ANNUAL REPORT
2013

Technical University of Košice
Faculty of Mechanical Engineering

ANNUAL REPORT 2013

Editors: Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
prof. Ing. Jozef Bocko, CSc.

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PREFACE

The mission of the faculty is in the first place to develop science and engineering, ensure dissemination of knowledge by teaching students in the branch of machinery and contribute to the intellectual and economic development of Slovakia. We have excellent and gifted students with perspective of bright professional career and good perspectives to find interesting work position on the job market. The faculty faces a lot of challenges: integration processes in Europe and world, problems with support of research and innovations, competitiveness and economic crises. The aim of the faculty is to strengthen its position of important institution of science and development between educational organizations of university type. Management of faculty has ambition to create better conditions for scientific activities of our employees and students, cooperation with practice as well as exploitation of these workplaces and laboratories in educational process. Building of excellent workplaces and laboratories is supported by grant projects and resources gained from cooperation with industry. Significant source of finance for faculty development are the structural projects of European Union. Important moment in the faculty development was acceleration of building of joint laboratories and research workplaces with prominent foreign and domestic companies.

Distinguished success have reached employees and students of faculty on the 20th International Engineering Fair on the presentation of outputs of technical universities TECHNOFÓRUM 2013. The faculty is a place where solutions with high innovative potential comparable with the newest world trends are created with active contribution of young people. In many cases such solutions were “hidden” only in diploma and doctoral theses or in other outputs in university archives. Presentation of similar results on the international fair can reveal their potential for practical using. Faculty of Mechanical Engineering of the Technical University of Košice presented on the fair several showpieces made by young researchers and students of faculty: three cars, robots for services and entertainment, program products for optimization and processing of data from measurements, rehabilitation shoes, clutch, compensation means for biomedical purposes, series of scientific publications for innovation of products and so on.

In the competition of the international fair we had 6 showpieces and the result of evaluation was very encouraging for us. From the 6 main prizes we have got one prize for rehabilitation shoes Smiling. We were the only winner from the community of 12 universities in the frame of TECHNOFÓRUM 2013.

Our exposition was interesting and it has been seen by many professionals and general public. We are pleased we have invited in our stand minister of economy, state secretary of ministry of economy, state secretary of ministry of education as well as presidents of two important professional associations – Machine Industry Association of Slovakia and Automotive industry Association of Slovak Republic.

Scientific activities of the faculty are based on solution of Operation projects for research and development, grant projects and projects on demand from technical practice. The results of these activities are concluded by their realization in industrial practice and they serve as source of ideas for publication activities as well as activities in the area of patents.

The results of publication activities are given in this Annual report. The quality of outputs is concluded by responses and citations as well as by fulfilling of hard

criterions for habilitations and inaugurations of professors on our faculty.
The activity of doctoral students on publication and research activities is very positive and it leads to creation of new generation of perspective promising scientists.

As a dean of the faculty I am expressing my thanks to all employees of the faculty for their high commitment in solution of their tasks and for the results they reached in different areas of their work.

In Košice, the 7th April 2014

Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
Dean of the Faculty

MANAGEMENT OF THE FACULTY

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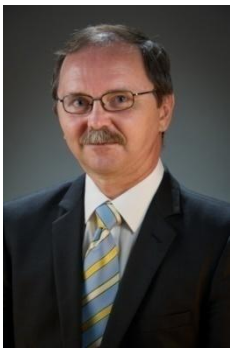
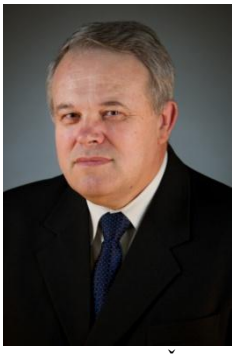
DEAN OF THE FACULTY

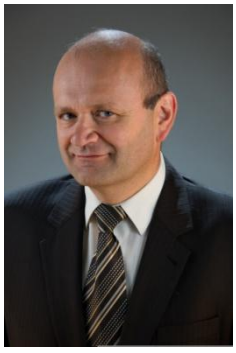
Dr.h.c. prof. Ing. Miroslav BADIDA, PhD.
VICE - DEAN RESPONSIBLE FOR DEVELOPMENT, EVALUATION AND PROJECTS COORDINATION



prof. Ing. Jozef BOCKO, CSc.
VICE - DEAN RESPONSIBLE FOR SCIENTIFIC - RESEARCH ACTIVITIES, FOREIGN RELATIONS AND COOPERATION WITH PRACTICE



prof. Ing. František GREŠKOVIČ, CSc.
VICE - DEAN RESPONSIBLE FOR STUDY IN 2nd A 3rd DEGREE AND INFORMATICS



prof. Ing. Ervín LUMNITZER, PhD.
CHAIRMAN OF ACADEMIC SENATE

doc. Ing. Janette BREZINOVÁ, PhD.

VICE - DEAN RESPONSIBLE FOR STUDY IN 1st DEGREE

Ing. Alžbeta ZAPACHOVÁ

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prof. Ing. Mária Čarnogurská, CSc. – Department of Power Engineering
prof. Ing. Jozef Kováč, CSc. – Department of Industrial Engineering and Management
prof. Ing. Hana Pačaiová, PhD. – Department of Safety and Quality Production
prof. Ing. Alexander Gmiterko, CSc. – Department of Applied Mechanics and Mechatronics
prof. RNDr. Martin Bača, CSc. – Department of Applied Mathematics and Informatics
doc. Ing. Ján Slota, PhD. – Department of Technologies and Materials
prof. Ing. Dušan Šimšík, PhD. – Department of Automation, Control and Human Machine Interactions
Students:
Ing. Marek Kliment – student of 3rd. level of study
Miroslava Jamborová – student of 1st level of study
Radko Popovič – student of 2nd level of study
Bc. Ján Kostka – student of 2nd level of study
Ing. Petra Lazarová – student of 3rd level of study
Ing. Stanislav Németh – student of 3rd level of study

EDUCATION

Accreditation for:

Bachelor level

1) Automotive Production
2) Safety and Occupational Health Protection
3) Environmental Management
4) Quality of Production
5) Mechatronics
6) Computer Aided Engineering Production
7) Control and Diagnostics for Technology of Production, Robotics and Transport
8) Industrial Engineering
9) Prosthetics and Orthotics
10) Technology of Environment Protection
11) General Mechanical Engineering
12) Mechanical Engineering – new
13) Technology, Management and Innovation in Machinery Production – new
14) Management of Technical and Environmental Risks in Mechanical Engineering - new

Master (Engineer) level

1) Applied Mechanics
3) Automation and Control of Machines and Processes
5) Automotive Production
6) Safety of Technical Systems
7) Production Quality
8) Biomedical Engineering
9) Transport Machines and Logistics
10) Power Supply Machines and Machinery
11) Environmental Management
12) Mechatronics
13) Computer Aided Engineering Production
14) Industrial Engineering
15) Robotic Technology
16) Engineering Technologies
17) Machines and Machinery for Building Industry, Agriculture and Dressing
18) Mechanical Engineering
19) Technology of Environment Protection
20) Production Machines and Machinery
21) Measurement
22) Plastics Technologies
23) Management of Technical and Environmental Risks in Mechanical Engineering

Doctoral study

1) Applied Mechanics
2) Automation and Control
3) Safety of Technical Systems and Safety of Work
4) Biomedical Engineering
5) Parts of Machines and Mechanisms
6) Transport Machines and Equipments
7) Power Supply Machines and Equipments
8) Mechatronics
9) Industrial Engineering
10) Engineering Technologies and Materials

11) Technology of Environmental Protection
12) Production Machines

Numbers of Students

STUDY LEVEL	FULL - TIME STUDENTS	EXTERNAL STUDENTS	TOGETHER
BACHELOR	998	103	1101
ENGINEER	673	207	880
DOCTORAL	67	64	131
			2112

Habilitations and Inaugurations

Habilitations

Ing. Piotr Czech, PhD.

Thesis: Vibroacoustic diagnostics of selected elements of gas engines of cars by artificial neuron nets

Lecture: Methods of analysis of vibroacoustic signals generated by selected elements of car's gas engine

Ing. Grzegorz Wojnar, PhD.

Thesis: Dynamic and vibration diagnostics of elements of mechanical systems of transport machines

Lecture: Using of selected vibration signal analysis oriented to effective determination of local damage of bearings in transmissions with spur gears

Ing. Andrzej Pacana, PhD.

Thesis: Implementation model of environmental managment in small and middle companies

Lecture: Selected methods of product quality evaluation

Ing. Alena Galajdová, PhD.

Thesis: Wireless sensor nets in automatic systems

Lecture: Properties of wireless nets and their applications

Ing. Miroslav Pástor, PhD.

Thesis: Stress and deformation fields as identifier of prediction of possible failures of supporting structures

Lecture: Application of optical methods for identification of critical locations in supporting structures

Ing. Ľuboš Kaščák, PhD.

Thesis: Influence of parameters of spot welding to properties of welded joints

Lecture: Non-conventional methods of material joininng in automotive industry – mechanical joints

Ing. Dušan Koniar, PhD.

Thesis:	Investigation of kinematic of microscopic objects by high-speed imaging
Lecture:	Virtual instrumentation for measurment and control applications in mechatronics

Ing. Tatiana Kelemenová, PhD.

Thesis:	Specific aspects of indirect measurement for determination of friction coefficients from the point of view of uncerntainty of measurement
Lecture:	Coordinate measurement machines and calibration of coordinate measurement machines

RNDr. Andrea Feňovčíková, PhD.

Thesis:	On graph labelings with predetermined weights
Lecture:	On graph labelings of magic and antimagic type

Inauguration

doc. Ing. Eva Zdravecká, CSc.

Lecture:	Improvement of tribological properties of mechanical systems by coating

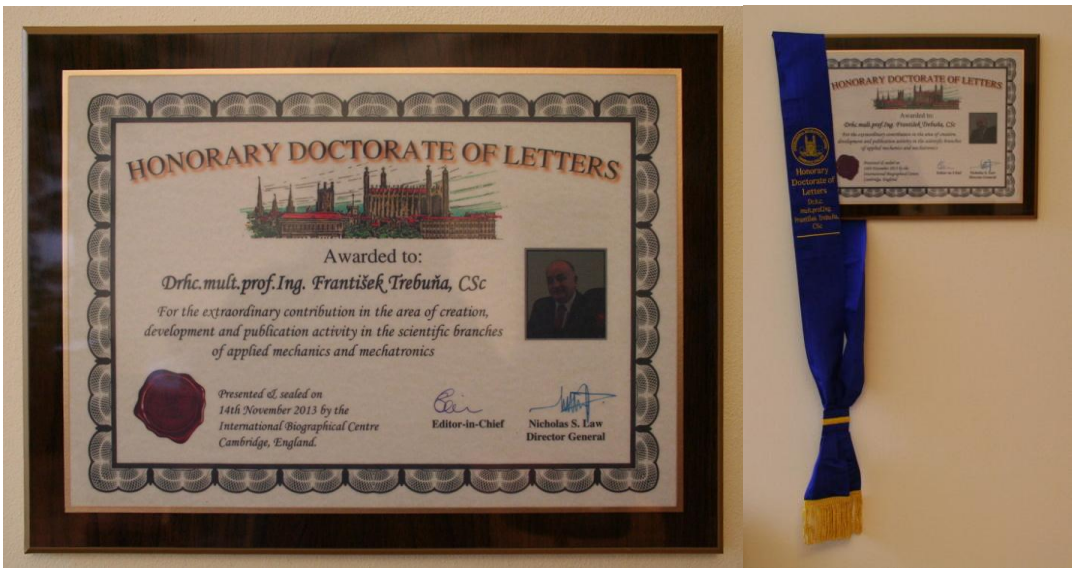
Distinguished Awards

Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.

Anniversary of creation of Slovak Republic was an occasion for a president of Slovak Republic, Ivan Gašparovič to award the state prizes. The state prizes are given to outstanding individuals for achievements in the field of culture, science, technique or education. Sixteen persons received various prizes. One of them was a dean of the Faculty of Mechanical Engineering TUKE, **Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.**
Prof. Trebuňa has been awarded by Order of the Ľudovít Štúr II. class for outstanding merit and lifetime achievement in the field of education, science, technique as well as for excellent presentation of Slovak republic abroad.
The prizes were awarded in a solemn ceremony in the Knight Hall of Bratislava castle.

Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.

Honorary Doctorate of Letters “For the extraordinary contribution in the area of creation, development and publication activity in the scientific branches of applied mechanics and mechatronics,” International Biographical Centre Cambridge, England, 2013

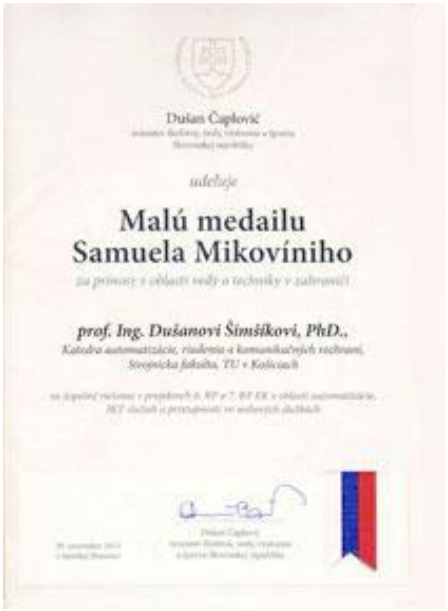


Dr.h.c. prof. Ing. Jozef Živčák, PhD.

Big Medal of Samuel Mikovíny for life-long contribution in the area of science and engineering – “Research and development, and implementation of customized implants with realization of invasive application of cranial implant made of titanium by new technology – laser-sintering.”
Awarded by Minister of Education, Science, Research and Sport of the Slovak Republic, Dušan Čaplovič.

prof. Ing. Dušan Šimšík, PhD.

Small Medal of Samuel Mikovíny for contribution in the area of science and engineering abroad – “Successful solution of FP6 and FP7 EU projects in the area of automation, ICT services and availability in WEB services.” Awarded by Minister of Education, Science, Research and Sport of the Slovak Republic, Dušan Čaplovič.



Dušan Čaplovič

udeľuje

Malú medailu Samuela Mikovíniho

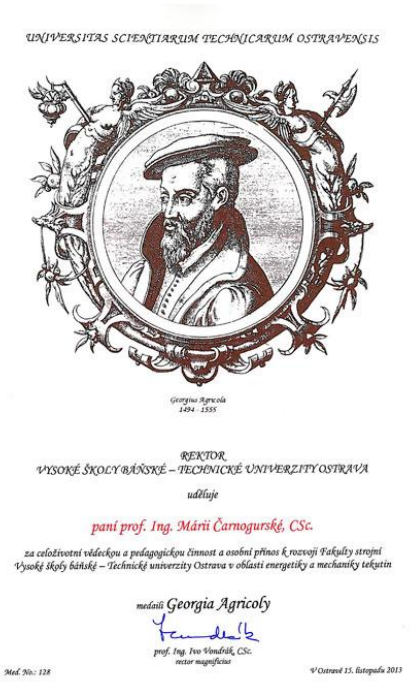
za prínosy v oblasti vedy a techniky v zahraničí

prof. Ing. Dušanovi Šimšíkovi, PhD.,

Katedra automatizácie, riadenia a komunikačných rozhraní, Strojnícka fakulta, TU v Košiciach

prof. Ing. Mária Čarnogurská, CSc.

Medal of Georgius Aricola for lifelong scientific and pedagogical activities and personal contribution to the development of the Faculty of Mechanical Engineering, VŠB - Technical University of Ostrava in the area of power engineering and fluid mechanics.



UNIVERSITAS SCIENTIARUM TECHNICARUM OSTRAVENSIS

Georgius Agricola
1494 - 1555

REKTOR
VYSOKÉ ŠKOLY BÁŇSKÉ – TECHNICKÉ UNIVERZITY OSTRAVA

uděluje

paní prof. Ing. Márii Čarnogurské, CSc.

za celoživotní vědeckou a pedagogickou činnost a osobní přínos k rozvoji Fakulty strojní Vysoké školy báňské – Technické univerzity Ostrava v oblasti energetiky a mechaniky tekutin

medaili Georgia Agricoly

prof. Ing. Ivo Vondrák, CSc.
rector magnificus

Med. No.: 128

V Ostravě 15. listopadu 2013

Main prize of 20th International Engineering Fair Nitra 2013

Distinguished success have reached Faculty of Mechanical Engineering on the 20th International Engineering Fair - presentations of technical universities TECHNOFÓRUM 2013. The showpiece of our faculty “Rehabilitation shoes for elderly people,” designed by prof. Ing. Dušan Šimšík, PhD. and doc. Ing. Alena Galajdová, PhD. has won main prize of the International Engineering Fair.

Exposition of the faculty

Rehabilitation shoe Smiling

Dean of the faculty Dr.h.c. mult. prof. Ing. František Trebuňa, CSc. and Ing. Alena Galajdová, PhD. receiving main prize of the fair from Minister of Economy Tomáš Malatinský

INSTITUTE OF SPECIAL TECHNICAL SCIENCES

- Department of Applied Mathematics
- Department of Applied Mechanics and Mechatronics
- Department of Biomedical Engineering and Measurement
- Department of Automation, Control and Human Machine Interaction

Department of Applied Mathematics and Informatics

Contact

The head:	Knežo Dušan, prof. RNDr., CSc.
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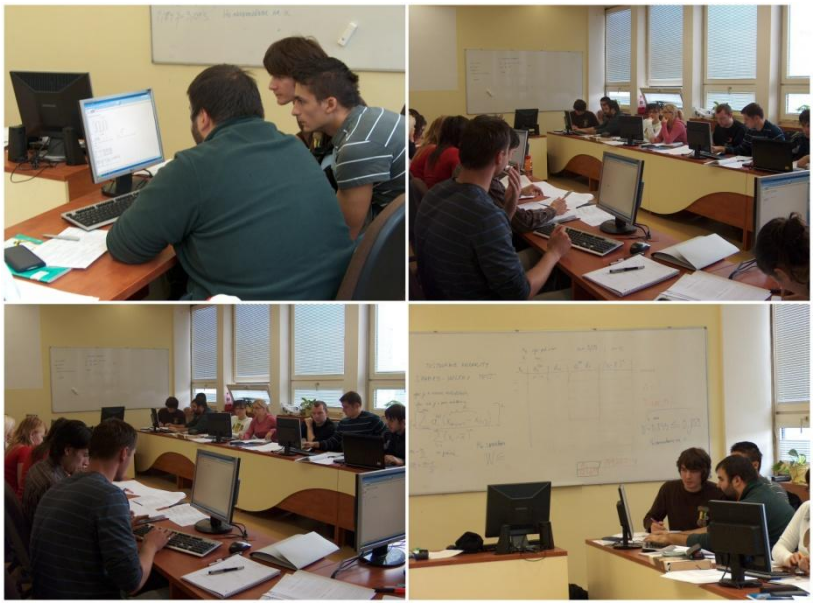

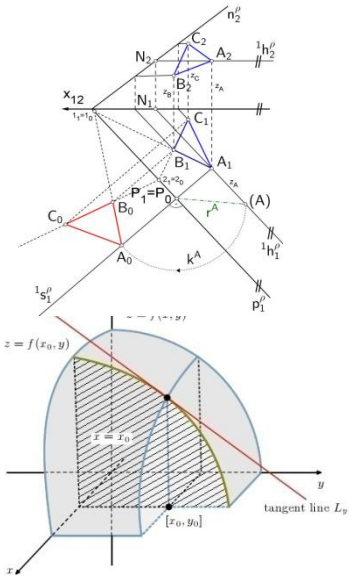

Staff

- Professors: **2**
- Assoc. Professors: **1**
- Assist. Professors **6**
- Researchers: **0**
- PhD. Students: **0**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
3/2013	6th World Conference on 21st Century Mathematics 2013, Lahore, Pakistan (prof. RNDr. Martin Bača, CSc.)
5/2013	Functional composite materials 2013, scientific conference, Slovak Academy of Science, Košice (RNDr. Denisa Olekšáková, PhD., RNDr. Jana Füzerová, PhD.)
7/2013	7th Czech-Slovak International Symposium on Graph Theory, Combinatorics, Algorithms and Applications 2013, Košice (prof. RNDr. Martin Bača, CSc., RNDr. Andrea Feňovčíková, PhD.)
7/2013	15th Czech and Slovak Conference on Magnetism 2013, P. J. Šafárik University, Košice (RNDr. Denisa Olekšáková, PhD., RNDr. Jana Füzerová, PhD.)
8/2013	Joint European Magnetic Symposia 2013, Rhodos (RNDr. Denisa Olekšáková, PhD., RNDr. Jana Füzerová, PhD.)
10/2013	Evaluation of environmental quality 2013, Technical University in Košice, Herľany (RNDr. Miriam Andrejiová, PhD.)
11/2013	Progressive magnetic materials 2013, scientific conference, Slovak Academy of Science, Košice (RNDr. Jana Füzerová, PhD.)

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Bachelor study

- ✓ Applied Mathematics Basics in Constructive and Computer Geometry
- ✓ Fundamentals of College Mathematics
- ✓ Mathematical Calculations Using MAPLE
- ✓ Mathematical Software
- ✓ Mathematics I.
- ✓ Mathematics II.
- ✓ Mathematics III.
- ✓ Mathematics IV.
- ✓ Numerical Methods
- ✓ Repetitorium in Mathematics
- ✓ Selected Chapters from Mathematics
- ✓ Seminary in Mathematics
- ✓ Statistical Methods
- ✓ Statistical Methods in Production
- ✓ Statistical Methods in Quality Management I.
- ✓ Statistical Methods in Quality Management II.
- ✓ Statistical Software
- ✓ Statistics for Environmentalists
- ✓ Theory of Probability

Master study

- ✓ Applied Mathematics
- ✓ Engineering Statistics
- ✓ Environment Statistics
- ✓ Mathematical Methods in Automatization
- ✓ Mathematical Modelling
- ✓ Mathematics I.
- ✓ Operational Analyses
- ✓ Statistical Data Processing of Environmental Information
- ✓ Statistical Methods
- ✓ Statistical Methods for Evaluation of Biological Signals
- ✓ Statistical Methods in Production

PhD. study

- ✓ Applied Mathematics
- ✓ Selected Chapters from Mathematics
- ✓ Mathematical Methods in Environmentalism

GRADUATE THESES

BACHELOR'S THESES:

Kamenický Matúš	Data analysis in the selected process in engineering production

MASTER'S THESES:

Bérešová Gabriela	Use of quality tools in the production process
Daxner Július	Determining of the Development of water Quality in selected water flow by the Environmental Indicators
Falotová Martina	Comprehensive evaluation of selected locations from an environmental perspective
Hužvárová Martina	Noise in the environment and its impact on the health
Jašeková Anita	Use of statistical methods in the evaluation of quality the production
Lešková Ivana	Defects in the production process
Mochnaľová Jana	Optimization of the production process of aluminum casting using statistical methods of quality management
Nickelová Ivona	Evaluation of the physical factors of the work environment
Uliková Silvia	Statistical control of annealing process in wet atmosphere in purpose of strip cleanliness increasing
Strauch Peter	Soft magnetic ferromagnetics based on FeNi (student PF UPJŠ)

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ Asymptotical properties of ordinary differential equations with distributed arguments.
- ✓ Application of mathematical methods in mechanics.
- ✓ Mathematical simulation in the area of biomedical engineering.
- ✓ Labellings and colourings of graphs.
- ✓ Metric dimension of graphs.
- ✓ Investigation of the soft magnetic materials and the simulation of mathematical model for calculation of the coercivity.
- ✓ The study of permeability dependence on the frequency and simulation of function by the mathematical models.
- ✓ The theoretical study of lattice Hamiltonians of the spin systems for zero and non - zero temperatures.
- ✓ Exactly soluble spin models on decorated lattices.
- ✓ Statistical processing control.
- ✓ Using statistical methods in environment.

Research characteristics:
The research of the department is oriented to the application of mathematical methods and statistical methods in the different areas, for example biomedical engineering, environment, mechanics, physics of materials and theoretical physics. The main fields of the mathematical disciplines at the department are differential equations, graph theory and mathematical calculations in theoretical physics.

