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- THE SUCCESS TRIANGLE FOR A SUSTAINABLE ECONOMIC, SOCIAL  
AND ENVIRONMENTAL DEVELOPMENT”**

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# Chemical risk ranking and evaluation: case study in a paint manufacturing company

*Roland Iosif Moraru<sup>1</sup>, Mihai Popescu - Stelea<sup>1</sup>, and Gabriel Bujor Băbuț<sup>1</sup>*

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**Abstract.** As economies grow and the use of chemicals becomes more and more widespread, the adoption of effective control measures allows for safer use of chemicals on an industrial scale. Chemical hazards can have severe negative consequences for both the health of employees, the safety of personnel and facilities (fire and explosion risk) and the environment. To characterize them, it is necessary to combine the inherent hazards associated to chemicals with their conditions of use that may generate emissions and exposures. Various methods, both qualitative and quantitative are available worldwide for chemical risk assessment, but unfortunately in Romania this important aspect is treated in a minimalist manner, which can often be considered as insufficiently rigorous. In this perspective, the present paper aims to validate through a practical case study conducted in a Romanian paint manufacturing company, the application of a simplified method of chemical risks prioritization and assessment. The obtained results allowed the substantiation of the control measures of these risks, being also able to constitute an instrument of raising awareness for all the interested parties (occupational safety and health inspectors, managers, safety officers, supervisors, workers), in the effective management of the chemical risks.

## Disability-sensitive occupational risk assessment

*Alina Trifu<sup>1</sup>, Daniel Onut Badea<sup>1</sup>, Doru Darabont<sup>1</sup>, Paul Foggorasy<sup>2</sup>, and Iulian Ivan<sup>1</sup>*

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<sup>2</sup>BAUM Engineering SRL, Arad, Romania

**Abstract.** This paper presents the findings of an ongoing National Institute for Research and Development in Occupational Safety “Alexandru Darabont” INCDPM project developed in collaborations with BAUM Engineering SRL that addresses the occupational safety issues related to workers with disabilities, with emphasis on disability-sensitive risk assessment. In our project we developed a method of occupational risk assessment that is disability-sensitive, in order to help employer and safety professionals. The disability-sensitive risk assessment method will identify all the risk factors in the system that can be the ultimate cause of injury and/or professional illness by means of predefined control lists and quantifying the risk based on the combination of gravity and probability of risk factor manifestation. The main steps in applying the method will be: establishment of the assessment team; description of the analysed system (workplace, installation); identification of risk factors in the system; assessment of the risks of occupational injury and illness; prioritizing risks and establishing prevention priorities; proposing prevention measures. Every step mentioned before will be disability-sensitive, taking account of individual workers’ differences and avoiding discrimination at the same time.

# Effectiveness of personal protective equipment in working with pesticides – a systematic review

*Daniel Onuț Badea<sup>1</sup>, Alina Trifu<sup>1</sup>, Doru Costin Darabont<sup>1</sup>, and Bogdan Țărnău<sup>2</sup>*

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**Abstract.** This paper presents the findings of an ongoing project developed in collaborations with SC Medinet HC Services SRL that addresses the occupational safety issues related to handling toxic substances, with emphasis on personal protective equipment in working with pesticides. INCDPM together with SC Medinet partner carried out an extensive literature review of existing published relevant materials, textbooks, journals, conference papers found in Science Direct Freedom Collection, Elsevier database, Web of Science - Core Collection, Springer Link Journals, that were processed with PRISMA method (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).

## The danger of initiating explosives by electrostatic discharge. Checking the level of sensitivity of explosives to electrostatic discharges.

*Dan Gabor<sup>1</sup>, Florin Adrian Păun<sup>1</sup>, and Anca Tăzlăuanu<sup>1</sup>*

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**Abstract.** Explosives designed for civil uses can be, in some cases, be triggered by accident due to electrostatic discharge. Static electricity, as a source of electrostatic discharge, is a common phenomenon in the explosives manufacturing industry. Explosives designed for civil uses are substances, materials and accessories that present a high-risk factor during their production, packaging, storage, transport, use and disposal. In order to establish essential safety requirements for civilian uses explosives, national legislation has been harmonized with European legislation, respectively with Directive 2014/28/EU of the European Parliament and of the Council regarding the placing on the market and control of explosives for civil use, for handling with minimal risk to the safety of human life and health, to prevent damage to property and the environment, and to ensure the safety and health of persons coming into contact with civil uses explosives. In this context, it is necessary to apply high-performance test methods to determine the safety parameters for assessing the conformity of explosives for civil use with the safety requirements set out in the specified directive. This paper describes some aspects regarding the implementation of the testing method for checking the level of sensitivity to electrostatic energy of explosives within the Laboratory of Non-Electrical Ex Equipment, Electrostatics, Materials and PPE within INCD INSEMEX Petroșani [1, 2].

# Explosion risk assessment for already installed equipment

*Mihaela Părăian<sup>1</sup>, Adrian-Marius Jurca<sup>1</sup>, Dan Matei<sup>2</sup>, and Sorin Iuliu Mangu<sup>3</sup>*

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**Abstract.** The equipment of installations for the processing, transport or storage of flammable substances which may generate an explosive atmosphere, in or around them, must be assessed in terms of the risk of explosions, both when they are put into operation or when the installation is modified and periodically for verify that the initial level of protection is maintained. The purpose of the assessment is to establish appropriate protective measures to prevent sources of ignition that could initiate explosive atmospheres. Explosion risk assessment is an obligation of the employer who must draw up an explosion protection document, as regulated in GD 1058/2006 transposing European Directive 1999/92/EC. The explosion risk assessment process focuses primarily on the formation of explosive atmospheres and then on the presence and activation of ignition sources. The principle of explosion protection is to reduce the probability of an ignition source occurring at the same time as the explosive atmosphere, to a minimum acceptable level according to the applicable norms and standards. The paper presents some aspects regarding the evaluation of the risk of explosions to already installed equipment, assembled in an installation, depending on the specific conditions.

## Determination by standardized test methods of electrostatic discharge sensitivity of electric igniters in order to prevent their unexpected initiation

*Florin Adrian Păun<sup>1</sup>, Mirela Ancuța Radu<sup>1</sup>, and Ana Petrina Păun<sup>2</sup>*

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**Abstract.** In the case of use of the electric igniters, in various applications, depending on their field of use, there may be a risk of unexpected initiation by means of electrostatic discharges from persons, their clothing and / or objects isolated from the ground. Electrification and consequently the accumulation of dangerous electrostatic potentials on people and on their outerwear, generally takes place during the performance of work tasks, a situation in which due to the movements performed by the persons involved, there is the phenomenon of friction between different parts of clothing or between clothing and the person wearing the clothing. The presence of the risk of unexpected initiation of electric igniters by electrostatic discharge requires the adoption and implementation of measures to minimize their effects on the safety and health of workers and others. In view of the above, determining the performance of sensitivity of electric igniters to unexpected initiation by electrostatic discharge is very important as this depends on the safety and security of workers / persons involved in activities that require the use of these elements / products.

# Aspects of explosion risk assessment in the case of bucket elevators

*Cătălin Mihai Popa<sup>1</sup>, and Dan Sorin Gabor<sup>1</sup>*

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**Abstract.** Many of the technological processes that take place in the installations in which cereal products are transported and / or stored, involve the existence of combustible dusts. These dusts may be suspended in the air, or in the form of accumulations in layers or deposits of dust of various thicknesses, and may lead to fires, explosions or catalytic decomposition in the presence of oxygen. If the combustible dusts are swirling in the air in appropriate proportions and an effective source of ignition is present, they can burn rapidly and with considerable explosive force. Given that most of the time, as a result of an explosion of combustible dust, the resulting damage is generally greater than that caused by an explosion of flammable gases, it is necessary to pay special attention to the way in which they are taken. and implemented measures to protect and prevent explosions of combustible dust. This paper highlights the principles and main factors that must be taken into account when conducting an explosion risk assessment for a bucket elevator carrying grain products, in order to establish and implement the necessary prevention and protection measures to ensure a minimum level. acceptable risk.

## Experimental determination of the lower explosion limit for two gasoline samples

*Irina Nalboc<sup>1</sup>, Maria Prodan<sup>1</sup>, Andrei Szollosi-Mota<sup>1</sup>, and Sonia Niculina Suvar<sup>1</sup>*

<sup>1</sup>National Institute for Research and Development for Mine Safety and Protection to Explosion - INSEMEX, Department of Safety Mineral Resources, 32-34 G-ral Vasile Milea, Petrosani, Romania

**Abstract.** The explosive atmosphere may be caused by flammable gases / vapours or combustible dust. If the amount of the substance, mixed with air, is sufficient, then a source of ignition is needed to cause an explosion. Liquids (for example petrol and other fuels) and solvents from industrial products emit flammable vapours which, when mixed with air, can ignite or explode. At normal temperatures, flammable liquids can emit enough vapours to form combustible mixtures with air, heat, and often thick, black, and toxic clouds of smoke. The behaviour of a fuel-oxidant mixture is characterized by certain explosions parameters, including explosion limits, which characterize the range of concentrations in which combustion propagates at very high speeds. For this work were performed experimental determination of the lower explosion limit for two commercial gasoline samples.

# Optimization of the Constructive System Lining – Metallic Support Structure in Order to Reduce Deformation Speeds of Horizontal Mining Works Executed in Deep Layer Sedimentary Rocks

*Catalin Marian Nistor<sup>1</sup>, Cristina Tamara Dumitrașcu<sup>1</sup>, and Ladislau Radermacher<sup>1</sup>*

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**Abstract:** Mining works executed in deep layer sedimentary rocks, are exposed to large deformation speeds during exploitation, because of rock pressure applied on the walls, the ceiling and bedrock of excavations. In this paper, we aim to find a solution for optimizing the constructive metallic structures, and subsequent linings, through the improvement of the transmission way of loads originating in rock pressure. According to Panet – Sulem support/rock interaction, there is a possibility of guiding rock pressure through constructive support system.

