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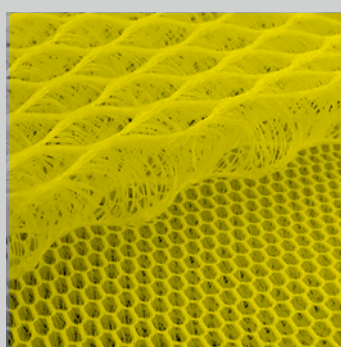
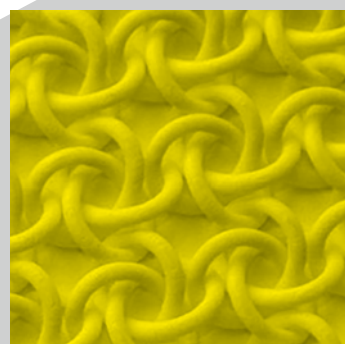
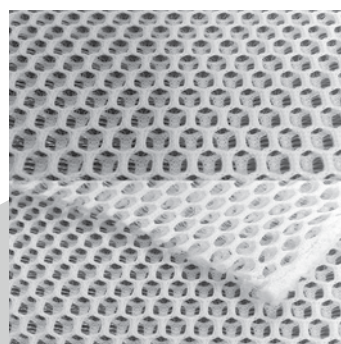
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BOOK OF ABSTRACTS

NATIONAL TEXTILE CONFERENCE - 2019



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SPECIAL ISSUE 10/2019

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Първи ден: 25.10.2019 г.

12:00 ч.	Настаняване в хотел УЦ Бачиново	<i>Рецепция</i>
12:30 - 13:00 ч.	<i>Работен обяд</i>	<i>Ресторант</i>
14:00 ч.	Регистрация в НТК19	<i>Конферентна зала</i>
14:30 ч.	Кръгла маса "Кадрово осигуряване и привлекателност на текстилната професия"	<i>Конферентна зала</i>
17:00 - 18:00 ч.	Посещение на изложба от младежкия конкурс	<i>Централно фоайе</i>
18:30 - 21:00 ч.	<i>Коктейл за участниците в НТК19</i>	<i>Централно фоайе</i>

Втори ден: 26.10.2019 г.

08:00 - 12:00 ч.	<i>Научни сесии</i>	<i>Конферентна зала</i>
<i>12:00 - 12:45 ч.</i>	<i>Работен обяд</i>	<i>Ресторант</i>
12:45 - 17:00 ч.	Научни сесии	<i>Конферентна зала</i>
17:00 - 18:00 ч.	Посещение на младежкото изложение	<i>Конферентна зала</i>
19:30 - 22:00 ч.	<i>Гала вечеря</i>	<i>Ресторант</i>

Трети ден: 27.10.2019 г.

08:00 - 11:45 ч.	<i>Научни сесии</i>	<i>Конферентна зала</i>
<i>12:00 - 13:30 ч.</i>	<i>Работен обяд</i>	<i>Ресторант</i>
13:30 - 14:00 ч.	Награждаване от младежкия конкурс - 2019	<i>Централно фоайе</i>
<i>14:00 - 14:15 ч.</i>	<i>Закриване на конференцията</i>	<i>Централно фоайе</i>

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XXI bgNTC 2019

CONTENTS

Topic № 1 Fibres and Yarns; Chemical Technologies; Nanotechnologies 299

STUDY ON FLAME RETARDANT FINISH FOR POLYESTER FABRIC

Vu Thi Hong Khanh, Do Ngoc Quyen, Le Kieu Oanh 301

COMPOSITE TEXTILE-HYDROGEL MATERIAL FOR CONTROL RELEASE OF VITAMIN B12

Daniela Atanasova, Desislava Staneva, Ivo Grabchev 302

INORGANIC-ORGANIC HYBRID COATINGS AS FLAME RETARDANT TEXTILE FINISHING

Teodora Savova, Desislava Staneva 303

NEW POLY(PROPYLENE IMINE) DENDRIMER MODIFIED WITH ACRIDINE AND ITS CU(II) COMPLEX. SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY

Ivo Grabchev, Desislava Staneva, Evgenia Vasileva-Tonkova, Paula Bosch 304

ANTIMICROBIAL COATINGS OF TEXTILES IN THE FOOD INDUSTRY

Miglena Irikova, Desislava Staneva, Ivo Grabchev 305

A NEW ERA OR ALREADY CURRENT MANUFACTURING PROCESS. A SUPERCRITICAL CO₂ AND THE TEXTILE CHEMISTRY

Desislava Staneva, Ivo Grabchev 306

NOVEL NON-WOVEN MATERIALS FROM BIO-SOURCED POLYMERS PREPARED BY ELECTROSPINNING

Maria Spasova, N. Manolova, I. Rashkov 307

ELECTROSPUN NON-WOVEN TEXTILE CONTAINING THE BIOFLAVONOID QUERCETIN

Nikoleta Stoyanova, Mariya Spasova, Nevena Manolova, Iliya Rashkov 308

NOVEL ANTIBACTERIAL AND ANTIOXIDANT ELECTROSPUN NONWOVEN TEXTILE FROM BIOCOMPATIBLE POLYMERS AND COMPOUNDS OF PLANT ORIGIN

Milena Ignatova, Nevena Manolova, Iliya Rashkov, Nadya Markova 309

INORGANIC-ORGANIC HYBRID COATINGS AS FLAME RETARDANT TEXTILE FINISHING

Teodora Savova, Desislava Staneva 310

SANITARY-HYGIENIC REQUIREMENTS FOR LINING AND INSOCKS

Margarita Koleva, Darina Zheleva 311

NEW POLY(PROPYLENE IMINE) DENDRIMER MODIFIED WITH 4-NITROBENZOFURAZAN. SENSOR AND ANTIMICROBIAL ACTIVITY

Ivo Grabchev, Desislava Staneva, Evgenia Vasileva-Tonkova 312

DEPOSITION OF NIOBIUM COATINGS ON TEXTILE FIBRE SUBSTRATES BY MEANS OF ION-BEAM SPUTTERING IN A VACUUM MEDIUM

Hristo Hadjiev, Steffen Haag 313

Topic № 2 Textile Technologies: Spinning, Weaving and Knitting 315

QUALITY CONTROL OF SUTURE THREADS

Diana.Germanova-Krasteva 317

STUDY OF THE EFFECT OF FINISHING TREATMENT ON THE COEFFICIENTS OF FRICTION OF FABRICS FROM NATURAL SILK

Diana Germanova-Krasteva, Rayka Chingova, Sasho Aleksandrov, Umme Kapanyk 318

STUDY OF PILLING RESISTANCE OF COMPOUND STRUCTURE LINEN AND FLAX WOVEN FABRICS

Indrė Tautkutė-Stankuvienė, Eglė Kumpikaitė 319

BIO-COMPOSITES REINFORCED WITH 3D KNITTED PREFORMS

Saber Ben Abdessalem, Samar Turki 320

MODERN CLASSIFICATION OF COMBINED KNITTING STRUCTURES

Georgios Priniotakis 321

FROM THE WASTE TO THE YARN

A. Lallam and L. Ben Hassine 322

VARIATION OF THE WOVEN THREADS DEFORMATION DURING MOISTURE-HEAT TREATMENT OF THE WORSTED FABRICS

Georgi Georgiev, Plamen Litov and Ivelin Rahnev 323

Topic № 3 Apparel Technology 325

A COMPARATIVE STUDY ON AIR PRESENCE ALONG STITCH LINES FOR THE PURPOSE OF INCREASED THERMAL RESISTANCE

Saeed Hassan 327

APPLICATION OF ELEMENTS OF BULGARIAN FOLK COSTUME IN CONTEMPORARY CLOTHING

Snezhina Angelova Andonova, Elka Zankova Djurakova, Milena Hasanova Perchinkova, Daniela Sadakova Ilieva 329

BULGARIAN EMBROIDERY AS A PROTECTION PROVIDING PRACTICE

Dayana Prokopova 330

DRAPING THE STYLES OF LADY'S SKIRT

Goran Demboski, Maja Jankoska and Elena Boskovska 331

Topic № 4 Textile art and Fashion Design 333

KOTEL CARPETS ELEMENT OF INTERIOR DESIGN TRAINING

Ivanka Dobрева-Dragostinova 335

THINK GREEN. CREATE PATCHWORK

Rumyana Lafchieva 336

HOW TECHNOLOGIES CHANGE DESIGN?

Ivelina Vardeva, Liliya Staneva 337

VISUAL PRESENTATION OF THE OVERCONSUMPTION

Anelia Antova, Anelia Antova 348

CULTURE LAYERS PURITY KAYA DESIGN BRAND

Kalina Stoyanova Stoyanova 339

FASHION BRAND BUILDING AS AN INDEPENDENT INSTITUTION

Teodora Spasova 340

"GARDEN OF EDEN" XIX ETN CONFERENCE AND ACCOMPANYING EXHIBITIONS, HASLACH, AUSTRIA (SHORT REVIEW)

Verjina Markarova 341

THE RISE OF KOREA'S FASHION INDUSTRY Iviyana Zasheva	342
FEMMAGE Assoc, Prof. PhD Adelina Popnedeleva	343
SALT OF LIFE Presenting Dilyana Cholakova	344
CAD-CAM SYSTEMS IN DESIGN OF LEATHER PRODUCTS Darina Zheleva, Margarita Koleva	345
ТОУ-БУКВИ. TOY-LETTERS Antonio Mitev	346
МОДНА КОЛЕКЦИЯ ТРОПИК FASHION COLLECTION TROPIC Stilyana Dzhongova	347
THE ART OF BEING PATTERNMAKER Nezabravka Popova-Nedyalkova	348
PRETTY THINGS OUTSIDE Rachel Zarbalieva, Rachel Zarbalieva	349
LEARNING AND CREATIVE ASPECTS OF DRAWING AS A STAGE OF DESIGN OF CLOTHING Ognyan Todorov Georgiev	351

Topic № 5 Textile Machinery and Equipment 353

Topic № 6 Textile Management, Marketing and Sustainability 355

RESEARCH ON THE ORGANIZATION OF PRODUCTION OF HEADRESTS FOR THE MERCEDES BENZ E CLASS Diana Germanova-Krasteva	357
THE POTENTIAL OF LABOUR IN INDUSTRY 4.0 Dr. Rossitza Krueger, eng. Nevena Ruskova	358
ИНОВИРАНЕ НА МОДНАТА ИНДУСТРИЯ ЧРЕЗ ТЕХНОЛОГИИ И ДИЗАЙН INNOVATING FASHION INDUSTRY THROUGH TECHNOLOGY AND DESIGN Капка Манасиева	359

Topic № 7 Innovations in Textile Education 361

MODERN LEARNING ENVIRONMENT FOR THE TEXTILE AND CLOTHING STUDENTS AT ITM, TU DRESDEN Saeed Hassan	363
ANTHROPOGENIC INNOVATION IN VOCATIONAL TRAINING ON WEAVING TECHNIQUES Daniela Karamanova, Ivelin Rahnev	365
FORMATION OF TWILL WEAVE WITH TWO PAIRS OF INTERCONNECTED HEDDLE FRAMES Miyrem Azisova, Ivelin Rahnev	366

XXI bgNTC 2019

Topic № 1
FIBRES AND YARNS;
CHEMICAL TECHNOLOGIES;
NANOTECHNOLOGIES



STUDY ON FLAME RETARDANT FINISH FOR POLYESTER FABRIC

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Introduction

Poly(ethylene terephthalate) (PET) fiber has many desirable properties such as high tensile strength, dimensional stability, high light fastness and resistance to many chemicals. These advantages make it have a wide range of applications especially for interior textiles. Unfortunately, its LOI is only 20-21 <21 and it is classified as a very flammable textile fiber (those with LOI ~ 21.0–25.0 are moderately flammable and generally if LOI > 25.0, textiles start to pass various national and international standard tests for flame retardant textiles). Nowadays, to make fire retardant polyester fabric, one can use flame retardant polyester yarn or flame retardant treatment for polyester fabric. In this study, Cetaflam PDP 30 of AVOCET, An Organo-phosphonate ester flame retardant (a non halogen flame retardant for polyester fabric) was used as a flame retardant agent. One bath, pad-dry-cure technique was used to finish fabrics. The flammability, tensile strength and dimensional stability of the fabric after treatment is compared with these properties of the un-treated fabric to clarify the effectiveness of the treatment and their influence on the physico-mechanical properties of the fabric.

Experimental

Polyester woven fabric with mass of 170g/m² was supplied by Namdinh Textile Company

Cetaflam PDP 30 of AVOCET was supplied by Tan Hong Phat Company

Method: One bath, pad-dry-cure technique was used to finish fabrics. The study was conducted with 17 experiments differed in curing conditions and concentration of padding solution, while all other parameters were the same for all experiments.

These 17 experiments were designed according to the central composite designs for 3 factors

After treatment, the samples were stored at standard condition for 24h before the different tests.

Assessment of treated fabric's properties: the real uptake of recipe chemicals on fabric, the vertical flammability characteristics of the untreated, finished fabrics. Tensile strength of the untreated and finished fabric was determined. The shrinkage of the fabric due to the processing is also determined. Based on the experimental results, the optimal parameters of the flame-retardant treatment for polyester fabric were determined

Results

The results show that the optimal parameters of the flame-retardant treatment for polyester fabric are the highest concentration of CETAFLAM PDP 30, the lowest curing temperature and the longest curing time.

Conclusion

CETAFLAM PDP 30 is an effective flame-retardant agent for polyester fabric. The disadvantage of this chemical is that the curing step must be at high temperature for a long time. This will shrink the fabric and reduce its tensile strength. To alleviate these constraints, the heating process should be conducted at the lowest temperature possible and prolong the heating time to ensure the necessary chemical reactions can occur.

Keywords: PET fabric, Cetaflam PDP 30, flame-retardant, pad-dry-cure technique

UDC677

COMPOSITE TEXTILE-HYDROGEL MATERIAL FOR CONTROL RELEASE OF VITAMIN B12

Daniela ATANASOVA¹, Desislava STANEVA¹, Ivo GRABCHEV²

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Introduction

Vitamin B12, also known as cobalamin, is a water-soluble compound and plays important role in the haematological and nervous systems. Both deficiency and excess of this vitamin can lead to negative dermatological action. Control release and delivery is an important mechanism for providing its effective dose over a period of time. Hydrogels offer an ideal solution for this task and also provide simultaneous moisturizing of the skin. In recent years, our research has been focused on the production of textile materials modified with hydrogel with sensor and antimicrobial properties [1,2]. The present study has been used a previously developed technique for modification of cotton fabric with hydrogel. The following parameters for the preparation of the hydrogel (the amount of crosslinking monomer and the amount of hydrogel on the cotton surface) have been changed to find the most suitable structure providing adequate loading and releasing of vitamin B12 under appropriate physiological conditions (temperature and pH).

Experimental part

100% cotton fabric; acrylamide (Fluka AG); *N,N'*-methylene-bis-acrylamide, *N*-methyl-diethanolamine, methylcobalamin B12 (Sigma Aldrich); modified eosin Y [1]; phosphate buffer (pH 7.4), prepared with sodium dihydrogen phosphate dihydrate and di-sodium hydrogen phosphate dodecahydrate (Valerus). The preparation of the cotton fabric-hydrogel composite materials was carried out in two steps, comprising dyeing a cotton fabric with modified Eosin Y and its modification with a hydrogel by photopolymerization of monomers. The composites have been prepared by dipping in vitamin solution for 36 h at room temperature and characterized by the obtained gel fraction and their swelling in water. The *in vitro* studies have been carried out in phosphate buffer pH 7.4 at 37 °C and with UV-visible spectroscopy the loading and releasing of vitamin B12 have been followed.

