



The V-th International Symposium
Creativity. Technology. Marketing

CREATIVITY TECHNOLOGY MARKETING

PROCEEDINGS

31 March 2023
Chişinău



CREATIVITATE TEHNOLOGIE MARKETING



CTM 2023

AL V-lea SIMPOZION INTERNAȚIONAL
31 martie, Chișinău, Republica Moldova

Universitatea Tehnică a Moldovei
Facultatea de Design
Str. Acad. Sergiu Rădăuțanu 4

Chișinău 2023

COMITETUL ȘTIINȚIFIC AL EVENIMENTULUI

Viorel BOSTAN, dr. hab., prof. univ., Rector al Universității Tehnice a Moldovei, președinte.

Carmen Maria LOGHIN, dr.hab., prof. univ., Prorector al Universității Tehnice „Gh. Asachi” Iași, Romania.

Antonela CURTEZA, dr.hab., prof. univ., Universitatea Tehnică „Gh. Asachi” Iași, Romania

Alexandra Gabriela ENE, dr.ing., Director general al Institutului Național de Cercetare Dezvoltare Textile Pielărie, București, Romania.

Savin Dorin IONESI, dr.ing., conf. univ., Decan Facultatea Design Industrial și Managementul Afacerilor, Universitatea Tehnică „Gh. Asachi” Iași, Romania.

Kalina PASHEVICH, dr. hab., prof.univ., Șef catedră Arta și Designul Costumului, Facultatea de Design, Universitatea Națională de Tehnologii și Design din Kiev, Ucraina.

Natalia OSTAPENCO, dr.hab., prof.univ., Șef catedră Modelarea și Proiectarea Confecțiilor, Facultatea de Arte și Modă, Universitatea Națională de Tehnologii și Design din Kiev, Ucraina.

Adrian STOLERIU, dr., conf. univ., Decan Facultatea Arte Vizuale și Design, Universitatea Națională de Arte „George Enescu” Iași, Romania.

Sergiu TRONCIU, dr., conf. univ., Decan al Facultății de Design, Universitatea Tehnică a Moldovei.

Angela SCRIPCENCO, dr., conf. univ., departamentul Design și Tehnologii în Textile, Universitatea Tehnică a Moldovei.

Marcela IROVAN, dr., conf. univ., Șefă de departament Design și Tehnologii în Textile, Universitatea Tehnică a Moldovei.

Valeriu POBORSCHI, conf.univ., Șef de departamentul Design Industrial și de Produs, Universitatea Tehnică a Moldovei

COMITETUL ORGANIZATORIC AL EVENIMENTULUI

Sergiu TRONCIU, dr., conf. univ., decan al FD, UTM.

Angela SCRIPCENCO, dr., conf. univ., coordonator pentru Cercetare Inovare la FD, UTM.

Valentina BULGARU, dr., conf. univ., departamentul DTT, FD, UTM.

Angela GHELBET, dr., conf. univ., departamentul DTT, FD, UTM.

Svetlana CANGAS, dr., conf. univ., departamentul DTT, FD, UTM.

Jana CÎRJA, dr., conf. univ., departamentul DTT, FD, UTM.

Ana Maria CÎRJA, asist. univ., departamentul DIP, FD, UTM.

Olga SUGAC, dr., conf. univ., șefă de program TDCT, departamentul DTT, FD, UTM.

Alina TOCARCIUC, asist. univ., șefă de program DVI, departamentul DTT, FD, UTM.

Viorica CAZAC, dr., conf. univ., șefă de program DTP, departamentul DIP, FD, UTM.

Cristina EFREMOV, lect. univ., dr., prodecană pentru activitatea didactică FD, UTM.

Larisa CAPBATUT, asist. univ., departamentul DIP, FD, UTM.

Ludmila ZASTAVNICHİ-ȘEREMET, asist. univ., departamentul DTT, FD, UTM.

Lucia ADASCALIȚA, asist. univ., departamentul DIP, FD, UTM.

Nadejda CIOBANU, inginer superior, departamentul DTT, FD, UTM.

Mariana COLOCARU, asist. univ., departamentul DTT, FD, UTM.