# Determination of the chemical composition of waste dust from process operations – case study

*Niculina Sonia Șuvar<sup>1</sup>, Irina Nălboc<sup>1</sup>, Maria Prodan<sup>1</sup>, and Andrei Szollosi-Moța<sup>1</sup>*

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**Abstract.** The main environmental wastes generated by the automotive industry include lubricants and coolants for cars; water and solvent cleaning systems; paint; scrap metal and plastics. It is important to establish the source of the waste release to establish appropriate organizational measures to ensure the correct environmental approach and safety issues. In the present work, several tests have been carried out to identify the source of release for a specific dust waste that appears in the process of car's interior finishing. XRF, ICP-OES, and FTIR analyses were performed for this purpose.

## Considerations on the type of protection increased safety “e”

*Lucian Moldovan*<sup>1</sup>, *Diana Salasan*<sup>1</sup> and *Clementina Moldovan*<sup>2</sup>

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**Abstract.** Increased safety “e” represents a type of protection applied to electrical equipment or Ex Components in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and against the occurrence of arcs and sparks. This type of protection cannot be applied to equipment producing electrical arcs and sparks in normal operation. This paper aims to underline some specific aspects regarding the equipment with type of protection increased safety.

## Aspects regarding the repair of electrical equipment designed for use in potentially explosive atmospheres

*Lucian Moldovan*<sup>1</sup>, and *Mihai Magyari*<sup>1</sup>

<sup>1</sup>INCD INSEMEX, Department for Safety of Explosionproof Equipment and Installations, 32-34 G-ral Vasile Milea street, Petrosani, Romania

**Abstract.** The characteristics providing protection to explosion of equipment designed for use in potentially explosive atmospheres must be preserved during their entire period of life. Repairing is defined as the action to restore faulty equipment to its fully serviceable condition complying with the relevant standard (the standard to which the equipment or parts of equipment were originally designed). Repairing of explosion-proof equipment must be performed considering the prescription of the applicable harmonized standards and the specific type of protection(s) involved. This paper is focused on some particular aspects related to repairing of explosion-proof equipment.

# The effects of humidity and temperature on the lanyards performance

Nicoleta Crăciun<sup>1</sup>

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**Abstract.** The lanyard is a component of personal fall protection systems which is connecting the body holding device at a reliable anchorage point. To ensure user's safety, the lanyard must retain its protective properties during the whole service period. Because of the diversity of working environments that) the lanyards are used in, they tend to be often more affected by risk factors than any other component of the system. This study discusses the most frequent types of risk factors (such as humidity and heat) and their effect on the breaking strength of different types of lanyards. The results of the study show that each additional risk factor significantly decreases the mechanical strength of the lanyards which can lead to the creation of unfavorable conditions in the event of a fall. Conclusions on the main causes of the loss of the protective properties of lanyards are drawn and on the need for evaluation criterion according to which should be decided whether to continue or not the use of the lanyards.

# Quality assurance for the tests to determine explosive parameters of the combustible dust-air mixtures

Adrian JURCA<sup>1</sup>, Mihaela PĂRĂIAN<sup>1</sup>, and Niculina VĂTAVU<sup>1</sup>

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**Abstract.** For any type of combustible dust, several important explosive parameters must be taken into account when designing and using protection systems: namely the ease with which dust clouds ignite and their burning rate, maximum explosion pressure, maximum pressure rise speed. of explosion. The accuracy of the results obtained necessary for the design and use of protection systems depends on a number of factors but also on the accuracy of the application of the test method (s) by the personnel involved. Test quality assurance is a requirement of EN ISO / IEC 17025 for the accreditation of testing laboratories. The standard requires laboratories to have a procedure in place to monitor the validity of test results, which involves participation in interlaboratory comparisons. This paper presents some specific issues highlighted during the successful participation of INSEMEX-GLI in several rounds of interlaboratory comparisons for the tests to determine explosive parameters of the combustible dust-air mixtures.

# The dynamics of carbon oxide evacuation from closed enclosures

*Doru Cioclea<sup>1</sup>, Emeric Chiuзан<sup>1</sup>, Nicolae Ianc<sup>1</sup>, Adrian Matei<sup>1</sup>, and Răzvan Drăgoescu<sup>1</sup>*

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**Abstract.** The carrying out of human activities of an industrial nature involves the use, handling or accidental presence of substances of a toxic nature such as carbon oxide. The presence of this gas in closed or semi-closed spaces can seriously affect the human body and when concentrations are high it can lead to death. Knowing how carbon oxide affects the human body and how it disperses into the air is very important for establishing preventive measures. Also, in order to establish the escape routes and the refuge areas, it is necessary to know the dispersion dynamics of carbon oxide both horizontally and vertically. The paper presents the experiment on establishing the dynamics dilution and evacuation of carbon monoxide in a closed enclosure.

## Classification of the Ocnele Mari saline from the point of view of gas emissions (CH<sub>4</sub> and CO<sub>2</sub>)

*Răzvan Drăgoescu<sup>1</sup>, Emeric Chiuзан<sup>1</sup>, Ion Gherghe<sup>1</sup>, Adrian Matei<sup>1</sup>, and Alexandru Cămărăşescu<sup>1</sup>*

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**Abstract.** Currently in Romania there are six salt mines which exploit the salt through underground mine workings: Dej salt mine, Tg. Ocna salt mine, Slanic Prahova salt mine, Ocnele Mari salt mine, Cacica salt mine, and Praid salt mine. The purpose of the present paper work is to establish the methane release (explosive gas) and the carbon dioxide release regime in mine workings from Praid salt mine in order to classification. This verification of the Ocnele Mari salt mine classification has been carried out during September 2021 and there have been taken into account the following elements:

- Geological and technical-mining conditions of the salt deposit related to Dej mining perimeter;
- Results of the quantitative and qualitative measurements from the underground mine workings regarding:
  - a) Circulated air flows;
  - b) Measured methane and carbon dioxide concentrations;
  - c) Absolute flows registered;
  - d) Accumulation capacity of gas in the deposit;
  - e) Gas concentrations and pressure in the massif.
- Existing evidences and documentations regarding the previous gas occurrences and their manner of manifestation;
- Establishing the way in which the gas is released into the underground atmosphere of the mine workings.

Based on the observations and on the carried out measurements, on the analysis of the studied geological and mining elements, there has been made the classification proposal of the Ocnele Mari salt mine from the point of view of gas emissions (methane and carbon dioxide)

# Variation of air condition parameters, in the conditions of the presence of carbon monoxide, in the duct of ventilation installations

*Ion Gherghe<sup>1</sup>, Doru Cioclea<sup>1</sup>, Cornel Boantă<sup>1</sup>, and Florin Rădoi<sup>1</sup>*

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**Abstract.** Industrial ventilation and air conditioning systems aim to ensure the conditions of air purity and microclimate corresponding to the activity of man and the nature of the technological process. The parameters of the state of the air which are of interest for the technique of ventilation and air conditioning are: air temperature and humidity, atmospheric pressure, and air speed. For the study on the variation of the air state parameters inside the industrial ventilation installations, in the experiment laboratory, on the study of the industrial ventilation systems, the experiment was performed on the variation of the air state parameters in the conditions of circulation through the ventilation duct a quantity of carbon monoxide at constant pressure. Prior to the introduction of carbon monoxide into the piping, the ventilation system was started at nominal parameters. During the experiment, the operating parameters of the drive motor were changed using a frequency converter on levels 50; 40; 30; 20; 10 and 5 Hz. The ventilation system used was structured by means of flow converters which were fixed in the open position. The ventilation system as well as the flow variators were operated by the SCADA type command and control system. The paper will present the analysis of the variation of state parameters (temperature, humidity, absolute pressure, and air speed) by introducing a constant amount of carbon monoxide in the ventilation duct.

# Interlaboratory comparisons to demonstrate the competence of two similar mobile laboratories

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**Abstract.** In order to maintain the RENAR (Romanian Accreditation Association) accreditation, each accredited laboratory must periodically participate in interlaboratory testing programs carried out with specialized providers or similar laboratories. In December 2021, an interlaboratory comparison in the field of environmental protection was organized by INCD ISEMEX PETROȘANI. The current paper examines the similarity of results of two auto-laboratories, in similar sampling points to demonstrate the competence of accredited laboratories. During the interlaboratory test session, immission measurements (nitrogen dioxide, nitrogen monoxide, carbon monoxide and sulphur dioxide), ambient noise measurements and determination of suspended dust concentration were performed. The main objective of the interlaboratory tests is to comply with limits established by the bilateral testing protocol, and all these results can be processed and achieved in situ due to systems endowing the auto-laboratories, which integrate all the measurements performed in situ. Results of the study indicate very close values found by the two mobile laboratories, which leads to the performance requirement for all components analysed, namely coefficients of variation below 20%.

## General consideration regarding fault – find, tests and maintenance in the installations in hazardous areas

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**Abstract.** The main topic of this paper is to analyse the approach to fault – finding, tests and maintenance regarding on what shall and shall not be done in an installation in hazardous area from the point of view of the explosion – protection safety. For a fault it is usual to be investigated by following a logical routine. This is one possible ways of proceeding developed from good engineering practice and experience in general terms. The test equipment for use in hazardous area will be either certified or uncertified. The maintenance is regarding in this paper from the point of view of SR EN 60079 – 17 starting from general requirements.

## Use of the high voltage source in order to verify the insulation systems of electric motors with the type of protection increased safety used in potentially explosive atmosphere

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**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. 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. A very important test by which these aspects are verified is the overvoltage-ignition test, applicable to electric motors with increased safety protection type.

