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NEW TECHNOLOGIES DEVELOPMENT AND APPLICATION
NOVE TEHNOLOGIJE RAZVOJ I PRIMJENA

BOOK OF ABSTRACTS
KNJIGA SAŽETAKA

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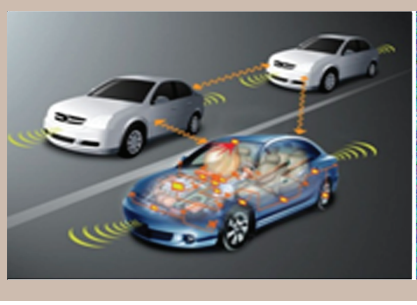

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27th-29th June 2019
NT-V,Br-V

Sarajevo
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27.-29. Juna 2019
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DRUŠTVO ZA NAPREDNE TEHNOLOGIJE SARAJEVO
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NOVE TEHNOLOGIJE - RAZVOJ I PRIMJENA

Sarajevo, Bosnia and Herzegovina, 27th-29th June 2019, NT-V, Br-V.
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BOOK OF ABSTRACTS – KNJIGA SAŽETAKA

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NEW TECHNOLOGIES - DEVELOPMENT AND APPLICATION „NT-2019“

Word of the organizers

We are aware of a different problems that the contamporary economy suffer. Research capacities are limited and infrastructure is poorly developed. Companies fall in using the contemporary knowledge and specialization, rarely promote innovation and commercialization, poorly manage research facilities and technology transfer. All this ultimately leads to their inadequate capacities to meet market demands, as well as lagging in a regional development and a low competitiveness. The organizers are going to prepare the series of free seminars, conferences and round tables for the economy, small and medium enterprises, with the goal to introduce new capacities and the possibilities of the technology development. Thus the organizers want to encourage technology transfer, development projects and innovative work, as well as develop awareness of the importance of intellectual property protection. In a product development, from concept to its production, a key element in achieving market success, is time. With ever stringent market requirements, the trends in increasing product individualization (personalization) become more obvious, and there are fewer products of mass consumption. Alternative solutions in production are increasingly being used to meet such conditions in the development and production. The organizers' intention is to introduce new methods and technologies to our market, as well as to inform the engineers, designers, contractors and investors about the possibilities and advantages of new methods and technologies, as well as products in their technical and financial form. The aim is to bring closer new 21st century technologies, that are in use in developed countries, to professional public in above mentioned conferences, seminars and round tables. With their development trends and achievements, new technologies can contribute to the development of both small and medium-sized enterprises and large companies, and thus to develop the local community in which they operate. The goals of conferences, seminars and round tables is that manufacturing companies as well as research and development institutions become more familiar with the latest technical and technological achievements in the field of new technologies used in the 21st century.

Sarajevo, 28th May 2019 *THE ORGANIZERS*

NOVE TEHNOLOGIJE - RAZVOJ I PRIMJENA „NT-2019“

Uvodna riječ organizatora

Uočili smo veliki problem današnjeg gospodarstva. Istraživački su kapaciteti ograničeni, infrastruktura slabo razvijena, kompanije zaostaju za suvremenim znanjem i specijalizacijama, rijetko promoviraju inovacije i komercijalizacije, slabo se upravlja istraživačkim kapacitetima i transferom tehnologija, što u konačnici dovodi do neadekvatnih kapaciteta kompanija za odgovor na zahtjeve tržišta, zaostajanja u regionalnom razvoju i niskoj konkurentnosti. Organizatori pripremaju seriju besplatnih seminara, konferencija i okruglih stolova za privredu, mala i srednja poduzeća, na kojima ih žele upoznati s novim kapacitetima i mogućnostima koje nude. Time također žele potaknuti transfer tehnologije, razvojne projekte, inovativni rad i razviti svijest o važnosti zaštite intelektualnog vlasništva. Pri razvoju proizvoda, od ideje do njegove proizvodnje, ključni element u postizanju uspjeha na tržištu je vrijeme. Uz sve oštrije zahtjeve tržišta, očitiji su i trendovi u porastu individualizacije (personalizacije) proizvoda, a sve je manje proizvoda masovne potrošnje. Kako bi se udovoljilo takvim uvjetima pri razvoju i proizvodnji, sve se više primjenjuju alternativna rješenja u proizvodnji. Namjera je organizatora približiti nove metode i tehnologije našem tržištu i upoznati inženjere, projektante, izvođače, te investitore o mogućnostima i prednostima novih metoda i tehnologija, kao i proizvoda u njihovom tehničkom i financijskom obliku. Stručnoj javnosti ovakvim konferencijama, seminarima i okruglim stolovima želimo približiti nove tehnologije 21. stoljeća koje su u upotrebi u razvijenim zemljama u svijetu. Nove tehnologije svojim trendovima razvoja i dostignućima mogu doprinijeti razvoju kako malih i srednjih poduzeća, tako i velikih kompanija, te na taj način razviti lokalnu zajednicu u kojoj djeluju. Ciljevi konferencija, seminara i okruglih stolova će biti takvi da proizvodnim tvrtkama i razvojno-istraživačkim institucijama približe najnovija tehničko-tehnološka dostignuća na području novih tehnologija koje se koriste u 21. stoljeću.

Sarajevo, 28. maj,2019.god. *ORGANIZATORI*

PREFACE

Modern industrial production is exposed to many influences and problems that prevent the strengthening of market competitiveness. Let us mention a few of them: materials and raw materials are constantly becoming more expensive, and some even disappear, so a suitable replacement should be found; mass production disappears, and large series manufacturing decreases, while small-scale and medium serial production increases to some extent; new production philosophy demands and prefers highly educated personnel able to successfully implement new technologies; technologies, as well as knowledge, quickly become obsolete, which requires lifelong learning, i. e. constant update of already acquired knowledge; environmental requirements are stronger and higher, which increases companies' costs and funds to invest in equipment (there is a demand for pollution and waste materials reduction, greater work safety, recycling, etc.); market is full of various goods and products of questionable quality from medium developed countries and often with dumping prices; there are ever increasing demands for wage increases, which forces the owners to dislocate their production facilities or move to countries with cheaper labor force; increased education of personnel affects their mobility and increase of fluctuation, as well as greater opportunities in the choice of better jobs, so that they make more use of their intellectual and emotional capabilities, thereby changing the mental structure of employees; customers are increasingly looking for a good design, durability and good price, with a wide range of support and service, not just a product; customers' knowledge is increasing, thus causing the increase in requirements that a product must be flawless in every respect, rather «ideal» (well designed, reliable, stylish, economical, etc.).To successfully solve the abovementioned requirements, there are new technological, production, organizational and other methods and models that ensure the improvement and modernization of production in the preparation phase (modern methods of product design, methods for modeling, simulation and optimization of products and production program, evolutionary methods – methods of artificial intelligence, software and computer hardware), as well as in the realization phase of production (flexibility, innovation, productivity, automation, product quality) we can name it all with a single word "Industry 4.0", which is already present around us, but its concept is not widespread.

The main objectives of the conference are:

- *Transfer of new and high technologies towards the development of scientific research work and implementation in production, in order to achieve technological and economic growth production in companies*
- *Transfer of innovations and practical knowledge and results of our own research, with the aim of strengthening competitiveness of companies.*
- *Promotion of technological and economic feasibility of applying new technologies in companies' industrial production, as well as "Industry 4.0".*
- *Organizing and conducting education to prepare young people for jobs will be in the future, to use technologies that will be, discovered, for competitiveness that will be global.*
- *Performing training courses in new technologies, production and business systems, integrated product development, implementation and maintenance of quality systems, production logistics, acquisition of competitive ability in the market, the application of modern methods in production management, the development of modern and successful production, etc.*
- *Education of the implementation of "Industry 4.0" with the aim of improving many aspects of human life.*

Sarajevo, 28th May 2019 *THE ORGANIZERS*

PREDGOVOR

Suvremena industrijska proizvodnja je izložena mnogim utjecajima i problemima koji ometaju jačanje konkurentnosti na tržištu. Evo samo nekih od njih: materijali i sirovine neprestano poskupljuju, a neki i nestaju, pa im valja naći odgovarajuću zamjenu; masovna proizvodnja nestaje, a velikoserijska se smanjuje, dok raste maloserijska i donekle srednjeserijska proizvodnja; nova proizvodna filozofija uvjetuje, preferira visoko educirane kadrove sposobne da uspješno implementiraju nove tehnologije; tehnologije kao i znanja brzo zastarijevaju, što zahtijeva cjeloživotno učenje, odnosno stalno osvježavanje već stečenih znanja; sve su oštriji i veći ekološki zahtjevi, što poduzećima povećava troškove i sredstva za investiranje u opremu (traži se smanjenje zagađivanja i otpadnih materijala, veća sigurnost u procesu rada, reciklaža otpada i sl.); tržište je sve punije raznovrsnim proizvodima ali i proizvodima upitne kvalitete iz srednje razvijenih zemalja i često s damping cijenama; sve su veći zahtjevi za porastom plaća, što vlasnike prisiljava da svoje proizvodne pogone dislociraju, odnosno presele u zemlje sa jeftinijom radnom snagom; porast obrazovanosti kadrova sve više utječe na njihovu mobilnost i porast fluktuacije, te veće mogućnosti u izboru boljih radnih mjesta, kako bi više koristili svoje intelektualne i emocionalne mogućnosti, čime se mijenja mentalna struktura zaposlenih; kupci sve više traže dobar dizajn, trajnost i povoljnu cijenu proizvoda, uz široki asortiman i servisne usluge, a ne samo proizvod; znanje kupaca sve je veće, zbog čega nastaju i sve veći zahtjevi da proizvod mora biti bez greške u svakom pogledu, bolje rečeno «idealan» (dobro dizajniran, pouzdan, moderan, ekonomičan itd.). Za uspješno rješavanje navedenih zahtjeva postoje nove tehnološke, proizvodne, organizacijske i druge metode i modeli koji osiguravaju unapređenje i modernizaciju proizvodnje u fazi pripreme (moderne metode oblikovanja proizvoda, metode modeliranja, simulacije i optimizacije proizvoda i programa proizvodnje, evolucijske metode-metode umjetne inteligencije, softverske i računalne tehnike), kao i u fazi realizacije proizvodnje (fleksibilnost, inovativnost, proizvodnost, automatizacija, kvaliteta proizvoda),sve to možemo nazvati jednom riječi „Industrija 4.0“, koja je već prisutna oko nas ali njen koncept nije dovoljno rasprostranjen.

***Osnovni ciljevi održavanja konferencije su slijedeći**:*

- *Transfer novih i visokih tehnologija u pravcu razvoja naučnoistraživačkog rada i implementacije u proizvodnji, s ciljem ostvarenja tehnološkog i ekonomskog rasta proizvodnje u kompanijama.*
- *Transfer inovacija i praktičnih znanja i rezultata vlastitih istraživanja, s ciljem jačanja konkurentske sposobnosti kompanija.*
- *Promocija tehnološke i ekonomske opravdanosti primjene novih tehnologija u industrijskoj proizvodnji u kompanijama, kao i“Industrije 4.0“.*
- *Organiziranje i izvođenje edukacija da pripreme mlade ljude za poslove koji ce biti u budućnosti, kako bi koristili tehnologije kojeće biti u budučnosti, za konkurentnost koja će biti globalna..*
- *Izvođenje edukacijskih predavanja iz novih tehnologija, proizvodnih i poslovnih sistema, integriranog razvoja proizvoda, uvođenja i održanja sistema kvalitete, logistike proizvodnje, stjecanja konkurentske sposobnosti na tržištu, primjene modernih metoda u upravljanju proizvodnjom, razvoju moderne i uspješne proizvodnje, itd.*
- *Edukacija o opravdanosti implementaciji „Industrije 4.0“ sa ciljem poboljšanja mnogih aspekata ljudskog života.*

Sarajevo, 28. maj,2019.god. *ORGANIZATORI*

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ABSTRACTS / SAŽETCI

„NEW TECHNOLOGIES, DEVELPMENT AND APPLICATION“

„NOVE TEHNOLOGIJE, RAZVOJ I PRIMJENA“

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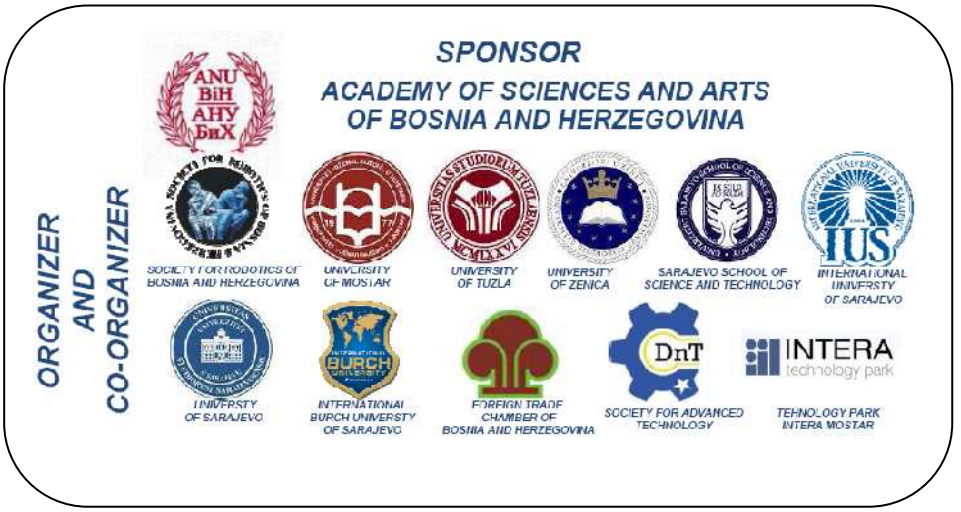

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5th International Conference

"New Technologies, Development and Application“ NT-2019

Sarajevo, 27 th-29 th June 2019

ACADEMY OF SCIENCES AND ARTS OF BOSNIA AND HERZEGOVINA

Irfan Mirza, Microsoft, Seattle
Director of Regulatory Compliance and Research Operations Microsoft
Seattle
USA

Topic: “DEVELOPMENT AND APPLICATION OF ARTIFICIAL INTELLIGENCE AND QUANTUM COMPUTERS”

Biography:

Irfan Mirza a world-class leader with demonstrated success in envisioning and landing transformation. Currently envisioning a paradigm shift in digital rights strategy for health data. Previously led a four-year transformation of Microsoft's commercial capabilities in online and cloud services, resulting in $5.5 billion of annual revenue in FY 2015 and $6.4 billion in FY 2016. I lead a team of world-class strategists who are laser-focused on comprehensive compliance and operations programs that enable Microsoft's Artificial Intelligence + Research (AI+R) organization to be the value creation engine for the company. My team ensures that our information and services are protected as we accelerate innovation through research teams across the globe who are driving advances in cutting-edge technology areas such as Artificial Intelligence, Quantum computing, and Cryptography. My areas of responsibility include development and management of key strategies in Regulatory Compliance, Release and Risk Management programs, and PhD Research Intern programs.

Prof. Rainer Leupers, PhD
RWTH Aachen University
Faculty of Electrical Engineering and Information Technology
Aachen
Germany

Topic: “EMBEDDED MULTICORE HW/SW DESIGN – AN ENABLING TECHNOLOGY FOR FUTURE ICT”

Biography:

Professor Rainer Leupers *received the M.Sc. (Dipl.-Inform.) and Ph.D. (Dr. rer. nat.) degrees in Computer Science with honors from TU Dortmund in 1992 and 1997. From 1997-2001 he was the chief engineer at the Embedded Systems chair at TU Dortmund. In 2002, he joined RWTH Aachen University as a professor for Software for Systems on Silicon. His research comprises software development tools, processor architectures, and system-level electronic design automation, with focus on application-specific multicore systems. He published numerous books and technical papers and served in committees of the leading international EDA conferences. He received various scientific awards, including Best Paper Awards at DAC and twice at DATE, as well as several industrial awards. Dr. Leupers is also engaged as an entrepreneur and in turning novel technologies into innovations. He holds several patents on system-on-chip design technologies and has been a co-founder of LISATek (now with Synopsys), Silexica, and Secure Elements. He has served as consultant for various companies, as an expert for the European Commission, and in the management boards of large-scale projects like HiPEAC and UMIC. He is the coordinator of EU projects TETRACOM and TETRAMAX on academia/industry technology transfer.*

Prof. Abdulnaser Sayma, PhD
Centre for Compressor Technology,
City University London
ECIV OHB
United Kingdom

Topic: “MIRCO TURBINES FOR SOLAR POWER AND WASTE HEAT RECOVERY”

Biography:

Professor Sayma obtained BSc in Mechanical Engineering with Distinction from Birzeit University in Palestine in 1987, MSc in Energy Technology from Salford University in 1990 and PhD from UMIST in 1994. His thesis topic was Finite Element model for dense gas dispersion in the atmosphere. He joined the Aeronautics department at Imperial College London in 1994 on EPSRC funded project as a research assistant where he worked on the development of an external aerodynamic compressible flow model introducing boundary layer grids and viscous effects in the Euler solver.

In 1996, he joined the Rolls Royce Vibration University Technology Centre (VUTC) at the Department of Mechanical Engineering, Imperial College London, where he stayed for about 9 years. He progressed to a Research Fellow, Senior Research Fellow and then Principal Research Fellow. In 2001, he was awarded the title RolIs Royce reaserch fellow at Imperial College and in 2003 he was awarded a Royal Academy of Engineering Senior Research Fellow co-funded by Rolls-Royce Plc. During his spell at the VUTC, he was one of two main developers for the unsteady aerodynamics and aeroelatisity code AU3D which has been the main aeroelasticity system at Rolls Royce. He also contributed to several major aero-engine projects including analysis of compressors, fans, turbines, rotating cavities, intake and bypass ducts and downstream nozzles. In 2005 he became a Senior Lecturer in Computational Mechanics at Brunel University. A year later, he was given a Chair in Computational Fluid Dynamics at the University of Sussex where he worked at the Thermo-Fluid Mechanics Research Centre (TFMRC) at the Department of Engineering and Design. He continued to lead research in unsteady compressible flow in turbomacinery, where he focused on industrial gas turbines and micro-gas turbines. He held several senior administrative positions, the last of which was the Director of Research and Knowledge Exchange for the School of Engineering and Informatics. He also introduced a new MSc in Sustainable Energy Technology.

Prof. Sadko Mandžuka, PhD
Intelligent Transport System Department
Faculty of Traffic and Transport Sciences,
University of Zagreb
Zagreb, CROATIA

Topic: „ INTELLIGENT MOBILITY”

Biography:

Prof. SadkoMandžuka is a professor at the Faculty of Traffic and Transport Sciences, University of Zagreb. He received BSc Eng. (1980), MSc. (1992), and Ph.D. (2003) degrees in automatic control from the Faculty of Electrical Engineering, University of Zagreb. Prof. Mandžuka is currently Head of Intelligent Transport System Department. He has wide experience in the area of Intelligent Transport System, Traffic modeling, Floating vessels control, hydro-technical systems control, etc. He had the opportunity to work both in academic and industrial environments including “Brodarski Institute Ltd”, consulting in the Innovation Area for SME’s, etc. He was a project leader and collaborating member of several EU and national Research & Development projects. Prof. Mandžuka is president of ITS Croatia, associate member of Croatian Academy of Engineering, member of Scientific Council for Traffic - Croatian Academy of Sciences and Arts, Founding member of Croatian Robotic Association, member of IFAC Technical Committee on Transportation and Vehicle Systems, member of IEEE Intelligent Transportation Systems Society, etc. He is Engineering Applications Section Editor of the international scientific journal “An International Journal of Control and Optimization: Theories & Applications (IJOCTA)”. Also, he is a member of the editorial board of international scientific journal International Journal of Intelligent Transportation Systems Research (Springer) and the national journal “Ceste i mostovi (Roads and Bridges)”. Finally, he has served in the program committees and as reviewer at several international congress and conferences. He is author of more than 100 internationally reviewed publications.

Prof. Zoran Miljković, PhD
University of Belgrade - Faculty of Mechanical Engineering
Department of Production Engineering
Laboratory for Industrial Robotics and Artificial Intelligence (ROBOTICS)
Belgrade, Serbia

Topic: “SINGLE MOBILE ROBOT SCHEDULING PROBLEM: A SURVEY OF CURRENT BIOLOGICALLY INSPIRED ALGORITHMS, RESEARCH CHALLENGES AND REAL-WORLD APPLICATIONS”

Biography:

Professor Zoran Miljković is a Full Professor in Production Engineering at the University of Belgrade - Faculty of Mechanical Engineering. Professor Zoran Miljković is a Head of Laboratory for Industrial Robotics and Artificial Intelligence (ROBOTICS) within the Department of Production Engineering. Professor Zoran Miljković received Dr.Sc. (Latin: Scientiae Doctor/Research Ph.D.), MSc (Magister Scientiae-New Latin) and Dipl.-Ing.Diplom-Ingenieur (equivalent to a Master's degree_MSc) degrees in mechanical engineering at the University of Belgrade, all in domain of Robotics and Artificial Intelligence.He has authored more than 150 refereed journal and conference papers and has published seven book-chapters in international scientific monographs in domain of Intelligent Manufacturing Systems, Industrial Robotic Systems, Mobile Robotics, Visual Servoing and Image Processing, Intelligent Robotic Control, Machine Learning, Artificial Neural Networks and Co-creative Decision-making. He has published three books (monograph, textbook and handbook) in scientific fields of manufacturing systems and processes, robotics and artificial neural networks. He is also an author of six software packages and several software applications, more than thirty technical solutions as well as methodologies for the production engineering development. Besides scientific and educational activities, Professor Zoran Miljković has been working on a significant number of projects in the field of metalworking industry development in Serbia, Montenegro and EU. He was a Vice Chairperson for H2020-MSCA-ITN and H2020-MSCA-IF calls (2016-2018); Evaluator of H2020-MSCA-ITN 2015 and H2020-MSCA-RISE-2018_Eng. proposals as well as FP7–People - ITN-IAPP-IEF-IOF-IIF_Eng. proposals (2008-2013); Reviewer of H2020-MSCA-ITN_2015-2018, FP7-PEOPLE-ITN_2007-2013 and FP7-PEOPLE-IAPP_2007-2013_Eng. research projects within the „Research Executive Agency“ established by the European Commission in Brussels

Prof. Seyda Ertekin , PhD
Middle East Technical University,
Dumlupinar Bulevari,
Cankaya ANKARA,
TURKEY

Topic: “METU SMART CAMPUS PROJECT (iEAST)”

Biography:

Dr. Seyda Ertekin is an assistant professor in Department of Computer Engineering at Orta Dogu Teknik Universitesi and also a research associate at Massachusetts Institute of Technology (MIT). At ODTU she is the coordinator of the METU-BILTIR Digital Transformation / Industry 4.0 Platform. Before she joined ODTU, she was at MIT as a research scientist with joint appointments at the Computer Science and Artificial Intelligence Lab (CSAIL) and the MIT Sloan School of Management in the Operations Research and Statistics Group. Dr. Ertekin received her Ph.D. in Computer Science and Engineering from the Pennsylvania State University in USA with a best thesis award and her B.Sc. in Electrical and Electronics Engineering from ODTU in Turkey. Throughout her Ph.D. studies, she has also worked as a researcher in the Machine Learning Group at NEC Research Laboratories in Princeton, NJ USA. Her research interests are in Artificial Intelligence, Machine Learning and Data Mining specifically addressing the challenges faced in learning from Big Data. Particular focus of her research is on predictive algorithms in energy systems, manufacturing plants and IoT platforms. She is the member of the first prize winner team at MIT at the INFORMS Innovative Applications in Analytics Award.

CONTENTS – SADRŽAJ

DEVELOPMENTS IN SOLAR POWERED MICRO GAS TURBINES AND WASTE HEAT RECOVERY ORGANIC RANKINE CYCLES

RAZVOJ MIKRO-GASNIH TURBINA ZA SOLARNU ENERGIJU I DOBIJANJA NATRAG ODBAČENE ENERGIJE ORGANSKIM RANKINEOVIM CIKLUSOM

Abdulnaser Sayma[1]
[1]City, University of London

Abdulnaser Sayma

ABSTRACT:
This main objective of this paper is to present recent developments and future challenges in two distributed power generation technologies that have the potential to play an important role in the future low carbon power generation. The first is parabolic solar dish systems powering a micro gas turbine by focusing solar energy to a focal area to heat the air in a Brayton cycle. The use of micro gas turbines can lead efficient, reliable and cost-effective technology. The second technology is small scale organic Rankine cycles (ORCs) that can be used to generate electricity from low grade heat, either generated as waste from industry processes and thermal plants, or from concentrated solar power. Although large scale ORCs have been successfully commercialised, there is still research and development required to achieve wide commercialisation at small scale, particularly regarding expanders.

Key words: *micro-gas turbines, organic Rankine Cycles, distributed power generation, turbo expanders, turbomachinery, concentrated solar power*

SAŽETAK:
Osnovni cilj ovog rada je predstaviti nedavne događaje i buduće izazove u dvije distribuirane tehnologije za proizvodnju električne energije koje imaju potencijal igrati važnu ulogu u budućem niskougljičnom proizvodnjom energije. Prvi je sistem paraboličnih solarnih sudova koji napajaju mikro-gasne turbine fokusirajući solarnu energiju na žarišno područje za zagrijavanje zraka u Braytonovom ciklusu. Uporaba mikro gasnih turbina može voditi učinkovitu, pouzdanu i ekonomičnu tehnologiju. Druga tehnologija je organski Rankineov ciklus (ORC) niskog nivoa koji se može koristiti za proizvodnju električne energije iz niskog stepena toplote, ili generirati kao otpad iz industrijskih procesa i termalnih postrojenja, ili iz koncentrirane solarne energije. Iako su ORC-ovi velikih razmjera uspješno komercijalizirani, još uvijek postoje istraživanja i razvoj potrebni za postizanje široke komercijalizacije u malom opsegu, posebice u pogledu ekspandera.

Ključne riječi:*mikro-gasne turbine, organski Rankinov ciklus, distrbuirana proizvodnja energije, turbo ekspanderi, turbo mašine, kencentrirana solarna energija.*

INTELLIGENT MOBILITY

INTELIGENTNA MOBILNOST

***Sadko Mandžuka*[1]**
[1]*Faculty of Traffic and Transport Sciences, Vukelićeva 4, HR-10000 Zagreb, Croatia*

Sadko Mandžuka

ABSTRACT:
Modern traffic problems can no longer be solved solely by the physical construction of new roads or reconstructions of existing roads. In this respect, significant scientific and research efforts have been made over the past twenty years, to address the problem of transport using new information and communication technology resources and novel knowledge on how to run such complex systems and processes. This new area of classical traffic engineering, called Intelligent Transport Systems (ITS), demonstrates a new approach and application of advanced management and technical-technological solutions to achieve greater safety, efficiency and reliability of transport, while reducing environmental and social impacts (reduction pollutant emissions, noise and the like).Modern "upgrade" of ITS (especially in an urban environment) is Intelligent Mobility, which is focused on the quality of the mobility itself and viewed from the perspective of the end-user. Intelligent Mobility is one of main piers of Smart City concept. The basic features of these new concepts are presented in the paper.

