



Sveučilište u Zagrebu Tekstilno-tehnološki fakultet
University of Zagreb, Faculty of Textile Technology

ZBORNİK SAŽETAKA

17. Znanstveno – stručnog savjetovanja i
7. po redu međunarodnog savjetovanja
TEKSTILNA ZNANOST I
GOSPODARSTVO

BOOK OF ABSTRACTS

17th Scientific – Professional Symposium and
7th International Scientific-Professional
Symposium
TEXTILE SCIENCE & ECONOMY

28. siječnja 2025., Zagreb, Hrvatska
28th January 2025, Zagreb, Croatia



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7th International Scientific-Professional Symposium

**SINERGIJA TEHNOLOGIJE, ZNANOSTI I UMJETNOSTI – KONCEPT
ODRŽIVOSTI I RAZVOJA TEKSTILNOG TISKA**

SINERGY OF TECHNOLOGY, SCIENCE & ART – THE CONCEPT OF
SUSTAINABILITY AND DEVELOPMENT OF TEXTILE PRINTING

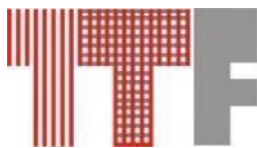


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28th January 2025, Zagreb, Croatia



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Urednik / Editor:

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TZG Logo / TZG Logo:

Prof. dr. sc. Martina Glogar

Kontakt adresa / Contact address:

Sveučilište u Zagrebu
Tekstilno-tehnološki fakultet
Prilaz baruna Filipovića 28a
HR-10000 Zagreb
Telefon: +(385) (1) 3712500
e-mail: tzg2025@tff.unizg.hr
<http://tzg.tff.unizg.hr>

University of Zagreb
Faculty of Textile Technology
Prilaz baruna Filipovića 28a
HR-10000 Zagreb
Phone: +(385) (1) 3712500
e-mail: tzg2025@tff.unizg.hr
<http://tzg.tff.unizg.hr>

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Riječ urednika

17. znanstveno-stručno savjetovanje „Tekstilna znanost i gospodarstvo“ – TZG 2025, realizirano je u organizaciji Sveučilišta u Zagrebu Tekstilno-tehnološkog fakulteta 28. siječnja 2025. u ozračju novih tehnologija i sve intenzivnijeg tržišnog i proizvodnog fokusa na personalizaciji tekstila, naprednim digitalnim tehnologijama i rastućoj svijesti o ekološkoj održivosti proizvodnih procesa. Tematski je ovogodišnje savjetovanje posvećeno digitalnom tekstilnom tisku, prvenstveno u kontekstu paradigme sinergijskog odnosa tehnologije, znanosti i umjetnosti stoga je naziv krovne teme: „*Sinergija tehnologije, znanosti i umjetnosti – koncept održivosti i razvoja tekstilnog tiska*“.

Kao što je i zamišljeno inicijalnom idejom skupa, i ove godine, savjetovanje Tekstilna znanost i gospodarstvo bilo je prigoda za susrete, razmjenu mišljenja i iskustava te uspostavu suradnje među sudionicima s visokih učilišta, instituta i gospodarstva. Predviđena tema savjetovanja „*Sinergija tehnologije, znanosti i umjetnosti – koncept održivosti i razvoja tekstilnog tiska*“ otvorila je široki spektar mogućnosti prijave radova iz različitih područja znanosti i umjetnosti.

Program savjetovanja TZG 2025 uključivao je pozvana predavanja renomiranih stručnjaka iz visokoobrazovnih i istraživačkih institucija, gospodarstva te posterska priopćenja znanstveno-istraživačkih, umjetničkih i stručnih radova. Nakon izlaganja održan je okrugli stol s naslovnom temom skupa, a događanje prati izložba kreativno-umjetničkih radova studenata Tekstilno-tehnološkog fakulteta. Održane su i dvije radionice s temom digitalnog tiska, a u prezentacijskom dijelu izlagači su predstavili svoje tehnologije tiska i proizvode.

Na savjetovanju je održano šest pozvanih predavanja eminentnih predavača. Prof. dr. sc. Željko Penava (Sveučilište u Zagrebu Tekstilno-tehnološki fakultet) održao je predavanje „*Od papirnog do digitalnog oblika – digitalizacija časopisa Tekstil (1987. – 2024.)*“. Slijedio je Prof. dr. sc. Igor Majnarić (Sveučilište u Zagrebu Grafički fakultet) s predavanjem „*Stanje u proizvodnji visokoproduktivnih inkjet tekstilnih pisača nakon sajma DRUPA 2024*“. Branka Falatko (Tvrtka 3-Print Group) održala je predavanje „*Kako digitalni tisak tekstila utječe na modernizaciju tekstilne industrije*“ te Danijel Galinec (Tvrtka Nanodiy d.o.o.), „*Pozicija DTG-a u odnosu na trend DTF-a*“. Nadalje, neovisni znanstveni istraživač, Alicia Mihalić održala je predavanje „*Uzorci i životni putevi tkanina ručno tiskanih blokovima: kreativnost i zajedništvo u radu dizajnerica dvadesetog stoljeća*“. Na kraju pozvanih predavanja, Ana Maria Ricov, diplomirana modna dizajnerica (Sveučilište u Zagrebu Tekstilno-tehnološki fakultet) predstavila se svojim kreativnim radom, prikazala modne kolekcije i istaknula značenje tehnologije tiska u svom kreativnom izričaju.

Također na ovogodišnjem savjetovanju predstavljena su dva projekta: Prof. dr. sc. Sanja Ercegović Ražić predstavila je Erasmus projekt *AEQUALIS4TCLF*, a Ebonita Ćurković predstavila je projekt *Moving forward with circularity in textile and fashion value chains TEX-DAN*.

Održan je okrugli stol na kojem su sudionici bili: Damir Bistović (Graphic Center d.o.o.), Dag Knepr (Fespa Hrvatska), Danijel Galinec (Tvrtka Nanodiy d.o.o.), Branka Falatko (Tvrtka 3-Print Group) i Prof. dr. sc. Martina Glogar, a moderetorica je bila: Željka Livić (Print magazin d.o.o.).

Na savjetovanju je prezentirano 34 rada u kategorijama znanstvenih, stručnih i preglednih radova. Radovi su prezentirani kao posterska izlaganja. Sažetci svih radova prezentiranih na savjetovanju

TZG 2025 u kategorijama znanstvenih, stručnih i preglednih radova dostupni su u digitalnom obliku u Knjizi sažetaka TZG 2025. Značajnija vidljivost savjetovanja TZG 2025 osigurana je suradnjom i objavom odabranih radova u časopisima *Tekstil* i *Koža i obuća*. Ostali cjeloviti radovi dostupni su u digitalnom obliku u Knjizi radova TZG 2025.

Dodatno, u okviru savjetovanja organizirana je u TTF Galeriji izložba „ONVERS RAPORT“ Izložba studenata Sveučilišta u Zagrebu Tekstilno-tehnološkog fakulteta. Studenti/autori navedene izložbe su: Alma Hasanović, Dorotea Belajec, Dora Bužić, Nora Pehar i Tea Šošćarić; mentorice su: Prof. art Koraljka Kovač Dugandžić, Doc. art Lea Popinjač.

Svojim proizvodima i djelatnostima predstavili su se: tvrtka *Moira* (proizvođač moderne pletene ženske odjeće), *Graphic Center d.o.o.*, *Šimić & Co d.o.o.* i dizajnerica *Matilda Sporiš* sa svojim brandom *M.A.T.I.A. (Make Any Textile Interesting Again)*.

Ovom prigodom još jednom zahvaljujemo upravi Fakulteta na ukazanom povjerenju, podršci i pomoći te svim predavačima, pokroviteljima, donatorima, autorima radova, recenzentima, izlagačima te znanstvenom i organizacijskom odboru i svim drugim suradnicima koji su svojim radom i zalaganjem sudjelovali u realizaciji savjetovanja TZG 2025.

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Doc. dr. sc. **Iva Brlek**

Članica Organizacijskog odbora

Editor's word

The 17th International Scientific-Professional Symposium "Textile science and economy" - TZG 2025, was organised by the University of Zagreb, Faculty of Textile Technology on January 28th, 2025. In an atmosphere of new technologies and an ever-increasing focus of the market and production on the personalisation of textiles, advanced digital technologies and a growing awareness of the ecological sustainability of production processes. This year's symposium is thematically dedicated to digital textile printing, especially in the context of the paradigm of the synergetic relationship between technology, science and art, hence the title of the main theme: "Synergy of technology, science & art - the concept of sustainability and development of textile printing".

As envisaged in the original idea of the meeting, this year's Textile Science and Economy symposium was also an opportunity for meetings, the exchange of opinions and experiences and the establishment of co-operation between participants from universities, institutes and companies. The planned theme of the conference "Synergy of technology, science & art - the concept of sustainability and development of textile printing" opened up a wide range of possibilities for the submission of papers from various fields of science and art.

The programme of the TZG 2025 conference included invited lectures by renowned experts from universities, research institutions and industry as well as poster presentations of scientific, research-related, artistic and professional work. The presentations were followed by a round table on the conference theme. The event was accompanied by an exhibition of creative and artistic works by students from the Faculty of Textile Technology. Two workshops on digital printing were also held and exhibitors presented their printing technologies and products in the presentation section.