# Study on common aspects of the types of protection for electrical equipment used in explosive atmospheres

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**Abstract.** The evaluation of explosion-proof electrical equipment for certification is particularly important given the risk of explosion and must be minimized. This in order to ensure the safety of life, health of workers, to prevent damage to goods and the environment when they meet the essential security requirements at European level. Directive 2014/34 / EU states that equipment used in explosive atmospheres must be designed to operate without endangering the environment for which it is intended. This paper presents a comparison between the types of protection for electrical apparatus by comparing some common characteristics that are important for maintaining the integrity of explosion protection. Consequently, this paper intends to be the precursor of a practical guide for the selection and implementation of different types of protection on the apparatus intended for use in areas with hazard of explosive atmospheres, both for designers and manufactures.

## Considerations regarding the main differences between flameproof electric motors, designed for explosion Group IIC, compared to explosion Group IIB, when testing in explosive mixtures

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**Abstract.** The flameproof enclosure type of protection is still one of the safest because it is based on a very simple and, therefore, unlikely fallible technology. If an explosive atmosphere penetrates an enclosure producing a trigger, the explosion occurs, but it remains confined within the enclosure. EN 60079-1 standard, states that flanged flame paths are allowed in the presence of gases and vapours of Group IIB, but cannot be used with gases and vapours of Group IIC. Also, flame transmission tests for Group IIB equipment are carried out at atmospheric pressure, whereas for Group IIC equipment they are conducted (depending on the testing method applied) at a higher initial pressure. The purpose of the paper is to perform a thorough study upon the differences between testing of flameproof electric motors of Group IIC, compared to electric motors of Group IIB gases and vapours, in terms of testing conditions required by the standard and how the explosion group influences the maximum explosion pressures and explosion pressure development, when tested in explosive mixtures of gases and vapours. The purpose of this paper is to assist manufacturers in designing flameproof electric motors that satisfy the requirements of the specific standard for either Group IIB or Group IIC applications in order to smooth the path for certification.

## Particular aspects of the tests for ignition of small components

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**Abstract.** The use of flammable substances in the industry means that the installations that process them generate explosion hazard zones in the proximal space. Equipment installed and operated in such hazardous areas must not ignite an explosive atmosphere. Confirmation of how equipment is adapted for use in an explosive atmosphere is named explosion protection. Explosion protection is confirmed by testing together with evaluation. For low-current equipment, the situation in which the hazardous atmosphere can be ignited by small components should be considered. The first part of the paper was devoted to the presentation of the explosion hazard and a brief presentation of the classification of equipment intended for use in explosive atmospheres. In the second part, the test methodology for ignition from small components is presented and in the last part, the results of ignition tests from small components are presented. The resulting main conclusion underlines the importance of test conditions.

## Development of methods for assessing the safety of dust removal facilities in environments with a danger of explosive atmosphere

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**Abstract.** Due to the tightening of air pollution laws and employee safety regulations, manufacturers are being forced to pay more and more attention to removing dust particles from the air released by their installations. This requires them to install large complex dust collection systems in all their facilities. Dust collection systems include collection points where air and entrained dust are drawn into a system of pipes that carry dust and air, fans that feed the movement of air, and dust collectors that separate dust from air. Dust collectors are mostly dry type. Dry-type dust collectors are divided into cyclones and bag-type dust collectors. As dust can create an explosive atmosphere, it is necessary to assess the risk of explosions and to establish appropriate measures to prevent the explosion or, as the case may be, to limit the effects of explosions. The paper presents aspects related to the evaluation of the risk of explosions at dust removal installations with emphasis on the risk of initiating the explosive dust / air atmosphere through electrostatic discharges.

## Explosives identification by infrared spectrometry

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**Abstract.** In order to identify various explosives and their precursors, technicians worldwide rely on chemical analysis instruments for rapid specific identification results to help ensure a safe remediation. This is one of the central tasks for homeland security and public safety personnel, especially since the recent proliferation of improvised explosive devices (IEDs). These instruments that are being used in the field, are extremely important for first responders. For this paper and the experiments made, a FTIR spectrometer (Fourier-transform infrared spectroscopy) was used. This is a technique used to obtain an infrared spectrum of absorption or emission of a solid, liquid or gas. A FTIR spectrometer simultaneously collects high-resolution spectral data over a wide spectral range. They are essentially in identifying unknown chemicals on a wide range of colors. Given the fact that this spectrometer does not generate energy during the sampling process, makes it ideal for verifying substances such as: Semtex, smokeless powders, dynamite, TNT and hundreds of other colored materials. Since contact is required between the sample and the instrument, we took extreme caution measures while analyzing these pressure sensitive substances. In this paper, determinations were made for the identification of functional groups from a series of explosives for civil use, in order to establish the necessary steps in developing an ideal method of identification

## Dilution in pressurized enclosures – critical points

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**Abstract.** The risk of explosion can occur in all activities involving flammable substances which, when mixed with air, can form an explosive atmosphere. Explosion protection is intended to prevent the ignition of explosive atmospheres. Pressurization, as a type of protection, 'p' is based on the introduction of a protective gas (air or inert gas) in an enclosure to prevent the formation of an explosive atmosphere within the enclosure by maintaining an overpressure relative to the surrounding atmosphere and, where necessary, by the use of dilution. The important tests for explosion protection by pressurization type of protection are based on the filling and purging test. Each of these involves monitoring certain points within the pressurized enclosure to confirm that concentrations are within acceptable limits. The location of these monitoring points can be identified by using computer simulations. This results, in so-called critical points, where the concentration lastly reaches the pre-set values. These critical points bring the advantage of the need to monitor concentrations at a much smaller number of points and thus it is increasing the accuracy of the tests. Following the approach of the work and the experiments carried out, it was found that computer simulation is effective for establishing critical points.

## Tests for pressurized equipment - upgrade possibilities

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**Abstract.** Explosive atmospheres can be caused by gases, vapors, mist, dust, lint, or fibers of flammable substances. If there is a sufficient quantity of the substance mixed with air, the imminence of an explosion depends on the probability and efficiency of the ignition source. The type of pressurized enclosure protection consists of separating the potentially explosive atmosphere from the ignition source by maintaining an overpressure inside the enclosure using a protective gas. The use of the equipment in an enclosure with a risk of an explosive atmosphere is accepted after going through the certification and testing process. Testing is carried out by the standards for explosion-protected equipment with pressurized enclosure protection. The main conclusion of the work is that the use of a new oxygen analyzer allows ten times higher value resolutions.

## Maintenance of on-premise test equipment for high quality tests

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**Abstract.** The use of equipment in areas where flammable substances may be released requires explosion protection for them. Explosion protection must be confirmed in the certification process, which in addition to assessment also requires testing. The tests to which equipment must be subjected to confirm explosion protection are regulated by specific standards, depending on the type of protection adopted. This paper focuses on the issues involved in ensuring the quality of test results for low current equipment. For the quality assurance of test results the required aspects are: proficiency testing, use of certified reference materials, repetition of tests using the same methods, retesting of retained items, correlation of test results for different characteristics of a product and control chart where applicable. Another important aspect is the conditions of use and operating condition of the equipment. Thus, maintenance, periodic inspection and interim checks of laboratory equipment are an essential part of ensuring the quality of results. An important conclusion of the work is that the important aspect for quality assurance of test results is proficiency testing, which confirms not only the suitability of the equipment used but also the conformity of the test procedures.

# Statistical analysis and trends in personnel authorisation for activities related to explosive atmospheres

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**Abstract.** Technological installations processing flammable substances in the form of gases, vapours, mists, dusts, lint or fibres create special spaces in their vicinity called explosive atmospheres classified into zones. For these installations to operate safely, they must be designed, installed, operated, maintained and repaired by personnel qualified and authorised to carry out these activities. In the first part of the paper the risk of explosion that may occur in the performance of these activities by the personnel involved is presented. In the second part of the paper, the importance of personnel authorisation in the field of explosive atmospheres and the authorisation procedure at national level is presented. In the third part of the paper statistical analysis and trends in the authorisation process in Romania are presented.

# Study of the possibility of ensuring emergency lighting in installations operating in environments Ex

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**Abstract.** The use of electrical energy in potentially explosive atmospheres involves various particularities, fact for which there have been raised a lot of issues concerning the design, construction and exploitation of electrical equipment such as the signalling lighting or emergency lighting intended to be used in these atmospheres. Anti-panic lighting is a part of safety lighting which aims to avoid panic and to provide the lighting level which to ensure that people can reach the pathway from which they can identify the evacuation route. The current paper proposes the development of a device for ensuring anti-panic lighting for a limited period of time, which can operate on two wires, may be distance controlled and adaptable for lamps which operate in areas with explosion hazard (Ex areas).

# Technical-scientific considerations regarding the reduction of the explosion effects generated by the explosive materials on persons and industrial and civil objectives

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**Abstract.** The attenuation is a function of a structural strength and mass of the PES structure. Relatively light or weak structures (or open PES facilities) are assumed to not attenuate any of the pressure or impulse load. These not-attenuating facilities include: Pre-engineered metal building, Hollow clay tile building, Trailer (drop or stand-alone), Tractor-trailer and Bulk/tank truck/Van truck. If there is a barricade present between the PES and the ES and this barricade meets certain criteria, the user can direct the model to reduce the pressure and impulse arriving at the ES because of the presence of the barricade. The fractional damage of the PES structure remaining intact after an explosive event is a function of the equivalent NEW (Net Explosive Weight) and the PES building type. The fractional damage (a value between 0 and 1) of each PES component (roof, front wall, side walls, and rear wall) is determined by comparing the NEW to lower-bound and upper-bound damage limits for the PES types. So, if the NEW is below the lower-bound damage limit value, then the PES structure is assumed to remain totally intact; if the NEW is greater than upper-bound damage limit value, then the PES structure is assumed to be completely destroyed; if the NEW value is between the lower-bound damage limit and upper-bound damage limit, the PES structure is partially or fractionally damaged. If the equivalent NEW is between the two values, an algorithm is used to determine how fast the PES structure transitions from zero damage to full damage as the NEW increases between the lower-bound damage limit and upper-bound damage limit values. This algorithm and all associated parameters are described in the following.

