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by EDOARDO MIROGLIO



BOOK OF ABSTRACTS

NATIONAL TEXTILE CONFERENCE - 2017

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T1 FIBRES AND YARNS; CHEMICAL TECHNOLOGIES; NANOTECHNOLOGIES









STUDY OF THE ELECTRIC RESISTANCE VARIATION OF THE POLYESTER FIBRES COATED BY AG IN VACUUM

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The essence of this experimental work comprises the application of a metal coating on the fibre in a vacuum environment by means of ion beam sputtering. The method for the deposition of thin film coatings in a vacuum environment is physical. The characteristic feature of this method is the very good adhesion towards the substrate, uniformity, and density of the deposited films with minimal internal tensions, the possibility to deposit very thin layers even several nanometres, good reproducibility of the films, and others. Subject of this article is the electric resistance of the fibres coated by thin film of Ag. In order to evaluate the variation of the electric resistance, or the electro-conductivity of the thin film, an experimental plan was designed.

Within the experiment, two factors are controlled: the target's electrical voltage and the duration of the exposure and the deposition of the thin film on the substrate.

Target tension ranges from 2.0 to 5.0 kV, while the duration of exposure ranges from 20 to 105 minutes.

The processing of the experimental results and the statistical treatment carried out allowed the calculation of the regression coefficients of the target polynomial. The advantage of the central - composite and rotational experiment consists in the design of a three - dimensional graph of the functional change of the studied parameters.

In this case, the duration of exposure has a predominantly and principally linear character. The figure shows that increasing the deposition time of the thin layer of silver, the electrical resistance of the coated fibers decreases. At the same time, the target voltage



has a parabolic effect on the conductivity of the thin film. This requires additional experimental work and in-depth research into this technological factor. In any case, the positive relationship between the technological factors and the increased electrical conductivity of the coated polyester fibers is obvious. This is a testimony of increasing the thickness of the thin layer of silver.

Keywords: thin films, electric resistance, textile fibres, vacuum.

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Introduction

In the recent years bacterial infections pose great challenges to human health, especially those caused by strains resistant to the antibiotics used in the clasical medical practice. Therefore, there is a significant need for new more effective antimicrobial agents with different chemical structure and mechanisms of action against existing bacterial and fungal strains.

In this study we describe the synthesis and spectral characterisation of novel PAMAM metallodendrimers with Zn(II) and Cu(II) metal ions and their immobilization on cotton fabric. In vitro antimicrobial activity of the obtained cotton fabrics with metallodendrimers and initial dendrimer ligand against different Gram-positive and Gram-negative bacteria and yeasts was compared.

Experimental part

Metal complexes with Zn(II) and Cu(II) of the modified with 1,8-naphtalimide fluorophores PAMAM dendrimer from zero generation were obtained. The dendrimers were dissolved in DMF:water 1:5 (v/v) and the cotton fabric was dipped in solution (a liquor-to-goods ratio of 1:20) and treated at 25 °C for 15 min, then dried at room temperature.

Results and Discussion

The antimicrobial efficacy of cotton fabrics treated with the tested compounds was evaluated by growth reduction of Gram-positive bacteria B. cereus, Gramnegative bacteria P. aeruginosa and fungus C. lipolytica.



The effect of untreated cotton fabrics (control), and cotton fabrics treated with D, D-Cu and D-Zn samples, on the growth of the test microbial strains are shown in figure. The cotton textile treated with D-Zn was found to be highly effective against the test yeasts and Gram-positive B. cereus reducing their growth completely and about 60%, respectively, followed by P. aeruginosa (48% growth reduction). Similar growth reduction was established by cotton fabrics treated with the ligand D and D-Cu; it was low for B. cereus and C. lipolytica (10-20%) to moderate for P. aeruginosa (30-32%).

Conclusion

It could be suggested that both slow diffusion of dendrimers from the cotton textile into the medium and direct contact with the microbial cells contributed to the antimicrobial effect of the treated cotton fabrics. Deposition of the metallodendimers on the textile fabric was found to prevent the formation of a biofilm, which is a good indicator of using this dendrimer to produce antibacterial cotton fabrics.

Keywords: cotton fabric, antibacterial textile, microbiological activity, metallodendrimers

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SUBLIMATION TRANSFER PRINTING ON DOUBLE LAYER FABRIC (POLYESTER/COTTON)

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In this study, it has been found that with the help of transfer printing, it is possible to achieve a colour variation of a double-layer fabric (a face - polyester and a reverse layer - cotton). A high resistance under the conditions of use characterizes the resulting prints as the dye penetrates into the structure of the polyester fibres. After finishing the process, the fabric retains its structure and its good physic-mechanical properties. A number of economic and environmental advantages characterizes sublimation transfer printing. The method is easy to use and economical in terms of dyes used, production area, time for loading and servicing the machinery, necessary personnel, cutting down a number of technological operations, saving of technological water, etc. This type of printing does not generate wastewater, and paper after printing is used for artistic packaging.

Besides the known advantages, the sublimation transfer printing has some disadvantages, of which

the main disadvantage is the lack of universality to the wide range of fibres used by the textile industry. It is particularly suitable for polyester fabrics and for mixtures containing at least 50% polyester as well as acetate fibres. The reason for this is that only certain dispersive dyes can sublime. Disperse dyes are insoluble in water and dyed hydrophobic synthetic fibres (polyester, acetate, polyamide and polyacrylonitrile). The choice of transfer printing dyes depends on a number of factors that are related to the various stages of transfer printing. To be suitable, dyes must have specific physical and chemical properties. The resulting fingerprints must have durations corresponding to the end-use of the article in question. Therefore, good results depend on various factors such as the type of dyes, paper, fabric, and transfer conditions (temperature and print time). Even a slight change in these indicators may cause a change in colour and even a disruption of the fabric.

The sublimation transfer printing method can be successfully used to print various images on a polyester / cotton double layer fabric. A high resistance under the conditions of use characterizes the resulting prints as the dye penetrates into the structure of the polyester fibres.

After finishing the process, the fabric retains its structure and its good physico-mechanical properties.



The authors thank E. Miroglio EAD - Sliven for the support and assistance in the performance of the graduate work at the College - Sliven of the Technical University - Sofia and presentation of the results of the National Textile Conference in 2017.

Keywords: Sublimation transfer printing, double layer fabric, cotton, polyester

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INVESTIGATION OF THE TENSILE PROPERTIES OF BRAIDED BI-, TRIAXIAL AND UNIDIRECTIONAL THERMOPLASTIC GLASS FIBRE / POLYPROPYLENE COMPOSITES

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Introduction As one of the most versatile and cost efficient processes,¹ the braiding technology offers optimal conditions for an economical manufacturing of preforms for composites.² Especially overbraiding of a mandrel is a technique which is used for the production of braided composites. It allows an individual design of geometries and structural parameters such as the pattern, number of yarn systems and braiding angle. These versatile design opportunities have an influence on the properties of the preforms and therefore as well on these of the composites.³ Derived from this the aim of the current research is the investigation of the influence of the braiding parameters on the tensile properties of braided composites.

Experimental A commingled roving based on glass fibres and thermoplastic polypropylene filaments is the base material for the investigation. It is used for the production of bi-, tri- and unidirectional braids each with three different braiding angles. To achieve a higher diameter and surface, the samples were produced as tubular braids on a mandrel through overbraiding. After braiding, the samples were removed from the mandrel and then compression molded in a hot press at 190°C. Tensile tests were performed afterwards.

Results With regard to the influence of the different braiding parameters on the tensile properties, it has been shown that the adding of an axial inlay yarn leads to a significant improvement of tensile strength. The structures made of triaxial braids showed the highest tensile strength. At the same time they have the highest elastic modulus.

Conclusion The setting of the braiding parameters have a main influence on the tensile properties and failure behavior of braided composite structures and should be taken into account when such components are designed.

Keywords: Composite, glass fibre, thermoplastic, braiding



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CELLULOSE ACETATE/POLYETHYLENE GLYCOL ANTIBACTERIAL FIBROUS MATERIALS PREPARED BY ELECTROSPINNING*

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Introduction

In the recent decades the application of polymer fibers in medicine, pharmacy, protective clothing, garments, etc. has greatly increased. Great attention has been paid to fibers from cellulose and cellulose derivatives due to their low cost, lightweight, easy processing, biodegradability, good mechanical and barrier properties and recycling. Bioactive wound dressings have been produced from biomaterials and take active part in the healing process. These materials may be loaded with different drugs to enhance wound healing process.

Experimental part Cellulose acetate (CA) (Aldrich) with $nM= 30\ 000\ g/mol$ and DS 39.8%, polyethylene glycol (PEG) (Fluka) with $M_r = 1,900-2,200\ g/mol$ and a model drug (Fluka) were used. Acetone (Sigma-Aldrich) of analytical grade of purity was used.

Results CA and CA/PEG fibrous materials loaded with a model antibacterial drug were prepared by electrospinning. The electrospun materials were morphologically and spectrophotometrically characterized. The static contact angle of the obtained materials was measured and the antibacterial properties were determined. It was found that CA and CA/drug materials were hydrophobic with water contact angle ~120°. In contrast, the CA/PEG and CA/PEG/drug materials were hydrophilic. Moreover, the drug-containing materials exhibited antibacterial activity against Gram-positive bacteria *Staphylococcus aureus* (*S. aureus*).

Discussion It was found that the contact angle values and the drug release depended on the composition of the prepared mats. High water contact angle values were measured for CA and CA/drug mats. The incorporation of the water-soluble polymer PEG reduced significantly the water contact angle values, and moreover it facilitated the drug release. It was found that the incorporation of the drug imparted antibacterial properties against the pathogenic microorganism *S. aureus*.

Conclusion

Novel fibrous mats based on CA and CA/PEG loaded with a model drug has been successfully prepared by electrospinning. The incorporation of PEG led to hydrophilization of the mats and facilitated drug release. Moreover, the drug-containing mats exhibited antibacterial activity against *S. aureus*.

Keywords: *electrospinning, cellulose acetate, drug, antibacterial activity.*

*This research has been performed at the Laboratory of Bioactive Polymers, IP-BAS in the frames of the B.Sc. thesis of O. Mola





MODELING AND CONSTRUCTION OF A LADIES' BOOT AND IMPLEMENTATION IN THE PRODUCTION OF "CHRISTIAN SHOES" LTD - GABROVO

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Introduction

Modeling is an inevitable beginning of footwear production. Any new footwear, which is produced in series, requires a preliminary precision-artistic design and development of a sample - a sample for specifying the size and shape of the product as a whole and its details. Three terms are used to create models: Modeling; Construction; Design;

The aims of this work are to model, construct and create technical documentation for implementation in the production of a ladies' boot in Christian Shoes EOOD, Gabrovo.

Experimental part

Modeling a molded-copy method is used:1. Modeling: Choice of soles and molding; Modeling a ladies' boot. 2. Design: Construction of the product in Footwear CAD; Selection of materials; Production of a sample model - sample; Structural adjustments 3. Grading. 4. Calculation. 5. Implementation in production: Production of patterns for cutting equipment; Production of a technical passport - cutting; Production of a technical passport - tracing; Production of a technical passport - sewing; 6. Calculation for 59 pairs of ladies' boots. 7. Respect for safety, hygiene and environmental standards;

Results

Implementation in production: Making Cutting Patterns; Production of technical passports; Production of technical passport tracing; Production of technical passport sewing; making;

Conclusion

A lady's boot model has been developed with all technical documentation; Wholesalers have shown interest and after the model's correction they have declared quantities of the new ladies boot model; The Footwear CAD system makes quick and accurate calculations of the cost of the models. The quantity of materials for the required orders is calculated; Drawing on Footwear CAD is a quick fix to meet consumer demand; With the Calc Master system it is possible to calculate the value of the materials needed to produce a certain amount of footwear and their quantity; The model is relatively light to work in production, "Christian Shoes" EOOD took a good decision with its investments in software.

Keywords: modelling, grading, design, ladies boot, footwear CAD system;

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COMPARISON OF MINERAL TANNING AGENTS IN THE PROCESSING OF ENZYME TREATED SHEEPSKIN

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Introduction

One of the main pollutants in the tanning industry is chrome tanning. By removing chromium compounds from tanning processes, scientists strive to create environmentally friendly and clean processing technologies. For this reason, the market has shown a growing demand for "ecological" products, especially using alternative tanning agents different from chromium, such as metallic substitutes - Al, Zr, Ti, Li. Part of these guidelines is the so-called "white tanning". The aims of this work are to study the possibility of "white" tanning of enzyme treated in the pretreatment processes sheep skins with a new product DMT - II (Zr - Al - Ti), and with an ACL product (Al-Zr-citric acid).

Experimental part

Materials, procedures and analytical methods

DMT-II - previously prepared mixed tanning agent, complex of Zr-Al-Ti; ACL - previously prepared mixed tanning agent, complex of Zr-Al-cit ac.; Cr tanning product; sheep skins;

In this study we compare sheep skins tanned in three variants by changing the type of tanning product. Shrinkage temperature (Ts), antibacterial activity, common water removable substances, true pore volume and physical properties of the leathers are tested by standard methods.

Results and discussion

Tanning complexes in new products have a very high degree of cross-linking of collagen of the dermis. Shrinkage temperature (Ts) of the tanned three sheep skins is within the range of 110°C to 121°C. The tensile strength is highest when we used Cr tanning agent. The results obtained convincingly prove the antimycotic properties of the products offered and the prospects of the proposed treatment.