Areas of expertises:

- ✓ Applied Statistics
- ✓ Condensed Matter Physics
- ✓ Discrete Mathematics
- ✓ Differential Equations
- ✓ Mathematical Modelling
- ✓ Theoretical and Statistical Physics

PROJECTS OF THE DEPARTMENT

Title of the project	**Problems in labelling and coloring of graphs**
Type of the project	Grant project VEGA
Number of the project	1/0130/12
Principal investigator	prof. RNDr. Martin Bača, CSc.
Time period of the project	2012 - 2014
Annotation of the project	The project deals with problems in labeling and coloring of graphs. The main goal of the project is to construct alpha - labeling (a special type of graceful labeling) of trees from graceful labelings of smaller trees and use a relationship among alpha - labelings and edge - antimagic labelings for obtaining edge - antimagic total labelings of trees. We will use a relationship between edges - antimagic labelings and face - antimagic labelings for describing d - antimagic labelings of plane graphs. We will study the Thue indices of the non - repetitive list colourings of graphs focusing on plane graphs.

PROJECTS OF THE DEPARTMENT PARTICIPATION

Title of the project	**Methods and techniques of experimental modeling of in - plant manufacturing and non - manufacturing processes**
Type of the project	Grant project VEGA
Number of the project	1/0102/11
Principal investigator	doc. Ing. Peter Trebuňa, PhD.
Time period of the project	2011 - 2014
Annotation of the project	The present project aims to put the application of methods of experimental modeling and development of new methods of investigation and analysis of internal processes, the use of new diagnostic methods for prediction of risk situations as well as further extending the possibilities for using conventional methods. The research project should increase the competitiveness of production in machinery industry, which requires a further substantial increase in educational level

creative staff development, research, design in general, but also graduates of all levels of engineering study courses, to prevent adverse situations during the operation and survival of engineering companies. The above objectives should help to avert the emergence of unexpected situations such as non - productive in the manufacturing sector prior to the existence of risk. This is the main objective, if it should contribute to basic research - oriented than the proposed project in the sphere of production to the sphere of non - production, management.

Type of the project	EU – OP Research and Development
Number of the project	ITMS code 26220220182; OPVaV - 2012/2.2/08 - RO
Principal investigator	doc. Ing. Ján Spišák, PhD.
Time period of the project	2013 - 2015
Annotation of the project	The primary objective of sub-activity is the provision of comprehensive services in the field of testing and analysis of raw materials, intermediate products, reinforcing materials, rubber compounds and finished rubber products such as tires, conveyor belts and rubber technical products to achieve sustainable quality in accordance with the new technical standards. Research and development activities will work in line with developments in the field of research. Quality and sustainable development department ensures that the following subtasks: design and specification of test and verification work rubber products and the identification of maintenance service, secure online collaboration research team with external national and foreign institutions and implementation of research and development FTaVP GV in selected production systems and services.

NATIONAL PROJECTS

Title of the project	**The influence of interaction of ferromagnetic iron based particles on the magnetic properties of composite materials**
Type of the project	Grant project VEGA
Number of the project	1/0861/12
Principal investigator	prof. RNDr. Peter Kollár, CSc.
Time period of the project	2012 - 2015
Annotation of the project	The project is focused on experimental study of the structure and magnetic properties of advanced materials with heterogeneous structure consisting of ferromagnetic particles based on iron embedded in magnetically active or inactive matrix which insulates ferromagnetic particles (organic

binders, ferrite and silica). The particles with the size of 2 nm - 0.1 mm have amorphous, nano - or microcrystalline structure. The particles with size of 2 nm - 100 nm will be prepared by chemical methods: nanocasting method or by the reverse micelle method and larger particles by mechanical milling. The study will be focused on the explanation of the influence of the interaction of these particles on their magnetic properties under various physical conditions (temperature and magnetization method). Expected results should further expand the application potential of the advanced materials for recording media with high density and soft magnetic materials suitable for application at frequencies above 20 kHz, where are ferrites used.

Title of the project	**The study of the influence of ferromagnet and insulator parameters on the magnetic properties of composite materials for electrical technology**
Type of the project	Grant project VEGA
Number of the project	1/0862/12
Principal investigator	RNDr. Ján Füzer, PhD.
Time period of the project	2012 - 2014
Annotation of the project	The project is focused on the determination the magneto - structural correlations in soft magnetic composites. Powders covered via chemical procedure will be hot compacted to obtain a ring composite material. Along with classical methods of measurements of magnetic properties and structural analysis and non - conventional methods which provide information on electromagnetic interactions between particles will be employed. In particular, the study of complex permeability and also analytical methods for determination of parts of magnetic losses will be adopted. The main goal is to determine mutual relation between magnetic parameters and the size of particles and the thickness of insulation layer. The next contribution to the explanation of these materials will extend their application potential. The outcomes of the project will be in the form of scientific publications and presentations at scientific conferences but their application within all levels of university education is also envisaged.

Title of the project	**Research of the Impact of Material Characteristics and Technological Parameters of Belt Conveyors on the Intensity of Contact Forces and Resistance to Motions of Hose Conveyors Using the Experimental and Simulation Methods**
Type of the project	Grant project VEGA
Number of the	1/0922/12

project	
Principal investigator	doc. Ing. Gabriel Fedorko, PhD.
Time period of the project	2012 - 2015
Annotation of the project	The essence of scientific research project is to interact pair of conveyor belt - guide rollers within the tubular conveyor roller stool. The project focuses on research conditions that affect the size of the resistance movement and contact forces. The basis of the research is based on experimental measurements on a special measuring device and subsequently analyzing, examining the measured values with high simulation software.
Title of the project	**Creation of the portal professional profile for scientific - research platform "Acta Mechanica Slovaca"**
Type of the project	Grant project KEGA
Number of the project	064TUKE - 4/2011
Principal investigator	Ing. Beata Hricová, PhD.
Time period of the project	2011 - 2013
Annotation of the project	The target of the project is to design a portal system processing scientific research results employees and students of the faculty for knowledge increasing and cognitive level that defines the real knowledge limiting orientation of research areas as information and knowledge results in terms of factual and reprographic sources available for the entire scientific community.
Title of the project	**Innovation in laboratory technology educational program of study Industrial Engineering**
Type of the project	Grant project KEGA
Number of the project	079TUKE - 4/2013
Principal investigator	Dr.h.c. mult. prof. Ing. Jozef Mihok, PhD.
Time period of the project	2013 - 2015
Annotation of the project	The project focuses on strengthening of laboratory teaching of technology in the field 05/02/52 Industrial Engineering study program in Industrial Engineering. It focuses mainly on the second and third cycle of higher learning to foster not only knowledge, innovative thinking and practical skills. Application of innovative training methods, particularly laboratory activities, interactive participatory design verification and simulation of business processes and systems throughout the value chain is considered essential for the development trend of learning processes. The solution is the extension of the

existing base laboratory of the Department of Industrial Engineering new technical, computer and software resources.

Title of the project	**Intensification of modeling in education of II. and III. degree in the field of study 05/02/52 Industrial Engineering**
Type of the project	Grant project KEGA
Number of the project	004TUKE - 4/2013
Principal investigator	doc. Ing. Peter Trebuňa, PhD.
Time period of the project	2013 - 2015
Annotation of the project	The purpose of this project and its main objective is to increase the attractiveness of the study puts the Department of Industrial Engineering 5.2.52 for both students and prospective students, but primarily for industrial practice, for which students are an essential input into the production process based on knowledge acquired during their studies, methodologies and working practices. The current corpus of field of study is relatively unchanged since 2004, accredited study program, Faculty of Mechanical Engineering, Technical University of Kosice, where his interest in the study or not stop now. To increase its attractiveness, it is necessary to inspect the program conceptually and upgrading its parts especially in the second and third level of study in particular the introduction of new for the current industrial practice of the necessary things they can use študentom immediately after graduation.

Title of the project	**ICT aided new forms of learning and increasing the efficiency of education for environmental study programs**
Type of the project	Grant project KEGA
Number of the project	032TUKE - 4/2013
Principal investigator	doc. Ing. Ružena Králiková, CSc.
Time period of the project	2012 - 2014
Annotation of the project	The project focuses on the application of new lecturing methods and enhancing the effectiveness of learning with support of ICT. By realisation of the project it is expected to create and access educational web site dedicated to specific problem in the field of environment protection technologies area as the knowledge base of several subject of study programs of the 1st, 2nd and 3rd degree of university study. Realisation of the project will lead to implementation of knowledge and experience of investigators in the educational process and conditions for improving and streamlining the

existing forms of education.

Title of the project	**Collective phenomena in coupled electron and spin systems**
Type of the project	Grant project APVV
Number of the project	APVV-0097-12
Principal investigator	RNDr. Pavol Farkašovský, CSc.
Time period of the project	2013 - 2017
Annotation of the project	The project is devoted to the theoretical study of collective phenomena in coupled electron and spin systems. The complex coupled electron and spin systems will be examined by sophisticated numerical methods with the goal to contribute to the understanding of physical mechanisms leading to the coexistence of quantum states with different order parameters, e.g., charge/spin ordering and superconductivity, ferromagnetic and ferroelectric state, metallic and insulatig states. Contrary to this, simpler coupled electron and spin systems will be examined by exact analytical methods with the goal to give an extrapolation of unconventional quantum states manifested as fractional magnetization plateaus in magnetization processes, the origin of enhanced magnetocaloric effect and the thermodynamic behaviour near the quantum critical points.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Employees and students	**Country**
Bača Martin, prof. RNDr., CSc.	Pakistan (20.2.2013-26.3.2013)

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Union of Slovak Mathematicians and Physicists
Mirian Andrejiová, RNDr., PhD.
Martin Bača, prof. RNDr., CSc.
Andrea Feňovčíková, RNDr., PhD.
Jana Füzerová, RNDr., PhD.
Lucia Gálisová, RNDr PhD.
Gabriela Ižaríková, RNDr., PhD.
Zuzana Kimáková, RNDr., PhD.
Dušan Knežo, prof. RNDr., CSc.
Denisa Olekšáková, RNDr., PhD.

Slovak Physical Society
Jana Füzerová, RNDr., PhD.
Denisa Olekšáková, RNDr., PhD.

Slovak Mathematical Society
Martin Bača, prof. RNDr., CSc.

PUBLICATIONS

Journals

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Department of Applied Mechanics and Mechatronics

Contact

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Staff

- Professors: **5**
- Assoc. Professors: **4**
- Assist. Professors: **7**
- Researchers: **4**
- PhD. Students: **8 internal, 5 external**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
5/2013	Department's competition of student scientific and technical activities.

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Mechanical Engineering**
- **Mechatronics**

PhD. degree:

- **Applied Mechanics**
- **Mechatronics**

Master's degree:

- **Mechanical Engineering**
- **Applied Mechanics**
- **Mechatronics**

Number of the students

(till 30. 10.2013) on the study programs guaranteed by the department:
first year of bachelor study:
- 112 internal form of study

second year of bachelor study:
- 61 internal form of study

third year of bachelor study:
- 77 internal form of study
- 13 external form of study

first year of engineer study:
- 36 internal form of study
- 11 external form of study

second year of engineer study:
- 30 internal form of study

Number of the graduates (2012/2013)

on the study programs guaranteed by the department:

- 14 PhD. students in the internal form of study (defended PhD. thesis)

GRADUATE PROFILE

BACHELOR'S PROGRAMS (Bc.)

Mechanical Engineering

Students of this program will obtain knowledge from the theory of the mechanical systems and from their application in computation, constructional and technologic problems. Students will know to design, develop, implement, expand and operate modern mechanical devices and they can cooperate with managers and specialists from other professions. Students will obtain also theoretic and methodical knowledge from the areas related to the engineering and machines, they will their skills improve in using of the CAD systems, they will introduce the economy rules, organisation and business activities in area of mechanical production. Students will obtain practical experiences, abilities and skills from working in area of construction and making of document of the mechanical systems.

Mechatronics

Study field is focused on preparing of specialist in area of mechanical - electrical engineering with knowledge of basics from area of informatics, automation, diagnostic etc. It is focused on machines, devices and systems with high added value of functionality, movement and manipulation ability, which are controlled with modern automation and computer techniques, digital distributed control systems etc. Mechatronics is sensed as interdisciplinary scientific field, which deals with computer controlled electromechanical systems.

MASTER'S PROGRAMS (Ing.)

Mechanical Engineering

Students of this study program will be able to analyze, design, construct, and review large engineering devices and they will be able to provide research with high creativity and self - activity. Students will obtain detailed knowledge from area of the mechanical engineering, which gives them ability to manage work teams in this area. They will be able to self - employed lead of projects and takeover liability for complex solutions. Students will be able to work with using of scientific approaches, because they will have experiences with formulation of hypothesis, with design of experiment, hypothesis verification and analyzing of obtained data.

Applied Mechanics

Students of this study program will have deepened knowledge from area of solid - state mechanics and compliant body mechanics. They will be able to do dynamic and strength analysis of complicated mechanical devices, and they will be able to use modern software, in modelling and simulation process. Obtained knowledge from area of solid state and compliant bodies and environments allows them to self - employed lead of projects in area of mechanical devices development. They will be able to analyze design and construct large engineering solutions including

mechanical systems and they will know to provide research with high creativity and self - activity.

Mechatronics

Study program mechatronics focuses to training of experts in area of electro - mechanical systems with knowledge of engineering informatics and automation for solution of engineering tasks coupled with complex system design, testing, production and operation of mechatronics systems controlled via distributed computer systems. There are many tasks as design, construction and projection of machines, machine devices and systems with high functional, movement and manipulation abilities and mechanical accuracy, which have been controlled via modern automation and computer devices with application of artificial intelligence parts. Students will be able to analyze, design, construct large engineering solutions included mechatronic systems and they will be able to do research with high creativity and self - activity.

PhD. PROGRAMS (PhD.)

Applied mechanics

Study in this program is focused on training of high - specialized scientist for research, development and practise in all disciplines and workplaces, where is applied scientific knowledge of mechanics. Their scientific erudition is focused mainly into these areas of mechanics: development and improvement of the analytical and numerical computing methods (finite element method, method of boundary elements, mesh less methods), theory of the modelling and analysis of the mechanical systems and construction, constitution relation with impact onto linear and nonlinear behaviour of material, condition of the marginal state of the materials and bodies, mechanics of composites, smart and MEMS materials, analysis of the stress, analysis of the coupled deformation and dynamic response of selected body classes included combined bodies, inverse tasks of the mechanics and deformation of selected technologic processes, optimization and contact tasks, interaction of constructions and environment, expert systems, mechanics of the micro and nano - systems, dynamics of the vehicles and machine devices.

Mechatronics

Students know scientific method of the research and development of the mechatronics products. Study focuses into solution of the scientific engineering problems in areas of the mechatronics, electronics, electrical engineering, mechanics and mechanical engineering, informatics and automatic control to the level of the artificial intelligence. The main assumption of the successful study is student ability of abstract thinking, their interest and ability to apply knowledge of these fields in solutions of engineering problems. Students have to know modern analytic and numerical methods and method of math modelling. Students will learn to characterize and to sense physic phenomena and experimental knowledge about these phenomena. Next, they will learn to find adequate models and new applications in specific disciplines, in science, in research and practice. Students will obtain theoretic knowledge and practical experience with the scientific work, they will be trained for self - employed scientific work in areas which cooperates with electrical engineering,

mechanical engineering, informatics, automation and control, measurement engineering and sensing engineering.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Mechatronics (Bachelor study)

- ✓ Bachelor Thesis
- ✓ Basic of Precision Mechanics II.
- ✓ CAD
- ✓ Computer Mechanics I.
- ✓ Computer Mechanics II.
- ✓ Computer Modelling of Dynamics Systems
- ✓ Design and Modelling of Precision Mechanisms
- ✓ Dynamics
- ✓ Elasticity and Strength I.
- ✓ Final Project
- ✓ Geometrically and Physically Nonlinear Mechanics
- ✓ History of Sciences
- ✓ Kinematics
- ✓ Measurement of Non - electrical Quantities
- ✓ Mechatronics Systems
- ✓ Microprocessor Systems
- ✓ Statics
- ✓ Term Project
- ✓ Vibration of Mechanical Systems

Mechanical engineering (Bachelor study)

- ✓ Bachelor Thesis
- ✓ Basic of Modelling of Mechanical Systems
- ✓ CAD
- ✓ Computer Mechanics
- ✓ Computer Modelling of Dynamics systems
- ✓ Dynamics
- ✓ Elasticity and Strength I.
- ✓ Elasticity and Strength II.
- ✓ Final Project
- ✓ Geometrically and Physically Nonlinear Mechanics
- ✓ History of Sciences
- ✓ Kinematics
- ✓ Measurement of Non - electrical quantities
- ✓ Microprocessor Systems
- ✓ Statics
- ✓ Term Project
- ✓ Vibration of Mechanical Systems

Safety and health protection in work (Bachelor study)

- ✓ Elasticity and Strength
- ✓ Technical Mechanics

Information systems in mechanical engineering production (Bachelor study)

- ✓ Technical Mechanics I.
- ✓ Technical Mechanics II.
- ✓ Elasticity and Strength

Management and economic of production (Bachelor study)

- ✓ Technical Mechanics
- ✓ Elasticity and Strength

Maintenance of machines and devices (Bachelor study)

- ✓ History of Science
- ✓ Kinematics
- ✓ Statics
- ✓ Dynamics
- ✓ Elasticity and Strength II.
- ✓ Elasticity and Strength I.

Technique for safekeeping of environment (Bachelor study)

- ✓ Technical Mechanics

Applied mechanics (Master study)

- ✓ Diplom Project
- ✓ Thermal Stresses

- ✓ Kinematics and Dynamics of Coupled Dynamic Systems
- ✓ Limit States of Construction
- ✓ Master Thesis
- ✓ Noise and Vibration
- ✓ Nonlinear Mechanics and Mechanics of Continuum
- ✓ Numerical Methods of Mechanics I.
- ✓ Numerical Methods of Mechanics II.
- ✓ Plasticity and Creep
- ✓ Stochastic Mechanics
- ✓ Term Project
- ✓ Theoretic Mechanics
- ✓ Theory of Dynamic Systems
- ✓ Theory of Elasticity
- ✓ Theory of Engineering Experiment
- ✓ Theory of Mechatronic Systems, Modelling, Designing and Optimalization
- ✓ Thin - walled Structures
- ✓ Vibration of Mechanical Systems

Mechanical engineering (Master study)

- ✓ Applied Mechanics
- ✓ Construction of Processing Devices
- ✓ Diplom Project
- ✓ Master Thesis
- ✓ Mechatronics
- ✓ Numerical Methods of Mechanics
- ✓ Term Project
- ✓ Theory of Dynamic Systems
- ✓ Theory of Engineering Experiments
- ✓ Plasticity and Creep

Automation and control of machines and processes (Master study)

- ✓ Theory of Engineering Experiments
- ✓ Mechatronic Systems

Biomedical engineering (Master study)

- ✓ Mechatronics for Biomedical Engineering

Transport systems and logistic (Master study)

- ✓ Building Mechanics
- ✓ Numerical Methods of Mechanics

Mechatronics (Master study)

- ✓ Computer Aided Design of Mechatronic Systems
- ✓ Control of Engineering Systems
- ✓ Controlled Vibration
- ✓ Diplom Project
- ✓ Dynamics Rotors
- ✓ Electromechanical Systems
- ✓ Master Thesis
- ✓ Measurements in Mechatronics
- ✓ Mechanics of Composites Materials
- ✓ Mechatronics I.
- ✓ Mechatronics II.
- ✓ Microprocessor Systems
- ✓ Numerical Methods of Mechanics I.
- ✓ Optimization of Mechatronic Systems
- ✓ Term Project I.
- ✓ Term Project I.
- ✓ Theory of dynamic systems
- ✓ Theory of engineering experiment
- ✓ Theory of Systems for Modelling and Designing
- ✓ Training Exercises

Materials of utility coating (Master study)

- ✓ Finite Element Method

Robotic systems (Master study)

- ✓ Mechanics of Robots

Processing of plastic (Master study)

- ✓ Degradation Processes and Life Prediction
- ✓ Finite Element Method

Production machines and devices (Master study)

- ✓ Numerical Methods of Mechanics and Production Machines

GRADUATE THESES

BACHELOR'S THESES:

Vladimír Leško	Testing of input-output multifunction card for mechatronic systems
Adam Prusák	Secondary power supplies in mechatronic systems
Vladimír Marton	Kinematic analysis of machine tool drive
Matej Kováč	Evaluation of magnetic position sensor of pneumatic drive for application in testing device used in automotive industry.
Marek Andrejko	The use of optical fibers and measuring their transmission parameters
Marek Molnár	Application possibilities of Photostress method for analysis of stress and strain fields near cracs
Ottó Eszenyi	Detection and image analysis of critical locations on machine castings
Miriama Fialková	Electromagnetic field effect analysis of the magnetic levitation didactic model
Štefan Mrkva	Design of humanoid robot hand model
Daniel Čerňan	Design of teaching aid for stability analysis of straight bars
Ján Packa	Determination of kinematic parameters using Digital Image Correlation method
František Figeľ	Using of rapid prototyping models for stress analysis by Photostress method
Ľubica Hudáková	Analysis of material properties of hyperelastic materials used in mechatronic systems
Štefan Palfi	The use of simulation softwares in field of robotics
Michal Sabol	Determination of impact forces by using dynamic strain gage apparatus
Marián Slejzák	Creation of learning models for experimental determination of stresses for combined loading
Peter Janík	Design and strength computation of piping yard
Matúš Fedorco	Static analysis of the elevating work platform AVPH 1400 and determination of its working space.
Pavol Dubovský	Static analysis and design of static balancing of the Jordan rehabilitation table mechanism
Marián Jančár	Design of a spring balancing mechanism of the Jordan rehabilitation table.
Jakub Jabczun	Strength computation of shoe brake
Peter Kačmarik	Design and strength computation of lifting equipment
Roman Jesenský	The use of modern technology for creation of "smart house"
Daniel Sedláčik	Solution of stability problems by computer methods
Peter Kyseľ	The use of SINT RingCore for determining residual stress
Štefan Beck	Kinematic and dynamic analysis of a machine tool mechanism.
Blažena Cibuľová	Static, kinematic and dynamic analysis of a building machine.
Zuzana Dronzeková	Creation of interactive models for static solution of force systems in equilibrium
Michal Marton	Analysis of mechanical system vibration by Matlab
Beáta Jurovská	Kinematic analysis of typewriter keys using the MSC Adams
Michal Vargovič	Kinematic analysis of planar mechanism of the sewing machine

	using MSC Adams
Andrej Bialko	Kinematic analysis of six link mechanism graphically and using the MSC Adams
Marek Štibora	Stress analysis reinforcing element shelving holder using experimental stress method
Martin Sroka	Stress analysis of arm console crane
Maroš Kmec	Using of FEM for simulation of wind loading of silage container
Eduard Javorský	Using of FEM for stress analysis of industrial manipulator
Lukáš Vančo	Using of FEM for thermal analysis of heater of truck changing
Ľuboš Buzinkay	Fatigue characteristics of selected construction materials
Krisztián Kóós	Design and control of the basic elements of the lifting device
Juraj Petráš	Determination of stress fields on structural elements considering the supportive effect of photoelastic coatings
Zuzana Čajková	Application of Lagrange equations of the second kind in the dynamic analysis of mechanical systems
Peter Pavelka	Analysis of selected kinematic parameters of mechanical systems
Matúš Mihaľov	Determination of vibration parameters of mechanical systems by measurement on non-rotating parts
Marek Mitz	Application of laser Doppler vibrometers for determination of modal parameters of mechanical systems
Peter Feckanič	The simulation of locomotion of four axis school robot
Roland Sipos	The simulation of locomotion of three axis school robot
Henrich Plachetka	Design of active gripper for four axis school robot
Martin Dominik	Design of active gripper for three axis school robot
Filip Filakovský	Design of automatic room lightning with external and internal light source
Zoltán Gönczi	Modeling of hydraulic system
Maroš Michna	Simulation model of rotating arm with two degrees of freedom
Tomáš Krenželák	Modeling of DC motor
Monika Brestovičová	Design of measurement device for heat array using the electronic sensors.
Jozef Seman	Diagnostic and increasing reliability of hydraulic system for Skin pas mill
Milan Škurka	Design of algorithm for control of side deviation of four-wheeled vehicle
Ladislav Vaško	Design of algorithm for control of distance between road vehicles
Marcel Krempaský	Design of algorithm for control of wheet position of mobile robot
Michal Štefanič	Design of algorithm for control of vertical position of guided missile
Anna Puzderová	Dynamic analysis of a four members mechanism analytically and dynamic analysis using the MSC Adams
Martin Beliško	Dynamic analysis of a circular cam mechanism using the MSC Adams
Anna Bencková	Simulation of logical systems with application to pneumatic logic elements
Otto Kišš	Possibility of using load cells to control amount of media in the containers
Hilda Firmentová	Computation of eigenfrequencies and eigenshapes of cylindrical shells by FEM

