

SIMPOZIONUL ŞTIINŢIFIC INTERNAŢIONAL MULTIDISCIPLINAR INTERNATIONAL MULTIDISCIPLINARY SCIENTIFIC SYMPOSIUM

"UNIVERSITARIA SIMPRO 2024"

SUB EGIDA / UNDER THE AUSPICES OF:

MINISTERUL EDUCAŢIEI MINISTRY OF EDUCATION

ACADEMIA DE ȘTIINȚE ȚEHNICE DIN ROMÂNIA ACADEMY OF TECHNICAL SCIENCES OF ROMANIA

BOOK OF ABSTRACTS

24 – 25 OCTOBER, 2024 PETROŞANI

DISCLAIMER

This book contains abstracts of the papers approved by the Conference Reviewers and Committees. Authors are responsible for the content and accuracy.

Information in the SIMPRO 2024 Conference Proceedings is subject to change without notice. No part of this book may be reproduced or transmitted in any form or by any means, for any purpose, without the express written permission of the International Multidisciplinary Scientific Symposium Editors and the Chairman of SIMPRO 2024.

Copyright ©SIMPRO 2024 All Rights Reserved by the International Multidisciplinary Scientific Symposium Published by Universitas Publishing House, Universității str., no 20, 332006 Petrosani.

ISSN-L 1842 - 4449 ISSN 2344 - 4754

INTERNATIONAL MULTIDISCIPLINARY SCIENTIFIC SYMPOSIUM UNIVERSITARIA SIMPRO, Secretariat Bureau E-mail <u>simpro2024@upet.ro</u>

Foreword

Between 24 and 25th of October 2024, at the University of Petroşani took place the 11th edition of the International Multidisciplinary Symposium "UNIVERSITARIA SIMPRO 2024". Under the motto "QUALITY AND INNOVATION IN EDUCATION, RESEARCH AND INDUSTRY - THE SUCCESS TRIANGLE FOR A SUSTAINABLE ECONOMIC, SOCIAL AND ENVIRONMENTAL DEVELOPMENT", the 2024 edition brought together researchers from several countries (Greece, Germany, Hungary, Italy, Ukraine, Cyprus, Austria, Australia, U.S.A. and, of course, Romania). The total number of papers presented in plenary and parallel sessions was of 117 prepared by more than 240 authors (although, initially, a number of 130 abstracts were submitted, 13 of them were rejected or withdrawn).



The symposium was organized under the auspices of the Ministry of Education and The Academy of Technical Sciences of Romania, and in partnership with the Alumni Association of the University of Petrosani, CDPM Union, S.C. TERMO & GAZ CONSULTING S.R.L. and SC PANTHEON CONSULTING S.R.L. The media partners for his edition were Ziarul EXCLUSIV, Cronica Văii Jiului, Mondo TV and HD 365

The symposium started with the greeting of the organizers, respectively of the Rector Prof. Dr. Eng. Sorin Mihai Radu and of the Vice-rector for Scientific Research Prof. Dr. Habil. Eng. Maria Lazar from the University of Petroşani and of the general director Sci. Res. I Dr. Eng. Artur George Găman from INSEMEX Petroşani.



Four papers were scheduled for the plenary section, presented by personalities from different fields. The papers aimed at presenting the results of recent research in the field of mining engineering carried out by speakers or visionary approaches on the new mission of universities or the responsibility of society regarding the sustainable use of raw materials.



As in previous years, the symposium was organized in several sections, covering a thematic area that reflected the scientific interests of researchers from the University of Petrosani, as well as other universities and research institutes in the country and abroad:

- Advances in safety science and occupational risk management
- > Challenges in geology, mining and mineral processing
- Surveying and civil engineering
- > Sustainable environmental engineering and protection
- > Innovational challenges in electrical engineering and energetic technology
- Responsible consumption and production
- > Developments in systems control, information technology and cyber security
- > Industrial, mechanical and transportation engineering
- > Recent trends in business, economics, law and public administration
- > Contemporary approaches in quality assurance, management and marketing
- Sustainable development in humanities, social sciences, education research and interdisciplinary studies

Also, a workshop and two round tables were organized corresponding to the important international projects carried out within the university:

- Workshop: Soluții inovative pentru refacerea sănătății solului: culturi de biomasă pe terenuri neproductive
- Round tables:
 - ✓ EURECA PRO 2.0 Sustainable practices and circular economy
 - ✓ HI EURECA Mining heritage within the just transition





Although atypical, by the number, diversity and quality of the presented papers, by the sustained communication between specialists in the covered topics, by the major interest regarding the projects debated in the workshop and round tables, it can be stated that this year's edition of the International Multidisciplinary Symposium "UNIVERSITARIA SIMPRO 2024" was a real success, being an opportunity for the exchange of ideas between researchers from the country and from abroad.

Executive Chairman: Prof. Dr. Habil. Eng. Maria LAZĂR

Editor in chief: Assoc. Prof. Dr. Eng. Florin FAUR

ORGANISING COMITTEE

General Chairman: Sorin Mihai RADU, Rector of University of Petroşani, ROMANIA Executive Chairman: Maria LAZĂR, ROMANIA Co-chairs: Codruța DURA, ROMANIA George Artur GĂMAN, ROMANIA Dan Codruț PETRILEAN, ROMANIA Dan Codruț PETRILEAN, ROMANIA Members: Csaba LORINȚ, ROMANIA Ilie UȚU, ROMANIA Imola DRIGĂ, ROMANIA Sabin IRIMIE, ROMANIA, Bogdan COZMA, ROMANIA Robert PRODANCIUC, ROMANIA

EDITORIAL BOARD

Editor in chief: Florin FAUR, ROMANIA Editors: Daniel MOISUC-HOJDA, ROMANIA Cristian RADA, ROMANIA Oana DOBRE- BARON, ROMANIA

INTERNATIONAL SCIENTIFIC COMITTEE

Tatiana ANTIPOVA, Institute of Cited Scientists, Agia Napa, CYPRUS Adam BAJCAR, POLTEGOR-Instytut, POLAND Lia Alexandra BALTADOR, "Lucian Blaga", University of Sibiu, ROMANIA Daniel BREAZ, "1 Decembrie 1918", University of Alba-Iulia, ROMANIA Serhii CHUKHAREV, National University of Water and Environmental Engineering, UKRAINE Lucian-Ionel CIOCA, "Lucian Blaga" University of Sibiu, ROMANIA Doru Costin DARABONT, NIRD-INCDPM Bucharest, ROMANIA Predrag DASIC, High Technical Mechanical School of Professional Studies Trstenik, SERBIA György DEÁK, NIRD in Environmental Protection Bucharest, ROMANIA Anca DRAGHICI, Politehnica University of Timişoara, ROMANIA Carsten DREBENSTEDT, TU Bergakademie, Freiberg, GERMANY Mihalis GALETAKIS, Technical University of Crete, GREECE Emilian GHICIOI, NIRD INSEMEX Petrosani, ROMANIA Janusz GRABARA, Czestochowa University of Technology, POLAND Claudiu KIFOR, "Lucian Blaga" University of Sibiu, ROMANIA Karoly (Charles) KOCSIS, University of Utah, USA Valerii KORNIYENKO, National University of Water and Environmental Engineering, UKRAINE Krzysztof KOTWICA, AGH University of Science and Technology, POLAND Gábor LADÁNYI, University of Miskolc, HUNGARY Omar LANCHAVA, Georgian Technical University, GEORGIA Lazăr AVRAM, University of Oil and Gasses, Ploiești, ROMANIA Zinovii MALANCHUK, National University of Water and Environmental Engineering, UKRAINE Theodoros N MICHALAKOPOULOS, National Technical University of Athens, GREECE Peter MOSER, Montanuniversität Leoben, AUSTRIA Viktor MOSHYNSKYI, National University of Water and Environmental Engineering, UKRAINE Mariana NAGY, "Aurel Vlaicu" University of Arad, ROMANIA Marek PAWEŁCZYK - Silesian University of Technology, POLAND Ion PANĂ, University of Oil and Gasses, Ploieşti, ROMANIA Daniel PUPĂZAN, NIRD INSEMEX Petroșani, ROMANIA Elena Cristina RADA, Insubria University, ITALY Maria FERNANDEZ-RAGA - University of Leon, SPAIN Marco RAGAZZI, Università degli Studi di Trento, ITALY Valentin RÅILEANU, IMI-NOVA, MOLDOVA Christos ROUMPOS, Public Power Corporation of Greece S.A., GREECE Krysztyna SKIBNIEWSKA, University of Warmia and Mazury in Olsztyn, POLAND Zoltan VIRAG, University of Miskolc, HUNGARY Dumitru ŢUCU, Politehnica University of Timişoara, ROMANIA Jean-Jacques WAGNER, IUT de Belfort-Montbeliard, FRANCE Janusz WIELKI, Opole University of Technology, POLAND

NATIONAL SCIENTIFIC COMMITTEE

Andrei ANDRAS - University of Petroşani Felicia ANDRIONI - University of Petroşani Gabriel BĂBUŢ – University of Petroşani Camelia BÅDULESCU - University of Petroşani Ioan BUD - Technical University of Cluj Napoca, North Center, Baia Mare Angelica GÅMAN - NIRD INSEMEX Petrosani Stefania DEÁK, Government of Romania - Department for Sustainable Development Gabriela DUMBRAVĂ – University of Petrosani Emilia DUNCA - University of Petroşani Andreea IONICĂ - University of Petrosani Larisa FILIP - University of Petroşani Claudia ISAC - University of Petroşani Sabina IRIMIE - University of Petroşani Wilhelm W. KECS - University of Petrosani Monica LEBA – University of Petroşani Mariana MAN - University of Petroşani Gheorghe MANOLEA - University of Craiova Marius MARCU - University of Petroşani Roland MORARU - University of Petroşani Vlad PĂSCULESCU - NIRD INSEMEX Petroșani Nicolae PĂTRĂȘCOIU - University of Petroșani Lavinia Elisabeta POPP - University Babes-Bolyai - Resita University Center Florin Dumitru POPESCU - University of Petroşani Ladislau RADERMACHER - University of Petroşani Oana - Carmen RĂVAS - University of Petroşani Mihaela TODERAS - University of Petrosani loel VERES - Technical University of Cluj Napoca

ADVISORY BOARD

Nicolae DIMA, ROMANIA Nicolae ILIAS, ROMANIA Dumitru FODOR, ROMANIA Mircea GEORGESCU, ROMANIA Iozsef KOVACS, ROMANIA

SYMPOSIUM SECRETARIAT

Technical support:

Ramona NEGOI - SIMPRO General Secretariat Lorand BOGDANFFY - IT and logistics Nelu MIJA - IT and logistics Cosmin RUS - IT and logistics Alexandru BOGYE - Graphic design Radu ION - Technical editor Secretaries of sessions: Mihai POPESCU-STELEA, University of Petrosani Roxana HERBEI, University of Petrosani Klaus FISSGUS, University of Petrosani Izabela Maria APOSTU, University of Petrosani Florin G. POPESCU, University of Petrosani Daniel MOISUC-HOJDA, University of Petrosani Arun Fabian PANAITE, University of Petrosani Stela DINESCU, University of Petrosani Raluca-Anamaria NICOLAESCU, University of Petrosani Mihaela GHICAJANU, University of Petrosani

Investigation of the rock destruction influence in the increased rock pressure zones on the stability of preparatory mine workings

Nazarenko Valentyn¹, Brui Hanna²*, Kuchin Oleksandr ³

 ^{1, 2} Technical University "Metinvest Polytechnic" LLC, Faculty of Mining and Metallurgy, Department of Mining, 69008, Zaporizhzhia, Ukraine
³ Dnipro University of Technology, Faculty of Architecture, Construction and Land Management, Department of Geodesy, 49005, Dnipro, Ukraine
*Correspondence: hanna.brui@mipolytech.education; Tel.: +38050-90-388-76

Abstract: The issue of determining the size of pillars of various types and purposes is very important, as it is closely related to the issues of completeness of excavation of mineral reserves, as well as ensuring the stability of protected workings. The purpose of this work is to study the behavior of the massif in the zones of increased mining pressure, to evaluate its stress-strain state for justification of the optimal parameters of pillars, which is a very urgent scientific task in the conditions of the converged formations of the Western Donbass. To analyze the stress-strain state of the rock massif area in the area of preparatory excavations, falling into the zones of increased mining pressure, the volumetric problem was solved using the finite element method. The problem was solved using Cosmos Works software. In order to determine the size of the pillar satisfying the requirements of completeness of excavation and safety of preparatory workings, this parameter was varied from 25 m to 40 m with an interval of 2 m. The work contains the results of monitoring the condition of mine workings as the longwall is approaching up to its stoppage. On the basis of modeling of the stress-strain state of the massif with linkage of the actual state of the drifts according to the monitoring results, the optimum parameters of the pillar are determined, which in the considered conditions are 37 meters.

Keywords: mine workings, pillar, increased rock pressure, stress-strain, surveyor's measurement.

Geological models and stability analysis

Adrian Florea^{1*}, Ciprian Danciu²

¹ University of Petrosani, Mining Faculty, Department of Environmental Engineering and Geology, 332006, Petrosani, Romania

² University of Petrosani, Mining Faculty, Department of Mining Engineering, Survey and Constructions, 332006, Petrosani, Romania

*Correspondence: adrianflorea@upet.ro; Tel.: +40-722-42-81-05

Abstract: Geological models are built to serve various purposes (e.g. reserve evaluation, rock stability analysis, etc.). Several software packages dedicated to geological modeling and rock stability analysis are currently available. The paper presents the workflow for rock stability analysis performed with Slide3 software from Rocscience. An important step is to build the 3D geological model both from the perspective of geometry and rock properties. Doing this in Slide3 is not an easy task and for this reason, we turned to GEOVIA Surpac. The steps were exemplified for the northern area of the Ruschita marble deposit.

Keywords: geological modeling, slope stability analysis, Slide3 Rocscience software, GEOVIA Surpac software, Ruschita marble

Determining the position of the center of gravity by tensiometric measurements for the machines with bucket wheels used to remove coal from deposits

Răzvan Bogdan Itu¹*, Florin Vîlceanu², Gheorghe Bogdan Urdea³

^{1, 2, 3} University of Petroşani, Faculty of Mechanical and Electrical Engineering, Department of Mechanical, Industrial and Transport Engineering, 332006, Petroşani, Romania *Correspondence: razvanitu@upet.ro; Tel.: +40-727-86-34-26

Abstract: The machines with bucket wheels used to remove and to put coal in deposits are intended to dump and remove coal from quarries and power station deposits. The paper presents how to determine the gravity center of a machine with bucket wheels used to remove coal from deposits, by tensiometric measurements, in various positions of the arm of the bucket rotor (wheel). The machine with bucket wheel used for taking out from deposits is within Arcelor Mittal Galați. The measurements have been made in limit positions of the arm of the bucket wheel, horizontally and vertically, respectively, and have been made because of determining an additional weight that should be added in the ballast box of the equilibrium arm, if appropriate.

Keywords: removal and depositing machine, center of gravity

The study of the gas dynamic regime of a new open salt mine Turda, Valea Sărată

Emeric Chiuzan¹*, Corneliu Boantă², Adrian Matei³, Răzvan Drăgoescu⁴, Alexandru Cămărășescu⁵

^{1, 2, 3} INCD - INSEMEX Petroșani, Hunedoara, Romania *Correspondence: emeric.chiuzan@insemex.ro; Tel.: +40-721-22-53-88

Abstract: The opening of any underground mining work requires a check and the establishment of the regime of explosive and toxic gas emissions (methane and carbon dioxide).

Establishing the regime of gas emissions is necessary to clearly establish the correct choice of specific machinery in construction Ex. or not, as well as the correct sizing of the vent.

The purpose of this paper is to determine the rate of methane (explosive gas) and of carbon dioxide (axphysants gas) in the mine workings of Valea Sărată salt mine newly opened salt mine.

For the preparation of the documentation, the following elements were taken into account:

- The geological conditions of the salt deposit in the Valea Sărată mining perimeter;

- Existing records and documentation regarding previous occurrences of gas and their manifestation;

The results of quantitative and qualitative measurements in underground mining works, regarding: - Circulated air flows;

- Gas concentrations: methane, its counterparts and carbon dioxide;

Establishing the release of gases in the underground atmosphere of the mining works.

Based on the measurements and observations made, as well as the analysis of the previously mentioned elements, the underground mining works were included.

Keywords: salt mine, methane, carbon dioxide release, gas emission

Research on use of methane gas from the degassing of coal seams and the cogeneration production of electricity and thermal energy

Colda Cosmin^{1*}, Sorin Burian², Danut Grecea³, Gheorghe Marc⁴

^{1, 2, 3} University National Institute for Research and Development in Mine Safety and Protection to Explosion - INSEMEX, 32-34 G-ral Vasile Milea Street, 332047, Petrosani, Romania
⁴ MARC INSTAL S.R.L., Romania
*Correspondence: <u>Cosmin.Colda@insemex.ro</u>; Tel.: +40-731-39-08-17

Abstract: The present work aims to analyze possibilities of using the methane gas resulting from degassing of coal seams under conditions of increased efficiency.

Degassing is absolutely necessary for the safe exploitation of coal seams, the result being accumulation of substantial amounts of methane gas that we propose to use in the cogeneration system of electricity and heat.

Keywords: energy, methane cogeneration, safe in operation, explosion protection

Copper mining's green revolution – sustainable techniques and technologies shaping the future

Rodica (Stepanek) Cujba^{1*}, Maria Lazăr²

¹ University of Petrosani, Doctoral School, Department of Mines, Oil and Gas, first year, 332111, Petroşani, România

² University of Petrosani, Faculty of Mines, Department of Environmental Engineering and Geology, 332111, Petrosani, România

*Correspondence: RodicaStepanek@upet.ro, Tel.: +40 799 115 779

Abstract: This paper traces the evolving landscape of copper mining, delving into the industry's shift towards sustainable practices and technologies. In this context, a critical case study is presented, with an emphasis on the mining of copper ore from Roşia Poieni. This case study analyzes the application of sustainable techniques in mining operations, assessing their effectiveness, feasibility and potential challenges. It is also evaluated the implementation of renewable energy sources, waste recycling initiatives and the adoption of clean technologies within the operations of the Roşia Poieni quarry. In addition, the study investigates the socio-economic ramifications of these sustainability efforts on the local community surrounding the mine.

The research begins with an overview of traditional extraction methods and highlights the importance of adopting green alternatives. Examining sustainable technologies in copper mining and processing, the paper explores the integrat ion of renewable energy, waste recycling and clean technologies to reduce emissions. The social impact of these sustainable practices is explored, including the benefits to local communities and increased workplace safety. Despite the challenges faced, the industry holds economic opportunities in adopting sustainable techniques. The paper concludes with a comprehensive overview of the industry's outlook, highlighting the importance of balancing technological advances with environmental responsibility in shaping the future of copper mining.

Keywords: copper, mining, sustainability, green technology, impact

Interdependency of safety factors and geometric elements of the waste dumps in the Berbeşti Mining Basin

Izabela-Maria Apostu¹*, Constantin Rada¹, Florin Faur³

^{1, 2, 3} University of Petroșani, Faculty of Mining, Department of Environmental Engineering and Geology, 332006, Petroșani, Romania *Correspondence: izabelaapostu@upet.ro; Tel.: +40-728-74-00-03

Abstract: As a result of mining operations, large amounts of sterile rocks result, which involve the occupation of some land surfaces and which can generate risk situations such as geotechnical phenomena (especially landslides). The risks the population is exposed to in the event of landslides and their increasing incidence in mining areas, make more and more researchers interested in investigating, inventorying and characterizing the conditions and landslides risk areas. The stability conditions for any engineering construction are evaluated right from the design phase. Since the physical and mechanical characteristics of the rocks that define the working slopes and the dumps in the mining perimeters cannot be significantly improved in order to increase stability reserves, the emphasis remains on their appropriate design. The paper aims to develop a fast method to provide indications of the safety factor for different geometric configurations of slopes. Based on the stability analyses, two nomograms were built that graphically represent the dependence between the geometric elements of the slopes and the values of the safety factors, the case study being carried out for the waste dumps in the Berbeşti Mining Basin, known for its lignite mining activity.

Keywords: dumps, design, geometry, landslides, mining, stability, safety factor

Proposal for a quick method for choosing plant species to accelerate pedogenesis on waste dumps

Izabela-Maria Apostu¹*, Maria Lazar, Eugen Traistă³, Florin Faur⁴

^{1, 2, 3, 4} University of Petroşani, Faculty of Mining, Department of Environmental Engineering and Geology, 332006, Petroşani, Romania *Correspondence: izabelaapostu@upet.ro; Tel.: +40-728-74-00-03

Abstract: Mining is one of the activities that require large areas of land for the storage of sterile rocks resulting from the extraction of useful mineral substances. Waste dumps are wide-spread, are unpleasant components of the landscape causing a negative visual impact, the modification of ecosystems and their functions, environmental pollution (depending on their content, it can result atmospheric pollution by entrainment of dust particles and powders by winds, generation of acid waters, land and soil pollution with trace elements, etc.), and may present risks for the objectives in the area as a result of the sliding potential. The waste dumps consisting of inert rocks like sands, clays, and dust in different mixtures, which present various degrees of aeration and permeability and which lack the fertility given by organic matter, need proper interventions and works to support the development of more valuable plants and to reintegrate them into the natural landscape. The research presented in this paper aims to identify the necessary steps in order to accelerate the pedogenesis process on mining dumps and, as a result, a logical scheme type method was developed that could be easily applied to any type of mining dump. Also, the logical scheme was applied and verified through an experimental study carried out at the level of the interior dump of North Pesteana open-pit from Rovinari mining basin, Romania.