Conclusion

1. The tanned three leathers are suitable for production of leathers for clothing and gloves according to BDS;

2. The tanned leathers with DMT-II and ACL are suitable for the article "white" leather;

3. DMT-II product is a very suitable substitute for chromium tanning;

4. In all three tanning variants, the leathers have antibacterial activity, strongly expressed in the DMT-II and ACL products;

Keywords: chrome - free tanning, sheep skins, zirconium, titanium, aluminium;

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STUDYING THE EFFECT OF THE COLLECTOR GEOMETRY ONTO MECHANICAL PROPERTIES OF ELECTROSPUN POLY (3-HYDROXYBUTYRATE) MATERIALS

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Introduction

Poly(3-hydroxybutyrate) (PHB) is a promising biopolymer produced by biosynthesis through bacterial fermentation. Its high crystallinity results in very poor mechanical properties with a low extension at break. Electrospinning onto patterned collectors at different collector speeds might be expected to achieve alignment of the fibers and thus tuning the mechanical properties of the prepared electrospun PHB-materials.

Experimental part

Poly(3-hydroxybutyrate) (PHB, 330000 g/mol), chloroform (CHCl₃) and *N*,*N*-dimethylformamide (DMF) were of analytical grade and used without further purification. A single column system for mechanical testing Instron 3344 was used for tensile tests.

Results

Electrospinning of the PHB (14% w/v) spinning solution in CHCl₃/DMF (4/1 v/v) was performed at 25 kV applied voltage, spinneret-to-collector distance of 25 cm and feeding rate of the spinning solution of 3 ml/h using three types of patterned rotating collectors - drum, blade and grid. In order to achieve desired orientation of the PHB fibers, the speed of the collectors was varied at 600 and 2200 rpm. In order to study the effect of the collector geometry on the mechanical properties of PHB materials, tensile tests were performed at room temperature and extension rate of 20 mm/min.

Discussion

The electrospinning of PHB onto rotating collectors of targeted design resulted in preparation of nonwoven textile with randomly deposited fibers (onto drum) or with alignment and patterned fibers structure (onto blade or grid type collector). In addition, increasing the collector speed to 2200 rpm resulted in an arrangement of the PHB fibers along the drum collector rotation direction. The obtained stress-strain curves clearly shows that the increasing the collector speed leads to enhancement of the strength of the electrospun PHB materials obtained onto patterned collectors.

Conclusion

The effect of the collector geometry onto mechanical properties of electrospun PHB materials was studied. It was shown that the alignment of the PHB fibers might be successfully achieved by using the patterned collectors and by varying their rotation rate. Therefore, it is a suitable approach for enhancing the strength of the electrospun PHB materials.

Keywords: *electrospinning, poly(3-hydroxybutyrate), patterned rotating collectors, mechanical properties.*

Acknowledgment:

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CELLULOSE ACETATE FIBROUS MATERIALS LOADED WITH CURCUMIN "N" OR "ON": PREPARATION, ANTIBACTERIAL AND ANTITUMOR ACTIVITIES

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Introduction

Curcumin (Curc) exhibits a number of valuable pharmacological properties. This beneficial compound manifests antibacterial, antioxidant, anticoagulant, anti-inflammatory, and antitumor activity. However, Curc is poorly soluble in water and body fluids, and this impedes attaining effective therapeutic concentrations. The incorporation of Curc in a polymer matrix is expected to be one of the successful approaches to overcome some of its shortcomings.

Experimental part

Cellulose acetate (CA, Aldrich) with nM= 30 000 g/mol and DS 39.8%, polyvinylpyrrolidone (PVP, Fluka) with Mr 24 000 g/mol and curcumin (Merck) were used. Acetone (Sigma-Aldrich) and ethanol (Sigma-Aldrich) of analytical grade of purity were used.

Results

Electrospinning was used to prepare fibers with embedded Curc (Curc-*in*-CA) and electrospinning in conjunction with electrospraying was used to prepare CA fibers decorated with Curc-PVP particles (Curc/PVP-on-CA). Electrospinning of CA solutions resulted in preparation of fibers with mean fiber diameter 780 ± 110 nm. Curc-PVP particles were observed on the surface of the mats as well as in their internal parts.

Discussion

The used solvent system and PVP concentration influenced the shape and size of the obtained nanoand microparticles of Curc-PVP as well as the wetting and Curc release from the fibrous Curc/PVP-*on*-CA mats. The obtained Curc/PVP-*on*-CA mats exhibit excellent antibacterial and antitumor properties. This result was attributed to the antibacterial and antitumor activity of Curc and the enhanced solubility of Curc by its incorporation in PVP.

Conclusion

Novel fibrous mats based on CA fibers with Curc-PVP particles have been successfully prepared by

electrospinning and by conjunction of electrospinning and electrospraying techniques. The incorporation of PVP led to hydrophilization of the mats and facilitated Curc release. Moreover, the Curc-containing mats exhibited antibacterial activity against *S. aureus* and *E. coli* bacteria and anti-tumor activity against human cervical HeLa cells.

Keywords: *curcumin, electrospraying, electrospinning, polyvinylpyrrolidone, cellulose acetate, antibacterial and antitumor activity.*

Acknowledgment:

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STUDY THE IMPACT OF NANOPOWDERS B₄C ON THE BALLISTIC CHARACTERISTICS OF ULTRA-HIGH-MOLECULAR-WEIGHT POLYETHYLENE

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Introduction

When designing ballistic protection products, it is necessary to use materials to create a lightweight armor that is light and provides comfort when wearing it. Combining the properties of metal alloys, fibers, polymer materials, textiles, nanoparticles by reinforcing them with a high polymer matrix can provide high ballistic protection.

The aim of this study is to create a lightweight model of product for individual ballistic protection by combining the properties of heterogeneous materials into a single composite system that provides reliable protection and wearing comfort. High molecular weight polyethylene, nano-fillers, polymers with a high strength are embedded in a single system without significantly changing parameters such as the weight, thickness and density.

The purpose of this study is to create a lightweight product model for individual ballistic protection by combining the properties of heterogeneous materials into a single composite system to provide reliable protection and wear comfort. High molecular polyethylene, nano-fillers, high strength polymers are incorporated into a single system without significantly changing parameters such as weight, thickness and density.

Materials and experimental procedure

Created is a composite system of Polyvinyl butyral (PVB), inorganic boron carbide nano particles (B_4C) applied to high molecular weight polyethylene (UHMWPE).

The ultra-high molecular polyethylene (UHMWPE) is a multilayer fabric non-woven fibers produced by Dyneema. The fabric is 0.1 mm thick and has a mass of about 140 g/m². The construction of multilayer polyethylene fiber fabric is a reinforcement that gives mechanical strength and elasticity to the individual ballistic protection means.

Polyvinyl butyral (BUTVAR B-98), manufactured by ACROS Organics (The Netherlands), is a white powder. Polyvinyl butyral dissolved in ethanol to create a highly viscose resin which after curing creates a strengthening matrix.

Boron carbide is a material with exceptional hardness Mohs 9.3, gives high strength, stability at high temperatures and chemical stability, for use in the creation of systems operating at peak loads. Used in the study B4C is a powder with a particle size Dpart = $0 \div 2.5 \mu$ (microns).

Preparation of polyvinyl butyral/nano powder B_4C solution

A solution of polyvinyl butyral (15 wt.%) In ethanol C_2H_5OH (pure for analyse). To monitor the effect of nano particle B_4C on ballistic and strength parameters, three solutions of 3, 5 and 8 g of B_4C were prepared. For the even distribution of particles, a magnetic stirrer is used, rotating at 1200 rpm for 3 hours at room temperature. The solutions are applied one-sided onto (UHMWPE), applying the same amount of solution (gravimetric method) to each of the sheets. The thus impregnated polyethylene layers were dried for 72 hours at room temperature (22 °C).



Physico - mechanical tensile strength tests have been conducted on a WPM "Chaper" dynamometer and are in accordance with the requirements of BDS EN ISO 13934-1 "Textiles, Tensile Properties of Fabrics - Part 1: Determination of Maximum Strength and Strength at Maximum Strength using the STRIP method". The prepared specimens are 10 mm (sample width) and 100 mm long. The mass measurement was performed according to BDS EN 12127 "Textiles, Fabrics, Determination of mass per unit area by using small samples".

Ballistic tests were conducted in accordance with Ballistic Test Method for Personal Armor Materials and Combat Clothing, STANAG 2920 Ed.3. A ballistic baud rate V50 is determined with scraper mimic under ambient conditions of 20° C and a relative humidity of 82.0 \pm 1.5. Shooting is carried out with a caliber of the barre 17.62 x 39 mm, an immitator of shakes A3 / 7623 with a mass of 1.102 \pm 0.02 g, barrel orientation 00 \pm 10, a distance between the barrel end and the panel 5 m \pm 50 mm, three shot and three missed. Hitting distance > 30 mm. Prepare packets from 10 layers for each of the amounts of B₄C.

Samples prepared are tested for tensile and ballistic strength. The strength increasing with an increase in the content of the bulk boron carbide. The strength, ballistic and weight data increase exponentially with increasing the amount of B_4C particles. An increase in ballistic resistance was observed for all samples with an increase in the content of B_4C particles compared to untreated high molecular weight polyethylene.

The quality of impregnation of high molecular weight polyethylene (UHMWPE) with PVB/ and dispersed B_4C nano particles was analyzed by scanning electron microscopy.



Figure 1 Scanning electron microscopy at x3000 and $5\mu m$ magnification, on sample (UHMWPE) - with nanoscale nanoparticles of irregularly shaped B₄C deposited on it.

Scanning electron microscopy unambiguously demonstrates the deposition of nano-sized particles whose elemental analysis confirms the presence of boron and carbon on (UHMWPE).

Conclusion

1. The proposed method of creating a high composite system PVB / B_4C / UHMWPE for individual balistic protection.

2. Physico-mechanical and ballistic tests have shown that the use of polyvinyl butyral together with B_4C nano particles leads to an increase in the strength of high molecular polyethylene as well as an increase in ballistic performance.

3. During the ballistic tests, an increase of the V50 ballistic velocity was observed, with an increase content of nano particals B_4C in the polyvinyl butyral reinforcement matrix and the ultra high molecular polyethylene.

4. Scanning electron microscopy unequivocally demonstrates deposited nano-sized particles whose elemental analysis confirms the presence of boron and carbon on (UHMWPE).



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Abstract

The goal of this work is to describe the way for integration of piezo materials in textil materials and clodes. This includes preparation, base materials and the properties. Nanocomposite materials on the basis of vinylidene fluoride-hexafluoropropylene copolymer with organically modified nanoclays were obtained by co-precipitation method from its solution in dimethylsulfoxide. The addition of nanoclays was found to facilitate the transformation of the polymer crystals from α - to β - phase. The increase of the tensile strength and elongation at break of the nanocomposites, containing Cloisite[®]15A was higher at lower content of nanoclays, compared to that of the initial VDF-HFP copolymer, thus disclosing that the clay layers were better exfoliated. The results obtained showed that the nanocomposites prepared could be promising for the application as new piezo materials. The main properties are shown in *Table 1*. Mechanical test of piezo materials are shown in *Figure 1*.

Table 1 Dielectric constants and critical

electrical field of the samples				
Parameter	Number of samples			
C(PF)	212	70	110	190
ε _r	9	15	22	25
U _{BR} (KV)	5.1	5.2	5.8	5.7
$E(V/m) \times 10^7$	6.0	5.7	3.0	-



Keywords: piezo materials, textile materials, flexible electronics, cloths

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TENSILE RESPONSE OF ARAMID-POLYAMIDE COMPOSITE MATERIALS WITH DIFFERENT FILLING DEGREES AND FIBRE ORIENTATION PRODUCED BY ADDITIVE MANUFACTURING

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The additive manufacturing (3D printing) was intensively developed in the last years. Today there are commercially available 3D printers, which can place carbon, glass or aramid filaments additionally to the thermoplastic material [1]. This allows the production of parallel layers, where the reinforced material is placed in the most efficient way.

This work presents experimental and numerical investigation (based on [2] and [3]) of the tensile response of Aramid-Polyamide composite samples, produced by additive manufacturing. In order to determine the material properties of the composites, several forms with different orientation and filling degree of the polyamide were produced. The form of the samples is determined by the DIN EN ISO 20753. The tensile tests shows for several structures initial high elasticity modulus, caused by the reinforced fibres and after that long elongation - up to 70%, based on similar to kinematical rearrangement of the polyamide filling walls. The resisting force for some of the structure types after the first peak remain enough high, so such structures can give additionally safety factor in constructions without increasing of their weight.



Keywords: *additive manufacturing, 3D printing, aramid-PA composite, tensile behaviour* [1] Mark One, https://markforged.com/

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Abstract

In this work, some technology steps for CIGS preparation are shown. CIGS (Copper indium gallium (di)selenide) is well known as a material for flexible solar cells. Its main properties and the structure are shown in the table.

IDENTIFIERS			STRUCTURE OF CIGS UNIT CELL
	CAS Number	12018-95-0 (CuInSe ₂)	
PROPERTIES	Chemical formula	$CuIn_x Ga_{(1-x)} Se_2$	SASA2
	Density	~5.7 g/cm ³	XXXX
	Melting point	1,340 to 1,260 K (x=0-1)	
	Band gap	1.7-1.0 eV (x=0-1)	$\cdot \mathcal{N} \mathcal{N}$
JRE	Crystal structure	tetragonal, Pearson symboltI 16	
UCTI	Space group	I42d	$\operatorname{Red} \to \operatorname{Cu},$
STR	Lattice constant	a=0.56-0.58 nm, c = 1.10-1.15 nm	Blue \rightarrow In/Ga

The production includes several steps as follows:

• Preparation of textil base/substrate with suitable metalization;

- Preparation of ink consisting CIGS and glue;
- Deposition of CIGS on textil using printing process;
- Preparation of electrical electrods and connectors.