MASTER'S THESES:

Miroslav Palko	Modification of serial transmission Renault Clio to competition purposes in A category
Marek Vargapál	Optimization of transportation equipment for transport of material for

	production of concrete bricks
Pavol Minďar	Assessment of technical ability of supporting structure for technological equipment of production line
Martin Šmida	Using of Photostress method for identification of possible failures of elements in mechanical devices
Jaroslav Hankovský	Design of algorithm for operational modal analysis of mechanical systems
Zsolt Angyal	Design of miniature mobile robot
Viktor Kalina	Design of robot model for mobile robot competition in sumo category
Marek Maurer	Effect of unloading elevator cage for his safety
Pavol Lengvarský	Structural and modal analysis of polymers used in home devices
Dominik Barabas	Identification of potentials for decreasing of noise and vibration of dust collectors
Renáta Andrásháziová	Using of Photostress method to the design of car's structural parts
Ján Bajkó	Production of energy from mechanical vibration for charging low-energy consuming devices
Pavol Bodnár	Analysis of vehicle vertical vibration by using dynamical damper
Marek Moravič	Computer modeling of springing of moving equipment
Attila Kamenicky	Design of a horizontal 1D suspension system of a working machine platform with magnetorheological damper.
Roman Kentoš	Modelling of vertical dynamicsof the Škoda Tr21 trolleybus.
Ján Cigan	Static balancing of a robot mechanism.
Peter Čarnoký	Selected methods of compiling DPR mechanical lift system
Štefan Štrauch	Design of tool's shape for production of chosen plastic part
Kamil Dobranský	Innovation of centrifuge for geared wheels MPS 7144
Pavol Kolej	Innovation of crane model structure
Štefan Rezeš	Design of guitar playing robot
Pavol Čuj	Laboratory stabilized source controled by microcomputer
Tomáš Lipták	Design of mobile robot on the principle of hovercraft
Milan Guľa	Resistivity of porous materials with airflow
Ladislav Jakab	Analysis of stresses and deformations in container with flat bottom
Juraj Kováč	Analysis of influence of shape of container bottom to stress distribution in schell
Dušan Németh	Influence of imperfections on resistance of a thin-walled structural member
Lucia Kováčová	A methodology of experimental determination of a damping ratio in mechanical systems
Pavol Mišenda	Estimation of resistance of welded joints based on analysis by Finite Element Method
Marek Rohaľ	Study of residual stress influence on resistance of a structural member
Milan Andráši	Simulation of the dynamics of personal power lift

PhD. THESES:

Mária Kenderová	Development of experimental methods for determining the interference field stresses and strains on the automotive circuit components
Michal Binda	Using of Experimental Methods for Modal Analysis of Mechanical systems
Tomáš Harčarik	Application of methods of computer mechanics for modal analysis of mechanics systems

Martin Hagara	Investigation and development of digital image correlation methodics in solving problems of mechanical systems dynamics
Róbert Surovec	Kinematic modelling of snake like robot in horizontal plannar constrained space with using of irregularities in walls

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ Development of non - traditional experimental methods for mechanical and mechatronic systems.
- ✓ Development of computer methods and algorithms for numerical simulation and optimisation of systems.
- ✓ Methods of experimental and numerical modelling of mechatronic systems
- ✓ Using of experimental methods for development of methodology for identification and prediction of failures in supporting elements of mechanical systems.
- ✓ Stochastic processes and limit states of mechanical systems.
- ✓ Development, verification and using of modern experimental methods of mechanics.
- ✓ Design and realisation of mechatronic systems, realisation of automatic controlled systems, measurement, data acquisition and their evaluation.
- ✓ Numerical modelling of mechatronic systems.
- ✓ Research of modules for intelligent robotic systems.
- ✓ Complex modular robotic system of mid category with higher intelligence.

PROJECTS OF THE DEPARTMENT

Title of the project	**Using of methods of experimental and numerical modelling for increasing of competitiveness and innovation of mechanical and mechatronics systems**
Type of the project	APVV – applied research and development
Number of the project	APVV - 0091 - 11
Principal investigator	Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
Time period of the project	07/2012 - 12/2015
Annotation of the project	Methods of experimental and numerical modelling of mechatronic systems are significant part of acceleration of product design with substantially shorter time of introduction of product into production and on market. They support reduction of errors, more powerful and sophisticated products

	with high added value. They have nowdays important position not only in research and development, but also in technology of their production. With respect to current equipment of solution workplace by devices, hardware and software as well as personal, it is possible to transform all important results gained in laboratories into applications in specific individual products and accordingly support sector with high added value. In Slovakia and all around the world the big attention is devoted to questions of numerical modelling. The workplace of applicants has all knowledge resulting from base research and increase competitiveness of machine production and products. There will use methods of experimental modelling, especially interferential methods based on image correlation, Photostress method, method ESPI, methods of modal analysis. In the frame of project solution these methods will be used in design of metamorphic robots and robotic systems that will have ability of flexible reconfiguration of its own kinematical and functional structure and they are designed on workplace of applicants.
Title of the project	**Centre for research of control of technical, environmental and human risks for permanent development of production and products in mechanical engineering**
Type of the project	EU - OP Research and development 2620002
Number of the project	ITMS: 26220120060; OPVaV - 2009/2.1/03 - SORO
Principal investigator	Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
Time period of the project	2010 - 2013
Annotation of the project	Project is primary focused to research of control of technical, environmental and humane risk, what is directly connected with safekeeping of life environment. Modern measurement technique will enables prevention and elimination of technical and also safety and environmental risks of mechanical producing processes, as well as resulting products in several phases of their life.
Title of the project	**Research of modules for intelligent robotic systems**
Type of the project	EU - OP Research and development 2620002
Number of the project	ITMS: 26220220141; OPVaV - 2009/2.2/05 - SORO.
Principal investigator	prof. Ing. František Šimčák, CSc.
Time period of the project	01/2011 - 12/2014

Annotation of the project	Element design of experimental chain and software for numerical modelling, buying of them, building of measurement chain for tensometer system, equipment of hardware chain, developing of professional program products with possibility of using of above mentioned systems. Enhancement of measurement possibilities and stresses evaluation, residual life and verification of measured data with other methods including of natural frequency identification and other dynamical properties of system.
Title of the project	**Complex modular robotic system of mid category with higher intelligence**
Type of the project	Stimulus – Project of applied research
Number of the project	1/0006/11
Principal investigator	Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
Time period of the project	09/2010 - 08/2013
Annotation of the project	Design and developing of modular robotic systems with higher intelligence to adapt and change its properties in accordance to changed environment conditions. Project is focused to robotic used also in dangerous areas, where people cannot operate directly, but through these robotics systems.
Title of the project	**Using of experimental methods for development of methodology for identification and prediction of failures in supporting elements of mechanical systems**
Type of the project	VEGA
Number of the project	VEGA 1/0289/11
Principal investigator	prof. Ing. František Šimčák, CSc.
Time period of the project	2011 - 2013
Annotation of the project	Using of experimental methods of mechanics for development of new methodology for identification and prediction of failures in supporting elements of mechanical systems with the aim to evaluation of residual life span of machines and equipments. Development and application of new treatments in the area of strain - gage measurement, photoelasticimetry, digital image correlation and vibrodiagnostic with using of top - level measurement equipments and up to date software.
Title of the project	**Numerical modelling of mechatronic systems**
Type of the project	VEGA

Number of the project	VEGA 1/1205/12
Principal investigator	prof. Ing. Jozef Bocko, CSc.
Time period of the project	2012 - 2015
Annotation of the project	The aim of the project is creation of numerical models of mechatronics systems with a specific application. This is concerned to simulation of snake - like robot locomotion when it moves through narrow unstructured passages for purpose to perform a task such as maintenance inside pipes. The snake - like robot utilize concertina snake gait which is the most suitable for this activity in both horizontal concertina motion and vertical concertina motion. The mathematical model for numerical simulation is based on the framework of non - smooth dynamics. Moreover, the mathematical and simulation model of the snake - like robot for concertina gait is created for purpose of controller design described by an ordinary differential equation. In terms of project experimental function model of snake - like robot on the basis of theoretical knowledge for purpose comparison with numerical model will be created.
Title of the project	**Development of non - traditional experimental methods for mechanical and mechatronic systems**
Type of the project	VEGA
Number of the project	VEGA 1/0937/12
Principal investigator	Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
Time period of the project	2012 - 2015
Annotation of the project	Development of non - traditional experimental treatments of deformation and stress analysis in supporting elements of mechanical and mechatronic systems with priviledged orientation to optical methods – digital image correlation (DIC), electronic speckle interferometry (ESPI) and reflection photoelasticimetry (Photostress). Precising and enhancement of residual stress measurement and evaluation. Application of optical methods of stress fields determination in vicinity of measured point. Verification of new - developed methods of lifespan and reliability evaluation of machine and equipment design as well as design of mechanical and mechatronic systems.
Title of the project	**Influence of imperfections on resistance of structural members and load - bearing structures of machines.**
Type of the project	VEGA
Number of the	VEGA 1/0090/12

project	
Principal investigator	doc. Ing. Vladimír Ivančo, CSc.
Time period of the project	2012 - 2015
Annotation of the project	The project is focused on study of influence of imperfections on resistance of structural members of thin - walled structures. Various methods of modelling of imperfections are examined and the measure of imperfection effect is determined.
Title of the project	**Using of modern optical methods of experimental mechanics for development of knowledge basis of students of second andthird level of university education.**
Type of the project	KEGA
Number of the project	021TUKE-4/2013
Principal investigator	Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
Time period of the project	2013 - 2015
Annotation of the project	Project is oriented to the development of modern optical methods ofmechanics (procedures that use digital image correlation - DIC, electronic speckle interferometry – ESPI, transmission and reflectionphotoelasticimetry - Photostress as well as interferency of coherentlight) and their implementation into education process at the second andthird level of high school education. Above-mentioned methods areup-to-date and they are able to detect deformations, strains and stresseson the surfaces of real structures or models. Application of suchtreatments is connected with using of non-standard computer programs for evaluation data resulting from experiments and their verification bynumerical methods. Elaborated procedures will cultivate creative andinnovative thinking of students mainly in the area of structural membersoptimization as well as in evaluation of life span and reliability ofstructures. The main output of the project will be two monographs, inwhich the theoretical basics, principles and applications of individual methods will be described.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Employees and students	**Country**
František Menda, Ing.	Polytechnic University of Valencia, Alcoy Campus, Spain Transilvania University of Brasov, Romania

Erik Prada, Ing.	Institute of Automatic Control, Lodz University of Technology, Poland
Martin Schrötter, Ing.	VŠB TU Ostrava, FS, CZ

VISITS OF STAFF MEMBERS FROM FOREIGN INSTITUTIONS

Employees and students	Country
Vaňo Jaime Masiá	Polytechnic university of Valencia, Spain
Sanchis Ernesto Juliá	Polytechnic university of Valencia, Spain
Loic Malaval	Clermont - Ferrand University, France
Peguet Jonathan	
Gnezdilov Viktor, Ing.	Siberian state industrial university, Russia

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Member of Editorial Committee of Home Journals

František Trebuňa, Dr.h.c. mult. prof. Ing., CSc.

Czech and Slovak Association for Mechanics

František Trebuňa, Dr.h.c. mult. prof. Ing., CSc.

Association of Slovak Mechanical Engineers

František Trebuňa, Dr.h.c. mult. prof. Ing., CSc.

Slovak Association for Mechanics

František Trebuňa, Dr.h.c. mult. prof. Ing., CSc., František Šimčák, prof. Ing., CSc., Jozef Bocko, prof. Ing., CSc., Ingrid Delyová, Ing., PhD., Peter Frankovský, Ing., PhD., Róbert Huňady, Ing., PhD., Miroslav Pástor, Ing., PhD

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.:

Guest editor and co - ordinating the submission of special issue of American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013

Member of Editorial Committee of Foreign Journals

František Trebuňa, Dr.h.c. mult. prof. Ing., CSc.

New York Academy of Sciences

František Trebuňa, Dr.h.c. mult. prof. Ing., CSc.

IEEE Institute of Electrical and Electronics Engineers

Alexander Gmiterko, prof. Ing., PhD.

Technical Scientific Committee IMEKO Technical Mechanics

František Trebuňa, Dr.h.c. mult. prof. Ing., CSc.

International Biographical Centre Cambridge, England

PUBLICATIONS

Books:

[1] GMITERKO, Alexander -HRONCOVÁ, Darina: **Modelovanie mechatronických sústav metodológiou výkonových grafov** - 1. vyd - Košice : Strojnícka fakulta TU - 2013. - 255 s.. - ISBN 978-80-553-1539-3.

[2] TREBUŇA, František - ŠIMČÁK, František: **Spoľahlivosť prvkov tlakových sústav** - 1. vyd. - Košice : TU - 2013. - 387 s.. - ISBN 978-80-553-1537-9.

Textbooks:

[1] KELEMEN, Michal - PUŠKÁR, Michal - VIRGALA, Ivan - MIKOVÁ, Ľubica:**Meranie v mechatronike** - 1. vyd. - Košice : TU - 2013. - 146 s.. - ISBN 978-80-553-1388-7.

[2] BOCKO, Jozef - DELYOVÁ, Ingrid:**Optimalizácia mechanických sústav** - 1. vyd. - Košice : TU - 2013. - 147 s.. - ISBN 978-80-553-1535-5.

[3] BOCKO, Jozef - DELYOVÁ, Ingrid:**Mechanika**- 1. vyd. - Košice : TU - 2013. - 141 s.. - ISBN 978-80-553-1542-3.

Journals:

[1] TREBUŇA, František - ŠIMČÁK, František - HUŇADY, Róbert - PÁSTOR, Miroslav: **Identification of pipes damages on gas compressor stations by modal analysis methods** - 2013. In: Engineering Failure Analysis. Vol. 27 (2013), p. 213-224. - ISSN 1350-6307

[2] TREBUŇA, František - ŠIMČÁK, František - BOCKO, Jozef - PÁSTOR, Miroslav:**Analysis of causes of casting pedestal failures and the measures for increasing its residual lifetime** - 2013.In: Engineering Failure Analysis. Vol. 29 (2013), p. 27-37. - ISSN 1350-6307

[3] PUŠKÁR, Michal - BIGOŠ, Peter - KELEMEN, Michal - MARKULIK, Štefan - PUŠKÁROVÁ, Paula:**Method for accurate measurement of output ignition curves for combustion engines** - 2013.In: Measurement. Vol. 46, no. 4 (2013), p. 1379–1384. - ISSN 0263-2241

[4] ROSSI, Marco - PIERRON, Fabrice - ŠTAMBORSKÁ, Michaela - ŠIMČÁK, Františ ek:**Identification of the Anisotropic Plastic Behaviour of Sheet Metals at Large Strains** - 2013.In: Experimental and Applied Mechanics : Volume 4. - New York : Springer, 2013 P. 229-235. - ISBN 978-1-4614-4226-4 - ISSN 2191-5644

[5] VIRGALA, Ivan - KELEMEN, Michal: **Experimental friction identification of a DC motor** - 2013.In: International Journal of Mechanics and Applications. Vol. 3, no. 1 (2013), p. 26-30. - ISSN 2165-9281

František Trebuňa, Dr.h.c. mult. prof. Ing., CSc.

[6] VIRGALA, Ivan - FRANKOVSKÝ, Peter - KENDEROVÁ, Mária: **Friction Effect Analysis of a DC Motor** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 1 (2013), p. 1-5.

[7] KELEMENOVÁ, Tatiana - KELEMEN, Michal: **Miniature actuators and scaling effect** - 2013.In: Journal of Mechanics Engineering and Automation. Vol. 3, no. 6 (2013), p. 393-396. - ISSN 2159-5275

[8] KELEMEN, Michal - COLVILLE, Daniel John - KELEMENOVÁ, Tatiana - VIRGALA, Ivan - MIKOVÁ, Ľubica: **A Concept of the Differentially Driven Three Wheeled Robot** - 2013.In: International Journal of Applied Mechanics and Engineering. Vol. 18, no. 3 (2013), p. 687-698. - ISSN 1734-4492

[9] PRADA, Erik - GMITERKO, Alexander - BALOČKOVÁ, Lenka: **Notional proposal of a mechatronic system of an artificial (robotic) snake and its electromagnetic actuator** - 2013.In: International journal of Science Commerce and Humanities. Vol. 1, no. 8 (2013), p. 77-85. - ISSN 2052-6164

[10] DELYOVÁ, Ingrid - HRONCOVÁ, Darina - SIVÁK, Peter - BELIŠKO, Martin: **The Dynamic Analysis of Cam Mechanism**- 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 266-270. - ISSN 2328-4110

[11] HRONCOVÁ, Darina - DELYOVÁ, Ingrid - FRANKOVSKÝ, Peter - PUZDEROVÁ, Anna: **Dynamic Analysis of the Shaping MachineMechanism** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 370-373. - ISSN 2328-4110

[12] FRANKOVSKÝ, Peter - HRONCOVÁ, Darina - DELYOVÁ, Ingrid - VIRGALA, Ivan: **Modeling of Dynamic Systems in Simulation Environment MATLABSimulink - SimMechanics** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 282-288. - ISSN 2328-4110

[13] FRANKOVSKÝ, Peter - ZUBKO, Pavol - OSTERTAG, Oskar - PAPACZ, Władysław - ŠMIDA, Martin: **Application of PhotoStress Method in the Analysis of Stress Fields Around a Notch** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 329-334. - ISSN 2328-4110

[14] TREBUŇA, František - ŠIMČÁK, František - HUŇADY, Róbert: **Experimental vibration analysis of railcar for spent nuclear fuel transportation** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 423-426. - ISSN 2328-4102

[15] HUŇADY, Róbert - ŠIMČÁK, František - TREBUŇA, František: **Modal analysis of exhaust fan impeller** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 457-460. - ISSN 2328-4102

[16] MIKOVÁ, Ľubica - ČURILLA, Miloslav: **Possibility of the Kinematics Arrangement of a Mobile Mechatronic System** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 390-393. - ISSN 2328-4110

[17] FRANKOVSKÝ, Peter - VIRGALA, Ivan - HUDÁK, Peter - KOSTKA, Ján: **The use the of digital image correlation in a strain analysis** - 2013.In: Applied Mechanics and Engineering. Vol. 18, no. 4 (2013), p. 1283-1292. - ISSN 1425-1655

[18] MIKOVÁ, Ľubica - KELEMEN, Michal - ČURILLA, Miloslav: **Mathematical modeling of wheeled mobile robots** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 246-250. - ISSN 2328-4110

[19] LENGVARSKÝ, Pavol - BOCKO, Jozef: **Theoretical basis of modal analysis** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 173-179. - ISSN 2328-4102

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[22] MENDA, František - ŠARGA, Patrik - TREBUŇA, František: **Edge baffles automation** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 374-377. - ISSN 2328-4102.

[23] GMITERKO, Alexander - LIPTÁK, Tomáš: **Motion capture of human for interaction with service robot** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 212-216. - ISSN 2328-4102

[24] LIPTÁK, Tomáš - MIKOVÁ, Ľubica - KELEMEN, Michal - PRADA, Erik: **Experimental verification of thrust model blower** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 417-422. - ISSN 2328-4102.

[25] HAGARA, Martin - SCHRÖTTER, Martin: **The printed patterns investigation for the purposes of deformation analysis performed by digital image correlation system** - 2013.In: American Journal of Mechanical Engineering. Vol. 1, no. 7 (2013), p. 185-189. - ISSN 2328-4102

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Staff

- Professors: 2
- Assoc. Professors: 2
- Assist. Professors: 2
- Researchers: 4
- PhD. Students: 7 internal

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
06/2013	Trends in biomedical engineering 2013, Vysoké Tatry

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Prosthetics and Orthotics**

Number of the students (till 31.12.2014), on the study programs guaranteed by department 35.

Number of the graduates (2013/2014), on the study programs guaranteed by the department:

- 27 students in the internal form of bachelor study
- 8 students in the external form of bachelor study

Master's degree:

- **Biomedical engineering**

Number of the students (till 31.12.2014), on the study programs guaranteed by department 14:

Number of the graduates (2013/2014), on the study programs guaranteed by the department:

- 14 students in the internal form of engineering study

GRADUATE PROFILE

BACHELOR'S PROGRAMS (Bc.)

Prosthetics and Orthotics

The priority target of study program Prosthetics and Orthotics is preparation of university qualified medical workers, who are allowed, within health and rehabilitation care on the indication base of doctor, to design and repair orthotics and prosthetics equipment in whole range of biomedical engineering. This worker will be able to effectively collaborate with medical or non - medical workers in area of health and rehabilitation care.

MASTER'S PROGRAMS (Ing.)

Biomedical Engineering

The aim of the study is to realize theoretical knowledge and practical experiences in such an amount, to have absolvent as independent working partner in engineering and medical process:

- for application of actual technical, mathematical and physical knowledge about new biomedical and instrumental techniques,
- in the area of research, development and utilization of the automatic and biomedical systems for the decision features support.

PhD. PROGRAMS (PhD.)

Biomedical Engineering

Doctoral program is focused on deepening and extension of theoretical knowledge gained in the previous study, to learn the scientific working methods and experimental habits and skills needed for scientific work in the biomedical engineering.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

- ✓ Architecture of Prosthetic and Orthotic Resources
- ✓ Basics of Biomedical Engineering
- ✓ Basics of Clinical Prosthetics and Orthotics
- ✓ Basics of Law
- ✓ Basics of Rehabilitation Engineering
- ✓ Biocybernetics
- ✓ Biomaterials
- ✓ Biomeasurement
- ✓ Biomechanics in Prosthetics and Orthotics
- ✓ Biomechanisms
- ✓ Biomedical Engineering I.
- ✓ Biomedical Engineering II.
- ✓ Calceotics
- ✓ Clinical Investigations Technics
- ✓ Courses of Social Science
- ✓ Diploma Project
- ✓ Diploma Project (DP)
- ✓ Elements of Anatomy and Physiology
- ✓ Ergonomic and Kinesiology Measurements
- ✓ Ergonomics Measurements
- ✓ Ethics in Medicine
- ✓ Final Project
- ✓ Final Work
- ✓ Functional Anatomy
- ✓ Goniometrics of Human Body
- ✓ Human Biomechanics
- ✓ Human Engineering
- ✓ Human Motion Analysis
- ✓ Human Tissue Systems
- ✓ Introduction in Biophysics
- ✓ Introduction in to Prosthetics and Orthotics
- ✓ Live and Work Conditions of Handicap People
- ✓ Mechanical Metrology
- ✓ Mechatronics for Biomedical Engineering
- ✓ Medical Devices Design
- ✓ Medical Devices I.
- ✓ Medical Equipment
- ✓ Medical Psychology
- ✓ Medical Systems
- ✓ Motion System
- ✓ Operation Technics
- ✓ Orthopedic Diagnostic and Treatment
- ✓ Parts and Modules of Medical Devices
- ✓ Physiology and Pathophysiology
- ✓ Prosthetics and Orthotics
- ✓ Prosthetics Physiotherapy
- ✓ Rehabilitation
- ✓ Rehabilitation Technics
- ✓ Semestral Project
- ✓ Sensor Systems for Biomedical Engineering

- ✓ Supporting Technologies for Handicap People
- ✓ Team Work
- ✓ Terminal Project

GRADUATE THESES

BACHELOR'S THESES:

Prosthetics and Orthotics (- 2012/13)

Simona Bodnárová	Changes of the body posture by transhumeral amputation
Helena Budzáková	Activity-specific upper limb prostheses
Marek Čontošfalský	Utilization of full body 3D scanner for fashion industry
Zuzana Hovancová	Leg orthosis for neuromuscular diseases
Ivana Huňadyová	Positioning devices for a sitting position support
Žofia Kalináčová (rod. Orságová)	Biomechanics of walking in prosthesis
Filip Kecer	Operation principle and applications of microsensors in implantology
Patrik Kölbel	Real-time contact pressure measurement by utilization of matrix tactile sensors (MTS)
Svetlana Králová	Taping in orthopedics and sports medicine
Stanislav Kušmírek	Modern fabrication methodologies in stomatology
Pavol Langer	Othotic techniques in veterinary practice
Matúš Lieskovský	Preparing of semi-finished for manufacture of orthosis from low-temperature thermoplastics
Margita Markovičová	Posture assessment of selected dancers group by 3D scanner
Zuzana Matejčeková	Compensation devices used for partial paralysis of upper extremities
Ján Naď	Measurement technics for human body by TC2 scanner
Simona Navalanyová	Evaluation of hyperlordosis and hyperkyphosis by 3D body scanner
Maroš Olejár	Parameters and modifications of wheelchairs for sport and dance
Marek Regula	Testing methodics for grip of upper limb prosthetic terminal devices
Peter Sedlačko	Testing of parameters of piezoresistive matrix tactile sensors (MTS) in orthotics
Martin Soták	Data digitization in dentistry
Viktória Stanová	Lower extremities prosthesis for infant to preschool age users
Valéria Sztéhliková	Technological process of dental orthosis manufacturing and commonly used materials
Marek Ševčík	Somatotype evaluation of selected sports groups

Katarína Šromovská	The manufacturing technology of individual prosthesis and epithesis
Jakub Štupák	Cutting, surface and heat treatment of titanium implants after 3D printing processes
Gabriel Tegdeš	Verticalization positioning and rehabilitation devices
Stanislav Žakarovský	Upper extremities prosthesis for infant to preschool age users
Mariana Brosová (rod. Haburajová)	Upper limb prostheses sockets
Anna Gajdošová (rod. Hancová)	Design solutions of crutches
Maroš Hajduk	Three-dimensional printing (3DP) of artificial tissues
Miloš Horňák	Evaluation of posture disorders
Denisa Mišľanová (rod. Lábajová)	Fabrication methods of trunk orthosis
Eva Schvarzbacherová	Utilization of new technologies in dental laboratory
Eva Tomková	Usage of CPM devices in joints rehabilitation
Marianna Maťašová	Digitalisation of spinal orthoses

MASTER'S THESES:

Biomedical engineering

Lucia Brestovičová (rod. Kacvinská)	The utilisation of robots in rehabilitation of after stroke patients
Mária Chalabalová (rod. Šurkalová)	Biocompatibility testing of surface treatment of titanium implants
Jana Kališová	Mechanical testing of soft animal tissue
Mária Kecerová	Verification of parameters for selected 3D scanners in prosthetics and orthotics
Miroslav Kohan	Application of full body 3D scanner in biomechanics
Jakub Kuzma	Assessment of anthropometric parameters by using the 3D scanner
Lívia Maťašová (rod. Poľová)	Verification of eye glaucoma by tonometer and perimeter
Marcel Modrák	The Analysis of Gait Dynamics Stereotype by EMG
Petronela Palková	Proposal for Diagnostic procedures in selected parts of the musculoskeletal system using Medical thermography
Janka Pavelová	Post-injury leg conditions rehabilitation processes
Andrej Plž	Mechanical testing of spinal implants
Irenej Poláček	Application of sensoric microwires into the surface structures of titanium implants
Dominika Sabová	Modeling of difusion of leak solutions throught the membranes
Tatiana Veselá	The utilization of skenning system in prosthetics and orthotics

HABILITATION THESIS:

Hudák Radovan	Diagnostics of biomechanical relations in application of special orthoses
Kelemenová Tatiana	Specific aspects of indirect measurement in identification of coefficients of friction from the viewpoint of achievable measurement uncertainties.