Key words: *Intelligent mobility, Intelligent transport systems, Smart city, Information-communication technologies, Sustainability*

SAŽETAK*:*
Suvremene prometne probleme više se ne može riješiti samo fizičkom izgradnjom novih cesta ili rekonstrukcijom postojećih cesta. U tom smislu, u proteklih dvadeset godina učinjeni su značajni znanstveni i istraživački napori za rješavanje prometnih problema korištenjem novih resursa informacijskih i komunikacijskih tehnologija i novih znanja o tome kako upravljati tako složenim sustavima i procesima. Ovo novo područje klasičnog prometnog inženjerstva, nazvano inteligentni transportni sustavi (ITS), daje novi pristup i primjenu naprednog upravljanja i tehničko-tehnoloških rješenja za postizanje veće sigurnosti, učinkovitosti i pouzdanosti transporta, uz istovremeno smanjene ekološke i društvene utjecaje (smanjenje onečišćenja uslijed emisija, buke i sl.). Suvremena „nadogradnja“ ITS-a (posebno u urbanoj sredini) je inteligentna mobilnost, koja je usmjerena na kvalitetu same mobilnosti i promatra se iz perspektive krajnjeg korisnika. Inteligentna mobilnost je jedan od glavnih stupova koncepta pametnog grada. U radu su prikazane osnovne značajke ovih novih koncepata.

Ključne riječi*: Inteligentna mobilnost, Inteligentni transportni sustavi, Pametni grad, Informacijsko-komunikacijske tehnologije, Održivost*

SINGLE MOBILE ROBOT SCHEDULING PROBLEM: A SURVEY OF CURRENT BIOLOGICALLY INSPIRED ALGORITHMS, RESEARCH CHALLENGES AND REAL-WORLD APPLICATIONS

PROBLEM TERMINIRANJA JEDNOG MOBILNOG ROBOTA: PREGLED AKTUELNIHBIOLOŠKI INSPIRISANIH ALGORITAMA, IZAZOVI ISTRAŽIVANJA I PRIMENA

Zoran Miljković[1], Milica Petrović[1]
[1]Full Professor, University of Belgrade - Faculty of Mechanical Engineering, Department of Production Engineering, Kraljice Marije 16; 11120 Belgrade 35; Serbia


Zoran Miljković *Milica Petrović*

ABSTRACT:
Intelligent mobile robots belong to advanced material handling systems that are finding increasing applications in modern manufacturing environments. Due to their mobility, mobile robots can adapt to changing environments in manufacturing systems and carry out various tasks such as transportation, inspection, exploration, or manipulation. On the other hand, features such as autonomy, intelligence, flexibility, and the capability to learn allow mobile robots to be widely used for many tasks, including material handling, material transporting, or part feeding tasks. Motion planning and scheduling of an intelligent mobile robot are one of the most vital issues in the field of robotics since these factors are essential for contributing to the efficiency of the overall manufacturing system. ... The experimental results indicate that all aforementioned algorithms can be successfully used for optimization of single mobile robot scheduling problem.

Key words: *single mobile robot scheduling, biologically inspired algorithms, intelligent manufacturing system*

SAŽETAK:
Inteligentni mobilni roboti pripadaju naprednim sistemima za unutrašnji transport materijala, koji pronalaze sve veću primenu u savremenim tehnološkim sistemima. Zahvaljujući svojoj mobilnosti, oni mogu da se prilagode promenljivim tehnološkim okruženjima i izvrše različite zadatke, poput transporta, inspekcije, istraživanja prostora ili manipulacije. Sa druge strane, svojstva kao što su autonomnost, inteligencija, fleksibilnost i sposobnost učenja, omogućavaju mobilnim robotima da se primenjuju za izvršavanje zadataka, kao što suzadaci transport materijala ili zadaci opsluživanja mašina alatki. Problem planiranja i terminiranja putanje kretanja mobilnog robota predstavlja jedan od najznačajnijih problema u oblasti robotike, imajući u vidu njegov uticaj na performance celokupnog tehnološkog sistema. ...
Eksperimentalni rezultati pokazuju da se biološki inspirisani algoritmi optimizacije mogu uspešno koristiti za rešavanje problema terminiranja jednog mobilnog robota u tehnološkom okruženju.

Ključne reči*: terminiranje jednog mobilnog robota, biološki inspirisani algoritmi, inteligentni tehnološki sistemi*

METU Smart Campus Project (iEAST)

METU-PROJEKT PAMETNOG KAMPUSA (iEAST)

***Seyda Ertekin*[1]**
[1]*Middle East Technical University, Dumlupinar Bulevari, Cankaya ANKARA,TURKEY*

Seyda Ertekin

ABSTRACT:
With the rise of urbanization, cities around the world have embraced applications and benefits of leveraging advanced technologies to deliver a range of services while promoting efficient, environmentally friendly, and sustainable eco-systems. By harnessing technology to improve the quality of life of citizens, these advanced technological tools have become critical in transforming urbanized cities across the globe into smart cities. Universities in particular have served as an ideal platform to showcase smart applications to promote smart campuses. This paper presents METU Smart Campus Project which addresses necessary analysis and recommendations for the implementation of a smart and sustainable campus at METU. Scope of the project includes development of a 10 year smart campus roadmap and a plan for implementation of near-term smart and sustainable campus activities. The project will assist METU in planning and implementing the smart intelligence, Energy, Aquatic (Water), Security, and Transportation Campus (iEAST).

Key words: *Smart city, smart campus, energy efficiency, transportation, smart buildings, water management.*

SAŽETAK:
S porastom urbanizacije, gradovi diljem svijeta prihvatili su primjene i prednosti iskorištavanja naprednih tehnologija za pružanje niza usluga uz istodobno promicanje učinkovitih, ekološki prihvatljivih i održivih ekoloških sistema. Koristeći tehnologiju za poboljšanje kvalitete života građana, ovi napredni tehnološki alati postali su presudni u transformaciji urbaniziranih gradova diljem svijeta u pametne gradove. Naročito su univerziteti poslužili kao idealna platforma za predstavljanje pametnih aplikacija za promicanje pametnih kampusa. Ovaj rad predstavlja METU projekt pametnog kampusa koji se bavi potrebnim analizama i preporukama za implementaciju pametnog i održivog kampusa na METU-u. Opseg projekta uključuje razvoj 10-godišnjeg pametnog kampusa i plana za provedbu kratkoročnih pametnih i održivih kampusnih aktivnosti. Projekt će pomoći METU-u u planiranju i provedbi kampusa pametne inteligencije, energije, vodenog (voda), sigurnosti i prijevoza (iEAST).

Ključne riječi:*pametni grad, pametni kampus, energetska efikasnost, transport, pametne zgrade, upravljanje vodama.*

BENEFIT OF USING ROBOTS IN THE PRODUCTION OF THREE-LAYER PARQUET

KORIST OD UPOTREBA ROBOTA KOD PROIZVODNJA TROSLOJNI PARKET

[1]Salah-Eldien Omer
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Salah-Eldien Omer

ABSTRACT:
The usage of robots in timber industry processing is starting to bring more benefits. The production of three-layer parquet is advancing in the sense of quality and variety. The production of lamella in this process is very important for the quality of the parquet. Usage of robots in certain phases of production process upgrades the quality and multiplies the quantity. Robots for the wood processing must be ordered according to the need of the process with cooperation with the producer of robots to assure the planed benefit.

Key words: *robots, benefits of robots, tree-layer parquets, upgrading reconstruction*

SAŽETAK:
Upotreba robota u drvnoj industriji počela je nositi veći profit. Proizvodnja troslojnih parket napreduje u smislu kvalitete i različitosti. Proizvodnja lamela u tom procesu je jako važna za kvalitetu samog proizvoda. Upotreba robota u određenim fazama procesa nosi povećavanje kvalitete i udvostručuje proizvodnju. Roboti u drvnoj procesnoj industriji moraju biti naručeni prema potrebi i zadaći vezanim za određene faze i to u suradnji s proizvođačem robota da bi osigurali planiranu korist.

Ključne riječi: *roboti, korist od robota, troslojni parket, unaprjeđenje rekonstrukcije*

ON THE USE OF THE UDWADIA-KALABA EQUATIONS FOR THE NONLINEAR CONTROL OF A GENERALIZED VAN DER POL-DUFFING OSCILLATOR

O KORIŠTENJU UDWADIA-KALABA JEDNAČINA ZA NELINEARNO UPRAVLJANJE GENERALIZIRANOG VAN DER POL-DUFFING OSCILATORA

Carmine M. Pappalardo[1], Domenico Guida[1]
[1]Department of Industrial Engineering, University of Salerno


Carmine M. Pappalardo Domenico Guida

ABSTRACT:
In this paper, a new method for controlling nonlinear mechanical systems is proposed. The methodology developed in this work is based on the use of the Udwadia-Kalaba equations in conjunction with the modern techniques of optimal control. The Udwadia-Kalaba equations represent an effective method for solving forward and inverse dynamics problems in the same analytical framework. On the other hand, the optimal control method is used in this work in combination with the inverse dynamic approach based on the Udwadia-Kalaba equations in order to obtain a nonlinear tracking controller. The mechanical system considered in this paper for performing numerical experiments is a nonlinear oscillator which includes in a generalized form the Van der Pol model for the system damping and the Duffing model for the system stiffness. The numerical results presented in this paper demonstrate the effectiveness of the method developed in this investigation.

Key words: *nonlinear dynamics, optimal control, Udwadia-Kalaba equations, Van der Pol oscillator, Duffing oscillator*

SAŽETAK:
U ovom radu predložena je nova metoda za kontrolu nelinearnih mehaničkih sistema. Metodologija razvijena u ovom radu temelji se na korištenju jednadžbi Udwadia-Kalaba u kombinaciji s modernim tehnikama optimalne kontrole. Jednadžbe Udwadia-Kalaba predstavljaju učinkovitu metodu za rješavanje problema direktne i inverzne dinamike u istom analitičkom okviru. S druge strane, u ovom radu koristi se metoda optimalnog upravljanja u kombinaciji s inverznim dinamičkim pristupom koji se temelji na jednadžbama Udwadia-Kalaba kako bi se dobio nelinearni kontroler za praćenje. Mehanički sistem razmatran u ovom radu za izvođenje numeričkih eksperimenata je nelinearni oscilator koji u generaliziranom obliku uključuje Van der Polov model za prigušenje sistema i Duffing model za krutost sistema. Numerički rezultati prikazani u ovom radu pokazuju učinkovitost metode razvijene u ovom istraživanju.

Ključne riječi:*nelinearna dinamika, optimalno upravljanje, Udwadia-Kalabajednačina, Van der Pol oscillator, Duffing oscillator.*

TLD DESIGN AND DEVELOPMENT FOR VIBRATION MITIGATION IN STRUCTURES

TLD PROJEKTOVANJE I RAZVOJ ZA UMANJENJE VIBRACIJA U KONSTRUKCIJAMA

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Francesca Colucci Marco Claudio De Simone Domenico Guida

ABSTRACT:
Steel structures are widely used all over the world. Steel interprets the most current synthesis between engineering and architecture, creating constructions that translate into investments that are advantageous over time. Thanks to the strength of its expressiveness and its known characteristics of elasticity and malleability, the architectural work and the structural one become the interpreter of the other, enhancing the project and its peculiarities. The variability of constructive solutions is significantly increased by the ease with which steel is combined with other materials. ……..The experimental apparatus is also designed to test active and passive control systems for vibration control and mitigation.To demonstrate the flexibility of the implemented apparatus, this article reports the study and design of a TLD, Tuned Liquid Damper, for passive vibration mitigation for a two-dimensional structure.

Key words: *test rig, mitigation, vibrations, TLD, control, design*

SAŽETAK:
Čelične konstrukcije su u širokoj upotrebi u cijelom svijetu. Čelik tumači najnoviju sintezu između inženjerstva i arhitekture, stvarajući konstrukcije koje se pretvaraju u investicije koje supovoljne tijekom vremena. Zahvaljujući snazi svoje izražajnosti i poznatim karakteristikama elastičnosti i prilagodljivosti, arhitektonsko djelo i strukturno djelo postaju tumač drugog, pojačavajući projekt i njegov eposebnosti. Varijabilnost konstruktivnih rješenja znatno se povećava lakoćom s kojom se čelik kombinira s drugim materijalima. …….. Eksperimentalni uređaj je također dizajniran za testiranje aktivnih i pasivnih sistema upravljanja za upravljanje i ublažavanje vibracija. Kako bi se pokazala fleksibilnost primijenjenog aparata, u ovom članku se navodi studija i dizajn TLD, Tuned Liquid Damper, za ublažavanje pasivnih vibracija za dvodimenzionalnu strukturu.

Ključneriječi: *testna oprema, ublažavanje, vibracije, TLD, kontrola, dizajn*

A COMPARATIVE ANALYSIS OF THE MACHINED SURFACES QUALITY OF AN ALUMINUM ALLOY ACCORDING TO THE CUTTING SPEED AND CUTTING DEPTH VARIATIONS

KOMPARATIVNA ANALIZA KVALITETA OBRAĐENIH POVRŠINA ALUMINIJSKIH LEGURA NA OSNOVU VARIJACIJA BRZINE I DUBINE REZANJA

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ABSTRACT:

The surface quality obtained by milling operations is one of the most studied aspects in the engineering. The main objective of this scientific paper involves to carry out an experimental research on the end-milling process of an aluminum alloy used in the aerospace industry. In this paper a comparative analysis was carried out on the machined surface quality,using different variations of the cutting speed and cutting depth. The cutting parameters values varies and the experimental program was thought in terms of properly modeled functions. In conclusion, a series of graphs were made based on the experimental data obtained by the surface roughness measurements.

Key words: *surface quality, cutting regime, cutting process, experimental research, data processing, objective function*

SAŽETAK:

Kvaliteta površine dobivena operacijama glodanja jedan je od najviše istraženih aspekata u inženjerstvu. Glavni cilj ovog naučnog rada je provesti eksperimentalna istraživanja o postupku završnog glodanja aluminijske legure koja se koristi u avionskoj industriji. U ovom radu provedena je usporedna analiza kvalitete obrađene površine, korištenjem različitih varijacija brzine rezanja i dubine rezanja. Vrijednosti parametara rezanja variraju i eksperimentalni program je promišljen u smislu ispravno modeliranih funkcija. U zaključku je napravljen niz grafova na temelju eksperimentalnih podataka dobivenih mjerenjima površinske hrapavosti.

Ključne riječi: *kvaliteta površine, režimi rezanja, postupak rezanja, eksperimentalno istraživanje, obrada podataka, funkcija cilja*

A COMPARATIVE ANALYSIS OF THE MACHINED SURFACES QUALITY OF AN ALUMINUM ALLOYACCORDING TO THE CUTTING SPEED AND FEED PER TOOTHVARIATIONS

KOMPARATIVNA ANALIZA KVALITETA OBRAĐENIH POVRŠINA ALUMINIJSKIH LEGURA NA OSNOVU VARIJACIJA BRZINE REZANJA I POSMAKA PO ZUBU

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Alina Bianca Pop Aurel Mihail Titu

ABSTRACT:
The milling operations are a topical and especially future-oriented methods. Thepurpose of this scientific paper is to carry out an experimental research referring to the end-milling process of the 7136aluminum alloy. This paper is a continuation of the own research activity carried out so far, within a company with the field of activity in theaerospace industry. The main objective is a comparative analysis which was carried out on the surface quality - machined on various cutting regimes. The cuttingprocess parameters used in the end-milling process are: the cutting speed, the feed per tooth and the cutting depth. The obtained results of the surface roughnesses were measured longitudinally on the tool feed motion using a professional surface tester.

Key words: *surface quality, cutting speed, feed per tooth, end-milling, experimental research*

SAŽETAK:
Operacije glodanja su tematske i osobito orijentirane prema budućnosti. Svrha ovog naučnog rada je provesti eksperimentalno istraživanje koje se odnosi na postupak završnog glodanja aluminijske legure 7136. Ovaj rad je nastavak vlastite dosadašnje istraživačke djelatnosti unutar poduzeća s područjem djelatnosti u avionskoj industriji. Glavni cilj je usporedna analiza koja je provedena na kvaliteti površine - obrađena na različitim režimima rezanja. Parametri procesa rezanja koji se koriste u postupku završnog glodanja su: brzina rezanja, posmak po zubu i dubina rezanja. Dobiveni rezultati površinskih hrapavosti izmjereni su uzdužno na pomicanju alata pomoću profesionalnog testera površine.

Ključne riječi: *kvaliteta površine, brzina rezanja, posmak po zubu, završno glodanje, eksperimentalno istraživanje.*

CONSIDERATIONS ON OPTIMIZING TECHNOLOGICAL PROCESS FOR PRODUCTION OF LOW VOLTAGE AUTOMOTIVE CABLES

RAZMATRANJA O OPTIMIZACIJI TEHNOLOŠKOG PROCESA ZA PROIZVODNJU NISKO VOLTAŽNIH AUTOMOBILSKIH KABLOVA

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Lucian Gal *Doina Mortoiu*

ABSTRACT :
The newest trends in the automotive industry are focused on reducing material usage, building more efficient engines, using aluminum and composite materials.
In accordance with the new requirements imposed by the market, related to diversity of production, adaptability, delivery times, mass production, costs, optimization of the production processes and equipment used becomes mandatory.
In the aluminum cable production process, obtaining the finite product is done by using a continuously optimized technology, whose implementation leads to the lean improvement of costs. The paper presents a number of optimization operations performed on the automotive aluminum wire production process.

***Key words**: wiring, aluminum, pulling, twisting, extrusion*

SAŽETAK :
Najnoviji trendovi u automobilskoj industriji usmjereni su na smanjenje upotrebe materijala, izgradnju učinkovitijih motora, korištenje aluminijskih i kompozitnih materijala.U skladu s novim zahtjevima tržišta, vezanim uz raznolikost proizvodnje, prilagodljivost, vrijeme isporuke, masovnu proizvodnju, troškove, optimizacija proizvodnih procesa i korištene opreme postaje obvezna.U procesu proizvodnje aluminijskih kabela dobivanje konačnog proizvoda provodi se kontinuirano optimiziranom tehnologijom, čija provedba dovodi do smanjenja troškova.U radu je prikazan niz optimizacijskih postupaka u procesu proizvodnje aluminijske žice u automobilskoj industriji.

***Ključne riječi**:ožičenje, aluminijum, povlačenje, uvrtanje, ekstruzija*

QUALITY CONTROL METHODS FOR LOW VOLTAGE AUTOMOTIVE WIRING

METODE UPRAVLJANJA KVALITETOM ZA NISKOVOLTAŽNA AUTOMOBILSKA OŽIČENJA

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Lucian Gal


Doina Mortoiu

ABSTRACT :
Current industrialization policy created a favourable context to the development of the automotive industry, due to the discovery of the facilities that aluminum materials offer.
Modification of the technology for production of aluminum wiring instead of copper wiring implies altering the quality control methods. The paper present the quality control methods used after the pulling, twisting and extrusion processes for the wiring. After their presentation, a series of optimization steps for the processes are presented.

Key words: *Quality control, testing methods, quality optimization.*

SAŽETAK :
Trenutna politika industrijalizacije stvorila je povoljan kontekst za razvoj automobilske industrije, zbog otkrića mogućnosti koje aluminijski materijali nude.
Modifikacija tehnologije proizvodnje aluminijskih ožičenja umjesto bakrenog ožičenja podrazumijeva promjenu metoda upravljanja kvalitete. U radu su prikazane metode upravljanja kakvoće korištene nakon procesa izvlačenja, uvrtanja i ekstruzije za ožičenje. Nakon njihove prezentacije prikazan je niz koraka optimizacije procesa.

Ključne riječi: *upravljanje kvalitetom, metode ispitivanja, optimizacija kvaliteta.*

FLATNESS MEASUREMENTON A COORDINATE MEASURING MACHINE

MJERENJE RAVNOSTI NA KOORDINATNOJ MJERNOJ MAŠINI

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Nermina Zaimović-Uzunović Samir Lemeš Dženana Tomašević Josip Kačmarčik

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ABSTRACT:
Different aspects of surface measurement strategies on Coordinate Measuring Machine (CMM) were varied and their influence on the flatness deviation result was investigated. The CMM measurements were conducted using single point and continuous scanning probing. The measurements were performed with five different point densities in rectangular grid sampling strategies and three different probe styli. The results showed a very significant influence of a sampling size on a flatness deviation measurement result.

Key words: *Coordinate Measuring Machine (CMM), Flatness, Sampling, Measurement Strategy*

SAŽETAK:
U radu su mijenjani različiti aspekti mjernih strategija za mjerenje ravnih površina na koordinatnoj mjernoj mašini (KMM) i istraživan je njihov uticaj na mjerni rezultat za ravnost. Mjerenja na KMMi su sprovedena primjenom mjerenja pojedinačnih tačaka, kao i kontinuiranog skenirajućeg mjerenja. Mjerenja su obavljena sa pet različitih gustina tačaka u strategiji sa pravougaonom mrežom za uzorkovanje tačaka i tri različita ticala na mjernoj sondi. Rezultati su pokazali veoma značajan uticaj veličine uzorka na mjerni rezultat za ravnost.

Ključne riječi: *koordinatna mjerna mašina (KMM), ravnost, uzorkovanje, mjerna strategija*

BLOCKCHAIN IN DISTRIBUTED CAD ENVIRONMENTS

BLOCKCHAIN U DISTRIBUIRANIM CAD OKRUŽENJIMA

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ABSTRACT:
Distributed and collaborative CAD (Computer Aided Design) environments gained wide popularity recently, in engineering fields such as BIM (Building Information Modelling) and GIS (Geographical Information Systems) in Civil Engineering, or PDM/PLM (Product Data Management/Product Lifecycle Management) in Mechanical Engineering. One of key issues in these applications is data integrity and confidence in information stored in information systems. Blockchain technology, initially invented to support the cryptocurrency trusted authority, opened its way to other areas, and it could be the solution for the data integrity issue in distributed CAD environments.

Key words: *Blockchain, CAD, BIM, PDM/PLM, Data Integrity*

SAŽETAK:
Distribuirana i kolaborativna okruženja za CAD (konstruiranje potpomognuto računarima) odnedavno su stekla veliku popularnost u područjima tehnike kao što su BIM (modeliranje informacija o zgradama) i GIS (geografski informacijski sistemi) u građevinarstvu, ili PDM/PLM (upravljanje podacima o proizvodu / upravljanje životnim ciklusom proizvoda) u mašinstvu. Jedno od ključnih pitanja u ovim aplikacijama je integritet podataka i povjerenje u informacije pohranjene u informacijskim sistemima. Blockchain tehnologija, prvobitno zamišljena kao podrška pouzdanim autoritetima za kriptovalute, otvorila je svoj put u druga područja i mogla bi biti rješenje za problem integriteta podataka u distribuiranim CAD okruženjima.

Ključne riječi: *Blockchain, CAD, BIM, PDM/PLM, Integritet podataka*

STUDY OF THE EFFECT OF TRANSDUCER THICKNESS AND DIRECTION ON THE COERCIVE FORCE MAGNITUDE

ISTRAŽIVANJE UTICAJA DEBLJINE PRETVARAČA I UPRAVLJANJA NA VISOKU KOREKTIVNU SILU

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ABSTRACT:
The purpose of this work is to determine the influence of the product thickness of metal structure samples, as well as the location of the magnetizing device (transducer) on the magnitude of the coercive force. The experiment was realized as a complete plan of the experiment with repetition at the zero point, and the mathematical model was chosen in the form of a square model of surface response.

Key words: *transducer, non-destructive testing (NDT), mathematical modeling, response surface methodology (RSM).*

***SAŽETAK*:**
Svrha ovog rada je da se utvrdi uticaj debljine proizvoda na uzorcima metalnih konstrukcija, kao i položaj uređaja za magnetizaciju (pretvarača) na veličinu koercitivne sile. Eksperiment je realizovan kao kompletan plan eksperimenta sa ponavljanjem na nultoj tački, a matematički model je izabran u obliku kvadratnog modela površinskog odziva.

Ključne reči: *pretvarač, nedestruktivno ispitivanje (NDT), matematičko modeliranje, metodologija površinske reakcije (RSM).*

MULTI ROLLER CYCLO REDUCING GEAR

MULTIROLER CIKLOREDUKCIONI ZUPČANIK

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ABSTRACT:
On the basis of the patents of one of the authors, constructions of a range of multi roller cyclo reducing gear have been devloped, having the advantage of achieving a high gear ratio of one stage. The main element of the cyclic gearbox is a generator delivering a translational movement created by input eccentric shaft rollers. The transmission of the torque from the generator is accomplished by engaging a large number of rollers in a ring gear to redistribute the load of the cyclo reducing gear. It is compact, with small dimentions. In the elaboration, dependencies are derived for determination of the transmission ratio and the geometric dimentions of the elements of the cyclo reducing gear.

Key words: *multi roller cyclo drive*

SAŽETAK:
Na temelju patenata jednog od autora, napravljene su konstrukcije nizamultiroler cikloredukcionih zupčanika, koje imaju prednost postizanja visokog prijenosnog omjera jednog stupnja. Glavni element cikličkog mjenjača je generator koji isporučuje translacijsko kretanje stvoreno pomoću ulaznih ekscentričnih valjaka osovine. Prijenos okretnog momenta iz generatora se postiže uključivanjem velikog broja valjaka u prstenasti zupčanik za preraspodjelu opterećenja ciklo redukcijskog prijenosnika. Kompaktan je, s malim dimenzijama. U razradi su dobivene ovisnosti za određivanje prijenosnog omjera i geometrijskih dimenzija elemenata ciklo redukcijskog prijenosnika.

Ključne riječi: *ciklo reduktor, više valjaka, translatorni pokret*

VIBRATION ANALYSIS OF ROTATING MACHINERY AS EXCITATION OF CONCRETE STRUCTURE VIBRATIONS

VIBRACIONA ANALIZA ROTIRAJUĆIH STROJEVA KAO UZBUDE VIBRACIJA BETONSKIH KONSTRUKCIJA

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Edin Džiho


Edin Šunje

ABSTRACT:
Concrete structures are exposed to ground-borne vibrations caused by transient or continuous excitation. Increased vibration levels and long-time exposure to vibrations could cause different levels of structural damages. As the continuous source of vibration, excitation is common to have rotational machinery. Rotational machinery faults usually increase the machinery vibrations, which are one of the excitation sources. In this paper, it would be presented an application of rotational machinery vibration analysis in determining the cause of increased concrete structure vibrations.