The conference comprised six invited lectures by renowned speakers. Prof. Željko Penava, PhD (University of Zagreb, Faculty of Textile Technology) gave a lecture on "From Paper to Digital Form – Digitisation of Tekstil Journal (1987 – 2024)". This was followed by Prof. Igor Majnarić, PhD (University of Zagreb, Faculty of Graphic Arts) with a presentation on "The state of production of high-productivity inkjet textile printers after the DRUPA 2024 trade fair". Branka Falatko (3-Print Group company) gave a lecture on "How digital textile printing influences the modernisation of the textile industry" and Danijel Galinec (Nanodiy d.o.o. company), "DTG's position in relation to the DTF trend". In addition, independent scientific researcher Alicia Mihalić gave a lecture on "Patterns and life paths of hand-printed fabrics: Creativity and Community in the Work of Twentieth-Century Women Designers". To conclude the invited lectures, Ana Maria Ricov, a graduate fashion designer (University of Zagreb, Faculty of Textile Technology), presented her creative work, showed fashion collections and emphasised the importance of printing technology for her creative expression.

Two projects were also presented at this year's symposium: Prof. Sanja Ercegović Ražić, PhD presented the Erasmus project *AEQUALIS4TCLF*, and Ebonita Ćurković presented the project *Moving forward with circularity in textile and fashion value chains TEX-DAN*.

A round table was held in which the following people participated: Damir Bistrović (Graphic Center d.o.o.), Dag Knepr (Fespa Croatia), Danijel Galinec (Tvrtka Nanodiy d.o.o.), Branka Falatko

(Tvrтка 3-Print Group) and Prof. Martina Glogar, PhD, and the moderator was: Željka Livaić (Print magazin d.o.o.).

At the conference, 34 papers were presented in the categories scientific, professional papers and reviews papers. The papers were presented as poster presentations. The abstracts of all papers presented at the TZG 2025 conference in the categories scientific papers, professional papers and reviews are available in digital form in the TZG 2025 Book of Abstracts. Greater visibility of the TZG 2025 symposium was ensured through the collaboration and publication of selected papers in the journals *Textile* and *Leather and Footwear*. Further full papers are available in digital form in the TZG 2025 Book of Papers.

The symposium also included the organisation of the exhibition "ONVERS RAPORT" at the TTF Gallery, an exhibition by students of the University of Zagreb, Faculty of Textile Technology. The students/authors of the above mentioned exhibition are: Alma Hasanović, Dorotea Belajec, Dora Bužić, Nora Pehar and Tea Šoštarić; mentors are: Prof. art Koraljka Kovač Dugandžić, Assist. Prof. art Lea Popinjač.

The following companies presented their products and activities: Moira (a manufacturer of modern knitted women's clothing), Graphic Center d.o.o., Šimić & Co d.o.o. and the designer Matilda Sporiš with her brand M.A.T.I.A. (Make Any Textile Interesting Again).

We would like to take this opportunity to thank the faculty management for their trust, support and help, as well as all presenters, patrons, sponsors, authors, reviewers, to the exhibitors and especially the scientific and organizational committee and all other staff members whose work and dedication contributed to the realization of the TZG 2025 symposium.

Proceedings editor:

Assist. Prof. **Iva Brlek** Ph. D.

Member of the Organizing Committee



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THE ARTISTIC CREATIVITY OF HENRI MATISSE AS A SOURCE OF INSPIRATION FOR THE DEVELOPMENT OF THE COLLECTION AND THE PATTERNS OF WOMEN'S TROUSERS

Petra BARABA¹ & Renata HRŽENJAK^{2,*}

¹ Naftalina, company for production, services and trade, Zagreb, Croatia; pet.baraba@gmail.com

² University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; renata.hrzenjak@tff.hr

* Corresponding author: renata.hrzenjak@tff.hr

Abstract: *The paper represents part of the artistic creativity of the representative of Fauvism, Henri Matisse, whose bold use of bright and pure colours had a decisive influence on the European art scene at the beginning of the 20th century. Matisse's art became the inspiration for the creation of a unique fashion collection of women's trousers that not only retains his revolutionary aesthetic, but also combines the richness of colour with a fashion statement. The patterns of the trousers are inspired by the fashion of the 60s of the last century.*

The experimental part of the paper describes the development of the design, the description of the collection, the construction and modelling of selected trouser models and the use of textile printing in the development of the collection itself. Two trouser models from the collection were realised in collaboration with the Croatian company Naftalina.

Keywords: *Fauvism; Henri Matisse; trousers; 60s; fashion collection*

THE WORK OF HUSSEIN CHALAYAN AS A STARTING POINT FOR AN INNOVATIVE APPROACH TO CLOTHING DESIGN

Kimi BIČANIĆ¹; Irena ŠABARIĆ ŠKUGOR^{1,*} & Blaženka BRLOBAŠIĆ ŠAJATOVIĆ¹

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; kbicanic@tff.hr

² University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; irena.sabasic@tff.unizg.hr

³ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; blazenka.brlobasic@tff.unizg.hr

* Corresponding author: irena.sabasic@tff.unizg.hr

Abstract: The aim of the paper is to give a new interpretation of the collection based on the inspiration of the selected fashion collections of the designer Hussein Chalayan. In the theoretical part of the thesis, the innovative and avant-garde approach of Hussein Chalayan's selected collections is examined and described. In the experimental part of the thesis, a clothing collection is presented, which was created by examining selected collections by Hussein Chalayan, with a focus on ready-to-wear collections. The result of the work is a collection of dresses shown with project drawings. One model was selected for production and is shown in fashion photographs.

Keywords: *innovative approach; fashion design; Hussein Chalayan; clothing collection*

THE OVERVIEW OF CROATIAN SUSTAINABLE TEXTILE AND GARMENT SECTOR POTENTIALS

Sandra BISCHOF^{1*}; Tanja PUŠIĆ¹ & Željko KNEZIĆ¹

¹ University of Zagreb Faculty of Textile Technology, Textile Science Research Centre, Zagreb, Croatia

* Corresponding author: sandra.bischof@ttf.unizg.hr

Abstract: *The paper deals with the overview of sustainable textile and garment sector potentials mapped for Majur municipality as one of the Danube Region, within the project Green-Tex. The main objective of the DRP0200404 Green-Tex project is to strengthen transnational collaboration and innovation in the Danube area's sustainable textile sector and thus make value chain actors in partner regions more resilient and competitive in adjusting to global shifts from traditional to more regenerative circular economy based green textile practices. One of the projects activities is to create and test new solutions throughout the entire value chain, starting from fashion design to production, usage, textile waste collection and recycling, and verify them in various contexts within the project territory.*

Keywords: *Green-Tex; Danube Region; sustainable value chains; circular economy; recycling*

PIGMENT PRINTING WITH NATURAL PLANT DYES

Iva BRLEK^{1,*} & Nika USMIANI¹

¹ University of Zagreb Faculty of textile technology, Zagreb, Croatia

* Corresponding author: iva.brlek@tff.unizg.hr

Abstract: *Due to increasing environmental awareness and the need to apply the circular economy, natural dyes are increasingly used in the textile sector. In this research, pigment printing is carried out with natural plant dyes, i.e. plant extracts from walnut leaves, pomegranate peels and onion peel. The composition of the printing paste and the fixation parameters are optimised. A print screen is created to assess the quality of the print, focussing on the sharpness of the print. Pastes with Prisolon DCA 90 or Tubivis Star, a universal thickening agent for textile printing, were compared without and with the addition of aluminium salt and there. A launder and rub resistance test was carried out on printed cotton fabrics. The results were analysed spectrophotometrically using a Datacolor 850 spectrophotometer. It was found that fixing the printed textile fabric with a paste containing the thickening agent Prisolon DCA 90 with aluminium salts and natural plant dye for 240 seconds at 180°C led to the best results in terms of launder and rub resistance. The natural dyes and their concentrations are selected according to the design idea with a view to the desired implementation in the textile design on the final product.*

Keywords: *natural dyes; pigment printing; fixation; laundering; rubbing*

THE INFLUENCE OF THE AFRICAN FABRIC PATTERN AND ITS TRANSFORMATION IN THE BATIK TECHNIQUE

Blaženka BRLOBAŠIĆ ŠAJATOVIĆ^{1,*}; Maja IHAROŠ, Koraljka KOVAČ¹ & Ana SUTLOVIĆ¹

¹ Faculty of Textile Technology University of Zagreb, Zagreb, Croatia

* Corresponding author: blazenka.brlobasic@tff.unizg.hr

Abstract: *The clothing culture in Africa varies from country to country, but all are characterized by bright colors, embroidery and vibrant jewelry. The fabrics of African culture are decorated with stamp printing, dyeing, painting and embroidery, and the colors are obtained from spices, leaves, fruits, vegetables or grass. Depending on which metal salt they are mixed with (zinc, sulfur or iron), they take on a certain intensity and shade. The peculiarities of the decorations and cuts of clothing in African culture are explored, as are the African ways of combining traditional culture with contemporary design. Traditional costumes were usually not cut and sewn, but wrapped around the body in different ways. The experimental part will show the production of a fabric pattern using the traditional batik technique, which was used in Africa to produce patterned fabrics. By digitizing and editing the resulting pattern, geometric shapes are added to give the pattern a more modern motif. The resulting ornament will be used to make fabrics and a collection of dresses, the construction and modeling of a selected model will be shown.*

