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PROGRAM

and

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DATE	HOUR	VIDEOCONFERENCES
May 12	11:00	OPENING SESSION
	12:00	Session 4: MECHANICAL ENGINEERING
	15:00	Session 1: FUNDAMENTAL SCIENCES
May 13	12:00	Session 2: COMPUTERS ENGINEERING
	15:00	Session 5: MATERIALS ENGINEERING
	18:00	Session 3: ELECTRICAL ENGINEERING
May 14	12:00	Session 4: MECHANICAL ENGINEERING
	15:00	Session 5: MATERIALS ENGINEERING
	18:00	Special session: VIRTUAL ROUND TABLE MEETING
END of the CONFERENCE		

May 12, 2021

OPENING of the CONFERENCE

Chairmen: Sorin RAȚIU and Tihomir LATINOVIC

11:00	**Speaker:** Florin DRĂGAN *University Politehnica Timișoara*
	Speaker: Gelu Ovidiu TIRIAN *University Politehnica Timișoara, Faculty of Engineering Hunedoara*
	Speaker: Tihomir LATINOVIC *University of Banja Luka*

May 12, 2021

Session 1 - FUNDAMENTAL SCIENCES

Chairmen: Diana BISTRIAN and Biljana VOJVODIC

15:00	**Speaker:** Raluca Bălașa (Politehnica University of Bucharest, Romania) **Title:** *A dynamic approach to wind tunnel testing under risk conditions assessment* **Authors:** R Bălașa, G Andrei, M Costea, E I Apostol and A Semenscu
15:10	**Speaker:** Justyna Orwat (Silesian University of Technology, Poland) **Title:** *Approximation of mining terrain subsidence induced by a multi- seam exploitation of hard coal deposits* **Authors:** J Orwat
15:20	**Speaker:** Justyna Orwat (Silesian University of Technology, Poland) **Title:** *Approximation of mining terrain inclinations caused by an exploitation of hard coal in a few seams by the use of polynomials* **Authors:** J Orwat
15:30	**Speaker:** Aleksey Samokhvalov (Russian Academy of Sciences, Bach Institute of Biochemistry, Russia) **Title:** *Electrophoretic study of G-quadruplex aptamer interactions with different short single-strand complementary oligonucleotides* **Authors:** A V Samokhvalov, A V Zherdev and B B Dzantiev
15:40	**Speaker:** Ihor Klymchuk (Ivano-Frankivsk National Technical University of Oil and Gas, Ukraine) **Title:** *Mountain tourist destination: the quality of groundwater sources* **Authors:** I Klymchuk, K Matiyiv, L Arkhypova and M Korchemlyuk
15:50	**Speaker:** Khrystyna Matiyiv (Ivano-Frankivsk National Technical University of Oil and Gas, Ukraine) **Title:** *Tourist destination and reference natural conditions: analysis of coexistence* **Authors:** K Matiyiv, I Klymchuk, M Korchemlyuk and L Arkhypova
16:00	**Speaker:** Ioana Ancuța Hălmaciu (University Politehnica Timisoara, Romania) **Title:** *Comparative analysis of the energy content of diverse fuels by using thermo-gravimetric investigations* **Authors:** I A Halmaciu, I Ionel, M R Wachter and A R Wachter
16:10	**Speaker:** Romulus Valeriu Corlan (University Politehnica Timisoara, Romania) **Title:** *Indoor air quality research within a furniture factory* **Authors:** R V Corlan, I Ionel, D Bisorca and R M Balogh
16:20	**Speaker:** Constantin Cătălin Niculescu (University Politehnica Timisoara, Romania) **Title:** *High demands of autonomous and connected vehicles at single-lane roundabouts* **Authors:** C C Niculescu
16:30	**Speaker:** Constantin Cătălin Niculescu (University Politehnica Timisoara, Romania) **Title:** *Priority strategy in arriving autonomous and connected vehicles at a single-lane roundabout* **Authors:** C C Niculescu
16:40	**Speaker:** Cornelia Victoria Anghel-Drugărin (Babeș-Bolyai University, Romania) **Title:** *Investigations of Electromagnetic Radiations (EMRs) in normal human life* **Authors:** Atif Abdulwahab A Oyouni, O Alzahrani, S Khalid Mustafa, S S Safaai, M Ayaz Ahmad, M R Ajmal, C V Anghel Drugărin and Mir Hashim Rasool
16:50	**Speaker:** Mohammad Ayaz Ahmad (University of Tabuk, Saudi Arabia) **Title:** *Multiplicity correlations of secondary charged particles produced in nuclear collisions at BNL energies* **Authors:** S Khalid Mustafa, C V Anghel Drugărin, Vyacheslav V Lyashenko, M Ayaz Ahmad, Mbunwe Muncho Josephine, Nursabah Sarikavakli and Mir Hashim Rasool
17:00	**Speaker:** Mohammad Ayaz Ahmad (University of Tabuk, Saudi Arabia) **Title:** *Effect of pre-sowing magnetic field simulation on biochemical change and growth of seed Phaseolus Vulgaris L* **Authors:** B Sawicka, B Krochmal-Marczak, P Pszczółkowski, D Skiba, B Bienia, S Khalid Mustafa, Meshari M H Aljohani, M Ayaz Ahmad and C V Anghel Drugărin

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Session 2 - COMPUTERS ENGINEERING

Chairmen: Manuela PANOIU and Miroslav ROGIC

12:00	**Speaker:** Cezara Raț (University Politehnica Timisoara, Romania) **Title:** *Technical considerations regarding the modeling and implementation of a WD application* **Authors:** A D Berdie, C Raț, A A Berdie and A M Berdie
12:10	**Speaker:** Stefana Janicijevic (Information Technology School of Belgrade, Serbia) **Title:** *New approach for graph based data mining model* **Authors:** S Janicijevic, A Mihajlovic and A Kojanic
12:20	**Speaker:** Tihomir Latinovic (University of Banja Luka, Bosnia and Herzegovina) **Title:** *Impact of COVID 19 on the information technology for online education, Education 4.0, challenges and solutions* **Authors:** T S Latinovic, L J Sikman, G Sikanjic, C Barz, A L P Vadean and P P Petrica
12:30	**Speaker:** Alexandru Gabriel Andrei (Politehnica University of Bucharest, Romania) **Title:** *Setting up new standards in aviation industry with the help of artificial intelligent – machine learning application* **Authors:** G Andrei, R Balasa and A Semenescu
12:40	**Speaker:** Umut Özkaya (Konya Technical University, Turkey) **Title:** *Blood donor classification by using ANN, KNN and SVM* **Authors:** F B Arı, H Bağdat and U Ozkaya
12:50	**Speaker:** Robert Bocak (Slovak University of Technology in Bratislava, Slovakia) **Title:** *New approach in assembly, disassembly and maintenance processes I4.0 by displaying in augmented reality environment* **Authors:** R Holubek, R Bocak and G O Tirian
13:00	**Speaker:** Matej Janicek (Slovak University of Technology in Bratislava, Slovakia) **Title:** *Verification of the voice control modification of robot - DOBOT Magician depending to change voice frequency* **Authors:** R Holubek, M Janicek and G O Tirian
13:10	**Speaker:** Abhishek Pandey (University, Kanchipuram, Tamil Nadu, India) **Title:** *A study on security threats in agricultural IoT and smart farming* **Authors:** A Pandey and V Ramesh
13:20	**Speaker:** Tahar Saadi (Research Center in Industrial Technologies, Algiers, Algeria) **Title:** *Monitoring and automated diagnosis of an air compressor unit by the application of artificial neural networks* **Authors:** T Saadi, M F Benlamnouar, N Bensaid and H Aouici
13:30	**Speaker:** Viktor Rychtárik (Slovak University of Technology in Bratislava, Slovakia) **Title:** *Digital Twin design at the material flow level* **Authors:** D R D Sobrino and V Rychtárik
13:40	**Speaker:** Daynier Rolando Delgado Sobrino (Slovak University of Technology in Bratislava, Slovakia) **Title:** *Developing simulation approaches: the case of Tecnomatix Plant Simulation in a simple case of Emulation for Logic Validation* **Authors:** D R D Sobrino, R Ružarovský, Š Václav and V Rychtárik
13:50	**Speaker:** Roman Ruzarovsky (Slovak University of Technology in Bratislava, Slovakia) **Title:** *A general take on a Tecnomatix Process Simulate´s Digital Twin creation and its exchange of information with the TIA Portal* **Authors:** R Ružarovský, R Skýpala, D R D Sobrino and G O Tirian

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Session 3 - ELECTRICAL ENGINEERING

Chairmen: Sorin DEACONU and Blanusa BRANKO

18:00	**Speaker:** Cătălin Ichim-Burlacu (University Politehnica Timisoara, Romania) **Title:** *Modeling the synchronous permanent magnet generator with RLC load* **Authors:** C Ichim-Burlacu, M Panoiu and C Rat
18:10	**Speaker:** Cezara Rat (University Politehnica Timisoara, Romania) **Title:** *The impact of communication on microgrid control* **Authors:** C Rat, M Panoiu and C Ichim-Burlacu
18:20	**Speaker:** Florina Piroi (Data Science Studio, Vienna, Austria) **Title:** *Efficiency of a small power photovoltaic installation connected to the low voltage network* **Authors:** E Spunei, I Piroi and F Piroi
18:30	**Speaker:** Weronika Kruszelnicka (University of Science and Technology in Bydgoszcz, Poland) **Title:** *Resource saving load control of induction pump motors in condition of power supply undervoltage* **Authors:** M Qawaqzeh, A Khasawneh, O Vovk, S Halko, S Kvitka, S Kurashkin, O Miroshnyk, T Shchur, W Kruszelnicka and A Tomporowski
18:40	**Speaker:** Mateusz Buza (University of Science and Technology in Bydgoszcz, Poland) **Title:** *Examples of the use of recyclate from photovoltaic cells* **Authors:** M Buza and W Kruszelnicka
18:50	**Speaker:** Angela Iagăr (University Politehnica Timisoara, Romania) **Title:** *Study about numerical relay 7SA612, the basic protection of 220 kV overhead transmission line* **Authors:** A Iagăr, G N Popa and C M Diniș
19:00	**Speaker:** Patrycja Walichnowska (University of Science and Technology in Bydgoszcz, Poland) **Title:** *The energy audit in the food industry* **Authors:** P Walichnowska
19:10	**Speaker:** Daniela Tabita Negrea (University of Oradea, Romania) **Title:** *Solutions for refurbishment, monitoring and control of hydrogenerating units. A case analysis* **Authors:** D T Negrea, A A Minda, M S Lolea and E R Szabo
19:20	**Speaker:** Daniela Tabita Negrea (University of Oradea, Romania) **Title:** *Continuous monitoring by S.C.A.D.A. systems of hydropower plants to increase the availability of electricity generation* **Authors:** D T Negrea, A A Minda, M S Lolea and E R Szabo
19:30	**Speaker:** Marius Lolea (University of Oradea, Romania) **Title:** *Contribution of electricity from renewable energy sources to obtain ecological hydrogen* **Authors:** M S Lolea, E M Barla, D T Negrea and A A Minda
19:40	**Speaker:** Marius Lolea (University of Oradea, Romania) **Title:** *A Fuzzy way to evaluate the electricity availability into hydrogen plants with photovoltaic panels* **Authors:** M S Lolea, E M Barla, D T Negrea and A A Minda

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Session 4 - MECHANICAL ENGINEERING

Chairmen: Camelia PINCA BRETOTEAN and Mladen TODIC

12:00	**Speaker:** Sorin Aurel Rațiu (University Politehnica Timisoara, Romania) **Title:** *Application of used engine oil in the asphalt pavement industry* **Authors:** S A Rațiu, M L Benea and M D Armioni
12:10	**Speaker:** Tomasz Zwiachel (Poznań University of Technology, Poland) **Title:** *Analysis of the strength of an innovative design of an organic farming potato harvester* **Authors:** Ł Gierz, T Zwiachel, K Przybył, K Koszela, A Duda and S Marek
12:20	**Speaker:** Weronika Kruszelnicka (University of Science and Technology in Bydgoszcz, Poland) **Title:** *Monitoring and analysis of the multi-disc comminution characteristics* **Authors:** W Kruszelnicka
12:30	**Speaker:** Mihaela Popa (University Politehnica Timisoara, Romania) **Title:** *Modern approach in a car accident with PC Crash program* **Authors:** A Dascăl, M Popa and V Rodic
12:40	**Speaker:** Oleh Onysko (Ivano-Frankivsk National Technical University of Oil and Gas, Ukraine) **Title:** *Investigation of the influence of tapered thread pitch accuracy on the strength of drill-string tool-joint* **Authors:** V Panchuk, O Onysko, V Kopei, V Vryukalo and T Lukan
12:50	**Speaker:** Camelia Pinca-Bretotean (University Politehnica Timisoara, Romania) **Title:** *Investigation of functional characteristics of composites used for break pads* **Authors:** C Pinca-Bretotean, Arun Kumar Sharma and A Josan
13:00	**Speaker:** Cosmin Constantin Suciu (University Politehnica Timisoara, Romania) **Title:** *Novel approach regarding hybrid-electrical turbocharger upon the production of vehicles* **Authors:** C C Suciu, S V Igret and I Ionel
13:10	**Speaker:** Valeriu Novac ("Dunărea de Jos" University of Galati, Romania) **Title:** *The Black Sea currents impact on naval operations* **Authors:** V Novac and E Rusu
13:20	**Speaker:** Nemanja Dobrnjac (University of Belgrade, Serbia) **Title:** *Analysis of the influence of working substance on the inversibility of heat pump components* **Authors:** M Dobrnjac, N Koruga and N Dobrnjac
13:30	**Speaker:** Boris Kecman (Altera doo, Banja Luka, Bosnia and Herzegovina) **Title:** *QFD method - a model for product improvement and development* **Authors:** Z Tanasić, B Kecman and G Janjić
13:40	**Speaker:** Yaroslav Kusyi (Lviv Polytechnic National University, Ukraine) **Title:** *The processing route planning of the executive surfaces of the mechanical engineering products using LM-hardness method* **Authors:** Y Kusyi and A Kuk
13:50	**Speaker:** Mohamed Farid Benlamnouar (Research Center in Industrial Technologies, Algiers, Algeria) **Title:** *Comparison between pulsed and direct of current gas tungsten arc welding for high strength low alloy welds* **Authors:** M F Benlamnouar, T Saadi, N Bensaid, M Zidani and Yazid Laib Dit Laksir

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Session 4 - MECHANICAL ENGINEERING