Keywords: anthropogenic soils, dumps, fertility, plants, protosols

Training scenarios for mine rescuers aimed at selecting and building rescue teams able of intervening in major incidents

Cristian Nicolescu^{1*}, George Artur Găman^{2, 3}, Daniel Pupăzan⁴, Cosmin Ilie⁵

^{1, 2, 4, 5} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, 32-34 G-ral Vasile Milea Street, Postcode: 332047, Petroşani, Hunedoara County, Romania

³ Technical Sciences Academy of Romania

*Correspondence: cristian.nicolescu@insemex.ro; Tel.: +40-724-04-00-01

Abstract: In mining rescue operations, the practical training of rescue personnel plays an essential role in the selection and configuration of rescue teams that intervene in critical situations, major incidents, accidents or other events occurring in underground mining works. Practical training can be conducted through monthly scheduled practical exercises at rescue stations within a mining unit, as well as through modern training means available at INCD-INSEMEX Petroşani (virtual reality, mobile training facility for rescuers) used in the process of instruction and re-instruction of mining rescuers. Mining rescuers' training level can be quantified through both physical and mental training by their reactions in certain critical situations, which can be created using virtual reality. Furthermore, the monitoring of the rescuers' physiological parameters before, during and after performing the practical exercise is also of particular importance. This monitoring can be carried out through the equipment available in the mobile training facility. The current paper aims to establish complex training scenarios for mining rescuers to select and configure rescue teams that can act in case of explosions, mine fires or other events.

Keywords: mining rescuer, training scenarios for mining rescuers, virtual reality, mobile training polygon, rescue teams.

Aproaching human error in industrial settings: memento for Romanian Occupatonal Helath and Safety professionals

Roland Iosif Moraru^{1*}, Gabriel Bujor Băbuț², Mihai Popescu – Stelea³

^{1, 2, 3} University of Petroşani, Faculty of Mines, 332006 Petroşani, Romania Correspondence: roland_moraru@yahoo.com; Tel.: +40-723-62-41-05

Abstract: In recent decades, in addition to numerous work accidents in which tens of thousands of deaths, disabilities and millions of days of temporary inability to work have been recorded, we have unfortunately witnessed some major disasters and accidents due to human errors. Indeed, one of the main identified contributors to the occurrence of these undesirable events stems from latent/active human errors. In this article, we try to develop a selective synthesis of some approaches to human error, different characteristic types, models and methodologies that have been developed to support the minimization of these errors. Relevant aspects of human error are systematized, including applicable systems for effective risk management in order to provide Romanian OSH specialists with tools for deepening/understanding a decisive and - at the same time - insufficiently studied aspect at the national level.

Keywords: Occupational Health and Safety (OHS), human error, performance shaping factor, human reliability, taxonomy

Determination by standardized test methods of the drum friction resistance performance of conveyor belts use in the underground and at surface

Florin Adrian Păun¹*, Adrian Jurca², Anca Tăzlăuanu³, Ana Petrina Păun⁴

 ^{1, 2, 3} The National Institute of Research and Development for Safety in Mines and Explosion Protection, 32-34 G-ral Vasile Milea, Petroşani, România
⁴ University of Petroşani, 20 Universității, Petroşani, România
* Correspondence: <u>florin.paun@insemex.ro</u>; Tel.: +40-720-01-76-38

Abstract: The field of use of conveyor belts is varied, they can be found both in the composition of installations operating in normal environments as well as in environments with the danger of potentially explosive atmospheres. The use of conveyor belts in environments with the risk of potentially explosive atmospheres requires the fulfilment of those safety requirements aimed at preventing sources of initiation of explosive atmospheres. In order to ensure the highest level of security, in these spaces with the danger of potentially explosive atmospheres, the conveyor belts used must have adequate protection properties against sources of ignition that may appear during their operation. At the same time, in this context, the application of test methods that allow determining the specific performance of conveyor belts, such as, for example resistance to friction on the drum, resistance to flame propagation, electrical resistance, is also important. The paper essentially aims to deal with the issues related to the application of standardized test methods, developed in the laboratory, necessary to determine the performances regarding the friction resistance on the drum of the conveyor belts used in the underground and at surface.

Keywords: explosion hazard, conveyor belts, drum friction, laboratory tests, environments Ex.

Environmentally friendly technologies of integrated open pit-underground mining

Mykola Stupnik¹, Vsevolod Kalinichenko²*, Olena Kalinichenko³, Oleksandr Shepel⁴, Volodymyr Pilchyk⁵

^{1, 2, 3, 4} Kryvyi Rih National University, Faculty of Mining and Metallurgy, 11 Vitalii Matusevych Str., KryvyiRih, 50027, Ukraine

⁵ SE "Eastern Mining and Processing Plant", 2 Horkoho St., 2, 52210 Zhovti Vody, Ukraine *Correspondence: kalinichenko@knu.edu.ua; Tel.: +380-67-56-82-260

Abstract: Kryvyi Rih iron ore basin is one of Ukraine's oldest. Over 150 years of open pit mining has resulted in significant areas of arable land disturbed by open pits, dumps and tailings facilities. In Kryvyi Rih region, operation of open pits, dumps and tailings facilities results in worsened environmental conditions.

Deep open pits and high dumps change the topography of the region. Open pits, dumps and tailings facilities not covered with vegetation contribute to bad air pollution by emitting large amounts of dust.

To settle the environmental issues and preserve the nature in the basin, gradual transition from the technology of open-pit mining to integrated open pit-underground and subsequent underground mining is developed and proposed.

In addition, the present paper addresses one of the main problems of geomechanical stabilization of the rock massif when constructing underground mines in areas of possible influence of open pit fields, and studies issues of controlling the stress-strain state of the rock massif during transition from the open-pit to integrated technology of deposit mining.

The research conducted enables substantiation of technologies involving formation of internal waste rock dumps during integrated open pit-underground mining.

The paper presents the results of the research on the stress-strain state of the massif during transition from the open-pit to integrated mining technology and proposes environmentally friendly technologies of integrated open pit-underground mining of deposits with waste disposal in the worked-out space of underground mines and open pits.

The results obtained are highly relevant and very important in both scientific and practical fields.

Keywords: integrated open pit-underground mining, ore, environmentally friendly technologies, deposit, geomechanical stabilization, stress-strain state of the rock massif

Assessment of the pollution level and determination of the geo-accumulation index of heavy metals in the soil from the Old Funicular dump area - Uricani

Mădălina-Flavia Ioniță¹*, Sorin-Mihai Radu²

¹University of Petrosani, Doctoral School, 332006, Petrosani, Romania

² University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of

Mechanical, Industrial and Transport Engineering, 332006, Petrosani, Romania

* Correspondence: madalina.ionita96@yahoo.com; Phone: +40-785-18-88-82

Abstract: As a result of the mining activities carried out in the Jiu Valley, tailings dumps resulted. Currently, some of these tailing dumps are greened, some are inactive, and some of them are still active within operational exploitation perimeters. In order to capture the negative effects of these deposits, in this work an assessment of the degree of contamination will be carried out and the level of geo-accumulation of heavy metals will be determined in the soil in the area of the Old Funicular dump, inactive tailings dump for about 12 years. The dump was formed following the deposition of tailings resulting from coal mining in the Uricani mine. The main purpose is to identify the types and concentrations of heavy metals present in the soil and determine the level of accumulation of these metals in a certain area. The study involved the collection of soil samples from 17 sampling points, followed by detailed chemical analyses to determine the concentrations of heavy metals present in the soil at the tailings dump. The results indicated variable levels of heavy metal contamination, with concentrations exceeding the normal value of these heavy metals in soil in certain areas. The geo-accumulation index (Igeo) was calculated to assess the degree of accumulation of each heavy metal in soil. The I_{geo} values obtained varied from slightly polluted to moderately polluted, suggesting a significant influence of mining activities on the soil in this area. The conclusions of the study emphasize the need to implement phytoremediation measures and continuous monitoring to prevent ecological and human health risks.

Keywords: contamination, heavy metals, soil, tailings dump

Preliminary studies on the utilization of silicomanganese slurry

Dumitrache Mariana Ionela^{1*}, Traistă Camelia², Lang Mihaela Dana³

¹University of Petrosani, Doctoral School, Department of Mines, Oil and Gas, Petrosani, România ² University of Petrosani, Faculty of Mining, Department of Environmental Engineering and Geology, 332006, Petrosani, Romania ³ Petrila City Hall, 335800, Petrila, Romania *Correspondence: mariana.ionela.dumitrache@gmail.com; Tel.: +40-752-17-16-17

Abstract: Silico-manganese sludges are a waste resulting from the ferroalloy industry, more precisely from the manufacture of silico-manganese. From a technological point of view, they come from the sludge resulting from the filtration of furnace gases. From a chemical point of view, they are made up of a large number of combinations of manganese and silicon. The manganese content varies widely between 5-35% MnO. Due to the fact as there are limitations for the manganese content in waters and soils, the presence of these sludge deposits constitutes a permanent risk of environmental contamination. In addition to the definitive closure (greening) of the deposit, there is also the possibility of valorizing this waste. The present paper presents the preliminary research carried out to identify a sustainable technology for the recovery of useful elements from the sludge.

Keywords: manganese, silico-manganese, manganese recovery

Evaluation of the suitability of non-productive land for biomass cultivation and its energy recovery

Emilia-Cornelia Dunca^{1,*}, Maria Lazăr², Ciprian-Gheorghe Danciu³, Camelia Madear ⁴, Lucia-Ana Varga⁵

^{1, 2, 4, 5} University of Petroşani, Faculty of Mine, Department of Environmental Engineering and Geology, 332006 code, Petrosani City, Hunedoara Country

³ University of Petrosani, Faculty of Mine, Department of Mining, Surveying and Construction Engineering, 332006 code, Petroșani City, Hunedoara Country

*Correspondence: duncaemilia@yahoo.com; Tel.: +40-751-01-04-39

Abstract: The work is part of the efforts to restore unproductive land in a green and circular economy. The results of the research carried out on non-productive land in the Jiu Valley are presented regarding the suitability of the soil and the cultivated biomass for its energy utilization and obtaining the digestate as fertilizer. The traceability of heavy metals from soil to biomass and the suitability of using biomass for its energy recovery are evaluated.

Keywords: biomass, biogas, unproductive land, inorganic pollution

Living Lab – a systemic innovation approach to restoring soil health on unproductive land in the Jiu Valley

Emilia-Cornelia Dunca^{1,*}, Sorin-Mihai Radu², Sabin Irimie³, Lucia-Ana Varga⁴, Fabian Panaite⁵

^{1, 4} University of Petroşani, Faculty of Mine, Department of Environmental Engineering and Geology, 332006 code, Petroşani City, Hunedoara Country

² University of Petroşani, Faculty of Mechanical and Electrical Engineering, Department of Environmental Engineering and Geology, 332006 code, Petroşani City, Hunedoara Country

³ University of Petroșani, Faculty of Mine, Department of Management and Industrial Engineering, 332006 code, Petroșani City, Hunedoara Country

⁵ University of Petroşani, Faculty of Mechanical and Electrical Engineering, Department of Automation, Computers, Electrical and Energy Engineering, 332006 code, Petroşani City, Hunedoara Country

*Correspondence: duncaemilia@yahoo.com; Tel.: +40-751-01-04-39

Abstract: The Living Lab is an innovative and effective approach to restoring soil health on unproductive land. Through collaboration between different researchers and the use of adaptable and sustainable solutions, this method can transform degraded land into valuable resources, contributing to agricultural sustainability and the development of local communities. The establishment of a Living Lab on the non-productive lands of Jiu Valley as a systemic approach to innovation in which all interested parties are involved in the research and application of solutions to restore soil health is a challenge. The paper presents the methods used, the working hypotheses, the data analysis and the interpretation of the results obtained in the living lab created to study the cultivation of biomass, its energy utilization and the obtaining of biofertilizers. Multiple approaches regarding the obtained biofertilizers and their application to restore soil health are presented. The limits and conclusions of the innovative research carried out so far in the Living Lab are presented.

Keywords: Living Labs, unproductive land, biomass, innovative research, soil health

Solutions for the reuse of areas affected by coal Extraction at Lupeni Mine

Tataru Andreea Cristina^{1,*}, Tataru Dorin²

^{1, 2} University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of Mechanical, Industrial and Transport Engineering, 335600, Petrosani, Romania *Correspondence: andreeatataru@upet.ro; Tel.: +40-721-04-47-67

Abstract: Coal extraction in Valea Jiului leaves behind large areas of affected land. Once the mining units in Valea Jiului are closed, they can be given a different destination than the original one. Both surface and underground constructions can be used for other purposes, both economic and environmental protection. One of the mining operations that is currently in the process of closure and greening is the Lupeni Mining. In this paper we will present some solutions for the reuse of the areas affected by coal extraction at the Lupeni Mine.

Keywords: reuse, areas, coal, exploitation

Dynamic analysis of a bucket wheel excavator boom using FEA

Alex Juhász^{1,*}, Zoltán Virág²

^{1, 2} University of Miskolc, Faculty of Earth and Environmental Sciences and Engineering, Institute of Mining and Energy, H-3515, Miskolc-Egyetemváros, Hungary
*Correspondence: alex.juhasz@uni-miskolc.hu; Tel.: +36-46-565-111/1808

Abstract: Bucket wheel excavators are the most widely used technology for lignite extraction and overburden removal in opencast mining. This is due to their high efficiency and ability to handle a wide range of geological conditions. The loads on the bucket wheel and dipper can vary significantly during excavation due to difficult-to-penetrate inclusions and the changing geological environment. This can lead to vibrations that can damage the excavator, especially the structural components directly or indirectly involved in the excavation. To investigate the effects on the main structural elements, it is essential to examine the natural frequencies. In this study, we investigate the natural frequencies and vibration modes of the boom structure of a bucket wheel excavator using a model developed in a previous study. The behavior of the structure is examined using a 3D finite element model under the action of loads and effects during use.

Keywords: bucket wheel excavator, boom structure, natural frequencies, mode shapes, finite element analysis, open-pit mining, lignite mining, overburden removal

Design and execution of drilling and blasting works using modern scanning techniques

Edward Gheorghiosu^{1*}, Silviu Becuț²

¹ National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani Department of Safety Explosives and Pyrotechnic Aticles, 32-34 G-ral Vasile Milea St., 332047 - Petroşani, Hunedoara County, Romania

² SSE Explo Romania, Cluj Napoca, Cluj County, Romania

* Correspondence: edward.gheorghiosu@insemex.ro

Abstract: The basic principles for the design of the parameters of the shooting techniques are: the exact definition of the technical and economic objectives and especially those related to the granulometry of the demolished material, knowledge of the characteristics of the rock massif (degree of cracking and local fracturing, compressive and tensile strength of the rocks, the degree of homogeneity and their compactness), knowing in detail the possibility of executing the firing holes for loading and crushing the demolished material, knowing the explosive used and its behavior in the concrete conditions of the quarry, specifying the restrictions imposed by the protection of the environment (distances from the surrounding objectives, the maximum accepted levels of vibrations, noises, dust). In order for all these principles to be fulfilled, there are methods of designing and executing the drilling and shooting works so that the results of the shooting works are those expected in conjunction with a rational exploitation in safe conditions.

The paper presents a case study where the design and execution of drilling and blasting parameters was successfully applied using modern equipment.

Keywords: explosives, blasting parameters, quarry, blasthole

Selection of post-quarrying land uses in Western Macedonia, Greece, using a hybrid multi-criteria method

Pagouni Chrisoula¹, Pavloudakis Francis²*, Kapageridis Ioannis³, Karlopoulos Evangelos⁴

^{1, 2, 3} Mineral Resources Engineering Department, University of Western Macedonia, 50150, Kozani, Greece

⁴ Chemical Processes & Energy Resources Institute, Centre for Research and Technology Hellas, 50200, Ptolemaida, Greece

*Correspondence: fpavloudakis@uowm.gr; Tel.: +30-24610-68255

Abstract: The region of Western Macedonia is rich in mineral resources. Over the past decades, it has been primarily focused on lignite mining, while also maintaining smaller-scale extraction activities for olivine, attapulgite, talc, calcium carbonate, dolomite, gypsum, marble, slate, and aggregates, which hold significant economic value. This study recorded active public, private, and municipal quarries as well as inactive public and municipal quarries requiring rehabilitation. Furthermore, a methodology was developed and applied for screening three of the inactive municipal guarries and selecting the more suitable land use for each one. For this purpose, the authors assessed opportunities and risks at the regional level and identified strengths and weaknesses specific to each quarrying site carrying out a SWOT analysis. Criteria for selecting between alternative land uses were then determined. An expert panel including geologists, mineral resource specialists, environmental engineers, regional and municipal officials, legal experts, chamber of commerce representatives, and quarry company board members was convened to evaluate these criteria, with weights assigned using the Analytic Hierarchy Process (AHP). Attributes with spatial variation were mapped using GIS, and the final ranking of land uses for each quarry site was determined using a simple algorithm. The scope of this study was to contribute to the development of communities located close to quarries by supporting the selection of the optimum post-quarrying land uses.

Keywords: Land management, Rehabilitation, AHP, SWOT, MCDA, Stakeholders' participation

The influence of blast holes stemming on the breaking yield of rocks fragmented with explosives

Cristian Radeanu^{1*}, Bogdan Garaliu-Busoi², Ladislau Radermacher³

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion - INSEMEX Petrosani, Department of Safety of Explosion and Pyrotechnic Articles, 332047, Petrosani, Romania

³ University of Petrosani, Department of Mining Engineering, Topography and Construction, 332006, Petrosani, Romania

*Correspondence: cristian.radeanu@insemex.ro; Tel.: +40-767-84-88-88

Abstract: Stemming of blast holes is an essential operation for controlled explosions, serving the purpose of filling the voids left after loading with explosives. This process prevents the escape of gases produced during the explosion, which have a pressure of around 10,000 daN/cm², and enhances the breaking effect while reducing dust and noise. Efficient use of stemming can significantly reduce the consumption of explosives and, consequently, the costs of rock fragmentation through drilling and blasting operations, allowing a reduction in explosive

consumption by 20-25%. Furthermore, improper stemming of blast holes results in low breaking efficiency, large material granulation, misfires, and, in other words, increased costs for drilling, blasting, and crushing operations, as well as potential accident hazards due to misfires. In this article, we will explore the materials used for stemming, the technologies employed, and improvement proposals to maximize the efficiency and safety of mining operations, leading to more efficient and safer use of explosives in rock fragmentation operations, enhancing breaking efficiency while reducing associated costs and risks.

Keywords: civil explosives, stemming, drill-blast works, firing parameters, burst yield, controlled explosions

Town planning and cadastre in mining areas. Case study of the former Baia Borșa mining zone, Maramureș county

Marius Cucailă¹, Simona Cucailă², Ioan Boroica^{3*}

¹University of Petroşani, Petrosani, Romania

² University of Petroşani, Department of Mining Engineering, Topography and Construction Petrosani, Romania

³ Maramureș Museum, Sighetu Marmației

*Correspondence: ionboroica@yahoo.com, tel. 0742400590

Abstract: Some relationship between the cadastre and urban planning regulations can be detected since the second half of the 19th century, together with the introduction of the stable cadastre in Maramures County and later in Transylvania. With the introduction of the cadastre, the first functional zoning of the territory of the cadastral localities was also carried out, which involved the cadastral registration of all parcels and the recording of the use categories, together with the delimitation of the intravilan or built area and extravilan lands grouped in fields according to the local toponymy. Both before the First World War and in the interwar period, town planning regulations paid little attention to the cadastre introduced in the second half of the 19th century, which is still in force today. During the communist period, urban planning, called also systematization, had a political purpose, especially in rural localities, when through the systematization sketches, the political authorities aimed to group within the intravilan area as narrow as possible to the advantage of agricultural surrounded areas and to standardize the built environment. Also, during this period, delimitations of industrial zones, including mining areas, are introduced, as well as the first urban planning considerations regarding the planned evolution of these areas. In the post-December period, there are some regulations regarding urban planning, made concrete by several laws, especially the Law no. 350/2001 regarding territorial development and urban planning. The general and mining cadastre for mining or former mining areas does not find the place it should occupy in urban planning. The purpose of the paper is to follow through the chosen case study – the case of former Baia Borsa mining area, the particular situation of urbanismcadastre relationship, with a focus on the relationship between the urbanism of mining areas mining extractive cadastre. The working hypotheses are described based on the analysis of available working materials: archival documents and General Urban Plans. GIS analysis methods are adopted as work methodology. The results and conclusions will serve as a basis for the formulation of proposals that can be incorporated into future urban planning policies for mining areas.

Keywords: historical cadastre, mining cadastre, urban planning, former mining town

Critical analysis of the Roșia Montană mining area as UNESCO heritage

Paul Leonard Grigorescu^{1*}

 ¹ University of Petroşani, Doctoral School, Department of Environmental Engineering and Geology, University Streetno.20, Petroşani, Romania
*Correspondence: <u>paul.grigorescu@yahoo.com</u>

Abstract: The Roşia Montană mining area has sparked numerous controversies and generated a series of protests, ultimately leading to the rejection of a large-scale mining project carried out in a public-private partnership and the inclusion of this area in the UNESCO heritage. In this article, we do not intend to judge the interests of a political nature or some businessmen. Still, an objective analysis of this field takes into account some key aspects related to the level of socio-economic development, natural mining, historical heritage and culture, historical pollution, and development potential (through tourism, resumption of mining activities, or other viable solutions). As a tool to quantify and conclude the presented aspects, we used a well-known method, namely the SWOT analysis.

