CONFERENCE PROGRAM

THURSDAY, NOVEMBER 13, 2025

RECEIVING GUESTS

FRIDAY, NOVEMBER 14, 2025

09^{00} - 10^{00} REGISTRATION - BUILDING B, ROOM B213

10^{00} – 10^{50} OPENING CEREMONY / PLENNARY SESSION 1 (ON-SITE B214 / ON-LINE)

10^{50} – 11^{20} COFFEE BREAK

11^{20} - 14^{00} PLENNARY SESSION 2 / PAPER PRESENTATIONS (ON-SITE B214 / ON-LINE)

14^{00} - 15^{30} LUNCH

15^{30} - 19^{00} PAPER PRESENTATIONS (ON-SITE B214 / ON-LINE)

SATURDAY, NOVEMBER 15, 2025

10^{00} - 17^{00} WORKSHOP: NEW TRENDS IN TECHNOLOGIES, MACHINE MANUFACTURING AND INTEGRATED PRODUCTION SYSTEMS (ON-SITE / ON-LINE)

PLENNARY SESSION

ON-SITE BUILDING B, ROOM B214

ON-LINE: HTTPS://MEET.GOOGLE.COM/DGY-VQPI-FDP

Iulian Vasile ANTONIAC

Materials Science and Engineering Faculty, National University of Science and Technology POLITEHNICA Bucharest

"MATERIALS IN MEDICINE: FROM DEFINITIONS TO CLINICAL PRACTICE APPLICATIONS"

Professor Iulian Antoniac is the leader of the Biomaterials Group and head of the Biomaterials & Interface Phenomenon Laboratory from the National University of Science and Technology POLITEHNICA Bucharest*. He specializes in biomaterials, bioceramics, and medical implant technologies. He has an extensive publication record and leads research projects on biodegradable implants and functional biomaterials. His work is internationally recognized in the field of advanced medical materials.*

Jürgen RAIZNER,

Director of Steinbeis Centers in Germany, Austria, Azerbaijan, Romania, and Ukraine

"TRANSFER VISIONS INTO BUSINESS: HOW TECHNOLOGY TRANSFER DRIVES COMPETITIVENESS AND INTERNATIONAL COOPERATION - UNIVERSITY–INDUSTRY COLLABORATION AS THE ENGINE OF INNOVATION AND GROWTH"

Jürgen Raizner is the Co-Founder and Managing Director of Steinbeis Transfer Management Ltd. (STM Ukraine), with international business experience since 1991. He has founded multiple Steinbeis centers across Europe, including in Germany, Austria, Romania, and Ukraine. For over two decades, he lectured at Hochschule für Wirtschaft und Umwelt Nürtingen-Geislingen, receiving the university's Medal of Honor in 2013. His expertise spans FDI facilitation, university-industry cooperation, and knowledge-driven entrepreneurship.

Nicanor CIMPOEȘU

Materials Science Department, Materials Science and Engineering Faculty, Gheorghe Asachi Technical University from Iasi

"LASER DRILLING OF AL2O3-ZRO2 CERAMIC COATINGS"

Nicanor Cimpoeșu, Ph.D., Habil. is a Full Professor in the Department of Materials Science at Gheorghe Asachi Technical University of Iași, Vice-Dean of the faculty, Erasmus coordinator, and head of the ESIM Laboratory. He earned his Ph.D. in 2010 and habilitation in 2018, supervising PhD students since 2019. He has over 235 publications, more than 10 technical books, and an H-index of 19 (WoS) / 20 (Google Scholar, Scopus). His research covers microstructure, biodegradable metals, corrosion resistance, and smart materials, and he has coordinated national and international projects including Horizon 2020 CeLaTeBa.

SECTION 1. MANUFACTURING SYSTEMS AND TECHNOLOGIES. MATERIALS SCIENCE AND ENGINEERING.

ON-SITE BUILDING B, ROOM B214

ON-LINE: HTTPS://MEET.GOOGLE.COM/EJY-UHWU-RHT

TOPICS: Manufacturing Technologies; Cold Forming Technologies; Welding Technologies; Nonconventional Technologies; Manufacturing Systems; Mechatronics, Robotics and Flexible Manufacturing; Computer-Aided Design, Computer Aided Manufacturing

Session chairs:

Costel MIRONEASA

Valery WOLFF

Laurențiu SLĂTINEANU

Traian – Lucian SEVERIN

1.USING ARTIFICIAL INTELLIGENCE FOR DRAWING A PATENT APPLICATION IN THE MECHANICAL FIELD

Laurențiu Slătineanu[1], Irina Beșliu-Băncescu[2], Gheorghe Nagîț[1], Oana Dodun[1], Marius Andrei Mihalache[1], Margareta Coteață[1], Vlada Țisari[1]