The usual efficiency of such kind of solar cells is in the range of 10%.

Keywords: Solar cell, textile materials, flexible electronics, CIGS.

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NEW POSSIBILITIES FOR DESIGN AND FABRICATION OF TEXTILE PRODUCTS BY ADHESIVE BONDING / WELDING

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Introduction

Despite the progress in sewing machines and the emergence of intelligent ones, which can dynamically control their mechanisms as a function of the material properties, sewing is the slowest operation in the clothing industry and requires the greatest amount of human labour.

The aim of this study is to present the advantages and disadvantages of the new alternative methods of adhesive bonding or welding the textile materials that replace the classic sewing. The various materials, techniques and machines used for bonding, as well as the requirements for the seam obtained and the methods for its testing are examined.

Comparative analysis of sewing and bonding / welding of textile materials

New possibilities for sewing elimination in many operations, including seams, hems, zippers, pockets, etc., as well as the improvement of the clothes manufacturing technologies and design are revealed. Different techniques can be used for

revealed. Different techniques can be used for seamless joining the textile materials based on heat, ultrasound and laser. The selection of a technique depends on the type of material used, the function of the final product, and the desired quality of the bonding / welding stitches. The seams quality depends on bonds strength, stretch ability, safety, draping ability, appearance, durability under conditions of use, etc. The resulting seam is waterproof and as a rule, the garments made with this technology are lighter. A more elegant profile and greater comfort are achieved and less friction for the end user. Adhesion or welding also reduce or eliminate the amount of thread used. It is also possible to place other materials inside the seams, such as elastic or electronic components in the



manufacture of smart clothes. Bonding and welding have already proven their advantages and durability in zippers, pockets and more components in outerwear or other clothing. However, companies are still experiencing and refining various mass production techniques.

Conclusion

The new techniques, using heat, ultrasound and laser for bonding of textile materials have a significant potential for manufacturing of textile products in the future. A replacement of sewing by adhesive bonding or welding will allow complete automation and robotization of processes and a change in the modern vision for textile and apparel production. The new requirements for the production of protective and sportswear, as well as for the production of intelligent clothes, demand the improvement of the methods of linkage of clothes.

Keywords: textile materials, welding, adhesive bonding, heat, ultrasonic, laser









T2 TEXTILE TECHNOLOGIES: SPINNING, WEAVING AND KNITTING











NEW WEAVING CONCEPT: MOTION CONTROL SYSTEM APPROACH

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Introduction

The running of the weaving machine requires a sequence of movement to control its various weaving functions given by dedicates parts and all of these functions must be accurately timed and fixed to ensure a regular sequence. Indeed, once and while the machine is running, the order of movements is fixed and the modification of parameters is strictly impossible during the weaving operation (shed height, harness speed, reed stroke and filling).

Designing new textile structures including both textile and non-textile structures requires the development of a new weaving machine based on a concept of fully independent movements unlinked to the main shaft, providing more flexibility.

Problematic

To produce new woven hybrid structures, a new weaving machine concept is requires allowing quick setting as well as weaving parameters modification while the machine running.

In order to develop each function on the machine, recent weaving machines are based on multi servomotors design, but the main functions of the machine are still the same as well as the movement synchronization.

Design of the new weaving machine

A new prototype to produce specific hybrid fabrics is designed. The machine is 360 mm width, and 1 up to 8 picks can be inserted in the shed as well as different devices, equipped with 9 frames. The suggested new design allows controlling all the weaving machine movements independently and redesigning the movement synchronization at each pick. These modifications allow to change various setting of the machine while it is running.

Control system architecture

Servomotors associated with a speed drive, has been selected to provide the various movements on the machine and a LMC058 Controller has been used for keeping the synchronization of each moving axis on the machine. It is an up to date controller type with all basic logical integrated functions.

A program depending on a digital cam profile has been done from this cam profile, the "SoMachine" Software allowed us to generate the master cam profile which corresponds to a virtual axis, which control slave axes (for example: reed axis). Based on this virtual axis, a new timing diagram has been defined. All parameters of each moving axis can be changed very quickly at each pick during the weaving by using this type of cam.

Conclusion

The development of the machine control program ensures the synchronization of the various axes on the machine with carrying out the safety of their axes. By using this system, a large number of parameters can be quickly modified which allow more flexibility on the weaving process. By implementing the LMC058 controller, various settings of the machine can change independently while it is running. Such a system permits fast multi axis synchronization with precision and increased reliability

Keywords: Weaving machine, controller, synchronization axis, CANOpen, electronic cam.



STUDY OF BIJECTIVE RELATIONSHIP BETWEEN THE SINGLE AND BUNDLE COTTON FIBER MECHANICAL PROPERTIES

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The characterization of cotton fiber is very complex due to the growing and harvesting conditions of the cotton plant. It is very important for breeders to understand the relationships that may exist between specific fiber properties, overall fiber quality and yarn quality. All of these factors interact and are critical to the development of cottons that can compete in a global market. Understanding these interactions will allow breeders to more effectively use fiber data for selection purposes to improve yarn quality.

In this paper, we will focus on the relationships between fibers' mechanical properties and yarns' ones by studying their relative behavior and the relationship between single cotton fibers and cotton fiber bundles.

For this purpose, three different types of cotton fibers will be studied. These cottons were chosen from a list of twelve cottons covering a large panel of varieties and physical properties as maturity, fineness, micronaire, length, etc... as shown in Figures 1 and 2. Classifications per length classes and linear densities will be done in order to enlarge the scale when making plant selection.

Analogical models based on springs, dashpots elements as kelvin Voigt models will be presented for each length class for single fibers and fiber bundles in order to provide additional information on their behavior. With single fiber analogical models and fiber bundle analogical models, a relationship linking these two models will be studied. This relationship should be a bijective relationship.

Properties evaluated will include elongation, single and bundle tenacities, work of rupture, etc... Fiber bundles quality will be an effective tool in predicting yarn quality and spinning performances.



Keywords: Cotton, single fibre, bundles, mechanical properties, modelling, analogical models



INVESTIGATION ON THE MOISTURE MANAGEMENT PROPERTIES OF MULTILAYER WOVEN STRUCTURES

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Introduction

The moisture management properties of the fabrics intended for ladies' and men's suits are very important, because they have to ensure the comfort of the people who wear them. The suits are made from two kinds of fabrics - facial fabric and lining. The materials used for both layers as well as their structure determine the transfer of the sweat caused by the human activities. The aim of the work is to investigate the impact of the facial fabric and the lining separately and as a two-layer structure on the moisture management properties.

Experimental part

The experiment is carried out using the following materials:

- facial fabrics 3 fabrics from 100% Wool and 3 fabrics from Wo/PES 50/50 produced in different masses per unit area;
- **lining fabrics** 3 fabrics with mass per unit area 85 g/m² from Cu/CV in different ratio of Cuprammonium Rayon and Viscose Rayon: 51/49, 56/44 and 76/24.

Using the Moisture Measurement Tester M290 (SDL Atlas, UK) the following moisture management properties are determined: Wetting Time; Absorption Rate; Maximum Wetted Radius; Spreading Speed; Accumulative One-Way Transport Index; Overall Moisture Management Capacity.

The properties are determined for each fabric separately and for each combination of facial fabric and lining. When testing the two-layer structures, the dropping is done on the lining fabric in order to simulate the sweat transfer from the human body to the environment.

Results and Discussion

• Pure wool fabrics get wetted quickly and have a low absorption rate. They show moderate to good moisture management properties - the One-Way Transport Indexes are over 200% and the Overall Moisture Management Capacities are between 0.5 and 0.6;

• The facial fabrics from Wo/PES get wetted more rapidly, resp. the rates of absorption are lower. The One-Way Transport Index is influenced by the mass per unit area of the fabric and increases proportionately. The Overall Moisture Management Capacities reach 0.5 - 0.7, that means a "very good" grade;

• The linings get wetted relatively slowly in the plane of the fabric (top and bottom) transferring the liquid in vertical direction. They have a high One-Way Transport Index, twice higher than that of the facial fabrics ensuring rapid take-off of the human sweat from the body. The OMMC values are about 0.8. There is no proved influence of the ratio of the components (Cuprammonium and Viscose Rayon) on the moisture management reasoned by the common nature (regenerated cellulose);

• The two-layer structures show high spreading speeds. They are 20 to 30% greater for the bottom surface (facial fabric) than that of the top surface (lining). The two-layer structures have lower One-Way Transport Index and OMMC compared to the single ones, due to the increased thickness and the presence of air gaps, which hinder the liquid transfer.

Conclusion

The linings from Cu/CV provide better moisture management properties of the woollen suits, taking the moisture away from the body. The transfer is more effective if the facial fabric consists of wool and PE fibres and is thinner.

Keywords: Moisture management properties, facial fabric, lining, multilayer woven structures



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When weaving a double fabric we usually use plain weave and its derivatives. Double fabrics are two separate fabrics that lie on top of one another and are joined together. In this case, a thick, warm double fabric is produced. Light coloured polyester yarns for warp threads are used for weaving double transfer printing fabrics. The colour of the yarn is of great importance because it does not have white ink for printing. On the double fabric, the sublimation transfer printing works only with polyester fibrous raw materials and textile substrates.

The subject of the paper is the description of the construction of a double fabric with a common fibrous composition of cotton type and a polyester face for transfer printing by sublimation.

The purpose of the development is to establish the tissue structure and machine mode of weaving for the predominant presence of polyester fibres on the face fabric. The main task in the development was to obtain a fabric in which the fibres of the front surface and the fibres from the packing surface would be stratified.

In the case of transfer printing, there is a clear requirement that the transfer print requires a definite representation on the face of 100% polyester fibres. This requirement is due to the specific technique of attaching dispersion dyes to the molten peripheral surface of the polyester fibres. Typically, the inside of the clothes is made from natural fibrous raw materials - cotton or wool. In the present case, the idea of the fabric is aimed at spring / summer clothing. The colour variety of clothes is obtained by transferring polyester fibres and the physiological conformation of cotton-type spinning blends. The categorical stratification of the face and the reverse layers can only be achieved by the weaves of double woven fabrics. In the case in point, these are two plain weaves. As far as the weave threads for the fabric are concerned, they are single carded yarns with a linear density of 20 tex. They are derived from white non-coloured polyester fibres. The yarn of the face fabric comprises a core of elastomeric thread. As far as the weaving threads for the



reverse fabric are concerned, they are also obtained by carded spinning system and have a cotton-type fibrous composition. They consist of 65% polyester and 35% viscose fibres. A core of elastomeric fibre is embedded in the weft threads of the reverse fabric. The elastomeric thread has the task of raising agility of the fabric and improving its exploding properties. Thus, the technological requirements to design the fabric by transfer printing and obtaining good hygienic exposition properties are satisfied.

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Keywords: Double woven fabric, polyester fibrous face, transfer-printing substrate

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THE APPLICATION OF THE IREQ INDEX FOR ASSESSMENT OF THE THERMOPHYSIOLOGICAL COMFORT LIMITS OF SLEEPING BAGS

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Sleeping bags are designed for outdoor application in cool or cold environment. They create additional microenvironment between the human body and the surrounding outdoor air, thus preventing or minimizing the heat losses from the body during rest and sleep. The Required Clothing Insulation Index (IREQ index) is presented in the International Standard ISO 11079 for interpretation of the cold stress of the human body in natural or artificial cold.

The aim of the present study was to predict the protective abilities of 4 sleeping bags with different insulation using the IREQ index. The IREQ index was used as it integrates the effect of environmental factors (air temperature, air velocity, relative humidity, mean radiant temperature) and personal factors (clothing insulation and metabolic activity) on the human thermophysiological comfort in cold environment.

The predictions were based on an own code, developed on the basis of the mathematical model for IREQ index predictions, presented in ISO 11079. Three values were calculated: the required clothing insulation index, the duration of the limited exposure and the recovery time. The predictions allow to assess the limits of applicability of the garments from the point of view of the thermophysiological comfort of the wearer, the metabolic rate during rest and sleep and the weather conditions.

The results obtained have a practical use, as they allow to determine the lowest outdoor temperature for use of the sleeping bag and the duration of the outdoor exposure of the person.

Keywords: IREQ index, thermophysiological comfort, sleeping bags, cold environment.



INVESTIGATION OF MECHANICAL COMFORT RELATED PROPERTIES OF MULTILAYER WOVEN ARAMID STRUCTURES FOR PROTECTIVE TEXTILES

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For several protective textiles, the resistance against penetration is very important property and is kept high enough by using combinations of up to 20 layers of different fabrics [1]. For many applications which are used in the protection area, aramid woven structures are normally used. Due to the fact, that many layers are required, it is assumed, that the using of multilayer woven structures could improve the stab resistance, but reducing the total weight of the assembly. To determine the influence of the single parameters of the structures and the influence of the interlacement between the layers, four different aramid fibre narrow fabrics with different properties and pattern, were produced and tested by determining the thickness, compression behaviour, bending rigidity and the mass per unit area.



