TECHNICAL UNIVERSITY – SOFIA
PLOVDIV BRANCH

14-TH INTERNATIONAL SCIENTIFIC CONFERENCE "ENGINEERING, TECHNOLOGIES AND SYSTEMS"

PROGRAM

TECHSYS 2025

15-17 May, Plovdiv, Bulgaria

TECHNICAL UNIVERSITY - SOFIA, PLOVDIV BRANCH

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Technical Secretary: Eng. Tsvetan Petrov, Eng. Christo Christev

TIME SCHEDULE

<table>
<tr><td>15 MAY 2025</td><td>13:00-14:00</td><td colspan="3">REGISTRATION
The conference will be held at Technical University of Sofia,
Plovdiv Branch
25, Tsanko Dyustabanov Street, Plovdiv 4000, Bulgaria</td></tr>
<tr><td rowspan="5">15 MAY 2025</td><td>14:00-14:30 h</td><td colspan="3">TECHSYS 2025
Opening Ceremony - AULA</td></tr>
<tr><td>14:30-15:00 h</td><td colspan="3">Plenary Session - AULA</td></tr>
<tr><td>15:00-15:30 h</td><td colspan="3">Coffee Break</td></tr>
<tr><td rowspan="2">15:30-18:30 h</td><td>Section 1
Hall 4327</td><td>Section 2
Hall 4325</td><td>Section 3
Hall 4425</td></tr>
<tr><td>Section 4
Hall 4326</td><td>Section 5
Hall 4328</td><td>Section 6
Hall 4422</td></tr>
<tr><td>19:00-22:00 h</td><td colspan="3">Conference Dinner at Imperial Hotel Plovdiv</td></tr>
<tr><td>16 MAY 2025</td><td>09:30-13:00 h</td><td colspan="3">Section 3
Hall 4425</td></tr>
</table>

TECHSYS 2025 Sections *

SECTION 1 - Automation, Control Systems and Robotics

SECTION 2 - Electrical Engineering and Electronics

SECTION 3 - Computer Engineering, Informatics and Communications

SECTION 4 - Mechanical Engineering

SECTION 5 - Automotive and Aeronautical Engineering

SECTION 6 - Materials Science

**** All sections will be held in the hybrid mode***

OPENING CEREMONY ACTIVITIES

15 MAY 2025
14:00 – 15:00 h

I. Opening ceremony of "Science Days of Technical University - Sofia" 2025

II. Opening of 14th International Scientific Conference "TechSys 2025" – ENGINEERING, TECHNOLOGIES AND SYSTEMS

III. Plenary Session

Metal AM in Tool Optimization

Prof. Ing. Miroslav Zetek, PhD - *Expert in machining technology and metal additive manufacturing, University of West Bohemia in Pilsen, Czech Republic*

Metal additive manufacturing is fundamentally changing the approach to tooling design, enabling geometries that are unattainable with traditional methods. A key advantage is the ability to integrate conformal cooling channels directly into the body of cutting tools and plastic injection moulds. This presentation will focus on critical aspects of the design and manufacture of such tools - from the proper design of internal structures and selection of suitable materials to the limitations of the SLM technology, to the necessary post-processing.

Specific applications will be used to demonstrate how productivity and tool life can be increased with 3D printing capabilities, as well as where the technological and economic limitations lie. The presentation will provide practical guidance on how to think about tooling design in a completely new way defined by additive manufacturing.

SECTION 1	AUTOMATION, CONTROL SYSTEMS AND ROBOTICS (hybrid) **Hall 4327** Chair: Borislav Penev Co-Chair: Sevil Ahmed-Shieva ***LINK in TEAMS - Section 1 online link***
15 MAY 2025 15:30 - 18:30	**Robot modeling and control in digital twin system** *Denis Chikurtev, Vladimir Ivanov, Simeon Tsvetanov, Kaloyan Yovchev*
	Mapless navigation with Deep Reinforcement Learning in indoor environment *Anastasia Slavova*
	Development of an Educational Omnidirectional Mobile Manipulator with Mecanum Wheels *Maya Stefanova Staikova*
	Engineering and Environmental Analysis of Additive Manufacturing in the Food Industry *Valentina Nikolova-Alexieva, Katina Valeva, Margarita Terziyska, Hristian Panayotov*
	Collaborative Robots as an Engineering Tool for the Transition of the Food Industry to Industry 5.0 *Valentina Nikolova-Alexieva, Katina Valeva, Margarita Terziyska, Nikola Shakev*
	Planning Resources by Model Predictive Control *Krasimira Petrova Stoilova, Todor Stoilov, Galia Angelova*
	Energy Management of Charging Stations for Electrical Vehicles *Todor Atanasov Stoilov, Krasimira Petrova Stoilova, Denis Petrova Chikurtev*
	System for emitting radio signals with a fictitious electromagnetic center *Konstantin Nikolov Nesterov, Nikolay Litchkov, Atanas Nachev, Kamen Vasilev Vasilev, Svetlana Yaneva*
	Kolmogorov-Arnold Networks for System Identification of First and Second Order Dynamic Systems *Lily Joro Chiparova, Vasil Popov*