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Abstract: *Artificial intelligence programs are currently used to solve a very wide range of problems in different fields of human society. On the other hand, there are concerns regarding the involvement of these programs in the development of so-called patent applications. In the paper, the problem of developing the description of the invention, the claims, and the abstract corresponding to a very simple object, namely a tea cup, was addressed. This cup had to be provided with means to notify the user about the temperature of the liquid inside it. It was found that the ChatGPT program was able to develop the requested documents at least in part in an accessible form. However, there were also aspects that would require the intervention of the inventor to ensure the consistency of the contents of the documents with the regulations formulated in this regard by the authorities with responsibilities in the field of patenting activities.*

Keywords: *ChatGPT, patent description, claims, abstract, tea cup.*

2.TRIBOLOGICAL BEHAVIOR OF ABS-LIKE PHOTOPOLYMER RESINS IN SLIDING BEARINGS MANUFACTURED BY DLP PRINTING

Gheorghe Macovei[1], Dragoș Luca[1], George Popa[1], Viorel Paleu[1*]

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Abstract: *Abstract: The 3D printing technology that uses photopolymerization, widely known among hobbyists under the acronym DLP (digital light processing), has the potential to revolutionize the manufacturing of sliding bearings used for light loads and in remote environments, where the availability of spare parts is problematic. In order to understand how these materials behave when subjected to friction and wear, studies are needed, as the current state of knowledge is insufficient. This article presents the behavior of multiple samples, manufactured under different parameters, and subjected to different loads and different speeds of contact. These samples were also subjected to UV curing. The tests showed correlation with other articles from literature.*

Keywords: *additive manufacturing, digital light processing, tribology, friction, denting*

3.INTEGRATED MANAGEMENT SYSTEM IMPLEMENTATION BASED ON ISO STANDARDS REQUIREMENTS

Andreea-M. Alexandru, Nicoleta L. Manta, Irina Severin

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Abstract: *The article explores the correlation of the requirements of standards related to management systems, such as: ISO 13485, ISO 9001, ISO 14001 and ISO 45001, with the aim of highlighting both the similarities and differences between them and proposing an integrated model applicable in companies. The article is based on the identification of a gap in specialized literature - few studies that analyze the implementation of an integrated management system that simultaneously combines ISO standards. The standards are described comparatively, analyzing their specific requirements for quality and environmental management, occupational health and safety. The study identifies common processes, such as leadership, risk management, monitoring and continuous development, and standard-specific processes, such as traceability of medical products or environmental impact management. Comparing implementation in different industries allows demonstrating the flexibility and adaptability of the IMS model, integrating common elements of ISO standards, with specificities applicable to certain areas, such as the requirements for medical devices according to ISO13485. A discussion on dedicated integrated management systems, such as EFQM model and an integrated management systems built to comply ISO standards related to management systems is conducted.*

Keywords: *Integrated management system, Standard requirements, Quality, Environment Impact*

4.GRAPHICAL PROFILING OF THE INNER ROTOR GEOMETRY USED IN A CONICAL HELICOIDAL SCREW COMPRESSOR

Virgil Gabriel TEODOR[1,2], Nicușor BAROIU[1,2], Florin SUSAC[1,2], Viorel PĂUNOIU[1,2], Georgiana Alexandra MOROȘANU[2], Răzvan Sebastian CRĂCIUN[1,2], Marius Corneliu GHEONEA[1]

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Abstract: *The paper addresses the challenge of profiling the inner rotor of a conical helicoidal screw compressor, starting from the known geometry of the outer rotor.*
The distinctive feature of conical helicoidal compressors lies in the fact that both rotors—inner and outer—are defined by conical helical surfaces that engage in a mutual enveloping relationship. This condition ensures continuous surface contact, sealing of the compression chambers, and operation without additional gearing elements. Rotor profile determination represents a critical stage in compressor design. Based on the geometry of the outer rotor, the paper proposes a graphical method for deriving the inner rotor's geometry. Subsequently, this profile serves as the foundation for generating the complete three-dimensional model of the inner rotor. The proposed method offers the advantages of conceptual simplicity and high precision, supported by the advanced parametric modeling capabilities of CATIA. The results confirm that the profiling approach yields a geometrically accurate rotor, suitable for performance analysis, structural studies, and design optimization.

