WBCInno

Catalogue on Research and Innovation Potential of the University of Kragujevac

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Kragujevac, July 2013

Impressum

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Preface

The University of Kragujevac, along with sixteen partners from Europe and Western Balkans region, started the implementation of the TEMPUS project WBCInno, entitled "Modernization of WBC universities through strengthening of structures and services for knowledge transfer, research and innovation" in October 2012. One of the project objectives is the development of Regional university innovation platform, preceded by mapping of the research and innovation potential at five universities from the Region participating in the project (University of Kragujevac, University of Novi Sad, University of Montenegro, University of Banja Luka and University of Zenica).

The first step was development of the mapping methodology and appropriate questionnaire with well-structured sections and questions that enabled collection of data on research infrastructure, laboratories, centres, research teams with significant results and innovation potential. The aim was also to collect the information on valuable research results, developed technologies, software, patents and licences, specific methodologies, trainings, commercial services, laboratory tests that can be commercialized and offered to the users outside the university, primarily from enterprises in the Region.

Besides the review of some mapping results in this printed version of the Catalogue, its electronic (HTML) version is also being developed which will allow the continuous input of collected data, management and generation of specific reports in order to monitor the research and innovative activities at the university. Also, the Catalogue will enable the data base search against various criteria by external users as well as easier linking of the interest groups (researchers, enterprises, innovators, investors, etc.) that encourage the commercialization of research results and innovations on the market.

The Catalogue is divided into six chapters. The first, introductory chapter on the University of Kragujevac is followed by the review of established structures and mechanisms at the University dealing with and encouraging the knowledge transfer, advanced research and innovation. The third chapter gives an overview of laboratories, institutes and centres founded at the faculties where research in technical and technological, natural and medical sciences areas is carried out. The centres for knowledge transfer established as the result of international projects at the University of Kragujevac as well as their activities and results are described in the fourth chapter. In the last ten years, the University has been supporting the establishment of and cooperation with other organizations and institutions that give support to the development of entrepreneurship and innovation in the Region. Some of them are briefly described in the fifth chapter. The sixth chapter represents the core of the Catalogue and gives the uniform presentation of centres, laboratories and research teams at the University of Kragujevac, through overview of their activities, results, resources, international/national projects and projects with the industry, most significant references, developed prototypes, patents and other measurable research results that have commercial and innovative potential.

The intention is to publish the printed versions of the Catalogue annually, and this edition presents centres, laboratories and research teams who joined this initiative from the beginning and delivered necessary information by filling in the questionnaire for the quality overview of their potential. Indisputably, the continuous mapping of research results in the following period will result in identification and presentation of other research groups at the University, which will in the long term allow better application of research results, knowledge transfer and development of innovative region.

Preface

On behalf of the WBCInno Consortium, we would like to thank to all of our colleagues who prepared high quality material for presentation of their teams' activities and results in this Catalogue. We would like to express our gratitude to Prof. Miodrag Lazić who provided information for the description of centres and laboratories of the Faculty of Engineering in Kragujevac. We are also very grateful to the Vice-dean for scientific research at the Faculty of Mechanical and Civil Engineering in Kraljevo, Prof. Zlatan Šoškić, for coordination and collection of data on their research groups, as well as to Ms Ana Obradović for her generous assistance in preparing the presentations of the centres at Faculty of Science in Kragujevac.

In Kragujevac, June 2013

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Jelena Jevtović

Content

1. University of Kragujevac 1838 – 1976 – 2013

The University of Kragujevac was founded in 1976 on the grounds of The Lyceum of the Principality of Serbia, the first higher education institution in modern Serbia, established 175 years ago in Kragujevac by the act of Prince Miloš Obrenović on 1st July 1838.

The University of Kragujevac is independent higher education institution whose activities comprises of education, science, research and art as elements of the unique process of higher education. It consists of 12 faculties where 20 000 students study on over 100 accredited study programs at all study levels (basic academic, master academic, integrated academic and doctoral studies, as well as two study programs of vocational studies).

Faculties of the University and University Library with University Gallery are located in 6 cities of Central Serbia: Kragujevac, Čačak, Jagodina, Kraljevo, Užice and Vrnjačka Banja.

Faculty of Engineering, Kragujevac

Sestre Janjić 6
34000 Kragujevac, Serbia

tel: +381 (0)34-335-990 to 335-997
fax: +381 (0)34-333-192
http://www.mfkg.rs/
e-mail: mfkg@kg.ac.rs

Faculty of Economics, Kragujevac

Đure Pucara Starog 3
34000 Kragujevac, Serbia

tel: +381 (0)34-303-500
fax: +381 (0)34-303-516
http://www.ekfak.kg.ac.rs/
e-mail: ekfak@kg.ac.rs

Faculty of Sciences, Kragujevac

Radoja Domanovića 12
34000 Kragujevac, Serbia

tel: +381 (0)34-336-223
fax: +381 (0)34-335-040
http://www.pmf.kg.ac.rs
e-mail: pmfkrag@kg.ac.rs

Faculty of Law, Kragujevac

Jovana Cvijića 1
34000 Kragujevac, Serbia

tel: +381 (0)34-306-500
fax: +381 (0)34-306-540
http://www.jura.kg.ac.rs/
e-mail: faculty@jura.kg.ac.rs

Faculty of Medical Sciences, Kragujevac

Svetozara Markovića 69
34000 Kragujevac, Serbia

tel: +381 (0)34-306-800
fax: +381 (0)34-306-800
http://www.medf.kg.ac.rs/
e-mail: dekanat@medf.kg.ac.rs

Faculty of Philology and Arts, Kragujevac

Jovana Cvijića bb
34000 Kragujevac, Serbia

tel: +381 (0)34-304-270
fax: +381 (0)34-304-2750
http://www.filum.kg.ac.rs/
e-mail: cabfilum@kg.ac.rs

Faculty of Technical Sciences, Čačak

Svetog Save 65
32000 Čačak, Serbia

tel: +381 (0)32-302-700
fax: +381 (0)32-342-101
http://www.tfc.kg.ac.rs/
e-mail: tfcacak@tfc.kg.ac.rs

Faculty of Agronomy, Čačak

Cara Dušana 34
32000 Čačak, Serbia

tel: +381 (0)32-222-584
fax: +381 (0)32-349-503
http://www.afc.kg.ac.rs/
e-mail: afdekanat@tfc.kg.ac.rs

Faculty of Mechanical and Civil Engineering, Kraljevo

Dositejeva 19
36000 Kraljevo, Serbia

tel: +381 (0)36-383-378, 383-379,
383-380, 383-269
fax: +381 (0)36-383-377
http://www.mfkv.kg.ac.rs/
e-mail: office@mfkv.kg.ac.rs

Teachers Training Faculty, Užice

Trg Svetog Save 36
31000 Užice, Serbia

tel: +381 (0)31-521-952
fax: +381 (0)31-511-078
http://www.ucfu.kg.ac.rs/
e-mail: ucfak@ucfu.kg.ac.rs
e-mail: ucfak@ptt.rs

Faculty of Education, Jagodina

Milana Mijalkoviča 14
35000 Jagodina, Serbia

tel: +381 (0)35-223-805
fax: +381 (0)35-223-805
http://www.pefja.kg.ac.rs/
e-mail: pefjagodina@pefja.kg.ac.rs

Faculty of Hotel Management and Tourism, Vrnjačka Banja

Vojvođanska bb
36210 Vrnjačka Banja, Serbia

tel: +381 (0)36-515-00-24
fax: +381 (0)36-515-00-24
http://www.hit-vb.kg.ac.rs/
e-mail: hitvb@kg.ac.rs

University Library, Kragujevac

Ulica slobode bb
34000 Kragujevac, Serbia

tel: +381 (0)34-300-299, 372-301
fax: +381 (0)34-370-299
http://www.ub.kg.ac.rs/
e-mail: ubkg@kg.ac.rs

Its establishment and development based on the concept of dispersed university was turned into one of the University's distinctive advantages, allowing it to use industrial and geographic potentials and human resources on the territory covering 500 Sq. m. with about 2.5 million citizens. In this way, the University became the main leader of development and integrative symbol of Central Serbia.

The University of Kragujevac was accredited by the Commission for Accreditation and Quality Assurance of the Republic of Serbia on 22nd May 2009, according to the decision no. 612-00-1355/2008-04. At the University, study programs are realized by about 1100 teachers and associates, i.e. 650 teachers and 450 associates, which compared to the number of students represents the high standard in raising the teaching quality, while more than 600 researchers participated in national science projects.

Out of the total number of teachers at the University of Kragujevac, according to the official records, 33% of them fulfil the requirements for mentors, in accordance with adopted standards, which makes the University of Kragujevac the highest ranked independent higher education institution in the Republic of Serbia for the previous school year. According to the records from the National Council for Research and Technology Development, two faculties of the University of Kragujevac are ranked among top 10 scientific-research institutions:

- The Faculty of Medical Sciences in Kragujevac, at fourth, and
- The Faculty of Sciences in Kragujevac, at tenth place.

At the University and its faculties, the scientific research is realized through basic, applied and development research in all five educational, scientific and art fields: natural and mathematic, social sciences and humanities, medical, technical and technological, and art fields. Besides, both interdisciplinary and multidisciplinary research is carried out as well, involving not only teaching and scientific staff, but also the students of academic and doctoral studies.

At faculties of the University of Kragujevac, about 35 000 graduate students gained their professional, academic and scientific titles, 1000 of them has graduated an M.A, about 800 gained doctoral titles and about 100 specialists completed their specialization. Besides, 23 Honored Doctors were selected among whom are: academic Ljubomir Simović, sculptor Nikola Koka Janković, painters Vladimir Veličković and Nikola Gvozdenović Gvozdo (Montenegro), writer Barnabir Vongar (Australia), dramatist Harold Pinter (England) and 4 Professors emeriti: Prof. Dr. Miodrag Lukić, Prof. Dr. Aleksa Maričić, Prof. Dr. Ivan Gutman, academic Prof. Dr. Radmila Bakočević.

The University of Kragujevac is coordinator or partner on about 40 international projects from various programmes funded by European Union and international organizations (TEMPUS, FP7, COST, SCOPES, Erasmus Mundus, etc.), involving over 300 teachers, researchers and associates in their implementation. Within the realization of activities contracted by international TEMPUS projects since 2009, the University of Kragujevac founded following organisational units, without the status of separate legal entity:

- International Projects Office
- Collaborative Training Centre
- Lifelong Learning Centre
- Technology Transfer Office

2. Structures and Mechanisms for Support to Knowledge Transfer, Research and Innovation

The University of Kragujevac, besides existing structures and mechanisms for support to knowledge transfer and research, such as centres described in the second part of the Catalogue, has brought the series of legal acts whose aim is to strengthen legal mechanisms supporting the knowledge exchange, excellence in research and innovations. The following text gives the preview of the centres established at the University of Kragujevac, foundations and programme committees.

Research Centre of SAAS and the University of Kragujevac

Address: Jovana Cvijića bb, 34 000 Kragujevac, Serbia
Tel: +381 (0) 34-300-426
Tel/Fax: +381 (0) 34-370-168
E-mail: lela@kg.ac.rs

The science - research centre whose founders are Serbian Academy of Science and Arts (SAAS) and University of Kragujevac, was formed on 21st May 1991 with the aim to encourage and develop scientific, educational and cultural activities of the wide area gravitating toward the University. This scientific - research centre has the status of the University's organizational units. Its main activities are realized through the research and scientific projects, organization of scientific events, discussions, lectures, exhibitions, promotions, cultural and other events as well as publishing activities. The Centre also publishes scientific and professional monographs, proceedings and other publications of great importance for the development of science, culture and arts.

The Centre for Career Development and Student Counselling

Address: Jovana Cvijića bb, 34 000 Kragujevac, Serbia
Tel: +381 (0) 34-300-425
E-mail: razvojkarijere@kg.ac.rs
www.razvojkarijere.kg.ac.rs

The Centre for Career Development and Student Counselling of the University of Kragujevac was established in order to provide necessary assistance and information to students, as well as to establish the cooperation between academic and business community and provide student mobility. The Centre organizes various events with the aim to inform students of opportunities for their further vocational development at postgraduate studies, scholarship programmes, study visits and practical placements as well as other opportunities in the countries and abroad, through presentation of foundations and institutions, scholarship fairs, etc. The Centre also organizes seminars, workshops, courses and lectures for students and graduates in order to provide the assistance in developing their practical skills and knowledge necessary for their first professional steps and their career development. Through establishing the cooperation with the companies in the city and the Region, the Centre provides the students with practical placement and professional development programmes to help them apply practically their academic knowledge and complement it with other skills and capacities.

University Information Centre of the University of Kragujevac

Address: Jovana Cvijića bb, 34 000 Kragujevac, Serbia
Tel: +381 (0) 34-300-426
Tel/Fax: +381 (0) 34-301-130
E-mail: era@kg.ac.rs
www.kg.ac.rs

University Information Centre of the University of Kragujevac (UNIC) consists of all institutions outside the University from the area of science, culture and education. With over 20 networked institutions UNIC today has about 2500 computer ports (about 2000 at main location). All faculties at main location are connected to UNIC gigabyte optical links. Dislocated faculties, with the exception of the Teachers Training Faculty in Jagodina, are connected to the gigabyte optical ring of the Academic Network of Serbia. Besides the above mentioned, in UNIC today, there are 12 local optical gigabyte links, 9 of which are at the main location. The base of the whole UNIC is the UNIC in whose system hall the main university servers are placed: Email server, DNS server, Antispam server, Antivirus server, Proxy server, WWW server and SQL server. UNIC intensively works on modernisation of existing application software and development of new software solutions, primarily for the Rectorate, but also for the faculties which are part of the University. The University's web-site is today one of the main source of information on its activities.

Collaborative Training Centre

Coordinator: Prof. Dr. Vesna Mandić
Address: Faculty of Engineering, Sestre Janjić 6, 34000 Kragujevac, building A, room AP-31
Tel: +381 (0) 34-501-201
Fax: +381 (0) 34-501-901
E-mail: mandic@kg.ac.rs , ctc@kg.ac.rs
www.ctc.kg.ac.rs

Collaborative Training Centre in Kragujevac is one of the centres from the network of Collaborative Training Centres established in the Western Balkans Region within Tempus project WBC-VMnet (www.wbc-vmnet.kg.ac.rs), on 10th June 2010, as organizational unit of the University of Kragujevac. Taking into account the significance and the necessity of the cooperation of the University with enterprises, the main strategic aim of the Centre is to coordinate and improve this cooperation, to facilitate knowledge and technology transfer and to provide opportunities to students and graduates to gain practical knowledge. The mission of the Centres is to develop efficient and effective mechanisms for cooperation between the University and enterprises, through project realization, vocational trainings for enterprises and unemployed and industrial fellowship programmes. The Centre coordinates the network of CTC centres in the WBC region (Kragujevac, Banja Luka, Podgorica, Rijeka), VMNet network with more than 1400 members and VRPM network of 74 researchers from 20 countries. Additionally, together with regional and EU partners, it participated in the development and implementation of new WBC Regional Model of University – Enterprise Cooperation, which suggests seven strategic measures: 1. Science and Technology Parks, 2. WBC regional industrial clusters, 3. Consortiums of University and enterprises for joint EU projects, 4. Cooperative training centres, 5. Open innovation networks, 6. Practical placement programme, 7. Industrial fellowship programme.

International Projects Office

Manager: Prof. Dr. Nenad Filipović
Address: Faculty of Engineering, Sestre Janjić 6, 34000 Kragujevac, building A, I floor
Tel/Fax: +381 (34) 33-55-86
E-mail: international.projects@kg.ac.rs
www.int-projects.kg.ac.rs

On 18th June 2010 the International Projects Office was established at the University of Kragujevac, starting officially with its activities on 11th October 2010. The purpose of the Office is to provide adequate organizational support in applying and realization of activities on current and future international projects of the University. The International Projects Office is managed by the Steering Committee coordinated by Prof. Dr. Nenad Filipović, the Vice-Rector for international cooperation at the University of Kragujevac.

Lifelong Learning Centre

Coordinator: Prof. Dr. Verica Babić
Address: Faculty of Economics, Đure Pucara Starog 3, 34000 Kragujevac, office E-6
Tel: +381 (0) 34-303-500
Fax: +381 (0) 34-303-516
E-mail: vbabic@kg.ac.rs, cdu@kg.ac.rs
www.delfis.kg.ac.rs

Lifelong Learning Centre of the University of Kragujevac was established on 17th June 2010 within the Tempus project "Development of Lifelong Learning Framework in Serbia", coordinated by the University of Kragujevac. Lifelong Learning Centre is involved in forming of organizational and institutional conditions for inclusion of the University of Kragujevac in the area of lifelong learning, as well as on the networking of the Centre with other universities' centres of the same kind in Serbia. Since the lifelong learning represents one of the priorities in knowledge-based society and economy, it is necessary to open the education toward the broader population in order to answer successfully to challenges brought by the process of globalization. Among others, the Centre also has the aim to establish partnership among all relevant stakeholders: the state and its bodies, enterprises, local communities and educational institutions. By organizing the round tables, conferences and similar events, the Lifelong Learning Centre at the University of Kragujevac initiates the social dialogue, and by analysing the employers' needs for new knowledge and skills at the labour market and by organizing the courses, workshops and trainings, it directly motivates the individuals to constantly improve at professional level and gain new applicable knowledge.

Technology Transfer Office

Coordinator: Prof. Dr. Miroslav Babić
Address: Faculty of Engineering, Sestre Janjić 6, 34000 Kragujevac, building A, I floor
E-mail: babic@kg.ac.rs

Technology Transfer Office was founded on 6th October 2012 at the University of Kragujevac within the realization of the TEMPUS project KNOWTS "National Platform for knowledge TRinagle in Serbia", no. 158881-RS-JPHES. The main objectives of the Centre are to facilitate and coordinate knowledge and technology transfer at the University of Kragujevac, analyse and assess the technical and commercial potential for innovations, provide necessary assistance to researchers in the process of protecting their intellectual property, organize training sessions in this field, and enable networking and internationalization of the research results through establishing of the proper data base.

Foundation for Scholarships and Encouraging the Development of Young Scientists and Artists

Address: Jovana Cvijića bb, 34000 Kragujevac
Tel: +381 (0) 34-370-270
Fax: +381 (0) 34-370-168
http://www.kg.ac.rs

Foundation for Housing Needs of Young People and Teaching Staff, Scientists and Artists

Address: Jovana Cvijića bb, 34000 Kragujevac
Tel: +381 (0) 34-370-270
Fax: +381 (0) 34-370-168
http://www.kg.ac.rs

Foundation "Miloš Maksimović"

Address: Jovana Cvijića bb, 34000 Kragujevac
Tel: +381 (0) 34-370-270
Fax: +381 (0) 34-370-168

The Steering Committee for the Management of the International Projects Office

The main objective of the Steering Committee is to raise the quality level of the scientific and research activities of the University as well as the degree of exploitation of the total potential for realization of projects at the University. Also, it aims to create favourable environment for introduction of new and improvement of existing study programs, as well as for modernization and promotion of teaching, scientific research and existing teaching resources and computer equipment, through participation and realization of projects. This would create the conditions where new technologies can be introduced and the level of competence of teachers, associates and students at the University of Kragujevac can be raised.

The Committee for Enterpreneurship at the University of Kragujevac

The Committee for Enterpreneurship at the University of Kragujevac was formed in order to create favourable market atmosphere and encourage investments, through development and cooperation of science and industry in realization of international, republic and regional projects. Also, it focuses on forming the human resources base through education of staff of appropriate profiles and their improvement through the practical placement system, commercialization of scientific, research and artistic work, in accordance with the law, as well as on raising the industrial and overall potential of the area around Kragujevac and Šumadija.

Centre of Excellence at the University of Kragujevac

The Contract on the Construction and Equipping of the Centres of Excellence at the University of Kragujevac funded by the European Investment Bank was signed on 20th May 2013 by the Republic of Serbia – Ministry of Education, Science and Technological Development, City of Kragujevac, University of Kragujevac and JUP "Istraživanje i razvoj" d.o.o. This Contract regulates rights and obligations of contracting parties regarding the financing and management of the activities related to the construction and equipping of the Centres of Excellence facilities at the University of Kragujevac planned for the period 2013-2015.

The facility will be located on the 11500 Sq. m and will be built nearby the University's Rectorate in Kragujevac. The total value of the investment for the construction and equipping of the Centre is 14 million euros. The City of Kragujevac and University of Kragujevac will participate in co-financing of the construction in total amount of 65.5 million dinars, i.e. the City of Kragujevac will provide 40 million and the University 25.5 million dinars.

As the leader of the scientific research, the University of Kragujevac decided to build the residential complex for young researchers as part of the measures for strengthening the scientific research. Additionally, it initiated the construction of Centre for Stem Cells Research and Stem Cells Bank. Their construction and equipping will be both the ground and prerequisite to the development of multidisciplinary scientific research, involving not only scientific research from the area of medicine and biomedicine, but also from the areas of biology, chemistry, technical and engineering sciences, biomedical engineering and other accompanying areas that will be included in the Centre's activities.