Results and discussion

The gel fraction increases with increasing the amount of acrylamide and crosslinker. The swelling is more pronounced in less crosslinked and thinner hydrogel layer. The samples that absorb the largest amount of water also absorb and released the largest amount of the vitamin, as it is well water-soluble.

Conclusions

New composite materials have been obtained which can be used as carriers of vitamin B12 and for its steady release under physiological conditions. This process can be regulated by altering the structure of the resulting hydrogel, such as hydrophilicity, degree of swelling, and pore size.

Keywords: cotton fabric; hydrogel; vitamin B12, drug release

Acknowledgements: The authors thank Grant № 11881/2019, Scientific Research Sector of University of Chemical Technology and Metallurgy.

[1] D. Staneva, I. Grabchev, P. Bosch, International Journal of Polymeric Materials and Polymeric Biomaterials, 2015, 64(16), 838-847.

[2] D. Staneva, D. Atanasova, E. Vasileva-Tonkova, V. Lukanova, I. Grabchev, Applied Surface Science, 2015, 345, 72-80.

INORGANIC-ORGANIC HYBRID COATINGS AS FLAME RETARDANT TEXTILE FINISHING

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The conventional treatments of halogen, nitrogen, and organic-phosphorus compounds act as flame retardants because they prevent the formation of flammable volatiles, isolate the flame from oxygen/air supply, release flame inhibitors, influence the pyrolysis reaction, and increase the formation of char. They are characterized with excellent fire resistance properties, but the drawbacks are their non-environmental and toxic nature. In recent years, the purposeful design of hybrid materials permits to tailor their functional characteristics. The combination of both inorganic and organic components can fulfil all technological needs for different applications.

The aim of this review is to summarize the advantages and disadvantages of the most promising organic and inorganic flame retardants used in textile processing.

The organic biomacromolecules (whey proteins, caseins, hydrophobins, and deoxyribonucleic acid) have been shown their potential as environmentally-friendly, biodegradable intumescent materials, which are able to grow and increase in volume against the heat. However, their disadvantage is the blockage of fabric porosity by higher viscosity, deterioration of physiological comfort and mechanical properties.

In general the metal hydroxides (magnesium hydroxide, $[Mg(OH)_2]$ $Ca(OH)_2$, $Al(OH)_3$) have been extensively used in halogen-free flame-retardant as cost effective and an environmentally friendly, with low toxicity additives. They are decomposing endothermically and converted from metal hydroxides to metal oxides and water molecules. Water molecules ensure that the oxygen concentration around the burning material is lowered and the flammable gases diluted, reducing the intensity of the fire. They are normally smoke suppressants and work predominantly in the condensed phase of combustion. The metal oxide forms a layer on the textile material and thus impedes burning.

Recently silicone-based compounds have been used in the design of flame-retardant textiles because of their promising properties and environmental friendliness. The ceramic layer is a thermal shielding barrier to oxygen, flame and heat. The siliceous char hinders the formation of volatile species that lead to further textile degradation. However the typical textile structure interfere the shielding effect.

These shortcomings can be overcome by developing methods for the simultaneous application of different flame retardants in order to achieve a synergistic effect.

Keywords: flame retardants, hybrid materials, textiles, coatings

NEW POLY(PROPYLEN IMINE) DENDRIMER MODIFIED WITH ACRIDINE AND ITS CU(II) COMPLEX. SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY

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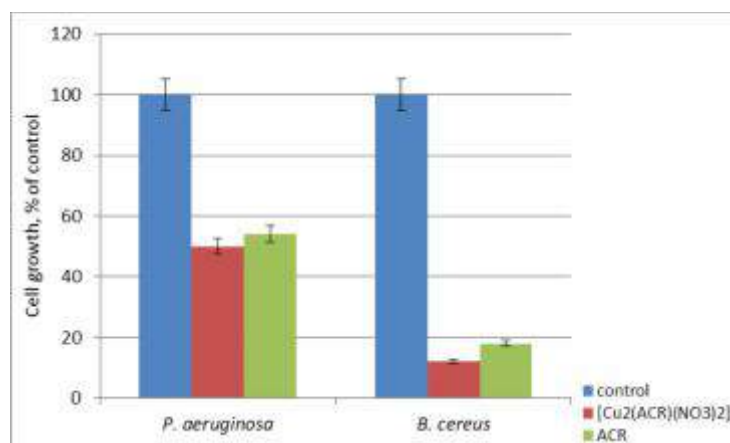
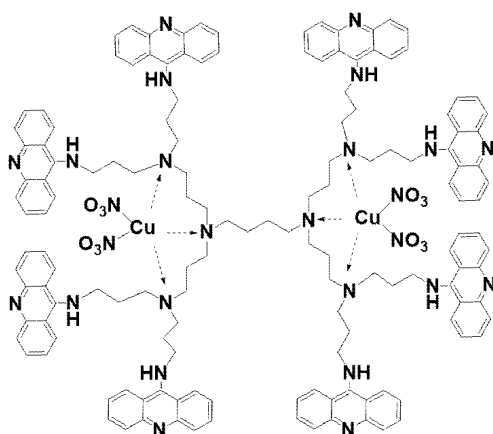
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For the first time acridine has been used for the modification of a poly(propylene imine) dendrimer (ACR). The new fluorescent dendrimer has been used as a ligand to obtain its Cu(II) complex $[\text{Cu}_2(\text{ACR})(\text{NO}_3)_2]$. EPR, FTIR and fluorescence spectroscopy has been used to confirm the structure of metallodendrimer. It has been found that two copper ions are included into the dendrimer core by coordination with the inner tertiary nitrogen atoms. The basic photophysical characteristics of dendrimer have been examined in different organic solvents, and a negative fluorescence solvatochromism has been observed. The antimicrobial activity of dendrimers has been tested *in vitro* against some model Gram-positive and Gram-negative bacteria and yeasts. The results demonstrated enhancement in the antimicrobial activity of acridine dendrimer via complexation with Cu(II) ions against *B. cereus* and *C. lipolytica*. Deposition of dendrimers on the surface of cotton fabric has led to an increase in hydrophobicity of the textile. That prevents the formation of bacterial biofilm and makes these compounds useful for the production of antibacterial cotton fabrics.



Scheme: Chemical structure of $[\text{Cu}_2(\text{ACR})(\text{NO}_3)_2]$ and Reduction of the growth of model bacteria by untreated (control) and treated cotton fabrics

Keywords: Dendrimer; Metallodendrimer, Acridine; Antimicrobial activity; Antibacterial cotton fabric

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UDC679

ANTIMICROBIAL COATINGS OF TEXTILES IN THE FOOD INDUSTRY

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Microorganisms are found everywhere in the world and most of them cause infectious diseases in humans such as viruses, fungi, pathogenic bacteria and etc. The Good Hygiene Practices and Good Manufacturing Practices in food industry are based on process control, where antimicrobial protection gaining interest from many years. Antimicrobial textiles need to be used to protect the health of consumers, workers and the integrity of the entire business.

A wide spectrum of bacteria *Bacillus cereus*, *Listeria Monocytogenes*, *Salmonella enteric*, *Escherichia Coli*, *Staphylococcus aureus* and etc. were responsible for many food borne epidemics with high hospitalisation and mortality rates worldwide, especially affecting young, old, pregnant, immunosuppressed people. The transporting belts, work clothes, textile cleaning and packing materials must have suitable antimicrobial treatment. Coatings applied to textile materials have many advantages, such as inhibiting the spread of germs, controlling infections, controlling odors, wound healing, and more.

The purpose of this review is to summarize the most important requirements for antimicrobial treatment of textile materials applied in food industry. These finishes reduce the risk of spreading infectious diseases and minimize hygiene problems.

The specificity of production determines the requirements for antimicrobial coatings as bacteriostatic and with preventive action in a biofilm formation. In addition, they must be insoluble in water and not separated from the treated surface to avoid contamination of food by antimicrobial agents, affecting health of both consumers and workers.

They must be resistant under conditions of use as friction, different temperature treatments and cleaning agents. It is important to achieve adequate level of disinfection, hygiene in the washing and prevention the recontamination of textiles or wastewater systems with viable micro-organisms, which can be responsible for antimicrobial resistance.

The most important antimicrobial agents with strong antimicrobial activity and safety, durability and chargeability are the N-halamines. Polybiguanides are specifically used as a cleaning agent in the food industry as 20% aqueous solution. Natural by-products of plant secondary metabolites can also be used as antimicrobial agents for textile processing. Photocatalytic nanoparticles, quaternary ammonium compounds and etc. have demonstrated strong antibiofilm effects against important human pathogens as well.

Keywords: food industry, antimicrobial, biofilm, coatings, textile

Acknowledgements:

The authors acknowledge Grant KOST № 1/24-2017, Fund "Scientific Research", Ministry of Education and Science of Bulgaria.

A NEW ERA OR ALREADY CURRENT MANUFACTURING PROCESS. A SUPERCRITICAL CO₂ AND THE TEXTILE CHEMISTRY

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The textile chemistry involves the processes for pretreatment (sizing, desizing, scouring, bleaching) dyeing and finishing (antishrinking, antimicrobial, different surface modification, etc.) of textile materials. At present all applied methods in textile production need a pure water and produce a large amount of wastewater, containing sodium chlorite, soda ash, hydrogen peroxide, dyes, detergents, polymers and other chemicals. The multiple aqueous rinsing and washing is also required. Developments of water-free manufacturing processes are essential for the textile industry due to ecological and economical reasons.

Many studies have been proved supercritical carbon dioxide (scCO₂) as a green alternative of water. It is an inexpensive, in abundance, non-flammable, relatively non-toxic, environmentally friendly and chemically inert. It is a good solvent for hydrophobic substances.

It has a higher diffusion rate and viscosity as a gas, which leads to shorter processing time. Sc-CO₂ exhibits density and solvating power similar to liquid solvents and this reducing requires chemicals and auxiliaries, energy consumption and air emissions. At the end of the processes both the used chemicals and solvent can be easily and completely recycled.

The benefits of changing processing methods are undoubted. However, issues related to their mass industrial deployment are of interest. Replacing water with another fluid leads to a significant change in the traditional views and knowledge about the textile processing.

It is important to study the interaction of a number of parameters in order to make these long-known technologies commercially available. These are pressure; temperature; carbon dioxide flow, chemical structure and dye concentration; type of fibers, treatment time and etc. Many questions are still stay without answer about relationship structure-solubility of dyes or of the other textile processing chemicals in supercritical carbon dioxide.

The initial capital costs related with the equipment for compressing CO₂ in a dense state are higher, but the return on the investment is expected to be excellent for both the shareholders and the society. Are the textile industry and the scientific community in Bulgaria ready to face these new challenges and restore their previously forgotten fruitful cooperation?

The purpose of this article is to introduce technologies using super-critical carbon dioxide as an important element in sustainable textile production and consumption.

Keywords: supercritical carbon dioxide, textile chemistry, sustainable production

Acknowledgements:

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NOVEL NON-WOVEN MATERIALS FROM BIO-SOURCED POLYMERS PREPARED BY ELECTROSPINNING

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Introduction

Recently, the progress in the field of nanotechnology has enhanced the interest of researchers and industry in composite materials, especially those based on biodegradable polymers. Fibrous nanomaterials possess specific properties related to their size and their exceptionally large specific surface area and porous structure. The cutting edge technology electrospinning is currently considered to be the most effective and promising method for fabrication of such fibrous materials.

Experimental part

Cellulose acetate (CA, Aldrich) with $M_n = 30\,000$ g/mol and DS 39.8%, was used. Poly(L-lactide) (PLLA, $M_w = 152\,000$ g/mol, Fluka), poly(ethylene glycol) (PEG, M_r 900-2 200 g/mol, Fluka), poly(ethylene oxide) (PEO, $M_v = 800\,000$ g/mol) and high-molar mass chitosan (HMW, $M_w = 600\,000$ g/mol, Sigma, degree of deacetylation 80%) were used. Acetone and chloroform were of analytical grade of purity and was purchased from Sigma-Aldrich.

Results

In this respect, among the polymers from renewable sources, polyesters and polysaccharides deserve special attention. Conditions for preparation of biodegradable and bioactive fibrous materials based on cellulose acetate (CA), polylactic acid (PLA) and chitosan were found. The surface morphologies, optical and mechanical properties of the fibrous materials were characterized by using scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), ultraviolet - visible spectroscopy (UV-Vis), water contact angle measurements and mechanical tests.

Discussion

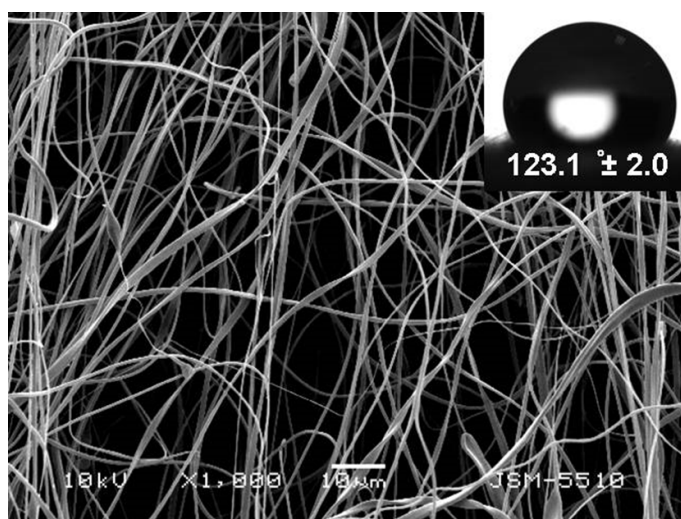
Our findings reveal that the viscosity of the spinning solutions and the morphology of the obtained fibrous mats were greatly influenced by the used polymer, solvent and the solution concentration. Suitable conditions for the preparation of defect-free fibers from CA, PLA and chitosan-containing solutions were found. Potential application of the obtained materials was proposed.

Conclusion

The key parameters influencing the morphology of fibrous mats of CA, PLA and chitosan were determined.

Keywords: cellulose acetate, PLA, chitosan, electrospinning

Acknowledgments: Financial support from the Bulgarian National Science Fund (Grant KP-06-OPR03/2) is gratefully acknowledged.



ELECTROSPUN NON-WOVEN TEXTILE CONTAINING THE BIOFLAVONOID QUERCETIN

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Introduction

In recent years, the health concerns associated with the side effects of synthetic compounds used in cosmetics, medicine, and food industry and the emergence of antibiotic resistance of pathogens have driven electrospinning research towards the development of nonwoven textiles encapsulating plant extracts. Quercetin, a bioflavonoid, present in some fruits and vegetables, possesses antioxidant, anticancer, anti-inflammatory, antidiabetic and neuroprotective properties.

In the present study, fibrous materials containing quercetin (QUE) were prepared by electrospinning of cellulose acetate/polyethylene glycol/QUE solutions.