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ Technology in the diagnosis of components and modules Computerized tomography (CT).
- ✓ Center for research of control of technical, environmental and human risks for permanent development of production and products in mechanical engineering.
- ✓ Excellence center of biomedical technology research.
- ✓ Research of new diagnostic methods in invasive implantology.
- ✓ New strategy for effective measurements with coordinate measuring machines with multi sensor systems.
- ✓ Optimization of technology method of orthotics and prosthetics with infrared thermography diagnostic.
- ✓ Virtual laboratory for 3D coordinate measurement.

Research characteristics:

The research of the Department of Biomedical Engineering and Measurement is oriented to:

- ✓ Technology in the diagnosis of components and modules by computerized tomography (CT).
- ✓ New diagnostic methods in invasive implantology.
- ✓ Optimization of technology methods of orthotics and prosthetics with infrared thermography diagnostic.
- ✓ New strategy for effective measurements with coordinate measuring machines with multi sensor systems.

PROJECTS OF THE DEPARTMENT

Title of the project	**Center for research of control of technical, environmental and human risks for permanent development of production and products in mechanical engineering**
Type of the project	OPVaV ERDF, Centre of Excellence
Number of the project	26220120060
Principal investigator	Jozef Živčák, Dr.h.c. prof. Ing., PhD.
Time period of the project	2010 - 2013

Title of the project	**Excellence center of biomedical technology research**
Type of the project	Centre of Excellence
Number of the project	26220120066
Principal investigator	Jozef Živčák, Dr.h.c. prof. Ing., PhD.
Time period of the project	2010 - 2013

Title of the project	**Research of new diagnostic methods in invasive implantology**
Type of the project	STIMULUS for VaV MŠ
Number of the project	3625/2012 - 11
Principal investigator	Jozef Živčák, Dr.h.c. prof. Ing., PhD. CEIT - KE
Time period of the project	2010 - 2013

Title of the project	**Rabbit diseases and farming**
Type of the project	KEGA
Number of the project	018UVLF - 4/2011
Principal investigator	Lucia Bednarčíková, Ing. PhD., Ondrejková, MVDr.
Time period of the project	2011 - 2013

Title of the project	**New strategy for effective measurements with coordinate measuring machines with multi sensor systems**
Type of the project	VEGA
Number of the project	1/0085
Principal investigator	Miroslav Dovica, prof. Ing., PhD.
Time period of the project	2012 - 2014
Annotation of the project	The project is concerned about the research of optimal choice of measurement strategies on the coordinate measuring machines using multi sensor systems. Strategy model designed with respect of cost - effectiveness as the one of the main criteria for strategy of measurement. Philosophy of effective measurement means to measure as precise as it is necessary and not as precise as possible. During the

measurements, tactile and contactless sensor systems will be used and they determine the partial prices of particular sub - phases of measurement. Furthermore, measurement uncertainty, that include an estimate of geometric errors on the coordinate measuring machines as well as speed of measurements, will be examined. The measurement will be performed on the coordinate measuring machine with tactile and camera sensor systems and on a computed tomography.

Title of the project	**Virtual laboratory for 3D coordinate measurement**
Type of the project	KEGA
Number of the project	005STU/4 - 2012
Principal investigator	Miroslav Dovica, prof. Ing., PhD.
Time period of the project	2012 - 2014
Annotation of the project	The project is a continuation of a previous project in the field of 3D measurement. Laboratory responds to the requirements of metrological practice and reduces the lack of knowledge and skills students are required in handling sophisticated measuring techniques in mechanical engineering as well as in the automotive industry. The project is designed for students of first, second and third degree university students who have basic knowledge of engineering metrology. Emphasis is placed on the use of their knowledge for the purpose of measuring and assessing quality of complex shape of machine parts produced by conventional and progressive technologies.

Title of the project	**Educational center of embryology and micromanipulation techniques.**
Type of the project	KEGA
Number of the project	011UPJŠ - 4/2012
Principal investigator	Michalíková Monika, Ing., PhD.
Time period of the project	2012 - 2014
Annotation of the project	Assisted reproduction is one of the youngest medical branches, but from 1978 it gives the chance to many couples to have genetically own child. The incidence of infertility rises and so rises also the need for more IVF cycles, each year. The professionals in biological sciences are not satisfactory informed in assisted reproduction, and until now there is no educational center for assisted reproduction embryology in Slovakia. The establishment of such educational center for

	embryology and micromanipulation techniques would give the chance to student of biological sciences to familiarize with this medical branch. It would also give chance to achieve the practical skills that are necessary for the embryologist practice.
Title of the project	**Design of the construction configuration and architecture of intelligent implants.**
Type of the project	VEGA
Number of the project	1/0515/13
Principal investigator	Jozef Živčák, Dr.h.c. prof. Ing., PhD.
Annotation of the project	The most common way in compensation of lost tissues is their implantation, during which is possible to replace lost tissues from own resources. (Autoimplant) or in case of hard tissues (bones) are used in significant rate implants from CoCrMo steels and titanium materials. Regarding to the fact that these areas are often very exposed in terms of strain is this resulting repeatedly to reimplantation of implant because of its mechanical demage or inflammatory processes. Elements of the intelligence applied in design of implants have to provide the information about the implant condition, current status of implant as a complex or selected part of the implant. Given the fact that it is a new technology the research of properties and range of their utilization in selected types of material is needed. The advantage of selected sensors is noninvasive and contactless way of measurement of expected parameters after implantation in human body, which will secure the prediction of implant collapse and reduction of the health risk.
Time period of the project	2013 - 2016
Title of the project	**Innovation of educational program in study field of general medicine with focussing on problematics of reproductive medicine.**
Type of the project	KEGA
Number of the project	012UPJŠ-4/2011
Principal investigator	Tóth Teodor, Ing., PhD./ Ostró Alexander, prof., MUDr., CSc.
Time period of the project	2011 - 2013
Title of the project	**Elements package for improvement and innovation in education at TUKE**

Type of the project	OPVaV
Number of the project	26110230070
Principal investigator	Jozef Živčák, Dr.h.c. prof. Ing., PhD.
Time period of the project	2013

Title of the project	**Medical university science park in Kosice (Medipark Kosice)**

Type of the project	OPVaV
Number of the project	26220220185
Principal investigator	Jozef Živčák, Dr.h.c. prof. Ing., PhD.
Time period of the project	2013 - 2015

Title of the project	**Implementation of new technologies in design and fabricationofimplants in biomedicalengineering and relatedscientificfields**

Type of the project	KEGA
Number of the project	036TUKE-4/2013
Principal investigator	Hudák Radovan, doc., Ing., PhD.
Annotation of the project	Recently, in the production of implants, new technologies using „additive manufacturing“ , i.e. adding material layer by layer, have been setting the trends. These technologies are more economical, environmentally friendly and they enable to create implants with shape variability, implants with porous structure but also tailor-made implants for different parts of human body. One of the first materials used for the additive manufacturing (AM) were plastics processed by various technological processes, e.g. stereolitography (SLA), fused deposition modeling technology (FDM), 3D printing, selective laser sintering (SLS) and the like. There are new possibilities of AM being introduced by using the technologies which enable to process metal powder. Mostly, it is direct metal laser sintering (DMLS), known since 1994, electron beam melting technology (EBM) that was also developed in the nineties of the last century and LENS technology (Laser Engineered Net Shaping). These technologies use an entry graphic format (especially STL) that requires a precise software preparation (CAD/CAM). The objective of the proposed project is creation

	of multi-media materials and e-learning course that will contain information about the new technologies and software support in the creation of implants in a form of video and photo documentation, animations and written educational materials. The presented multi-media content will be used in teaching of various subjects within Biomedical engineering and also within other departments at various faculties and science interdisciplines that integrate technical and medical science.
Time period of the project	2013 - 2015

Type of the project	KEGA
Number of the project	031TUKE-4/2013
Principal investigator	Michalíková Monika, Ing., PhD.
Annotation of the project	The primary aim of this project is to prepare and publish educative orthotics and prosthetics handbook in the study program prosthetics and orthotics, for students in bachelor-degree study in FME TUKE in Kosice. Educational handbook is built on the analysis of the latest knowledge in the field of prosthetic and orthotic. The same knowledge base will be the used for training DVD containing multimedia courses. The secondary aim is speciazed laboratory completion, with a focus on teaching the correct understanding of thermal - technologiacal processes in manufacturing, construction and application of prosthetic and orthotic devices, optimization of working with materials used in this areas.
Time period of the project	2013 - 2015

VISITS OF STAFF MEMBERS FROM FOREIGN INSTITUTIONS

Employees and students	**Country**
Kneppo Peter, prof. Ing., DrSc.	ČVUT Prague, Faculty of Biomedical Engineering
Siemeniako Franciszek, prof. DSc., PhD Eng. Dean	Politechnika Bialostocka, Poland

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Member of scientific boards of domestic and foreign magazines
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

A member of the journal"Metrológia a skúšobníctvo"(Metrology and Testing) – Slovak Republic
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

A member of the journal Acta Mechanica Slovaca – Slovak Republic
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Member of the board of home magazine Trauma ISSN 1335 - 8588, Slovak Republic

Chairman of the National Grant Agency KEGA MŠ VVaŠ, Slovak Republic.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Chairman of Committee TC 18, Slovak Republic.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Member of scientific boards: TU SjF Košice, TU Košice, PU FZO Prešov, PU Prešov, TU SjF Žilina, ČVUT FBI Prague, KU – TF Ružomberok, FŠ PU v Prešove, SMU Bratislava.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

The main course supervisor of Biomedical Engineering field.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

The main course supervisor of scientific discipline Bionika a biomechanika.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

The main course supervisor for the habilitation rights and inauguration in the field of Biomedical Engineering.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Chairman of FOK (faculty committee) in the field of Biomedical Engineering.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Member of the Privy Council for project preparation.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

Member of scientific boards of domestic and foreign magazines.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Member of the board of a foreign magazine Lékař a technika (The Clinician and Technology) ISSN 0301 - 5491 (Czech Republic)
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Acta Mechanika a automatika Poland Reflexotherapy (Poland)
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Representative of Slovak Republic and Biomedical engineering field in a membership of Technical University of Košice v EAMBES – Europen Alliance for Medical and Biological Engineering Science.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Member IFSA No. 20040120 - 001 – International Frequency Sensor Association.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Representative of Slovak Republic v IMEKO – TC 18 – Measurement of Human Functions.
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

Member of the scientific committee IOP – „Inžineria ortopedično protetična“ (Poland).
Jozef Živčák, Dr.h.c. prof. Ing., PhD.

PUBLICATIONS

BOOKS:

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[2] Jozef Živčák, Teodor Tóth, **Meranie intra-abdominálneho tlaku** / , 2013. In: Košice: Technická univerzita v Košiciach: 2013, 132 s. /978-80-553-1602-4/

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[5] Tatiana Kelemenová, Michal Kelemen, **Miniature actuators and scaling effect** / - 2013.In: Journal of Mechanics Engineering and Automation. Vol. 3, no. 6 (2013), p. 393-396. - ISSN 2159-5275

[6] Michal Kelemen ... [et al.], **A Concept of the Differentially Driven Three Wheeled Robot** / - 2013.In: International Journal of Applied Mechanics and Engineering. Vol. 18, no. 3 (2013), p. 687-698. - ISSN 1734-4492

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biomedicínskom výskume / - 2013.In: Transfer inovácií. Č. 26 (2013), s. 223-225. - ISSN 1337-7094

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Využitie maticových tlakových senzorov (MTS) v protetike a ortotike / - 2013.In: Novus Scientia 2013 : 12. ročník medzinárodnej vedeckej konferencie doktorandov strojníckych fakúlt technických univerzít a vysokých škôl : 10. apríl 2013, Košice. - Košice, TU, 2013 S. 1-5. - ISBN 987-80-553-1380-1

[11] Martin Šarik, Radovan Hudák, Jozef Živčák , **Analýza tepelných procesov pri priamom laserovom sinterovaní titánového prášku** / - 2013.In: Novus Scientia 2013 : 12. ročník medzinárodnej vedeckej konferencie doktorandov strojníckych fakúlt technických univerzít a vysokých škôl : 10. apríl 2013, Košice. - Košice : TU, 2013 S. 1-6. - ISBN 978-80-553-1380-1

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PATENT:

[1] Stanislav Slosarčík, Miroslav Dovica, Pavol Cabúk, **Chladiace kanáliky na rozhraní korundový substrát - 3D LTCC štruktúra** / Wlodzimierz Kalita, Marius Weglarski, 2013. In: SR: Úrad priemyselného vlastníctva SR: 2013, 4 s.

Department of Automation, Control and Human Machine Interactions

Contact

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Staff

- Professors: **1**
- Assoc. Professors: **4**
- Assist. Professors: **0**
- Researchers: **0**
- PhD. Students: **7 internal, 7 external**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
2/2013	Int. Conference ARTEP2013, Stará Lesná, Slovakia. Co-organising of the conference.
6/2013	Final examinations of Master students in “Automation”
7/2013	Workshop “Rehabilitation Robotics” – Organising of workshop
7/2013	Trendy v biomedicínskom inžinierstve 2013, Podbanské, Slovakia. Organising of the conference.

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

No study program at bachelor level

Master's degree:

- **Automation and Control of Machines and Processes (ACMP)**

PhD. degree:

- **Automation and Control (AC)**

Number of the students (till 30. 10. 2013)
on the study programs guaranteed by the department:
first year of study:
– 7 internal form of study

second year of study:
– 9 internal form of study

Number of the graduates (2012/2013)
on the study programs guaranteed by the department:

– 16 students in the internal form of engineering study

GRADUATE PROFILE

MASTER’S PROGRAMS (Ing.)

Automation and Control of Machines and Processes

Graduates of this study program have good background in the theory of automation and control including artificial intelligence algorithms. They are prepared to design automated control and information systems independently, implement and operate them. Theoretical knowledge and practical skills allow them to work in industry, ICT field, design of products/services, and in research too. Graduates have experience with CAD systems, design and simulation tools for FESTO automation, automation of products or services using mobile technologies, wireless sensor networks, programming and implementing PLC or other tools of automatic control.

PhD. PROGRAMS (PhD.)

Automation and control

Postgraduates obtain wider theoretical knowledge in the field of informatics, automatic control, communication and artificial intelligence. Their get skills in work with PLM systems, modelling and simulation systems, wireless sensors networks design, ambient intelligence, tele - monitoring and control, fundamentals in experimental work and data analysis. Postgraduates are able to work in research and developmental institutions, in management positions in the field of sophisticated automated production technologies and as staff at universities.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Automation and Control of Machines and Processes

- ✓ Application of Neural Networks
- ✓ Automated Production Systems
- ✓ Automatic Control Theory I.
- ✓ Automatic Control Theory II.
- ✓ Automatic Control Tools I.
- ✓ Automatic Control Tools II.
- ✓ CIM and Information Security
- ✓ Computer Systems and Networks
- ✓ Control of Complex Systems
- ✓ Electrical Technology for Automation
- ✓ ICT for Ambient Intelligence
- ✓ Identification, Modelling and Simulation of Systems Logic Control
- ✓ Industrial Control Systems
- ✓ Reliability and Safety of Technical Systems
- ✓ Information and Control Systems
- ✓ Master Thesis
- ✓ Mechatronic Systems
- ✓ NC Machines and Systems
- ✓ Programming Languages and Tools
- ✓ Semestral Project
- ✓ Semestral Project I.
- ✓ Sensor Systems
- ✓ Servo Systems
- ✓ Systems with Artificial Intelligence
- ✓ Technical Measurement and Diagnostic

List of subjects guaranteed by the department at another programs of Mechanical Engineering Faculty

- ✓ Automation of Industrial Technologies
- ✓ Bio - cybernetics
- ✓ Electrical Drives
- ✓ History of Science and Technology
- ✓ History of Technology
- ✓ Information and Management Systems
- ✓ Intelligent Manufacturing Systems
- ✓ Introduction to CAD Solid Modelling
- ✓ Management of Products Development
- ✓ Medical Electronics

GRADUATE THESES

MASTER'S THESES:

Automation and Control of Machines and Processes

Zuzana Bakaľarová	Experimental verification of a rehabilitation robot
Jana Barčišová	Web as a tool to support of learning
Michal Fecko	The automation of the identification process using biometric data
Lukáš Jančoška	Processing data from sensor networks and their evaluation
Matúš Keczer	Automated control systems using programmable smart relay Zelio Logic 2
Lukáš Lisy	Experimental verification of gyroscopic device for 3D motion monitoring
Katarína Niskačová	Automation treatment of feed water for steam boilers
Veronika Ondirová	Design of active feedback measuring chain for rehabilitation robot
Róbert Rákay	Automatic stacker integrated into a flexible mounting system FMS 500
Matúš Teplica	Using virtual reality to optimize workstation with selected Tecnomatix modules

PhD. THESES:

Automation and Control

ANDRÁŠOVÁ, Marianna	New technologies for creating of intelligent environment for seniors households
BALOG, Róbert	Optimalisation of mechatronics and ergonomics parameters of rehabilitation shoe
BIROŠ, Ondrej	Sensor networks in automation and household monitoring with wireless technologies utilisation
GORLICKÝ, Miroslav	Mechatronics rehabilitation device controlled by chaotic signals
JOBBÁGY, Boris	Development of robotics devices with pneumatic muscles for upper limb rehabilitation
KARCHŇÁK, Ján	Inertial sensors in monitoring of physical activities and events
MAXIM, Marek	The potential and application of a high - end CAD
MORE, Marcel	The use of intelligent methods in control of rehabilitation robots with the force feedback
OLEJNÍK, Matej	Mobile communication interfaces in industry and services
ŐHLSCHLÄGER, Kamil	The UI using in evaluation of sensor networks in the monitoring and management of industrial processes and services
PETRÍK, Stanislav	Modelling, control and simulation of product life - cycle
MOUSA, Salah Alfitory	Multiagent networks in monitoring and control of industrial processes and services using wireless

	technology
SAMANEH, Ihab	Sensor networks for mobile systems
SZERDIOVÁ, Lenka	Verification of the effectiveness of seniors walk training with rehabilitation mechatronic shoes

RESEARCH AT THE DEPARTMENT

Area of research:

Automation and Control

- ✓ Automation and control in industry and services.
- ✓ Application of artificial intelligence methods for the identification, modelling, simulation and control of non - linear systems and biometrics.
- ✓ Design and modelling of man - machine communication interface.

Research characteristics:

Automation and Control

Department perform scientific research, particularly in these areas: automation and control in industry and services, application of artificial intelligence methods for the identification, modelling, simulation and control of non - linear systems and in biometrics, modelling and communication interface man – machine, wireless sensor networks, tele - monitoring and control, ambient intelligence, rehabilitation robotics, ICT services and home automation, e - Accessibility and Autonomy.

Areas of expertises:

Automation and Control

- ✓ automation and control in industry
- ✓ wireless sensor networks and actuators
- ✓ automated products and services in human fields
- ✓ human motion analysis
- ✓ ambient intelligence and domestic automation
- ✓ artificial intelligence methods applications for identification, modelling, simulation and control of nonlinear systems and biometrics
- ✓ modelling and development of human - machine interfaces
- ✓ switched reluctance motor control

PROJECTS OF THE DEPARTMENT

Title of the project	**Research and development of the Intelligent non - conventional actuators based on artificial muscles**
Type of the project	OP Research and Development, Implementation of knowledge and technologies obtained by research and development
Number of the project	ITMS 26220220103

Principal investigator	doc. Ing. Ján Piteľ, PhD.
Time period of the project	10/2010 - 09/2013
Annotation of the project	The expected project output is the design and implementation of intelligent artificial muscle - based actuator and its technical documentation in such a way that it is be possible to use it for manipulation and rehabilitation tasks in practice. The actuator shall be able to adapt to varying parameters in controlled process using sophisticated intelligent control techniques and methods. Another project output is the design of progressive and energetically cost - effective artificial muscle - based manipulation and rehabilitation devices with positive impact on: - productivity of manipulation processes in manufacturing, - rehabilitation process resulting in better health of patients after rehabilitation and decreased manual demands on rehabilitation workers.

NATIONAL PROJECTS

Title of the project	**Theoretical principles, methods and tools for senior's mobility diagnostics and rehabilitation**
Type of the project	Grant project VEGA
Number of the project	1/1162/11
Principal investigator	prof. Ing. Dušan Šimšík, PhD.
Time period of the project	01/2011 - 12/2013
Annotation of the project	The main aim of this project is to develop the complex diagnostical and rehabilitation system with prevention impacts on decreasing of risk of seniors falls and their cosequences. The core of the solution is an analysis of theoretical principles and development of new tools and services based on qualitative and objective quantitative methods. End users are health care proffesionals from rehabilitation departments, geriatrics centers, retirement houses, fitneess centres, and individual users - seniors. Rehabiliation system is supported by fall identification system and emergency alarm for household of elderlies living alone..

INTERNATIONAL PROJECTS

Title of the project	**ASPIRE – Access to society for people with individual requirements**
Type of the project	TEMPUS IV
Number of the	530345 – TEMPUS – 1 – 2012 – 1 – GE – TEMPUS – JPHES

project	
Principal investigator	prof. Ing. Dušan Šimšík, PhD.
Time period of the project	10/2012 – 9/2015
Annotation of the project	ASPIRE program aims to foster the rights of individuals with special needs to access education and enjoy the right of participation in everyday society, to combat discrimination of the individuals with special needs by instilling awareness and acceptance in society as in line with Bologna Process and the UN Convention on the Rights of Persons with Disabilities.

