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18th ROMANIAN TEXTILES AND LEATHER CONFERENCE

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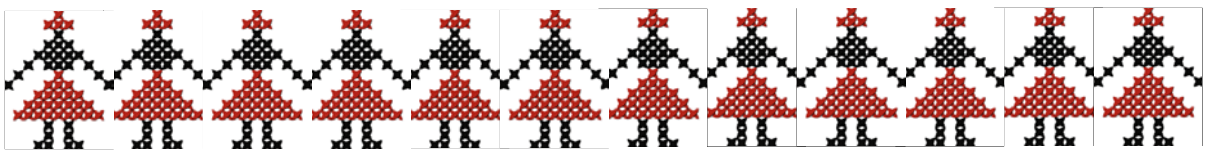

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Textile science and technology

VISCOELASTIC BEHAVIOR OF THE WARP KNITTED SPACER FABRICS

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Abstract. Viscoelasticity is the main characteristic of time dependent materials. Majority of the studies in this field focus on experimental analysis and accordance of the data with the models proposed to determine viscoelastic behavior of the structure. In the present study viscoelastic behaviour was investigated on a warp-knitted spacer fabric in compression and decompression deformation. For this purpose the fabric sample was exposed to loading and unloading time intervals under pre determined conditions. Data obtained from the experiments concerning the compressive behavior of the sample were evaluated in terms of stress relaxation and creep phenomenons through the load-time plots. From the results it was observed that despite the non-homogenous strucrure, spacer fabric sample demonstrated exponantially changing behavior over time. Since the response of the fabric to the compression and decompression periods can be explained as a function of time, a mathematical approach was examined in accordance with the time dependent behavior of the fabric regarding the monofilaments as bent beams. By changing the structural parameters such as monofilament diameter, overall thickness, raw material type and external conditions such as rate of compression and contact area of pressure foot viscoelastic behaviour of spacer fabrics can be investigated in terms of theoritical basis and modelling studies as further work.

Keywords: Bent beams, compression, time dependent, stress relaxation, creep

EFFECTS OF LAUNDERING ON THE STRUCTURE AND PROPERTIES OF ELASTIC WARP KNITTED FABRICS

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Abstract. Elastic warp knitted materials are widely used in medical compression and fixing products. They are usually worn directly on the body and used every day. The hygienic requirements are met through periodical laundering. The laundering is an impactful process because of treatment with hot water and detergent, as well as mechanical agitation. It leads to irreversible dimensional changes in fabric and products. They occur due to stress relaxation in the fibers, threads, and fabric structure by the combined effects of time and finishing. At the same time, repeated laundering can affect the main properties of knitted fabrics, as well as the appearance of products. Many studies have been done in order to determine the dimensional stability of knitwear as a result of washing, based on which the best structures and technological parameters of both knitting and finishing have been recommended. The vast majority of publications refer to elastic weft knitted fabrics and materials for everyday clothing with an accent on dimensional changes. The main purpose of this work is to determine the effect of laundering cycles on the structure and properties of elastic warp-knitted fabrics. Warp knit fabrics with longitudinal elastomer threads and pilar stitches as the ground are studied. The standard test methods were used. As a research result, it was concluded that fabrics with weft threads on the full width have greater dimensional stability, especially coursewise. Fabrics with the weft threads laying in according to the repeat have got through holes in places where there are no contacts between two adjacent weft threads. After repeated washing, the size of the holes is significantly reduced and leads to structure and properties changes. The technological solution for manufacturers of elastic warp knitted fabric for medical purposes was recommended on the research results.

Keywords: elastic fabric, laundering, dimentional stubility, sructural parameters, permeability.

IMAGE ANALYSIS BASED TEST METHOD OF POLLEN AMOUNT ON FABRIC SURFACE USING COLOUR THRESHOLDING

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Abstract*. An aesthetically pleasing appearance is essential in the choice of curtain fabrics used indoors. In addition, today, technical features such as flame retardancy, sound absorption, and pollen prevention can be expected from the fabrics used as curtains. Large quantities of lightweight pollen produced by plants in nature can be carried for great distances and easily hold onto curtains. Pollen grains on the fabric spoil the pleasant appearance of the curtain. Perhaps more importantly, they pose a serious problem for people who are allergic to pollen. In order to prevent the pollen from adhering to the fabric surface, some chemicals are applied to the fabrics with finishing processes. The measurement of the success of the chemicals used in the finishing processes and the process conditions is made subjectively by visual inspection of fabric photographs taken under a microscope. This study aims to calculate the pollen amount on fabric surfaces numerically by using image analysis methods. An image processing algorithm has been developed based on the colour thresholding principle for this purpose. The amount of pollen on the fabrics was measured both by the developed image analysis method and manually on the computer by a visual method. The high correlation coefficient value obtained between the measurement results indicates that the image analysis method can be used in the measurement of pollen amount. As a result, a measuring system has been developed that can detect the amount of pollen on fabrics quickly and objectively.*

Keywords: *Pollen, colour thresholding, textile test, fabric test, image analysis*

LIQUID MOISTURE TRANSPORT IN WOVEN FABRICS OF DIFFERENT WEAVES AND WEFT DENSITY

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Abstract. Liquid moisture transport in textile materials is a very important aspect of the physiological comfort of clothing usage. It is strongly connected with the sweat secretion by the human body and transfer of sweat from the human skin to the environment through the clothing material. The liquid moisture transport is important especially for textile materials applied in inner - close to skin layer of clothing. The Moisture Management Tester M290 by SDL Atlas Ltd. (US) is an instrument developed to measure and characterize in a complex way an ability of textile materials to manage the liquid sweat. In the presented work the cotton woven fabrics were measured in the range of the liquid moisture transport properties using the MMT device. The fabrics differ between each other in the range of weave (plain and twill 3/1), and density of the weft yarn (110/dm, 90/dm and 70/dm). The rest of the structural parameters are the same. The grey fabrics have been finished in the same way – standard starch finishing. Obtained results allowed to assess an influence of weave and weft density on parameters characterizing the moisture management ability of the investigated fabrics. It was stated that the cotton fabrics with the twill 3/1 weave are characterized by shorter wetting time of both surfaces – top and bottom and greater absorption rate of the top surface that the fabrics with the plain weave. Spreading speed of the top surface of the fabrics with the twill 3/1 weave is also greater than that for the top surface of the fabrics with the plain weave. However, due to the significantly greater minimum wetted radius of both surfaces and less absorption rate of the bottom surface the fabrics with the plain weave have been assessed better than the twill fabrics in the aspect of their ability to manage the liquid moisture. Statistical significance of the stated relationships was assessed using the multifactor ANOVA. In a majority of cases the influence of weave and weft density on the parameters from the MMT was assessed as statistically significant at the significance level 0.05. There is also statistically significant interaction between the main factors – weave and weft density. The influence of weave on the parameters characterising the liquid moisture transport in fabrics is modified by the influence of weft density.

Keywords: fabrics, cotton, liquid transport, measurement, comfort

ROTARY PRINTING: PASTE REDUCTION AND PASTE CALCULATION USING STATISTICAL ANALYSIS

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Abstract. The pigment printing method is preferred because it is acceptable for all kinds of fiber types, suitable for sensitive fabrics, does not need to be washed after printing, and has good fastness. There are many factors affecting the consumption of printing paste in rotary screen printing. These factors include fabric structure, printing speed (m/min), bar size (mm), machine press, screen mesh number (holes/inch), colours of patterns, colour deepness and counter clearness, printing paste chemicals, and paste viscosity. The complicated calculation of the printing paste system is made even more difficult by numerous parameters. For this reason, it is difficult to prepare the correct amount of printing paste, which is determined by the operator's experience. This situation increases the amount of waste in the water as well as the overall cost. In order to reduce the waste of printing paste, this study aims to develop a new method that performs calculations using algorithms instead of experience-based systems. In order to achieve this, a data pool was first created by using production data from the printing department, and close to 600 records were used in this project. The amount of paste consumed in a 1 m^2 area of fabric was calculated using the data obtained. In short, it will be called the consumption factor. To evaluate the variance of this factor in relation to machine parameters, one-way anova and Dunn's tests were used. According to the findings, bar size and mesh count have a significant impact on paste consumption. It has been shown that machine speed and pressure have an indirect impact on printing paste consumption through other parameters. With the new system, the printing paste calculation accuracy rate was evaluated in 3 ways: as "saved recipes", "underweight recipes" and "overweight recipes". The accuracy rates for "saved recipes," "underweight recipes", and "overweight recipes" were respectively 66%, 19%, and 15%. The amount of waste paste rate has been reduced from 23% to 12%. When the cost of the savings ratio is computed, it is found that $ 1128 can be saved on the price of printing paste and dyestuff.

Keywords: Rotary printing, pigment printing, print paste optimisation, sustainability, waste reduction.

DESIGN OF TEXTILE REINFORCED COMPOSITES BASED ON IMPACT BEHAVIOUR

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Abstract. Fibre Reinforced Composites are becoming the most popular materials in sport, automobiles, aerospace or other industries where high strength to low ratio is required. A fibre reinforced composite material is a material that contains fibres which provide strength and stiffness to it. Impact strength and impact behaviour are two of the most important aspects to be considered in the design phase of composites. Knitted fabrics are known to have very good impact behaviour in certain directions, which can be controlled by the structure, especially by using in-lay yarns. The paper presents the influence of reinforcement system and matrix used over the impact behaviour of composite materials. 3D U shaped sandwich knitted fabrics made by para-aramid (Steel Kevlar and Twaron) and technical natural yarns (Linen) were used as reinforcement system. The fabric compactness, required to increase the mechanical behaviour and fibre volume fraction of the composites, was improved by introducing transversal Twaron yarns as in-lay yarns. The composite materials were prepared by Vacuum Assisted Resin Transfer Moulding (VARTM) technique using epoxy and polyester resins as matrix. The low velocity impact behaviour was evaluated using a Ceast Fractovis Plus 2000 impact testing machine. The experimental results shown that the composites impact behaviour can be controlled by structure of reinforcement preform and by matrix used.

Keywords: knitted fabrics, preform design, impact behaviour.

A HYDROGEL FROM A TEXTILE SUPPORT USED IN THERAPY OF WOUNDS

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Abstract. Textile with medical application represents a strong potential for specific textile in the interdisciplinary content between engineering and medical therapy. The paper approaches some issues related to the administration of an antibiotic in the topical therapy of chronic or nosocomially infected wounds. The chitosan hydrogel is used as a carrier to the affected dermis. Textile support is an interlock knitting structure of 100% cotton yarn with fineness of 70/1. The study focuses, both structurally and diffusively, on the hydrogel's response to the presence of antibiotics included in its pores. The morphological characteristics (by: Scanning Electron Microscopy, SEM, degree of swelling, porosity) and structure (by: FTIR spectra, differential thermal analysis, DTA) of the hydrogel are analyzed, and release kinetics of antibiotic as well. There were presented different recipes to build up a hydrogel structure with appropriate pores able to include large molecules of antibiotic and then to drug release to severe wounds. The application has a good perspective, as there is an acute need for the therapy of skin wound.

Keywords: interlock structure, hydrogel, antibiotics, morphology, release exponent.

DIGITIZATION OF PROTECTIVE MATERIALS

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Abstract: Due to the diversity of designs and the use of flexible materials, there are still many unresolved issues in the textile industry that require deep research. This paper proposes a theoretical investigation of an innovative method of developing and creating a virtual gallery of fabric samples by digitization with an x-Tex scanner. The advantage of this process for companies in the industry is the reduction of time lost for the delivery of samples to the customer, the costs of execution, and the reduction of the consumption of storage space of materials with a positive impact on the environment. Although published research on digital libraries has increased, it focuses mainly on technical issues and models of using the digital library. Existing methods are limited only to fabrics that have a small geometric structure, if this method is used on a larger geometric scale errors are ensured. All these limitations have encouraged the research process in order to obtain a much larger study on the transposition and characteristics of materials in digital images. In order to improve the design of existing and future digital libraries, it is necessary to identify what criteria should be applied in the evaluation process. When the goal is to implement a more cost-effective, productive, secure, and sustainable way of studying materials, the answer is obvious: digital materials. Thus, in order to achieve the expected efficiency, it is necessary to go beyond the existing notion of digital material. Most research is focused on digital graphics at the level of structure and thread of textiles, little research has been done at the overall level of rendering a physical sample, which indicates the interest of research to obtain a set of rendering parameters of protective textiles: color, rough surface, porosity, gloss, and draping.

Keywords: Digital protective materials appearance, Scanning, Rendering

ON THE USE OF A BIOCOMPATIBLE HAND BUILDER FOR TUNING THE SURFACE AND MECHANICAL PROPERTIES OF A NATURAL FIBER FABRIC

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Abstract. Modern industry is in continuous evolution coming with new technologies and industrial dynamics. Industrial system evolution has brought innovations to befall established as key elements affecting its growth and transformation. As part of this sectoral system in continuing evolution, the textile industry is moving towards full automation, even where manual handling is still mandated. Currently, the textile fabric when produced constitutes a soft structure with a high degree of flexibility and for the complete automation of the textile manufacturing sector, these characteristics constitute a constraint for the possibility of using robots in the process of garment production This study focus on how the thermal treatment applied to fabrics made from natural fibres alters their native properties and particularly those regarding the surface and mechanical properties. And for this purpose, the temporary finishes were chosen for their ability to be removed or considerably abated the first time at which the item is washed/dry cleaned. A simple natural hand builder was chosen as long as being suitable for cellulosic materials and the final effect on textiles was to obtain a certain degree of rigidity. The comparison between untreated and thermally treated fabrics was firstly analysed using the ATR-FTIR technique which throughout qualitative evaluations settled out the peaks characteristic of the functional groups present on the sample surfaces. The mechanical analyses were performed to understand how the thermal treatment changed some physical properties of the fabrics to transform them into more rigid materials.

Keywords: industrial-dynamics, temporary-finishings, cellulosic-materials, qualitative-evaluations, physical properties, textiles.