Chairmen: Camelia PINCA BRETOTEAN and Mladen TODIC

12:00	**Speaker:** Cosmin Preda (Lucian Blaga University of Sibiu, Romania) **Title:** *Study and thermal analysis of vanes shape design for brake discs in automotive industry* **Authors:** C Preda, R M Bleotu A K Sharma and C Pinca-Bretotean
12:10	**Speaker:** Cosmin Preda (Lucian Blaga University of Sibiu, Romania) **Title:** *Modeling and optimization of a new braking system used on the tricycle for controlled skidding* **Authors:** R M Bleotu and C Preda
12:20	**Speaker:** Damir Hodžić (University of Bihać, Bosnia and Herzegovina) **Title:** *Bending analysis of cantilever beam in Finite Element Method* **Authors:** D Hodžić
12:30	**Speaker:** Damir Hodžić (University of Bihać, Bosnia and Herzegovina) **Title:** *Modeling of influential machining parameters to the surface quality of wood* **Authors:** D Ramić, D Hodžić and A Hodžić
12:40	**Speaker:** Tihomir Latinovic (Uniersity of Banja Luka, Bosnia and Herzegovina) **Title:** *Identification of the coefficient of friction during axisymmetric wire drawing* **Authors:** M Todić, S Pašalić, M Merdanic and T Latinović
12:50	**Speaker:** Hamza Amirat (University of Dr. Yahia Fares, Medea, Algeria) **Title:** *Heat transfer and fluid flow in a channel containing five heated blocks with and without slot-jet* **Authors:** H Amirat and A Korichi
12:00	**Speaker:** Tomasz Kalaczynski (University of Science and Technology in Bydgoszcz, Poland) **Title:** *Modal analysis methods usage possibilities during virtual tests of designing multimedia mobile stages* **Authors:** T Kalaczynski
13:10	**Speaker:** Tomasz Kalaczynski (University of Science and Technology in Bydgoszcz, Poland) **Title:** *Analysis of dynamic effect on the structure of selected construction elements of mobile stage* **Authors:** T Kalaczynski
13:20	**Speaker:** Bogdan Dorel Cioroagă (University Politehnica Timisoara, Romania) **Title:** *Redesign of docking swingdock levers for increasing load capacity in resting position* **Authors:** B D Cioroagă, V G Cioată and I Kiss
13:30	**Speaker:** Robert Klosowiak (Poznan University of Technology, Poland) **Title:** *Heat transfer on the impinging wall of the reversing chamber* **Authors:** R Kłosowiak
13:40	**Speaker:** Bogdan Pulpea (Military Technical Academy "Ferdinand I", Bucharest, Romania) **Title:** *Study regarding real manufacturing automotive parts jointed through resistance spot welding* **Authors:** G B Pulpea, M Stănoiu, A Rotariu, I Voiculescu, D Pulpea and A Moldovan
13:50	**Speaker:** Dinu Iacob Poiană (University Politehnica Timisoara, Romania) **Title:** *Manufacture and processing of long tubular parts, by respecting environmental protection issues* **Authors:** D I Poiana, D Stan and I Ionel
14:00	**Speaker:** Patrycja Bałdowska-Witos (University of Science and Technology in Bydgoszcz, Poland) **Title:** *Preliminary assessment of the environmental impact of the first year of the COVID – 19 pandemic* **Authors:** P Bałdowska-Witos
14:10	**Speaker:** Patrycja Bałdowska-Witos (University of Science and Technology in Bydgoszcz, Poland) **Title:** *The impact of personal protective equipment on the environment in the time of the COVID-19 pandemic* **Authors:** P Bałdowska-Witos

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Session 5 - MATERIALS SCIENCE

Chairmen: Erika ARDELEAN and Dragoslav DOBRAS

15:00	**Speaker:** Raluca Suică-Bunhgez (ICECHIM Bucharest, Romania) **Title:** *Antioxidant and antimicrobial properties tested of AgNP-spring plant on E. coli and C. parapsilosis* **Authors:** I R Suica-Bunghez, I C Covaliu, A A Sorescu, L C Nistor, M Calin, I Raut and R M Ion
15:10	**Speaker:** Cristina Covaliu (Polytechnic University of Bucharest, Romania) **Title:** *Removal of Mn (II) ions from wastewater using Typha angustifolia* **Authors:** L I Diaconu, I C Covaliu, I R Suica-Bunghez and G Paraschiv
15:20	**Speaker:** Alaeddine Kaouka (Ecole Normale Supérieure de Laghouat, Algeria) **Title:** *Mechanical behavior and corrosion resistance of electrochemical borided titanium alloy Ti-6Al-4V* **Authors:** A Kaouka
15:30	**Speaker:** Alaeddine Kaouka (Ecole Normale Supérieure de Laghouat, Algeria) **Title:** *Dual phase α + β formed in Ti-6Al-4V titanium alloy and its mechanical characterization* **Authors:** A Kaouka
15:40	**Speaker:** Ana Alexandra Sorescu (ICECHIM Bucharest, Romania) **Title:** *Lamium purpureum – mediated phytosynthesis of silver nanoparticles: kinetics and antioxidant activity* **Authors:** A A Sorescu, A Nuta and I R Suica-Bunghez
15:50	**Speaker:** Ana Alexandra Sorescu (ICECHIM Bucharest, Romania) **Title:** *Catalytic degradation of Direct Orange 26 using Magnolia liliiflora – one pot green synthesized silver nanoparticles* **Authors:** A A Sorescu, A Nuta, I R Suica-Bunghez, R M Ion and M Calin
16:00	**Speaker:** Mohamed Farid Benlamnouar (Research Center in Industrial Technologies, Algiers, Algeria) **Title:** *Effect of alloying elements on weldability of high strength low alloy steel with austenitic stainless steel* **Authors:** M F Benlamnouar, N Bensaid, M Zidani, T Saadi, M Temmar and R Badji
16:10	**Speaker:** Cosmin Pascariu (National Institute of Research and Development for Electrochemistry and Condensed Matter, Timisoara, Romania) **Title:** *Synthesis and characterization of three dimensional porous materials based on cellulose fibers* **Authors:** C Mosoarca, C Pascariu, D Ursu, C Orha and R Banica
16:20	**Speaker:** Cosmin Pascariu (National Institute of Research and Development for Electrochemistry and Condensed Matter, Timisoara, Romania) **Title:** *Hydrothermal treatment of Mya arenaria exoskeletons in alkaline media* **Authors:** R Banica, A Bucur, C Pascariu, M Poienar, C Mosoarca, R Bucur, A Negrea and I Hulka
16:30	**Speaker:** Florina Stefania Rus (National Institute of Research and Development for Electrochemistry and Condensed Matter, Timisoara, Romania) **Title:** *Synthesis and Raman characterization of aerogels based on reduced graphene oxide* **Authors:** F S Rus, C Ladasiu and R Banica
16:40	**Speaker:** Doina Elena Gavrila (University "Politehnica" Bucharest, Romania) **Title:** *Morphological aspects and characteristics of composite materials with polymer matrix and metal powders* **Authors:** D E Gavrilă, V Stoian, A Caramitu and S Mitrea
16:50	**Speaker:** Patrycja Walichnowska (University of Science and Technology in Bydgoszcz, Poland) **Title:** *Efficiency of solid waste management* **Authors:** D Danylchenko, S Dryvetskyi, O Dovgalyuk, E Dyakov, O Miroshnyk, T Shchur, A Idzikowski, P Walichnowska, W Kruszelnicka, A Tomporowski, R Kasner and P Bałdowska-Witos

May 14, 2021

Session 5 - MATERIALS SCIENCE

Chairmen: Erika ARDELEAN and Dragoslav DOBRAS

15:00	**Speaker:** Imre Kiss (University Politehnica Timisoara, Romania) **Title:** *Developments of discontinuously reinforced aluminium matrix composites* **Authors:** C Bulei, I Kiss, B Stojanovic and D Utu
15:10	**Speaker:** Imre Kiss (University Politehnica Timisoara, Romania) **Title:** *Composite solutions with recycled textile wastes* **Authors:** M P Todor, I Kiss, M Rackov and V Cioata
15:20	**Speaker:** Imre Kiss (University Politehnica Timisoara, Romania) **Title:** *Reinforcing concrete with recycled plastic wastes* **Authors:** A Baciu, I Kiss, E Desnica and J Sarosi
15:30	**Speaker:** Daniela Miloștean (University Politehnica Timisoara, Romania) **Title:** *Study of air quality through suspended particles determination* **Authors:** D Miloștean and M Flori
15:40	**Speaker:** Mihai Radu (University Politehnica Timisoara, Romania) **Title:** *Technological aspects regarding the deoxidation of steels on EBT-LF-MTC technological flow* **Authors:** M Radu, T Heput, E Ardelean and M Ardelean
15:50	**Speaker:** Iulia Olivia Poenaru (University Politehnica Timisoara, Romania) **Title:** *Quality of continuous cast steel products used in automotive industry* **Authors:** O Poenaru, A V Socalici, A Budiul Berghian and C Birtok Băneasă
16:00	**Speaker:** Laurențiu Zgripcea (University Politehnica Timisoara, Romania) **Title:** *Unconventional method of cutting aluminum plates using fiber laser with oxygen assist gas* **Authors:** L Zgripcea, A Socalici, V Putan and C Birtok Băneasă
16:10	**Speaker:** Vasile Andrei Fodor (University Politehnica Timisoara, Romania) **Title:** *Use of recyclable materials in the circular economy* **Authors:** V A Fodor, A Socalici, T Heput and E Fodor
16:20	**Speaker:** Roxana Marina Solea (University Politehnica of Bucharest, Romania) **Title:** *About the managerial functioning of an economic organization, applicable to educational systems* **Authors:** A Ioana, D Tufeanu, C Nicolicescu, D I Luta (Manolescu), B C Ene, D I Juganaru and R M Solea
16:30	**Speaker:** Roxana Marina Solea (University Politehnica of Bucharest, Romania) **Title:** *About the managerial functions of an economic organization, applicable to educational systems* **Authors:** A Ioana, D Tufeanu, C Nicolicescu, D I Luta (Manolescu), B C Ene, D I Juganaru and R M Solea
16:40	**Speaker:** Suresh Aluvihara (University of Peradeniya, Sri Lanka) **Title:** *Chemical characterization of Sri Lankan dolomite for waste water treatments and advanced applications* **Authors:** S Aluvihara, C S Kalpage, P W S K Bandaranayake, W M A T Bandara and S Serban

May 14, 2021

Session 5 - VIRTUAL ROUND TABLE MEETING

Chairmen: Sorin RAȚIU and Tihomir LATINOVIC

18:00	*How can we create mixed teams for joint research?*

IFS – FUNDAMENTAL SCIENCES

Title: *A dynamic approach to wind tunnel testing under risk conditions assessment*

Authors: R Bălașa, G Andrei, M Costea, E I Apostol and A Semenscu

Abstract: This paper provides an overview of risk management and risk control in wind tunnel testing. The focus of this review is on approaches to identifying hazards based on "barrier analysis." The main feature of the method is to identify the source of risk, assess the level of the "barrier" that prevents a hazardous situation, monitor the risk's status and make improvements or set up new "barriers" if necessary, but also to identify and implement measures to reestablish risk control and, if possible, to reduce the unpleasant effects. This article proposes a risk assessment for an applicable wind tunnel project. In recent years, the INCAS Trisonic wind tunnel's measuring equipment and data acquisition system have been upgraded, resulting in an increase in the number of tests.

Title: *Approximation of mining terrain subsidence induced by a multi-seam exploitation of hard coal deposits*

Author: J Orwat

Abstract: Underground mining exploitation of hard coal deposits causes vertical displacements of terrain surface and a rise of subsidence trough on it. It's very important to make predictions of mining exploitation influences with a high accuracy. Evaluation of computational models applied in forecasting of exploitation effects is made on the basis of comparing forecasted values of deformation indicators with their average measured values. In this case subsidence of terrain surface caused by an exploitation of the 338/2, 358/1 and 341 hard coal seams have been observed. They on an observational line No. 8 after the end of exploitation in the 338/2, 358/1 coal seams and the 338/2, 358/1, 341 coal seams have been measured. Average values of measured subsidence on the way of approximation have been obtained. Approximation by the use of polynomials has been done. There a polynomial order and a sections number of approximationg function on the base of minimalization of a value of variability coefficient of random dispersion of observed subsidence have been chosen. Then the approximating values of measured subsidence with their values forecasted by the use of the Bialek's formula have been compared. Made comparisons showed that a mathematical model used to predictions of subsidence values in a good way imitates the average values of subsidence.

Title: *Approximation of mining terrain inclinations caused by an exploitation of hard coal in a few seams by the use of polynomials*

Author: J Orwat

Abstract: In the work methods of obtaining the forecasted values of mining terrain inclinations and their average values observed above an underground mining exploitation conducted in several hard coal seams located on a great depth have been presented. Exploitation in a southern part of Poland, in the Upper Silesian coal basin, in the 338/2, 358/1 and 341 hard coal seams by the use of a longwall system has been carried out. Predictions of exploitation impacts by the use of the Bialek's formula and the EDN-OPN computer program have been made. Influence of an operating periphery and a seams fall in calculations of forecasted values of terrain inclinations has been taken into account. Average values of inclinations measured on sections of an observational line No. 8 by approximation have been determined. A polynomial of higher order with division into the parts has

been used. A number its segments and its optimal order on the basis of minimalization of a value of variability coefficient of random dispersion of observed inclinations have been chosen.
Then the forecasted values of inclinations with their approximated measured values have been compared. It has been found that a formula used to a forecast of inclinations values caused by a multi-deposit operation of hard coal carried out on a great depth imitates well enough the approximated values of observed inclinations.