CZU 082=135.1=111
C 84

Materialele conferinței în format electronic sunt plasate pe site-ul:
<https://fd.utm.md/evenimente/>

Responsabilitatea pentru exactitatea expunerii, corectitudinea datelor, cifrelor, citatelor, referințelor este integral a autorilor articolelor.

Redactor responsabil: Angela Scripcenco

Procesarea computerizată: Svetlana Cangaș
Coperta: Ana-Maria Cîrja

DESCRIEREA CIP A CAMEREI NAȚIONALE A CĂRȚII

„Creativitate. Tehnologie. Marketing.”, simpozion internațional (5;2023; Chișinău). Creativitate. Tehnologie. Marketing. CTM 2023 : Al V-lea Simpozion Internațional, 31 martie. Chișinău/ Comitetul științific: Viorel Bostan (președinte) [et al.].
- Chișinău: Tehnica-UTM, 2023. - 327 p.: fig., tab.
Antetit.: Universitatea Tehnică a Moldovei, Facultatea de Design. – Texte, rez.: lb.rom, engl. – Referințe bibliograf. la sfârșitul art. – 50 ex.

Bun de tipar 09.11.23

Comanda nr. 111

MD-2004, Chișinău, bd. Ștefan cel Mare și Sfânt, 168, UTM
MD-2045, Chișinău, str. Studenților, 9/9, Editura „Tehnica-UTM

ISBN 978-9975-45-987-7

© Universitatea Tehnică a Moldovei, 2023
© Facultatea de Design, 2023

CUPRINS

Cuvânt de salut	10
PLENARY SESSION	
ȘEDINȚA ÎN PLEN	
OSTAPENKO Nataliia, KOLOSNICHENKO Maryna A conceptual approach to the development of design and ergonomic solutions for special purpose clothing	13
GHEORGHÎȚA Maria Contribuția angajamentului social și de mediu la sustenabilitatea întreprinderilor din industria ușoară și implementarea economiei circulare	17
LIUKLIAN Nadiia, PASHKEVYCH Kalyna, PROTSYK Bogdan, PETROVA Olga Smart fashion: connection between haute couture and the newest technology	23
TOPIC 1: SCIENTIFIC AND CULTURAL ASPECTS OF DESIGN	
SECȚIUNEA 1: ASPECTE ȘTIINȚIFICE ȘI CULTURALE ALE DESIGNULUI	
ECATERINA MĂRGHIDAN Textile printing / Art and technology	27
CAZAC Viorica, ADASCALIȚA Lucia Analiza diversității fețelor de pernă din interiorul tradițional	33
CAZAC Viorica, CÎRJA Jana Valorile protectoare ale costumului tradițional	39
TOPIC 2: TRENDS IN ART AND FASHION DESIGN DEVELOPMENT	
SECȚIUNEA 2: TENDINȚE ÎN DEZVOLTAREA ARTEI ȘI A DESIGNULUI VESTIMENTAR	
ROȘCA Mălina Ioana, VATRĂ Ana-Diana, AVĂDANEI Manuela Lăcrămioara, LUPOAE Florentina Stil și eleganță – produse vestimentare pentru persoane cu dizabilități locomotorii	47
CHUPRINA Natallia, SKICHKO Diana, CHZHAN Khan Design features of special clothing for archeologists	56
CHUPRINA Nataliia, TERESHCHENKO Olha, BILAS Kristina Modern urban stylistics of the military	62
DOINA-BEZUȚCHI Angela, MALCOCI Marina Studiul metamorfozelor stilului etnic	67