A STUDY ON THE INFLUENCE OF SLIVER PREPARATION SYSTEM ON THE QUALITY OF COTTONISED HEMP/COTTON BLENDED ROTOR SPUN YARNS

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Abstract. In the past decades, bast fibers have gained increasing attention from researchers due to their excellent properties and environmentally friendly cultivation. Because their farming needs less water, fertilizers and pesticides than cotton cultivation, bast fibers are considered a sustainable alternative to cotton. By cottonisation, the length and the thickness of technical hemp and flax fibres are reduced so that the cottonised fibers can be blended with cotton and processed on the cotton spinning system which is more efficient and economical than the traditional hemp or flax spinning system. Because hemp fibers have high bending rigidity, difficulties in processing on the cotton spinning system have been reported. The research work aims to present the influence of sliver preparation system on the quality of 50/50 cottonised hemp/cotton blended rotor-spun yarns. A second card passage has been introduced in the standard technological line in order to increase the individualisation level of multi-cell hemp fibers. Three variants of sliver preparation systems (with double carding, with double carding and one passage of draw frame, with double carding and two passages of draw frame) have been used to obtain rotor spun yarns of 37 tex, 59 tex, and 100 tex linear density. One hundred percent cotton yarns of similar linear densities were produced using a sliver preparation system consisting in two draw frame passages after carding which is a standard practice in rotor spinning mills. The optimal variant of sliver preparation system in spinning of 50/50 cottonised hemp/cotton blended rotor-spun yarns is the variant with double carding and two passages of draw frame. All the analyzed characteristics of cottonised hemp/cotton blended rotor-spun yarns are worse than the characteristics of all-cotton yarns. Further research concerning the optimization of the production process parameters are necessary in order to improve the yarn quality.

Keywords: cottonised hemp, hemp/cotton blend, rotor yarn, sliver preparation system.

INFLUENCE OF TEMPERATURE ON THE PREPARATION OF ORANGE OIL EMULSION ELECTROSPINNING MICROCAPSULES

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Abstract. Essential oils, apart from the fragrance they release, are characterized by having countless properties, they can be used in aromatherapy, as antioxidants, antibacterial, etc. Its inclusion in the electrospinning process can be carried out by means of a coaxial extrusion but it is also feasible, under strict control of the parameters, to carry out the electrospinning from an emulsion. The state of the art defines the possibility of obtaining core-shell fibers by electrospinning emulsions, nevertheless, obtaining microcapsules is also a possibility, the viscosity, conductivity, and different conditions must be adjusted in order to break the jet from the Taylor´s cone to create the spherical particles. This requires control of the parameters of both the electrospinning process and during the preparation of the emulsion. In this work, oil/water (O/W) emulsions of 4% orange essential oil in a 9% PVA solution are prepared. The addition of the oil during the preparation of the emulsion is carried out at room temperature (22ºC) or at higher temperature (70ºC). As expected, the viscosity of the emulsions is different due to changes in temperature. The samples are analyzed using instrumental techniques such as electron microscopy (SEM), differential scanning calorimetry (DSC) and Fourier Transform InfraRed Spectroscopy FTIR. The results show how an increase in temperature derive into higher core-shell portions whereas lower temperatures contribute to spherical shapes. Further studies will be focused on wider range of temperatures and future applications. Authors would like to acknowledge the financial support to Instituto Valenciano de Competitividad (IVACE), on a nominative line during 2022.

Keywords: Nanofiber, textile, polyvinyl alcohol, PVA, essential oil.

DEGRADATION OF FULL BODY SEAT BELTS UNDER DIFFERENT USAGE CONDITIONS

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Abstract. Full body seat belts ares used as a protective equipment in order to minimize the consequences of high falls. In fall events, failures in these equipments should may not provide the required protection for users. Otherwise there are few studies about the characterization of used full body seat belts in order to identify and quantify the loss of mechanical properties in these personal protective equipment. The purpose of this paper is to present a brief discussion about the composition of these protective equipments, its finalities, use work limitations, required properties as well as previous research results. For this research were used protective seat belts as samples, collected in several companies from various types of activities. Results showed those protective equipment lose their protective properties during service life, caused by several destructive factors as well as UV, dust, chemicals, temperature changes and humidity, as the direct contact with sharp objects and rough surfaces. After a extensive review of literature from papers we conclude that this is a relevant topic, weak unexploited and which tends to collaborate with the development of technological innovations in the manufacture of full body seat belts, that can offer beyond better comfort, more protection and generate more application scopes according to the risks of degradation found in different work fields.

Keywords: Personal Protective Equipment, Full Body seat belts, Degradation, Textile Materials Tests, UV, Chemical.

IMPROVING THE QUALITY OF KNITTED PANELS OBTAINED ON THE STOLL KNITTING MACHINE

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Abstract. The paper presents an optional device for Stoll knitting machines that substantially improves the quality of knitted panels. The ASCON device is used to measure the length of the threads processed on the knitting machines, controlling the thread consumption on each knitted row, regardless of the direction of the slide of the knitting machine or the work system specified in the central program (in the case of the 530 HP machine there are 3 work systems S1, S2 and S3. This device ensures in the production process a uniform and constant thickness (length and width) of the knitted panels to the detriment of the problems caused by the process of spinning or winding the threads such as thinning, thickening or uneven tension of the threads on the spool. In the world of knitting, it is known that problems can arise that directly reflect on the quality of the product due to the malfunctioning of some working parts of the machine, insufficient preparation of the operator or even due to the quality of the yarn. The so-called "system traces" can appear, these having the following causes: the wear of the degree cams on certain systems of the cam slide; uneven lateral thread tension; values of the knitting too high, not being in accordance with the work speed; uneven tensioning when winding the thread. Traces of the systems are visible on the knitted panel, they clearly affect the quality of the finished product, giving the appearance of wavy knitwear, requiring a direct and immediate action on the working organs (degree cams) to fix this problem.This problem can be solved by implementing the YLC2 system through the ASCON device.

Keywords: knitted panels, ASCON device, system traces, Stoll knitting machine.

STUDY ON THE INFLUENCE OF TENSIONAL PROPERTIES ON THE QUALITY OF KNITTED MATERIALS

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Abstract. The problem of analyzing the quality of yarns and the structure of textile materialson the mechanical properties it is mainly in the following situations: in the technological manufacturing process after the textile product has been made or in the cutting phase, especially in the case of using yarns with increased elasticity or in the wearing process when the material is subjected to mechanical stress-strain. Most deformations due to the structure of the textile material make it more or less extensible and elastic in case of repeated mechanical stress. The ability of textile materials to deform under mechanical stress, especially tensile stress, is dependent on their elastic properties. Other factors that influence the deformation capacity of the textile material are represented by the gauges, stifness, contraction of the textile yarns. The study of the mechanical properties of textile structures under diferent strain rates is very important for the actual engineering design of the finished product. The elimination of latent stresses from the raw textile material is carried out during their finishing operations. It was found that the change in tensile properties is due to the differences in the structure of the material, applying the same finishing process. It has also been demonstrated that the existing tensions in the textile material are completely eliminated after wearing, following complex stress. The paper presents the influence of tensional properties on the quality of textile materials and the interpretation of stress-strain diagrams through different mathematical models.

Keywords: knitted materials, deformation, tensile properties, structure parameters

SMALL-SCALE PPG-UAV FOR EMERGENCY RESPONSE ACTIONS DEVELOPMENT PHASE

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Abstract. The paper describes the development processes for a small-scale UAV (Unmanned Aerial Vehicle) for emergency response actions and remote sensing. The UAV system consists of one or more ultralight multifunctional aerial units with a configuration that can be adapted to the nature of the intervention: monitoring, observation and logistics, air transport, detection of intervention staff using the PPE that is equipped with a special radio ID transponder etc. These aerial units comprise of PPG (Powered ParaGlider) type UAVs that use textile paraglider wings designed to have an easy handling, predictable deployment at all times and good aerodynamic characteristics. The fabric used is a low weight double rip-stop nylon 6.6 fabric with special coating for UV protection. The wing is attached to an automated command and control unit designed for increased modularity in order to be tailored for specific operational requirements of the intervention. The paper summarizes the development process starting with pre-dimensioning and simulation of a numerical experimental model, process done with a computer program developed within the our institute, following with the CNC cutting of the wing patterns, general prototype assembly and finishing with live testing of the prototype in either static tests and/or simulated emergency live situations.

Keywords: Unmanned Aerial Vehicle (UAV), Powered Paraglider (PPG), Technical Textiles, Emergency Response.

STUDY ON THE BREAKAGE BEHAVIOR OF UPHOLSTERY FABRICS

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Abstract. The materials used for upholstery (furniture fabrics, etc.) play an important role for at least three reasons: they create the style of the furniture they cover; it allows for maintenance and increases the durability of the furniture which determines the appropriate type of use of the furniture, the time, energy and expenses involved in maintenance and the cost of these materials which can represent the largest percentage of the cost of the furniture. The appropriate choice of furniture material depends on a number of properties such as: good moisture absorption, high strength in dry and wet environment, good dyeability, good color fastness, softness, price and availability. In paper, the behaviour of fabrics used for upholstery fabrics in the event of breakage was investigated. These fabrics are distinguished by the type of yarns from which they are produced, the yarns count, the thickness of the yarns on the two systems, the fabric structure and destination. Upholstery fabrics were obtained on air-jet or water-jet looms. These versatile fabrics before being used for upholstery have undergone various finishing treatments such as: desizing, singeing and mercerizing (for cotton fabric), piece dyeing (for dyed variants), width setting and bonding for one variant. These fabrics are characterized by the fact that: the breaking force of the fabrics is directly proportional to the breaking strength of the warp yarns, because they participate entirely in the strength of the fabric, and the fabric structure influences the strength by creating a balance between the degree of curling of the yarns and the number of connection points where frictional forces occur. In the case of the upholstery material obtained by glueing two fabrics, it is characterized by the fact that the breaking force is lower than the total breaking force of the component fabrics, because the breaking occurs in the weakest area. The abrasion tests concluded that all fabrics on the surface of the upholstered product are in the field of heavy-duty fabrics with high demand.

Keywords: furniture, yarns, upholstery, breaking.

PREDICTING THE DEGREE OF PILLING IN FLEECE FABRICS BY BP-ANN AND ENHANCING THE PILLING RESISTANCE OF RAISED FLEECE FABRICS BY FINISHING TREATMENTS

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Abstract. The pilling characteristics and the causes of the raised knitted fleece fabrics produced by Dok-San Textile were investiged, and finishing techniques to improve fabric resistance to pilling were used. Both treated and untreated fabrics performed tests for comfort and pilling. The backpropagation artificial neural network modelling was designed to assess the degree of pilling of fleece textiles before to the raising process utilizing the parameters of fiber length and type, face yarn count, wale and course density, loop length, covering factor, tightness factor, batch process time, anti-pilling enzyme treatment, hair length index, and hair area index. The hair length index and area index of yarn hairiness were determined by image processing. For this purpose, The Dok-San textile R&D unit developed the application in the Python programming language, which was utilized to process images of single yarn hairiness. The multi-criteria decision-making TOPSIS method was used to evaluate the comfort and tactile qualities of fleece fabrics. As a result, the raised two-thread fleece fabric's degree of pilling has increased by 0.5 to 1-5 grades as a result of the anti-pilling finishing agents' optimization. Additionally, it has been observed that the one-sided sheared and two-sided raised fabrics maintain their comfort properties.

Keywords: Fabric pilling degree, yarn hairness, artifical neural network, image processing, multi-criteria decision making, TOPSIS.

AUTOCAD BASED GRAPHICAL METHOD FOR DETERMINING THE LIMITS AND SPECIFIC AREAS OF STRESS-STRAIN CURVES THAT DESCRIBE THE MECHANICAL PERFORMANCE OF YARNS

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Abstract. The most frequent stress to which the yarns are subjected during their processing, as well as during the use of the finished products, is that of traction. The values of the breaking force and elongation at break do not fully reflect the behaviour of the yarns under tensile stress. For a more complete characterization, the stress-strain diagrams are used, based on which the behaviour of the yarns can be highlighted when they are subjected to tensile forces lower than the breaking forces. The main characteristics that can be determined with the help of stress-strain diagrams are the specific limits and zones (the proportionality zone, the elastic zone, the flow zone and the breaking zone), the absorbed energy, the modulus of elasticity. In order to determine the positions in the diagram of the points corresponding to the specific limits (the limit of proportionality, the limit of elasticity, the limit of flow and the breaking limit) a graphic method was designed which is based on the facilities offered by the AutoCAD® software. This computer program is widely used in the textile industry, for example for garment design, for pattern design and grading or for pattern layout, but has been sporadically used for yarn design and performance analysis. The paper presents in detail a graphical method based on this computer-aided graphics software through which important tensional characteristics for the structural and technological design of yarns can be highlighted quickly and precisely. These tensional parameters can give relevant information for a design that has in mind the transformation of the yarns into appropriate textile products from a qualitative point of view, as well as for obtaining sustainable finished products.

Keywords: yarns, tensile stress, AutoCAD, graphical method.

TEXTILE INDUSTRY IN BULGARIA AND THE COVID-19 EPIDEMIC: CHALLENGES AND TRENDS

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Abstract. The textile industry is an essential part of the economy of Bulgaria. The clothing industry, as a significant part of the textile industry, provides jobs to nearly 100 000 workers. However, over the last 2 years, the manufacture of clothes has undergone shocks and a series of difficulties due to the covid crisis. The pandemic, which arose at the beginning of 2020, raised numerous questions. The many restrictive measures, taken by governments, to limit the spread of infection and protection of human life and health have created many problems for specialists and workers in the field of textile production and sewing industry. An analysis of what is happening with the production of textiles, and in particular with the creation of clothing, in the pandemic situation, is necessary.The challenges that stand in front of the sewing industry are considered, namely: delaying or stopping the supplies of materials to manufacturers and ready-made products entirely to customers; release of workers from sewing companies as a result of reducing orders; closing shops due to reduced shopping of clothes; remaining collections in the warehouses of companies and shops due to the inability to sell produce; increasing the debt between companies and shortages of funds for materials and salaries. The main problems of the textile and sewing industry in the crisis, caused by the Covid Pandemic, were analyzed and evaluated in this paper.

Keywords: Textiles, Clothing industry, Covid crisis, restrictions, analysis, recovery.