By constructing and equipping the Centre for Stem Cells Research and Stem Cells Bank, the Republic of Serbia will for the first time create conditions to preserve, use and research stem cells of its citizens, on its territory and by its experts, at the institution founded by the Republic itself. This will be immeasurable strategic contribution to the protection of national interests, not only in the development of the science, but also above all to preserve the genome of its own nation. The significance of the construction and equipping of the Centre will facilitate the multidisciplinary character of scientific research, connecting different scientific disciplines, researchers from different areas as well as scientific and other institutions to which the Centres will provide logistic assistance and support. In this way, the Centre will also provide the position and frame for industrial development in this region, and practically have the role of Scientific and Technology Park, as the base for development not only in the Central Serbia, but also in the wider region.

Kragujevac has become the leader of the development in Central Serbia in both higher education and health area (Clinical centre) and also of the development of restored Serbian industry and private entrepreneurship. Having all this in mind, the University of Kragujevac has decided to initiate and support the realization of scientific infrastructure project of the Centres of Excellence, as the main project that would include the activities of Scientific and Technology park.

3. Organisational Units of the University of Kragujevac Where Scientific Research Is Carried Out

At technical and technological, natural and medical sciences faculties, the scientific research is carried out within laboratories, institutes and centres. Their list is provided in this chapter based on publically available information:

The Faculty of Engineering Sciences in Kragujevac | www.fink.rs

•Laboratories

1. WEB Lab
2. Laboratory for Thermodynamics and Heat Engineering
3. CAD Laboratory
4. Laboratory for Composite Materials and Engineering Software
5. Laboratory for Automatics, Hydraulics, Electric Engineering and Robotics
6. Laboratory for Energy and Process Engineering
7. Laboratory for Mechanical Constructions and Mechanization
8. Laboratory for Metal Forming and Machine Materials
9. Laboratory for Metal Machining and Tribology
10. Laboratory for IC Engines and Fuels and Lubricants
11. Laboratory for Motor Vehicles

•The Faculty's Institute with 23 profitable centres which carry out applied research and cooperation with industry at commercial basis:

1. Centre for Computer Technologies
2. Centre for Composite and New Materials
3. Centre for Materials and Welding
4. Regional Centre for Permanent Education
5. Centre for Testing the Vehicles Carrying Dangerous Goods and Diagnostics
6. Centre for Bio-Engineering
7. Centre for Virtual Manufacturing
8. Innovative Centre for Information Technologies
9. Centre for Recycling of Used PC equipment
10. Regional EVRO - Centre for Energy Efficiency
11. Centre for Integrated Development of Products and Processes and Intelligent Systems
12. Centre for Revitalization of Industrial Systems
13. Centre for Applied Automatics
14. Centre for Heating, Air-Conditioning and Solar Energy
15. Centre for Rational Energy Management
16. Centre for Testing and Calculation of Machine Elements and Systems
17. Centre for Testing of Mechanical Gears
18. Centre for Quality
19. Centre for Tribology
20. Centre for Computer Integrated Manufacturing/Enterprises
21. Centre for Traffic Safety
22. Centre for Terotechnology
23. Centre for Technical Proper Function of Vehicles

Faculty of Mechanical and Civil Engineering in Kraljevo | www.mfkv.kg.ac.rs

•Within Faculty's Scientific Research Work, there are following centres and laboratories:

1. Centre for Construction and Transportation Machinery
2. Centre for Railway Vehicles
3. Centre for Production Technologies and Systems
4. Centre for Integrated Research and Process Planning
5. Centre for Joining and Testing of Materials
6. Centre for Maintenance, Quality and Technical Diagnostics
7. Centre for Thermal Technique and Environment Protection
8. Centre for Automatic Control and Fluid Technique
9. Centre for Applied Mechanics and Machine Design
10. Laboratory "3D Impulse"
11. Regional Centre for Energy Efficiency Kraljevo
12. Innovation Centre

Faculty of Technical Sciences in Čačak | www.tfc.kg.ac.rs

1. Laboratory for Information Technology
2. Laboratory for Advanced Materials
3. Laboratory for Computer Science
4. Computer Centre
5. Laboratory for Electronics
6. Laboratory for Electro - Technics
7. Laboratory for Electronic Measurements
8. Laboratory for Pneumatics and Mechanics
9. Laboratory for Electro - Thermal Engineering
10. Laboratory for Electric Machines, Drives and Regulation LEDR – Lab
11. Laboratory for Postgraduate Studies
12. Laboratory for Physics
13. Laboratory for Electrical Installations
14. Laboratory for Mechatronics
15. Laboratory for Technological Processes
16. Laboratory for Non – Metals

Faculty of Science in Kragujevac | www.pmf.kg.ac.rs

• Department for Biology and Ecology – organisational units within these departments are:

1.Aquarium
2.Botanical Garden in Kragujevac
3.Centre for Preclinical Testing of Active Substances / Laboratory for Cell and Molecular Biology
4.Center for Radiation and Chemical Mutagenesis and Antioxidant Protection

• Department of Mathematics and Informatics
• Department of Physics

1.Laboratory for Physical Mechanics and Molecular Physics
2.Laboratory for Electromagnetism and Optics
3.Laboratory for Atomic and Nuclear Physics
4.Laboratory for Electronics
5.Laboratory for General Physics Course
6.Computing Laboratory
7.Laboratory for Teaching Material
8.Astronomical Observatory

9. Laboratory for Radiation Physics – Radiation Physics Group
10. Laboratory for Software Development

• Department of Chemistry
1. Department of Inorganic Chemistry
2. Department of Organic Chemistry
3. Department of Analytical Chemistry
4. Department of Biochemistry

Faculty of Medical Sciences in Kragujevac | www.medf.kg.ac.rs

1. Centre for Molecular Medicine and Stem Cells Research
2. Centre for Morphological Research
3. Centre for Functional Research
4. Centre for Clinical and Epidemiological Research

Faculty of Agronomy in Čačak | http://www.afc.kg.ac.rs

1. Laboratory of Chemical Technologies and Quality Control
2. Laboratory for Instrumental Analysis
3. Laboratory for Microbiology
4. Laboratory for Chemistry and Chemical Technologies
5. Chemical Laboratory
6. Laboratory of Biology
7. Laboratory for Plants Protection

4. Centres at the University of Kragujevac Dealing with Knowledge Transfer

4.1 Collaborative Training Centre

Based on the realized "Trainings and Service Needs Analysis (TSNA)", the Collaborative Training Centre (CTC) in Kragujevac has developed following customized trainings, for both employed and unemployed:

1. CAD/CAM modelling (40 hours)
2. Tool design (40 hours)
3. Modelling and optimization of production processes using the FE / FV simulation (40 hours)
4. Project Management (20 hours)
5. CAM modelling and generating NC code for 3 axis CNC milling machines (40 hours)
6. Industrial metrology (40 hours)
7. Electronic medical devices (40 hours)

Since 2010, there were 111 trainees who attended the training courses realized by the CTC centre.

CTC has realized various events, workshops, seminars, brokerage events for enterprises, researchers, innovators, with more than 900 participants from the region (18 info days, 3 seminars, 7 workshops, 3 brokerage events) in order to innovate the knowledge of the employed staff on new technologies, intellectual property rights, methodology for innovations development, etc.

In order to facilitate the promotion and gaining of new knowledge among students, CTC centre has developed and coordinated new **Practical Placement Programme (PSP)** that gives an opportunity to students to gain practical experience in industry in the area related to their academic studies, as well as to develop further their professional, technical and interpersonal skills. Practical Placement Programmes have significant role in linking the education with employment. They help students direct their education towards the needs of the labour market and improve their position and employability. Thus, the aim of PSP is also to facilitate involvement of students in the business world and allow them to gain professional experiences and skills, besides their theoretical knowledge. Twenty student mobilities were realized in the region (Croatia, Bosnia and Herzegovina, Montenegro) and EU (Italy, Denmark, Slovenia) within WBC-VMnet project and over 200 mobilities in local enterprises.

Industrial Fellowship Programme (IFP) is focused on establishment of sustainable partnership between universities and industry through hosting industrial fellows (graduates and engineers from industry) in research and academic centres, with the aim to realize advanced targeted trainings for industrial fellows and joint research in accordance with the needs of industrial sponsor. Working in the team with experienced researchers, industrial fellow can gain research experience and knowledge through involvement in current projects, necessary for further development activities of the industrial sponsor. Flexible IFP duration, organized several times during the year, enables the hiring of industrial fellow on development and innovation projects of mutual interest, for both academic and industrial partner. The IFP programme is an excellent opportunity for technology transfer and involvement of young people in innovative projects that contributes to the exchange of experience, ideas, knowledge and increase of innovative potential and competitiveness of enterprises. Thirty ISP programmes with 25 enterprises were realized in the Region.

Collaborative Training Centre (CTC centre) at the University of Kragujevac develops and implements innovative approach in product development and optimization of technology process based on the application of virtual engineering technologies. Modern resources (VM software, equipment for reverse engineering, rapid prototyping, measuring and quality control), trained staff and external experts of VMnet network make these services unique in these areas. They are primarily directed towards national enterprises and represent strong support in increasing their competitiveness on the market. CTC Kragujevac offers following services:

1. Rapid prototyping
2. Measurement and quality control
3. Numerical simulations and process optimization
4. Parts scanning with simple and complex geometry
5. Reverse engineering
6. Organization and realization of trainings for employed and unemployed
7. Optimization and design of tools for metal-sheet forming

4.2 Lifelong Learning Centre

Centre for Lifelong Learning, Student Counselling and Career Development of the Faculty of Economics offers following trainings:

1. International business communication,
2. Pedagogic competencies of University teachers and associates,
3. Working with SPSS (Statistic Package for the Social Sciences),
4. Basics of Stock Market Operating,
5. Communication Skills - Step to Success,
6. Development of Project Proposals,
7. Managerial Skills for Successful Business,
8. Regional development,
9. Entrepreneurship.

The Centre has developed the methodology for training programmes of 20-30 hours. The topics, aims and target groups for each training programme has been defined on the basis of analysis of employers' needs related to the knowledge and skills of their employees.

In the area of student counselling and career development, the Centre organized two workshops with the topics on academic writing and time management, dedicated to students, as well as seven debates on the topics of lifelong learning, employment, study visits, persons with disability in higher education and enterprises.

The Centre also supported the training programme for personal assistants of the Association of Disabled Students and got involved in the organization and certification of the Teaching Assistants Training Programme, in cooperation with the Ministry of Youth and Sport of the Republic of Serbia.

The Centre organized two international conferences on the lifelong learning where both Serbian and international experts held presentations and discussed the relevant issues, as well as 13 round tables which gathered over four hundred representatives of the universities, industry, local authorities, ministries, non-government sector, secondary schools, students, pupils and other interest groups in order to promote and efficiently realize the concept of lifelong learning.

4.3 Technology Transfer Office

Technology Transfer Office of the University of Kragujevac within its regular activities should provide necessary assistance to researchers/innovators at the University in the process of patent application as well as consultancy for other forms of results commercialization. Considering that the Centre was founded at the end of 2012, the series of trainings were carried out for the office's staff. It is also planned to elaborate the Regulations on the Activities of the Technology Transfer Center which will define more closely the procedures of protecting the intellectual property and patent applications, i.e. define the ownership of the patents, etc.

5. Other Organisations for Support to the Enterpreneurship and Innovations in the Region

In the last ten years in Kragujevac, as regional centre, several institutions supporting the development of entrepreneurship, strengthening the innovative infrastructure and cooperation of University with enterprises were founded.

Regional Economic Development Agency for Šumadija and Pomoravlje (REDASP)

Address: Kralja Petra I 22, 34 000 Kragujevac, Serbia
Tel: +381 (0) 34-302-701
Tel/Fax: +381 (0) 34-302-706
E-mail: officekg@redasp.rs
www.redasp.rs

The Regional Agency for the Development of Small and Medium Enterprises "Šumadija" represented the first institution in the territory of the Šumadija and Pomoravlje region whose mission was the development of SME sector as one of the preconditions for economic development of the entire area. It was created by the initiative of local stakeholders, the City Assembly of the city of Kragujevac, NGOs and the private sector, and within the project of "The Non-financial support to the SME sector in Serbia", funded by the EU and the European Agency for Reconstruction. The agency registration itself was carried out in December 2001, while it officially started work on 5th May 2002, which is regarded as the foundation date of the current institution. After the second year, the three-year development strategy was created by the objectives of which the Regional Agency for Small and Medium Enterprises "Šumadija" evolved into the Regional Agency for Economic Development of Šumadija and Pomoravlje. In the process of transformation a list of founders and the target group of the institution was extended, all of which required an introduction of new departments and the recruitment of new staff. The transformation itself aimed at achieving competitive market position which will enable the achievement of profit, a satisfactory level of sustainability and the reduction of the dependence on the financial support from donors.

The Regional Agency today, as officially accredited regional development agency (ARRA) represents the partnership of private, public and non-governmental sector from 2 regions: Šumadija and Pomoravlje. On the territory of these regions there are 11 municipalities: Aranđelovac, Batočina, Knić, Lapovo, Rača, Topola, Despotovac, Paraćin, Rekovac, Svilajnac and Ćuprija and cities Kragujevac and Jagodina, as administrative centres of Šumadija and Pomoravlje regions. The Agency was officialy accredited on 26th June 2012 by the National Agency for Regional Development (NARD), when it also received an accreditation marks.

The primary objective of the Regional Agency is to create conditions and stimulate economic and social development of the Šumadija and Pomoravlje region. The mission of the Regional Agency is to create conditions for sustainable socio-economic development of Šumadija and Pomoravlje by building instruments of regional and local economic development and stable network of key factors: the Serbian government, local authorities, the Regional Chamber of Commerce, the National Employment Service, associations of entrepreneurs, universities, financial institutions, donors, NGO sectors, local media, service providers and others. The vision of the Regional Agency is to represent a key provider of development processes in Šumadija and Pomoravlje through the creation and coordination of the implementation of development strategies, strengthening the identity of the territory where it exerts its influence and creating networks and partnerships of the key stakeholders.

Business Innovation Centre Kragujevac– BIC

Address: Trg Topolivaca 4, 34 000 Kragujevac, Serbia
Tel: +381 (0) 34-502-500, Tel/Fax: +381 (0) 34-502-506
E-mail: office@bickg.rs
www.bickg.rs

BIC was founded in April 2008 and begun its activities in January 2009 as a Limited liability company whose founders are the City of Kragujevac, Regional Chamber of Commerce Kragujevac, Regional Agency for Economic Development of Šumadija and Pomoravlje and Association of Private Entrepreneurs "Šumadija" with the aim to support young start-up enterprises at local community level. The project is funded by the City of Kragujevac, National investment plan and donor funds.

BIC offers a unique opportunity for innovation-based ventures in the combination of low-cost, furnished office facilities; top-of-the-line internet and telecommunications; strategic advice from their on-site Management Team and through "Know-How Network" of professional service providers, experienced business advisors and academics; access to funding sources, marketing and PR support; responsive on-site management; and a culture of quality and cooperation. Through this targeted services package, BIC fosters entrepreneurial ideas from the early stage of business development until the graduation stage of growth.

BIC is an economic development tool designed to help innovative young companies in start-up phase of realization of their business idea and accelerate their growth and success. The purpose of BIC is to produce successful firms that will leave the incubation program financially viable and freestanding, usually in two to three years; to create jobs, commercialize new innovative technologies and to strengthen local and national economies. BIC differs from commercial property and serviced offices by requiring clients to "graduate" from it, on average after 3 years. The emphasis on "graduation" is reinforced by a policy of implementing graduated rental and service fee increases as the business grows, to encourage clients to seek accommodation options in more conventional commercial premises. BIC encourages companies to stand on their own as soon as they can and to leave BIC when they 1) have their management team in place; 2) have acquired 2nd round financing; 3) have revenue-producing products or services. This opens a spot in the BIC for new companies and starts new business development cycle.

Business Start-Up Centre – BSC

Address: Dr. Zorana Đinđića 10/VI, 34 000 Kragujevac, Serbia
Tel: +381 (0) 34-330-651, Tel/Fax: +381 (0) 34-333-492
E-mail: info@bsckragujevac.rs
www.bsckragujevac.rs

BSC Kragujevac supports young people under the age of 35 in establishing their small and medium enterprises. With the aim to found 10 new SMEs, BSC organizes the Best Business Plan Competition and various trainings for current and potential entrepreneurs. Every year, BSC offers individual consultancy services, free registration, microcredits as well as offices and services of Business incubator to newly founded enterprises within the Best Business Plan Competition. BSC Kragujevac contributes to capacity building of local partner institutions by supporting them in development and introduction of new innovative management and IT solutions as well as by supporting the University of Kragujevac in the process of adjusting its Curricula to European standards in order to promote entrepreneurship in society.

Along with other BSCs from the region, BSC Kragujevac organizes conferences and debates in the Netherlands and other EU countries. These events have great influence on business world, state officials and NGOs by raising their awareness on problems affecting the establishment of business start-up centres and development of SMEs in South East Europe. BSC Kragujevac is also a co-organizer of the SEE regional conference focused on experience exchange between business start-up centres and incubator SENSI. Their aim is to initiate the issues of policies development and reform with relevant government officials from the region and international organizations representatives.

Regional Automotive Cluster of Central Serbia

Address: Dr Zorana Đinđića 10/IV, 34000 Kragujevac
Tel: +381 (0) 34-334-432
E-mail: autoclusterCS@rpk.kg.co.rs
Year of establishment: 2010
Total number of members: 28
Total number of members' employees: 6.620
Members structure: micro enterprises 1, small enterprises 6, medium enterprises 8, large enterprises 4

Flower Producers Cluster Šumadijski cvet

Address: Mihaila Pupina 2, 34000 Kragujevac
Tel: +381 (0) 34-302-706
E-mail: sumadijskicvet@gmail.com
www.sumadijskicvet.com
Year of establishment: 1996
Total number of members: 170
Total number of members' employees: 800
Members structure: entrepreneurs 125, micro enterprises 120, small enterprises 5
Number of international enterprises: 2

Regional Cluster for Information and Communication Technologies (IKT)

Address: Trg Topolivaca 4, 34000 Kragujevac
Tel: +381 (0) 34-502-500
E-mail: office@neteffect.rs
Year of establishment: 2013

Association – Medical and Health Tourism Cluster

Address: Bulevar srpskih ratnika 11, 36210 Vrnjačka Banja
Tel: +381 (0) 36-611-151
E-mail: klaster.mzt@vrnjcispa.rs
Year of establishment: 2011

Construction Cluster "Šumadija and Pomoravlje''

Address: Gružanska 17, 34000 Kragujevac
Tel: +381 (0) 34-300-411
E-mail: agem.klaster@yahoo.com

Netwood, Cluster of Furniture Manufacturers Kragujevac

Address: Kralja Petra I 22, 34000 Kragujevac
Tel: +381 (0) 34-370-320
E-mail: office@netwoodcluster.net

6. Presentations of Centres, Laboratories and Research Groups

- Centre for Bio-Engineering
- Centre for Information Technologies
- Centre for Revitalization of Industrial Systems
- Centre for Virtual Manufacturing
- Collaborative Training Centre of the University of Kragujevac
- Engineering Software Research Group
- Research of Noise, Vibration and Harshness
- Laboratory for Thermodynamics and Heat Engineering
- CAD Laboratory
- Centre for Preclinical Testing of Active Substances / Laboratory for Cell and Molecular Biology
- Laboratory for Microbiology
- Botanical Garden in Kragujevac
- Reseacrh Group of Prof. Dr. Živadin D. Bugračić
- Radiation Physics Group
- Group for Mathematical Modelling and Computer Simulations
- Centre for Molecular Medicine and Stem Cells Research
- Centre for Automatic Control and Fluid Technique
- Centre for Construction and Transportation Machinery
- Centre for Thermal Technique and Environment Protection
- Centre for Railway Vehicles
- Laboratory "3D Impulse"
- Laboratory for Advanced Materials SASA, Department for Amorphous Systems
- Laboratory for Electric Machines, Drives and Regulation LEDR – Lab
- Laboratory E-Lab
- Centre for Economic Research at the Faculty of Economics in Kragujevac
- Centre for Lifelong Learning, Student Counselling and Career Development

Centre for Bio-Engineering

Centre for Bio-Engineering (CBI) was founded in June 2006 at initiative of professors Miloš Kojić and Nenad Filipović. The first and current manager is Professor Nenad Filipović. The Centre was established as the result of a number of international and national scientific projects and international papers in the area of bio-engineering. The Elaborate and the Decision on Establishment of CBI defines the rooms used by the Centre (room C-22) as well as the equipment purchased from the projects in bio-engineering area.