Keywords: *Afrika; batik; ornament; clothing construction*

DIGITALLY PRINTED COTTON FABRIC - THE INFLUENCE OF WASHING CONDITIONS

Tihana DEKANIĆ^{1*}; Martina GLOGAR¹; Tena MARGAN¹; Tanja PUŠIĆ¹ & Suzana ĐORĐEVIĆ²

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; tihana.dekanic@tff.unizg.hr, martina.glogar@tff.unizg.hr, tena.margan@gmail.com, tanja.pusic@tff.unizg.hr

² Academy of Vocational Studies Southern Serbia, Department of Technological Art Studies, Leskovac, Serbia; szn971@yahoo.com

* Corresponding author: tihana.dekanic@tff.unizg.hr

Abstract: *The aim of this study was to investigate the effects of washing on digitally printed cotton fabric in blue colour. The study included several important steps: the selection of the most suitable detergent and washing temperature, the analysis of the effects of detergents on colour fastness and the physical properties of the cotton fabric after five washes. Detergents with different formulations and physical forms were used. The results showed that powder detergents containing optical brighteners caused the strongest changes due to their abrasive effect on the pigment layer. To preserve colour integrity, washing at 40 °C with detergents without optical brighteners is recommended.*

Keywords: *digital pigment printing; detergents; washing; washing fastness; washing recommendations*

DEVELOPMENT OF ECO-FRIENDLY PRINTING PASTES USING NATURAL DYES EXTRACTED FROM MULBERRY BRANCHES

Alen ERJAVEC^{1,*}; Manja KUREČIČ²; Anita KRAJNC³ & Julija VOLMAJER VALH⁴

¹ University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia; alen.erjavec@um.si

² University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia; manja.kurecic@um.si

³ University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia; anita.krajnc@student.um.si

⁴ University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia; julija.volmajer@um.si

* Corresponding author: alen.erjavec@um.si

Abstract: *The circular economy framework encompasses several critical areas, including waste management, natural resource preservation, energy efficiency, and the textile industry. Within textiles, sustainable strategies are increasingly prioritised, particularly regarding the use of natural dyes. Historically, textiles, whether composed of natural or synthetic fibres, have been dyed and printed to align with consumer preferences. However, the widespread use of synthetic dyes, predominantly synthesized from fossil fuels through hazardous chemical processes, has raised significant environmental concerns. These dyes not only contribute to pollution but also have adverse effects on ecosystems and human health. As a result, the growing demand for eco-friendly products has shifted focus toward textiles made from natural fibres and coloured using sustainable, environmentally friendly natural dyes.*

This study aimed to explore an innovative approach for extracting natural dyes from mulberry residues generated during the seasonal pruning of mulberry trees and to develop an eco-friendly printing paste from these dyes. Mulberry residues, an often-overlooked by-product of agricultural activity, present an untapped source of natural dye that can be repurposed for textile applications. To extract these dyes, a Soxhlet extractor was employed using water as a solvent. The isolated extracts were then utilized in a direct printing process, with printing pastes formulated using non-aggressive and environmentally friendly chemicals to minimize environmental impact.

A thorough evaluation of the printing quality was conducted to determine the feasibility of these natural dye formulations in textile printing applications. Among the tested formulations, the printing paste labelled TBG 3, which included ammonium iron(II) sulphate as a mordant, was identified as the most effective for achieving high-quality prints on cotton fabric. This printing paste demonstrated superior colour intensity, adhesion, and overall performance. Another formulation, TBG 2, containing potassium alum as a mordant, also exhibited excellent properties, showcasing its potential as an eco-friendly alternative.

The results underscore the promise of natural dyes extracted from mulberry residues in sustainable textile applications. By utilizing agricultural by-products, this research contributes to waste reduction and promotes a more circular approach to resource utilization. Furthermore, the development of environmentally friendly printing pastes aligns with global efforts to reduce the ecological footprint of the textile industry. This study highlights the potential for integrating natural dye extraction and eco-conscious printing processes into modern textile production, advancing sustainability and meeting growing consumer demand for greener products

Keywords: eco-friendly printing; dyes; textile; printing; mulberry residues

DEVELOPMENT OF DECORATIVE FABRICS WITH REDUCED FLAMMABILITY

Sandra FLINČEC GRGAC^{1,*}, Ksenija VIŠIĆ¹, Ana SUTLOVIĆ¹ & Iva STRMO

¹ University of Zagreb Faculty of Textile Technology, 10000 Zagreb, Croatia; sflincec@tff.unizg.hr, ksenija.visic@gmail.com, ana.sutlovic@tff.unizg.hr

* Corresponding author: sflincec@tff.unizg.hr

Abstract: *We are witnessing various disasters caused by the spread of flames indoors. Indoors, cotton fabrics with different patterns are often used, which are characterized by high esthetic qualities, comfort and softness, but in the event of a flame they pose a great danger. For this reason, the possibility of using different concentrations of an environmentally friendly halogen-free hydroxyfunctional organophosphorus compound (HFOP) in the printing paste is being investigated in order to achieve durable printing while maintaining heat and flame resistance. After the printing process, part of the samples are subjected to a washing process in accordance with the requirements of the HRN EN ISO 6330:2012 standard using a phosphate-free standard detergent (ECE Test Detergent 98 without Phosphate, ISO 105-C08/C09) at 40 °C in a Mathis Polycolor device. The flammability properties of the untreated and treated samples before and after washing were determined using the limiting oxygen index (LOI) values according to the ASTM D 2863-97 standard. Thermogravimetric analysis (TGA) with monitoring of gaseous decomposition products by IR spectroscopy (TG-IR) was used to evaluate the thermal stability of newly developed decorative materials with reduced flammability while monitoring gaseous exsosts during decomposition to assess the impact on the environment and humans. The change in whiteness and yellowness index before and after the washing process of pure cotton and the same printed fabrics was measured with a DATACOLO FS600 PLUS spectrophotometer. The results indicate the possibility of using the print paste as a cross-linking agent for an environmentally friendly flame retardant.*

Keywords: Environmentally friendly flame retardant; cellulose material; textile printing; wash fastness

THE FLUORESCENT COTTON YARNS FOR INTERIOR TEXTILE DESIGN

Tomasz FRASOŃSKI^{1,*} & Anita TARBUK²

¹ Interdisciplinary Doctoral School at the Lodz University of Technology, Institute of Architecture and Urban Planning, Lodz, Poland, tomasz.frasonski@dokt.p.lodz.pl

² University of Zagreb Faculty of Textile Technology, Department of Textile Chemistry and Ecology, Zagreb, Croatia, anita.tarbuk@tff.unizg.hr

* Corresponding author: tomasz.frasonski@dokt.p.lodz.pl

Abstract: *The fluorescence of mercerized cotton yarns was investigated in this paper in the context of artistic textile design for interior. For this purpose, cotton yarn chemically bleached and mercerized under industrial conditions (Runolist, Unitas, Croatia) was optically brightened with two commercially available fluorescent whitening agents (FWA) in three concentration. The influence of the FWA concentration to spectral remission, whiteness and its changes with coloristic meaning was investigated. The possible artistic textile design with selected yarns in knitted and woven fabric to be used in interior is given.*

Keywords: *cotton yarns; fluorescence; optical brightener; textile design*

BANANA PSEUDOSTEM SAP FOR IMPROVING UV PROTECTION AND FLAME RETARDANTS OF COTTON FABRIC

Lea HARAMINA; Lea BOTTERI^{1,*} & Ana SUTLOVIĆ¹

¹University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; lea.haramina@gmail.com;
ana.sutlovic@tff.unizg.hr;

* Corresponding author: lea.botteri@tff.unizg.hr

Abstract: *Banana is one of the oldest cultivated plants. It belongs to the Musaceae family and is widely known in human nutrition. However, the pseudostem of the banana plant that remains after one-year pruning needs to be disposed of adequately. In most cases, these are unecological procedures such as burning or disposal in nature, thus creating biowaste that should be avoided as much as possible. For this reason, it is desirable to apply a circular economy model that includes the use of all parts of the plant. The pseudostem of the banana plant is rich in fibers and sap that can be used in textile technology, thus reducing the production of biowaste. This paper investigated the effect of an extract from the banana pseudostem (banana pseudostem sap) for the purpose of improved protection against UV radiation and protection against burning of chemically bleached cotton fabric. After the extraction, the banana pseudostem sap was subjected to evaporation to obtain a dry residue necessary to determine the optimal concentrations to obtain the desired effects. Chemically bleached cotton fabric was treated with two different concentrations of dry extract from the banana pseudostem by the bath exhaustion process. Before the processing itself, the samples were pretreated with metal salt (mordant) potassium aluminium sulphate dodecahydrate $KAl(SO_4)_2 \cdot 12H_2O$ in order to better bind the banana pseudostem sap to the fabric. UV protection was measured with a transmission spectrophotometer, while flammability was tested by measuring the limiting oxygen index (LOI), burning rate and micro-combustion calorimeter (MCC). Due to the brown colour of the banana pseudostem sap, the colour parameters of the cotton material were also investigated. Banana pseudostem sap is a valuable raw material for ecological and functional textile processing, which can be used not only as a natural dye for dyeing textile material, but also improving UV protection and burning behaviour of cotton fabric while maintaining the aesthetic qualities.*