Section 2:

Innovative textile structures and processing

THE INVESTIGATION OF THE EFFECT OF POLYMER BLENDING AND RADIAL FIBER ORIENTATION ON THE TENSILE PROPERTIES OF ELECTROSPUN TUBULAR VASCULAR PROSTHESES

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Abstract. Cardiovascular diseases cause the greatest global mortality and generally require a replacement for the diseased blood vessel as a treatment procedure. Autologous vessels and commercial synthetic grafts are sufficient to be used instead of large-diameter blood vessels. However, due to the lack of availability of autologous vessels and the inadequacies in clinical performance of these prostheses when used as small-diameter vascular grafts, which can lead to some problems such as intimal hyperplasia and thrombosis, there is a significant need for fabricating tissue-engineered vascular grafts that can fulfill the morphological, mechanical, and biological requirements. The vascular grafts should be made of biocompatible, biodegradable, and non-toxic materials. These materials should degrade in a certain period of time to allow the body to construct its native tissue. On the other hand, it should maintain the mechanical integrity until the revascularisation process is completed. Additionally, these scaffolds should have sufficient porosity and pore sizes to allow cell attachment, migration, and proliferation, whereas they should prevent blood leakage and satisfy the mechanical strength and strain at the same time to withstand the hemodynamic forces and be compatible with the surrounding tissues to avoid compliance mismatch. In this regard, utilizing biopolymers that can be processed by the electrospinning technique is considered a promising option for researchers because of the flexibility to optimise the design parameters for achieving the most efficient scaffolds. From the perspective of mechanical features, the tensile strength and strain values in axial and radial directions are crucial to resisting circumferential and longitudinal stresses induced by blood flow and neighboring tissues. Obtaining vascular grafts with improved mechanical characteristics could be achieved by utilizing synthetic biopolymers used in various forms and fiber orientation. In this study, electrospun vascular prostheses with radially oriented fibers made of polycaprolactone (PCL), polylactic acid (PLA), and their blend (50/50) are produced by using a 5 mm rotating collector and a rotational speed of 10,000 rpm. The results showed that the tensile strength values in the radial direction are higher than the ones in the axial direction, whereas tensile strain values are lower in radial directions because of the circumferentially oriented fibers. Neat PCL scaffold had the highest axial strain of % 811.22, while neat PLA graft had the highest circumferential tensile stress of 10.24 MPa. On the other hand, blending affected the mechanical properties negatively, with a small contribution to the strain value in the radial direction. Thus, it is considered that using copolymers instead of blending could be a better way to integrate the advantages of both PCL and PLA.

Keywords: vascular grafts, hemodynamic forces, electrospinning, circumferential orientation

SYNTHESIS OF HYBRID MEMBRANE OF POLYSULFONE WITH ZINC OXIDE FOR POTENTIAL APPLICATION IN CLEANING TEXTILE EFFLUENTS

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Abstract. Large-scale production requires sustainable alternatives in all procedures used in the textile industry, in order to minimize the negative consequences for the environment, with emphasis on fiber beneficiation processes and developments of textile materials. Due to the large volume of pollution of effluents from the textile industry, it is necessary to take treatment measures for the reuse or correct disposal of the material. The objective of this work is to produce a polysulfone (PSU) and zinc oxide (ZnO) membrane with potential use for cleaning textile effluents originating in the dyeing stage. The high volume of clean water used by the industry itself can be recovered from processes that make the water fit for use again, as well as the recovery of dyes dispersed in textile effluents may be possible through specific treatments. However, due to the complexity of textile effluents, composed of a variety of dyes, acids, bases, oxidizing and wetting agents, in addition to other contaminating residues, the treatment of these effluents becomes difficult and the use of several cleaning techniques for the removal of each type of waste becomes necessary. That said, the optimization of effluent treatment points to a possible circular economy practice within the textile industry. To produce pure and hybrid membranes, the phase inversion technique was used. The membranes produced were analyzed by FTIR and XRD. The results of the diffractogram of the membranes showed peaks characteristic of the PSU. The spectrum in the infrared region of the hybrid membranes showed characteristic polysulfone bands superimposed on the characteristic ZnO bands. Finally, the production of hybrid membranes of PSU and ZnO was successful and possibly has potential for use in cleaning textile effluents due to the antibacterial properties of ZnO together with PSU.

Keywords: Sustainability, textile effluent treatment, polymeric membranes, circular economy..

Section 3:

Smart textiles

ELECTRONICS IN SMART TEXTILES – AN OVERVIEW OF INTEGRATION TECHNIQUES

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Abstract. Clothing plays an important role in everyday life, satisfying two primary consumer needs, protection and aesthetics. However, with the quick evolution of technology, another function has emerged to satisfy consumer needs. This article presents and analyses the current state of integration of electronic components into clothing. E-textiles can be characterised as textiles with electronic components that are textile-integrated, textile-adapted, or textile-based integration. The way in which electronic devices are integrated into textiles influences their characteristics and the final look. E-textiles must be lightweight, flexible, provide comfort and safety, be easy to clean and maintain, and at the same time, to be able to transmit the information that was designed for. However, it is really important that textiles satisfy the wearers basic needs which have diversified over time. With the evolution of technology and the progress of all research in the field of e-textiles, a variety of methods of integrating electronic components into or onto textiles have been discovered. These methods are based on known technologies such as sewing, embroidery, knitting, inkjet printing, or electrically conductive adhesive soldering. Integrating electronic components into or onto textiles is an increasing challenge for researchers considering that the connections between electronics and textiles need to be less visible and more secure. The ideal in terms of connection between electronic components and textile fabrics is defined as an e-textile, which shows no visible traces of integration of electronic devices but can transmit the necessary information without any impediments. The goal of this article focuses on analyses and evaluation of the recent advances in the field of e-textiles. The study also evaluates and presents possible solutions for the integration of electronic elements within textile fabrics.

Keywords: wearable electronics, smart textiles, electronic textiles, conductive textiles.

Section 4:

Sustainable and functional textiles and clothing

RIPPED JEANS: THE DISCREPANCY BETWEEN QUALITY ASSURANCE STRATEGIES IN THE SUSTAINABLE PRODUCTION OF DENIM AND THE MARKET STRATEGIES OF FASHION MANUFACTURERS

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Abstract. Corporate responsibility in terms of compliant and sustainable quality products appears to be similar for denim fabric manufacturers and denim garment producers. However, although the stated policies are in the same register, the latter seem to apply different rules as they are more concerned with market success and increasing sales. Quality assurance in a high-performance denim weaving mill involves a comprehensive quality control strategy that should include online monitoring of the weaving mill, offline laboratory controls, denim finishing and washing tests to provide a diverse range of best quality products for the specific profile required by customers. The fashion industry and consumers are currently demanding sustainability, so denim manufacturing is focusing on sustainability more than ever. Quality management must include step-by-step quality control for the quality assurance strategy within the weaving mill, and at the same time the entire company must commit to addressing the need to develop sustainable processes and products. To gain customer confidence that denim fabrics meet global requirements, including sustainability requirements, the quality assurance strategy of denim manufacturers works with certifications and eco-labels. In the global denim jeans market, fashion brands have announced long-term sustainable goals. However, in some cases, they seem to ignore the ethical and environmental impacts of denim. For example, they neglect the extent of pollution and resource consumption in favour of market growth by developing specific products to meet and sustain high demand. The most important trend in the denim jeans market is the shift in consumer preferences from regular jeans to ripped, stained, cut-off and patched jeans. This trend has continued in recent years due to changing consumer lifestyles, influencers from social media, but also starting from the top jeans' brands. In this paper, a case study was conducted on the overall quality assurance efforts in denim weaving mills to meet the requirements of customers (fashion brands) for suitable properties of a range of stretch denim fabrics and the expectations of consumers as end users, as well as to ensure the commercial success of controversial garments from the point of view of sustainability, i.e., ripped jeans made from high quality denim fabrics.

Keywords: stretch denim, denim industry, quality assurance, sustainability, jeans producers, ripped jeans.

OPTICAL PROPERTIES OF TEXTILE MATERIALS FOR PERSONAL PROTECTIVE CLOTHING

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Abstract. The optical properties of textiles characterize the surface of a material and play a very important role in heat transfer through textiles, in the case of exposure to radiative heat sources (e.g. protective clothing for firefighters, steelworkers, military, etc.). Regarding the thermal protection of clothing from radiative sources, the biggest hazard is represented by the open flame as a result of materials combustion. Since the adiabatic flame temperature of common fuels is usually between 1250 K and 2500 K, then the dominant wavelength of radiative sources is in the region of near-infrared radiation (700 nm – 2500 nm). The experiments in this study were carried out with the aim of analyzing the influence of chemical composition and colour on the optical properties of textile materials, which in turn influence radiative heat transfer. In this regard, the reflection and absorption coefficients were experimentally determined for three types of materials used as outer layers for protective clothing for firefighters. The reflection and absorption coefficients of the textile samples were measured using a Fourier Transform Infrared (FTIR) Spectrophotometer (IR Prestige-21 from Shimadzu). It was found that both the chemical composition and the colour have a significant influence on the optical properties of textile materials. The layout of the graphs is similar for the optical properties of textiles that have the same fiber composition and structure but different colors. The differences between the values of the optical properties that are due to colour reach up to 40% in the case of absorption coefficients. The influence of the fibrous composition on the optical properties is also important, emphasizing the importance of the proper selection of textile materials in designing protective clothing. It was also observed that for the wavelengths corresponding to the visible range, the differences between the values of the optical properties of the materials tend to decrease a lot. In other words, these materials prove their functionality in the infrared spectrum of electromagnetic waves, the field where the thermal effect of radiation is most pronounced.

Keywords: reflection, absorption, thermal radiation, protective textiles, spectrophotometer.

THE FUTURE OF TEXTILE WASTE MATERIALS IN CONSTRUCTION

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Abstract. Concern in recent decades about environmental degradation has grown exponentially, fulminating since the emergence of specific strategies to overcome climate change, such as the European Green Deal (2019-2020). Due to the linear consumption model that produces effects on the environment in every phase of the products life cycle, the textile industry sector is considered one of the most polluting sectors. Directives and regulations on the disposal of waste materials have already been established in the EU, in terms of landfill disposal, waste incineration and the development of more sustainable waste management systems, which focus on both environmental protection and the reuse of textile waste (WFD 2008, EU Directive 2018/851) which set new rules on waste management and new recycling targets. Following the study of specialized literature, an increased attention is paid to the reuse of textile waste in the context of the global trend of approaching circular strategies. The reuse of textile waste in construction is one of the most long-lasting ways of extending the life cycle of textiles or of long-term recycling. The ecological footprint of the construction sector can be significantly reduced by using systems based on textile waste, thus creating the conditions for the improvement of environmental conditions in large urban agglomerations. Textile fabrics can be used in constructions with a resistance role in the form of plates, blocks or linear elements, with a thermal insulation role (cotton, wool, hemp, polyesters, acrylics, nylon, polypropylene) or in the form of insulating panels or blankets, either in the form of heat-insulating materials and with the role of sound insulation. The global demand for composite materials is increasing, allowing new products to enter the market and helping to reduce the negative impact on the environment by exploiting unused textile waste. Composites retain the properties of the elements used and sometimes have superior physical and mechanical properties. Technological variants and short value chains to produce composites ensure the success and economic reliability of the studied solutions. Entering the building materials market, however, requires a constant flow of raw materials to reach industrial scale, but fibres recovered from various waste streams are suitable for reinforcing concrete and the advantages of using such recycled fibres often include lower processing costs. Further research proposes several solutions for making products based on textile waste used for the thermal insulation for new and old buildings, with a model for studying the thermal properties of an insulation blanket by combining a textile material with one already used for building insulation. An important place is occupied by the deepening of the study regarding these products and systems of heat-insulating facades and their method of application at the level of current needs of society.

Keywords: textile recycling, reuse, building insulation, composite materials, textile fibres.

CARE OF PREMATURE NEWBORNS IN NEONATAL THERAPY BY THE SKIN-TO-SKIN METHOD - A NEW DESIGN SOLUTION THAT OFFERS SAFETY AND EFFICACY

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Abstract. Neonatal therapy wards are currently working with topics that reflect the issues of care and opting for new design solutions that optimally support the provision of high-quality, family-integrated support and that support the development and growth of premature newborns in appropriate conditions. It is known that initially NICUs were not intended for parents to be present with premature babies and there are huge differences in the quality and facilities of NICUs in Europe. As such, it is about a new concept, a new approach for the parent to be an integrated part during the treatment. Certain facilities are created to bring parents and their children together to make the neonatal intensive care a good place for the well-being and treatment of patients." The intensive care unit in Chisinau supports safety and healing through unrestricted parental presence, the use of sensory support materials and optimal work facilities, promoting close collaboration between families and staff in the care of the sick newborn. The work reveals the aspects related to how important the bond between parent and child is in neonatal therapy. A new design of a clothing product that can be used in the care of children through the skin-to-skin method is presented. Some recommendations are made regarding the correct positioning of the child during certain medical procedures with the presence of the parent.

Keywords: premature babies, neonatal therapy, parents, medical procedure.

A REVİEW ON KNITTED FABRICS PRODUCED FROM SUSTAINABLE HEMP FIBER BLENDS

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Abstract: Sustainability is to keep the negative effects on the ecosystem at a level that does not exceed the capacity of the system by limiting the use of non-renewable resources to be transferred to the next generations. Along with many other industries, the textile industry is one of the most environmentally destructive sectors. For various purposes, the textile industry consumes a lot of water and chemicals. It is advised to modify inefficient production processes, reduce packaging, change raw materials, consider energy efficiency, and use less water to reduce waste generation and its potentially fatal effects on the environment. Therefore, the concept of sustainability is crucial for textile companies to minimize environmental damage and maintain ecological balance, and several studies are being conducted in this field. To enhance sustainability in textiles, the selection of sustainable raw materials, textile manufacturing, mass production, packaging, labeling, and global distribution of textiles must all be addressed. The use of fibers that are renewable, biodegradable, and recyclable is suggested as a potential solution for each of these serious issues affecting the textile and clothing sectors. Since ancient times, plants and animals have been utilized all over the world to produce natural fibers for textiles. Later, man-made or synthetic fibers were used instead of natural ones due to a shortage of natural resources. To overcome such a demand and maintain sustainable production, alternative natural and biodegradable fiber such as hemp fiber have been recommended in recent years for their unique properties. Hemp is a material that gains importance day by day in terms of scientific, sectoral, and economic aspects due to its renewable and sustainable character, biodegradable, and multi-purpose product. It is little affected by heat and withstands high temperatures. There is no problem with pilling and static electricity. Less water and fertilizer are used in hemp production than in cotton production. This study aims to examine knitted fabrics produced using sustainable hemp fibers, the blend ratios of hemp fiber with other fibers, the spinning of hemp fiber, the advantages and disadvantages of their usage, the current market scenario, and application areas.