Keywords: *conical helicoidal screw compressor, graphical profiling, enwrapping surfaces*

5.CNC MANUFACTURING TECHNOLOGY OF A STRAIGHT SHAFT PART USING EMCO CONCEPT TURN 55 CNC MACHINE

Nicușor Baroiu[1,2], Georgiana-Alexandra Moroșanu[2], Virgil-Gabriel Teodor[1,2], Florin Susac[1,2], Florin-Ioan Moroșanu[1]

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Abstract: *In order to support the rapid and efficient acquisition of various industrial products, numerous data archiving and management systems have been created in virtual environments. These digital platforms are complemented by the constant advancement of cutting tools and modern machinery, capable of adjusting and improving dimensional and construction parameters before parts are actually made. A significant contribution to this process is made by Computerized Numerical Control machines - CNC. These optimize the production flow through a high level of precision, a superior work capacity and a reduced execution time. In this paper, a CNC manufacturing technology for a straight shaft part, using EMCO Concept Turn 55 CNC system is presented. The stages of the machining process are described, from model preparation and setting of working parameters, to machine programming and final execution of the part.*

Keywords: *CNC, shaft, EMCO, turning*

6.APPLICATION OF LAFFER CURVES IN THE CONTEXT OF CONFORMITY ASSESSMENT MODULES FOR THE MACHINERY SECTOR

Costel MIRONEASA[1], Lucian ISPAS[2] , Silvia MIRONEASA[3]

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Abstract: *The paper presents the application concept of the Laffer curve to optimizing conformity assessment processes in the machinery sector. Originally used in fiscal economics, the Laffer curve can be adapted to analyze the relationship between the intensity/frequency of conformity assessments and the resulting compliance levels. The key idea of the paper is that an optimal level of assessment exists that maximizes compliance while minimizing excessive quality costs. The paper presents how assessment for machinery manufacture is carried out through various conformity assessment modules, each with different requirements in terms of documentation, testing, and involvement of third-party bodies. When applying the Laffer curve principles, it can be helpful for enterprise management to identify the right balance between regulatory rigor of conformity assessment and economic pragmatism, avoiding situations where over-investment in compliance compromises the competitiveness of the enterprise without proportional safety or other benefits. We suggest that the Laffer curve can provide an important conceptual framework for optimizing conformity assessment processes, aiming to find the optimal balance where compliance costs are minimized while maintaining an adequate level of product safety and quality.*

Keywords: *Laffer curve, conformity, assessment modules, machinery*

7.USING THE IDEAS DIAGRAM METHOD TO DESIGN A MINI-EQUIPMENT FOR TENSILE TESTING OF 3D PRINTED SPECIMENS

Vlada Țisari[1], Oana Dodun[1], Gheorghe Nagîț[1], Margareta Coteață[1], Andrei Marius Mihalache[1], Irina Beșliu-Băncescu[2], Laurențiu Slătineanu[1]

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Abstract: *Some observations regarding the use of conventional tensile testing equipment have led to the need for designing and developing a mini tensile testing equipment intended for small-sized specimens made of polymeric materials fabricated by 3D printing. To identify a suitable solution for such equipment through the efficient use of technical creativity, the ideas diagram method was applied. The use of this method involved identifying several variants of the mini-equipment components, which were subsequently combined to obtain a solution considered to be the most appropriate. By applying the idea diagram method, it was possible to identify a viable solution for the tensile testing equipment, which was then materialized and subjected to preliminary experimental trials.*

Keywords: *ideas diagram method, 3D printing, tensile testing; testing mini equipment; polymeric specimens.*

8.INFLUENCE FACTORS AND SPECIFIC REQUIREMENTS FOR RESEARCH ON THE ABRASIVE EROSION WEAR PROCESS

Ștefan Jureschi[1], Margareta Coteață[1], Irina Beșliu-Băncescu[2], Ioan Surugiu[1], Mihai Boca[1], Roxana Gabriela Hobjâlă[1], Vlada Țisari[1] and Laurențiu Slatineanu[1]

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Abstract: *The active components of the molds used for the manufacture of vibropressed concrete pavers are subject to abrasive erosion processes. These active components are usually made of manganese steels. For the experimental research of the abrasive erosion process of manganese steel test samples, it was necessary to design equipment that meets the requirements of abrasive erosion testing. The systemic analysis method was used to highlight the factors capable of exerting influence on some output parameters of the abrasive erosion process. Some principles of axiomatic design allowed establishing correlations between the functional requirements and the corresponding design parameters of the equipment intended for the experimental research of the abrasive erosion process by using the pin-on-ring method. In this way, a device adaptable to a universal lathe was designed, which provides conditions for researching the influence exerted by some factors on the dimensions of the crater generated in the manganese steel test sample by abrasive erosion.*