Activities

- Simulation of cardio-vascular systems
- Simulation of respiratory systems
- Simulation of muscle functions
- Sport bio-mechanics
- Medicines transport, nanotechnology
- Tumour growth prediction

Results

- More than 400 papers were published in international journals and over 350 papers at international and national conferences
- Software for simulation of blood flow through blood vessels was developed
- Software for simulation of air flow in alveoli was developed
- Software for noise analysis from blind Doppler was developed
- Software for simulation of spinal column load was developed

The most important references

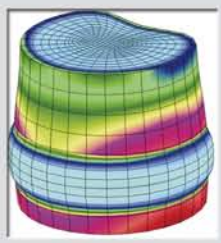
1. Nenad Filipovic, Zhongzhao Teng, Milos Radovic, Igor Saveljic, Dimitris Fotiadis and Oberdan Parodi, Computer simulation of three dimensional plaque formation and progression in the carotid artery, Medical & Biological Engineering & Computing, DOI:10.1007/s11517-012-1031-4, (2013)
2. Parodi O., Exarchos T., Marraccini P., Vozzi F., Milosevic Z., Nikolic D., Sakellarios A., Siogkas P., Fotiadis D.I., Filipovic N.,Patient-specific prediction of coronary plaque growth from CTA angiography: a multiscale model for plaque formation and progression, IEEE Transaction on Information Technology in Biomedicine, Vol. 16(5), pp. 952-965, (2012)
3. Filipovic N., Isailovic V., Djukic T., Ferrari M., Kojic M., Multiscale Modeling of Circular and Elliptical Particles in Laminar Shear Flow, IEEE transactions on biomedical engineering, Vol. 59(1), pp. 50-53.DOI: 10.1109/TBME.2011.2166264, (2012)
4. Filipovic N., Rosic M., Tanaskovic I., Milosevic Z., Nikolic D., Zdravkovic N., Peulic A., Fotiadis D., Parodi O., ARTreat project: Three-dimensional Numerical Simulation of Plaque Formation and Development in the Arteries, IEEE Trans Inf Technol Biomed, Vol.16(2), pp. 272-278, (2012)
5. Dimkic M., Rankovic V., Filipovic N., Stojanovic B., Isailovic V., Pusic M., Investigation of the M., Modeling of radial well lateral screens using 1D finite elements, Journal of Hydroinformatics, IWA Publishing.DOI:10.2166/hydro.2012.008, (2012)

Resources

1. Pulsatile pumps
2. Uniaxial Stretch system for studying mechanical characteristics of biological tissues
3. Biaxial Stretch system for studying mechanical characteristics of biological tissues
4. Isolated heart system (Langendorf)
5. ETH 256C – Two-channel /ECG/EMG/EEG amplifier
6. Hand-held Doppler BIDOP 3







Contact

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Tel: +381 (0) 34 334 379

International projects

1. Development of an Anatomical Model for the Simulation of Excitation Propagation And Cardiac Biomechanics, Bilateral project, Serbia - Greece (2004 - 2006)
2. Integracija otkrivanja zakonitosti podataka i složenog kompjuterskog modeliranja bolesti koronarnih arterija, Bilateral project, Serbia - Slovenia (2010 - 2012)
3. Specifični kompjuterski model koronarnih arterija kod pacijenta i predviđanje nastanka i razvoja arterosklerotičkog plaka Bilateral project, Serbia - Spain (2011 - 2012)
4. Multi-level patient-specific artery and atherogenesis model for outcome prediction, decision support treatment, and virtual hand-on training, FP7- ICT IP-224297-ARTreat, (2008 - 2013)
5. Multi-level protection of materials for vehicles by "SMART" nanocontainers, FP7-NMP-2007-LARGE-1 MUST (2009 - 2013)
6. Razvoj metoda i softvera za modeliranje elektromagnetnog polja prilikom funkcionalne elektrostimulacije na ruci, Contract with Integrated Microsystems Austria (2007-2009)
7. Razvoj anatomskog modela za simulaciju širenja pobuda u kompleksnom sistemu elektro-kardio-biomehanike, Bilateral project, Serbia - Greece
8. South-Eastern European Grid-enabled eInfrastructure Development 2, SEE-GRID2 031775, (2007-2009)
9. New cardiovascular planning and diagnostic tool for coronary arteries in BSEC countries using computational simulation, BSEC project (2009-2010)
10. Integracija otkrivanja zakonitosti podataka i složenog kompjuterskog modeliranja bolesti koronarnih arterija, Bilateral project, Serbia - Slovenia (2010 - 2012)

National projects

1. Razvoj metoda i softvera za numerička i eksperimentalna istraživanja iz oblasti biomedicinskih nauka, SANU (1997 - 2000)
2. Razvoj metoda, softvera i uređaja za oblast biomehanike i bioinženjeringa, TR 233 (2001 - 2004)
3. Transport biološki aktivnih molekula u fiziološkim membranama, OI 1246 (2001 - 2005)
4. Razvoj kompjuterskih modela i softvera za modeliranje i simulacije iz oblasti opšteg i biomedicinskog inženjeringa TR 6209
5. Metode modeliranja biomehaničkih sistema sa primenom u medicini, OI 144028 (2006 - 2010)
6. Razvoj softvera i hardvera iz oblasti bioinženjeringa sa primenom u kliničkoj praksi, TR 12007 (2008 - 2010)

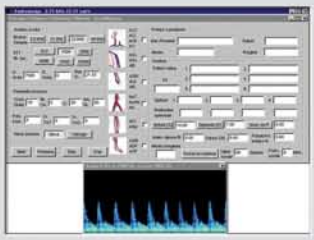
Software solutions

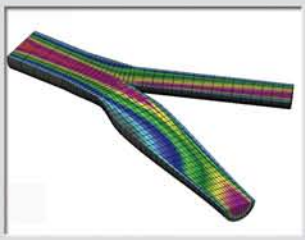
- Software for simulation of blood flow through blood vessels, the capacities of this software are as follows:
  - automatic generation
  - three-dimensional review of the velocity fields, blood pressures in blood vessel
  - calculation of shear strain
  - preview of the solution in certain model cross-sections

- Software for simulation of air flow in alveoli, the capacities of this software are as follows:
  - automatic generation of a model with approximate number and dimension of alveoli
  - preview of areas of radial and axial velocity of air, pressure
  - preview of streamline areas
  - simulation of particles' flow within alveoli with and without the mass

- Software for noise analysis from blind Doppler and determining of all relevant clinical parameters (resistance index, pulsatility index, etc)

- Software for simulation of spinal column load
  - the program determines the load on the discs of the spinal column in static weight lifting
  - calculation of intradiscal pressure, deformation and strain in a spinal disc





Centre for Information Technologies

Centre for Information Technologies (CIT) is part of the Faculty of Engineering in Kragujevac. It was founded in 2002 by the Decision of the Teaching – Scientific Council. The centre, whose founder and manager is Prof. Dr. Nenad Grujović, involves young researchers and students in the realization of activities on internal, national and international projects.

CIT has long experience and significant success in realization and cooperation on large international projects (FP6, TEMPUS, INTERREG, WUS), both as coordinator and partner.

Activities

- Research and development in the area of information technologies, software engineering, design and implementation of computer aided systems, especially in the area of information and hydro-informatics
- Research and development in the area of rapid prototyping (RP)
- Development research and application in the area of bio-engineering as well as tissue and implant engineering
- Multidisciplinary research and application of information technologies and RP in the economics, agriculture, art and design
- Organization of education activities
- Publishing (printed material, electronic multimedia versions – CD, DVD, internet and remote learning)

Results

- The Centre developed cooperation with renown world institutions such as: Technical University Braunschweig (Germany), Technical University of Athens (Greece), Technical University of Creta (Greece), University of Bologna (Italy), UPC Barcelona (Spain), Imperial College (UK), Harvard University (USA), IBM, Microsoft, Oracle, etc.
- Links with national and international enterprises have been developed through participation in joint projects
- In cooperation with surgeons at Clinical centre in Kragujevac, an implant of sternum was produced by applying RP technology
- Student teams organized within CIT had excellent results on competitions in the area of information technologies:
  - First place two years in a row at the national competition Imagine Cup 2008 and 2009, and
  - Second place on world finals of Imagine Cup 2009 in Egypt
- CIT is official university centre for development and application of e-Learning and teleconferences and it is the member of e-Learning Task Force of Serbian network
- CIT is the official member of Microsoft Dynamics Academic Alliance and IBM Academic Initiative network
- Excellent achievements were accomplished by the employees in CIT in the area of hydroinformatics, as the area that Centre's experts have been developing for a long period
- CIT is also famous as regional leader for software development in hydroinformatics and lead partner of the Institute for the development of water resources "Jaroslav Černi"

Resources

1. Equipment for rapid prototyping and reverse engineering:
   - 3D printer ZCorporation ZPrinter 310 for production of 3D model
   - Roland MDX-20 (combination of CNC milling machine and Coordinate Measuring Machine CMM of the system for 3D digitalization)
   - Laswer 3D scanner Roland PICZA LPX-2
   - 3D digitalizer Immersion Microscribe G2LX, CMM system for object digitalization within the range of "mechanical arm"
   - System for vacuum casting MTT Vacuum Casting 5/01
2. Equipment for multimedia and teleconferences
   - Polycom VSX 7000 - fixed
   - Sony PCS G70P – portable system
3. Equipment for hydroinformatics



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International projects

1. Restructuring of Mechanical Engineering Studies, TEMPUS JEP-CD-18114-2003 (2003 – 2006)
2. Engineering Business Management and Services Master Module, TEMPUS JEP-CD-40104-2005 (2006 – 2009)
3. Reinforcement of Research Capacity in Software Development and Innovative Collaborative Design and Engineering in Serbia and Montenegro, RRSCD INNCODE 043820 (2006 – 2008)
4. Computer Science Curricula Founding and Upgrading, TEMPUS JEP-CD-16156-2001 (2001–2004)
5. Education Network Based on Information Technology, TEMPUS JEP-UM-17119-2002 (2002-2005)
6. Development of the Engineering Software and Improvement of Teaching Process on the Regular and Postgraduate Studies at the Faculty of Mechanical Engineering, WUS Austria, (May – September 2003)
7. Course Development Program +, Rapid Prototyping, WUS Austria (2004)
8. eLearning Programme for Serbia and Montenegro, Foundation of Mobile eLearning Centre at University of Kragujevac, WUS Austria (2005)
9. eLearning Programme for Serbia and Montenegro, Creation eLearning Content for Rapid Prototyipng Course, WUS Austria, (2006)
10. FLOODMED Monitoring, forecasting and best practices for flood mitigation and prevention in the CADSES region, INTERREG IIIB CADSES Programme #5D214, CARDS (2006)
11. ECDL for Serbian Administration, TEMPUS JEP_41101_2006 (2007 - 2009)

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2. Živković M., Kojić M., Slavković R. and Grujović N., A general beam finite element with deformable cross-section, Computer Methods in Applied Mechanics and Engineering, Vol.-, No.190, pp. 2651-2680, ISSN, 2001
3. Kojić M., Grujović N., Slavković R. and Živković M., A General Orthotropic Von Mises Plasticity Material Model with Mixed Hardening: Model Definition and Implicit Stress Integration Procedure, Journal of Applied Mechanics, Vol.-, No.63, pp. 376-382, ISSN, 1996
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5. Milos Stojkovic, Jelena Milovanovic, Nikola Vitkovic, Miroslav Trajanovic, Nenad Grujovic, Vladimir Milivojevic, Slobodan Milisavljevic and Stanko Mrvic, Reverse modeling and solid free-form fabrication of sternum implant, Australasian Physical & Engineering Science in Medicine, Vol.33, No.13246, pp., ISSN 0158-9938, Doi 10.1007/s13246-010-0029-1, 2010

Developed software and technical solutions

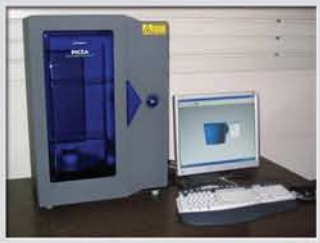
Developed software:

- Dejan Divac, Vladimir Milivojević, Nenad Grujović, Zdravko Stojanović, Zoran Dubajić, Software for data management on the system of Hydropower system "Vlasina", Electric Power Industry of Serbia, Institute for the development of water resources "Jaroslav Černi",Belgrade, 2009
- Dejan Divac, Nikola Milivojević, Nebojša Popović, Nenad Grujović, Zdravko Stojanović, Software for data management on the system of Hydropower systems "Djerdap 1" and "Djerdap 2", Electric Power Industry of Serbia, Institute for the development of water resources "Jaroslav Černi", Belgrade, 2009
- Dušan Mikavica, Nemanja Branisavljević, Nenad Grujović, Zdravko Stojanović, Zoran Simić, Software for acquisition, logical control, filtering and processing of data collected on computer aided measuring systems on the measuring systems on Hydropower system "Vlasina", Electric Power Industry of Serbia, Institute for the development of water resources "Jaroslav Černi", Belgrade, 2009
- Nikola Milivojević, Nebojša Popović, Zoran Dubajić, Nenad Grujović, Zoran Simić, Software for data management on the system of Hydropower systems "Drinsko – Limske", Electric Power Industry of Serbia, Institute for the development of water resources "Jaroslav Černi", Belgrade, 2009

Technical solutions:

- Nenad Grujović, Slobodan Milisavljević, Miroslav Trajanović, Vladimir Milivojević, Miloš Stojković, Jelena Milovanović, Nikola Vitković, Dragan Glavonjić CUSTOMIZED STERNUM IMPLANT, Kragujevac - Niš, 2009





CENTAR ZA REVITALIZACIJU INDUSTRIJSKIH SISTEMA

Centre for Revitalization of Industrial Systems

Centre for Revitalization of Industrial Systems was founded in 1993 and today it carries out its activities within the Faculty of Engineering in Kragujevac. The Centre gathers many professors from the Department for Production Engineering, but it also includes the Laboratory for Metal Cutting and many other laboratories and centres with significant material and human potential. It also engages many recognized experts from industrial practice.
The Centre was established with the aim to gather experts from scientific-research institutions and industry, so that theoretical and engineering knowledge and ideas can be implemented through new technologies and products. Within the Centre for Revitalization of Industrial Systems, many projects have been implemented to fit the national and international market needs. Many of them have resulted in realization of completely new technical solutions for special machines, equipment, tools and measuring devices. The Centre is open for cooperation with enterprises that would like to improve their existing production programs and launch new products on the market.

Activities

- Design of new and optimization of existing technological processes
- Design of specialized shrink machines and devices
- Design of specialized shrink tools
- Design of flexible modular systems of shrink tools
- Optimization of cutting tool selection
- Design of specialized cutting tools
- Design and production of devices for management of cooling and lubricating devices
- Design and production of modern tribo-diagnostic equipment in accordance with ASTM and ISO standards
- Design of transportation systems
- Revitalization and repair of machines
- Provision of services in the area of prototyping of machines and devices
- Provision of services in the area of 3D modelling and technical documentation updating
- Provision of education services in the area of tools and devices management
- Provision of services in the area of statistic data analysis
- Provision of expert opinions and expertise
- Specialized courses in various technical and IT areas (data bases, analytical data bases, CAD software)
- Software solutions in the area of engineering and re-engineering of technological processes, as well as calculations of processing expenses

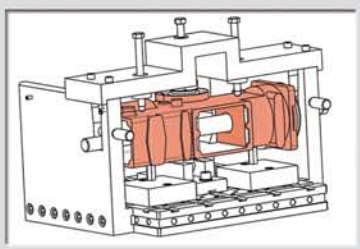
Results

- Development and marketing of tribometers TPD -93 and TPD-2000 on international universities
- Development of devices for testing static and dynamic flexibility of tangentially loaded junctions
- Development of tribometer for determining the static friction coefficient at micro/nano contact and raised temperatures
- Tool for final surface processing using the method of rolling the steel ball along the surface of processed object

Resources

1. Business space of 80 Sq. m.
2. Modern computer equipment
3. Available laboratory resources for metal cutting and laboratory for tribology
   - Large number of universal machines
   - Numerical milling machine HASS
4. Large number of measuring devices and instruments (tribometers, device for measuring the roughness and other measuring equipment)



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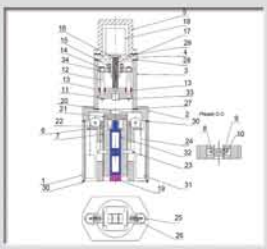
Technical solutions

1. Budak I., Tadić B., Jeremić B., Vukelić Đ., Miljanić D., Todorović P., Hodolič J., Industrijski prototip uređaja za ispitivanje statičke popustljivosti i nosivosti spoja elemenata za stezanje i radnog predmeta, TR-35020, Metalik DOO, Nikšić, Montenegro, Novi Sad, 2012
2. Dr. Janko Hodolič, Dr. Branko Tadić, Dr. Đorđe Vukelić, NOVO EKSPERIMENTALNO POSTROJENJE ZA SAVIJANJE TANKOZIDNIH CEVI PRIMENOM TOPLOTE GENERISANE TRENJEM, ALKA DOO, Kragujevac, The Republic of Serbia, Faculty of Technical Sciences in Novi Sad, Faculty of Engineering in Kragujevac, 2010
3. Tadić, B., Babić, M., Mitrović, S., Lazić, M., Vukelić, Đ., Univerzalni tribometar, TR 04, Laboratory for Tribology, Faculty of Engineering in Kragujevac, 2010
4. Dr. Đorđe Vukelić, Dr. Branko Tadić, Dr. Janko Hodolič, dipl. inž. Jelena Mitrović, mr Nenad Simeunović, Specijalni modularni sistem steznih pribora za obradni centar HURCO-500, IMT, Boljevac, The Republic of Serbia, Faculty of Technical Sciences in Novi Sad, Faculty of Engineering in Kragujevac, 2010
5. Tadić, B., Marjanović, N., Vukelić, Đ., Galović, S., Uređaj za ostvarivanje ekstremno visokih pritisaka, TR 16, Laboratory for Metal Machining , Faculty of Engineering in Kragujevac, 2010

The most important prototypes and services

Prototypes:
- Modular system of shrink tools for processing centre HURCO - 500
- EKO skimmer SK-95/80 and MIXERA MX-93
- Device with extremely high pressure
- Tribometer TPD 95
- Tribometer TPD 2000
- Special gear for auxiliary movement in milling process
- Copy milling machine for wood processing
- Machines for production of copper fittings
- Four-axis measuring machine – Tribology Measuring Centre
- Device for testing static flexibility of tangentially loaded contacts
- Device for testing of dynamic flexibility of tangentially loaded contacts
- Tool for final surface processing using the method of rolling the steel ball along the surface of processed object
- Tribometer –TK – Teaching resource
- Tribometer – TKK – Teaching resource

Services:
- Consulting services in the wider area of production engineering and mechanical constructions
- Development of new products and prototypes (users are small and medium enterprises and research institutions)



CENTAR ZA VIRTUELNU PROIZVODNJU

Centre for Virtual Manufacturing

Centre for Virtual Manufacturing (CeVIP) was founded in 2006, at Faculty of Engineering in Kragujevac, within the project titled "Virtual Manufacturing Support for Enterprises in Serbia". CeVIP has necessary resources for application of innovative technologies of virtual engineering (virtual manufacturing, CAD/CAM/CAE, virtual reality, quality and performance control of CNC machines, etc.). It realizes joint research projects with Serbian enterprises and offers innovative approach and services in product, processes and tools development and their optimization, contributing in this way to the increase of their innovative potential and competitiveness on the market. Strategic networking with enterprises, leading research institutions and relevant ministries within the VMnet network makes CEVIP renowned and reliable service provider in research and innovative environment in Serbia.