Keywords: Sustainability, sustainable fibers, knitted fabrics, hemp fibers

MODULAR CLOTHING DESIGN FOR PREMATURE BABIES

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Abstract. The concept of modular clothing can be characterized by obtaining clothing products that can be reassembled from different modules. A modular garment is one that can be disassembled into different parts or modules and reassembled at the will of the wearer. This is generally achieved through a variety of closures, from buttons and zippers to snaps and Velcro. The product elements can be fixed to add or change one of the product features. And then there is the more flexible version - geometric modularity where a product can be folded into a different size or shape. In the work, I presented how we can obtain more clothing products intended for premature babies. We focus on the diversification of the elements because they give us the opportunity to obtain the products of the appropriate dimensions. Currently, the trend towards modular clothing is more and more common, it offers the possibility for the clothing to be functional. Functional products are necessary for the category of wearers studied, being those that satisfy certain of their requirements. Methods were used to observe the types of movements performed, the medical devices to which they are connected, the position in which these wearers sleep. After that, functional modular systems were designed that offer the possibility to cover the child's body, minimizing the number of seams and optimizing the process of dressing and undressing through holes specially adapted for medical equipment.

Keywords: premature babies, medical echipment, parents, medical procedures.

APPROACHES TO RECYCLING IN THE FASHION INDUSTRY (UPCYCLING)

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Abstract. The process of recycling in the fashion industry began to take a full scale due to the disastrous effects on the environment, as the industry is considered one of the biggest polluters globally. Clothing products become waste when they reach the end of their life cycle due to the increasing number of new products on the market and because they no longer meet the consumer's needs or wants of being usable (they are no longer aesthetically pleasing or corresponding dimensionally). Thus, by introducing the upcycling process, among others, a new door opens in terms of creating a continuous loop for the reduction of clothing waste. This study aims to present some theoretical aspects regarding an improved method of applying the upcycling process by studying in detail the conditions that must be met for a clothing product to be viable and compatible for this approach, taking into consideration some constructive and technological parameters. The end of life of clothing products could be seen not only as a material ready to be recycled but more as a base for building a new and improved garment, by applying a new design or decoration. The proposed method is based on the creation of a continuous upcycling process by using in the manufacture of the new product a sewing thread with properties of complete dissolution at high temperatures, thus reducing the time for disassembling the old product. One of the important advantages of this method is the fact that in this way we can definitively close the loop of recycling clothing products, thus reducing the effects of environmental pollution. Although at the moment, studies for this approach are limited to denim products or products with well-defined properties to withstand high temperatures, it has a lot of potential. This approach is an innovative one and has real potential in the design process in the context of the circular economy. The study revealed that although there are similarities between standard approaches and upcycling processes, the latter requires specific considerations to achieve the most efficient design and production processes. This includes sourcing fabrics earlier in the design process as well as ensuring that patterns and technical details are consistent with available material resources. Upcycling is a process that can ensure the reduction of the volume of clothing products from landfills. This method is also beneficial for reducing carbon emissions and other negative effects that are not beneficial to the environment.

Keywords: fashion industry, recycling, upcycling, processes, innovation, design, environment.

RESEARCH ON THE INTERDEPENDENCE OF STRUCTURE AND COMFORT CHARACTERISTICS OF TEXTILES FOR TRADITIONAL SHIRTS

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Abstract. European cultural strategies focused on unity through diversity, valuing multiculturalism and intangible and material cultural heritage involve a greater focus on traditional costume. The aspiration of Romania and the Republic of Moldova to include the traditional shirt with altita in the UNESCO Representative List of the Intangible Cultural Heritage of Humanity is another argument that determined the necessity of this study. Just as the traditional costume is a subject of transnational interest, several communities have been initiated preoccupied with the revitalization of the traditional costume both in Romania and the Republic of Moldova. The objective of revitalization and voluntary reintegration of the pieces of the traditional costume in the circuit of the current clothing products as an element of national identity entails several necessary topics to be solved. One of these is related to the identification of the textiles from which one of the important pieces of the suit-shirt is to be made. It must be as faithful as possible from the aspect of aesthetic characteristics, but also the functional, technological ones. Because the traditional shirt presents a secular codified history with symbolic connotations of great identity importance, everything that determines it is chosen with great care. In order to ensure the irreproachable fidelity of the traditional shirts made today with the historical ones, the creators strive to choose for them homemade cloth obtained by hand through the same traditional technologies, aspiring to ensure the same characteristics of the products. The structure characteristics of the handmade fabrics influence the aesthetics of the integral product, especially the quality of the aesthetics of the reproduction of the symbolic ornamental elements that form the structural-compositional ensemble of the reproduced history. At the same time, they determine the comfort characteristics of textiles. The work presents the results of the study of the interdependence of the characteristics of structure and comfort as being in a direct dependence. The study was done within the State Project 20.80009.0807.17. "Education for the revitalization of the national cultural heritage through traditional processing technologies used in the Republic of Moldova in the context of multiculturalism, diversity and European integration", running at Technical University of Moldova.

Keywords: codes, mesage, traditional shirt, ornamental motifs.

THE TRADITIONAL ROMANIAN COSTUME BETWEEN AESTHETICS, COMMUNICATION AND SUSTAINABILITY

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Abstract. The ancestors bequeathed us a huge material and immaterial treasure resulting from their cognitive, creative, artistic, graphic, structural, technical, mathematical, etc. skills that directly materialized other skills such as communication, thinking, psychosensory, etc. The traditional Romanian costume presents the result of the integrated functionality of all abilities. The analysis of the identity characteristics allowed the finding of its survival in time, testimony being the long life span of over 150 years. Each piece of the traditional costume was conceived as a result of the profound analysis of the correlation: medium-functionality-spiritual aspirations/values-carrier-materials-constructive solutions-technological solutions-destination. The objective of the study was focused on analyzing the aesthetics and sustainability of the traditional costume, identifying solutions in this regard offered by our predecessors. The applied research methods are: direct observation, comparative analysis, semantic analysis, visual evaluation of museum traditional costume collections, materials used, structural analysis and their positioning within the costume, analysis of constructive and technological solutions of costume pieces, field interviewing, analysis of photographic materials. The result of the study allowed the finding that the traditional costume presents a code of aspirations of the wearer or creator codified by the ornamental motifs organized in compositional modules, respectively in ornamental registers. The arrangement of the ornamental registers in the morphological structure of the traditional costume pieces forms the image of the costume correlated with the image of the wearer, with the anthropomorphological and conformation peculiarities. The coded messages hidden in the language of the ornamental motifs have made the pieces of the traditional costume timeless products through their continuous actuality, characterized by unity through diversity. The depth of the aesthetics and the symbols of the traditional costume is accentuated by the sustainable solutions offered to us by the ancestors. They refer to: the constructive solutions focused on the elements of regular geometric shapes, the high degree of lightness of the shirts allow their use throughout the wearer's life with all the morphological and conformation changes supported during life, the use of techniques for combining the elements through the keys ensure an unrepeatable aesthetic shirts, suggestively capitalize with finesse and elegance the elegance silhouette lines, but also ensure the resistance of the joints to various dynamic stresses of any complexity and extension. Each piece of the traditional costume represents a wise guide of aesthetic, functional and sustainable solutions offered for the wearer to meet the societal challenges, to communicate, to be environmentally friendly, thus also ensuring the protection of the environment, to be healthy and to highlight the cultural values of the people and the personal values of the wearer. The study was done within the State Project 20.80009.0807.17. “Education for the revitalization of the national cultural heritage through traditional processing technologies used in the Republic of Moldova in the context of multiculturalism, diversity and European integration”, running at Technical University of Moldova.

Keywords: codes, mesage, traditional shirt, ornamental motifs.

GRAPHICS, SYMBOL AND TECHNOLOGIES OF MAKING TRADITIONAL MOLDOVAN CARPETS

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Abstract. The cultural traditions of a nation, a people are reflected in the symbol, graphics and technologies of making popular wear products. The linear graphics, the chromatic ornament, framed in structural compositional rigors educated over long periods, denote the cultural cultivation of the people for centuries. Traditional carpet weaving technologies preserved over time reflect spiritual as well as economic development. Adaptation, graphic elements and borrowed weaving technologies led to the development of the popular wear product and the carpet itself. The traditional carpet is a product with a considerable lifespan and at the same time it is the product that transmits, but also preserves over time, the symbolic and graphic elements of the woven motifs. Production technologies reveal to us a rather varied palette of ornamental motifs, broadening the product's destination. Each period of carpet development promotes a basic ornamental motif. The rose motif is predominantly characteristic of the 20th century, the tree of life motif identified as an authentic motif is found in the 19th and 20th century carpet. The use of motifs of the "tree of life", "comb" or "palm", "shepherd's hook" in the ornament of the carpet, characterizes the authenticity of the product. The way of organization, the graphics of the ornament changes over time, taking over foreign cultural influences, in this way the dry carpet. the 19th reflects the stylized graphic of the ornament motif loaded with elements of symbol and legend, the graphic of the sec. the 20th makes attempts at realistic accounts of the ornament.

Keywords: chromatics, destination, ornament, weaves.

Section 5:

Fashion design and product development

DIGITALISATION IN THE SUPPLY CHAIN OF THE FASHION INDUSTRY- STUDY CASE

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Abstract: In today's world, the industrial revolution is focused on digitalisation and sustainable manufacturing processes for products at optimal costs, but in an environmentally friendly way. Among consumer goods industries, fashion has one of the largest and most complicated supply chains. Thanks to globalisation, players in the worldwide supply chain of textile products now have the opportunity to identify and implement new (digital) solutions to make their activities as efficient as possible, build networks that involve all entities(suppliers/buyers/partners), communicate as quickly as possible and maximise their company's chance of success in this field. The fashion industry is dynamic, because it has to face all kinds of challenges, both from consumers and from competitors in the market. Digitalisation brings important changes in the production processes. It offers the possibility of developing new models/collections in the shortest possible time and of deciding whether the developed products meet the customer's requirements. The choice of digital tools must be based on the structure of the products that the company manufactures: fashion products (clothing), protective products, medical products, sports gear, automotive, etc. This paper presents the main stages and elements of the digitalisation process of the production, marketing and distribution of fashion items and analyses them through case studies (SWOT analysis).

Keywords: fashion industry, manufacturing processes, digitalisation, case study, textile.

DIGITAL TOOLS FOR THE DEVELOPMENT OF CLOTHING PRODUCT COLLECTIONS

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Abstract. The fashion sector makes up a significant part of the global economy. It has been hit hard by the economic crisis caused by the pandemic, but also by industrial trends and changes. In response to these factors, many companies have restructured their creative/manufacturing processes to use sustainable technologies - digital technologies. The conceptual development of the new model is carried out by using 2D/3D digital tools, as the latter allows the designer to explore multiple solutions for designing new models tailored to the customer's needs or fashion trends. The digital design process of the models of apparel products, through the use of tools and libraries that are specific to the software that is employed, leads to a reduction in the development time of the new model, facilitates communication between the departments of a company and allows the adoption and implementation of the measures that are necessary in order to streamline the manufacturing and processing stages in a sustainable manner. Designing the shapes of garments by using 2D digital tools to create 2D patterns that are then converted into prototypes by using 3D methods offers the designer the possibility of creating customised products and models (fashion on demand) that meet the customer's requirements to the best possible extent. By employing various models, the authors of this article show how one can select and use Gemini's digital tools in order to develop new models for garments

Keywords: 2D/3D digital tools, garment design, 3D virtual prototype, Gemini CAD

VIRTUAL FITTING ROOM AND ITS POTENTIAL IN E-COMMERCE

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Abstract. The purpose of this study is to develop and present a solution for online commerce in the fashion industry. The solution to be implemented has an integrated virtual fitting room, with an archive of 3D avatars, that can be used in order to simulate the customers body, which then can be dressed according to the style that the client desires, and also can be seen from different angles (360). This helps the customer form an accurate opinion of the style, motion and also if the garment is fitted for her/his silhouette. In order to project and develop the dynamic fashion avatars 3D, the CLO3D software was used. This software helps us create a solid database of avatars, that includes 4 types of silhouettes, different heights and a wide spectrum of sizes (34EU-52EU). As for the construction of the patterns that were used in the simulation of the avatars, we used Gemini Cad Systems. Also, in this study you will look at different types of garments on silhouettes that are not necessarily well balanced, with different proportions than the standard ones, elaborating in this way solutions and recommendations for the eventual misfits that the client might encounter in the virtual fitting room. Another aspect that we will look at in this study is the current status of 3D virtual simulation systems and their impact on the Fashion Industry, different types of views and approaches on avatars, advantages and disadvantages, and how can this be implemented on e-commerce platforms. Finally, this study leads to discussions regarding the advantages of 3D fashion, using virtual fitting rooms in order to have fewer returns from e-commerce, in the fashion industry, and also happier and more satisfied clients, that find products which fit their body properly, according to their silhouette and measurements.