Key words: *vibration analysis, excitation, concreete structure vibrations, rotational machinery vibrations*

SAŽETAK:
Betonske konstrukcije su izložene vibracijama temelja uzrokovanih povremenim ili stalnim poremećajnim silama. Povišene vibracije i dugotrajno izlaganje vibracijama mogu uzrokovati različite nivoe oštećenja konstrukcije. Kao izvor stalne poremećajnesile vibriranja se najčešće javljaju rotacione mašine. Greške na rotacionim mašinama obično uzrokuju vibracije samih mašina, koje su jedan od izvora pobude oscilovanja. U ovom radu je predstavljena primjena analize vibracija rotacionih mašina u određivanju uzroka povišenih vibracija betonske noseće konstrukcije.

Ključne riječi: *analiza vibracija, pobuda, vibracije betonskih struktura, vibracije rotacionih mašina.*

KAIZEN IN PRACTICE-CASE STUDY OF APPLICATION OF LEAN SIX SIGMA METHOD IN WOOD-PROCESSING FIRM

KAIZEN U PRAKSI – STUDIJA SLUČAJA PRIMJENE LEAN SIX SIGMAKONCEPTA U DRVOPRERAĐIVAČKOJ FIRMI

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Ismar Alagić

ABSTRACT:
This article is the result of several years of author's work in the field of quality management especially in the use of methods and tools for quality management. I have paid special attention to the research of a unique and understandable concept of continuous progress - Kaizen.

What is Kaizen?Kaizen is a combination of two Japanese words KAI and ZEN. Compound KAIZEN (Japanese 改善) which means "always good" or "continuous improvement".This article provides proposal a set of approaches that are the basis for the development and application of the principles and Kaizen of Lean Six Sigma concepts. A special focus is given to the method of applying Lean Six Sigma concepts in specific working conditions of domestic company from wood-processing sector.

Key words: *Lean Six Sigma (LSS), Kaizen, Wood-processing, Improvement*

REZIME:
Ovaj rad je rezultat višegodišnjeg rada autora u oblasti upravljanja kvalitetom, posebno u korištenju metoda i alata za upravljanje kvalitetom. Posebnu pažnju posvetio sam istraživanju jedinstvenog i razumljivog koncepta kontinuiranog napretka - Kaizen.
Šta je Kaizen? Kaizen je kombinacija dvije japanskeriječi KAI i ZEN. Složeni KAIZEN (japanski改善)) što znači "uvijek dobro" ili "kontinuirano poboljšanje”. Ovaj rad daje prijedlog niza pristupa koji su osnova za razvoj i primjenu principa i Kaizen koncepta Lean Six Sigma. Posebna pažnja posvećena je načinu primjene Lean Six Sigma koncepata u specifičnim uslovima rada domaće kompanije iz drvno-prerađivačkog sektora.

Ključne riječi: *Lean Six Sigma (LSS), Kaizen, drvoprerada, poboljšanje*

DEVELOPMENT, SIGNIFICANCE AND POSSIBILITIES OF APPLICATION COFIRING OF COAL WITH BIOMASS IN THERMAL POWER PLANT IN BOSNIA AND HERZEGOVINA

RAZVOJ, ZNAČAJ I MOGUĆNOSTI PRIMENE KOPIRANJA UGLJA SA BIOMASOM U TERMOELEKTRANI U BOSNI I HERCEGOVINI

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Izet Smajevic


Anes Kazagic

ABSTRACT:
Above 30% of power production in Europe is still coming from coal. More than 600 coal or lignite fired power plants produce electricity all over the Europe, with more capacity located in Germany, Poland, Bulgaria, Greece, the Czech Republic and South East Europe. Various ways of reducing CO_2 from coal-based power generation are currently in certain phases of research, development and demonstration. Many of them involve biomass co-firing.Co-firing coal with biomass can be carried out directly (in the same combustion chamber), indirectly (after pre-treatment), in parallel (separate combustion), and completely (full conversion to biomass). This paper sumerrise recent activities carried out in Bosnia and Herzegovina, namely JP Elektroppriovreda BiH and Faculty of Mechanical Engineering of University in Sarajevo, to develop and implement solutions of retrofiting large thermal power plants in Bosnia and Herzegovina with biomass. Target is achieving the power production in thermal power plants in Bosnia nad Herzegovina to be sustainable in long-term view.

Key words: *cofiring, biomass, coal, thermal power plants, sustainability*

SAŽETAK:
Preko 30% proizvodnje električne energije trenutno još uvijek dolazi iz uglja. Preko 600 termoelektrana širom Evrope proizvodi električnu energiju, sa najviše kapaciteta lociranih u njemačkoj, Poljskoj, Bugarskoj, Grčkoj, Češkoj i zemljama Jugoistočne Evrope. Istovremeno, različiti načini smanjenja emisije CO_2 iz termoelektrana na ugalj trenutno su u različitim fazama istraživanja, razvoja i demonstracije. Mnogi od njih uključuju kosagoriejvanje s biomasom. Kosagoriejvanje s biomasom se može raditi direktno (u istoj komori za izgaranje), indirektno (nako predtretmana), i paralelno (u odvojenoj komori za izgaranje), kao i u cjelovitosti (potpuna konverzija na biomasu). Ovaj rad sumira aktivnosti u Bosni i Hercegovini, tačnije u JP Elektroppriovreda BiH i na Mašinskom fakultetu Univerziteta u Sarajevu, na razvoju i implementaciji rješenja retrofita termoelektrana u BiH sa biomasom. Cilj je dostizanje dugoročne održivosti proizvodnje energije u termoelektranma u BiH.

Ključne riječi: *kosagorijevanje, biomasa, ugalj, termoelektrane, sodrživost*

IMPROVING THE PERFOMANCE PROPERTIES OF ABRASIVE TOOLS AT THE STAGE OF THEIR OPERATION

POBOLJŠANJE SVOJSTAVA PERFORMANSI ABRAZIVNIH ALATA U FAZI NJIHOVOG RADA

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ABSTRACT:
Grinding performance largely depends on the durability of the abrasive tool. Developed and tested solid lubricant for impregnating the working surface of the grinding wheel, which increases its cutting ability and, as a result, reduces the number of edits. Reducing the need for frequent revisions of the abrasive tool reduces dust generation in the workshop and helps to prevent the occupational disease of the grinder - pneumoconiosis.

Key words: *higher fatty carboxylic acids, friction coefficient, grinding wheel.*

***SAŽETAK*:**

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kao rezultat, smanjuje broj izmjena. Smanjenje potrebe za čestim revizijama abrazivnog alata smanjuje stvaranje prašine u radionici i pomaže u sprečavanju profesionalne bolesti mlinca - pneumokonioze.

Ključne reči: *Više masne karboksilne kiseline, koeficijent trenja, točak za brušenje.*

SIMULATION CENTRIFUGAL CASTING OF THE HEAT RESISTANT AUSTENITIC STEEL HK30 MODIFIED BY NIOBIUM

SIMULACIJA CENTRIFUGALNOG LIVENJA VATROOTPORNOG AUSTENITNOG ČELIKA HK30 MODIFICIRANOG NIOBIJEM

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Mirsada Oruč

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Pontus Anderson

ABSTRACT:
Simulation casting of has become a powerful tool to visualize mould filling, solidification and cooling, and to predict the location of internal defects such as shrinkage porosity, sand inclusions and cold shuts. It can be used for existing castings, and for developing new castings. This process in casting technology is an innovative casting process simulation tool that basically simulates mold filling and solidification, and provides the possibility of simulating casting production. The simulation process in any case reduces production cost and optimizes the technological process of casting. It's possible simulate most commercial casting methods, as well as the process of centrifugal casting of heat resistant steel and alloys.
In this paper presents the application of the 3D CAD model in technology centrifugal casting tube of HK 30 Nb steel.

Key words: *3D model, simulation, casting, centrifugal casting*

SAŽETAK:
, očvršćavanja i hlađenja, te za predviđanje lokacije unutrašnjih defekata kao što su poroznost, mikropukotine, ih problema i za izradu novih odlivaka. Ovaj proces u tehnologiji livenja je inovativni alat koji u osnovi simulira punjenje kalupa i očvršćavanje, i daje mogućnost simulacije proizvodnje odlivaka. Postupak simulacije u svakom slučaju smanjuje troškove proizvodnje i optimizira tehnološki proces livenja. Moguće je simulirati većinu komercijalnih metoda lijevanja, a također i proces centrifugalnog livenja vatrootpornih čelika i legura
U ovom radu predstavljena je primjena 3D CAD modela livenja u tehnologiji centrifuganolivene cijevi od čelika HK 30 Nb.

Ključne riječi: *3D model, simulacija, livenje, centrifugalno livenje*

IMPLEMENTATION OF INDUSTRY 4.0 AND INDUSTRIAL ROBOTS IN THE MANUFACTURING PROCESSES

IMPLEMENTACIJA IDUSTRIJE 4.0 I INDUSTRIJSKIH ROBOTA U PROIZVODNIM PROCESIMA

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ABSTRACT:
The fourth industrial revolution or Industry 4.0 is already present around us, but the concept itself is not widespread. The implementation of Industry 4.0 will improve many aspects of human life in all segments. We are witness to big changes in all industry branches, with new business methods, product system transformation, consumption, delivery and transportation emerging, owing to the implementation of new technological discoveries that include: robotics & automation, Internet of Things (IoT), 3D printers, smart sensors, Radio Frequency Identification (RFID,) etc. The implementation strategy of Industry 4.0 is to enable the adjustment of industrial production to complete intelligent automation, which means introducing self-automation, self-configuration, self-diagnosis and problem-solving, knowledge and intelligent decision-making. We must point out that the success or failure to implement Industry 4.0 lies in the hands of all participants in the production chain, from the manufacturer to theend-users.

Key words**:** *manufacturing process, industry 4.0, robot, automation, internet of things (IoT), smart factory*

SAŽETAK*:*
Četvrta industrijska revolucija ili Industrija 4.0 već je prisutna oko nas, ali sami koncept nije rasprostranjen. Implentacijom Industrije 4.0 će se poboljšati mnogi aspekti ljudskog života u svim segmentima.. Svjedoci velikih promjena u svim industrijskig granama, pojavljuju se nove poslovne metode, preoblikovanje proizvodnih sistema, potrošnje, isporuke i transporta sve zahvaljuči implementaciji novih tehnoloških otkrića koji pokrivaju: robotika & automatizacija, internet stvari (IoT), 3D štamapa, pametni senzori,radio frekventna identifikacija (RFID) itd. Strategija implementacije Industrije 4.0 se sastoji u tome da se vrši prilagođavanje industrijske proizvodnje potpunoj pametnoj automatizaciji, a to znači uvođenje metoda samo-automatizacije, samo-konfiguraciji, samostalno dijagnosticiranje problema i otklanjanje, spoznaja i inteligentno donošenje odluka..Moramo kazati dauspjeh ili neuspjeh implementacije Industrije 4.0 leži u rukama svu učesnika u lancu od proizvođača do krajnjeg korisnika kupca.

Ključne riječi*: proizvodni proces, industrija 4.0, robot, automatizacija, internet stvari (IoT),pametna fabrika*

DEVELOPMENT OF THE SYSTEM FOR OIL VAPOR DRAINAGEF ROM BEARING HOUSINGS OF BIG HYDROAGGREGATES

RAZVOJ SISTEMA ZA ODSIS ULJNIH PARA IZ KUĆIŠTA LEŽAJEVA VELIKIH HIDROAGREGATA

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Amar Leto


Mensud Đidelija


Edin Šunje

ABSTRACT:
During the operation of large hydro aggregates, oil is heated in the axial and radial bearings and the production of oil vapor appears. The clearance in the gaskets of the bearings increase during the multi-year work and often allows the passage of oil vapor to the surrounding space what causes condensation on the equipment. Penetration of the oil vapors in the generator area and their condensation on the generator's equipment influences on the unit readiness and requires more frequent cleaning and degreasing. For this reason it is of vital importance for the hydroaggregatespressence of the functional system for oil vapordrainagedirectly from the housing of axial and radial bearings. This paper presents the structural solution of oil vapor drainagesystem on vertical hydro aggregates with the Kaplan turbine.

Key words: *oil vapor, drying of oil vapor,air flow*

SAŽETAK:
Pri radu velikih hidroagregata dolazi do zagrijavanja ulja u kućištima aksijalnih i radijalnih ležajeva i stvaranja uljnih para. Zazori u brtvama ležajeva se povećavaju tokom višegodišnjeg rada i često omogućavaju prolaz dijela uljnih para u okolni prostor i njihovu kondenzaciju na opremi. Prodor uljnih para u generatorski dio i njihova kondenzacija na opremi generatorautiče na pogonsku spremnost i zahtijeva češće čišćenje i odmašćivanje. Zbog toga je od vitalne važnosti za hidroagregate postojanje funkcionalnog sistema za odsis uljnih para direktno iz kućišta aksijalnih i radijalnih ležajeva. U radu je prikazano konstrukciono rješenje sistema za odsis uljnih para na vertikalnim hidroagregatima sa Kaplan turbinom.

Ključne riječi: *uljne pare, odsis uljnih para, strujanje*

VISION GUIDED ROBOT KUKA KR 16-2 FOR A PICK AND PLACE APPLICATION

VIZIJSKI VOĐEN ROBOT KUKA KR 16-2 ZA PRIMJENU KOD UZIMANJA I ODLAGANJA

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Samir Vojić

ABSTRACT:
In this paper, we describea robotic vision system for picking and placing objects using industrial robot KUKA KR 16-2. The proposed system recognizes the object and estimates the position and orientation of the object. It then sends the result to the robot control system. The system was installed in a lab for robotics at the Technical faculty in Bihać.

***Key words*:** *robotics, vision system*

SAŽETAK:
U ovom radu opisan je robotski vizijski sistem za uzimanje i odlaganje predmeta korištenjem industrijskog robota KUKA KR 16-2. Dati sistem prepoznaje predmete i procjenjuje položaj i orijentaciju predmeta i nakon toga šalje rezultate upravljačkom sistemu robota. Sistem je instaliran u laboratoriji za robotiku Tehničkog fakulteta u Bihaću.

Ključne riječi: *robotika, vizijski sistem*

TESTING OF TRIBOLOGICAL PROPERTIES OF ADI

TESTIRANJE TRIBOLOŠKIH KARAKTERISTIKA ADI MATERIJALA

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Pavel Kovač


Borislav Savković


Dušan Ješić


Dražen Sarjanovic

***ABSTRACT**:*
This experimental work consists of testing of isothermally improved specimens for wear process without lubrication. In the first part investigated was tribological properties on tribometer pin on disc made produced from ADI. Tested was loss of length and loss of mass of pin for different increasing number of revolutions. Both wear parameters were increasing with number of revolutions. In the second part this was accomplished by conducting face milling tests for a range of machining conditions. More specifically, the effects of cutting speed on tool life was tested. In the study was found that the machinability of ADI, in terms of tool life, degrades as the cutting speed increases. Tool wear progression in time cubic polynomial fit equations for workpiece ADI material. The Tool life equation developed by Taylor to quantify the relationship between cutting speed and tool life is determined as well.

***Key words:** tribology tests, pin on disc, wear, tool life, ADI.*

***SAŽETAK**:*
Ovaj eksperimentalni rad se sastoji od ispitivanja izotermno poboljšanih uzoraka Na procese habanja bez podmazivanja. U prvom delu istraživane su tribološke osobine na tribometru pin i disku napravljenom od ADI. Testiran je gubitak dužine i gubitak mase pina za različiti rastući broj obrtaja. Oba parametra habanja su se povećavala sa brojem obrtaja. U drugom delu to je postignuto provođenjem testova za glodanje na licu za različite uslove obrade. Preciznije, ispitan je efekat brzine rezanja na vek trajanja alata. U studiji je utvrđeno da se obradljivost ADI, u smislu trajanja alata, degradira kako se brzina rezanja povećava. Progresija habanja alata u vremenskim kubičnim polinomima prilagođenih jednačina za ADI materijal obratka. Određena je i jednačina za postojanost alata koju je razvio Taylor za kvantifikaciju odnosa između brzine rezanja i veka trajanja alata.

***Ključne reči:** tribološki testovi, pin na disku, habanje, postojanost alata, ADI*

ANALYSIS OF THE COMPARATIVE ADVANTAGES OF GEAR PUMPS INDICATORS

ANALIZA POKAZATELJA KOMPARATIVNIH PREDNOSTI ZUPČASTIH PUMPI

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Milutin Živković Predrag Dašić

ABSTRACT:
Hydraulic pumps belong to the basic devices of each hydraulic system, because they convert mechanical energy to the pressure of the working fluid. As a significant number of drive solutions are realized by gear pumps, special attention will be dedicated to them in this paper. Their basic comparative advantage is in the simplicity of conservative solutions as well as relatively simple production. This implies, for the buyer, an acceptable price and not a negligible or favorable mass ratio and the achieved strength. For this reason, the authors of this paper will define all the indicators of this conclusion. In support of this assertion, we will analyze the gears of production of the famous Serbian manufacturer, PPT-HIDRAULIKA ad from Trstenik. The same will show tabs and diagrams.

Key words: *gear pumps, weight ratio, pump power, comparative comparisons*

SAŽETAK*:*
Hidrauličke pumpe spadaju u osnovne uređaje svakog hidrauličkog sistema, jer pretvaraju mehaničke u energiju pritiska radnog fluida. Kako se značajan broj pogonskih rešenja ostvaruje zupčastim pumpama, u radu će se pažnja posvetiti njima. Njihova osnovna komparativna prednost je u jednostavnost konsrtukivnih rešenja kao i relativno jednostavna izrada. To podrazumeva, za kupca, prihvatljivu cenu a nije zanemarljiv ni povoljan maseni odnos i ostvarena snage. Iz tog razloga, autori ovog rada, će definisati sve pokazatelje ovakvog zaključka. Kao prilog ovoj tvrdnji, analiziraćemo zupčaste pumpe proizvodnje poznatog srpskog proizvođača, PPT-HIDRAULIKA ad iz Trstenika. Ista će se pokazati tabelarno i korišćenjem dijagramskih zavisnosti.

Ključne reči*:zupčaste pumpe, težinski odnos, snaga pumpe, komparativna poređenja*

SYSTEMS FOR PASSIVE AND ACTIVE VIBRATION DAMPING

SISTEMI ZA PASIVNO I AKTIVNO PRIGUŠNJE VIBRACIJA

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Safet Isić


Semir Mehremić


Isak Karabegović


Ermin Husak

ABSTRACT:
Vibrations are a mechanical phenomenon that accompanies the work of many mechanical systems. Increased vibration can negatively affect the performance of these systems (e.g. the accuracy of the cutting machine) or, in some cases, endanger the strength and stability of the system (e.g. oscillation of bridges under the influence of wind, oscillation of buildings in the earthquake, etc.). Reduction of the amplitude of the oscillation could be done by changing the mass arrangement, changing the stiffness, and installing special supports. This approach often requires a change in the constructive system solution, what is in many cases difficult or impossible to do. The alternative is active vibration damping systems, which, depending on the vibration states of the system they are part of, can induce the vibrations that by superposition lead to their reduction. With the development of mechatronics, the possibilities of such systems are becoming ever greater. This paper reviews the vibration damping system (active and passive) and presents the principle of the mechatronic system for active vibration damping.

Key words: *vibrations, active damping, passive damping, mechatronics.*

SAŽETAK:
Vibracije su mehanički fenomen koji prati rad većine mehaničkih sistema. Povišenje vibracija može negativno uticati na njihove rezultate rada (npr. na tačnost mašina za obradu rezanjem) ili, u nekim slučajevima, ugroziti čvrstoću i stabilnost sistema (npr. oscilacije mostova pod djelovanjem vjetra, oscilacije zgrada pri potresu, itd.). Redukcija amplitude oscilovanja može se vršiti promjenom mase, promjenom krutosti i ugradnjom specijalnih oslonaca. Ovaj pristup često zahtijeva promjenu konstruktivnog rješenja sistema. Alternativa su aktivni sistemi za prigušenje vibracija, koji, zavisno od stanja vibracija sistema čiji su sastavni dio, mogu inducirati vibracije koje superponiranjem dovode do njihove redukcije. Sa razvojem mehatronike, mogućnosti ovakvih sistema postaju sve veće. U ovom radu izvršenje pregled sistema za prigušenje vibracija (aktivno i pasivno) i prikazan princip rada mehatroničkog sistema za aktivno prigušenje vibracija.

Ključne riječi: *vibracije, aktivno prigušenje, pasivno prigušenje, mehatronika*

APPLICATION OF THE MODIFIED GENETIC ALGORITHM FOR OPTIMIZATION OF PLASMA COATINGS GRINDING PROCESS

PRIMENA MODIFIKOVANOG GENETIČKOG ALGORITMA ZA OPTIMIZACIJU PROCESA BRUŠENJA PLASMENIH PREMAZA

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Vladimir Tonkonogyi *Predrag Dašić* *Olga Rybak* *Tetiana Lysenko*

ABSTRACT:
The problem of defining optimal conditions for grinding plasma coatings may be considered as multi-objective optimization problem with a system of bounding inequalities that contain surface roughness, temperature, local and residual stresses as well as intrinsic defects size. This approach contributes to applying evolutionary algorithms such as genetic algorithm to solve the stated problem. Taking into account special characteristics of technological process, modification of the classical genetic algorithm has been carried out in the presented research.

Key words: *genetic algorithm, multi-objective optimization, selection operator, mutation operator, surface grinding, plasma coatings*

***SAŽETAK*:**
Problem definisanja optimalnih uslova za brušenje plazma prevlaka može se smatrati višekriterijumskim optimizacionim problemom sa sistemom graničnih nejednakosti koji sadrže hrapavost površine, temperaturu, lokalne i rezidualne naprezanja kao i veličinu unutrašnjih defekata. Ovaj pristup doprinosi primeni evolucionih algoritama kao što je genetski algoritam za rešavanje navedenog problema. Uzimajući u obzir posebne karakteristike tehnološkog procesa, u prikazanom istraživanju izvršena je modifikacija klasičnog genetskog algoritma.

Ključne reči: *genetski algoritam, multi-objektivna optimizacija, selektorski operator, operator mutacije, površinsko brušenje, plazma premazi*

PHOTOVOLTAIC SYSTEMS WITHSUN TRACKING POSITION

FOTONAPONSKI SISTEMISA PRAĆENJEM POZICIJE SUNCA

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Edin Šemić Malik Čabaravdić

ABSTRACT:
This paper describes the work of solar photovoltaic systems and the types of photovoltaic panels. Solar energy can be transformed in many ways into electrical, and the simplest way is through photovoltaic cells. The work principles of photovoltaic cell is based on photoelectric effect. Solar panels can be fixed, or mobile panels with one or two rotation axis. Mobile systems can be optimally positioned in relation to the sun, no matter where the sun is in the sky.

Key words: *photovoltaic cell, solar panel, position, solar radiation.*

SAŽETAK:
U ovom radu opisan je rad fotonaponskih sistema koji prate kretanje sunca, te tipovi fotonaponskih panela. Sunčeva energija se može na više načina pretvoriti u električnu, a najjednostavniji način jeste putem fotonaponskih ćelija. Princip rada fotonaponske ćelije se temelji na fotoelektričnom efektu. Solarni paneli mogu biti fiksni, ili pokretni po jednoj ili dvije ose. Pokretni sistemi mogu biti optimalno pozicionirani u odnosu na sunce bez obzira gdje se sunce nalazi na nebu.

Ključne riječi: *fotonaponska ćelija, solarni panel, pozicija, sinčevo zračenje.*

ACHIEVING OPTIMAL STIFFNESS OF PLANAR MULTILINK MECHANISMS STRUCTURE BY MEMBERS SHAPE MODIFICATION

OSTVARIVANJE OPTIMALNE ČVRSTOĆE STRUKTURE PLANARNOG MULTILINK MEHANIZMA PO MODIFIKACIJI OBLIKA ČLANOVA

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Denijal Sprečić Džemal Kovačević Jasmin Halilović Edis Nasić

ABSTRACT:
FEA for shape optimisation, for individual parts or assemblies is widelly used. FEA should simulate eather real load conditions, eather load conditions aplied during lab.-testing (more often case in automotive industry). FEA is shortening shape optimisation duration, but if one tries to achieve absolutely credible simulation of phisical condition, FEA can be relatively long lasting, too. In the paper is shown an examle of shape optimization for stiffness improvement for multilink Bonnet Hinges. Reasons why it is very dificul and, longlasting to perform accurate FEA for specific assembly and requirenets is presented. Hinges initial design was chosen, simplified FEA for initial design have been performed. Comparing initial design FEA result, experimental measurement result and goal value, reference value for FEA have been obtained. Hinges design have been varied, fast FEA for each variation have been performed, until reference value is reached. Procedure resulted in a successfully optimized design.

Key words: *Planar multilink mechanisms, FE simulation, stiffness optimization.*

SAŽETAK:
Za optimiranje oblika individualnih proizvoda ili sklopova, FEA je u širokoj upotrebi. FEA bi trebala simulirati ili stvarne radne uslove ili uslove ispitivanja u labolatoriji(u auto-industriji češće). FEA skraćuje proces optimiranja oblika, ali ukoliko se insistira na apsolutno preciznoj simulaciji fizičkih opterećenja i uslova, FEA takođe može biti relativno dugotrajna za izradu. U ovom radu je prikazan primjer optimiranja oblika sa ciljem poboljšanja krutosti višečlanog mehanizma okova pokrova motora. Prikazani su objektivni razlozi zašto je za dati primjer apsolutno precizna FEA kompleksna i dugotrajna. Uzet je početni oblik, za njega su izrađene pojednostvljena/brza FEA i fizički test. Upoređujući rezultate FEAe, testa i zahtijevane deformacije, utvrđena je ciljna vrijednost, koju pri optimranjui treba postići FEA-om. Obik okova je mijenjan, za svaku varijaciju je izrađena FEA, dok nije postignuta ciljna vrijednost deformacije. Ova procedura je dovela do postizanja zadovoljavajućeg optimiziranog dizajna okova.

Ključne reči: *Ravanski višečlani mehanizmi, FE simulacije, optimiranje krutosti*

THE IMPACT OF THE DEFORMATION REDISTRIBUTION ON THE SPECIAL NARROWING FORCE

UTICAJ PRERASPODJELE DEFORMACIJE NA SILU SPECIJALNOG SUŽAVANJA

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Mirna Nožić *Himzo Đukić*

ABSTRACT:
The paper presents the results of experimental investigations of the special narrowing process with two variants of tool construction in the production of the same workpiece.Both tools had three narrowing operations. Deformation analysis was obtained through logarithmic deformation and narrowing ratio, and was performed after each narrowing operation.In laboratory conditions, a deformation force was recorded on a hydraulic test machine with custom manufacturing tools. For the experiments, cylindrical preparations, obtained by deep drawing with the reduction of wall thickness from steel and brass, were used.