Experimental part

Cellulose acetate (CA, Aldrich) with $M_w = 30,000$ g/mol and acetyl groups content of 39.8 wt.%, polyethylene glycol (PEG, Fluka) with ($M_r = 1,900$ -2,200 g/mol) and quercetin (QUE, 95%, Sigma-Aldrich) were used. Acetone (Sigma-Aldrich) of analytical grade of purity was used as received. Custom-made electrospinning equipment was used.

Results

Suitable electrospinning conditions for obtaining the novel fibrous CA/PEG/QUE materials were found. The morphology of the electrospun materials was evaluated by SEM. The experimental results showed that fibers with mean fiber diameter of 390 ± 150 nm were obtained at total polymer concentration of 10 wt%, CA/PEG ratio of 80/20, and 10 wt% QUE in respect to polymers. The presence of QUE in the polymer matrix was confirmed by FT-IR analysis. XRD and DSC analyses were performed as well. The antioxidant activity of the quercetin-containing fibrous materials was studied by the DPPH radical scavenging method.

Discussion

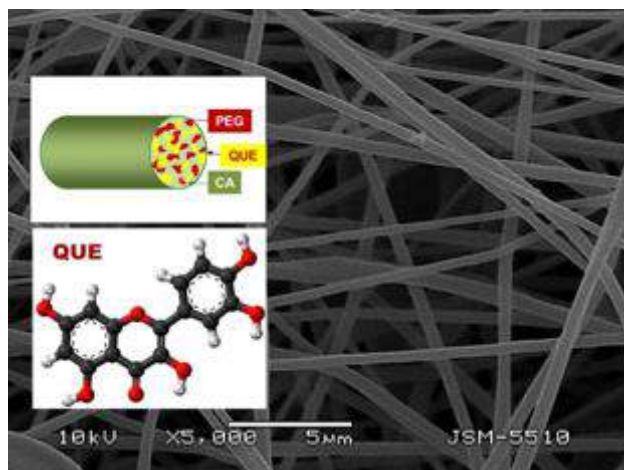
The results from the DSC and XRD analyses show the absence of T_m for QUE as well as the absence of diffraction peaks for QUE in the CA/PEG/QUE fibers thus indicating that QUE is in amorphous state. Antioxidant activity tests have revealed that the quercetin-containing fibrous mats exhibit high antioxidant activity.

Conclusion

In this study it has been shown that the bioflavonoid quercetin may successfully be incorporated in cellulose acetate-based fibers. The obtained nonwoven materials are promising for biomedical applications.

Keywords: Cellulose acetate, nonwoven textile, quercetin, electrospinning, antioxidant properties

Acknowledgment: This work was supported by the Bulgarian Ministry of Education and Science (Grant D01-217/30.11.2018) under the National Research Programme "Innovative Low-Toxic Bioactive Systems for Precision Medicine (BioActiveMed)" approved by DCM # 658/14.09.2018.



UDC677

NOVEL ANTIBACTERIAL AND ANTIOXIDANT ELECTROSPUN NONWOVEN TEXTILE FROM BIOCOMPATIBLE POLYMERS AND COMPOUNDS OF PLANT ORIGIN

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Introduction Phenolic compounds and plant extracts are highly attractive for application in medicine and pharmacy due to the set of their beneficial biological properties (antioxidant, anticancer, anti-inflammatory and antimicrobial activities) [1]. When included in nanofibrous materials, such compounds may impart them beneficial properties. Therefore finding routes to prepare fibrous materials loaded with phenolic compound caffeic acid (CA) or plant extracts (Extr) is of great interest.

Experimental part CA-containing fibrous mats were prepared as described earlier [2,3]. Fibrous materials containing Extr were obtained by applying electrospinning in conjunction with dip-coating. The morphology of the prepared fibrous materials was examined by scanning electron microscopy (SEM) with Jeol JSM-5510 (Jeol Ltd., Japan). The antibacterial activity of the fibrous materials against *S. aureus* 749 and *E. coli* 3588 was studied in vitro by determining the number of surviving cells in liquid medium. The antioxidant activity of the mats was assessed using the DPPH assay.

Results and Discussion Novel poly(3-hydroxybutyrate) (PHB)-based fibrous materials containing natural phenolic compound CA coated with polyelectrolyte complex (PEC) of quaternized chitosan/k-carrageenan (alginate) of diverse architectures were obtained. These materials were prepared by applying electrospinning or electrospinning combined with dip-coating and PEC formation. Fibrous materials containing Extr were also successfully fabricated. Analyses by X-ray diffraction and differential scanning calorimetry showed that CA incorporated in the fibers was in the amorphous state, whereas CA included in the coating on the fiber surface was in the crystalline state. CA-containing fibrous materials (both non-coated and coated with PEC) exhibited considerable antibacterial effect against *S. aureus* and *E. coli* bacteria. These materials had capability of suppressing the adhesion of pathogenic *S. aureus* bacteria. The performed DPPH radical scavenging assay showed that in contrast to the neat mats, CA- and Extr-containing mats exerted good antioxidant activity similar to that of free CA or Extr.

Conclusion The results indicate that the obtained novel fibrous materials containing CA or Extr can be promising candidates for wound dressing applications.

Keywords: electrospinning, dip-coating, polyelectrolyte complex, caffeic acid, plant extracts, antibacterial nanofibers, antioxidant nanofibers

Acknowledgments: Financial support from Bulgarian National Science Fund (Grant DFNI T02/1 12.12.2014) and from Ministry of Education and Science (Grant D01-217/30.11.2018, National Scientific Program BioActiveMed) is gratefully acknowledged.

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INORGANIC-ORGANIC HYBRID COATINGS AS FLAME RETARDANT TEXTILE FINISHING

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The conventional treatments of halogen, nitrogen, and organic-phosphorus compounds act as flame retardants because they prevent the formation of flammable volatiles, isolate the flame from oxygen/air supply, release flame inhibitors, influence the pyrolysis reaction, and increase the formation of char. They are characterized with excellent fire resistance properties, but the drawbacks are their non-environmental and toxic nature. In recent years, the purposeful design of hybrid materials permits to tailor their functional characteristics. The combination of both inorganic and organic components can fulfil all technological needs for different applications.

The aim of this review is to summarize the advantages and disadvantages of the most promising organic and inorganic flame retardants used in textile processing.

The organic biomacromolecules (whey proteins, caseins, hydrophobins, and deoxyribonucleic acid) have been shown their potential as environmentally-friendly, biodegradable intumescent materials, which are able to grow and increase in volume against the heat. However, their disadvantage is the blockage of fabric porosity by higher viscosity, deterioration of physiological comfort and mechanical properties.

In general the metal hydroxides (magnesium hydroxide, $[Mg(OH)_2]$ $Ca(OH)_2$, $Al(OH)_3$) have been extensively used in halogen-free flame-retardant as cost effective and an environmentally friendly, with low toxicity additives. They are decomposing endothermically and converted from metal hydroxides to metal oxides and water molecules. Water molecules ensure that the oxygen concentration around the burning material is lowered and the flammable gases diluted, reducing the intensity of the fire. They are normally smoke suppressants and work predominantly in the condensed phase of combustion. The metal oxide forms a layer on the textile material and thus impedes burning.

Recently silicone-based compounds have been used in the design of flame-retardant textiles because of their promising properties and environmental friendliness. The ceramic layer is a thermal shielding barrier to oxygen, flame and heat. The siliceous char hinders the formation of volatile species that lead to further textile degradation. However the typical textile structure interfere the shielding effect.

These shortcomings can be overcome by developing methods for the simultaneous application of different flame retardants in order to achieve a synergistic effect.

Keywords: flame retardants, hybrid materials, textiles, coatings

SANITARY-HYGIENIC REQUIREMENTS FOR LINING AND INSOCKS

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Introduction The lining is the material inside the shoe that comes in contact with the entire foot: the sides, top and heels. The main purpose of the lining is to cover the inside seams of the shoe and lengthen the shoe's lifespan. Linings made out of certain materials cushion and comfort the foot or draw out moisture. Sanitary hygienic properties of lining and insocks are of great importance for comfort and protection of the foot in the running period of shoes.

Lining are subjected to a smaller and weaker mechanical effects than upper leathers of the shoes both during the manufacture of the shoes and in the time of their running. This determines the smaller requirements for their physical and mechanical properties. This study applies current ISO standards to determine the performance of different types of lining and recommend the most appropriate ones.

Experimental part

Materials, procedures and analytical methods

- Sample 1 - Chrome tanned cattle hide (fodra) with finish
- Sample 2 - Chrome-vegetable tanned pig skin (fodra) without finish
- Sample 3 - Chrome-syntan tanned pig skin (fodra) with finish

In this study we compare three different samples of leathers used as lining and insocks. Colour fastness to rubbing, perspiration resistance, water permeability and absorption are tested by ISO methods.

Results and discussion

Comparing the three linings with the four types of rubbing, the following is observed:

- Chrome tanned cattle hide (fodra) with finish is resistant to almost all types of rubbing, except rubbing under the influence of alcohol, where results are around and below the limit.
- Chrome-syntan tanned pig skin (fodra) with finish shows better test results than sample 1-chrome tanned cattle hide (fodra) with finish. For sample 2 only some types of rubbing results are about and below the requirements of the standard.
- Chrome-vegetable tanned pig skin (fodra) without finish has significantly lower results than the other two samples, especially when subjected to wet rubbing and those with sweat and alcohol.

The water and vapour permeability of the samples indicates that it is much higher in pig lining. This is probably due to the differences in the structure of the skin tissue in different samples. The way of tanning may also have an impact. The effect of the finish on pig skins is not considered. The same tendency is observed in the absorption index. The vapour permeability of pig skins is significantly higher. This also determines their good sanitary and hygienic properties. The retention of water vapour in the skin tissue is significantly lower and leads to greater comfort with prolonged use of the articles

Conclusion

1. According to the requirements of the colour fastness standard, sample 3 has the best performance for lining and insocks.
2. According to the requirements of the standard for water permeability and absorption, sample 3 has the best performance.
3. According to the requirements of the standard of perspiration resistance, sample 1 - cattle leather is the most suitable for lining and insocks.
4. Both the type of skin and hide, as well their treatment - tanning and finishing have an impact on the results.
5. In accordance with the requirements of EN ISO 17700, BDS 9056-71, BDS EN 12801, the most suitable lining and insocks is the sample 3 - chrome-syntan tanned pig skin (fodra) with finish

Keywords: footwear test methods, uppers, lining, insocks

UDC678

NEW POLY(PROPYLENE IMINE) DENDRIMER MODIFIED WITH 4-NITROBENZOFURAZAN. SENSOR AND ANTIMICROBIAL ACTIVITY

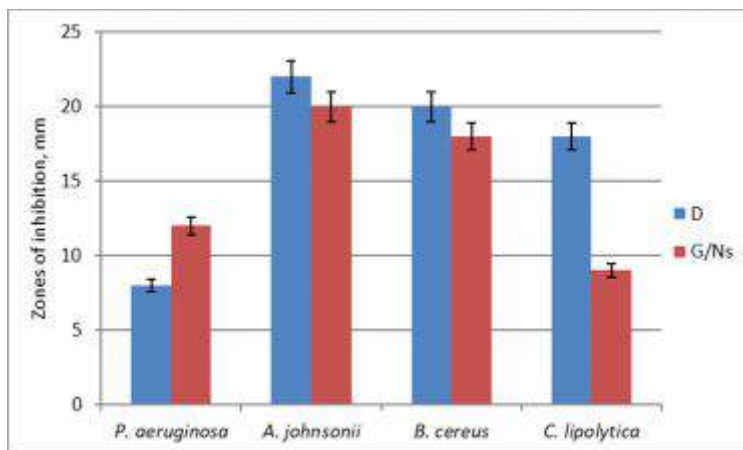
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4-chloro-7-nitrobenzofuranzan has been used for the first time for peripheral modification of a second generation poly(propylene imine) dendrimer. In organic solvents this dendrimer exhibits a deep yellow color and emits a yellow-green fluorescence whose intensity depends strongly on the medium polarity. This effect can be explained by a possible occurrence of a PET effect. The sensory activity of the new fluorescent dendrimer has been investigated against different metal ions (Ag(I), Co(II), Sr(II), Pb(II), Mg(II), Cu(II) and Fe(III)). It has been found that the best detecting activity of the dendrimer is with respect to Fe(II) ions, while regarding the other tested ions it exhibits a weak sensory activity. That indicates the capacities of the dendrimer to act as a selective sensor for detecting Fe(III) ions. In alkaline medium, the new dendrimer has been found to have low fluorescence intensity, whereas in an acidic medium it increases many times. Hence, it can also be used as a detector of pH changes in the environment. The results from microbiological study have showed good antimicrobial activity of dendrimer against *B. cereus* and *A. johnsonii* and moderate against *P. aeruginosa*.



Chemical structure of dendrimer

Zones of inhibition of the test bacteria and yeasts by 0,2mg of the investigated dendrimer D

Keywords: Dendrimer; poly(propylene imine); 4-chloro-7-nitrobenzofuranzan; Antimicrobial activity; Antibacterial cotton fabric

Acknowledgments: "This research was funded by Fund "Scientific Research", Ministry of Education and Science of Bulgaria, grant number DX 09/3 2016"

DEPOSITION OF NIOBIUM COATINGS ON TEXTILE FIBRE SUBSTRATES BY MEANS OF ION-BEAM SPUTTERING IN A VACUUM MEDIUM

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The experiments carried out show that the deposition of metallic coatings in particular niobium on textile substrates in a vacuum environment by means of an ionic plasma beam is possible and feasible. The main task, namely the deposition of thin-film silver coatings on textile fibres in the vacuum environment, was successfully achieved.

The preliminary experiments carried out in the dissertation show that the deposition of electrically conductive materials, pure niobium 99, 99% on textile panels, yarns and tapes is possible, but the established electrical conductivity is insufficient to obtain low electrical resistance.

The results of the metallised fibres tests showed the preservation of the qualitative characteristics of the substrates after the ion metal metallisation, namely their flexibility, plasticity and softness typical of the textile fibres.

The plasma finishing in the vacuum medium then not only complements the final cleaning of the fibres, but also contributes to the activation of the surface of the fibre mass. The extraction voltage should not exceed 100 V, and the plasma etching time should not be longer than 3 min.

The thickness of the metallic coating ensures the maintenance of the technical and mechanical characteristics of the fibres. The morphological and chemical analyses of the deposited coatings confirm the results obtained and facilitate the establishment of specific and strictly validated process parameters to achieve permanent metallisation and good adhesion performance.

Clear and accurate vacuum deposition parameters have been developed that can be repeatedly reproduced. Ionic plasma deposition under vacuum was the correct method for metallisation of substrates that cannot be subjected to high temperature

loads by another vacuum plasma method. Because of the low process deposition temperature, this metallization method is particularly distinguished from the other methods known and described in this dissertation thesis. The experimental results presented in this dissertation thesis can be fundamental for further research on metallised textile fibres and their derivatives.

Keywords: polyester fibres, niobium coating, ion-beam sputtering, vacuum.