Keywords: Heritage, mining perimeter, legislation, cultural heritage, urban ensemble, industrial architecture, architectural monuments, acid drainage, degradation of buildings

The impact of conveyed material on the efficiency and capacity of a conveyor belt – gravitational energy storage system

Basileios Deligiorgis¹*, Michael Galetakis²

^{1, 2} Technical University of Crete, School of Mineral Resources Engineering, University Campus, 73100, Chania, Greece

*Corespondance: vdeligiorgis@tuc.gr

Abstract: The energy transition relies on renewable sources such as wind and solar, but their intermittency requires energy storage systems to balance supply and demand. The current storage methods include batteries for short-term energy storage and pumped-hydro storage for long-term. Batteries have limited number of storage cycles and recycling issues, while pumped-hydro requires specific conditions for the construction of the reservoirs. Conveyor belt – gravitational energy storage offers a technologically mature solution that could be implemented widely for energy storage. In this study, a gravitational energy storage system, utilizing a reversible conveyor belt to elevate granular material and a regenerative motor to harvest energy during material's downward movement is analyzed. This system can be installed in decommissioned open-pit mines or in areas with suitable steep topography. The impact of the conveyed material properties on the system's efficiency and capacity is examined using sensitivity analysis. The examined material properties included density, swelling factor and angle of repose. Results indicated the dominant role of material's density on the efficiency and capacity of the system.

Keywords: conveyor belt, gravitational energy storage, decommissioned mines

Evaluation of the correlation between mechanical tension and frequencies for resistance elements of mining machinery using advanced measurement techniques

Florin Vîlceanu¹*, Stela Dinescu², Adriana-Estera Tufiș³, Ilie Iucal⁴

 ^{1, 2, 3} Mechanical, Industrial and Transportation Engineering Department, University of Petroşani, România
⁴Ph.D student, University of Petroşani, România
*Correspondence: <u>florinvilceanu@upet.ro</u>; Tel.: +40-727-848-889

Abstract: The distribution of stresses is crucial in structural engineering to evaluate the performance and integrity of resistance elements under various load conditions of machine bearing structures. This paper evaluates the correlation between various advanced techniques for mechanical tension distribution analysis and positioning of electroresistive transducers on a tensile bar, as well as accelerometric measurements generated by bar movement, which can be a resistance element within a metal structure of mining machinery. By using finite element analysis (FEA) to model the structural behavior of the bar and position the tensometers, specific deflection measurements by resistive tensometry (TER) were performed correlated with acceleration measurements by positioning an accelerometer on it. The data obtained were examined by wavelet spectrogram, highlighting the relationship between deformations and frequencies during the traction process. Analysis of the wavelet spectrogram of deformations measured with TER provided detailed insight into local variations in stresses and how they are influenced by bar movements. A correlation was also made between these data to highlight significant relationships between mechanical tensions and frequencies. The obtained results are relevant in optimizing the process of measuring stresses on the resistance elements of machines, in designing equipment and structures for industrial applications. These findings can help improve the performance and reliability of mining machinery and other metal structures exposed to different types of loads.

Keywords: wavelet spectrogram, strain gauges, mining machinery, finite element

Spectral analysis of plastic types in the bed of the eastern Jiu River

Angelica-Nicoleta Gaman^{1*}, Marius Kovacs²

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petrosani, 32-34 G-ral Vasile Milea Street, Postcode: 332047, Petrosani, Hunedoara County, Romania

*Correspondence: <u>angela.gaman@insemex.ro</u>

Abstract: Plastic waste represents a global problem, their presence in the environment, particularly along riverbanks and in oceans caused by discharge of various types of waste, being well-known. However, documented analysis of these plastics can contribute to understanding and raising awareness of the risks they pose to the aquatic environment and human health. Macro-sized plastic materials of various dimensions and shapes that reach the water system, gradually degrade and break down into smaller fragments as they are transported and, over time, become microplastics in other rivers, streams, and oceans.

The purpose of this study is to identify microplastics present in the bed of the Eastern Jiu River basin using Fourier-transform infrared spectroscopy (FTIR), which provides a qualitative spectral analysis of absorption or emission, followed by cartographic analysis allowing classification of microplastics found, based on size and type of contaminant (polyester, polypropylene, polyvinyl chloride, polystyrene). Therefore, six types of plastic materials from the Eastern Jiu River bed were explored, and the applied FTIR method provided high identification precision, significant time savings compared to other techniques, and easy implementation by inexperienced operators. Our results have shown that infrared spectral analysis of plastic types is a powerful and versatile technique, offering detailed and valuable information on composition and characteristics of plastic materials. Moreover, this study aims to advance understanding of the processes related to plastic waste affecting aquatic life and, consequently, human health.

Keywords: plastics, microplastics, environment, water pollution, infrared spectrometry

Development of a methodology for simultaneous analysis of pesticide residues in water by gas chromatography-mass spectrometry (GC-MS/MS)

Alexandru Florin Simion^{1*}

¹ National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, 32-34 G-ral Vasile Milea Street, Postcode: 332047, Petroşani, Hunedoara County, Romania

*Correspondence: alexandru.simion@insemex.ro; Tel.: +40-727-20-07-86

Abstract: Residues of pesticides in water can have significant implications for aquatic and terrestrial ecosystems, as these residues may stem from agricultural runoff, improper disposal, or accidental spills. Therefore, it is imperative to develop precise analytical methodologies to identify and quantify the complex array of pesticide compounds in water. Through the appliance of this analytical methodology, researchers can markedly reduce the cost of pesticide analysis while augmenting the likelihood of accurately identifying the specific pesticide involved. This method enables the simultaneous identification and quantification of as many as 38 highly toxic pesticides, thereby offering a comprehensive and efficient approach to pesticide analysis. Furthermore, in this paper, the methodology was validated, considering specificity, selectivity, linearity, sensitivity (LOD, LOQ), accuracy, precision, robustness, matrix effect, and stability of analytes. To bring matters to a close, the developed method, combined with suitable materials and instrumentation, offers a dependable and efficient approach for analyzing pesticide residues in water. This contribution significantly enhances water quality monitoring and risk assessment strategies by facilitating the identification of pollution sources, the evaluation of exposure levels, and the formulation of effective mitigation measures aimed at safeguarding human health and the environment from the adverse effects of pesticide residues.

Keywords: gas chromatography, mass spectrometry, MRM, pesticides, water

Evaluating the effectiveness of continuous surface mining systems: Lessons learned from six decades of lignite extraction in Western Macedonia, Greece

Kondyla Dimitra¹, Pavloudakis Francis²*, Kapageridis Ioannis³, Barakos George⁴, Roumpos Christos⁵, Agioutantis Zach⁶

^{1, 2, 3}Mineral Resources Engineering Department, University of Western Macedonia, 50150 Kozani, Greece

⁴Curtin University, Kalgoorlie, Australia

⁵ Public Power Corporation of Greece, Department of Mining Engineering and Closure Planning, 10432 Athens, Greece

⁶ University of Kentucky, Department of Mining Engineering, Lexington, KY, USA

*Correspondence: fpavloudakis@uowm.gr; Tel.: +30-24610-68255

Abstract: The South Field Mine, situated in Western Macedonia, Greece, for over six decades of uninterrupted operation used continuous surface mining systems: bucket wheel excavators (BWEs), belt conveyors, and stackers. This paper, using the principles of the lessons learned process, tries to identify, document, analyze, and disseminate valuable knowledge and experience acquired in this mine, focusing on the performance indicators and downtimes of BWEs. Quantitative analysis methods were employed to analyze data and detect trends and factors for productive time losses. During a rather crucial period for the mine, due to decarbonization and energy transition policies, the performance of BWEs was strongly affected and exhibited a decline. On the other hand, availability and utilization remained relatively stable. Mechanical failures and annual maintenance appeared to be the primary causes of downtimes. Non-operating time, connected with the lack of personnel, had also a great impact on operational efficiency. According to the linear regression model, this downtime has the greatest influence on the availability of the BWEs. Concluding, this research implies the importance of the incorporation of new technologies for monitoring and producing daily and monthly records of the mine activities can enhance the overall effectiveness of a continuous mining system.

Keywords: continuous mining systems, bucket-wheel excavators, availability, utilization, performance

Enhancing Environmental Sustainability through Industrial Symbiosis: Research on the Development of an Eco-Industrial Park in Jiu Valley Using Analytical Hierarchy Processes

Camelia Madear^{1*}, Cristina Stoica Rus²

¹ University of Petrosani, Faculty of Mining, Department of Environmental Engineering and Geology, 332006, Petrosani, Romania

² University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of Mechanical, Industrial and Transportation Engineering, 332006, Petrosani, Romania *Correspondence: cameliamadear@upet.ro; Tel.: +40-744-60-77-38

Abstract: Establishing an eco-industrial park is a crucial initiative in promoting industrial symbiosis, where one company's waste becomes a resource for another, facilitating the circular economy and reducing environmental impact. This integrated concept aims to create an enabling

environment for collaboration and resource sharing between different companies in an industrial area. By identifying opportunities for industrial symbiosis and facilitating cooperation between companies, an eco-industrial park promotes resource efficiency and waste reduction, contributing to increased sustainability and economic competitiveness. Circular economy principles are fundamental in this context, encouraging recycling, reuse, and regeneration of materials and energy within the eco-industrial park. This research focuses on the development of an eco-industrial park in the Jiu Valley, using Analytical Hierarchy Processes (AHP) to systematically evaluate and prioritise potential symbiotic relationships and resource-sharing opportunities. AHP, a structured decision-making approach, helps assess various criteria and stakeholder preferences, ensuring a balanced and effective implementation strategy. By combining these concepts and implementing appropriate policies and practices, the establishment of an eco-industrial park can be a significant step towards building a more sustainable and responsible industrial system that brings economic, social, and environmental benefits to both companies and the surrounding community. This paper aims to provide a model for eco-industrial park development that can be replicated in other regions, fostering broader adoption of sustainable industrial practices.

Keywords: industrial symbiosis, eco-industrial park, sustainability, multicriterial analysis, analytical hierarchy processes

Ex-post project comparisons: from triple constraint measurements to aggregated organizational impact

Cărămidaru Ibrian^{1*}

¹ University of Petroșani, Faculty of Mines, Department of Engineering and Management 332006, Petroșani, Romania *Correspondence: ibriancaramidaru@upet.ro; Tel.: +40-766-29-48-40

Abstract: While many of the social and economic outputs in the contemporary world are delivered by means of interconnected or disparate projects, comparing and aggregating completed projects is still a difficult task for organizations, financing institutions and governmental agencies. Moving beyond the typical appraisal of projects in terms of investment placement or financial impact, the current paper explores the adequacy of comparing the organizational effort for completed projects through similarity measurements of metrics for the triple constraint compliance (duration, cost, scope). Building on this statistically oriented proposal, the organizational impact of networked project is to be compared through the lenses of two divergent scenarios – one of project failures and one of connected projects, whereas two successive projects are connected by arrays of shared deliverables. Project comparisons in terms of organizational impact are using a stakeholder approach to the organizational setting, hence asking for metrics suitable for each stakeholder category – from valuing the lessons learned by team members to customer satisfaction or mission compliance metrics.

Keywords: project management, project comparison, project coupling

Optimizing Software Quality: Lessons from Agile and DevOps practices

Raluca Nicolaescu^{1*}

¹ University of Petrosani, Mining Faculty, Department of Management and Industrial Engineering, 332006, Petrosani, Romania
*Correspondence: <u>raluca.dovleac@yahoo.com</u>; Tel.: +40-720-10-97-40

Abstract: Software products have become integral to our everyday lives, making the quality of these products a crucial concern. Recent efforts to deliver software more rapidly have focused on iterative and fast-paced deliveries, a hallmark of Agile methodologies. However, despite these advancements, there remains a significant issue: both Agile and DevOps practices often fall short in meeting customer quality expectations. This paper analyzes how quality is managed within Agile and DevOps frameworks and explores potential integrations of quality management practices to ensure higher customer satisfaction. Through a detailed review of current literature and practical case studies, this study aims to identify gaps and propose actionable solutions for enhancing software quality in fast-paced development environments.

Keywords: Quality, Software quality, Agile, DevOps, SDLC, quality metrics

Enhancing Team and Technical Agility through SAFe[®] Methodology and a Three-Dimensional Diagnostic Approach to Anti-Patterns in the Financial Industry

Raul Ionut Riti^{1*}, Andreea Cristina Ionica², Monica Leba³

^{1, 2, 3} University of Petrosani, zip code 332 006, Petrosani, Romania *Correspondence: ritiraul@yahoo.com; Tel.: +40-756-62-41-94

Abstract: This research paper examines the implementation of the SAFe® Methodology in financial institutions to identify and resolve shortcomings in Agile practices. The primary emphasis is on the discrepancies in the responsibilities of Product Owners and how they affect the goals of the organization. The study proposes a new diagnostic approach that focuses on three dimensions: operational, strategic, and cultural. The goal is to improve overall agility and effectiveness. The methodology incorporates a comprehensive examination of Agile methodologies through a literature review, identifying deficiencies in the detection and resolution of anti-patterns. The proposed solution entails a comprehensive framework that incorporates Product Owners, Scrum Masters, and Value Stream Mapping to address these deficiencies. Comprehensive diagnostic analyses entail the use of quantitative self-assessments and qualitative interviews, with a focus on aligning strategic objectives with Agile implementation. The study's findings emphasize the need to reevaluate production owner strategies, increase Scrum Master participation, and optimize Value Stream Mapping to tackle operational inefficiencies. The recommendations prioritize the improvement of Agile processes, fostering team collaboration, and increasing productivity within financial institutions. The paper emphasizes the significance of continuously improving Agile practices to meet the ever-changing requirements of the financial sector, thus enhancing adaptability and organizational effectiveness.

Keywords: Anti-Patterns, Organizational Effectiveness, SAFe®

We together - for the climate, education, democracy

Barbara Wedler^{1*}, Sandra Kuhn²

^{1, 2} University of Applied Science Mittweida, Faculty of Social Work, D-09648, Mittweida, Germany
*Correspondence: wedler@hs-mittweida.de; Tel.: +49 3727 581706

Abstract: We together' looks at the microcosm of society in the university town of Mittweida. This project brings the different facets and views as well as the people behind them closer together. Meeting spaces are created for people of different ages from different life contexts. These include public lectures, artistic micro-projects, experimenting with children, designing public spaces, etc. By choosing a children's book as a starting point, a door is opened that often remains closed to the youngest members of our society: The door to a social discourse at eye level. This project also aims to involve children in the participatory negotiation process on the topic of climate protection. The university is setting out and assuming social responsibility for life in Mittweida beyond the semester.

Keywords: We together, third mission of the university, education, democracy

Kraft-Copilot - a joint project that transcends disciplinary and professional boundaries

Wiesemann Sarah¹, Wedler Babara²*

^{1, 2} University of Applied Science Mittweida, Faculty of Social Work., D-09648, Mittweida, Germany

*Correspondence: wedler@hs-mittweida.de; Tel.: +49 3727 581706

Abstract: Young adult carers (YACs) face considerable challenges that affect their personal development, health and quality of life. In Germany, there are currently only a few customised support services for this target group. The Kraft co-pilot project aims to develop and test an adaptive, gamified learning and networking platform that addresses the specific needs of YACs, strengthens their self-care and sustainably improves their quality of life. Participatory research methods such as workshops, photo voices, online surveys and the use of modern media were used to analyse the living conditions and needs of YACs. These results formed the basis for the development of the platform content. The platform integrates personalised support, networking opportunities and target group-specific offers based on an AI-supported recommendation system. Kraft-Copilot offers an innovative solution for supporting YACs, closing existing gaps in care and helping to improve their quality of life. Nevertheless, further efforts are required to establish flexible and sustainable care services, particularly in structurally weak regions.

Keywords: young adult carers, participation development, networking platform

An Analysis by One-Way ANOVA Statistic Experiment on the Effects of Product Packaging upon Sales Volume

Codruța Cornelia Dura^{1*}, Imola Drigă², Mirela Popescu³, Ana Preda⁴

^{1, 2, 3, 4} University of Petroşani, Faculty of Economic, Administrative and Social Sciences, Department of Economics, 332006, Petroşani, Romania *Correspondence: codrutadura@upet.ro; Tel.: +40-722-36-35-36

Abstract: The paper addresses the issue of measuring the impact of product packaging upon the sales performance of the firm. To this end, we performed a marketing experiment by using the completely randomized design model for the case of a traditional agro-food company. The results of our experiment were analyzed with the help of the One-Way ANOVA method, through employing the SPSS 22.0 software. It turned out that the influence of packaging upon the number of orders placed by clients in a given period of time was a relevant one. Moreover, by running the Post Hoc tests, we were able to identify the types of packaging with the highest impact upon the sales volume and to draw up some recommendations in order to improve firms' product policy.

Keywords: marketing experiment, One-Way Anova Analysis, completely randomized design, Post Hoc tests.

TRIZ as a tool that incorporates art for the evolution of Innovative Projects

Cojocari Elena^{1*}, Cşeminschi Stanislav²

^{1, 2} University of Petroșani, Department of Engineering and Management, 332006, Petrosani, Romania

*Correspondence: cojocari.elena,rm@gmail.com; Tel.: +40-729-99-23-46

Abstract: This study presents an in-depth analysis of how TRIZ (Theory of Inventive Problem Solving) can enhance the evolution of innovative projects. The research focused on identifying the successful traits of TRIZ in the new product development cycle. Extensive data collection enabled a comparative study on TRIZ application over time, highlighting its recent use and effectiveness. The study identified domains where TRIZ has been successful and those where it has faced challenges.

A key finding is that TRIZ is not just a problem-solving tool but also a method that integrates artistic elements into engineering innovations. By blending technical precision with creative problem-solving, TRIZ enables the development of products that are functionally efficient and aesthetically pleasing. This unique aspect makes TRIZ valuable for designing solutions that resonate both practically and emotionally.

The findings suggest that strategic TRIZ application can steer challenging projects towards success, demonstrating its versatility and effectiveness. By adding an artistic dimension to engineering, TRIZ fosters a holistic approach to innovation, ensuring final products are innovative, appealing, and user-friendly.

Keywords: TRIZ, innovative projects, new product development cycle, comparative study, data collection, readiness, problem-solving tool, engineering innovations, user-friendly product

The business model: way to highlight the cause-and-effect relationships between stakeholders and money

Samuil Ionela^{1*}

 ¹ University of Petroşani., Faculty of Mines, Department of Management and Industrial Engineering, 20 University, zip code 332006, Petroşani, Romania
*Correspondence: ionelasamuil@gmail.com; Tel.: +40-724-35-00-39

Abstract: The business model is foundational to every organization, evolving through phases from initial definitions and classifications to innovations and the current development of open network-based models with systematic monitoring and strategy mapping capabilities. This evolution continually gives rise to specialized versions.

Entrepreneurs widely embrace the CANVAS business model due to its visual nature, facilitating the visualization of business potential. Unlike mere lists, its nine dimensions are structured into a table that visualizes relationships between components. The model divides into left and right sections, with the value proposition central between them, fostering mapping, discussion, design, and innovation across the nine dimensions.

In contrast, static business models face criticism for their inflexibility, prompting the rise of dynamic business models in dynamic economic landscapes. Dynamic models integrate traditional frameworks with dynamic system modeling, mapping value creation elements into causal relationships. Simulation enables analysts and entrepreneurs to understand how the organization responds to strategic changes in terms of performance, innovation, and value creation.

The analysis of the evolution of business models, the exploration of the applicability of the CANVAS model, the examination of the advantages of dynamic models, and the study of the impact of dynamic systems modeling (SD) reflect the central themes of the research. These objectives are aimed at an in-depth exploration of the concept of business models within the context of contemporary dynamic environments.

Keywords: business models, CANVAS, organization, value propositions, dynamic system

Exploring the dynamics: innovations, sustainability and community development of agritourism in Gorj County

Elena Loredana Stancioiu¹*, Cristina Andreea Ionica², Monica Leba³, Ionela Samuil⁴

¹ University of Petrosani, Doctoral School of Engineering and Management, 332006, Petroşani, Romania

^{2,4} University of Petrosani, Mining Faculty, Department of Management and Industrial Engineering, 332006, Petrosani, Romania

³ University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of Automation, Computers, Electrical and Energy Engineering, 332006, Petroşani, Romania

Abstract: Agritourism has emerged as a multifaceted industry at the intersection of agriculture and tourism, offering diverse experiences that encompass farm visits, culinary tourism, outdoor activities, and educational programming. This paper explores the dynamics of agritourism, focusing on innovations, sustainability, and community development. Through an analysis of survey data, we examine the evolving landscape of agritourism destinations, highlighting the integration of technology, the promotion of sustainable practices, and the role of agritourism in fostering rural

development. Innovations in agritourism include the diversification of offerings to cater to a broader audience and the integration of technology for enhanced visitor experiences and operational efficiency, such as the use of drones for farm monitoring, smart irrigation systems, and mobile apps for farm tours. Sustainability is a key focus area, with agritourism destinations embracing environmentally friendly practices, promoting organic farming methods, and engaging visitors in discussions about food systems and conservation. Furthermore, agritourism plays a vital role in community development by stimulating local economies, preserving cultural heritage, and fostering collaboration between farms, businesses, and communities. The analysis of survey data provides additional insights into visitor motivations, satisfaction levels, and the economic impacts of agritourism on local communities. By exploring these dynamics, this paper aims to provide insights into the potential of agritourism as a driver of innovation, sustainability, and community empowerment in rural areas, capturing the voices and experiences of visitors directly involved in the agritourism experience.