Key words: *special* narrowing, die, narrowing press, deformation redistribution, special narrowing force

SAŽETAK:
U radu su prikazani rezultati eksperimentalnih istraživanja procesa specijalnog sužavanja sa dvije varijante konstrukcije alata pri izradi istog radnog predmeta. Oba alata su imala tri operacije sužavanja. Deformaciona analiza je data preko logaritamske deformacije i odnosa sužavanja, a vršena je poslije svake operacije sužavanja. U laboratorijskim uslovima, na hidrauličnoj kidalici sa prilagođenim proizvodnim alatima, vršeno je snimanje deformacione sile. Za eksperimente su korišteni cilindrični pripremci, dobiveni dubokim izvlačenjem sa redukcijom debljine zida od čelika i mesinga.

Ključne riječi: *specijalno sužavanje, matrica, tiskač, preraspodjela deformacija, sila specijalnog sužavanja*

NOZZLE OPTIMIZATION OF DUAL THRUST ROCKET MOTORS

OPTIMIZACIJA MLAZNIKA RAKETNIH MOTORA SA DUALNIM POTISKOM

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Mohammed Alazeezi


Predrag Elek

ABSTRACT:
Optimizing the nozzle of a solid propellant rocket motor plays an essential rule in the overall performance of the motor. In this paper, the investigation of an optimization model of dual thrust rocket motors will be presented. Due to having two phases of thrust in this type of rocket motors, determination of the rocket nozzle expansion ratio is a non-trivial problem. The idea is to use a simple, fixed length and expansion ratio, convergent-divergent nozzle, which provides the highest total impulse of the motor. Usual assumptions for an ideal rocket motor have been used. The optimization model was developed in MATLAB and calculations has been performed using previously obtained interior ballistic and other relevant data for a dual thrust solid propellant rocket motor.

Key words: *optimization, convergent-divergent nozzle, rocket propulsion, dual thrust*

SAŽETAK:
Optimizacija mlaznika raketnog motora sa čvrstom pogonskom materijom je od izuzetnog značaja za ukupne performanse motora. U radu je prikazano istraživanje koje se odnosi na optimizacioni model za raketne motore sa dualnim potiskom, tj. dvostepenom krivom potiska. Zbog postojanja dve faze potiska i dva pritiska u komori, određivanje optimalnog stepena širenja mlaznika predstavlja netrivijalan problem. Osnovni koncept podrazumeva korišćenje jednostavnog konvergeno-divergentnig mlaznika, fiksne dužine i stepena širenja, koji obezbeđuje najveći totalni impuls motora. U modeliranju su korišćene uobičajene pretpostavke za idealni raketni motor. Optimizacioni model je razvijen u programu MATLAB, a proračuni su izvršeni na bazi ranije dobijenih unutrašnjabalističkih i ostalih podataka za ovaj tip raketnog motora.

Ključne reči: *optimizacija, konvergentno-divergentni mlaznik, raketni pogon, dualni potisak*

INFLUENCE OF STRIP COOLING RATEON LÜDERS BANDS APPEARANCE DURING SUBSEQUENT COLD DEFORMATION

UTJECAJ NAČINA HLAĐENJA TRAKE NA POJAVU LÜDERSOVIH LINIJA KOD NAKNADNE HLADNE DEFORMACIJE

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Stoja Rešković *Tin Brlić* *Ivan Jandrlić* *FrancVodopivec*

ABSTRACT:
This paper presents the results of study of Lüders bands appearance on hot rolled strip during cold deformation. The research was carried out on niobium microalloyed steel. After the thermomechanical treatment the strip was cooled at different rates. Samples taken from hot rolled strip were tested by stretching to fracture with simultaneous application of the methods thermography and digital image correlation. The analysis of measurement results was performed with the software packages IRBIS 3 professional and MatchID. Significant differences were found in the samples tested at different cooling rates. In the samples cooled at a lower cooling rate, the appearance of Lüders bands in the elastoplastic area was determined. The appearance of Lüders bands was not observed in the samples cooled at a higher rates.

Key words: *Lüders band, microalloyed steel, hot rolled strip, cooling rate*

REZIME:
U radu su prikazani rezultati istraživanja pojave Lüdersovih linija na toplovaljanoj traci kod hladne deformacije. Istraživanja su provedena na čeliku mikrolegiranom niobijem. Nakon termomehaničke obrade traka je hlađena različitom brzinom.Uzorci toplovaljane trake ispitivani su razvlačenjem do loma uz istovremenu primjenu metoda termografije i digitalne korelacije slike. Analiza rezultata mjerenja provedena je programskim paketima IRBIS 3 professional i Match ID. Utvrđene su značajne razlike u ispitivanim uzorcima hlađenim različitom brzinom. Kod uzoraka hlađenih manjom brzinom utvrđena je pojava Lüdersovih linija u elastoplastičnom području. Pojava Lüdersovih linija nije zapažena kod uzoraka hlađenih većom brzinom.

Ključne reči: *Lüdersove linije, mikrolegirani čelik, toplovaljana traka, brzina hlađenje*

INVESTIGATION OF PRIMER INFLUENCE ON STRENGTH OF ALUMINIUM SPECIMENS BONDED BY VHB TAPE

ISPITIVANJE UTICAJA PRIMERA NA NOSIVOST ALUMINIJSKIH UZORAKA LIJEPLJENIH VHB TRAKOM

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Aida Čolo


Petar Tasić


Ismar Hajro

ABSTRACT:
Very High Bond tape is a type of adhesive often used for fast and efficient bonding of repair work as well as assemblies. One of many types of VHB tape is the acrylic based 4611F, which according to the product specifications has good properties at slightly elevated temperatures and is used for bonding parts of roof constructions of busses and trucks, glazing systems and traffic signs. This paper presents the results of lap sheer testing of VHB bonded aluminium specimens. The tests were carried out on both primed and unprimed specimens at the following temperatures: 20, 50, 100 and 150 °C. The results obtained show that benefits of priming exist only at room temperatures.

Key words: *VHB, aluminium, primer, lap sheer test, elevated temperature*

REZIME:
VHB (eng. VeryHigh Bond) trake su često korišten način brzog i efikasnog spajanja prilikom reparaturnih i montažnih radova. Jedna od VHB traka je i 4611F, koja je na bazi akrila. Prema proizvođačkoj specifikaciji, posjeduje dobre osobine na blago povišenim temperaturama, a koristi se, na primjer, za spajanje dijelova krovnih konstrukcija autobusa i kamiona, sistema ostakljenja i saobraćajnih znakova. U ovom radu su prezentovani rezultati ispitivanja nosivosti preklopih spojeva izvedenih VHB trakom na aluminijskim limovima. Ispitivanja su izvršena sa i bez nanošenja primera na temperaturama 20, 50, 100 i 150 °C. Rezultati su pokazali postojanje prednosti upotrebe primera samo na sobnoj temperaturi.

Ključne riječi: *VHB, aluminij, primer, preklopni spoj, povišena temperatura*

REAL TIME CONTROL OF ABOVE-KNEE PROSTHESIS WITH POWERED KNEE AND ANKLE JOINTS

KONTROLA U REALNOM VREMENU NATKOLJENIČNE PROTEZE S POGONJENIMZGLOBOVIMA U KOLJENU I GLEŽNJU

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Zlata Jelačić *Remzo Dedić*

***ABSTRACT**:*
Passive prostheses, which are mostly used by amputees, enable performance of various activities such as walking on levelled and inclined ground, and even running, riding a bicycle and as of lately swimming. However, performing high power demanding tasks, such as stair ascent, presents a problem, because the lack of muscles makes it impossible to produce the required forces. To perform high demanding power activities, prosthesis must be powered, primarily in its main joints – knee and ankle. In this paper, we present the real time control ofnewly developed above-knee prosthetic SmartLegprototype with powered knee and ankle joints. Specialized control unit is developed in order to achieve required kinematics and dynamics to enable it to perform high power demanding activities in more natural manner, especially stair ascent.

***Key words:** powered above-knee prosthesis, control unit, real time control, prototype testing*

***SAŽETAK**:*
Pasivne proteze, koje najčešće koriste amputirane osobe, omogućuju izvođenje različitih aktivnosti kao što su hodanje na niveliranom i blagonagnutom terenu, pa čak i trčanje, vožnju bicikla i plivanje. Međutim, izvođenje zahtjevnih zadataka, kao što je penjanje uz stepenice, predstavlja problem, jer nedostatak mišića onemogućuje postizanje potrebnih sila. Za obavljanje visoko zahtjevnih energetskih aktivnosti, proteza se mora napajati, prvenstveno u glavnim zglobovima - koljenu i gležnju. U ovom radu predstavljamo kontrolu u realnom vremenu novo razvijenog prototipaSmartLegproteze s pogonjenim zglobom koljena i gležnja. Razvijena je i specijalizirana upravljačka jedinica kako bi se postigla potrebna kinematika i dinamika, te omogućilo obavljanje zahtjevnih zadataka, kao što je penjanje uz stepenice, na prirodniji način.

***Ključne riječi:**aktivna natkoljenična proteza, kontrolna jedinica, kontrola u realnom vremenu, ispitivanje prototipa*

RENEWABLE ENERGY SOURCES AND CORELATED ENVIRONMENTAL SYSTEMS

OBNOVLJIVI IZVORI ENERGIJE I KORELOVANI EKOLOŠKI SISTEMI

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Senad Rahimić Mersida Manjgo

ABSTRACT:
The paper presents the methodology for creating a 3D CAD database for standard steel profiles that are available on the market for the purpose of their application for constructions. In this paper we developed a methodology that enables us to create the base of all standard steel profiles in the CAD system, using a file in the "Libary Feature Part" format. After designing the construction in the 3D sketch, the "Weldements" command selects the appropriate profile from the database and creates the 3D construction. The "Filet Bead" option is used for the welded join, then the surfaces are selected to be joined and that define the type and thickness of the welded join.

Key words: *database, system, CAD*

SAŽETAK:
U radu je prikazana metodologija izrade 3D CAD baze podataka za standardne čelične profile koji su dostupni na tržištu u svrhu njihove primjene za konstrukcije. U ovom radu smo razvili metodologiju koja nam omogućava da stvorimo bazu svih standardnih čeličnih profila u CAD sistemu, koristeći datoteku u formatu "Libary Feature Part". Nakon crtanja konstrukcije u 3D skechu, naredbom "Weldements" biramo odgovarajući profil iz baze podataka i kreiramo 3D konstrukciju. Za zavarene spojeve se koristi opcija "Filet Bead", zatim se odaberu površine koje se spajaju i koje određuju tip i debljinu zavarenog spoja.

Ključne riječi: *baza podataka, sistem, CAD*

PUT KA NOVOJ DEFINICIJI KILOGRAMA

THE WAY TO A NEW DEFINITION OF THE KILOGRAM

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Daut Denjo *Senada Pobrić*

SAŽETAK:
U ovom radu je prikazan put ka novoj definiciji jedinice mase, kilogram, preko dva veoma složena eksperimenta koja se vode u vodećim svijetskim metrološkim institutima. Ti eksprimenti su Avogardo projekat i Watt-ova vaga, koji imaju za cilj povezivanja kilograma sa prirodnom konstantom, Planck-ovom konstantom. Također u radu su navedene prirodne konstante objavljene od CODATA kao i aktivnosti Physikalisch-Technische Bundesanstalt (PTB) na radu ostalih fizikanih veličina i njihovom povezivanju na prirodne konstante.

Ključne riječi: *Metrologija, jedinica mase kilogram*

ABSTRACT:
This paper presents a way to a new definition of a mass unit, kilogram, through two very complex experiments which are performed in the leading world metrology institutes. These experiments are Avogardo project and Watt's scales, which are aimed to connecting kilograms with natural constant, Planck's constant. Also, the paper mentioned natural constant, published by CODATA and Physicalisch-Technische Bundesanstalt (PTB) activities in the work of other physical quantities and their connection to the natural constants.

Key words: *metrology, mass unit kilogram*

HEXAPOD ROBOT NAVIGATION USING FPGA BASED CONTROLLER

NAVIGACIJA HEKSAPOD ROBOTA KORIŠTENJEM FPGA KONTROLERA

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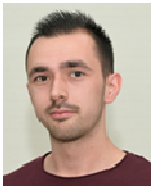

Lejla Banjanović-Mehmedović Alen Mujkić Nedim Babić Jakub Šečić

***ABSTRACT**:*
In order to improve efficiency and achieves higher performance, motor control mechanism on a robotic platform realized by microcontroller-based system in last time is changing with the reconfigurable hardware platforms. This paper presents the field programmable gate array (FPGA) implementation of the hexapod robot navigation using the tripod gate sequence. The servo motor controller is implemented in the Cyclone IV FPGA chip by Altera using Verilog as Hardware Description Language (HDL). The implementation of the servomotor controller in FPGA has several advantages as circuit design flexibility and parallel command executions when compared to conventional microcontroller-based system. The particular advancesintroduced in this field have impact on motor control design of multiple-output requirements as well as parallel co-work of multiple robotic platforms in different applications in scope of Industry 4.0.

***Key words:**FPGA, hardware description language (HDL), hexapod robot navigation, Verilog.*

***SAŽETAK**:*
U cilju unapređenja efikasnosti i dostizanja više perfomanse sistema, upravljanje motorima na robotskim platformama realizovano mikrokontrolerima u zadnje vrijeme se zamjenjuje sa rekonfigurabilnim hardverskim platformama. Ovaj rad prezentira FPGA implementaciju navigacije heksapod robota korištenjem tronožne sekvence kretanja. Kontroler servomotora je implementiran na Alterinom Cyclone IV FPGA čipu korištenjem Verilogakao hardverskog deskripcionog jezika (HDL). Implementacija kontrolera servomotora na FPGA ima nekoliko prednosti pri komparaciji sa konvencionalnim mikrokontrolerom kao što je fleksibilnost logičkog kola te paralelno izvršenje komandi. Ovo osobito ima značaja kada se primjenjuje upravljanje velikim brojem motora kao što je pri paralelnom radu više robota u različitim aplikacijama Industry 4.0.

***Ključne riječi:** FPGA, hardverski deskripcioni jezik (HDL), navigacija heksapod robota, Verilog*

DEVELOPMENT OF TSCLab: A TOOL FOR EVALUATION OF THE EFFECTIVENESS OF ADAPTIVE TRAFFIC CONTROL SYSTEMS

RAZVOJ TSCLab-a: ALAT ZA EVALUACIJU UČINKOVITOSTI ADAPTIVNIH SUSTAVA UPRAVLJANJA PROMETOM

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ABSTRACT:
Adaptive Traffic Control Systems (ATCS) have been widely implemented for urban traffic control due to their capability to alleviate traffic congestion. Evaluation of the effectiveness of ATCS is challenging and presents an open problem. Different measures of effectiveness with in-depth insights into the traffic situations of the controlled signalized intersection are required. In this paper, development of TSCLab (Traffic Signal Control Laboratory), a MATLAB based tool for evaluation of ATCS is presented. It can gather and visualize relevant data, which describe the performance of ATCS in real time, in a VISSIM based simulation environment. To proof the capabilities of TSCLab, the ATCS UTOPIA/SPOT has been evaluatedusing an isolated intersection as the use case.

Key words**:** *intelligent transport systems, adaptive traffic control system, isolated signalized urban intersection, evaluation of effectiveness.*

SAŽETAK:
Adaptivni sustavi upravljanja prometom seprimjenjuju zbog njihove mogućnosti smanjivanja zagušenja prometa. Ocjene kvalitete rada takvih sustava je izazovna i predstavlja otvoren problem. Potrebne su različite mjere kvalitete semaforiziranih raskrižja s mogućnošću dobivanja dubinske slike o prometnoj situaciji. U ovom članku je predstavljen razvoj alata TSCLab (engl. Traffic Signal Control Laboratory) koji omogućava navedenu ocjenu kvalitete rada adaptivnih sustava upravljanja prometom. Implementiran je u MATLAB-u i omogućuje prikupljanje te grafički prikaz bitnih podataka, koji opisuju ponašanje adaptivnih sustava upravljanja prometom, u simulacijskom okruženju zasnovanom na simulatoru VISSIM. Radi prikaza mogućnosti TSCLab je primijenjen za ocjenu kvalitete rada sustava UTOPIA/SPOT korištenjem izoliranog raskrižja kao testnog scenarija.

Ključne riječi*: inteligentni transportni sustavi, adaptivni sustavi upravljanja prometom, izolirano semaforizirano urbano raskrižje, evaluacija učinkovitosti*

APPLYING UNMANNED AERIAL VEHICLES (UAV) IN TRAFFIC INVESTIGATION PROCESS

PRIMJENA BESPILOTNIH LETJELICA U PROCESU OČEVIDA PROMETNIH NESREĆA

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Pero Škorput Sadko Mandžuka Martin Gregurić Maja Tonec Vrančić

***ABSTRACT**:*
Traffic accident investigations are technical and technological processes which essentially contain two opposed demands: the shortest clearance time in order to prevent secondary incidents and investigation as an act which purpose is to determine the elements of criminal offense of causing a traffic accident or a traffic offense. The investigation today, in time context, is a depended process that requires relatively longer time period to gather evidence, make necessary measurements, describe traces etc. In this paper will be shown the possibilities of digitalization and three-dimensional (3D) modelling of traffic accident sight. Innovative technologies will be described, such as making three-dimensional (3D) models of the actual place where traffic accident happened, using Unmanned Aerial Vehicle (UAV) and photogrammetric procedures.

***Key words:** digitalization, UAV, investigation, traffic accident, 3D model*

***SAŽETAK**:*
Uviđaji prometnih nesreća su prometni i tehničko-tehnološki procesi koji u svojoj osnovi sadržavaju dva međusobno suprotstavljena zahtjeva: što kraće vrijeme raščišćavanja mjesta prom oč

rometnog prekršaja.
Provedba očevida je danas u vremenskom kontekstu zavisan proces koji zahtjeva relativno duži vremenski period kako bi se prikupili dokazi, obavila potrebna mjerenja, opisali tragovi i sl. U ovom radu prikazati će se mogućnosti digitalizacije i izrade trodimenzionalnih 3D modela mjesta prometne nesreće. Opisati će se inovat

fotogrametrijskih postupaka.

***Ključne riječi:** digitalizacija, bespilotna letjelica, uviđaj, prometna nesreća, 3D model*

IOT CONCEPT IN COOPERATIVE TRAFFIC MANAGEMENT

IOT KONCEPT U UPRAVLJANJU KOOPERATIVNOG UPRAVLJANJA PROMETOM

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Miroslav Vujic


Sadko Mandzuka


Luka Dedic

***ABSTRACT**:*
In order to improve the quality of traffic in urban areas it is necessary to establish communication between infrastructure and vehicles. Basic concept is defined through cooperative approach where traffic information is exchanged between vehicles and vehicles and vehicles and infrastructure. Because of large amount of data, new communication technologies are crucial for data saving and analysis. Internet of Things is a plausible concept for data storage, but the intention of this research is to define possible wireless communication technologies that can be used in urban traffic management. Many ITS solutions demand different performance of wireless technologies (speed of connection establishment, bandwidth, etc.), so certain scenarios will be described in this research.

***Key words:** Internet of Things, Intelligent Transport Systems, Traffic Environment, Traffic Control*

***SAŽETAK**:*
U cilju poboljšanja kvalitete prometa u gradskim područjima potrebno je uspostaviti komunikaciju između infrastrukture i vozila. Osnovni koncept definiran je kooperativnim pristupom u kojem se informacije o prometu razmjenjuju između vozila i vozila te vozila i infrastrukture. Zbog velike količine podataka, nove komunikacijske tehnologije su ključne za pohranu i analizu podataka. Internet stvari je prihvatljiv koncept za pohranu podataka, ali svrha ovog istraživanja je definirati moguće bežične komunikacijske tehnologije koje se mogu koristiti u upravljanju gradskim prometom. Mnoga ITS rješenja zahtijevaju različite performanse bežičnih tehnologija (brzina uspostavljanja veze, propusnost, itd.), tako da će u ovom radu biti opisani različiti scenariji u gradskom prometu.

***Ključne riječi**: Internet stvari, Inteligentni transportni sustavi, prometno okruženje, upravljanje prometom*

PERFORMANCE EVALUATION OF TWO COMPUTATIONAL APPROACHES FOR VEHICLE COLLISION SIMULATION

OCJENA PERFORMANSI DVA RAČUNALNA PRISTUPA ZA SIMULACIJU KOLIZIJE VOZILA

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Clio G. Vossou D. V. Koulocheris Kiriakos P. Kapetis

ABSTRACT:
A vehicle collision can be divided in three distinct time phases, the pre-collision, the collision and the post-collision phase. Usually during a traffic accident reconstruction the collision and post-collision phases are investigated in order for the accident reconstructionist to draw conclusions concerning the causes and the events that lead to the vehicle collision. The investigation of both phases is usually a repetitive procedure which terminates when the investigation results match the physical evidence drawn from the accident scene. The objective of the analysis of the collision phase is the determination of the velocities of both vehicles prior and post collision.……In order to evaluate the performance of both algorithms, the vehicle collisions described in details in the RICSAC database have been used. The results of each algorithm are compared with each other as well as with the measured quantities existing in RICSAC database.

Key words: *vehicle collision, genetic algorithms, RICSAC database, planar impact mechanics, crush energy*

SAŽETAK:
Suda rvozila može se podijeliti u tri različite vremenske faze, prije sudara, faza sudara i faza nakon sudara. Obično se tokom rekonstrukcije prometne nesreće ispituju faze sudara i nakon sudar a kako bi rekonstruktor nesreće donio zaključke o uzrocima i događajima koji su doveli do sudara vozila. Istraživanje obiju faza obično je postupak koji se ponavlja i završava kada rezultati istraživanja odgovaraju fizičkim dokazima izvučenim iz mjesta nesreće. Cilj analize faze sudara je određivanje brzina oba vozila prije i poslije sudara ……. Kako bi se procijenila učinkovitost oba algoritma, sudari vozila opisani u RICSAC bazi podataka su korišteni. Rezultati svakog algoritma međusobno se uspoređuju, kao i izmjerene veličine u RICSAC bazi podataka.

Ključne riječi: *sudar vozila, genetski algoritmi, RICSAC baza podataka, planarna udarna mehanika, energija gnječenja*

ADVANCED APPLICATIONS FOR URBAN MOTORWAY TRAFFIC CONTROL

NAPREDNE APLIKACIJE U UPRAVLJANJU PROMETOM NA URBANIM AUTOCESTAMA

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***ABSTRACT**:*
Congestions on urban motorways are caused by recurrent traffic from the urban area, which tries to bypass controlled traffic intersection in the same urban area, and non-recurrent transit traffic. Modern information-communication technologies and advanced traffic control algorithms are introduced as valid approach to ensure efficient and safer traffic flows on them. This paper proposes coordination between ramp metering (RM) and Dynamic Route Guidance Information Systems (DRGIS). DRGIS reroutes vehicles from congested parts of the motorway while RM controls in-flow of the vehicles from on-ramps with special traffic lights. This paper also provides an overview of the Intelligent Speed Adaptation (ISA) implementation in the context of autonomous vehicles and connected driving.

***Key words:** Traffic Control, Ramp Metering, Route Guidance, Autonomous Vehicles*

***SAŽETAK**:*
Zagušenja na urbanim autocestama uzrokovana su vozačima koji žele koristiti kapacitete iste kako bi izbjeglisemaforizirana raskrižja u jezgri neposredne urbane sredine, te tranzitnog prometa. Aplikacija suvremenih informacijsko-komunikacijskih tehnologija i naprednih upravljačkih algoritma je jedan od pristupa u osiguravanju sigurnijih i efikasnijih prometnih procesa na njima bez značajnih ulaganja u prometnu infrastrukturu. Ovaj rad predstavlja koordinaciju između sustava upravljanja priljevnim tokovima i dinamičkih putnih vodiča za sinergijsko upravljanje opterećenim priljevnim tokovima i usmjeravanje vozila izvan zona zagušenja. Također, rad analizira inteligentnu prilagodbu brzine vozila u kontekstu autonomnih i umreženih vozila.

***Ključne riječi:** Upravljanje prometom, Upravljanje priljevnim tokovima, Putni vodiči, Autonomna vozila*

THE IMPACT OF THE SEATBACK ANGLE ON THE APPEARANCE OF THE DRIVER'S DISCOMFORT

UTICAJ UGLA NASLONA SEDIŠTA NA POJAVU NEUDOBNOSTI VOZAČA

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Slavica Mačužić


Jovanka Lukić

ABSTRACT:
Car model, colour, design, motor power, driving performance, is just some of the factors that influence the purchase of a new car. However, one of the most important tasks of vehicle manufactures is driver comfort. In the initial phase of designing a car, a posture of vehicle driver must be carefully considered, because a long-term driving can affect driver performance, especially in an inadequate posture. In this paper, a virtual environment of middle-class car was created. Different angles of the seat back are considered, with the aim of determining the driver body discomfort. Anthropometrics characteristics of different male and female populations were used. The analysis was carried out for two conditions: during driving and resting. Software package Ramsis was used to perform posture analysis of "mannequin" in driving and resting condition. The obtained values of fatigue and discomfort, as body parts discomfort, were different for all kinds of subjects.

Key words: *anthropometry, driver, modelling, discomfort, Ramsis*

REZIME:
Model automobila, boja, dizajn, snaga motora, vozne performanse, su samo neki od faktora koji utiču na kupovinu automobila. Ipak, jedan od najvažnijih zadataka proizvođača vozila je udobnost vozača. U početnoj fazi projektovanja automobila, položaj vozača mora biti pažljivo razmotren jer dugotrajna vožnja može da utiče na performanse vozača, posebno u neadekvatnom položaju. U ovom radu je kreirano virtualno okruženje automobila srednje klase. Razmatrani su različiti uglovi naslona sedišta, sa ciljem da se odredi neprijatnost tela vozača. Korišćene su antropometrijske karakteristike različitih muških i ženskih populacija. Analiza je izvršena za dva uslova: tokom vožnje i tokom odmora. Softverski paket Ramsis je korišćen za analizu položaja „manekena“ u stanju vožnje i stanju odmora. Dobijene vrednosti zamora i nelagodnosti, različite su za sve vrste ispitanika.

Ključne reči: *antropometrija, vozač, modeliranje, neudobnost, Ramsis*

APPLICATION OF NEW TECHNOLOGIES TO IMPROVE THE VISUAL FIELD OF HEAVY DUTY VEHICLES' DRIVERS

PRIMENA NOVIH TEHNOLOGIJA ZA POBOLJŠANJE VIDNOG POLJA KOD DUGIH TERETNIH VOZILA

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ABSTRACT:
The World Health Organization has declared pedestrians, cyclists and motorcycle, moped drivers and passengers, as vulnerable categories of participants in traffic. Some of the reasons are that they often can be found in a blind spot of the cars, vans and heavy duty vehicles. Therefore, the drivers of such vehicles can't notice them. Determination of the visual field of heavy duty vehicles' drivers, is performed in the paper by applying Catia V5 software, module Ramsis (in caseif only rear-view mirrors are used). Based on this approach, the reasons for using cameras and sensors instead of a rear-view mirror are reflected in the reduction of blind spots and reduction of the aerodynamic drag coefficient, the numerical simulation was obtained by usingAnsys/ Workbench14.5 software.