Figure 1 Simulated 3-D Image of two layers twill pattern

The fabrics were simulated with Wisetex [2] and the results of the calculated thickness, mass per unit area and compression curve are simulated and compared with the measurements.

The comparison shows, that at the more dense structures the difference between the simulation and the experiment is larger than of the more open structure. This can be results of the higher compaction and reorientation of the multifilaments in the yarn cross section, which cannot be directly considered during the modelling with Wisetex. Anyway, the results of the created geometries show good correlation with experimental results and these can be used later for FEM simulations of penetration behaviour. The long term aim of this work is the selection of most suitable weave pattern for ballistic protection and stab resistance, but these are too stiff and hard for wearing. Using proper interlacement between the layers, the softness of the fabrics can be increased significantly without significant loss of penetration resistance.

Keywords: aramid woven fabrics, multilayer, weight, thickness, simulation, Wisetex

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STRESS IMPACT OF THE WARP THREADS FROM FANCY TWISTED YARNS ON THE DOUBLE-FACED STRUCTURE OF SINGLE-LAYER FABRICS

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Woven fabric suitable for outerwear, made by fancy yarns of different fibrous composition. Obtaining a fabric with good drapability and good performance properties requires specific machine settings, due to which all warp threads have to be equally stressed.

The subject of this paper is the study of the mechanical characteristics and stresses of the warp threads in the formation of the weaving shed, as well as the way in which the stresses in the weaving warp are uniform. The aim of the paper is to find out how the fabrication of single-layer fabric with different surfaces and uniform construction is achieved.

The structure of the fabrics is determined by the type of raw material, the quality of the yarns, the

quantity and the reciprocal layout of the warp and weft threads, the method of artistic shaping and finishing treatments.

Fancy twisted yarns generally consist of three strands the main (carrier), the effector, and the fastening. In the classical way, they are made by two passages. The first one, called Fancy Twisting, is performed on ring-shaped tweezers, which, unlike those for smooth twist, have at least two feeder devices.

The alignment of stresses in the weave warp must follow the mechanical characteristics of the yarns identified by the following inequality:

$\mathcal{E}(T_t 667) = 0.5\% < \mathcal{E}(T_t 286) = 8\% < \mathcal{E}(T_t 33x2) = 11\%$



The layout of the warp threads and their fitting into the shed set must follow the following principle. The easily stretched yarn T_i33x2 should be embedded in the backsheet frames, yarn T_i286x1 threaded into the front and yarn T_i667x1 threaded into the first frames. The results of the research on the yarns found that the mechanical properties of the three types of yarn should be taken into account in the manufacturing of the fabric. The most stretchable yarn should be threaded into the rear frame, the middle stretch yarn should be embedded in the front frames, and the yarn with the smallest stretch should be embedded in the first frames. In this way, a fabric of good appearance and good drapability can be obtained.

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Keywords: *Fancy yarn, double-sided fabric, weaving shed adjustment*

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T3 APPAREL TECHNOLOGY













DESIGN OF SWIMSUITS FOR WOMEN FROM ELASTOMERIC KNITWEAR

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Introduction

Subject of this article are some features in the algorithms for designing and building a standard basic construction of elastic knitwear.

Results

In theory and practice, there is a variety of algorithms for geometrically unfolding the surface of a sheet garment. In accordance with the type and purpose of clothing, the creation of a standard construction base is directly related to:

• the body dimensions that characterize the shapes and proportions of the human body in its dynamics;

• the type, structure and properties of the textile fabrics from which the product will be made.

Elastomeric knitted materials are characterized by a relatively greater tensile deformability, i.e., higher structural mobility and stretching. This property is the basis for easy acceptance of shapes consistent with the projected protrusions and depressions of the human figure.

In the upper abutments, the devices approach the shape of the human body and are characterized by relatively stable dimensions. The formation of the lower portions is effected at the expense of the stretching of the articles in the respective bearing surfaces of the figure, e.g. in the hips area. The different degree of deformation for different types of materials in the field of low loads requires the determination of transverse and longitudinal relative deformations.

Conclusion

An algorithm is proposed for sizing and geometrically constructing a basic construction of swimsuits for women from elastic materials with deformation indicators that meet the requirements for fit, pressure and perception. Five model variants have been developed with a wide application of the basic parts on the same basic structure, for a standard type dimension.

Keywords: typical figures for women, swimwear, model variants



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Abstract

1. Introduction

The paper deals with damp - heating processing (DHP) in sewing industries. Steam presses are by large the most frequently used machines in modern textile production enterprises. All research results from the present article refer to such presses and to the damp - heating processing.

The subject of this study is the DHP, which is essential for quality and productivity in sewing production. The main objective is to carry out preliminary experiments to determine the limit values of one of the main manageable factors of the DHP process when working with chemical textile materials - the amount of steam introduced into the treated tissue package.

The subject of this study was the DHP of many natural textile materials - wool and wool type ones, cotton and cotton type ones, flax ones. However, another large group of TM - chemical textile materials - has not been the subject of a multi -factor study with Steam presses in Bulgaria.

Concerning this fact the main objective is to investigate the relationship between the temperature difference ($\Delta T = T_2 - T_1$) measured at different points of the processed packet of fabric depending on the quantity of steam input at the DHP of Steam presses.

2. Experimental part

A steam press of the type HR-2A-04 HOFFMAN is used. The temperature is read off by using the system. The samples are of chemical textiles. The conditions for the experiment are defined by a large number of previous tests and analysis.

The main controlling factors are:

 T_1 - temperature under the first layer of textile materials - T (°C); T_2 - temperature under the second layer of textile materials - T (°C); H - steam quantity - H (mm) in accordance to the used steam press.

3. Results and a Discussion

The results of the experiments done are summarized in a table. Verification of reproducibility of the process is carried out, which includes verifying the consistency of dispersions (according to Kohren). It is proven that the process is reproducible.

4. Conclusion

As a result of the conducted tests and analyses it has been determined the dependence of the temperature difference measured at different points of the packet of fabric on the quantity of steam input for the chemical TM. This creates the conditions for planning and conducting a multi-factor experiment with chemical textile materials and for optimizing the process.

Keywords: damp - heating processing (DHP); chemical textile materials; sewing companies



T4 TEXTILE ART AND FASHION DESIGN













THE CLOTHING AS A SOCIAL STATUS SIGN

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The subject of this article is an interpretation of the clothing's elements as a sign for a social status in the society. It is reviewing various subcultures, which are giving freedom for expressing your individuality. The article is comparing the role of the clothes in the modern fashion world to their impact in the Bulgarian traditional costume and its symbols. The clothes are viewed as the main label describing one's social status. The symbols and signs in the Bulgarian traditional costume represent different kinds of status, e.g. marital status. The author conceptualize the use of traditional rules and symbols in the modern clothes, using modern methods but keeping the traditional functions and meanings. The article conclude with a discussion on a contemporary approach towards the traditional embroideries.

Keywords: tradition; clothing; symbols; fashion; social status; sign

WORD UP – TEXTILE DESIGN TREND

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"Modern art is the creative world's response to the rationalist practices and perspectives of the new lives and ideas provided by the technological advances of the industrial age that caused contemporary society to manifest itself in new ways compared to the past."

I work to represent my experience of the newness of modern life in appropriately innovative ways. I transform my art from the gallery to pattern design, ready for the biggest international expositions and fashion industry.

My master degree work is based on the fashion trend "Word up". All the inspiration came from my abstract work with the letters in combination with street art.

In this project, I am representing my development from the start of my degree. In the final, I made designs that are ready for sell and can be printed in 1000 of meters...

I have more than two hundred sketches and projects, separated in three sections named "Black and white", "Color" and "Hue saturation". The size of the designs is 50/64 centimeters. Some of the projects are printed on fabrics.

I am going to finish the presentation with my favorite quote: "Design can be art. Design can be aesthetics. Design is so simple, that's why it is so complicated."

Paul Rand





TEXTILE PATTERN DESIGNS FOR CHILDREN: 'FUNNY BIOLOGY'

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"Funny Biology" is series of silk-screen, hand-printed textile pattern designs, for children's bedrooms, created with educational and playful purposes. Each pattern is based on the study materials in Biology lessons in primary schools, in order to provide a more interesting and entertaining way of understanding and learning the complex micro and macro cosmos we live in. The patterns consist of different cells, their cellular organisms and structures; the actions and interactions that occur within them.

Some of the aims of the research are not only to create an alternative and more entertaining approach to the traditional educational system in schools, but also to create a moral compass and a healthier relationship between the children themselves, their parents, their friends, society in general and the nature.

The patterns are designed for curtains and blankets in children's rooms and are accompanied with a colouring book that contains the cells, incorporated in the patterns and their various parts, as well as information about them. The core purpose of this is for children to be able to discover the names and shapes of the different cells, while playing with the textile designs in the interior. The variety of forms, that are to be coloured by the children, are integrated with texts, provided by Biology students, who develop informative platforms and books about Science for children. It was also a challenge for me because I found out that while teaching children about biological concepts, they could create moral bonds between themselves, their family, and the nature. For example, one of the texts in the booklet is based on a parallel relationship between the organisms in the cell parts and the family members.

In my artistic practice, I do illustration and animation and during my research, I found out interesting things about the visual identity and techniques in games and cartoons that are popular and loved by kids nowadays. The colours of these artistic products, which the children react positively to, turned out to be very bright, saturated, with lack of textures and shades, more generalized, but following the model of interesting associative forms. Through the animation, cartoons and children's illustrations, my goal was to develop designs that are close to the kids' worldview.

My other observation was based on Natural Science Museums around the world, which exhibits all sorts of artistic creations and interactive learning games, prompting children to understand Physics, Chemistry and Biology at an earlier age. Watching the happy running children who shout: "Wohoo!" through most of the museums' exhibits, and adding to this my interest in art pedagogy, has prompted me to seek such solutions in Textile art.

My wish is to be able to continue this course of work in the future through live observation of cells, under a microscope; to communicate with other students and scientists; joining powers with textile companies that approve the relationship between design and pedagogy, that look for a deeper meaning in designs, not just the beauty, and creating new connections between textile techniques, pedagogy and games!

Keywords: Textile, Design, Patterns, Biology, Kids, Children, Moral, Education, Play, Understanding



AN APPLYING MODIFIED MORPHOLOGICAL IMAGE PROCESSING METHODS IN COLOUR IMAGE EDITING

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Introduction

In the present article are explored theoretical and practical aspects of digital image processing in the two-dimensional space. For the purposes of digital image processing, the notion of mathematical morphology is used. It is a tool for studying and extracting individual elements of the internal image structure to support their presentation and description according to selected criteria such as: boundaries of areas, skeletal lines, etc.

Experimental part

Initially, there are two parameters that have to be set. One of the parameters specifies the size (in pixels) of the square region that will crawl through the image. The value of this parameter is directly proportional to the size (in pixels) of the objects in the image to be removed. The second parameter sets the maximum allowable difference between two adjacent contour pixels. Image processing begins with checking the colors of the first contour square. The colors of each two adjacent pixels are consistently compared. The comparison is carried out by subtracting the pre-values (colors) of the two compared pixels on their ingredients - red, green and blue. After decomposition, the corresponding components of the two pixels are compared. If no difference between the ingredients exceeds the set value, the next two adjacent contour pixels are compared. The process continues until a difference of any of the ingredients is greater than the set value, or until all the pixels of the contour square are bounced. If a difference greater than set value, before all pixels of the current square are crawled, the process is terminated. The following contour square is then crawled. If any difference beyond the value of set value is detected after scrolling all the pixels on the current contour square, all pixels inside the square acquire a value equal to that of the first pixel of the contour square. As a result, objects that fall inside the contour square and are substantially different from the background around them are removed and replaced with the background colour.

Results

The figure on the right shows the original sample image (left top and bottom) with dimensions 200×200 pixels, and the results after applying the method. The size of the processing square is set to 9×9 pixels (top right), and 5×5 pixels (bottom right). The maximum difference between two adjacent pixels is set to 20 for both processed images.

Discussion

The present method can be applied in the field of the textile industry to produce stylized images.

Conclusion

A novel method for editing color images, using morphological methods is developed.

Keywords: morphological image processing, erosion, dilation



DESIGNS FOR DECORATING ON CHILDREN'S CLOTHING AND INTERIOR

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In my artworks, I am interested by intimacy and emotions. The appearance of a child is a miracle and because of this precious intimate moment, I created designs for newborns and children from 0 to 3 years old. The children's clothing and interior decorations are designed with drawings of chickens, hens, eggs, rabbits and sheep, symbols of Easter represented in three different design collections - "Chicken", "Sheep" and "Rabbit". Easter is a celebration marking the new beginning, the power of faith, goodness and love, the birth of man and nature. Nature is incorporated in the design with cloudy animal surreal situation, creating a lot of space for imagination and association from the child's side.

Each of the elements included in the projects has a special defined positive symbolism. Moreover, I use these positive interpretations of the symbols to wish gentleness, kindness, spiritual purity, luck, health, well-being, fertility and wealth to the child. In this way I use art to create an unique spiritual moment of wishing luck to the child. This is also a reason for the animals to be in very dreamy, magical compositions: flying in clouds, floating in space.

I use color combinations that are gentle, but also very fresh and clean. In order to create a calm and happy atmosphere for the small children. I use a little bit of red to make use of the fact that it is attracting attention, not creating aggressive behavior. On the other hand, orange is creating warmth, comfort, coziness and promotes a welcoming feeling. I use yellow in bigger shapes because of it is ability to fill up the space with lively, energetic and cheerful energy. While green is calming and reminding the connection with nature, I use blue to support the intellectual part of the child.