# Assessment of the technical conditions of Jieț waste dump in the context of its reintegration into the surrounding landscape

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**Abstract.** Coal mining activity in Jiu Valley is approaching, faster than expected a few years ago, to its end and one of the main directions for transforming the area (while ensuring its sustainability) is the development of tourism. Under these conditions, a problem that has remained partially unresolved is related to the integration of the former mining perimeters, especially the waste dumps, into the surrounding landscape. Such an approach must always start from a thorough check of the technical condition of these artificial earth constructions. For this reason the stability of the dumps in the Jiu Valley is considered to be an important issue, considering that possible failures endanger both the natural and the anthropic environment. In the case of the waste dump considered as a case study, because several years have passed since the last sterile rocks were deposited and since stability studies were performed, a new such study was considered necessary (given that the deposited rocks underwent certain changes: compaction, mechanical disintegration, chemical alteration, etc.). This paper presents the results of the stability analyzes carried out during 2022 and a series of conclusions regarding the limits within which the geometric elements must be framed so as to ensure a good stability reserve and thus allow the ecological restoration works to begin.

# Development of a specialized computer application „AQNOISE.EXE 01” on the integrated quality management system specific to noise testing and certification activities

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**Abstract.** Continuous improvement of the occupational safety and health climate in work systems affected by the presence of noise requires, in addition to the assessment of occupational risks arising from exposure to noise, the resolution of issues such as: the development of procedures for noise testing of equipment, as well as the determination and assessment of occupational exposure to this contaminant; development of an equipment certification system in terms of airborne noise emissions; implementing an effective system of training and testing of staff on occupational safety and health issues. The AQNOISE.EXE 01 program is a working tool used for the operational and procedural management of documents related to the integrated quality management system specific to noise testing and certification activities by entering data and information on: applicable legal regulations, both in the field of testing and assessment of the noise conformity equipment; objectives and policies in the field of noise testing and certification; responsibilities and requirements in the field of noise testing and certification; implementing, maintaining and improving the integrated quality system in the field of noise testing and certification; ways of recording data in order to ensure compliance with the applicable noise testing and certification requirements.

# Computer application for facilitating the choice of Ex equipment

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**Abstract.** If electrical and non-electrical equipment used in underground mines susceptible to firedamp and coal dust or in other industries with explosion hazard is not properly selected for operating in explosive atmospheres, they are likely to generate an ignition of the atmosphere and to result in events with significant environmental and material damages and, moreover, with human victims. Therefore, it is mandatory for the responsible persons to reach the best decision when choosing the equipment which is suitable for operation in such atmospheres, from the explosion protection point of view. The current paper presents the development and operation of a Windows application for facilitating the choice of proper Ex equipment, in accordance with the specificity of the explosive atmosphere, whether there are involved the underground parts of the mines or the parts of the surface installations of these mines which could be endangered by firedamp gas / combustible dust, or other surface locations with explosion hazard

## The relational system of the elderly after retirement

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**Abstract.** The paper presents a concise description of the relational system of the elderly after retirement. The main objectives of the paper are: to identify these relationships and how this relational system contributes to the acceptance of retirement; to highlight the specifics of the relationships of the elderly; to inventory the activities of the elderly that influence their relationships. The method used in this study is the interview-based survey and the results are obtained after interviewing twenty people. They are between 65 and 80 years old and some of them live in rural areas and others live in urban areas. The interviewees emphasized the importance of relating, after retirement, with family, friends, and the community. These relationships are based mainly on help: the elderly take care of their grandchildren, they work in the household; also, family, friends, neighbours, the community help them when they are in need (whether they are sick, unable to move or alone). Among the activities facilitating the development and consolidation of the relational system, the following stand out: agricultural work, household activities, caring for grandchildren, involvement in community life. The consolidation and development of the relational system is facilitated and enabled by activities such as: agricultural work, household activities, caring for grandchildren and involvement in the community life.

# A new academic management vision for the University of Petrosani

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**Abstract.** We face a period of profound changes in our society, changes that will have effects on education. Today, universities abroad focus on practical things, while in Romania the basis remains the theory. The West European or American higher education institution (HEI) emphasize on dual specializations, internships, business partnerships, and encourage creativity. Abroad, students can get substantial scholarships or have the guarantee of a well-paid job after graduation. In this context, can we give a new face and adapt the higher education system in Romania, in particular in the case of the University of Petrosani, by implementing the hybrid education and developing new applied specializations in collaboration with business partners? We will try to give the answer to this question in this paper

## Software-as-a-Service Programs and Project management: A Case Study on Odoo ERP

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**Abstract.** The paper aims at presenting the particular way of implementing Odoo ERP (Enterprise Resources Planning) within the Cloud environment, in order to manage the activities involved by a research project. To successfully achieve the objectives of the project - from choosing the research topic to writing the main body of study and disseminating critical information - the Odoo Project module allows the researchers to establish the stages involved in the implementation process, the description of related tasks, the appointment of persons responsible with the procedures of carrying out of the planned activities, the management of tasks in Kanban system, the drawing up of Gantt charts etc. The employment of Odoo ERP in scheduling research activities is highly accessible and easily opens the possibility to connect with other Odoo modules (such as accounting module or e-signature module), thereby saving significant amount of time and efforts related to the analysis of project status data. Moreover, the project progresses can be tracked by using simple devices with an Internet browser and a stable connection, which allow the access to the application via modern Cloud technologies.

# Finite element model validation for a 14,5 mm armor piercing bullet impact on a multi-layered add-on armor plate

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**Abstract.** For armor plates testing and evaluation the use of modeling and simulation tools, together with a validated finite element model is a reliable approach in respect to a firing conducted session. The paper presents the validation of an advanced finite element model on the impact between two 14,5 mm armor piercing bullets with a multilayered add-on armor plate made by aluminum alloy, alumina tiles, aramid fabric woven, ultra-high molecular weight polyethylene fiber composite and a steel plate. An 8 mm thick armor steel witness plate was placed at 2 cm behind the add-on plate. The real tests were conducted in a firing range and a chronograph was used to measure the values of the bullet impact velocities. The test results showed that the first bullet penetrates the witness plate and the second bullet only deforms it. A three-dimensional finite element model of the bullet and armor plates was conceived to perform the impact simulations in LS-DYNA. Tensile and compression tests, as well as other scientific methods were employed to establish the strength and failure model parameters for each material. The results of the finite element model follow the experimental ones regarding the yaw angle assumptions that were applied for a simulation scenario.

## Assessment and analysis of potentially explosive areas in distribution stations, generated by alternative fuels such as LPG, CNG and H<sub>2</sub>

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**Abstract.** Rising prices and the desire to reduce pollution by replacing traditional fuels (benzine and diesel) in the transport system require solutions to make this sector more economically efficient. The use of LPG, CNG and H<sub>2</sub> implies, from the point of view of explosion risks, additional features compared to conventional filling stations to increase safety and environmental protection. Thus, this paper presents the effects caused by each fuel analysed (LPG, CNG and H<sub>2</sub>), in the worst case, the initiation case. The analysis performed is based on simulation using ANSYS – Computational Fluid Dynamics (CFD) software, and the result is particularly useful for adopting optimal measures to minimise the risk of explosion.

# Research on emissions from large combustion plants (LCP). Case Study

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**Abstract.** According to Directive 2010/75 / EU and Law 278/2013 on industrial emissions, operators of large combustion plants (IMA) must carry out continuous self-monitoring of pollutant emissions and are required to perform parallel measurements with accredited laboratories, to certify results. Thus, INCD INSEMEX Petroșani, through the Testing Laboratories Group, accredited by RENAR, offers these type services to various economic agents. The current paper presents measurements performed at two IMA exhaust chimneys, in two different stages, to quantify pollutants released into the atmosphere and to establish the impact they generate on health of population in the area of the study. Analysis of results showed that the maximum allowed value for the SO<sub>2</sub> was exceeded, so that, at the end of this paper, some recommendations were reviewed, according to BAT (Best Available Techniques), to support the economic agent and inhabitants of the area in having a cleaner environment.

# Identification of quantifiable biological parameters for rescue personnel in the context of relational analysis of hazardous environments

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**Abstract.** The previous events in the industry reflect the need to take action to stop or at least slow down the development of damage and to prevent or reduce, as far as possible, their extent. In the case of breakdowns in industrial technological processes, their management requires, in addition to plant maintenance personnel properly trained for such situations, the participation of specialized personnel for interventions in hazardous environments. To form an image, the intervention is described as a set of actions in the facilities of a technological flow in which an event out of technological control was triggered, which aims to stop the negative consequences. The systemic approach of the correlation of hazardous substances in connection with the hazardous environment, of the relationships between the hazardous environment, constructions, technological installations and personnel as well as the identification of the effects of hazardous environments allows the crystallization of a relational analysis of hazardous environments. In this context, rescuers involved in the liquidation of damage must have a high degree of practical and physical training. During the training / interventions, rescuers have the opportunity to constantly monitor their physiological parameters through wearables. This paper aims to identify quantifiable biometric parameters for rescue and rescue personnel in the context of relational analysis of hazardous environments.