Title: *Electrophoretic study of G-quadruplex aptamer interactions with different short single-strand complementary oligonucleotides*

Authors: A V Samokhvalov, A V Zherdev and B B Dzantiev

Abstract: Aptamers are single-strand nucleic acids typically 20-80 nucleobases (n.b.) in length, which can bind different compounds with high affinity and selectively. Their ligand-binding properties can be attenuated by adding short complementary strands. These interactions open new opportunities for aptamer-based assays. Strong dependence between length and electrophoretic mobility of short nucleic acids makes polyacrylamide gel electrophoresis a powerful tool to study their complexes.
The interactions between 36 n.b. DNA G-quadruplex aptamer (5′-GAT-CGG-GTG-TGG-GTG-GCG-TAA-AGG-GAG-CAT-CGG-ACA-3′) specific to ochratoxin A and nine complementary single-strand DNA (ssDNA) were studied. The length of ssDNA was varied from 9 to 5 n.b. To maintain ligand-binding conformation of the aptamer, buffer with high content of salts (20 mM Tris-Acetate, 50 mM NaAc, 20 mM $MgAc_2$, pH 8.5) was used. The best resolution between the aptamer and its complex was provided for gel composition with 15% of monomer and monomer/cross-linker ratio 15 to 1.
Bands of free aptamer and ssDNA were observed for all studied variants. If ssDNA length was less than 9 n.b., position of the aptamer's band remains unchanged independent from aptamer/ssDNA ratios, and additional bands did not appear. The longest ssDNA (5′-CGC-CAC-CCA-3′) didn't lead to appearing of new band but slowed down the aptamer migration depending on the ssDNA concentration. In the presence of 27-fold ssDNA excess the relative position of aptamer band changed from 0.566 to 0.468.
Thus, electrophoresis visualizes aptamer-ssDNA interactions and so can be used in the development of analytical systems.
This study was financially supported by the Russian Science Foundation (Project No. 20-74-00112).

Title: *Mountain tourist destination: the quality of groundwater sources*

Authors: I Klymchuk, K Matiyiv, L Arkhypova and M Korchemlyuk

Abstract: The Carpathian region is distinguished by a high tourist flow and variety of hotels. The need for consumption of quality drinking water for tourists and local population is determined. Underground sources and wells constitute a water supply of accommodation facilities in this region. The issue of drinking water quality in the Carpathians remains poorly studied. It is necessary to realize the landscape, the content of heavy metals in the rocks, the differences in elevation, and tourist flow that can cause diffusion pollution.
Sources of water supply in the tourist area of the Ukrainian Carpathians are the subject of the article.
The sociological survey of the owners of local tourist accommodation facilities showed that 17.5% use surface sources, 48.8% use underground sources, 32.5% use mixed sources, 56.2% of respondents dispose of sewage disposal without proper water reclamation.
We took samples of drinking water from sources, wells in this region and analyzed such indicators

as pH, temperature, altitude, nitrates and nitrites, phosphates, ammonium, and mineralization. Sensafe's visual membrane tests for drinking water determined heavy metals such as Cu, Ni, Co, Zn, Cd, Hg, Fe in the water samples. The functional dependence of the content of heavy metals and the altitude zonation of drinking water sources for the region is described by the equation y = -0,059ln(x) + 0,4219.
The study is the basis for future research about the impact of large tourists flow on the environment in the term of sustainable tourism development.

Title: *Tourist destination and reference natural conditions: analysis of coexistence*

Authors: K Matiyiv, I Klymchuk, M Korchemlyuk and L Arkhypova

Abstract: The relevance of the study lies in the strong development of tourist destinations in mountainous areas at the beginning of the XXI century, which causes a change in the reference conditions of ecosystems. In particular, in the Ukrainian Carpathians, there is a steady trend of significant pollution of water bodies due to disordered drainage of wastewater from rural green estates, which are a popular place for tourists. In particular, in the Yaremche tourist destination of the Ivano-Frankivsk region of Ukraine there are about 1000 accommodation establishments, which receive from 0.5 to 1.5 million tourists annually. Sewage from small hotels and rural estates remains a problem, as the vast majority do not have centralized drainage systems.
The aim of the article is to assess the coexistence of a tourist destination and the reference conditions of aquatic ecosystems by studying the water quality in the Prut River and its tributaries, which tend to the clusters of the Yaremche tourist destination.
In the course of the research the data from the statistical reporting of the Prut river pollution by industrial enterprises were processed, the dynamics of the number of tourists of Yaremche tourist destination was analyzed and water samples were taken in ten sections of the Prut river - centers of tourist clusters. The pH values, temperature, nitrates and nitrites, phosphates, ammonium ion and mineralization were measured with the help of instruments. The content of such heavy metals as: Cu, Ni, Co, Zn, Cd, Hg, Fe in water samples was determined by visual membrane tests for Sensafe drinking water. The Index of surface water pollution for each tourist cluster is obtained. The cartographic model of the coexistence of the tourist destination and the reference conditions of the Carpathian mountain ecosystem was obtained with the help of Map Info software.
The scientific novelty is the obtained functional dependence between the number of tourists in tourist destination clusters and the water pollution index at each sampling point, which accumulates diffusion pollution of the territory.
The obtained results of the research are a component of further researches of the impact of oversized tourism on the environment for the purpose of sustainable tourism development.

Title: *Comparative analysis of the energy content of diverse fuels by using thermo-gravimetric investigations*

Authors: I A Halmaciu, I Ionel, M R Wachter and A R Wachter

Abstract: Thermogravimetry is a well-known analyzing technique in which the mass of a substance is monitored as a function of temperature or time as the sample specimen is subjected to a controlled temperature program in a controlled atmosphere. The basic method is based on measuring sensors for the mass loss, a controlled-atmosphere furnace, a temperature programmer, all interfaced to a computer. It is known as TG or DTG analysis. Kinetic parameters, stability, and changes in the composition are the most important results revealed from such analysis.
The article focuses on three different analysis run upon thee different fuels: one a fossil one (coal), the other is a classic biomass (renewable fuel), and the third is waste chicken manure. The conclusion is indicating that all three are having important energy content, showing specific points

in the TG and DTG curves. The similarities and the differences are pointed out. Also the techniques used is described, as it is worth to be considered for complex waste biomasses, which might be subject of biogas production. The technique is recommended in addition to classic thermal analysis and heating value determinations.

Title: *Indoor air quality research within a furniture factory*

Authors: R V Corlan, I Ionel, D Bisorca and R M Balogh

Abstract: Improving the life quality and condition depends also on in the environment. People spend daily most time inside buildings for work, sleeping, eating, resting, and doing sports and other activities. The article refers to a study case of an indoor research within a furniture factory and is achieved via instruments for collecting diverse indoor parameters, such as pressure, temperature, CO2, and PM (particulate matter) concentrations, noise and humidity levels. All data recorded are needed to evaluate the conditions of the indoor climate in which the workers are activating. The measuring methods are shortly introduced and the IAC (indoor air quality) index is expressed. The personnel activating in this factory is working intensely, standing up, and having to wear a mask considering the Covid19 context. Thus, it's important to depict each aspect that might trigger a concern if IAQ limits are over passed, not mentioning the synergetic context of the diverse effects. Through revealing the IAC, and the comfort/discomfort level PMV/PPD (predicted mean vote and predicted percentage dissatisfied) each one can benefit from this awareness and enhance the behavior in such a way that one might improve the indoor condition. The rapidly and irreversible climate changing, mostly due to increasing of the pollution level and exhaust of greenhouse gases should push humanity to make more studies of this kind and thus realize the need of improvement and development of new solutions whereby one can sustain the indoor environment as proper as possible, in addition to the outdoor climate.

Title: *High demands of autonomous and connected vehicles at single-lane roundabouts*

Authors: C C Niculescu

Abstract: The roundabouts gained popularity for being more reliable than any other type of intersection. They exist across the world's infrastructure nowadays.
The growing complexity of modern vehicles, together with embedded systems, can optimize traffic management considerably. Autonomous and Connected Vehicles (CAVs) can optimize traffic operations, minimize the time lost in the waiting queues, and improve the gap acceptance process. These enhancements that CAVs could achieve are applicable for the single-lane roundabouts, too, the intersection type considered for this paper.
Traffic management systems consist of application and management tools to increase the transportation systems' overall traffic performance and safety. A traffic management system collects data from heterogeneous sources, exploits such information to identify hazards that may degrade traffic performance, and then provides services to control them using Vehicle-to-Infrastructure (V2I) communication.
There are already researches aiming to improve traffic management, but the roundabout managers do not consider the high demands of vehicles for the single-lane roundabouts. By now, all simulations assumed low demands (typically 2-1000 vehicles/h).
This research performs a risk assessment of the potential failure of the roundabout manager created by the bottlenecks from the high demands of vehicles at single-lane roundabouts.

Title: *Priority strategy in arriving autonomous and connected vehicles at a single-lane roundabout*

Authors: C C Niculescu

Abstract: The increasing complexity of Autonomous and Connected Vehicles (CV/AV/CAV) can conduct to better traffic management. The roundabout management systems give CVs/AVs/CAVs optimal trajectories to negotiate the roundabout, leading to improved traffic efficiency and safety and decreased traffic incident response time. Vehicle-to-Infrastructure (V2I) communication ensures the communication between the roundabout management systems and CVs/AVs/CAVs. Further, use this information in addition to their sensing systems to create more reliable execution maneuvers.

The latest researches aim to increase traffic management, but the roundabout managers do not consider vehicle ranking. For example, emergency vehicles (police, fire service, ambulance, and civil defense) have a high ranking; thus, their priority at a single-lane roundabout is the highest. The international road legislation obliges all the traffic participants to give priority to the service vehicles.

This research performs a risk assessment of the potential failure of the roundabout manager from not considering the emergency vehicles (police, fire service, ambulance, and civil defense) at single-lane roundabouts.

Title: *Investigations of Electromagnetic Radiations (EMRs) in normal human life*

Authors: Atif Abdulwahab A Oyouni, O Alzahrani, S Khalid Mustafa, S S Safaai, M Ayaz Ahmad, M R Ajmal, C V Anghel Drugărin and Mir Hashim Rasool

Abstract: The ordinary electromagnetic fields (EMF), generated from various electrical/electronic devices have been implicated to influence a range of bodily functions. Based on their ubiquitous nature, widespread applications, and capability to produce deleterious effects, conclusive investigations of the health risks are critical. The electromagnetic environment is being rapidly altered by humans as a result of technological advancements. Some application of Phantom model has been discussed well in this article on the bases of the bio-effect of electromagnetic radiations. Scientific investigations concerning the interaction of EMF with living systems, especially its health effects, are increasing in number. An approach of specific absorption rate (SAR) distribution has been applied in this model. The present results have been complied with the European and USA standards (EN 50361, IEEE 1528) due to an assessment of dosimetric. A gripping device, DUT (Device Under Test) and software Open SAR were used to measure the transmitted radio-frequency (R. F.) or energy in general absorbed by human tissues. The SAR is a function of the electrical conductivity (σ), the induced electric field from the radiated energy (measured in Volt/meter) and the mass density of human tissue. Due to the high sensitivity of the probe, its output voltage is measured without amplification. The electric field probe corresponds to the recommendations of CENELEC (European Committee for the Coordination of Electrical Standards) and ICEEE (the International Committee of Electrical and Electronic Engineers) for measuring electromagnetic fields of cell phones, base stations, and various radiating devices. The DUT handle is constructed of a material with low energy loss and low permittivity. It allows moving axes (X, Y, Z) in all three dimensions (3D) or rotation around the phantom ear for precise positioning of device DUT. The calculated values of specific absorption rate (SAR) distribution were found approximate in order of (15±0.05) grams over per unit grams of human tissue. These results were found within good agreement with others.

Title: *Multiplicity correlations of secondary charged particles produced in nuclear collisions at BNL energies*

Authors: S Khalid Mustafa, C V Anghel Drugărin, Vyacheslav V Lyashenko, M Ayaz Ahmad, Mbunwe Muncho Josephine, Nursabah Sarikavakli and Mir Hashim Rasool

Abstract: In the present articles an attempt has been made for the determination of multiplicity distributions of the secondary charged particles produced in the central region of relativistic heavy ion collisions. Due to sophisticated measurement of energy in the nuclear emulsion experiment only some particles having special criteria could be selected to measure their energy with consenting accuracy. A hypothetical model is proposed to correlate the energy of the produced particles to their emission angles so that it becomes easy to estimate the energy distribution in terms of measured emission angle. The proposed model is constructed upon statistical thermodynamic assumptions. Moreover, two additional base functions are originated that play the role of the statistical angular weight factor and the nuclear density of the compressed nuclear matter at the moment of particle emission. The prediction of the model are compared with complete set of measured data of the reactions of proton, helium, carbon and neon nuclei with the composite emulsion nuclei as target at an energy of 14.6A GeV. The findings of simulated events show a good agreement with experimental data obtained by various workers [1-5] at different energies.

Title: *Effect of pre-sowing magnetic field simulation on biochemical change and growth of seed Phaseolus Vulgaris L*

Authors: B Sawicka, B Krochmal-Marczak, P Pszczółkowski, D Skiba, B Bienia, S Khalid Mustafa, Meshari M H Aljohani, M Ayaz Ahmad and C V Anghel Drugărin

Abstract: The present study based on a field experiment carried out between the years 2015-2017 in Żyznów (N 49°81', E 21°84', 239 m above sea level). The experiment was carried out using the randomized block method with three repetitions. The experimental factors were the exposure of magnetic field seed stimulation: I) 15 seconds; II) Thirty seconds and III) the control object, without seed stimulation. The thing of the study was a common bean, cv. Gold Saxa. The present work aimed to determine the effect of pre-sowing magnetic field stimulation of common bean seeds on plant growth and development elements. The biostimulation of sources by magnetic field improved energy, strength, and germination of seeds. Pre-sowing magnetic field stimulation of common bean seeds favourably affected the fresh weight of 1 and 5 leaves but has not affected their dry weight. The leaves' collection dates measured the new 1 and 5 plates and their dry weight content. The collection dates of leaves determined the level of fresh weight of 1. and 5. leaf and the content of their dry weight. The highest level of the leaves' fresh weight was achieved in full flowering, and the highest dry matter content of the leaves was found in the phase of pod setting.

2CE – COMPUTERS ENGINEERING

Title: *Technical considerations regarding the modeling and implementation of a WD application*

Authors: A D Berdie, C Raț, A A Berdie and A M Berdie

Abstract: Developed by the SAP (System Application and Products) concern, the new Dynpro Web technology aims to develop scalable business applications that comply with standardized user interface principles. This paper highlights how a Web Dynpro application consisting of several components can be modeled and implemented in the ABAP language (Advanced Business Application Programming) using a component binding technique based on the concept of MVC (Modell-View - Controller). All these aspects are presented through the case study, developed and implemented on the SAP NetWeaver integration platform version 7.0.

Title: *New approach for graph based data mining model*

Authors: S Janicijevic, A Mihajlovic and A Kojanic

Abstract: Communication Telco Network (CTN) is interdisciplinary field that is advanced concept of important Social Network Analysis (SNA). Objects in SNA are members of society discovered as vertices that are linked by edges. This paper presents identification of relevant vertices within connected components in telecommunication network graph, such as influencers. Beside this result, the algorithm describes behavior between component members, research interactions between components and telecom voice-sms services adoption. Algorithm is based on a combination of three important machine learning techniques - Classification technique Extreme gradient boosting (XGB), Isolated islands with a pruning method in graph.
This data mining model is used in telecommunication companies as part of marketing strategies and campaign management processes as influencer is awarded for contribution in network services spreading and adopting between members.