Keywords: *abrasive erosion, systemic analysis, influence factors, pin-on-ring, device adaptable to a universal lathe.*

9.EXPERIMENTAL INVESTIGATION CUTTING FORCES AND MOMENTS IN ROUGHING GRINDING OF MINERAL MATERIALS

Petre Valea[1]

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Abstract: *The paper presents the experimental installation for measuring cutting forces and moments in the roughing grinding process of mineral materials (granite, basalt, marble) using the RPO200-AKS plan grinding machine tool with type 1A1 diamond discs, cutting with the front side with characteristics specific to roughing operations, mounted on a 76.2 mm mandrel.*
The chosen factorial experimental design is 31x22. This was the basis for conducting the experiments, establishing three input variables: cutting speed, longitudinal feed, cutting depth and output variables: cutting force components Fx, Fy, Fz and cutting moments Mx, My, Mz.
Using the Data Fit program version 9.1.32 the regression functions for the force components Fx, Fy, Fz were obtained. The experimental research conclusions regarding the variation of cutting forces and moments as well as the degree of machinability in the case of mineral materials tested in the roughing grinding process.

Keywords: *roughing grinding, mineral materials, diamond discs, cutting forces, cutting moments.*

10.CASE STUDY REGARDING THE MANAGEMENT OF TOTAL QUALITY COST

Mitica Afteni[1,2], Cezarina Chivu[1], Gabriel-Radu Frumusanu[1], Florin Susac[1]

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Abstract: *Nowadays, companies focus their strategies considering the efficiency of the internal processes and activities. The structure of the cost should be identified to define the most suitable solution for cost control. Considering that one of the main impacts on a company result is the quality of its products, there should be identified which are the quality cost and the non-quality cost. The management team has a difficult job in identifying the individual impact of each total quality cost component (prevention, detection and non-quality analysis). The strategy for total quality cost management is then identified based on product status - conform or non-conform to technical specifications. The main purposes of the present case study are the building of a database coming from industrial environment and the defining of a working algorithm, which can support the managerial decisions related to the total quality cost control. An integrated approach of total quality cost structure, using the proposed algorithm, will enable us to reduce both analysis time and related expenses.*

Keywords: *total quality cost structure, processes efficiency, decision making algorithm*

11.INTEGRATING RISK, QUALITY, AND EXCELLENCE CRITERIA FOR SMART DIGITAL TRANSFORMATION AND PRODUCTIVITY GROWTH

Diana Haimana[1], Irina Severin[2,]

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Abstract: *Digital transformation has become an essential factor for organizations that aim to increase productivity and respond to the challenges of a dynamic and interconnected economy. However, the mere adoption of digital technologies – such as process automation, advanced data analytics, or artificial intelligence – does not automatically guarantee improved performance. Without a structured approach that includes proper governance, risk identification and management, and a clear quality assurance system, digitalization may generate imbalances or even failures within organizations.*
This article proposes an integrated framework based on three internationally recognized instruments: the ISO 31000 standard for risk management, the principles of quality management (ISO 9001), and the EFQM model for organizational excellence. Integrating these three components allows organizations to implement digital technologies in a coherent, controlled, and results-oriented manner, thus providing a solid foundation for real and sustainable productivity growth.

Keywords: *Smart digitalization; Risk management (ISO 31000); Quality management (ISO 9001); EFQM excellence model; Productivity growth*

SECTION 2. APPLIED MECHANICS.

ON-LINE: HTTPS://MEET.GOOGLE.COM/ODO-CIZR-UJI

TOPICS: Mechanical Engineering; Applied Tribology; Analysis and Simulation, Maintenance, Reliability, Life Cycle,

Session chairs:

Ilie MUSCĂ

Viorel PALEU

Stelian ALACI

Sergiu SPÎNU

1.IMPACT SQUEEZE OF A STACK OF DISKS SEPARATED BY LAYERS OF BINGHAM FLUID

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Abstract: *This study examines the impact squeeze of a multi-disk stack incorporating a Bingham fluid. The configuration consists of rigid disks separated by interstitial gaps partially filled with a viscoplastic fluid, which flows radially outward during impact and generates resistance. A heuristic, simple analytical model is formulated based on squeeze film theory and Bingham rheology. Preliminary experimental validation is carried out using a drop tower setup using polyethylene disks and toothpaste exhibiting Bingham fluid behavior. Force, displacement, and flow dynamics are recorded through sensors and high-speed imaging. The results demonstrate the capacity of Bingham fluid to generate hydrodynamic load and confirm the predictive accuracy of the model.*