Title of the project	**Enable - network of ICT supported learning for disabled people**
Type of the project	GRUNDTVIG
Number of the project	518537-LLP-1-2011-1-SI-GRUNDTVIG-GNW
Principal investigator	prof. Ing. Dušan Šimšík, PhD.
Time period of the project	11/2011 – 10/2014
Annotation of the project	Disabled people experience significant barriers to social participation and accessing education and employment. Many of them already use ICT to overcome the barriers they would otherwise face. However, ICT can be both an enabler which increases access and participation (opportunities) and a source of additional barriers, depending on how its design and implementation. An ENABLE network of 16 European Partners and four third country partners will use electronic networking tools to gather information and investigate the ICT support lifelong learning by disabled adults. Three stages will correspond to three main implementation work packages: data gathering; data organisation, evaluation and categorisation; and data application.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Power machines and equipments

Employees and students	**Country**
Šimšík Dušan, prof. Ing., PhD.	USA, Ireland
Galajdová Alena, doc., Ing., PhD.	USA, Ireland, Armenia
Biroš Ondrej, Ing.	Italy
Líška Ondrej, doc. Ing., PhD.	Greece, Czech Republic
Šeminský Jaroslav, doc. Ing., PhD.	Czech Republic

VISITS OF STAFF MEMBERS FROM FOREIGN INSTITUTIONS

Employees and students	Country
Thomova Zora, prof., PhD.	USA
Tariq Rahman, Dr.	USA
Annraoi de Paor, prof.	USA
Stonišová Mariana, Mgr. Bc.	Czech Republic

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Member of SBMI committee - (Society for Biomedical Engineering and Medical Informatics)

Dušan Šimšík, prof. Ing., PhD.

Memberof SASI (Slovak Association of Mechanical Engineers)

Dušan Šimšík, prof. Ing., PhD.

Member of SSAKaI (The Association of Slovak Scientific and Technological Societies)

Dušan Šimšík, prof. Ing., PhD.

Member of SLS (Slovenská lekárska spoločnosť – odborná spoločnosť pre fyziatriu, balneológiu a liečebnú rehabilitáciu)

Dušan Šimšík, prof. Ing., PhD.

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

Member of Int. committee IMEKO TC 17 – Measurement in robotics
Member of the Board and National coordinator of AAATE - Association for the Advancement of Assistive Technology in Europe
Chairman of ICTA Europe – International Commission on Technology and Accessibility, Subcommision of Rehabilitation International (RI); member of RI Executive Commission
National Contact of EDEaAN – European Design for All e - Accessibility Network;
National Contact of EASTIN – European Assistive Technology Information Network
Member of BEL – Biomechanics European Laboratory
Dušan Šimšík, prof. Ing., PhD.

Member of AAATE - Association for the Advancement of Assistive Technology in Europe;
Secretary of ICTA Europe – International Commission on Technology and Accessibility, Subcommision of Rehabilitation International (RI);
Member of EDEaAN – European Design for All e - Accessibility Network;
Member of EASTIN – European Assistive Technology Information Network;
Member of BEL – Biomechanics European Laboratory.
Alena Galajdová, Ing., PhD.

PUBLICATIONS

Textbooks

[1] ŠIMŠÍK, Dušan - GALAJDOVÁ, Alena: **Identifikácia osôb na základe dynamickej stopy chôdze** - 2013. In: Trestné právo, kriminalistika, bezpečnostné vedy a forenzné disciplíny v kontexte kontroly kriminality. - Plzeň : Vydavatelství a nakladatelství Aleš Čeněk, 2013 P. 221-250. - ISBN 978-80-7380-440-4 Czech Republic

Journals

[1] ŽIDEK, Kamil - MAXIM, Vladislav - KRAJŇÁK, Stanislav: **Testing of automatized rehabilitaion device designed for elderly by industrial robo**t / - 2013. In: Lékař a technika. Vol. 43, no. 1 (2013), p. 35-38. - ISSN 0301-5491

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[6] KRAJŇÁK, Stanislav - ŠVIDEROVÁ, Katarína - SIMAN, Daniel - TOMPOŠ, Adrián: **Úloha virtuálnej reality pri posudzovaní vznikajúcich rizík** / - 2013. In: Produktivita a Inovácie. Roč. 14, č. 2 (2013), s. 27-30. - ISSN 1339-2271

[7] CHARVATOVÁ, Hana - JANÁČOVÁ, Dagmar - DRGA, Rudolf - LÍŠKA, Ondrej - VAŠEK, Vladimír: **Computer apolication for solving the heat balance in the co-flow shell and tube heat exchangers** / - 2013. In: Strojárstvo. Roč. 17, č. 9 (2013), s. 98-99. - ISSN 1335-2938

[8] KARCHŇÁK, Ján - ŠIMŠÍK, Dušan: **Wireless technologies and its application in motion analysis** / - 2013. In: Transfer inovácií. Č. 25 (2013), s. 141-145. - ISSN 1337-7094

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[2] ŠIMŠÍK, Dušan - SIMAN, Daniel - GALAJDOVÁ, Alena - KRAJŇÁK, Stanislav: **Mainstreaming on ambient inteligence and the role of eAccessibility networking** / - 2013. In: AAATE 2013 : 12th European AAATE conference : Assistive Technology: From

Research To Practice : Vilamoura, Algarve, Portugal 19-22 September, 2013. - Amsterdam : IOS Press BV, 2013 P. 391-396. - ISBN 978-1-61499-303-2

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INSTITUTE OF TECHNOLOGIES AND MANAGEMENT

- Department of Technologies and Materials
- Department of Industrial Engineering and Management

Department of Technologies and Materials

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Staff

- Professors: **5**
- Assoc. Professors: **8**
- Assist. Professors **17**
- Researchers: **5**
- PhD. Students: **19**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
1/2013	KEYENCE Internationals – Mr.Yosihira Morimota
5/2013	MCAE Systems – Road Show Slovakia 2013
5/2013	Carl Zeiss – Microscopy Division – Ing. M. Alman,PhD.
6/2013	International scientific conference – Progressive Technologies and Materials in Mechanical Engineering
9/2013	Prometec Bratislava – Dipl. – Ing. R. Hladík
10/2013	International scientific conference - Surface Engineering
12/2013	Nanotechnology and tribology scientific seminar

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Automotive Production**
- **Computer Aided Mechanical Engineering Production**
- **Technology, Management and Innovation of Mechanical Engineering**

PhD. degree:

- **Mechanical Engineering Technologies and Materials**

Master's degree:

- **Automotive Production**
- **Mechanical Engineering Technologies**
- **Computer Aided Mechanical Engineering Production**

Number of the students (till 30. 10. 2013)
on the study programs guaranteed by the department:
first year of study:
- 166 internal form of study
- 25 external form of study

second year of study:
- 151 internal form of study
- 20 external form of study

third year of study:
- 104 internal form of study
- 17 external form of study

first year of engineer study:
- 67 internal form of study
- 15 external form of study

second year of engineer study:
- 106 internal form of study

Number of the graduates (2012/2013)
on the study programs guaranteed by the department:

- 105 students in the internal form of engineering study
- 19 students in the external form of engineering study
- 101 students in the internal form of bachelor study
- 13 students in the external form of bachelor study

- 4 PhD. students in the internal form of study (defended PhD. thesis)

- 1 PhD. students in the external form of study(defended PhD. thesis)

GRADUATE PROFILE

BACHELOR'S PROGRAMS (Bc.)

Automotive Production

Graduate is able to design and project production processes and production sequence of components, assemblies and testing of automotives aggregates and automobiles. Heis able to cooperate with innovation propositions of automotive components and work on rationalizing projects. Is also able to cooperate on manufacturing places planning, and insuring their managing with the intention of productivity, quality, environmental and safety characteristics.
Graduate is able to organize material and information flows in the supply networks of automotive industry. He has control over techniques of informative technologies applications in the production preparation, planning, production management and testing.
He has control over techniques of laboratory works and experiments of project managing. Graduate can apply in the sphere of technological preparation, production planning, projection of automotive components and aggregates, testing and in the service favors. He can apply in the sphere of services connected with automotive industry, in service and consultant companies and also as small entrepreneur.

Computer Aided Mechanical Engineering Production

Graduate of bachelor student program Computer Aided Mechanical Engineering Production is able to solve problems related with introducing and running of production – technological systems. Graduates have knowledge about production technologies (machining, mechanical working, welding, surface modifying, thermal working,

assembling, transporting and warehousing, materials, manufacturing machines, facilities of operational and interoperable manipulation and transport, control of production processes and their controlling. Mentioned special accomplishments have expanded of knowledge from computing techniques, CA systemsand CA technologies used by the preparation and production management. Graduates have additional accomplishments on the basis of which they are able to communicate with others professions and elements participated on ensuring of production (management, construction, supplying, etc.)
Graduates have ability to assert by the implementation and controlling of production – technological systems just how technologist. They have knowledge necessary to ensuring intelligent operation and solving non - standard situation which comes into being by working. They also have sufficient knowledge to projecting integrated parts of production progress.

Technology, Management and Innovation of Mechanical Engineering

Graduates of the Production technology program and study program Technologies, management and innovation of mechanical engineering in 1st level of university degree found your applicatable as manufacturing technologist, engineers of tools and equipment, workers in CAx technology service, specialist for testing, operation and maintenance, expecially of the upstream sector of the automotive industry in the development of components, production management of vehicles and other related activities connected with automotive industry.
The application can also be found in the lower control service level, technical services of operations and companies and can be also the management unit's members of larger organizations.

MASTER'S PROGRAMS (Ing.)

Automotive Production

Educational program Automotive Production is intended for preparation of engineers with focus on mechanical engineering for production new products, designing of production processes and managing automobile manufacturing and their components. Graduate has knowledge and ability of using them to the technologies of manufacturing components, assembling aggregates and their testing, production technique and structure of manufacturing workplace, logistician and organization of supply chains of automotive industry. Content of study program is realized through education in such way, that theoretical, research, special and applied knowledge throughout innovation trends of automotive production were to be provided. Graduate have knowledge onto production of new and innovated products primarily technology of computer aided design and engineering, virtual reality, production of prototypes and theirs testing. They have knowledge about methods of slip and agile production and about implementation of high tech. A part of graduate profile is also knowledge of foreign language and adequate attainments from economies, management, environmental direction and safeness of systems. Graduation have additional accomplishment on basis of which, they are able to work in team with other professions participated on securing of production (marketing, service trades, logistics, etc.). Graduate have application in wide spectrum of professions of automotive production, at researchers and developments centers of automotive producers and supplier's of aggregate and components, in the units of preparation of production just

how designers of production processes and systems. Graduate works in positions of production engineers able to insure quality and effectiveness of production and its continual innovation.

Mechanical Engineering Technologies

Graduates of master degree in program Mechanical Engineering Technologies are able to systematically and complexly solve problems of preproduction, processing and after processing stage with support of CAx Technologies. They have knowledge about possibilities of conventional and unconventional technique of production of semi products, complete parts, tenet of techno – sanity construction parts and products, and knowledge about methods of quality control. These abilities are integrated with knowledge of economical character, what enables to the graduate solve even problems of managing and processing of mechanical and electrotechnical productions. All of these activities are performed with the support of mathematical modeling method, method of simulation, logisticians and mathematical optimization. Graduates of master degree in field of study – Manufacturing technologies and in educational program – mechanical engineering technologies acquire attainments from common technological disciplines from this specialization, from special technology disciplines of specialization, as well as from discipline of natural sciences. Graduate simultaneously obtain accomplishments at area of informative technologies by the solving of specialization problems and practice in laboratorial work. A part of education is knowledge of foreign language and adequate knowledge from area of economy, law and next humane departments. By studying of this specialization, graduate obtain ability to specialize oneself and assumption of perpetually self educating.

Computer Aided Mechanical Engineering Production

Graduate of educational program acquire knowledge connected with development of production Technologies as well as knowledge needs to use new engineering materials in the mechanical engineering production. In this program, accent is put on connection of management and production technology in the modern structure of industry as well as encompassment of informative bindings at production systems. Graduate are able to work with PC techniques and her applications in the area of CAD/CAM, by the production planning (CAPP), in modeling, simulating and optimizing of technological processes, in creation of technologically oriented databases, in managements of engineers information etc. Acquired attainments enable graduates wide range of application in technological specializations of manufacturing, in area of using computing techniques, in the automation of engineering activities at production. Graduates are characterized by adaptability and flexibility towards condition changing in area of production practice.

PhD. PROGRAMS (PhD.)

Mechanical Engineering Technologies and Materials

The third degree of university study in field of Mechanical Engineering Technologies and Materials deepens and widens theoretical knowledge from technological discipline from area of metallurgy, progressive technology of non cutting and splintery processing of metals, automation of technological processes and possibilities of their application in mechanical engineering corporations, with the ecological aspect. Graduate of doctoral study will have application at research – development

departments of manufacturing corporations, top level managerial functions, managing of manufacturing departments with sophisticated production technique, institutes of Slovakia's academy of science, on technical universities and on technical high schools.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Power machines and equipments

- ✓ Accuracy and Control of Production
- ✓ Advanced Processing Technology
- ✓ Applied Database Systems
- ✓ Applied Informatics
- ✓ Applied Informatics in Technology
- ✓ Assembly Technologies and Joining
- ✓ Automation of Engineering Works
- ✓ Automobile Service Devices
- ✓ Automotive Components Manufacturing
- ✓ Automotive History
- ✓ Automotive Operation and Maintenance
- ✓ Automotive Operation, Maintenance and Service
- ✓ Automotive Production Technologies
- ✓ Automotive Supply Chain Management
- ✓ Automotive Testing
- ✓ Bachelor Theses
- ✓ Bachelor Theses Habilitation
- ✓ Basics of Enterprising
- ✓ Basics of Enterprising in Machinery Production
- ✓ Basics of Innovations
- ✓ Basics of Product Design for Automotive Production
- ✓ Basics of Work Rationalization
- ✓ Basis of Mechanical Production
- ✓ Basis of NC Machines Programming
- ✓ Business Fundamentals
- ✓ Business Plan
- ✓ CA Methods in Technological Processes I.
- ✓ CA Methods in Technological Processes II.
- ✓ CA Methods in Technological Processes III.
- ✓ CAD / CAM Systems - Automation of Technical Preparation of Production
- ✓ CAD Design of Product and Manufacturing
- ✓ CAD in Technology
- ✓ Calculated Methods in Technologies
- ✓ CAx Technologies in Preparation and Management of Production
- ✓ Ceramics Coatings
- ✓ Certification and Standardization
- ✓ Computer aided mechanical production
- ✓ Computer aided production planing - CAP
- ✓ Computer Aided Simulation
- ✓ Computer Design of Dies and Tools
- ✓ Construction materials
- ✓ Creative Work Methodics
- ✓ Defense of Diploma Thesis
- ✓ Defense of Final Work
- ✓ Design and production of dies and tools II
- ✓ Design and Production of Tools I.
- ✓ Design and Production of Tools II.
- ✓ Design of Automotive Manufacturing Workstations and Workshops
- ✓ Design of Automotive Production
- ✓ Design of Fixtures
- ✓ Design of Laboratories and Test - rooms
- ✓ Design of Production Systems
- ✓ Design of Technological Processes
- ✓ Diploma Project
- ✓ Diploma Thesis
- ✓ Experimental Methods of Technology
- ✓ Final Project
- ✓ Final Work
- ✓ Geometrical Specifications of Products
- ✓ Graduation Theses Habilitation
- ✓ Informatics and PC I.
- ✓ Informatics and PC II.
- ✓ Information Systems
- ✓ Information Technologies I.
- ✓ Information Technologies II.
- ✓ Innovation and Reengineering Strategies Management
- ✓ Innovation Technologies
- ✓ Innovations
- ✓ Innovations in Automotive Manufacturing
- ✓ Intensification of Production Technologies

- ✓ Laboratory Exercises I - Automotive Components
- ✓ Laboratory project
- ✓ Machines and Tools for Plastics Processing
- ✓ Machines and Tools for Plastics Processing I.
- ✓ Machines and Tools for Plastics Processing II.
- ✓ Management of product development
- ✓ Material Flows and Logistics
- ✓ Materials Engineering
- ✓ Materials for Automotive Production
- ✓ Materials I.
- ✓ Materials II.
- ✓ Materials Science
- ✓ Measurement and Testing
- ✓ Mechanical Technologies and Materials I.
- ✓ Mechanical Technologies and Materials II.
- ✓ Mechanical Technologies and Materials III.
- ✓ Mechanical Technology
- ✓ Methods for Intelligent Production Processes
- ✓ Modeling and Optimization of Production Processes
- ✓ Modeling and Simulation of Manufacturing Processes and Systems
- ✓ Modeling and Simulation of Technological Processes
- ✓ Modeling of Technological Processes
- ✓ Monitoring of Technological Processes
- ✓ NC Machine Programming
- ✓ NC Machinery
- ✓ NC Production Technics
- ✓ New Construction Materials
- ✓ New Materials
- ✓ Non - conventional Materials and Technologies I.
- ✓ Non - conventional Materials and Technologies II.
- ✓ Optimization of Technical Preparation of Production
- ✓ Planning and Design of Technical Preparation of Production
- ✓ Planning and Design of Technological Processes
- ✓ Planning and Evaluation of Experiments
- ✓ Precision Manufacturing and Nanotechnologies
- ✓ Process reengineering
- ✓ Processing of Technological Information
- ✓ Product innovations
- ✓ Product Innovations
- ✓ Product Logistics
- ✓ Production Quality
- ✓ Progressive and non - conventional technologies
- ✓ Progressive materials and their processing
- ✓ Progressive Production Technologies
- ✓ Progressive Technologies
- ✓ Reengineering
- ✓ Repair Technologies
- ✓ Research and Development Management
- ✓ Semestral project
- ✓ Seminar to Automotive Production Development
- ✓ Services Planning for Automobile Manufacturing
- ✓ Simulation of Discrete Processes
- ✓ Simulation of Technological Processes
- ✓ Small business I.
- ✓ Small business II.
- ✓ SMART and Intelligent Materials
- ✓ Special Materials
- ✓ Strategic Planning
- ✓ Surface Treatments
- ✓ Systems of Quality Management
- ✓ Technical Creativity
- ✓ Technical Materials
- ✓ Technical Production Preparing for Automotive Production
- ✓ Technical Production Set up Preparing
- ✓ Technological Information
- ✓ Technological Material Properties
- ✓ Technologies of Automatized Manufacturing
- ✓ Technology Assessment
- ✓ Technology I.
- ✓ Technology II.
- ✓ Technology III.
- ✓ Technology of Apparatus Techniques
- ✓ Technology of Automotive Production
- ✓ Technology of Automotive Production I.
- ✓ Technology of Automotive Production II.
- ✓ Technology - ability and Products Quality
- ✓ Technology - ability of Constructions
- ✓ Testing of Automobile and Components
- ✓ Theory and Means of Automated

Control of Production Processes
- ✓ Theory and Technology of Processes of Machining, Mechanical Working and Surface Finish
- ✓ Theory and Technology of Processes of Welding, Casting and Powder Metallurgy
- ✓ Theory and Technology of Special Metallic and Non - metallic Materials Preparing
- ✓ Theory of Conventional Technologies
- ✓ Theory of Forming, Tools and Jigs
- ✓ Theory of Innovative Technologies
- ✓ Theory of Machine Cutting, Tools and Jigs
- ✓ Theory of Progressive Technologies
- ✓ Thermomechanics
- ✓ Trends of Technology Development
- ✓ Typology of Automotive Industry

GRADUATE THESES

BACHELOR'S THESES:

Agócs - Kiss Alexander	Analysis of automotive production in Mexico
Bálint Attila	Analysis of automotive production in Hungary
Bartoš Slavomír	Design and production of teaching aids for tool geometry learning
Bednárová Jana	Review of machinability of titanium alloys for the aerospace industry
Bodnár Roland	Innovation of material flow equipments in the automobile production plants
Bonková Lenka	Analysis of materials databases for application in automotive industry
Bučko Peter	Benchmarking of the composite materials processing technologies
Buzsek Tomáš	Testing stations for car chassis testing
Centko Jozef	Producers review of packaging steel materials by web application
Chovanec Pavol	Opportunities for utilization of welding technology on automobile bodies
Cmur Vladimír	Clutch cylinder assembly procedure
Čonka Juraj	Turbo blower assembly procedure
Csanak Szabolcs	Product testing by using SolidWorks Simulation

Cupper Martin	Application of CA technology for design of the workplace for moulding of plastics
Demko Leonard	Review of using FEM softwares when machining
Dibala Michal	Machining of high strength light weight alloys in automotive industry
Dirga Dávid	Using SolidWorks Motion application in the engineering
Dráč Patrik	Analysis of automotive production in Canada
Drobňák Radovan	Review of welding methods used for automobile chassis construction
Dučák Lukáš	CAD design of the experimental device for springback test of thinplates
Dudáš Radovan	Devices for maninulation and transport in car production and assembly
Dulaj Lukáš	Possibility of temporary car-body protection during winter operation
Dzurický Tomáš	Concept specification for car design proposal
Dzurik Jozef	Computer aided methods for determinig of metal in polymers
Eperješi František	Innovative solutions in cars networking and connectivity with infrastructure
Eštok Martin	Mikroelektromechnical systems analysis
Farkašovský Tomáš	Optimization of the production line for the manufacturing of connecting rods
Ferenčík Roman	Analysis of automotive production in Turkey
Gabzdil Richard	Modern car drives
Gallik Maroš	Engineering design of pin on disc tribometer
Goffa Ondrej	Analysis of innovation activities of the global supplier for automotive - Johnson Controls
Gumán Patrik	Design proposal of lever shearing machine for the samples production in the program CATIA
Hajdecker Alexander	TGA/DSC methods for evaluaion of polymer degradation
Hajdú Peter	Analysis of automotive production in Poland
Halás Juraj	Analysis of innovation activities of the global supplier for automotive - Faurecia
Hanobik Stanislav	Multimedia teaching tools in material engineering
Himič Lukáš	Analysis of automotive production in South Korea
Ivan Maroš	Proposal production technology forging using CAD system
Ivan Peter	Modelling of the mechanical loading of the drill tool in

	SolidWorks
Jazudek Ján	Science and technology centers and organizations for the transfer of innovation in the automotive industry
Juriš Viliam	Innovative material concepts of car autobody
Kačmár Pavol	Application of the artificial neural networks when modelling of tool wear in machining
Kalapáč Peter	Possibilities evaluation of the surface integrity milled parts
Kelíšek Viktor	Innovation management techniques for networks and cooperation
Kohan Jozef	Non-coventional forming technologies in automotive production
Kohlšovský Richard	Concept specification of a car interior
Köver Michal	Innovation of welding technology of cryogenic pressure vessels
Koza Ivan	Reverse engineering at creating 3D model of parts
Krajný Peter	Preparation of multimedia materials for creating the components in CAD
Krempaský Marcel	High strength steel sheets application at cars body production
Kriak Andrej	Cutting materials used for milling difficult-to-machine alloys
Krompigel Ernest	Overview of unconventional methods of welding and joining materials in car production
Kropko Jozef	Multimedia teaching tools in progressive technologies
Kuchár Ján	Engineering design of injection mold for plastic moldings using CAD systems
Kudas Dušan	Overview study applications of NX CAM program by milling
Lenárt Martin	Using of bonding technology of polymeric materials in the automotive industry
Leško Dávid	Analysis and removal of selected failures of mechanical components of cars
Leskovjanský Štefan	Possibilities of rebuilding vehicles for competition purposes
Letanovský Matúš	Analysis of innovation activities of the global supplier for automotive - Siemens
Lipták Tomáš	CAD visual representation of chosen operations when end milling
LiščinskTomáš ý	Engineering technologies used at automobile bodies construction
Ľoch Patrik	Production machines CAD model database consolidation and

	proposal for its access via web
Macejko Marek	The Computer Support in the Evaluation of Newly-Formed Surfaces
Mačovský Lukáš	Steel foams and their application in automotive industry
Majirský Ladislav	Algorithm design for tensile test evaluation using Matlab software
Marinič Martin	Web application review of equipments for gas welding and electric arc welding
Medvec Dávid	Workshop oriented programming machines by defining Q-parameter
Miháľ Jakub	Desing of simulator for measurement of efficiency and wear of braking pads
Miloň Ľubomír	Review of tools and cutting conditions for milling of form surfaces from chosen workpiece materials
Mitruška Jozef	Workshop oriented programming at production of general flat surfaces and shaped features
Nagyová Adriána	Axles of passenger and racing cars
Olexa Andrej	Car component design innovation in CAD
Oros Štefan	Car axle assembly
Orosz Attila	Concept design of a car interior
Paulina Martin	Concept design of a car exterior
Pavlík Ján	Diagnostics and testing of engines
Petrek Pavol	Optimization of cutting conditions for the production of drawing tools in the automotive industry
Petruška Matej	Study of machining nickel based superalloy Inconel 718
Pitoňák Martin	Design and functionality verification of accessory for automobile made of composite materials using CA systems
Porubský Viktor	Tribological testing in erosive wear conditions
Ragan Jozef	Simulation of airflow around the car body
Repko Peter	CAM system and the possibility of its use in the manufacture of rotating parts
Ristvej Tomáš	Multimedia teaching tools in conventional technologies
Šavlík Stanislav	Statistical analysis of experimental data from the field of materials engineering
Ščensný Marián	Monitoring of cutting tool in face milling and production of shaped surfaces
Ščomak Igor	A multimedia presentation of the KTaM SjF TUKE research portfolio using web applications.