Activities

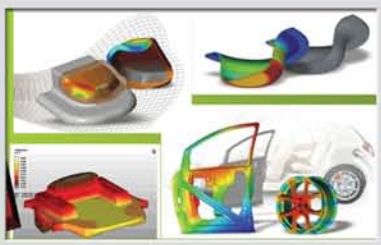
- Realization of scientific – research projects in the areas such as: virtual manufacturing, modelling and FEM/FVM numerical simulations and optimizations of technological processes, application of CAD/CAM/CAE technologies, 3D visualization of products and processes through application of virtual reality
- Development of VMnet network for effective knowledge and technology transfer and provision of high-tech services
- Provision of services and consulting – elaboration of feasibility studies, consulting in introduction of VM technologies, simulation of tool production, generating NC code, testing of CNC machines performances, etc.
- Realization of international projects (TEMPUS, FP6, SEE, WUS, EUREKA, GIZ, EAR, etc.)
- Organization and realization of courses for knowledge innovation, seminars, workshops and trainings

Results

- Strategic equipping of CEVIP centre with capital equipment and software that are unique in Serbia
- Establishment of VMnet network and HTML platform for knowledge systematization; the network gathers over 1400 registered users from entire Western Balkans Region as well as 18 leading experts from various areas
- Establishment of VRPM (Virtual/Rapid Prototyping/Manufacturing) group on CORDIS portal
- Organization of seminars, workshops, info-days, trainings, etc.
- Coordination of 12 international projects from FP6, TEMPUS, WUS, EAR, IPA/SEE programmes
- Coordination of collecting 120 examples of good practice in transformation of research into innovation
- Trainings abroad for CEVIP team members (Slovenia, Italy, Denmark, Germany, WBC, etc.)
- Realization of research projects and services for Serbian enterprises

Resources

1. Software packages for virtual manufacturing (Simufact.forming, Delcam PowerMill, Stampack, Vulcan)
2. Renishaw device QC10 BallBar for control of CNC machines performances
3. Equipment for virtual reality (Infocus 3D projector with 5 pairs of stereoscopic glasses NuVision, 5DT data glove, magnetic movement tracking device VR Space Wintracker with three sensors)



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International projects

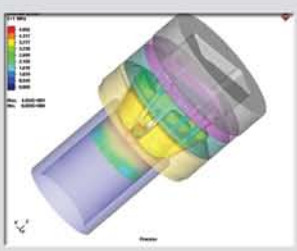
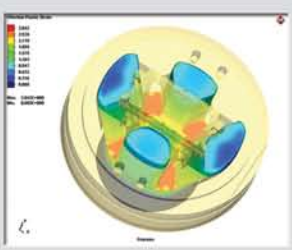
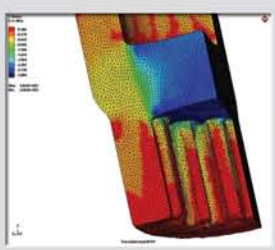
1. Modelling and Simulation in Metal Forming, WUS CDP, 2005-2006
2. EUREKA/ASMATA, E!3240: Renewal of steel car parts with aluminium, 2005-2007
3. Optimization of material forming processes through physical modelling, FE simulation and inverse analysis, Bilateral project between Serbia and Slovenia, 2006-2008
4. Development of Metal Forming Electronic Instructional Resources, eLearning-WUS, 2006
5. Virtual Engineering, WUS projekat, 2006, No. 103/2006
6. Virtual Manufacturing Support for Enterprises in Serbia, 2006-2007, http://cevip.fink.rs
7. Reinforcement of Research Capacity in Software Development and Innovative Collaborative Design and Engineering in Serbia and Montenegro, RRCSD INNCODE, FP6 INCO 043820, 2007-2009
8. Promoting Innovation in the Industrial Informatics and Embedded Systems Sectors through Networking, I3E, SEE/A/219/1.1/X, 2009-2012, www.i3e.eu
9. Modelling and optimization of tool by application of information technologies of virtual manufacturing with experimental verification, Bilateral project Croatia-Serbia, 2011-2013
10. Improvement of the competitiveness of enterprises in Serbia through new technologies transfer and support of innovations, GIZ 83124094, 2012-2013, http://cevip.fink.rs

Projects with industry

1. Preventing defects in hot forging process through application FE simulation, Zastava Kovačnica 2003
2. Optimization of multi-stage forging process aimed at tool verification and filling, Zastava Kovačnica, 2003
3. Tool stress prediction through simulation of aluminium profile extrusion, Nissal, 2006
4. Simulation of Al profile extrusion process for predicting quality of welding zone, Nissal, 2006
5. Application of numerical simulations for determination of tube forming quality, Jucit invest, 2007
6. FE simulation of deep drawing process of box-shaped part, Metalac INKO, 2007
7. FE analysis of hydraulic rubber pipe 2SN, Fadip holding Bečej, 2007
8. Tool design for lateral profiling roof tile panels, Metalprodukt, 2007
9. Scanning and modelling segments of the worm shaft, Toza Marković Kikinda, 2007
10. Simulation of profile rolling process for machine design, Milanović inženjering, 2007
11. Modelling of hot porthole-die extrusion of AL profile, SCGM, 2008
12. Reverse engineering of heat exchanger plate and simulation of sheet metal forming, Budućnost, 2008
13. Optimization of deep drawing process of monoblock sink of ferritic steel, Metalac INKO, 2008-2009
14. Optimization of process of making the cover of stainless steel sheet in four operations, Metalac bojleri, 2009
15. Simulation of multi-stage cold extrusion of parts with internal gear, Sloboda, 2009
16. Analysis of hot forging of joint body and optimization of technology, Fabrika automobilskih delova, 2010
17. Modelling and optimization of hot aluminium forging, Petar Drapšin, 2010
18. Design of progressive tools for production of parts of high-strength steel, Unimet, 2011
19. Simulation and analysis of bending and forming of spring contact part, Metalka Majur, 2012
20. Reverse engineering and modelling of light for LEDs, Metalka Majur, 2012
21. Reverse engineering and rapid prototyping of bakelite handle, Metalac posuđe, 2013
22. Rapid tooling for composite sink production, Polyagram, 2013

The most important prototypes, products, services, strategies and methodologies

- I3E Strategic Research Agenda, I3E Consortium, 2012
- Strategic Research Agenda – Annex I National Profiles, 2012
- Methodology Guide for Innovation, I3E Consortium, 2012
- Methodology Guide for Innovation – Annex I National Profiles, 2012
- WIKI data base with 120 examples of good practice in transformation of research into innovation, 2011 http://www.i3e.eu/i3e_wiki

Collaborative Training Centre of the University of Kragujevac

Collaborative Training Centre in Kragujevac is one of four centres from the CTC centres network established in the Western Balkans Region within Tempus project WBC-VMnet, as organizational unit of the University of Kragujevac. Taking into account significance and necessity of cooperation between University and enterprises, the main strategic aim of the Centre is to coordinate and improve this cooperation, to facilitate knowledge and technology transfer, to provide opportunities for students and graduates to gain practical experience and for employees to innovate existing knowledge. The Centre realizes development activities and research for enterprises in innovative rapid product and process development through application of software and equipment that are unique in the Region: software packages for production process simulation, equipment for rapid prototyping, multi-sensor coordinate measuring machine for reverse engineering and final quality control of products.

Activities

- Promotion of results/technologies/resources at the University and establishment of cooperation with enterprises
- Realization of research projects with enterprises in the area of rapid product and process development
- Expanding and coordination of VMnet - Virtual Manufacturing network
- Development and coordination of CTC centres network (Kragujevac, Podgorica, Banja Luka, Rijeka)
- Development and implementation of expert trainings, seminars and workshops in accordance with the needs of enterprises and labour market
- Development and implementation of Industrial Fellowship Programme (IFP)
- Development and implementation of Practical Placement Programme (PPP)

Results

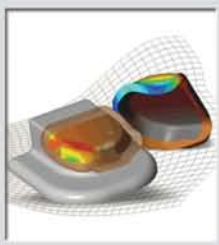
- Development and implementation of new WBC Regional Model of University – Enterprise Cooperation, through seven suggested strategic measures
- Establishment and coordination of four Collaborative Training Centres in the Region (Kragujevac, Rijeka, Podgorica, Banja Luka)
- Development of TSNA methodology and appropriate questionnaires (Training&Service Needs Analysis) for identification of enterprises and labour market needs in the Region (more than 800 surveyed)
- Development and implementation of 18 specialized trainings for enterprises and unemployed in the Western Balkans Region (WBC), more than 230 certified trainees
- Info-days, seminars and workshops for innovating knowledge in enterprises (20 events with 800 participants)
- Three brokerage events in the Region (over 300 participants)
- Research and development services for enterprises in the area of rapid prototyping, measuring and quality control of the product, virtual simulations and optimization of production processes (more than 60 enterprises)
- Expanding and coordination of VMnet network with 1400 members in the Region
- Establishment and coordination of VRPM (Virtual/Rapid Prototyping/Manufacturing) group on the CORDIS FP7 portal with more than 70 members from 20 countries
- Practical Placement Programme (PPP) – twenty two student mobilities in the Region and EU, and over 200 placements in local enterprises were realized
- Industrial Fellowship Programme (IFP) with 30 enterprises in the Region within the WBC-VMNet project

Resources

1. Multi-sensor coordinate measuring machine Werth VC IP250 (optical, laser and fibre sensors)
2. 3D printer Objet Alaris 30 for rapid prototyping
3. Simufact.forming software for virtual manufacturing and simulation of production processes







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International projects

1. WBC Virtual Manufacturing Network – Fostering an Integration of the Knowledge Triangle, 144684-TEMPUS, 2009-20012 www.wbc-vmnet.kg.ac.rs
2. Modernization of WBC universities through strengthening of structures and services for knowledge transfer, research and innovation, 530213-TEMPUS, 2012-2015 www.wbc-inno.kg.ac.rs
3. Improvement of the competitiveness of enterprises in Serbia through new technologies transfer and support of innovations, GIZ 83124094, 2012-2013 www.ctc.kg.ac.rs

Knowledge and technology transfer programmes

1. CUSTOMIZED TRAININGS. In order to enhance the innovative potential of Serbian enterprises, knowledge and skills of their employees, as well as their competitiveness on the market, the Collaborative training centre (CTC) in Kragujevac offers following trainings for employees and unemployed in accordance with realized "Training and Service Needs Analysis (TSNA)":
   - CAD/CAM modelling
   - Tool design
   - Modelling and optimization of production processes using the FE / FV simulation
   - Project management
   - CAM modelling and generating NC code for 3 axis CNC milling machines
   - Industrial metrology
   - Electronic medical devices

2. PRACTICAL PLACEMENT PROGRAMME (PPP). In order to help students promote and gain new knowledge, CTC centre developed and coordinates new Practical Placement Programme (PPP) which provides students with the opportunity to gain practical knowledge in industry, in the area related to their academic studies, and to further develop their professional, technical and interpersonal skills.

3. INDUSTRIAL FELLOWSHIP PROGRAMME (IFP). IFP is focused on establishment of sustainable partnership between universities and industry through hosting industrial fellows (graduates and engineers from industry) in research and academic centres, with the aim to realize advanced targeted trainings for industrial fellows and joint research in accordance with the needs of industrial sponsor.

The most important prototypes, products, services, strategies and methodologies

- WBC Regional Model of University – Enterprise Cooperation, 2010, ISBN 978-86-81037-27-0
- TSNA (Training&Service Needs Analysis) methodology with four types of supporting questionnaires
- Customized trainings for enterprises (CAD/CAM modelling, Tool design, Modelling and optimization of production processes through application of FE/FV simulations, Rapid prototyping and product development, CAM modelling and generating the NC code for 3 axis CNC milling machines, Industrial metrology)
- Practical Placement Programme (PPP) with all supporting annexes
- Industrial Fellowship Programme (IFP) with all supporting annexes
- Development/production of prototypes for enterprises and innovators
- Quality control and measuring, reverse engineering
- Methodology for rapid prototyping and product and process development

Engineering Software Research Group

Engineering Software Research Group – ESLAB was founded in 1976. Main activities of the group for engineering software are connected to development of PAK (Program for analysis of constructions) and its application in research and solving of practical engineering problems.
ESLAB has continuous cooperation with leading scientific-research institutions from the area of development and application of the finite element method all around the world. This cooperation was established through joint projects for development of specific modules of the program package PAK, its application and links to other program packages developed in these scientific-research centres. ESLAB also cooperates with Serbian faculties and research institutions, as well as with numerous companies in Serbia and abroad.

Activities

1. Development of specific modules of the program package PAK for numerous scientific-research institutions from the area of development and application of the finite element method, as well as with numerous companies from all over the world
2. Implementation of the international and national scientific-research projects
3. Application of program package PAK in static and dynamic analysis of machine constructions in exploitation conditions
4. Three-dimensional digitalization and testing of accuracy in relation to the CAD model and elaboration of detailed measuring reports using optical measuring system ATOS (quality control, reverse engineering, digital modelling and assembling, etc.)
5. Testing of accuracy of large objects, testing and adjusting of machines and constructions, analysis of static deformation (optical measuring system TRITOP)
6. Dynamic testing of material

Results

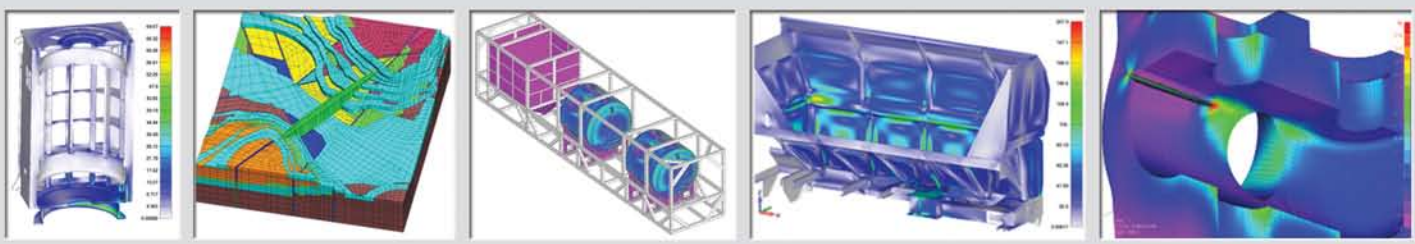
The main result of the ESLAB is the development and application of the program package PAK (Program for analysis of constructions). PAK is the program of common use for:

- linear and non-linear static and dynamic analysis
- heat conduction
- laminar fluid flow
- solid – fluid interaction
- flow through porous environment
- coupled problems
- biomechanics
- geomechanics
- fracture mechanics
- damage mechanics and material fatigue.

The program package PAK is on the level of world known programs for structural analysis. It is based on top-level theoretical achievements in the field of the finite element method. The authors of the program had published their original scientific results and methodologies in a great number of world known journals and books.

Resources

1. PAK – Multyphisics software system
2. Optical measuring systems ATOS and TRITOP
3. Coordinate measuring machine Faro Arm Platinium
4. Licenced software packages: SIEMENS NX, Femap, NX Nastran, Solid Edge, Tehnomatix, Team Center, LSDYNA, GiD, FEAP, ADINA, ABAQUS
5. Equipment for dynamic material testing (Servo-hydraulic puslator SHIMADZU, tension split Hopkinson bar)



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International and national projects

International projects:
- ECDL for Serbian Administration, TEMPUS IB_ JEP 41101-2006 (2007 - 2009)
- Reinforcement of Research Capacity in Software Development and Innovative Collaborative Design and Engineering in Serbia and Montenegro, FP6 project: RRSCD INNCODE 043820, (2007 - 2010)

National projects:
- Razvoj metoda i softvera za analizu, simulaciju i optimizaciju procesa velikih deformacija u mašinskoj industriji, TR 258 (2002-2004)
- Razvoj softvera za analizu čvrstoće i procenu radnog veka konstrukcije, TR 6204 (2005 - 2007)
- Razvoj softvera za eksplicitnu nelinearnu dinamičku analizu, TR 12005 (2008 - 2010)
- Razvoj softvera za rešavanje spregnutih multifizičkih problema, TR 32036 (2010 - 2014)

Projects with enterprises and institutions

- Several filter and stress-deformation analyses of interaction between cumulative reservoir, dam and rock mass were done for the needs of Institute "Jaroslav Černi". A methodology is developed offering a very good estimation of global structure safety, as well as a possibility of localization of critical zones.
- The great number of experiments conducted at the Institute for automobiles were modelled with application of developed software (simulation of fracture of b-column and horizontal traverse of the vehicle, crash-test for Fiat Punto was modelled)
- Great number of thermo-plastic analyses of drums in our thermal plants and estimation of remaining operating life time are done for needs of Electric Power Industry of Serbia.
- The impact of crack grow in steam turbine of power plant "Kolubara" and steamlines was analysed and assessment of their working life cycle was performed
- The analyses of several plants for water refinement - a send filter, sediment filter and multimedia filter, were conducted for the needs of ˝LINDE˝ company from Germany. These plants are used for water supply in Algeria.
- The influence of the existing crack on operation abilities of lifting beams used in steel factories of "MANNESMAN" company from Germany was analysed and calculation of heat conduction through insulation material "VATRAMIL" was conducted.
- Calculations of static and dynamic stability of various wagon types in accordance with the criteria and testing program were defined by the international standards TSI, EN, UIC, ERRI for the needs of freight car industry. Causes of fractures on various types of wagons and stands were analysed by numerical calculations.
- Thanks to the development of the module for biomechanics, for modelling of muscle and connective tissues, blood flow through blood vessels and other medical phenomena, the cooperation on international projects is established with: Harvard School of Public Health from USA, Nanyang Technology University from Singapore and Hong Kong Polytechnic University from Hong Kong
- Within joint work with Faculty of Medical sciences in Kragujevac, scanning, modelling and stress analysis of tibia bone was carried out. For the purpose of several projects, as well as individual research within doctoral and master papers in the area of biomechanics, scanning and modelling of lower jaw, vertebras and femur were performed.

The most important prototypes, software, services and testing

- Software system PAK-Multiphysics
- Control of the dimensions and shapes through application of system ATOS, TRITOP, FARO ARM
- Material testing using Hopkins bar and servo-hydraulic pulsator
- Trainings:
  - Linear and non-linear analysis of construction, mechanics of fracture and fatigue
  - Training and testing of basic computer literacy in ECDL test centre
- Dynamic material testing using two devices
  - Servo-hydraulic pulsator SHIMADZU (static material testing, mechanics of fracture, material fatigue, testing at increased temperatures)
  - Tension split Hopkinson bar (testing of material characteristics at significantly increased deformation speeds)



Research of Noise, Vibration and Harshness

Research of Noise, Vibration and Harshness of vehicles (Vehicle NVH) has been the focus of the department's activity for quite long. The members of the team have many years of experience in the development of research methods, measurement set up and realization of research in this area. This field is very interesting for the automotive industry, but developed research methods in the area of oscillatory and acoustic comfort of vehicles are applied in other fields too, as well as in solving the environmental protection issues due to unwanted effects of the traffic noise.

Activities

- Investigations of dynamics of vehicle's elements and structures
- Testing of the vehicles comfort
- Development of research and analysis methods
- Development of data analysis program
- Identification of regulation-technical characteristics of a driver
- Development of identification methods
- Design of measuring and testing equipment
- Measuring of internal and external vehicle noise, as well as noise in driver`s working places, public places, traffic roads, etc.
- Measuring of vibration and oscillatory comfort
- Analysis of noise and vibration
- Software development

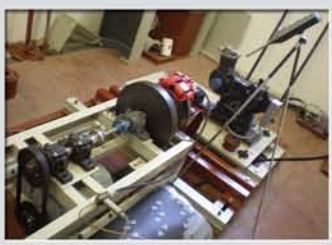
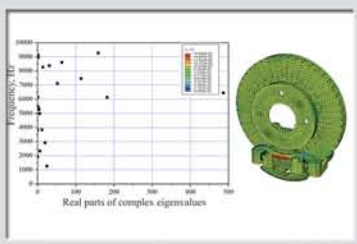
Results

- Development of method and measurement installation for testing the brake noise
- Development of method for measuring of vibration and oscillatory comfort of vehicles
- Experimental and simulation research of mechanical and functional couplers of dynamic vehicle system

Resources

1. Hydraulic pulsator
2. Measurement installation for research of brakes noise
3. Installed equipment (pole mounted crane, device with oscillatory plates, two-component hydraulic pulsator, measurement set up for brakes noise testing)
4. Computer equipment (large number of complete computer configurations; large number of printers)
5. Other equipment (device for measurement of vehicle speed, sound measuring device, dynamometric steering wheel with accessories, testing vehicle, testing minibus chassis in operating condition, scales for measuring of vehicle weight, large number of mock ups show samples)



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International projects

- Set up a new laboratory system for NVH of vehicles as part of teaching curricula and redesign of laboratory practice to the Motor vehicles and IC engines course at the Faculty of Mechanical Engineering, IMG 04-SCG3004 (2005)
- Restructuring of Mechanical Engineering Studies, TEMPUS CD_JEP_18114_2003, (2004 - 2006)
- DIAUSS Development and Improvement of Automotive and Urban Engineering Studies in Serbia, TEMPUS JP 516729-2011 (2011-2013)

National projects

- Istraživanje i razvoj vozila formule 4x4 ukupne mase do 4t
- Razvoj niskopodnog gradskog autobusa
- Istraživanje bezbednosti vozila kao dela kibernetskog sistema: Vozač-Vozilo-Okruženje

Projects with industry

1. Razvoj i realizacija elektro hidrauličkog dvokomponentnog pulzatora, for company Metaloprerada Užice in cooperation with the institute Mihalo Pupin
2. Razvoj teretnog vozila formule 4x4, for "Zastava kamioni"
3. Razvoj niskopodnog gradskog autobusa, in cooperation with INN Vinča, Center for vehicles, for the factory FAP, Priboj

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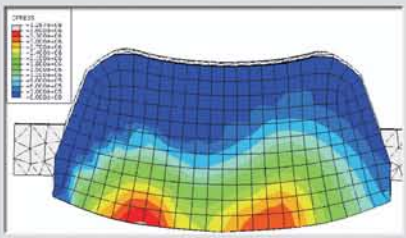
Developed methodologies and devices

Methodologies:
- Method for determination the fatigue curves
- Method for testing the high frequency noise of disk brakes

Devices:
- Device for testing the noise of disk brakes
- Device for determination the moment of inertia of vehicle



Laboratory for Thermodynamics and Heat Engineering

Laboratory for Thermodynamics and Heat Engineering is active in the scientific fields of thermodynamics, and heat, classical energy, and process engineering. In addition, this laboratory is active in architectural engineering, general renewable energy, solar energy, biomass, and geothermal energy. In all these fields, the laboratory supports education, scientific investigations, expert work and publishing of scientific and education material. These activities are realized in accordance with the needs of the Ministry of Education, Science and Technological Development of the Republic of Serbia, Ministry of Energy, Development and Environmental Protection of the Republic of Serbia, UNESCO, European Commission, and various legal and private entities.