Key words: *blind spot, visual field, Ramsis, rear-view mirrors, cameras and sensors, Ansys*

REZIME:
Svetska zdravstvena organizacija proglasila je pešake, bicikliste i vozače i putnike na motociklima i mopedima ranjivom kategorijom učesnika u saobraćaju. Neki od razloga su što se često nađu u mrtvim uglovima kod automobila, kombija i dugih teretnih vozila. Dakle, vozači vozači tih vozila ne mogu ih primete. U radu je izvršeno određivanje vidnog polja vozača dugih teretnih vozila primenom softverskog paketa Catia V5 modul Ramsis (u slučaju da se koriste samo retrovizori). Na osnovu ovakvog pristupa, proizilaze razlozi korišćenja kamera i senzora umesto retrovizora, koji se ogledaju u smanjenju mrtvih uglova, kao i smanjenje koeficijenta aerodinamičnosti, numerička simulacija je dobijena primenom softvera Ansys/Workbench 14.5.

Ključnereči: *mrtviuglovi, vidnopolje, Ramsis, retrovizori, kamere i senzori, Ansys*

THE IMPACT OF ELECTRIC CARS USE ON THE ENVIRONMENT

UTICAJ KORIŠĆENJA ELEKTRIČNIH AUTOMOBILA NA ŽIVOTNU SREDINU

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***ABSTRACT**:*
This paper gives basic information on electric cars, types of electric cars (hybrid, chargeable hybrid, battery, electric cars with fuel cells, solar cars), on current state of the electric cars use and its impact on the environment. The highest energy saving in relation to IC engine vehicles is achieved in city driving. Electric cars are as ecologically clean and energy efficient became the subject of the energy policy of developed countries (USA, Japan, and Germany). In developed countries, regulations are adopted according to which ECs must be represented in a certain percentage in total car production. Such regulations also apply in other countries.

***Key words:** electric cars, internal combustion engine (IC), environment*

SAŽETAK:
U radu su date osnovne informacije o električnim automobilima, tipovima električnih automobila (hibridni, punjivi hibridni, baterijski, električni automobili sa gorivim ćelijama, solarni automobili) o sadašnjem stanju korišćenja električnih automobila i uticaju korišćenja električnih automobila na životnu sredinu. Električni automobili su kao ekološki čisti i energetski efikasni postali predmet energetske politike razvijenih zemalja (SAD, Japan, Nemačka). U razvijenim zemljama se donose propisi po kojima EA moraju da budu zastupljeni u određenom procentu u ukupnoj proizvodnji automobila.

***Ključne reči:** električni automobile, SUS motor, životna sredina*

PERFORMANCE ANALYSIS OF THE HDLC PROTOCOL-NRM MODE

ANALIZA PERFORMANSI HDLC PROTOKOLA-NRM NACINA RADA

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ABSTRACT:
HDLC (High-level Data Link Control) protocol is the most fundamental error-and flow control procedure used in data communications for a single physical channel. Moreover HDLC is bit-oriented synchronous, data-framing, switched and non-switched data link layer (layer 2) protocol. Apart from the classical HDLC standard of ISO, the generic recovery mechanisms of this protocol constitute the basis for a whole family of data link protocols designed for wired and wireless systems. The following work presents a series of detailed analytic studies on performance modelling and evaluation of an HDLC-controlled link wherein various retransmission options and traffic scenarios are considered. The goal of the analysis is the mean link throughput and mean frame flow time computation with respect to a set of link and protocol parameters, as frame length, window size, duration of time-outs for a given bit-error probability, channel load and distance between communicating stations.

***Key words*:** *mean link throughput, mean frame flowtime, bit-error probability, time-outs*

SAŽETAK:
Protokol HDLC (High-Level Data Link Control) je pouzdana upravljacka procedura za prenos podataka, detekciju i korekciju grešaka u prenosu, koja se koristi u razmjeni podataka za jedan fizički kanal. Osim toga, HDLC je bit-orijentirani protokol podatkovnog sloja (sloj 2) za sinhronizirani prenos podataka, komutirano (sa prospajanjem) i ne komutirano (bez prospajanja). Osim klasičnog HDLC ISO standarda, generički mehanizmi retransmisije ovog protokola čine osnovu za čitavu familiju protokola za podatkovne veze dizajnirane za žične i bežične sisteme. Ovaj rad predstavlja seriju detaljnih analitičkih studija o modeliranju, analizi i evaluaciji performansi HDLC kontrolirane veze u kojoj se razmatraju različite opcije retransmisije i prometni scenariji. Cilj analize je izracunavanje srednjeg prometa veze, srednjeg vremena protoka okvira, vjerovatnoce greške bita u prenosu, opterećenja kanala i udaljenost između komunicirajucih stanica.

Ključne riječi: *srednji promet veze, srednje vrijeme protoka okvira, vjerovatnoca greške bita*

SOLVING AGILE SOFTWARE DEVELOPMENT PROBLEMS WITH SWARM INTELLIGENCE ALGORITHMS

REŠAVANJE PROBLEMA AGILNOG RAZVOJA SOFTVERA UZ POMOĆ ALGORITAMA INTELIGENCIJE ROJA

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ABSTRACT:
This paper outlines a short overview of swarm intelligence algorithms that are used within the software engineering area. Swarm intelligence algorithms have been used in many software engineering tasks, e.g., grammatical inference or mutation testing. However, their presence in the agile software development field is still awakening. As there are some promising results of solving different problems of agile software development with swarm intelligence, this paper discusses such problems and the proposed solutions within the last decade. Based on the results we propose a systematic classification of swarm intelligence algorithms according to problems within agile software development, i.e., next release problem, risk, software design, software cost estimation, and software effort estimation. Afterwards, we present papers that fall in the scope of the proposed classification, and provide highlights of each paper for researchers, conducting research in this and associated fields. In this manner, we provide some conclusions for each of the classified problem groups, and, in the end, we review the guidelines for the future.

Key words: *Agile Software Development, Swarm Intelligence, Optimization, Search-based Software Engineering*

REZIME:
U radu je dat kratak pregled algoritama inteligencije rojeva koji se koriste u oblasti softverskog inženjerstva. Algoritmi inteligencije roja korišćeni su u mnogim zadacima softverskog inženjeringa. Međutim, njihovo prisustvo u polju agilnog razvoja softvera tek je na početku. Kako postoje rezultati koji obećavaju rješavanje različitih problema razvoja agilnog softvera s inteligencijom roja, u ovom radu se raspravlja o takvim problemima i predloženim rješenjima u posljednjoj deceniji. Na osnovu rezultata predlažemo sistematsku klasifikaciju algoritama inteligencije rojeva za probleme unutar agilnog razvoja softvera. Nakon toga predstavljamo radove koji spadaju na područje predložene klasifikacije. Na ovaj način donosimo neke zaključke za svaku od klasifikovanih problemskih grupa, i na kraju pregledamo smjernice za budućnost.

Ključne riječi: *Razvoj agilnog softvera, inteligencija roja, optimizacija, softversko inženjerstvo zasnovano na pretraživanju*

SOCIO-CYBER-PHYSICAL SYSTEMS ALTERNATIVE FOR TRADITIONAL MANUFACTURING STRUCTURES

SOCIJALNO-KIBERNETSKO-FIZIČKI SISTEMI ALTERNATIVA ZA TRADICIONALNE PROIZVODNE STRUKTURE

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Elvis Hozdić

ABSTRACT:
This work presents a new concept for the restructuring of systemic and organization manufacturing structures in manufacturing enterprises. In the proposed concept is the role of man improved and the role of manager will be given to man, in real time. It is developed the basic concept of socio-cyber-physical manufacturing systems (SCPMS) that represents a building blocks for the new conception of an advanced manufacturing systems in a spirit of socio-cyber-physical systems (SCPS). The proposed concepts enable cybernetization of the functional and managerial competences of the manufacturing structures. This approach aims to improve the performance of manufacturing systems by increasing their productivity, availability, responsiveness and agility, all of which increase competitiveness of manufacturing companies.

Key words: *cyber-physical systems, Industry 4.0, manufacturing systems, socio-cyber-physical manufacturing systems*

REZIME:
Rad prikazuje novi koncept za prestrukturiranje sistemskih i organizacijskih proizvodnih struktura u proizvodnom preduzeću. U predloženom konceptu je unapređena uloga čovjeka na način da mu je dodjeljena uloga menadžera, upravitelja u relnom času. Razvijen je osnovni koncept socijalno-kibernetsko-fizičkih proizvodnih sistema (SKFPS) koji predstavlja gradbeni blok za novu koncepciju proizvodnih sistema u duhu socijalno-fizičkih sistema (SKFS). Predloženi koncept omogućava kibernetizaciju funkcionalni i upravljačkih kompetencija proizvodnih struktura. Pristup ima za cilj da poboljša performance proizvodnih sistema preko povećanja njihove produktivnosti, dostupnost, odgovornost, agilnosti, a sve to povećava konkurentnost proizvodnih preduzeća.

Ključne riječi: *kibernetsko-fizički sistemi, Industrija 4.0, proizvodni sistemi, socijalno-kibernetsko-fizički proizvodn isistemi*

OPTIMIZATION BASED ON SIMULATION OF ANTS COLONY

OPTIMIZACIJA BAZIRANA NA SIMULACIJI KOLONIJE MRAVA

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ABSTRACT:
Natural processes optimize life on earth for thousands of years, so people are inspired by many problem-solving techniques in nature. Metaheuristics inspired by natural processes and systems have become a very active field of research in recent years. One of the most popular methods is Ant Colony Optimization (ACO). In this paper is considered the application of Ant Colony Optimization in the case of the Traveling Salesman Problem (TSP). Different cases, with a different number of ants (population size) with a different number of iteration using software simulation, are considered. It is shown that Roulette Wheel Selection has some impact on the speed of the result. On the other hand, with more ants in each iteration, we get more constructed solutions, which increases the probability of finding a better solution.

Key words: *ant, colony optimization, ACO, software, Traveling Salesman Problem – TSP*

SAŽETAK:
Prirodni procesi optimiziraju život na zemlji hiljadama godina tako da su i ljudi često inspirirani prirodom u rješavanju problema. Metaheuristika inspirirana prirodnim procesima i sistemima postala je veoma aktivno polje istraživanja prdhodnih godina. Jedana od najpopularnijih metoda je Optimizacija kolonijom mrava. U ovom radu se razmatra prijena optimizacija kolonijom mrava u slučaju problema trgovačkog putnika. Razmatrani su različiti slučajevi sa različitim brojem mrava (veličina populacije) i sa različitim brojem iteracija korištenjem softverske simulacije. Pokazano je da selekcija na pincipu točka ruleta ima uticaja na brzinu dobijanja rezultata. U drugu ruku sa više mrava u svakoj iteraciji dobija se bolja gradnja rješenja, što povećava vjerovatnost pronalaska boljeg rješenja.

Ključne riječi: *mrav, optimizacija kolonijom, ACO, softver, problem trgovačkog putnika- TSP*

ESTIMATION OF THE MINOR-LOSS AT THE JUNCTION OF A HEADRACE TUNNEL AND A SURGE TANK WITH AN ORIFICE

ODREĐIVANJE LOKALNIH GUBITAKA SNAGE NA SPOJU DOVODNOG TUNELA I VODOSTANA SA DIJAFRAGMOM

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Adis Bubalo *Muris Torlak* *Safet Isić*

ABSTRACT:
The main goal of the investigation presented in this paper is to analyse influence of the orifice size on the water level oscillations in a surge tank arising during load rejection and water hammer in a hydropower plant. An approach to achieve it, which is adopted in this study, is to develop an adequate 1D *model allowing a fast and reliable simulation of the hydraulic processes in the headrace tunnel and the surge tank. For such a model, estimation of the minor loss at the junction of the surge tank and the headrace tunnel has a crucial role. The calculated water level oscillations show a good agreement with the values measured in an existing surge tank with orifice. The results obtained with the same model for a set of different orifice diameters yield conclusions on the surge tank response in the case of modified orifice design.*

Key words: *hydropower plants,surge tank, orifice,simulation, minor losses*

SAŽETAK:
Glavni cilj istraživanja prezentovanog u ovom radu je analiza uticaja veličine dijafragme na oscilacije nivoa vode u vodostanu za vrijeme odbacivanja tereta i pojave hidrauličkog udara u hidroelektrani. Da bi se to ostvarilo, moguće je primijeniti i pristup koji je usvojen u ovom radu, a to je razvoj adekvatnog 1D *modela koji omogućava brzu i pouzdanu simulaciju hidrauličkih procesa u dovodnom tunelu i vodostanu. Za takav model, određivanje lokalnih gubitaka snage na spoju vodostana s dovodnim tunelom ima ključnu ulogu. Izračunate oscilacije nivoa vode pokazuju dobro slaganje s vrijednostima izmjerenim u postojećem vodostanu s dijafragmom. Rezultati dobijeni tim modelom za skup različitih prečnika dijafragme daju zaključke o ponašanju vodostana u slučaju modifikacije konstrukcije dijafragme.*

Ključne riječi: *hidroelektrane,vodostan, dijafragma, simulacija, lokalni gubici snage*

LABORATORY RESEARCH OF THE INFLUENCE OF PULSATING FLOW OF FLUE GASES AT THE HEAT TRANSFER

LABORATORIJSKO ISTRAŽIVANJE UTICAJA PULZACIJA TOKA DIMNIH PLINOVA NA PRENOS TOPLOTE

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ABSTRACT:
Compared to classical combustion methods, pulse combustion is a qualitative step forward also in terms of a more intensive heat transfer resulting from turbulent pulsa-ting flue gas flow. …. During the research, the heat exchanger is considered as cocurrent or countercurrent depending on the flow of working fluids, whereby the data on which the dependence of heat transfer intensity from the pulsating flue gas flow to the water as heat receiver can be established. It has been shown that the heat transfer coefficient in the pulse flow depends on the burner geometry - the distance between the end of the resonant pipe and the heat exchanger inlet, and the thermal load of the burner. For certain burner geometries and thermal loads, the heat transfer coefficient in pulsating flue gas flow is more than 2 times the heat transfer coefficient in developed turbulent flow without pulsations.

Key words: *burner, pulse combustion, pressure pulsations, heat transfer*

SAŽETAK:
U odnosu na metode klasičnog sagorijevanja, pulzirajuće sagorijevanje predstavlja kvalitativan iskorak i u pogledu intenzivnijeg prenosa toplote koji je posljedica turbu-lentnog pulzirajućeg toka dimnih plinova. …. Tokom eksperimentalnih istraživanja izmje-njivač toplote je, s obzirom na tok radnih fluida, posmatran kao istosmjerni i protu-smjerni, pri čemu su prikupljani podaci na bazi kojih se može uspostaviti zavisnost intenziteta prenosa toplote sa pulzirajućeg toka dimnih plinova na vodu kao prijemnik toplote. Pokazano je da koeficijent prelaza toplote kod pulzirajućeg toka zavisi od geometrije gorionika, udaljenosti između kraja rezonantne cijevi gorionika i ulaza u izmjenjivač toplote te od termičkog opterećenja gorionika. Za određene geometrijske forme gorionika i termička opterećenja, koeficijent prelaza toplote kod pulzirajućeg toka dimnih plinova je i preko 2 puta veći od koeficijenta prelaza toplote pri razvijenom turbulentnom toku bez pulzacija.

Ključne riječi: *gorionik, pulzirajuće sagorijevanje, pulzacije pritiska, prenos toplote*

RE-ENGINEERING OF THE ELEMENTS OF SMALL HYDRO TURBINES

REINŽINJERING ELEMENATA TURBINA MALIH HIDROAGREGATA

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ABSTRACT:
One of the challenges that enterprises are often met is lack of technical documentation of turbine elements. Modern approach to creation of technical documentation for elements of small hydro turbine has been presented. Geometry of penstock valve, guide vanes and draft tube influence on hydro aggregate efficiency. Beside the direct influence on efficiency, in this example the geometry of draft tube is in the same time an input parameter for selection of characteristics and geometry of new hydro turbine that should replace an existing one. The existing dimensional restrains should be respected. Geometry of turbines elements has been scanned using 3D scanner. As the result of scanning process, we obtained a point cloud that represent input data for further CAD software processing and creation of technical documentation as a final goal.

Key words: *re-engineering, 3D scanning, technical documentatio*

SAŽETAK:
Jedan od izazova sa kojim se često susrećemo jeste nedostatak tehničke dokumentacije pojednih komponenti sistema. U radu je predstavljen suvremen pristup izrade tehničke dokumentacije postojećih elemenata male hidroturbine. Na efikasnost rada hidroagregata bitno utječe geometrija lopatica sprovodnog agregata kao i geometrija difuzora. Pored direktnog utjecaja na efikasnost rada turbine, u ovom slučaju geometrija difuzora predstavlja ulazni parametar za izbor karakterstika i geometrije nove turbine koja treba da zamjeni postojeću. Nova turbina treba da se uklopi u postojeće gabarite i dimenionalna ograničenja. Geometrija elemenata turbine je snimljena korištenjem 3D skenera. Kao rezultat skeniranja dobiven je oblak tačaka koji predstavlja ulazne podatke za daljnju softversku obradu i izradu tehničke dokumentacije.

Ključne reči: *reinžinjering, 3D skeniranje, izrada tehničke dokumentacije*

INTENSE APPEARANCE OF CHESTNUT GALL WASP (Dryocosmus kuriphilus Yasumatsu) IN BOSNIA AND HERZEGOVINA

INTENZIVNA POJAVA KESTENOVE OSE ŠIŠKARICE, Dryocosmus kuriphilus Yasumats u BOSNI I HERCEGOVINI

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Zemira Delalić

ABSTRACT:
This paper presents the research of biological characteristics, prevalence, intensity of appearance in year 2016 and 2017 and a prognosis of further expansion of chestnut gall wasp (Dryocosmus kuriphilus Yasumatsu) in Bosnia and Herzegovina. Research has shown that the expansion location of D. kuriphilus has expanded in relation to localities from the first findings in 2015.The study also determined the intensities of the D. kuriphilus phenomenon in all sites where this pest was found, and the intensity of occurrence (category 3) was the highest on the sites in the municipality of Velika Kladuša and Cazin. Intensive appearance of chestnut gall wasp creates a possibility of expansion of chestnut blight fungus (Cryphonectria parasitica).Due to that problem, it is necessary to conduct a research to determine if there is a risk of spreading of this disease in the areas of sweet chestnut in Bosnia and Herzegovina.

Key words: *chestnut gall wasp, sweet chestnut, intensity appearance, invasive species*

SAŽETAK:
U radu je prikazano istraživanje bioloških karakteristika, rasprostranjenost, intenzitet pojave u 2016. i 2017.godini i prognoza daljeg širenja kestenove ose šiškarice (Dryocosmus kuriphilus Yasumatsu) u Bosni i Hercegovini.Istraživanja pokazuju dase područje rasprostranjenjaD. kuriphilus proširilo u odnosu na lokalitete prvog nalaza 2015.godine.Istraživanjem su utvrđeni i intenziteti pojave D. kuriphilus na svim lokalitetima na kojima je ovaj štetnik nađen, a intenzitet pojave (kategorija 3) bio je najveći na lokalitetima na području opštine Velika Kladuša and Cazin. Intenzivnom pojavom kestenove ose šiškarice postoji mogućnosti proširenja uzročnika raka kore kestena.Zbog toga je potrebno provesti istraživanja kako bi se utvrdilo postoji li opasnost za taj tip širenja zaraze u sastojinama pitomoga kestena u Bosni i Hercegovini.

Ključne riječi: *kestenova osa šiškarica, pitomi kesten, intenzitet pojave, invazivna vrsta*

HEALTH RISK ASSESSMENTS BASED ON THE CONTENTS OF HEAVY METALS IN SARAJEVO URBAN SOIL

PROCJENA ZDRAVSTVENOG RIZIKA BAZIRANA NA SADRŽAJU TEŠKIH METALA U URBANOM ZEMLJIŠTU SARAJEVA

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ABSTRACT:
The aim of this study was to assess risks posed to human health based on contents of heavy metals found in soil in Sarajevo urban area. The contents of Cd, Pb, Cr, Ni, Cu, Zn, Co, Se and As have been measured and the hazard coefficient (HQ), non-carcinogenic hazard index (HI) and carcinogenic risk (RI) have been calculated. Overall, HQ and HI were lower than the safe limit of 1, indicating that there is no direct risk to human health from heavy metals in the investigated area; however, these levels should be monitored in a long-term perspective. Our results suggest that children are at higher risks than the adults due to their contact with potentially polluted soil. The soil contaminated with heavy metals can be used as a diagnostic tool for health risk assessments.

Key words: *soil, heavy metals, urban area, health risk assessment, children, adults.*

REZIME:
Cilj ovoga rada bio je procijeniti zdravstveni rizik baziran na sadržaju teških metala nađenih u zemljištu urbanog dijela Sarajeva. Sadržaj Cd, Pb, Cr, Ni, Cu, Zn, Co, Se i As je izmjeren, a koeficijent opasnosti (HQ), nekancerogeni indeks opasnosti (HI) i kancerogeni rizik (RI) su proračunati. Sveukupni HQ i HI su bili niži od sigurne granice koja iznosi 1, indicirajući da nema direktnog rizika po ljudsko zdravlje od teških metala u ispitivanom području; kakogod, ove vrijednosti trebaju biti dugoročno praćene. Naši rezultati pokazuju da su djeca pod povećanim rizikom u poređenju sa odraslim osobama shodno povećanom kontaktu s zagađenim tlom. Tlo zagađeno teškim metalima može biti upotrebljeno kao dijagnostičko sredstvo za procjenu zdravstvenog rizika

Ključneriječi: *zemljište, teškimetali, gradsko područje, procjena zdravstvenog rizika, djeca, odrasli.*

SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY OF SILVER NANOPARTICLES

SINTEZA, KARAKTERIZACIJA I ANTIMIKROBNO DEJSTVO NANOČESTICA SREBRA

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ABSTRACT:
During the past few years, metal nanoparticlesreceived attention due to their interesting optical and electrical properties. Among them, silver nanoparticles (AgNP) showed various specific properties. In this paper, we've synthesised silver nanoparticles and tested their antimicrobial activity. As a precursor for silver, we used silver salt-$AgNO_3$. As a stabilizer and also a reducing agent, we used Gallic acid monohydrate, because it is known that in strong alkaline solutions, this acid is capable of reducing silver ammonium complex, thus generating stable AgNP. The characterization was done using UV/VIS spectrophotometer by assessment of absorption maximum λ_{max} in certain interval of time. In order to determine the inhibitory effects of silver nanoparticles, the test diffusion antibiogram method was used. Based on the results obtained, we concluded that nanoparticles synthesized in this way, show excellent antimicrobial activity and can be used as antimicrobial agent.

Key words: *nanoparticles, spectrophotometry, antimicrobial activity*

REZIME:
U proteklih nekoliko godina, velika pažnja posvećena je metalnim nanočesticama zbog njihovih interesantnih optičkih i električnih osobina. Među njima, nanočestice srebra (AgNP) pokazale su nekoliko specifičnih osobina. U ovom radu, korištena je sol srebra - $AgNO_3$. Kao stabilizator i reducirajući agens koristili smo monohidrat galne kiseline jer je poznato da u jako baznim rastvorima ova kiselina ima mogućnost redukcije amonijevog kompleksa srebra, generišući stabilne AgNP-ove. Karakterizacija je izvršena koristeći UV/VIS spektrofotometar, procjenom apsorpcije maksimuma λmax u određenom vremenskom intervalu. U svrhu određivanja inhibitorskih efekata nanočestica srebra, korišten je test difuznog antibiograma. S obzirom na dobijene rezultate, zaključili smo da nanočestice sintetizirane na navedeni način pokazuju odličnu antimikrobnu aktivnost i mogu biti korištene kao antimikrobno sredstvo.

Ključne riječi: *nanočestice, spektrofotometrija, antimikrobno dejstvo*

COMMUNITIES OF AQUATIC MACRO INVERTEBRATES FROM THE KONJUH MOUNTAIN WATERSOURCES

ZAJEDNICE VODENIH MAKROBESKIČMENJAKA IZVORIŠTA PLANINE KONJUH

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ABSTRACT:
Hydrobiological studies of macrozoobenthos in the headwater streams of the protected landscape of Konjuh were carried out at five sites during the spring, summer and autumn of 2017. The invertebrate biodiversity was consisted of nine groups and 46 taxa. By analyzing the composition of macrofauna, the greatest diversity of taxa was found in the Trichoptera and Ephemeroptera group which were represented by 13 taxa each. Following them are groups with a smaller number of taxa, Plecoptera (8), Diptera (5), Coleoptera and Oligochaeta with two taxa. Other groups found in the headwater streams of Konjuh Mountain are represented by one taxon. The presence of a different number of taxa was found at the investigated sites: at the site Krabašnjica - 25, Studešnica – 15, at the Djevojačka cave and Gluha Bukovica 21 taxa and at the site Tuholj - 16. Based on the analysis of the physical and chemical parameters of the water and the index of saprobity, it has been determined that the water of Konjuh Mountain headwater streams has an oligosaprobic character and is considered to be the first class of water quality.

Key words: *Aquatic invertebrates, biodiversity, Konjuh*

***SAŽETAK*:**
Hidrobiološka istraživanja makrozoobentosa izvorišta zaštićenog pejzaža Konjuh, izvršena su na pet lokaliteta tokom proljeća, ljeta i jeseni 2017. godine. Biodiverzitet makroinvertebrata je predstavljensa devet grupa i 46 taksona. Analizom sastava makrofaune najveći diverzitet taksona je imala grupa Trichoptera i Ephemeroptera po 13 taksona. Slijede grupe sa manjim brojem taksona, Plecoptera (8), Diptera (5), Coleoptera i Oligochaetasa po dva taksona. Ostale konstatovane grupe u izvorištima planine Konjuh zastupljene su sa po jednim taksonom. Na istraženim lokalitetima je utvrđeno različito prisustvo taksona, na lokalitetu Krabašnjica – 25, Studešnica – 15, nalokalitetu Djevojačka pećina i Gluha bukovica 21 takson i na lokalitetu Tuholj – 16. Na osnovu analize fizičko-hemijskih parametara vode i indeksa saprobnosti utvrđeno je da voda izvorišta planine Konjuh ima oligosaprobni karakter i da se ubraja u prvuklasukvalitetavoda.