My aim is to wish to the children a good path in life and create the proper atmosphere for that using Textile art.

The game I create with the scale of motifs and colors makes the projects suitable for bed linen and casual wear as well as interior decoration. This universality of the scale of the pattern makes it easier for the children to relate to a special visual identity that they will remember and feel part off. Again, I focus on the feeling of being at home and warmth.

Chickens, sheep and rabbits can also be perceived as positive characters that protect the child and guide his calm and spiritual world. The chickens bring the courage and boldness, the sheep symbolize the innocent and vulnerable, the rabbit is the good coordination and high observation.

Keywords: Design, Patterns, Chicken, Sheep, Rabbit, Children, Babies, Intimacy

MAJOR TRENDS IN THE RESEARCH AND DEVELOPMENT OF THE TECHNOLOGY IN THE FASHION INDUSTRY

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Flexibility has always been the key to the success of leaders in fashion industry, while computer technology is the most powerful tool to respond quickly to the demands of the customers. Computer aided design and production systems (CAD/CAM), which have entered the fashion industry, are the natural outcome of both the progress of information technology and the demands of manufacturing, namely faster and more effective making of the end product, as well as making cheaper and of higher quality clothes. The character of the apparel market has changed due to the availability of a standard set of products, and focusing on the customers' preferences, which means that there is a great variety and choice of available products.

The concept of fast response to the customer demand requires the production of the proper goods at the right time in proper quantities whenever the customer needs to buy. Various information technologies are in the spotlight of modern thinking. In 80s and 90s of the 20th and the beginning of the 21st centuries, a huge number of leading experts in this field have shaped the patterns of development. The application of these new technologies has a great social impact on not only the total number and the location of the people employed, but also on their skills and the need of training.

This article aims at describing the current situation and the major trends in the development of the technologies related to the production of clothes, and also at researching the social dimensions of some of the changes which they may lead to. It starts with comparing the driving forces of the technological development in the 80s and 90s of the 20^{th} century, and also gives information about some of the results of the current progress. This document explores how necessary the production systems are, and if they are ready to respond to the requirements of the individual customers. The impact of these new technologies on the human resource has also been taken into account.



Figure 1 "Virtual changing room or a magical mirror" - one of the new technologies of the 21st century, which will be part of the integration of the production with the marketing department. (http://www.criticalcommons.org/Members/ccManager/clips/cisco futureofshoppinginterfacegesture.flv/view)

Keywords: information systems, technologies, fashion industry, CAD/CAM, integrated production



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The Venice Biennial and the "Documenta" in Kassel are the most prestigious exhibitions in the world that show trends and achievements in the field of art.

For the first time on this forum, we see so much installations and objects of textile materials and techniques.

The 57th Venice Biennale was opened in May 2017 under the title "Viva Arte Viva". Christine Macel, who has been the chief curator at the Pompidou Centre, Paris since 2000, is the curator of the Biennale. Around 120 artists were invited to the curator's exhibition and 103 of them exhibited at the Venice Biennial for first time. This fact itself implies a different view of the processes in the contemporary art.

The Biennale is structured from nine pavilions entitled: "Pavilion of Artists and Books", "Pavilion of Joy and Fears", "Pavilion of the Common Space", "Pavilion of the Earth", "Pavilion of Traditions", "Pavilion of Shamans "," Dionysus Pavilion "," Pavilion of colours "and" Pavilion of Time and Infinity ".

Pavilions follow as heads of a book, as nine episodes that tell about complex, multi-layered approaches and the vast variety of practices that artists use. Macel is interested in the dialectic between engaging art and "art for art" without taking an ending position. Artists from all generations, from 25 to 97 years of age, participate.

One of the nine "chapters" in the exhibition addresses the question of traditions. This is provocative, as the tradition is considered an enemy of modernity. The textile is associated with tradition, but the biennial involves textile works that are both plastic and conceptual.

The Golden Lion Award for Best Artist was awarded to Franz Erhard Walter for his textile installations.

I would like to present some of the most impressive works made with textile materials and techniques.



Lee Mingwei, "project mending"

Keywords: traditions, modernity, textile materials and techniques, plastic, conceptual



EUROPE – SUI GENERIS ISM

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`ISM` is about changing an idea into ideology. This suffix derived from the Ancient Greek to reach all the way to us today. It tells lots and many stories of bringing people together and drove them in a direction as one. As a cultural movement, the renaissance gave to the people the power and will to believe in themselves. It brings the classical Greek philosophy that the `Man is the measure of all things.` and it puts the human as a centrepiece and manifest of art, politics and architecture, of life itself. As the history unfolds humanism changes into individualism and somehow we end up on the I in every `-Ism. We are the one that say `everything is already invented` and egoism makes us believe that we can just transform and use the history as we please. The collection tells that story in textile, colours and shapes. The drapery is transformed into pleats, solid colours turn into splashes graphic lines and stripes create a noise within.

ISM is a cohesive collection with clean and urban lines.





FASHION TRENDS AND FORECASTING

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This article researches the relationship between fashion trends, forecasting and fashion style.

Introduction

Many fashion forecasters, researchers and trend analysts are trying to create models and theories for better understanding or predicting of fashion and style change. Fashion trends change so quickly that it is sometimes hardly traceable. Over the last hundred years, fashion, styles and trends have changed constantly, vigorously and controversially. To track the movement of that it requires only a few points to draw a line and find direction.

Content

Cyclical character of fashion is observed in the re-emergence and recycling of fashion ideas, such as the return of kaki color in the late 90s of the 20th century. Looking for these movements, placing their observations and analyzes within the narrow theoretical framework, visualizing the shape and direction of change, fashion analysts develop a sense of progression in fashion, direction and speed of change. Until distribution, it reaches the trend that becomes visible to its followers. It is done through various communication strategies and community networks, even in the visual or verbal recommendation of the new fashion. Fashion trends often shift from one social group to another, but sometimes simply through different sets of people. Analysts and fashion forecasters are responsible for attracting consumers and helping retailers and designers to offer their ideas. Various methods are used in the course of anticipation, but the aspirations of all are aimed at creating such method to predict consumer mood, behavior and buying habits.

Conclusion

The fashion forecasting process includes basic steps to understand the business vision and targeting customer profile, gathering information about available goods, compiling information, defining trends, selecting products appropriate to the brand, the goals and the desire of the customer. Experts predict colors, fabrics, textures, materials, stamps, accessories, shoes, street style changes, or other styles that will be presented on catwalks and in stores for upcoming seasons. The concept applies to all levels of the fashion industry - high fashion, ready-to-wear, mass market and street.

Keywords: fashion, trends, forecasting





INFOGRAPHICS AS PART OF ADVERTISEMENT DESIGN

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Introduction

The use of infographics in constructing a new approach in advertising communication is one of the current themes of contemporary advertising design. Infographics include imagery of objects, graphs, diagrams, block diagrams, tables, map illustrations, etc. Innovative application of these elements requires analysis of the image not just as a supplementary explanatory element of the text (as it is often presented) but as a new version of the information transmission. The level of perception, information supply and memorization is significantly higher than that of traditional media: written speech, explanatory images and graphics.

Methodology and tools

The popularity and widespread distribution of infographics is due to two main reasons related to the peculiarities of human consciousness. These are the high congestion of contemporary man living in the information age and "the priority of visual perception", which asserts that human mind perceives images more quickly and effectively than text.

The article offers a new approach towards variable factors influencing rational conclusions about goods and services that determine consumer's choice. Rational conclusions can be made on the basis of accordingly provided information. For this reason, the impact on the emotional sphere of the target audience is considered in terms of cognitive input and operations.

Conclusion

Effective impact on perception requires an examination of the progressively-logical elements within a particular social or economic process. The data is analyzed by methods of mind mapping, as well as by application of intuitive information processing, methods of synergy and theory of systems.

Keywords: design, advertisement, communication, infographics, perception, memory, image





EUROPE – SUI GENERIS TREASURE

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An extinct ancient nation leaves messages to their versatile culture, which are encoded in the forms, colors, decorations, technology and function of products and construction. The great secret, of the historical contribution of the Thracians in European and world culture, is called Orpheus. This name is the password of an aristocratic oral culture, which millennia is expressed in rituals, sacred spells, and funerals.

Orpheus is called a teacher of immortality, a healer of the body and the soul, that inspires energy for the eternal creation of Beauty and Good. He conquers with his sacred words and actions the all living and dead nature. Confessing orphans are convinced that they will achieve a complete, spiritual and intellectual immortality. They achieve a balance between the flesh and the spirit, between morally and incorruptibly, ritually burying their precious treasures.

Life after death, the quest for balance, and Thracian treasures are the symbol and inspiration of the collection.

Basic for building the silhouettes is the relationship between the flesh and the spirit, the matter and the air.

The used colors are Orphic: red, black and white, which represent the Life-Death and Immortality.

The accents are the golden ornaments and wreaths, that remind of the oldest gold in the world that the Thracians have left us.





ANALYSIS OF COLORS TRENDS IN FASHION

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Introduction

The collection, processing and analysis of data on fashion trends is associated with the prediction of colors, fabrics, structure, and style of clothing. The purpose of this activity is to predict the choice of users. The baseline data from such projections is needed by manufacturers and retailers specializing in the fashion field.

Experimental part

Based on a survey of the colors chosen over the years, an analysis of available literary sources has been made on predicting color trends in fashion. It has been found that the choice of colors by the user is based on the internal psychological process that is associated with the perception process. The user selects on which type of products to pay attention, organizes information about them and interprets it in a way that is profitable.

Conclusion

The direct use of color components to predict color trends is inappropriate, because the influence on color choices has many other factors. Complex software and analysis methods are used to predict color trends. A trend in the colors chosen by users can be established by decades.

Keywords: Fashion Trends, Colors, Forecasting.



THE APPEARANCE OF NEW FORMS OF EXPRESSION IN THE INTERPRETATION OF TEXTILE

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ABSTRACT

In the last decade of the 20th century and the years of the new millennium, we have witnessed trends in fashion where the designers are no longer satisfied with the pure utilitarian function of clothing and its decorativeness. The present text deals with their exploration in relation to developing and manipulating textile materials and surfaces which noticeably extends the realm of the senses, the contact with their surroundings and reconfiguring in space, and the way our body comes in contact with it. With the help of digital and electronic technologies, we are able to access more levels of decorativeness. The ornamental elements within, serving aesthetic function and participating in the structure of the clothing, carry changeable value. There is a precedent for uniqueness, which is not fixed and creates an opportunity for greater variety leading to the development of a new appearance. This dynamic leads to an interactive apparel with the status of "thinking", which reacts to the established conditions of its surroundings.

Keywords: interactive fashion, decorative textile techniques



NO MAN'S LAND

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NO MAN'S LAND is the name of my graduate collection and it aims at visualizing the current situation of Europe. This diploma work is a product of research for the last century of European development in social and historical aspects, and answers the question, "Why is today a reflection of the end of Europe?"

According to the fabrics used in the Middle East and these in Europe, the colour combinations and the business style in the outfits, I mixed the most specific parts of clothing and created a combination that personalizes a new person, who lives in this no man's land, a individ, that bears the marks of different civilizations and lives now. The fabrics of the outfits are natural: cotton, linen, wool, reminding the East traditional garment. Colour combinations between bright and earths colours, clear line in construction, parts of the business look, all this conforms the initial idea of the main vision.

Last hundred years in European development are a prerequisite for a nowadays pogrom and a proof for a self-destruction of Europe. In 1916, The Sykes-Picot agreement, officially known as the Asia Minor Agreement, was signed. It was a secret 1916 agreement between the United Kingdom and France, to which the Russian Empire assented. The agreement defined their mutually agreed spheres of influence and control in South-western Asia. The agreement allocated to Britain control of areas roughly comprising the coastal strip between the Mediterranean Sea and the River Jordan, Jordan, southern Iraq, and an additional small area that included the ports of Haifa and Acre, to allow access to the Mediterranean. France got control of Southeastern Turkey, northern Iraq, Syria and Lebanon. Russia was to get Istanbul, the Turkish Straits and Armenia.

Since then these hundred years are full of wars, separations, unions, walls, borders, utopia and ambivalent wishes for a better life. A logical sequel



of this process was the The Arab Spring also referred to as Arab revolutions. It was a revolutionary wave of both violent and non-violent demonstrations, protests, riots, coups and civil wars in North Africa and the Middle East.

The followed migration to Europe was the end for the Agreement and the beginning of the disappearance of the continent. This situation asked the questions "Is it possible the acceptance between strangers and local people, or will the estrangement between the local ones be more possible?" No man's land is not a title, it is a fate.

This collection is created in twelve outfits, but they are not just fashionable clothes, they incorporates the idea for the nowadays lives and presents the eventual to-be inhabitant of this NO MAN'S LAND.

Keywords: no man's, migration, combination, new inhabitant, differences



TEXTILE, FORM AND CONTENT IN THE WORK OF MADAME GRÈS AND AZZEDINE ALAIA

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This text will examine the work of two of the most influential fashion designers of 20th century, who have put the human body in the centre of their creative task. During the first half of 20th century Madame Grès designs her famous draped evening gowns, inspired by the Classical period of Ancient Greece (Hellenic period). Her colleague Azzedine Alaia who was particularly successful since 1980s outlines the revival of the "body awareness" tendency and elevates his creations into works of art. The specific originality of their work will be revealed through the prism of the art and fashion relationship, as well as by comparative analysis of cut and tailoring, silhouettes, fabrics, textures, fabric manipulation techniques and different approaches to garment construction used by both designers.