Keywords: virtual fitting room, dinamic fashion avatars 3D, e-commerce platforms, sustenability, fashion industry

INSPIRATION FOR A SUMMER COLLECTION: MEDITERRANEAN LIFESTYLE

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Abstract. Changes in lifestyles during the pandemic have significantly affected the clothing preferences of many people. In this process, the resort collections have often been used by the designers and the brands to respond to these changing needs. Resort collections provide relatively more space for the designer to create original value. Within the scope of the study, the design process of the Maviterranean collection, inspired by the corresponding culture, will be explored exclusively and evaluated in terms of cultural sustainability. Mediterranean culture has inspired many designers and brands in terms of lifestyle, architecture and cultural values for years. The process starting with definition of the theme till the creation of a prototype for the women's denim and non-denim 2021 and 2022 summer collections will be evaluated. The context of the study is limited to certain stages of the product development process since the goal was to keep the focus on the perspective of designers. Case study was employed as the research method. Within the scope of the collection, it has been observed that the architectural and decorative details of the Mediterranean towns, local fabrics, handicrafts and the evil eye bead symbol were integrated to the collection physically and spiritually. The 2021 summer collection was based on the "evil eye bead in Mediterranean culture". Innovative batik and garment dyed styles inspired by the colors of Evil Eye Beads, traditional embroidery and patterns have been reinterpreted based on today's trends in the collection of 540 variants, which includes logo, graphic and pattern works in which the form of the bead is stylized. The 2022 summer collection was created with the theme of "Mediterranean as a Lifestyle". Architectural and decorative details of Mediterranean towns, local fabrics and handicrafts, and the colors of the coastline were the main inspirations of the theme. The fabric portfolio was developed by interpreting the fabrics that imitate the softness and permeability of the local woven and knitted surfaces of the Mediterranean and evoke local patterns with current fabric technologies. A product group of 200 pieces was created in line with today's product fit. As a result of the study, the transformation process of the determined themes into products has been revealed both with their structural and physical characteristics. This study provides valuable insights into the contribution of a fashion brand, Mavi, to cultural sustainability, by choosing local materials and production methods within the framework of the Mediterranean culture theme.

Keywords: Mediterranean culture, cultural sustainability, resort collection, collection development process, local values.

DIGITAL WEAVING DESIGN WITH EXTRA THREADS BASED ON ARAHWEAVE SOFTWARE

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Abstract. The reason why addressing these types of structures is their practical relevance for use in a wider context, including weaves for figured ribbons, luxury fabrics for clothing, decorative woven fabrics for home textiles etc. The cultural factor could be the primordial factor used as source of inspiration for fabric designers. From this perspective, the revival of Romanian motifs can preserve the traditional culture and can improve the new textile designs. In this paper, are exemplified the advantages of digital weaving design process based on ArahWeave program, on decorative fabrics inspired by Romanian traditional motifs. The extra threads criteria, weave patterning variables and technical specifications are analysed too. The woven fabrics with extra threads are decorative patterned fabrics, which may be produced by introduction of a separate set of extra warp or/and weft threads in addition to the ground threads. The extra threads appear dominant in decorative register, are different in colour and structure of the ground threads, and float on the face and reverse of woven fabric after a certain composition and ratio. In this way, it is possible to obtain woven fabrics with decorative registers, oriented only in the warp or weft direction, or in both directions. The author explores the advantages of using ARAHNE integrated CAD/CAM software, with a focus on fabrics with extra threads of decoration. The ArahWeave is a market-leading program for the design and weaving of dobby and jacquard fabrics, which covers the entire production process, from the creation using Computer-Aided Design (CAD) right through to production Computer-Aided Manufacturing (CAM). The ArahWeave program also supports ultra-realistic simulation of woven fabrics and the preparation of technical documentation for production and loom threading, which shortens product launch times and prevents possible mistakes in the manufacturing process. Textile designers can use ArahDrape, a texture mapping program that helps to create simulations of the final products and so, to make a better presentation of their fabrics.

Keywords: decorative woven fabric, extra warp, extra weft, simulation, ArahWeave, ArahDrape program.

Section 6:

Innovations in textile finishing

ESTABLISHING THE OPTIMAL METHOD OF SCOURING - BLEACHING FLAX FIBRES USING A MATHEMATICAL METHOD BASED ON EQUALLY IMPORTANT CRITERIA

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Abstract. Flax is a natural, sustainable fibre with various colors (from gray to brown) that indicate the degree of maturity of the plant and the appearance of defects when the plant is affected by certain diseases. The processing of flax fibres to give a pleasant whiteness is necessary to be able to use them to obtain clothing, bed linen, kitchen towels, upholstery, canvas for painters, decorative objects. The flax fibres were treated for scouring and bleaching, with different substances specific to the two operations. Several variants of treating were tested (12 for scouring and 5 for bleaching), obtaining 60 variants of flax fibres with different degrees of whiteness. The scouring treatment was performed so that in some versions a cotton-like softness is obtained, and in others to preserve all the specific characteristics of flax. Using as a mathematical method, the Onicescu method (version I) based on equally important objective criteria, the hierarchies of the scouring - bleaching methods were determined according to the effects obtained: degrees of whiteness, resistance to breaking and elongation to breaking. The degrees of whiteness were determined on a spectrophotometer and the mechanical properties on a dynamometer. The hierarchical series obtained can be useful to those who want to obtain white flax in which one of the listed effects predominates.

Keywords: flax, scouring, bleaching, mathematical method, softness, degrees of whiteness .

FORMULATION STUDY ON THE PREPARATION OF FOAMS FOR FOAM DYEING OF DENIM FABRICS BY USING REACTIVE DYES

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Abstract. The paper discusses the rationale and the outcomes of formulating a dyeing foam capable of incorporating and delivering large quantities of two distinctive types of reactive dyes (a phthalocyanine one, Reactive blue 15, and an anthraquinone one, Reactive blue 4), which are typically used at technological scale for dyeing cotton and cotton-polyester fabrics of denim type. The investigated formula includes all the necessary components for its application on industrial equipment: a foaming agent, a dispersant, a thickener, an antiprecipitant, the dyestuffs, a lubricant, and alkaline fixing agents. All components are of commercial type and of industrial grade. The foam was produced in two steps, by air bubbling and by intense stirring. A formulation study was performed according a mixture experimental design with three variable factors consisting in the correlated amounts of the foaming agent (Lutensol ON 110), the dispersant (Sokalan CP 12S), and the rheology modifier (xanthan gum). As a response, the foam stability was measured, considering the half-time decay. The statistical-mathematical model of Scheffé type was used to interpret the synergistic / anergic dependencies between the influencing factors, in order to perform a pre-optimization study of the formula. Such a study is useful during the technological adjustment of the foam dyeing equipment, and for establishing the liminal operating conditions.

Keywords: dyeing foam formulation, industrial applicable formula, complex foaming mixture, experimental design, pre-optimization study.

ACHIEVEMENTS AND LIMITS ON THE CHEMICAL CHARACTERISATION OF MEDIEVAL SILVER COINS IN MOLDOVA TERRITORY

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Abstract. Moldovian history has a rich collection of ancient objects which is able to give a round image on culture, traditions, weapons and numismatic elements from old times on these lands. The paper presents experimental results obtained by combining non-invasive techniques (optical microscopy - OM, fluorescence spectroscopy X rays- XRF) in determining the degree of degradation of the composition and structural characterisation of silver coins belonging to the treasury of Iasi, dating from the 16th and 17th centuries. In this study are analysed by non-destructive methods, coins from nine locations, archaeological pieces from the Moldavia's History Museum - "Moldova" National Museum Complex of Iasi. Based on the numismatic inventory, the nature of the composite materials has been identified. A study of the surface analysis of metal artefacts (optical microscopy) was observed physical damage processes (cracking, fragmentation, grinding or erosion) chemically altering generated by the soil conditions. The arrangement of the elements in the corrosion crusts is achieved by XRF determinations directly on the artefacts or by SEM-EDX surface assessments. Following investigations by XRF analyses were obtained important data regarding the chemical composition and fakes determination. These data have been introduced into a database which is active in the field of Romanian museums.

Keywords: hoard of coins, numismatics, degree of degradation, MO, XRF.

Section 7:

Footwear design and technology

ONLINE METHODOLOGIES AND ASSESSMENT FOR DIGITALFABLAB COURSE – PART 1

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Abstract. The DigitalFABLAB project is using the opportunities proposed by Augmented Reality to create an entirely digital, captivating, reachable from everywhere, and engaging footwear FabLab that is offering an unmatched learning-by-doing experience to a large group of people worldwide. The training programme includes units, learning outcomes, the structure of each unit, and delivery strategies and assessment methodologies for online learning. The training program is designed for a complete program of 500 hours of virtual training. It will grant 20 ECVET (European credit system for vocational education and training) points, covering competencies that are usually developed in practical learning. The programme addresses the whole footwear manufacturing process from design, product engineering, cutting, stitching, assembling, and finishing. The DigitalFABLAB training programme developed by the project's consortium is structured in 11 Units, with different time loads corresponding to specific learning outcomes. In addition, five online collaborative workshops with other Vocational Education and Training (VET) providers for validation and capturing good practices in online methodologies and assessment were held in Portugal, Poland, Spain, Italy, and Romania. According to findings revealed by participants in all countries, adjustments have been made to units and suggested improvements will be considered for developing the content of the DigitalFABLAB.

Keywords: digital training, augmented reality, practical learning, footwear manufacturing, VET providers

ONLINE METHODOLOGIES AND ASSESSMENT FOR DIGITALFABLAB COURSE – PART 2

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Abstract. Footwear FabLabs are shared workspaces where students can benefit from the equipment and technologies to develop and create shoe products and components. DigitalFABLAB aims to be an additional step toward the digital transformation of footwear Vocational Education and Training (VET) in Europe. Consequently, two audiences will be mainly targeted by project activities: the education community, composed of professional school VET teachers, technology centres trainers, and High Education VET professors; current and prospective footwear students. New, innovative VET practices must be adopted to attract new professionals, reduce the skills gap between Education and Work, and adapt to a highly digitalized world. The project will build on the latest technologies by simulating real-world experiences in a fully digital FabLab. The goal of the Joint International course for digital "Learning by Doing" on Footwear manufacturing is co-creating a digital joint international course for practical learning on Footwear manufacturing, supported by practical already existing Units of Learning Outcomes (ULOs), integrally anchored in digital strategies. This article continues to reveal the findings of the five collaborative workshops held in Portugal, Poland, Spain, Italy, and Romania, where the VET providers from each country have validated and proposed improvements to the methodologies and assessment of the content of the DigitalFABLAB courses.

Keywords: digital training, augmented reality, practical learning, footwear manufacturing, VET providers

THE DEVELOPMENT OF AN ANDROID APPLICATION FOR THE INTEGRATION OF A DATABASE WITH SHOE LASTS AND FOOTWEAR MODELS

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Abstract. At every moment of our lives, whether we are at work or home, gadgets or phones are the main objects that surround us and that we use. Like any other field, the footwear industry is progressing due to the implementation of new technologies. Thematic applications, developed for Android and iPhone operating systems, are not missing from the play store. This research aims to develop an application that will ease the process of choosing the shoe lasts by the user. A footwear model has been made for each last to give the user a more accessible view of the possible types of shoes that can be manufactured. The application development was carried out with the help of the particular software, Android Studio. The shoe lasts, and models were obtained using Mind CAD 3D Last Design & Engineering and MindCAD 3D Design & Engineering. The application can be of great help to both freelancers and footwear companies to make faster filtering of the lasts needed to design certain types of footwear. Also, the model attached to the database can ease the work of the designer and the manufacturer. Each shoe last has a series of measurements assigned to it so that it can be more easily identified according to customer needs.

Keywords: footwear lasts, footwear products, digital application, lasts' measurements.

SOFTWARE APPLICATION FOR FOOTWEAR CARBON FOOTPRINT CALCULATION

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Abstract. Due to the fast fashion trend, footwear companies are facing new challenges and they must adapt their strategies to satisfy consumer needs and become sustainable. To achieve this the companies should improve energy and material consumption and eliminate hazardous substances from the production phase. Unfortunately, the lifespan of a pair of shoes is falling not because they are not functional but because of overproduction and consumer purchase habits. In 2019 almost 24 billion pairs of footwear were produced worldwide which leads to an enormous quantity of greenhouse gas emissions (GHG). To determine the total emissions is necessary to calculate the carbon footprint of the product taking into consideration all the activities involved in the life cycle of a product. This paper provides a brief overview of the environmental impact of the footwear industry and presents the methods of calculating the carbon footprint over the life cycle. In the manufacturing industries, the carbon footprint is used as an inventory element of the product's life cycle to show their commitment to reducing the environmental impact on the one hand and to certify the sustainability of their products, on the other hand. The footwear industry is well known as a polluting industry that's why is necessary to act for sustainability along the whole value and supply chain, by reducing their carbon footprint. To achieve this, there are some software can help companies to calculate the carbon footprint of their products. The objective of this paper is to present various software used to determine the carbon footprint, especially for footwear products.

Keywords: sustainability, life cycle, environmental impact

CONTINUING VOCATIONAL EDUCATION AND TRAINING IN ROMANIA FOR INDUSTRIAL SHOE PRODUCTION

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Abstract. This paper highlights vocational training standards, professional qualifications, training programs, and mechanisms for recognition of prior learning of the Romanian CVET system and the existing study programs that address the footwear sector. The findings will support the development of curricula for work-based learning in industrial shoe production, including structure, schedule and assessment methods. This review was developed within the Erasmus+ project "Developing Innovative and Attractive CVET programmes in industrial shoe production" (DIACVET). In many countries, Vocational Education and Training (VET) is considered a second choice for those who failed to reach Higher Education (HE). Also, VET has a rather poor image and offers limited career opportunities in terms of Continuing Vocational Education and Training (CVET). Thus, more challenging occupations like working for the Quality Assurance (QA), Design or Production Planning departments are reserved for people with an educational background from HE. Therefore, developing and strengthening CVET is a crucial element to increase the attractiveness of VET and assuring its high quality. DIACVET project aims to develop, pilot and implement comprehensive courses for the foremen in industrial shoe production and to develop a sector qualification framework level to reference existing or newly drafted national qualifications in partner countries. The project also addresses the challenge of accepting Learning Outcomes (LO) from another learning venue, hiring a skilled foreman from another country, or trusting national qualifications from another country by ensuring transparency at CVET levels within the shoe sector for all stakeholders.

Keywords: CVET, footwear, training standards, curricula.