# Studies regarding the structuring of physical effort of rescuers in the process of practical training in the mobile training facility

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**Abstract.** The rescuer's performance falls into the category of "hard work", in terms of effort, far exceeding the average overall labor consumption of the worker from the active fronts of work. This character, of hard work, is also imprinted by the fact that the professional effort contains several static components and large amplitude oscillations, regarding the level of maximum efforts. The longer they last, the harder is the work. Training is a process of psychophysiological preparation through which an increased performance is obtained in the professional activity of rescuers. The maximum performance is obtained by raising the functional capacity of the body to the highest degree. For this it is necessary to use the systematic and methodical exercise according to pedagogical rules. The paper presents the evolution of physiological parameters, as well as the structuring of the physical effort of rescue personnel in the process of practical training in the mobile training facility, with the aim of preparing rescue teams for situations close to real ones. The mobile training facility consists of a physical training space (endless ladder, impact device, treadmill, elliptical bike, stepper), an indoor training circuit and a control room that allows the coordination of all activities.

# Release of overpressures in computational simulations of air-methane explosions

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**Abstract.** Research in the field of gas explosions has had and continues to have, as its main support, physical experiments performed on various scale models, the construction of real size models are often large consuming materials, time and labor. The rapid development of computing techniques has allowed among other things, the transfer of gas explosions research in the virtual space, for the validation of computational simulations of this type being still considered physical experiments and specialty literature. Within NIRD INSEMEX Petrosani, being an accredited institute in the elaboration of technical reports for gas explosion type events, the phenomenon of rapid combustion virtualization increased in time and as a result, computational simulations becoming an efficient tools in explaining the mechanisms of explosion production. Nevertheless, one of the problems raised by this virtualization process is the limitation of performing computational simulations in closed or partially closed spaces, initial conditions imposed, without the possibility of dynamic modification of these conditions according to the development of overpressures generated by the virtual explosion. This paper presents a computational experiment in which it was possible to transform the boundary conditions at predefined pressure thresholds, from rigid surfaces into surfaces capable of releasing the overpressures developed in closed / partially closed spaces, putting the results of this kind of simulations in line with real dynamic effects of gas explosion events.

# Optimal Monitoring of Server Rooms with Home Assistant Platform

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**Abstract.** High-performance IT systems with high computing power resources, used especially for processing large volumes of data or performing laborious calculations at significant speeds, are installed in special server rooms. Such a room specially built for High-Performance Computing systems, also called HPC, involves soundproofing and fireproofing of the walls, air conditioning equipment, as well as permanent monitoring of the room with a series of sensors, among which can be mentioned: temperature and humidity sensors, smoke sensors, air quality sensors, water and flood sensors, motion sensors, video cameras for real-time remote viewing. Given the wide variety of smart devices on the market equipped with such sensors, it is advisable to choose a suitable software environment, which offers the possibility to integrate, monitor, and control all these smart devices. One of the most popular free, open-source automation applications is Home Assistant. This software platform brings an improvement in the server rooms through the capabilities of monitoring, automation, and notification of events through text messages (email, SMS) or acoustic and video alerts. The paper presents an IoT implementation of a server room monitoring system, applied at INCD INSEMEX headquarters.

# Quality assurance issues for normal grade testing protection provided by equipment housings Ex

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**Abstract.** Potentially explosive atmospheres generated by the raw materials used, intermediate / final products or the resulting waste may form in all industries involving flammable / combustible substances. The creation of these atmospheres must be treated as a major risk, as the fires or explosions that may occur affect human health and safety as well as the environment. Reducing these risks requires the assessment of the risk of explosion and the establishment of measures to reduce it to acceptable levels in accordance with the requirements of European standards and the ATEX Directive. The general standard SR EN 60079-0 requires that only electrical / non-electrical equipment, certified for safe use, be used in hazardous areas Ex, which must ensure an appropriate normal degree of protection through the outer casing, as this protection is a requirement basic explosion protection. The tests for determining the degree of protection were carried out in accordance with harmonized European requirements and in the area of high-performance stands in accordance with SR EN ISO / IEC 17025, and the validity of the test results was demonstrated by successful participation in interlaboratory competitions and test of laboratory competition.

# Analysis of dangerous situations generated by explosive materials in non-compliant operations performed on industrial locations intended for their storage

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**Abstract.** Design and efficient implementation of OSH management in the field of explosives for civilian use, having the effect of optimizing the activity of preventing unwanted events blast type specific to industrial locations intended for the preparation / storage of explosives for civil use, constitutes it explosion risk assessment which represents the integrated expression of the configuration components of this type of risk within the different accident scenarios. No matter what it's about a component within the location or his integral technical infrastructure such an analysis allows the identification and ranking of site specific accident hazards to be assessed, in order to properly allocate security resources for priority measures to prevent and combat / eliminate the causes of these types of dangerous events. To this end, the "Security Document" specific to the industrial site intended for specific operations with explosive materials must demonstrate that: an appropriate accident prevention policy and an effective safety management system have been implemented; the dangers of injury are identified and the necessary measures are taken to prevent them and to limit their consequences for man and the environment; in design any installations has been incorporated adequate safety and reliability for construction, operation and maintenance; emergency plans have been drawn up.

# Computerized simulations and modelling for evaluation of ballistic and security parameters of explosives for civil use

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**Abstract.** Explosives are chemical compounds - substances or mixtures of substances that have a large amount of energy and which under the influence of external actions decompose suddenly, violently with the release of heat and the formation of gases capable of performing a mechanical work. Due to their specific characteristics, these products are used, both in the civil field and in industry, for the execution of works such as: extraction from the massif, in mines or quarries of useful rocks, execution of mining works (galleries) for opening and preparing deposits for exploitation, tunnels, wells, road constructions, railways, canals, demolition of foundations / civil / industrial buildings that have become unusable, geophysical-seism metric surveys, etc. Research in the field of use of explosives for civil use in various industrial and civil applications requires in-depth knowledge of areas such as the phenomenology of explosion, the behaviour of materials in shock waves, the dynamics of structures, seismic engineering, etc. The design of these types of processes requires the consideration, with a relative approximation, of the degree of danger due to the design of fragments resulting from detonation, vibrations, pressures, tensions created in the space affected by the explosion, generation of explosion gases, etc. legislation in force, being an important indicator regarding the classification, handling, storage and transport in the assessment and management of the risks related to these operations. The paper presents a series of computer simulations, both of the ballistic parameter regarding the working capacity of the explosives, and of the security parameter regarding the impact sensitivity.

## Shaping a quality framework for IIoT companies

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**Abstract.** The technological progress of the past century has led to the emergence of integrated technologies such as those encompassed by the Internet of Things (IoT). Recently, IIoT (Industrial Internet of Things) emerged as a first step to revolutionize the industrial sector, by taking advantage of modern technologies and capabilities such as: the interconnectivity of industrial devices, the usage of machine-to-machine communication (M2M), big data and machine learning in order to improve a company's efficiency and operations reliability. At the same time, the concerns for quality management within these companies continues to remain a constant concern and while quality has also evolved in the past couple of years to match the requirements of Industry 4.0 enterprises, an unexplored direction is that of the relevance of quality frameworks in manufacturing and industrial enterprises. The present paper explores this research direction in order to help provide the guidelines for developing a quality framework for IIoT companies.

# Acoustic zoning for the safe use of explosives in the open pit

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**Abstract.** Rockfall in open pit mining using explosives is the most method of operation. Also, in addition to the technical and economic advantages, this method of extraction produces effects that can have a negative impact in the area near the quarry. The effects of the blasting are such as seismic waves that produce vibrations, air overpressure (noise), rock throws and toxic gases. If the intensity and extent of these effects are not properly anticipated and assessed, serious consequences can occur to people, civil / industrial buildings, the environment, thus affecting the health of the population and the stability / integrity of buildings / slopes in the vicinity of mining operations. The paper describes methods to assess the noise produced by the detonation of explosives for civilian use when removing rocks in the quarry, with the aim of ensuring a degree of disturbance acceptable to the population as well as for the protection of civil / industrial objectives in the area of mining. The obtained results are extracted from a research study carried out for the opening in operation of a new mining deposit, applying calculations and theoretical interpretations having as reference the conditions established for the development of the blasting works.

# The use of computational fluid dynamics applications to various flow problems

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**Abstract.** To deal with any such applications, it is a must to understand the basic form and nature of the governing equations of fluid dynamics. It is imperious to fully understand the basic of numerical discretization that can be applied in equations. This paper aims to present some CFD tools that are the starting point in solving problems related to the field of fluid dynamics. During this work, we will note that anyone CFD technique will not be appropriate for all problems and the diverse mathematical nature of partial differential equations will ensure that some algorithms will best work for hyperbolic equations and others will do best for elliptic equations. In addition, this paper examines precisely how CFD techniques can be used to solve various flow problems. In other words, CFD applications requires the simultaneous knowledge of some major aspects, such as the governing flow equations and their mathematical behavior, aspects of numerical discretization of partial differential equations, also known as finite differences or of integral equations, known as finite volumes. Computational fluid dynamics has a major impact on airplane design and soon to be a critical technology for aerodynamic design with the purpose to enhance the design process for any machine that deals with fluid flow.

# Studies on the exposure of workers to fine particles from diesel engine exhaust emissions generated in urban transport

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**Abstract.** The paper presents the results of the studies on the exposure of workers who may face exhaust emissions of diesel engines from urban transport. Many workers such as drivers, toll booth workers, security guards, public domain workers, police officers may be exposed daily to the chemical pollutants from urban transport. It is estimated that 52% of annual occupational deaths in the European Union can be attributed to work-related cancers. The study responds to the actions to prevent the exposure of workers to carcinogens that the European Commission has included in the *Europe's Beating Cancer Plan* adopted in early 2021.