Ključne riječi: *vodeni beskičmenjaci, biodiverzitet, Konjuh*

BIOGENIC ELEMENTS AS COFACTORS IN ENZYMES AND THEIR AMOUNT IN THE CHIA SEED

BIOGENI ELEMENTI KAO KOFAKTORI U ENZIMIMA I NJIHOVA KOLIČINA U CHIA SJEMENU

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ABSTRACT:

In this paper, concentrations of biogenic elements such as copper, zinc, iron and magnesium in the chia seed have been determined. These transition metals are important because they have the ability to bind to biomolecules and produce complex compounds (coordinating compounds or complexes). Metals which bonded to enzymes have the role of cofactors and they participate in important biological processes such as enzyme catalysis or other significant biological processes. Copper is a necessary trace element. Copper is the cofactor of important enzymes such as cytochrome oxidases and respiratory chain enzymes. It is essential for proper iron metabolism, but residual salts are toxic. Zinc is one of the most important biogenic trace elements. It is necessary for preserving and transmitting genetic information. Over 300 enzymes contain zinc. It enhances immunity. Iron is a necessary biogenic element and in the human organism is mainly found in hemoglobin. Magnesium also enters into the composition of certain enzymes or is their activator.

Key words: *copper, zinc, iron, magnesium, black chia.*

SAŽETAK:

U ovom radu, određene su koncentracije biogenih elemenata kao što su bakar, cink, željezo i magnezijuma u chia sjemenu. Ovi prelezni elementi su važni jer imaju sposobnost da se vezuju za biomolekule i grade kompleksna jedinjenja (koordinaciona jedinjenja ili komplekse). Metali koji se vežu za enzime imaju ulogu kofaktora i učestvuju u važnim biološkim procesima kao što je enzimska kataliza ili drugim značajnim biološkim procesima. Bakar je neophodan element u tragovima. Kofaktor je važnih enzima kao što su citohrom oksidaza i enzimi respiratornog lanca. Neophodan je za pravilan metabolizam željeza, ali zaostale soli su toksične. Cink je jedan od najvažnijih biogenih elemenata u tragovima. Neophodan za očuvanje i prenos genetičke informacije. Preko 300 enzima sadrži cink. Pojačava imunitet. Željezo je neophodan biogeni element i u ljudskom organizmu se uglavnom nalazi u hemoglobinu. Magnezijum također ulazi u sastav pojedinih enzima ili je njihov aktivator.

Ključne riječi: *bakar, cink, željezo, magnezijum, crna chia.*

THE POSSIBILITY OF IMPROVING MINERAL WATER QUALITY USING SELECTIVE ION EXCHANGE COLUMN

MOGUĆNOST POBOLJŠANJA KVALITETA MINERALNE VODE PRIMJENOM SELEKTIVNE IONOIZMJENJIVAČKE KOLONE

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ABSTRACT:
The quality of mineral water is conditioned by a number of factors, primarily the quality of water in the water source. The aim of this study was to determinate content of Ni^{2+} and Mn^{2+} ions in the mineral water, after treatment by selective ion-exchange column. The primary, objective of investigated technological process was optimal performance of the column, during the processing of water, so that the content of Ni^{2+} and Mn^{2+}ions in the mineral water, after treatment reduce to allowable concentration, and the concentration of Mg^{2+}ions in the mineral water decreases insignificantly, and thereby the cost of water treatment are not increased. Also, during the study, was determined the effect of application of ion - exchange columns in the physico-chemical water parameters, such as turbidityof the water, the water hardness and pH value. The results showed a statistically significant difference ($p<0,01$) in the content of $Ni^{2+}$and Mn^{2+}ions before, and after treatment, so that the mean concentration of nickel in water before processing is 0,187359 mg/l, and after the treatment, this value is 0,015600 mg /l. ….

Key words: *quality of mineral water, selective ion-exchange column.*

SAŽETAK: *Kvalitet mineralne vode uvjetovan je brojnim faktorima, a prvenstveno kvalitetom vode na izvorištu.Cilj ovog istraživanja je odrediti sadržaj Ni^{2+} i Mn^{2+} ionau mineralnoj vodi, nakon tretmana selektivnom ionizmjenjivačkom kolonom. Primarno, istraživa je rad ionoizmjenjivačke koloneu tokom obrade mineralne vode, sa ciljem da se sadržaj Ni $^{2+}$ i Mn^{2+},nakon tretmana, reducira do dozvoljene koncentracije, a da se pri tome koncetracija Mg^{2+}neznatno smanjuje, te da se troškovi obrade ne povećavaju. Također, u toku istraživanja ispitivan je uticaj primjene ionoizmjenjivačke kolone na fizikalno-hemijske parameter vode, kao što su mutnoća, tvrdoća i pH vrijednost. Rezultati istraživanja pokazuju statistučki značajne razlike ($p<0,01$) u sadržaju Ni^{2+} i Mn^{2+} iona, prije i nakon tretmana, tako da je koncentracija nikla u vodi prije obrade bila 0,187359 mg/l, a nakon tretmana 0,015600 mg /l. Koncentracija …*

Ključne riječi: *kvalitet mineralne vode, selektivno ion-izmjenjivačka kolona.*

NON-CANCEROGENIC RISK TO HUMAN HEALTH WITH Pb, Cu, and Zn INTAKE FROM SOIL IN THE AREA OF HERZEGOVINA

PROCJENA NEKANCEROGENIH RIZIKA UNOSOM Pb, Cu i Zn IZ ZEMLJIŠTA NA PODRUČJU HERCEGOVINE

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Alma Mičijević


Aida Šukalić


Alma Leto

ABSTRACT:

The aim of this paper was to establish the level of heavy metals (Pb, Cu, and Zn) concentrations in the total form. Following that determination, by using the Hazard Quotient Index (HQI a non-cancerogenic risk to adult and children health by oral, digestive and dermal intake of heavy metals from the soil into the body has been calculated. The survey included three locations in the narrower part of Herzegovina in 2012, including Dubrave, Blagaj, and Mostar. Heavy metal analysis was performed according to the international standard ISO 11047 which specifies the atomic absorption spectrometry method for determining one or more elements in soil extract. By calculating the HI (Hazard Index) at all locations, it was found that HI <1 and therefore it does not pose a risk to adult health by heavy metals intake into body from the soil. By calculating HI at all locations for children, it was found that at the site of Mostar the value of HI for oral Pb intake from the soil is 3.03 and therefore poses a health risk.

Key words: *heavy metals, risk, land, non-cancerous index*

SAŽETAK:

Cilj rada je bio da se utvrdi nivo koncentracije teških metala Pb, Cu i Zn iz zemljišta u ukupnom obliku. Nakon toga izračunom HQI (Hazard Quotient Index) utvrditi nekancerogeni rizik po zdravlje odraslih i djece oralnim, ihalatornim i dermalnim unosom teških metala iz zemljišta u organizam. Istraživanje je obuhvatilo tri lokacije u užem dijelu Hercegovine u 2012. godini, i to Dubrave, Blagaj i Mostar. Analiza teških metala rađena je po međunarodnom standardu ISO11047 koji specifira metodu atomske apsorpcione spektrometrije za određivanje jednog ili više elemenata u ekstraktima iz tla.

Izračunavanjem HI (Hazard Index) na svim lokacijama, utvrđeno je da je HI<1 te nema rizika po zdravlje odraslih unosom teških metala u organizam iz zemljišta. Izračunavanjem HI na svim lokacijama kod djece, utvrđeno je da je na lokaciji Mostara vrijednost HI za oralni unos Pb iz zemljišta iznosi 3,03, te predstavlja rizik po zdravlje.

Ključne riječi: *teški metali, rizik, zemljište, nekancerogeni indeks*

CHARACTERIZATION AND INVESTIGATION OF BIOACTIVITY OF COPPER(II) AND COBALT(II) COMPLEXES WITH IMINE LIGAND

KARAKTERIZACIJA I ISPITIVANJE BIOAKTIVNOSTI BAKAR(II) I KOBALT(II) KOMPLEKSA SA IMINSKIM LIGANDOM

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Emir Horozić *Jasmin Suljagić*

***ABSTRACT**:*
Imines are organic compounds which in their structure have a double bond between one carbon and one nitrogen atom.This study involves the synthesis of imines and complexes with biogenic bivalent metals (copper and cobalt) characterized by FTIR and UV/VIS spectroscopy. Antioxidant activity was determined using FRAP, DPPH and ABTS methods while antimicrobial activity was tested by diffusion technique on bacterial strains: Staphylococcus aureus, Enterococcus faecalis, Escherichia coli and Salmonella Enteritidis. The results show that the structure of imine Cu(II) and Co(II) complexes differ significantly. In the formation of the Cu(II) ion, O, N and S are the donor atoms of imine, while only the S donor ligand atom is involved in the formation of a coordinate bond with Co(II). Imin and Cu (II) complex exhibits antibacterial activity against Staphylococcus aureus and Enterococcus faecalis, while Co (II) complex has no antibacterial activity.

Key words:*imine, metal, complex, antioxidant activity*

***SAŽETAK**:*
Imini su organski spojevi koji u svojoj strukturi imaju dvostruku vezu između jednog ugljikovog i jednog azotnog atoma.Ovo istraživanje obuhvata sintezu imina i kompleksa sa biogenim dvovalentnim metalima (bakrom i kobaltom) koji su karakterizirani FTIR i UV/VIS spektroskopijom. Antioksidativna aktivnost određena je primjenom FRAP, DPPH i ABTS metode dok je antimikrobna aktivnost ispitana difuzionom tehnikom na bakterijskim sojevima: Staphylococcus aureus, Enterococcus faecalis, Escherichia coli i Salmonella Enteritidis. Rezultati pokazuju da se strukture iminskih Cu(II) i Co(II) kompleksa značajno razlikuju. U formiranju veze sa Cu(II) ionom učestvuju O, N i S donorski atomi imina dok u formiranju koordinativne veze sa Co(II) učestvuje samo S donorski atom liganda. Imin i Cu(II) kompleks ispoljavaju antibaktericidno djelovanje prema Staphylococcus aureus i Enterococcus faecalis, dok kod Co(II) kompleksa nije zabilježena antibakterijska aktivnost.

Ključne riječi: *imin, metal, kompleksi, antioksidativna aktivnost*

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*SALMONELLA*SPECIES - *FROM PRODUCTION TO DINING TABLE*

*SALMONELLA*SPECIES – *OD PROIZVODNJE DO KONZUMACIJE*

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***ABSTRACT**:*
The aim of this paper was to investigate the potential presence of Salmonella spp. in fecal samples of laying hens from broiler farms, as well as table eggs, animal feed, and mortalities that sporadically occurred on the farms in the Tuzla Canton region. Continuous testing of samples for the presence of Salmonella spp. was carried out on 300 samples of faeces in the period of two years. The presence of bacteria was confirmed in 121 sample. Out of 400 samples of eggs, the presence was identified in 23 samples. Out of 40 samples of animal feed, Salmonella spp. was determined in one sample. On sporadic mortalities on farms, 50 carcasses were tested and the presence of Salmonella spp. was found in 29 samples.Samples were tested by methods BAS EN ISO 6579-1: 2018, Horizontal method for the detection, enumeration and serotyping of Salmonella – Part 1: Detection of Salmonella spp. and Method for the detection of Salmonella spp. from animal faeces and environmental samples from primary production.

***Key words:** Salmonella spp., faeces, table eggs, zoonosis.*

***SAŽETAK**:*
Cilj ovog rada je da istraži mgućnost prisustva Salmonella spp. U uzorcima fekalija tovljenih brojlera kao i jaja, životinjskoj hrani i smrtnosti koja se sporadično desila na farmama u regiji tuzlanskog kantona. Kontinuirano testiranje uzopraka na prisustvo Salmonella spp. je vršenona 300 uzoraka fekalija u period od dvije godine. Prisustvo bakterije je potvrđeno u 121 primjerku. Od 400 uzoraka jaja prisustvo je identificirano u 23 uzorka. Od 40 uzoraka životinjske hrane Salmonella spp. je otkrivena u samo jednom uzorku. U sporadičnim smrtnostima na farmama, 50 lešina je testirano i prisustvo Salmonella spp. je nađeno u 29 slučajeva. Uzorci su testirani metodama BAS EN ISO 6579-1: 2018. Horizontalna metoda za detekciju, određivanje broja i serotipizaciju Salmonella - Dio 1: detekcija Salmonella spp. i Metoda za detekciju Salmonella spp. u fecesu životinja i u uzorcima okoliša iz faze primarne proizvodnje.

***Ključne reči**: Salmonella spp., fekalije, konzumna jaja, zoonoze.*

ASSESSMENT OF ACTIVE CHARCOAL EFFICIENCY WITH FILTER PAPER IN THE WATER PURIFICATION PROCESS

PROCJENA EFIKASNOSTI PROČIŠĆAVANJA VODE AKTIVNIM UGLJEM SA FILTER PAPIROM

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Nudžejma Jamaković Enver Karahmet Branka Varešić

ABSTRACT:

The water purification is process of removing unwanted chemicals, biological contaminants, suspended solids and gases from the contaminated water with a specific purpose. Activated charcoal is often used as part of filters for water purification and on the pharmacological market are available and activated charcoal capsule that can consume a certain period of time for cleaning the body. The aim of this paper is to check the efficiency of activated carbon as a water purifier, and assess whether it can really purify drinking water until adequate measures. The results showed that active charcoal with filter paper reduces calcium, iron, chloride, lead and cadmium concentrations, the concentration of potassium, magnesium and sodium after passing through active charcoal with filter paper depends on the starting sample, potassium monitors the movement of sodium, and magnesium is disproportionate to sodium. Activated charcoal with filter paper doesn't remove efficiently chloride and we can say that is not a good copper purifier, but that conclusion is not safe and ultimate.

***Key words**: active charcoal, water, purification, metals, chloride*

SAŽETAK:

Pročišćavanje vode je proces uklanjanja nepoželjnih hemikalija, bioloških kontaminanata, suspendirane tvari i gasova iz onečišćene vode sa određenim ciljem. Aktivni ugalj se često koristi kao dio filtera za pročišćavanje vode, a na farmakološkom tržištu su dostupne i kapsule aktivnog uglja koje se konzumiraju jedno izvjesno vrijeme radi čišćenja organizma. Cilj ovog rada je bio provjeriti efikasnost aktivnog uglja kao pročišćivača vode, te ocijeniti da li zaista može pročistiti vodu za piće do adekvatne mjere. Rezultati su pokazali da aktivni ugalj sa filter papirom smanjuje koncentraciju kalcija, željeza, hlorida, olova i kadmija, koncentracija kalija, magnezija i natrija zavisi od polaznog uzorka, kalij prati kretanje natrija, a magnezij je disproporcionalan sa natrijem. Aktivni ugalj sa filter papirom ne uklanja efikasno hloride i možemo reći da nije dobar pročišćivač bakra, ali taj zaključak nije siguran i konačan.

***Ključne riječi**: aktivni ugalj, voda, pročišćavanje, metali, hloridi*

ASSESSMENT OF THE QUALITY OF WATER OF THE RIVER UNA IN THE NATIONAL PARK UNA ON THE BASIS OF SELECTED MICROBIOLOGICAL PARAMETERS

PROCJENA KVALITETA VODE RIJEKE UNA U NACIONALNOM PARKU UNA NA OSNOVI IZABRANIH MIKROBIOLOŠKIH PARAMETARA

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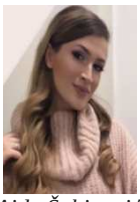
Aida Šahinović Alešević


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Aida Džaferović

ABSTRACT:
Una River Water Quality Assessment was conducted in the Una National Park area as field and experimental type. Due to its unique natural values such as water quality, diversity of rare flora and fauna, specific sedimentation Una River belongs to the most beautiful and most interesting rivers in Europe. Earlier researches have proved that Una River water in the Una National Park has a distinctly clean water and clear in layers of blue-green colour. ...
It is known that coliform bacteria are secreted by faeces which through wastewater reach into natural waters and thereby disturb their integrity. To conclude, many anthropogenic influences are found at Lohovo and Ripac sites, compared to other sites whose water samples showed negative results.

Key words: *Una River, coliform bacteria, Escherichia coli, membrane filtration, microbiological quality*

SAŽETAK:
Istraživanje procjene kvaliteta vode rijeke Une na području Nacionalnog parka Una bilo je terenskog i eksperimentalnog tipa. Zbog osobitih prirodnih vrijednosti kao što su kvalitet vode, raznolikost rijetke flore i faune, specifične sedrene tvorevine, rijeka Una spada u najljepše i najzanimljivije rijeke u Evropi. Ranijim istraživanjima utvrđeno je da voda rijeke Une na području Nacionalnog parka Una ima odliku čistih voda, bistra i prozirna u slojevima plavo-zelene boje. ...
Poznato je da se koliformne bakterije izlučuju fekalijama, koje preko otpadnih voda dospijevaju u prirodne vode i time narušavaju njihov integritet. Kao zaključak navode se mnogi antropogeni uticaji na lokalitetima Lohovo i Ripač, u odnosu na ostale lokalitete čiji uzorci vode su pokazali negativne rezultate.

Ključne riječi: *rijeka Una, koliformne bakterije, Escherichia coli, membranska filtracija, mikrobiološki kvalitet*

EFFICIENCY OF PRECIPITATION AND REMOVAL OF Pb(II) AND Zn(II) IONS FROM THEIR MONOCOMPONENT AND TWO-COMPONENT AQUEOUS SOLUTIONS USING Na_2CO_3

EFIKASNOST PRECIPITACIJE I UKLANJANJA Pb(II) I Zn(II) IONA IZ NJIHOVIH MONOKOMPONENTNIH I DVOKOMPONENTNIH VODENIH OTOPINA PRIMJENOM Na_2CO_3

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ABSTRACT:
Chemical precipitation is the most widely used method for heavy metal removal from water, and its effectiveness depends on several factors such as the type and initial concentration of heavy metals present in water, the precipitating agent used and the pH of the solution. In this paper an experiment of chemical precipitation and removal of Pb(II) and Zn(II) from their monocomponent and two-component aqueous solutions was carried out in a laboratory by batch process, using sodium carbonate as precipitating agent. The influence of initial concentrations of Pb(II) and Zn(II) and pH values of their aqueous solutions on the efficiency of precipitation and removal of lead and zinc ions was examined. By increasing the pH of the aqueous solutions, a higher efficiencies of chemical precipitation and removal of Pb(II) and Zn(II) were obtained, with higher removal efficiencies being achieved for the lead. The efficiency of removal of heavy metals was higher in solutions that had higher initial concentrations of heavy metal ions.

Key words: *heavy metal, water treatment, chemical precipitation, sodium carbonate.*

SAŽETAK: *Hemijska precipitacija je najčešće korištena metoda za uklanjanje teških metala iz vode, a njena djelotvornost ovisi o nekoliko faktora kao što su vrsta i početna koncentracija teških metala prisutnih u vodi, korišteno sredstvo za precipitaciju i pH vode. U ovom radu proveden je eksperiment hemijske precipitacije i uklanjanja iona Pb(II) i Zn(II) iz njihovih monokomponentnih i dvokomponentnih vodenih otopina u laboratoriji šaržnim postupkom, primjenom natrijum karbonata kao sredstva za precipitaciju. Ispitivan je uticaj početnih koncentracija Pb(II) i Zn(II) i pH vrijednosti njihovih vodenih otopina na efikasnost precipitacije i uklanjanja iona olova i cinka. Povećanjem pH vodenih otopina dobijene su veće efikasnosti hemijske precipitacije i uklanjanja iona Pb(II) i Zn(II), pri čemu je postignuta veća efikasnost uklanjanja olova. Efikasnost uklanjanja teških metala bila je veća u otopinama u kojima su imale njihove veće početne koncentracije.*

Ključne riječi: *teški metali, tretman vode, hemijska precipitacija, natrijum karbonat.*

INFLUENCE OF PROCESSING ON PHYTONUTRIENT CONTENT OF CHERRIES

UTICAJ PROCESIRANJA NA SADRŽAJ FITONUTRIJENATA U TRESNJAMA

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Maida Djapo *Maja Kazazic*

ABSTRACT:
Phytochemical or bioactive compounds are secondary metabolites synthetized in plans that serve as antioxidants. Different studies have shown direct correlation between presence of bioactive compunds and health benefits of plant products. Sweet cherries contain important amount of bioactive compounds, mostly polyphenols. They are mainly used in fresh state, but also different cherry products are made to enable their consumption through the year. Aim of this study was to determine amount of polyphenols, anthocyanins and antioxidant activity in 3 different cherry cultivars and their products, jams and juice, prepared using traditional recepies. Total phenolic content was determined by the Folin-Ciocalteu method. Antioxidant activity using ABTS radical scavenging capacity assay and ferric reducing antioxidant potential (FRAP) assay. pH-differential method was used for determination of total anthocyanin content of all samples. There are significant differences in the content of all investigated bioactive compounds among selected cherry cultivars. ...

Key words: *cherry, polyphenols, anthocyanins, antioxidant activity, bioactive compounds*

SAŽETAK:
Fitohemikalije ili bioaktivna jedinjenja su sekundarni metaboliti sintetizirani u biljkama koji služe kao antioksidanti. Različite studije pokazale su direktnu korelaciju između prisustva bioaktivnih spojeva i zdravstvenih koristi biljnih proizvoda. Trešnje sadrže značajnu količinu bioaktivnih jedinjenja, uglavnom polifenola. Najviše se koriste u svježem stanju, ali se također pripremaju različiti proizvodi od trešnje kako bi se omogućila njihova potrošnja tokom cijele godine. Cilj ove studije bio je utvrditi količinu polifenola, antocijana i antioksidantne aktivnosti u 3 različite sorte trešnje i njihovih proizvoda, džemova i sokova, pripremljenih po tradicionalnim recepturama. Ukupni sadržaj fenola određen je Folin-Ciocalteu metodom. Antioksidativna aktivnost je određena pomoću ABTS testa kapaciteta uklanjanja radikala i ispitivanja smanjenja antioksidativnog potencijala feri (FRAP). Za određivanje ukupnog sadržaja antocijana u svim uzorcima korištena je pH-diferencijalna metoda. Postoje značajne razlike u sadržaju svih istraživanih bioaktivnih jedinjenja među odabranim sortama trešnje. …

Ključne riječi: *trešnje, polifenoli, antocijani, antioksidativna aktivnost, bioaktivna jedinjenja*

DETERMINATION OF ESENTIAL METALS IN DRINKING WATER FROM NORTHWEST AREA OF BOSNIA AND HERZEGOVINA WITH AAS METHOD

ODREĐIVANJE SADRŽAJA ESENCIJALNIH METALA U VODI ZA PIĆE SA PODRUČJA SJEVEROZAPADNE BOSNE AAS METODOM

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Huska Jukić

ABSTRACT:
Safe and good quality drinking water is the basis for good human health.Drinking water can contain heavy metals that can cause serious health problems, but also essential elements that are very desirable and of great importance to the human organism.Therefore, the aim of this study was to determine the content of essential metals in drinking water from the northwestern Bosnia and Herzegovina. 24 samples of fresh water from eight municipalities were collected from different sources, in which nutrients were analyzed: sodium (Na), potassium (K), iron (Fe), calcium (Ca), magnesium (Mg) and selenium (Se).Measured metal concentrations (Na, Ca, Mg and Fe) were within the limits allowed by the Regulations of B&H and WHO guidlines, while the Se and K concentrations were slightly above the prescribed limits. Since these are essential heavy metals, their presence in drinking water is not a threat to human health.

Key words: *fresh water, esential elements, AAS.*

ABSTRACT:
Ispravna i kvalitetna voda za piće temelj je dobrog ljudskog zdravlja. Voda za piće može sadržavati teške metale koji mogu uzrokovati ozbiljne zdravstvene probleme, ali i esencijalne elemente koji su vrlo poželjni i od velikog su značaja za organizam čovjeka.
S toga, cilj ovog istraživanja bio je odrediti sadržaj esencijalnih metala u vodi za piće sa područja Sjeverozapadne Bosne i Hercegovine. Prikupljena su 24 uzorka pitke vode iz osam općina sa različitih izvorišta u kojima su analizirani nutrijenti natrij (Na), kalij (K), željezo (Fe), kalcij (Ca), magnezij (Mg) i selen (Se). Izmjerene koncentracije metala (Na, Ca, Mg i Fe) bile su u granicama maksimalno dozvoljenih propisanih Pravilnicima u BiH i smjernicama WHO-a, dok su vrijednosti koncentracija Se i K bile nešto više od propisanih. Budući da su ovo esencijalni teški metali njihovo prisustvo u vodi za piće ne predstavlja opasnost za zdravlje ljudi.

Key words: *voda za piće, esencijalni metali, AAS*

CONSIDERATION OF OPPORTUNITIES FOR THE OPTIMIZATION OF HEAT ENERGY CONSUMPTION IN INDUSTRY AND ENERGETICS

RAZMATRANJE MOGUĆNOSTI OPTIMIZACIJE POTROŠNJE TOPLOTNE ENERGIJE U INDUSTRIJI I ENERGETICI

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Stojan Simić *Goran Orašanin* *Dušan Golubović* *Davor Milić* *Krsto Batinić*

ABSTRACT:
One of the priorities of modern industrial production is the optimization of heat energy consumption. The use of different technical solutions can reduce the heat energy consumption in industry and energetics. The paper considers how the optimization of heat energy consumption is influenced by the following technical solutions: increasing the efficiency of the boiler, returning the condensate to steam boilers and using the evaporator, setting the process parameters of combustion in industrial furnaces, heat insulation of the reservoirs, vessels and installations, application of heat pumps and the use of renewable energy sources and waste materials. Each of the considered technical solutions leads to a reduction in the consumption of heat energy and emissions of waste gases into the atmosphere.

Key words: *emission; optimization; heat energy; industry; energetics.*

SAŽETAK:
Jedan od prioriteta savremene industrijske proizvodnje je optimizacija potrošnje toplotne energije. Primjenom različitih tehničkih rješenja može se smanjiti potrošnja toplotne energije u industriji i energetici. U radu je razmatrano kako na optimizaciju potrošnje toplotne energije utiču sljedeća tehnička rješenja: povećanje stepena korisnosti kotla, vraćanje kondenzata u parne kotlove i korišćenje otparka, podešavanje procesnih parametara sagorijevanja industrijskih peći, toplotna izolacija rezervoara, posuda i instalacija, primjena toplotnih pumpi i korišćenje obnovljivih izvora energije i otpadnih materijala. Svako od razmatranih tehničkih rješenja dovodi do smanjenja potrošnje toplotne energije i emisije otpadnih gasova u atmosferu.

Ključne riječi: *emisija; optimizacija; toplotna energija; industrija; energetika*

RENEWABLE ENERGY SOURCES AND CORELATED ENVIRONMENTAL SYSTEMS

OBNOVLJIVI IZVORI ENERGIJE I KORELOVANI EKOLOŠKI SISTEMI

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Svetlana Stevović *Dušan Golubović* *Slađana Mirjanić*

ABSTRACT:
A sustainable development and holistic approach are an imperative for all countries, especially those in developing, with a goal to alleviate global warming effects and minimize cross-border environmental pollution. Development strategy starts bz analyses of their technically feasible energy potential for world emission trading market and for New Energy Policy 2050. This paper presents the research results of current state of renewable energy sources in Serbia, as well as opportunities for incorporating the world and European legislation, new technology, knowledge, and investments in the energy sector of the country. Conclusions and discussion are given in the contecst of possible development for entier region of Balcan countries. Several examples of initial investments in renewable energy sources are reported as smart practice.