Keywords: agritourism, innovation, sustainability, community development

Social mechanisms and human resource management practices in creativitybased organizations

Miclea Olga^{1*}, Rus Daniela², Enache Carla³, Mateiu Ciprian⁴, Tudor Denisa⁵

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petrosani, 332047, Petrosani, Romania
^{3, 4, 5} University of Petroşani, Doctoral School, 332006, Petrosani, Romania
*Correspondence: <u>olga.miclea@insemex.ro</u>, Tel.: +40-254-541-621

Abstract: The aim of this paper is to provide a theoretical and practical background on creativity, clarifying the definitional aspects of the term. It offers evidence of its conceptual categories and answers the following question: How have scientists conceptualized creativity? What concepts should form the essence of creativity? Very few studies have proposed a multi-level model to unlock the black box of creativity as a collective process, attempting to understand the underlying mechanisms. However, researchers have largely ignored a specific focus on the mechanisms that enable creativity to occur, as well as a joint exploration of the categories "creation," "outcome," and "interaction." It is also suggested that managers at all levels who wish to encourage creativity and innovation within their organizations should carefully select recruits, evaluating personal characteristics and skills such as creative thinking, imagination, and intuition. They should also create an appropriate environment where these potentially creative individuals can work and collaborate, promoting individual involvement in the creative act and encouraging employees to find better ways to do things. This means that human resource management practices play a crucial role in identifying, attracting, and retaining the best talents.

Keywords: creativity innovation, concept, social mechanism, human resource management practice

The potential impact of emotions on sustainable development practices

Moisuc Alexandrina^{1*}

¹Lecturer, PhD., University of Petroșani, Romania *Correspondence: alexandrinamoisuc@upet.ro

Abstract: The emotional engagement of the general public is pivotal in achieving Sustainable Development Goals (SDGs). In 2015, the United Nations outlined 17 life-changing goals—nearly all the countries in the world committed themselves to improving the planet and the lives of its citizens by 2030. Emotions significantly influence attitudes and behaviors toward sustainable development. This study explores how bystanders' emotional responses to unsustainable behavior impact their willingness to intervene, with broader implications for sustainability efforts. Participants watched short video clips depicting unsustainable behaviors. The findings revealed that the more intensely bystanders experienced emotions, the more likely they were to address the unsustainable behavior. These emotional responses can either motivate or hinder participation in sustainability initiatives. By acknowledging and strategically addressing the emotional dimensions of sustainability, it is possible to enhance public engagement and drive behavioral change. This research underscores the benefits of a holistic understanding of sustainability that incorporates emotional and rational considerations to encourage sustainable practices and achieve the SDGs.

Keywords: unsustainable behavior, emotions, sustainable development, economic impact

Sustainable approaches to international hiring

Moisuc Alexandrina¹*, Moisuc-Hojda Daniel²

¹ Lecturer, PhD., University of Petroșani, Romania ² Lecturer, PhD., University of Petroșani, Romania *Correspondence: alexandrinamoisuc@upet.ro

Abstract: This study aims to analyze and correlate the theoretical frameworks and practical implementations involved in the international hiring process with a focus on sustainable development. The challenges presented by such a human resources strategy are extensive, encompassing various actions, approaches, and adaptations required to comply with individual rights and the prevailing laws of each relevant country. Identifying suitable candidates is a significant challenge necessitating sustained engagement with professional institutions and ensuring the prompt integration of new employees. The geographical origin of employees can either facilitate or hinder the operational workflow. Moreover, sustainable development considerations are integral to this process, requiring that recruitment practices promote economic growth, social inclusion, and environmental protection. Relocating to a different country often represents the fulfillment of significant personal aspirations, underscoring the importance of effective and sensitive human resources management in these transitions. It is of utmost importance to provide insights into creating a more equitable and sustainable approach to international hiring.

Keywords: human resource management, sustainable development, cultural integration, economic growth

Considerations on common practical applications of normal distribution

Mitran Cătălin-Ilie^{1*}

¹University of Petroşani, Department of Mathematics and Informatics, Petroşani, Romania

*Correspondence: cata.miha.ilie@gmail.com, +40-722-26-10-7-87

Abstract: In the case of a large number of practical considerations, such as those related to the distribution coefficient of the population's intelligence, the ratio between motivation and performance, but also the distribution of the average of an exam in the case of a large number of competitors, it can be found that these tend to follow similar results to those given by the normal distribution. For these reasons, the study of these phenomena can be described with the help of normal distribution.

Keywords: normal distribution, average value, probability density function

Explosion risk prevention in a foundry hall - Case study

Cristian Tomescu^{1*}, Doru Cioclea², Sorina Stanila³, Bogdan Tomus⁴

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX, 32-34 G-ral Vasile Milea Street, Postcode: 332047, Petrosani, Hunedoara County, ROMANIA

^{3, 4} University of Petrosani, Corp C, University Street, Postcode: 332047, Petrosani, Hunedoara County, Romania, e-mail: SorinaStanila@upet.ro; BogdanTomus@upet.ro

*Correspondence: Cristian.Tomescu@insemex.ro; Tel.: +40-731-39-08-04

Abstract: The development of material batches in a foundry hall presents a series of five specific risks of which the most common, characterized as risk level 2 and 3 is represented by fires / explosions caused by solid materials, liquids, gases (combustible materials).

The risk of explosion, a serious danger, is present in: batches of wet materials, working tools or additives. When the molten metal comes into contact with water, moisture or wet material, the water instantly transforms into vapor, expanding its volume 1600 times and at a temperature above 1000°C it dissociates into component elements (hydrogen and oxygen) and produces a violent explosion, creating a dangerous situation for workers.

Such an incident took place in a foundry hall in the exhaust system of a medium frequency induction heating furnace, during the development of a brass batch, bronze.

In order to reduce the risk, a series of actions and corrective measures were applied, modification of work instructions, modifications and improvements of the gas exhaust installation, as a result of an event analysis and elaboration of a study, which is the subject of this paper.

Keywords: furnace, temperature, explosion, brass, gas exhaust.

Green Management vs Black Swan Events

Antipova Tatiana^{1*}, Riurean Simona²

¹ Institute of Cited Scientists, Agia Napa, Cyprus

² University of Petrosani, Petrosani, Romania

*Correspondence: antipovatatianav@gmail.com; Tel.: +357-99262439

Abstract: The growing threat of catastrophic disasters, so-called Black Swan Events, highlights the need for effective and resilient Green Management strategies. First of all, we should understand the nature of Black Swan Events and the area they affect. To do this, we have drawn a general classification of Black Swan Events, each element of which corresponds to the efforts and specific tools of Green Management. The main goal of our work is to classify and observe the most common Black Swan Events and give general solutions to prevent, combat, and overcome each of them, engaging Green management strategies.

Keywords: disasters, strategy, sustainable development, green management, Black Swan Events.

An overview on the stability conditions in Jilt North open pit (Oltenia mining basin, Romania)

Florin Faur^{1*}, Daniel Moisuc-Hojda²

¹ University of Petrosani, Faculty of Mining, Department of Environmental Engineering and Geology, 332006, Petrosani, Romania

² University of Petrosani, Faculty of Mining, Department of Mining, Surveying and Construction Engineering, 332006, Petrosani, Romania

*Correspondence: florinfaur@upet.ro; Phone: +40-724-46-16-01

Abstract: Regardless of the period for which the lignite open pits in the Oltenia mining basin (Romania) will continue to be in operation, ensuring the stability conditions is an imperative, both in terms of workplace security, but also for the safety of the natural and anthropogenic objectives located on neighboring lands, in the so-called area of influence. In this paper, a synthesis of the research carried out in the last three years regarding the stability of the mining works in the Jilt North mining perimeter (open pit) is presented. In this sense, the results of the stability analyzes performed for normal conditions, but also under the assumption of the presence of seismic loads (taking into account the seismic episode from the beginning of 2023) are presented, and, finally, some relatively simple and low-cost solutions are suggested, that aim to increase the stability reserve and, implicitly, prevent the triggering of landslides on the working and/or dumping steps of the open pit.

Keywords: earthquake, Jilt North, open pit, stability, waste dump

Investigation of the deformation mechanism of opening and preparation works in the Livezeni Mining Area

Nistor Cătălin Marian^{1*}, Radermacher Ladislau², Dura Cristina Tamara³, Nistor Ramona⁴

^{1, 2, 3, 4} University of Petroşani, Faculty of Mines, Department of Mining Engineering, Topography and Constructions, zip code 332006, Petroşani, Romania *Correspondence: <u>nistor_catalin_marian@yahoo.com</u>, Tel: +40-0722-40-47-50

Abstract: In the process of extracting underground mineral resources, it has been observed that the extraction methodology and the spatial progression of mining directions exert a significant reciprocal influence on both existing and contemporary mining works. The purpose of these studies aim at the stability and durability of the Livezeni Mining Area. This study also aims to explore and elucidate the mechanisms through which new underground extraction activities impact existing mining structures. The primary objective is to identify effective strategies for managing rock pressure, thereby maintaining the geometric integrity of both existing and newly constructed mining gallery profiles and works. This approach seeks to ensure an optimal balance between extraction efficiency and the structural conservation of the underground environment.

Keywords: inclined shaft, heading gallery, rock pressure, mining panel, coal.

The use of thermal imaging technology in intervention and rescue actions in toxic, flammable and explosive environments

Cosmin Ilie^{1*}, George Artur Găman^{2, 3}, Andrei Gireadă⁴, Izabella Kovacs⁵

^{1, 2, 4, 5}National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, 32-34 G-ral Vasile Milea Street, Postcode: 332047, Petroşani, Hunedoara County, Romania

³ Technical Sciences Academy of Romania

*Correspondence: cosmin.ilie@insemex.ro; Tel.: +40-743-14-95-47

Abstract: The degree of success of an intervention and rescue operation in toxic / explosive / flammable environments can be most correctly quantified by the number of injured persons surprised by the event being intervened, who are identified, resuscitated and safely transported to the nearest health facility/ first aid point.

Unfortunately, in most of the cases, the area where the research is carried out is more or less accessible, due to the inundation with smoke, toxic or explosive gases or the lack of visibility. For this reason, we most often witness an oversized consumption of specific rescuers' resources in an attempt to identify and locate accident victims in areas without visibility or with a dangerous atmosphere.

The application of thermal imaging technology allows the location of victims of industrial events in which toxic / explosive / flammable gases are generated or in areas without visibility, with the aim of an effective rescue operation, with reduced costs and risks, both for the injured and for the rescuers who intervene in such areas.

Keywords: thermal imaging, intervention and rescue, toxic/explosive/flammable environments.

Disaster management and first aid elements in the case of accidents with emissions of flammable - toxic gases - an integrative literature review

Lorand Toth1*, Andrei Gireadă², Alin Irimia³, Izabella Kovacs⁴

^{1, 2, 3, 4} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, 32-34 G-ral Vasile Milea Street, Petroşani 332047, Romania *Correspondence: lorand.toth@insemex.ro.; Tel.: +40-731-39-08-03

Abstract: Natural and anthropogenic hazards generate numerous losses of human life and material damage every year, which directly affect the process of social and economic development. Over time, hazards changed their patterns, expanded and became more frequent, being increasingly difficult to predict. Under these conditions, efforts to prevent hazards and mitigate their impact on society are necessary as integral parts of sustainable development policies.

In order to identify the stages of manifestation of a disaster, it is necessary to clarify some aspects regarding the assessment of risks and vulnerabilities, anticipating a response to an accident, assessing the dimensions of the event and last but not least aspects regarding rehabilitation and reconstruction if necessary.

In the sub-chapter dedicated to the identification and characterization of toxic environments, the toxic gases with the highest degree of danger will be reviewed, their mechanisms in toxicological terms and the related defining characteristics, as well as the maximum admissible limits at different exposure times in accordance with the national legislation in force.

The defining chapter of this scientific work will represent important aspects regarding the evaluation of patients exposed to toxic gas emissions, first aid elements as well as measures to secure victims exposed to toxic substances.

The present work aims to provide information about disaster management, its phases and first aid elements in the case of certain specific situations

Keywords: disaster management, flammable - toxic gas emissions, victim assessment first aid elements

Notions regarding the design and dimension of a partial ventilation installation -Case Study

Răzvan Drăgoescu^{1*}, Emeric Chiuzan², Ion Gherghe³, Alexandru Cămărășescu⁴

¹National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX, 32-34 G-ral Vasile Milea Street, Petroşani, Hunedoara, Romania *Correspondence: <u>razvan.dragoescu@insemex.ro</u>; Phone: + 40 254541621; Fax: +40 254546277

Abstract: The problem of industrial ventilation has arisen as a result of serious pollution problems that occur both in the environment of industrial areas and industrial premises. Before addressing an industrial ventilation study, the question must be asked whether there is no simpler means of reducing or eliminating the causes of pollution or reducing pollution by changing the production process or the way the actual ventilation system is designed and built. The commissioning of an industrial ventilation system occurs whenever noxious substances occur in a workplace, in order to

maintain a safe, healthy, productive and comfortable indoor environment in conditions of occupational hygiene, safety and health of workers. where this need is determined not only by the degree of human occupation but also, most often, by other factors, for example - production processes.

Keywords: industrial ventilation, partial ventilation, indoor environment

Considerations regarding the new requirements of the current standards regarding the explosion protection of equipment operating in environments with potentially explosive atmospheres

Sorin Rasnoveanu^{1*}, Sorin Zsido², Diana Sălăşan³

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, 32-34, G-ral Vasile Milea Street, Petroşani 332047, Romania *Correspondence: sorin.rasnoveanu@insemex.ro; Tel.: +40-722-21-87-24

Abstract: Evaluation of explosion-proof protected electrical equipment in scope of certification is extremely important considering the risk of explosion that has to be minimized in order to ensure life safety and health of workers and to prevent damaging of property and the environment, as well as free movement of goods when they meet the essential safety requirements at European level. The standards SR EN 60079-0 (Explosive atmospheres. Part 0: Equipment. General requirements) and one or more of the standards containing the specific requirements for the type(s) of protection applied to equipment (ex. SR EN 60079-7 for the type of protection increased safety "e"), are used to perform the assessment

Keywords: explosive atmospheres, explosion proof protected, electrical equipment

Computational study of hydrogen dispersion, fireball and explosion for enhanced infrastructure safety

Adina Cristina Pasculescu¹*, Gabriel Dragos Vasilescu², Dragos Păsculescu³, Alexandru Santa⁴, Claudius Andrei Popescu⁵

^{1,4,5} University of Petrosani, Doctoral School, 332006, Petrosani, Romania

² National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX, Laboratory for Explosive Materials and Pyrotechnic Articles, 332047, Petrosani, Romania

³ University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of Automation, Computers, Electrical Engineering and Power Engineering, 332006, Petrosani, Romania

*Correspondence: adina-cristinamarioane@upet.ro; Tel.: +40-786-35-43-03

Abstract: Hydrogen plays an important role in the energy transition and has an impact on production, transmission, storage, utilization up to district heating and the integration of electric and gas transmission systems. By converting the electric energy into hydrogen, it can be easily transported with (and stored in) parts of the existing natural gas transmission network. Safety is a

crucial issue to be addressed in this case, since accidental hydrogen releases present significant risks, particularly with the growing implementation of hydrogen infrastructure. In can be mentioned that there has been a lack of comprehensive investigation into hydrogen leakage scenarios, especially under complex real-world conditions. This study addresses this gap by modeling the dispersion of hydrogen gas, fireballs, and explosions based on various scenarios. The study employs consequence modelling software to analyze hydrogen leakage, vapor dispersion, and subsequent fires and explosions. Factors such as flammable quantity and wind speed are analysed for their impact on accident outcomes. The results show that both the dispersion distance of hydrogen and the thermal radiation distance of fireballs increase with larger quantities of flammable substance and higher wind speeds. This thorough numerical study of hydrogen leakage provides valuable quantitative insights, serving as a crucial reference for facility siting and design to mitigate the risk of hazardous events.

Keywords: energy transition, hydrogen, modelling, safety, simulation

Case study on spectral characteristics of road traffic noise

Sorin Simion¹*, Vlad Lăutaru²

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, 32-34 G-ral Vasile Milea Street, Postcode: 332047, Petroşani, Hunedoara County, Romania

*Correspondence: sorin.simion@insemex.ro; Tel.: +40-0254541621

Abstract: The ambient noise has a major effect on health by creating a discomfort for individuals exposed to it, becoming a form of environmental pollution that produces symptoms associated with stress, fatigue, dizziness, irritability, sleep disorders, and even tachycardia.

The objective of this paper is to provide an introduction to the methodology of determining ambient noise, by identifying spectral characteristics in order to adopt optimal measures to reduce unwanted effects and improve the comfort level of residents near traffic arteries.

Every ambient noise determination is a challenge for specialists who need to manage a multitude of variables such as accurate identification of noise source(s), their representative operating conditions, adjusting measurement periods to meteorological conditions (which cannot be controlled by the operator), including wind direction/speed, atmospheric turbidity and the possibility of precipitation.

The paper outlines provisions regarding the equipment used for acoustic measurements, measurement principles, source operating conditions, meteorological conditions, measurement procedures and result evaluation.

This study analyses the noise level generated by road traffic over a monitoring period of 4 months at the main intersections in the East area of the Jiu Valley. It presents the spectral characteristics of sound pollution level created by road traffic, identifying dominant frequencies and comparing them with legal limits to quantify the discomfort experienced by residents living near traffic arteries.

Implementing effective measures to reduce the noise impact on residents requires spectral analysis of noise, to identify frequencies likely to cause discomfort and select optimal solutions/materials based on those characteristics.

Keywords: ambient noise, urban noise, road traffic, noise pollution

CFD simulation of methane discharge dynamics from enclosures closed

Doru Cioclea^{1*}, Ion Gherghe², Florin Rădoi³, Adrian Matei⁴

^{1, 2, 3, 4} National Institute for Research and Development in Mine Safety and Protection to Explosion
– INSEMEX, 32-34 G-ral Vasile Milea Street, Petroşani, Hunedoara, Romania
*Correspondence: doru.cioclea@insemex.ro; Phone: + 40 727200779; Fax: +40 254546277

Abstract: Anthropogenic activities involve extracting the transformation and use of natural resources. During the process of surface or underground extraction of useful mineral substances, particles or gases appear in the working environment resulting from the removal or natural release from the rock mass. The process of transforming useful mineral substances is carried out on the surface in closed enclosures, usually, and involves the use of complex technological processes. Explosive or toxic gases, mists, dusts or powders may be released into the working atmosphere during these technological processes. Industrial hazards in enclosed spaces are released into the atmosphere for workers' safety reasons. In the event that workers are caught in the event of fire or explosion caused by flammable or explosive substances, morbidity is extremely high. The paper presents the CFD analysis regarding the determination of methane dispersion dynamics during evacuation at a closed enclosure.

Keywords: CFD, exhaust, dilution, gas dynamics, toxic gas, methane, closed spaces

Chemical characterization of industrial waste - case study

Niculina-Sonia Suvar^{1*}, Irina Nalboc², Asimina Toplician³

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX, Department for Safety of Mineral Resources, 332047, Petrosani, *Correspondence: sonia.suvar@insemex.ro; Tel.: +40-254541621

Abstract: Many consumer items contain recycled components as part of a circular economy; however, the chemical composition of recycled products is typically unknown. The composition of waste materials has a significant impact on environmental emissions related to waste treatment, recycling, and disposal. It may also have a substantial impact on the life-cycle assessment of waste management solutions. However, the influence of the waste composition is rarely considered in evaluations, and trash life cycle assessment usually rely on inaccurate secondary source data.

To determine the overall composition of a waste combination, the components are separated, individually tested for chemical composition, and the results are combined.

In this paper, three samples of recycled materials underwent an ATR mode FTIR spectrometer screening study. X-ray fluorescence (XRF) was used to analyze the sample composition in terms of the identification of metals and metal oxides.

The chemical compositions of the samples were found by means of a spectral library. Using highthroughput hazard and exposure data, the results were clustered to identify groups of compounds that may be linked to unique chemical sources. These substances were then prioritized for further research. Although incidence by itself does not always imply hazard, these findings can assist in identifying overlooked pathways of exposure in exposure assessments or in enhancing existing models.

Keywords: FTIR, XRF, compounds, chemical composition, waste.
Determining the auto-ignition temperature of process petroleum products

Andrei Szollosi-Mota¹*, Maria Prodan², Eugen Traistă³

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, 32 34 G-ral Vasile Milea St., 332047 - Petroşani, Romania
 ³ University of Petrosani, Environmental Engineering and Geology, Petrosani, Romania

*Correspondence: andrei.szollosi@insemex.ro

Abstract: The process underlying petroleum refining is distillation, which is a physical process of separating the components of a mixture based on their boiling point. Petroleum is a mixture of solid and gaseous hydrocarbons dissolved in a mixture of liquid hydrocarbons. Crude oil contains a series of organic substances (alkanes, cycloalkanes, aromatic hydrocarbons) organic compounds with nitrogen, oxygen, sulfur, etc.

Self-ignition is caused by exothermic (heat-generating) oxidation reactions. The temperature at which auto-ignition occurs is a measure of the sensitivity of the substance to oxidation (the oxidability of the substance.) The auto-ignition temperature is the lowest temperature at which a substance will ignite spontaneously in a normal atmosphere without an external source, such as sparks or flames.

The purpose of this paper is the determination, according to SR EN 14522:2006 - Determination of the auto-ignition temperature for gases and vapors. The results obtained after the determinations are used for the increasing safety of the personnel and process, for the optimization of the process parameters (temperatures, pressures, etc.) and to avoid unwanted events such as fire or explosion.

Key words: auto-ignition temperature, petroleum products

Evaluation of the self-ignition temperature of dust accumulations - case study dry vegetable matter

Andrei Szollosi-Mota¹*, Vasilica Irina Nălboc², Asimina Toplician³

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion, INSEMEX Petrosani G-ral Vasile Milea Street no. 32-34, Romania *Correspondence: andrei.szollosi@insemex.ro

Abstract: Ignition and spontaneous combustion (self-ignition) can occur when a combustible substance with a relatively low ignition temperature (hay leaves, cereal straw, vegetable waste, peat) releases heat. The release of heat can occur in different ways either by oxidation in the presence of moisture content and oxygen in the air or through bacterial fermentation which will generate heat. Heat dissipation is blocked because plant materials such as (leaves, straws, hays) are good thermal insulators, thus producing an increase in the temperature of the material to a temperature equal to or higher than its auto-ignition point. Even at normal temperatures, molecules on the surface of combustible dust particles undergo exothermic interactions with oxygen from the air carried in the free volume between the particles, which is the fundamental cause of self-heating (or perhaps self-ignition). The temperature in the reactive dust and air system will then rise as a result of any heat given off, hastening the reactivity of subsequent dust molecules with oxygen. Combustible powders can self-ignite depending on a variety of variables, including their chemical composition, the characteristics of the constituent parts, the particle size and geometry of the material mass, and not least the surrounding temperature.