Keywords: *banana pseudostem sap, waste, cotton, UV protection, flame retardants*

PRESERVING HERITAGE, PROMOTING SUSTAINABILITY: UPCYCLING SLAVONIAN DOWRY TEXTILES INTO OUTERWEAR

Duje KODŽOMAN^{1,*} & Ines BARIĆ

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; dkodzoman@tff.unizg.hr

* Corresponding author: dkodzoman@tff.unizg.hr

Abstract: *This paper explores the intersection of cultural heritage, sustainability, and textile design by documenting the transformation of vintage dowry textiles from the Slavonian region into modern outerwear. Heirloom carpets and blankets, traditionally gifted in dowries during the past century and valued for their longevity and symbolic status, were reimagined into jackets and coats under the creative vision of student designer Ines Barić. By extending the life of these materials, the initiative conserves resources while preserving cultural narratives and traditions. This paper highlights the historical importance of dowry textiles and their adaptation in contemporary fashion, illustrating how circular practices in design can advance both ecological sustainability and cultural preservation. The initiative also presents selected garments from the Miraz collection, relevant to the theme, showcased through photographs and technical sketches. Repurposing about 20 kg of textiles to create a collection of 15 garments significantly reduced environmental impact by saving resources and avoiding the CO₂ emissions, water use, and energy required for producing new materials.*

Keywords: *Cultural Heritage; Sustainable Fashion; Circular Design; Upcycling; Textile Reuse*

DEEP BLUE – CYANOTYPES AND TEXTILE ART

Petra KR PAN^{1,*} & Lea POPINJAČ¹

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Republic of Croatia; petra.krpan@tff.unizg.hr

² University of Zagreb Faculty of Textile Technology, Zagreb, Republic of Croatia; lea.popinjac@tff.unizg.hr

* Corresponding author: petra.krpan@tff.unizg.hr

Abstract: *This paper, titled “Deep Blue - Cyanotypes and Textile Art” examines the significance of cyanotype in textile art as a sustainable, non-toxic printing method that bridges historical depth with contemporary eco-consciousness. Invented in 1842 by Sir John Herschel, cyanotype has long served as a unique medium for creating illustrations, specifically photograms, establishing a distinctive aesthetic that endures today. Known as the blueprint process, cyanotype is considered a precursor to modern photography, relying on basic chemical components, ferric ammonium citrate and potassium ferricyanide and UV light to produce images.*

In this scientific and artistic research, we explore the historical roots of Prussian blue and the symbolic meanings attributed to the color blue in 19th and 20th century art and culture. Additionally, we analyze the effects of varying exposure times and choice of substrates, comparing types of paper and textiles to understand how UV light intensity and chemical concentrations shape the final image or photogram. To produce a cyanotype print, ferric ammonium citrate and potassium ferricyanide are combined with water in precise ratios to create a photosensitive solution. This solution is applied to a substrate, such as paper or fabric, and dried in a dark environment to prevent premature exposure. Once dried, the coated substrate is exposed to sunlight or UV light, initiating a photochemical reaction that results in the intense blue color characteristic of cyanotypes. The image is then developed and fixed by rinsing the substrate in water, completing the process.

While cyanotype is one of the more eco-friendly printmaking methods, its sustainability depends on responsible chemical handling and disposal practices. Cyanotype can be applied to various natural fibers and fabrics, such as cotton, linen, or recycled paper, making it adaptable to sustainable materials that can decompose or be recycled at the end of their lifecycle. Ultimately, this paper will explore the practical applications and artistic impact of cyanotype techniques on textiles, underscoring its significance in advancing sustainable practices within textile art. This paper aims to highlight both the practical and aesthetic impacts of cyanotypes in textile art, advocating for its role in sustainable art practices.

Keywords: cyanotype, photogram, Prussian blue colour, textile, textile art

INKJET-PRINTED CONDUCTIVE TEXTILES FOR SMART MUSCLE BRACES: A FUSION OF SCIENCE, TECHNOLOGY, AND ART

Manja KUREČIČ^{*1}; Lidija ŠKODIČ¹; Tanja KOS¹; Darko ŠTANC¹;
Laura BERGLEZ² & Silvo HRIBERNIK²

¹ Faculty of mechanical engineering, University of Maribor, Maribor, Slovenia

² Faculty of electrical engineering and computer science, University of Maribor, Maribor, Slovenia

* Corresponding author: manja.kurecic@um.si

Abstract:

Muscle injuries in elite sports represent a significant concern, accounting for up to one-third of all sports-related injuries and are a leading cause of prolonged absences from competition. These injuries can occur at any point along the muscle-tendon axis, with consequences that can be catastrophic for athletes, coaches, and teams, particularly when they occur at critical points in the competition cycle. The main goal of rehabilitation teams in managing sports muscle injuries is to facilitate the athlete's rapid return to competition while preventing further damage or re-injury. Currently, two primary categories of medical devices assist in diagnosing and treating musculoskeletal disorders. The first group includes imaging devices such as X-rays, ultrasonography, magnetic resonance imaging (MRI), computer tomography (CT), and ultrasound tissue characterization (UTC), which are used to identify muscle tissue lesions such as tears, ruptures, hematomas, and effusions. The second category of devices measures various aspects of muscle function, such as biomechanical properties, electrical activity, contractile performance, and viscoelastic characteristics, employing specialized measurement techniques and accompanying medical devices to evaluate muscle function and performance.

In response to the need for more accessible and efficient solutions, the University of Maribor, in collaboration with the Faculty of Mechanical Engineering, the Faculty of Electrical Engineering and Computer Science, SkyLabs d.o.o., and Inova IT d.o.o., was involved in the national research project Wibrant ("Wearable Integrated Smart Brace for Rehabilitation Monitoring and Diagnostic of Muscular Disorders"). The project aimed to develop an innovative, wearable, and flexible smart brace that enables non-invasive, real-time telediagnosics and telerehabilitation for muscular disorders. This research focused on the development of (i) a carrier brace textile — a comfortable, wearable smart material designed to integrate a sensory system, and (ii) an integrated, flexible electronic sensory system capable of energy-efficient patient monitoring in real-world environments, providing local data storage, data pre-processing, and data transmission to mobile devices.

The wearable smart brace was designed using a knitted fabric with specific elasticity, ensuring that the fabric recovers completely to its original state after being stretched. Both the sensor and conductive system were creatively designed for accurate sensory connection and design-oriented look. The sensory matrix was prepared using conductive printing pastes (Clevios), applied via digital ink-jet printing technology.

Keywords: muscle injuries, flexible electronics, conductive printing, sensory systems, inkjet technology

DESIGN OF THE WOMEN'S SHOE COLLECTION INSPIRED BY THE ARCHITECTURE OF PETER EISENMAN

Lucija ŠARIĆ¹; Tea KRIŠKOVIĆ², Suzana KUTNJAK-MRAVLINČIĆ¹

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia,

² Shoe factory Ivančica d.d. Ivanec, Croatia, tkriskovic@ivancica.hr

* Corresponding author: suzana.kutnjak-mravlincic@ttf.unizg.hr

Abstract: *This study investigate the possibilities of applying Peter Eisenman's principles of architectural design to shoe design. The aim was to connect the architecture and design of the author's shoe collection and to create functional conceptual solutions for women's shoes inspired by the deconstructive principle. In the work, a functional mini-collection of women's shoes was realized, consisting of three developed model samples (prototypes) of shoes of different types and uses. The shoe prototypes are produced as part of industrial shoe production and go through all phases and processes from the initial design concept to the development of the model samples and final production. The overall design concept of the collection presented can be developed further depending on the intended use or special requirements and transferred to the design of men's or unisex shoes for different target groups.*

Keywords: *Deconstructivism, Peter Eisenman, shoe design, model development*

TEXTILE WASTEWATER TREATMENT USING GREEN SORBENT

Kiril LISICHKOV^{1*}; Hamdije MEMEDI² Katerina ATKOVSKA¹; Stefan KUVENDZIEV¹;
Shaban JAKUPI³ & Erhan MUSTAFA⁴

¹ Faculty of Technology and Metallurgy, University "Ss. Cyril and Methodius", Skopje; lkiril@tmf.ukim.edu.mk

² Faculty of Natural Science, University of Tetovo; hamdijememedi@hotmail.com

³ Faculty of Low, University of Tetovo; jakupi_70@hotmail.com

⁴ Inkohem D.O.O. Skoje, N. Macedonia; erhanmustafa1978@gmail.com

* Corresponding author: lkiril@tmf.ukim.edu.mk

Abstract: Wastewaters from textile industry contain large amount of heavy metal ions, such as Cr(VI), Zn(II), Pb(II) and Cd(II). They are widely used for color pigments of textile dyes production. The free discharge of such wastewater into the environment would cause major environmental problems. The presence of toxic Cr(VI) in the aquatic environment has emerged as one of the most serious environmental concerns. This article reports the technical applicability of a low cost green sorbent, nanoporous bentonite, as adsorbent for elimination of Cr(VI) ions from textile wastewater. The batch adsorption experiment was conducted to determine the impact of several working parameters (initial metal ion concentration, pH, amount of adsorbent) on the removal efficiency of Cr(VI). The interpretation of the experimental data have been done using the pseudo first and the pseudo second-order kinetic models.