Keywords: impact, squeeze, Bingham, stack

2.EXPERIMENTAL DEVICE FOR THE STUDY OF DRY FRICTION

Irimescu Luminița, Alaci Stelian, Ostrovan Gabriel

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Abstract: *This paper presents an experimental divice intended for the study of dry friction between a cylindrical surface and a sphere. The spherical surface is materialized by a physical pendulum whose movement is monitored using a wireless rotation sensor, which measures and plots the graph of the angle variation as a function of time. The sphere is materialized by a lever that presses on the pendulum by its own weight. The main purpose of the paper is to determine the coefficient of friction between the physical pendulum and the lever by imposing the condition that the theoretical model and the experimental pendulum have identical decreases in angular amplitude.*

3.PNEUMATIC VISE / GRIPPER WITH AIR-ONLY FEEDBACK (NO ELECTRONICS)

CORBAN Andrei[1], DURBACĂ Marian[2], FRENȚIU P. Titus[3], FRENȚIU T. Dennis[4], MINA Alexandru[5], POSA Alexandru[6]

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Abstract: *The paper presents the development and analysis of a pneumatic vise/gripper concept equipped with an air-only feedback system, which operates without the use of electronic components. The basic principle consists in the exclusive use of compressed air pressure to detect and adjust the gripping force, eliminating the need for sensors or electrical controllers. This approach allows for a simple, robust, and reliable mechanism, suitable for demanding industrial environments where electronic solutions can be costly or difficult to implement. The advantages of low cost, minimal maintenance, and adaptability are discussed, as well as potential applications in fastening, handling, and automation systems. The paper aims to highlight the contribution of pure pneumatic feedback to improving the accuracy and safety of the gripping process, demonstrating the relevance of the air-only concept for future innovative solutions in the field of manufacturing and robotics technologies.*

Keywords: Pneumatic gripper, Air-only feedback, Mechanical design, Industrial automation, Clamping systems.

4.IMPLEMENTATION OF SMART TECHNOLOGIES FOR IMPROVING OCCUPATIONAL SAFETY AND HEALTH

CORBAN Andrei[1], DURBACĂ Marian[2], FRENȚIU P. Titus[3], FRENȚIU T. Dennis[4], MINA Alexandru[5], POSA Alexandru[6]

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Abstract: *The paper addresses the importance of implementing smart technologies in occupational safety and health (OSH) in the context of digital transformation and the Industry 4.0 concept. It highlights how solutions based on smart sensors, data analysis, artificial intelligence, and real-time monitoring systems can contribute to proactive risk identification and accident prevention. By integrating these technologies, a safer working environment can be ensured, with a high level of protection for employees and a reduction in incident-related costs. The paper highlights the advantages of introducing intelligent warning, assessment, and control mechanisms, as well as their role in supporting managerial decision-making. The main conclusion is that digitization and the use of intelligent technologies represent a strategic direction for modernizing and streamlining OSH management, with applicability in various industrial fields.*

Keywords: *Occupational safety, Smart technologies, Workplace health, Risk prevention, Industry 4.0.*

5.STUDY OF THE FRICTION PHENOMENON IN THE WIPER-WINDSHIELD CONTACT

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Abstract: *the paper presents a series of experiments studying the friction between the wiper and the windshield and a series of considerations regarding the occurrence of the stick-slip phenomenon. The stand used was built so that a series of laboratory tests could be carried out under different load and speed conditions.*
In the first part of the study, the maximum and average friction forces, as well as the maximum and average friction coefficients, were determined. In the second part, the presence of the stick-slip phenomenon and the conditions for its manifestation were investigated. Observations were also made on the behavior of the system under these conditions.

Keywords: friction coefficient, stick-slip.