Prüfbedingungen	Kennwerte	Einheiten	Nr.1: PES beschichtet Versuch 1	Nr.2: PES beschichtet Versuch 2	Nr.3: PES unbeschichtet
Probenzustand: klimatisiert	Feinheit				
	\bar{x}	dtex	3,43	3,32	3,27
Einspannlänge: 20 mm	s	dtex	0,32	0,32	0,23
	V	%	9,32	9,71	7,02
Verformungsgeschwindigkeit: 20 mm/min	$\pm W(95\%)$	dtex	0,10	0,09	0,07
	Höchstzugkraft				
Vorspannkraft: 200 mg	\bar{x}	cN	12,3	12,5	13,2
	s	cN	1,0	1,1	0,9
	V	%	8,13	9,14	6,82
	$\pm W(95\%)$	cN	0,3	0,3	0,3
Klemmenbrüche: keine	Höchstzugkraftdehnung				
	\bar{x}	%	31	30	40
	s	%	5	5	8
	V	%	15,9	17,7	18,8
n= 50	$\pm W(95\%)$	%	1	2	2
	Feinheitsbezogene Höchstzugkraft				
	\bar{x}	cN/tex	35,9	37,6	40,6
Bemerkungen: keine					



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- * Специалност "Апретурно и багрилно производство"
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Topic № 2
TEXTILE TECHNOLOGIES:
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QUALITY CONTROL OF SUTURE THREADS

Diana GERMANOVA-KRASTEVA

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Introduction

The wound suture is one the first medical application. First references could be found in ancient Egyptian texts 3000 BC. Nowadays there is a huge variety of suture threads. They may be natural - from animal gut (catgut), silk or linen, synthetic or artificial, absorbable or non-absorbable, mono- or multifilament, coated or uncoated, etc. The use and requirements for surgical threads are strictly regulated and clinically controlled. Among the main regulatory documents are: Council Directive 93/42/EEC concerning Medical Devices, the editions of European Pharmacopoeia, BDS EN ISO 13485: 2016 Medical devices - Quality management systems - Requirements for regulatory purposes. They set out the requirements for controlling geometric dimensions (length and diameter), strength and elongation characteristics, sterilization, packaging and labeling.

Experimental part

An analysis of the existing normative documents was made and the requirements for the surgical sutures were systematized. The indicators for quality assessment of the threads are defined and the methods for their determination and control are selected.

An algorithm for incoming, ongoing and final control and for document flow in the production of suture threads has been developed.

Tests on absorbable and non-absorbable threads were performed. They were carried out in the laboratory of "R1 Suture" Ltd. and included the control of the following suture parameters: appearance (pollution, moss, color unevenness, open braided thread, etc.), conformity of the diameter of the thread metric number, tensile strength of a simple knot

The results obtained were compared with the requirements given in European Pharmacopoeia, 7-th Edition, 2011.

Results

The proposed algorithm includes the sequential steps for performing incoming, ongoing and final control, as well as the required actions. It is designed in the form of flowcharts.

The quality control of the selected absorbable and non-absorbable threads was performed according to the developed algorithm.

Discussion

In the production of suture threads, a quality management system and a well-functioning control mechanism at each stage: entrance, production and acceptable control, are required to guarantee their performance.

Conclusion

In view of their purpose, a number of requirements are set to the sutures and only their strict adherence will guarantee the health of the people and their rapid recovery.

Keywords: Medical textiles, surgery, suture threads, quality control



UDC677

STUDY OF THE EFFECT OF FINISHING TREATMENT ON THE COEFFICIENTS OF FRICTION OF FABRICS FROM NATURAL SILK

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Introduction

The study of the coefficients of friction of fabrics is related both to technological issues such as ordering of layers of fabrics, cutting and subsequent separation, packaging and storage, as well as to completely consumer requirements such as sliding on the body, drapery, etc. For silk fabrics, which are characterized by a low mass per square area, the issue of layering and separation of multilayered fabrics becomes even more relevant.

Another characteristic that affects the static and dynamic coefficients of friction is the construction and composition of the silk thread. It is composed mainly of two proteins - fibroin (70-80%) and sericin (20-30%). The fibroin filament emitted from the Bombyx mori silk glands is smooth and soft and forms the structural center of the silk. Sericin is a coating with amorphous structure sticking the filaments to each other. It gives rigidity to the raw thread.

Typically, the weaving is performed with raw fibers, and after weaving the fabric goes through a series of finishing treatments, the main of which is boiling. It eliminates the sericin to a great extent. Therefore, we expect that the changes in the silk threads after treatment will lead to significant changes in the values of the friction coefficients of the ready fabrics.

Experimental part

The study was performed on 4 fabrics of different structure: weaves, densities of the warp and weft threads in fabric and linear densities of the threads.

The following fabric characteristics before and after finishing were measured: mass per square area; densities of the warp threads; densities of the weft threads; static coefficients of friction; dynamic coefficients of friction.

The friction coefficients were measured using the -meter MXD-02 of Labthink, China, according to BDS EN ISO 8295:2006. They are determined at different levels of pressure: 200, 300 and 400 g and in different directions: warp-warp threads and warp-weft threads.

The percentages of change in the studied characteristics were calculated. Results are presented in tabular and graphical form.

Results

The following facts have been established:

- after finishing the fabric shrinks much more in the direction of the warp threads than in the direction of the weft ones;
- although the fabric shrinks, its mass per square area decreases by 14 to 20%;
- the friction coefficients increase linearly according the pressure;
- the static and dynamic coefficients of friction after treatment increase and the change is over 100% for some structures and directions of friction.

Discussion After finishing, especially after boiling, much of the sericin is dropped. The silk filaments contact more tightly and this leads to an increase in the friction and adhesion forces.

Conclusion The static and dynamic coefficients of friction of raw and finished fabrics made from natural silk are determined. The reasons for the increase in the values of the friction coefficients after treatment have been identified and analyzed.

Keywords: Static and dynamic coefficients of friction, fabrics from natural silk, finishing

STUDY OF PILLING RESISTANCE OF COMPOUND STRUCTURE LINEN AND FLAX WOVEN FABRICS

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Introduction

Linen and hemp has some similarities, because they both are bast cellulosic fibres and some differences in their properties and appearance because of different structure of the fibre [1]. One of the most important end-use properties of woven fabrics is pilling resistance [2]. The authors think that this fabric's property may also differ for linen and hemp woven fabrics. Thus, the aim of the study is to analyse and compare pilling resistance of linen and hemp woven fabrics.

Experimental part

The investigated fabrics were woven from linen 38 tex yarns and hemp 38 tex yarns in warp and weft. They were woven in compound double-layer weave using Itama R500 (Italy) weaving loom in joint-stock company "Klasikinė tekstilė" (Lithuania).

The pilling resistance tests were performed using Martindale Abrasion and Pilling Tester MESDAN-LAB, Code 2561E (SDL ATLAS, England), in accordance with the standard ISO 12947-2.

Results and discussion

The experiment results show that grades of loom state linen and hemp woven fabrics are the same, i.e. 3.5. This result is quite high after 5000 abrasion cycles. However, the pilling results of dyed fabrics are lower, i.e. they seek 2,5 grade for hemp fabric and just 1,5 grade for linen fabric after 2000 abrasion cycles. It can be stated that both results are low, but the results of linen fabric was worse.

Conclusions

The grade of linen fabric is higher than the grade of flax fabric during the pilling tests performed, because the hemp fibre is stronger and longer in comparison to linen fibre. The pilling resistance of the dyed fabrics was lower than this of loom state fabric, because fabrics receive different chemical and mechanical effects during finishing.

Keywords: hemp and linen woven fabrics, pilling resistance, loom state and dyed fabrics, pilling grades.

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BIO-COMPOSITES REINFORCED WITH 3D KNITTED PREFORMS

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Textile-reinforced composites are widely used in composite applications where a lightweight and rigid structure is an imperative target. As reinforcement materials, spacer fabrics are making a greater interest in composite materials field, in order to replace conventional sandwich panels. Spacer fabrics are three-dimensional structures made of two fabric layers linked vertically with pile yarns or fabric cross-links. They can be seen as a solution to the critical problem of bonding between skins and core in classical sandwich composites. They are obtained by weaving or knitting technologies. At present, studies of such fabrics are mostly based on weaving and warp knitting but not flat knitting. In fact, woven spacer fabrics could not present complex shapes which limited the uses of the 3D composite. Warp-knitted spacer fabrics are connected with pile yarns and not with connecting layers. Thus, 3D composites based on warp-knitted spacer fabrics are expected to be used only for cushioning applications and protection materials. Flat-knitted preforms are promising since they allow a flexible manufacture of complex shapes in a unique process step, a better ratio weight/stiffness, and a good resistance to fatigue and corrosion.

This work deals with the development of 3D flat-knitted composites using cotton yarn and unsaturated polyester resin. According to literature, materials used in the development of flat-knitted spacer fabrics are more concentrated on glass and carbon fiber owing to their high modulus. Thus, we have tried to develop bio-composites by using a natural yarn during the development of the reinforcement material. U and V-shaped spacer fabrics were produced with a Stoll 330 TC flat-knitting machine, in order to assess the impact of fabric cross-link shape on composite mechanical performances.

In this study, three-point bending and flat compression tests were performed by a Lloyd EZ 20 testing machine, on the consolidated composites.

It was found that composite material with U reinforcement has the best compression resistance whereas the best bending properties were obtained with V shaped connection. Consequently, mechanical performances of knitted sandwich structures are greatly affected by the connecting layer's shape. Thus, the selection of the spacer fabric according to its composite envisaged application is of primary importance.

In conclusion, the developed structures present competitive solution for light weight composites such as solar panels and sound absorbers. The use of the cotton yarn as a reinforcement material, in this research, can be seen as a trend to develop bio-composites in order to reduce the environmental impact of man made fibers.

Keywords: Spacer Fabrics, Flat knitting, Cotton preforms, Polyester Matrix, Mechanical properties.



UDC677

MODERN CLASSIFICATION OF COMBINED KNITTING STRUCTURES

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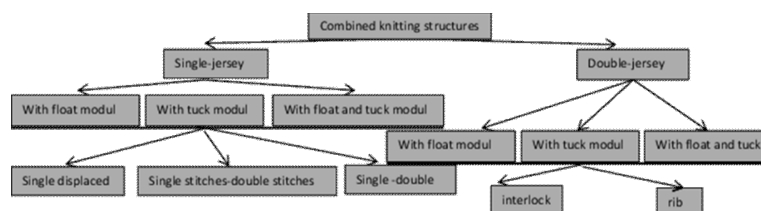
Recently, new garments with specific properties have been introduced into the garment industry and the production of new fashionable garments, which add to the versatility of contemporary clothing. Such are the combined knitting structures which, in addition to having the positive properties of knitting, are also of less elasticity and stretchability and have a good shape and stable stitch structure. This allows them to be used where woven fabrics have traditionally been used so far. The combined structures are single-faced (single-jersey) and double-faced (double-jersey) structures consisting of float (miss) and tuck stitches modules [1]. Mainly braided circular machines with a higher gauge (12E-24E) are [2, 3, 4]. The initial application of these structures was in France, where based on interlock or rib knit modules [2] used to stabilize the knits. In this regard, in 1950, the first circular knitting machines with 12 systems were built to allow the mass production of these structures. Spenser D. [2] examines a small part of these structures and their development without special classification. These structures are discussed from Iyer C., Mammel B. and Schach W., [4], how presented many of the combined knitting structures used without particular classification and arrangement. Usually, these structures are small repeats in course (2-6), and when using individually selected needles and differently colored threads, these repetitions can be infinitely large. The repetition in wale is also usually small (2 to 12) and may be unlimited in jacquard unbalanced structures [5].

The main purpose of this study is to create a complete classification of known combined knitting structures and a complete modern classification. This will help knitwear designers learn about these types of structures and use them in their collections. The diagram gives a complete classification of the combined knitting structures according to the modules used to obtain them. Usually, using a float (miss) stitches modules module, the knitting gains a certain degree of stability by reducing its elasticity. This reduction is directly proportional to the number of float modules in one repeat of the knitting, i.e. $\varepsilon = f(n)$, where "ε" is the stretchability in percentages and "n" is the number of float modules in one repeat. The tuck stitches modules gives a greater volume of knitting and in combination with float and less stretch. Combining the float and the tuck stitches modules in different variants results in combined knits of different construction and properties that could be planned in advance [6, 7].

Key words: combined, knitting, structures, stitch, float, tuck

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UDC677

FROM THE WASTE TO THE YARN

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Abstract Since the 1950s, plastics have continued to extend in all human activity fields, whether civil or military ranging from domestic uses to aeronautical applications through the electronics and medical sectors. The development of high performance plastic materials in strategic areas is growing permanently but strongly dependent on fossil resources.

The increased development of these materials is based mainly on the exploitation of natural resources of fossil origin poses two major problems; one is the rapid depletion of raw materials and the other lies in the management of waste generated by the end of life of these same materials.

In order to reduce the impact of these two important factors, several solutions can be contemplated:

- reduce the consumption of fossil material and thus reduce waste to the source;
- provide post-consumer material recycling operations;
- find bio-sourced materials for replacing fossil materials.

In this work, we have chosen to treat the recycling of plastic waste in order to reduce oil consumption and at the same time reduce the level of CO₂ generated by the incineration of post-consumer waste. In this study two Poly (Ethylene Terephthalate) (PET) polymers obtained from mineral water bottle and a virgin PET polymer were characterized by viscosimetry, differential scanning calorimetry (DSC) and rheology. Virgin PET showed better rheological and viscosimetric properties compared to recycled PET polymers.

In order to improve properties when reprocessed at high temperatures, recycled polymers were blended with the virgin one. Rheological and thermal properties of extruded recycled/virgin (PETV/R) blends showed a good rheological and thermal compatibility and stability compared to extruded pure recycled polymers. Melt spun yarns obtained from recycled/virgin blends were investigated by static and dynamic mechanical analysis and gave interesting mechanical properties

Keywords: recycling, PET recycling, bottles recycling

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VARIATION OF THE WOVEN THREADS DEFORMATION DURING MOISTURE-HEAT TREATMENT OF THE WORSTED FABRICS

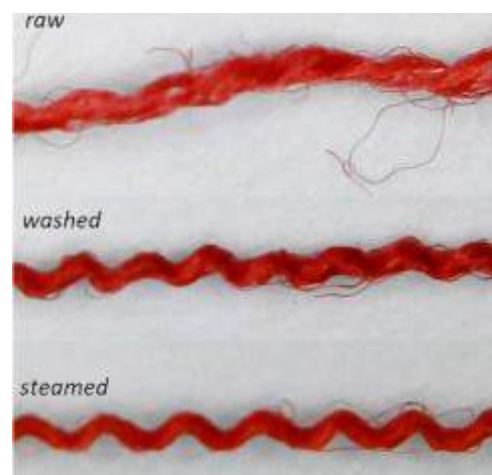
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The presented study focuses on the changes in the structure of the worsted fabrics in their enrichment under the conventional finishing technologies. The main structural changes of the worsted fabrics occur during the removal of the tissue from the loom and then the laundry and thermal fixation of the fabric. These core operations by moisture - heat treatment reveal the main deformations of the warp and weft threads. The following finishing operations focus on removing the internal stresses in the fibres and the linkages between the weaving threads. They do not affect so much on the transverse dimensions and the surface mass of the fabric. The purpose of these operations is to balance the construction and flatten the surface of the woven fabric. Finishing technological operations affect the fabrics in two directions: structural and superficial. In the examined worsted fabric for outerwear and after passing all finishing operations, set by technology, it became clear that after removing the woven fabric from the loom its width begins to fall (from 195 cm raw width) and this sharp decline continues after the first finishing operations of washing and drying by thermal fixing. At the first intermediate quality control, the width of the fabric is already 160 cm and this width is maintained in the next three operations and after softening by thermal fixing the width of the fabric again begins to fall by 2-3 cm per operation until it reaches its final width of 151 cm at the final quality control. With the surface mass, things stand right back from raw it is 167 g/m² to the first intermediate control, when it is already 190 g/m², the surface mass increases here as well, and in width it retains its values in the next few operations. Until the fabric undergoes softening with thermal fixing, the surface mass begins to grow again, and after the final operation, it is 206.6 g/m². In threads densities things are different, the weft density from raw to quality control state changes slightly, and the warp density from raw to final quality control state is steadily increasing, at the beginning it is 249.1 dm⁻¹ and at the final quality control, it is 321.7 dm⁻¹. This is due to the shrinkage of the fabric and its change in width after each moisture-thermal operation. The change in the weft and warp threads can be seen in the pictures taken. In the raw state, the fibres are under stress, and the destroyed warp and weft threads have wavy deformations with different frequencies and amplitudes. After washing and thermal fixing, the basic dimensions of the amplitudes and the wavelength (reciprocal frequency) of the wavy deformed threads are achieved, after their incorporation into the fabric structure. After this process, all subsequent moisture-heat treatments influence the removal of internal stresses and the smoothing of the parameters of the wavy deformations. In the final look, the main and weft threads have a uniform shape and the fabric has a smooth and uniform smooth surface.