Keywords: textile wastewater; Cr(VI) ions; adsorption; green sorbent; nano-bentonite

INVESTIGATION OF SURFACE MODIFICATIONS OF ELECTROSPUN POLYCAPROLACTONE FILAMENTS WITH ALKALINE HYDROLYSIS

Mislav MAJDAK^{1*}; Daisy CROUCH²; Kaili CHEN²; Pierre-Alexis MOUTHUY²; Maja SOMOGYI ŠKOC¹ & Iva REZIĆ MEŠTROVIĆ¹

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; maja.somogyi@tff.unizg.hr; iva.rezic@tff.unizg.hr

² University of Oxford, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, Oxford, United Kingdom, daisy.crouch@ndorms.ox.ac.uk; kaili.chen@ndorms.ox.ac.uk; pierre-alexis.mouthuy@ndorms.ox.ac.uk

* Corresponding author: mislav.majdak@tff.unizg.hr

Abstract: *Medical textile materials are an important staple of healthcare, as they encompass a wide variety of devices, from simple bandages and gausses, to complex implants. These devices are often made from various materials, one of which is polycaprolactone (PCL). PCL is a biodegradable and biocompatible polymer that has found a great use in the medical field, which has been expanding due to the advances of the electrospinning process. Unfortunately PCL lacks active groups, such as hydroxyl and carboxyl and is therefore inherently hydrophobic. This in turn can limit the application of PCL in tissue engineering, as well as wound management. To remedy this situation, surface modification methods can be used. Therefore, in this research a conventional method used for surface modification of polymer surfaces, alkaline hydrolysis, has been implemented. With the use of four different concentrations of sodium hydroxide (NaOH) (0.25, 0.5, 0.75 and 1 mol/dm³) in two time regiments of 60 and 120 minutes, electrospun PCL filaments were modified. Further on, to investigate the level of success alkaline hydrolysis might have had on PCL filaments, changes in lengths/shrinking as well as vertical water migration were investigated. The obtained results show that alkaline hydrolysis influenced the dimensions of the filaments, while the vertical water migration tests have shown that in comparison to the untreated filaments, modified filaments have a clear hydrophilic character.*

Keywords: PCL; electrospinning; medical textiles; alkaline hydrolysis

STATUS IN THE PRODUCTION OF ROLL TO ROLL HIGH-PRODUCT INKJET TEXTILE PRINTERS AFTER THE DRUPA FAIR 2024.

Igor MAJNARIĆ*; Ana LEŠIĆ¹ & Marija JAKELIĆ¹

¹University of Zagreb Faculty of Graphic Arts, Zagreb, Croatia; igor.majnarić@grf.unizg.hr

¹University of Zagreb Faculty of Graphic Arts, Zagreb, Croatia; lesic.ana1@gmail.com

¹University of Zagreb Faculty of Graphic Arts, Zagreb, Croatia; marijajakelic3003@gmail.com

*Corresponding author: igor.majnarić@grf.unizg.hr

Abstract: *At the international trade fair DRUPA 2024, various innovations in printing technology were showcased. Among the presented technologies, Inkjet was the most prominent, finding applications across multiple industrial sectors, including the printing of textile materials. This paper will describe high-productivity Inkjet machines specialized for textile printing, manufactured by Konica Minolta, DURST, and EFI. These three multi-color models, equipped with different types of piezo Inkjet heads and integrated pre- and post-treatment systems, achieve impressive production speeds of 1,470 m²/h, 6,400 m²/h, and 828 m²/h. They are single-pass rotary machines with roll widths exceeding 2 meters, specifically the Konica Minolta NASSENGER SP-1, Durst Alfa 330 and EFI Reggiani HYPER ReNOIR 340 models.*

Keywords: *Inkjet, Konica Minolta NASSENGER SP-1, Durst Alfa 330, EFI Reggiani ReNOIR 340*

COFFEE RING EFFECT IN SYNERGY WITH COPPER NANOPARTICLES FOR SUSTAINABLE FUTURE OF INDUSTRIAL PROCESSING

Ernest MEŠTROVIĆ¹; Katja ČEMERIN¹; Tihana MLINARIĆ¹ & Iva REZIĆ MEŠTROVIĆ^{2,*}

¹ University of Zagreb, Faculty of Chemical Engineering and Technology, Zagreb, Croatia, ernest.meštrovic@fkit.hr

² University of Zagreb, Faculty of Textile Technology, Zagreb, Croatia, iva.rezic@tff.unizg.hr

* Corresponding author: iva.rezic@tff.unizg.hr

Abstract: *The coffee ring effect, a natural phenomenon observed when a droplet of liquid containing dispersed particles evaporates, results in the accumulation of particles along the droplet's edges. This effect, often considered a limitation in achieving uniform coatings, has recently been harnessed for innovative applications in materials science. Copper nanoparticles (CuNPs), known for their exceptional antimicrobial, catalytic, and conductive properties, present significant potential when combined with this phenomenon. This study explores the synergistic relationship between the coffee ring effect and CuNPs for the functionalization of textiles. By utilizing the self-assembling nature of the coffee ring effect, CuNPs can be deposited in controlled patterns, enhancing their performance and reducing material waste. This approach offers a sustainable and scalable solution for materials formulation and processing, paving the way for environmentally friendly production of advanced materials with enhanced properties such as antimicrobial activity and durability. The findings demonstrate a promising integration of natural physical phenomena with nanotechnology, contributing to the sustainable future of textile manufacturing. The concept has been validated in our previous studies using several models that included two active substances, pantoprazole and doxycycline, along with two excipients, sodium chloride and (2-hydroxypropyl)- β -cyclodextrin (HP- β CD), studied under various conditions. The results were analysed using microscopy to observe characteristic patterns. Special attention was given to the behaviour of saline solution, with the collected data being categorized into clusters. In the model containing pantoprazole and HP- β CD, interactions between these two components were observed, which were further investigated using differential scanning calorimetry. The such concepted preliminary research validated the hypothesis that the coffee ring effect can be utilized to study the properties of soluble formulations. The aim of this work was to deeper our understanding of the coffee ring effect so that we could gain deeper insights into the interactions between active compounds and other process parameters, which is crucial for creating formulations that improve stability and efficacy in solutions or in colloid phases. This approach not only holds promise for improving processing outcomes but also offers potential advancements in physical and chemical properties of novel formulations or advanced materials. Furthermore, the reduced need for highly potent materials enhances safety and reduces costs associated with working with very active substances. This dual benefit underscores the significant potential of employing the coffee ring effect in the advancement of industrial scale formulation science and technology. Through this innovative approach, we open new avenues for the development of more effective and stable products.*

Keywords: coffee ring effect; copper nanoparticles; industrial application; sustainable solutions

PATTERNS AND LIVES OF HAND BLOCK-PRINTED TEXTILES: CREATIVITY AND COMMUNITY IN THE WORK OF TWENTIETH-CENTURY WOMEN DESIGNERS

Alicia MIHALIĆ^{1,*}

¹ Independent Researcher, Zagreb, Croatia; mihalic.alicia@gmail.com

* Corresponding author: mihalic.alicia@gmail.com

Abstract: *Within an environment increasingly dominated by mechanised, large-scale production, the interwar turn to hand printed textiles highlighted the aptness of textile surfaces to accommodate a straightforward application of modern art principles that, accompanied by a high level of craftsmanship, integrated the designer and maker. Created as both interior and dress fabrics, wood and linoleum block printed textiles particularly exemplified the creative work of female artists who devised their designing and printing processes as inseparable activities through which unique and captivating engagements with textile patterns articulated an awareness for their quotidian and utilitarian functionality. In this sense, produced in independent and intimate workshop settings that affirmed the role of community and exchange in the development of design principles, the fabrics allowed for an unmediated exploration of abstract compositions and figurative representations, encapsulating the simplicity of traditional craft through the display of vivacious and innovative motifs. By examining the ability of hand printed textiles to transgress the boundaries between fine art and craft as well as to embody aesthetic and utilitarian qualities, the paper will situate the dynamic modernist narratives of twentieth-century women designers within the pictorial and performative contexts of block-printing and screen-printing techniques and position their activities at the intersection of individual and collaborative practices. Moreover, through the lens of interwar and post-war developments, the study will draw attention to the accessible, sustainable, and participatory legacy of hand printed textile media in the light of their ongoing relevance and applicability.*

Keywords: *printed textiles; women designers; modernism; art; craft; handmade*

INFLUENCE OF LAUNDRY EFFLUENT STABILITY ON FIBRE FRAGMENTS IDENTIFICATION

Petra MIHOVILOVIĆ^{1,*}; Branka VOJNOVIĆ¹ & Dragana BEGOVIĆ

¹University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; petra.mihovilovic@tff.unizg.hr;
branka.vojnovic@tff.unizg.hr