Activities

- Educational activities of students on bachelor, master and PhD studies (Subject on bachelor academic studies: Thermodynamics, Heat and mass transfer, Heating, air-conditioning and solar energy; Subjects on master academic studies: Devices and plants for heating and air conditioning, Solar engineering; Subjects on PhD studies: Heat and mass transfer, Modelling of energy – ecology behaviour of buildings and Solar engineering)
- Scientific – research activity comprises research, development, design and provision of assistance in introducing devices and plants from the areas of heat engineering, process engineering and energy engineering into industry production
- Expert activities consists of expertise, attestation, certifying and revision of realized designs of devices and systems of heat engineering, process engineering, conventional and renewable energy
- Elaborations on energy efficiency of buildings and their energy passports

Results

Developed installations for:
- Measuring the characteristics of radiator heating bodies
- Heating and air conditioning by using geothermal heat pumps
- Accumulating hot water and electricity obtained from solar energy

Prototypes for solar energy utilization:
- Concentrator to obtain heat
- Hybrid collector to obtain heat and electricity
- Hybrid concentrator to obtain heat and electricity

Resources

1. Contemporary computer and measurement equipment
2. Anemometers with hot wires for measurements of velocity and temperature in fluids
3. Ultrasound measuring devices of flow rate of liquids
4. Infrared cameras
5. Infrared thermometers
6. Combined instruments for measurement of humidity, temperature and velocity in air
7. Manometers
8. Stroboscope
9. Measuring device for lighting
10. Pyranometer for measurement of solar radiation
11. Analyser of combustion products
12. Analog-digital converters for monitoring, automation and control of measurements by using computers and internet





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International and national projects

International projects:
1. Development of environment responsive facade engineering to enhance livability, sustainability, and energy conservation in optimized design of public housing, Housing authority research fund, Hong Kong Polytechnic University (2003-2005)
2. Rural sustainable development through integration of renewable energy technologies in poor European regions, EU Framework 6, (2004-2007)
3. Building Integration of Solar Thermal Systems (BISTS), COST action TU1205 of EU, (2013-2017)

National projects:
1. Energy efficiency of large built environment with complex multi-usage, EE814-175A (2003)
2. Development and investigation of hybrid plane collector of solar energy for heat and electricity conversion, EE708-1 003B (2003-2005)
3. Development of Solar asymmetric stationary parabolic concentrators for electricity and heat generation, NPEE9273003 (2006-2009)
4. Research and development of a Serbian net-zero energy house, Project TR 33015 of Ministry for Education, Science and Technological Development of The Republic of Serbia (2011 - 2014)

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4. Milorad Bojic, Slobodan Djordjevic, Jovan Malesevic, Marko Miletic, Dragan Cvetkovic. A simulation appraisal of a switch of district to electric heating due to increased heat efficiency in an office building, Energy and buildings, Vol.50, No.1, pp. 324-330, ISSN 0378-7788, Doi http://dx.doi.org/1 0. 1 016/j. enbuild.2012.04. 004. 2012.
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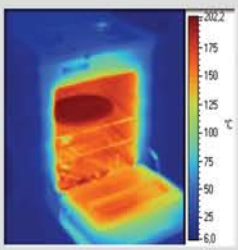




CADLAB
CAD Laboratorija

CAD Laboratory

CAD Laboratory includes several working stations that have standard configuration PCs and CAD software. Working stations have LAN and Internet connections. In addition to PCs, the Laboratory has a laser printer and scanner, and a purchase of a server and plotter is also planned. Modern CAD systems are researched and developed in the CAD Laboratory and knowledge and experience are exchanged with related institutions, economic organizations in the country and abroad.

Activities

The activities of the CAD Laboratory are aimed at the following fields:

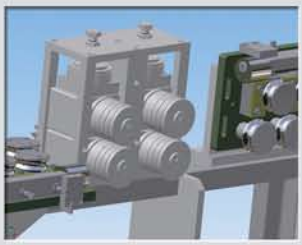
- Education - comprises educational activities at basic and after graduate studies on several majors at the Faculty of Engineering in Kragujevac. Students have the opportunity to independently improve themselves through development of specific projects. In addition to educational activities, the training in using the modern CAD systems is conducted.
- Research is related to improvement of the members of the CAD laboratory and other researchers, through independent work under the guidance of more experienced colleagues, as well as through working on doctoral dissertations, master's theses, seminar papers and other papers from the CAD field and from familiar fields where powerful CAD tools are used. Members of the CAD Laboratory are involved in great number of projects financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia.
- Cooperation with economic and other organizations is developed through transfer of knowledge and experience from the field of introduction, using and application of CAD tools in almost all areas of mechanical design.
- Participation in realization of national and international projects, Ministry department: TR-35037 and TR-6308B and international Tempus project: 530577-TEMPUS-1-2012-1-RS-TEMPUS-JPCR

Results

- CAD Laboratory has developed a great number of independent, specific projects and designs with some economic organizations
- Organization of courses for 3D modelling for grammar students
- Organization of trainings for former employees from "Zastava Automobili" in cooperation with NSZ
- Organization of trainings for employees of Fiat

Resources

1. Space for organization of trainings
2. Computers
3. Software packages (AD Inventor, DS CATIA, MS Office)
4. Plotter
5. LAN network

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International projects

1. Improvement of product development studies in Serbia and Bosnia and Herzegovina, TEMPUS 530577, (2012 -2015)
The main project objectives are:
   - Introduction of new study programs in the area of management of production development, innovation management and development of eco-products on partner universities
   - Modernization of existing study programs from the area of product development on specialized, master and PhD studies
   - Development of courses of lifelong learning for engineers employed in industry in the area of product development, as well as for the unemployed
   - Networking with regional industrial entities.
2. Establishment and Promotion of Sustainable Regional Centre for Permanent Education, RSEDP 03SER01/06/003-04SER01/11/006,

National projects

1. Razvoj nove konstrukcije kašike bagera kontinualnog dejstva u cilju integrisanja modularnih reznih elemenata, TR – 35037

2. Razvoj modularnih elemenata za samomontažnu opremu za domaćinstvo i industriju, TR - 6308B

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4. M. Blagojević, V. Nikolić, N. Marjanović, Lj. Veljović, ANALYSIS OF CYCLOID DRIVE DYNAMIC BEHAVIOR, Scientific Technical Review, Vol.59, No.1, pp. 52-56, ISSN 1820-0206, 2009
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The most important services and trainings

- Cooperation with industry and other organizations (though transfer of knowledge and experience from the field of introduction, using and application of CAD tools in almost all areas of mechanical design)
- Education comprising all educational activities for employees in industry, from the Employment Agency, etc.
- Trainings:
   - Course of 3D modelling for grammar students – Course of introduction to PLM software packages for students of first andsecond year of Grammar Schools in Kragujevac, 100 attendees (2010-2013)
   - GZV (Zastava Vehicles Group) – trainings for former employees from "Zastava Automobili" in organization with NSZ, 56 attendees, 100 hours each (2012-2013)
   - FAS (Fiat Automobil Serbia) – 150 attendees (2011) – 3 trainings: T0, T2, T4.



Centre for Preclinical Testing of Active Substances / Laboratory for Cell and Molecular Biology

Centre for Preclinical Testing of Active Substances – CPCTAS is a separate organizational unit of the Faculty of Science that acts in accordance with its Statute. Centre was founded in 2008, at the beginning of realization of the three-year project EU: FP7 – Capacities, Research Potential, CENTRE FOR PRE-CLINICAL TESTING OF ACTIVE SUBSTANCES (CPCTAS, GA 206809). In a relatively short time, the Centre has managed to increase its material base and technical equipment to reinforce through personnel and structural changes and to gain experience and references by a number of papers issued. Laboratory for Cell and Molecular Biology is a central part in charge for coordinating activities of Centre for Preclinical Testing of Active Substances and, accordingly, of organization and activities subject to accreditation of Laboratory in accordance with SRPS ISO/IEC 17025:2006.

Activities

- Chemical synthesis, purification and extraction of bioactive substances, microbiological, cell and molecular, immunological and pharmacological preclinical testing of active substances of wide span of action, scientific research work that connects basic research and clinic, as well as provision of services to the third party
- Testing the significance of physiological, genetic, molecular-biological and tumour markers in the assessment of effects of active substances and prediction of pathological state of people
- Defining the mechanisms of active substances activity in biological systems with clear feedback information for chemical synthesis of new variations of active substances with improved characteristic, as well as defined output for distribution, clinical testing and application of tested active substances

Results

- The Centre was legally established and technically equipped within CPCTAS project: maintenance of existing technical resources as well as purchase of new equipment within PIBAS project
- The Centre employs seven young researchers (doctoral students); all newly employed researchers passed two-month education in related laboratories in EU
- Laboratory engages 6 young researchers (students of doctoral studies) through PIBAS project
- Since its establishment, the Laboratory has been performing scientific – research and educational activities; currently elaboration of 6 doctoral dissertations is in progress
- For two-year period (2011-2012), the Laboratory performed the testing of biological activities of chemically synthetized substances and extracts, i.e. isolated pure substances from plant material (over 120 samples)
- Technical equipment and educated personnel allow the Laboratory to develop within scientific – research and educational work, but also an exit to the market and cooperation with the clinic and pharmaceutical companies

Resources

1. Real Time PCR System 7500, Applied Biosystem 7500
2. Ultra Centrifuge SORWALL WX 80 separates the cell's organelles and elements of blood
3. Systec autoclave VX 55 provides the sterility of samples
4. Inverted Research Microscope Nikon Eclipse Ti-E for observing fluorescent-coloured protein and cell parts
5. Microscope Nikon TS-100, Inverted laboratory microscope for monitoring the colour and morphology of cells
6. Laminar flow cabinet BH-EN 2003-S with vertical air streaming and HEPA filters for sterile work with cell cultures
7. CO2 incubator MD 151 UV, Medline provides optimal temperature conditions required for growing cells in the culture
8. Liquid nitrogen container SPECTRUM for storing biological material at −196 °C
9. ELISA micro-board reader RT-2100C for spectro-photometric measuring of absorbance at different wavelengths
10. Eppendorf Mastercycler gradient PCR equipment is used for amplification of nucleic acids
11. Information system (IS) for support CPCTAS – LCMB




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International and national projects

International projects:
1. Centre for Preclinical Testing of Active Substances – CPCTAS (GA 206809; 2008-2011) – FP7 project

National projects:
1. Preklinička ispitivanja bioaktivnih supstanci (Preclinical testing of bioactive substances – PIBAS; III41010; 2011-2014)

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The most important methodologies and services

Testing of the Laboratory for Cell and Molecular Biology is related to the testing of biological activity and mechanisms of active substances actions, potential drugs with the focus on:
- The type of cell death (Apoptosis)
- Migratory potential of cells
- Angiogenesis
- Mitochondria-dependent signal pathways
- Mechanisms of redox and energy status

Analyses developed in Laboratory are:
- Determination of cytotoxicity – MTT test
- Method for detection of the cell death type – acridine orange/ ethidium bromide staining method and fluocytometry method
- Methods for determining the apoptosis parameters – caspase 9, caspase 8, Fas receptor expression - colorimetric method, immunofluorescence, Western blot
- Marking and quantification of proteins – immunofluorescence, Western blot technique (β catenin), ELISA
- Test that monitors changes of migratory potential – transwell method
- Qualitative and semi-quantitative determination of genetic expression – multiplex PCR
- Determination of concentration of superoxide anion radical – nitro blue tetrazolium (NBT) test
- Determination of nitrite concentrations according to Griess
- Spectrophotometric determination of total glutathione concentrations
- Monitoring the expression of iNOS– immunofluorescence



Laboratory for Microbiology

Laboratory for Microbiology is the part of the Institute of Biology and Ecology of the Faculty of Science in Kragujevac. The main activity of the Laboratory is related to the scientific-research and educational work in the area of microbiology within the Biology and Ecology study program. The objective of the laboratory is to introduce new methods and innovate existing ones with its original scientific-research work and in this way to contribute to the promotion of existing knowledge from the area of ecology of microorganisms, soil and water microbiology and other relevant areas. Nowadays, modernization and promotion of educational process have significant role in microbiological research.

Activities

- Contributions to the scientific knowledge in the area of microbiology with special focus on physiological activity and control of microorganisms
- Microbiological characterisation of newly synthetized antimicrobial substances and antimicrobial substances of plant origin with clear feedback information relevant for promotion of their efficiency
- Promotion of knowledge in the area of ecology of microorganisms with special focus on the role of microorganisms in natural eco-systems and their relation to other elements in biocenosis
- Testing of the sanitary and ecological quality of water eco-systems with the aim of objective status assessment, creation and establishment of adequate monitoring system, enhancement of protection capacity, pollution reduction and promotion of quality of natural waters in Serbia
- Creation and implementation of unique integrated information system related to Serbian lakes and reservoirs (SeLaR - Serbian Lakes and Reservoirs Info system) and creation of information basis for archiving available limnological data in electronic form and their processing into information useful to all users
- Education of young scientific staff through work with students at master and PhD studies
- Work with vocational organizations and promotion of efficiency of their work through implementation of modern laboratory methods and demonstration of examples of good laboratory practice
- Raising the level of ecological awareness in society with special attention to the place and significance of hygienic and sanitary indicators of quality and assessment of microbiological risks

Results

- More than 50 papers published in international scientific journals from Thomson list and 50 papers published in national scientific journals
- More than 200 papers presented at international / national scientific events
- The associates of the Laboratory participated in several international projects: one from FP7, 2 from TEMPUS and one from COST programme
- In the period 1990-2014, 12 scientific projects have been/are realized from the basic research and technological development programmes
- A great number of environmental studies were realized (Šumadija and Pomoravlje, Kragujevac, Kruševac) as well as studies related to water supply in Kragujevac
- Original microbiological mWQI index for water quality was created
- Integrated management information system related to Serbian lakes and reservoirs was developed and implemented (SeLaR info-system) (http://selar.pmf.kg.ac.rs)

Resources

1. The Laboratory has standard equipment for microbiological research: vertical laminar flow cabinet with Bunsen burner, incubators, dry sterilizators, refrigerators, vortex mixer, pH meter, colony counter, UV lamp, digital precision scales, analytical scales, Autoclave Systec VE 55, ELISA micro-board reader, spectrophotometer, equipment for membrane filtration, etc.
2. Great collection of microorganisms strains (bacteria and fungi), both standard ones and clinical isolates from the nature
3. Corresponding equipment for sampling and conserving samples for the research of microorganisms from natural eco-systems
4. Information system (SeLaR) for water resources management and efficiency assessment of the existing monitoring system




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International and national projects

International projects :
1. Centre for Preclinical Testing of Active Substances – CPCTAS (GA 206809; 2008-2011) – FP7 project

National projects:
1. Preklinička ispitivanja bioaktivnih supstanci – PIBAS (III41010; 2011-2014)
2. Karakterizacija i primena metabolita gljiva i utvrđivanje potencijala novih biofungicida, (2011-2014), grant No. 173032
3. Razvoj i implementacija SeLaR Informacionog sistema (2008-2010), grant No. 22001
4. Biomonitoring i ekološka zaštita hidroakumulacija za vodosnabdevanje Kragujevca, (2003-2006), No. 1252

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Research areas and specialized analyses

Microbiological characterisation of bioactive substances:

Types of samples tested: (a) chemical substances – synthetized inorganic or organic substances with potential biological (antioxidant, antimicrobial, antibiofilm) activity; (b) extracts and isolated clean components of natural sources – plants, lichen, fungi, propolis.
Model systems for testing the effects of samples – standard strains (manufacturer: American Type Culture Collection - ATCC), clinical isolates and isolates from nature.

Analyses developed in Laboratory

Antibacterial and antifungal activity, by applying the following methods: disc-diffusion method and dilution method (Minimal inhibitory concentration (MIC); Minimal microbiocid concentration (MMCK); Effect of tested samples on microorganisms' growth in function of time (growth curve); Mechanisms of tested samples activities (damage of cytoplasmic membrane, loss of salt tolerance, enzyme inhibition); Synergistic effect of tested samples on microorganisms' growth).

Antibiofilm activity, by applying the dilution method (Testing ability of bacteria to form biolfilm in vitro; Effect of tested samples on biofilm creation; Effect of tested samples on formed biofilm; Analysis of biofilm structure with fluorescent microscope).

Microbiology of water – Microbiological (bacteriological) indicators of condition and quality of water by applying direct methods (membrane filtration) and indirect (growth) methods.
Indicators of condition and water quality are determined from ecological aspect (total number of bacteria; number of aerobic heterotrophs – psychrophiles and mesophiles; number of facultative oligotrophs; presence and number of different physiological bacteria groups) as well as condition and water quality indicators from sanitary-ecological aspect (total coliform bacteria; fecal coliform bacteria; number of Clostridium perfringens).

Application of information technologies and methods of data mining in assessment of obtained data, modelling and predicting.

Botanical Garden in Kragujevac

The Botanical Garden is organizational unit of the Institute for Biology and Ecology, at Faculty of Science in Kragujevac. It is located in the complex of the Memorial park "21 Oktobar", on the surface area of 18.6 hectares. The forming of Botanical garden started in 1992 with the aim to protect genetic and special diversity of Serbian flora, research acclimatization and special introduction, educate student in the area of biodiversity and environmental protection as well as to increase the biological and ecological culture of citizens. Opening ceremony was held on 8th September 1997.

Within the Botanical Garden there are three units:

- Exhibition unit – with decorative part, cyclic plateau with the bust of Josif Pančić, dendrarium, alpinetum, special collections, labyrinth with endemic species
- Administrative-scientific unit and
- Economic-production unit – with tree nursery and greenhouse.

Activities

- Contribution to the scientific knowledge in the area of protection and preserving the flora biodiversity, especially in Serbia
- Contribution to the protection and reintroduction of endangered, rare, protected and specially protected plant species
- Promotion of knowledge related to flora both in Serbia and in the world
- Education of young scientific staff through work with students at master and PhD studies
- Education of pre-school and elementary school children in the area of protection and preservation of biodiversity of flora through realization of educative workshops in the Botanical Garden
- Education of wider population on the benefits of biodiversity protection
- Raising the level of ecological awareness in the society with the special attention to the place and significance of plants.

Results

- Teachers and associates from the Institute of Biology and Ecology engaged in Botanical Garden participated in many national and international projects
- Establishment of Botanical Garden and reintroduction of some plant species

Resources

BotanicalGarden uses standard equipment of the Institute for Biology and Ecology at Faculty of Science:

1. Vertical laminar flow cabinet with Bunsen burner
2. Incubators
3. Dry sterilizators
4. Refrigerators
5. UV lamp
6. Analytical scales
7. Autoclave Systec VE 55
8. Planting dishes???

Within the Botanical Garden area there are green houses and planting hotbeds as well as irrigation system.

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International projects

1. Development of Botanical garden in Kragujevac. Program development of foreign aid to Serbia, the South region of the Czech Republic, 2006

National projects

1. Preklinička ispitivanja bioaktivnih supstanci – PIBAS (III41010; 2011-2014)
2. Ex situ zaštita biodiverziteta flore Srbije – Serbian Environmental Protection Fund (2010-2013). Contract no. 401-0000715/2010-01/2
3. Razvoj Botaničke bašte u Kragujevcu (2008), Contract no. 401-0000024/2008-01
4. Razvoj Botaničke bašte u Kragujevcu (2004), Contract no. 401-00265/2004-01

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2. Jakovljević Dragana Z., Stankovic Milan S., Topuzovic Marina D. Seasonal variability of Chelidonium majus L. Secondary metabolities content and antioxidant activity. EXCLI JOURNAL, (2013), vol. 12 , p. 260-268.
3. Stanković Milan S., Radojević Ivana D, Ćurčić Milena G., Vasić Sava M., Topuzović Marina D.,D., Čomic Ljiljana R., Markovic Snežana D. Evaluation of biological activities of goldmoss stonecrop (Sedum acre L.) TURKISH JOURNAL OF BIOLOGY, (2012), vol. 36 No. 5, p. 580-588.
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The most important prototypes, products, services, strategies and methodologies

Research area: protection of biodiversity of flora

- Reintroduction of endangered, rare, protected and specially protected species through reproduction and growth processes in laboratory environment, in controlled conditions in Botanical Garden and their return to their natural habitats.



Research Group of Prof. Dr. Živadin D. Bugarčić

One of the objectives of the Research Group of Prof. Dr. Živadin D. Bugarčić is the synthesis of new complexes of transition metals ions that show higher biological activity and lower toxicity at the same time. The complex synthesis that would have better properties in vivo than those used so far is a great challenge, especially because the complexes of transition metals ions are hardly soluble in physiological conditions, and some of them are very unstable as well. This is why the research on the relation between the structure and activity of newly synthetized complexes is very significant.

Special attention is paid to the change of coordination sphere of a complex, i.e. on the introduction of new inert and unstable ligands, with the aim to achieve better dissolubility of synthetized complexes. Internal and unstable ligands are selected on the basis of chemical properties of metal ions that are being complexed, as well as on the basis of recent experience in the research of reaction mechanisms and potential antitumor complex properties.

Activities

Having in mind the significance and role of transition metals ions and their complexes in different biochemical and metabolic processes, the group decided to perform detailed research of reactions of some new complexes with bio-molecules. The subject of the group's research is: synthesis and characterisation of new complexes of transition metals ions, e.g. Pd(II), Pt(II), Pt(IV), Ru(II), Ru(III) and Au(III), as well as study of interactions of these complexes with different bio-molecules such as essential amino acids, peptides and DNA fragments. This research is very significant at fundamental, biological and medical aspects. It is well known that some complexes, such as complexes Pt(II) and Pt(IV), have been used for several decades in chemotherapy as anti-cancerogenous substances. However, besides antitumor activity, these complexes also show toxic effects, such as nephrotoxicity, ototoxicity, resistance, etc. Toxic property of platinum complex is explained exactly by the interaction of these complexes with bio-molecules that contain sulphur, e.g. glutathione. Taking all this into account, in order to study better the mechanism of antitumor effects of platinum complex, it is essential to continue with research of interactions of platinum complex with bio-molecules containing sulphur and nitrogen. It is necessary to determine the complexing mechanism, constants of reaction substitution speeds and stability of the built complexes. Also, it is important to examine the influence of various factors affecting the constant of substitution speed such as temperature, pressure, pH, ionic strength, solvent and catalyst effect. As it is known, some complexes Pt(IV) are also used in chemotherapy. It has been shown that the first process of their antitumor activities is reduction of Pt(IV) to Pt(II), and then the activity mechanism is the same as in cisplatinum or carboplatin. Thus, it is very important to perform detailed research of the reduction mechanisms of Pt(IV) complex with bio-molecules containing sulphur (cysteine, glutathione), as well as with ascorbic acid. Also, new potentially biologically active complexes Ru(II), Au(III) and Ru(III) were synthetized. For characteristics of new complexes, as well as for studying the mechanisms of substitution reactions, modern methods and techniques are used, such as UV-VIS, IR, NMR, stopped-flow, HPLC, roentgen structure analysis and others.