Keywords: worsted fabrics, finishing, textile structural changes

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UDC677



by EDOARDO MIROGLIO

Topic № 3

APPAREL

TECHNOLOGY



A COMPARATIVE STUDY ON AIR PRESENCE ALONG STITCH LINES FOR THE PURPOSE OF INCREASED THERMAL RESISTANCE

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Introduction

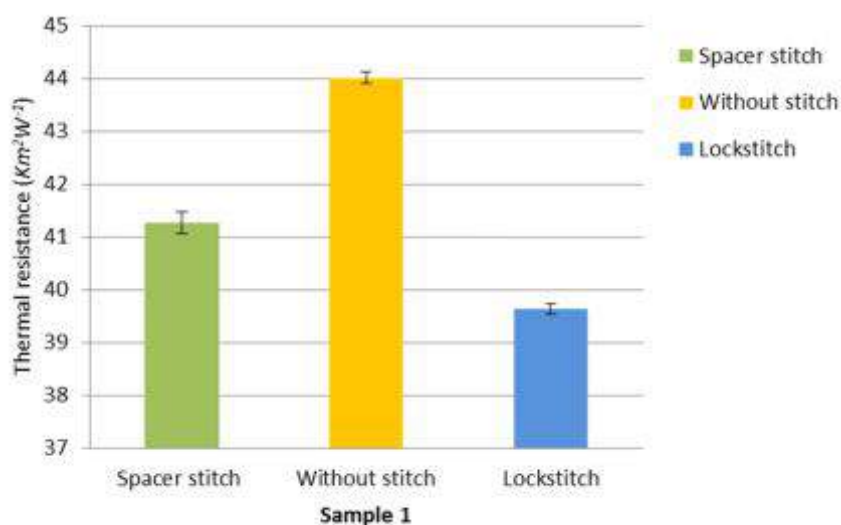
In clothing products for extreme weather conditions, layers of textile materials are combined with insulation materials and are held together with sewing. During the stitch formation, the outer and inner layers of textile material are brought close together by the tensions of sewing threads. The air, which itself act as an insulator plays a very important role in clothing insulation systems [1], [2]. Due to compression along stitch lines the entrapped air in insulation material in particular is forced to leave. During the stitch formation when the outer and inner membranes of the material are sewn together and cold spots are formed, heat conduction is very rapid and a general reduction in the overall insulating value of the material takes place [3]. These thin spots, commonly known as 'cold spots', are responsible for heat loss from the human body to its external climate.

Experimental part

A new sewing technology is developed which do not rapidly compress the sewing material and insulation material sandwich structure along stitch lines, thus help to maintain sustain the insulating air along stitch lines which is important for higher thermal resistance. The new technology is names as 'Spacer Stitching'. This new material feeding technique introduces a distance between the extreme layers of fabric and prevents the compression of insulating material by thread tensions at needle insertion points. Due to introduction of distance between the extreme layers of fabrics, it is named 'Spacer Stitching'. Spacer stitching patent application (EP 3252196 A1) has published on 06.12.2017 [4].

Results, Discussion, and Conclusion

In order to compare the thermal resistance sweating guarded hot plate test method was used. The sweat guard hot plate or commonly known as skin model works as per DIN (BS) EN 31092 and ISO 11092 [5], [6]. This device measures thermal properties and water vapor resistance of fabrics and other materials under steady state conditions. The tested fabric sample is placed on a horizontal porous metal plate, which is heated up to 35 °C [7]. Air flow is maintained during testing at 1 ± 0.05 m/s at 15 mm above working platform [8]. The dimensions of sample prepared



UDC677

are 300 mm * 300 mm. In total 15 samples were prepared with 5 samples each for conventional lockstitch, unstitched sample and spacer stitching with stitch pate distance of 11 mm for testing.

The thermal resistance of samples without stitch showed the best thermal resistance, followed by the samples sewn with spacer stitching. Samples sewn with conventional lockstitch showed the lowest thermal resistance. An improvement of 3.6 % was observed in thermal resistance of spacer stitching samples when compared with conventional lockstitch method.

Keywords: air gaps, thermal resistance, spacer stitching, lockstitch

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APPLICATION OF ELEMENTS OF BULGARIAN FOLK COSTUME IN CONTEMPORARY CLOTHING

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Abstract

1. Introduction

In recent years, globalization has conquered all spheres of natural science, technology and industry.

The global dissemination and integration of ideas, technologies and culture [3] is particularly characteristic of the fashion and apparel industries [5].

In this dynamic development of globalization it is of utmost importance that we manage to preserve specific Bulgarian traditions and customs. Some of the innermost manifestations of the national spirit have found expression in Bulgarian folk costumes.

Each application of elements of the Bulgarian folk costume in our contemporary clothing is a touch of the national spirit and striving to preserve the national traditions.

The purpose of this work is to study and analyze the characteristic features of Bulgarian folk costume from a given region and to develop model variants of contemporary clothing with elements of this folk costume.

2. Experimental part

The subject of this study is an extremely colorful and attractive female folk costume for a wedding ritual from the Draginovo region.

A thorough study of traditions of performing the wedding ritual [4] has been made in the village of Draginovo, Velingrad municipality.

As a result of researches, original folk women's wedding costumes from the village of Draginovo were illustrated.

3. Results and a Discussion

A thorough analysis of characteristics of these costumes has been made with regard to:

color and color combinations;

construction lines and silhouette;

composition and structure of textile materials used.

Model variants of women's clothing with elements of traditional folk costume for wedding ritual from the village of Draginovo have been developed.

4. Conclusion

The researches, analyzes and their results can serve as a means of illustrating the method and principles of work in the development of contemporary clothing with elements of folk costumes.

Keywords: Bulgarian folk costume; contemporary clothing

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BULGARIAN EMBROIDERY AS A PROTECTION PROVIDING PRACTICE

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In Bulgaria, the topic of traditional stitching, its origin, function and importance of sewn images is becoming more and more interesting for representatives of the scientific community and people working in the field of art, but also for a wider range of new researchers and simply people feeling deeply their Bulgarian origin. The Bulgarian embroidery practice (in Bulgarian -called 'vezba') is one of the first cultural achievements of humanity, along with weaving and sewing. Multicolored embroidered figures, called 'shevitsa', are one of the main features common for all traditional costumes of the Bulgarian women, regardless of the regional differences and the changes occurring over time. The wide variety of these figures are not just an aesthetic expression of creative inspiration. Embroidery ornamentation is a manifestation of both morality and values, but it also visually and materially represents the hopes and worries of the person from the past. Therefore, one of the basic functions of the 'shevitsa' is to protect. This topic has been introduced in the scientific community by a number of researchers, such as I. Koev, R. Ganeva, G. Mihailova and others. On the other side, the issue concerning demonology in Bulgarian folklore has been deeply studied by native and foreign researchers (D. Marinov, R. Gatsin and others). Each topic is incredibly interesting itself, but when viewed on a mutual basis, the connection between both of them can be seen and understood more clearly.

The Bulgarian nation has defended themselves from outside forces through various practices, carried out parallelly. One of them was only women's work - the traditional Bulgarian embroidery. This sacral practice, passed down from generation to generation, along a female line in the family, has a deep initiating potential. The art of 'vezba' used to be a compulsory part of the education and initiation of the little girl on her way to becoming a woman. This transition from one social status to another, is the most burdensome and of the greatest importance in the traditional Bulgarian society. It is the period when a girl is most vulnerable and susceptible to outer influences and malicious forces.

The ornamentation of clothes by stitching is a technique originating from the cosmogonic conception of the Bulgarians, his value system, knowledge of the universe, as well as the forces that control him and and which man is influenced by. It is an expression of the basic cultural differentiation - the opposition between man and nature.

The 'vezba', as a method of protection, focuses on the idea that man is not only exposed to the hostility of natural forces or other circumstances beyond his control, but there are also other forces to which everyone is subject to and can be influenced by. The Bulgarian people have given the image and name to many of them. Most of these images can be compared and related to the popular expression in Bulgarian folklore "evil eyes".

The desire of the Bulgarians in the traditional society is to protect themselves from those invisible forces. This leads to the creation of trademarks in the clothing - necklaces, sleeves, edges of the skirts, as well as at the seams. In the image of the garment that covers the naked human body, these open spaces, these holes are the transition between man's wild nature and his cultivated behaviour - his culture, his socialization.

Embroidery ornaments are a code by which the garment becomes a mediator between two worlds - the human one and the one beyond. Communication flows in both directions, so it is important certain actions which are the same for everyone in the community to be passed forward correctly and followed strictly. Therefore, this defines man's belonging to the society and provides him an ultimate protection from all outer forces.

Keywords: stitching, embroidery, ornament, protection.

UDC677

DRAPING THE STYLES OF LADY'S SKIRT

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Introduction

The majority of two dimensional tests for determining fabric drape cannot exactly provide the idea of fabric appearance in the finished garment, since draping includes three dimensional double curvature deformations, which correlate to fabric shear properties. The drape coefficients for various types of garments stating the optimal drape coefficient have been published as a guide. However, the effect of fabric drape on final garment appearance is still difficult to correlate since it depends on style and garment end use. The paper investigates correlation between drape coefficient and final appearance of the various fabric weights and styles of lady's skirts.

Experimental part

The ranges of woven fabric of various weights have been selected for manufacturing of lady's skirts. The fabrics were tested for fabric drape using BS 5058:1973 method. Two styles of plain lady's skirts, one long and one short, having two side seams, were manufactured from investigated fabrics. The appearance of the skirt styles chosen is shown in **Figure 1**. The sewn skirts were photographed from the front, back and two sides. The area of the skirts on the pictures was measured using an image analyzer. The correlation was investigated between fabric drape coefficient and the surface area on the photograph from the front, the left and right sides and the back of the skirts.

Results

The fabric drape coefficient for all investigated fabric ranged from 35 to 94%. The area of the skirts from the front was higher than the area of the skirt from the back. The area of the skirt from left and right side was smaller compared to front and back area of the skirt. There was slight difference between the left and right side of the skirt, for both styles of the skirt.

Discussion

There was no correlation between fabric drape coefficient and skirt area from the front, back and sides of the skirt for the long style of the skirt. Also there was no correlation between these parameters and fabric weight. For the short style of the skirt, the correlation was found between the fabric drape coefficient and skirt area from the sides. Somewhat lower correlation was found between fabric drape coefficient and the skirt area from the front and back. Also, the correlation was found between fabric weight and the side areas of the skirt.

Conclusion

Two plain styles of lady's skirts, having two side seams, were manufactured from fabrics of various weights and drape coefficients. The skirts were photographed from all four sides and the area of the skirt on the photograph was measured. The correlation was found between fabric drape and skirt area for the short style.

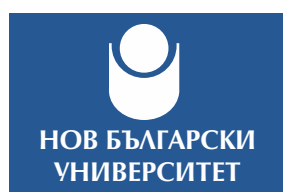
Keywords: fabric drape, woven fabric, skirt, image analysis



Figure 1 The styles of sewn skirts



Topic № 4
TEXTILE ART
AND FASHION DESIGN



КОТЛЕНСКИТЕ КИЛИМИ ЕЛЕМЕНТ В ОБУЧЕНИЕТО ПО ИНТЕРИОРЕН ДИЗАЙН

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Докладът представя "Магията на котленските килими", като част от обучението по интериорен дизайн в Нов български университет. В учебния процес са застъпени теми, кореспондиращи с устойчивите принципи за запазване на местните традиции, занаяти, етническа, културна, религиозна идентичност и развитие на дизайна в този контекст. Пътуващ семинар, дава възможност на студентите да се потопят в автентичната атмосфера, да обогатят своите познания и култура, свързани с българската традиционна архитектура, бит и занаяти. Беседи, демонстрации и практически занимания разкриват магията на обработката на вълната, багрено, символиката, цветосъчетаването, композиционните принципи, техниките на тъкане. На базата на придобитите познания и умения студентите разработват проекти за възможности за приложение на котленските килими и характерни за тях мотиви в съвременния интериорен дизайн.

KOTEL CARPETS ELEMENT OF INTERIOR DESIGN TRAINING

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The report presents "The magic of the Kotel carpets" as part of the interior design training at New Bulgarian University. The course covers topics that are consistent with the sustainable principles of preserving local traditions, crafts as well as ethnic, cultural and religious identity corresponding with design development in the same context. Traveling seminar gives the students the opportunity to immerse themselves in the authentic atmosphere and to enrich their knowledge and culture, related to Bulgarian traditional architecture, lifestyle and crafts. Disquisitions, demonstrations, and hands-on activities reveal the magic of wool threatening process, dyeing, symbolism, color combining, composition principles and weaving techniques. Using the acquired knowledge and skills, the students develop projects and discover the variety of possibilities for applying the Kotel carpets and their specific motifs in the contemporary interior design.

THINK GREEN. CREATE PATCHWORK

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Living in a consuming society, we do not often value the real things.

We want more and more forgetting about the shortage in the world and global crisis.

We leave tons of clothes after us. Fast fashion has increased the amount of waste coming from the fashion industry.

Cotton, wool, linen, polyester, satin, velvet, corduroy, denim.

These fabrics are perfect material to create something new and useful

Shirts, dresses, curtains, and bandanas even man ties are great for creating patchwork.

Although Bulgaria has rich textile traditions, patchwork and quilting are not popular.

Last several years the situation has changed. There was held some contests and many people want to learn basic skills.

I am interested in modern and contemporary quilts, designing of quilts and teaching.



Keywords: textile art, fabric, patchwork, quilt, recycling.

UDC687

HOW TECHNOLOGIES CHANGE DESIGN?

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Introduction

The article introduces the concept of responsive design or how new technologies have changed web design. Almost every new customer these days wants not only desktop version of your website, but also a mobile version for your tablet and phone. Except it is important for design to maintain a variety of compatible solutions for playback for different technologies, different resolutions and all screen resolutions must be compatible. Technology must be intuitive to use by customers of all ages.

Research

To illustrate the responsive design, a guest house site was re-designed to show how new technologies are influencing and changing the current UI design. To achieve this goal, the Adobe XD software product was selected, through which the following tasks were set and performed: development of low-fi prototype, hi-fi prototype, responsive design.