MANDYRADZHY Ilona, KOSTOCHKA Anna, KOLOSNICHENKO Olena, CHUPRINA Natalia Ethnic preconditions for designing contemporary eco-clothing	71
MORASKA Maryana, LOZOVENKO Svitlana, BILOTSKA Larysa The creation of a stylized dress for the enaissance era historical reconstruction	77
MYKHAILIUK Olha, TERESHCHENKO Olha, MAMLAI Anastasiia The use of the structure of natural forms in the collections of modern designers	80
MYKHAILIUK Olha, TERESHCHENKO Olha, SERKIS Victoria Analogies of the forms of marine fauna in modern clothing collections	84
VODZINSKA Oksana, PAUKOVA Valentyna Transformer dress as an example of reasonable garment consumption	88
VOROBCHUK Mariia, PASHKEVYCH Kalyna, Zhuozhao XIE, Dai WENHUI Qr-code as a source of creating decorative elements in the fashion industry	90
TOPIC 3: VISUALIZATION OF INFORMATION TECHNOLOGIES IN DESIGN	
SECȚIUNEA 3: VIZUALIZAREA TEHNOLOGIILOR INFORMAȚIONALE ÎN DESIGN	
FLOREA-BURDUJA Elena, IROVAN Marcela, INDRIE Liliana Tehnologii digitale aplicate în diversificarea produselor de îmbrăcăminte	96
ARNĂUTU Irina Jacquard fabric simulation with extra wefts in arahweave	102
PALAMARCIUC Anna Mijloace digitale de proiectare a colecțiilor vestimentare	108
TOPIC 4: PROSPECTS FOR THE DEVELOPMENT OF ENVIRONMENT DESIGN	
SECȚIUNEA 4: PERSPECTIVE PENTRU DEZVOLTAREA DESIGNULUI DE MEDIU	
DZIKEVYCH Anna, IVANOVA Margaryta, OLEINIKOVA Iryna Improving the autonomous lighting system and equipping pedestrian crossings	115
HOPERSKYI Serhii, OLEINIKOVA Iryna, LAGODA Oksana Natural materials in the ecodesign of the urban environment	121
JOMIR Constantin, ENE Alexandra-Gabriela Modelarea matematică și analiza structurală pentru materialele com pozitelor flexibile ale sistemelor modulare flotante utilizate în marea salmastră	126

LEONOVA Daryna Protection of personnel and military equipment against electromagnetic attacks by using shielding textile materials	133
JOMIR Mihaela, RADULESCU Razvan Ion, GROSU Catalin, SCARLAT Razvan Textile structures and panels assembly for limiting the effects of maritime and fluvial disasters	136
OLEYNIKOVA Iryna, LAGODA Oksana, ISAIEV Denys Testing the efficiency of the installation of basalt wind turbines with onipko rotor	142
RYSHKEVYCH Natalia Visual communication system as an important component of library interior design	148
MADAN Elena Mobilierul vienez din Moldova sfârșitul sec. al XIX-lea-mijlocul sec. al XX-lea	154
TOPIC 5: TECHNOLOGIES IN FASHION INDUSTRY SECȚIUNEA 5: TEHNOLOGII ÎN INDUSTRIA MODEI	
RIABCHYKOV Mykola, NAZARCHUK Liudmyla Creation of smart elements of clothing using magnetic textiles	163
MELNYK Liudmyla, KYZYMCHUK Olena The effect of raw materials on the stiffness of elastic knitted fabrics	168
FRUNZE Valentina, IROVAN Marcela Dezvoltarea unor produse sustenabile prin aplicarea principiilor modelii circulare	172
RARU Aliona, FARÎMĂ Daniela, IROVAN Marcela Biomaterialele – o alternativă sustenabilă în domeniul industriei textile	178
OSTAPENKO Nataliia, STRUMINSKA Tetiana, RUBANKA Alla, OLIINYK Halyna, MAMCHENKO Yana Systematization of the components of ergonomic clothing for military personnel by functional characteristics	182
ARABULI Arsenii, BAJZIK Vladimir, KYZYMCHUK Olena Thermal properties of hybrid knitted fabrics for electromagnetic field shielding	184
VESELA Julia, OSTAPENKO Nataliia, RUBANKA Alla, EZHOVA Olga, LUTSKER Tetiana, Structural and technological features of the femoral platform	186