Semanik Maroš	Analysis of influence of factors on the measurement of porosity of gear-boxes using CA technics
Semaník Michal	Application of Raman spectroscopy for identification of polymeric materials used in automobiles
Sendrei Tomáš	3D scanning workstation design
Sim Miroslav	Trends in development and application of tailored welded blanks in automotive industry
Šipošová Eva	Digitalizing of machine part's drawings
Slanina Martin	CAD aided design of friction simulator for stamping processes
Slivka Tomáš	Methods and techniques for finishing bodywork in services
Soós Štefan	Application of composite materials in automotive production
Šromovský Dominik	Algorithm for cutting tool selection when machining titanium alloys
Stanislav Jakub	Numerical simulation of manufacturing simple cell phone cover
Straka Jozef	Possibilities of joining materials in the automotive industry
Suchý Tomáš	Production, proprieties and using of elastic and strength part of composite materials
Šveda Erik	Simulation of injection molding of plastic part with use of CAE software
Szabó Ondrej	Electronic record of students' attendance in education process
Takáč Ladislav	Analysis of driving performace cars
Tancsák Peter	Analysis of the use of artificial intelligence tools in the process of metal cutting
Tomáš Jevický	Utilization of the software SYSWELD in simulation of welding processes
Tomčák Tomáš	Concepts of progressive dies with a focus on trimming operations
Topoli Rudolf	Proposal of holder for positioning of the samples using computer technology
Trojčák Tomáš	Designing of CNC machining technology of testing die for stamping
Tuch Tomáš	Draft of combustion engine and verification of its parameters using the software package Lotus Simulation Tools
Vaňo Oliver	Analyses of terrain cars segment of indian and chinese manufacturers
Vaško Richard	Progressive technologies when machining titanium and nickel based superalloys

Vattai Erik	Innovation trends in development of BMW cars
Vavrek Radovan	Design proposal of selected automotive component
Vojtek Jaroslav	Innovation management techniques for product development
Žak Peter	Application of composite materials in automotive industry

MASTER'S THESES:

Adam Jozef	Evaluation of selected automotive clusters in the EU
Andráš Marián	Progressive surface treatments for automotive industry in e-learning system
Andrejovský Lukáš	The numerical simulation of deep-drawing process in terms of the production company Matador Industries, a.s.
Bačko Jozef	Techniques for implementing Lean Production in automobile production
Badida Ján	An innovative project in the automotive business Hanke Ltd. Michalovce
Balla Ján	Design of production promotional item from tin steel sheet using CAD
Balogh Jozef	Application of coordinate measuring device FARO Platinum Arm
Baňas Peter	The lifetime prolongation of the selected automobile component
Baran Miroslav	Determination of dynamic viscosity of organic coatings using Brookfield method
Bašista Martin	CAD designing and production of thermoforming mould with RapidTooling method
Bátovský Juraj	Racksystems for assembly workstations
Béreš Štefan	Design of materials database for auto body components
Bodnár Loránt	Optimization of process of mouldings production from regrind
Bolcarovič Tomáš	Proposal of technical solution for arm rest mounted on the floor console of the passenger car
Borsuk Matej	Designing of CNC machining technology of automotive parts
Butvin Maroš	The optimalisation of maintenance management system with support of information technology
Čarňanský Eduard	Composite materials production technologies in automotive production
Chaban Jozef	Development lines for electromobility in the EU
Čižmar Peter	Utilization of CA technologies during welding of automobile bodies
Cmorej Peter	Determination of selected properties of termoindicating

	coatings
Demčák Štefan	Analysis of educational laboratories for lean manufacturing
Demová Petra	Comparison of coatings properties from experimental and service tests
Dobránska Denisa	Materials processing in automotive production using the laser technologies
Dolanská Lucia	Design of punching die for trailer's frame holes and methods of its lifetime increasing
Drobňáková Vladimíra	Abrasive wear of corrosion resistance materials under various testing conditions
Drozda Peter	Technologies used for production of cars' shaped features from high strength steel sheets
Dzurík Ján	Possibilities the evaluation of surfaces after tribological tests
Dzurik Rastislav	Study the company was founded to design and prototyping automotive components
Dzurillová Mária	CAD modeling of profiles and form surfaces for NC machine tools
Falat Michal	Creating model of innovation of selected product in CAD environment
Fecko Michal	Innovation chassis cars and their effect on driving performance
Filo Tibor	Analysis of agility approach in automotive supply chain
Furimský František	Thermogravimetric analysis of composites
Gábriš Vladislav	Applications of reverse engineering for innovation processes
Gal Stanislav	Project of small city car in CAD
Gaľ Viktor	The application of 3D optical methods for formability assessment of sheet metals
Gaľa Ivan	Project of car component testing stand design
Gazda Richard	Tribological analysis of tool steels with a thin coatings
Grochalová Zuzana	Analysis of learning methods for Lean Manufacturing
Hankovský Matúš	The analysis of friction models at the contact surfaces of dies
Havran Martin	Equipment design for biaxial tensile test using CAD
Horváth Peter	Lean assembly laboratory station
Hriczo Anton	Examination of welded joint of load bearing structure of automobile semitrailer
Imrich Daniel	Trends of innovation of the measuring equipment in the

	automotive industry
Ivan Pavol	Metallographic analysis of permanent joints of automobile bodies
Ivanecká Ulrika	Analysis of process of Al sheets cutting
Jalčák Lukáš	Production of shaped surfaces defined parametrically
Jánoš Matej	Proposal of database of mechanical properties of thin packaging sheets obtained by uniaxial tensile test, bulge test, springback test and earing test
Kancian Vladimír	Degradation of coatings in industry tests
Kandrik Róbert	Finite element modeling of cutting tool mechanical load when drilling
Kapusta Peter	Application of LEAN approach in the design of automotive component
Karako Július	Comparison of cup test results using Erichsen testing device and its numerical simulation
Kašajová Lenka	Evaluation of selected material properties after cutting of material by laser beam
Kaššai Pavol	Proposal of holder of the samples for experimental equipment in CAD system
Kerekeš Martin	Traction and dynamic factors driving the behavior of motor vehicles
Kerpčár Peter	Desing of technology for production of stamping by multioperation deep-drawing using CAD
Kicko Igor	Influence of tool position to milled surfaces roughness at CNC milling
Knapová Katarína	Deformation changes evaluation of bathtub deep drawing by ARGUS photometric system
Kochan Miroslav	Design of the components of the machine travel SCOT - TRACK - CMS Tisoves a.s.
Kolcun Miroslav	Design and optimization mechanism for opening the sides of rail freight wagon type Habbiins
Koncz Juraj	Process optimization of grinding in Getrag Kechnec
Košík Vladimír	Measurement of Percent Crystallinity of Thermoplastics with DSC method
Kostár Lukáš	Desing of model for predicting the deformation properties of steel sheets
Kremeň Juraj	CAD sonotrode designing for ultrasonic welding
Krivjanský Lukáš	Surface treatments in automotive industry and their evaluation

Krupa Marek	Effect of combined load on the quality of surface-coated composite parts
Krúzs Robert	The Evaluation of Coating Properties Applied on Plastic Bodywork Parts
Kuco Martin	Application of agile principles in the design of automotive component
Kunzo Erik	Manufacturing technologies of ultra-light construction elements using the composite materials
Kužidlo Viktor	The use of bonding technology in the automotive industry
Kuzma Ján	CAD design of stamping die for production of tin cars' chassis from tin steel sheet
Lorko Lukáš	Resistance spot welding of aluminium sheets EN AW 5754
Mackanič Ján	Design of production of GPS module housing using PC simulation
Mag Tibor	Design of chosen form shapes and verification of surface quality
Majerčák Milan	Using of CAM system at testing of tool geometry for stainless steel machining
Makara Lukáš	Computer aided modelling of water jet process cutting
Mako Peter	Digitizing of selected automotive component
Malaťak Milan	Computer aided design in manufacturing plastic product
Málik Martin	Evaluation of tool-wear on surface roughness and surface accuracy
Mesaroš Martin	Formability of coated steel sheets in e-learning system
Mrovčák Lukáš	The Morphological Characteristics of Thin Coatings with a Computer Support
Murza Mário	Evaluation of selected mechanical properties of fiber composite automotive components
Norko Štefan	Influence of the quality and the type of used flux on the weld joint in the production of pipes using submerged arc welding technology
Ondo Jaroslav	Production design of stamping from thick steel sheet using numerical simulation
Ondruš Marek	Project of given production system in CAD system
Pacák Miroslav	Application of data glove for selected component assembly analysis
Paulinsky Peter	Analysis of the influence of parameters of electrodischarge texturing on the microgeometry of cylinders surface

Petriková Tímea	Innovation project - design of the car seat cover
Petróci Ján	Upgrading the intake pipe in the automotive industry
Porubský Branislav	Project of automatized assembly station for given component
Puľák Juraj	Innovations in the creation and application of KIS
Remetei Eduard	Proposal of the storage compartment in the interior of the passenger car
Rusnák Martin	Evaluation of influence of welding current in resistance spot welding on the quality of welded joints
Sabo Marek	Innovation forms of education for the automotive industry
Sabo Tomáš	Assessment of joined parts in the automotive industry by microscopic analysis
Sedlačík Tomáš	Evaluation of mechanical and thermal load og cutting tool when machinnig titanium alloys
Seman Ladislav	Designing of Injection mould with support of CAx (11 768-0001 COVER M9)
Sentivan Tomáš	The analysis and conceptual design of the warming drawer
Siták Peter	Transmission and its impact on vehicle traction properties
Školník Jozef	Analysis of surfaces when producing form shapes by end mill cutters
Šlejzák Jaroslav	Video analysis application for selected part assembly
Spodník Mikuláš	Technology proposal for production of inner part of dumper
Šponták Peter	NC program application in the production of injection mold cavity and its verification on CNC milling machines
Spusta Peter	Innovation methods to create assembly technological documentation
Štellmach Martin	Substitution options of conventional materials in automotive production
Šváb Ján	Evaluation of mechanical properties of DLC coatings
Švihura Peter	Design and verification of manufacturing promotional items by using CAD / CAM systems
Švihura Stanislav	Proposal of technological process of surface treatment selected
Ťahla Jaroslav	Evaluation of degradation processes phenol-epoxy coatings
Todák Emil	Influence of structure and model orientation on properties of FDM prototypes.
Tomas Štefan	The selection and consideration of appropriate strategies for the production of shaped surfaces on CNC milling machines

Tomašura Martin	Alternative solutions for individual mobility
Troščák Tomáš	Evaluaton of selected formability criteria of steel sheets using Erichsen testing device
Turlik Martin	Optimization of stamping dies shaped parts design produced by LOM
Uhrin Marek	Possibilities of modification functional parts of crusher by application of wear resistant materials
Vajda Milan	Stand for quick fabrication of samples and prototypes
Varga Martin	CA systems at design and production of RC flying equipment
Varga Peter	Testing of components made from composite materials proprieties
Végh Alexander	Application of neural network for modeling and prediction of surface integrity in Matlab software
Vozár Tomáš	Tribological properties of selected carbon coatings
Wilson Martin	Delmia module application in assembly workstation design
Zajac Ján	Innovation management methods for production processes in automotive industry
Ziarko Matúš	Innovation ways for the development of innovation drive cars
Živčák Matúš	CNC milling at production of forming dies' shaped surfaces

PhD. THESES:

Bogdan Dávid	Analyses impact factor of the mechanisms violation very thin sheets using for packaging
Duleba Branislav	The dependence of mechanical properties on the percentage of filler in nanocomposites
Egri Marián	Possibilities for advancing the life span of machine componentsby implementation of new renovation technologgies
Svat Peter	Research of efficient utilization of wear resistant coated HSS tools
Peter Švantner	Modeling of influence of material properties to the limit Strain by sheet metal forming with higher strenght properties

RESEARCH AT THE DEPARTMENT

The research activities focus on:

- ✓ Research into new modern steels in relation to requirements concerning their formability.
- ✓ Research into formability conditions and their influence on the quality and final properties of drawn parts.

- ✓ Verification of the application of progressive technologies in joining of metal materials for automotive industry.
- ✓ The optimization of machining parameters in the production of tools for thin steels and plastics production.
- ✓ Research into tribological aspects of thin coatings applied on machining tools, forming tools and implants.
- ✓ Innovation procedures in the technology of machining, evaluation of workability of construction materials and cutting properties of new tool materials, wear resistance coatings on the tools, tool wearing and energy intensity during machining.
- ✓ Development of new procedures and methods for production of samples and prototypes using various methods considering specific orientation of product design: conventional machines, rapid prototyping, rapid tooling.

Research characteristics:
Scientific and research activities of the department are diversified according to specializations of the individual department sections. The current personnel structure of the department and its technological equipment allow for comprehensive solutions of material, technological, and designing tasks (in terms of products, tools and fixtures), including modeling, simulations and optimization of process planning and products, their experimental research, laboratory and semi - operational verification of the outcomes. The department offers the solutions in the area of metal and plastic forming, joining of materials, surface treatment of materials, machining of metal and non - metal materials, innovations of production and rapid prototyping.

PROJECTS OF THE DEPARTMENT

Title of the project	**Center of research and control of technical, environmental and human risks of sustainable development of production and products in mechanical engineering**
Type of the project	OP Research and Development, Implementation of knowledge and technologies obtained by research and development
Number of the project	ITMS 26220120060
Principal investigator	prof. Ing. Emil Spišák, CSc.
Time period of the project	2007 - 2013
Annotation of the project	Creation of sustainable research centers of management of technical, environmental and human risks assessment for continuous development of production and products in mechanical engineering industry. The impact will be guaranteed by generating new knowledge and its application in innovative measures aimed at increasing the competitiveness of Slovak enterprises through the introduction of new engineering products with higher added

	value and utility and new energy, material and environmentally effective technologies for their production. The principles and concepts of the project respect and support the implementation of the global objective of the Operational Programme "Research", which aims to modernize and streamline the system to support research and development whose outputs will contribute to the growth of regional and national economy and thus improve the terms of the educational process at high schools.
Title of the project	**Unique equipment for evaluation of tribocorrosion properties of the mechanical parts surfaces**
Type of the project	OP Research and Development, Implementation of knowledge and technologies obtained by research and development
Number of the project	ITMS 26220220048
Principal investigator	doc. Ing. Janette Brezinová, PhD.
Time period of the Project	2007 - 2013
Annotation of the project	The project aims to develop engineering design and construct unique equipment for evaluation of tribocorrosion properties of the mechanical parts surfaces, as well as provide device infrastructure to evaluate the characteristics of functional surfaces after tribocorrosion tests. During project solving will be make a set of samples with different types of functional surfaces, which will simulate industrial applications.Functionality of prototype constructed will be tested on this set of samples. Outcomes of surfaces evaluation made on this unique equipment will be published in scientific journals.
Title of the project	**Competence center of knowledge technologies for innovation of production systems in industry and services**
Type of the project	OP Research and Development, Implementation of knowledge and technologies obtained by research and development
Number of the project	ITSM 26220220155
Principal investigator	prof. Ing. Milan Kováč, DrSc.
Time period of the project	2011 - 2013
Annotation of the project	The strategic goal of the Center is to ensure the effective collaboration between academic and industrial sector in the field of research and development of knowledge technologies

within the frame of the Competence Center. Among the other important goals belong: support of excellent independent applied research outputs with quality comparable to international levels, strengthening the cooperation in research and development between academia (research organizations) and industry, support of existing and building of new joint research and development facilities, building and upgrading the infrastructure for the key research and development industrial sectors of the Slovak Republic, complementary support of the international cooperation in basic and applied research with emphasis on initiatives and programs of the European Union (in particular the 7th Framework Program for Research and Development and Eureka program), increasing the attractiveness of centers supported and the region by attracting the highly qualified experts from Slovakia and abroad, establishment of competence centers of applied research and development, brokerage centers for technology transfer and knowledge to promote the partnerships between universities, research and development organizations and the business sector (SMEs and large enterprises) in the regional centers.

NATIONAL PROJECTS

Title of the project	**Application of progressive tool coatings for increasing the effectiveness and productivity of forming sheets made of modern materials**
Type of the project	Grant project APVV
Number of the project	1/0682/11
Principal investigator	prof. Ing. Emil Spišák, CSc.
Time period of the project	2012 – 2015
Annotation of the project	Project solves problems of forming process optimization and increasing of forming dies lifetime by application of thin coatings to die`scontact surfaces and researches interaction of tribologic pair die surface – sheet surface. Tribologic system die surface – sheet surface will be researched from the view of their surface topology, adhesive and abrasive wearing and deformation and failure mechanisms of die and sheet coatings. Research of active parts of forming dies will be focused to system coating - die material in initial state, after deposition of conventional coating Ti - Al - N type and after deposition of new composite coatings TiN, TiCN and TiAlN after mechanical loading and after simulation of working conditions. Degradation of system coating - die material will be diagnosed using modern experimental techniques at known qualitative distribution of stresses in analysed area.

	The project focuses on identification of strength and structural parameters of system coating - die material that are experimentally measurable and have dominant influence to surface quality of processed sheets and total working time of forming die.
Title of the project	**Research and optimization of evaluation methods of strength and plastic properties of thin tin plates**
Type of the project	Grant project VEGA
Number of the project	1/0396/11
Principal investigator	prof. Ing. Emil Spišák, CSc.
Time period of the project	2011 - 2013
Annotation of the project	Mostly thin steel sheets are used in the production of food cover, tins, caps, closures and the other products made with forming process. Considering the significant changes in tinplates production and increasing demands on their properties, there is a need to use quick evaluation methods, which allow assessing mainly their mechanical and plastic properties with low costs. On the base of actual experience, new testing methods were developed, which correspond to the strain of thin steel shits in technological processing. The project deals with optimization of evaluation methods of strength and plastic properties of DR tinplates. Mainly limiting deformations and causes of failures of thin tinplates will be evaluated.
Title of the project	**Research of supperhard nanocomposite films for stressed joints under increased temperature in biomedicine**
Type of the project	Grant project VEGA
Number of the project	1/0264/11
Principal investigator	doc. Ing. Eva Zdravecká, CSc.
Time period of the project	2011 - 2014
Annotation of the project	The aims of project are oriented to research super hard biocompatible films generated by plasma processes and to gradient composite coatings for applications in medicine. The coatings will be deposited on substrates with different hardness applied for implants. The project integrates research of mechanical and physical properties with an emphasis on research of tribological phenomena dynamically stressed the contacts. In the course of the project will be prepared new materials, also the deposition processes will be optimalized.

	Evaluation of wear resistance of super hard composite films will be studied under low and elevated temperatures. Part of the project is a design model analysis of wear traces of wear and wears particles. Interconnection of tribology with microelectronics, nanotechnology, physics and medicine and cooperation between young team assumes the successful development of tribological and “smart surfaces”.
Title of the project	**Integration of trials, numerical simulation and neural network to predict cutting tool**
Type of the project	Grant project VEGA
Number of the project	1/0279/11
Principal investigator	prof. Ing. Ildikó Maňková, CSc.
Time period of the project	2011 - 2013
Annotation of the project	Scientific goals of project are oriented to the investigation of accompanying phenomena (tool wear, cutting force, temperature, surface roughness) when turning and drilling titanium alloy employing cutting tools from cubic boron nitride and tungsten carbide, respectively. Project is mainly oriented to the research of cutting tool wear and its identification through monitoring of cutting force and vibrations when turning and drilling. Moreover tool life determination applying shortest cutting tool tests will be developed and employed. Advanced software based on FEM and ANN will be applied for tool performance prediction in respect of required surface quality. Stress of project goals are given on integration of trials numerical modeling and neural network prediction of cutting tool performance.
Title of the project	**The research of quality improving of countered shaped milling by advanced coating tools**
Type of the project	Grant project VEGA
Number of the project	1/0500/12
Principal investigator	doc. Ing. Jozef Beňo, CSc.
Time period of the project	2012 - 2014
Annotation of the project	Proposed project is aimed on the research of the surface quality improvement when producing various formed surfaces employed in tool making and production of moulds. Theme of project lays the accent on machined surface texture of parts with formed surfaces, and proper quality of formed surfaces that are produced by combinations of metal removal strategies in 3D milling reduces needs of additional surface finishing operations of formed surfaces. Project has to

	examine and explore possibilities leading to the optimisation of the final surface quality of the formed surfaces when 3D milling by milling cutter provided with advanced tool coating and toll shape/geometry as well. Project has to apply a combination principle consisting of experiments, data measurements and data evaluation by software as well as proposal and design of new simulation models based on measured data.
Title of the project	**Study of tribological aspects of formability of surface - treated steel sheets and tailored blanks.**
Type of the project	Grant project VEGA
Number of the project	1/0824/12
Principal investigator	prof. Ing. Emil Evin, CSc.
Time period of the project	2012 - 2015
Annotation of the project	The concept of autobody defined in the framework of the ULSAB project pointed to opportunities for improving its performance (toughness, ability to absorb impact energy, lifetime, emissions, etc.). One of ways is application of high - strength Zn - coated steel sheets and tailored blanks; and sophisticated procedures for optimizing the mechanical properties, technological conditions and technological stamping processes (hydroforming). The subject of investigation will be the optimization of friction processes between the contact surfaces of tribological pairs “blank – die”. The character, size and wear mechanism of contact surfaces of tribological pairs during particular process cycles will be diagnosed. Based on the experimental results the multi parametric purpose function (of friction coefficient, galling) will be derived for optimization of the selection of tribological properties of contact pairs “blank - die” (uncoated and coated) in relation to mechanical loading of stamping dies.
Title of the project	**Implementation of new methods and forms into education of engineering technology and materials**
Type of the project	Grant project KEGA
Number of the project	059TUKE - 4/2012
Principal investigator	doc. Ing. Janette Brezinová, PhD.
Time period of the project	2012 - 2014
Annotation of the project	The aim of the project is implementation an adaptive teaching system using Hypermedia to improve the process of teaching subjects in the field of engineering technology and materials.

	The practical outcome of the project will be creation adaptive educational web portal for attendance, distance and combined learning. The portal will also include videos of engineering technologies, tasks and tests for self - assessment students, educational materials to diagnose students' knowledge. In the frame of the project there will be established classroom for modeling and simulation of technological processes of materials processing. In the field of surface treatment of engineering materials there will be replenished corrosion laboratory for evaluation the quality of surfaces, functional, and barrier coatings. The outcome of this project will also be a monograph, focused on technological processes in engineering production and finalization treatment of products.
Title of the project	**Adaptive control of manufacturing processes for a new generation of jet engine components**
Type of the project	Grant project APVV
Number of the project	DO7RP - 0014 - 09
Principal investigator	prof. Ing. Ildikó Maňková, CSc.
Time period of the project	since 2009
Annotation of the project	The purpose of this call is to promote the active participation of Slovak research and development teams in the 7th Framework Programme of the European Community for research, technological development and demonstration activities through additional financing costs necessary for the implementation of FP7 proposals that have received financial support from the European Commission. The call aims to promote the participation of Slovak subjects in research and development projects .It is an open public call.