Title: *Impact of COVID 19 on the information technology for online education, Education 4.0, challenges and solutions*

Authors: T S Latinovic, L J Sikman, G Sikanjic, C Barz, A L P Vadean and P P Petrica

Abstract: After the COVID-19 crisis started, most countries have decided to temporarily close schools and colleges. This was done to reduce the spread of COVID-19. Learning was continuing online through distance education. Using the existing scientific papers and analysis of various surveys (Eurostat, PISA, ICILS, PIRLS, TALIS), the paper tries to clarify how the COVID-19 crisis-affected student learning and the development and use of Information Technology. The rapid development of science and technology has a great impact on human life. Digital technologies are leaders in achieving financial effects and innovations in the industry. Today's education should meet the needs of the industrial revolution. New curricula at universities must be adapted to the COVID-19 situation. The curriculum must include new technologies, using the Internet of Things (IoT), virtual laboratories, etc. On the other hand, professors have to correct teaching methods, which requires the use of new software and the fast Internet on which professors work. The education sector is also expected to align with the development of Education 4.0 in line with the development of Industry 4.0. New education takes place through blended learning, project-based learning and changed classrooms (public interaction and digital interaction). A quality education strategy requires appropriate investment in tools, accessibility, content and skills development, and training for teaching and administrative staff. We must not forget the infrastructure in terms

of availability of high-speed internet (new 5G internet), smart cities, smart healthcare, etc.

Title: *Setting up new standards in aviation industry with the help of artificial intelligent – machine learning application*

Authors: G Andrei, R Balasa and A Semenescu

Abstract: In these times, dominated by innovation, technology is an important asset in optimizing maintenance, aircraft operations and even the investigation process of aviation accidents, with unprecedented results so far.
All the information related to an aircraft, generated over time, can be included in a database, in order to be analyzed for better technical insights. The same approach can be applied in analyzing evidence and reports generated after an aircraft accident occurred.
Aircraft investigation involves tones of hard-working hours and evidence analysis. This research aims to identify a new tool to improve the investigation process of aircraft incidents caused by human factors errors. Using artificial intelligence to process the resulted evidence during the aircraft accidents investigation, will shed light on the root cause of the incident much faster. Accelerating an investigation means huge benefits for all parties involved.
In this sense, a proof-of-concept software has been developed to emphasize the power of artificial intelligent in the aircraft accidents investigation. Using machine learning algorithms, a program was trained with data, to develop an application capable of automatically determining the root cause of an accident based on witness statements.
All data was derived from the Aviation Safety Reporting System database from the U.S, which was queried for incidents, occurred between 2000 and 2020.
This application is not only about automating a stage in an aircraft accident investigation, is rather about setting up new standards in aviation industry with the help of artificial intelligence.

Title: *Blood donor classification by using ANN, KNN and SVM*

Authors: F B Arı, H Bağdat and U Ozkaya

Abstract: In this study, Artificial Neural Networks (ANN), Support Vector Machine (SVM), K-Nearest Neighbor (KNN) algorithms were used to predict blood analysis. Comparative analysis was made with Machine Learning Methods. Accuracy, sharpness, sensitivity, F1 score, sensitivity, and MCC metrics were used in the study. The proposed ANN structure reached 79.86% accuracy, 91.74% sensitivity, 42.86% specitivity, 83.33% precision, 87.34% F1 score, 39.82% MCC values in predicting blood analysis. This ANN structure showed the highest performance in predicting blood analysis, followed by KNN and SVM, respectively.

Title: *New approach in assembly, disassembly and maintenance processes I4.0 by displaying in augmented reality environment*

Authors: R Holubek, R Bocak and G O Tirian

Abstract: In the current ever-accelerating time of deployment of new production systems associated by various manipulating, technological and maintenance procedures, there is a demand from the point of view of the industrial sphere for shortening these operations and efficiency of the selected processes. It is the ability to visualize these processes using modern augmented reality (AR) technology that is the way to achieve the desired aspects. Visualization via smartphones, tablets, headsets in the AR environment allows users to provide comprehensive information with the exact procedure and information about the required tasks (assembly, disassembly, service

operations, maintenance, wiring diagrams, etc.). The use of AR technology, also in view of the ongoing pandemic situation Covid 19, makes possible to involve less qualified operators in the industrial sphere. Deployment of the less skilled operators in the production sphere, using AR technology, can make up for the shortage of skilled labor that is currently lacking in every industry. In this way, it is also possible to keep the industrial sector in good condition without undesirable factors such as production shutdowns, long service operations, and poorly trained service personnel.

Title: *Verification of the voice control modification of robot - DOBOT Magician depending to change voice frequency*

Authors: R Holubek, M Janicek and G O Tirian

Abstract: Voice control is becoming increasingly popular nowadays. Voice control is used, for example, in the car when entering navigation, in smartphones it is possible to search for the desired thing on the Internet using smartphones, or a smart home voice assistant will make grocery purchases if necessary. Is the reliability of voice control close to perfection or does it have its flaws? Continuous improvement of voice control proves that reliability still has unexplored possibilities for improvement. In collaborative robotics, multiword voice commands are more successful. In the longer time it takes to say the whole command, it is easier to identify the voice command and assign the correct task. Modifying the voice frequency also improves the success of the commands. This article examines single-word and multi-word voice commands and verifies modifications to the commands of a collaborative robot depending on the change in voice frequency.

Title: *A study on security threats in agricultural IoT and smart farming*

Authors: A Pandey and V Ramesh

Abstract: Agricultural sector plays a major role in the Indian economy. Even in 2020, the majority of Indian farmers use traditional tools for agriculture such as plough, sickle, etc. This leads to the wastage of energy and manpower and less yield per capita labour force. With Industry 4.0, the Internet of Things (IoT), Artificial Intelligence (AI), and Nano Technology, among others, is gaining prominence. It has revolutionized the industrial process and is bringing a significant change in the farming process and value chain. Globally, the farming sector is adopting genome editing and smart breeding technologies, and integrating digital AI-based technologies with microbial soil mapping to increase the output quality, develop pest and disease resistant seeds, etc. The physical threats will always be one of major and unpredictable risks in agriculture but there is an upward trend in the recent decades to attempt to minimize their impact by engaging new technologies. To this end, the agricultural domain applications are taking advantage of robust and trustworthy connectivity of different types of equipment, Internet of Things (IoT) networks, and cloud computing infrastructures. For example, the development of smart and precision agriculture applications in order to reduce the existing risks and maximize the production efficiency. Those innovations are only some of the notable achievements that have come as a result of the huge growth of ICT capabilities. On the other hand, with the rapid development of ICT, significant threats of different forms that attempt to exploit security-related vulnerabilities arise as well. In this study a survey on the benefits and the security threats imposed by the introduction of novel ICT technologies in the agricultural sector nowadays as well as on the associated mitigation measures and strategies. Research began with the advantages of ICT technologies and their importance in the agri-sector and then focused on the threats emerging alongside the evolution of smart agriculture or Agriculture 4.0.

Title: *Monitoring and automated diagnosis of an air compressor unit by the application of artificial neural networks*

Authors: T Saadi, M F Benlamnouar, N Bensaid and H Aouici

Abstract: The automation of monitoring and the diagnosis of the defects becomes increasingly essential because the modernization of the industrial facilities which becomes more complex, in front of the weakness of the human operator. The objective of this work consists with development of a system of diagnosis automated of the defects based on the technique of artificial intelligence "artificials neurals networks" applied to a compressing group of air installed to the compressor plant of air. This technique with its capacities of generalization and memorizing has enables to us to have effective diagnostic tools. Possibly, for the implementation of this technique in a system Intranet, a graphic interface is realized.

Title: *Digital Twin design at the material flow level*

Authors: D R D Sobrino and V Rychtárik

Abstract: Mass customization in industry is a current challenge for many organizations. Requirements for quality, functionality and uniqueness of products grow at a disproportionate pace, and at the same time price continues to be the main attribute of the customer for purchasing the product. There are many tools for reducing the cost of production for which none of the interested parties (companies and clients) are usually willing to pay. One of these tools is precisely the Digital Twin concept, which is the essence of the so-called Simulation 4.0. This concept focuses on the creation of digital prototypes of products and production processes at any of its difference instances including the material flow or plant level. Up until recently, Simulation had been known for being static in nature and using pre-determined or generated values – dead simulations without dynamics or interactions with real data. On the other hand, Simulation 4.0 is built on principles of the Digital Twin technology, which is flexible, time-changing and capable of interaction with the real world. Simulation 4.0 uses many tools as IoT, Big Data, Cloud Computing technologies used to process live data and sent to local or global databases. An essential part of the structure is the setting up of smart parts, machines and the paths and communication among them. This data is sent for further processing to analytical tools or to the simulation model that responds flexibly to the current state of production. Interactions between real-digital world can be interpreted as, for example, light signals, opening and closing gates or shut down the production. By creating smart objects across production, the entire production process can be controlled by simulation, which is the goal of creating sustainable production, and what the present paper pursues to demonstrate and achieve.

Title: *Developing simulation approaches: the case of Tecnomatix Plant Simulation in a simple case of Emulation for Logic Validation*

Authors: D R D Sobrino, R Ružarovský, Š Václav and V Rychtárik

Abstract: Over the years, simulation and simulation tools have provided industry and many other sectors with an incredible amount of information for the improvement of their processes. Together with the development of new technologies and industrial practices, simulation has also evolved leading to the new solution approaches, which are used in the context of the current industrial era or Industry 4.0. The present paper presents a take on the evolution of simulation leading up until Simulation 4.0 and some of its defining elements. Special emphasis is made in some of the approaches in this context as it is the case of the Digital Twin and the Virtual Commissioning ones. The paper also presents a simple application example that exemplifies a developing simulation

approach as it is the case of the emulation for logic validation. This is done from the optics of Tecnomatix Plant Simulation, which is a promising tool developing at a fast pace and offering not only great 3D capabilities but also sound analytics of the simulated instances.

Title: *A general take on a Tecnomatix Process Simulate´s Digital Twin creation and its exchange of information with the TIA Portal*

Authors: R Ružarovský, R Skýpala, D R D Sobrino and G O Tirian

Abstract: Digital twins are rapidly establishing themselves as a necessary step in digital change also in the design of automated and robotic manufacturing systems. The digital twin serves as an interface between physical industrial products and digital worlds. This allows you to map the continuous availability of data throughout the lifecycle from product planning and development, production and commissioning to use and recycling. An important step towards this goal is to create digital twins of the components in order to create a database usable for the design of new production systems in a virtual environment. One of the possibilities of using the digital twins is testing and virtual commissioning of production systems. Instead of the classic CAD model, the digital twin replaces a detailed digital image of individual components, including their full functionality. The Digital Twin comprises the CAD model, kinematic behavior model a most important is the logical behavior model. Our goal is to create a digital twin component of the production system, integrate a CAD model, create a kinematic model and a logical behavior model. This digital twin will have signals assigned to it for logical behavior. The result is the verification and testing of the information exchange between the virtual control system and the virtual model, using the Software-in-the-Loop method and the Tecnomatix Process Simulate software environment on the digital twin side and the Siemens TIA Portal on the controller side. The result of the knowledge is that the exchange of information is functional and usable for virtual commissioning.

3EE – ELECTRICAL ENGINEERING

Title: *Modeling the synchronous permanent magnet generator with RLC load*

Authors: C Ichim-Burlacu, M Panoiu and C Rat

Abstract: This paper is concerned with the modeling of the three-phase permanent magnet synchronous generator (PMSG) in the dq0 reference system while taking into account the effects of the load. The generator was considered to be directly connected to a balanced three-phase load. The loads under consideration were R and RLC type loads. The connection to the R load can be simulated using the standard PMSG dq model and Park transformations, but the connection to the RLC load requires the modeling of the system as a whole. LabVIEW simulations of these models were used in order to study the behavior of the PMSG under various load conditions (R, RL and RC). These models can be used to simulate the behavior of the PMSG in a conventional (natural gas, coal, etc.) or renewable (wind energy, hydropower, etc.) energy conversion system. They can also be used in designing the control of the energy conversion system (MPPT control, Droop control, etc.).

Title: *The impact of communication on microgrid control*

Authors: C Rat, M Panoiu and C Ichim-Burlacu

Abstract: This paper is concerned with the microgrid communication systems and their impact on the microgrid control system. Regardless of the control structure, a microgrid cannot exist without a communication system. An efficient and reliable communication network ensures the possibility of implementing a secure, durable and cost-effective microgrid. The configuration of the communication network depends on many factors, like the structure of the microgrid, the control objectives, the implementation costs, the maintenance costs, etc. In the case of centralized control, all relevant data from the entire system is collected and processed in a single controller. The failure of a communication link in this central controller may cause the entire microgrid to fail. Therefore, the existence of a robust and reliable communication system is vital and the creation of redundant communication links is also recommended. The situation is different in the case of decentralized control, where communication is limited to local controllers, but this leads to limited performance, therefore it is preferable for such microgrids to have at least a very basic communication system composed of simple and inexpensive communication network. In the case of distributed control, each subsystem has its own local controller (LC) with the ability to communicate with other controllers for the purpose of exchanging information. Thus, the most advantageous communication network architecture is a hybrid one that consists of a combination of centralized and decentralized control methods.

Title: *Efficiency of a small power photovoltaic installation connected to the low voltage network*

Authors: E Spunei, I Piroi and F Piroi

Abstract: Deploying photovoltaic installations to cover the electrical energy requirements of home and industrial consumer is both a national and an international trend. To determine the photovoltaic system's efficiency, the system must be continuously monitored. In this work, we present a case study for a 40 kW photovoltaic installation deployed for an industrial consumer. For a period of eleven days, we measured the energy levels that the consumer absorbed both from the national energy network and from the photovoltaic installation. We conclude that the photovoltaic installation covers approximately half of the energy required by the industrial consumer.