CANGAȘ Svetlana, FLOREA-BURDUJA Elena Poziționarea gulerelor cu revere în produsele de îmbrăcăminte	188
KAZHUKALO Yana, LOZOVENKO Svitlana Fusing the art of crochet and knitting for creating sustainable clothing and eco-friendly apparel	196
TKACHUK Oksana Research on hygienic properties of materials for underwear	201
HERASYMCHUK Oleksandr, TKACHUK Oksana Regarding the question of obtaining natural textile fibers from pine needles	203
MALCOCI Marina, DOINA-BEZUȚCHI Angela Elaborarea modelelor noi de încălțăminte utilizând diverse construcții	209
KAPTIUROVA Dariia, CHERTENKO Liliia, BONDAR Olexander Improvement of the shape and design of tactical footwear for the Ukrainian military	213
RIABCHYKOV Mykola, MYTSA Viktoriia Provision of new models of organization in the fashion industry with the use of electronic labels	215
SORBALĂ Iulia, MALCOCI Marina Studiul etapelor la crearea catalogului de produse de încălțăminte	221
SCRIPCENCO Angela Modern approach to forming a clothing wardrobe for school	227
SCRIPCENCO Angela The trends in the processing technologies of apparel in the luxury segment	232

TOPIC 6: ARTS OF PRINTING
SECȚIUNEA 6: ARTELE TIPARULUI

MARDARI Daniela, Viorica CAZAC Utilizarea realității augmentate în designul produselor tipografice	237
GHELBET Angela, OSOBA Alexandra Perspective de dezvoltare a designului și tehnologiilor poligrafice	244
IFTODI Daniela, ADASCALIȚA Lucia Ilie Bogdesco – artistul plastic ce implică arta caligrafică în grafica de carte	250
SÎRBU Dina, CAZAC Viorica Influența substanțelor chimice utilizate în procesele tipografice asupra sănătății angajaților	255

<p>UNGUREANU Cristina, CAZAC Viorica Siguranță, inofensivitate și vizibilitate prin aplicațiile electroluminiscente serigrafiate cu destinație specială</p>	263
<p>Nicoleta VASILIEV, Viorica CAZAC Analiza impactului edițiilor de carte interactive asupra dezvoltării abilităților copiilor</p>	268
<p>ENESCU Daniela Stefania Studiu de caz privind realizarea materialelor publicitare cu ajutorul imprimantelor 3D</p>	275
<p>VASYLIEV Oleksandr Design features of online store logos</p>	281
<p>TOPIC 7: BUSINESS ASPECTS OF DESIGN ACTIVITIES / ENTREPRENEURIAL EDUCATION IN DESIGN</p> <p>SECȚIUNEA 7: ASPECTE DE AFACERI ALE ACTIVITĂȚILOR DE DESIGN / EDUCAȚIE ANTREPRENORIALĂ ÎN DESIGN</p>	
<p>GHELBET Angela, GOLAN Antonina Sistemul electronic de achiziții publice pentru echipamentul militar: realități și perspective</p>	286
<p>GHELBET Angela, BULGARU Valentina, GHEORGHITĂ Maria, SCRIPCENCO Angela, OBERȘT Ala Educația antreprenorială a studenților în opinia angajatorilor din domeniul textile-pielărie</p>	292
<p>TĂLĂMBUȚĂ Angelina, MATEI Livia Condițiile de protecție a unei opere de creație intelectuală</p>	301
<p>TOPIC 8: PEDAGOGICAL ASPECTS IN ENGINEERING TRAINING</p> <p>SECȚIUNEA 8: ASPECTE PEDAGOGICE ÎN PREGĂTIREA INGINEREASCĂ</p>	
<p>Rodion CIUPERCĂ, Vasilina POPOV Oportunități de dezvoltare a competențelor pedagogice pentru cadrele didactice din învățământul vocațional</p>	308
<p>GOROSHKOVA Valentina Formation of value and communicative competence of students of secondary professional education and their development in the process of extra-educational activities</p>	314
<p>TRONCIU Sergiu Importanța concursurilor pentru pregătirea studenților la specialitățile creative</p>	319
<p>Mulțumiri și precizări</p>	324

NATURAL MATERIALS IN THE ECODESIGN OF THE URBAN ENVIRONMENT

HOPERSKYI Serhii, OLENIKOVA Iryna, LAGODA Oksana
Kyiv National University of Technologies and Design, Kyiv, Ukraine