* Corresponding author: petra.mihovilovic@tff.unizg.hr

Abstract: *In the last decade, interest in environmental pollution caused by microplastics has significantly increased. Among various sources of microplastics, textiles made from synthetic fibres are one of the main sources of fiber fragments in aquatic environments. Fiber fragments are mostly released during the washing process of textiles. The challenges associated with the characterization and quantification of fibrillar microplastic in such samples are related to the wide range of concentrations and degree of degradation. The laundry effluent samples present a particular challenge for FF analysis as they contain a residual component of the detergents used in washing processes, such as surfactants. In addition, surfactants promote the formation of aggregates composed of fibre fragments and inorganic components of the detergent (e.g. zeolites). These aggregates exhibit altered physical and chemical properties that lead to an underestimation of the fiber fragments number, which is a direct consequence of the entanglement of several fibre fragments. The aim of this study was to investigate the possibility of identifying polyethylene terephthalate fibre fragments both in water and detergent suspensions. In order to investigate the influence of solution or suspension stability on the MPFs identification, the formation of aggregates was carried out with both freshly prepared but also with 5 days aged suspensions. The amount of fibre fragments in the suspensions was determined gravimetrically after membrane filtration followed by characterisation of the filter cake using an optical microscope. It was confirmed that the presence of detergents leads to aggregate formation. Furthermore, aging of the solution results in an even greater extent of aggregate formation.*

Keywords: *wastewaters; washing process; microplastics; fibre fragments; PET; detergents.*

INFLUENCE OF SALT ON THE DECOLOURISATION OF EVERZOL BLACK B DYE SOLUTION BY ADSORPTION PROCESS

Petra MIHOVILOVIĆ^{1,*}; Mario CETINA¹; Branka VOJNOVIĆ¹; Ana PEŠIĆ
& Antonija IVEZIĆ

¹University of Zagreb Faculty of Textile Technology, Department of Applied Chemistry, Zagreb, Croatia;
petra.mihovilovic@tff.unizg.hr; mario.cetina@tff.unizg.hr; branka.vojnovic@tff.unizg.hr

* Corresponding author: petra.mihovilovic@tff.unizg.hr

Abstract: *In the textile industry, significant volumes of water are consumed in the production and processing of textile fibres and materials. As a result, large quantities of wastewater remain, which must be regenerated and returned to the process or appropriately disposed. The composition of the wastewater depends on many factors, including the type of textile fibres and materials, the type of treatment process and the chemicals used. Textile wastewater is often characterised by high temperature values, turbidity, high values of biochemical oxygen demand (BOD) and chemical oxygen demand (COD), a wide range of pH values and considerable content of suspended solids, but also significant amounts of fats, surfactants and dyes. Coloured wastewater is a particularly serious problem, as dyes are not aesthetically pleasing. In addition, many of them can be toxic even in low concentrations and prevent sunlight from penetrating into deeper layers of water, hindering the process of photosynthesis and the supply of oxygen to the water.*

Of the many decolourisation methods available, the adsorption process has proven to be one of the most efficient and cost-effective. Besides, the adsorption process does not produce any toxic by-products. The adsorption process is influenced by the type, nature, and available surface area of the adsorbent as well as the temperature, pH and presence of other substances in the wastewater. Namely, salts present in the wastewater due to its usage as auxiliaries in the dyeing process can increase the efficiency of the adsorption process.

The aim of this paper was to investigate the adsorption efficiency of commercially available powdered activated carbon for the removal of the reactive dye Everzol Black B dye ($c_0 = 500 \text{ mg dm}^{-3}$) in the presence of sodium chloride at the different concentrations ($c = 0.1$ and 1.0 mol dm^{-3}). Isothermal batch adsorption studies were carried out at $45 (\pm 1) \text{ }^\circ\text{C}$ with 0.1 g of activated carbon in the periods of 15 minutes to 16 hours when equilibrium was reached, and the results were compared with the adsorption process in a salt absence. Based on the results obtained, we determined the kinetic parameters of the adsorption process of Everzol Black B dye and proposed a suitable adsorption mechanism.

Keywords: *textile wastewater; Everzol Black B; isothermal adsorption; activated carbon; ionic strength; adsorption kinetics*

DIGITAL TECHNOLOGIES TO REDUCE TEXTILE WASTE IN CLOTHING INDUSTRY

Ineta NEMEŠA^{1,*} & Marija PEŠIĆ²

¹Technical faculty "Mihajlo Pupin", University of Novi Sad, Serbia; inetavil@gmail.com

²Technical faculty "Mihajlo Pupin", University of Novi Sad, Serbia; marija.stankovic.986@gmail.com

* Corresponding author: marija.stankovic.986@gmail.com

Abstract: *Traditional clothing technologies tolerate 15-25% textile waste in the production process. Using commercially available digital tools it is possible to improve garment designing and manufacturing phases and with it to reduce amounts of still generated pre-consumer fabric waste. Using 2D and 3D designing software zero waste design or flexible design concepts could be used. Management software for the clothing industry significantly improve material requirement planning, material inventory and cut planning processes and reduce the largest part of the fabric waste obtained in the manufacturing phase of garments. New generation interlining fusing presses eliminate fabric shrinkage and with it material waste which is obtained by adding material buffers around fused cut components in markers.*

Keywords: *pre-consumer fabric waste, digital technologies, 3D designing software, management systems, cut planning software, fabric shrinkage*

SUSTAINABLE RECYCLING OF BIOCOMPOSITES REINFORCED WITH *SPARTIUM JUNCEUM L.* FIBRES

Marijana PAVUNC SAMARŽIJA^{1,*}; Matea TOLO & Edita VUJASINOVIĆ¹

¹University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; marijana.pavunc@tff.unizg.hr; mtolo@tff.unizg.hr; edita.vujasinovic@tff.unizg.hr

* Corresponding author: marijana.pavunc@tff.unizg.hr

Abstract: Sustainable development and the imperative of a circular economy, as well as the growing demand for renewable raw materials, have imposed the need for research into efficient recycling procedures for production and/or consumer waste. This is particularly relevant for new, increasingly prevalent structural materials—biocomposites (composite materials in which at least one constituent, fibre as reinforcement or matrix, is biodegradable or of natural origin). Although biocomposites are considered more environmentally friendly compared to conventional fibre-reinforced composites, their proper disposal and efficient integration into recycling processes still represents a challenge. Recycling approaches for fibre-reinforced composites include mechanical, chemical, and thermal methods, each with its own advantages as well as limitations. While mechanical recycling is often simpler and less energy-intensive, and thermal recycling enables energy recovery from the material, chemical recycling stands out as a method with the potential for simultaneous recovery of both fibres and polymer matrix in almost original form, thus enabling their reintegration into the new production process. This paper presents an investigation into the possibility of chemical recycling of a biocomposite made from a PLA (polylactide acid) matrix reinforced with *Spartium junceum L.* fibres, with the aim of defining the most efficient process that ensures satisfactory quality of recovered fibres with minimal environmental impact.

Keywords: biocomposites; sustainability; recycling; chemical recycling

KNITTED FABRICS POTENTIAL ENERGY OF DEFORMATION DURING ONE LOAD / UNLOAD CYCLE

Željko PENAVAL¹; Diana ŠIMIĆ PENAVAL² & Tea JOVANOVIĆ¹

¹University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; zeljko.penava@tff.unizg.hr

²University of Zagreb Faculty of Civil Engineering, Zagreb, Croatia; dianas@rad.unizg.hr

* Corresponding author: zeljko.penava@tff.unizg.hr

Abstract: *The aim of this paper is to analyze the force/elongation diagram of a knitted fabrics loaded in the row's direction, and then in the wale direction, and to define a common characteristic point at a certain elongation until the knitted fabric sample breaks. Then carry out a test with one load/unload cycle and determine the potential energy of the knitted fabric for different yarn count. Smooth tubular knitted fabrics for fine women's socks made of polyamide microfilament yarns with a nominal yarn count of 20, 33, 40 and 60 tex were used for the test. Knitted fabric samples are cut in the row direction and in the wale direction. Tests were performed on fabric samples that were fixed in two parallel clamps that were placed in a tensile tester. The knitted fabric samples are first exposed to an axial force acting in the row direction and in the wale direction until they break, and then the knitted fabric samples are exposed to one loading/unloading cycle until the relative elongation $\epsilon=200\%$ in the row direction and $\epsilon=200\%$ in the wale direction. The obtained results were used to calculate the potential energy and how the nominal yarn count affects the potential energy values for different directions of force action.*

Keywords: *axial load; potential energy of deformations; knitted fabric; yarn count*

DESIGNING KNITTED FABRICS INSPIRED BY BIOMIMETICS

Mia POPOVSKA¹ & Vesna Marija POTOČIĆ MATKOVIĆ^{2,*}

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; miapopovska@gmail.com

² University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; marija.potocic@tff.unizg.hr

* Corresponding author: marija.potocic@tff.unizg.hr

Abstract: *This paper explores the field of biomimetics in textile design, specifically focusing on the application for creating innovative knitwear patterns that mimic forms found in nature. By investigating the integration of biomimetic principles in knitting, this paper aims to illuminate the innovative and sustainable possibilities that arise when nature becomes a mentor for design. The paper further addresses the integration of biomimetic principles into knitwear patterns, which can lead to the development of unique textures, shapes, and surfaces. The principles will initially be explained based on comparisons with forms found in nature, and then through the works of artists such as Neri Oxman, a renowned designer and architect exploring the intersections between nature and technology; Iris Van Herpen, known for her avant-garde fashion creations that often draw inspiration from organic forms found in nature; and Japanese knitting pioneer Issey Miyake. This research on knitting techniques is based on a series of variations inspired by porous structures from nature, with a particular focus on wooden and botanical patterns observed through microscopic lenses. A collection of knitted samples was produced on a flat knitting machine, mostly using both needle beds.*