Title: *Resource saving load control of induction pump motors in condition of power supply undervoltage*

Authors: M Qawaqzeh, A Khasawneh, O Vovk, S Halko, S Kvitka, S Kurashkin, O Miroshnyk, T Shchur, W Kruszelnicka and A Tomporowski

Abstract: The paper considers the operational effects on induction motors of the pumping units drive and shows the relevance of resource-saving control of induction motors, especially high power, in conditions of reducing the supply voltage. The existing analysis methods of influence the voltage decrease on flow rate of insulation resource are considered. Their imperfection due to ignore simultaneous effect on motors insulation the undervoltage, their loading and mechanical characteristics type of drive unit have been established. It has been determined the rate of thermal wear of insulation depends exponentially on the following values: nominal rate of insulation thermal wear, parameter characterizing the insulation class, nominal constant winding temperature, nominal ambient temperature, current steady winding temperature, current ambient temperature. In turn, the excess winding temperature in steady-state operation depends on winding insulation class, which determines its nominal steady-state excess temperature, motor current multiplicity, power loss factor and winding conductor material, which corresponds to the temperature coefficient of resistance. Using the L-shaped substitution circuit of an induction motor, the relationship between the multiplicity of motor current and coefficient of deviation of supply voltage, motor slip and its parameters have been established. The working sections of induction motor and pump unit mechanical characteristics have been considered. The adequacy of obtained dependences was confirmed experimentally by the indirect method. On the basis of research, the law of pump units load regulation in conditions of reduced supply voltage while maintaining the rated flow rate of insulation life of the drive induction motors has been established.

Title: *Examples of the use of recyclate from photovoltaic cells*

Authors: M Buza and W Kruszelnicka

Abstract: The aim of the article is to discuss the issues related to the post-consumer management of photovoltaic panels. In particular, the recyclate from monocrystalline cells was analyzed in terms of use in various areas of the economy, such as construction, energy, industry, in the context of the new EU action plan for the circular economy. The article presents the current solutions used in the EU and identifies future challenges that accompany the dynamically developing industry. The increasing mechanical parameters of the modules determine the use of more advanced recycling methods. Consequently, this results in higher energy inputs during this process.

Title: *Study about numerical relay 7SA612, the basic protection of 220 kV overhead transmission line*

Authors: A Iagăr, G N Popa and C M Diniș

Abstract: In this work we analyzed the numerical relay 7SA612, which represents the basic protection of the 220 kV overhead transmission lines (OTL) starting from the Mintia electric station.

The main function of 7SA612 relay is the distance protection with 6 measuring systems. In addition, this relay offers a multitude of protection functions: earth-fault detection, tele protection, fault locator, power-swing detection/tripping, phase overcurrent protection, switch-onto-fault protection, STUB bus overcurrent protection, overvoltage/undervoltage protection, over/underfrequency protection, auto-reclosure, synchro-check, breaker failure protection, thermal overload protection.

We used the computer-controlled CMC 356 set for testing the 7SA612 relay at its mounting location. CMC 356 supplied the 7SA612 relay with the three-phase voltage and current set. Test Universe, the program of CMC 356, allowed the simulation of all possible OTL faults, in order to test the protection functions of 7SA612 relay. The protection characteristics of the 7SA612 relay were imported into the Test Universe program using the DIGSI program.
All analog quantities (voltages, currents) of the OTL in the pre-fault (1 s), fault (maximum 6 s) and post-fault (500 ms) period, can be analyzed as waveforms, phase diagrams, and positive, negative and zero sequence. The test bulletins gave complete information about how the analyzed protections worked, through the digital signals showing the start of the distance protection and the trigger pulse sent by 7SA612 relay to the breaker of OTL. Were measured the operation time, as well as their deviation from the nominal values, on each step of distance protection.
The tests showed that 7SA612 relay incorporates all the necessary functions for the protection of 220 kV OTL, both in case of single-phase and polyphase faults. 7SA612 relay cleares fast and selectively the faults on the analyzed 220 kV OTL.

Title: *The energy audit in the food industry*

Authors: P Walichnowska

Abstract: Constantly increasing amount of pollution makes that companies are looking for an effective, cost-effective and lowemission solution in order to produce the product. It is very important to save energy while maintaining a high quality of product. The paper explains the term related to the problem of energy analysis - energy efficiency. Two mechanisms supporting the increase in energy efficiency in enterprises are also described, namely the energy efficiency audit and the energy audit in enterprises. The main point of the article is to present the preliminary results of an energy audit of a packaging machine with two power options - gas or electric. The analysis was carried out on the basis of the machine installed in the food company.

Title: *Solutions for refurbishment, monitoring and control of hydrogenerating units. A case analysis*

Authors: D T Negrea, A A Minda, M S Lolea and E R Szabo

Abstract: Inside hydropower plants, an adjustment of the characteristics of the hydro -generators must be made periodically in order to be functional at the best parameters. Hydropower plants are energy sources that produce electricity very cheaply, in the conditions of Romania, and even if there are no incidents over time, the verification of the functional parameters is necessary. In this context, the paper analyzes the modernization works of the hydro- generators within a power plant belonging to EEA Bihor, Romania. Both technical and economic aspects of costs are highlighted. The authors propose certain interventions meant to increase the efficiency in operation of hydro-generators.

Title: *Continuous monitoring by S.C.A.D.A. systems of hydropower plants to increase the availability of electricity generation*

Authors: D T Negrea, A A Minda, M S Lolea and E R Szabo

Abstract: The electrical energy must correspond both qualitatively and functionally, as well as continuity in the supply of the receivers connected to the electric power systems. In order to be permanently available, it must be able to be monitored continuously. Thus, S.C.A.D.A. (Supervisory, Control and Data Acquisition) systems are installed in power plants. which allow the

monitoring and control of several functional parameters such as: the speed of the electric generator, the water level in the dam, the electric current supplied, the active and reactive power, the frictions in the rotor shaft, the temperature and the degree of cooling etc. The authors propose through this paper a correlation between the structure of monitoring installations with a sensor system well positioned in installations, tracking the probability of proper operation of hydropower plants, incidents in operation and the level of availability of electricity produced, by analyzing specific parameters in several plants SEE Bihor, Romania.

Title: *Contribution of electricity from renewable energy sources to obtain ecological hydrogen*

Authors: M S Lolea, E M Barla, D T Negrea and A A Minda

Abstract: At the forefront of renewable energy sources, hydrogen is an increasingly cost-effective form of energy recovery and storage. Both for motor vehicles and for industrial or residential use, in domestic applications. For this reason, it is necessary to introduce ecological hydrogen production facilities, on an ever-increasing scale. The authors of the paper therefore propose an analysis of the methods of obtaining hydrogen by hydrolysis using photovoltaic panels as the primary source of energy and final storage, either of hydrogen in the form of gas bottled under pressure in tanks, or of electricity obtained from hydrogen through galvanic cells.

Title: *A Fuzzy way to evaluate the electricity availability into hydrogen plants with photovoltaic panels*

Authors: M S Lolea, E M Barla, D T Negrea and A A Minda

Abstract: The performance of an installation, from the point of view of reliability, using probability theory, considers that it has two states: the state of good functioning and the state of failure.In reality, the transition from the operating state of an equipment to the failure state is achieved by going through several intermediate states, having certain other performance. Following this theory, the authors aim by fuzzy modeling, using the dedicated module from the Matlab program, to establish the performance of hydrogen production facilities by hydrolysis with primary energy source using photovoltaic panels. As input quantities in the simulation model will be done the parameters of solar energy with certain degrees of performance and as output quantities are the characteristics of hydrogen and electricity fuel cells that will highlight the efficiency of the installation and energy conversion.

4ME – MECHANICAL ENGINEERING

Title: *Application of used engine oil in the asphalt pavement industry*

Authors: S A Rațiu, M L Benea and M D Armioni

Abstract: The automotive industry presents a number of significant problems at the moment, including the waste it produces. Used engine oil is an eloquent example in this regard, as significant amounts of spent lubricant are generated annually, with a high pollutant potential. If conventional recycling measures cannot be applied, it is necessary to find alternative management solutions that do not allow the used oil to reach the environment. This article presents a review of the recovery of used engine oil in the asphalt pavement production and rejuvenation industry.

Title: *Analysis of the strength of an innovative design of an organic farming potato harvester*

Authors: Ł Gierz, T Zwiachel, K Przybył, K Koszela, A Duda and S Marek

Abstract: Small organic farms still use potato lifters for harvesting. This harvesting technology involves a lot of work because potatoes need to be picked manually. The aim of this study was to design an innovative organic farming potato harvester aggregated with a 38 kW tractor and to analyse its strength with the finite element method (FEM). The research assumption was to fit the innovative construction with a potato basket in order to minimise the labour consumption of organic potato cultivation. The project involved analytical calculations of the strength, which were followed by the design of a CAD model and a detailed strength analysis with the FEM. Autodesk Inventor and Femap were the programs used to aid the design of the machine. The designed model had no nodes where stresses would be greater than 32% of the maximum allowable stress in the material structure and 43% of the maximum allowable stress in the structure of welds. The innovative design of the potato harvester developed in this study can be used with all tractors (farm and orchard tractors) equipped with a three-point linkage.

Title: *Monitoring and analysis of the multi-disc comminution characteristics*

Authors: W Kruszelnicka

Abstract: Comminution processes are one of the most commonly used in food, chemical, cosmetics, pharmaceutical industry as well as the part of the recycling activities. Disc or multi-disc mills plays and important role in the comminution of biomaterials cause of their high effectiveness and throughput. One of the challenges, which the comminution technology have been facing for the long time, is decreasing the energy consumption and increasing throuhtput. To achive this, the complex knowledge about the comminution process inside the mill should be available. For this reason, the in-time monitoring systems of comminution characteristics, which ensures identification of the relations between changes of process parameters and comminution characteristics such as power consumption, throughput, specific energy consumption and size reduction ratio were applicated to the mills. The aim of this study is to analyze and identify the relationship between comminution process control parameters (eg. speed of dosing the batch, velocity of comminution elements) and comminution characteristics. The experiment on five-disc mill was carried out to achive the goals. The different disc velocities and batch dosing speeds were tested during rice and corn comminution. The results shows that the power consumption during the process is correlated with disc velocities cumulative gradient and the throughput correlated with batch dosing speed.

Title: *Modern approach in a car accident with PC Crash program*

Authors: A Dascăl, M Popa and V Rodic

Abstract: Road safety is linked to human behavior, road infrastructure and vehicles, and every year countless media campaigns are carried out around the world, precisely to raise awareness and try to reduce road risk behaviors.
Also, the reconstruction of road accidents is a contemporary and important issue, addressed by both private and public entities around the world. The current procedures frequently used by the police in the reconstruction of road accidents are based on: a measuring tape and/or measuring wheel; an agenda - for writing the sketch; a pencil; chalk, to mark the sidewalk; and a camera for photographic documentation. There are also some constraints on the current method of data collection that are identified in the work of police officers, such as:

- involves a significant amount of time spent at the scene of the accident by police officers who might otherwise be engaged in various tasks;
- causes a disruption of the regular traffic flow, with consequent economic and social;
- can lead to the loss of valuable data, due to the low level of detail in the sketch;
- exposes both police officers and civilians to unnecessary risks during the data collection process.

Thus, in many situations, the expert is faced with the lack of data necessary to perform a qualitative technical expertise and to accurately reproduce the dynamics of the accident.
In this sense, in order to be able to carry out an objective technical expertise, in accordance with the goals set by the research bodies, in addition to the classical methods already known by most technical experts such as: the use of established mathematical models, empirical methods, in the present time there is the possibility of using modern, complex methods, which ensure superior accuracy of the results obtained.
This methods optimally integrate the mathematical models used in the literature and the established empirical methods, but involve the use of computational tools that allow the expert to exploit his knowledge and ensure the possibility of reproduction by simulating road accidents so that at the end of the expertise to extract certain conclusions, which in other conditions would have been extremely difficult to formulate. In this sense, a modern tool used in conducting forensic and extrajudicial technical expertise is the program PC-Crash, specialized in simulating road traffic accidents, which covers a multitude of different situations, as it benefits from the advantages of the latest achievements in hardware and software. Thus, the latest technological developments allow technical experts to reconstruct road accidents in a new dimension, by implementing modern techniques offered by the latest advances in the field.
This paper presents the reconstruction of a possible road accident, in the absence of clear evidence, by analyzing the physical possibilities of the accident, based on the laws of physics, and the technical construction characteristics of vehicles and the configuration and characteristics of the road. The approach proposed by this paper can be adopted as a future solution, due to its advantages: fast, rigorous.

Title: *Investigation of the influence of tapered thread pitch accuracy on the strength of drill-string tool-joint*

Authors: V Panchuk, O Onysko, V Kopei, V Vryukalo and T Lukan

Abstract: Pipes and drill string elements are connected by tapered threads on the pin and box. These connections are called string-grid tool-joint. Such connections are made by lathe. Therefore, their accuracy largely depends on the kinematics of the lathe, as well as the accuracy of the profile of the cutters and their geometric parameters. One of the basic parameters of thread accuracy is its pitch. An important indicator for a tapered threaded connection is the accuracy of the Lead Angle of the threaded. Therefor these two parameters and their influence on strength are the objects in

this research. The presented theoretical researches became a basis of the software application developed by authors. Based on its use, the values of the input parameters for studying the strength of the connection are obtained. Based on the application of the finite element method in the axisymmetric model of a tapered thread tool-joint, the specified computer study is performed. The research results confirmed the effectiveness of the presented model and the practical significance of the developed application.

Title: *Investigation of functional characteristics of composites used for break pads*

Authors: C Pinca-Bretotean, Arun Kumar Sharma and A Josan

Abstract: The friction material used for the brake pads should have a low wear rate, outstanding thermal stability to hold the braking properties of the vehicle and coefficient of friction should constant under different operating conditions which include loads which applied, temperature, dry or wet braking environment and speed. Due to this reason, every newly developed friction material's fabrication should undergo a series of experimental tests to evaluate the friction as well as wear properties. In this article a study of frictional and wear behavior of friction material for ecological brake pads of road vehicles discussed. In the formulation of the friction material shells as a filler, a small amount of metal, silicon carbide, graphite, resin and hexametiltetramine were used. The main objective of the paper refers to the investigation of the impact of the working regime on friction material's tribological characteristics. In this sense, were studied the evolution of the coefficient of friction and the thermal field at the contact surface between the friction couplings, the influence of load on the friction coefficient at different speeds and the influence of load on wear rate at a constant speed. The knowledge of the functional properties of the newly developed friction material produced in the laboratory provides the possibility of pertinent assessments regarding the durability of the brake pads during operations, as well as on the quantity of wear products released into the atmosphere.