Key words: *renewable energy sources, environmental policy, energy law, developing countries, greenhouse gas emission, feed-in tariffs*

SAŽETAK:
Održivi razvoj i holistički pristup su imperativ za sve zemlje, posebno one u razvoju, sa ciljem ublažavanja efekata globalnog zagrevanja i minimiziranja prekograničnih zagađenja životne sredine. Strategija razvoja počinje analizom njihovog tehnički izvodljivog energetskog potencijala za svetsko tržište emisija i za novu energetsku politiku 2050. Ovaj rad predstavlja rezultate istraživanja trenutnog stanja obnovljivih izvora energije u Srbiji, kao i mogućnosti za inkorporiranje svetskog i evropskog zakonodavstva, nove tehnologije, znanja i investicija u energetski sektor zemlje. Zaključci i diskusija su dati u kontekstu mogućnosti razvoja za ceo region zemalja na Balkanu. Nekoliko primera inicijalnih investicija u obnovljive izvore energije izneto je kao pametna praksa.

Ključne reči: *obnovljivi izvori energije, politika životne sredine, energetsko pravo, zemlje u razvoju, emisija gasova sa efektom staklene bašte, feed-in tarife*

BUILDING THERMAL INSULATION MATERIAL BASED ON SHEEP WOOL

GRAĐEVINSKI TERMOIZOLACIJSKI MATERIJAL BAZIRAN NA OVČJOJ VUNI

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Muhidin Zametica


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***ABSTRACT**:*
The number of the research has confirmed that sheep wool is an ideal material for insulation in buildings. Production of thermal insulation panels from sheep wool in BiH, with the current infrastructure and qualified work force available, could provide a product which is of good quality and competitive price in view of the demanding markets. In addition, the production could easily be tailored to fit the existing facilities. Only the last step of the production process of the wool thermal insulation panels is different from the current one and requires specialised machines for panels. The feasibility study identified that investment into the project of production of thermal insulation panels made out of sheep wool would be cost-effective for the investors and that such project would be profitable. Among other things, the study identified several social benefits (1) Sheep wool as building insulation material uses little primary energy and $CO_{2,}$ (2) Sheep wool waste can be used as natural fertiliser; (3) Launching production of sheep wool insulation materials would revive infrastructure of sheep breeding, shearing and wool buying in BiH.

***Key words:** Sustainability, sheep wool, fusibility study, Financial and Economic Analysis*

SAŽETAK:
Posljednjim istraživanjima utvrđeno je da je ovčja vuna izuzetan materijal koji se može koristiti u građevinskom sektoru. Proizvodnjom termoizolacionih panela od ovčje vune u BiH, sa postojećom infrastrukturom i kvalifikovanom radnom snagom, može se dobiti kvalitetan i cijenom konkurentan proizvod za zahtjevno tržište. Također, proizvodnja može biti lako prilagođena egzistirajućim pogonima. Jedino finalni korak u procesu proizvodnje termoizolacionih panela od ovčje vune je drugačiji te zahtijeva specijalne mašine za obradu panela.Ovom studijom izvodivosti utvrđeno je da je investiranje u projekat proizvodnje termoizolacionih materijala od ovčje vune finansijski isplativ za investitorate da projekat donosi profit. Pored ostalog, identifikovano je nekoliko društvenih benefita: (1) ovčja vuna kao građevinski izolacioni materijal troši malo primarne energije i CO_2 (2) otpad od ovčje vune može se koristiti kao prirodno gnojivo; (3) pokretanjem proizvodnje izolacionih materijala od ovčje vune oživljava se infrastruktura uzgoja ovaca, striženja i otkupa vune u BiH.

***Ključne riječi:** održivost, ovčja vuna, studija izvodivsti, finansijska i ekonomska analiza*

IDENTIFYING MATERIAL ATTRIBUTES FOR DESIGNING BIODEGRADABLE PRODUCTS

IDENTIFIKACIJA ATRIBUTA MATERIJALA U PROCESU DIZAJNA BIORAZGRADIVIH PROIZVODA

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Indji Selim Ana M. Lazarevska Daniela Mladenovska Tatjana Kandikjan Sofija Sidorenko

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ABSTRACT:
Nowadays, a relevant material selection, which simultaneously is affected by the manufacturing constrains, consumers' needs, market rules, etc., becomes one of the crucial phases in the process of product development. Therefore, this paper aims to identify relevant attributes for biodegradable materials by conducting a tailor-made survey among students enrolled in design studies. Utilizing the Ashby and Johnson (2002) categorization methodology which classifies the material attributes into four groups (general, technical, environmental and aesthetical), the students are inspired to propose additional ones, based on their preferences. Further, preferences-based weighting among the complete set of attributes is performed by utilizing the multi-criteria analysis (MCA), and the obtained weights are used as guidance for overall ranking of the attributes' set. The results of this survey are a sound base towards improving the material selection process influenced both by the designer and the manufacturer perspective.
Key words: *biodegradable materials, attributes, design, multi-criteria analysis*

SAŽETAK:
Danas, relevantna selekcija materijala, koja je istovremeno pod uticajem proizvodnih ograničenja, potreba potrošača, tržišnih pravila, itd., postaje jedna od ključnih faza u procesu razvoja proizvoda. Stoga, ovaj rad ima za cilj da identifikuje relevantne attribute za biorazgradive materijale sprovođenjem prilagođene ankete među studentima koji su upisali studije dizajna. Koristeći metodologiju kategorizacije Ashby i Johnson (2002) koja klasificira attribute materijala u četiri grupe (opće, tehničke, ekološke i estetske), student su inspirirani da predlože dodatne, na osnovu njihovih preferencija. Dalje, obračunavanje težinskih faktora zasnovano na preferencijama između kompletnog skupa atributa vrši se korištenjem analize višestrukih kriterija (MCA), a dobijene vrijednosti se koriste kao smjernice za ukupni rang postavljenih atributa. Rezultati ovog istraživanja su dobra osnova za poboljšanje procesa odabira materijala koji su pod uticajem kako od strane dizajnera, tako i iz perspective proizvođača.

Ključne riječi: *biorazgradivi materijali, atributi, dizajn, analize višestrukih kriterija*

THE INFLUENCE OF SHOCK DISINFECTION ON DURABILITY OF INTERNAL WATER SUPPLY

UTJECAJ DEZINFEKCIJSKOG ŠOKA NA TRAJNOST UNUTATARNJE VODOVODNE MREŽE

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ABSTRACT:
Water supply is a potentially exposed to bacterial contamination when it is newly constructed or re-introduced. It must pass tests for chlorine concentration and coliform absence before being put into use. Shock chlorination is usually performed preventively. This is a process of disinfecting internal water supply or plumbing systems by circulating a concentrated chlorine solution throughout the system. Shock disinfection is intended to destroy pathogenic microorganisms. During its implementation very aggressive conditions are present. Under these conditions various metals dissolve, which can cause serious damage to the internal water supply network. Before shock disinfection is carried out it is necessary to assess how it should be applied so that disinfection will be successful without damaging the plumbing installation. Carrying out shock disinfection should take into account all the microorganisms to be destroyed and the materials used that are more or less susceptible to corrosion.

Key words: *shock disinfection, internal water supply, corrosion*

SAŽETAK:
Novoizgrađeni ili obnovljeni sistem snabdijevanja vodom je potencijalno izložen bakterijskoj kontaminaciji. Prije puštanja u pogon mora proći test ispitivanja koncentracije klora i odsutnosti koliformnih bakterija. Uobičajeno je da se preventivno izvede klorni šok. To je postupak dezinfekcije unutarnjih i javnih vodovodnih sistema cirkulacijom koncentrirane otopine klora po cijelom sistemu. Dezinfekcijskim šokom se uništavaju patogeni mikroorganizmi. Primjenom takvog postupkadezinfekcije, stvaraju se vrlo agresivni uvjeti unutar sistema vodosnabdijevanja, koji uzrokuju otapanje nekih metala, što može imati za posljedicu ozbiljna oštećenja vodovodne mreže. Prije izvođenja dezinfekcijskog šoka, potrebno je donijeti odluku, kako izvesti postupak da dezinfekcija bude uspješna bez oštećenja vodovodne instalacije. Pri tome je potrebno uzeti u obzir sve mikroorganizme koje treba uništiti i korištene materijale koji su manje ili više podložni koroziji.

Ključne riječi: *dezinfekcijski šok, unutarnja vodovodna mreža, korozija*

SUSTAINABLE INNOVATION IN ARCHITECTURAL DESIGN

ODRŽIVA INOVACIJA U ARHITEKTONSKOM DIZAJNU

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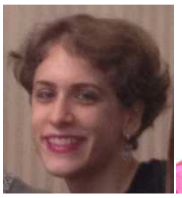


Jovana Jovanović Xiaoqin Sun Zoran Cekić Suzana Koprivica

ABSTRACT:
Architecture always tries to find a far-sighted redefinition and revival through various concepts. The design is there to support innovative and random functional volumes, which appear in the form of bizarre, scattered constellations of new housing estates. By itself, the design is inwrought in a metropolitan glossary and it becomes almost a routine. The ongoing technologies and machinery transform the view on urban design. Eco-towns made up of living modules that adapt bioclimatic techniques emerge all over the world and serve as pores to the world. The constantly new scenarios of sustainable urban design impose the tumultuous growth of the cities. Poor designs of dwellings nowadays can have underlying flaws as they do not contribute to the energy saving and reduce energy consumption inside them. Sustainable urban design brings a new horizon into focus driven by economic, energetic, technological and cultural changes.

***Key words*:** *design, metropolitan glossary, eco-towns, sustainable urban design, horizon*

SAŽETAK:
Arhitektura uvijek pokušava da pronađe dalekosežnu redefiniciju i oživljenje kroz različite koncepte. Dizajn je tu da podrži inovativne i slučajne, funkcionalne volumene, koji se pojavljuju u obliku čudnovatih, rasutih konstalacija novih stambenih naselja. Sam po sebi, dizajn je upleten u metropolitanski rečnik i postaje gotovo rutina. Tekuće tehnologije i mašine transformišu postojeći pogled na urbani dizajn. Eko-gradovi sastavljeni od živih modula, koji su dobijeni usvojenim bioklimatskim tehnikama projektovanja, pojavljuju se širom svijeta i služe kao pore za svijet. Novi scenariji održivog, urbanog dizajna konstantno nameću buran rast gradova. Loši dizajni građevinskih objekata danas mogu imati osnovne nedostatke, jer ne doprinose uštedi energije i smanjenju potrošnje energije u njima. Održivi urbani dizajn donosi (stavlja) novi vidokrug u fokus, koji je vođen ekonomskim, energetskim, tehnološkim i kulturnim promjenama.

Ključne riječi: *dizajn, metropolitanski rečnik, eko-gradovi, održiviurbanidizajn, vidokrug*

CUSTOMIZING OF THE TECHNIQUES USED FOR DESIGNING OF THE ORTHOPEDIC FOOTWEAR

PRILAGOĐAVANJE TEHNIKA KORIŠTENIH ZA PROJEKTOVANJE ORTOPEDSKE OBUĆE

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N.V. Bekk V.V. Kostyleva T.S. Lapina

ABSTRACT:
The search of scientific information was carried out in order to expand opportunities for rehabilitation of people having low limbs (legs and feet) diseases. The techniques were developed for customizing of the orthopedic footwear intended for different abnormalities of low limbs. The offered techniques were tested in the industrial conditions having proved that their application decreases the costs of designing process and improves the quality of ready-made footwear.

Key words: *footwear, customizing, designing, orthopedic boots, correction, feet abnormalities*

SAŽETAK:
Provedena je potraga za znanstvenim informacijama kako bi se proširile mogućnosti rehabilitacije oboljenja osoba s niskim udovima (nogama i stopalima). Razvijene su tehnike prilagođavanja ortopedske obuće namijenjene različitim abnormalnostima niskih udova. Ponuđene tehnike su ispitane u industrijskim uvjetima, što dokazuje da njihova primjena smanjuje troškove projektiranja i poboljšav akvalitetu gotove obuće.

Ključne riječi: *obuća, prilagođavanje, oblikovanje, ortopedskečizme, korekcija, abnormalna stistopala*

FORECASTING ACCESSORIES FORMING ON THE BASIS OF HISTORICAL PROTOTYPING

PROGNOZA OBLIKOVANJE DODATAKA NA OSNOVU ISTORIJSKOG PROTOTIPIRANJA

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Taube M.V. *Bekk N.V.* *Boychenko I.A.*

ABSTRACT:
The basis of modern design for women's accessories is a statistical information obtained through questionnaires distributed among the population. However, this method cannot meet the requirements of medium-term forecasting, which would be more beneficial in modern conditions. The medium-term forecast is based on historical databases. It is reasonable to start collecting data for the medium-term forecast, referring to the beginning of the XIX century. The era of Empirestylewas the founder for the development of women's and men's accessories thanks to the changed way of life and the way of life people got used to…….In contrast to the home, ball room, outdoorandsocialrequired some accessories, which formed the basis forthe first three types of design of women's leather accessories. Thesametypes of design areeasy to detect through 20th century, no less relevant they are now. Their design and design criteria, noware the basis for building medium-term forecasts.

Key words: *assortment, leather goods, historical prototypes, forecasting, constructions*

SAŽETAK:
Osnova modernog dizajna za ženske dodatke je statistička informacija dobivena putem upitnika raspoređenih među stanovništvom. Međutim, ova metoda ne može zadovoljiti zahtjeve srednjoročnog predviđanja, što bi bilo korisnije u suvremenim uvjetima. Srednjoročna prognoza temelji se na povijesnim bazama podataka. Razumno je početi prikupljati podatke za srednjoročnu prognozu, koja se odnosi na početak XIX stoljeća. Era carskog stila bila je utemeljiteljica razvoja ženskih i muških pribora zahvaljujući promijenjenom načinu života i načinu života na koji su se ljudi navikli…… Za razliku od doma, prostorija za bal, vanjske i društvene prilike zahtijevali su neke dodatke, koji su činili osnovu za prve tri vrste dizajna ženske kožne galanterije. Iste vrste dizajna lako se mogu otkriti do 20. stoljeća, ne manje važne sada. Njihovi dizajn i kriteriji dizajna sada su temelj za izradu srednjoročnih prognoza.

Ključne riječi: *asortiman, proizvodi od kože, povijesni prototipovi, predviđanje, konstrukcije*

VACUUM TECHNOLOGY OF EFFECTIVE NANO SUSPENSION FUEL MANUFACTURING

VAKUUM TEHNOLOGIJA EFEKTIVNE NANO SUSPENZIONE PROIZVODNJE GORIVA

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Deulin E.A Ikonnikova E.I

ABSTRACT:
The effective Vacuum technology of nano-structured fuel- suspension manufacturing, based on reproducible resource is presented. The fuel- suspension heat ability is rather higher then the ability of initial components: coil and ethylene. The technology supplies the potential customers with ecology clean and profitable fuel, because it is based on the reproducible resources that may be used in regions, being isolated of petrol manufacturing companies. The fuel is ecologically clean and effective.

Key words: *Vacuum technology, fuel, heat,manufacturing*

SAŽETAK:
Prikazana je učinkovita vacuum tehnologija proizvodnje nano-strukturirane suspenzije goriva na temelju obnovljivog resursa. Toplotna sposobnost suspenzije goriva je viša od sposobnosti početnih komponenti: svitka i etilena. Tehnologija opskrbljuje potencijalne kupce ekološki čistim i profitabilnim gorivom, jer se temelji na obnovljivim resursima koji se mogu koristiti u regijama, izoliranim od poduzeća koja se bave proizvodnjom benzina. Gorivo je ekolož kičisto i učinkovito.

Ključne riječi:*vakuum tehnologija, gorivo, toplota, proizvodnja.*

PRINCIPLES OF SYSTEMIZATION AS A BASIS FOR DESIGNING OF COMBINATION TECHNOLOGICAL SYSTEMS

PRINCIPI SISTEMIZACIJE KAO OSNOVA ZA PROJEKTOVANJE KOMBINACIONIH TEHNOLOŠKIH SISTEMA

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ABSTRACT:
The article deals with the issues of systematization of factors determining the creation of metalworking equipment. The analysis of the basic laws of the existence and development of production systems is carried out. The main requirements for reconstructed production are given. As a result of completing the production program according to priorities, conditions are created for the maximum value of the rate of formation of the final indicator of production efficiency.

Key words: *reconfigured production, mobile machines, production system.*

***SAŽETAK*:** *U radu se razmatraju problemi sistematizacije faktora koji utiču na stvaranje opreme za obradu metala. Izvršena je analiza osnovnih zakonitosti postojanja i razvoja proizvodnih sistema. Dati su glavni zahtjevi za obnovljenu proizvodnju. Kao rezultat popunjavanja proizvodnog programa prema prioritetima, stvaraju se uslovi za maksimalnu vrijednost stope formiranja konačnog pokazatelja efikasnosti proizvodnje.*

Ključne reči: *rekonfigurirana proizvodnja, mobilne mašine, proizvodni sistem.*

NEW TRENDS IN ENGEENERING WOOD TECHNOLOGIES

NOVI TRENDOVI U TEHNOLOGIJAMA INŽINJERSKOG DRVETA

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ABSTRACT:
In the age of accelerated advancement of new technology, innovative and contemporary materials, the application of ecological and natural materials is more than urgent need for reduction of pollution and climate changes mitigation.Wood is natural material, traditionally used in building sector from the beginning. In recent years, wood has rapidly developed into a high-tech construction material. Today we are witness of the multi-storey wooden buildings all over the world as well as EWP market grouth. BiH is very rich county with forest. The wood processing industry has been traditionally a well-developed industry in BiH. Regardless that the legislation and standards are not on place in BiH the forestry sector and wood industry today do have significant export results. New technologies in EWP should be improved and developed in existing or new companies in BiH to ketch up with increasing EWP market. This paper will present recent innovations in wood industryand market trends to open discussion between HEI, industry and business, local government and CSOs for future sustainable/responsible development of this important sector in BiH and region.

Key words:*EWP, environment protection, energy efficiency, market, innovation*

SAŽETAK:
U doba ubrzanog napretka novih tehnologija, inovativnih i savremenih materijala, primjena ekoloških, prirodnih i zelenih materijala je više nego hitno potrebna da bismo smanjenjili zagađenja i ublažili postojeće klimatske promjene. Drvo je prirodni materijal, koji se tradicionalno koristi u građevinskom sektoru od samog početka razvoja čovječanstva. Posljednjih godina ulaganja u razvoj drvo predstavlja visokotehnološki građevinski materijal. Danas smo svjedoci građenja višekatnih drvenih građevina širom svijeta kao i rasta tržišta EWP.
BiH je zemlja veoma bogata šumom. Drvoprerađivačka industrija je tradicionalno bila dobro razvijena industrija u BiH. Bez obzira što zakonodavstvo i standardi nisu na snazi u BiH, šumarski sektor i drvna industrija danas imaju značajne izvozne rezultate. Nove tehnologije u EWP-u trebaju se poboljšati i razviti u postojećim ili novim kompanijama u BiH, kako bi domaće kompanije uhvatili ritam brzog razvoja EWP tržišta. Ovo istraživanje ima za cilj da predstavi najnovije inovacije u drvnoj industrijii tržišne trendove kako bi se otvorile diskusije između HEI, industrije i poduzetnika, lokalnih vlasti i OCD za budući održivi/odgovorni razvoj ovog važnog sektora u BiH i regiji.

Ključne riječi: *EWP, zaštita okoliša, energetska efikasnost, tržište, inovacije*

OPTIMISATION OF PROJECT DURATION AND COSTS USING OVER-WORKING OF EXECUTORS AND EQUIPMENT WHEN THERE ARE LIMITATIONS FOR THEIR MAXIMUM UNITS

OPTIMIZACIJA TRAJANJA I TROŠKOVA PROJEKTA UVOĐENJEM PREKOVREMENOG RADA RADNIKA I OPREME KADA SU OGRANIČENE NJIHOVE MAKSIMALNE KOLIČINE

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Omer Kurtanović Fatih Destović

ABSTRACT:
This paper presents the engagement of resources of the type of workers and equipment on the project with their adopted normal working hours and the maximum allowed overtime work. At the same time, the two criteria, the duration and costs of the project are minimised, by introducing the overtime work of these resources and by importing their available quantities. It is noted that overtime work costs are generally higher than normal work hours and the required reduction in the duration of the project should be achieved with minimum additional costs. The problem has the final number of Pareto-optimal solutions. An illustrative example of a hypothetical project is solved using an interactive "analytic - project management software" approach.

Key words: *Project Management, project duration, project cost, regular work, owertime, available resources, multicriteria optimization, Pareto-optimal solutions, software*

SAŽETAK:
Ovim radom izlaže se angažovanje resursa tipa radnika i opreme na projektu sa njihovim usvojenim normalnim radnim vremenom i maksimalno dozvoljenim prekovremenim radom. Istovremeno se minimiziraju dva kriterijuma, trajanje i troškovi projekta, uvođenjem prekovremenog rada navedenih resursa i uvažavanjem njihovih raspoloživih količina. Ima se na umu da su troškovi prekovremenog rada u opštem slučaju veći od troškova za normalno radno vrijeme i potrebno je ostvariti zahtjevanosmanenje trajanja projekta uz minimalne dodatne troškove. Problem ima konačan broj Pareto-optimalnih rješenja. Ilustrativni primjer hipotetčkog projekta rješava se primjenom interaktivnog postupka „analitičar – softver za Project Management“.

Ključne riječi: *Planiranje projekta, trajanje projekta, troškovi projekta, regularno vrijeme, prekovremeni rad, raspoloživi resursi, višekriterijumska optimizacija, Pareto-optimalna rješenja, softver*

RECONSTRUCTION OF VACUUM SYSTEM ON CENTRAL FANS ON MOLINS SUPER 9

REKONSTRUKCIJA SISTEMA VAKUUMA NA CENTRALNOM VENTILATORU NA MAŠINI MOLINS SUPER 9

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Emir Krivić

ABSTRACT:
In this experimental work, possible solutions to the problem of damage to the impeller of the centrifugal (radial) fan are provided. Due to the impact of the impeller, a breakdown (damage) of the casing occurred, and then to the bending of the shaft of the fan assembly. In the first part of the paper, as a proposal of the solution, the reconstruction of the axle mounting on the basis of the installation of double bearingsof the same type and the structural change of the blades of the rotor was done. In the second part, the process of reconstructing the impeller of the fan with modified production technology was worked out to solve the problem of balancing the mass. The study defines the methodology to be followed through the design documentation and the Instructions on the assembly process, which must be strictly observed. By complying with the prescribed technological procedure, the lifetime of the fan will undoubtedly be prolonged.

Key words: *centrifugal fan, impeller (rotor), blade wear, effort, balancing of rotational masses, loss of vacuum*

SAŽETAK:
U ovom eksperimentalnom radu su data moguća rješenja problema oštećenja radnog kola centrifugalnog (radijalnog) ventilatora. Usljed udara radnog kola došlo je do probijanja (oštećenja) kućišta, a zatim i do savijanja osovine sklopa ventilatora. U prvom dijelu rada kao prijedlog rješenja urađena je rekonstrukcija uležištenja osovine na bazi ugradnje duplih ležajeva istog tipa i konstrukciona izmjena lopatica rotora. U drugom dijelu je razrađen postupak rekonstrukcije radnog kola ventilatora sa izmijenjenom tehnologijom izrade radi rješenja problema balansiranja masa. U studiji je kroz konstrukcionu dokumentaciju definisana metodologija koju treba ispoštovati i Uputstvo o postupku montaže kojeg se treba strogo pridržavati.Poštivanjem propisane tehnološke procedure nesumnjivo će se produžiti vijek trajanja ventilatora.

Ključne riječi: *centrifugalni ventilator, radno kolo (rotor), habanje lopatica, napor, balansiranje obrtnih masa, gubitak vakuuma*

DETECTION OF CHANGES IN THE RIVER BED AND IDENTIFICATION OF BOUNDARY CHANGES USING TOPOGRAPHIC DATA FROM DIFFERENT EPOCHS

DETEKCIJA PROMJENA KORITA RIJEKE I IDENTIFIKACIJA PROMJENA GRANICA KORIŠTENJEM TOPOGRAFSKIH PODATAKA IZ RAZLIČITIH EPOHA

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ABSTRACT:
The river Bosna is the right tributary of the Sava River, which has its source at the foot of Mount Igman near Sarajevo. The entire river basin of Bosna is located in Bosnia and Herzegovina and represents the most densely populated place in the Federation of Bosnia and Herzegovina. The floods of the Bosna River occur from time to time. ... This article identifies and analyzes the changes occurring within the administrative boundaries defined by the middle of the river trough. The time-flow changes (1959, 1968, 1974/1977, 2008 and 2012) of the Bosna river basin (in the section of the lower flow) were analyzed, and therefore the change of the municipal and cadastral border. As a result of the change in the flow of the river Bosna, the loss/gain of arable land is evident.

***Key words**: Bosna River, time-flow changes, municipal and cadastral border, administrative boundaries*

REZIME:
Rijeka Bosna je desna pritoka rijeke Save, koja izvire u podnožju planine Igman u blizini Sarajeva, a ulijeva se u rijeku Savu. Cijeli sliv rijeke Bosne nalazi se u Bosni i Hercegovini i predstavlja najgušće naseljen prostor u Federaciji BiH. Rijeka Bosna povremeno se izlijeva iz korita i izaziva velike poplave. … Ovaj članak analizira promjene nastale u administrativnim granicama koje su definirane sredinom riječnog korita. Analiziran je vremenski tok (1959, 1968, 1974/1977, 2008 i 2012) promjene korita rijeke Bosne (prije delte), a samim tim i promjena općinske i katastarske granice. Kao posljedica promjene toka rijeke Bosne, evidentan je gubitak/dobitak obradivog zemljišta.

***Ključne riječi:** rijeka Bosna, promjene tijekom vremena, općinske i katastarske granice, administrativne granice*

URBAN STORMWATER MANAGEMENT – NEW TECHNOLOGIES –

UPRAVNJANJE URBANIM OBORINSKIM VODAMA – NOVE TEHNOLOGIJE –

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ABSTRACT:
Urbanization and climate change have negative effects on the changes of natural hydrological regime (precipitation and runoff regime), which results with more frequent floods and landslides. Besides of the increased quantity of the stormwater that drainage channels have to collect, negative consequences of urbanization are also evident through increased pollution of runoff stormwater. Therefore, the drainage system and stormwater management should be adapted to these changes so that the negative effects of new hydrological conditions of precipitation and runoff and stormwater pollution in the urban areas are mitigated. This article aims at presenting challenges and opportunities for the advancement of stormwater management practices in urban areas. Some of urban stormwater management technologies are presented. These technologies are more used in urban areas of some countries of Europe.

