*;  
**Assoc.Prof.Eng. Zoltán VIRÁG Ph.D.** - University of Miskolc, *Hungary*;

---

**EDITORIAL BOARD:**

**Editor-in-chief:** Assoc.Prof.Eng. Sorin MIHĂILESCU Ph.D. - University of Petroșani, *Romania*  
**Deputy Editor:** Lecturer Eng. Andrei ANDRAȘ Ph.D. - University of Petroșani, *Romania*  
**Associate Editors:** Prof.Eng. Ioan-Lucian BOLUNDUȚ Ph.D. - University of Petroșani, *Romania*;  
Assoc.Prof. Eng. Iosif DUMITRESCU Ph.D. - University of Petroșani, *Romania*;  
Assoc.Prof.Eng. Gabriel PRAPORGESCU Ph.D. - University of Petroșani, *Romania*;  
Prof.Eng.Habil. Florin Dumitru POPESCU Ph.D. - University of Petroșani, *Romania*;  
Assoc.Prof.Eng. Sorin VĂTAVU Ph.D. - University of Petroșani, *Romania*

---

**Editorial office address:**

University of Petroșani, 20 University Street, 332006, Petroșani, Romania,  
**Phone:** (40) 254/54.29.94, 54.25.80, 54.25.81, 54.25.82, **Fax.** (40)254/54.34.91, 54.62.38,  
<https://www.upet.ro/annals/mechanical/> E-mail: [andrei.andras@gmail.com](mailto:andrei.andras@gmail.com)

---

## Contents

Doșa, I., Tomuș, O.B., <i>Power demand of the TK-R 16/8 turbocompressor function of inlet conditions</i>	5
Dumitrescu, I., Itu, R.-B., <i>Frangible coupling a safety element in airports' traffic</i>	11
Florea, V. A., <i>Researches on wear and reliability of some subassemblies and spare parts of technological equipment</i>	19
Gavriliuță, A., <i>Design of a learning platform for 5S method for using to improve a manufacturing system</i>	27
Hlavatá, P., Maxaa, J., <i>Flow analysis of the pressure distribution in the experimental chamber of the differential pumping</i>	33
Hristova, T., <i>Methodology for determining the replacement period for lifter bars for the surface industry</i>	41
Lupu, A.-C., Petrescu, M., <i>Equipment for water ozonation in fish breeding lakes</i>	51
Lupu, A.-C., Petrescu, M., <i>Mobile autonomous aerator</i>	59
Radu, S.M., Popescu F.D., Andraș, A., Kertesz (Brînaș), I., Tomuș, O.B., <i>Simulation and modelling of the forces acting on the rotor shaft of BWEs, in order to improve the quality of the cutting process</i>	63
Romenda, R., Virág, Z., Magyar, T., <i>Separation processing methods of waste electronic and electrical equipment</i>	73
Rusu, R., Alexandru, T.-G., Manole, M., <i>A two-stage macro based approach for developing aircraft engine components concessions based on surface morphing technologies</i>	79
Stoicuța, O., Nan, M. S., Grecea, D., Plotogea, C., <i>Modeling and simulation of the sterile rocks excavation process using bucket wheel excavators</i>	89
Șerban, G., <i>Analysis of micro-profile machining of the non-planar surfaces of injection molds for polymeric composites</i>	99
Șoica, F.F., Egri, A., Stanimirescu, A., <i>Analysis of quality indicators from slurry decanters</i>	105

Vátavu, S., <i>Plunger hydraulic machines. Typology, calculation principles and applications in mining</i>	111
Virág, Z., Fülöp, V., Molnár, J., <i>Initial steps to develop a cutting and hauling adapter for dimension stone mining</i>	121
Index of Authors	127
Instructions for Authors	128

### INDEX OF AUTHORS

<b>A</b>		<b>M</b>	
Alexandru, T.-G.,	79	Magyar, T.,	73
Andraș, A.,	63	Manole, M.,	79
<b>D</b>		Maxaa, J.,	33
Doșa, I.,	5	Molnár, J.,	121
Dumitrescu, I.,	11	<b>N</b>	
<b>E</b>		Nan, M.S.,	89
Egri, A.,	105	<b>P</b>	
<b>F</b>		Petrescu, M.,	51, 59
Florea, V.A.,	19	Plotogea, C.,	89
Fülöp, V.,	121	Popescu, F.D.,	63
<b>G</b>		<b>R</b>	
Gavriluță, A.,	27	Radu, S.M.,	63
Grecea, D.,	89	Romenda, R.,	73
<b>H</b>		Rusu, R.,	79
Hlavatá, P.,	33	<b>S</b>	
Hristova, T.,	41	Stanimirescu, A.,	105
<b>I</b>		Stoicuța, O.,	89
Ítu, R. B.,	11	<b>Ș</b>	
<b>K</b>		Șerban, G.,	99
Kertész, (B.) I.,	63	Șoica, F.F.,	105
<b>L</b>		<b>Ș</b>	
Lupu, A.-C.,	51, 59	Tomuș, O.B.,	5, 63
		<b>V</b>	
		Vătavu, S.,	111
		Virág, Z.,	73, 121