*Corresponding author: OLENIKOVA Iryna: e-mail olejnikova.iv@knutd.com.ua

Abstract: *Factors affecting the choice of materials for the creation, operation and disposal of objects and infrastructure systems of the city are considered. Basalt and carbon fiber composites were selected as materials that meet the requirements of ecodesign. The unique properties of these materials provide a wide range of products that can be made on the basis of such natural fibers. The main areas of improvement of the specified materials, improvement of properties to expand their functionality are considered. A comprehensive approach to the design of objects is proposed, taking into account all possible dangers that arise from the initial stage of their production to the last stage - disposal. The possibility of using basalt composites as components of most objects in the creation of a natural human habitat has been demonstrated. The high absorption properties of carbon fabrics have been studied. This allows creating a new approach to the issue of water and air purification.*

Key words: *urban infrastructure, power pole, basalt composite, carbon composite.*

1. INTRODUCTION

Over the past 5-7 years, the attitude of society towards the design and construction of a socialized human environment has begun to change rapidly, and there are at least three reasons for this change:

- crisis phenomena in the world economy, and above all, the crisis of infrastructure: financial, energy and resource in general, transport, communications. Moreover, against the general background of the development of infrastructure technologies, innovations in it are rapidly lagging behind the demand of society;
- strengthening of the "systemic fragility" of the infrastructure and the entire set of ensuring social reproduction (primarily in the sectors of direct support, for example, utilities, communications, transport and logistics), due to their avalanche-like complication, and also due to the asymmetric increase in threats from man-made and natural nature (including new large-scale biological threats such as the COVID pandemic);
- increasing environmental pollution and depletion, as a result, of systemic natural resources such as water, clean air, soils.

As one of the natural responses to these negative trends, a new approach to the principles of designing the human environment has emerged ECODESIGN [1].

2. MODERN ECODESIGN PROBLEMS

ECODESIGN is a key concept for a new paradigm of the arrangement of the environment and the socialization of modern man [2]. It consists, first of all, in the key attention to the protection of the environment and considers a person at the same time:

- a) as part of the ecosystem as a whole and
- b) as an object of assessment of the degree of his symbiosis with the environment of his existence.

In a simplified sense, Ecodesign is a direction in design that pays key attention to protecting the environment throughout the life cycle of a product, system, or process. Here, in the complex, all aspects of the creation, use and disposal of the product / system are taken into account.

Ecodesign, along with the obvious and already established (standardized / standardized) requirements of aesthetics, comfort and price of renovation, introduces new decision-making factors for its creation, namely:

- A measure of the consumption of the sum of all resources at the stage of design, manufacture, use and disposal, with particular emphasis on the so-called "scarce" resources (energy) and resources potentially threatening the external environment

- The very origin of materials, especially in the field of biotechnology and renewable resources. Many aspects are taken into account, starting with the protection of the environment by the manufacturer (supplier) and ending with the observance of the rights of workers in enterprises, the correct attitude to animals, etc.

- Safety in the use of the product / system, no harm to health, minimization of noise, emissions, radiation, vibration, etc. Recently, specific standards and requirements have been introduced into the understanding of safety at social facilities ANTIVANDALISM, compliance with traffic regulations, security of elements CRITICAL INFRASTRUCTURE. It is possible to expect that the multilevel safety factors will be further folded into a separate RELIABILITY AND SECURITY criterion [3].

- Ease and safety of disposal, the ability to reuse materials with minimal environmental damage

Different countries and associations have developed and adopted specific methodologies and standards that allow for a comprehensive analysis of the above aspects, for example, the Environmental Impact Analysis EIA (see below). At the same time, the very concept of Ecodesign - mentally split into two or three differently interpreted approaches in design and macro / micro design of the environment.

The first, the most primitive one is the correct consumption, processing, use of natural materials, as well as the widespread use of recycled materials.

The second is ecodesign as an introduction to today's rational and uniform world of glass and concrete of landscaping, micro-water objects, often with microfauna. This movement is typical for more or less prosperous countries of the East, poor in bioresources - South Korea, Singapore, the Middle East. In some Western countries, this takes the form of gardens and lounge facilities on rooftops without much reference to urban facilities as a single structure.