Key words: *urban stormwater, stormwater management, decentralized technologies, runoff hydrograph, green roof, porous pavements, bioretention*

REZIME:
Negativne posljedice urbanizacije i klimatskih promjena su izmijenjen prirodni hidrološki režim (režim oborina i otjecanja), koji uvjetuje učestalije pojave poplava i klizišta. Pored povećanih količina oborinske vode, koju treba prihvatiti oborinska kanalizacija, negativne posljedice urbanizacije uočljive su i kroz povećano zagađenje otjecanja oborinskih voda. Sistem odvođenja, odnosno upravljanja oborinskim vodama, treba se prilagoditi ovim promjenama i ublažiti negativne posljedice izmijenjenog hidrološkog režima oborina i otjecanja, te zagađenja koje nose oborine, posebno u urbanim sredinama. Ovaj članak ima za cilj predstaviti izazove i prilike za unapređenje prakse upravljanja oborinskim vodama u urbanim područjima. Neke od novijih tehnologija upravljanja urbanim vodama su prezentovane. Te se tehnologije više koriste u urbanim područjima nekih zemalja Europe.

Ključne riječi: *urbane oborinske vode, upravljanje oborinskim vodama, decentralizovane tehnologije, hidrogram otjecanja, zeleni krovovi, porozni zastori, bioretenzije*

ADVANTAGES AND DEFICIENCIES OF „IN-SITU“ EXPLOSIVE MATERIALS PRODUCTION („NALIM“ TECHNOLOGY)

PREDNOSTI I NEDOSTACI PROIZVODNJE EKSPLOZIVNIH MATERIJA NA LICU MJESTA („NALIM“ TEHNOLOGIJA)

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ABSTRACT:
The technology of explosive materials production by „NALIM“ („in-situ“) technology represents the production of explosive materials at the point of their application, respectively production of explosive materials „in-situ“. It is used for the surface exploitation of useful mineral raw material deposits both in Bosnia and Herzegovina and around the world. This production technology has a significant number of adventages over conventional stationary technology for the production of explosive materials, as well as a certain number, mostly minor, of deficiencies for which it can be claimed as insignificant in relation to the advantages of this technology.

Key words: „*NALIM“ technology, BULK vehicles, explosive materials, mineral row materials.*

SAŽETAK:
Tehnologija proizvodnje eksplozivnih materija po „NALIM“ tehnologiji ima značenje proizvodnje eksplozivnih materija na mjestu njihove primjene, odnosno proizvodnje eksplozivnih materija „na licu mjesta˝. Koristi se kod površinske ekspolatacije ležišta korisnih mineralnih sirovina kako u Bosni i Hercegovini tako i širom svijeta. Ova tehnologija proizvodnje ima značajan broj prednosti u odnosu na klasičnu stacionarnu tehnologiju proizvodnje eksplozivnih materija, kao i određen broj, uglavnom manjih, nedostataka za koje se može tvrditi da su beznačajni u odnosu na prednosti ove tehnologije.

Ključne riječi: „*NALIM“ tehnologija, BULK vozila, eksplozivne materije, mineralne sirovine.*

NEW APPROACHES AND TECHNIQUES OF MOTIVATION FOR CONSTRUCTION INDUSTRY ENGINEERS IN B&H

NOVI PRISTUPI I TEHNIKE MOTIVISANJA INŽINJERA GRAĐEVINSKE INDUSTRIJE U BIH

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ABSTRACT:
Motivation of engineers in the construction industry is the subject of many researches, due to the effect of lack of motivation on the work delays. This paper investigates what motivation factors are significant for engineers in construction Industry in B&H. Quantitative methods based on a sample of 252 engineers filling the Multidimensional Work Motivation Scale were used. Selected target population included different profiles of Engineers regarding the age, gender, family status, level of education, professional experience, residential status, and bank credit status. Results proved that identified regulations has significant impact on the motivation of engineers with higher level of education. This paper found also that external regulations are significantly affecting the motivation of engineers with unsolved residential status.

Key words: *motivation theories, construction industry, human behavior, intrinsic motivation, identified regulations, introjected regulations, productivity, job satisfaction*

SAŽETAK:
Radna motivacija inžinjera u građevinarstvu je predmet mnogih istraživanja, posebno zbog efekta kojeg ostavlja nedostatak motivacije u obliku mnogobrojnih kašnjenja u radnim procesima. Ovaj istraživački rad ima za cilj da utvrdi koji su faktori motivisanja značajni za inžinjere u građevinskoj industriji u BiH. U ovom istraživačkom radu korištene su kvantitativne metode zasnovane na uzorcima preuzetim od 252 inžinjera koji su ispunjavali Višedimenzionalnu radnu skalu. Odabrana ciljna populacija obuhvata različite profile inžinjera sa aspekta njihove dobi, spola, porodičnog statusa, stepena obrazovanja, profesionalnim iskustvom, statusom stanovanja i bankovnog kreditnog statusa. Rezultati su pokazali da identifikocijski faktori imaju značajan impakt na motivaciju inžinjera sa višim nivoom obrazovanja. U ovom radu je također utvrđeno da spoljni propisi značajno utiču na motivaciju inžinjera sa neriješenim stambenim statusom.

Ključne riječi: *teorije motivacije, građevinska industrija, ljudsko ponašanje, unutrašnja motivacija, identifikocijski faktori, inkorporirane odredbe, produktivnost, zadovoljstvo poslom*

PARAMETRIC ANALYSIS OF SILICA FUME EFFECTS ON THE HIGH STRENGTH CONCRETE COMPOSITION

PARAMETARSKA ANALIZA UTICAJA FILTERSKE SILIKATNE PRAŠINE NA SASTAV BETONA VIŠIH ČVRSTOĆA

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Azra Kurtović


Naida Ademović

ABSTRACT:
The silica fume is obtained by the reduction of high purity quartz by coal in electrolytic furnaces in the production of silicon and ferrosilicon alloys and consists of very fine spherical particles containing at least 85% of amorphous silicon dioxide. It is used as a mineral additive of type II for production of cement concretes. The paper presents results obtained from an experiment campaign. Influence parameters and their significance in the optimization of the concrete mixture composition prepared with mineral additives and admixtures in terms of the cement amount, water/binder ratio and compaction were analyzed. After obtaining satisfactory results for the usability of the foreseen silica fume, a choice of stone aggregate was conducted with respect to the stability of the concrete mixture and the strength of concrete up to 28 days. In the analysis of the experimental results, it was emphasized that the compaction grade of the concrete mixture is the primer influencer on the formation of the structure of concretes of higher strength.

Key words: *silica fume, high strength concrete, optimization, mineral additives, admixtures.*

SAŽETAK:
Filterska silikatna prašina se dobija redukcijom kvarca visoke čistoće sa ugljem u elektrolučnim pećima pri proizvodnji silicijskih i fero-silicijskih legura i sastoji se od veoma finih sferičnih čestica koje sadrže najmanje 85% amorfnog silicijum-dioksida. Koristi se kao mineralni dodatak tipa II za spravljanje cementnih betona.U ovom radu su prikazani rezultati eksperimenta u pogledu analize značajnosti uticajnih parametara pri optimalizaciji sastava betonske mješavine spravljene sa mineralnim i hemijskim dodatkom u pogledu količine cementa, vodovezivnog faktora i zbijenosti. Po dobijanju zadovoljavajućih rezultata za upotrebljivost predviđene filterske silikatne prašine, pristupilo se izboru kamenog agregata u pogledu stabilnosti betonske mješavine i prirasta čvrstoće betona do 28 dana. U analizi rezultata eksperimenta je istaknut primaran uticaj stepena zbijenosti betonske mješavine na formiranje strukture betona viših čvrstoća.

Ključne riječi:*silikatna prašina, betoni viših čvrstoća, optimizacija, mineralnidodaci, mješavine*

RELIABILITY OF STEEL HALL IN ZENICA LOADED BY SNOW LOAD

POUZDANOST ČELIČNE HALE U ZENICI POD OPTEREĆENJEM SNIJEGA

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Rašid Hadžović Vahid Redžić

ABSTRACT:
Snow load is the dominant load for steelstructures of hall in Zenica, Bosnia and Herzegovina. Existing structures are calculated in accordance with the JUS regulations that were valid in the former Yugoslavia. The snow load was based on the values proposed in the DIN regulations of 1936 and used until the development of new regulations according to Eurocode 1 in accordance with the EU recommendations. New values of snow load are given by the map of snow loads in digital form. The paper analyzes the snow load values in Zenica according to JUS and EC 1 and certain reliability indices for critical points of the structure.

Key words: *steel hall, snow load, JUS, Eurocode 1, reliability index*

SAŽETAK:

Opterećenje snijegom je dominantno opterećenje za čeličnu konstrukciju hale u Zenici, Bosna i Hercegovina. Postojeće konstrukcije su proračunate u skladu sa JUS propisima koji su bili validni u bivšoj Jugoslaviji. Opterećenje snijegom je bazirano na vrijednosti propisane DIN normama iz 1936. i korištene su do razvitka novih standarda rema Eurocode 1 u skladu sa EU preporukama. Nove vrijednosti opterećenja snijegom su date na karti opterećenja snijegom u digitalnoj formi. Ovaj rad analizira opterećenje snijegom u Zanii prema JUS i EC 1 i određivanju indeksa pouzdanosti za kritične tačke konstrukcije.

Ključne riječi: *čelična hala, opterećenje snijegom, JUS, Eurocode 1, indeks pouzdanosti*

MAP OF CHARACTERISTIC SNOW LOADS ON THE GROUND OF BOSNIA AND HERZEGOVINA

KARTA KARAKTERISTIČNOG OPTEREĆENJA SNIJEGOM NA TLU U BOSNI I HERCEGOVINI

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Rašid Hadžović Bakir Krajinović

ABSTRACT:
Every country of European Union is using own map of snow loads on the ground based on real values of snow height and snow density in accordance to Eurocode 1. Values of snow loads are given by different zones with boundaries. Maps are similar but not the same. In Czech Republic map is created in digital form and usable by geographic coordinates of the object place. In Bosnia and Herzegovina map is made in digital form together with experts from Czech Republic. Values are taken from main meteorological stations, calculated and used for map snow load. In this paper is represented 3 years work on map of snow loads on the ground of Bosnia and Herzegovina based on real values of snow height and density.

Key words: *snow load, snow height and density, Eurocode 1*

SAŽETAK:
Svaka zemlja Evropske unije koristi vlastitu kartu opterećenja snijegom na tlu na temelju stvarnih vrijednosti visine snijega i gustoće snijega u skladu s Eurocode 1. Vrijednosti opterećenja snijegom daju različite zone s granicama. Karte su slične, ali ne i iste. U Češkoj Republici karta je napravljena u digitalnom obliku i upotrebljiva je po geografskim koordinatama objekta. U Bosni i Hercegovini karta je napravljena u digitalnom obliku zajedno sa stručnjacima iz Češke. Vrijednosti se uzimaju sa glavnih meteoroloških stanica, izračunavaju se i koriste za kartu opterećenja snijegom. U ovom radu predstavljen je 3-godišnji rad na karti opterećenja snijegom na tlu Bosne i Hercegovine na osnovu stvarnih vrijednosti visine i gustoće snijega.

Ključne riječi: *opterećenje snijegom, visina i gustoća snijega, Eurocode 1*

THE LACK OF TECHNIQUES USED IN MANAGEMENT AS A FACTOR CAUSING DELAYS IN CONSTRUCTION PROJECTS IN B&H AND OTHER DELAY FACTORS DETECTED

NEDOSTATAK TEHNIKA KOJE SE KORISTE PRI UPRAVLJANJU KAO FAKTOR KOJI DOVODI DO ODGAĐANJA U GRAĐEVINSKIM PROJEKTIMA U BIH I OSTALI DETEKTOVANI FAKTORI

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Ahmed El Sayed *Emad Mamoua* *Adnan Novalić*

ABSTRACT:
This paper investigates the factors affecting the delays in construction projects in B&H, and explores the usage of management software in the planning and execution phases of projects. Quantitative method, based on collecting surveys from different type of construction projects participants, such as designers, contractors, and project managers, was used. Number of projects analysed in this research is 132 projects finished during the past 5 years. This paper found that inadequate use of management software, along with the issues related to contractual relations, scheduling and estimations, changes in demands by investors, and shortage of skilful manpower are main reasons causing delays in construction projects in B&H. This paper concludes that different approaches should be used when it comes to the planning and scheduling phase of projects.

Key words: *construction projects, delay factors, management software, contractual relations*

SAŽETAK:
Ovaj istraživački rad tretira faktore koji utiču na odgađanje procesa u izgradnji građevinskih projekata u BiH i istražuje korištenje softvera za upravljanje u fazama planiranja i egzekucije. Korišten je kvantitativni metod koji je baziran na sprovođenju anketa među različitim vrstama učesnika građevinskih projekata, kao što su; dizajneri, izvođači radova i projektni menadžeri. Broj analiziranih projekata u okviru ovog istraživanja je 132, a koji su kopletiran i tokom zadnjih 5 godina. Ovaj rad je utvrdio da je ne adekvatna upotreba softvera za upravljanje, zajedno sa pitanjima koja se odnose na ugovorne odnose, raspoređivanje i procjene, promjene u zahtjevima, i nedostatak soposobne radne snage glavni razlozi kašnjenja procesa u grđaevinskim projektima u BiH. Povrh svega, u sklopu ovog istraživačkog rada zaključeno je da bi se u fazama planiranja i raspoređivanja projekata trebali koristiti različiti pristupi.

Ključne riječi: *građevinski projekti, faktori kašnjenja, softveri upravljanja, ugovorne strane*

NEW ECOLOGICAL INDUSTRIAL SYNTHESIS OF ALKYL THIONOCARBAMATE FROM ISOPROPYL DIXANTHOGENATE

NOVA EKOLOŠKA INDUSTRIJSKA SINTEZA ALKIL THIONOCARBAMATA IZ ISOPROPIL DIKSANTHOGENATA

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ABSTRACT:
A novel synthesis of N-alkyl and N,N-dialkyl-O-isopropyl thionocarbamates from isopropyl dixanthogenate and primary and secondary amines have been developed on laboratory and applied on industrial scale production. Sodium hypochlorite have been used for oxidation of amine salt of isopropyl xanthogenic acid to diisopropyl xanthogenate until all reactant have been digested. According to satisfactory yield and purity of synthesized N-alkyl and N, N-dialkyl-O-isopropyl thionocarbamates obtained by laboratory optimal synthetic procedure a satisfactory industrial adaptation on industrial scale have been done.

Key words: *isopropyl dixanthogenate, isopropyl thionocarbamate, amine.*

***SAŽETAK*:**
Nova sinteza N-alkil i N, N-dialkil-O-izopropil-tionokarbamata iz izopropil diksantogenata i primarnih i sekundarnih amina razvijeni su u laboratoriji i primenjeni u industrijskoj proizvodnji. Natrijum hipohlorit je korišćen za oksidaciju aminske soli izopropil ksantogene kiseline u diizopropil ksantogenat sve dok se sav reaktant ne digestira. Prema zadovoljavajućem prinosu i čistoći sintetizovanih N-alkil i N, N-dialkil-O-izopropil-tionokarbamata dobijenih laboratorijski optimalnom sintetičkom procedurom, urađena je zadovoljavajuća industrijska adaptacija na industrijskom nivou.

Ključne reči: *izopropil diksantogenat, izopropil-tionokarbamat, amin.*

SOME ASPECTS OF MODERN NUTRITION

POJEDINI ASPEKTI SAVREMENE ISHRANE

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Jožef Božo

ABSTRACT:
People today are occupied by virtual reality and reality around themselves more than themselves, are becoming more and more ill and become victims of health problems, due to the inadequacy of their diet to their needs. Scientific and technological achievements have a significant impact on all aspects of today's life, but their contribution to food preparation and modern nutrition in general is not significant. In the interest of survival, with the cultural resources and scientific potential at the beginning of the 21st century, the problem of finding foods must match the contemporary needs, the taste and the spirit of the time, the conditions, the way and the style of life.

Key words: *diet, reduction of diversity, molecular gastronomy.*

ABSTRAKT:
Ljudi današnjice okupirani virtuelnom stvarnošću i stvarnošću oko sebe više nego u sebi, sve više obolevaju i postaju žrtve zdravstvenih problema, posledica neprimerenosti ishrane njihovim potrebama. Naučno-tehnološka dostignuća imaju značajan uticaj na sve aspekte života današnjice, ali je njihov doprinos načinu pripremanja hrane i savremenoj ishrani uopšte, neznatan. U interesu opstanka, sa kulturnim resursima i naučnim potencijalom kojim se raspolaže početkom 21. veka, mora se pristupiti problemu iznalaženja ishrane koja će odgovarati savremenim potrebama, ukusu i duhu vremena, uslovima, načinu i stilu života.

Ključne riječi: *ishrana, redukcija diverziteta, molekularna gastronomija.*

EFFICIENCY OF THE BOSNIAN-HERZEGOVINIAN ECONOMY

EFIKASNOST BOSANSKO-HERCEGOVAČKE EKONOMIJE

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Vjekoslav Domljan

Ivana Domljan

ABSTRACT:
The aim of this paper is to analyse the issue of efficiency and its components for Bosnia and Herzegovina (B-H) and a group of its comparator countries.
We estimate a global production/efficiency frontier and a frontier for small Central and South East European countries (comparator countries) from 1950 to 2014 and from 1996 to 2014 respectively.
The KWH ("Kumbhakar-Wang-Horncastle") decomposition of efficiency using Stochastic Frontier Analysis (SFA) is applied to the respective countries to evaluate the effects of changes in efficiency. Comparing the efficiency of comparator countries and B-H, and recognizing country heterogeneity, we examine whether there is the evidence of efficiency convergence, i.e. whether B-H moves toward the respective efficiency frontier.
According to our research, B-H is lagging behind some comparator countries (Switzerland, Austria, Slovenia and Macedonia) after the global crises of 2007.

Key words: *Cobb-Douglas parametric frontier model, efficiency, Bosnia and Herzegovina*

SAŽETAK:
Cilj članka je analizirati efikasnost i njene komponente Bosne i Hercegovine (BiH) i skupine komparativnih zemalja.
Procjenjujemo granicu proizvodnje/efikasnosti svijeta i granicu za male zemlje centralne i jugoistočne Europe (zemlje komparatori) za razdoblje 1950.-2014. god. odnosno 1996.-2014. god.
U analizi stohastičke granice (ASH) koristi se KWH ("Kumbhakar-Wang-Horncastle") pristup za ocjenu učinaka promjene efikasnosti odnosne skupine zemalja. Uspoređujući efikasnost zemalja komparatora i BiH, uz uvažavanje heterogenosti zemalja, istražujemo ima li dokaza za konvergenciju u efikasnosti tj. pomiče li se BiH prema odnosnim proizvodnim granicama.
Prema našem istraživanu, BiH zaostaje iza izvjesnih zemalja komparatora (Švicarska, Austrija, Slovenija i Makedonija) u razdoblju poslije globalne krize.

Ključne riječi: *Cobb-Douglas model granice, efikasnost, Bosna i Hercegovina*

CHALLENGES OF APPLYING BLOCKCHAIN TECHNOLOGY

IZAZOVI PRIMJENE BLOCKCHAIN TEHNOLOGIJE

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Savo Stupar *Mirha Bičo Ćar* *Elvir Šahić*

ABSTRACT:
Due to the fact that modern computers have "perfect memory" and can process a huge number of transactions through a computer network very quickly, the idea of a decentralized currency system is not a new thing and it has long been a dream of advocates of the concept of anonymous digital money. Thus, a revolutionary blockchain technology was created, which initially enabled and supported the functioning of the first digital crypto currency - bitcoin. Blockchain technology is an amalgam of several different and equally revolutionary technological achievements in the field of cryptography and computer networks. The aim of this paper is, using Bitcoin as example, to briefly explain the functioning of this technology and its suitability for use in many other areas of human activity, especially those that have a problem of distrust and the possibility of fraud.

Key words: *Blockchain technology, Digital cripto currency, Bitcoin, Mining, Hash*

SAŽETAK:
Zbog činjenice da savremeni računari imaju „savršeno pamćenje“ i mogu veoma brzo procesirati ogroman broj transakcija putem računarske mreže, ideja decentralizovanog sistema valute nije novitet i dugo je bila san zagovornika koncepta anonimnog digitalnog novca. Tako je nastala revolucionarna blockchain tehnologija, koja je u startu omogućavala i podržavala funkcionisanje prve digitalne kripto valute – bitcoin. Blockchain tehnologija je amalgam više različitih i jednako revolucionarnih tehnoloških dostignuća u oblasti kriptografije i računarskih mreža. Cilj ovog rada je da na primjeru bitcoina ukratko objasni funkcionisanje ove tehnologije i njenu pogodnost za primjenu u mnogim drugim područjima ljudskog djelovanja, a posebno u onim u kojima postoji problem nepovjerenja i mogućnost prevare.

Ključne riječi: *Blockchain tehnologija, Digitalne kripto valute, Bitcoin, Rudarenje, Hashiranje*

MOBILE APPLICATION MPODACI (MDATA)

MOBILNA APLIKACIJA MPODACI

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Suad Sućeska

***ABSTRACT**:*
Mobile application mPodaci (mData) has purpose to get up-to-date data of clients by smartphone. It is written for mobile operating system Android, based on programming language JAVA. It is able to send the data using two ways: email and SMS. It also means that data could be sent using two different kinds of connections: Internet connection, used by email, and phone connection, used for sending SMS messages. The application supports Android from version 15 to the latest.

***Key words:** mobile application, mobile user, Android, email, SMS message*

***SAŽETAK**:*
Mobilna aplikacija mPodaci je namjenjena za dobivanje ažurnih kontaktnih podataka klijenata pomoću smartphone-a. Napisana je za mobilni operativni sistem Android, koji bazira na programskom jeziku JAVA. Slanje podataka je omogućeno na dva načina: email-om i SMS-om. Ovo znači da se podaci šalju i pomoću dvije različite vrste konekcija: Internet konekcije, koju zahtjeva email, i telefonske konekcije potrebne za slanje SMS poruka. Aplikacija podržava Android od verzije 15 pa do najnovije.

***Ključne riječi**: mobilna aplikacija, mobilni korisnik, Android, email, SMS poruka*

Autors Index – Indeks autora

SOCIETY FOR ROBOTICS OF BOSNIA AND HERZEGOVINA

The Society for Robotics has years of experience in education and training of personnel in Bosnia and Herzegovina. The Society for Robotics is working to increase the role of knowledge in Bosnia and Herzegovina, and thus to influence the positioning of Bosnia and Herzegovina as high as possible on an innovative scale in Europe and the world. The role of the Society for Robotics is to encourage the development of science and technology, as well as to increase their contribution to the development of society, with the widest possible application of new knowledge and new technologies. Thus, it aims to encourage the transformation of Bosnian-Herzegovinian society into a modern knowledge-based society. For these reasons, the objectives of the Society for Robotics are: scientific and technical research in the field of robotics and robotic systems; education and improvement of education in robotics, robotic systems and mechatronics; application of robots and robotic systems in the industry; establishment of laboratories for education and knowledge transfer; establishment of centers for robotics and robotic systems at universities, secondary and vocational schools; innovators in the wider field of robotic systems conducting various activities; organizing scientific and professional conferences in the country and abroad; having innovators in the field of robotics, robotic systems and mechatronics organize exhibitions; cooperation with similar societies abroad. Activities of the Society for Robotics are the following: gathering scientists, researchers, engineers, teachers and students who work in all areas of robotics; publishing and encouraging the publication of monographs, textbooks, journals and other publications in the field of robotics; helping teachers to introduce new ideas and modern methods in teaching robotics; organizing congresses, conferences, symposia, seminars, and other scientific meetings of scientists and engineers; cooperation with similar professional organizations in the country, international societies and associations; popularization and dissemination of knowledge, as well as training and assistance in the training of scientific novices and researchers.

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Secretery general
Society for Robotics B&H
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DRUŠTVO ZA ROBOTIKU U BOSNI I HERCEGOVINI

Društvo za robotiku ima višegodišnje iskustvo u edukaciji i obrazovanju kadrova u Bosni i Hercegovini. Društvo za robotiku radi na tome da poveća ulogu znanja u Bosni i Hercegovini, a samim tim da utiče na pozicioniranje Bosne I Hercegovine na što više mjesto na inovativnoj skali u Evropi i svijetu. Uloga Društva za robotiku je da postiče razvoj nauke i tehnologije , te poveća njihov doprinos razvoju društva, uz najveću moguću primjenu novih znanja i novih tehnologija, i da na taj način podstakne transformaciju bosanskohercegovačkog društva u moderno društvo temeljno na znanju. Zbog navedenih razloga ciljevi Društva za robotiku su slijedeći: naučno-stručna istraživanja u oblasti robotike i robotskih sistema, edukacija i unapređenje obrazovanja iz robotike, robotskih sistema i mehatronike, aplikacija robota i robotskih sistema u industriji, formiranje laboratorija za edukaciju i transfer znanja, formiranje centara za robotiku i robotskih sistema na univerzitetima, srednjim i stručnim školama, održavanje aktivnosti inovatora iz šire oblasti robotskih sistema, organiziranje naučno-stručnih skupova u zemlji i inostranstvu, organiziranje izložbi inovatora iz oblasti robotike, robotskih sistema i mehatronike, saradnja sa sličnim društvima u inozemstvu. Djelatnosti Društva za robotiku su slijedeće: okupljanje naučnika, istraživača, inženjera, nastavnika, studenata i učenika koji rade u svim područjima robotike, objavljivanje i poticanje objavljivanja monografija, udžbenika, časopisa i ostalih publikacija u području robotike, pomaganje nastavnicima u uvođenju novih ideja i modernih metoda u nastavi robotike, organiziranje kongresa, konferencija, simpozijuma i seminara te ostalih naučnih okupljanja naučnika i inženjera, surađivanje sa sličnim stručnim organizacijama u zemlji, surađivanje sa sličnim međunarodnim društvima i savezima društva, populariziranje i širenje znanja kao i izobrazba i pomoć u izobrazbi znanstvenih novaka i istraživača.

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Prof.dr.sc.Safet Isić

Generalni sekretar
Društva za robotiku
Prof.dr.sc. Isak Karabegović

Nacionalni park Una bosanskohercegovačka i svjetska prirodna vrijednost

Štrbački buk, najviši vodopad na rijeci Unu i najposjećenija atrakcija u Parku

Martinbrodski slapovi, prostorno najveći kompleks slapova u Parku, nominirani su za uvrštavanje na Listu svjetske baštine UNESCO-a

Sportsko rekreativne aktivnosti

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Fauna Nacionalnog parka Una

Kanjon Unca


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