Results

As a result of the research, a responsive design of the site selected by the team was achieved.

Responsive design is fully compliant with current design trends involving the placement of elements with respect to Grid technology (12 parts / desktop colonization, 8 tablet colonization, 4 mobile colonization).

Hi-fi prototype is made according to the capabilities of the Adobe XD software free version. An interactive presentation of the site selected by the team is a guest house "Old Macedonia" realized in the closest final construction presented in terms of details and functionality.

Conclusion

In conclusion, anyone interested can check out the Hi-flickableprototypesharinglink provided by the team:

<https://xd.adobe.com/view/18210685-3d66-441b-6293-da6d0cb731eb-6e10/>

Keywords: UI design, UI design change, affecting design



VISUAL PRESENTATION OF THE OVERCONSUMPTION

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The overconsumption is seen as one of the main problems of our time. Lately more and more information about the environmental impact of the fashion industry is accessible for the ordinary customer. According to me, here comes the question if this knowledge are enough. Is it possible to reconsider your buying habits after reading some articles? Maybe. Or maybe it is not that simple after all.

I have seen my diploma collection project as a chance to present this problem using visual language which can have stronger impact in one person's eyes. The strategy was to show the overuse and it's alternative. The outerwear is representing the heaviness of the overconsumption. It appears to be curious in order to call attention, but at the same time it is also heavy and not really comfortable. The bizarre details make the viewer pay attention to the whole picture. On the other side, the rest of the clothes remain lighter, simpler, comfortable and a 100% wearable.

I used three main techniques in the development of the fabrics and clothes. Because in the sublimation printing the image appeared as clear as the source, it was the perfect printing method for me to present a clear visual images. I developed some prints using nature as a source of inspiration. The custom prints represent images of water, the Great barrier reef, insects, marigolds, ducks, etc. I also worked on making a three -dimensional ducks. For them I created a print and a patter, sewed the parts and stuffed them with some wadding. Another grip which I incorporated in my collection was the upcycling of old clothing and textiles with which I was able to present the accumulation and its heaviness. Using old clothes helped me to reduce the need of buying new materials for that purpose and to show what a pity is that clothing of high-quality, which could last many more years, ends up in the trash too soon. In the collection there is also a zero-waste moment. It was made using hand-knitted ribbons which were assembled together with some transparent vinyl strips and hand-stitching. This technique was promising as it has no unnecessary material left out after the garment is done. After creating this knitted top I saw the potential in the development of a clothing construction technique based on ribbons. And my aim now is to develop a system for my next collection to become zero-waste.



The end result of this whole process is a collection that have some wearable fashion items, but at the same time it needs to be seen as a statement. It has strong visual language which communicate easily with the audience.

Being informed about the problem and realizing it is a big step forward it's solution. More and more fashion designers take part in reducing their work's ecological footprint. Now we need more aware customers who will shop smart. And then it will be a matter of time all the 'green' methods of textile and clothing creation to really enter in the big fashion industry. And some day maybe we will have no more clothes than we actually need. That is the story which my collection was created to tell.

Keywords: overconsumption, sublimation printing, up-cycling, zero-waste

UDC687

CULTURE LAYERS PURITY KAYA DESIGN BRAND

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Being a student in the Fashion programme of New Bulgarian University inspired my imagination and willing to aim to become fashion designer and formed the idea of a brand that I wanted to start one day. So the idea of that brand became my the main inspiration for creating my Bachelor Diploma Portfolio and the collection behind it.

Brand Idea and Brand Name

The brand name comes from Hawaii - kaya means rich, plentiful. The fashion brand draws inspiration from the abundance and richness of everything around us and the environment, presenting a colourful palette of emotions and experience, refracted through the prism of different cultures and currents in the arts.

Inspiration

The brand draws inspiration from the nature, beautiful colours and shapes, innovative methods for achieving non-standard style of fabrics and clothing design, influenced by the legendary classics in art and fashion. The inspiration for the Culture Layers Purity collection comes from the diverse layers of society that shape cultural features. Their differences are expressed through the combination of materials, fabrics and structure, achieving symbiosis. The colour theme is inspired by the water surface under the moonlight, the contrast of light pink and white with dark grey, blue and black - another interpretation of the combination of the different in synchronical movement. The main ideas of the collection are inspired by the designs of the legendary architect Tadao Ando, transparency as a key element of his art and advanced design decisions.

The inspiration for the Culture Layers Purity collection comes from the diverse representations of cultural differences, combined in perfect symbiosis. Expressed through the combination of different fabrics and structures - metallic shine in the details, transparency of the fabrics and layering that looks like a 3D texture, wool fabrics in the colour theme.

The architecture of his works follows the trends of modernism, the simplicity of forms and the complexity of structures through the accumulation of transparency in the elements. Vinyl is applied as an innovative material, in parts and details of the clothes - it gives the idea of minimalism and modernism at once.

The brand is coming out under the name Kaya Design and is addressed to modern women, who work a lot for achieving their dreams and who pay special attention to their outfits and looks. Kaya Design aims to create beautiful, inspired from nature designs, with unusual construction, premium quality of fabrics and with attention to details. The brand is working on experimental and couture fashion designs.

FASHION BRAND BUILDING AS AN INDEPENDENT INSTITUTION

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In the 21st century, fashion brands were fundamental socio-cultural objects of behavior, vision and lifestyle in the mass society. The fashion industry is a phenomenon that is turning into an artistic craft and is one of the leading economic sectors. This industry, as a part of the arts is extremely necessary to carry messages and enrich society not only in material and pragmatic but also in a spiritual and intellectual aspect. Therefore, ethically speaking it is appropriate for every brand to have a mission with creative messages, so that it does not qualify as a "balloon full of air" but rather represent a world full of intentions and messages. The successful fashion brands outside the escalating fast fashion industry there are inevitably series of sociological starting points presenting and distributing to the public.

This article aims to present a business strategy for the concept of building a fashion brand as an independent institution.

A fashion brand can become an institution as long as it is built and organized properly, with strict discipline and a purposeful business plan.

The institution as such is a community that sets the rules for its policies and perceptions, imposes a way of perceiving and organizing the world around it. By creating a fashion brand as an independent institution, the artist behind it will have the opportunity to realize his work without complying with other dogmas, rules and restrictions.

By building an individual and autonomous process of creation, distribution and sales, a fashion brand has the great potential to be independent of the politics and psychology of external institutions, which can hinder its development even if it ceases to exist.



Keywords: brand building, ethic, business, sustainability, institution

"GARDEN OF EDEN" XIX ETN CONFERENCE AND ACCOMPANYING EXHIBITIONS, HASLACH, AUSTRIA (SHORT REVIEW)

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In this report I will give a short review of the topics and problems, discussed in some of the presentations at the XIX ETN conference, held at the end of July 2019 in Haslach, Austria, which I took part in as an ETN member.

The authors of the presentations in question will also be discussed.

The report will also present some of the accompanying exhibitions, such as:

- An international group exhibition, titled "Garden of Eden", after the main theme of the conference itself, displayed at the Neuhaus Palace, located on the banks of the Danube river. 90 works by authors from 34 countries were presented. The exhibition opens up a broad overview of current trends in contemporary textile art, ranging from well-established names to very young authors participating for the first time in an exhibition of this magnitude.

- "Before Cotton" - Japanese textiles from the Kei Gallery Collection, Kyoto, exhibited in the old tower of Haslach Church.

- "Where flowers bloom" - solo exhibition of Tanja Boukal at the "Heimart" Gallery in Neufelden.

The aim of the report is to acquaint anyone interested with the problems, topics, trends and perspectives in the field of textile art now, presented at the conference by authors from all over the world.

Keywords: "Garden of Eden", XIX ETN conference, Haslach, Austria.



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THE RISE OF KOREA'S FASHION INDUSTRY

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The idea for my collection comes from the K-pop (Korean hip hop, rap, pop) craze that is gaining popularity all over the world, along with the well-known American rap and R&B sound. The influence of the k-pop music has spread amongst the Korean culture and has impacted the music in Western Europe and America.

"So the first question always is: Why is Korean fashion the future of Asian fashion?" "The first point is the sheer number of designers and brands launching in Korea right now. The country has the infrastructure to support any number of brands - a large, young population; factories and fabric mills; good business practices; an in-built celebrity culture; fast internet; English and Chinese speaking employees ... combine these points with strong traditional fabric and costume practices (people regularly wear traditional clothing), strong education and training practices and you have the perfect incubator for a burgeoning fashion industry." "Choosing Hallyu Wave from international business perspective as the main topic of this writing was due to its increasing importance in music industry and its growing influence in South Korean government policies. Hallyu Wave is also known as "Korean Wave". It refers to the sudden increase in popularity of South Korean culture around the world in the last ten years, largely due to the Korean entertainment industry and the popularity of K-drama and K-pop."

"As the Hallyu wave expands, there are a lot of researches regarding this phenomenon from various fields of study, such as business, finance, cultural studies, tourism, etc. Previous studies regarding Hallyu Wave also varied from Korean pop music Korean drama Korean products generally analyzed the history of Korean music and the Korean culture embedded-ness in Korean pop music which has become one of the main tools in expanding Hallyu Wave."

"On top of all this, the Korean government has highlighted fashion and art as the next "soft power" to be exported alongside K-Pop and K-Dramas around the world. For example: The Seoul Municipal Government actually pays for the bulk of Seoul Fashion Week. This means that emerging fashion brands can afford to show their collections in the same space, with the same top models, show producers, lighting, sound and access to international press and buyers as those brands that have been around for 20+ years and are worth millions, if not billions, of dollars."

"Fashion is an industry. It's not an art. It's a part of a country's economy. The Korean government has recognised this and, naturally enough, realised that an investment in young designers will eventually lead to more money in their coffers. So, infrastructure and governmental support are perhaps the strongest reasons why Korean fashion is powering along right now."

Keywords: fashion, k-pop, music, popularity, designers

FEMMAGE

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Introduction

The exhibition is a curatorial project of Assoc. Prof. PhD. A. Popnedeleva, who collects works by young female artists who are at the beginning of their creative journey. Some graduated with a bachelor's or master's degree from the National Academy of Fine Arts, Sofia a year ago, others are facing diploma defense.

The main medium in the exhibition is embroidery, which is used differently in different works. Embroidery is considered a completely feminine activity, making it a powerful feminist tool.

The term femmage is derived from the combination of the words female and collage and was introduced by Miriam Shapiro. Shapiro defines "feminine" term for applique, sewing, embroidery, which in "high" art corresponds to "collage."

Miriam Shapiro is associated with the Pattern and Decoration movement, created in the United States in the 1970s as a form of "low" art, of which Western "high" art, with its claims to spiritual and moral content, seeks to separate.

Decoration and ornamentation are defined as "feminine" in the Western tradition.

As the art of the twentieth century became more and more abstract, this dichotomous hierarchy between "low" and "high" art, between fine and applied, between meaningful and decorative, is increasingly difficult to maintain. Sexist and racist is the insistence on the superiority of the tradition of "high" Western art over "low" and non-Western forms of visual expression.

Movement in its political and feminist context is directed against the economic and cultural control of the elite commercial system.

Displayed works prove that artificial division public / private, home crafts / "high" art can be overcome.

Keywords: young female artists, embroidery, feminist tool, femmage, "low" and "high" art



UDC745/749

SALT OF LIFE

Presenting Dilyana CHOLAKOVA

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"Salt of Life" is a conceptual fashion project, which explores the global problem of water pollution with plastics. Based on a recent Greenpeace and National Geographic research, which says that there are found microplastics in the sea salt, I built my concept around this problem and the effect on salt extraction, the environment and all of us.

The coexistence of over 300 protected bird species and the manual extraction of the second in cleanness sea salt in the world inspired me to represent this symbiosis in 7 conceptual outfits. The aim of the research is to make popular and appeal for preserving this region, which is protected but threatened...



Developing a strong concept begins with an in-depth research of the region. The creative process includes lots of drawings, logo project, different print designs, experiments with different materials, draping and sculpturing the cloth in order to find the shapes and a lot of handwork.

The silhouettes of the clothes are inspired by the forms of the birds in Lake Atanasovsko. Stylizing the shapes, I created a series of abstract drawings in black and white. Part of them can be seen printed on textile in 3 of the outfits. The colours of the collection also reflects different aspects of the life in this region. Another experimental textile is the one with silicone drops over organza. This textile can be seen mostly on the head accessories with conceptual slogans, referring to more responsibility and awareness.

Keywords: salt, plastics, awareness, future, biodiversity

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CAD-CAM SYSTEMS IN DESIGN OF LEATHER PRODUCTS

Darina ZHELEVA, Margarita KOLEVA

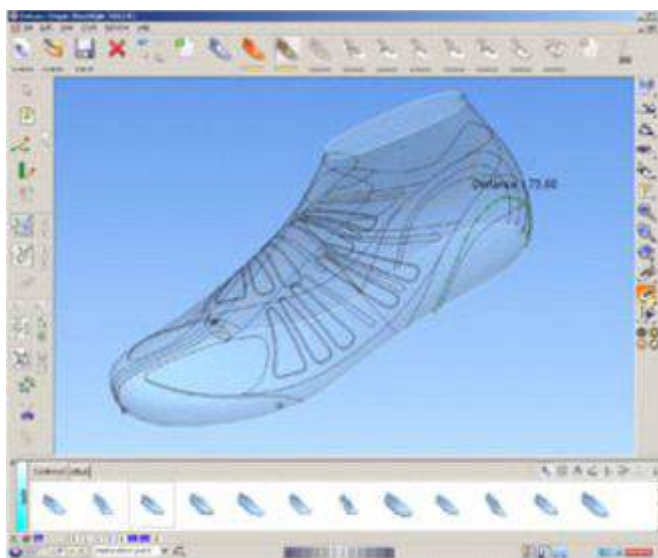
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The footwear manufacturing has gone from craft production to industrial with the introduction of machinery. Every product that is manufactured industrially requires the creation of a model sketch, drawing or sample. The development of patterns for leather products has been around since ancient times. With the advancement of science and technology in recent decades, the craftsmanship methods for the development of models that require great skill and years of practice are being replaced by machine design. Automated systems make it possible to work not only with physical models but also with their images. These systems are more productive, faster and increase the quality of the models made with them.

The main part of the details of footwear and haberdashery are made of sheet materials. The spatial shape is obtained in the production process, in which both the sizes and shape of the details and lines are changed. When designing these products, it is special that they do not develop the structural sizes and shapes of the details that they have in the finished products, but the technological ones.

With the development of electronic computing technology, a fundamental breakthrough in the approach and methods for model development has taken place. In the late 1970s and early 1980s CAD systems were introduced in footwear technology. CAD systems companies are developing different options with different functionalities to meet market demand. A CAD system cannot operate at full capacity without specialists. The specialists should be familiar with materials, machinery, technology, i.e. with the production itself, as well as with the software systems.

The purpose of this study is to trace the entire process from patterns creation, design with CAD-CAM systems to the final product.