INTERNATIONAL PROJECTS

Title of the project	**Application of artificial intelligence in monitoring of precision machining**
Type of the project	Grant project APVV
Number of the project	SK - SRB - 0031 - 11
Principal investigator	prof. Ing. Ildikó Maňková, CSc.
Time period of the project	2012 - 2013
Annotation of the project	Proposed project is focused on use of laboratory equipment, special devices and software in both participating institution for implementation of artificial intelligence for decision making

process in precision machining monitoring. Machining monitoring will be oriented to the correlation between tool wear and surface quality. Tool wear is dominant factor that influences surface quality in precision machining. Project aim is to apply and verify methods of artificial intelligence – neural network – for prediction of tool wear and machined surface quality. Data acquired from experimental work and precision machining process computer modelling will create input to neural network. To achieve project objectives, tool condition monitoring via force signals will provide. Neural network will be used for decision making process in tool condition monitoring as well as neural network will be applied for cutting tool wear prediction. Stress of project goals is given by integration of experimental trials, numerical modeling and neural network implementation to the decision making process.The main outcomes from project are oriented to the joint publications, research material collection and use of common laboratory equipments and software. Another expected outcome is focused on preparation of joint international research project.

Title of the project	**Supporting innovations of autobody components from the steel sheet blanks oriented to the safety, the ecology and the car weight reduction** **SIASEW**
Type of the project	Grant poject APVV
Number of the project	**APVV – 0273 - 12**
Principal investigator	prof. Ing. Emil Evin, CSc.
Time period of the project	2013 - 2017
Annotation of the project	The key aim of the project is supporting the activity of designers and product engineers in the phase of production preparation of automobile components from tailored blanks, focused on the abatement of emissions in production and car traffic by decreasing the weight of particular components of car body. The ambition of project is the implementation of scientific knowledge obtained from numerical and experimental methods to the proposals of modified standard procedure of validation of the virtual methods. The numerical methods in combination with the experimental methods

present very strong tool for supporting the activity of designers and product engineers and allow reacting more effectively to the changes in the technological process, allow decreasing the experimental works, which lead to increasing quality, reliability and competitiveness of the firms that are producing components of automobiles from tailored blanks. The accuracy and reliability of prediction of simulation results depends on the accuracy of material model, accuracy and completeness of material data. On the base of results of experimental and virtual tests, prediction models of index of functionality, formability and weldability will be proposed. A model of multi-criteria optimization of working properties of the components, which will lead to the increasing of competence of engineers in process of innovation, proposal and production of new components of car bodies, will be proposed.

Title of the project	**Technological and design aspect of extrusion and injection moulding of thermoplastic polymer composites and nanocomposites**
Type of the project	7.FP
Number of the project	FP7 - PEOPLE - 2010 - IRSES / 269177
Principal investigator	prof. Ing. František Greškovič, CSc.
Time period of the project	2009 - 2013
Annotation of the project	The most important objective of the project is to strengthen the research and didactic potential of researchers, particularly early stage researchers employed by universities acceding to the project. Owing to training, seminars, and research, the researchers will acquire new experience in the field of processing of advanced thermoplastic polymer composites by means of machines with screw plasticizing systems of innovative and original design. The staff exchange as well as the synergy and the mutual complementation will contribute to the transfer of knowledge between the individual partners, i.e. between European Union research centres and a third country university in Ukraine taking part in the project. Work will be implemented in four Work Packages. Each partner will be responsible for one issue. Single screw extrusion of thermoplastic composites will be conducted at the Lublin University of Technology (Poland), while twin screw extrusion

– at the West Saxon University of Applied Science in Zwickau (Germany). Actions connected with injection moulding will be carried out at the Technical University of Kosice (Slovakia). Experiments on the properties of thermoplastic composites will be performed at the Lviv *Polytechnic* National University (Ukraine). The expected results include: knowledge transfer, improving the qualifications of staff members, initiating and strengthening cooperation at a high scientific and technological level, and defining the vision of the further development of research on extrusion and injection moulding of advanced materials and the design of plasticizing systems in single - and twin - screw extruders, which should result in new research projects. In consequence, a permanent, long - term collaboration with Ukraine will be developed. The consortium will become more open to future cooperation with other research institutions in the European Union and worldwide.

Title of the project	**Magneto - abrasive surface treatment as a method to increase performance of spindle axis cutting tools**
Type of the project	MŠ DAAD
Number of the project	DAAD
Principal investigator	doc. Ing. Jozef Beňo, CSc.
Time period of the project	2012 - 2013
Annotation of the project	Project deals with investigation of effects of tool edge preparation upon relevant process phenomena when machining. Preparation of tool edge depends on factors which are affected either by their production as well as by subsequent coating. Main objective of project is to investigate effect of active tool geometry on phenomena characterising turning and drilling operations. Microgeometry of tool edges as their rounding and chamfering are used to characterise tool preparation. Further quantities being studied in project are tool edge sharpness and tool edge coating. Tool preparation is investigated in terms of quantities as forces, tool wear and surface roughness when turning and drilling

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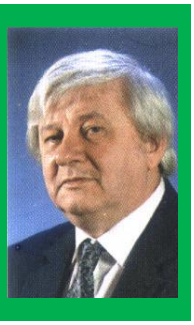
Department of Industrial Engineering and Management



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Staff

- Professors: **2**
- Assoc. Professors: **3**
- Assist. Professors: **7**
- Researchers: **2**
- PhD Students: **6**

Activities at the department

Date	Title of the event, activity characterizing the life at the Institute in 2013
4/2012	Journal Transfer inovácií 25/2013
6/2012	Journal Transfer inovácií 26/2013
09/2013	Journal Transfer inovácií 27/2013
12/2013	Journal Transfer inovácií 28/2013
12/2013	16th International Scientific Conference Trends and innovative approaches in business processes, Košice © 2013

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMMES

Bachelor's degree:
5.2.52 Industrial Engineering

Master's degree:
5.2.52 Industrial Engineering

Doctoral degree:
5.2.52 Industrial Engineering

Number of the students (2013/2014)
on the study programmes guaranteed by the department:
Bachelor's degree:
- 80 internal form of study
- 13 external form of study

Master's degree:
- 95 internal form of study
- 39 external form of study

Doctoral degree::
- 6 internal form of study
- 9 external form of study

Number of the graduates (2012/2013)
on the study programmes guaranteed by the department:
Bachelor's degree:
- 36 internal form of study
- 10 external form of study

Master's degree:
- 39 internal form of study
- 16 external form of study

Doctoral degree:
- 6 internal form of study
- 4 external form of study

GRADUATE PROFILE

BACHELOR PROGRAMMES (Bc.)

Industrial Engineering

The Bachelor of Industrial Engineering programme objective is to help students apply technical, technological, economical and mathematical principles to the design,

improvement, and installation of integrated systems comprised of people, material, information, and energy.

MASTER PROGRAMMES (MSc., ENG.)

Industrial Engineering

The graduate gains complete university education focused on planning, designing, implementing and managing production systems and also creativity development in engineering projects or processes. The student has deep knowledge of natural sciences, technical, technological disciplines and humanities with expertise in industrial engineering, company management, production management, business economics, theoretical knowledge of operation and system analysis, logistics, personal management, investment, finance, innovation, information management, etc. The graduate is ready, either to continue his/her study in postgraduate degree and develop his/her research career in industrial management, or to enter job market immediately. He/she will successfully perform as a middle or top manager in organisations within various sectors of industry, requiring the synergy of managerial, economical, technical and soft skills and knowledge.

DOCTORAL PROGRAMMES (PhD.)

Industrial Engineering

The graduate gains complex university education in Industrial Engineering. He/she has mastered research and development methods of gaining knowledge independently. He/she will be able to develop creative methods in the field of the Industrial Engineering. The graduate will be successful in the top managerial positions in various types of organisations, consulting companies and universities, in both research and teaching careers.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Industrial Engineering

- ✓ Automation of Production
- ✓ Accounting
- ✓ Assembly in automobile industry
- ✓ Basics of Industrial Engineering
- ✓ Basics of Law
- ✓ Basics of Marketing
- ✓ Basics of Production Design
- ✓ Basics of Work Rationalization
- ✓ Business Analysis
- ✓ Business Economics
- ✓ Business Information System
- ✓ Business Management
- ✓ Business Strategy of SMEs
- ✓ Design of Manufacturing Processes and Systems
- ✓ Design of production systems
- ✓ Design of workplaces and operations in automobile industry
- ✓ Economics of Manufacturing Technologies
- ✓ Economics of Operations and Maintenance
- ✓ Economics of Production Enterprise
- ✓ Ergonomics
- ✓ Ergonomics II.
- ✓ Financial and Economic Analysis
- ✓ Flexible Assembly Systems
- ✓ Human Resource Management
- ✓ Human Self-realization Management
- ✓ Innovation Management
- ✓ Introduction to economics, organization and entrepreneurship in engineering production
- ✓ Introduction to Economics
- ✓ Laboratory exercises II. –
- ✓ Operations Management
- ✓ Personal Management

- automobile assembly
- ✓ Machine Ergonomics
- ✓ Management and Business Economics
- ✓ Management of Changes
- ✓ Management of Investment Business Development
- ✓ Marketing
- ✓ Marketing Strategy of Enterprises
- ✓ Planning in automobile production
- ✓ Production Design
- ✓ Production Management
- ✓ Productivity and Competitiveness
- ✓ Project Management
- ✓ Psychology in Managerial Work
- ✓ Strategic and Financial Management
- ✓ Supply and Distribution Logistics
- ✓ Taxation

GRADUATE THESES

BACHELOR'S THESES:

Industrial Engineering

Bančanská Ľudmila	Modular systems for food production
Bartošová Lea	Project management in the field of electrical engineering
Dudová Anna	Process optimization blowing nitrogen Zn layer on the operating conditions of lines
Dufala Marek	The key risks of innovative projects
Duchová Viera	Performance management process engineering production
Fedorek Tomáš	Innovation processes within the storage of selected products
Fryc Erik	Production optimalization of electrical products in the company's SEZ Krompachy a.s.
Goduš Daniel	Industrial gases used in welding
Hamrák Lukáš	Handling equipment and engineering equipment manufacturing.
Handzušová Veronika	Product lifecycle management in PLM systems
Huľvej Tomáš	Methods and systems engineering semi-protection against corrosion
Jakab Matej	Reconfigurable (modular) systems for palletizing and storage
Jánoš Marek	Evaluation the impact of the working conditions on workers healthy in the industry
Jurčišin Miloš	Possibilities to develop the production and marketing area of selected company
Kocichová Nikoleta	Import barriers of goods from third countries
Kočiš Milan	Assessment the level of monotony of manual work
Kočiš Peter	Solution of supply logistics in the company Termostav-Mráz, Ltd
Kokjati-Nagyová Petra	Management of the documentation in PLM systems
Košár Martin	Reconfigurable (modular) systems for inter-operational transport
Koťuhová Katarína	Identifying gaps implemented management systems
Maliňák Tomáš	Production planning in an industrial enterprise

Mikláš Michal	The application of synergy in order production
Minaríková Miroslava	Application of MS Project in the innovation projects management
Mnichová Anna	Measurement of work and workers efficiency in selected company
Murdžáková Erika	Case study of customer relationship management
Polláková Enikö	Optimization of logistics activities in Manex, Ltd.
Saksa Martin	Simulation of the production process in Plant Simulation
Sopková Oľga	Innovation IS to support the operation of the company ZSSK Cargo Slovakia,a.s.
Straková Miriam	Inovation of system marketing activities company DSI Slovakia ltd.
Szakácsová Lilla	Case study of supply chain optimization in the manufacturing process
Szücsová Juliána	Packaging Technology Applied in machinery production
Tilický Peter	Evaluation of the production factors in a particular company
Tirpáková Jana	Failure analysis in the process of GETRAG FORD Transmissions GmbH
Tóth Gabriel	Case study of elimination the selected forms of waste for a particular process
Vargová Iveta	Increasing efficient use of technology in the transport business
Valčo Stanislav	Study to increase the productivity of manual work activity
Balla Tomáš	Extending the product range in the engineering company
Bubák Peter	Trends in ergonomic products innovation
Glosner Richard	Elimination of shifted wraps of HR coils rolled on HRM 1700
Kočiš Jozef	Implementation of TPM and its direct impact on the efficiency of production facilities
Kozel Róbert	Draft of pallet truck manufacturing process in Hakoz company
Sasfai Róbert	A case study of the implementation of production facility innovation in process of continuous casting
Schindler Roman	Model study of optimization of the production process
Šefčík Ján	Modernization project production activities of the company
Vancák Marek	Possible substitutes electroplated deposited chromium coatings
Zambo Michal	Process optimization for increased stability passivated corrosion protection of galvanized products

MASTERS THESES:

Industrial Engineering

Agnetin Dominik	Optimization and production process innovation of weldments
Balog Anton	Guerilla marketing application for small and medium businesses
Bjalončíková Miroslava	Innovation project of business processes optimization
Budayová Elena	Experimental verification of a virtual reality equipment

Diková Antónia	Optimization of the drilling process of selected products
Ferko Michal	Experimental verification of multi-touch interactive systems design
Franko Vladimír	Simulation and optimization of supply chain enterprise
Gavulová Simona	Ergonomic criteria for assembly workstations
Harmošová Zuzana	Feasibility study of introducing of corporate investment in production
Hiľovský Patrik	Application of the NIOSH method for loads handling
Hriva Marek	Financial investment of industrial enterprises
Chovancová Denisa	Innovative measures for the production process of steel constructions
Janočko Peter	Optimization of production operations in company Matador Automotive Vráble
Jurina Maroš	Implementation of the model in practice improvement DMADV
Kepič Lukáš	The application of modern quality management approach in terms of the engineering company
Konradyová Zuzana	Competence network businesses
Kobulnický Ján	Implementation of the controlling in an industrial company
Kočiščáková Jana	Study of an industrial enterprise performance development
Kučerák Michal	Optimization of production scheduling based on selected algorithms
Lacková Veronika	Project study of ergonomic labaratory solving
Lipták Lukáš	Sensitivity of selected disassembly optimization model output on change of mobile phone model
Mikulcová Martina	Application of risk in an investment decision
Pakan Patrik	Innovation of sales promotion in the company Prívesy, Ltd.Rožňava
Petričko Juraj	Increase the efficiency of processing of crushed stone
Petrigalová Patrícia	Support management decision-making in company by reporting
Ravas Ľubomír	System optimization of service processes in mechanical production
Rybár Rastislav	Experimental verification of the simulation module of software system Tecnomatix
Sarvaš Miroslav	Innovation of production in the industrial company
Semanová Veronika	Project lifecycle management of products
Schneider Matúš	Designing of digital factories
Skokan Peter	Simulation models of selected technological processes
Sleziak Tomáš	Implementation of PLM systems in manufacturing companies
Suvák Adam	Inovation system marketing activities of universities
Šimočko Martin	Optimizing the optical environment of production workstation
Škuba Ján	Optimization of supply activities in company Viard - H
Šuhajda Ľuboš	Disassembly optimization of selected mobile phones
Švihurová Lenka	Optimization of supply chain management company
Tarhanič Tomáš	Agile corporate structure
Vysoký Jaroslav	Impact of PLM systems on the supply chain and distribution chain in the enterprise
Berdáková Alena	Measurement of company performance

Dorová Bernadeta	The impact of quality management on business performance
Ficery Tomáš	Efficiency improvement of maintenance in company USS Košice
Pado Marián	Analysis of internal processes using colored Petri nets
Chovancová Lívia	Evaluation of the projection company competitiveness by selected methods
Ilavský Mário	Feasibility study prototype production
Jergová Natália	Methods depicting of disassemble sequences and disassembled products
Kavečanská Denisa	Determining the value of the company
Nosáľová Miroslava	Innovation of structure project management in order to reduce risks of structural funds projects
Perlakiová Sylvia	Feasibility study of production of paper napkins
Polák Róbert	Maintenance management case study in the company
Sedlák Pavol	Application tool 8D Report in quality management
Šima Stanislav	Optimization factors in the production process by the method used
Temniak Ivan	Case study of customer relationship management in the company Tatry Mountain Resort
Trojová Silvia	Implementation of reverse logistics in company Getrag Ford
Váradyová Katarína	Optimization of process characteristics through escalation management

PhD THESES:
Industrial Engineering

Čuchranová Jana	Ergonomic design of hybrid production systems
Durkáčová Michaela	Effectiveness management of business processes
Majský Jozef	Communication in crisis management company
Šesták Ján	Development of modular reconfigurable manufacturing system
Šusterová Monika	Risk assessment methodology for innovation projects
Moussttafa Aboubaker Altiaieb	Design of model capacity production planning for small mechanical company
Hubmann Gregor, G.	Methods and techniques of financing for the non-profit sector
Schölzhorn Manfred	Technical outsourcing of human resources as a competitive factor

RESEARCH AT THE DEPARTMENT

Area of research

- Integrated designing of production systems on the physical and virtual modelling base.
- Methods and techniques of experimental modeling of in-plant manufacturing and non-manufacturing processes
- Technology to reduce the occurrence of cyanobacteria in stagnant water

PROJECTS OF THE INSTITUTE

Title of the project	**Implementation and modification of technology to reduce the occurrence of cyanobacteria in stagnant waters**
Type of the project	OPVaV
Number of the project	**ITMS: 26220220028**
Main solutionist	prof. Ing. Dušan Šebo, PhD.
Time period of the project	**2010-2013**
Annotation of the project	Main aim of project is to apply unconventional technology to reduce eutrophication of stagnant water, contaminated mainly by cyanobacteria and lower eyelids. Project activities are focused on the modification and adaptation of patented equipment, which was researched for wastewater treatment in the previous work of the Department of Environmental and Process Control. The device is used for experimental purposes and doctoral education in environmental and industrial engineering. Expected outcomes are mainly in verification of technology, but also in new patent solutions, publicity activities and transfer of the acquired knowledge into practice.

Title of the project	**Center for research of control of technical, environmental and human risks for permanent development of production and products in mechanical engineering - Integrated designing of production systems on the physical and virtual modelling base.**
Type of the project	OPVaV
Number of the project	**ITMS: 26220120060**
Main solutionist	prof. Ing. Jozef Kováč, CSc.
Time period of the project	**2010-2013**
Annotation of the project	Integrated designing of production systems on the physical and virtual modelling base is added in specific goal 3: Designing innovation and implementation of production system, high-tech products and development of knowledge intense service for elimination the innovation project risks within formation the research excellence centre in SjF TU of Košice. The solution has to contribute to extension the knowledge in the area of integrated designing of production systems through experimental laboratory activities supported with sophisticated high-tech technologies.

Title of the project	**Agile, adapting to market business systems with highly**

	flexible corporate structure
Type of the project	VEGA
Number of the project	**1/0879/13**
Main solutionist	Dr.h.c. mult. prof. Ing. Jozef Mihok, PhD.
Time period of the project	**2013-2014**
Annotation of the project	New generation production systems with groundbreaking innovations have characteristics of agile and intelligent manufacturing base. The concept of this production structure proves ability to survive and succeed in the competitive environment of continuous and unpredictable changes that may occur in turbulent markets, technologies, business relationships and in all other aspects of business. To overcome the global challenges, a new strategy of development and design based on the new perception of business models, is needed. This requires decentralized, flexible reconfigurable, modular and autonomous production systems, grouped in well cooperating logistic network of plants (subcontracting firms) and supported by innovative management techniques. In connection with expected trends, the project specializes on research and development of innovative concepts of agile, to market adapting business systems with a highly flexible structure.

Title of the project	**Proactive crisis management of industrial enterprises based on the concept of controlling**
Type of the project	VEGA
Number of the project	**1/0669/13**
Main solutionist	doc. Ing. Jaroslava Kádárová, PhD.
Time period of the project	**2013-2015**
Annotation of the project	In recent years there has been significant changes in the activities of businesses and how their management. It is caused by developments on the world market, as well as changing conditions of business environment in Slovakia. Turbulence and variability of conditions internal and external business environment calls for the modification of traditional approaches, concepts, methods, techniques and tools of corporate governance and there is a need innovative and creative management practices. Existing management approaches to penetrate advanced approaches and techniques and management process moves to proactive approaches focused on preventive measures. The project aims to propose a methodology for the identification of emerging issues in the enterprise and innovative approaches to crisis management. The methodology will build on existing methods of controlling such as BSC, DEA, ABC, BCM and others and will be adjusted to the conditions and needs of

industrial companies operating in Slovakia.

Title of the project	**Methods and techniques of experimental modeling of in-plant manufacturing and non-manufacturing processes**
Type of the project	VEGA
Number of the project	**1/0102/11**
Main solutionist	doc.Ing. Peter Trebuňa, PhD.
Time period of the project	**2011-2014**
Annotation of the project	The project aims to put the application of methods of experimental modeling and development of new methods of investigation and analysis of internal processes, the use of new diagnostic methods for prediction of risk situations as well as further extending the possibilities for using conventional methods. The research project should increase the competitiveness of production in machinery industry, which requires a further substantial increase in educational level creative staff development, research, design in general, but also graduates of all levels of engineering study courses, to prevent adverse situations during the operation and survival of engineering companies. The above objectives should help to avert the emergence of unexpected situations such as non-productive in the manufacturing sector prior to the existence of risk. This is the main objective, if it should contribute to basic research-oriented than the proposed project in the sphere of production to the sphere of non-production management.

Title of the project	**Intensification of modeling in education of II. and III. degree in the field of study 05/02/52 Industrial Engineering**
Type of the project	KEGA
Number of the project	**004TUKE-4/2013**
Main solutionist	doc. Ing. Peter Trebuňa, PhD.
Time period of the project	**2013-2015**
Annotation of the project	The purpose of this project and its main objective is to increase the attractiveness of the study at the Department of Industrial Engineering 5.2.52 for both students and prospective students, but primarily for industrial practice, for which students are an essential input into the production process based on knowledge acquired during their studies, methodologies and working practices. The current corpus of the field of study has been relatively unchanged since 2004. It is accredited study program at the Faculty of Mechanical Engineering, Technical University of Kosice. To increase its attractiveness, it is necessary to review the program conceptually and upgrade its parts, especially in the second

and third level of study, in particular the introduction of new current practises prevailing for the industrial practice that students can use immediately after graduation.

Title of the project	**Innovation in laboratory technology educational program of study Industrial Engineering**
Type of the project	KEGA
Number of the project	**079 TUKE-4/2013**
Main solutionist	Dr.h.c. mult. prof. Ing. Jozef Mihok, PhD.
Time period of the project	**2013-2014**
Annotation of the project	The project focuses on strengthening of laboratory teaching of technology in the field 05/02/52 Industrial Engineering study program in Industrial Engineering. It focuses mainly on the second and third cycle of higher learning to foster not only knowledge, innovative thinking and practical skills. Application of innovative training methods, particularly laboratory activities, interactive participatory design, verification and simulation of business processes and systems throughout the value chain is considered essential for the development trend of learning processes. The solution is the extension of the existing base laboratory of the Department of Industrial Engineering: new technical, computer and software resources.

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Conference Posters

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[2] ŠUSTEROVÁ, Monika - DURKÁČOVÁ, Michaela: **Posúdenie rizík a doby odhadu v projekte** - 2013.In: Novus Scientia 2013 : 12. ročník medzinárodnej vedeckej konferencie doktorandov strojníckych fakúlt technických univerzít a vysokých škôl : 10. apríl 2013, Košice. - Košice : TU, 2013 S. 1. - ISBN 978-80-553-1380-1

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Research reports

[1] TREBUŇA, František - ŠIMČÁK, František - BOCKO, Jozef - TREBUŇA, Peter - ŠARGA, Patrik - PÁSTOR, Miroslav - MENDA, František: **Odhalenie príčin vzniku prasklín na odkôrňovacom bubne metódou kvantifikácie zvyškových napätí.** - Košice : TU - 2013. - 99 s..