## **INSTRUCTIONS FOR AUTHORS<sup>1</sup>**

**THE TITLE OF THE PAPER WILL BE WRITTEN WITH CAPITAL LETTERS, CENTERED, AT 7.0 cm FROM THE UPPER EDGE OF A4 FORMAT, ALONG THE ENTIRE WIDTH, TIMES NEW ROMAN, 14 POINTS, BOLD.**

(14 points)

(14 points)

**The first name and the family name will be written with CAPITAL LETTERS, BOLD, CENTERED, 130 mm width, Times New Roman, 12 points, each name being followed by number, and in the footnote the didactic and scientific degree, the position and place of work of the authors (possibly fax, E-mail) are indicated, with italics, 130 mm width, Times New Roman, 11 points.**

(12 points)

(12 points)

**<Tab> Abstract: (Times New Roman, 10 points, bold)** The Abstract will only be in English and will have between 50 and 100 words, arranged all over the entire width, single, left – right alignment, all over the width of the printed space, Times New Roman, 10 points.

(10 points)

(10 points)

**<Tab> Key words: (Times New Roman, 10 points, bold)** 5 – 10 words, in English, along the entire width, Times New Roman, 10 points.

(10 points)

(10 points)

(10 points)

**<Tab> 1. THE TITLE OF THE CHAPTER IS WRITTEN WITH CAPITAL LETTERS, BOLD, TIMES NEW ROMAN, 11 POINTS AND WILL BE NUMBERED WITH ARABIC NUMBERS.**

(11 points)

**<Tab>** The paper text paragraphs will be left – right aligned. The lines of the entire text will be single spaced with Times New Roman fonts, size 11 points.

The paper will be edited in a language of international circulation (English, French, German) on A4 format (210 x 297), page setup: top 5.6 cm, bottom 4.6 cm, left 3.7 cm, right 3.7 cm, in WORD and the number of pages must be even between 4 and 16. The size of the symbol is given next and is written in the instructions used to assist in editing the text. It indicates a blank line and does not show in the text of the paper, being obtained by pressing <ENTER>. The size of a <Tab> is 1.27 cm. No blank line is left between the paragraphs. Between the last line before the title and the title of the chapter and between the title and the first next line a blank line is left for each.

---

<sup>1</sup> *Professor Eng., Ph.D. at the University of Petroşani, email adress*

**<Tab> 1.1 Subchapter. Subchapters can be used in the text, numbered with the number of the chapter and a number showing the number of the subtitle within the chapter. The subchapters and the numbers are Times New Roman, 11 points, bold.**

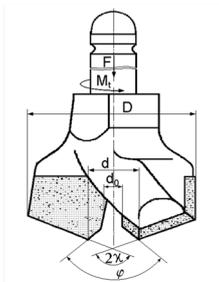
(11 points)

The text is written in new paragraph and not continuing the subtitle, an 11 point blank line being left between the subtitle and the following text.

(11 points)

## **2. PRESENTATION OF THE FIGURES**

(11 points)



**Fig. 1.** Detachable bearing figure. The figures will be surrounded by text.

(11 points)

## **3. PRESENTATION OF THE TABLES**

(11 points)

The tables will be enclosed in the text, a 10 points blank line being left above and under the table, and will be numbered with Arabic numbers. Both the number and the explanations to the table are written with Times New Roman, 10 points, italic, for the number and bold for the explanation to the table, centered in the space of the table and above it. The table entries will be Times New Roman, 10 points, bold, and the data in the table will be Times New Roman, 10 points. The thin lines of the table will be ½ points (0.02 cm), and the thick ones will be ¾ ... 1 points (0.03 ... 0.04 cm).

(11 points)

## **4. PRESENTATION OF THE MATHEMATICAL EQUATIONS**

(11 points)

The mathematical equations will be with times New Roman, 11 points, center of the page and numbered on the right with Arabic numbers between round brackets.

(8 points) <Blank line 8 point high>

$$X^2 + Y^2 = Z^2 \quad (1)$$

(8 points) <Blank line 8 point high>

An 8 point high blank line is left between the last line before the relation and the relation and between the latter and the next first line.

The last page will be at least 2/3 full.

The pages of the paper will only be numbered by a pencil outside the printing space.

(11 points)

**REFERENCES** (will be written according to the model, Times New Roman 10 points).

(10 points)

- [1]. **Marian I.**, *Mining mechanization*, Technical Publishing House, Bucharest, 1969 (Romanian language)