# Monitoring slope stability in surface mines: are low-cost UAVs used for excavated rock volume calculations capable of early detection of displacements?

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**Abstract.** This paper tries to assess the ability of UAVs equipped with RGB cameras to monitor the stability of the specific slopes in the surface lignite mines of Ptolemaida basin. For this purpose, the results of high measurement accuracy surveying, which was applied based on a series of target prisms placed on the crests of mine benches, are compared with the displacements detected by subtracting successive digital terrain models produced using UAVs equipped with RGB cameras in combination with RTK processing.

# Expertise of thermal environment in metallurgical complexes in Romania

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**Abstract.** Workplace microclimate is determined by temperature and humidity of air, air currents and caloric radiation of work environments. All microclimate factors act combined and simultaneously on the human body. Thermal comfort plays a decisive role in mental and physical abilities of workers, and decisively influences workplace performance of employees. In order to ensure the highest possible yield for workers, employers must regularly evaluate microclimate parameters by measurements. The paper presents a case study on the thermal environment of several metallurgical complexes in Romania, by calculating the PMV and PPD indices at various workplaces that are found in all studied units. After correlating the PMV and PPD indices for each workplace in particular, in all studied units, results were used to create a regression analysis that is expressed by a regression graph, in order to present as concise and objective as possible differences between the studied workplaces. Importance of the paper is outlined by the need to develop research in the field of Health and Safety at Work, in order to objectively assess working conditions in Romania and to develop new methods to ensure a proper work climate in order to maintain or increase the level of workers' productivity.

# Theoretical and experimental research on the double lane change maneuver

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**Abstract.** A virtual double lane change test procedure is proposed based on the NATO AVTP 03-160W requirement. This test procedure simulates an emergency maneuver that determines the vehicle's dynamic stability and decisively influences road safety, being one of the most applied methods of performance evaluation. Using Trucksim modeling and simulation software, the virtual vehicle model and test procedure were established. The experimental data obtained with FED Alpha vehicle helped to validate both models. For this purpose, the vehicle dynamic responses such as steering wheel angle, vehicle lateral acceleration, yaw velocity and roll angle were comparatively analyzed. Important and valid conclusions concerning the optimization of the vehicle's dynamic behavior were drawn. Ultimately, a methodology to predict the maximum speed to successfully pass double lane change is proposed.

# Research on the improvement of the rescuers training facility for the practical performance tests of respiratory protection devices

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**Abstract.** Respiratory protection devices, both compressed air and compressed oxygen based, are subject to certification for placing on the market. The European standards governing the requirements for certification, the manner of conducting the tests are reviewed periodically in order to increase the operational safety of respiratory apparatus in order to cope in any circumstances with the dangers to which rescuers are subjected. The evaluation of the respiratory apparatus from a practical point of view is done by the practical test of performance. The modernization of the training facility according to the latest standardization regulations regarding the practical performance tests is necessary for the certification activity of the respiratory apparatus but it is also useful for the activity of training rescuers, having the role of harmonizing the request of the respiratory apparatus with the effort to which the rescuers are subjected.

## Work conditions and mental demands in museum activities

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**Abstract.** The paper presents some results of an extended study on work conditions and mental demands in culture activities – especially for museum personnel. The study aimed to emphasize the occupational risks and nocivities and the mental (neuro-psychical) demands of activity. A complex methodology was used, including different techniques and instruments concerning the activity characteristics and the subjective assessment of the work demands as well.

# Aspects of the earthing and short-circuit devices' safety quality

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**Abstract.** Earthing and short-circuit devices are part of the category of equipment and means of electric shock protection, and their purpose is to protect workers in the event of an accidental voltage in the work area while doing electrical installation work. The purpose of this study is to convey the findings of research into the level of safety that these devices must provide, not only in terms of electrodynamic and electro thermal consequences that occur during a short-circuit, but also in terms of mechanical, chemical, and environmental aspects. The study's risk analysis of safety performance provides critical information for earthing and short-circuiting device manufacturers to ensure the safety function throughout their use, as well as for workers to pick, use, and maintain.

# Testing the constructive strength of a container arranged as a mobile deposit of explosive materials

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**Abstract.** Today, due to the diversity of the conditions in which the blasting works are executed, they often require a special organization regarding the transportation and storage of the explosive goods near the blasting field. If for explosive storage arranged for long-term use such as those of the producers, there are detailed regulations regarding the constructive and security requirements that they must meet, for the temporary storage facilities, there are not enough details regarding the constructive requirements that they must comply with. One of the most important aspects taken into account when designing and arranging a mobile explosive depot is the limitation to the maximum of the dynamic action and the throw effect of pieces of material under the pressure of an accidental detonation. The paper describes the results obtained after testing a container prototype designed for the storage of explosives. Following the tests performed and the evaluation of the dynamic effects of explosions inside and outside the container as well as the analysis of the measurement regarding the pressure generated by the detonation of explosive charges, it turned out that the construction and detonation behavior of the tested container complies with the purpose and safety requirements for setting up a mobile explosive depot.

# Imaging documentation in the on-site investigation of explosion / fire events

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**Abstract.** Explosion/fire investigation is a procedure that involves significant resources of time and activities. The most important of the basic activities performed by the investigator/investigation team is the on-site research, which, if properly performed, allows the elaboration, foundation, and verification of hypotheses, while playing a defining role in establishing the final conclusions regarding the place of initiation and cause of the event.

For these types of phenomena, the on-site investigation is hampered by the damage caused by the event, making it difficult to identify footprints or traces, or by the disruptive effects of the extinguishing products used. The investigation is carried out in the area of the outbreak as well as in all the areas where the fire spread and aims to examine the fire footprint, the set of traces, objects, and materials present in the burnt area, seen in interaction, both with each other and with the surrounding space and environment.

Traditional verbal or written methods of presenting evidence or traces collected at the crime scene are no longer sufficient today, as technological advances are also evident in these areas. Important benefits include the coverage of the entire crime scene, which allows for complete and efficient documentation, using spherical or panoramic photography, or the use of spatial, three-dimensional scans.

This paper aims to present the important contribution made by on-site documentation activities using SceneCam Forensic imaging scanning equipment, based on a high-resolution (HDR) image capture device capable of capturing spherical, 360° x 180° images at a resolution of up to 50 Megapixels in a single scanning operation (Spheron Cam VR).

# Methodology for measuring the seismic effects generated by quarry blasting works

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**Abstract.** Exploitation of useful mineral substances by surface works is an important branch of mining activity. For rocks of low strength or weak aggregation, the method of extraction by mechanical means (excavators of various types, draglines) is successfully applied, but for rocks of medium and high strength, aggregated with or without cracks, or other geological anomalies, the method of extraction generalized exploitation is that by drilling-blasting, using explosives appropriate to the field conditions and correlated according to the technical possibilities and the geometry of the work. One of the major disadvantages to the technologies where drilling-blasting works are applied is the generation of seismic waves, which will propagate after the detonation of the charges. In the common situation, where in the area of operation are civilian or industrial targets, that need to be protected, it is important to monitor these effects by performing seismic measurements and then processing the data to adjust the blasting technique in order to reduce these seismic waves in intensity, but while maintaining adequate performance parameters. The paper presents the methodology based on technical-scientific principles for performing these measurements, applied to surface exploitation.

# Process for Stabilization of Heavy Metals From Solid Waste Resulting in the Process of Acid Mining Water Treatment

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**Abstract.** The technology and the installation of acid mine water treatment by bioaccumulation, is realized in three distinct stages, namely: the primary stage, consisting of raw water capture, treatment with neutralizing and coagulating chemical reagents, solid phase settling and sludge treatment, [I, II, IV, V], the secondary stage, consisting in the removal of heavy metals and the neutralization of acidity by passing the effluent of the first stage, through a battery of phytoextraction cells, [III], using for this purpose truncated cells. In the tertiary stage, the stabilization of heavy metals in the thickened clearing and the aerial part of the sedge takes place.

# Legislative aspects at national and international level regarding the exploitation of gold-silver deposits

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**Abstract.** In Romania, mining is a historical, traditional occupation, attested since antiquity, when the Romans came here to extract gold and other base metals from the underground mines in our mountains. The exploitation of gold and silver deposits is still important for the economic and social development of the country. Generally, these ores are essential for modern life, so their exploitation must be regulated so as to respond effectively to these needs. Legislation in this field has an important role in promoting and supporting the exploitation of gold and silver deposits. Nationally, the mining activity is regulated by the Mining Law no. 85/2003, a law which, from my point of view, does not effectively ensure the mechanisms on the basis of which the capitalization of mineral resources should be done as smoothly as possible. At European Union level, the legislation contains a wide range of obligations and rights regarding the mining of natural resources and deposits, which the competent public authorities in the Member States must enforce. In countries with tradition in the field of gold-silver mining, the laws referring to the extractive sectors are developed in accordance with the interests of the citizens. This system provides sufficient opportunities for civil society participation in decision-making. This paper identifies the main legislative aspects that can be improved to create a fair legal framework for the exploitation and capitalization of precious metal deposits in Romania.

## Analysis of total content of petroleum products in water by using FTIR spectroscopy

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**Abstract.** Contamination of aquatic and terrestrial environment with oil products is a major problem in processes of extraction, transport and processing of crude oil. Derived organic compounds, resulting from fractional distillation of crude oil often end up in wastewater and surface water causing irreversible effects on aquatic ecosystems. Thus, it's necessary to identify and qualitatively determine the total content of petroleum products in water, by classical chemical, chromatographic and infrared spectroscopy methods. Gathering high-resolution spectral data was performed by a modern method, Fourier transform infrared spectrometry (FTIR), a relatively precise, high accuracy data method. The study's main purpose is to describe most important steps to be followed to obtain representative results for the use of FTIR spectrometry in determining total content of petroleum products in water. Steps described in the study involve drawing the baseline, calibrating the method with certified reference materials and estimating the uncertainty degree of the analysis method used. The study of total content of petroleum products is addressed especially to researchers in the field of analytical chemistry to update the methods used, environmental engineers to estimate the pollution degree of a body of water and (PhD) students who want to deepen the field of petroleum compounds analysis.