SECTION 2	ELECTRICAL ENGINEERING AND ELECTRONICS (hybrid) **Hall 4325** Chair: Tsvetana Grigorova Co-Chair: Stanimir Stefanov ***LINK in TEAMS - Section 2 online link***
15 MAY 2025 15:30 - 18:30	**Reliability of Electro Power Equipment Determined by Data in its Operation and Storage** *Konstantin Nikolov Nesterov, Nikolay Litchkov, Atanas Nachev, Yavor Boychev, Svetlana Yaneva*
	Investigation of Triple-Microcantilever sensor for Ultra-Low Mass Sensing Applications *Luca Banchelli, Vladimir Stavrov, Borislav Todorov Ganev, Nikolay Lyubenov Nikolov, Todor Stoilov Todorov*
	Sensors and Sensing Methods for Early Detection of Life-threatening Sudden Illnesses in Motor Vehicles Drivers *Hristo Radev, Galidiya Petrova*
	A study of a phase-shift controlled ZVS DC-DC converter with synchronous rectifier *Tsvetana Grigorova, Georgi Bodurov, Mihail Dobrolitsky*
	Determination of the Size of an Astronomical Object Using Photon Counting Mode *Boryana Kostadinova Pachedjieva*
	Investigation of the Efficiency of a Peltier Element *Atanas Petrov Radulov, Mario Tanev Dechev, Misho Ivanov Matsankov*
	Comparative Analysis Between Simulation Using Specialized Software for Photovoltaic Power Plant Design and Real-World Data from a Solar Power Plant *Mincho Sttanislavov Velkov*
	Model for determining the magnetic permeability of a neodymium magnet *Georgi Lubomirov Dobrev*

SECTION 3	COMPUTER ENGINEERING, INFORMATICS AND COMMUNICATIONS (hybrid) **Hall 4425** Chair: Grisha Spasov Co-Chair: Dilyana Budakova ***LINK in TEAMS - Section 3 online link***
15 MAY 2025 15:30 - 18:30	**Design and implementation of Passive Optical Network for small town** *Fatima Sapundzhi, Boyko Zarev, Slavi Georgiev, Snezhinka Zaharieva*
	An Experimental Evaluation of Latency-Aware Scheduling for Distributed Kubernetes Clusters *Radoslav Furnadzhiev*
	Event-driven data orchestration: A modular approach for high-volume real-time processing *Stanislav Dakov, Megi Dakova*
	An Algorithm for Assessment of Time Series Data Related to the Used Materials for Packaging Placed on the Market *Delyana Dimova*
	Tariff Responses: A Graph-Theoretic Approach with Industry Dependencies *George Pashev, Silvia Gaftandzhieva*
	Predicting traffic load data: ARIMA and SARIMA comparison *Teodora Atanasova Mecheva, Todor Peychinov, Adeliya Karaivanova*
	LoRaWAN IoT system for measuring air parameters in a traffic monitoring station *Grisha Spasov, Stefan Lishev, Galidia Petrova*
	Process optimization with smart BLE beacons *Stanimir Ivanov Kabaivanov*