Key words: fashion, art, "body awareness", design, analysis



AN INVESTIGATION OF DESIGN OF 3D ELEMENTS ACCORDING TO THE LATEST FASHION TRENDS

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Introduction

The 3D elements are very interesting fashion features for fashion designers and pattern makers and always are on fashion. The paper presents an investigation of design of 3D elements in ladies' dresses and jackets according to the latest fashion trends.

Experimental part

Ladies' dresses and jackets with 3D elements in the latest fashion trends, season fall winter 2017-2018, collections Ready-to-Wear are studied. With the help of the statistical method Correspondence Analysis the level of connection of types of 3D elements, their design and other fashion features are investigated. The Correspondence Analysis is chosen because this method presents results in graphics, which is very suitable way for investigations in fashion design.



Conclusion

The results of the study give possibilities for easy fashion design and variety of new models of ladies' dresses and jackets on the base of the strongest connections between the types of 3D elements, their design and other fashion features. New designs with applications of the results of the investigation are presented in the paper.

Keywords: fashion design, 3D elements, correspondence analysis.

INTERPRETATION OF 3D BIOPRINTING IN TEXTILE TECHNIQUES AND SEWING TECHNOLOGIES

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Abstract: The purpose of the created collection is innovation in the direction of textile technique and sewing technology. The object of the study is the human, his external (limbs, skin) and internal forms (joints, bones, organs). The subject of the study is 3D bioprinting as a modern technology for imitation, resumption and further development of man and his organism. As a result of the study, the principle of working of 3D printers for construction of a whole object, was applied by successive and multiple layering of a fiber-like mixture. This method is used for weaving with rubber flex and cord, pieces of clothing in a pattern of muscles and spine. Rubberized human hands are made by latex castings in three-dimensional shape. In the construction of the garments, by gaining and removing volumes in certain centimeters, free-standing overalls that mimic and further develop the human figure, are obtained. The collection embodies the essence of man by recreating his perfect forms given to him by nature (by rubber and fabric) in a new contemporary way.

Keywords: Innovation, human, imitation, fibres, rubber.



Photograph: Polina Sotirova Made by: Elisaveta Angelova Idea: Polina Sotirova



MODERN TECHNOLOGIES AND CAD SYSTEMS FOR PRINTING ON TEXTILES

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This article discusses in detail the printing technology on textile and all kinds of surfaces and materials - t-shirts, hats, bags and etc.

Introduction

The printing technology that the article concerns is screen printing. This is the most quality and lasting way of transferring images onto textiles. The article points to a specific example of making, preparing and publishing a project to be conveyed on textiles.

Methodology and tools

Attention is drawn to the most important CAD (Computer Aided Design) systems that are used to prepare a print design. A specific example is provided with the Adobe Illustrator program and the methods of preparing and designing a project to be printed on textiles. The most important aspects of the preparation, the peculiarities of the process of completion and transmission, as well as a description of the finished product are concerned. Special attention is paid to the color profiles and the opportunities they offer for monochrome and full color printing as well as the coloring process itself. The materials are examined according to their origin and the specifics of the preparation for printing on them according to the latest trends and technologies

Conclusion

The material will be useful for designers and artists, as well as people who are involved in direct printing on textiles. The text may be used for reference in the production and preparation of images, drawings and any kind of graphics that will be printed on all types of material or textiles. With its completeness the material affects not only handmade single pieces but can also be used as an aid in the production of industrial quantities. Because emphasis is not only on manual printing but also on digitized process.

Keywords: *CAD* systems, screen printing, textile



FASHION STYLES OF SUBCULTURES FROM THE 80`S OF THE 20[™] CENTURY TILL TODAY

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Abstract

Studying the vast variety of subcultural styles and their attitude to fashion, I aim to uncover the multicultural world of modern man, to compare and, at the same time, outline the differences in subcultural way of thinking, dressing, way of life, etc; different aspects and levels of affinity – aesthetic, psychological, socio-cultural, etc. I consider the philosophy of subcultures in youth fashion today, to be particularly relevant: namely, to be yourself, to be distinctive and to bring individuality, to be unique and different.

1. Introduction

The study is a retrospective of subculture styles after the 1980s (goths, grunge, skate, etc.) and their reflection in modern fashion. There is an up-to-date analysis of issues concerning social identity and professional belonging. Musical styles, the media and sports largely contribute to the collapse of society into small cultural worlds, confessing their principles and defending their values and rules of life. Modern fashion borrows from vampire aesthetics, the Gothic oddities or even the craft of self-proclaiming skaters. The non-standard, dark, melancholy and supernatural enjoy many followers and will always excite fashion.

2. Conclusion

This article analyzes subcultures and their links to fashion, suggesting that this opens up greater opportunities for new creative interpretation, as well as introducing future designers to subcultures.

Keywords: Fashion, Subculture, Goths, Grunge, Skate



EUROPE – SUI GENERIS THE RED FIELDS

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The collection is dedicated to the historical period marked between the two World wars. The uniqueness of Europe is found in the strength of its society. The collection recreates in very sensual way the power of the human and how we survive because of our soul strength. The sillouets are inspired by some sounding sings that came out as important and remarkable for the period. We all know the irrevocable power of the **love letters** through those hard years. This has been the only true connection between the warriors and their beloved women. This inspiration reflects in the fabrics and mostly in the accessories that support the collection. The other main inspiration is the **Poppy flower** as main sign of the remembrance. It is interpreted in the textile treatment.

The materials that are used are both natural and synthetic: cotton, neoprene, rubberised fabrics, satin.

The cuts are modern and urban.





FREQUENCIES DIGITAL FAIRYTALES

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We live in a world where technology is everywhere around us, always progressing, making our daily routines and work faster and much easier, but at the same time, basic analog objects are still the same for the masses - for example for decades our clothes are produced more or less the same. This constant collision between the analog and digital is the main concept of the project called 'Frequencies'. It is part of the 'Digital Fairytales' diploma theme and features a humble attempt of a digital art installation that in a way presents the next phase in the clothing and textile design and manufacture.

Nowadays more and more options are emerging - from different membranes that waterproof or windproof our outerwear to wires and optical fibers woven into the fabrics that transform our body temperature to light or change the colors of our clothing.

Frequencies observe the interaction of light, sound and textile material with three devices constructed of Arduino UNO boards, LED lights and microphones. The Arduino UNO boards, coded by Hristo Yankov, pick up all kinds of soundwaves via a microphone and then use each soundwave as a power for the LED lights incorporated into the garments. Each device is powered by one nine-volt battery and 6 AA batteries. Depending on the sounds that are produced near the clothing items, the result could be playful or could be transformed into a beautiful light dance when music is played. In the process of working on the project, the devices were tested multiple times for few variables like the range of the microphone, intensity, and frequency of the soundwaves.

The project was presented as an installation at a local gallery along with a performance where all the effects of the soundwaves were observed. Two of the garments were worn by models that had a purse containing the Arduino boards, making them wireless and free to move and interact with the visitors.

Digital, future textile, tech, fashion design





COLLECTION FACE OFF

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The collection Face Off tells a story in which many women would recognize themselves The collection presents the play between the many images of a single human, and the woman in particular, and her ability to be multifunctional, adapting according to the situation, notwithstanding if caused by herself of external influences.

Inspiration and Research

Egypt is a topic that has always inspired me. While exploring the Egyptian mythology as part of an assignment, I was intrigued by the Ka, the person's double. It is one of the manifestations of the soul, the patronizing spirit, the spiritual double every person has. Although in the process I moved out of of the mythology, towards modern times, the Ka left a deep trail in my mind. Thus, merging past to present, the main character in my story, the woman, was formed.

Colour

My main colour will be black, since it has always been present in fashion throughout the seasons. In addition, it will



make the other colours stand out. Thus, it will perfect mix with blue and silver to result in a stunning combination.

Fabric and textile manipulation

To compensate the small number of colours in my collection I used a broad combination of materials/fabrics such as eco leather (both hard and soft), cotton, wool, tulle and acrylic fibre. Some of the fabrics contain metallic threads. I let my mind flow and I completely freed my imagination by experimenting and manipulating regular as well as uncommon fabrics. One of the methods I used is Flog with which I made handmade prints. I also included the folding technique as a manipulation with which I achieved layering effect. At last, I applied the overlapping technique for fabrics, which fuses two separate and completely different fabrics into one. I did this by applying a black net over my main blue material. With that, the collection's volume stands out through construction and manipulation. There are squares from net as well as improvised ones thanks to the applied technologies.

Silhouette

The collection is focused mainly on volumes in the shoulders and the sleeve in the upper parts of the clothes - blouse, top, and jacket. There are round shapes in the coats and the trousers. When we talk about the past and the present, we slightly hint at the future. This is expressed through the metallic blue and black flashes of the hand-made print. Clothes are a bold combination of artistic and everyday wear.

Target

The target group for this collection is women of 25 years old and above. I choose not to set an upper border because I think that a woman's taste improves with age and she can choose what's best for her equally well as if she were 25.

Keywords: *Collection, story, woman, colour, manipulation, volume.*

FASHION DESIGN OF LADIES' DRESSES WITH TWISTED DRAPERIES

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Introduction

The draperies in design of clothing are free, fixed and twisted ones. Maybe the draperies, which are a result of twisting of a piece, are the type with smaller popularity. By this reason a study of fashion design of ladies' dresses with twisted draperies is presented in the paper

Experimental part

Ladies' dresses with twisted draperies are designed as the draped pieces are in different forms and locations on the bodice, and different combinations with other pieces and constructional or decorative elements. The designs are in varied styles and purpose, and the ideas are connected with the latest fashion trends. A geometric constructional system of pattern making of these types of draperies is presented in the paper.

Conclusion

The results of the study give possibilities for easy fashion design and variety of new models of ladies' dresses with twisted draperies.

Keywords: *fashion design, pattern making, lady's dress, drapery, twisted drapery.*





FASHION TREND AND FASHION TRENDS MOVEMENT

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Fashion is a social and cultural phenomenon of a complex nature. Its system is complex and can be viewed from several angles. Fashion like pop culture, semiotics, an economic stimulus, as gender dynamics, as a change or novelty. It reaches the mainstream introduced by fashion trends. Trend means similarities across information sources, characterized by building awareness of the new look and accelerating demand among consumers.

In this report I study and analyse the formation of fashion trends and the theory of their movement. Their formation and reproduction begins with the gradual exploration of the first, second and third epochs of modern fashion, and ends with postmodernism and stylistic tribes to date. The focus is on shortening the time span in the emergence of the trend, its evolution and its subsequent transformation into fashion trend, fad or classics.

Setting a name or explaining a tendency is not enough, it is necessary to trace its "life". Its birth, evolution, and distribution can categorize it in one of the fashion theories. Trickle-down, trickle-up, trickle-across, cyclicality and the pendulum principle in fashion.

Fashion tendencies are the usual way of presenting fashion in textile products. They have the ability to bring innovations, define the spirit of time and to inspire the most important thing in fashion - a sense of novelty.

Keywords:

Fashion Trend Movement of fashion trends Zeitgeist Innovation















T5 TEXTILE MACHINERY AND EQUIPMENT











DETERMINATION OF THE KINEMATIC CHARACTERISTICS **OF THE GROSSE EJP 4 KNIFE BOX DRIVE MECHANISM** BY MEANS OF "MODEL METHODS"

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Abstract

The "Model Methods" is a graphical method for determining the kinematic characteristics of polyclonal mechanisms. In the present work, a comparison is made with the method of closed vector contours for determining the kinematic characteristics of the knife box drive mechanism of the "GROSSE EJP 4" jacquard machine. This mechanism is composed of a cam mechanism with a Swinging Roller follower and a successively connected crank mechanism.

Keywords: kinematic analysis, model methods, knife box mechanism, jacquard machine.

Introduction

The "Model Methods" was proposed by Piperkov and developed in details by Tenchev. The method is geometric and is limited to constructing a secondary model to determine the units's velocity and tertiary model to determine their accelerations. The primary model is the position of the mechanism. An advantage of the method is that complicated mathematical formulas are avoided for the transmission functions of the mechanism and the double differentiation of the positional function. Undoubtedly, the advantage is the avoidance of uncertainties of trigonometric functions at some angular values, the division of zero in some cases, and the indeterminacy of arcos functions. A major flaw in the method is the large drawing work, even with the use of graphics programs. Roussev has proposed a mathematical apparatus based on analytical geometry to analytically determine the characteristic points of the models, enabling the method to be applied for a desired number of values of the coordinate.

Experimental part

A kinematic analysis of the mechanism for driving the frames of the "GROSSE EJP 4" jacquard machine was made, using the "Model methods" and the "closed vector contours" method for determining the transmission functions of the component and polyclonal mechanism. This mechanism is composed of a cam mechanism with a roller coil and a successively connected crank mechanism. In the analysis of the cam mechanism, it turned out that it is an eccentric mechanism that can be replaced by an equivalent fourbar mechanism. Attached to it is the crank mechanism, which facilitates the analysis.

Results

The velocity and acceleration of the one frame of the "GROSSE EJP 4" jacquard machine were obtained. The other knife box moves under the same law, in opposite direction. The model methods is used by his analytical interpretation, proposed by Roussev. The same results are obtained for the kinematic characteristics of the output unit. The analysis was done for 36 sampling points. The mathematical program Mathcad 15 was used to perform the analysis.