6.FINITE ELEMENT MODELING OF THE FRICTION STIR WELDING (FSW) PROCESS OF DISSIMILAR ALUMINUM ALLOYS

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Abstract: *Friction Stir Welding (FSW) is a solid-state joining technique widely used for high-strength aluminum alloys, offering clear advantages over conventional fusion welding. Among dissimilar combinations, the joint between AA7075 and AA6061-T6 has gained increasing interest due to its applications in aerospace, automotive, marine, and defense industries, where lightweight and high-performance structures are required. This study develops a finite element model (FEM) to simulate the thermo-mechanical behavior of the FSW process in these alloys. The model accounts for tool geometry, rotational and traverse speeds, and material constitutive laws to predict temperature distribution, plastic flow, strain evolution, and residual stresses. Validation against experimental data ensures the accuracy and reliability of the simulations. The results confirm that the solid-state nature of FSW minimizes defects typical of fusion welding, such as porosity, hot cracking, and shrinkage. Dissimilar joints produced by FSW show superior fatigue resistance, higher tensile strength retention, and improved microstructural stability. Additionally, the process generates lower heat input, reducing distortion and preserving desirable properties, while eliminating the need for filler materials or shielding gases, thus lowering cost and environmental impact. Overall, the FEM framework provides valuable insights into material flow and thermal history, supporting process optimization and confirming FSW as a robust solution for advanced engineering applications.*

Keywords: FSW, finite element, stress, strain

7.FINITE ELEMENT MODELING OF DAMAGE IN METAL FORMING

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Abstract: *Predicting damage initiation and fracture in metal forming is essential for designing reliable components, yet experimental characterization is costly and limited. Finite element modeling (FEM) provides a robust alternative, allowing investigation of the interactions between stress, strain, and temperature. In this study, FEM was used to evaluate several damage models, including Oyane, Johnson–Cook, Cockcroft–Latham, Lemaitre, Gurson–Strain, Bonora, and JC-Mesh Separation, under realistic thermo-mechanical conditions. The results show that simpler criteria offer efficiency but oversimplify complex stress states, while advanced models such as Lemaitre, Bonora, and Gurson–Strain capture progressive failure more accurately, and JC-Mesh Separation delivers detailed crack path prediction at higher computational cost. Overall, the findings emphasize that model selection must balance accuracy, computational effort, and application requirements, providing valuable guidelines for reliable damage prediction in metal forming.*

Keywords: damage model, finite element, stress, strain

8.ABOUT TRANSVERSE SLOPE AND DRAINAGE OF THE RUNWAY SURFACE

Ionut – Marius Nazarie, Ilie Musca

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Abstract: *In order to operate safely on the road surface, the macrotexture and the transverse slope of the runway have important roles and must be analyzed as an interdependent system. In the case of wet surfaces, in conditions of inadequate drainage, the risk of aquaplaning is greater. Proper drainage, system optimization, must ensure macrotexture and transverse slope characteristics that allow water or contaminants to drain from the surface, to prevent stationary accumulations of liquids. The paper deals with a case study regarding the influence of the transverse slope value and the mean depth of the macrotexture on the drainage characteristics, on a wet surface, and the impact on the safety of operations.*

Keywords: transverse slope, macrotexture, drainage, slope

9.COMPARATIVE ANALYSIS OF RO-RO PONTOON STABILITY: REAL STRUCTURE VERSUS SCALE MODEL

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Abstract: *This paper presents a comparative stability assessment of a Ro-Ro pontoon at full scale and at a 1:25 physical model scale. Inclining tests were carried out on both the real pontoon and the scale model, using systematic weight shifts between port and starboard to determine the metacentric height and righting*

lever characteristics. In addition, hydrostatic and stability parameters of the real pontoon were calculated with the NAPA software package, which provided equilibrium conditions and righting lever curves in accordance with established stability procedures. The experimental and computational results showed that the scale model reproduced the overall stability characteristics observed in the real pontoon, while numerical values differed as expected due to scaling effects. These findings confirm the usefulness of physical modeling and computational analysis as complementary approaches to the validation of hydrostatic stability in floating structures.

Keywords: Stability analysis, NAPA software, Ro-Ro pontoon, Scale modeling

10.MATHEMATICAL MODELING AND ADVANCED ANALYSIS OF THE ND:YAG WELDING PROCESS USING IN SITU SPECTROSCOPIC METHODS ,

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SECTION 3. AUTOMOTIVES / ENVIRONMENTAL ENGINEERING AND SUSTAINABLE DEVELOPMENT.