Keywords: *Knitwear, biomimetics, nature, technology, pattern*

THE INFLUENCE OF THE WASHING PROCESS OF POLYESTER FABRICS ON THE COMPOSITION OF LAUNDRY WASTEWATER

Tanja PUŠIĆ^{1,*}; Sandra FLINČEC GRGAC¹; Branko NERAL²; Ana ŠARAVANJA¹
& Tihana DEKANIĆ¹

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia, tanja.pusic@tff.unizg.hr;
sandra.flincec@tff.unizg.hr; ana.saravanja@tff.unizg.hr; tihana.dekanic@tff.unizg.hr

² University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia; neral.branko@um.si

* Corresponding author: tanja.pusic@tff.unizg.hr

Abstract: *Environmental issues, considered through the impact of textiles on the quality and health of people, have become increasingly important in recent decades. One of the topics of increasing interest to researchers and the public is microplastic pollution. The properties of the textile material, in combination with the variables of the washing process, have an influence on the release of fragments in the washing process. This study focuses on a polyester fabric with a complex structure exposed to the washing process with the reference detergent ECE A and water according to procedure 2A of a standard HRN ISO EN 6330. The effects of washing were evaluated by characterising the unwashed and washed fabric, the wastewater and the filter cakes. Unwashed and washed textiles were analysed by gravimetric analysis and monitoring of released microplastic from textiles. Physico-chemical parameters of the laundry wastewaters included pH and conductivity, turbidity, and chemical oxygen demand (COD). The results show the importance of analysis of textile materials and wastewater to understand the complexity of this system and its impact on the environment.*

Keywords: *polyester fabric, washing, fragments, wastewater*

FRUITS OF HORSE AND SWEET CHESTNUT – GREEN AGENTS FOR WASHING RAW WOOL

Tanja PUŠIĆ^{1,*}; Agata VINČIĆ¹; Željko KNEZIĆ¹, Zorana KOVAČEVIĆ¹
& Tihana DEKANIĆ¹

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; tanja.pusic@tff.unizg.hr; agata.vincic@tff.unizg.hr; zeljko.knezic@tff.unizg.hr; zorana.kovacevic@tff.unizg.hr; tihana.dekanic@tff.unizg.hr

* Corresponding author: tanja.pusic@tff.unizg.hr

Abstract: *The problems of wastewater contamination with various pollutants from the textile finishing and care process require the search for a solution to this dispersed system and its complex mechanisms. Attempts are being made to use natural detergents, especially for the needs of artisans, designers and creatives who promote sustainability and circular economy. In this study, a comparison was made between fruits of horse chestnut and sweet chestnut as natural and green products containing saponins. In the first phase of the study, an analytical evaluation of the horse chestnut and sweet chestnut was carried out based on the total active substance and pH value. In the second phase, the washing performance of domestic raw wool, the sheep breed "Pramenka" was tested. After the washing process, the properties of the wool fibres and the composition of the wastewater were analysed to verify the concept of functionality and sustainability.*

Keywords: *green agents, chestnut, wool fibres, washing, wastewater*

3D PRINTED THERMOPLASTIC POLYMER SCREEN FOR TEXTILE PRINTING

Luka SAVIĆ¹; Anja LUDAŠ DUJMIĆ^{1,*} & Sanja ERCEGOVIĆ RAŽIĆ¹

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; luka.savic@tff.unizg.hr; anja.ludas@tff.unizg.hr; sanja.ercegovic@tff.unizg.hr

* Corresponding author: anja.ludas@tff.unizg.hr

Abstract: *This study investigate the application of 3D printing technology in the design of textile printing screens using a thermoplastic polyurethane polymer (TPU, trade name Filaflex Gold), known for its flexibility, durability and adhesion properties. These properties make it suitable for the production of reusable screens that meet the requirements of modern textile printing. The process involves designing the printing screen using CAD software's, preparing the file for 3D printing and optimizing parameters such as extruder temperature (215 – 250 °C) and printing speed. Using a 3D printer equipped for flexible filaments ensures accurate and reliable results for creating textile printing screens with TPU. TPU printing screens are compatible with techniques such as screen-printing and hand painting. Thanks to their elasticity, they adapt to curved or irregular surfaces such as textiles, while their durability ensures multiple uses with minimal wear and tear. The method is cost-effective, sustainable and easy to implement on a range of production scales, from small workshops to industrial applications. This approach demonstrates the potential of combining 3D printing and advanced polymers to improve customization, reduce waste and increase efficiency in the design and manufacture of textiles.*

Keywords: 3D printing; Printing screen; Thermoplastic polyurethane polymer (TPU); Sustainable design

DEVELOPMENT AND APPLICATION OF SMART TEXTILE MATERIALS

Ammar SELMANOVIĆ^{1,*}

¹ Faculty of Technical Engineering, Bihać, Bosnia and Herzegovina; ammar.selmanovic@unbi.ba

* Corresponding author: ammar.selmanovic@unbi.ba

Abstract: *Smart textile materials are an advanced class of textiles that incorporate functionalities beyond traditional uses, integrating technology to interact with the environment, users, or objects. These materials combine textile fibers with electronic components, such as sensors and actuators, to respond to various stimuli, enabling a range of applications in fields such as healthcare, sports, fashion, and defense. The development of smart textiles has been driven by advances in materials science, electronics, and nanotechnology. Innovations have allowed for the creation of fabrics that can monitor vital signs, regulate temperature, change color, or even generate energy. In healthcare, smart textiles are used for monitoring patients' physiological conditions, while in sports, they can improve performance through real-time data collection. In fashion, they offer aesthetic features like color-changing fabrics or integrated lighting. Despite the potential, challenges remain in terms of durability, comfort, and integration of electronic components with textile fibers. As technology advances, smart textiles are expected to evolve further, becoming more functional, efficient, and widely adopted in everyday life.*

Keywords: *smart textiles; functional materials; technology integration; sensory; technology integration.*

DESIGNING THE FUTURE: AI-POWERED TTF LOGO-INSPIRED PATTERNS FOR APPAREL AND ACCESSORIES

Rahela STRINIĆ; Vanja LANDRIPET; Lucija KUNDAKČIĆ; Tomislav ROLICH¹;
Slavenka PETRAK^{1,*} & Maja MAHNIĆ NAGLIĆ¹

¹University of Zagreb Faculty of Textile Technology, Zagreb, Republic of Croatia; rahela.strinic@tff.hr;
vanja.landripet@tff.hr; lucija.kundakcic@tff.hr; tomislav.rolich@tff.unizg.hr; slavenka.petrak@tff.unizg.hr;
maja.mahnic@tff.unizg.hr

* Corresponding author: slavenka.petrak@tff.unizg.hr

Abstract: *The utilization of artificial intelligence is gaining prominence in digital apparel and accessory design, progressively altering creative methodologies in the formulation of new models and collections within the fashion sector. Artificial intelligence exhibits remarkable potential in producing numerous design solutions and variations, guided systematically by users. This article examines the prospective use of artificial intelligence in creating textile print patterns, drawing inspiration from the logo of the University of Zagreb Faculty of Textile Technology, which served as the principal source of motivation. The research investigates the potential of sophisticated generative design methods, utilizing artificial intelligence models to generate distinctive patterns and textures derived from the logo's design features. A methodical approach is outlined, incorporating design inspiration, computer modeling, and creative iteration. The research and extensive description of the logo design's major aspects and elements facilitated the exploration of crafting descriptive instructions. These instructions included crucial visual and conceptual components to direct the AI-facilitated creativity process. The produced textile patterns and textures were then utilized in the traditional digital design process for apparel and fashion accessories. The curated collection of models was subsequently analyzed using artificial intelligence algorithms to discern style attributes and produce novel outputs — distinct apparel and accessory designs enhanced through iterative procedures customized to user preferences. The AI-generated variations of apparel and accessory models were assessed regarding quality, suitability for textile printing, scalability, repeatability, aesthetic appeal, and utility.*

Keywords: *clothing and accessory design; artificial intelligence; TTF logo; pattern generation*

THE INFLUENCE OF BIOPOLYMER COATINGS ON THE PHYSICAL-MECHANICAL PROPERTIES OF YARNS

Dolores STULIĆ¹; Maja SOMOGYI ŠKOC¹ & Iva REZIĆ MEŠTROVIĆ^{2*}

¹ University of Zagreb Faculty of Textile Technology, Department of Materials, Fibres and Textile Testing, Zagreb, Croatia; stu.dolores@gmail.com, maja.somogyi@tff.unizg.hr

² University of Zagreb Faculty of Textile Technology, The Department of Applied Chemistry, Zagreb, Croatia; iva.rezic@tff.unizg.hr