Conclusion

From the presentation of the two methods, the following conclusions can be drawn:

- Both results give the same results.

- Roussev's analytical adaptation of the "Model Method" is easier to interpret than the vector contours;

- in the "Model Methods", it is not necessary to determine the kinematic characteristics of the previous mechanism;

- there is no uncertainty about arcos functions. The "Model methods" can be used to determine the kinematic characteristics of the blocks of a polyclonal mechanism. It can be used to solve the task of "conflicting" points in the position of the mechanism and to determine the position of a given unit in the uncertainty of the trigonometric functions. By this method, the directions of the velocities and the accelerations of the units are easily and unambiguously determined.



PREVENTIVE VIBRATION CONTROL OF HARNESS MECHANISM OF WEAVING MACHINES WITH FLEXIBLE RAPIERS

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This paper provides a method for preventive vibration control of weaving machines in order to reduce unforeseen accidents and downtime. For realization on this, a necessary periodic monitoring of the technical condition of weaving looms.

Through the vibrational condition of the machines and their mechanisms, it is easy to establish the current technical condition, their residual resource and timely take action for the next stage of maintenance.

The purpose of the work is to create a method for preventive vibration control convenient for use in real production conditions, as not hindering the manufacturing process. To achieve the goal, it is necessary to determine the number and location of control points for vibration measurement, minimum number of measurement points to obtain sufficient information on the vibration status of the control mechanism.

The subject of the experimental work is the harness mechanism of weaving machine with flexible rapiers "Vamatex Leonardo". From preliminary theoretical studies presented in Dimitrov K., M. Tzoneva, I. Rahnev, P. Genova, Force analysis of the shedding mechanism of loom with flexible rapiers "VAMATEX LEONARDO" - part one, Machine Mechanics, 2015], are established the most loaded kinematic couples from the harness mechanism. The status control is based on the results of the theoretical study. On the figure are shows the location and the points of vibration measurement. For the purposes of the experiment, it is necessary and sufficient to use only one of the parameters characterizing



vibrations. The RMS value (v, mm / s RMS) in the direction of measurement and measuring points is registered. The total value $(v_{xyz1}, v_{xyz2}, v_{xyz3}, v_{xyz4})$ is determined by the dependence:

$$v_{xyz} = \sqrt{v_x^2 + v_y^2 + v_z^2} \quad (1)$$

The values obtained $(v_{xyz1}, v_{xyz2}, v_{xyz3}, v_{xyz4})$ serve for correlational relations, which by correlation analysis is defined quantitatively the power of their interrelation. The calculated correlation coefficients indicate that the interconnection between v_{xyz1} and v_{xyz2} is very big, as $r_{12} = 0,0988$. The correlation analysis provides possibility to determine a minimum number of measurement points

for preventive vibration control.

Keywords: weaving machines, vibrations, preventive control, correlation analysis



MODERNIZATION OF LIGHTING SYSTEMS IN A TEXTILE ENTERPRISE

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Introduction

The lighting of workplaces in the textile industry has an important role both in increasing productivity and quality, as well as in the safety and health of workers. The innovative LED (light-emitting diode) lighting technology provides new opportunities for increased the energy efficiency and quality of the lighting in textile enterprises.

Experimental part

The paper presents a project for energy efficient modernization of the lighting systems of sewing, cutting and ironing workshops in a textile enterprise by introducing of a new LED luminaires. The development is carried out in the following stages:

- audit of the existing lighting system, which consists of data collecting for number, type and power of lighting fixtures, geometric parameters of the workshops, measurement of the illumination, establishment of the condition of the lighting system;

- lighting engineering design of new LED lighting for textile workshops including: specifying the requirements of the quantitative and qualitative indicators of lighting in the textile works according to BDS EN 12464-2011[1]; selecting of appropriate LED luminaires; multivariate lighting calculations of new lighting for textile factories using specialized lighting software (Figure);

- comparative analysis of the light [1] and energy indicators [2] of the existing and newly proposed LED lighting solutions for the workshops. Assessment of the electricity savings and economic efficiency of the proposed modernization.

Results

The existing lighting systems of the sewing, cutting and ironing workshops investigated are using amortized luminaires with T8 fluorescent lamps with electric power 3×36 W. Measured average illuminance $E_{ave}=396$ lx in the sewing workshop is very low comparing to the standard $E_n=750$ lx[1].

Seven LED luminaires with powers from 37 to 70 W are selected for the lighting calculations in specialized lighting software Relux (Figure).

The analysis of the results shows significant energy savings from the introduction of LED lighting, for example, for the sewing workshop, the annual electricity consumption decreases from 11880 kWh/y down to 3300÷5300 kWh/y for variants with different LED luminaires, with less than 3 years payback period for the LED luminaire with the lowest efficiency.

Conclusion

The analysis of the results of the research confirms the feasibility and the high energy and economic efficiency of the lighting modernization of textile enterprises with LED lighting proposed.

Keywords: textile workshop lighting, LED, lighting calculations, energy efficiency, payback **Reference**

1. BDS EN 12464-2011 Light and lighting - Lighting of work places - Part 1: Indoor work places.

2. BDS EN 15193 Energy performance of buildings - Energy requirements for lighting.





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The Picanol Group is an international, customer-oriented group specialized in the development, production and sale of weaving machines, engineered casting solutions and custom-made controllers.

The group develops, manufactures and sells through Weaving Machines (**Picanol**) high-tech weaving machines, based on air (airjet) or rapier technology. It supplies weaving machines to weaving mills worldwide, and also offers its customer such products and services as training, upgrade kits, parts and service contracts. For more than eighty years, Picanol has played a pioneering role in the industry. Today, it is a world player in the weaving machine industry. Picanol also markets accessories via GTP Global Textile Partner.

Next to this, the **division Industries** covers all activities not related to weaving machines like the foundry activities (Proferro) and the group's mechanic finishing activities. It is the ambition to offer the customer engineered casting solutions for middle to large series in a value-driven partnership in the long term. Through PsiControl and Melotte the company applies to the design, the development, the manufacturing and support of technological components, services and mechatronical system solutions for original equipment manufacturers in various industries.

Next to the head office in Ypres (Belgium), the Picanol Group has production facilities in Asia and Europe, linked to its own worldwide service and sales network. The Picanol Group realized a consolidated turnover of 639,78 million euros in 2016. The Picanol Group employs 2,100 employees worldwide and has been listed on Euronext Brussels since 1966 (ticker: PIC). Since 2013, the Picanol Group has also had a reference interest in the Tessenderlo Group (Euronext: TESB).




TEX-TECHNIKA LTD

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"Tex-Technika" Ltd. operates in Bulgaria since 1997

and has many years of experience in the apparel industry. Its main activities are the complete equipment of apparel workshops, according to the European standards for this industry, sale, maintenance and repair of textile machinery and CAD/CAM systems, supply of spare parts and consumables, CAD/CAM services, as well as participation in international cooperation programs and projects.

One of the strategic company goals is the intensification of the support to its customers and develop cooperation with EU partners. The success of this task is based on the deep knowledge of the branch and it is specific in the region, as well as the numerous contacts in Bulgaria and the neighbour countries.



Tex-Technika Ltd is currently represents and/or operates as a dealer of following garment technologies suppliers:

1. Pattern development and layout optimization, 3D garment simulation:

Soft Fashion Inc. (USA), StyleCAD: www.stylecad.com;

Morgan Technica Spa (Italy), 3^{DRESS}, Visual Nest: www.morgantecnica.com;

2. Visual Digitizer:

Action Potential Ltd. (UK): iDigit: www.actionpotentialtech.com;

3. Wide format plotting/cardboard cutting:

Manufacturas y Transformados AB S.L. (Spain): www.tktbrainpower.com; *Plotter Technology Ltd. (UK):* www.plottertech.com;

4. Integrated cutting room solutions:

Morgan Technica Spa (Italy), *COP* - cuting room planing; *Morgan Fusion*: modular cutting line (loader, spreader, labeler, cutter): www.morgantecnica.com;

The represented companies offer products/solutions that comply to highest technologies standards and allow for the efficient, economical and environmentally friendly production of garments/goods of all kinds based on different materials (textiles, knitwear, artificial leather, etc.)

Feel free to contact us at www.textechnika.com

Keywords: 3D, CAD/CAM, software, cutting room optimization, spreader, cutter.











T6 TEXTILE MANAGEMENT, MARKETING AND SUSTAINABILITY









СПИСАНИЕ "ТЕКСТИЛ И ОБЛЕКЛО"



IMPORTANCE OF THE TECHNOLOGICAL DOCUMENTATION ON THE SUSTAINABLE DEVELOPMENT OF SPINNING PRODUCTION

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The whole process of yarn formation by twisting is concentrated in a miniature space whose volume does not exceed 5 ml. The mass of fibrous material also generally does not exceed 3-5 mg. In the case of ring spinning machines, this space is located immediately after the outgoing drafting pair, and in the rotor spinning - in the camera's canal.

The essential phenomenon consists in the final transformation of the fibrous sheaf of parallel stacked fibres into spiral wound fibres. This is the moment, that separates ultimately and irreversibly the spinning technological flow.

First, the yarn can no longer recover the embedded fibres with preserved initial properties and quality. This means that any technological error or incorrect machine setting degrades the quality of the yarn ordered and reduces its market value.

Secondly, any rejected yarn, due to poor quality, damages previous technological processes. The preparation of the twisted bundle begins with the dissolution of the fibrous raw materials and undergoes numerous processes and operations. In this sense, from the initial formation of a uniform fibrous flow to its conversion into yarn, the fibres are subjected to the action of various machine parts and working organs.

The setting and observance of the nominal operating mode of the spinning gear maintain the quality of the yarn and the efficiency of the production. In our day, this requirement requires the development and maintenance of an information system for technological management of spinning production.



Keywords: spinning, sustainability, information system.

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WORK RELATED MUSCULOSKELETAL DISORDERS AMONG YOUNG WOMEN IN THE TEXTILE INDUSTRY: PAIN NOW AND IN THE FUTURE TOO

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Introduction: Work related Musculo-Skeletal Disorders (WMSD) are the most common occupational health problem in most Asian countries, affecting the nerves, tendons, muscles and connective tissues (1). Physical and psychosocial factors cause this condition. Repetitive and forceful motions of the limbs, constrained neck posture and prolonged standing are some work related factors which can be attributed to WMSD (2). In the third world, young women opt for textile industry employment for its cultural appropriateness and indoor nature; the industry prefers them for their docile nature and willingness to do repetitive work (3). It is generally understood that adolescents have a high prevalence of musculoskeletal pain. The links between perceived stress and pain have been well understood among them (4). However, other determinants of WMSD among young workers such as abuse, depression, behavioural problems and occupation have not been described hitherto. In this context, we aim to assess and compare the prevalence of WMSD among young women who are current employees, with that of the past employees who have worked in the textile industry for at least a year.

Experimental part: A community based cross-sectional study design was used. A total of 200 young women employees which include 100 adolescent current employees and 100 past employees of the South Indian textile industry were interviewed for the study. Written informed consent and assent was obtained from all participants. Interviews were conducted among the study subjects in their houses and it included questions on musculoskeletal pain, associated physical and psychosocial factors such as hours spent on sitting and sleeping in a day, history of anaemia, socio-economic status, and history of abuse, depression, behavioural problems and nutritional status.

Results: The age of current employees ranged from 16 to 19 and past employees ranged from 16 to 28. The past employees had quit their employment for a minimum period of 1 year for reasons such as ill health or family responsibilities and marriage. Among the current employees, 66% reported musculoskeletal pain and among the past employees, 67% reported musculoskeletal pain. Subjects reported neck and shoulder were the most common sites of pain. In the study population, among the 133 who had pain, 116 (87.2%) slept less than 8 hours a day as compared to 55 (82.1%) of the 67 who did not experience pain. In the study population, among those who had pain, 116 (87.2%) sat for less than 2 hours a day, as compared to those who did not experience pain 55 (82.1%). In the regression analysis, factors which were significantly associated with WMSD were history of abuse (AOR 5.22, 95% CI 2.42-11.26), presence of depression (AOR 7.05, 95% CI 1.51- 32.87) and behavioural problems (AOR 2.08, 95% CI 1.04-4.17).

Discussion: It has been understood that increased reactivity to stressors and ergonomic risk factors such as increased force, repetition and posture at workplace causing ischemia, inflammation, reflex muscle spasm and release of pain producing chemicals results in WMSD(5). This study was community based and hence the ergonomic details of the subjects and their work conditions could not be assessed. However from previous reports of the nature of textile industry employment in the study area, it is well understood that forced labour, excessive working hours, prolonged standing, excessive noise, abuse and lack of nutrition are prevalent (6,7). In this study, the essential element in occupational disease, i.e. exposure-effect relationship between the working environment and the disease, is applicable for the



current employees (8). However, for the past employees, even though they have been removed from the exposure, i.e. the textile industry employment, similar rates of WMSD were seen as compared to that of the current employees.

Conclusion: WMSD are widely prevalent among current and past employees of the textile industry alike. From our study, we conclude that poor working conditions and faulty ergonomics apart, psychosocial factors must be assessed as possible determinants of WMSDs among young working women. The effects of the exposure appear to continue even a year or more after discontinuing the job.