Spontaneous combustion is a phenomenon resulting from the heating of powders of an organic nature (vegetable residues) by slow oxidation and takes place with the passage of air through the mass of fine vegetable matter.

The purpose of this paper is to study the self-ignition behaviour of combustible vegetable matter originating from the shredding of organic vegetable matter.

Keywords: autoignition temperature, vegetable

Development of experimental models based on apriori studies of hydrogen explosions effects

Florin Manea^{1*}, Nicolae Vlasin², Vlad Păsculescu³

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion - INSEMEX, Romania

*Correspondence: Florin Manea, <u>florin.manea@insemex.ro</u>, tel: 0727200785

Abstract: Taking into account previous research conducted by INSEMEX Petrosani in the field of gas mixture explosions, particularly methane explosions, the transition to investigating hydrogen explosions required studying the explosive characteristics of this gas and adopting experimental models that meet safety requirements in use, due to the much more aggressive behavior of hydrogen compared to methane in the explosive process. Aspects covered within this article highlight the research performed by INSEMEX with regard to virtual tests of hydrogen explosions conducted prior to the design and development of the experimental models. The results of these tests subsequently served for selecting the materials, configuring the experimental models, and for sizing them.

Considering that the future physical experiments are aimed at obtaining data from hydrogen explosions in interconnected spaces, the arrangement and division of the experimental models into combustion chambers were also analyzed on the basis of virtual tests. Thus, two experimental models have been developed. The first model is intended for analyzing the linear propagation of hydrogen explosions through interconnected chambers. For the second model, a rectangular spiral path was adopted, with interconnected chambers arranged along it and explosions initiated in the central chamber, while maintaining the cross-section and propagation length corresponding to the linear stand. This dimensional consistency will be useful in comparative studies regarding the hydrogen explosion process on linear and non-linear trajectories.

Keywords: hydrogen, explosion, experimental, ignition, test

CFD simulation of carbon dioxide circulation dynamics in a ventilation installations tubing

Florin Rădoi^{1*}, Nicolae Ianc²

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX, 32-34 G-ral Vasile Milea Street, Petroşani, Hunedoara, Romania
 *Correspondence: florin.radoi@insemex.ro; Phone: + 40 254541621; Fax: +40 254546277

Abstract: Reducing the risk of occurrence of phenomena such as poisoning, as a result of the untimely penetration of a certain amount of asphyxiating gases, inside a ventilation installation, is a priority, regarding the health and safety of workers, material assets and the negative influence on

the environment, due to the possible problems caused by the occurrence of asphyxiating atmospheres, formed by mixing air with these gases. In closed or semi-closed industrial and nonindustrial buildings, effective ventilation is the primary measure to prevent toxic atmospheres. Knowing the behavior of asphyxiating gases as well as their manner of dispersion is essential for preventing hazardous circumstances at the level of inadequately aired ventilation facilities, where they could develop. For the study of the dynamics of carbon dioxide circulation inside the piping of an industrial ventilation installation under the influence of the air state parameters, the CFD technique was used with the help of the ANSYS MULTIPHISICS software package In order to carry out the simulation in a manner as close as possible to the experimental conditions, the topographic elevation of the ventilation installation was carried out within the experimental laboratory where the experiments were carried out in the laboratory, and the computer model was made The paper presents the CFD analysis regarding the influence of the state parameters on the dynamics of carbon dioxide flow inside the ventilation systems. Thus, the state parameters determined in the experimentation area and their introduction into CFD modeling are presented, respectively the establishment of the flow and dispersion model of carbon dioxide in ventilation ducts with high complexity, in the intake, transport and exhaust phases.

Keywords: CFD, dispersion, accumulation, exhaust, asphyxiating gas, ventilation.

Research on the means of improving the times of locating and evacuating victims in intervention and rescue actions

Alin Irimia^{1*}, Daniel Pupăzan², Cristian Nicolescu³, Lorand Toth⁴

1, 2, 3, 4 INCD-INSEMEX Petroşani, Address: G-ral Vasile Milea street, no. 32-34, Petrosani, Hunedoara, Romania

*Correspondence: alin.irimia@insemex.ro; Tel.: +40-731-39-08-13

Abstract: In the industrial areas likely to generate toxic/explosive atmospheres, a trend is observed for retrofitting with compact installations, often very close, very small free spaces, the structures where the equipment and production lines are mounted are often metal load-bearing structures, closed with metal panels thermal insulation, due to the economic advantages regarding both construction and energy costs during use. Disadvantages to the traditional construction concept of industrial premises, the use of concrete constructions and more "airy" production lines, present a challenge for rescue teams in the event of an explosion or fire with massive smoke emissions. Considering the priority of rescuing people caught by the event, the high probability of their intoxication, the rapid location of people who could not self-evacuate is a battle against time. Rescuers participating in such interventions need locating equipment capable of operating in a space that largely blocks radio waves through a shielding effect, while at the same time allowing for high mobility, low weight and volume, characteristics necessary for creeping through spaces limited free spaces and ensuring a low consumption of compressed air, if the atmosphere has become unbreathable.

Keywords: rescuer, team, toxic, atmosphere

Impact of the presence of hydrogen on type testing of pressurized housings

Gabriela Pupazan^{1*}, Marius Darie², Tiberiu Csaszar³, Alexandru Beldiman⁴

^{1, 2, 3, 4} National Institute for Research and Development in Mine Safety and Protection to Explosion
- INSEMEX, 32-34 G-ral Vasile Milea Street, Petrosani, Romania
*Correspondence: gabriela.pupazan@insemex.ro

Abstract: Hydrogen is an explosion hazard in potentially explosive atmospheres because of its ability to form flammable and explosive mixtures with oxygen in the air over a wide range of concentrations. Equipment protected against explosion by the pressurized enclosure type of protection is designed for use in potentially explosive atmospheres such as hydrogen. The first part of the paper highlights the explosion hazard and defines aspects of explosion protection. The second part of the paper describes the principle of protection by pressurized enclosures and the classification of pressurized equipment. The last part of the paper is the analysis from the point of view of the impact of the presence of hydrogen in the hazardous atmosphere on the type of tests to which the equipment must be exposed. An important conclusion of the paper is that, although in principle explosion protection by pressurized enclosure is not influenced by the flammable substance present in the hazardous atmosphere, the type tests to which equipment protected in this way must be subjected must take account of the presence of hydrogen and use the appropriate helium purge and dilution tests.

Keywords: pressurized equipment, explosive atmosphere, risk of explosion, hydrogen, type tests.

Selection of equipment that operates in potentially explosive atmospheres generated by gases, vapours and mists

Sorin Burian^{1*}, Cosmin Colda², Danut Grecea³

^{1, 2, 3} University National Institute for Research and Development in Mine Safety and Protection to Explosion - INSEMEX, 32-34 G-ral Vasile Milea Street, 332047, Petrosani, Romania *Correspondence: <u>Sorin.Burian@insemex.ro</u>; Tel.: +40-727-20-07-77

Abstract: In the European Union (EU), selection of equipment for use in potentially explosive atmospheres is made in accordance with the ATEX (Atmosphères Explosibles) directives. The history of risk management in potentially explosive areas (Ex Zones) is closely related to industrial development and awareness of hazards associated with explosions in flammable environments. Ex classification refers to classification and marking of potentially explosive areas to ensure the correct and safe use of equipment in these environments. This classification is essential for identification and management of explosion risks in various industrial locations.

Currently, continuous efforts are being made to improve explosion prevention technologies, safety standards and regulations to ensure a safe working environment in such areas. It is important to note that risk management in Ex areas remains an ongoing concern and the continuous evolution of technologies and regulations reflects the desire to improve safety in these hazardous environments. It is important to pay special attention to selection, installation and maintenance of Ex equipment to ensure a safe working environment in accordance with specific requirements of potentially explosive area.

In general, consulting the manufacturer's specifications provides a deeper understanding of equipment's features and capabilities and helps in making informed and relevant decisions regarding its compatibility with the working environment in potentially explosive atmospheres.

Keywords: selection, equipments, ATEx, Ex zones

Aspects of the standardization process for explosive atmospheres

Adriana Andriș^{1*}, Marius Darie², Tiberiu Csaszar³, Oana-Raluca Botea⁴

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion - INSEMEX, Department for Safety of Installations and Explosion Proof Equipment, 332047, Petrosani, Romania

⁴ Economic College HERMES, 332058, Petrosani, Romania

*Correspondence: adriana.andris@insemex.ro; Tel.: +40-254-54-16-21

Abstract: This paper provides an overview of standardization activity in the field of explosive atmospheres, both nationally and internationally, as well as the evolution of this activity in various sectors related to explosive atmospheres. The first part of the paper gives a brief overview of explosion risk, explosion prevention and protection, classification of explosive atmospheres, and factors influencing explosion protection. In the second part of the paper, the national standardization context is presented, together with the reference institutions in the field of standardization for or related to explosive atmospheres. On this occasion, the international institutions administering standards that have an impact on the regulation of explosive atmospheres at the national level are also presented. The last part of the paper presents an analysis of the changes in the representative standards in the field of explosion protection in light of the significant changes made in the current edition compared to the previous edition.

Keywords: standard, explosive atmospheres, risk of explosion

Ensuring the protection against atmospheric discharges of technical installations operating in environments with the risk of potentially explosive atmospheres generated by hydrogen

Florin Adrian Păun¹*,Cătălin Mihai Popa²

^{1, 2} The National Institute of Research and Development for Safety in Mines and Explosion Protection, 32-34 G-ral Vasile Milea, Petroşani, România

* Correspondence: <u>florin.paun@insemex.ro</u>; Tel.: +40-720-01-76-38

Abstract. The presence of flammable/combustible substances in industrial premises leads to the occurrence of the risk of explosion. In general, flammable/combustible substances can include many of the raw materials, intermediate products, final products as well as waste products from the normal manufacturing process. All these flammable/combustible substances, when mixed with air, generate potentially explosive atmospheres that pose a risk of explosion in the presence of ignition sources. Among the sources of ignition, capable of initiating explosive atmospheres, such as those generated by hydrogen mixed with air, are atmospheric discharges. To prevent the risk of explosion and ensure an appropriate level of protection, technical installations operating in environments with

the risk of potentially explosive atmospheres must be protected against atmospheric discharges. The work essentially aims to deal with aspects related to ensuring protection against atmospheric discharges of installations operating in spaces with the risk of potentially explosive atmospheres, including those generated by hydrogen, at the same time identifying and analyzing the methods and technical solutions that can be applied to prevent the risk of explosion, protecting technical installations and consequently ensuring the highest level of security.

Keywords: risk of explosion, atmospheric discharges, explosive atmospheres, flammable/combustible substances, technical installations

Limiting the concentration of radon in buildings, a requirement for people's health

Mihaela Părăian¹*, Angelica-Nicoleta Găman², Andreea Tătaru³, Sorin Iuliu Mangu⁴

^{1, 2} National Research and Development Institute for Mining Safety and Explosion Protection – INSEMEX, G-ral Vasile Milea Street, no. 32-34, Postal code: 332047, Petrosani, Hunedoara County, Romania

^{3, 4} University of Petroşani, Universitatii Street, no.20, Postal cod: 332006, Petrosani, Hunedoara County, Romania

*Correspondence: mihaela.paraian@insemex.ro; Tel.: +40-727-20-07-82

Abstract: Radon is a radioactive gas from the decay of radium, the latter from the decay of uranium. It is present in certain soils and can be transported through porous media, especially through the phenomenon of diffusion. Thus, he can enter people's homes, public spaces or workplaces. Radon is a radioactive gas that causes cancer. Radon is estimated to cause tens of thousands of lung cancer deaths each year. In fact, radon is the second leading cause of lung cancer in the world. Only smoking causes more lung cancer deaths.

The paper presents some theoretical/practical and legislative aspects for the prevention of dangerous radon accumulations in buildings. A case study is also presented for a house where large amounts of radon were measured. The technical solution to reduce radon and the results of monitoring the concentration of radon radioactivity before and after the implementation of the technical solution are presented

Keywords: radon, radioactivity, lung cancer, accumulations in buildings, monitoring and prevention

Study of land cover from Fârdea administrative territory, Timiș county

Daniel Dicu¹, Mihai Herbei²*, Radu Bertici³, Adrian Smuleac⁴, Roxana Herbei⁵, Simona Cucaila⁶, Marius Cucaila⁷

^{1, 2, 3, 4} University of Life Sciences "King Mihai I" from Timisoara, Romania
 ^{5, 6, 7} University of Petrosani, Romania
 *Correspondence: mihai_herbei@yahoo.com

Abstract: Soil, the main natural means of production, is the layer forms on the land surface, in many years under the influence of climatic conditions on parental materials. The fertility of a soil depends directly on the physical and chemical properties of the respective soil. The soil, as an open ecological system, is connected to the environment, through a continuous flow of matter and

energy. The purpose of the paper is the collection, processing and accumulation of scientific data related to environmental factors, the geographical characteristics of the area, soil resources, data related to the nature and intensity of the limiting factors, the qualitative evaluation of the lands and their productivity. The relevance of the theme is highlighted mainly in the field of meadow conservation in the studied area, but also in the identification, protection and conservation of soil resources. The study of the specific natural conditions of the territorial administrative unit Fârdea was carried out, respectively the relief conditions, hydrography and hydrology, climate, soil resources, elements of flora and fauna (biodiversity). Observations were also made regarding the meadows, the morphological, physical and chemical characteristics of the soils on this area, from the perspective of the characterization of the soil cover, the determination of the quality class for the pasture use category. The types of soils identified on the researched territory are Regosols, Alluviosols, Eutricambosols and Luvosols. The limiting factors that influence the quality of the soil cover within the Fârdea cadastral territory are mainly dimensioned by: soil reaction with low values, the slope of the land and the danger of soil erosion, the degree of subsidence, the reserve of humus.

Keywords: morphologic, soil, land cover, texture, properties

Experimental model for hydrogen explosion dynamics analysis applying an air buffer chamber to investigate the change of propagation direction

Tuhut Ligia Ioana^{1*}, Florea Daniel Gheorghe², Ghicioi Emilian³

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion - INSEMEX, Romania

*Correspondence: ligia.tuhut@insemex.ro, tel: +40799211678

Abstract: Hydrogen explosions pose significant safety risks, necessitating detailed experimental studies to understand their dynamics and develop effective mitigation strategies. This paper presents the construction and testing of an experimental stand designed to study hydrogen explosions in a square spiral configuration comprising four interconnected chambers, with the capability of modifying the propagation direction.

The initial experiments involved introducing hydrogen into all the chambers to observe the explosion dynamics in a uniform hydrogen environment. In this particular experiment, a novel approach was tested by introducing hydrogen into the first and third chambers, while the second and fourth chambers were filled with clean air.

This new configuration aimed to investigate the effects of alternating hydrogen and air-filled chambers on the explosion's behavior. The experimental results were quite unexpected and provided new insights into the direction of explosion propagation and the effectiveness of the sealing methods used. The findings highlighted the complexity of hydrogen explosions in mixed environments and underscored the importance of design of enclosures in influencing the explosion dynamics.

These results have significant implications for safety protocols and the design of systems intended to manage hydrogen explosions, offering a deeper understanding of the variables that affect explosive behavior in interconnected chamber setups.

Keywords: hydrogen, explosion, experimental, ignition, test

Examining the incorporation of digitalization into occupational health and safety and its practicality: a comprehensive analysis of existing literature

Matei Andrada Denisa^{1*}, Morar Marius Simion², Cioară Cristian Raul³

 ^{1, 2, 3} National Institute for Research and Development in mine safety and protection to explosion – Insemex Petroşani, 332047, Petroşani, Romania
 *Correspondence: andrada.matei@insemex.ro; Tel.: +40 254 541621

Abstract: This study examines the digital transformation of occupational health and safety practices, particularly in light of Industry 4.0, with the aim of highlighting their effects on performance, risk reduction and workplace issues. Another aim is to examine the advancements of occupational safety and health (OSH) influenced by digitization and to determine the advantages and disadvantages of integrating digital methods into OSH practices. A detailed literature review was conducted to understand digitalization-related OSH innovations. The paper examined current studies on occupational health and safety and the use of new technologies, finding that digital technologies can significantly reduce workplace accidents. As businesses adopt digital methods, workplace accidents are reduced and performance improved, but new risks are emerging that raise issues of privacy, security, clarity and accountability. While technology affects the workplace to some extent, the digitalization techniques of occupational safety and health must adapt to meet the modern needs of providing health and safety.

Keywords: Industry 4.0, digitalization, occupational safety and health, safety technologies, digital methods

Dynamics of hydrogen explosion propagation in interconnected spaces

Gheorghe Daniel Florea^{1*}, Dan Codruț Petrilean² Nicolae Ioan Vlasin³, Vlad Mihai Pasculescu⁴

^{1, 3, 4} National Institute for Research and Development in Mine Safety and Protection to Explosion – NIRD INSEMEX, 332047, Petrosani, Romania.

² University of Petrosani, Petroşani, Romania, University Street, nr. 20.

*Correspondence: daniel.florea@insemex.ro; Tel.: +40-254-54-16-21

Abstract: The study of hydrogen explosions in interconnected spaces is critical for ensuring safety in industrial and laboratory settings where hydrogen is utilized. This paper focuses on a detailed physical experiment of a hydrogen explosion with linear propagation consisting of four interconnected chambers. The experimental stand was built transparent walls, allowing clear observation of the explosion process. The main purpose of the experiment was to analyze the behavior and dynamics of the explosion in a controlled environment. The main purpose of the experiment was to analyze the behavior and dynamics of the explosion in a controlled environment. For this purpose, hydrogen was introduced into the first and third chambers, while the second and fourth chambers were filled with clean air.

Within NIRD INSEMEX Petroşani, an accredited institute for the elaboration of technical reports on gas explosion events, the study of the phenomenon of rapid combustion visualization has seen significant development. Physical explosion experiments have become essential and efficient tools in explaining and understanding the mechanisms of explosion occurrence. High-precision measuring instruments, such as high-speed cameras, Schlieren techniques and pressure sensors, have been used to capture and analyze data on the behavior of flame fronts. These data allow for a much better identification and understanding of the critical factors influencing explosion propagation and intensity.

The results obtained from this study contribute to a deeper understanding of explosion dynamics in interconnected spaces and provide a basis for developing improved safety measures and predictive models for hydrogen explosion scenarios. Future research will focus on refining these models and exploring the influence of varying hydrogen concentrations and ignition sources on explosion propagation.

Keywords: hydrogen explosions, interconnected spaces, physical experiments, Schlieren techniques, experimental stand.

The environmental impact of natural gas pipeline accidents

Ladislau Radermacher^{1*}, Florin Faur², Diana Marchiş³

¹ University of Petrosani, Faculty of Mining, Department of Mining, Surveying and Construction Engineering, 332006, Petrosani, Romania

^{2, 3} University of Petrosani, Faculty of Mining, Department of Environmental Engineering and Geology, 332006, Petrosani, Romania

*Correspondence: santierpetrosani@yahoo.com; Tel.: +40-765-89-89-80

Abstract: Natural gas pipeline accidents have severe environmental consequences, affecting air, soil, water, and biodiversity. Methane emissions, a potent greenhouse gas, contribute to climate change, while soil and water contamination harms local flora and fauna. Resulting fires can destroy natural habitats. Common causes of these accidents include pipeline corrosion, excavation activities, and human errors or technical failures. Effective prevention and management require proactive monitoring, modern leak detection technologies, education and training of personnel, and well-developed emergency response plans. By adopting preventive measures and ensuring swift responses, the negative impact of accidents can be mitigated, thereby protecting the environment.

Keywords: accidents, environment, impact, natural gas, pipeline

Creation of explosive air-hydrogen mixtures for controlled physical experiments

Adrian Bogdan Şimon-Marinică¹*, Emilian Ghicioi², Florin Manea³, Ligia Tuhut⁴

^{1, 2, 3, 4} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, Romania

*Correspondence: <u>bogdan.simon@insemex.ro</u>

Abstract: This paper presents the use of an automatic system for the preparation of gas mixtures in order to obtain a homogeneous hydrogen-air mixture, at concentrations within the explosion limits for flammable gases, from 4 % volume fractions (lower flammability limit) to 75 % volume fractions (upper flammability limit) and with a precision suitable for laboratory applications. The system is managed by a software specially designed by the author, which controls the mixing of two volumetric flows, stored and circulated at atmospheric pressure with the help of two cylindrical

injectors, subsequently driven by step-by-step electric motors. The system is tested by preparing the hydrogen-air mixture at the desired concentrations and subsequently, the results are measured using a hydrogen sensor to confirm them.