National projects

1. Sinteza i reaktivnost novih organskih jedinjenja i kompleksa metala kao potencijalnih terapeutskih i biološki aktivnih agenasa, Project of the Ministry of Education, Science and Technological Development, No. 1254 (2002-2005)
2. Struktura novih kompleksa jona prelaznih metala i mehanizam njihovih reakcija sa biološki značajnim ligandima, Project of the Ministry of Education, Science and Technological Development, No. 142008 (2006-2010)

Resources

1. UV-VIS spectrophotometer Perkin Elmer Lamda 35
2. UV-VIS spectrophotometer Perkin Elmer Lamda 25
3. HPLC chromatograph Shumadzu
4. IR spectrometer Perkim Elmer FTIR 31725
5. NMR spectroscope Varian Gemini 2000




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International projects

1. Bilateral projects:
1. Mehanizam interakcija kompleksa Pt(II) i Pd(II) sa nekim bio-molekulima, Bilateral project of the Ministry of Education, Science and Technological Development of The Republic of Serbia and DAAD of The Republic of Germany, (2009-2010)
2. Kinetika i mehanizam reakcija Au(III), Pt(IV) i Ru(II/III) kompleksa i nekih biomolekula, Bilateral project of the Ministry of Education, Science and Technological Development of The Republic of Serbia and DAAD of The Republic of Germany, (2011-2012)

Project funded by the European Union:
1. Science teacher education revision and upgrading, TEMPUS JEP STERU, (2006-2009),
2. Metallo-Drug Design and Action, COST project D39, (2008.-2011)
3. Modernisation of Post-Graduate Studies in Chemistry and Chemistry Related Programmes, TEMPUS JEP MCHEM, (2010-2013).

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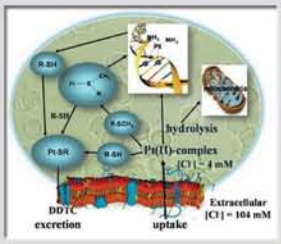
16. J. Bogojeski and Ž. D. Bugarčić Kinetic and thermodznamic studies on reactions of [PtCl(bpma)]+ and [Pt(bpma)H2O]2+ (bpma = bis-(2-pyridylmethyl)amine) with some azoles and diazines Trans. Met. Chem., 2011, 36, 73-78.



Radiation Physics Group

Laboratory for Radiation Physics is located within the Department for Physics at the Faculty of Science in Kragujevac. Its establishment started back in 1978, when Prof. Petar Marković came from Institute "Vinča" to the Faculty of Science in Kragujevac. The Laboratory is involved in various fields within radiation physics, such as radioecology, neutron dosimetry, modelling of interaction of radiation with material, radioactivity control, radiobiology, radon measurement, etc. It has published more than 150 papers in international journals on SCI (ISI) list and many appearances at national and international conferences. This Laboratory has shown remarkable and significant activity in accidental situtations, such as accident in Chernobyl and Fukushima, as well as in war conditions related to depleted uranium.

The web-site of the group can be found at http://www.pmf.kg.ac.rs/radijacionafizika/

Activities

- Gamma spectroscopy
- Radon measurement
- Measurement of ambient dose equivalent
- Dose calculation
- Monte Carlo method
- Human body phantoms
- Neutron dosimetry

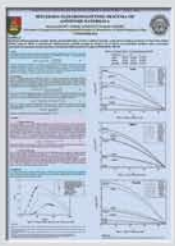
Research areas

- Radioecology
- Stopping power of heavy charged particles
- Trackology
- Modeling of radon measurement with Nuclear Track Detectors
- Lung dosimetry

Resources

1. Gamma spectrometer
2. Alpha spectrometer
3. Atomteh
4. MCNP software



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National projects

- Experimental and theoretical investigation in radiation physics and radioecology, ON 17102
- Theoretical and experimental investigation in microdosimetry and radioecology, ON 141025
- Development of experimental and theoretical methods in radioecology, ON 101425

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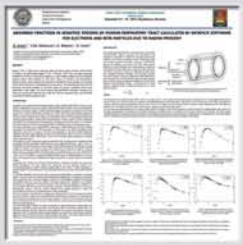
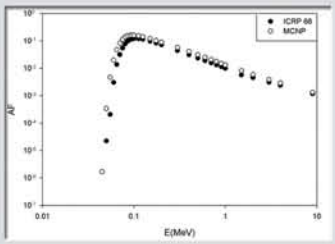
The most important products, services and trainings

Products:
- Calculation of CR-39 sensitivity to radon
- Input files with ORNL mathematical phantoms of the human body for MCNP 4B
- Simulation of LR115 and CR-39 detectors etching

Services:
- Control of radioactivity in import and export materials

Trainings:
- Training for the protection against ionisation radiation





Group for Mathematical Modelling and Computer Simulations

Group for Mathematical Modelling and Computer Simulations was formed in 2008 at the Faculty of Science in Kragujevac by joining the knowledge and experiences of experts from the area of mathematics, computer sciences, physics, engineering and bioengineering. The main activity of the group is development of mathematical models of real systems and processes, simulation of their behaviour under different conditions and optimization according to given criteria. In order to provide high performance of simulation and optimization processes, special attention is paid to the development of hardware and software platforms for parallelization and distribution of developed algorithms. The Group realizes several scientific and industrial projects ranging from modelling of muscle biomechanics at molecular level to simulations and optimizations of hydropower systems.

Activities

- Development of mathematical models for description of natural processes
- Development of numerical methods for simulation of behaviour of real physical systems
- Optimization of physical processes represented by appropriate mathematical models
- Parallelization of the computation in order to achieve high performances

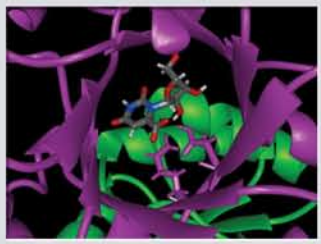
Results

- Great number of publications in leading international and national scientific magazines and journals
- Scientific monographs published by referent world publishers
- Participation in the international and national projects (FP7, TEMPUS, SCOPES, DAAD, Projects of the Ministry of Education, Science and Technological Development of the Republic of Serbia, etc.)
- Methods and tools for modelling, simulation and optimization of real physical and processing systems
- Software tools for application in industry
- Great number of information trainings and workshops, as well as mathematical courses (FIAT Automobili Srbija, ComTrade, ELB Solutions, etc.)

Resources

1. Software tools for computer simulations (finite element method, finite difference method, particle methods, DEVS, etc.)
2. Software tool for multi-criteria optimization
3. Faculty's cluster computer KRAGUJ comprising about 150 processing cores with total of 300GB RAM memory and 6TB storage space. The members of the Group for Mathematical Modelling use this resource intensively for solving demanding computer problems in the area of modelling and simulations. Also, Groups experts actively participate in adjustment and porting various software solutions used by other research groups to the high performance computing platform.



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International projects

1. Multiscale mechanisms of lingual mechanical function, NIH R01 DC 011528, Subcontract of BioIRC to Steward/St. Elizabeth Hospital, Boston, US, 2011-2016.
2. FP7-224297 - Large-scale Integrating Project(IP): ARTreat. „Multi-level patient-specific artery and atherogenesis model for outcome prediction, decision support treatment, and virtual hand-on training", 2008-2011.
3. SEE-GRID-SCI, South East European GRID enabled eInfrastructure Development (2008-2010), FP7, PI Ognjen Prnjat, GRNET.
4. Tempus Joint European project (JEP) Curriculum development CD-JEP-40104: Engineering Business Management and Service Science Master Module, 2006-2009.
5. INTERREG IIIB CADSES Programme #5D214, CARDS project FLOODMED Monitoring, forecasting and best practices for flood mitigation and prevention in the CADSES region, 2006-2008.
6. SCOPES Joint Research Project No. IB7320-111079 (Swiss National Science Foundation): New Methods for Quadrature, 2006-2008.
7. SEE-GRID-2, South East European GRID enabled eInfrastructure Development (2006-2008), FP6, PI Ognjen Prnjat, GRNET.
8. DAAD 2012-2013 project: „ Artificial Neural Network modelling of silver nanoparticle formation after thermal decomposition of an aerosol ".

National projects

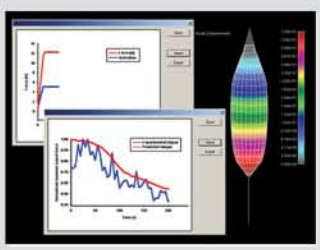
1. Project supervision during rehabilitation of the seepage below Visegrad hydropower plant, 2013.
2. Monitoring and forecast model of inflow into Trebisnica basins, 2012.
3. Application of biomedical engineering in preclinical and clinical practice, III 41007, 2011-2014.
4. Methods for multiscale modelling with application in biomedicine, OI 174028, 2011-2014.
5. Development of Drina hydro-information system (stage 3a), 2010

Developed software packages

- Software packages for planning and monitoring of recovery of the waters under the Hydro Plant "Višegrad", 2013.
- Software for monitoring and prognosis of inflow to accumulation of the system "Trebišnjica", 2012.
- Software for muscles modelling at molecular level, 2011.
- Hydro information system "Drina", 2010.
- Multi-level patient-specific artery and atherogenesis model for outcome prediction, decision support treatment, and virtual hand-on training
- Software for calculation of effects of pneumatic knee prosthesis – Brace Designer
- Software with examples for education in the area of simulations in bioengineering – FEM – Examples
- Software package SPH07 – Software for modelling the fluids and solids using mesh-free method of smoothed-particle hydrodynamics

Services and trainings

- Consulting services in the area of design and development of computer systems
- Consulting services in the area of modelling, simulation and optimization of real physical and processing systems
- Development of scientific, system and applicative software
- Specialized computer training and workshops of all levels
- Mathematical courses of all levels



Centre for Molecular Medicine and Stem Cell Research

Centre for Molecular Medicine and Stem Cell Research is special organizational unit of the Faculty of Medical Sciences, University of Kragujevac. The Centre was established in 2008 and works in accordance with the Statute and regulative acts of Faculty of Medical Sciences. In previous period, the Centre has significantly improved its technical equipment and professional staff which led to publishing of a large number of scientific papers.
Its basic activities have the aim to examine the immune bases and mechanisms of various organ specific diseases and tumours as well as research on immunomodulatory properties of stem cells.

Activities

- Realization of scientific-research projects under the Ministry of Education, Science and Technological Development of the Republic of Serbia
- Realization of more than 20 internal projects funded by the Faculty of Medical Sciences in Kragujevac
- Organization of interactive laboratory meetings, seminars and lectures
- Realization of research for doctoral dissertations

Results

- For the last two years, more than 20 scientific papers have been published on SCI list and more than 10 doctoral dissertations have been realized
- In the Centre's laboratory, five projects of the Ministry of Education, Science and Technological Development of the Republic of Serbia are being realized
- Currently, many internal projects of the Faculty of Medical Sciences in Kragujevac are being realized

The most important prototypes, products, services, strategies and methodologies

- Determining the classification to a cell line and the differentiation degree by the method of flow cytometry
- Marking and quantification of proteins – ELISA
- Chain multiplication reaction – PCR, RT-PCR
- Determining cytotoxicity – MTT test
- Immunohistochemistry

Resources

1. Real Time PCR System, Eppendorf
2. BD Biosciences FACSCalibur flow cytometer
3. Two laminar flow cabinet with vertical air flow for cell cultures
4. ELISA micro-board reader, Zenit
5. Two CO2 for growing cells in culture

Contact

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International and national projects

International projects:

1. Centre for Preclinical Testing of Active Substances – CPCTAS (GA 206809; 2008-2011) – FP7 project. Coordinator Faculty of Science, University of Kragujevac. Consortium: Faculty of Medical Sciences University of Kragujevac, Institute Curie Paris, School of Medicine Aristotle University Thessaloniki, Faculty of Natural Sciences and Matemathics Skopje.

National projects:

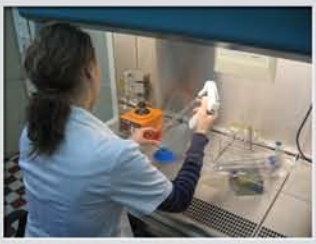
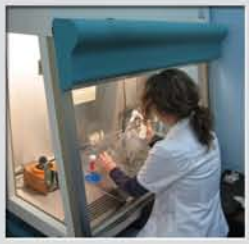
1. Razvoj infrastrukture za prioritetna polja nauke, Ministry of Education, Science and Technological Development of The Republic of Serbia,ON175103,(2011-2014)
2. Molekulske determinante urođene imunosti u autoimunskim bolestima i kancerogenezi, Ministry of Education, Science and Technological Development of The Republic ofSerbia, ON175069, (2011-2014)

Junior projects of the Faculty of Medical Sciences in Kragujevac

1. Sistem za elektromagnetno praćenje u krvnim sudovima i kolonoskopiji, JP 01-4708, (2013)
2. Ispitivanje uloge Galektina-3 u metaboličkoj disfunkciji i inflamaciji u mišjem modelu indukovane gojaznosti i tipa 2 *Diabetes mellitus*-a primenom dijete sa visokim sadržajem masti, JP 07-12, (2012)
3. Analiza faktora udruženih sa postoperativnim oporavkom kod bolesnika posle elektivne abdominalne histerektomije, JP 09-12, (2012)
4. Korelacija lokalne ekspresije timidilat-sintaze i endoglina (SD 105) i sistemskih vrednosti endoglina (CD 105) i TGF-u bolesnika sa kolorektalnim karcinomom, JP 12-12, (2012)
5. Uticaj ekspresije COX-2, P27 i VEGF na stvaranje novih krvnih i limfnih sudova u tkivu klasičnih i folikularnih varijanti papilarnog karcinoma štitaste žlezde, JP 27-12, (2012)
6. Analiza parametara glikoregulacije, liporegulacije, parametara funkcije štitaste žlezde i citokinskog profila tokom trudnoće, JP 28-12, (2012)
7. Nivo adiponektina u serumu pacijenta u zavisnosti od metaboličkog sindroma i koronarne bolesti, JP 11-11, (2011)
8. Uloga IL-33/ST2 signalnog puta u aktivaciji i funkciji dendritskih ćelija u modelu tumora dojke, JP 25-10, (2010)
9. Ekspresija p16, p53 i VEGF, i citokinski profil u malignomima kolorektalne regije, JP 09-10, (2010)
10. Uloga Galektina-3 i ST2 u aktivaciji i funkciji NK ćelija u tumorskim modelima, JP 01-10, (2010)
11. Značaj citokinskog profila pacijenata u etiopatogenezi psihotičnih poremećaja, JP 12-09, (2009)
12. Imunski fenomeni kod malignih oboljenja, JP 03-09, (2009)
13. Disfunkcija dendritskih ćelija u tumoru dojke: povezanost faktora rasta vaskularnog endotela (VEGF) sa statusom maturacije dendritskih ćelija, JP 05-06, (2006)

References

1. Pejnovic NN, Pantic JM, Jovanovic IP, Radosavljevic GD, Milovanovic MZ, Nikolic IG, Zdravkovic NS, Djukic AL, Arsenijevic NN, Lukic ML. Galectin-3 deficiency accelerates high-fat diet-induced obesity and amplifies inflammation in adipose tissue and pancreatic islets. Diabetes. 2013 Jun;62(6):1932-44. doi: 10.2337/db12-0222.
2. Volarevic V, Mitrovic M, Milovanovic M, Zelen I, Nikolic I, Mitrovic S, Pejnovic N, Arsenijevic N, Lukic ML. Protective role of IL-33/ST2 axis in Con A-induced hepatitis. J Hepatol. 2012 Jan;56(1):26-33. doi: 10.1016/j.jhep.2011.03.022.
3. Volarevic V, Milovanovic M, Ljujic B, Pejnovic N, Arsenijevic N, Nilsson U, Leffler H, Lukic ML. Galectin-3 deficiency prevents concanavalin A-induced hepatitis in mice. Hepatology. 2012 Jun;55(6):1954-64. doi: 10.1002/hep.25542.
4. Milovanovic M, Volarevic V, Ljujic B, Radosavljevic G, Jovanovic I, Arsenijevic N, Lukic ML. Deletion of IL-33R (ST2) abrogates resistance to EAE in BALB/C mice by enhancing polarization of APC to inflammatory phenotype. PLoS One. 2012;7(9):e45225. doi: 10.1371/journal.pone.0045225.
5. Jovanovic IP, Pejnovic NN, Radosavljevic GD, Arsenijevic NN, Lukic ML. IL-33/ST2 axis in innate and acquired immunity to tumors. Oncoimmunology. 2012 Mar 1;1(2):229-231.

Centre for Automatic Control and Fluid Technique

Centre for Automatic Control and Fluid Technique is the scientific-research unit of the Faculty of Mechanical and Civil Engineering in Kraljevo, dealing with fundamental, applied and development research in the area of machine and process control, robotics and fluid and fluidelectrical components and systems of drives and control, as well as direct services for industrial subjects (testing, elaboration of studies, computer programming, etc.).

Activities

Research and services for industry in the area of:

- Computer control of machines and processes
- Process robotization
- Design of hydraulic and pneumatic components and systems for drive and control
- Development of control algorithms
- Identification of parameters and processes
- Control-based improvement of energy efficiency
- Remote supervision and control

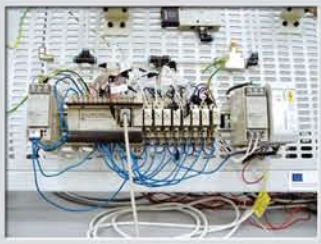
Results

- Laboratory for electrohydraulics and electropneumatics
- Table for testing sanitary security devices
- Synthesis of control algorithms for hydraulic control systems
- Synthesis of control algorithms for systems with delays
- Development of computer controlled universal hydraulic testing table
- Development of computer controlled pneumatic testing table with proportional technique
- Development of algorithms of identification for hydraulic and pneumatic systems

Resources

1. Equipment for testing the security devices of sanitary equipment
2. Equipment for determining the flow properties of pneumatic valves
3. Equipment for testing the properties of pneumatic actuators
4. Software for modelling and simulation of dynamic systems
5. Software for acquisition of data and process control



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International and national projects

International projects:

1. FP7, Transport EU-Western Balkan Network for Training, Support and Promotion of Cooperation in FP7 research activities, (2009-2010)
2. IPA, Automotive Training Centre for Central Serbia (ATC), (2011-2012)
3. IPA, Bridge technical differences and social suspicions contributing to transform the Adriatic area in a stable hub for a sustainable technological development - Adria Hub (2012-2015)

National projects:

1. Istraživanje, razvoj i primena metoda i postupaka ispitivanja, kontrolisanja i sertifikacije sanitarne armature i uređaja u skladu s međunrodnim standardima (2004-2007)
2. Zamena ventilski upravljanih sistema sistemima sa frekventnim regulatorom (2008-2010)
3. Povećanje energetske efikasnosti postrojenja za proizvodnnju toplotne energije pomoću automatkog upravljanja (2011-)
4. Razvoj energetski efikasnog postrojenja za gasifikaciju i kogeneraciju čvrste biomase (2011-)

The most important references

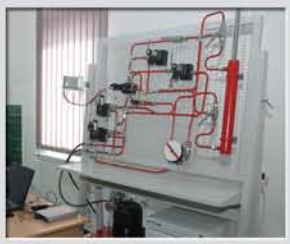
1. DJ. Dihovicni, N. Nedić, "Simulation, animation and program support for a high performance pneumatic force actuator system", Mathematical and Computer Modeling, Vol.48,(5-6), ISSN 0895-7177, pp.761-768,(2008)
2. N.Nedić, LJ. Dubonjić, V. Filipović "Design of constant gain controllers for the hydraulic control system with a long transmission line" Forschung Ingenieurwesen, Vol.75, No.4 (2011) pp. 231–242, ISNN: 0015-7899
3. V. Filipović, N.Nedić, V.Stojanović, "Robust identification of pneumatic servo actuators in the real situations" Forschung Ingenieurwesen, Vol.75, No.4 (2011) pp. 183–196, ISNN: 0015-7899
4. Milicevic, I., Slavkovic, R., Golubovic, D., Nedić, N., Radonjic, S., „Applications of pc for identification and simulation of kinematics and dynamics in process of design and analysis of industrial robots" Technics Technologies Education Management, Vol.7 (3), (2012), pp. 1201-1211 ISNN: 1840-1503
5. Vojislav Filipović, Robust switching control systems with input delay, Studies in Informatics and Control, Vol. 20, no. 4, pp. 411–420, 2011.
6. Vojislav Filipović, Global exponential stability of switched systems, Applied Mathematics and Mechanics (English Edition), Vol. 32, No. 9, pp. 1197–1206, 2011.
7. Vojislav Filipović, Robust control of systems over a communication network with queues IFAC Proceedings Volumes (IFAC-Papers Online), Vol. 14, No. 1, pp. 390–395, 2009
8. Ljubiša Dubonjić, Novak Nedić, Vojislav Filipović, and Dragan Pršić, "Design of PI Controllers for Hydraulic Control Systems," Mathematical Problems in Engineering, vol. 2013, Article ID 451312, 10 pages, 2013. doi:10.1155/2013/451312

The most important prototypes, products, services, strategies and methodologies

• Table for testing sanitary security devices

Services and trainings

• Courses in the area of maintenance and design of hydraulic and pneumatic systems
• Training for PLC programming
• Training for using the software package for modelling and simulation
• Training for using the software package for measuring and control
• Testing of hydraulic and pneumatic components


Centre for Construction and Transportation Machinery

Science-research program of the Centre for Construction and Transportation Machinery comprises research and development of new generation of construction and mining machines, transportation systems and carrier constructions in machine building. The Centre has established wide scientific and professional cooperation with other research centres performing research in this area.
The coordinator of the Centre for Construction and Transportation Machinery is Dr. Milomir Gasic, Full Professor at the Faculty. The Centre has corresponding licences for design (group 333), review and testing of the working equipment and judicial expertise in the area of mechanical technique.