Key words: Working adolescents, Work related Musculo-Skeletal Disorders (WMSD), young women, textile industry

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ENHANCEMENT OF COMPETITIVENESS IN CLOTHING INDUSTRY, BY MODERNIZING TECHNICAL EQUIPMENT

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The aim of this study is to present the importance of the modernization of innovations and technical equipment as factors for enhancing the competitiveness of Bulgarian enterprises in clothing industry. The choice is dictated by the topicality of the subject and by the fact that enhancing the competitiveness of the enterprise is an important economic issue. Enhancing competitiveness must be a priority for any developer. It is predetermined to maintain high financial performance in the long run. At the same time, competitiveness is difficult to assess and manage.

Market conditions demand a new approach to the company competitiveness - developing its own strategy for boosting competitiveness and stable economic growth. It is the well-founded competitive strategy of the company that determines the prospects of its activity, determines the type of competitive advantages and provides resource security for its realization. Competitive advantages of enterprises are among the determining factors for achieving higher and long-term competitiveness of the enterprise economic unit and of Bulgarian industry and economy as a whole.

Traditional methods for statistical analysis are used in relation to the theory of the subject area in order to achieve the goals set and tasks described. Competitiveness as an important factor that determines the potential of any organization is a driving force in today's dynamic world. A proper understanding of the importance of this crucial economic factor is essential to the development of each organization. In the context of the growing economic globalization, organizations face constant changes in their external and internal environment.

Competitiveness should not be seen only on the results achieved and the effectiveness of its activities in the short or long term. Account must be taken of its ability to continually update and adapt to changing conditions and its advantage over competitors.

The company management method proves that success is possible as long as managers know exactly when and how to react to changes in the external and internal environment. There is always, of course, something else to be desired and to be learnt. The company considered is a Bulgarian company that has proven its advantages, which has the potential to develop not only in other cities of the country but also abroad. 'Marinelli Build' Ltd places as a priority its investment in the modernization of the equipment of the enterprise, aimed at reducing the time for performing basic and often repetitive operations.

Keywords: competitiveness, strategy, equipment

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"ISKRA" Ltd is a leading company in the production of textile passementerie with 55-year traditions that guarantee high quality and fast delivery terms of its products. The production programme of the company is: elastic and non-elastic underwear and sportswear bands, cotton and synthetic technical tapes, paspels, printed labels, jacquard woven labels and laser-cut labels, laces, embroidery, cords, shoe braces and shoe netting, aiguillette, waist-bands, rubber and polythene covered socks fibre and more. The technical equipment of the company includes weaving and jacquard looms, base-knitting and flecht machines, machines for hard and soft bobbining of cotton yarns and synthetic silks, boudling and retwisting of yarns. The high quality of the production makes us a preferable partner for more than 4000 Bulgarian and international clients, as well as collaborators in the branch. We develop our investing programme in close relation with leading companies from Switzerland, Germany, Italy and others. The production of "ISKRA" Ltd is certificated under ISO 9001:2015 from Verification Ltd.

THE EU POLICY FOR THE GLOBALISED TEXTILE AND CLOTHING INDUSTRY: EVIDENCE FROM THE EUROPEAN GLOBALISATION ADJUSTMENT FUND

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The textile and clothing sector is an important part of the European manufacturing industry giving employment to more that 1.6 million people (2014) in 184 300 companies. The sector accounts for a 2.5% share of value added and a 5.3% of employment in total manufacturing in Europe, and about 20% of EU sector production is exported outside the EU. The sector is dominated by a large number of SMEs often concentrated in regions where it contributes the wealth and cultural heritage. The Textile and Clothing sector has been shielded from international competition much longer than other industrial sectors by the 1974 Multifiber Agreement on Textile and Clothing and then by the Multilateral Agreement on Textile & Clothing. Upon the liberalisation of the market after 2005, the entire production chain of the sector is presented in the EU.

Despite its long tradition in Europe, the technological change, the developments of production costs and shifting production locations lead to increased competition on the EU and worldwide arena in the sector. A sensible negative consequence undergone the labour market and thus like many other sectors, the T&C sector is one of the most affected by the phenomenon of globalisation.

The European Globalisation Adjustment Fund (EGF) has been up and running since January 2007 with main objectives to show solidarity with workers who had lost their jobs as a result of major structural changes in global trade patterns and further as a consequence of the global financial and economic crisis.

The aim of this paper is to outline the impact of the globalisation on the textile and clothing industry in EU based on the activities performed by the EGF. The chosen approach helps to clarify the transformation of the sector upon globalisation of the business and how EU policy tackles with. The research covers the period of 2007-2016.

There are a number of conclusions that emerge from the study. The beneficiaries of EGF are companies mostly from Italy, the economy with highest value added in the textile and clothing sector and with largest number of persons employed, followed by companies from Spain. Support in finding another job in a region was provided to workers from former textile companies where over 500 workers are made redundant by a single company (including its suppliers and downstream producers) in textiles in Belgium, Malta, Portugal, Malta and Lithuania. Four applications are benefited from the EGF support for workers lost their job from wearing apparel sector in Malta, Spain, Lithuania and Slovenia. Thus 8% of all supported workers by the EGF within 2007-2016 are from textiles sector from 11 companies. The applications and the support are realised in the period of 2008-2010 and only one company from Spain in 2013/2014 indicating a comparatively resilience period in the European textile industry striving to preserve the sector. A range of specific supporting measures were applied in each case: support self employment, advice and guidance through individual case management, financial allowances to support job search and mobility, training to achieve new competences. The EGF has a maximum annual budget of EUR 150 million for the period 2014-2020. It can fund up to 60% of the cost of projects designed to help workers made redundant find another job or set up their own business. The study suggests the efforts should be concentrated to make profit from the creativity and design thinking to support the innovation in textiles and clothing sector and to revitalise the traditional EU sector on a competitive global level.

Keywords: textile, clothing, globalisation, employment, EGF



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LIMITATIONS OF SOCIAL AUDIT AND CERTIFICATIONS

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Introduction: Outsourcing of manufacturing to countries with inadequate laws and weak enforcement has created a significant need for systems to monitor negative social and environmental impact. Companies have adopted own audit approach to enforce supplier compliance¹. Independent certifications as per voluntary social standards have also gained popularity and acceptance. However, in the recent years, social audits and certifications have come under severe criticism. The audit regime is claimed to be 'working' for corporations, but failing workers and the planet as labour abuses, poor working conditions and environmental degradation within global supply chains remain widespread². In this context, an effort has been made to list and analyse the major limitations of the social audit and certification.

Information sources: most of the information is from the author's collective experience in standard setting, providing implementation support, establishing and running certification business, developing quality systems, training auditors etc. for around two decades in agriculture and textile sector.

Results & discussion: Social audit and certification have several intrinsic limitations and operational weaknesses. Conflicting business interests, unhealthy business competition, lack of adequate accountability, announced audits etc. are intrinsic to the system while, quality of the auditor, audit methodologies etc. are more of operations related.

Conclusion: Audits and certification even with its limitations, is still a valuable tool for assessment and monitoring if used effectively. Currently, there are no adequate alternatives. Collective efforts are required to change and improve the audits and certifications to remove these shortcomings. Equally important is creating parallel systems involving the stakeholders to support the implementation of the standards and sort out key negative social and environmental issues in the vulnerable locations.

Key words: Social audits, Certification, accreditation, auditor, working conditions

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T7 INNOVATIONS IN TEXTILE EDUCATION











METHODOLOGY FOR INITIAL PROFESSIONAL EDUCATION IN THE FIELD OF THE SEWING INDUSTRY

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Abstract

The article presents a developed and implemented methodology for initial professional training of operator in apparel manufacturing at sewing industry. The need for this stems from the lack of well-trained staff for the sewing industry and the labor market peculiarities. The methodology has been introduced and verified as a specific training in a manufacturing company.

Keywords: sewing industry, professional education, methodology

One of the problems faced by companies in the sewing industry in the country is the lack of qualified staff. On the one hand, there is not much willing to work in this industry on the labor market, and on the other hand, a large part of the jobseekers is of low educational and qualification level. The aim of the paper is to present an exemplary methodology for the initial professional training of an operator in sewing production that is applicable in a manufacturing process. The presence of unemployment in the country and the low level of education of a large number of the long-term unemployed necessitates the necessity of both initial and continuing vocational training. These are activities aimed at acquiring new specialties (qualifications), developing or improving existing knowledge. Their relevance and importance, as a means of reducing unemployment, has increased over the last 8 years. The survey conducted among representatives of companies from the Blagoevgrad, Kyustendil and Petrich regions showed that their managers clearly realized the importance of the problem of staff availability and training and expressed willingness to participate in continuing or initial training activities according to the specific needs of enterprise. The following is designed for full-time training for a period of 3 to 4 months. It can be modified and adapted for application at other manufacturing conditions. The purpose of the training is to prepare operators for sewing production. Required knowledge for modules divided into:

Machinery - sewing industry machinery and equipment [2];

Material science - basic and auxiliary materials [3];

Technology - general techniques and tailoring techniques for machinery and equipment in sewing industry [4];

Manual activities.

Safety Techniques.

The developed methodology is applied in a company for production of women's and men's ready-towear clothes. Initial training included 20 people, aged between 22 and 50, with a different level of education. During the training, a series of tests were carried out to establish the level of knowledge gained. In the final, testing was conducted to determine the suitability of learners for different positions in sewing factory.

1. A methodology for initial professional training of an operator in sewing production has been developed.

2. The methodology has been introduced and verified at initial vocational training in production conditions.

3. Implementation has shown very good results, with the whole training group achieving the desired results within the set deadlines.

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ACTUAL DEVELOPMENT OF THE OLDEST TEXTILE VOCATIONAL SCHOOL IN BULGARIA

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Sliven is the founder of the textile industry in Bulgaria. In the past, textile crafts developed in the town. In 1834 Dobri Zhelyazkov, born in Sliven, created a modern textile factory for his time.

In 1883, the Textile School in Sliven was founded, and the Vocational High School of Textiles and Clothing" Dobri Zhelyazkov", *www.pgto-sliven.com* is his successor. Today, the textile companies in the country are concentrated in the town of Sliven. This requires the training of qualified staff for the textile industry. Our school is the only one in the country that teaches the classics specialty : "Textile technician" for spinning, weaving, knitting, finishing and dyeing, "Computer design and patterning of woven area products", "Computer design and patterning of knitted area products", "Clothing Technology", "Fashion Design".

With the training in theory and practice in these specialties, the school strives to meet the needs of textile companies. The Vocational High School of Textiles and Clothing" Dobri Zhelyazkov" has qualified teachers conducting pupils' training. Practical training (learning and real production practices) are conducted in direct real production environment within the partner companies. Tradition is our work with textile companies both in the city and in the country. Tradition is our work with textile companies both in the city and in the country. Tradition is our work with textile companies both in the city and in the country. Tradition is our work with textile companies both in the city and in the country. Tradition is our work with EAD - Sliven, "Roger Vanden Berghe" - Belgium, "Kolhida", "Vitex" - Troyan, "Rossi-Nick".

These companies provide us all necessary conditions for training students. In production, they get acquainted with and work with the latest textile technology. This helps them bring theory to practice. After completing their studies, some students start working in these companies. Others continue their studies at universities and textile colleges.

Unfortunately, we have to mention some problems such as reducing purchasing power, the importation of textiles from other countries etc.

Despite all the school has been working continuously to attract students who, after completing their training to realize in textile companies.





JAQUARD WEAVING IN COLLECTIONS OF THE TEXTILE INDUSTRY MUSEUM IN SLIVEN

Toni DIMITROVA

Museum of the textile industry in Sliven at the National Polytechnic museum, Stoil voyvoda 5, Sliven, Bulgaria e-mail: textilemuseum@abv.bg

The permanent exposition of the Museum of Textile Industry in Sliven is exposed to an Austrian hand-made jacquard loom from the end of the 19th century - a unique exhibit that always provokes a great interest among the visitors.

It demonstrated the invention of French Joseph-Marie Jacquard, who in fact manages to implement an older idea of controlling textile fibres, which can weave a repeating figure on the fabric.

This essentially provides unlimited possibilities for textile fabrics to be fabricated.

Moreover, it provides the basis for process programming and machine and machine management.

Some researchers call this discovery an "attachment" to the loom - a very original and technically very precise definition.

This theme is presented in a part of the basic, auxiliary and book fund of the Museum of Textile Industry and unites various objects, values and documents from the museum collections connected with the history of textile machinery, the development of textile production and vocational education in Bulgaria.

The theoretical interpretation of the problem finds expression in a part of the museum's documentary fund, where books, collections, textbooks and handbooks in Bulgarian, Russian and German, related to the history and theory of jacquard weaving, drawing and split science are preserved.

Some of them contain specific practical layouts of figure fabrics, covering all successive stages of creating one right - from the drawing to the finished sample.

Besides valuable technological information, they also contain information about the development of Bulgarian textile production and professional textiles education in Bulgaria, highlighting the facts of the life and work of people related to the history of textiles.

Jacquard's main merit is the discovery of the perforation principle of control to reconcile the operation of the individual mechanisms in the machine.

This principle, it turns out, can be universally applied - later it has been successfully applied in musical instruments, mechanical piano, printing machines, computing equipment.

For the first time in Bulgaria, weaving machines with jacquard machines started to be used after 1880. in the State Slick factory in Sliven, hired by the Bulgarian joint-stock company "Napredak".

Although the relatively late and quite timid jacquard weaving has successfully entered the Bulgarian wool industry in the early twentieth century.

Keywords: jacquard, programming, figured textile.



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