The third is an attempt to create a fashion for micro-eco-solutions as a culture of life - the creation of bio-objects on window sills, a garden on the roof, complex solutions with bio-objects, up to greenhouses inside prestigious households. In the latter case, it is no longer so much a design as a way of life.

In addition to this, the three-year period of the pandemic has given rise to a trend in the search for a biologically independent and protected environment as an element of solving the problem of biological protection (the introduction of biological protection means into households such as quartz lamps, bioprotective vestibules, etc.), as well as

means of autonomous life support.

Finally, in a number of EU directives, since about 2009, the concept of “Ecodesign” has already been working normatively in its most adequate understanding in matters of labeling goods and services for energy efficiency, the presence of hard-to-recycle waste and the possibility of their use as secondary raw materials, and others.

One of the options for assessing the factors that are key to reducing environmental impact at all stages of the life cycle can be used as an Environmental Impact Analysis (EIA) [5].

In addition to objective (measurable factors) such as

- Price per unit of power or other specific parameter of a typical system,
- The level of costs for the production of goods or services (Carbon equivalent),
- Warranty period for the product, system, etc.

The EIA evaluation scheme also includes objectified expert indicators (for example, in a wall scale or statistically processed expert opinion):

- Desires - consumer preferences (expert assessment)
- Legal requirements (eg tenders), market component (competition)
- Data on the product and its production process and the nature of the primary raw materials (assessment)

For clarity, you can build a vector diagram in comparable coordinates and define the optimum as an area.

3. BASALT AND CARBON COMPOSITES AS COMPONENTS OF ECODESIGN

Setting the task for the use of materials is based on the setting of the task of compliance with the Ecodesign approach. Requirements are:

1. Simplicity and availability of primary raw materials, avoiding metal in general and rare metals in particular (composites based on Basalt and Carbon with the simplest organic fillers).
2. Regulated (set during production) properties and consumer qualities
3. Sufficiently long (or better regulated) life span correlated with innovation/renovation cycles.
4. Ecological cleanliness (biological neutrality) and ease of disposal.
5. Easily technologically achieved aesthetic effect.
6. Relative cheapness.

In principle, all these requirements are met by materials made of composites based on reinforcement with basalt or carbon fabrics, the so-called. basalt concrete, casting, extrusion, stamping from a mixture of org. Filler + reinforcing additive from basalt or carbon particles, profiles and scales in proportions of 15% or more.

Further examples of implementation (types of products):

- pillar (pipe, structural element),
- road markers and bumpers,
- instrument boxes and body parts of the control infrastructure in the public utilities,
- basalt rebar and road grids,
- soil reinforcement systems and artificial soil for greenhouses and flower beds.

The rapid development of the production of composites based on basalt fiber made it possible to create various components of a comfortable human existence in the urban environment (Figure1).

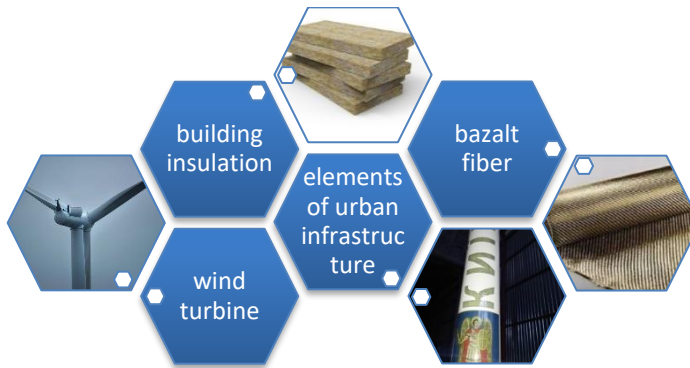


Figure 1: Basalt composite products

Thus, basalt fabrics became an alternative to metal reinforcing structures in construction [5]. Insulators based on basalt wool allow you to retain heat in homes without causing a negative impact on the environment. Replacing metal structures for street lighting with poles made of basalt composite not only extends their service life several times, but also significantly improves the aesthetic composition of the city. The energy crisis in Ukraine demonstrated the need for autonomous power supply for local areas and requires the creation of renewable energy generators. Such structures can also use elements made of basalt materials. In order to prove the advantages of basalt materials over metal in meeting the requirements of eco-design, a comparative analysis of poles for lighting city streets was carried out (Figure 2).