ON-LINE: HTTPS://MEET.GOOGLE.COM/RXF-GDJB-PDS

TOPICS: Automotives, Engineering Management and Leadership; Innovation, Creativity and Industrial Development; Quality Management; Environmental Engineering and Sustainable Development; Learning and Education in Engineering, Materials Science, Metrology

Session chairs:

Ioan MIHAI

Ştefan – Constantin LUPESCU

Ioan – Cozmin MANOLACHE – RUSU

Petru BULAI

1.CONTINUOUSLY VARIABLE TRANSMISSIONS: PROGRESS AND CHALLENGES FROM THE LAST YEARS

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Abstract: *Interest in continuously variable transmissions (CVTs) has grown considerably in the context of increasingly stringent requirements for energy efficiency and emissions reduction. This article reviews recent research on conventional and unconventional CVTs, focusing on technological developments and current directions for development. It structures recent technical literature on the latest analytical models developed, control strategies implemented, and numerical methods used to simulate the behavior of these transmissions. The paper compares the reported performance and efficiency of CVT systems, including especially hybrid and electric vehicles, highlighting design solutions, design methods, and good experimental testing practices. The main contribution consists of the systematic organization of specialized literature and the highlighting of the technological trends that define the evolution of continuously variable transmissions.*

Keywords: review, CVT, eCVT, AMT, transmission structure, FEM, efficiency

2. A DESIGN AND DEVELOPMENT OF AN EXPERIMENTAL STAND FOR CARDAN TRANSMISSION ASYNCHRONISM ANALYSIS

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Abstract: *Although characterized by a simple construction, cardan transmissions remain relevant and are frequently addressed in the specialized literature in the context of analyzing the phenomenon of asynchronism and its associated effects, particularly through mathematical modeling and analytical simulations. The aim of this study is to design and develop an accessible modular experimental test rig*

intended for investigating cardan transmission asynchronism, with the goal of strengthening the connection between theoretical approaches and experimental research—the latter being insufficiently represented due to the limitations of existing practical platforms. The rig was designed in a three-dimensional environment and is based on a metal frame supporting two universal joints, three shafts, a drive electric motor, and a data acquisition system consisting of a development board, polar wheels, and Hall sensors. Functional validation involved conducting experimental tests for different geometric configurations of the transmission shafts. The angular velocities recorded for the three shafts were stored and subsequently analyzed, leading to the determination of an RMS index of asynchronism relative to the input shaft speed. The results confirm that the level of asynchronism increases with shaft misalignment and improper orientation of the joint forks. The functional analysis demonstrates that the rig effectively highlights kinematic irregularities and serves both as an educational tool and as a practical platform for applied research.

Keywords: *cardan transmission, asynchronism, experimental stand, propulsion dynamics*

3. SIMULATION OF THE IMPACT BETWEEN TWO VEHICLES IN PC-CRASH, ANALYSIS AND CALCULATIONS FOR THE SIDE IMPACT BETWEEN AN AUDI A4 QUATTRO AND A MERCEDES-BENZ C320

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Abstract: *This paper shows the behaviour of vehicles in a side impact scenario using accident simulation software, which is used by the vast majority of experts both in Romania and abroad.*

The parameters provided by the software are then compared with calculations for the lateral impact of the two cars chosen for this case. The results between the calculations made by the software and the actual calculations for the two vehicles are quite close.

Keywords: *Soft accidentology, side impact, calculations for side impact*

4.STUDIES ON THE EFFECT OF OCCUPANCY ON INDOOR PM AIR LEVEL IN TEACHING LABORATORIES

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Abstract: *In this study, atmospheric dust concentrations PM_{10}, PM_5, $PM_{2.5}$, PM_1, $PM_{0.5}$ and $PM_{0.3}$ were monitored using a PCE-PCO2 particle counter. The research was carried out in two university teaching laboratories, selected according to the occupancy rate: one with an occupancy rate over 70%, and the other with an occupancy rate below 5%. The measurements were carried out during the teaching program, between 08:00 and 20:00. The indoor results were compared with the outdoor dust concentrations. Also, the correlation between dust concentrations and the number of students present, respectively the occupancy rate*

of the laboratories, was made.

Keywords: *atmospheric dust, PM_{10}, $PM_{2.5}$, teaching laboratories*

5.GREEN ROOFS: SUSTAINABLE BUILDING SOLUTIONS

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Abstract: *Green roofs perform a vital role in helping cities adapt to the effects of climate change by reducing the need for artificial cooling in hot weather and attenuating or capturing rainwater runoff, as well as providing a range of habitats for wildlife. However, green roofs can only provide these environmental benefits if designed and installed in a way that ensures that minimum performance criteria are met. This code therefore highlights the important green roof design, installation and maintenance considerations and provides guidelines as to how.*

Keywords: *Green roofs, Building, Energy performance*

6.ECOLOGICAL PRINCIPLES OF URBAN DESIGN

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Abstract: *For the first time in the Republic of Moldova were developed two Practical Codes - one for the design of green buildings, the second for greenery. The codes contain a series of design principles in the field of urbanism, which must be the basis for the elaboration of urban planning documentation for projects with low impact on the environment. The principles are set out below in a structure based on several requirements, which will have areas of applicability depending on the type of urban planning documentation developed (PUG, PUZ or PUD).*