Section 8:

Ecology in textiles and leather processing

TOOLS AND COURSES OF ACTION FOR ENVIRONMENTAL SUSTAINABILITY IN THE TANNING INDUSTRY

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Abstract: Nowadays, practicing sustainability is a key aspect for any business organization and most companies can no longer survive without including sustainability in their operations. As a global consumer's good industry, leather making is facing the increasing constraints imposed by the sustainability commandments related to the social, economic and environmental dimensions. The last decades experienced massive changes in the leather industry in terms of environmental protection (mainly regarding the reduction in chemicals, energy and water usage), the ethical treatment of the workforce or fair trade practices. Tanneries, alongside brands, manufacturers and retailers, are under pressure from environmental organizations and consumers to deliver a cleaner, more economically efficient and more ethical leather industry. Tanneries work under a series of rigid rules and an increasing stringent legislation and with a great deal of concern about sustainability issues, at a time when the tanning sector is facing risks related to leather's dependence on the meat production, little vertical organization in the leather supply chain, lack of traceability of hides and skins, lack of responsible chemical management, which all result in leather quality issues. The aim of this paper is to shortly review the main challenges faced by tanneries in the pursuit of sustainability, having in mind that the tanning industry is in interconnection with the other components of the whole value chain of the leather sector. Current actions undertaken in order to improve the environmental performance of the tanneries and the key global or local organization that promote the approach of the sustainability issues that are relevant to the leather industry are reviewed. It also describes some available tools to implement a sustainability policy in the tanning sector companies as well as the 10 most cost-effective pollution prevention actions needed to increase the sector efficiency and lower the environmental and human health impact of the tanning sector. As leather manufacturing involves use of many hazardous chemicals, which are harmful and toxic to humans and environment, special attention is paid to guidelines and regulations on the chemical management in tanneries. The most popular certifications awarded to companies in the leather sector to demonstrate the fulfilment of sustainability standards and performance are also mentioned.

Keywords: environmental impact, sustainable production, eco-friendly leather, sustainability policy, chemical management

UV-ABSORBING NATURAL PRODUCTS AND THEIR POTENTIAL APPLICATIONS IN SUN-PROTECTIVE TEXTILES

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Abstract. Over the past decades, several methods have been developed related to increasing the resistance of textile materials to UV radiation, both in the spinning-weaving and the finishing stages. The degree of protection of textiles against ultraviolet (UV) radiation depends on many factors, such as the chemical composition and fineness of the fiber, the thickness, porosity, and density of the fabric, the history of treatments applied during preparation, dyeing, and finishing processes. Different organic or inorganic compounds (like zinc oxide, whitening agents, natural and synthetic dyes etc.) possess UV blocking ability and are known as UV absorbers or blockers. Acidic alcoholic extracts of rosehip from dog roses and cranberry were obtained and studied with regard to their antioxidant activity and ability to impart sun protection properties to textile materials. The characterization of the plant extracts was carried out by determining the antioxidant activity by the chemiluminescence method, and by FT-IR and UV-VIS spectral analysis. The antioxidant activity of cranberry extract is about 30% higher than that of rosehip extract, and the 1:1 mixture of the two extracts have the antioxidant activity equal to that of rosehip extract. The higher antioxidant activity of cranberry extract compared to that of rosehip can be attributed to the presence in its composition of large quantities of compounds with proven antioxidant capacity, namely anthocyanin, delphinidin, cyanidin and genistein; in the mixture sample these compounds may interact with rosehip-specific compounds, such as pelargonidin and malvidin. The FT-IR spectra of extracts indicate the presence of peaks that are assigned to the functional groups of polyflavonoids. The FT-IR spectra of both rosehip and cranberry extracts present bands originating from acidic structures, alongside aromatic phenolic structures, and ethylenic groups. The UV-VIS spectra of extracts samples indicate absorption bands corresponding to polyphenolic structures. For both extracts, an absorption peak which can be attributed to a structure with extended conjugation, probably originating from coumarin, was detected. So, phenolic hydroxyl groups contribute to the antioxidant activity of bioactive materials extracted from rosehip and cranberry fruits, due to their ability to inhibit free radicals formation. Rosehip and cranberry extracts and their mixtures can be included in finishing recipes, as valuable active ingredients of novel environmentally friendly UV absorbing products used for sun-protective textiles, able to minimize the damaging effect of UV radiation on the human skin.

Keywords: plant extracts, UV radiation, skin protection, rosehip, cranberry, textile finishing

UV AND SONIC DEGRADATION OF NONWOVEN FABRICS USED AS WET WIPES

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Abstract. This research investigates one of the degradation cases for nonwovens as wet wipes, whose consumption is increasing a lot, and an alternative degradation method is examined.Consumption of wet wipes increases every day and unfortunately used wet wipes were left to mainland by the humanbeings. For this reason, the nonwoven fabrics as wet wipes containing viscose and Tencel fibres, polyethylene terephthalate (PET) fibre and their blends were used in the current research. Dry and prepared wet wipes with a wetting solution were kept under sunlight for four months to examine UV degradation and contolled at the end of the time period. Photographs and microscopic views were taken and degradation behaviour were evaluated visulally. Colour change and visual change was reported and weight loss values were calculated to examine the degradation behaviour objectively. As an alternative degradation method, a sonicator was used and the test samples were exposed by 30 hours for sonic degradation. Degradation was observed for all fabric types and examined by microscopic viwes. It was determined that all the test fabrics show important differences in colour change and fabric handle under the same UV degradation conditions. After sonic degradation, decomposition were observed for the time period used in the research and it was supposed as a hopeful method for the further researches.

Keywords: nonwoven , fabric, wet wipes, degradation, UV

EXPERIMENTAL RESEARCH REGARDING THE RECYCLING OF COMPOSITE MATERIALS MADE FROM TEXTILE WASTE

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Abstract. The main environmental impact factors caused by: the production of virgin fiber, the increasing consumption of textile products and the high percentage of disposal of textile waste in landfills or by incineration make the fashion industry one of the most polluting industries. At the level of the European Union, the large volume of textile products consumed and their low quality generate approximately 5.8 million tons of post-consumer textile waste annually. Due to the fact that the textile waste recycling industry is poorly developed, 75% of this amount is disposed of in landfills and only 25% of the total volume is recycled into low-value products or through incineration with energy recovery. Pre and post-consumer textile waste represents a valuable resource of raw materials. Extending the life cycle through the cascade valorization of these raw materials requires a multisectoral approach. A viable solution for reducing the amount of unused textile waste is to make composite panels for the construction sector proposed as an alternative to OSB (oriented strand board) wood-based panels. Composite material boards were obtained by thermopressing cotton type fabric waste with multiple fibrous composition and the matrix made from the waste of polypropylene nonwoven material and bioriented polypropylene film. The reduction of the environmental impact offered by the proposed solution derives from the reduction of the volume of unused textile waste and the significant increase in the duration of use of textile materials by transforming them into construction materials, with a life cycle of over 50 years by putting them into operation within civil constructions. The purpose of this study is to verify the possibilities of recycling the waste resulting from the processing of the boards of the new composite material, through cutting, thermoforming and making new panels. They were characterized from a mechanical point of view and compared with the characteristics of the original composite material boards but also with those of the oriented strand board (OSB) panels. The results obtained from this study confirm the viability of recycling the waste resulting from the production flows of the proposed composite material.

Keywords: recycling, composite material, textile waste, polypropylene.

Section 9:

New business models and emergent ecosystems

BUSINESS MODELS FOR THE TEXTILE INDUSTRY. CASE STUDY: THE COLLABORATIVE MODEL AT THE LEVEL OF THE EUROPEAN UNION

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Abstract. In recent times there have been concerns about the implementation of sustainable business models that respect economic, social and environmental principles. Entrepreneurial models adapt to new economic models, such as: circular economy, shared economy or collaborative economy. The development of innovation capabilities and the capitalizations of digital technologies represent current trends that offer business development potential. These trends have captured the attention of practitioners and academics. Although debates regarding business models and the collaborative economy in the context of the digital transition have intensified in recent times, the literature indicates that scientific foundations are still needed to provide support to practitioners. In this study the authors focus on business models in the textile industry. After summarizing the research results on these models, was developed a case study on the example of the European Union countries. The objective of the case study was to assess the extent to which collaborative business structures – respectively, digital innovation hubs – are present and provide support for the companies in the textile industry from the European Union. In the empirical research, the inductive, exploratory, multi-case study method is used, related to EU member countries. The data was collected from the Smart Specialisation Platform, a platform which provides information, expertise and professional guidance, as well as examples of good practices for collaborative business development. The comparison between cases, provided information on the extent to which enterprises in the textile industry have access to services provided by the digital innovation hubs, operating at Member State level. The results of the study have a double utility: scientific (because they provide clues to trends in business models), and practical (because they provide support to enterprises, interested in accessing or offering services within collaborative business structures).

Keywords: business models, economic models, collaborative systems, textile industry, Digital Innovation Hubs, European Union.

THE INFLUENCE OF PRICE VARIATION ON THE PROFITABILITY OF SERVICE PROVIDERS

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Abstract. According to the specialised literature, the most important challenges of the service economy are: the methodology of setting tariffs, the way to achieve price competition and the assessment of the perception regarding the quality/price ratio. These challenges, with a major impact on the profitability of the business, have different magnitudes depending on the nature of the services, the particularities of the businesses as well as the specifics of the activity field. For this reason, in the present research, the attention is focused on the service providers which are operating in the field of electrical installations. The purpose of the study is to assess the influence of price variation on the profitability of service providers. The empirical research was based on econometric analysis at the sample level. The sample included the most important 10 companies whose main activity corresponds to NACE code 4321 - Electrical installation. Based on the data collected from secondary sources, corresponding to the period 2016-2020, correlation and regression analyses (using the method of least squares) were run. Performance, assessed by the sales growth rate, net profit margin, economic profitability and financial profitability, represented the dependent variables. Price variations were treated as independent variables. The number of employees, the size of the firms and the volume of receivables were considered control variables. Although empirical research has not statistically validated the influence of price variation on the profitability of companies that provides services in the field of electrical installations, the research is useful for managers (of such firms) because it allows increased performance by controlling other variables, such as the volume of receivables and the profitability of the use of own capitals.

Keywords: profitability, electrical installation, price variation, econometric analysis, Romania.

SHAPING PROFESSIONAL HUMAN RESOURCES IN THE TEXTILE AND CLOTHING TRADE IN THE CONTEXT OF THE 4TH INDUSTRIAL REVOLUTION

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Abstract. The vision related to Industry 4.0 functional models and concepts are still in an early stage of construction and implementation internationally and also locally in Romania, especially for commodities production, which is subjected to analysis with more focus on traditional branch of textile &clothing of Romanian industry.The paper aims to identify Industry 4.0 concepts with scientific character, but also with pragmatic relevance for production organizations. The advantages offered by digitisation are not yet fully understood, mainly due to the lack of social interest, explained by the possible negative impact foreseen on some professional occupations that may disappear. The examples of Industry 4.0 best practice in the consumer goods industry in Romania are punctual and not part of a national plan for sustainable development, as in the case of Germany, which has already proposed a country-wide project. The latest economic events unexpectedly marked by the health crisis caused by the Covid 19 pandemic and Ukraine - Russia conflict prove the importance and the necessity of a strong economy, in which the crucial role is played by the engine of industry with specialized fields on a wide range, created in the proximity of each country or associated international communities. In the Industry 4.0 stage, the objective is to reduce unskilled work transferred to automated machines and to increase activities with creative, innovative and decision-making content, with a high degree of skill, which can attract human resources, valued and motivated higher than the traditional system applied on the basis of outdated salary scales. At the same time, the role of the final customer in determining the types of products is increasing, actively involved in the life cycle of consumer products, requested in different variants, in real time and as customised as possible. Finally, an in-depth study is needed to identify solutions for the integration of all the links involved from design, production to sales in order to eliminate diverging interests at present, due to the demand for fast deliveries, at low prices, with productivity costs, still high, due to the massive decreasing of human resources involved in manufacturing system based on competences and fair measuring of human efforts. The need to introduce the initial concept of "smart factory" becomes the central element, able to achieve versatility, to ensure multi-skilled staff, to ensure the necessary quality, having ensured productivity thanks to cyber- physical systems" (CPS), "internet of things (IoT), internet of systems (IoS). One of the areas that will be strongly affected by the Industry 4.0 phenomenon is the textile and clothing sector, threatened to disappear in Romania , that must turn this threat into development opportunity.The possible "smart factory-with smart operators I.4.0" models shall be specific to industrial activities andl also ensure interest and attractiveness for future generations of employeess.

Keywords: smart factory, smart operators,cyber-physical systems,clothing trade,human resources.

MANAGEMENT CHALLENGES FOR THE ROMANIAN HEIS IN TRANSITIONING TOWARDS A MODEL OF VIRTUAL UNIVERSITY

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Abstract. The last two years have shown that traditional universities can adapt to new challenges and find educational and administrative solutions to respond to a new situation in a short time, bringing changes to their strategies. In this context, the paper brings to attention approaches to model a virtual university (VU), giving some directions that can be followed by the academic and administrative management staff of Romanian HEIs (higher education institutions) towards adopting such a model. By exploring through qualitative methods, the concepts provided by the existing specialized literature on virtual education in general, as well as the effects of emergency remote teaching adopted by HEIs as a basic form of virtual education during the pandemic times, it was possible to synthesize and propose a new model of virtual university. As such, a comprehensive model of VU was created starting from (1) a virtual education system formed by five integrated components (product, structure, process, people, resources), combined with (2) a VU business planning template, alongside (3) the dimensions of online learning quality: from the learner's perspective and (4) a model for virtual education at traditional universities. The resulting conceptual model could guide the management of Romanian HEIs in decision-making about including virtual education as components within existing programs or as an extension of separate departments or centers or as a spin-off company of the traditional base university. This has important implications for striking a balance between the Romanian authorities' preoccupation to implement changes within the educational system as a result of the covid pandemic of the last 2 years and the rising desire of demand and expectation (e.g., students' desire for flexible courses and programs, as well as for the digitalization and virtualization of various processes to simplify the activities and interactions of the administrative staff; university management's desire to increase the attractiveness, competitiveness and why not, the income). In future work, the model will be subject to evaluative research for testing, validation, interpretation, and proposals within the Romanian HEI ecosystem.