# Car access to mountain resorts - advantages and disadvantages. Case study: Parâng Resort

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**Abstract.** Tourism stimulates economic growth and the development of local communities. The mountain areas, as points of tourist attraction, represent real treasures in terms of the spectacular landscapes, the specific geological and floristic elements and the diversity of sports and activities that can be practiced. Problems such as long distance from areas of interest (localities), difficult access, harsh climatic conditions, vulnerability to natural disasters prevent the development of mountain resorts and mountain tourism. Access to mountain resorts is one of the most discussed issues. While some are making sacrifices to find sustainable solutions to give tourists access to the resorts, others apply simpler solutions, such as building roads and allowing public traffic. The existence of modernized access roads supports the development of a mountain resort in the sense that tourists can get comfortably, safely and as close as possible to the existing objectives using their personal car, without depending on other means of transport. However, this comfort is accompanied by a number of advantages and disadvantages, which are analyzed in this paper and highlighted by the case study method. For this purpose, the county road DJ709F, recently modernized, which provides car access to Parâng Resort, located in Parâng Mountains, was studied.

# Capturing the temperature gradients of GMAW hardfacing processes by employing CFD and FEM simulation procedures

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**Abstract.** Hardfacing is carried out whenever a local improvement of the mechanical properties of metallic parts is demanded. In this regard, gas metal arc welding technology is one of the most popular choices. One decisive factor of the welded joint quality is governed by the heat affected zone. The present paper proposes a simulation methodology that can be employed for capturing the temperature gradients in any location of the base metal, when such information is required. The model was developed by using ANSYS Workbench simulation software and is based on coupled CFD and Transient Thermal analysis. In the first stage, a welded sample is subjected to 3D scanning for recreating its constitutive surfaces in a CAD environment. In the next stage, the convective heat transfer occurring due to the velocity of the shielding gas is captured by means of CFD analysis. Experimentally derived temperatures are employed for developing a transient thermal analysis, having defined the exterior heat transfer coefficient. In the last stage, the simulation results are verified in an arbitrary location of the base metal that is located outside the heat affected zone.

# Research on the setting of maximum pressure in salt caverns intended for CO<sub>2</sub> storage

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**Abstract.** The caverns are built in the salt massifs, by dissolving the salt at depths from 150 m to 1000÷2000m, and can have a volume between 5000 and 1 000 000 m<sup>3</sup>. These can provide the storage of large amounts of hydrocarbons, hydrogen or carbon dioxide. Sealing is a fundamental prerequisite for many underground works where it is necessary for the stored product to have minimal leakage. The main factors in the appearance of well leakage are: Fluid pressure distribution, geological environment, well cementing operation and cavern architecture. For a functioning cavern, fracturing the walls is a major risk, which can lead to loss of tightness. Consequently, the pressure of the stored product must be less than the absolute value of the lowest compression effort, even when a margin of safety is being taken. Knowledge of these efforts, their evolution over time and their distribution around the caverns, is the research objective for the authors of this article. For real-scale analysis, a 3D model of finite element analysis was used, using numerical modelling software for geotechnical analysis of rocks.

# Presenting air quality status through hot spot maps realized by using Kernel Density Estimation (KDE) - case study: Craiova, 2020/2021

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**Abstract.** As hot spot mapping has become an usual technique used worldwide in order to obtain a clearer view on the geographic incidence of several factors from the most diverse fields, this paper aims to present a case study (developed late 2020 and early 2021) regarding air quality status of Craiova – an important Romanian city – involving the most relevant three gaseous air pollutants. The study has been realized by using a modern technique for generating hot spot maps on grids, as smooth continuous surfaces, which is Kernel Density Estimation (KDE).

# Management of occupational safety and health in the commissioning of defective work equipment in the manufacturing industry

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**Abstract.** Work equipment must provide compliance with the essential safety and health requirements applicable from the design and manufacturing stage to ensure a high level of protection of social interests, safety and health at work, and environmental protection. Non-conformities are discovered during the initial commissioning of work equipment in some circumstances due to incorrect design and/or manufacture, resulting in unsafe and non-compliant equipment that is defective when placed on the market and marketed. The purpose of this article is to present the research findings. The goal was to assess the risks associated with the security aspects of digital paper and cardboard printing machinery, to ensure compliance with current safety and health regulations, and to limit the risk of operating defective products. The study offered research results on the establishment of safety and compliance conditions, in order to design a methodology for assessment and technical inspection of work equipment, based on risk assessment and taking into account the usual and anticipated use of the work equipment. Introduction on the market, to improve the efficiency of technical inspection and market surveillance operations by detecting and generating risk profiles for work equipment manufacturer non-conformity.

## Dewatering of waters from surface quarries in the Oltenia basin with the help of horizontal drilling

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**Abstract.** Dewatering involves reducing level of flooding of field by various technical measure. This paper studies the methods of dewatering involving reducing the level of flooding of field by various technical measure water from surface quarries with the help of horizontal drilling. Horizontal drilling does not cause discomfort at the level of exploitation works, transport and storage of deposits being a very efficient method. This has a great advantage both in terms of efficiency and the level of the environment because it eliminates land cover.

# Increasing the quality of medical services by streamlining the human resources management

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**Abstract.** The most affected field of the society by the two-year COVID-19 pandemic was undoubtedly the medical one. An analysis of the most important changes that have taken place in this field, from the perspective of human resources in the medical sector, is the main objective of the research. A first step in this complex analysis, however, is to identify the situation of human resources in the medical sector from the perspective of its satisfaction in the pre-pandemic period. The present paper aims to highlight the situation existing in the Romanian medical system prior to the pandemic from the perspective of employee satisfaction, through a research conducted in a medium-sized hospital in Romania. The research method used was the survey, with 144 respondents, represented by the employees of the hospital, questionnaire applied in 2018 and 2019 years. One of the conclusions of this paper is that improving employee satisfaction from the perspective of human resources management in the organization studied, increase the quality of medical services offered to the patients, and therefore increase patient satisfaction.

# The elderly activities before and after retirement

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**Abstract.** The paper presents an inventory of the activities of the elderly before and after retirement. The objectives of this paper are: to identify and analyse the activities of the elderly before retirement; to identify and analyse the activities of the elderly after retirement; to analyse the dynamics of the elderly' s roles; to build the intervention plans in relation to the elderly's activities in correlation with the roles played by them. The interview is the method used in data collection and the results are obtained from the qualitative analysis of the data: inventory of answers, their classification into categories, coding of answers and their interpretation. The schedule of activities and the typology of activities have changed radically after retirement and the satisfaction of the elderly in relation to these activities varies depending on the health problems, depending on the financial difficulties and the relationships that the elderly have with the family. Most of the elderly people interviewed say that they try to stay active and satisfy their desires even if it is more difficult for them due to their health condition. They focus on helping and supporting the family, and they feel great satisfaction when it comes to helping them.

# The current crises are negatively affecting the business and macroeconomic stability

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**Abstract.** The authors of this article aim to highlight how current crises (health, economic and financial, energy, food, etc.) have an effect on domestic and, especially, international affairs. At the same time, the aim is to identify and specify how the crises we are facing are jeopardizing macroeconomic stability. A number of study authors on the trend of the world economy have already stated that the world economy is practically in recession. This conclusion was reached based on the fact that, in addition to the crises affecting the world situation, the effect of the pandemic Corona virus, and the Russian-Ukrainian war (Russian-Ukrainian armed conflict) which is expected to be long-lasting. The prospect of a Russian-Ukrainian armed conflict leads to the conclusion that, at the European Union and individual level, each and every state will face difficulties with negative effects on maintaining macro-stability and the development of domestic and international affairs at a convenient pace. In order to determine these aspects, we set out to use the widest possible methodology of international comparisons, the use of statistical indicators calculated and obtained from the European Union, Eurostat, the National Institute of Statistics and the application of statistical-econometric methods / models to obtain the parameters that will form the basis of the future comparison and, especially, of establishing the evolutionary trend of the world, European economy and, especially in this case, of Romania.

# Role of EU and non-EU universities in achieving environmental sustainability

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**Abstract.** At present, the principles of sustainable development are being implemented in almost all economy sectors whereas one of the key drivers of the transition to a new concept is higher education system also. The inclusion of special academic disciplines on sustainable development, the implementation of environmental protection measures, financial support for research in the field of environmental sciences, campuses landscape – all these stimulates the process of transition to a concept of sustainable development. In addition, higher education makes it possible to form an ecological worldview among the younger generation that is an effective tool in achieving sustainable development goals (SDGs). University graduates who understand the need to achieve the SDGs and provide environmental protection, lead an eco-friendlier lifestyle and pass on the knowledge they have gained to their children or other family members. The purpose of this study is to analyze the relationship between the involved activity of universities in the field of sustainable development and the implementation of large-scale government programs to achieve environmental sustainability. The study will examine the experience of Eu and non-EU universities and state environmental protection programs. The results obtained allow us to conclude about the correlation between educational activities in the higher education system and achievements at the state level of environmental sustainability.

## Exploring the Possibilities of Using Project Management Methodologies in the 21st Century Education

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**Abstract.** One of the reasons why education in the 21st century is different, is the use of technology to enhance learning. In this context, proper project management methodology that individualize learning and makes students take responsibility for their own learning, reflect and evaluate their own learning processes, must be implemented. The educational process is approached as a result of the project management methodology considering previous experiences regarding education projects and exploring the possibilities of adapting to the dynamics of the digital age. A successful education process delivers effective learning being designed in order to enhance it. In the context of the research, Web 2.0 tools proved to be useful educational tools with significant results especially when integrating elements of Google Analytics and Gamification. So, the article proposes a framework for integrating a mixture of Web 2.0, Google Analytics and Gamification in the educational process.