Title: *Novel approach regarding hybrid-electrical turbocharger upon the production of vehicles*

Authors: C C Suciu, S V Igret and I Ionel

Abstract: The paper focuses on research regarding hybrid-electrical turbocharger The concept of ETCh (electrical turbochargers), characterized by variable- and fixed-geometry, is well-known. The models of hybrid-electrical system use an electrical generator, mounted on the shaft, connecting the compressor wheel to the turbine. The common turbochargers are propelled by the exhaust gas pressure generated by the engine, this means that its speed goes up simultaneously, as the engine's speed does. Furthermore, when the throttle body shuts off, it creates a backpressure, which adds additional stress to the turbocharger. As result, the hybrid-electrical system normally wastes energy, in order to generate the needed electricity. But the resulted electricity can be further used to drive the turbocharger, when the engine speed is low. As consequences, better fuel consumption, more reduced emission concentrations and positive impact on the environment are expected. This concept is successfully used in various motorsport applications (Formula 1 and *Le Mans* series) since 2014, but the authors propose its further use, as basic concept, in the current production of vehicles, especially the hybrid powered ones.
The study is part of the PhD program of the main author.

Title: *The Black Sea currents impact on naval operations*

Authors: V Novac and E Rusu

Abstract: The Black Sea is a semi-enclosed sea with a poor water exchange with other seas,

which is of paramount importance to the circulation and water masses dynamics. Besides the water exchange, many other factors like seabed topography, salinity, thermal, and wave regimes impact the Black Sea water dynamics. Though the said waters do not have pronounced dynamics, the paper identifies the features of the sea currents, which are significant for naval operations, especially littoral operations, conducted in this basin. As observed data are scarce for the Black Sea basin, the paper will use the results from modeling currents parameters and altimetry data. The work can serve as awareness regarding the impact of currents on naval operations useful for scholars and practitioners.

Acknowledgment: This work was carried out in the framework of the research project DREAM (Dynamics of the REsources and technological Advance in harvesting Marine renewable energy), supported by the Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding – UEFISCDI, grant number PN-III-P4-ID-PCE-2020-0008.

Title: *Analysis of the influence of working substance on the inversibility of heat pump components*

Authors: M Dobrnjac, N Koruga and N Dobrnjac

Abstract: The heat pump is a device that raises thermal energy from a lower to a higher temperature level, while consuming energy. Thermodynamic analysis of the heat pump allows us to determine the interdependence of losses in particular parts of the device, as well as the impact of each local irreversibility on the efficiency of the device as a whole. The efficiency of a heat pump is influenced by the thermodynamic parameters of its individual parts: compressor, condenser, throttle valve and evaporator. In this paper, a comparison of different substances which are used as working fluids in heat pumps is analyzed, so as their influence on the irreversibility of heat pump components. The calculation was performed using the EES software package (Engineering Equation Solver) which is used for numerical modelling of thermodynamic systems, process optimization and creating process diagrams.

Title: *QFD method - a model for product improvement and development*

Authors: Z Tanasić, B Kecman and G Janjić

Abstract: Nowadays, in the global market products and services need to have factors that exceed expectations if the manufacturer wants to be one of the leading market players, and they have to fulfill all the basic and customer requirements. Very often there is a large percentage of working time which is wasted in communication in order to clarify misunderstandings, correct mistakes, and sometimes reorganize improper work activities. To avoid these losses, more time has to be spent on analyzing and planning to meet customer requirements. The QFD method is a comprehensive method for quality planning and management in the product creation process. This why it is necessary to perform systematic monitoring and measurement in all processes, primarily on the basis of set goals in terms of time, costs and product quality.

The paper presents the use of the QFD method to improve the existing product, a device for automatic pressure adjustment in car tires. According to the QFD methodology, all participants are provided with a system analysis in the realization of products through four phases, from customer requirements to all definitions of the work process. Also, the goal is to achieve a reduction in the number of work instructions. The fourth matrix shows key processes with performance and graded significance. These are processes that require special attention during production design, in order to improve a product and make it meet customer expectations.

Title: *The processing route planning of the executive surfaces of the mechanical engineering products using LM-hardness method*

Authors: Y Kusyi and A Kuk

Abstract: There are two principles of the processing route planning of surfaces of the products. The principle of the object-oriented designing for the processing route planning of product surfaces is used for non-conjugated surfaces of machine products. The main criterion for the principle of the object-oriented designing for the processing route planning of product surface is minimum technological self-cost of machining of the certain product surface. The principle of the functionally-oriented designing for the processing route planning of the products surfaces is used for the executive and conjugated surfaces of machine products. The main criterion for the principle of the functionally-oriented designing for the processing route planning of the products surfaces is providing of the important operating characteristics due to the operation conditions of machine parts. The operating characteristics are close related with the surface layer quality parameters of products developed at the development and production stage in the Life-Cycle of a Product. The processing route planning of the executive and conjugated surfaces of products by means of LM-hardness method is suggested. The experimental investigations are realized for the processing route planning of the surfaces of steel workpieces at the mechanical engineering enterprise. The results of experimental investigations confirms the processing route planning of surfaces of products obtained at the development and production stage in the Life-Cycle of a Product using method of estimated refinement. Further research should be carried out for a more wide nomenclature of materials to introduce the proposed technique into the practice of modern mechanical engineering.

Title: *Comparison between pulsed and direct of current gas tungsten arc welding for high strength low alloy welds*

Authors: M F Benlamnouar, T Saadi, N Bensaid, M Zidani and Yazid Laib Dit Laksir

Abstract: Pipeline transport requires the use of welded steels consisting mainly of high strength low alloys. It is common to find defects in weld joints due to uncontrolled welding parameters, which affects mechanical behavior of weld and its fracture resistance. This study investigates the effect of TIG welding parameters on defect forms and mechanical behavior of high strength low alloy. Microhardness, tensile and Charpy test are used to characterize mechanical comportment. Defect behavior of welds is evaluated by Radiographic image processing and ultrasonic techniques using two types of electric arc and three welding parameters.

Title: *Study and thermal analysis of vanes shape design for brake discs in automotive industry*

Authors: C Preda, R M Bleotu A K Sharma and C Pinca-Bretotean

Abstract: Braking system is one of the most important component for any vehicle, it convert the kinetic and potential energy of the vehicle into heat, which allow the vehicle to stop. During braking operation, disc and its components it has to experience fast change in temperatures, the heat absorbed and dissipated must be effective, to maintain a high performance of the braking system.

That's why brake disc cooling is an important area of research for top manufacturers which needs high performances for the cars, and vented discs are the most important piece, being used as these are considered to have high heat-dissipating characteristics. The aim of this paper was to create a design for the most efficient ventilation of the brake disc, by creating ventilation holes inside it.

Because in the automotive industry, a thermal shield is often used for the braking system, this

paper also looked at its influence on the temperature of the braking system and its operation in optimal conditions.
For each design variant created, a semi-metallic material was used, for the beginning, following that for the most efficient variant, from a thermal point of view, the ceramic material was chosen.
For the initial case, each constructive variant will have the brake discs made of semi-metallic material, with gray cast iron pads, and for the best variant, a thermal analysis will be performed in the ANSYS simulation program, with ceramic material, which got improved thermal properties.

Title: *Modeling and optimization of a new braking system used on the tricycle for controlled skidding*

Authors: R M Bleotu and C Preda

Abstract: The tricycle for controlled skidding is often preferred by extreme sports lovers, and in this paper this design concept is approached.
A complete design of the tricycle was made, together with its braking system, which is its essential element. Then, thermal analyzes were approached, using finite elements to obtain the best disc temperature values.

Title: *Bending analysis of cantilever beam in Finite Element Method*

Authors: D Hodžić

Abstract: Paper describes bending of cantilever beam and its analysis using finite element method. Cantilever beam is a structural member and in this paper a two dimensional Finite Element model for steel material beam has been developed to study. This work aims to analyze bending analysis of cantilever beam with boundary conditions. The outputs of finite element model are used to investigate effect of point load on integrity of beam and mechanical properties of material.

Title: *Modeling of influential machining parameters to the surface quality of wood*

Authors: D Ramić, D Hodžić and A Hodžić

Abstract: The micro-roughness represents the basic structure of the roughness of the treated surfaces and they are mainly a consequence of the processing during the production. The microgeometry of treated surfaces has a significant impact on the contact conditions of surfaces, which is reflected in the quality of gluing, pressing, and surface treatment and assembly, ie the interchangeability of structural details of the product, and thus the product quality. The roughness of treated wood surfaces is almost impossible to reliably determine theoretically using analytical models, and the application of experimental analysis of the investigated influential parameters is essential to improve the treatment regime, while maintaining the cost and quality of treatment at a satisfactory level.
The aim of this paper is to examine the significance of the influential parameters of roughness of the treated surface, ie wood density (ρ), displacement speed (s^{1}) and cutting depth (h) when turning solid wood elements, and analysis of experimental data for achieving lower roughness of the treated surface, without compromising the quality and total production costs. The purpose of the experimental plan is to generate a mathematical model that describes the process.

Title: *Identification of the coefficient of friction during axisymmetric wire drawing*

Authors: M Todić, S Pašalić, M Merdanic and T Latinović

Abstract: The technological process of wire drawing is very important for modern industry (electrical engineering, mechanical engineering, construction, etc.) due to the production of semi-finished products that are later shaped and installed in the final product. The tool in which the deformation is performed during drawing is exposed to significant mechanical loads that lead to its wear. In order to prolong the life of the tool, the intensity of the coefficient of friction in the deformation zone is important, ie it should be aspired to keep this intensity as low as possible. In order for the coefficient of friction to be within acceptable limits, it lubricates with various lubricants. The type of lubricant as a function of other parameters in the deformation zone is usually performed on the basis of recommendations and experience. However, the quality of lubricants can also be determined experimentally by identifying contact stresses in the deformation zone for various types of lubricants.

Title: *Heat transfer and fluid flow in a channel containing five heated blocks with and without slot-jet*

Authors: H Amirat and A Korichi

Abstract: A slot-jet has emerged as a passive method to enhance convective heat transfer over five heated blocks in a two-dimensional horizontal channel. A slot-jet is located on the channel in the rear of each block. The simple algorithm is chosen and the Ansys Fluent © CFD software code is utilized. The blocks geometry are considered the same (w=h=0.5), the used cooling fluid is air (Pr=0.71), the slot-jet velocity, and the distance between each block rear face and the center of the slot are considered as constant (v_j=1, x_j=0.0125). The configurations with and without slot-jet Re=400 to show the slot-jet effect on heat transfer and flow structure. The result shows a noticeable modification, the temperature of the blocks is reduced and the heat transfer is significantly improved with the slot-jet. At Re=400 and v_j=1, the heat transfer improvement can exceed 159% and 247% for the first and the last block, respectively.

Title: *Modal analysis methods usage possibilities during virtual tests of designing multimedia mobile stages*

Authors: T Kalaczynski

Abstract: The paper presents the possibilities of modal analysis methods in the study of the technical condition of designing multimedia mobile stages. In particular, the possibility of implementing modal analysis methods tools in modelling and diagnostic research process has been presented. The paper discusses two selected methods of modal model estimation. On the basis of experimental studies we verified the usefulness of these methods in the description of the technical condition of the object at the stage of the virtual model. The use of modal analysis methods could help to explain the further nature of mobile stage element behaviour during their normal exploitation.

Title: *Analysis of dynamic effect on the structure of selected construction elements of mobile stage*

Authors: T Kalaczynski

Abstract: The paper presents the comparison of experimental analysis results conducted on modal truss, which is corresponding to essential elements of typical mobile stage using in

entertainment industry. The analysis of research object's dynamic properties aims to determine the structure susceptibility to dynamic effect, which in the case of mobile stages mainly occurs during movement. Therefore, determining the dynamic properties will facilitate the assessment of the suitability of a selected modal method in terms of its applicability to predicting the behavior of the entire construction during its normal exploitation.

Title: *Redesign of docking swingdock levers for increasing load capacity in resting position*

Authors: B D Cioroagă, V G Cioată and I Kiss

Abstract: The paper presents a study of redesigning a Swingdock docking leveler, with a capacity of 100 kN, in order to increase the load capacity in the resting position.
The need for this study resulted from a real problem, which occurs during the operation of the product, which consisted in the failure of the support element of the ramp assembly, a phenomenon that led to the destruction of the ramp and was a potential generator of dangerous accidents.
In the study, we proposed a prototype for testing, modeled this prototype in 3D, performed an analysis using the finite element method in order to identify areas where stresses exceed allowable values, we redesigned the ensemble in critical areas and validated experimentally the proposed solution.
Following the experiments, we concluded that the proposed solution is appropriate, the docking leveler assembly being able to support the mechanical stresses developed in critical areas as a result of imposed loads.

Title: *Heat transfer on the impinging wall of the reversing chamber*

Authors: R Kłosowiak

Abstract: The publication will present the results of numerical analysis and experimental for axisymmetric jet entering the chamber reversing. Jet flowing through the chamber reversing been examined in experimental studies and numerical steady-state and transient analysis. The results of this analysis provide information about where the conversion of kinetic energy and potential pressure. The next step is to determine the shear stress in the area of the impinging wall in reversing chamber based on the theory of thermal and hydrodynamic boundary layer. In the present case it will be considered a phenomenon of heat exchange in the impinging jet at the bottom of the chamber reversing, with particular emphasis on the phenomena occurring at the point of stagnation. For this purpose built heat flux sensor installed in the area of the stagnation point. With the extensive literature on the heat transfer at the point of stagnation makes it possible to build a mathematical model and the balance of theoretical and experimental results. Next steps include the analysis is of heat transfer out of the stagnation point on the impinging wall. For numerical analysis used Reynolds stress model has been implemented in the commercial program ANSYS CFX. For the experimental analysis was used constant temperature anemometer with X probe to register the two velocity components and their fluctuations. To the reversing chamber inject the jet having a temperature of 20° C hitting the bottom of the reversing chamber at a temperature dT = 40K for three speeds 20,30, 50m/s.

Title: *Study regarding real manufacturing automotive parts jointed through resistance spot welding*

Authors: G B Pulpea, M Stănoiu, A Rotariu, I Voiculescu, D Pulpea and A Moldovan

Abstract: The process of joining metallic sheets through resistance spot welding (RSW)

represents an important joining procedure in the automotive industry. Monitoring the conformity of the weld spot by technical control (qualitative and quantitative methods for verification) is necessary for the elimination or minimization of the possibility of welds failure under normal conditions of handling, storage, and utilization of metallic automobile structures. The parameters and conditions of RSW are established by calculations and specific tests. This study reveals the welding characteristics of auto parts from real structure designs, consisting of two-sheets of carbon steel joined by resistance multiple spots weld. Destructive control tests, which are usually used to determine RSW characteristics, were performed on samples with predetermined dimensions, which were destroyed during the tests. This paper presents the research performed for the evaluation of the behavior of these materials, which were subjected to three types of tests: chisel test, peel test and tensile–shear test. The main purpose of this study was to evaluate the weld in real manufacturing conditions in order to obtain the required joint quality, according to the specifications.