* Corresponding author: iva.rezic@tff.unizg.hr

Abstract: *The modification of polyester yarn was carried out with the aim of producing sustainable coatings from biodegradable natural polymers. The modification of yarns with biodegradable natural polymers represents an ecological alternative to the sol-gel process. The coatings were produced from erythritol, gelatine and collagen with the addition of propolis and alginate fibres and a natural plasticiser (glycerine). The sustainable coatings in this work fulfil the requirements of the Food and Drug Administration (FDA) and the European Medicines Agency (EMA). The advantage of the sustainable coatings is that they consist of compounds that can be taken orally and are therefore suitable for external use. The morphology of the yarn was determined before and after modification with Dino-Lite. The pH value, thickness and linear density were also monitored before and after modification. The results showed that the modification had no significant effect on the thickness or linear density of the yarns. Furthermore, based on the pH results, the modified samples are suitable for external application on the skin. The results of the tensile strength properties of the modified samples showed a decrease in the strength value of the tested samples (the untreated sample has the highest value and the sample treated with erythritol and propolis has the lowest). When analysing the elongation values of the tested samples, it is noticeable that the sample treated with erythritol and propolis has the lowest ability after modification, while the untreated sample also has the highest elongation ability. The samples after modification had a very pleasant textile feel (hand value). The modification of the polyester yarn was carried out with the aim of obtaining a flat product for use as a medical dressing for chronic wounds or for a possible surgical application in dentistry, etc.*

Keywords: *medical textile; yarn; modification; testing, biodegradable natural polymers*

COLORFUL TEXTILES FROM COLORFUL NATURE

Ana SUTLOVIĆ^{1,*}; Martina GLOGAR¹; Iva BRLEK¹ & Ivana ČORAK¹

¹University of Zagreb Faculty of Textile Technology, Zagreb, Croatia

ana.sutlovic@tff.unizg.hr; martina.glogar@tff.unizg.hr; iva.brlek@tff.unizg.hr; ivana.corak@tff.unizg.hr

* Corresponding author: ana.sutlovic@tff.unizg.hr

Abstract: *The demands of modern life and industry strive for environmentally friendly and sustainable processes in all areas of human activity, including the textile industry. In response to this demand, natural dyes, which had fallen into obscurity at the end of the 19th century, have gained popularity as an acceptable alternative to synthetic dyes. In the past, natural dyes of plant and animal origin for dyeing textiles were mainly used for dyeing protein fibers, while cellulose materials were bleached. However, the revival of the use of natural dyes poses a challenge and puts the emphasis on the use of natural dyes for cotton materials. In addition to the beautiful coloration, the modern use of these dyes also implies the study of their multifunctional properties (antimicrobial, antifungal, protection against UV radiation, etc.). The research presented in this paper provides an overview of the results obtained in the field of the application of natural dyes of plant and animal origin, including through dyeing techniques and textile printing, focusing on the contribution to the study of textile heritage and the modern fashion industry based on the principles of circular economy. Research in the field of historical textiles contributes to the identification of archeological textile finds and in the field of restoration and conservation. In the production of modern textiles, the focus is on the idea of "zero waste", i.e. the use of plant waste, weeds or invasive species. To ensure an "eco" premise, care must be taken to ensure that the choice of plants does not endanger their habitat, that the technological processes do not cause pollution, that the choice of chemicals does not compromise the quality of the textiles and that textile material is produced that is safe for human health.*

Keywords: *natural dyes; textile materials; circular economy; zero waste*

DIGITAL INKJET PRINTING QUALITY ASSESSMENT AFFECTED BY TOPOGRAPHICAL AND MORPHOLOGICAL ELEMENTS OF THE FABRIC SURFACE STRUCTURE

Marijana TKALEC¹; Martina GLOGAR^{1,*}; Ivana ČORAK¹ & Deja MUCK²

¹ University of Zagreb Faculty of Textile Technology, Zagreb, Croatia; marijana.tkalec@tff.unizg.hr; martina.glogar@tff.unizg.hr; ivana.corak@tff.unizg.hr

² University of Ljubljana Faculty of Natural Sciences and Engineering, Ljubljana, Slovenia; deja.muck@ntf.uni-lj.si

* Corresponding author: martina.glogar@tff.unizg.hr

Abstract: *The paper analyses the influence of the reproduction quality and colour appearance on fabrics of different construction and structural characteristics, printed using digital inkjet technology based on reactive dyes. The 100% cotton fabrics of different construction and structural characteristics were chosen: Plain weave 1/1, Twill weave 2/1 and Mixed panama weave 2/1. Furtherly, the samples were digitally printed on Tx2-1600 Mimaki digital printing device with reactive dyes, previously impregnated with a special solution of thickener and chemicals. Three different images named: Multi-coloured composition, a Photography standardized for the image analysis and a Print quality analysis form, were digitally printed on the fabrics. For the analysis, three different methods were used. First method analyses colour reproduction using spectrophotometric measurements to obtain data on colour properties. Second method – method of image analysis in ImageJ program, together with microscopic imaging with Dino-Lite digital microscope was used to obtain the data on printed graphic element appearance and on the ink capilarity/wicking on different fabrics. Third method refers to the visual/subjective analysis of the Photography printed on different fabrics. The spectrophotometric results were presented through colouristic analyses, based on colour and colour differences objectification. The objective values of the parameters: Lightness (L*), Chroma (C*) and hue (h°) showed influence of the structure and characteristics of the substrate on colour reproduction; certain changes are obtained, which are also confirmed by the colour differences evaluation. The image analysis confirms the influence of yarn characteristics and structure of the fabrics on ink wicking – according to the results, Plain weave that has more cross over points gives better printing quality due to values of capillary spreading, in comparison to other two samples where yarns float for longer distance and the ink wicks easily. Visual/subjective and microscopic analysis of the Photography prints confirm the influence and interaction between the heterogeneous structures of textile fabrics and the quality of colour reproduction.*

Keywords: *Fabric topography; colour reproduction; digital inkjet printing; image analysis; ImageJ*

CONTEMPORARY TRENDS, TEXTILE INDUSTRY AND INCREASING IMPORTANCE AND ROLE OF PUBLIC RELATIONS

Milovan VUKOVIĆ^{1,*}, Aleksandra VUKOVIĆ² & Snežana UROŠEVIĆ³

¹ University of Belgrade; Technical Faculty in Bor, Serbia, e-mail: mvukovic@tfbor.bg.ac.rs;

² Academy of Technical and Art Applied Studies, Belgrade; School of Railroad Transport, Serbia,

³ University of Belgrade; Technical Faculty in Bor, Serbia, e-mail: surosevic@tfbor.bg.ac.rs

* Corresponding author: mvukovic@tfbor.bg.ac.rs

Abstract: *The most important contemporary world-wide trends – development of new communication technologies and, consequently, new communicative practices, and, appearance of a number of crisis situations – which began in 2008, affect all aspects of society, including economic life. Social media, for instance, are increasingly integrated into contemporary world, which means, vast majority of people are exposed to what they see online, especially, when it comes to fashion. It becomes difficult not only for customers to follow trends, but also for companies to advertise and, more importantly, sell their products. Numerous industrial sectors, including the textile and fashion companies, are exposed to various threats – above all, the decrease in the demand for specific products. Many textile and fashion companies, due to a fast changing business environment, try to find out more appropriate mechanisms to face the consequences of numerous new challenges. Under influence of these factors, crisis management in a systematic way within a company seems to be one of possible tools in order to reduce the adverse effect of undesired events. Solving any problem, on the other hand, mainly depends on the level of public relations development as a recognizable business function, apart from marketing. The crucial goal of this study explains and highlights the role of public relations in contemporary business environment, particularly from the standpoint of companies that dominate in the textile and fashion industry. The first part of the paper depicts the role of public relations in general. The central part of this paper focuses on public relations practices that deal with the advancement of new communicative practices, on one hand, and, crisis situations, on the other hand. We also consider possible communication strategies, developed within public relations field that can help the textile industry to resolve any problem under conditions of risk.*

Keywords: *public relations, new communicative practices, crisis situations, textile and fashion industry, customer relations.*

GRAIN SIDE LEATHER DECORATION

Franka ŽUVELA BOŠNJAK^{1,*} & Sandra FLINČEC GRGAC¹

¹ University of Zagreb Faculty of Textile Technology, 10000 Zagreb, Croatia; sflincec@tff.unizg.hr

* Corresponding author: franka.zuvela.bosnjak@tff.unizg.hr

Abstract: *Leather as a valuable material for the production of clothing, footwear, haberdashery, upholstery for household interiors, for all means of transportation and trimmings requires many treatment processes in order to fulfil the properties desired by consumers. From a functional point of view, the finishing processes on the grain side of the leather play an important role, including topcoating, lacquering, varnishing, embossing, etc. The grain side of the leather is protected from external influences and defects and damage are concealed. Leather finished in this way is an ideal basis for various aesthetic decorations that give the leather its final appearance and functionality. There are a number of leather decoration processes such as: Engraving, embossing, carving, drilling, embroidering, printing, painting, knitting, tattooing, various laser beards, etc. Each of these operations is carried out in the manufacture of leather goods for different applications and does not affect the functionality of the leather. It is an extremely important creative and design component that extends from finishing to the final stage of decoration, even for items that are not unique.*

Keywords: leather; finishing processes; decoration

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