# The role of university - business partnerships in increasing students entrepreneurial skills

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**Abstract.** In this paper, we first bone up on the literature as regards the relationship between universities and the business environment and its role on the development of entrepreneurship as an engine of economic growth. We continued the paper by presenting this relationship in the context of introducing projects related to entrepreneurship within the University of Petroșani. In the methodology part, on the one side, the university - business entity partnerships are statistically analyzed and on the other side, the results of a enquiry that was applied to entrepreneurs during 2019-2021 within the POCU project "EU - ENTREPRENEUR - increase of students participation from vulnerable categories to undergraduate study programs through entrepreneurial innovation" POCU Contract /379/6/21. The paper brings to interesting conclusions about the relationship between universities and entrepreneurs and how it can intensify the efficiency of this collaboration from the perspective of increasing the entrepreneurial skills of students.

# Influence of current direction in longitudinal ventilated road tunnels on the backflow of combustion Products

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**Abstract.** The results of numerical modeling in longitudinal ventilated sloping road tunnels are given. The slope of the tunnels varies in the range of 0-6%. The geometry of the tunnel is as follows: length: 100 m; width: 8 m; height: 6 m; area of the seat of fire: 16 m<sup>2</sup>. The seat of fire sized: 2.75x5.8x1.5 m is in the central part of the tunnel The scenarios of development of 5, 10, 20, 30, 50 MW fires are studied in the case of positive and negative directional ventilation flows. The time of modelling was 120 seconds. The numerical problems were modelled with a volumetric grid method. The grid cell dimensions were: 0.5\*0.5\*0.5 m. Virtual point and volumetric measuring equipment was used to record the modeling results. The modelling used 4 groups of measuring devices that measured and recorded air velocity, temperature, and air and smoke densities. The paper discusses cases of algebraically summarizing the ventilation and fire-induced flows. Based on the results of numerical modeling, we can point out that the widely accepted indices of critical velocity and back-layering length in inclined road tunnels often give erroneous results. Therefore, in strategies for emergency ventilation, indicators such are critical velocity and back-separation should be used with caution.

# On industrial tourism as a viable perspective for the Jiu Valley

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**Abstract.** The need to recognize the value of technological structures as elements of heritage has led to the establishment and development of industrial tourism. The interest in the conservation of abandoned industrial sites has not only scientific but also economic and heritage importance, especially for the regions severely affected by the industrial restructuring process. This process has had disastrous consequences, especially for the mono-industrial regions dominated by a single field of activity. One such example is the Jiu Valley, which was one of the most industrialized areas of the country and the main cities based their economy on the mining industry. But the Jiu Valley is defined not only by mining and mines, by cities and people with a precarious financial situation but also by hospitable cities and people, eager to share their traditions and culture. In this context, the article identifies the potential of exploitation of industrial structures in tourism, thus supporting the perspective component of revitalization by reuse of a mining perimeter. Investments in cultural heritage can lead to positive effects for the local economy not only in terms of cultural consumption, but also in terms of increasing the number of jobs and incomes.

## Points of intersection between sustainability and project management

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**Abstract.** The goal of this paper is to explore the dimension of sustainability in project management through a systematic literature review; more specifically, the article aims at reviewing the approaches to ensure the performance of urban projects performance targeting sustainable objectives. An attempt to explore the way the two fields intersect by means of exchanging both strengths: project management know-how areas, on the one hand, and sustainability tools, a win-win for improving the efficiency of implementing sustainability in every project. The research objective is to define concepts, terminology and conceptual clarifications on the management of sustainable urban development projects, the bibliographic reference, which will present the historical evolution and the current state of knowledge in the field (theories, studies and relationships, good practices, definitions). The scope of this effort is to dive into the maze of a literature review in order to identify the link between project management and sustainability and the transition paved by unique and challenging experiences which shifts towards a green and inclusive future.

# Using virtual instrumentation in the application study of electronic devices

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**Abstract.** Continuous technological developments require proper training of future specialists through the use of modern training systems. This paper presented in detail both hardware and software structures in a laboratory stand for interactive training of future professionals in the fields related to using electronic devices. Virtual instrumentation is the basics of these applications in terms of data acquisition, processing, and display in a form as explicit and easy to understand of the results. The entire system was created using National Instruments equipment to generate the input stimulus signals to generate both input signals and receive response signals. For various electronic circuits or devices, software applications were created in the LabView graphics development environment. Builds in the form of interactive applications the virtual instruments offer the opportunity for future professionals to benefit from a complete training starting from studying the theoretical part of laboratory work, visualizing the implementation schemes, and making measurements that are then used to make different analyses of results.

# ***J. curcas* and *Manihot esculenta* are potential super plants for phytoremediation in multi-contaminated mine spoils.**

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**Abstract.** Phytoremediation approaches have increasingly been applied in environmental remediation projects. In this study, the potentials of *Manihot esculenta* (*M. esculenta*), *Vigna unguiculata* (*V. unguiculata*) and *J. curcas curcas* (*J. curcas*) in remediating multi-contaminated mine spoils was evaluated. The target potentially toxic elements (PTEs) are Cd, As, Zn, Pb, and Hg. The test plants were grown and monitored under growth stress conditions for 270 days. Using inductively Coupled Plasma- Mass Spectrometry and EPA method 200.8, the total elemental contents in the shoot and root parts of the plants were determined. Significant differences ( $p < 0.01$ ) were observed in the uptake performance of the test plants. For example, *M. esculenta* and *J. curcas*, bioaccumulated 50- 80 % of the various baseline PTE contents in their root parts at 270 days after planting. In contrast, < 27 % of PTEs were found in the root parts of *V. unguiculata*, except Zn at 70 %. Growth stressors and soil PTEs were factors that reduced biomass production in respective plants by 25 %. Cumulatively, the performance order *M. esculenta* > *J. curcas* > *V. unguiculata* was observed for multi-contaminant removal in soils. Techniques for enhancing the easy cultivation of the test plants are recommended to enhance their applicabilities in phytoremediation projects.

# Decision analysis within the small company for specialized equipment destined for monitoring the safety mining parameters

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**Abstract.** This paper offers a review of fundamentals in decision analysis and the construction of evidence-based probabilities for use in decision-making. The term quantitative risk analysis generally connotes reliance on probability and statistics. However, select quantitative risk-based decision-making methodologies, such as game theory, do not require knowledge of probabilities. Maximizing the minimum (maximin) gain, minimizing the maximum (minimax) loss, or maximizing the maximum (maximax) gain are but a few examples of decision-making criteria for handling risk and uncertainty without adhering to probabilities. Quantitative risk assessment builds on the existence of probabilities that describe the likelihood of outcomes, such as consequences. In general, probabilities are derived on the basis of historical records, statistical analysis, and/or systemic observations and experimentation. We commonly refer to probabilities that are derived from this process as "*objective probabilities*". Often, however, situations arise where the database is so sparse and experimentation is so impractical that "*objective probabilities*" must be supplemented with "*subjective probabilities*" or probabilities that are based on expert evidence, often referred to as "*expert judgment*". This paper focus on generating probabilities on the basis of expert evidence, using by the decision rules under uncertainty.

## Methodological tools for project risk management

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**Abstract.** The increasing size and complexity of acquisition and development projects in both the public and private sectors have begun to exceed the capabilities of traditional management techniques to control them. With every new technological development or engineering feat, human endeavours inevitably increase in their complexity and ambition. This trend has led to an explosion in the size and sophistication of projects by government and private industry to develop and acquire technology-based systems. These systems are characterised by the often unpredictable interaction of people, organisations, and hardware. This complexity has imposed a complementary rise in the level of adverse events, particularly in acquisition projects, that I often difficult to identify, analyse, and manage. Indeed, managing the risk associated with the acquisition of large-scale technology-based systems has become a challenging task. Such risks cost overrun, time delay in project completion, and not meeting a project's performance criteria. This paper presents the scientific results regarding to principles and guidelines necessary to conduct risk management in an adaptable and repeatable framework, showing the tools and method developed in the course of conducting risk management on many different projects.

# Special lifting and transport solutions for heavy and complex loads in the design of the lifting frame

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**Abstract.** Approach and reasoning for developing new solutions and lifting methods, effectively manage risk. This comes in various forms, primarily reducing risk to staff and secondary, reducing or eliminating risk to plants and customers. This is why front-loading engineering solutions are being developed that provide improved safety, schedule improvement and cost efficiency. The paper presents solutions for lifting and transport systems in which alternative methods are used.

# Exploiting multimedia technologies in education, research, and university-community projects

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**Abstract.** The pandemic has led to the acceleration of the digital transformation of all university activity. Some users/university staff were better prepared for this, but others need support and training in the development of digital skills. Increasing the efficiency and effectiveness of digitized activities (administrative, educational, research, university marketing, communication, and community involvement, with business or industrial partners) require increasing concerns for the university's human resources to have the necessary knowledge of operation. Moreover, our students are from generation Z, Millennials and can be stimulated in learning, interaction, and communication with the help of digital means, multimedia technologies and social media. We are witnessing a radical change in the way communication takes place in universities and within its extended community, with its various stakeholders. In this dynamic context we have built and present the way to extend the digital/multimedia competencies of university staff (administrative, teaching, research staff, etc.) with the support of an international community associated with the Erasmus+ project: "Multimedia Competencies for University Staff to Empower University - Community Collaborations" (2020-1-RO01-KA203-080399).

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