Activities

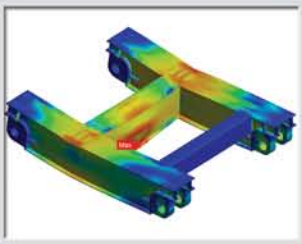
- Designing and operating the transportation, construction and mining machines
- Designing of transportation systems
- Designing of storage systems
- Developing carrier constructions of machine equipment
- Designing and operating ski-lifts and cable-cars
- Review, testing of devices and machines with professional certificates –attests on applied health and safety measures at work
- Operating the building construction, supervision of building and equipment at construction site
- Project revisions, recension, expertise and judicial expertise

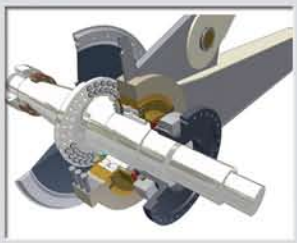
Results

- The main project of the Double girder bridge crane with the capacity of Q=16t and range L=13,65m
- The project of reconstruction of bearing arrangement and the engine of the dredger's wheel SRs 2000.32/5.0 (2x670 kW)+VR92
- The main project of mini hydropower station – mechanical part of the project
- The main project of hydraulic passenger elevator in residential-business building
- The main project of hydraulic cargo elevator for cars in residential-business building
- The main mechanical project of touristic cable car Golijska reka - Jankov kamen
- The project of cable car Krčmar–Technical control of functionality and conditions analysis
- The main project of derived condition of factory facility for storing and packing the provender
- The main project of modular metal floor-garage
- The main project of angular steel-net transmission towers 35KV-EMKV-35-U0-30

Resources

1. Software for measuring and acquisition of measured values Catman®
2. System for measuring the remaining stress by measuring tapes MST3000
3. System for testing the protection at flipping the machines of construction and transportation machinery

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International and national projects

International projects:

1. TEMPUS JEP 40069-2005 – Multidisciplinary Studies of Design in Mechanical Engineering

National projects:

1. Istraživanje i razvoj novih koncepcija veza okretne i neokretne konstrukcije mašina transportne i građevinske mehanizacije, Technology Development Project No. TR 35038
2. Istraživanje i razvoj novih generacija zuba kašike rotornih bagera i bagera vedričara, Technology Development Project No. TR 14038
3. Novo rešenje modularne metalne spratne garaže, Innovation Project No. 451-01-02960/2006-09
4. Primena rekuperativnog razmenjivača za korišćenje otpadne toplote u mehanički i hemijski abrazivnim sredinama, Primena konvektivno-zračnog rekuperatora za korišćenje otpadne toplote staklarske peći, Project No. NP EE302-70B

The most important references

1. Savković M., Gašić M., Ćatić D., Nikolić R., Pavlović G.(2012): Optimization Of The Box Section Of The Main Girder Of The Bridge Crane With The Rail Placed Above The Web Plat, Structural and Multidisciplinary Optimization (2013) Vol. 47 (2); 273-288, DOI: 10.1007/s00158-012-0813-5, (M21)
2. Savković M., Gašić M., Petrović D., Zdravković N., Pljakić R. (2012) Analysis Of The Drive Shaft Fracture Of The Bucket Wheel Excavator, Engineering Failure Analysis 20 (2012) 105–117, DOI 10.1016/j.engfailanal.2011.11.004,(M21)
3. Gašić M, Savković M, Bulatović R, Petrović R (2011) Optimization Of A Pentagonal Cross Section Of The Truck Crane Boom Using Lagrange's Multipliers And Differential Evolution Algorithm. Meccanica (2011) 46:845–853. DOI:10.1007/s1 1012-010-9343-7, (M21)
4. Savković M., Gašić M., Arsić M., Petrović R. (2011) Analysis Of The Axle Fracture Of The Bucket Wheel Excavator, Engineering Failure Analysis, 18 (2011) 433–441, DOI 10.1016/j.engfailanal.2010.09.031, (M21)
5. Gašić M, Savković M, Bulatović R (2011) Optimization Of Trapezoidal Cross Section Of The Truck Crane Boom By Lagrange's Multipliers And By Differential Evolution Algorithm (De). Strojniški vestnik – Journal of Mechanical Engineering, 57(2011)4, 304-312, DOI: 10.5545/sv-jme.2008.029, (M23)

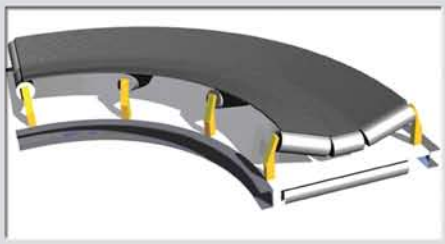
The most important prototypes, products, services, strategies and methodologies

Prototypes:
- Prototype of modular solution of steel prefabricated floor-garage

Methodology:
- New method of securing the machine from flipping – ROPS

Services:
- Control and testing of devices and machines with issuing the professional certificates – attests on applied measures of protection at work
- Elaboration of projects, project revisions, professional and judicial expertise, target group: industrial enterprises

Trainings:
- Realization of professional training programme (for following activities: elaboration and management of project documentation of machine constructions based on three dimensional models of parts and assemblies)



Centre for Thermal Technique and Environment Protection

Centre for Thermal Technique and Environment Protection operates within the Faculty of Mechanical and Civil Engineering in Kraljevo.
The Centre consists of two laboratories, Laboratory for Thermal Technique and Environment Protection and Laboratory for Noise. It was accredited by the Accreditation Body of Serbia according to the standard SRPS ISO/IEC 17025:2006.
The Centre for Thermal Technique and Environment Protection is authorized by the relevant Ministries of the Republic of Serbia for measuring the emission of pollution components in the area and measuring of noise.
The Centre has modern measuring equipment and professional staff for abovementioned activities.

Activities

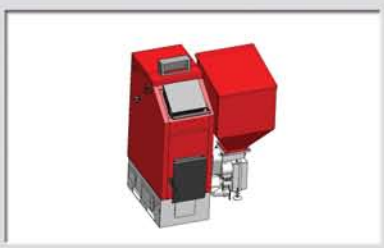
- Development of new energy efficiency systems for heat and electrical energy production
- Development of new systems for combined production of heat and electrical energy
- Substitution of gas fuel from solid ones by the methods of gasification and pyrolysis
- Increase of energy efficiency in energy production and expenditure
- Design of systems for renewable energy use (geothermal, solar, biomass energy, wind energy and water energy)
- Development of systems for environmental protection (protection of air, water, soil)
- Emission measurements and measurements for determining the energy plant balance

Results

- Development of system for increasing the energy efficiency of rotary furnaces for calcination of dolomite
- Development of systems for intensification of heat exchange in glass industry
- Increase of the utility degree of water cooling plant (cooling tower)
- Development of systems for gasification of biomass with the process of direct and counter-direct gasification
- Rationalization of the use of heat energy using physical heat of condensates
- Design of mini hydro power plants (water intake with coupled side drain)
- Development of system for increasing energy efficiency in civil engineering
- Absorption processes for eliminating the sulphur oxide

Resources

1. Computer gas analyser
2. Device for determining the solid particles concentrations
3. Digital automatic device for tracking and calculation of thermodynamic parameters of flue gases
4. Analytical scales

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International projects

1. Norveška pomoć Srbiji za sprovođenje politike energetske efikasnosti, izradu energetskog bilansa na lokalnom nivou i primenu Kjoto protokola, Project No. 2060336, (2006-2009)
2. Studija o izgradnji kapaciteta Republike Srbije u oblasti strateškog planiranja u energetskom sektoru, Project No. 2070413, (2008-2010)
3. Norveška pomoć Srbiji u uvođenju nove energetske politike i uspostavljanju energetskog planiranja na lokalnom nivou, Project No. 2070405, (2008-2009)
4. Energetska efikasnost u Srbiji, World Bank Project, 2009.

National projects

1. Razvoj energetski efikasnog postrojenja za gasifikaciju u kogeneraciju čvrste biomase, Reference No: TR 33027, (2011.-2014.)
2. Povećanje energetske efikasnosti postrojenja za proizvodnju toplotne energije pomoću automatskog upravljanja, Reference No: TR33026, (2011.-2014.)
3. Razvoj i primena rekuperativnog razmenjivača toplote u mehanički abrazivnim sredinama, Kraljevo 2002.

Projects with industry

1. Razvoj postrojenja za bojenje i sušenje proizvoda, Reference No: 232024, User: Company for Manufacturing of Metal Equipment "EKONOM" d.o.o. Ušće,Project type: Research-Development-Demonstration (R, D and D) (2005.-2007.)
2. Korišćenje geotermalne energije toplotnom pumpom za grejanje zavoda zavoda za specijalnu rehabilitaciju „Agens" u Mataruškoj Banji, Project No: 300027, User: Clinic for Specialized Rehabilitation „Agens" in Mataruška Banja (2003. -2005.)
3. Primena konvektivno-zračnog rekuperatora za korišćenje otpadne toplote staklarske peći, Project: EE 302-70B, User: „Bela stena" Baljevac on Ibar, (2001.-2002.)

The most important prototypes, products, services, strategies and methodologies

Patents:

• Convective heat recuperator

Prototypes and products:

• Heat exchanger (gas-gas)
• Recuperation heat exchanger in glass industry
• The direction reactor for biomass gasification

Services:

• Service of measuring the emission of burning products
• Elaboration of material and heat balances of energy facilities and plants for environmental protection (air protection)
• Elaboration of energy revisions in civil engineering
• Elaboration necessary for studies mini hydro power plant

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АКРЕДИТОВАНА ЛАБОРАТОРИЈА ЗА ИСПИТИВАЊЕ
SRPS ISO/IEC 17025:2006

Centre for Railway Vehicles

Centre for Railway Vehicles is the scientific-research unit of the Faculty of Mechanical and Civil Engineering in Kraljevo. The main objectives of the Centre are permanent development of teaching process and scientific-research work, as well as the continuation and promotion of cooperation with industry in the area of railway machine engineering and construction testing.

Activities

- Design, construction and calculation of railway vehicles
- Design, construction and calculation of machine constructions and elements
- Experimental testing of railway vehicles
- Experimental testing of machine constructions
- Consulting services and expertise in the area of railway machine engineering and mechanical constructions

Results

- Centre for railway vehicles has many years of experience in the area of design, calculations and testing of railway vehicles
- Large number of projects in the area of experimental testing of railway vehicles and their components according to valid international standards UIC, TSI, EN, ERRI, etc.
- The Centre was engaged in several projects related to the solving of very complex problems in technology of railway vehicles transportation
- The Centre participated in several international projects and was coordinator of one FP7 project
- Important results were achieved by the Centre through realization of great number of national projects under the auspices of the relevant Ministry
- Among the most significant results, its research-scientific work in the area of railway machine engineering stands out
- The Centre members published great number of scientific papers in relevant international journals and at scientific-professional conferences

Resources

1. Equipment and resources for testing within the certification of railway vehicles:
- Static testing of railway vehicles
- Testing of torsional stiffness of railway vehicles
- Testing of railway vehicles brakes in place
- Testing of railway vehicles in driving
- Dynamic testing of railway vehicles in a crash
- Dynamic testing of railway vehicles in driving
- Testing of elements of suspension of railway vehicles for fatigue

2. Equipment and resources for testing constructions:
- Deformation calculation
- Measurements of acceleration and vibration
- Motion
- Distance
- Speed
- Force and moments
- Temperatures

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International projects

1. FP6 projekat "Regional railway transport research and training centre foundation" , Project No: TSA4-CT-2005, Contract Number O15992, (2005 – 2007)
2. FP7 project "Transport EU Western Balkan Network for Training, Support and Promotion of Cooperation in FP7 research activites Regional railway transport research and training centre foundation", Project No: TransBonus, FP7-SST-2007-RTD-1, Project number 218699 , (2008 – 2010)
3. FP7 project "Strengthening Railway Vehicles Centre of Faculty of Mehanical Engineering Kraljevo – SeRViCe" , Project No: 206929 , (2008 – 2011)

The most important references

1. Dragan Petrović, Milan Bižić, Improvement of suspension system of Fbd wagons for coal transportation, Engineering Failure Analysis, Volume 25 (2012), 89–96, doi:10.1016/j.engfailanal.2012.05.001.
2. Mile Savković, Milomir Gašić, Dragan Petrović, Nebojša Zdravković, Radmila Pljakić, Analysis of the drive shaft fracture of the bucket wheel excavator, Engineering Failure Analysis 20 (2012), 105–117, doi:10.1016/j.engfailanal.2011.11.004.
3. Dragan Petrovic, Milan Bizic, Mirko Djelosevic, Determination of dynamic sizes during the process of impact of railway wagons, Archive of Applied Mechanics, Volume 82, Number 2 (2012), 205-213, doi: 10.1007/s00419-011-0549-5.
4. Dragan Petrović, Milan Bižić, Milomir Gašić, Mile Savković, Vladeta Gajić, Increasing the Efficiency of Railway Transport by Improvement of Suspension of Freight Wagons, Promet – Traffic&Transportation, Vol. 24, 2012, No. 6, 487–493, doi:10.7307/ptt.v24i6.1202.
5. Milan Bizic, Dragan Petrovic, Zoran Djinovic, Milos Tomic, Experimental Testing of Impact of Railway Wagons, Experimental Techniques, July 2012, doi:10.1111/j.1747-1567.2012.00850.x. (in press)

The most important prototypes, products, services, strategies and methodologies

Patents:

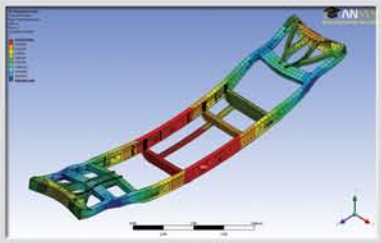
- Device for welding the leaf springs, Patent number MP-2008/0068, Intellectual Property Office, the Republic of Serbia, Belgrade, 2008, Patent application published in "Intellectual property gazette " 6/08

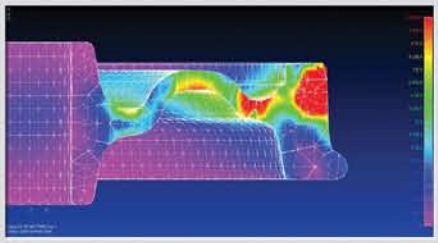
Developed methodologies:

- Static examination of railway vehicles
- Examination of torsional stiffness of railway vehicles
- Testing of railway vehicles brakes in place
- Testing of railway vehicles in driving
- Dynamic testing of railway vehicles in a crash
- Dynamic testing of railway vehicles in driving
- Testing of elements of suspension of railway vehicles for fatigue

Testing in accordance with previous methodologies are mandatory in the process of certification of railway vehicles according to valid international standards and regulations.

The Centre also offers consulting services, trainings, measurements, attesting and product development in the area of railway machines engineering and construction testing for the industry.





Laboratory "3D Impulse"

Laboratory "3D Impulse" deals with the application of digital technologies for rapid product development. The main technologies applied by the Laboratory are selective laser sintering and three-dimensional optical scanning. Selective laser sintering allows production of functional prototypes, tools and small series of metal and plastic products. Three dimensional optical scanning allows the quality control and reverse engineering.

Laboratory "3D Impulse" was established within the projects supported by EU, the City of Kraljevo, Regional Chamber of Commerce in Kraljevo and University of Bologna, with the support of the City of Čačak and non-governmental organisation USAID with common goal to develop scientific-research laboratory to facilitate development of new products in Serbian enterprises.

Activities

- Rapid product development
- Rapid prototyping by the method of selective laser sintering of plastic (polyamide, alumide, carbamide, etc.)
- Rapid prototyping by the method of selective laser sintering of metal (stainless steel, tool steel, aluminium, etc.)
- Rapid development of products made of plastics and metal by the method SLS (products with complex geometry, individual and small series)
- Rapid tooling by SLS method
- 3D scanning with the scanner Atos compact scan 5M
- Quality control of the product geometry
- Reverse engineering

Results

- Realization of EU RSEDP2 project: "Inovativni menadžment za nove proizvode-IMPuls"
- Production of 100 prototypes/products/tools made of plastics and metal for small and medium enterprises of Raska, Rasina and Moravica District
- 300 3D models - 3D scanning of objects and reverse engineering
- Prototyping for European automobile industry
- Manufacturing of tools for injection of plastics with spiral cooling channels

Resources

1. Machine for direct laser sintering of metal - EOS EOSINT M280
2. Machine for direct laser sintering of plastics - FORMIGA P100
3. 3D scanner – Atos compact scan 5M
4. Solid Works, geometry modelling
5. Analysis, calculations and FEM analysis

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International projects

1. EU project from RSEDP2 Call: „Inovativni menadžment za nove proizvode-IMPuls"
2. USAID project „Opremanje centra za savremene proizvodne tehnologije na Mašinskom Fakultetu u Kraljevu"

Laboratory "3D Impulse" was established as the result of the project "Innovative management for new products" (known under official acronym "IMPuls") realized within the Regional Socioeconomic Development Program. The aim of the project was establishment of technological base for support of new product development that would be useful for both small and medium enterprises in Serbia. First task of the project was the promotion of the concept of rapid product development as well as relevant technologies introduced by this project. With that aim, technologies of selective laser sintering of plastics and metal, and technologies of 3D scanning were presented in 512 small and medium enterprises of Raski, Rasinski and Moravicki Districts. This was followed by the mapping of innovativeness and competitiveness of 316 enterprises that showed interest for application of rapid product development methods. Based on the assessment of market capacity obtained in this way, 107 enterprises were selected for free-of-charge services of the Centre. After the training for engineers and managers for application of new technologies for rapid product development, innovation management, innovation marketing and funding, development of 308 CAD models was supported and 121 prototypes of improved products were produced. The project was realized in the period 9.3.2011- 9.6.2013 and the total value of the project was 966.624,00 EUR, out of which 90% was provided by the European Commission and 10% by the contributions of the Cities of Kraljevo and Čačak and other local authorities from the Districts where the project is realized.

Further support to the Laboratory "3D Impulse" was provided by the NGO organisation USAID with the programme "USAID Sustainable Local Development Project". This project provided equipment for the multimedia presentation room and laboratory website.

After the project completion, the services of Laboratory "3D Impulse" will be commercially available to all users, including enterprises, individual designers, scientific institutions and others in the country and abroad engaged in the development and design of products.