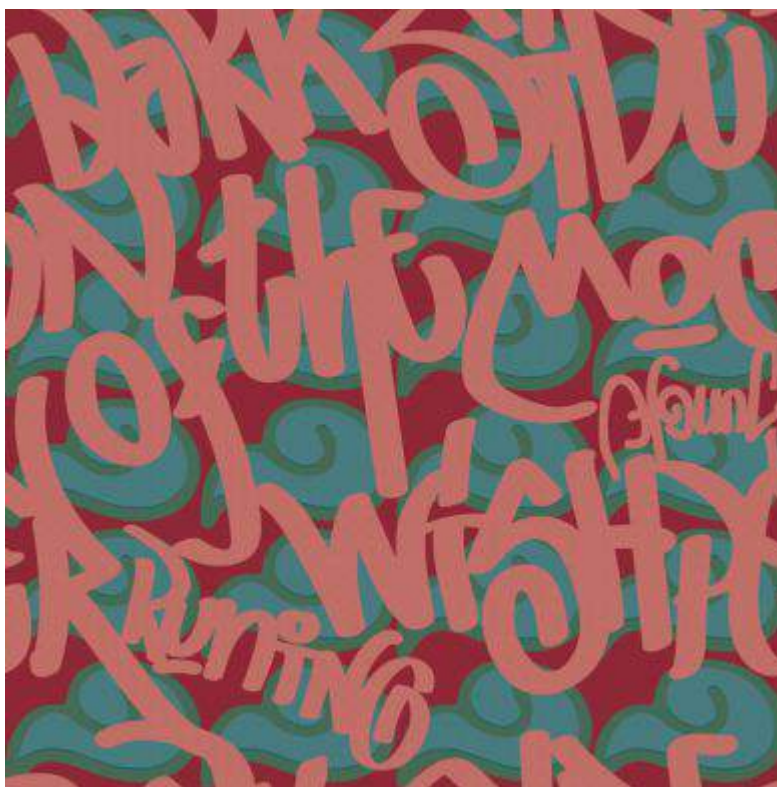
Keywords: footwear technology, design, CAD-CAM systems

ТОУ-БУКВИ TOY-LETTERS

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My diploma works is right for clothing and accessories (shoes) on the theme street art-"TOY-LETTERS". The idea comes from the letters painted on the wall of the city (street art), which I have been practicing for the last 5 years or more, so I decide to visualize designs with this theme. The designs presented are graffiti-style, horizontally and vertically arranged, repeated in report. The works are presented on paper and cloth, textile samples of the designs and computer visualizations.



Key words: street art, graffiti, letters

МОДНА КОЛЕКЦИЯ ТРОПИК FASHION COLLECTION TROPIC

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Inspired by the lush tropical flora, fauna and the diversity of life, both in the jungle and in the underwater world, I was inspired to create a Tropic Collection to present the tropical life through artistic patterns for clothing. Through vivid and vibrant colors, I present exotic images from the depths, warm shallow reefs from the savannas to the dense evergreen flora where beautiful orchids grow on tree trunks, where monkeys, rodents, birds and insects find there home. The patterns are presented as an end product of a design - namely casual and formal ladies' dresses, clothing, swimwear and beach accessories for men, women and children. The collection contains patterns that can be printed on different types of fabrics and various modern print technologies.



Key words: exotic, tropical, nature

UDC745/749

THE ART OF BEING PATTERNMAKER

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As a university patternmaker lecturer I often have to answer my students' questions, the most frequent being: "Which is the best patternmaking system?", "Which is the best CAD system, and finally "Why do I have to know all this?". My answer to the first two questions is that there is no such thing as "the best system". Pattern making is only a part of the process of making clothes. It comprises the designer's idea about the shape and achieving the desired fitting in to the body. Patternmaking is considered good when clothes fit the body well, complies with individual shape, size and proportions, provides comfort in movement, does not make unwanted pleats, and corresponds with the designer's idea. This is the meaning of transforming a creative idea into a shape. It is not enough to memorize a certain number of formulas and rules to fulfil a task like that. To create a good patternmaking requires a lot of knowledge, experience and creative thinking. What is challenging in contemporary fashion training is minimizing the gap between the design and the patternmaking, and perceiving the patternmaking process as an exciting part of the design process.

In historical perspective the concept, as well as the requirements and expectations of "patternmaker" have changed and evolved.

The first clothes human beings began to wear were the animal skins, roughly sewn together to cover the body. The starting point for making that type of clothing became the flat piece of material whose purpose was to enfold a three-dimensional figure, the figure of the human body.

With the appearance and development of spinning and weaving, different textiles came into being. In the medieval world the pieces of textile were directly draped over the body, attached and supported with girdles, decorative brooches or clips (buckles, clasps). The first clothes which were cut so that they fitted the body and limbs by means of sleeves and trouser legs appeared in the time of the Minoan civilization. It was at that time the art of patternmaking took its rise.

The old French word *tailleur* is derived from *taille*, which means dividing, cutting. The French Technology dictionary from 1832 gives the following definition: "Tailleur d'habits. This is a person who cuts and sews clothes. There are only a few tools that they use: scissors, needles, threads, silk, leather...".

In the "Description of all kinds of craft" from 1747 it is pointed out that for the tailors the part that requires the best skills and abilities is cutting, because it is on cutting that the shape and fitting it to the body depend, and cutting and fitting are the main factors for the comfort and pleasure of wearing the clothes, as well as for attracting the customers.

What follows is Michael Tierny's contemporary interpretation of patternmaker's work: "Without a creative patternmaker the design simply does not work... It is like being in a relationship - if both factors are not available, creativity does not exist. Patternmaker and designer are equally essential."

This abstract deals with the role of the patternmaker, as well as with some of the difficulties or the requirements they face while working in a team to make clothes.

Keywords: clothes, design, patternmaking, manufacture.

PRETTY THINGS OUTSIDE

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With the help of technology people are able to create new social realities for the individual and society. The question begs, what kind of social reality have we created and are continuing to perpetuate? Is it one that strengthens our relationships and helps us to be more socially adept? Or is it one that makes us insecure and ultimately, divides us? We are at a point in history where we need to pause, examine and place serious thought regarding these new social realities and what these realities mean for society as well as for each of us as citizens and human beings.

The use of social networking sites has both positive and negative consequences. We can gain an understanding of other cultures, meet people from all over the world, maintain and strengthen familial relationships, and help people to become more socially integrated. However, it appears that internet addiction and narcissism are real problems. Rather than use these sites to develop meaningful relationships, people are using them to display their popularity to the world. Through technology, people are involved in a countless number of relationships, but oftentimes the quality of these numerous associations leaves people feeling empty. Despite the many conveniences of feeling constantly connected, according to Muhammad Sarwar (2013), the rising epidemic of addiction to smartphones is impacting social and family life and creating friction in our lives.

My collection, "pretty things outside", contemplates the transformation and fragility of humanity in relation to the might of technology. It is a reflection of the current state of the society we live in: an emotionally hollow society which assigns value to people the same way it attributes value to products. Materials such as silver neoprene, satin, lace and faux leather represent the materials used in packaging. The words "fragile" are written on a large dusty pink ribbon on a dress alluding to the hollowness that is perpetuated in modern society. Layering occurs in many of the garments in the same way a new product is packaged, bought and then opened. A military inspired lace blazer relates to the subtle power exercised by corporations over people. A spider brooch alludes to the web that we as a society have spun. The contrast of femininity and fragility vs strength and power is expressed in the colors (black and pink) and shapes of the garments (angles and curves, combination of pants and skirts). The woman in this collection is both an object to be admired (puffy, oversized sleeves; off-the shoulder sleeves; ribbons) as well as a vessel of brutality (via utilitarian details such as pockets, belt).



UDC745/749

Technology has had a profound impact on what it means to be social and we are at a tipping point; is society at the brink of a social revolution? How long can we go on pretending to be a perfect version of ourselves? A flat one dimensional hologram on a screen, like the most enthralling packaging you have ever seen on the store shelf. Is this what connects us and makes us human? The commodification of our experiences, sharing online every happy moment with family and friends. Or is it something more? Perhaps our ability to empathize with one another; to see past the digital façade that hides how truly lost we all are in our own and universal ways: lost to greed, lost to jealousy, lost for words, lost in ourselves. People have become willing participants in a transaction, trading their personal secrets for the benefit of companies - oblivious to the fact this information is in turn used to extract more money and data from them. We are as much addicted and dependent on this system as the system is dependent on us. Fashion is a reflection of our times and many other designers in the past year have also dedicated their collections to spreading the message of purification and self-discovery in these wake of these troubling times. In fact artists from all fields are making a statement about our carefully curated online personas and how we perceive ourselves and others.

At the end of the day it is about choices. We have the choice to decide what kind of future we want: a future where no decision is our own and we feel unfulfilled and empty, or a future where we take ownership of our state of being and feel complete. The silver lining in this modern predicament is our unique human ability to look back on our past, to reflect, and to disconnect from that which harms us.

Keywords: technology, fragility, packaging, society

LEARNING AND CREATIVE ASPECTS OF DRAWING AS A STAGE OF DESIGN OF CLOTHING

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Abstract

1. Introduction

Drawing is an important, initial stage in the design and in general of the creation of clothing. You can say it is the most creative, the most essential. Drawing is the basis of all the arts associated with a vision. It express imaginative thinking in its purest form. Depending on the specific task and the area it serves, it may be different in nature.

Mastering and drawing the human figure is one of the difficult problems that must be solved when designing a clothing project. Its interpretation in this process has specific peculiarities and problems for solving in a purely creative and educational way.

Understanding the problems, opportunities and specific features in the construction of a clothing project is an important condition for successful creative development in a given field.

2. Experimental part

This study addresses the theoretical and practical problems associated with the creation of clothing projects, which are relevant not only to creative problems, but also to teaching, related to the understanding of the peculiarities and mastery of the necessary knowledge, skills, procedures, techniques, materials.

The different disciplines involved in the artistic construction of the project contribute differently to this. Better alignment between them is necessary for the common purpose.

3. Results and a Discussion

The specificities in the academic drawing and artistic execution of clothing projects, the tasks they solve, and issues related to their practical application and mastery are analyzed. Specific and more common problems related to successful creative and teaching practice in this field are indicated.

4. Conclusion

Thinking about and applying the problems involved can contribute to the more effective training and creative realization of students studying specialties related to fashion design and the design of clothing in general.

Keywords: drawing, fashion, clothing design, human figure.

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ЮГОЗАПАДЕН
УНИВЕРСИТЕТ
·НЕОФИТ РИЛСКИ·



Topic № 5

TEXTILE MACHINERY AND EQUIPMENT



Topic № 6

TEXTILE MANAGEMENT, MARKETING AND SUSTAINABILITY



RESEARCH ON THE ORGANIZATION OF PRODUCTION OF HEADRESTS FOR THE MERCEDES BENZ E CLASS

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Introduction

Grammer AD, situated in Trudovets, is part of the German company Grammer and is specialized in the production of seats and headrests, as well as covers for them. It executes orders for brands such as Mercedes Benz, Toyota, BMW and other leading automotive producers. As part of a German company, the issues of quality and production organization are among the top priorities and have been raised on a scientific basis. The company has its own production system, which is based on Toyota Production System (TPS). Its goals are: to provide world class quality and service to the customer; to develop each employee's potential, based on mutual respect, trust and cooperation; to reduce cost through the elimination of waste and maximize profit; to develop flexible production standards based on market demand.

The presented research is focused on the organizational aspects in the production of headrests for the Mercedes Benz E Class.

Experimental part

The study includes:

- description of the sequence of technological operations required for production of 5 types of headrests for the different seats made of leather or leather and textiles;
- stopwatch measurement of the operation times and comparing them with the set standard time;
- determination of the production line tacts (for each type of headrest);
- grouping of the technological operations into organizational ones;
- drawing of a synchronous schedule;
- deployment of the work places;
- development of workflow diagrams for each work place;
- development of cycle diagrams.

Results

An organization of the production line has been proposed, which guarantees synchronous operation and the shortest possible production cycle. The necessary documents for implementing and controlling the production activities have also been developed.

Discussion

To increase productivity requires the introduction and application of an effective production system. For this purpose, each individual element of the system must be optimized.

Conclusion

Technological calculations have been made and an organizational solution for the production of headrests for the Mercedes Benz E Class proposed. Special emphasis is given to the analysis of time consumption as a major factor in increasing productivity.

Keywords: Production system, organization, automotive industry, headrests



THE POTENTIAL OF LABOUR IN INDUSTRY 4.0

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Introduction This study is researching the impact of the automation measures in different textile production tiers on the workers motivation and productivity. It reviews the lessons learned from the Textile Learning Factory 4.0 (Kisters a. o., 2017) at the Institute for textile technology at the RWTH in Aachen, Germany and ManuTech4 (Gloy, 2016); some consultancy studies about the factory of the future in trends in the textile sector (KPMG, Mc Kinsey, Boston Consulting Group, Apparel Resources, RINA, a. o.) and publications at RWTH Aachen and some conferences about upgrading in manufacturing (Zhen Chen, a. o. 2015, Gries, 2019).

The aim of the research is to show that the effect of the Industry 4.0 can be positive only if workers acceptance is assured.

Experimental part The researcher used workers survey, interview with management and academia and case studies on the effects of the introduction of new systems in garmenting and a complete production process and intended movement of production sites back to Western Europe (Germany, UK) withdrawing job opportunities from Asia, Eastern Europe and China. Creation of new jobs within the same factory or neighbor industries was evaluated based on statistic data, survey and desk research data. The case studies also showed reluctance and even boycott and damage tendencies in the workforce to the new technics. The advantage of the cyber-physic systems (CPS) and the Internet of Things (IoT) for technology, quality and costs points of view was weighted against the social footprint of the technologies and the social stress levels.

Results In the case of automats and cyber-physic systems (CPS) was shown that experienced and especially older not IT affine workers showed concerns against, as they faced difficulties to get acquainted easily with the systems and lost their productivity incentives. Unskilled workers saw in the technology possibility to do difficult operations where they were not having access to in the previous work flow, as they required level of skills. But the new technology currently does not offer a system of awarding higher productivity of workers. There is also an effect of monotony and even fatigue as physical breaks between operations are less. It needs further research of accident rates in such settings and how far the cyber-physic systems are able to protect workers from accidents compared to the traditional work places. The example in automotive in China where the failure effect was multiplied by not sufficient control out of the programming showed also potential of costs increase instead of saving. There are also some limits in recognition of failures of the detectors based on variety (see example of face recognition systems in Germany and UK building up people controllers again next to the machines), which is worth to be considered in further conclusions of the combination of man power and robots.

In the concept of smart factory where single line produces single products a clear correlation with opening of new job opportunities (example in India) was seen.

Conclusion The research showed that workers satisfaction depends on the level of education of workers in the need of the new technology and on the introduction of new incentives replacing the ones for productivity and the overtime premium rates, considering still the profitability of the businesses and the investment and maintenance burden of the automats. Also a new paradigm of work-life balance and decent living standards for workers is necessary and needs broader consideration in Industry 4.0.

Keywords: workers motivation and productivity, Cyber-physic system (CPS) and Internet of things (IoT), smart factory

ИНОВИРАНЕ НА МОДНАТА ИНДУСТРИЯ ЧРЕЗ ТЕХНОЛОГИИ И ДИЗАЙН

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Резюме

Свидетели сме на всеобщ преход на индустрии и общества към различни парадигми провокирани от цифровите технологии. Извършва се цифрова революция и се реализира Индустрия 4.0. Модната индустрия също се трансформира, създават се нови бизнес модели, начини на производство и потребление. Модата е еко и социална, а технологиите определят устойчивото и бъдеще. Целта на статията е разкриване на основните промени в глобалната модна индустрия породени от технологичното развитие. Изведени са конкретни направления в иновационното развитие на индустрията. Разкрива се новото съдържание и специфика на дизайна във всички етапи на логистичната верига.