Keywords: virtual university, virtual education, conceptual model, model of virtual university (MVU)

GREEN - FROM THREAD TO CUSTOMER PERCEPTION

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Abstract. The paper focuses on ecological awareness in the textile industry, highlighting the impact of customers who purchase products from the "sustainable" collections of fast fashion brands. The significant negative impact of the textile industry on the environment is well-established, as the clothing industry is the second-largest polluter of the environment after the oil industry. There is also a close connection between the customers' level of information and their propensity to purchase a product or service, and so, the textile industry has a substantial role in educating consumers towards a more sustainable buying behavior, based on need rather than a feeling or to desire In this context, it is clear that there is a need for more educated decisions when it comes to purchasing patterns and for consumers to better grasp the concept of circular economy which is based on the reuse of products, therefore consumers must focus on quality products that they can use a longer period of time and which can later be used by another consumer. This applied research consisted of a quantitative study, using simple random sampling collecting 389 responses, with a confidence level of 95% and a margin of error of approximately 5%. The questionnaire contained 28 questions and was meant to reveal the consumer trends in terms of using and purchasing behavior of sustainable clothing products within fast fashion brands. The objective of the research was to identify the similarities and differences between customer segments and to find out what are the main relevant factors in the purchase of clothing products of sustainable collections. One result of the research refers to the frequency of purchase, which is not significantly different by gender. Collating the budget spent annually on outfits and the number of products purchased, it is highlighted that more than 50% of respondents do not have a sustainable behavior, as they purchase more than 30 products, usually low-priced, suggesting that they could not see an extended life cycle. Another relevant result refers to the use post-purchase: in the last year, 27% of respondents preferred to donate or recycle the clothing products they no longer used, 30% to throw them away and 43% kept the clothing products even if they purchased others. 42% of respondents believe that fast fashion brands are sustainable due to the materials they use, and 58% believe that fast fashion stores are not sustainable, due to the large amount of manufactured products. The research results are relevant and useful as more and more fast-fashion companies are starting to integrate sustainability in their overall business strategy.

Keywords: fast fashion, recycled, sustainable products, sustainability, circular economy.

DIGITAL VERSUS DIGITALIZED BUSINESS ECOSYSTEMS MODELS

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Abstract. Up until now, the business ecosystem concept is defined as an interactive and dynamic structure, a community of interconnected actors from various industries. According to the late reasearch on this domain, the business ecosystems' dynamics depends on developed coevolutive processes. From this point of view there was discovered the relevance of adopted business models by the actors who are engaging into this type of structure. However, during the pandemic times business ecosystems relied a lot upon their adaptability metrics through the lens of digitalization processes. Consequently, one of the most promising research stream on business ecosystems is related to business model innovation especially in terms of ecosystems' orchestration and digitalization. Meanwhile, this new research approach created the opportunity to further explore and develop the concept of digital business ecosystems. Therefore, the current research aims to explore and define the main key aspects which could explain differences and similarities between digital and digitalized business ecosystems models based on critical analysis of the scientific literature. The foreseen result is not only to highlight digital versus digitalized business models or structures, but also to create a new digital business ecosystems framework of analysis. Hence, the proposed framework could represent an anchor point in business models research especially within the emergent business ecosystems.

Keywords: business ecosystems, business models, digitalization, innovation

APPROACHING A CONTRACT FROM A MANAGEMENT POINT OF VIEW

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Abstract. Management is the process of planning, decision making, organizing, leading, motivation and controlling the resources of an organization to reach its goals efficiently and effectively. As companies depend on their contractual relationships, concluding a contract has become a management issue as it is a legal one, managing contracts being an overlooked form of management. Because businesses grow and develop, contract management can become increasingly complex, highlighting the need for effective strategies and solutions. Besides this, managing contracts can create value driver in a form of reputation enhancement, a good and effective contract management can lead to business certainty, operational risk reduction, product quality enlargement, counterparty dependability. Based on a literature review, this paper will analize the life-cycle of a contract in order to discover how can contracts be actively managed in a company to reduce risk and increase certainty. The aim of this paper is to identify the stages of contract management. As found out, there are five clear stages that should be taken into consideration by a contract manager: creation, collaboration, execution, tracking and renewal. In each of these stages there can be identified further components related to legal matters such as: initial requests, authoring, negociating, approving, execution, obligation management, revisions and amendaments, auditig, renewing.

Keywords: Business, Process, Life-cycle, Stages.

Section 10:

Entrepreneurship and innovation

THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE. TEXTILE INDUSTRY CASE STUDY

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Abstract. Currently, Industry 4.0 is the most popular concept related to changes in the operation of industrial enterprises. Industry 4.0 has been discussed in the literature mainly from a technological perspective, overlooking the social challenges related to this fourth industrial revolution. The manufacturing industry is currently witnessing the fourth industrial revolution, where the "real" and "virtual" worlds will be seamlessly connected, so traditional manufacturing processes are undergoing an enormous transformation that will change the way companies approach manufacturing. In recent years, more and more companies in various fields are interested in automation because they have seen the impact it can have on business and employees: reducing production costs, improving products and services, increasing employee productivity, etc. However, there are also threats related to the adoption of new technologies in the industry, such as high acquisition costs, lack of necessary financial resources, insufficiently trained human resources in the digital field, uncertainties of the business environment, etc. The purpose of this paper is to identify the impact that Industry 4.0 has on the performance of employees in the textile field and their level of reluctance regarding the changes that will take place in the factory. The research involves carrying out a quantitative analysis of the impact that Industry 4.0 has on the perception and performance of workers in a textile factory. The data was collected from the specialized literature and then from the interpretation of the results obtained following the distribution of questionnaires to the employees of the Katty Fashion company from Iasi. Studies show that the introduction of Industry 4.0 in the textile field is expensive. In addition to the cost side, this change requires methods of training employees on the use of new technologies or creating new jobs specifically dedicated to technicians and engineers because they already have technical knowledge. However, the most important thing is that employees receive guidance and explanations related to the fact that the role of new technologies is to optimize manufacturing processes and not to replace the human resource with robots.

Keywords: industry 4.0, industrial internet of things, smart factory, textile industry, workforce.

INOVATION AND PRODUCTIVITY GROUTH IN MANUFACTURING INDUSTRY-PHARMACEUTICAL COMPANY STUDY CASE

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Abstract. The pharmaceutical industry is one of the most important that is closely related to humanity, because the results obtained (medicines) contribute to maintaining people's health and sometimes even saving their lives. That is why it must always be in continuous development and digitization if it's necessary to obtain the best results and to continuously adapt to different requirements, one of the newest and most striking examples being the Covid-19 pandemic that we recently "struggled" with and which is not over yet. The technological flow takes place on 5 lines: injectable solutions, injectable powders, tablets, tinctures, ointments, solutions for external use. Parallel to the production process, a medicine control activity is carried out both through the State Laboratory and Control of Medicines, as well as through the analysis and control laboratory within the company. The article is based on the analysis of the process of aseptic filling with sterile powder from a manufacturing flow of pharmaceutical products, in all stages of the technological flow, following in particular two of the most important stages. The purpose and objectives of the analysis of the production flow are to reduce the losses resulting from the stapling stage of the process and to increase the productivity in the stage of labeling the vials. The definition of the word loss includes several aspects, including time, human strength and material or financial resources, all of which have an important impact on a manufacturing process, regardless of the finished product obtained. Research is important first of all for the company, because every type of loss means costs and reducing them would also mean reducing costs. It can also eliminate the effort that employees put in when they need to be identified, analyzed and then eliminated.

Keywords: *loss reduction, manufacturing flow, injectable powders, stapling stage.*

Section 11:

Engineering education

ANALYSIS OF FASHION DIGITALIZATION IN ROMANIAN CLOTHING COMPANIES

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Abstract. The fashion industry is an industry that has undergone significant changes over time. The recent pandemic crisis emphasised the need for digitalisation in the fields of online commerce and education in and for textile and clothing companies,. Customer requirements are becoming more and more diversified, and to keep up with them, companies have to adapt their way of working. The evolution of technology has brought to attention the importance of using dedicated digital fashion software. This article presents an analysis of the current state of digital tools used in clothing and fashion companies. Both an interview and an online survey was conducted with some T&C companies, in order to identify the guidelines and digital skills needed for the fashion industry as well as today status of the industrial application of virtual fashion technology. The interview is focused on identifing the starting points of the analysis for each partner country, Romania, France, Belgium, Slovenia and Portugal, and provides an in-depth exploration of the required digital skills and the integration of virtual technology for prototyping personalised clothing in the fashion industry. The survey, both on-line and interviews, was conducted with fashion or clothing companies from Romania, from all over the country. Although the type of interviewed companies is very wide, they all use different software programs in their activity, and there is a need for more. There is for the sure need for digital skills for fashion design.

Keywords: digital fashion, clothing companies, digital skills, fashion industry, virtual fashion.

ANIMALS INSPIRE TEXTILES WITH HIGH ADDED VALUE – REVIEW FOR TEXTILE EDUCATION PROMOTION IN THE STUDY COURSE

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Abstract. Animals are fascinating creatures and have inspired humans since time immemorial. Birds, mammals, and insects; all animals have got special abilities and body compositions to survive in wildlife conditions. Textile production is inspired by animals and knowledge of naturally raised objects are helping to invent excellent products with high added value. This paper deals with examples of applications straight taken from the animals' skin, feathers, etc. Sharkskin detail helped to invent a special smooth swimming suit which can give extra time in the competition. Penguin feather construction to capture the air for thermal insulation inspired the creation of phase-change materials. Beaver skin allows finding a solution for diving costumes with spacer fabric. That are only some examples in nature when we look around us. When a producer wants to be competitive, it is advantageous to have got smart and intelligent colleagues. Students in the course Clothing comfort and Transport Properties (follow-up master study programme) are working with the ideas from the scientific literature review and trying to find their own solutions with a selected animal. Combination with commonly loved animals against the thermo-physiological relations is motivating them from the inside to creative thinking. Such people are necessary to invent excellent textile products with the respect to the material sources and longevity of the products themselves. Shearing of the findings is giving soft skills and following discussion too. We cannot close our thinking in the box of the known, we need to step behind when sustainable solutions have to be found. Examples will be given in this article.

Keywords: animals, clothing comfort, education, creativity, multidisciplinary

WINTEX PROJECT A NEW OPPORTUNITY FOR FOR TEXTILE SECTOR EDUCATION IN TUNISIA

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Abstract. *WINTEX an Erasmus+ CBHE project is presented in this paper. The project is dealing with weaving innovation between academia and Industry in the textile sector in Tuinisia. The project aims the fostering of enterprise-university collaboration in Tunisia by the establishment of three innovation textiles' centers at each participating HEIs. Those will boost the collaboration among textile SMEs and participating HEIs. The Innovation textiles' centers, which created in the framework of this project, will provide services for innovation development, matching industry needs with research results, promoting cooperation between researchers and industry, development and promotion of new products and opening of new markets, support to researchers and to business owners to commercialize their innovative ideas etc. The centers will focus on the integration green technologies and Key Enabling Technologies in the textile sector with particular emphasis at each of the institutions in each to not overlap services and provide better and more comprehensive support to local SME needs. In addition, those centers will become focal points for industry encounters and will provide support and guidance to HEIs' students for embracing innovation and entrepreneurship in the textile sector. The engagement of students in the centers will also play a crucial role in establishing traineeships and indirect capacity building to students to complete their training program with hands on practice in innovation and the textile industry-academia collaboration. The project will also develop an online collaboration platform for technology transfer that will support the matching of offer and demand for research results becoming a tool for open innovation that will set the bases for the long-term cooperation between HEIs and academia in general with the industrial sector of Tunisia. The online platform will be the main support tool for the centers and a place for transnational networking and matching of offer and demand.*

Keywords: *Capacity Building Higher Education,Textile Academic Industry Council Concept, Textile Innovation Centers, practice in education innovation and the textile industry-academia collaboration.*

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THE CONSTANT DEVELOPMENT OF ENTREPRENEURIAL EDUCATION IN ROMANIAN TECHNICAL UNIVERSITIES. "GHEORGHE ASACHI" TECHNICAL UNIVERSITY CASE STUDY

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Abstract. Over the past decades, universities have experienced unprecedented challenges and increased pressure from various stakeholders requiring them to undertake a more active role in innovation and entrepreneurial education, both in terms of mindset and practical instruments. At the same time, starting with 2014 entrepreneurship education became a strategic direction for the European Union and in 2016 EU developed the Entrepreneurship Competence Framework (EntreComp) aimed at consensus around a common understanding of entrepreneurship competence by defining competencies, learning outcomes, and proficiency levels (EU, 2016). The study focuses on the pivotal role of universities in general and technical universities in particular as suppliers of entrepreneurial education in order to stimulate their students' entrepreneurial endeavors to better address the challenges of the 21st Century. The research consists of an in-depth analysis of the entrepreneurial education opportunities provided to students by "Gheorghe Asachi" Technical University of Iasi. The research questions that guided the study were: 1. How is "Gheorghe Asachi" Technical University of Iasi infusing an entrepreneurial mindset in engineering students? 2. Which are the engineering programs that implement most entrepreneurial education courses? 3. What are the most frequent entrepreneurship-related extracurricular activities implemented in the university? The analysis consisted of two phases: the first phase entailed a critical analysis of the literature examining the main concepts relevant to the study, namely entrepreneurship, entrepreneurial education, and entrepreneurial university, and the role of technical Higher Education Institutions (HEIs) in shaping entrepreneurial competencies in engineering students. The second phase consisted of an exploratory empirical content analysis of the "Gheorghe Asachi" Technical University of Iasi 11 schools websites in order to identify the courses covering topics related to entrepreneurship, the events meant to promote entrepreneurship, the student entrepreneurial societies set up by the university, the technology transfer centers and the extracurricular activities implemented throughout the university during the 2021-2022 academic year.

Keywords: Entrepreneurial education, engineering education, higher education institutions, entrepreneurial universities.