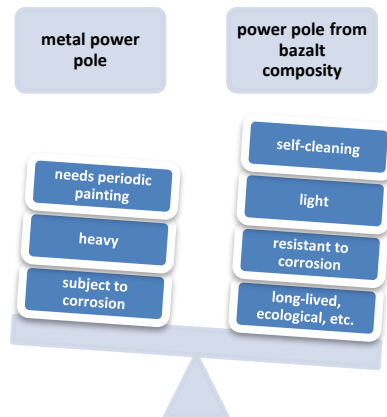


Figure 2: Comparison of the properties of a metal pillar and a pillar made of basalt material.

Another variant of the natural material that has unique properties is carbon fiber. This fiber has excellent structural characteristics and adsorption properties [6]. It can effectively adsorb various inorganic and organic compounds and promote regeneration. The main problem that arises when working with such a fiber is a weak

bond between the fibers. In order to increase the strength of weaving, it is proposed to cover it by nanomaterials, which, on the one hand, will not affect the adsorption properties, and on the other hand, it will preserve the integrity of the material.

4. CONCLUSIONS

Basalt and carbon fiber composites were selected as materials to improve urbanistic areas and satisfy the requirements of ecodesign.

It was substantiated that most metal objects of urban infrastructure can be made of basalt composites. Also wind electric stations could include such components.

Due to excellent structural characteristics and adsorption properties of carbon fiber it can effectively adsorb various inorganic and organic compounds and promote regeneration. To solve the problem of weak bonds between the fibers and to increase the strength of weaving it was proposed to cover it by nanomaterials.

5. REFERENCES

1. ZAVGORODNIA, V.I. Ekodyzain yak novyi pidkhid do proektuvannia: rozvytok ta problemy In: *Materialy vseukrainskoi naukovo-praktychnoi konferentsii здobuvachiv vyshchoi osvity i molodykh uchenykh «Suchasna mystetska osvita: dosvid, problemy ta perspektyvy»* - 20 April 2018. Kyiv: Kyivskiy derzhavnyi instytut dekoratyvno-prykladnoho mystetstva i dyzainu imeni Mykhaila Boichuka, pp 54-56. [In Ukrainian]
2. KVASHCHUK Yu.V., STEPANENKO M.P. Ekodyzain u konteksti optymizatsii mistobudivnoi sfery. In: *VII mizhnarodna naukovo-praktychna konferentsiia «Kompleksne zabezpechennia yakosti tekhnolohichnykh protsesiv ta system»*. - 24-27 April 2017. Chernihiv: Chernihivskiy natsionalnyi tekhnolohichnyi universytet. [In Ukrainian]
3. KRYZHANOVSKA N. Ya., SMIRNOVA O. V. *Ekodyzai*. KhNUMH im. O. M. Beketova, Kharkiv, 2019. [In Ukrainian]
4. KIM H., CLUZEL F., LEROY Y., YANNOU B., YANNOU-LE BRIS G. *Research perspectives in ecodesign* 2020. [Last accessed: 15.09.2022] URL: <https://www.cambridge.org/core/journals/design-science/article/research-perspectives-in-ecodesign/2485F1098847037823E79FD933684CB9> [In English]
5. Vivek Dhand, Garima Mittal, Kyong Yop Rhee, Soo-Jin Park, David Hui *A short review on basalt fiber reinforced polymer composites* Composites Part B: Engineering Volume 73, 2015, pp. 166-180
6. Chen, D.S., Wang, Y., Zou, Y.X. *Activated Carbon Fiber Fabrics in Filtration and Clean Water Resources*. MSF 980, 2020, pp. 387–393. <https://doi.org/10.4028/www.scientific.net/msf.980.387>