Ключови думи: модна индустрия, иновации, технологии, дизайн

INNOVATING FASHION INDUSTRY THROUGH TECHNOLOGY AND DESIGN

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Abstract

We are witnessing a universal transition of industries and societies of different paradigms provoked by digital technologies. The digital revolution is underway and Industry 4.0 is upon us. The fashion industry is also subject to external and internal forces. The phenomenon of printed clothing, self-cleaning textiles, augmented or virtual reality and wearable technologies together and individually have the potential to change the world of fashion forever. The evolution of clothing leads to an interactive connection with the man. Many companies added value to their products and deliver it to their new customers. This solidifies new brands that are flexible and up-to-date, evolve with technology and capture their consumers mood.

The main development priorities can be developed into two directions: Business development with a focus on leadership and pioneering; Industrial development with a focus on manufacturing / textile and creative industries /. Development trends can be identified as specific, global and market.

Over the years, fashion and innovation have often clashed, becoming closer and more cooperative in their attempts to test their limits, guaranteeing better products or systems. From design to retail, from product to communication, fashion and technology are interconnected and the transition from craft to industrial production, from analogue to digital content, innovative development improves the stages and makes them faster and more efficient.

The fashion industry is ever transforming, new business models are created, as well as new ways of production and consumption. Regardless of whether fashion is eco and/or social, whether it is retail or high fashion, technologies determine its sustainable future. Technology and design identify trends that can be defined as:

- Global as a result of major changes in society and technology that are modernizing everyday life and have a significant impact on the fashion world.*
- Specific in terms of process efficiency and innovative potential.*
- Markets that determine competitive advantage, which in turn is achieved through innovation.*

Design is constantly gaining importance in the development of products to meet different requirements, in the production of high quality goods and in maintaining the increasing market share. All these factors have become key elements of economic and social development.

The purpose of the article is to uncover the major changes in the global fashion industry caused by the technological developments. Key directions in the innovative development of the industry are outlined. New content and design specifics are revealed in all stages of the logistics chain.

Keywords: *fashion industry, innovation, technology, design.*

Topic № 7

INNOVATIONS

IN TEXTILE EDUCATION



ЮГОЗАПАДЕН
УНИВЕРСИТЕТ
· НЕОФИТ РИЛСКИ ·

MODERN LEARNING ENVIRONMENT FOR THE TEXTILE AND CLOTHING STUDENTS AT ITM, TU DRESDEN

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Technische Universität Dresden (TU Dresden) dates back to 1828 when the 'Saxon Technical School' was established in Dresden, and is one of the eleven German Universities distinguished as an "Excellence University". The Institute of Textile Machinery and High Performance Materials Technology (ITM) at TU Dresden is one of the leading educational and research institutes in the world focusing mainly on the world's leading textile machinery manufacturers in Germany and the processing of textile high performance materials for technical applications.

Technical Textiles are ubiquitous, and Germany is the global leader for their production. Engineers working in the textile industries not only design fashionable textiles for clothes brands, but high-tech products with a focus on functionality. Their work is often invisible, but all the more important from a technical perspective. The applications are diverse, ranging from fiber composite materials and medical textiles to textile architecture and membrane constructions. Textile machines manufacturing functional and high performance textiles are high-tech mechatronic devices, able to control large set of process parameters and to perform complex programmed sequences. Their scale may vary, such as for micro machines for assembling of medical devices to very large, several dozens of meters machines for producing textiles for architecture, agriculture and other applications. In large scale manufacturing, different process stages are connected in series for seamless process flow.

Therefore, another important aspect of the work at ITM is to provide industry-related education programs. The main teaching task of the ITM is the preparation of the future specialists for the textile and clothing industry, covering all levels - traditional in Germany Dipl.-Ing, Masters, and doctorate studies. The ITM provides excellent facilities for performing the fundamental research as well as research projects with industrial partners. The interdisciplinary collaboration with national and international versatile research institutes as well as industrial partners helps to transfer the research results into applied outcomes. ITM provides its student excellent opportunity for training and education in an unmatched interdisciplinary study environment, with possibilities to specialize in mechanical engineering, assembly technology, material modelling, smart textiles, sports and functional textiles, protective clothing, lightweight construction, measuring and sensing technology, machine development or bio-medical technology and many more. There are nearly 100 research associates working in ITM in various research groups. These research groups work independently as well as work together for interdisciplinary research on pure fundamental research as well as on industry driven applied projects.

For students with an undergraduate degree, the ITM offers a four-semester graduate Master program in Textile and Clothing Technology. Students with their bachelors or higher degrees in textile engineering, mechanical engineering, chemical engineering or industrial engineering are eligible for this study. Successful participants are awarded a Master of Science degree. The interdisciplinary study opportunities for students from other disciplines of TU Dresden as well as other universities within the framework of general studies, special lectures, seminars, assignments, graduate or master thesis, as well as exchange of students on ERASMUS + or E-team programs are also carried out. Fully funded scholarships are offered by the German Academic Exchange Service (DAAD) for the applicants from

developing countries for the study in the Master course Textile and Ready-made Clothing Technology at ITM.

This paper will give an overview of the modern teaching methods with application of CAD systems, modern e-learning platforms and practical use of the textile and sewing machines, applied during the master course.

Keywords: TU Dresden, ITM, Textile and Clothing, study, research

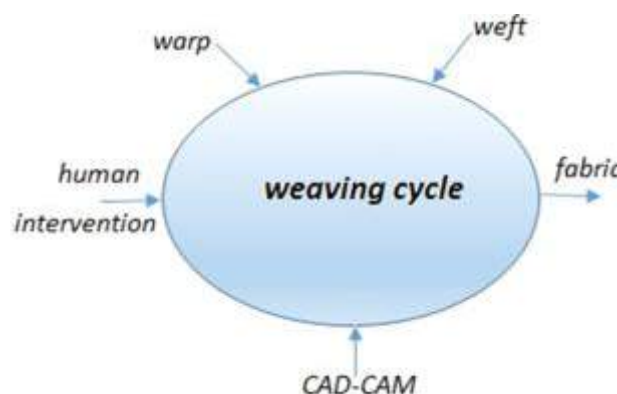
ANTHROPOGENIC INNOVATION IN VOCATIONAL TRAINING ON WEAVING TECHNIQUES

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Everywhere in the modern world, education and training in the field of textiles and clothing are meeting with unspoken public resistance. The visible part of this negative attitude is the low willingness of young people to pursue these professions and the corresponding small number of students in vocational schools, colleges and universities. This issue is of enormous scope and affects almost every direction in the life of the modern man. Weaving technique as a craft is a typical example in this regard. The peculiarity of the weaving most shortly and clearly is reflecting in the generally accepted definition of fabric: the mutual perpendicular intersection of two systems of threads - the warp and the weft. This entails two basic concepts - threads motions and the weaving cycle. The warp threads make two movements: vertically when the weaving mouth is formed and horizontally when the warp is unwinding and the fabric is winding. The wefts also make two horizontal movements: transversal to the warp when the weft is woven into the weaving mouth and longitudinally to the warp when the weft is inserted at the end of the fabric. The weaving cycle unites the disjointed movements of the working bodies that control the warp and weft threads. One cycle involves the weaving of one weft of fabric. Human involvement in weaving goes in two directions: physical intervention and observation. The intersection of the warp threads and wefts was originally carried out entirely and solely with the help of the limbs of the human body. Even so far, some civilization reserves have shown primordial weaving techniques. Human involvement in the weaving cycle is limited in the formation of the weaving mouth, the passage and the weaving of the weft. The observation applies the basic senses such as sight and touch. Visual control maintains the correctness of the weave, and the groove maintains the tension of the warp threads and the uniformity of the fabric. Compulsory human intervention is reducing to three movements: formation of the weaving mouth, insertion and beating the weft. An independent operator can maintain all other parameters of the weaving cycle. From this point of view, the functions and service of the modern hand loom focus on the possibility of direct human involvement in the weaving cycle. Other functions, such as heddle frame alignment, warp tension, and even regularly pulling of the fabric, are assigned to a parallel automatic control system. The wooden structure of the handloom implies the initial origin of the weaving and creates the necessary cosiness to focus on the meaning of the intersection. The industrial nature and cost-effectiveness of weaving as a technology remain secondary. The weaver focuses on the creative conception of the intersection and the artistic combination between the weaving threads. The combined action of a handloom and the computer management of secondary functions support the author's freedom in the weaving project and the ability to obtain fabric with practical application.



Keywords: hand loom weaving, vocational education.

FORMATION OF TWILL WEAVE WITH TWO PAIRS OF INTERCONNECTED HEDDLE FRAMES

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The weaving cycle for making a weft involves three basic actions that begin with the opening of the shed, promotion the weft by the shuttle and beating-up the weft to the end of the fabric through the reed brought by the batten. For industrial weaving machines, the longitudinal displacement of the warp is achieved within the weaving cycle by unwinding the weaving warp and pulling the raw fabric from the work area. It is common knowledge that, regardless of the number of suspended shed frames - heddles, when they are paired with a roller coil, half the frames are always up and others down. This means that only weaves whose weft rapport is equal to and multiple of 2: plain weave, reps and panama can be played. Then how do we get uni-faces twill 2/2? The answer to this question is related to the seemingly unstable and flexible construction of the old wooden loom. Simultaneously pushing down two adjacent pedals is sufficient to remove two adjacent warp threads that are threaded into a pair of paired frames. The wooden structure of the loom allows deformation of the frame supports and the corresponding main filaments remain in the lower tissue mouth and the rest in the upper. All of this is essential in preserving and reproducing wooden weaving looms for hand horizontal weaving.

What is the appeal of handmade or artistic weaving? What is the difference between handloom and artistic weaving? The only technique available in which a person can directly, with a touch of the raw material, convert threads into fabric. And to date, only woven fabric can meet everyday needs such as clothing and household furnishings. At the same time, hand weaving is the only opportunity for a person to carry out his own artistic project directly and cheaply. To express his personality as skills and aesthetics. As a fabric drawing, as a combination of fibrous materials and as a colour variety. The major problem in this case is the lack of proper weaving equipment. Generally, old looms are available. The mandatory accessory equipment is missing. These are nibbles, shuttles, drones, hills, snowdrifts, etc. Old weaving looms are not only depreciated and damaged by the weather and the tree eater.



They were manufactured using woodworking technology from the mid-19th century. These looms are cumbersome and it would be difficult for a modern man to devote himself to working life or to secure his livelihood. The maintenance of these looms is accompanied by unnecessary effort and low productivity. Also, ordinary wooden looms have 2 or 4 heddles. Those with 4 frames, on the other hand, use interdependent controls and can perform plain weave or twill 2/2 as a special variety. These looms are generally intended only for plain weave fabrics, which limits the possibilities for creative idea / activity.

Keywords: hand weaving loom, textile craft, shed formation, vocational education.

TEXTILE AND GARMENT MAGAZINE - GENERAL DESCRIPTION

According to data by SS. Cyril and Methodius National Library Sofia

(<http://www.nationallibrary.bg>), the specialised Textile and Garment Magazine has been issued, without interruption, since 1949 and is the successor of Textile Review, which had been published in 1931 and 1932 in Sliven, with Editor-in-Chief P. Starbanov.

Inspired by the creators of the departments in Textiles at the Technical University of Sofia and the University of Chemical Technology and Metallurgy - Sofia, Prof. Agop Kevorkian and Prof. Kiril Dimov, the magazine has a scientifically applied character and publishes author's papers of lecturers from universities and research units as well as from vocational high schools in textiles, clothing and design.

The magazine also publishes materials from textiles and clothing industries.

The purpose of the magazine is to present to the highly specialized community in the country and abroad the achievements of the theoretical and experimental research of scientists and specialists from all points of view of textile science and practice.

The main topics of the published papers comprise chemical and mechanical technology of textile materials, technology and design of sewing products, textile art, textiles industry economics and the pedagogy of textiles training and education.

Editorial Board of the magazine does the selection and review of the papers collectively while over the years its Editors-in-Chief have been:

Assoc. Prof. Ivelin Rahnev - from 2015 until present;
Prof. Ivan Georgiev - from 2000 to 2015;
Prof. Georgi Nikolov Georgievich - from 1996 to 2000;
Prof. Ivan Hardalov - from 1995 to 1996;
Eng. Svilena Kissyova - from 1990 to 1995;
Prof. Petar Adarov - from 1984 to 1987
Prof. Atanas Chervendinev - from 1964 to 1984;
Editorial Board - from 1958 to 1963;
K. Pastarmadzhiev - from 1952 to 1957;
Stanka Tsekova - from 1950 to 1951;
Editorial Committee - since 1949.

Title of the magazine in Bulgarian: Текстил и облекло (Tekstil i Obleklo).

Title of the magazine in English: Textiles and Garments magazine.

The publisher of the magazine is:

The Scientific and Engineering Union of Textiles, Garments and Leather (SEUTGL)

UIC: 121111930, Bg121111930

Place of publishing: Sofia, Bulgaria

Status of the edition - currently published with:

ISSN 1310-912X (print) for the printed edition in hard copy;

ISSN 2603-302X (Online) for the printed online edition.

The Textiles and Garments magazine was first published online under its current title in 1996 with the 1st issue - Textiles and Garments, ISSN 1310-912X at www.tok-bg.org.

Since 2016, the issues under the same title: Textiles and Garments and with the same ISSN: 1310-912X have been available at www.tok.fnts.bg.

Since 2018, the issues under the same title: Textiles and Garments and with online ISSN 2603-302X are available at www.bgtextilepublisher.org.

Periodicity: 10 - 12 issues per year.

Format of the print and online edition: A4 with 10 quires (A3), including one quire for the colour cover and nine black and white quires for the paper's body of the magazine.

Language of the text: mainly in Bulgarian, abstracts - in English and some whole articles - in English the working language of foreign authors.

Origin of the published materials:

author's works by lecturers, researchers and specialists;

papers presented at conferences and other forums

Subject to Universal Decimal Classification - UDC (УДК):

33, Economics. Economic sciences.

377, Special Education. Vocational education. Vocational schools.

378, Higher Education / Higher Education Institutions.

677, Textile Industry. Technology of textile materials.

678, Industry of High Molecular Substances. Rubber industry. Plastic industry.

687, Tailoring (apparel) Industry.

745/749, Applied Art. Art Crafts. Interior. Design.

658.512.23, Artistic design (industrial design).

Previous title and continuity of the magazine for the period of issue:

Since 1996: Textiles and Garments, ISSN 1310-912X (Print), ISSN 2603-302X (Online);

From 1990 to 1996: Textiles Industry, ISSN 1310-8069;

From 1985 to 1987: Light Industry and Services, ISSN 0205-1885;

From 1959 to 1996: Textiles Industry, ISSN 0495-0046;

From 1958 to 1958: Light industry: Textiles, ISSN 0455-6208;

From 1957 to 1957: Light industry: Textiles' edition, ISSN C625-9138;

From 1952 to 1957: Light industry, ISSN C617-924X;

From 1949 to 1950: Industry: a monthly edition of the Ministry of Industry, ISSN C616-9929.

URL: www.tok.fnts.bg

www.bgtextilepublisher.org

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Sofia, March 2018

Ivelin Rahnev

НАУЧЕН КОМИТЕТ

на 21-ва Национална текстилна конференция, Благоевград, 25-27 октомври 2019 година

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