SECTION 3	COMPUTER ENGINEERING, INFORMATICS AND COMMUNICATIONS (hybrid) **Hall 4425** Chair: Grisha Spasov Co-Chair: Dilyana Budakova ***LINK in TEAMS - Section 3 online link***
16 MAY 2025 09:30 - 13:00	**A Performance Comparison of Shortest Path Algorithms in Directed Graphs** *Antonina Ivanova Ivanova, Fatima Sapundzhi, Kristiyan Danev, Metodi Popstoilov, Slavi Georgiev, Slavi Georgiev*
	GainingPythonSkillsThroughInteractiveEducatio_robotOzobotEVO *Maya Stefanova Staikova*
	Applications of Virtual Reality Simulations and Machine Learning Algorithms in High-Risk Environments *Velyo Enev Vasilev, Dilyana Budakova, Veselka Petrova-Dimitrova*
	Generalized Net Model for Analysis on Behavior and Efficiency of IVA in a Risky Environment *Dilyana Budakova, Velyo Vasilev, Lyudmil Dakovski*
	Analyzing at Scale the Effects of Optimal Global Sequence Alignment on Sequence Similarity using a GPU Optimized Implementation of the Needleman-Wunsch Algorithm and the SBERT module *Maria Pl Marinova, Emilia Pardo, Vencislav Kolev, Valko Milev*
	FPGA Prototyping of Heterogeneous Security Architecture for Educational Purposes *Maria Pl Marinova, Nikolay Kakanakov, Stefan Stoyanov*
	Methodology for automatic information extraction and summary generation from online sources for project funding *Mariya Zhekova*
	Machine Learning-Powered Agents for Optimized Product Management in Performance Max Campaigns *Veselka Sasheva Petrova-Dimitrova*

SECTION 4	MECHANICAL ENGINEERING (hybrid) **Hall 4326** Chair: Iliya Chetrokov Co-Chair: Raycho Raychev ***LINK in TEAMS - Section 4 online link***
15 MAY 2025 15:30 - 18:30	**Investigation of technological system stability during side-milling** *Plamen Plamenov Kasabov, Ilya Chetrokov, Sabi Sabev*
	Methodology for the Design and Verification of a Securing Structure for Transporting Cylindrical Rollers on Load Bogies *Plamen Plamenov Kasabov, Marian Kalestrov*
	A Parametric Numerical Study of the Dynamic Factor in The Rope of a Dc Motor Driven Hoist-Ing Mechanism *Rosen Mitrev, Venelin Jivkov, Nikolay Nikolov*
	Numerical modelling and analysis of fatigue failure in 42CrMo4 steel pivot bolts at different heat treatments *Raycho Raychev, Ivanka Delova, Yordan Mirchev, Tsvetomir Borisov*
	Crack growth modeling in CT specimens: the influence of heat treatment and loading *Raycho Raychev, Ivanka Delova, Yordan Mirchev, Tsvetomir Borisov*
	Design and Construction of anEngine Oil Viscosity Meter with Electronic Control *Penko Mitev, Atanasi Tashev, Yordan Stoyanov*
	A Functional Model Printing Approach Optimized for Cost-Efficiency Using FDM Technology *Blagovest Bankov, Todor Todorov Todorov, Georgi Todorov*
	Non-linear Creep of a Spherical Container with Fluid under *Victor Rizov*
	Non-linear Investigation of a Functionally Graded Pipe *Victor Rizov*
	Ensuring Accuracy in Turning *Svetlana Koleva Jordanova*

SECTION 4	MECHANICAL ENGINEERING (hybrid) **Hall 4326** Chair: Iliya Chetrokov Co-Chair: Raycho Raychev ***LINK in TEAMS - Section 4 online link***
	Optimization of Accuracy and Repeatability in Laser Micro-Processing Using Experimental Design *Todor Gavrilov, Todor Todorov Todorov, Yavor Sofronov, Hristiana Nikolova, Angel Todorov*
	A methodology for modernization of hydropower unit in pumped hydro energy storage systems *Konstantin Kamberov*