Title: *Manufacture and processing of long tubular parts, by respecting environmental protection issues*

Authors: D I Poiana, D Stan and I Ionel

Abstract: The aim of the paper is to present a study concerning ways to obtain and process long tubular parts, while complying with environmental protection requirements. Currently, the world is facing and forced to solve the problems of developing technologies that protect the environment, as much as possible. Thus finding measures to materialize & meeting this goal are essential. In this paper, one presents special measures to reduce environmental pollution related to manufacture of long tubular parts, as well to various processes for further processing of these long tubular parts. The study focuses in particular on certain processes for making long tubular parts and processes for processing holes made in these long tubular parts. In the paper are presented the studies on perforation by perforation in the air and in the liquid environment. The conclusions of the paper. include the considerations that highlight the positive and negative aspects of the technological processes presented. The study is part of the PhD program of the main author.

Title: *Preliminary assessment of the environmental impact of the first year of the COVID – 19 pandemic*

Authors: P Bałdowska-Witos

Abstract: The actual date of the appearance of the infectious COVID-19 disease in the world will remain a contentious issue and probably never decisive. Now, in the year 2021, almost every country is affected by the coronavirus disease (COVID-19). The introduced rules to prevent the spread of the virus completely changed the trend in waste management. Personal protective equipment such as masks, gloves and disinfectants began to be massively used all over the world. The current struggle to improve the condition of the natural environment by limiting the use of plastics has completely slowed down. It is estimated that in the next few years the amount of plastic waste will increase dramatically. The reason for this will be not only the increasing amount of waste, but also the limited number of waste collection and recycling due to the spread of the virus, which leads to its accumulation. The paper discusses the impact of COVID-19 on the production, recycling and disposal of solid waste.

Title: *The impact of personal protective equipment on the environment in the time of the COVID-19 pandemic*

Authors: P Bałdowska-Witos

Abstract: In the current global health emergency around the world, personal protective equipment plays a key role in reducing the spread of the COVID-19 pandemic. Since single-use products made of plastic are the most common devices, this means that adequate amounts of fossil resources will be used and a huge amount of waste will be generated. This paper aims to compare the environmental performance of different types of protective masks, taking into account the entire life cycle of the mask.

5MaE – MATERIALS ENGINEERING

Title: *Antioxidant and antimicrobial properties tested of AgNP-spring plant on E. coli and C. parapsilosis*

Authors: I R Suica-Bunghez, I C Covaliu, A A Sorescu, L C Nistor, M Calin, I Raut and R M Ion

Abstract: Biogenic synthesis of silver nanomaterials (AgNPs) using plants has become a romising area due to the conventional chemical synthesis method, beneficial for environment. In the last years, the development of novel and prompt antimicrobials barriers against infections caused by antibiotic resistant bacteria has been increasingly accessed.
In this paper research it is described a simple eco-friendly method used for the preparation of antioxidant silver nanoparticles using *Galanthus nivalis* extract. The phytochemical and bioreduction properties of snowdrop was investigated by UV-VIS (250-750 nm) and FTIR (400-4000 nm). UV-visible spectra showed a surface resonance peak between 460-470 nm corresponding to the formation of silver nanoparticles. FTIR spectra confirmed the formation of biological molecules in AgNP synthesis. Ultrasonic bath was used to obtain small silver nanoparticles. The antioxidant activity of metallic nanomaterials was evaluated using DPPH method and it were obtained good results. The antimicrobial activity of AgNP sample was tested on *Candida parapsilosis* and *Estherichia coli*.

Title: *Removal of Mn (II) ions from wastewater using Typha angustifolia*

Authors: L I Diaconu, I C Covaliu, I R Suica-Bunghez and G Paraschiv

Abstract: People have used plants since ancient times to prevent and remove heavy, toxic metals from both the human body and the environment. Nowadays, when the environment is extremely polluted, we must try methods to protect and preserve it. For the present research, it was used all the rush components (root, rhizome and stem). The Typha angustifolia was procured from Dambovita area. The experiment consisted of immersing the rush in a volume of wastewater, contaminated with Mn II (2 mg/L), at different times (8, 16, 24 ,32, 40 h), under stirring. It was possible to observe the plant's ability to retain Mn (II) ions gradually, as the time period increased. The retention capacity of Mn (II) ions began to increase after 8 hours of contact. A slow increase in yield was observed; after 16h being 9.5%, and after 40h being 19%.

Title: *Mechanical behavior and corrosion resistance of electrochemical borided titanium alloy Ti-6Al-4V*

Authors: A Kaouka

Abstract: Some mechanical properties and corrosion resistance of borided Ti-6Al-4V titanium alloy were investigated with different testing methods; tensile tests, and bending tests along with hardness measurements and fracture toughness. The corrosion rates of borided are observed in 5% NaCl solution using Potentiodynamic polarization test.
In this work, boriding process based on the electrochemical boriding applied on titanium alloy at 950 °C for 30 min, this method has an electromagnetic frequency in the range of 100–500 kHz during electrolysis has been proposed and realized on Ti-6Al-4V alloy.
The surface methodology was used to analyze the effects of boride. The formation of the new microstructure was examined by optical-light microscopy, scanning electron microscope inspections along with thin film X-ray diffraction analyses, and elemental dispersion spectrometry

analyses, which confirmed the borided layer formations. XRD patterns confirmed the formation of titanium borides (TiB and TiB_2). The micro-hardness of the boride layer was measured using Vickers microhardness tester. Some mechanical characterization were investigated on the borided substrates such as the surface hardness of borided titanium alloy, microhardness measurements were achieved to study the consequence of the microstructure on hardness. Vickers microhardness values were around 1400 HV to 1800 HV, its exhibited excellent adhesion to the substrate as long as the boride layer, which was much higher than 260 HV hardness of Ti-6Al-4V titanium alloy. Fracture toughness values were found about 5.5 $MPa{\cdot}m^{1/2}$ to 10.8 $MPa{\cdot}m^{1/2}$. Decreasing in yield, ultimate strength values and low fracture toughness of boride layer Ti_2B. Corrosion results confirmed that the borided sample had a higher corrosion resistance than as untreated sample in 5% NaCl solution. The borides formation in treated sample enhanced the corrosion resistance. SEM image of the corroded surface of borided sample is distributed with smaller corrosion pits, which confirmed the corrosion resistance ability of borided Ti-6Al-4V titanium alloy.

Title: *Dual phase α + β formed in Ti-6Al-4V titanium alloy and its mechanical characterization*

Authors: A Kaouka

Abstract: In this study, the microstructure of Ti-6Al-4V titanium alloy has been described. The dual phase α + β that was obtained from the single-phase α″ in metastable in Ti-6Al-4V titanium alloy via melting at 1000 °C for 4 h and following by water quenching. The formation of the new microstructure was investigated by optical-light microscopy, scanning electron microscopy, X-ray diffraction, and elemental dispersion spectrometry analyses. The characteristics of the microstructure of the α″ phase changed to microstructure of the dual phase α + β. The microstructural characteristics contained irregular-shaped variants, a homogeneous and fine-grained microstructure. An important characteristic of the α + β, which is a lamellar structure in the Ti-6Al-4V titanium alloy was observed. These results indicated the existence of a strict variant selection rule between the α and β phase, a specific variant combination of the decomposed α and β phases was detected. The origin of this rule was the α″ variant that was formed before the decomposition. The X-ray diffraction analysis revealed that the phase constituents of the sample changed to the α + β phases. In addition, microhardness measurements were performed to study the consequence of the microstructure on hardness. Vickers microhardness reached about 770 HV, which was much higher than 260 HV hardness of Ti-6Al-4V titanium alloy.

Title: *Lamium purpureum – mediated phytosynthesis of silver nanoparticles: kinetics and antioxidant activity*

Authors: A A Sorescu, A Nuta and I R Suica-Bunghez

Abstract: Phytosynthesis is a viable alternative to classical chemical route due to its cost effectiveness and to the fact that it does not use hazardous chemicals. *Lamium purpureum* is a plant that has bright pink-purple flowers with astringent, diaphoretic and diuretic uses. This research paper describes the phytosynthesis of silver nanoparticles, known since ancient times for their antimicrobial and antifungal properties, from aqueous extract of *Lamium purpureum*. Phytosynthesis was carried out at different temperatures (room temperature, 30^0 C and 50^0 C) by mixing the aqueous extract with a 10^{-3} M silver nitrate solution and instantly observing the visual change in color of the aqueous extract. UV – Vis's spectra were recorded in the range of 250 – 800 nm and the absorptions between 438 nm (room temperature – mediated phytonsynthesis) and 445 nm (50^0 C – mediated phytosynthesis) clearly stated that silver nanoparticles were obtained. The reaction kinetics was evaluated by recording the UV – Vis's spectra at well-established time intervals and DLS was used to quantify their diameter. Antioxidant activity was evaluated using the DPPH assay

and all the values obtained for the phytosynthesized silver nanoparticles were considerable higher than those for the corresponding aqueous extract.

Title: *Catalytic degradation of Direct Orange 26 using Magnolia liliiflora – one pot green synthesized silver nanoparticles*

Authors: A A Sorescu, A Nuta, I R Suica-Bunghez, R M Ion and M Calin

Abstract: Silver nanoparticles (AgNPs) exhibit unique physical – chemical and electronic properties that enables their use as efficient catalysts for the removal of organic dyes from wastewaters. This paper presents the green synthesis of AgNPs using petals of *Magnolia lilliflora* that have analgesic, carminative and febrifuge properties. Green synthesis was carried out at room temperature and 50^0 C and the results were carefully monitored by recording the UV – Vis's spectra at different time intervals. Catalytic degradation of Direct Orange 26 (DO 26) involves the use of AgNPs, aqueous DO 26 solution and a reductive agent by recording the absorbance at 495 nm. The antioxidant activity of the green-synthesized AgNPs was evaluated using the DPPH method and a preliminary study of their antimicrobial activity against knowm strains was also carried out.

Title: *Effect of alloying elements on weldability of high strength low alloy steel with austenitic stainless steel*

Authors: M F Benlamnouar, N Bensaid, M Zidani, T Saadi, M Temmar and R Badji

Abstract: This work aims to investigate the effect of alloying elements of filler metal on the weldability of dissimilar joints between HSLA-X70 high strength steel alloy and 304L austenitic stainless steel. The weld joints were prepared using different filler metal by varying Carbone, chromium and molybdenum contents. The mechanical characteristics obtained from hardness, tensile and impact testing, were correlated to the optical and SEM microscopy, to establish a relationship between filler metal composition and the microstructures in different weld regions. It is concluded that at low Carbone content, the good weldability is achieved by increasing Cr addition and decreasing Mo addition while maintaining the other elements in filler metal. This exhibit the best grain refinement in heat affected zone and good combination between tensile proprieties and impact resistance of dissimilar weld joint.

Title: *Synthesis and characterization of three dimensional porous materials based on cellulose fibers*

Authors: C Mosoarca, C Pascariu, D Ursu, C Orha and R Banica

Abstract: Porous carbon materials have gradually gained more attention and research efforts for industrial applications when low density materials and chemical inertia are required. In this paper we present the obtaining of aerogels based on cellulose fibers. The aerogels were synthesized using the lyophilization technique, a process followed by the hydrothermal carbonization of the organic mass at medium pressure and temperature in CO_2 and water vapors. The technique used offers the possibility of obtaining a 3D structured composite containing simultaneously organic and inorganic material which, in addition to its practical utility as a thermal insulation material, can also represent a precursor for obtaining other three-dimensional metallic and non-metallic structures. The obtained aerogels were characterized by X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive X-Ray Analysis (EDX), Fourier Transform Infrared

Spectroscopy (FTIR) and Ultraviolet-visible (UV-VIS-NIR) Spectrometry.
Acknowledgments: This work was supported by a grant of the Romanian Ministry of Research and Innovation, by the National Program NUCLEU, Project Code PN 19 22 01 01, Contract No 40N/2019.

Title: *Hydrothermal treatment of Mya arenaria exoskeletons in alkaline media*

Authors: R Banica, A Bucur, C Pascariu, M Poienar, C Mosoarca, R Bucur, A Negrea and I Hulka

Abstract: Under the circumstances of climate change caused by pollution, the synthesis of inorganic materials through ecological techniques is an important desideratum. In the particular case of calcium hydroxide production, with wide industrial applications, the material is most often achieved by calcination of the calcium carbonate and hydration of the obtained calcium oxide. The calcination process requires temperatures above 800ºC. Likewise, the process of crushing marble or calcium oxide balls is a strong energy consumer. In this paper we present a new ecological possibility of obtaining calcium hydroxide with oriented growth, through a hydrothermal process carried out at low pressure, using as raw material the aragonite modification of calcium carbonate present in the exoskeleton of the *Mya arenaria* shell. Hydrothermally synthesized samples were characterized by x-ray diffraction, thermogravimetry and scanning electron microscopy. The obtained materials can have applications in the synthesis of hydroxyapatite, calcium sulfate or can be reactive templates for obtaining inorganic materials with oriented growth.
Acknowledgements: This work was supported by a grant of the Romanian Ministry of Education and Research, CNCS - UEFISCDI, project number PN-III-P1-1.1-TE-2019-2116, within PNCDI III.

Title: *Synthesis and Raman characterization of aerogels based on reduced graphene oxide*

Authors: F S Rus, C Ladasiu and R Banica

Abstract: Graphene is an innovative material based on carbon with possible applications in the electronics of the future. Graphene can be defined as a monolayer of carbon atoms with delocalized electrons, identical with the one from the graphite structure that has electrical properties due to the absence of van der Waals forces that ensure the structural integrity of graphite. One of the main methods of manufacturing this material is by increasing the distance between the sp2 -hybridized carbon atoms planes from the graphite structure by oxidation. This oxidation leads to the formation of graphene oxide, a material which due to the –COOH, =CO and –OH groups grafted on the carbon atoms plane does not show significant electroconductive properties. To increase the electrical conductivity of graphene oxide, this is chemically reduced. Raman spectroscopy is a useful tool to determine the exfoliation degree of graphite and the purity of the resulting reduced graphene oxide (RGO). RGO can be the base material to create electroconductive and functionalized tri-dimensional structures. Graphene aerogels was synthesized and Raman spectroscopic characterization was performed. In order to obtain Ag/RGO, silver nanoparticles were electrochemical deposited on graphene-based aerogels.
Acknowledgments: This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI-UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0619/Contract 42/2018 "Nanostructured carbon materials for advanced industrial applications", within PNCDI III national research program.