Keywords: *PUG, PUZ, PUD*

7.TECHNICAL DESIGN FEATURES FOR GREEN ROOFS

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Abstract: *Green technologies are in the trend of modern architecture. An advantage of green technologies is the creation of conditions for a healthy lifestyle, primarily by absorbing dust, reducing noise levels and protecting structures that cover buildings from atmospheric influences. Due to the use of environmentally friendly construction technologies, a high effect is obtained by reducing heat loss through the outer envelope of the building, which reduces the amount of heat consumed.*

Keywords: *Green roofs, thermal protection, Air permeability*

8.EFFECT OF PHYSICAL PROPERTIES OF FUEL MIXTURES ON ICE PERFORMANCE

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Abstract: *The scientific research presented in this study focused on determining the density (ρ) and kinematic viscosity (μ) of biodiesel–diesel blends, key properties for fuel characterization and engine performance. The objective was to assess the influence of biodiesel concentration on these parameters using methods compliant with GOST 3900 and GOST 33-82. At 15 °C, the density of pure biodiesel (B100) was measured at 0.886 g/cm³, which is 6.24% higher than conventional diesel, while B20 and B50 blends showed increases of 1.44% and 3.36%. At 20 °C, the kinematic viscosity of B100 was 1.97 times higher than diesel, whereas B20 and B50 exhibited moderate increases of 1.09 and 1.19 times. The results indicate deviations from the additivity principle, suggesting a synergistic effect in which diesel exerts a dominant influence on the blend properties, an aspect essential for optimizing combustion and lubrication characteristics.*

Keywords: *biodiesel, diesel fuel, density, kinematic viscosity, fuel blends, physical properties.*

9.CAPABILITIES AND LIMITATIONS OF A 4DOF CAR SIMULATOR

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Abstract: *Four-degree-of-freedom (4DOF) automotive simulators provide an effective platform for analyzing vehicle behavior under various dynamic conditions. They allow the reproduction of rotational movements (pitch, roll, yaw) and vertical translation (heave), being widely used in applied research for evaluate safety, comfort, and stability during driving. This paper explores the modeling of a 4DOF automotive simulator using MATLAB/Simulink enviroment, aiming to highlight its capabilities in simulating critical traffic scenarios. Simulation enables the investigation of hazardous situations such as emergency braking, loss of steering control, obstacle avoidance maneuvers, and driving on low-traction surfaces. These scenarios contribute to understanding how vehicles and passengers respond to dynamic demands, providing relevant data for optimizing the design of safety and comfort systems Modeling in MATLAB/Simulink allows for accurate representation of vehicle movements, facilitating virtual testing of behaivor in controlled environments. This approach significantly reduces the risks associated with physical testing and provides flexibility in exploring a large number of driving conditions. At the same time, 4DOF simulators can be integrated into automotive system validation processes, contributing the development of safer and more*

efficient solutions. Although the 4DOF simulator does not cover all possible degrees of freedom, it offers an optimal balance between complexity and practical applicability. Its limitations are offset by the ability to reproduce essential movements for analyzing vehicle behavior in scenarios relevant to road safety. 4DOF simulator is a valuable tool for investigating vehicle behavior in risky conditions, contributing to the improvement of road safety and the development of modern automotive technologies.

Keywords: *Simulator, 4DOF, car, Matlab/Simulink*

10.PIEZOELECTRIC DIESEL DROPLET GENERATION SYSTEM INTEGRATED INTO THE INTAKE MANIFOLD OF MAC ENGINES

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Abstract: *This study presents the development and evaluation of a piezoelectric diesel droplet generation system integrated directly into the intake manifold of medium-speed marine and automotive compression ignition (MAC) engines. The system employs high-frequency piezoelectric actuation to produce controlled micro-scale diesel droplets, enabling improved fuel–air premixing prior to combustion. Experimental characterizations show that the actuator can generate droplets with diameters in the range of 20–60 μm, significantly finer than conventional injector spray distributions in the intake region. Engine bench tests indicate enhanced mixture homogeneity, leading to reduced ignition delay and more stable combustion. Notably, the system demonstrates potential for lowering particulate matter and NO_x formation through improved charge preparation, without requiring modifications to the primary high-pressure injection system. The integration approach maintains engine structural integrity and allows modular retrofit. Results highlight that piezoelectric droplet generation in the intake manifold represents a promising pathway for efficiency enhancement and emission reduction in MAC engines, particularly under low-load and transient operating regimes.*