Keywords: hydrogen explosion, CFD calculations, clean energy, risk assessment

GHG intensity" – metric that surpasses "carbon footprint" in accurately and effectively expressing the improvement of a technological process in terms of carbon emissions' reduction

Clementina Sabina Moldovan^{1*}, Liana-Simona Sbîrnă²

¹ University of Petrosani, Faculty of Mines, Department of Environmental Engineering and Geology, 332006 Petrosani, Romania

² University of Craiova, Faculty of Sciences, Department of Chemistry, 200478 Craiova, Romania *Correspondence: clemymoldovan@gmail.com; Tel.: +40-730-91-29-67

Abstract: As officialdoms, in estimating carbon emissions' reduction achievements, often use to just look at the "carbon footprint", which is the total amount of emissions containing carbon (representing Scope 1 – direct, Scope 2 – indirect and Scope 3 – all the rest within the technological process), it is essential for us to emphasize that, actually, there is a much more accurate and effective way to show the extent in which a certain technological process affects the environment in terms of carbon emissions. Explicitly, this can be achieved by punctually looking at emissions per unit of product, using a new metric called "GHG intensity", which represents the amount of carbon dioxide equivalent emitted per product, denoted as CO₂eq, that sometimes might be decreased even in a certain situation when the total amount of emissions appears to be increased. The present paper aims to explain the differences between "carbon footprint" and "GHG intensity" and to examine particular results obtained for some aluminium slabs. This analysis is particularly important in the context in which (climate change and environmental degradation being an existential threat to the entire world and, in particular, for Europe) the European Green Deal recently imposed a challenge, aiming to ensure an efficient and competitive economy in the European Union, requiring for all net GHG emissions to be eradicated by 2050.

Keywords: GHG intensity, carbon footprint, carbon emissions' reduction, carbon dioxide equivalent, specific embedded emissions, calculation-based methodology, mass balance, aluminium slabs

Considerations in Choosing Equipment for Explosive Atmospheres

Alexandru Marian Beldiman¹*, Gabriela Pupăzan², Adriana Andriș³

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion - INSEMEX, 32-34 G-ral Vasile Milea Street, Petrosani, ROMANIA *Correspondence: <u>Alexandru.Beldiman@insemex.ro</u>

Abstract: In potentially explosive environments, equipment used for generating, distributing, storing, measuring, regulating, transmitting, and consuming electrical energy requires additional constructive measures to prevent any ignition source that could trigger an explosion. This ensures operational safety in the presence of explosive atmospheres through the unique characteristics of

each type of protection. The selection of electrical equipment for use in potentially explosive environments requires an understanding of the classification of hazardous zones for gases, vapors, and dust, as well as knowledge of temperature classes. To ensure workplace safety and minimize the risk of explosions in potentially explosive environments, it is essential to take all necessary measures regarding the maintenance, inspection, and correct use of electrical equipment and connection devices. A key conclusion is that once the correct zoning of potentially explosive areas has been achieved, it is possible to proceed with the design of the electrical installation using certified electrical equipment for those zones. This approach ensures that the use of equipment strictly complies with existing regulations and is compatible with specific zoning.

Keywords: Explosive atmosphere, electrical equipment, temperature classes, maintenance.

Checking the security of explosives for civil use under conditions of high temperatures

Cristian Raul Cioara^{1*}, Marius Simion Morar², Andrada Denisa Matei³, Ștefan Ilici⁴

^{1, 2, 3, 4} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petrosani, 332047, Petrosani, România

*Correspondence: cristian.cioara@insemex.ro; Tel.: +40-254-541-621

Abstract: Explosives for civil uses are part of the category of dangerous products, representing a significant risk of explosion during storage and handling under conditions of exposure to high temperatures.

The main risks associated with the use of explosives for civil uses are those of uncontrolled explosion, fire or poisoning by combustion products. The importance of the field is argued by the fact that for the civil explosives, the European Union promoted the Directive for explosives (2014/28/UE), which regulates the marketing of these products.

This paper refers to the verification of the thermal stability of explosives for civil uses, in order to evaluate the fulfillment of the essential security requirement of Annex 1 of the Directive (2014/28/UE), "Physical and chemical stability of the explosive in all environmental conditions that can be exposed", taking into account the major risk of an uncontrolled explosion as a result of improper storage conditions and/or a major damage situation (fires).

Keywords: explosives, chemical stability, high temperatures, essential security requirements.

Post-editing of the images obtained from the physical experiments of hydrogen explosions

Laurentiu Munteanu¹*, Marius Cornel Suvar², Zoltan Vass³, Adina Cristina Păsculescu⁴

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion INSEMEX Petrosani, 32-34 G-ral Vasile Milea Street, Petrosani, Romania
 ⁴ University of Petrosani, Doctoral School, 20 Universitatii, Petrosani, Romania
 *Correspondence: munteanu.laurentiu@insemex.ro; Tel.: +40-734-30-26-39

Abstract: Hydrogen is recognized as an ecological fuel due to the fact that it does not emit greenhouse gases when used. However, the explosion risk associated with hydrogen is a significant hazard in production, storage, transport and use activities, requiring rigorous safety measures. This paper presents the experimental results of explosions of a mixture of air and hydrogen carried out

on two specialized laboratory stands with different geometries. The Schlieren technique was used for imaging the shock wave and flame front propagation phenomena. Due to the weak highlighting of the flame front in the raw images obtained, it was necessary to post-process them using specialized software for video editing in order to improve the clarity and visibility of the relevant details. The results obtained from the presented study provide a deeper understanding of the behavior of the flame front in explosion conditions on stands of different geometries, contributing to the improvement of safety and efficiency in industrial and research applications.

Keywords: hydrogen hazard, explosion, laboratory stand, Schlieren technique

Methods of isolating buildings in order to reduce the level of noise pollution inside them

Stanci Aurora^{1*}

¹ University of Petrosani, Faculty of Mines, Department of Environmental Engineering and Geology, 335600, Petrosani, Romania *Correspondence: aurorastanci@upet.ro; Tel.: +40-722-53-42-92

Abstract: The problems related to noise pollution inside the buildings are actual topical and of interest. With the development of road infrastructure and industry, significant problems have arisen related to noise levels inside buildings. In order to reduce the level of pollution inside buildings, solutions must be found to reduce it both at the source and at the receiver. To reduce the level of pollution at the receiver, insulating construction materials can be used to reduce the level of pollution inside the building. In this paper we aimed to study the reduction of noise pollution in buildings using different construction materials. The study was carried out with the help of a model of a house, a model that represents a construction structured in four walls with different composition.

Keywords: noise, pollution, insulation

Considerations over the production, transport and storage of the hydrogen using the natural gas pipe system, in a maximum mix of 25%v/v

Iulian Vladuca¹*, Sorinel Popescu², Stela Dinescu³, Ștefan Alexandru Șerban⁴, Ramona-Manuela Stanciuc⁵

^{1, 4, 5} National Research and Development Institute for Gas Turbines COMOTI, Iuliu Maniu Ave. 220D, 061126, Bucharest, Romania

^{2, 3} University of Petrosani, Department of Mechanical, Industrial and Transport Engineering, 20 University Street, Petrosani, Romania

*Correspondence: <u>iulian.vladuca@comoti.ro</u>; Tel.: +40-729-05-85-51

Abstract: Mixing the natural gas with hydrogen has become a problem of national interest in Romania, for the introduction of hydrogen into the circuit: production from renewable sources, storage and transport, using the natural gas pipes, including the possibilities of hydrogen extraction from the mix, for various other purposes. Various analyses, through Lazard studies, show that a 25% v/v (by volume) mix of hydrogen with natural gas is feasible for use in power picking plants,

when the energy demand is high, and the price of hydrogen (production/ transport/ storage/ mixing/ etc.) thus entering into the sale price of the produced energy. Other analyzes by the so-called "Hydrogen Valley" platforms, show a major interest in the development of partnerships from various areas of research and development sectors and private companies, for development of technologies in the field of production/ storage/ transport/ mixing/ etc. of hydrogen with natural gas, in proportions of 25%, as a first step for the gradual decarbonization around the globe. The paper presents, also, a diagram of connections between different research and development sectors and private companies, in order to appreciate the technological level involved in finding feasible solutions, according to the National Hydrogen Strategy.

Keywords: mixing natural gas with hydrogen, hydrogen national strategy, global decarbonization

Monitoring the level of radioactivity present in the air in the Municipality of Lupeni

Stanci Aurora^{1*}

¹, University of Petrosani, Faculty of Mines, Department of Environmental Engineering and Geology, 335600, Petrosani, Romania

*Correspondence: aurorastanci@upet.ro; Tel.: +40-722-53-42-92

Abstract: Environmental monitoring involves supervision, forecasting, warning and intervention in order to systematically evaluate the dynamics of the qualitative characteristics of environmental elements, in order to know the quality state of the environment. One environmental problem is the level of radioactivity in the air. Environmental radioactivity monitoring is done for three purposes, namely knowing the level of radioactivity in the environment, assessing human exposure to radiation and establishing measures for the ecological restoration of areas with increased radioactivity. In this paper I propose to present the results obtained following the monitoring of the level of radioactivity of the air in the Municipality of Lupeni in order to establish the level of environmental radioactivity in this area.

Keywords: monitoring, radioactivity, air

Technical and safety solutions for the demolition by blasting of a tall hyperboloid cooling tower

Robert Laszlo^{1*}, Ciprian Jitea², Stefan Ilici³, Aurelian Nicola⁴, Levente Miklos⁵

^{1, 2, 3} National Institute for Research and Development in Mine Safety and Protection to Explosion INSEMEX Petrosani, 32-34 G-ral. Vasile Milea Street, Petrosani, 332047, Romania ⁴ University of Petrosani, Universitatii Street 22, Petrosani, Romania ⁵Industrial Demolition Company, Tg. Mures, Romania

*Correspondence: robert.laszlo@insemex.ro, mob. +40 722 305 573

Abstract: The restructuring of industrial activities involves the carrying out of conservation activities or the decommissioning of buildings or areas that may later be the object of the development of new civil or industrial projects. Many demolitions work by using explosives and are characterized by a high degree of difficulty. This has shown that the use of the blasting technique is a proper alternative from the point of view of efficiency, quality, and security. The paper describes the practical solutions and safety conditions of realizing the demolition of a cooling tower located within a fertilizer plan and having in the very close vicinity several civil constructions. Considering the location of civil construction, the challenge of the project was to find solutions to reduce the throwing distance of the concrete pieces under the action of the explosion, to mitigate vibrations through the collapse and sequential contact with the ground of the construction, and to reduce the value of the overpressure of the air created due to the piston effect during the collapse of the construction of the tower. To establish the possible effects generated by the execution of the tower demolition by blasting works, a risk assessment was made with reference to seismic wave, air shock wave, noise, dust, and the level of shock generated by the impact of constructions with the soil. The demolition works were successfully carried out, and thanks to the technical solutions and the adopted protection and security measures, no damages were recorded.

Keywords: explosive, demolition, blasting parameters, risk evaluation, safety

Correlations between weighting coefficients corresponding to the measurement groups

Ofelia Larisa Filip^{1*}, Anca Daniela Ciovică (Filip)²

^{1, 2} University of Petrosani, Faculty of Mines, Department of Mining Engineering, Surveying and Underground Constructions, 332006, Petrosani, Romania *Correspondence: larisafilip@upet.ro; Tel.: +40-764-42-28-94

Abstract: The information base needed to solve geodetic and topographic problems consists of measurements of angles and distances. According to their presentation and conditions, measurements are grouped and defined differently and consequently processing methods are different. The purpose of the processing operations is the same, namely to determine the probable values of the measured quantities and their accuracy ranges, expressed by weight coefficients. For the mining topography activity, the weighting coefficients have an important role in the decision act regarding the safe drawing and management of mining works.

Keywords: mining surveying, topographic underground networks, errors, topographic measurements

Contributions to the development of geodetic networks

Ofelia Larisa Filip^{1*}, Anca Daniela Ciovică (Filip)²

^{1, 2} University of Petrosani, Faculty of Mines, Department of Mining Engineering, Surveying and Underground Constructions, 332006, Petrosani, Romania *Correspondence: larisafilip@upet.ro; Tel.: +40-764-42-28-94

Abstract: The topographic basis made for drawing and conducting underground works (mining, hydrotechnical, communication routes, special) is dependent, in some situations, on geodetic points that must be determined on the surface for this purpose. Geodetic points are obtained by developing the higher order geodetic network using methods that ensure the necessary precision, but also the

efficiency of the measurement and calculation operations used. On the theoretical content, the paper presents the current known methods, on the one hand, and the possibilities of improvement, on the other hand.

Keywords: mining surveying, topographic underground networks, topographic measurements

Monitoring the Just Transition in Jiu Valley, Romania

Maria Elena Boatca¹*, Sabina Irimie², Adrian Pal²

 ¹ Politehnica University of Timisoara, Faculty of Management in Production and Transportation, Department of Management, 300191, Timisoara, Romania
 ^{2, 3} Asociatia Institutul Social Valea Jiului, 332006, Petrosani, Romania
 *Correspondence: maria.boatca@upt.ro; Tel.: +40-741-05-82-76

Abstract: In the structure of the project management cycle, monitoring is an important step. The paper makes a comparative analysis between program and project monitoring, customizing on the Just Transition Program in Romania and a project within this program that is implemented in the Jiu Valley. In this context, the paper focuses on presenting the evolution of Just Transition initiatives and related EU-funded projects, as well as on the analysis of the administrative structure of the institutions involved in the governance of the transition to climate neutrality in Romania. The Jiu Valley microregion is one of the beneficiaries of the Just Transition in Romania. Jiu Valley

was severely affected by the reduction of coal mining activities. The transition in Komana. Jut valley was severely affected by the reduction of coal mining activities. The transition from coal mining to a low-carbon energy system has led to high unemployment, migration of young people and adults, poverty and social exclusion. The paper focuses on presenting the evolution of Just Transition initiatives and related EU-funded projects, as well as on analyzing the administrative structure of institutions involved in the governance of the transition to climate neutrality in Romania. Further, the authors openly discuss and perform a detailed analysis of the major challenges regarding monitoring Just Transition activities and possibilities to overcome the identified challenges.

Key words: Just Transition, project management, monitoring, monitoring committee, JUSTEM

Methods for identifying and assessing risks of occupational injury and disease their suitability for assessing emerging risks

Adriana Milea (Pârvu)¹, Lucian-Ionel Cioca^{2*}

^{1, 2} Lucian Blaga University of Sibiu, Faculty of Engineering, Department of Engineering and Management, 550025, Sibiu, Romania *Correspondence: lucian.cioca@ulbsibiu.ro; Tel.: +40-745-11-08-55

Abstract: The integration of digital technologies, including industrial automation, artificial intelligence, advanced robotics, the Internet of Things (IoT), additive manufacturing (3D printing), etc., is radically transforming industrial and organizational work environments. These emerging technologies bring both significant opportunities for efficiency and innovation, but also introduce new and complex risks to worker safety (exposure to electromagnetic radiation, cognitive overload, cyber risks, potential for accidents caused by human-machine interactions, etc.). Effectively

identifying, assessing and managing these emerging risks is critical to ensuring a safe, healthy and efficient workplace atmosphere.

The purpose of this research, which is based on previous theoretical and empirical studies, was to: identify the most used methods/methodologies/tools for hazard identification, risk analysis and occupational injury and disease risk assessment; the comparative analysis of the selected methods, to highlight their advantages and disadvantages, respectively their limitations. Also, the research sought to examine the effectiveness and suitability of the selected methods for identifying and assessing new risks emerged from the adoption of digital technologies in technological and manufacturing processes.

In the context of rapid technological evolution, it is essential to improve and adapt these methods to be as accurate, adaptable and to remain relevant, thus ensuring better protection of the working environment and more effective risk management in an era of production more and more digitized.

Keywords: method, risk, emerging risk, risk analysis, safety

The modern technology implementation for safe energy transition

Maria Daniela Stochitoiu^{1*}, Utu Ilie²

^{1, 2} University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of A.C.I.E.E., 332056, Petrosani, Romania *Correspondence: danielastochitoiu@upet.ro; Tel.: +40254543382

Abstract: The role of electrical energy becomes more important with the progress in transitioning towards clean energy and thus increases the importance of electric power networks for society and economy. The need of electrification and of renewable sources is growing. The risk that can appear is that the transition to clean energy may stagnate if the networks are not sufficiently updated for connecting the new supplies of electricity on consumer demand. This paper emphasises the theoretical aspects and the importance of the static power-electronic devices installed in AC transmission (where static synchronous series compensator SSSC device is considered as one of the active power control facilities) as an essential feature to avoid technical problems in the power networks, for increasing the transmission capacity and assuring efficiently the stability of the system.

Keywords: active power control, series compensator, voltage compensation

Public opinion about the impact of renewable energy sources on the environment of Jiu Valley

Alexandra Soica^{1*}, Nicoleta Negru², Razvan Bogdan Itu³, Susana Apostu⁴

^{1, 3, 4} University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of Mechanical, Industrial and Transport Engineering, 332006, Petrosani, Hunedoara
 ² University of Petrosani, Doctoral School, 332006, Petrosani, Hunedoara
 *Correspondence: alexandra valynikalay@yahoo.com; Tel.: +40-728-31-04-62

Abstract: This study examines public opinion on the environmental impact of renewable energy sources, focusing on a comprehensive survey conducted in 2023 involving 10,000 residents aged 18 to 60. The survey consisted of 20 questions designed to gauge opinions on energy sources and their application in both private households and public spaces. The findings reveal that while a majority of residents are in favor of adopting renewable energy sources, they perceive the associated costs as

prohibitive. The study concludes that significant governmental support is essential to make the transition to renewable energy viable for the community. The research employs a structured questionnaire to collect quantitative and qualitative data, highlighting the substantial potential for renewable energy adoption in regions traditionally dependent on coal mining

Keywords: adoption, coal mining, energy sources, environment, renewable energy

Particularities regarding the determination of maximum surface temperature of junction boxes with type of protection increased safety "e" designed for use in gaseous explosive atmospheres

Lucian Moldovan¹*, Mihai Magyari², Clementina Moldovan³, Sorin Râșnoveanu⁴

^{1, 2, 4} INCD INSEMEX, Department for Safety of Explosionproof Equipment and Installations, 32-34 G-ral Vasile Milea street, Petrosani, Romania

³ University of Petrosani, Department of Environmental Engineering and Geology, 20 University street, Petrosani, Romania

*Correspondence: lucian.moldovan@insemex.ro; Tel.: +40-743-11-23-17

Abstract. Increased safety "e" represents a type of protection applied to electrical equipment or Ex Components designed for use in potentially explosive atmospheres generated by the presence of flammable substances in the form of gases, vapours or mists. According to this type of protection, additional measures are applied so as to exclude the possibility of occurrence of arcs, sparks and excessive temperatures even in case of abnormal operation. This type of protection cannot be applied to equipment producing electrical arcs and sparks in normal operation. This paper underlines some specific aspects regarding the determination of maximum surface temperature (such as the preparation of the test sample, determination of the hottest points and the maximum surface temperature), considering the requirements of the specific standards, in case of increased safety junction boxes designed for use in gaseous explosive atmospheres (including hydrogen).

Keywords: increased safety, junction box, type of protection, maximum surface temperature

Aspects regarding the use of variable speed drives in the case of explosion protected electric motors used in explosive environments

Mihai Magyari^{1*}, Dragoş Fotău², Sorin Zsido³

^{1, 2, 3} National Institute of Research and Development for Safety in Mines and Explosion Protection,
32-34 G-ral Vasile Milea, 332047 Petroşani, România
*Correspondence: mihai.magyari@insemex.ro; Tel.: +40-727-20-07-87

Abstract: This paper presents some of the most important aspects that have to considered regarding the functioning of variable speed explosionproof electric motors designed for use in explosive mixtures of gases and vapors, highlighting some of the most important technical issues which can occur in practice, as well as some practical solutions in terms of designing these types of electrical drives in order to overcome some of the short comes which can arise while functioning in various technical installations of operators in the oil and gas industry.

Keywords: variable speed drive, explosionproof electric motor, explosive atmosphere

Aspects regarding the usage of the high voltage impulse generator in order to verify the insulation systems of electric motors used in potentially explosive atmosphere

Dragoş Fotău¹*, Marcel Rad², Diana Sălăşan³, Valentin Sîrbu⁴

^{1, 2, 3, 4}National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani, 32-34, G-ral Vasile Milea Street, Petroşani 332047, Romania *Correspondence: dragos.fotau@insemex.ro; Tel.: +40-727-36-94-72

Abstract: The purpose of this paper is to present the importance of the specific tests for electric motors with type of protection increased safety "e" designed to be used in explosive atmosphere. This paper presents the voltage impulse ignition test applicable to electric motors with increased safety protection type.

Due to the fact that electric motors with type of protection Increased Safety, whose supply voltage exceeds 1000 V, presents a high risk of sparks occurring in windings, it is necessary to perform tests to verify that the insulation of the windings is adequate and does not lead to electric discharge (through electric springs or sparks) at winding levels

Evaluation of explosion-proof protected electrical equipment in scope of certification is extremely important considering the risk of explosion that has to be minimized in order to ensure life safety and health of workers and to prevent damaging of property and the environment, as well as free movement of goods when they meet the essential safety requirements at European level.

The standard SR EN 60079-0 (Explosive atmospheres Part 0: General requirements) and one or more of the standards containing the specific requirements for the type(s) of protection applied to equipment (ex. SR EN 60079-7 for the type of protection increased safety "e"), are used to perform the assessment.

Keywords: electrical equipment, increased safety, explosive atmosphere

Reliability of blasting machines used to initiate electrical detonators

Dan Gabor^{1*}, Mihaela Părăian², Anca Tăzlăuanu³

^{1, 2, 3} National Research and Development Institute for Mining Safety and Explosion Protection – INSEMEX, G-ral Vasile Milea Street, no. 32-34, Postal code: 332047, Petrosani, Hunedoara County, Romania

*Correspondence: dan.gabor@insemex.ro; Tel.: +40-729-49-90-80

Abstract: In underground or surface mining operations in Romania, blasting machines manufactured before 1990 are still used to initiate electric detonators. These blasting machines have a long or very long operating life and certain operating parameters have changed over time. On the basis of the data collected during the periodic inspections, the data contained in the test reports issued by the Laboratory of Non-Electrical Ex Equipment, Electrostatic Materials and Personal Protective Equipment of INCD Insemex Petroşani, an analysis was made in this paper of the parameters that change in a blasting machine over time, the possible causes and the consequences of these changes. Data from test reports from 2003 to 2023, i.e., over a period of 20 years, performed on blasting machines manufactured in Romania and the former German Democratic Republic was used for the analysis. According to the analysis carried out for the preparation of this paper, it was

found that the blast machines with the longest service life were those produced in the former GDR, i.e., Vopil M514 blast machines, and that most of them were inductor and capacitor blast machines. The parameters that changed as a result of long use were the output voltage value, the pulse power and, in the case of blasting machines intended for coal mining, the pulse duration.