The most important prototypes, products, services, strategies and methodologies

Production of 100 prototypes, products and tools for small and medium enterprises involved in the IMPuls project:

- Medical equipment
- Automobile industry
- Moulds
- Home gallantry
- Lights and other product from the production programs in local enterprises

Rapid prototyping and tooling for enterprises outside the territory of Serbia:

- Tool for injection of plastic part of the brake on BMW
- Prototypes made of polyamide for Hella
- Prototypes for ski industry

Services:

- Rapid prototyping/product development/tooling by the method of selective laser sintering of metal and plastics
- 3D object scanning
- Quality control of product geometry
- Reverse engineering

Laboratory for Advanced Materials SASA, Department for Amorphous Systems

Department for Amorphous Systems of the Joint Laboratory for Advanced Materials SASA at the Faculty of Technical Sciences in Čačak was formed in 1991. Until now, it has realized successfully 10 national scientific-research projects (seven fundamental and three development projects) funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia. At the same time, a series of international projects with renowned international scientific organizations is realized:

- Institute "A.A. Bajkov" Russian Academy of Science in Moscow
- Institute for Solid State and Materials Research in Dresden, Germany
- Institute of Physics Chinese Academy of Sciences in Beijing
- Institute for Microelectronics of Slovak University of Technology in Bratislava
- Institute for Nano-materials of National Academy of Sciences of Ukraine in Kiev
- Department for Mössbauer Spectroscopy at the University of Indore, India
- Institute of Chemical Technologies and Analytics at the Vienna University of Technology
- FOTEC GmbH Wiener Neustadt, Austria

Activities

- Physics, technology and application of amorphous and nanocrystalline materials
- Synthesis and technology of producing multi-component amorphous massive alloys based on iron, amorphous and nanocrystalline powder
- Promotion of research in the area of physics and technology of advanced materials (organization of the international scientific events in the materials science and engineering in cooperation with Serbian Academy of Sciences and Arts: TEOTES, FITEM, ETRAN, YUCOMAT, ACA)

Results

With the purpose of realization of the projects, new experimental methods are being developed in order to gain and study the properties of amorphous and nanocrystalline metal alloys for application in advanced technologies:

- development of magnetic sensors based on magnetoresistance (MR) and magnetoimpdance (MI) effect
- thermo electrical measurements of amorphous and nanocrystalline ribbons and powders in protection atmosphere
- dilatometric measurements of amorphous and nanocrystalline ribbons
- examining of absorption and desorption of hydrogen in metal powders by measuring the electrical resistivity of absorbent

More than twenty doctoral dissertations and master thesis were realized in the Laboratory

Resources

1. Histereziograf BROCKHAUS Tester MPG 100 D
2. Planetary Mill BALL MILL Retsch PM 100
3. POLYWAR met microscope, LEICA camera and software
4. Thermovision system IR Flex CamT INFRARED SOLUTION
5. LCR HI Tester 3532 HIOKI
6. Faraday balance SARTORIUS 2462




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International and national projects

International projects:
1. Bulk Soft Magnetic Materials, IFW Dresden
2. Kinetics of Glass Transition of Bulk Metallic Glasses, IP CAS Beijing
3. Magneto PIM Fabrication of Complex Shaped, Magnetically Soft and Hard Parts Using PIM, Fotec Wiener Neustadt

National projects:
1. Directed analysis, structure and properties of multifunctional materials
2. Reconstruction of cutting teeth of the bucket wheel excavator SchRS1600(G3)

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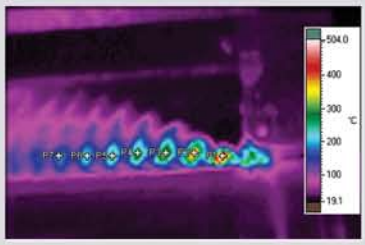
The most important prototypes, products, services, strategies and methodologies

- Recording the magnetic properties of soft magnetic materials up to 10 kHz
- Recording the thermomagnetic and thermoelectric material properties up to 700 0C
- Mechanochemical synthesis of ferromagnetic and ceramic powders
- Quantitative (stereological) microstructure analysis of materials
- Thermovision recording and testing of the process and materials (static and dynamic)



Лабораторија
Машине
Погони
Регулација

Laboratory for Electrical Machines, Drives and Regulations LEDR- Lab

Laboratory for Electrical Machines, Drives and Regulations performs laboratory exercise from the following subjects:

- Electrical machines
- Electromotor drives
- Regulation of electromotor drives

Laboratory for Electrical Machines, Drives and Regulations of electromotor drives is the part of the Faculty of Technical Sciences in Čačak. Exercises on programs of basic studies of Electro-Energy, Computer Engineering and Mechatronics and master studies of Remote Control are carried out in the Laboratory. Moodle system for e-learning with course materials is also available to students. In order to attend these courses, students need to send a request after which they receive the password to log in to the system.

Activities

- Performing laboratory exercise and experiments at study programs of Electro-Technical and Computing Engineering at the Faculty of Technical Sciences in Čačak
- Providing services of laboratory testing of motors and drives for industry
- Modernization of scientific and education process by introducing new procedures and methods of testing electric machines
- Modelling, design and testing of new prototypes of machines and devices
- Organization of vocational lectures, trainings, symposiums and conferences on the topic of electric machines and drives

Results

A series of laboratory exercises:

- Electrical machines - http://www.empr.ftn.kg.ac.rs/elmas.html
- Electromotor drives - http://www.empr.ftn.kg.ac.rs/elpog.html
- Regulation of electromotor drives - http://www.empr.ftn.kg.ac.rs/regpog.html

Development of new measuring apparatuses and devices:

- Apparatus for standard testing of asynchronous and direct current motors
- Apparatus for measuring the moment of the motor and determining the mechanical characteristics
- Apparatus for testing of stepper motors
- Educative panel with automatic elements
- Apparatus and software for determining of the energy efficiency category and three-phase asynchronous motors with the power up to 7,5 kW
- Electromagnetic brake for controlled load of electrical motors up to 7.5kW
- Construction of prototypes of four-axis numerically operated machine for built-up welding

Resources

- The cabinet with contractor equipment
- The cabinet for managing the sub-synchronous thyristor cascade
- Combination of direct current machines and synchronous generator
- Educative panel with automatic elements
- Measuring and acquisition system PCMCI 6036E
- Signal conditioners
- Measuring and acquisition device NI USB6008/6009
- Precise digital multimeter-calibrator
- Systems for speed measurements
- Electromagnetic brake for controlled load
- Measuring and acquisition system cRIO 9074 with electrical motor modules up to 7.5kW
- The cabinet for two-zone regulation of the speed of direct current motor
- Thyristor inverter
- Apparatus for testing stepper motors
- Measuring and acquisition system cDAQ-9178 with modules
- Educative panel with automatic elements
- Measuring and acquisition system PCI 6013
- Measuring suitcase for energy measurements
- Digital oscilloscope TEKTRONIX
- Micro-control development surroundings: Atmel, PIC, Texas instruments
- Software: LabVIEW, Matlab, SoMachine





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International and national projects

International projects:
1. Master in Remote Control, WUS AUSTRIA MSDP project, (2009 - 2010)

National projects:
1. Primena višeparametarskih simulacionih modela radi analize energetske efikasnosti ponašanja tipskih školskih zgrada, Project Coordinator - Faculty of Technical Sciences in Čačak, project within National Energy Efficiency Programme EE813-200A, (2003-2006)
2. Razvoj i primena logističkih sistema za korišćenje biomasa i otpadnog drveta kao energenata u domaćinstvima i industriji, Project Coordinator - Faculty of Technical Sciences in Čačak, project within National Energy Efficiency Programme EE–243005A, (2006-2009)
3. Nova tehnička rešenja i trendovi u izvođenju nastave iz grupe predmeta elektrotehničke struke, within the Vocational Education and Training Reform Programme and European Agency for Reconstruction (CARDS project).
4. Projektovanje primene propisa EU o energetskoj efikasnosti kućnih aparata, Project Coordinator - Faculty of Technical Sciences in Čačak, project within National Energy Efficiency Programme EE 18018, (2008-2010)
5. Istraživanje, razvoj i primena programa i mera energetske efikasnosti elektromotornih pogona, project contact person - M. Bjekić, Project Coordinator - Faculty of Technical Sciences in Čačak, the Programme for Research and Technological Development of the Ministry of Education, Science and Technological Development, area of Energy and Mining, project number TR33016, (2011-2014)
6. Projektovanje i razvoj prototipa četvoroosne numerički upravljane mašine za navarivanje, Project Coordinator - Innovation centre of Mechanical Faculty Belgrade, Programme For Innovation established for 2011 by the Ministry for Education, Science and Technological Development, project number 451-03-00605/2012-16/25

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The most important prototypes and services

• Design and development of prototype of four-axis numerically operated machine for built-up welding

• Laboratory offers commercial services for testing of electrical machines, design and construction of drive machines. Target groups are companies whose activities are production, transportation and exploitation of electrical energy, especially those dealing with electro mechanical energy transformation.

Laboratory E – Lab

E-Lab is hypermedia laboratory with specially adjusted environment for different types of advanced electronic communication. Laboratory is equipped with the newest system for video-conferencing, exclusive computer and communication equipment and has outstanding ergonomic design.
E-Lab was established within the EU TEMPUS JEP project "Sc. Curriculum in E-Learning", with significant support from the Faculty of Technical Sciences. One of the main objectives of this laboratory is to provide the ambience and technological logistics for the realization of online education and via video-conferencing system. In that sense, within E-Lab there is the System for e-learning based on Moodle environment.
Via e-learning system, teaching activities are realized remotely and so far five student generations on study program Master for e-Learning have had an opportunity to benefit from it.

Activities

- Modernization of educational activities by promoting regional and international cooperation through linking the institutions and individuals as well as through information exchange in the area of e-learning and remote education
- Development and implementation of e-courses
- Design of e-learning infrastructure
- Organization of vocational lectures, trainings, symposiums and conferences on the topic of e-learning and remote education
- Promotion of remote education through cooperation and participation in national, regional and international events of competitive, promotional or commercial character
- Promotion and launching of innovative and creative professional and research solutions
- Development of remote experiments with the aim to modernize the engineering education

Results

- Development of course for e-tutors (in cooperation with the University of Macerata)
- Training for WBC-VMnet Consortium representatives for application of tools and technologies in education
- Establishment of the e-learning system at the Faculty of Information Technology in Podgorica
- Organization of the seminar "Methods, procedures and tools for e-grading" for teaching staff of elementary and secondary schools.

Resources

1. Videoconferencing system VCON HD 3000, that allows remote transfer of videos and images, with support to four remote participants, streaming of multi-media contents, lectures recording and other advanced options
2. Ten modern networked notebook computers with possibility to connect additional mobile users
3. Capacity for business solutions, such as business meetings, presentations, corporate trainings, etc.
4. E-learning platform

Videoconferencing equipment in E-Lab will be used for other activities of the Faculty as well that will be organized remotely: lectures, presentations, experiments, and meetings with partner faculties




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International and national projects

1. JEP - 41016 - 2006 M.Sc. Curriculum in E-Learning (Tempus) 2007-2009.
2. Tempus DL@WEB "Enhancing the quality of distance learning at Western Balkan higher education institutions", 2010-2013
3. WUS MSDP project "Master in Remote Control", 2009 - 2010.
4. WUS MSDP project "MSc in eLearning: e- moderating Module", 2010–2011.
5. Infrastruktura za elektronski podržano učenje u Srbiji. Project supported by the Ministry of Science, Education and Technological Development of the Republic of Serbia, 2011 - 2014.

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The most important prototypes, products, services, strategies and methodologies

- Ensuring the quality of educational software (courseware) using the methodology of quality grid, developed in cooperation with association EPPROBATE
- Development and implementation of electronic courses and electronic tests
- Establishment and maintenance of e-learning infrastructure (server, learning platform, supporting software, protection)
- Consulting services in the development of educational software
- Services of educational software evaluation by the certified reviewers

Centre for Economic Research at the Faculty of Economics in Kragujevac

More than half of a century, Faculty of Economics in Kragujevac has positioned itself as a respectable institution, in scientific, research and consultant sense. As a high-educational institution, Faculty provides necessary human resources in the fields of general economics and management, offering the opportunity for bachelor, master and doctoral studies' enrolment. Through its scientific and educational activity, Faculty strives to build up leading position in the country and region, giving its contribution to the development through education of economists and managers, as well as through impelling scientific and research work within fundamental and applied research. In striving to put the cooperation with national and international industry, organizations and institutions to a higher quality level, in 2008 Faculty of Economics created the Centre for Economic Research and brought the Act on its Organisation and Activities. The main objectives of the Centre include realization of basic, applied and development scientific research, organizing trainings and providing professional consultant services. Great contribution to the activities and development of the Centre is made by all Faculty employees, especially professors and associates, with their significant scientific-research results.

Activities

- Realization of basic, applied and development scientific research
- Provision of expert and consultancy services in various subareas of the economics and management, based on the concluded contracts with third parties
- Innovating knowledge
- Organization of trainings and testing in the area of registered activities, realization of courses and workshops
- Elaboration of projects
- Providing opportunities to all interested parties in scientific and wider social community to gain general or wider knowledge from economics and management
- Networking and intensifying the cooperation with national enterprises, organizations and institutions
- Organization of national and international scientific events, seminars and conferences
- Cooperation with foreign universities within international scientific projects
- Other related activities and projects, in accordance with the available resources of the Centre for Economic Research.

Results

- Centre for Economic Research, in cooperation with the Publishing Centre of the Faculty of Economics University of Kragujevac, contributes to fortifying and development of publishing at the Faculty
- Centre for Economic Research in cooperation with the Publishing Centre also organizes traditional national scientific events and international conferences at the Faculty of Economics University of Kragujevac
- Centre for Economic Research of the Faculty of Economics University of Kragujevac encourages: participation in projects; publishing of the scientific papers in national and international magazines, paper proceedings of national and international conferences and scientific events; publishing of school books and monographs, etc.

Resources

1. Numerous library and information resources of the Faculty of Economics University of Kragujevac which are available in the Centre for Economic Research and described at official Faculty's web-site: http://www.ekfak.kg.ac.rs/biblioteka




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International and national projects

International projects:

1. The Emergence of Southern Multinationals and their Impact on Europe, ISCH COST Action IS0905, (2011-2014)

National projects (2011 - 2014):

1. Primena savremenih metoda menadžmenta i marketinga u unapređenju konkurentnosti preduzeća u Srbiji u procesu njene integracije u EU, 179062
2. Istraživanje kogeneracionih potencijala u komunalnim i industrijskim energanama Republike Srbije i mogućnosti za revitalizaciju postrojenja, 42013
3. Unapređenje javnih politika u Srbiji u funkciji poboljšanja socijalne sigurnosti građana i održivog privrednog rasta, 47004
4. Istraživanje i razvoj platforme za naučnu podršku u odlučivanju i upravljanju naučnim i tehnološkim razvojem Srbije, 47005
5. Izazovi i perspektive strukturnih promena u Srbiji: strateški pravci ekonomskog razvoja i usklađivanja sa zahtevima EU, 179015
6. Inteligentni sistemi za razvoj softverskih proizvoda i podršku poslovanja zasnovani na modelima, 44010
7. Preklinička ispitivanja bioaktivnih supstanci (PIBAS), 41010
8. Razvoj finansijskih institucija i tržišta u Srbiji -mikroekonomski i makroekonomski pristup, 179005
9. Primena biomedicinskog inženjeringa u pretkliničkoj i kliničkoj praksi, 41007
10. Strategijske i taktičke mere za rešavanje krize konkurentnosti realnog sektora u Srbiji, 179050
11. Aproksimacija integralnih i diferencijalnih operatora i primene (174015)

Centre's services

The Centre for Economic Research offers following educational services:

1. Marketing - Marketing skills, Client concern (CRM), Market research, Positioning of a brand, Creation of promotional campaigns
2. Management - Strategic and business plan, How to become successful manager?, From idea to profit, Leadership, Team work, Projects management
3. Human resource management and communication - Motivation of the employee, Compensational system, Business communication and Presentational skills
4. Finance and accountancy - Finance for beginners, Analysis of financial reports, Managing cash and demands, Credit financing, Controlling
5. International business dealings - Stock exchange, Customs, Export business, Internationalization of business
6. Skills and knowledge in computer science - Web marketing, Excel, Word, Access..., ECDL
7. Within consulting services, the Centre for economic research offers to its clients the following:
   - Help in developing strategic plans
   - Development of qualitative business plans
   - Evaluation of company and capital's worth
   - Development of pre-investment and investment studies
   - Creating of promotional strategies
   - Market research
   - Offering professional advice on development of corporation image
   - Financial report analysis and tracking of financial performance
   - Development of compensational systems
   - Project writing for various purposes and aims.

The most important patents and other tools for research valorisation

• In 2012, with the significant support of the Centre for Economic Research and Publishing Centre, professors and associates of the Faculty of Economics in Kragujevac published total of 208 papers in the following categories:

- M14 - 12 papers
- M71 - 4 dissertations
- M53 - 10 papers
- M61 - 2 references
- M63 - 29 references
- M64 - 2 references
- M41 - 1 paper
- M22 - 1 paper
- M23 - 31 papers
- M24 - 20 papers
- M33 - 41 papers
- M34 - 3 papers
- M52 - 18 papers
- M42 - 1 paper
- M43- 8 papers
- M44 - 4 papers
- M45 - 1 paper
- M51 - 19 papers
- M66 -1 reference



Centre for Lifelong Learning, Student Counselling and Career Development

Centre for Lifelong Learning was founded on 17.06.2010 at the Faculty of Economics University of Kragujevac within the TEMPUS project "Development of the Lifelong Learning Framework in Serbia". As the result of the project "Student Counselling and Career Guidance" within Democracy Outreach Programme, funded by the Embassy of USA in Serbia, it expanded its activities to student counselling and career guidance. Centre for Lifelong Learning, Student Counselling and Career Development has the aim to make higher education more accessible to young people, as well as to help students gain knowledge and skills necessary for their involvement in business practice. Specific goals of the Centre are: to help students overcome barriers to fulfil their assignments, gain new knowledge and develop their expertise and practical skills; to make higher education more accessible to young people with disability; to link former students with Faculty/University; to allow gaining of general knowledge that is not tightly connected to a certain professional field, but that is specific and directly applicable at work place; to raise awareness about the importance of free and unobstructed access to higher education for everyone.

Activity

- Development, definition and realization of trainings, courses and modules in lifelong learning area
- Support to development of small and medium enterprises through provision of special programme of trainings for entrepreneurs
- Organization of seminars and conferences devoted to promotion of Centre's activities and attracting new participants
- Preparation and organization of workshops, courses and trainings for students and employees at faculties of University of Kragujevac.
- Coordination and cooperation with foreign universities within international projects in the area of lifelong learning
- Provision of consulting to institutions/enterprises in terms of knowledge that would be most adequate for them having in mind their activity scope, technology and market trends
- Development of new modules of learning based on ICT
- Provision of necessary information, support and assistance to students

Results

- The Centre organized two international conferences on lifelong learning, where both national and international experts held presentations and discussions, as well as 13 round tables
- The Centre carried out three researches on employers' needs for the knowledge and skills of their employees
- The Centre developed methodology for training programmes of 20-30 hours
- Working on institutionalization of lifelong learning system at University of Kragujevac, the Centre participated in defining the Strategy for Lifelong Learning adopted by the University
- The Centre participated in the elaboration of the Strategy for Development of Education by 2020
- The Centre published more than 10 publications on lifelong learning
- The Centre started the project"Student Counselling and Career Guidance" within Democracy Outreach Programme, funded by the USA Embassy in Serbia and expanded its activities on student counselling and career guidance
- In the area of student counselling and career guidance, the Centre organized two workshops on academic writing and time management for students, as well as seven debates on lifelong learning, employment, study visits, disabled persons in higher education and entrepreneurship.

Resources

1. www.delfis.kg.ac.rs
2. Computer laboratory: 20 computers
3. Video-conferencing room
4. Software SPSS for statistical data processing: licence for 45 users




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International and national projects

International projects:
1. 145010-TEMPUS-2008-RS-JPHES „Development of Lifelong Learning Framework in Serbia – Razvoj sistema celoživotnog učenja u Srbiji"
2. Project „Student Counselling and Career Guidance" within Democracy Outreach Programme, funded by the USA Embassy in Serbia

National projects:
1. Project „Obrazovanje za sve – unapređenje dostupnosti i kvaliteta obrazovanja dece iz marginalizovanih grupa" in cooperation with the Ministry of Education, Science and Technological Development of the Republic of Serbia, funded by OEBS and UNICEF

Developed courses/trainings

1. Creation of entrepreneurship, consisting of following subjects: Identifying the business opportunities, Leadership and Team Building, Acquisition of key resources, Management of enterprises growth – the course is intended for managers, employees interested in promotion of their skills, unemployed with entrepreneurial ambitions, graduated students, entrepreneurs, government employees and representatives of local authorities
2. Regional development includes following subjects: Regional analysis and strategic planning, EU funds, Institutional framework of regional development, Project management – the course is intended for graduates, students, representatives of local and republic authorities
3. Managerial Skills for Successful Business includes following subjects: Identification of business opportunities, Entrepreneurial leader skills, Creating the business plan – guidelines for writing and characteristics, Planning and formulating strategies – the course is intended for managers, employees interested in promotion of their skills, unemployed with entrepreneurial ambitions, government employees and representatives of local authorities
4. Development of Project Proposals, consisting of following topics: Project proposal writing, Elements of the project, Problem analysis and its tools, Definition of project objectives and results, Difference between general and specific objectives, Approval of project funding and donor's expectations, Logical framework matrix for EU project, Preparing good quality project budget – the course is focused on students of all faculties of the University of Kragujevac
5. Gaining Entrepreneurial Skills includes following topics: Initiating and running the business in turbulent environment, Entrepreneurial business skills, Personal skills of negotiation, leadership, right decision making in business, Project management, Planning, management and organisation of people, Marketing and organization of marketing, Sales and its organization, Finances and investments – the course is designed for the business people, unemployed with entrepreneurial ambitions and students of all professional profiles
6. Entrepreneurship and Project Management in Modern Business, includes following subjects: Project management, Analysis and data visualization, Data and knowledge management, E-business, Software development, Theoretical and methodology bases for elaboration of business plan, Using financial reports for business decision making, Start-up program for small and medium enterprises – the course is intended for graduated students, economists, engineers
7. Reengineering of Business Process in Modern Enterprise, consisting of following subjects: Modelling and system simulation, Components and automatization systems, SCADA systems and programmable logical controllers, Production strategies in modern enterprises (small and medium ones), Business risks and strategies on risk management in modern enterprises, Modern concepts of calculations and expenses management - the course is for graduated students, economists, engineers

The most important prototypes, products, services, strategies and methodologies

- Training programmes
- University strategies for development of lifelong learning
- Moodle platform for e-learning
- TNA analysis (training needs analysis)
- Monograph study: "New knowledge, skills and competences"
- Monograph study: "Development and application of lifelong learning concept"



Modernization of WBC universities through strengthening of structures and services for knowledge transfer, research and innovation

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Tempus

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