Title: *Morphological aspects and characteristics of composite materials with polymer matrix and metal powders*

Authors: D E Gavrilă, V Stoian, A Caramitu and S Mitrea

Abstract: The use of composite materials with polymer matrix and metal powders is desirable due to the possibility of obtaining intermediate characteristics between polymers and metals but also to the numerous possibilities for the use of these materials. Their electrical properties can be close to those of metals and the mechanical characteristics and processing methods are close to those of plastics. In such composites there is the possibility of controlling the physical and electrical characteristics. The composites obtained may have a range of excellent properties, high electrical and thermal conductivity, high specific strength and modulus of elasticity, high temperature resistance, corrosion resistance, flame retardance, but also a lower weight and convenient prices. The article studies the morphology of these materials, their crystallinity obtained by the method Differential Scanning Calorimetry (DSC). Polyethylene (HDPE) and Polypropylene(PP) were used as matrices and Fe and Al powders were used as metal powders. SEM analyzes revealed the existence of agglomerations of metal particles both before and after the preparation of the composites. Due to these agglomerations, an average value of particle size can be considered. At the same time, an influence of the presence of agglomerations on the studied characteristics was observed. It is also very important the size of the metal particles, if they are in the nano range, smaller than 100nm, or have larger dimensions.
Different variations of the crystallinity are observed for the two polymers. For PE there is an increase in crystallinity with the increase in powder content. The highest growth is obtained for nanopowders. For PP there is a decrease in crystallinity with the increase in powder content. Particles with nano dimensions penetrate more easily both in the amorphous domains and in crystalline domains the mechanical properties of PP / iron powders are superior to PE / iron powders.
There is a more pronounced increase in the thermal conductivity for HDPE. In the case of PP the thermal conductivity increases are lower. The appearance of agglomerations in the composites with HDPE matrix and their decomposition in thermal field leads to the increase of thermal conductivity.
The maximum depth of penetration hmax decreases for both composite materials, the lowest value being obtained for the material with small particles.
The electrical conductivity increases by adding powders, but it essentially depends on the nature of the polymers, the size of powders, the nature of the metals, method of preparation. Higher losses were obtained for PE with Al for nano dimensions of the particles.
Important increase of losses was obtained in the case of PP for nanoparticles of Al and Fe.
Increases in conductivity and losses depend fundamentally on frequency and increase with frequency.
The content of powders was 3, 5, 8%.

Title: *Efficiency of solid waste management*

Authors: D Danylchenko, S Dryvetskyi, O Dovgalyuk, E Dyakov, O Miroshnyk, T Shchur, A Idzikowski, P Walichnowska, W Kruszelnicka, A Tomporowski, R Kasner and P Bałdowska-Witos

Abstract: With the constant growth and development of cities, the problem of rational utilization of solid household waste, which is formed as a result of life, arises. First of all, it is important to develop the correct methodology for cleaning cities. This methodology should be based on scientifically based organizational and technical solutions to reduce the impact of human waste on the environment. This article discusses the issue of organizing the disposal of solid

household waste on the example of Ukraine, its legislation and analysis of emerging problems.

Title: *Developments of discontinuously reinforced aluminium matrix composites*

Authors: C Bulei, I Kiss, B Stojanovic and D Utu

Abstract: Metal matrix composites become interesting for use as constructional and functional materials. The development of metal matrix composites was primarily directed to the continuous-fibre reinforced metal matrix composites – such as boron fibre/aluminium-based matrix, continuous alumina fibres /aluminium-based matrix, graphite fibre/aluminium-based matrix or graphite fibre/magnesium-based matrix composites. Despite the successful production of these metal matrix composites, they manufacturing was limited by the concerns related to the technological processes and cost, their availability remaining a significant barrier to their manufacturing. Concurrently, discontinuously reinforced metal matrix composites - such as silicon-carbide particulate reinforced aluminium-based matrix or graphite particulate reinforced aluminium-based matrix composites -, were developed cost effectively for industrial and commercial applications, based on the particulate materials which could be integrated in a light matrix, using innovative manufacturing methods. This type of material has become a major research subject in recent years

The benefits of metal matrix composites as compared to the unreinforced (monolithic) metals or alloys include superior mechanical and physical properties that deliver improved structural performance. Careful control of reinforcement particles, distribution and size allows to provide outstanding structural performance in a range of applications. Therefore, discontinuously reinforced metal matrix composites are suitable for a wide range of industrial applications. This study aims to investigate the developments in area of the discontinuously reinforced aluminium matrix composites.

Title: *Composite solutions with recycled textile wastes*

Authors: M P Todor, I Kiss, M Rackov and V Cioata

Abstract: Textile waste amounts represent a remarkable issue whether they are produced during production and processing of textile materials, such as production waste and excesses (industrial or pre-consumption), or at the end-of-life of products, once it had been sold and used (post-consumer materials). Whereas pre-consumer textiles can be easier recycled because we know their general composition and sources, post-consumer textiles often consist of different materials that need to be taken apart to be regenerated. Pre-consumer textiles are yarn, fabric and products leftovers (fabric weaving, cut and sew fabric scraps, clothing samples or unsold garments) that are discarded during production. Post-consumer textiles are garments disposed by the wearer after use.

Much of the textile waste is thrown in landfills or incinerated, with a high environmental impact and at great cost. Valuable resources held within the waste are also lost. Having in view that 50% of collected clothing is re-wearable, and the rest could be recycled, a particular attention have to be given to recycling processes for both products and waste, aiming at reintroducing them in a new industrial process, through new manufacturing ways, and so, starting a new life-cycle. The textile reuse and recycling, in general, reduce environmental impact compared to incineration and landfilling. However, only 12% of the global textile materials go into recycling while 73% are landfilled or incinerated.

There are different approaches to be used and different ways to identify suitable technologies that could lead product manufacturing towards a remarkable reduction of production costs, while considering recyclable materials as a real and efficient alternative. Among them, there are technologies for waste recovery, which transforms textile waste into secondary raw materials,

creating circularity and reducing environmental impact. Studies have shown that different textile waste can be used in composite solutions. This type of reinforcements has become a major research subject in recent years. This study aims to investigate the composite solutions with recycled textile waste.

Title: *Reinforcing concrete with recycled plastic wastes*

Authors: A Baciu, I Kiss, E Desnica and J Sarosi

Abstract: Solid waste is one of the many factors that negatively affect the environment. The plastic is an important type of solid waste with a strong environmental impact, all types of plastic used in daily life becoming, sooner or later, waste. Therefore, increasing consumption of various types of plastic products is one of the most important challenges in environmental protection. From different perspectives, waste reuse is important because it helps to recycle in the production process, reduces environmental pollution, and helps sustain and conserve non-renewable natural resources.

On another hand, many constructions require precise techniques and technologies that can utilize a number of new materials. Also, the lightweight building material industry is considered useful in promoting reused materials. In this context, the use of simple concrete and reinforced concrete is somewhat restricted by specific phenomena such as: cracking, fire resistance, shrinkage, shock resistance, wear resistance, durability, etc. For this reason, an improvement in the performance of the concrete can be obtained by adding in their mass of reinforcements dispersed in the form of fibres from different materials. The dispersed reinforced concrete results in the inclusion of a variable amount of discontinuous fibres in the concrete mass. These fibres can be of different types and sizes and have different properties. This type of reinforcements has become a major research subject in recent years.

Therefore, using plastic waste in the materials industry is an environmental solution to minimize the proportion of landfills used in waste incineration. Reusing plastics as concrete additives could also redirect old water and soda bottles, the bulk of which would otherwise end up in a landfill. Research has focused on the impact of adding plastic material to fresh and hardened concrete. This study aims to investigate the use of polyethylene terephthalate (PET) wastes in concrete.

Title: *Study of air quality through suspended particles determination*

Authors: D Miloștean and M Flori

Abstract: The suspended and settleable particles which exist permanently in the atmosphere have their concentration variation depending on weather conditions, traffic in the collecting area, industrial activities, etc. It is known that once these particles pollute the atmosphere can affect human health so, their collection by efficient filtration air systems is needed in order to proper evaluate them.

In this paper the short-term concentration of the suspended particles from air is determined in the collection point located inside the Faculty of Engineering Hunedoara (Romania), in the vicinity of the road. The sampling was done in months May and June of year 2020, during three time intervals. Obtained minimum and maximum suspended particles concentrations were 13.43 $\mu g/m^3$ and 83.96 $\mu g/m^3$, respectively.

Title: *Technological aspects regarding the deoxidation of steels on EBT-LF-MTC technological flow*

Authors: M Radu, T Heput, E Ardelean and M Ardelean

Abstract: The extremely rapid progress of continuous steel casting, both metallurgically and in terms of plant construction, has allowed this process to spread widely in industry. Concerns in this area relate mainly to the possibility of increasing the amount of cast steel and improving its quality. The research considered a weak alloy steel brand S275JO with the addition of titanium developed on an EBT-LF-MTC technological flow, in an EBT type oven with a capacity of 100 tons and cast on MCT with 5 wires. The paper presents the results of research on the variation of titanium oxide contents contained in the slags taken from processing in the LF pot and the slag deposited on the immersion tubes from continuous casting to the last batch of the casting sequence. Based on the research conducted, it was possible to establish the causes that cause deviations from the required chemical composition as well as defects in the casting process. The results obtained have applicability in research and practice.

Title: *Quality of continuous cast steel products used in automotive industry*

Authors: O Poenaru, A V Socalici, A Budiul Berghian and C Birtok Băneasă

Abstract: The process of removing non-metallic inclusions from the liquid steel is proceeding mainly during their forming and growth, the main objective is increasing the speed of removing this inclusions. Qualitative and quantitative analyses of non-metallic inclusions from cast steel lead to determine their origin and nature. This paper presents the research and results regarding the influence of non-metallic inclusions reflected on quality of continuous cast steel products used in manufacturing of hydraulic cylinders from automotive industry.

Title: *Unconventional method of cutting aluminum plates using fiber laser with oxygen assist gas*

Authors: L Zgripcea, A Socalici, V Putan and C Birtok Băneasă

Abstract: The process of cutting aluminum plates is widely used in automotive industry, especial in the last years for new electrical vehicles. Conventional method of cutting uses CO_2 and fiber lasers together with nitrogen used as assist gas. This paper presents new method of cutting aluminum sheets using pulsed laser in combination with oxygen instead of nitrogen. Results obtained in workshop are presented, in terms of productivity, quality and increase of laser range thickness for aluminum plates.

Title: *Use of recyclable materials in the circular economy*

Authors: V A Fodor, A Socalici, T Heput and E Fodor

Abstract: The waste of a certain industry can be the raw material for another industry. As any material can become an explosive if we match them with the suitable complementary elements and the perfect detonator for these, also any waste can be useful for the circular economy.
In this paperwork there will be introduced some methods through any kind of material can be reused. The impact of recycling on the environment would be positive, because nothing would be lost, everything would be transformed.

Title: *About the managerial functioning of an economic organization, applicable to educational systems*

Authors: A Ioana, D Tufeanu, C Nicolicescu, D I Luta (Manolescu), B C Ene, D I Juganaru and R M Solea

Abstract: The article has as a starting point the definition of the notion of managerial functioning. It also presents the distinction between managerial functioning and managerial function. The article presents and analyzes the 5 managerial functioning of an economic organization, applicable to any educational system, at any level: the personnel functioning (human resource); financial-accounting functioning (financial resource); production functioning (material resource); commercial functioning; the functioning of research - development - innovation (CDI-Information resource). The analysis of each functioning of the economic organization and of the educational systems is based on the presentation of the activities specific to each managerial functioning. The importance of the personnel functioning is being highlighted, with its specific activities: determination of the necessary labor force; establishment of the salary system; selection of the necessary workforce; staffing of recruited personnel. At the same time, the financial-accounting functioning has a special importance, argued by its specific activities: the conception and elaboration of the organizational scheme of the internal accounting financial system; financial-accounting records; managerial reporting and analysis. The importance of the managerial functioning of Research-Development-Innovation is being argued by its benefits for the development of the economic organization.

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Abstract: In this article, the definition of the 5 managerial functions of an economic and applicable organization and educational systems at any level (forecast, organization, coordination, command and control), is based on the grouping of activities specific to the management of that enterprise according to the following main criteria: homogeneity of activities group (category); the purpose of each category of activities - to perform the basic functions related to the enterprise, functions presented above. The article also presents the basic characteristics of the managerial functions of the enterprise: the managerial functions of the enterprise have a general character, being valid for any type of enterprise, aspect argued by the essence of the managerial process; multiple validity, is the characteristic according to which any managerial function of the enterprise is valid (manifests itself) both at the level of management of the enterprise and at the level of the executors; different weights, is the characteristic that expresses the fact that the managerial functions of the enterprise are found in different qualitative and quantitative measures, in direct correlation with the hierarchical level of the management afferent to the respective managerial function. The article highlights the increased importance of the managerial function of forecasting, through the efficiency of the activities specific to this managerial function.

Title: *Chemical characterization of Sri Lankan dolomite for waste water treatments and advanced applications*

Authors: S Aluvihara, C S Kalpage, P W S K Bandaranayake, W M A T Bandara and S Serban

Abstract: Dolomite is a prominent industrial mineral which is having a vast range industrial uses. Usually dolomite is found in hydrothermal veins, pegmatite and some sediment alone or allied with some other minerals such as calcites at various deposits around the world. The Matale area in Sri Lanka is a famous region for the deposits of dolomite rocks. The chemical characterization and prognosis of the advanced industrial uses of dolomite which is available in Matale region in Sri Lanka were the intentions of the existing research. The dolomite rock samples were collected nearby the Matale, Sri Lanka. The collected samples were chemically characterized using X-ray fluorescence (XRF) spectrophotometer, Fourier transform infrared (FT-IR) spectrophotometer and also the dolomite samples were microscopically characterized using an optical microscope. According to the fundamental results of the experiments, there were observed 99.4% of Ca and 0.5% K as the composed elements with respect to the X-ray fluorescence (XRF) analysis, composed the majority of dolomite without having other accessory minerals or functional groups with respect to the Fourier transform infrared (FT-IR) analysis and the colorless, reddish brown and white particles with tabular crystals and curved faced under the microscopic analysis. As the overall investigation of this experiment, it is possible to conclude the purity of this rock in dolomite is higher and less contaminated. Therefore, these dolomite/ dolomite rocks may have some better performances in the processes of the reduction or removal of the temporary hardness of water which is caused by the carbonates in water, adsorption agent (adsorber) for some of heavy metals such as Pb and Cd in the form of powdered and removal or recovery material for some chemical compounds such as phosphates.