Keywords: blasting machines, electric detonators, mining

Research on reducing PM10 particles in the Jiu Valley area as a result of using photovoltaic panels in electricity production

Alexandra Soica¹, Nicoleta Negru^{2*}, Sorin Mihai Radu³, Angela Egri⁴

^{1, 3, 4} University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of Mechanical, Industrial and Transport Engineering, 332006, Petrosani, Hunedoara
 ² University of Petrosani, Doctoral School, 332006, Petrosani, Hunedoara
 *Correspondence: negru.ioananicoleta@yahoo.ro; Tel.: +40-763-61-54-27

Abstract: Air quality in industrial areas is a pressing concern due to its significant impact on public health and the environment, especially regarding PM10 particle pollution. Effectively mitigating these risks requires practical solutions. The adoption of photovoltaic panels for energy production emerges as an attractive option to address environmental pollution and promote sustainable development. This study aims to comprehensively analyze the potential of photovoltaic panels in reducing PM10 particle levels in the Jiu Valley region, an area primarily dominated by the mining industry. The research includes an assessment of air quality and PM10 particle pollution levels in the Jiu Valley, along with a detailed analysis of the energy potential of photovoltaic panels in the region. Statistical analysis was conducted to compare PM10 particle levels in the air with and without the use of photovoltaic panels, particularly in relation to those emitted by the mining industry. The findings provide valuable insights into the effectiveness of photovoltaic panels in mitigating PM10 particle pollution in the Jiu Valley, thus advocating for a sustainable approach to managing air quality in industrial areas.

Keywords: air quality, photovoltaic panels, pollution, environment, industrial areas

Hardware and software used for the study of angular motion by remote control

Nicolae Patrascoiu^{1*}

¹ University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of ACIEE, 332006, Petrosani, Romania *Correspondence: nicolaepatrascoiu@upet.ro; Tel.: +40-722-48-94-01

Abstract: This work is part of a project that includes methods for studying automation elements' functionality. From this project, I chose to present, in this paper, the hardware and software structure used for the study of angular motion. The generation of movement in the sense of controlling the spinning direction and amplitude is achieved by a DC motor. The Discovery Studio module, a Digilent product, controls the motor through the L298N DC motor driver module. The movement parameters are measured through an experimental incremental transducer through a National Instruments data acquisition module. The software created in LabVIEW allows both the

control of the motor and the determination of the spinning direction and amplitude. The user has an interface with movement control elements and visualization of measurement results, for various operating conditions.

Keywords: incremental sensors, DC motor control, LabVIEW, DiscoveryStudio, remote control

Prebunking, an effective defense mechanism to strengthen consumers' cyber awareness

Simona Riurean^{1*}, Tatiana Antipova²

¹ University of Petrosani, Faculty IME, Department ACIEE, 332006, Petrosani, Romania

² Institute of Cited Scientists, Agia Napa, Famagusta, 5330, The Republic of Cyprus

*Correspondence: sriurean@yahoo.com; Tel.: +40-744-51-73-96

Abstract: In today's digital age, especially with generative AI, several significant cyber threats exploit the consumers' vulnerabilities. Prebunking, a proactive strategy aiming to protect consumers from misinformation and cyber attacks, can serve as an effective defense mechanism by exposing them to milder versions of deceptive content. Traditional reactive approaches, such as post-incident responses and debunking misinformation, often fall short. Prebunking, on the other hand, poses a proactive alternative, aiming to preemptively arm consumers with the knowledge and skills needed to recognize and resist both cyber threats, and misinformation This paper explores various prebunking methods aiming to enhance consumers' cyber defense. Different approaches to prebunking methods and strategies are developed in this paper, aiming to raise consumers' ability to create a stronger, more instinctive defense against cyber threats and deep fake news, contributing to a more informed and secure digital environment for us.

Keywords: cybersecurity, cyber resilience, cyber hygiene, deep fake, misinformation, ethical phishing simulation

Is the European infrastructure ready for long haul electric transportation? An analysis of a freight transport from Romania to Germany using an electric semi-trailer truck

Alina Panciu¹*, Mihai Victor Zerbes², Lucian Lobonț³

Lucian Blaga University of Sibiu, Faculty of Engineering, Department of Industrial and Management Engineering, 550025, Sibiu, Romania *Correspondence: alina.panciu@ulbsibiu.ro; Tel.: +40-0269-217-928

Abstract: The heavy-duty vehicle sector is responsible for over 25% of the greenhouse gas emissions generated by road transport in the EU. In order to achieve their ambitious objectives stated in the" Fit for 55" Package, the European Institutions have to provide the legal framework, that will compel the member states to assure the infrastructure to support the transition towards more sustainable modes of transport, and to put the Union on track for the full decarbonization of the transport sector by 2050. Thus, the new Alternative Fuels Infrastructure Regulation (AFIR) – part of "Fit for 55" Package, has to ensure there is sufficient public charging infrastructure to follow

the deployment of zero emission cars and semi-trailer trucks. Accordingly, the top ranked European semi-trailer truck makers have to align their industrial plans and business activity to fully transition to zero-emission semi-trailer truck sales. The purpose of this analysis is to evaluate the possibility of a heavy-duty electric semi-trailer truck to carry out a trip on a frequent commercial route between Romania and Germany. The scientific paper is based on an analysis in the form of a case study generated on the basis of a theoretical requirement. The results will show to what extent electric vehicles and infrastructure are ready for this type of transport. After results examination, we found that our findings overlap with the literature and that there is still much room for improvement in this area. Major changes are needed, namely additional investments in infrastructure and subsequent detailed analyses of the opportunity to develop the use of electric vehicles.

Keywords: battery electric trucks, European infrastructure, electric long-haul trips, AFIR regulation, zero emission vehicles, electric charging stations.

Aspects of earthing of installations in environments with potentially explosive atmospheres

Mirela Ancuța Radu^{1*,} Cătălin Mihai Popa², Ana Petrina Păun³

^{1, 2} The National Institute of Research and Development for Safety in Mines and Explosion Protection, 32-34 G-ral Vasile Milea, Petroşani, România

³ University of Petroșani, 20 Universității, Petroșani, România

* Correspondence: mirela.radu@insemex.ro; Tel.: +40-729-49-90-81

Abstract: In environments with potentially explosive atmospheres, earthing protection covers three aspects: protection against electric shock, prevention of electrostatic discharges from equipment/facilities, processed materials or people, and protection against atmospheric discharges. The paper presents some aspects regarding the specific requirements for earthing protection in atmospheres with the risk of explosive atmospheres that must be taken into account when evaluating the risk of explosions. Norms and reference standards are also highlighted, which are constantly changing in step with the latest scientific achievements, emphasizing the importance of updating them with the latest information.

Keywords: potentially explosive atmospheres, earthing protection, grounding

Autonomous indoor navigation system concept: hardware and software integration for electric vehicles

Rus Cosmin¹*, Leba Monica²

^{1, 2} University of Petroşani, Faculty of Mechanical and Electrical Engineering, Department of Automation, Computers, Electrical and Power Engineering, 332006, Petroşani, România *Correspondence: cosminrus@upet.ro; Tel.: +40-765-74-44-36

Abstract: This paper presents a comprehensive investigation into the development of an autonomous electric vehicle specifically designed for indoor use. The research focuses on two critical aspects: the hardware-based steering system and the software algorithm for autonomous navigation. The steering system integrates a set of sensors and a closed-loop control algorithm to

accurately determine the wheel positions relative to the steering wheel, utilizing a microcontroller and a LiDAR sensor for precise directional control. Concurrently, an interactive dashboard was developed, using Python and Qt, to display real-time data including motor temperature, battery voltage, and current consumption. The autonomous navigation algorithm, implemented and tested in MATLAB Simulink, uses LiDAR-generated maps to define the vehicle's trajectory within a physical space. The algorithm guides the vehicle through predefined coordinates, adapting to environmental changes and obstacles. The integration of these hardware and software components aims to achieve reliable autonomous navigation in confined indoor spaces, enhancing the vehicle's performance and safety. This research contributes significantly to the field of intelligent electric vehicles, promoting advancements in autonomous mobility solutions for industrial, commercial, and residential applications.

Keywords: navigation, closed space, Simulink, Lidar, dashboard, monitoring

Application of altera programmed logic integrated circuit in efficient asynchronous drive system

V. Borodai^{1*}, O. Nesterova², V. Naida³

^{1, 3}Dnipro University of Technology, Department of Electric Drive, 49005, Dnipro, Ukraine

² Dnipro University of Technology, Department of Philosophy and Pedagogy, 49005, Dnipro, Ukraine

*Correspondence: Email: Boroday va2@ukr.net; Tel: +38-099-784-81-29

Abstract. The work is a logical continuation of the development of an energy-efficient asynchronous drive, which is based on previous theoretical studies. A practical implementation based on the ALTERA programmable logic circuit (PLC) is proposed, which will contribute to the spread of energy-saving and energy-saving technologies under the condition of a deep change in the load of mechanisms of long-term operation and minimal costs for control equipment.

Keywords: asynchronous drive, system of energy-efficient application, adjustable AC drive, ALTERA programmable logic integrated circuits.

Developing a programmable electronic circuit for the controlled ignition of explosive mixtures

Vass Zoltan¹*, Şuvar, Marius², Bogdan Şimon-Marinică³, Muntean, Laurențiu⁴

^{1, 2, 3, 4} National Institute For Research And Development In Mine Safety And Protection To Explosion – INSEMEX Petroşani

*Correspondence: vass.zoltan@insemex.ro

Abstract: The research performed in the domain of explosive gaseous mixtures, in particular of hydrogen-oxygen gaseous mixtures, is gaining ground due to their applications in various fields, such as power generation, propulsion systems and safety engineering.

Due to the current realities of environmental and political considerations it is necessary to transition away from conventional carbon-based sources of energy, to more clean sources of energy. In order to accomplish this goal, research is needed in the field of clean energy, in particular in the research of hydrogen.

These research activities are performed under a strict laboratory environment where the conditions and requirements of the ignition of these gaseous mixtures are critical. In this context, the design and development of programmable electronic control circuit for the controlled ignition of explosive gaseous mixtures represents a significant advance. The objective is to create a system that not only is reliable, but also cost-effective and simple to use.

In this paper we present a design and development of a digital electronic circuit.

Keywords: hydrogen, mixture, ignition, control circuit

Modernization of electrical installations for lighting and power in the Electroenergetics Laboratory of the University of Petroşani

Florin Mureșan-Grecu^{1*}, Florin-Gabriel Popescu², Marius-Daniel Marcu³, Dragoș Păsculescu⁴, Teodora Lazăr⁵

¹ University of Petroșani, Doctoral School, 332006, Petroșani, România

^{2, 3, 4, 5} University of Petroşani, Faculty of Mechanical and Electrical Engineering, Department of Automation, Computers, Electrical and Energy Engineering, 332006, Petroşani, România
 *Correspondence: flomavon2002@yahoo.com; Tel.: +40-723-709-239

Abstract: Creating an interior electrical installation for lighting and sockets is a rigorous endeavor that must comply with current regulations and standards in the field. For this, it is necessary to draft a technical project that includes the designed situation and calculation briefs to determine the parameters of the installation. This paper succinctly presents the realization of interior electrical installations for lighting and outlets in the Electroenergetics Laboratory ("Laboratory L1") in Building A of the University of Petroşani and its adjacent rooms.

Keywords: electrical installation, modernization, standards, calculations, protections.

Mimicking humanoid robot gait using human motion data from IMU

Muntean Emanuel^{1*}, Leba Monica²

^{1, 2} University of Petrosani, Faculty of Engineering, Mechanics and Electricity, Department of Systems Engineering, zip code 332006, City Petrosani, Country Romania
 *Correspondence: emanuelmuntean@upet.ro; Tel.: +40-722-38-91-33

Abstract: This paper presents a new method for mimicking the gait of a humanoid robot using data obtained from Inertial Measurement Unit (IMU) sensors placed on a human body. The proposed framework benefits from the capabilities of IMU sensors to capture detailed motion data, including acceleration and angular velocity from various parts of the human body. The IMU sensors are strategically placed on the both feet to ensure comprehensive gait analysis. The collected data is processed using 2 Arduino UNO that send PWM signals to control the robot's Servo Motors in order to replicate human-like walking patterns. The methodology involves several key steps: data acquisition, preprocessing, feature extraction, and gait synthesis. During data acquisition, IMU sensors record the human subject's gait in real-time. The effectiveness of the proposed method is

validated through a series of experiments, where the humanoid robot successfully mimics the human gait on flat surfaces. The results demonstrate that the IMU-based gait imitation framework achieves high fidelity in replicating human walking patterns, offering significant improvements in the robot's stability and adaptability. This research contributes to the field of humanoid robotics by providing a robust and efficient approach to gait imitation, with potential applications in rehabilitation, assistive robotics, and human-robot interaction. Future work will focus on refining the control algorithms and exploring the integration of additional sensory data to further enhance the robot's gait performance.

Keywords: Humanoid robot, IMU sensors, gait imitation, signal processing, gait analysis, human-robot interaction.

Development of a mobile platform with a manipulator robot

S.K. Shykhov^{1*}, V.O. Knysh², O.M. Plahunov³

^{1, 2, 3} Dnipro University of Technology, Faculty of Electrical Engineering, Department of Electric Drive, 49005, Dnipro, Ukraine

*Correspondence: shykhov.stan.k@nmu.one; Tel.: +38-095-601-57-16

Abstract: Traditional manufacturing production lines are characterized by static and rigid configurations, resulting in significant idle time during reconfigurations for new products or processes. This inflexibility not only decreases productivity but also limits the ability to respond quickly to market demands. With the advent of Industry 4.0, mobile robotic units have leveraged the Internet of Things and Artificial Intelligence to significantly enhance their capabilities and application fields. By integrating sensors, actuators, and machine-to-machine communication, mobile manipulators have become essential components of modern smart industry. These systems combine the capabilities of a mobile platform with a robotic arm, making them versatile tools in production, science, military, construction, medical care, and business sectors. This paper introduces the development and implementation of the "CuRoK" mobile robot manipulator at the Dnipro University of Technology. The CuRoK features a robust hardware architecture, including a mobile platform and a multi-link manipulator arm with five degrees of motion. Critical components such as actuators, sensors, controllers, and human-machine interfaces are discussed in details. The paper addresses challenges encountered during the development process, such as mechanical vibrations and electrical interference, and presents solutions to mitigate these issues. Emphasis is placed on improving part machining quality, reducing tolerances, and enhancing electrical isolation. The successful deployment of CuRoK underscores the importance of integrating mobile manipulators in modern education and industry, highlighting their role in fostering skills essential for the next generation of engineers and technicians.

Keywords: service robotics, mobile manipulation, modern manufacturing, Industry 4.0, education

A literature review on integrating AI and blockchain technologies in animatronics for children's entertainment and education

Alina Stepanek^{1*}, Fabian Arun Panaite²

^{1, 2} University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of System Control and Computer Engineering, 332006, Petrosani, Romania
 *Correspondence: alinasoltoianu@upet.ro; Tel.: +40-722-18-44-37

Abstract: This paper presents a comprehensive literature review on the integration of animatronics for children, AI systems applicable to animatronics, and blockchain in IoT for animatronics. It begins with an overview of the historical context and evolution of animatronics in children's entertainment and education, highlighting key milestones and safety considerations. The review explores various AI systems used in animatronics, including machine learning, computer vision, natural language processing, and behavioral AI, discussing their implementation and associated challenges.

The study further investigates the role of blockchain technology in animatronics, focusing on critical aspects such as data security, supply chain management, and operational transparency. Blockchain ensures secure data transmission between animatronics and control systems, enhances the traceability and verification of components and materials used in animatronics, and maintains transparent and immutable records of maintenance logs and operational data.

The paper provides a comprehensive analysis of the integrated role of AI and blockchain in advancing animatronic technologies, aiming to offer valuable insights for designers, developers, and educators involved in the field of animatronics.

Keywords: animatronics, AI systems, blockchain, internet of things (IoT), children's entertainment, educational technology, machine learning, data security.

The development of an energy system model from renewable sources in agrotourism structures

Rada Elena Cristina¹*, Karaeva Anzhelika²*, Torretta Vincenzo³, Fabio Conti⁴, Bâscă Gabriela⁵, Zerbes Mihai-Victor⁶, Tulbure Anca⁷, Giurea Ramona⁸

^{1, 2, 3, 4} University of Insubria, Department of Theoretical and Applied Sciences, 21100, Varese, Italy,

⁵Conexiuni Association, Sibiu, Romania, 550159

^{6, 8} Lucian Blaga University of Sibiu, Faculty of Engineering, Department of Industrial Engineering and Management, 550025, Sibiu, Romania

⁷ Lucian Blaga University of Sibiu, Faculty of Agricultural Sciences, Food Industry and Environmental Protection, Department of Food Industry and Environmental Protection, 550012, Sibiu, Romania,

*Correspondence: <u>elena.rada@uninsubria.it</u> and <u>akaraeva@uninsubria.it</u>, Tel.: +39 0332 218782

Abstract: This paper presents the development of an energy system model from renewable sources in an agro-tourism structure. The research started from a general overview of renewable energy sources regarding the main sources of renewable energy and the renewable energy potential in Romania. After a presentation of the current status of the use of energy systems from renewable sources (ESRS) in Sibiu County, a research was developed taking into account the building energy certificate, the legislation, the procedure for obtaining this certificate, and also a description of the tourism sustainability certificate in the context of the European strategy for sustainable tourism. The case-study regarding the development of an energy system model based on renewable sources in an agro-tourism structure was developed including a graphic representation of the energy circuit within the energy system, an investigation into the implementation of the energy systems from renewable sources with the identification of key performance indicators, and an analysis of the legislation imposed on buildings and energy efficiency solutions for buildings. The fossil fuels are non-renewable forms of energy, deriving from finite resources that they will ultimately be depleted, will bring to the increasing the total cost of energy for the agro-tourism structure. Consequently, it is becoming increasingly evident that concerted actions are required to promote the adoption of technologies based on renewable energy sources under the circular economy view and in agreement also with Sustainable Development Goals (SDGs) and FIT for 55.

Keywords: agro-tourism structure, ESRS, renewable sources, key performance indicators, sustainability, SDGs, circular economy.

Developing an autonomous drone for early detection of forest fires

Sibişanu Remus¹, Manole Tudor², Rus Cosmin^{3*}

^{1, 3} University of Petroşani, Faculty of Mechanical and Electrical Engineering, Department of Automation, Computers, Electrical and Power Engineering, 332006, Petroşani, România ²University of Petroşani, Faculty of Mechanical and Electrical Engineering, Master T.T.I.A. (second year), 332006, Petroşani, România *Correspondence: cosminrus@upet.ro; Tel.: +40-765-74-44-36

Abstract: This research aims to develop an autonomous drone system for early detection of forest fires. By integrating specialized sensors with AI algorithms, the drone can quickly identify fire outbreaks in remote areas, enabling prompt responses to potential threats. The study provides a detailed analysis of sensor capabilities and data collection methods to optimize detection accuracy. Advanced AI algorithms, such as machine learning and computer vision techniques, are utilized to enhance real-time data processing and decision-making. The system architecture is robust and scalable, allowing deployment in diverse forest environments. The focus is on ensuring the drone's autonomy for navigating challenging terrains and performing continuous monitoring without human intervention. Regulatory compliance is addressed by thoroughly examining current aviation and environmental laws, ensuring the drone operates within legal frameworks while maximizing efficacy. Field trials in various forest regions demonstrate the system's effectiveness in early fire detection, with case studies showing its success in preventing fire escalation. The research highlights the potential for integrating this technology into existing forest management practices, offering a cost-effective and sustainable solution for fire prevention.

Keywords: AI, sensors, autonomy, machine learning, environmental monitoring

Challenges in integrating artificial intelligence for enhanced robotic autonomy and interaction

Alexandru Costinaș¹, Marius Leonard Olar²*, Sebastian Daniel Roșca³

^{1, 2, 3} University of Petroşani, Faculty of Mechanical and electrical engineering, Department of System control and computer engineering, zip code 332006, Petroşani, România *Correspondence: teseract@gmail.com; Tel.: +40-731-44-73-48

Abstract: In recent years, the integration of artificial intelligence (AI) into robotic systems has opened new horizons across various fields such as industrial production, healthcare, transportation, and space exploration. This article presents how AI enhances robots' capabilities in perception, planning, and executing complex tasks. Deep learning and reinforcement learning algorithms enable robots to analyze sensory data in real-time, make predictions, and make autonomous decisions in dynamic and unpredictable environments. We also address the challenges related to safety, ethics, and human-robot interaction, emphasizing the need for clear regulations and stringent ethical standards. The case study presented illustrates the successful implementation of AI in robotic applications, showcasing the potential of this technology to revolutionize how robots operate and interact with the surrounding world. The conclusions highlight the importance of interdisciplinary collaboration to advance the effective development and deployment of AI in robotics.