SECTION 5	AUTOMOTIVE AND AERONAUTICAL ENGINEERING (hybrid) **Hall 4328** Chair: Atanas Nachev ***LINK in TEAMS - Section 5 online link***
15 MAY 2025 15:30 - 18:30	**Wind Tunnel Study of Aerodynamic Characteristics of Wing with Arc Shaped Wingtips** *Stanimir Penchev*
	Wind Tunnel Investigation of Wake Characteristics of a Wing with Winglets *Hristian Panayotov, Stanimir Penchev, Martin Zikyamov*
	Thermal and Structural Analysis of a Gasoline Engine Piston at Different Boost Pressures *Krasimir Ambarev, Stiliyana Taneva*
	Research and Analysis of Traffic Intensity on a Street with High Traffic Load: Case Study of the City of Sofia *Durhan Nazamov Saliev, Georgi Mladenov, Plamen Petkov*
	The Parameters characterizing the performance of automotive elec-tronic control systems on petrol engine emissions *Hristo Stefanov Konakchiev*
	Research and analysis of the real-time interaction between performance and smoke emission of a diesel vehicle *Iliyan Damyanov, Rosen Miletiev, Tsvetan Valkovski*
	A comparative study of vibrations in front suspension components using bushings of different materials *Krasimir Ambarev, Stiliyana Taneva*
	Research and analysis brake fluid impact on the brake system performance *Georgi Dragiev Mladenov*
	Traffic flow model for coordinated traffic light systems *Iliyan Andreev, Durhan Saliev, Iliyan Damyanov*

SECTION 5	AUTOMOTIVE AND AERONAUTICAL ENGINEERING (hybrid) **Hall 4328** Chair: Atanas Nachev ***LINK in TEAMS - Section 5 online link***
	AI-based assistant for SORA Risk Assessment: approach, interaction logic, and perspectives for cybersecurity integration *Anton Puliyski, Vladimir Serbezov*
	Strategy for Optimal Control in a Forklift Hydraulic System Open-Center Type *Yordan Stoyanov Stoyanov*
	Application of a Three-dimensional Model in the Analysis of a Traffic Accident Involving a Motorcycle and a Pedestrian *Milena Georgieva Mratsenkova, Borislav Veselinov Vasilovski*
	Helicopter Rotor Aerodynamic Characteristics in Ground Effect: Numerical Study *Gabriel Venelinov Georgiev*

SECTION 6	MATERIALS SCIENCE **Hall 4422** Chair: Boyan Dochev ***LINK in TEAMS - Section 6 online link***
15 MAY 2025 15:30 - 18:30	**The Simulation of Gravity Filling in a Silica Sand Mold with Grey Cast Iron (EN-GJL-250).** *Antonio Antonov Nikolov, Krum Petrov, Anton Mihaylov*
	The Modelling and optimization of the precision hot forging/extrusion process of an asymmetric C45E/ 1.1191 carbon steel bearing element *Antonio Antonov Nikolov, Krum Petrov, Dimiter Yankov, Anton Mihaylov*
	Implementation of cored wire treatment techology in nodular cast iron foundries *Gergana Milkova Buchkova*
	Investigation of the Influence of Deposition Temperature and N2 Flow on the Hardness of TiN Coating *Chavdar Ognyanov Pashinski*
	Investigation of the Mechanical Properties of Thermosetting Polymers Reinforced with Carbon Particles *Boyan Angelov Dochev*
	A Study of the Microstructure of Non-standardised Alternative Piston Aluminium-silicon Alloys subsequent to Various Modifications: the influence of modification treatments on their microstructure and properties *Desislava Petkova Dimova*
	A Tensile testing of polymer material specimens obtained by Fused Deposition modeling *Miglena Marinova Paneva, Peter Pavlov Panev, Veselin Tsonev*
	An Approach of Accelerated Heat Aging of Test Specimens Produced by 3D Additive Materials *Miglena Marinova Paneva, Peter Pavlov Panev*
	Theoretical and experimental research on centrifugal casting of short and long castings *Angel Marinov Velikov, Ivan Georgiev, Boyko Krastev, Krum Petrov*

SECTION 6	MATERIALS SCIENCE **Hall 4422** Chair: Boyan Dochev ***LINK in TEAMS - Section 6 online link***
	Approaches to Creating Colorful 3D Printed Parts and Reliefs *Mihail Zagorski, Radoslav Miltchev, Boyan Dochev, Nikolay Stoimenov*
	Exploring the Connection between Design and Materials through the Digitalization of Modular Solutions *Ivelina Angelova Daulova, Mihaela Gancheva Gadzheva-Nedelcheva*
	General Characterization of 5083 Aluminum Alloys and Examination of the Joining Method Using Friction Stir Welding *Cem Misirli*
	Effects of Micro Arc Oxidation on Metal Materials and Application Potential *Cem Misirli*