COMPARATIVE ANALYSIS OF STUDENTS' PERCEPTIONS OF ONLINE EDUCATION BEFORE AND AFTER THE PANDEMIC COVID 19

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Abstract. The method of online learning have changed along with the technological changes brought about by the COVID 19 pandemic. The knowledge gained of online education in 2020-2021 has grown exponentially in the mentioned period for both students and teachers. The transfer of activities from physical to online in both business and education has created a number of disadvantages: i) the separation between work and life, the schedule at home is different from that of the office, because the day seems longer and you are tired, stressed demotivated; ii) the feeling of distraction from external influences, colleagues interrupting you, the noises made by those around you, missing the park and only pets or children, created a relaxing environment at home that invites you to rest; iii) the lack of connection with colleagues, the meeting with them no longer takes place, in the canteen, in the company kitchen in the morning for coffee, in the team buildings organized by the company and the feeling of belonging to the group disappears. The analysis proposed in this article aims to show the changes in perceptions regarding the forms of online education that have emerged among of students: a) before the 2018 pandemic period, based on a survey conducted on 422 respondents from the Technical University "Gheorghe Asachi" Iasi, University "Alexandru Ioan Cuza" Iasi, Lucian Blaga University from Sibiu, Bucharest Polytechnic University, when these didactic methods were used only in specific situations compared to b) the concrete situation when all forms of education went online, using a research carried out in April-May 2020 on 766 students from the same universities.

Keywords: e-learning, knowledge, changes, m-learning, assessment.

STATISTICALLY BASED DECISIONS FOR A HUMAN RESOURCES PROBLEM

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Abstract. Human resources management contains theoretical notions - concepts, definitions, classifications, organizational charts - and problems to be analyzed and solved, especially decision problems. Moreover, administrative performance management is an integral part of this field. Therefore, the management system of employee rewards for high organizational performance must be analyzed. The present work statistically analyses the satisfaction-performance relationship in public institutions and proposes a statistical, econometric model for this problem. One of the essential activities in a public institution is forecasting the budget of revenues and expenses for the future, especially the forecasting of expenses regarding salaries. The case study for predicting the salary budget contains the analysis of gross wages, the number of hours worked, and the age of 51 employees of a public subunit in December 2021. The statistical methodology applied to this continuous study is the descriptive statistical analysis of the data series obtained through direct observation, the formulation of statistical hypotheses on the analyzed parameters, the fundamentals of the choice of statistical tests, and the application of statistical tests to validate the formulated assumptions, the realization of statistical correlations between the series of values to observe the link between the parameters of the studied phenomenon, issuing decisions for the human resources department. The novelty of this work is represented by applying a coherent statistical methodology to an organizational phenomenon subject to permanent changes. These methodologies support decisions to optimize the activity of the human resources department.

Keywords: decision process, statistical analysis, statistical hypothesis, human resource problem

STATISTICAL METHODOLOGY FOR THE DECISION-MAKING PROCESS IN A COMPANY

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Abstract. In a company, the decision-making process is present continuously at all levels. From a systemic point of view, it contains input data - objects, decision alternatives, tie-breaking criteria and output data - the decisions taken to achieve the objectives. The quality and substantiation of decisions involve using various multidisciplinary techniques from fields such as artificial intelligence - neural networks, fuzzy systems, mathematics - mathematical modelling methods, statistics, evolutionary algorithms - genetic algorithms. The current research explains the application of statistical techniques in the decision-making process methodologically, on a numerical example applied in a company. Thus, the series of values contains data about the generation of two types of documents in a time interval of four years by a company, during which digitisation activities of the process were carried out. The central objective is verifying the efficiency of the documentation generation process after digitisation, with a secondary aim of modifying the human resources organisation chart. The methodology contains the formulation of the decision problem - objectives, data collection, descriptive analysis of data, formulation of statistical hypotheses, application of appropriate statistical tests for hypothesis validation, and application of regression techniques for the future substantiation of decisions.

Keywords: decision process, statistical analysis, statistical hypothesis

INFORMATION SYSTEMS - ENHANCE INNOVATION: REFLECTIONS ON DELONE AND MCLEAN MODEL

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Abstract. The organizations of current era live in the information society, a society that seeks to innovation and collective efforts, where the current economy become not depending on the traditional means of productions which are capital, land and human resources, but it's reliance has become on knowledge and information systems. The use and activation of information systems is now considered an important measure of the extent of organizations growth and progress. Therefore, most of the organizations accelerated today to find, develop and benefit from such systems to achieve organizational innovation. The DeLone & McLean IS model (D&M) has been widely used and researched since its introduction in 1992, and after its update in 2003. D&M seeks to provide a comprehensive understanding of IS success by identifying and explaining the relationships among their most critical dimensions of success. Many studies have provided important insights into this model. Nevertheless, innovation seen as outcome of IS model, D&M research remains to be systematically reviewed comprehensively. This article gives an overview of the current state of research on the Information System Model impact on innovation. Thereby, it provide a concise entry point to the theory's background and its application on innovation, which might be specifically beneficial for both academics and practitioners from private companies. Additionally, this article also identified gaps in the literature and recommends potential future areas requiring further investigation. To that end, the findings of this systematic review study provide an impactful contribution through offering a holistic review of the current state of D&M model studies.

Keywords: DeLone & McLean model, Information system, Innovation, Organizational benefit

DIGITAL HEI'S TRANSFORMATION THROUGH THE DEVELOPMENT OF DIGITAL READINESS, RESILIENCE AND CAPACITY

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Abstract. The COVID -19 crisis has drastically changed and affected the professional, social, cultural aspects, and the public health situation of the world. It has caused massive damage at the economic and financial level (bankruptcy or restrictions on the activities of some companies, increase in the unemployment rate), in addition to the high number of infections and deaths. In this situation, it was necessary to find alternative solutions for carrying out various professional activities in order to prevent a wide-scale collapse. Education was a particularly affected sector, as all of the activities that normally take place face to face were no longer deemed safe. The global pandemic and the resulting closures have proven that there is only one way to continue most educational activities in the current scenario: GOING DIGITAL. The authors of this paper present a method of significantly improving the digital readiness of university stakeholders, supported by intensive and stimulating learning and teaching practises in partner countries. The Consortium of the project called "European Digital Readiness Strategy for Clothing Studies" (acronym E- DRESS) aims to develop a MULTILINGUAL educational platform that meets the needs of students from partner universities and provides them with the opportunity to take jointly developed courses in clothing studies.

Keywords: clothing studies, higher education, digital readiness strategy, multilingual educational platform

THE ANALYSIS OF THE CURRENT NEEDS OF ROMANIAN TEXTILE PROFESSIONALS WITH THE PURPOSE OF RAISING AWARENESS ON THE REUSE AND RECYCLING OF CLOTHING AND TEXTILES

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Abstract. The European Commission has defined the 'waste hierarchy' in order to design a transnational waste policy at the operational level that focuses on the reuse and recycling of materials to encourage innovation in recycling (Eurostat, 2020). Therefore, the upcycling of clothing and training of textile experts in environmentally conscious practices seems to be a transnational need that requires the contribution of different experts in the EU and the promotion of the recommended approach in the different European countries in order to create a common policy on circular economy and sustainable development. Against this background, the project entitled "Stimulating gender-based innovative training methods to promote CLOTHING REcycling through Augmented Reality" (AR4ReClothing) focuses on raising awareness of the environmental and social benefits of upcycling clothing and training specialists through innovative methods (training materials tailored to the real needs of end-users and AR mobile applications that promote clothing upcycling activities with a gender-sensitive methodology) that better embed environmental sustainability and capitalise on the different but significant role of women in ecological activities. In this context, it was necessary to analyse the current awareness needs of textile professionals (manufacturers, designers, technicians, etc.) regarding the role and participation of men and women in environmental activities for the sustainable development of the Romanian garment industry.

Keywords: clothing recycling, upcycling, innovative training methods, sustainable development

FASHION FOR TOMORROW PROJECT A NEW TRENDS OF INTERCULTURAL LEARNING

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Abstract. *The European project "Fashion Sustainability in the spotlight, new trends of Intercultural Learning" also called "Fashion for Tomorrow is co-financed by the Creative Europe Programme of the European Union. The project"*Fashion Sustainability *in the spotlight, new trends of Intercultural Learning" aims to support capacity building and audience development in fashion by enhancing sustainable fashion awareness, creative and intercultural competences in the fashion domain through non-formal education and fashion performing arts, valuing the social modernization and culture preservation.The project aims to be an innovative demonstration of democratic access to culture and performing arts and promotes innovation of civic education in culture, professionalism, value and quality in the culture of fashion.* The *project "Fashion Sustainability in the spotlight, new trends of Intercultural Learning" is grounded on the general concept of increasing the level of fashion literacy and educational value of professional fashion through an integrated approach of intercultural leaning towards sustainability in fashion. The project brought performance in the fields of creative industries by structured development of new forms of artistic expression, encouraging awareness of the benefits of the collaboration of specialists and artists from various cultural fields with focus on the performing arts, sustainable fashion design, intercultural learning, formal and non-formal education. The partnership is driven by the fact that fashion should be protective towards both the environment and the people. It paves the way for a modern, humanistic, sustainable and fashionable thinking by bringing a new input on the audience taste cultivation towards sustainable fashion, promoting textile heritage and cultural diversity.*

Keywords: *Fashion for tomorrow, new trends of Intercultural Learning, Fashion Sustainability , non-formal education and fashion performing arts.*

EDUCATION ON SUSTAINABLE TEXTILE TECHNOLOGIES AND FASHION IN THE EUROPEAN MARKET

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Abstract. It is widely recognised that Education for Sustainable Development (ESD) plays a critical role in creating a more sustainable world by fostering the development of the knowledge, skills, understanding, values, and actions necessary for such change (UNESCO, 2020). In this context, ESD represents a holistic approach that focuses on lifelong learning to create informed people who can make decisions today and in the future. Related to the textile and fashion industry, ESD is an appropriate approach to continuously implement sustainability aspects in education and training. To achieve this goal, the European project "Sustainable Fashion Curriculum at Textile Universities in Europe - Development, Implementation and Evaluation of a Teaching Module for Educators" (Fashion DIET) has developed a digital teaching module in a partnership between a University of Education and universities with textile departments. The main objective of the project is to elaborate an ESD module for university lecturers in order to introduce a sustainable fashion curriculum in textile universities in Europe and implement it in educational systems. The project therefore aims to train educators along the textile supply chain, to inform the young generation about the latest aspects of sustainability and raise awareness by implementing ESD in textile education. This paper presents the learning outcomes of the modules on sustainable fashion design and related production technologies developed by the technical university partners, as part of the total of 42 courses covering didactic-methodological approaches and the sustainable orientation of the fashion market, offered at the consortium level. The project content is made available as Open Educational Resources through Glocal Campus, an open-access e-learning platform that enables virtual collaboration between universities.

Keywords: textile, education, sustainability, e-learning.

NEED ANALYSIS OF THE CURRENT SITUATION OF HIGHER EDUCATION FOR THE SMART TEXTILES SECTOR

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***Abstract**. Smart and functionalised textiles represent a large sector of the textile industry that has a dynamic development and shows great potential for current and future niche markets. The sector relies heavily on innovation and technical creativity and the constant need for new materials and processes is supported by the multidisciplinary approach efficiently to solving the requirements of the applications. Another important aspect of the sector refers to the markets and the transition from research to commercially viable products (TRL9). These two issues concerning product R&D and markets are creating the need to ensure that the future specialists have the knowledge and technical and transversal skills that will answer the changes the sector faces. In this context, the HACKTEX - Innovative smart textiles & entrepreneurship project will develop virtual training materials for smart and functional textiles, as well as training materials dedicated to entrepreneurship in the sector. To develop these materials, a need analysis was carried out in the 6 countries of the consortium, where the current state of engineering education dedicated to smart textiles is evaluated. The field survey targeted three main issues: assessment of the current needs of the sector (academic, manufacturing), assessment on how to capitalize on existing initiatives and identification of weak point at Universities in training for smart textiles. Respondents were divided in three target groups: specialists from the industry; specialists from the universities and research institutes; and students. The answers were processed and the results are presented in the paper in a comparative manner, with an emphasis on knowledge and skills specific to smart textiles perceived as important by the respondents.*

***Keywords:** Field research; target groups; present situation, existing initiatives; weak points.*

IMPROVING YOUR DIGITAL SKILLS IN THE TEXTILE AND CLOTHING INDUSTRY

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***Abstract**. Amongst the 21st Century skills that students should acquire during their educational trajectory are "information and technology" literacy. Because of the importance of the Textile and Clothing industry in Europe, special attention needs to be given to incorporating these skills in the curriculum of the students in this area. The European ICT-TEX (ICT in Textile and Clothing Higher Education and Business) project wants to contribute to this demand by developing curricula focussed on ICT. The ICT-TEX project is an Erasmus+ Knowledge Alliance joining 12 European partners of universities (5), companies (4) and non-profit organisations (3) which are geographically spread over Europe. At the start of the project, a questionnaire was sent out to textile entrepreneurs and manufacturers to provide input for the gap analysis. These results were used to draw up the content of the courses under development. The syllabuses cover several areas of the textile and clothing industry: Design and Production of Woven Fabrics; of Knitwear; of Technical and Smart Textiles; Finishing, Printing & Functionalisation and Apparel Design and Production. In total 16 courses have been developed and they are presented in a very user-friendly Moodle platform. The target group for whom the courses are developed are not only Bachelor students, but also teaching staff and employees already active in the textile and clothing industry who want to improve their digital skills. For each of these target groups, dedicated extra course material is provided. This material is available once you have registered on the platform, which is accessible through the project's website. With establishing these syllabuses, the ICT-TEX project wants to give the opportunity to people from the textile and clothing industry to improve their digital skills.*

***Keywords:** Erasmus+ Knowledge Alliance, ICT in textile technology, digital skills, textile and clothing industry.*

STATISTICAL TECHNIQUES FOR CONFLICTS ASSESSMENT IN THE ORGANIZATIONAL GROUP

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Abstract. In the organizational framework in which we carry out our activity, we interact with other people. In this system of interactions, conflict situations inevitably arise. The causes are multiple: different objectives (objective conflict), different ideas or opinions (cognitive conflict), different emotions, attitudes (affective conflict), and aggressive behaviour (behavioural strife). Regardless of the type of conflict, an analysis is necessary to model the moderating character of people's behaviour within the group. The current research pursues a statistical analysis of the behaviour of the two groups of respondents (M/F) on the five specific dimensions of conflict involvement, uses parametric and non-parametric statistical tests and modulates moderator parameters according to the other four dimensions of the conflict approach. The test used in modelling is multivariable ordinal regression. The research results are, on the one hand, a compact statistical methodology for questionnaire analysis and an ordinal regression model of the moderating character of the individual within the group.

Keywords: regression analysis, conflict analysis in organizations, ordinal regression model.