Keywords: artificial intelligence, robotic systems, deep learning, safety, interdisciplinary collaboration

Modelling and implementation of the dashboard interface for electric vehicles using advanced simulation technologies and navigation APIs

Victor Triohin^{1*}, Tudor Manole²

¹ University of Petroşani, Faculty of Mechanical and Electrical Engineering, Department of Automation, Computers, Electrical and Power Engineering, 332006, Petroşani, România ² University of Petroşani, Faculty of Mechanical and Electrical Engineering, Master T.T.I.A. (second year), 332006, Petroşani, România *Correspondence: victortriohin@upet.ro; Tel.: +40-765-74-44-36

Abstract: This paper presents the design and implementation of a digital dashboard interface for electric vehicles using advanced simulation technologies and navigation APIs. The proposed dashboard system integrates real-time data processing and visualization to provide critical information to the driver, enhancing both the safety and efficiency of electric vehicle operation. Developed on a low-cost embedded platform, the system utilizes a combination of GMap.NET for mapping and navigation, the OpenWeatherMap API for real-time weather updates, and the Geoapify API for route planning and navigation functionalities. The graphical interface, created using Windows Forms and C#, includes features such as speed indicators, battery level indicators, navigation aids, and current weather information. A simulation program was developed to demonstrate the system's capabilities, including real-time updates of vehicle parameters such as speed, battery level, and remaining range. The simulation adjusts these parameters based on user inputs and driving conditions, providing an accurate representation of the vehicle's performance. The study highlights the system's adaptability to various vehicle models with minimal modifications

and its potential for future enhancements, such as integrating additional sensors and incorporating AI algorithms for improved performance. The research underscores the importance of user-friendly interfaces and real-time data integration in modern electric vehicles, offering a scalable and cost-effective solution for enhancing electric vehicle usability.

Keywords: real-time data processing, user interface, vehicle management, simulation program, embedded platform

Energy consumption and resource allocation made more efficient through Artificial Intelligence: AI-Driven Design Optimization for HVAC (Heating, Ventilation, and Air Conditioning) system

Maria-Isabela Ghicajanu (Cașotă)^{1*}, Dan Codruț Petrilean²

¹ University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of Doctoral School, 332006, Petrosani, Romanian

² University of Petrosani, Faculty of Mechanical and Electrical Engineering, Department of Automation, Computers, Electrical and Energy Engineering, 332006, Petrosani, Romanian *Correspondence: ghicajanumaria@gmail.com Tel.: +40-730-48-17-12

Abstract: In contemporary industrial and commercial settings, Heating, Ventilation, and Air Conditioning (HVAC) systems are critical for maintaining optimal indoor environments. However, the efficient operation of these systems is often challenged by varying external and internal conditions, leading to suboptimal energy consumption and increased operational costs. This paper explores the integration of Artificial Intelligence (AI) to enhance the performance and efficiency of HVAC systems. Using Brain.js, a JavaScript-based neural network library, we train a model using multiple input parameters, including indoor temperature, outdoor temperature, humidity, airflow rate, operating hours, and occupancy levels, to predict optimal setpoints and energy consumption.

To facilitate practical application and user interaction, I developed a Vue.js-based web interface. This interface allows users to input real-time environmental and operational data, which is then processed by the trained neural network to provide actionable predictions for optimizing HVAC performance.

Future work will focus on enhancing the model's accuracy by incorporating additional data sources, such as weather forecasts, real-time energy prices, and more occupancy data. I also plan to implement adaptive learning algorithms to allow the system to continuously improve its predictions based on new data. Furthermore, expanding the system's capabilities to include predictive maintenance alerts and integrating with IoT sensors for more precise data collection may be key areas of development. By pursuing these improvements, I aim to create a more robust, intelligent, and comprehensive solution for HVAC system optimization, ultimately contributing to smarter and more sustainable building management practices.

Keywords: Artificial Intelligence, HVAC, predictive, improvement, intelligence, system optimization, programming, data modelling, energy saving

Managing the risks of injury and occupational disease in the maintenance activity of wind farms

Georgeta Buică¹*, Antonov Anca Elena², Constantin Beiu³, Dragos Pasculescu⁴, Mircea Risteiu⁵

^{1, 2, 3} INCDPM "Alexandru Darabont" Bucharest, 35 A Ghencea Blvd, 6th county, Bucharest, Romania

⁴ University of Petrosani, 20 Universitătii st., Petrosani, Hunedoara, Romania

⁵ University "1 Decembrie 1918" Alba-Iulia, 5 Gabriel Bethlen st, Alba Iulia, Romania

*Correspondence: georgiana buica@yahoo.com; Tel.: +40-727-27-79-43

Abstract: In the context of climate change and through the lens of the objectives set at the EU level regarding climate neutrality, through the Integrated National Plan in the field of Energy and Climate Change 2021-2030, Romania proposed to increase the share of sources to 55.8% in 2030 of renewable energy in the electricity sector. For this purpose, one of the targets established at the national level is related to the construction and commissioning of new electricity production capacities from wind and solar sources.

The paper aims to present a synthesis of the research carried out regarding the assessment of accident risks and professional improvement in the exploitation and maintenance of wind farms.

Considering the new regulations regarding the safety of machines, in the category of which wind turbines fall, taking into account the European and national strategies regarding digitalization, the implementation of software systems for monitoring, control and data acquisition in the integrated management systems of electricity producers led to the reduction over time of the risks of occupational injury and desease.

The paper considers new research regarding the risks that may appear as a result of the aging of the workforce and its fluctuation/migration in the activity of exploitation and maintenance of wind farms in order to establish some measures to prevent the risks of accidents and occupational diseases determined by the introduction of new digital production technologies.

Keywords: risk, evaluation, safety, wind turbine

Arc flash detection on photovoltaic systems

Constantin Beiu^{1*} Georgeta Buică², Antonov Anca Elena³, Dragos Pasculescu⁴, Mircea Risteiu⁵

^{1, 2, 3} INCDPM "Alexandru Darabont" Bucharest, 35 A Ghencea Blvd, 6th county, Bucharest, Romania

⁴ University of Petrosani, 20 Universitătii st., Petrosani, Hunedoara, Romania

⁵ University "1 Decembrie 1918" Alba-Iulia, 5 Gabriel Bethlen st, Alba Iulia, Romania

*Correspondence: cbeiu@protectiamuncii.ro; Tel.: +40-745-28-04-83

Abstract: Photovoltaic (PV) systems are increasingly being used. Because of ageing and the trend toward higher DC voltage levels, incidents of DC arc faults in PV systems are becoming more common, which seriously impacts system stability and human safety. Parallel arcs draw a higher current than series arc faults, so detecting the latter is more challenging. The undetected arc faults pose a severe fire hazard to residential, commercial, and utility-scale PV systems. Such a dangerous event must be detected early to deliver electricity safely and reliably. This paper comprehensively

reviews the state-of-the-art techniques for DC arc fault detection in photovoltaic systems (PV). Different methods and the features used for detection are discussed and compared in detail. This paper also emphasizes the importance of DC arc fault simulation for characteristics study and fault diagnosis purposes. Several DC arc fault models have been reviewed and compared.

Keywords: risk, evaluation, safety, solar panel

Identification of thermal environment in workplaces producing advanced suspension systems for the commercial vehicle industry and methods to normalize working conditions

Marius Kovacs^{1*}, Simion Alexandru²

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroşani.

*Correspondence: marius.kovacs@insemex.ro

Abstract: The thermal comfort of workers depends on the balance of heat within the human body. This balance is affected by various factors in the workplace, including relative humidity, air temperature, average radiant temperature, air velocity, and clothing, as well as physical activity. The thermal sensation of the entire body can be estimated by calculating the PMV (predicted mean vote) and PPD (predicted percentage of dissatisfied) indices.

The purpose of the case study was to assess the thermal environments of 14 workplaces that perform hot processing of subassemblies necessary for industrial vehicles.

During the tests, a series of long-lasting measurements were carried out and the thermal sensation of the workers was calculated for each workplace.

The main objective of the work is to assess the degree of comfort at workplaces performing hot metal processing and identify measures to normalize working conditions.

The study results indicate in almost all cases high values of the percentage of people possibly dissatisfied with the work environment from hot processing of subassemblies necessary for industrial vehicles. Also, for these workplaces, certain measures are recommended to normalize working conditions, namely: improving ventilation installations for each work area.

Keywords: microclimate in the workplace, vehicle industry, thermal comfort

Specific requirements for selecting protective systems for technological installations with combustible dust

Adrian Jurca^{1*}, Dan Gabor², Mirela Radu³

^{1, 2, 3} National Research and Development Institute for Mining Safety and Explosion Protection – INSEMEX, G-ral Vasile Milea Street, no. 32-34, Postal code: 332047, Petrosani, Hunedoara County, Romania

*Correspondence: adrian.jurca@insemex.ro; Tel.: +40-727-20-07-71

Abstract: Industrial explosions have been a risk for as long as man has been processing, storing and transporting combustible dusts. The list of products that may combust in powdered form is extensive and includes a wide range of materials. Fine dust, such as wood, textiles, plastics, coal, carbon, light metals such as aluminium, magnesium, and titanium, agricultural products such as

flour, cacao, sugar, grain, tobacco, and spices, as well as chemicals, pharmaceuticals, rubber, etc., may be explosive. Combustible dust occurs in a variety of industries and is a risk factor in many workplaces if not handled properly. In many cases, explosive atmosphere accumulation and ignition sources are not possible to be avoided, situation when an explosion might occur, if the combustible dust is present in suspension, mixed with air (with enough oxygen), within the explosion limits, together with an ignition source. Managing the explosion risk involve hazard identification, followed by explosion prevention and protection techniques. The paper presents a series of specific requirements regarding the principle of design and selection of protective systems used in technological installations with combustible dust in order to immediately stop the propagation of an incipient explosion and/or to limit the effective range of an explosion.

Keywords: combustible dust, explosion propagation, combustion characteristics, protective systems

Evaluation of industrial risk specific to the transport of dangerous substances

Gabriel Vasilescu^{1*}, Daniela Rus², Maria Andreica³, Ciprian Mateiu⁴, Denisa Tudor⁵

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX, Laboratory for Explosive Materials and Pyrotechnic Articles, 332047, Petrosani, Romania

^{3, 4, 5} University of Petroșani, Doctoral School, 332006, Petrosani, Romania

*Correspondence: dragos.vasilescu@insemex.ro, Tel.: +40-254-541-621

Abstract: In selecting the research area for this study, several factors were considered: the type of Critical Infrastructures (local, regional, national, or international significance), the mode of transport for hazardous substances (road, rail, naval), the frequency of transports within the area, the quantities transported, the exposed elements (population, economic operators, hospitals, schools, etc.), and the existing environmental factors in the area. The impact distance refers to the distance from the transport accident site to the point where a certain threshold corresponding to a potential effect (e.g., health impact, environmental contamination, material damage) caused by the release of hazardous materials is reached. The impact zone is a strip defined by the impact distance on either side of the transport route, between the point of origin and the destination of the analysed route segment. Hazard maps are created by identifying SEVESO sites and road transport routes. In the selected scenarios, potential exposure to hazards associated with the transport of hazardous substances is evaluated by considering the elements at risk within the hazard area (social, environmental, and economic factors). By comparing the magnitude of hazards with the level of social and individual vulnerability, the general vulnerability index is determined. The results obtained are then used to develop emergency response plans and land-use planning, as well as to establish measures and procedures to mitigate the consequences of disasters.

Keywords: industrial risk, transportation of dangerous substances, hazard map, social vulnerability, disaster

Development of Testing Infrastructure for Maritime Pyrotechnic Articles

Jitea Ilie-Ciprian¹*, Rădeanu Cristian², Garaliu-Bușoi Bogdan³, Ilici Ștefan⁴, Laszlo Robert⁵

^{1, 2, 3, 4, 5} National Institute for Research and Development in Mine Safety and Protection to Explosion INSEMEX Petrosani, 32-34 G-ral. Vasile Milea Street, Petroşani, 332047, Romania

Abstract: Advances in safety science and occupational risk management for industrial applications using explosive materials require a robust testing infrastructure. This paper aims to develop a comprehensive framework for the testing of maritime pyrotechnic articles, addressing regulatory requirements, infrastructure design and implementation. The study is based on International Maritime Organisation (IMO) and European Union guidelines, ensuring compliance with rigorous safety standards. The methodology involves detailed calibration and validation of test equipment such as climate chambers, digital gauges and timers to measure critical parameters such as ignition delay, burn time and operational efficiency under extreme conditions. Hand flares and floating smoke flares are subjected to extensive cyclic temperature, immersion and operational stress testing to verify durability and performance. Findings demonstrate that proper conditioning and testing of marine pyrotechnic products in controlled environments can significantly enhance their reliability and safety. The study concludes that a well-structured testing protocol, aligned with international safety standards, is essential to minimise risk and ensure high levels of operational safety in maritime applications.

Keywords: maritime pyrotechnics, safety science, occupational risk management, testing infrastructure, explosive materials, IMO Standards, calibration and validation, burn time, ignition delay, temperature cycles

Evaluation of the auto-ignition temperature of dust accumulations - a case study of waste from the automotive industry

Niculina-Sonia Suvar^{1*}, Maria Prodan², Camelia Traistă³

^{1, 2} National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX, Department for Safety of Mineral Resources, 332047, Petrosani, Romania
 ³ University of Petrosani, 20 Universitatii Street, 332006, Petrosani, Romania
 *Correspondence: sonia.suvar@insemex.ro; Tel.: +40-254541621

Abstract: The phenomenon known as spontaneous combustion occurs when combustible organic powders are heated by gradual oxidation through an air channel (formed by an air depression) through the dust aggregate. The oxidation of combustible powders is the reaction of these powders with air oxygen to form carbon dioxide, carbon oxide, water, and other gases whose contents are temperature-dependent. Combustible dust can self-ignite based on their chemical composition, the characteristics of their constituent materials, the size and shape of the material mass's particles, and—last but not least—the ambient temperature. Environmentally friendly organic waste is being used for many applications, including building materials, in response to global concerns about sustainability in construction engineering. The difficulty is that, when using these materials, one must ensure the safety associated with the handling of such organic components that are known to have flammable characteristics. This work aims to determine the self-ignition behavior of combustible dust from the automotive industry, in order to be able to take the appropriate measures of protection.

Keywords: Combustible dust, spontaneous combustion, dust accumulation, autoignition temperature

Development of a model for improving environmental aspects in an automotive company

Zerbes Mihai Victor^{1*}, Popescu Liliana Georgeta², Rotunjanu Alexandra-Georgiana³

^{1, 2} University "Lucian Blaga" University of Sibiu, Industrial Engineering and Management Department, 550025, Victoriei Bld. no.10, Sibiu, Romania
 ³ Continental AG, Sibiu, Romania
 *Correspondence: liliana.popescu@ulbsibiu.ro; Tel.: +40-760-26-50-10

Abstract: This paper focuses on the analysis and evaluation of environmental aspects in the context of implementing the 8D methodology in order to reduce energy usage of an automotive Company in Romania. The main objective is to identify and implement efficient solutions to reduce energy consumption and minimize the impact on the environment. The paper analyzes the environmental aspects associated with energy use and production within the automotive company. The 8D methodology is a structured problem - solving process, and we explore how it can be applied to reduce energy usage. We present the key stages of the 8D methodology highlighting how they can be adapted and implemented within studied company to effectively address the environmental aspects related to energy consumption. Through a case study conducted at an automotive company in Sibiu we describe how the 8D methodology could be applied to reduce energy usage. Specific problems related to energy consumption were identified and analyzed, and effective corrective actions were developed to address them. In conclusion, this paper demonstrates the importance of environmental evaluation, the application of the 8D methodology, and the use of a structured process to address environmental aspects and reduce energy usage at an automotive Company from Sibiu, Romania. It provides a solid foundation for continuous improvement of environmental protection practices and energy efficiency within the organization.

Keywords: 8D methodology, environmental aspects

Non-conventional sources and methods of mineral extraction – challenges and opportunities

Carsten Drebenstedt^{1*}

¹Technische Universitat Bergakademie Freiberg, Germany *Correspondence: <u>Carsten.Drebenstedt@mabb.tu-freiberg.de</u>

Abstract: The availability of mineral resources is essential for the functioning of the economy, the services in the society, security, health, welfare and others. The last years shows, that mineral resources becomes more and more a geo-political instrument, even if there is a concentration on few producers, and in no political stable regions. Protectionism and single country interests lead to a shortage of mineral exports and higher prices, which sets economic regions as Europe with low resource potential under pressure. In result the European Union published the "Critical Raw Material Act" to find answers for a certain self-supply of strategic for the economy minerals by new exploration and mining projects, by increase of processing, metallurgical and recycling capacities, and by R&D to realize. An important role plays the use of the own mineral resource potential in European Union. Near surface primary deposits mostly discovered and exploited in the last 1.000 years. A new resource for mineral resources can be the residuals of the mining, processing and

metallurgical processes, e.g. waste dumps, tailings, ashes, slags, and uneconomic for conventional technologies, e.g. small size and complex mineralized deposits. To extract the minerals from these non-conventional deposit's new technologies as phytomining, leaching, high selective mining, robotics can be used. The article gives an insight in the latest developments at TU Bergakademie Freiberg.

Keywords: mineral resources, mining and processing, new technologies, phytomining, leaching, high selective mining

Use of AI/ machine learning and GIS – case study evaluation of dump stability

Carsten Drebenstedt^{1*}

¹Technische Universitat Bergakademie Freiberg, Germany *Correspondence: Carsten.Drebenstedt@mabb.tu-freiberg.de

Abstract: Slope and dump stability is an important element of occupational and public safety of a mining operation. If dump deformations are happening, different tools are used to investigate the reasons. Learning from mistakes in the past is the basic to improve acting for the safety in future. Because the reasons for dump deformations can be multicriterial, a result of a chain reaction analytical tools may be not able to give adequate answers and solutions. Was the mistake found, especially in case of dump deformations in closed mines it's a need to proof the long-term stability of the whole dump area, sometimes with thousands of hectares and billions of m³. In such situations, e.g. data collection by exploration and test of material samples are not efficient or not led to the right result to predict dangerous areas. Such a difficult case in German lignite mines is the sudden liquefaction of dump material after decades by dynamic stimulation. To find dangerous dump areas the combination of Geoinformation systems and Neural Networks was applied. The article presents the use of this tool, the possible prediction results, limitations, and further development's needs.

Keywords: slope stability, dump deformation, geoinformation systems, neural networks, landslide prediction

New ways of networking and managing European University Alliances: the FOREU2 SwafS Horizon Group

Agnieszka Kosciuszko^{1*}, Sabin Ioan Irimie²

¹ Montanuniversität Leoben, International Relations and European University Office, 8700 Leoben, Austria

² University of Petrosani, Mining Faculty, Department of Industrial Management and Engineering, Petrosani, Romania

*Correspondence: agnieszka.kosciuszko@unileoben.ac.at, Tel.: +43 3842/402-8030

Abstract: For several years now, European University Alliances have been playing a major role on the European higher education and science scene. The question is not only how individual universities cooperate with each other, but also how the alliances enter into a dialogue with each other and develop cooperation at a higher level. In this paper, I will focus on the example of an extended period of cooperation between several SwafS (Science for and with Society) Horizon Projects. The projects involved focussed on the Research and Innovation dimension of European Universities and they developed new ways of collaborating and networking. This is a completely new way of management and cooperation, not only between scientists but also between entire projects on the European level.

Keywords: European University alliances, Horizon projects, project management, European networking, management in research projects, transnational collaboration at universities, transformation, joint research agenda, synergy

European Quality Assurance Standards and its implementation by the development of joint study programmes

Julia Sishchuk¹*

¹Technische Universitat Bergakademie Freiberg, Germany *Correspondence: Iuliia.Sishchuk@mabb.tu-freiberg.de

Abstract: Since its establishment in late 2020, the EURECA-PRO European university alliance has developed and implemented a variety of educational offerings across partner universities. These include new Bachelor's and Master's programs, as well as credited modules and courses on Responsible Consumption and Production (RCP), European values and culture, European languages, and more. All educational offerings have to comply with current EU quality assurance standards. At the same time by collaboration of the nine partner universities there is a need to address unique challenges arising from different national regulations. Thus, by development of QS standards for EURECA-PRO's educational offerings the European standards of Quality assurance and national requirements were analyzed and summarized to identify the most essential criteria that are going to be presented.

Keywords: European university, EURECA PRO, bachelor program, master program, Responsible Consumption and Production, quality assurance

RECENZORI / REVIEWERS

Mihai Adrian Albulescu Andrei Andraș Iosif Andraş Felicia Andrioni Tatiana Antipova Izabela-Maria Apostu Lazăr Avram Gabriel Băbuț Camelia Bădulescu Daniel Breaz Lucian Ionel Cioca Doru Costin Darabont Predrag Dasic Ion Doşa Anca Drăghici Emilia Dunca Florin Faur Mihalis Galetakis Angela Găman Mircea Georgescu Janusz Grabara Mihai Herbei Daniel Moisuc-Hojda Andreea Ionică Claudia Isac Claudiu Kifor Marius Kovacs Omar Lanchava Maria Lazăr

Monica Leba **Gheorghe Manolea** Marius Marcu Theodoros Michalakopoulos Lucian Moldovan **Roland Moraru** Mariana Nagy Aurelian Nicola Cătălin Nistor Ilie Onica Ion Pană Vlad Păsculescu Nicolae Patrășcoiu Florin Dumitru Popescu Mihai Popescu-Stelea Lavinia Elisabeta Popp Maria Prodan Elena Cristina Rada Ladislau Radermacher Sorin Mihai Radu **Christos Roumpos** Alexandru Simion Mihaela Toderaș Lorand Toth Eugen Traistă Dumitru Tucu loel Vereş Zoltan Virag Janusz Wielki
ÎN PARTENERIAT CU / IN PARTNERSHIP WITH:

Asociația Absolvenților Universității din Petroșani, ALUMNI ALUMNI Association of the University of Petrosani

Sindicatul CDPM din Universitatea din Petroşani University of Petrosani CDPM Union

S.C. TERMO & GAZ CONSULTING S.R.L.

SC PANTHEON CONSULTING S.R.L.

PARTENERI MEDIA / MEDIA PARTNERS:

Ziarul EXCLUSIV

Cronica Văii Jiului

Mondo TV

HD 365