Patents

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INSTITUTE OF MACHINE AND MACHINERY DESIGN

- Department of Production Systems and Robotics
- Department of Machine Design, Transport and Logistics

Department of Production Systems and Robotics

Contact

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Staff

- Professors: **2**
- Assoc. Professors: **3**
- Assist. Professors: **6**
- Researchers: **4**
- PhD. Students: **6 internal, 7 external**

Activities at the department

Date	Title of the event, activity characterizing the life at the Institute in 2013
3/2013	Lecture of expert from the practice - Jaromír JEZNÝ, Ing., PhD., ZŤS VVÚ Košice a.s.
5/2013	ŠVOČ – student's scientific and professional activity (1. place – Peter Béreš, 2. place – Tomáš Tilo)
5/2013	Lecture of expert from the practice – Ladislav Vargovčík, Ing., PhD., ZŤS VVÚ Košice a.s.
5/2013	Participation in 20. International Engineering Fair with exhibits: Motoman Robot and automatic machine for Rubik´s Cube folding
6/2013	Robotics and Intelligent Manufacturing Systems – International Conference
7/2013	Project "Children´s University" for primary school students. Topic: How does work the robot like a human? - Practical demonstrations and experiments with robots
8/2013	The "Summer with the idea" for secondary school students. Topic: Robotic device of Faculty of Mechanical Engineering. LEGO robot and its construction, Robotic soccer
8/2013	Researchers' Night 2013
10/2013	Award of MŠVVaŠ SR – Bc. Peter Béreš
10/2013	Lecture of expert from the practice – Zbigniew Pilat, Ing., PIAP Warsaw
11/2013	FLL - First Lego League Competition
11/2013	Lecture of expert from the practice – Antoni Swic, prof., Jaroslav Zubrzycki, prof. – Lublin University of Technology

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Control and diagnostics of production, robotic and transport technology**

Number of the students
(till 31. 01. 2014)
on the study programs guaranteed by the department:
third year of study:
– 15 internal form of study

Number of the graduates (2012/2013)
on the study programs guaranteed by the department:
– 15 students in the internal form of bachelor study
– 3 students in the external form of bachelor study

Master's degree:

- **Robotic**
- **Production machinery and**

Number of the students (till 31. 01. 2014)
on the study programs guaranteed by the

equipment	department: first year of study: – 23 internal form of study – 8 external form of study second year of studies: – 15 internal form of study – 15 external form of study **Number of the graduates (2012/2013)** on the study programs guaranteed by the department: – 18 students in the internal form of engineering study – 8 students in the external form of engineering study
PhD. degree:	
• **Production systems**	**Number of the students** (till 31. 01. 2014) on the study programs guaranteed by the department: Internal students: 6 External students: 7 **Number of the graduates (2012/2013)** on the study programs guaranteed by the department: – 1 PhD. students in the internal form of study (defended PhD. thesis) – 1 PhD. students in the external form of study (defended PhD. thesis)

GRADUATE PROFILE

BACHELOR'S PROGRAM (Bc.)

Control and diagnostics of production, robotic and transport technology

Study program Control and diagnostics of production, transport and robotic technology is an innovation of the study program The operation and maintenance of machines of bachelor's degree in Mechanical Engineering Faculty. The program continues to support the fields of the practice of industrial profile, quality and productivity. It provides high theoretical and practical experience with technology in the field of profiling. It focuses on the acquisition of management skills, innovation and renewal of machinery and equipment, namely, manufacturing, transport and robotic techniques.

MASTER'S PROGRAMS (Ing.)

Robotic

Mechanical engineer profiled for the design, application and operation of automated equipment (robots) and systems. By self - profiling (selecting subjects) as a specialist designer (robot theory, design methodology, design and construction, management and programming, diagnostics and experimental methods), designer (theory of production systems, design methodology, design and programming, diagnostics and experimental methods), (an robot theory, theory of operation, methods of operation and service, diagnostics and maintenance, management and programming, experimental methods). The summary of knowledge and skills include the application of CA technologies, management of engineering activities, management of operational activities, business management and personnel management.

Production machinery and equipment

Mechanical engineer profiled for the design, application and operation of machinery and equipment for engineering (machining, forming, casting, welding, locksmith standing) and tools (food, wood processing machines) and production systems. By self - profiling (selecting subjects) as a specialist designer (the theory of production machinery, design methodology, design and construction, methods of automation, control and programming, diagnostics and experimental methods), establishment (production machines theory, theory of operation, traffic handling methodology, diagnostics and maintenance, management and programming, experimental methods), manufacturer with deep knowledge of the design (the development of talent, knowledge and skills in shaping, humanizing technology and creating a working environment). The summary of knowledge and skills include the application of CA technologies, management of engineering activities, management of operational activities, business management and personnel management.

PhD. PROGRAM (PhD.)

Production systems

Deepening understanding of the engineering study by the independent study program of elaboration and extension of theoretical approaches and methodologies in the field of engineering structural design and manufacturing robotic technology based on innovative concepts from the design of robot cells and flexible manufacturing systems - based on innovation system structures, from models of the production management systems based on optimization of operating conditions. Deepening knowledge and skills for individual activity, synthesis and optimization of the proposed facilities and systems taking into account the interrelationships and compatibility of design modules, engines, control systems and diagnostic methods with implementation of computer intelligence and relation of “man - machine - environment”. Deepening the knowledge of constructing concepts and principles of technical solutions and their experimental models and their verification using virtual and real models. The scientific approach of development of dissertation topic is based on the use of modern methods of creating innovative solutions (CAI - TRIZ) supported by means of CA technologies (including virtual prototyping and dimensional calculations, product lifecycle management, modeling and simulation, ...). Specialization of knowledge oriented to the construction of machines, robots and manufacturing systems is bound to direct involvement in scientific projects of training center with a high degree of application of their own creativity.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

- ✓ Automated Production Systems
- ✓ Basics of Fluid Mechanisms
- ✓ Basics of Informatics
- ✓ Basics of Service and Maintenance
- ✓ Computer Seminar
- ✓ Construction and Design of Interoperable Manipulation
- ✓ Design Management and Marketing
- ✓ Diploma Thesis
- ✓ Diploma Project
- ✓ Evolution Trends in Robotics
- ✓ Evolution Trends in Production Technology
- ✓ Experimental Methods
- ✓ Final Work
- ✓ Final Project
- ✓ Fluid Mechanisms
- ✓ Food Industry Machines
- ✓ Food Production Automation
- ✓ History of Technique Design
- ✓ Information Systems in Maintenance
- ✓ Innovation and Renewal of Machinery and Devices
- ✓ Laboratory Practice
- ✓ Machines and Robots Programming
- ✓ Machines and Devices Design Methodology
- ✓ Machines Design
- ✓ Machine Tools Automation
- ✓ Machine Tools Building Theory
- ✓ Machine Tools Control Techniques
- ✓ Maintenance of Machinery and Devices
- ✓ Maintenance and Diagnostics of Machine Tools
- ✓ Maintenance and Diagnostics of Robots
- ✓ Manipulation Technology for Food Production
- ✓ Methodology of Designing and Technologicality of Production Machines Construction
- ✓ Modelling of Technical Structures
- ✓ Modules for Construction of Production Machinery and Equipment
- ✓ Operation of Food - processing Machines
- ✓ Operation of Machinery and Devices
- ✓ Operation of Production Systems
- ✓ Operation of Robotic Systems
- ✓ Peripheral Devices of Production systems
- ✓ Presentation Photography
- ✓ Production Technology
- ✓ Production Systems
- ✓ Production Systems Design
- ✓ Project Management
- ✓ Propagation Techniques
- ✓ Robotics
- ✓ Robotic and Handling Technology for Production Systems
- ✓ Robot Control
- ✓ Robotic Systems
- ✓ Robotics Systems in Automobile Production
- ✓ Robotic Technology
- ✓ Semestral Project
- ✓ Service Robots
- ✓ Service Systems
- ✓ Technical Diagnostic
- ✓ Technology for Integrated Production
- ✓ Theory of Robot Design
- ✓ Thesis Seminar
- ✓ Unconventional Food Machines
- ✓ Unconventional Production Machines

GRADUATE THESES

BACHELOR'S THESES:

Control and diagnostics of production, robotic and transport technology

Peter Ferenčík	Project of the control workstation with Dual-arm robot
Patrik Vinter	Implementation of a comprehensive predictive maintenance in the factory

Alena Kobularčíková	Virtual interactive motion modules for robotic technology
Martin Hutňan	Increasing the productivity of welding cells TOMARK
Štefan Suchý	The design inovation machine for thread cutting
Ondrej Juruš	Operation and maintenance of manipulation transport systems project
Michal Rimbala	Program processing of computational tasks for the machines maintenance and reliability
Marek Rusinkovič	The draft of multiparametric diagnostic on selected machine tool
Monika Schmidtová	Analysis of oscillations in machine tools and their elimination
Vladimír Slávik	Effect of lubrication on the accuracy of the machine tool
Peter Drotár	Application of virtual reality in the process of plant maintenance
Lucia Gibaľová	Service robot application's project in warehousing
Jozef Kmec	Design of Service Robot forTtransport
Peter Béreš	The project mobile robot for healthcare
Rajmund Antl	Cost optimization in turning operation
Rastislav Dimun	Model for diagnosing of antifriction bearing of railway vehicle wheel
Mária Hudáková	Modernization of the machine
Peter Tamás	Design of wheel module for service robot

MASTER'S THESES:

Production machinery and equipment

Martina Dobránska	Innovation of turning machines to improve safety
Daniela Dudová	Upgrade Options for grinders to improve safety
Viktor Varholík	Innovation of table grinders
Miroslav Vrabeľ	The structural design of machinery for planing wood
Simona Keruľ-Kmecová	Innovation of drill pillar
Dušan Rusnák	Construction of universal tool machines using the principle of building element
Erika Kádárová	Analysis of methods and experimental procedures for the identification and monitoring of critical nodes of production machinery
Peter Kmec	Proposal modular units for reconfigurable welding positioners
Tomáš Ferčer	The structural design threading unit for robot end-effector - technological head
Lukáš Rusnák	The structural design of intelligent modules for the manipulator end-effector - gripper
Adam Bašista	The design of the bayonet connection of rotary motion modules
Viktor Frandofer	Proposal for product family rotary motion modules
Ján Subovits	Application of composite materials in engineering production
Adam Žilinský	Proposal combined machine tool for home use
Vladimír Duda	Innovation of printing equipment
Jana Chromá	Innovation of eccentric presses to increase safety
Daniela	Innovation of machining centre for non-rotating workpieces to

Kleinová	improve its safety
Tomáš Tilo	Design of manual grinder
Pavol Fussek	Design of service robot for planting trees in orchards
František Janočko	Analysis of the causes of failures with modern methods on the water management workplace
Marek Kuchta	Equipment design for screwdriving technological plugs into radiators Korad
Ján Semjan	Application of intelligent camera for synergistical use in robotic technique
Miroslav Šterdas	The conceptual design of workstation for multirobotic assembly with two robots
Tomáš Takáč	Design and verification of functionality robotic workstation with positioning unit RotoSpin
Peter Vančo	Retrofitting of robot Puma 560
Michal Varga	Design of the manipulator for palletizing cable trays

PhD. THESES:
Production systems

Michal Tuleja	Proposal of an integrated system diagnostics, maintenance and repair of machinery and equipment
Jozef Varga	Swivel walker with mobility motor support

RESEARCH AT THE DEPARTMENT

Area of research:

Power machines and equipment

- ✓ Multirobotics systems profilation
- ✓ Virtual prototyping of machining machines
- ✓ Methods and tools for design of service robots
- ✓ Modular reconfigurable robotic systems
- ✓ Development of modular principles for constructing of handling systems
- ✓ Multifunction positionable modules for production robotic technology
- ✓ Intelligent manipulation system with unoriented 3D objects

Research characteristics:

The main fields of research of the Department of Production Systems and Robotics are: service, humanoid and industrial robotics, production technology and reconfigurable manufacturing systems. Research tasks in the field of robotics are oriented to address current needs such as multirobotic systems and solutions of mutual co - operation of robots, robotic systems based on modularity and rekonfigurability as well as research in the field of intelligent robotics systems.
The research is focused on the issues of working precision of machine tools, to evaluate the technical level of production lines, as well as the development of expert systems for dealing with diagnostic of machinery and equipment.

The Department of Manufacturing Engineering and Robotics supports research in education in the field of manufacturing machines and robots by creating and implementing e - learning form of education using virtual laboratories connectable via the internet.

Areas of expertises:

- ✓ Multirobotic systems and robot cooperation
- ✓ Intelligent robotic systems
- ✓ Kinematics structures
- ✓ Construction of production machines and robots
- ✓ Virtual laboratories and Virtual models
- ✓ Modular reconfigurable robotic systems
- ✓ Intelligent manufacturing systems

PROJECTS OF THE INSTITUTE

NATIONAL PROJECTS

Title of the project	**Principles of cooperation and profiling of multirobotic systems**
Type of the project	VEGA
Number of the project	1/0810/11
Principal investigator	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	2011 - 2013
Annotation of the project	The project focuses on the methodology of creating structures of multirobotic systems as a new paradigm of application development strategies, solutions of robots and mutual coordination of the robots and cooperation in carrying out manipulation tasks. The project forms a methodology that will shape and assign tasks to each robot based on their hierarchical position, kinematics, function, location and so on. The goal is to find an optimal parallel operation of several robots to ensure the implementation of the tasks of handling the same object manipulation and / or logically bound handling operations. Such solutions are being used in automate supply chain and service activities of manufacturing and assembly systems.
Title of the project	**Research and development of new kinematic structures based on rotary modules for the use in manufacturing construction machinery and robots**
Type of the project	VEGA
Number of the project	1/0854/12
Principal investigator	Peter Demeč, prof. Ing., CSc.

Time period of the project	2012 - 2014
Annotation of the project	The project is focused on research and development of new kinematic structures based on rotary modules for use in manufacturing of construction machinery and robots. The leitmotif of the project is research in the possibility of replacement of linear motion units in the structure of production machines and robots by rotary modules while preserving, respectively extending of the work area, improving accessibility in confined spaces and improvement of static, kinematic, dynamic and precision parameters in comparison with machines or robots based on classic principle of serial kinematics with linear units. Research of new kinematic structures will be implemented by a combination of virtual prototyping and verification of analytical solutions at a specially developed experimental prototype machine of a new concept. There will be discussed the matter of possible field for the use of innovative machines or robots in practice.

Title of the project	**e - learning of robotics with implementation of a virtual laboratory with remote management of real facilities on Internet base**
Type of the project	KEGA
Number of the project	047TUKE - 4/2011
Principal investigator	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	2011 - 2013
Annotation of the project	With the development of web technologies and virtual environments and multimedia applications there is an increasing importance of using the technologies in education. The possibility of direct management and real - time monitoring of the robot over the Internet allows a step innovation in engineering education in professional courses in robotics and automation through remote access to the training and experimental workplace. Students get a virtual visualization of process models and observed data. At the same time through web cameras and audio sensors, students get a real view of the experimental workplace by the real sound effects. The project aims to create a comprehensive education system in the field of robotics, integrating theoretical knowledge with practical experimentation in virtual reality environment as well as in real device robotic workstations, remotely controlled via the internet.

Title of the project	**Creation of a comprehensive educational – teaching material for the article Production technique using a combination of traditional and modern information**

technology and e - learning

Type of the project	KEGA
Number of the project	023TUKE - 4/2012
Principal investigator	Peter Demeč, prof. Ing., CSc.
Time period of the project	2012 - 2014
Annotation of the project	The project is aimed at creating a research environment for the collection and processing of new knowledge of production engineering for engineering production and creation of a university textbook on the field. The project seeks to create existing and new knowledge for students and the general public, by professional and modern cogeneration. Part of the textbook will be multimedia attachments electronically focused to visualize the key issues in theory, as outlined in the individual chapters of the book. The project will be developed also instructions for exercises in the form of textbooks to undergraduate textbook and selected parts of the field will processed for the internet version of education through e - learning. Project supports the main hub object in I. respectively II. Degree of engineering study in study programs of courses Manufacturing Technology, Engineering Technologies and Materials, Mechanical Engineering, Automobile Manufacturing, Maintenance of Machinery Devices, Mechatronics and Industrial Engineering, which is not adequate textbooks and teaching equipment.

APPLIED RESEARCH TASKS

Title of the project	**University scientific park TECHNICOM for innovating applications with knowledge technology support**
Type of the project	OPVaV
Number of the project	**26220220182**
Main solutionist	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	**2013 - 2015**
Annotation of the project	The project aims to build an experimental workplace to verify the innovations of mechatronic modules and systems of reconfigurable robotics. The workplace will be able to design reconfigurable robots on a level of synthesis of technical systems using specific methods of constructing from the field of mechatronics. In addition, the workplace will be able to carry out testing of individual mechanical and electronic building blocks of a reconfigurable robot, including software.

Title of the project	**Applied research of intelligent manipulation systems in industrial robots with unoriented 3D objects**
Type of the project	OPVaV
Number of the	**26220220164**

project	
Main solutionist	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	**2012 - 2014**
Annotation of the project	The project aims to build a research institute for laboratory tests to verify selected algorithms of identification and methods of reliability of grasping randomly positioned objects. The project will carry out analysis of new trends in the scanning area, sensing and distinguishing 3D objects with the selection of suitable sensors for further research.

Title of the project	**Research of modules for intelligent robotic systems**
Type of the project	OPVaV
Number of the project	26220220141
Principal investigator	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	2011 - 2014
Annotation of the project	The project is focused on the area of service robotics. The project is to create a new generation of modules for building robots, characterized by the integration of multisensory equipment with distributed intelligence, resulting in cognitive skills for generating the autonomous function of a human - robot cooperation. New modules will be offered on the market in a variety of attractive modifications, such as rescue work, security, pyrotechnic scouting, fight against terrorism, but also areas such as handling large pieces, assembly operations and operations requiring high performance and precision.

Title of the project	**Research Centre of technical, environmental and human risks management in terms of permanent development of production and products in mechanical engineering**
Type of the project	OPVaV
Number of the project	**26220120060**
Main solutionist	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	**2010 - 2013**
Annotation of the project	Creation of sustainable research centers of management of technical, environmental and human risks assessment for continuous development of production and products in mechanical engineering industry. The impact is be guaranteed by generating new knowledge and its application in innovative measures aimed at increasing the competitiveness of Slovak enterprises through the introduction of new engineering products with higher added value and utility and new energy, material and environmentally effective technologies for their

production.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Power machines and equipments

Employees and students	Country
Baločková Lenka, Ing.	Hungary
Demeč Peter, prof. Ing., CSc.	Czech Republic
Hajduk Mikuláš, prof. Ing., PhD.	Czech Republic, Poland, Romania, Germany
Jánoš Rudolf, Ing., PhD.	Germany, Romania
Pešková Alena, Ing.	Hugary
Semjon Ján, Ing., PhD.	Germany, Czech Republic, Romania
Sukop Marek, Ing., PhD.	Poland, Czech Republic, Romania
Varga Jozef, Ing.	Germany, Romania
Varchola Michal, Ing.	Ukraine

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Cluster AT+R

Mikuláš Hajduk, prof. Ing., PhD.

SASI – Slovak Association of Mechanical Engineers

Peter Demeč, prof. Ing., CSc.

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

Society for the machines of the Czech Republic (CZ)

Peter Demeč, prof. Ing., CSc.

PUBLICATIONS

Books

[1] HAJDUK, Mikuláš - BALÁŽ, Vladimír - VAGAŠ, Marek - SUKOP, Marek: **Programovanie priemyselných robotov KUKA**, 1. vyd - Košice: TU - 2013. - 91 s. - ISBN 978-80-553-1437-2

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Patents

[1] HAJDUK, Mikuláš - SUKOP, Marek - SEMJON, Ján - JÁNOŠ, Rudolf: Testovacie zariadenie vačkových

spínačov úžitkový vzor č. 6508 - Banská Bystrica: ÚPV SR - 2013. - 4 s.

[2] KURIŠKO, Jozef - DOBRÁNSKY, Jozef - BARON, Petr - SVETLÍK, Jozef: Mobilná regulačná armatúra patentová prihláška č. 79-2011 - Banská Bystrica: Úrad priemyselného vlastníctva SR - 2013. - 5 s.

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[5] KURIŠKO, Jozef - DOBRÁNSKY, Jozef - BARON, Petr - SVETLÍK, Jozef: Nastaviteľný pánt na brány zverejnená patentová prihláška č. 77-2011 Banská Bystrica: ÚPV SR - 2013. - 7 s.

Department of Machine Design, Transport and Logistics

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Staff

- Professors: **2**
- Assoc. Professors: **4**
- Assist. Professors **7**
- Researchers: **2**
- PhD. Students: **7 internal, 2 external**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
11/2013	Lecture of a representative of University of Bielsko-Biała - Poland (Dr Habil. Stanisław Zawiślak)

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

PhD. degree:

- **Transport Machines and Machinery**
- **Parts of Machines and Mechanisms**

Master's degree:

- **Transport Engineering and Logistics**
- **Machines and Machinery for Building Industry, Agriculture and Dressing**

Number of the students
(till 30. 10. 2013)
on the study programs guaranteed by the department:
first year of study:
– 17 internal form of study
second year of study:
– 17 internal form of study

Number of the graduates (2012/2013)
on the study programs guaranteed by the department:
– 27 students in the internal form of engineering study
– 0 students in the external form of engineering study
– 1 PhD. students in the internal form of study (defended PhD. thesis)
– 1 PhD. students in the external form of study (defended PhD. thesis)

GRADUATE PROFILE

MASTER'S PROGRAMS (Ing.)

Transport Engineering and Logistics

The study program "Transport Engineering and Logistics" in the branch of study "Transport Machines and Machinery " is a 2 - years engineer's study after the first 3 years of previous relevant Bc. - study. In the framework of this program there are presented basic information and knowledge from the area of theoretical principles, machine design (steel supporting structure and drives) and operation of transport and handling machines. There are described all important transport machines and machinery, which are working continuously (i.e. the large - scale spectrum of conveyors) and cyclically (i.e. lifting machines – the wide range of cranes and lifts), as well as fundamental principles of material flow projection and transport logistics applications.

Machines and Machinery for Building Industry, Agriculture and Dressing

The study program "Machines and Machinery for Building Industry, Agriculture and Dressing" in the branch of study "Transport Machines and Machinery " is a 2 - years engineer's study after the first 3 years of previous relevant Bc. - study. In the framework of this program there are presented basic information and knowledge from the area of theoretical principles, machine design (steel supporting structure and drives) and operation of mobile working machines (i.e. machines for building industry and agriculture) and dressing machines. From the area of building machines there are described earthmoving machines (e.g. wheel loaders, excavators dozers, graders, scrapers, dumpers), as well as other building machinery. Agricultural machines are represented by machines for plant production (e.g. harvesters, mowing machines) and machines for animal production. Crushers and mills are examples of dressing machinery.

PhD. PROGRAMS (PhD.)

Transport Machines and Machinery

The graduate obtains wide and deep theoretical knowledge in the field of transport and handling machines and machinery. He masters scientific methods of research and development in the area of transport machines and logistics. He can find a qualified job in research and development institutes in leading positions, as well as in technical universities. His professional skills are supported by ability to articulate autonomously and to solve research tasks, together with leading of a research team.

Parts of Machines and Mechanisms

The graduate obtains wide and deep theoretical knowledge in the field of parts of machines and mechanisms. He masters scientific methods of research and development in the area of machine design and machine parts. He can find a qualified job in research and development institutes in leading positions, as well as in technical universities. His professional skills are supported by ability to articulate autonomously and to solve research tasks, together with leading of a research team.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

- ✓ CA - Methods of Structures Design
- ✓ Logistics of Production and Technical Systems
- ✓ Drives and Transmissions I.
- ✓ Experimental Methods
- ✓ Social - Science Subject
- ✓ Building Mechanics
- ✓ Theory and Design of Earthmoving Machines
- ✓ Applied Mathematics
- ✓ Progressive Production Technologies
- ✓ Safety of Technical Systems
- ✓ Reliability of Technical Systems
- ✓ Theory and Design of Conveyers
- ✓ Drives and Transmissions II.
- ✓ Semestral Project
- ✓ Steel Structures Design I.
- ✓ Storages and Storage Management
- ✓ Projection of Flexible Production Systems
- ✓ Computer Aided Design I.
- ✓ Technical Drawing
- ✓ Computer Aided Design I. and II.
- ✓ Machine Parts and Mechanisms II.
- ✓ Machine Parts and Mechanisms III.
- ✓ Numerical Methods in Mechanics
- ✓ Theory and Design of Lifting Machines
- ✓ Operational Strength
- ✓ Year - Class Project
- ✓ Theory of Vehicles
- ✓ Maintenance, Diagnostics and Repairs of Machines
- ✓ Steel Structures Design II.
- ✓ Computer Aided Design II.
- ✓ Logistics and Material Flows
- ✓ Public Transport Systems and Conveyances
- ✓ Diploma Project
- ✓ Diploma Work
- ✓ Elements of Mechanical Engineering
- ✓ Draw up of Technical Documentation
- ✓ Machine Parts
- ✓ Parts of Machines and Mechanisms
- ✓ Machine Parts and Mechanisms III.
- ✓ Computerized Graphics
- ✓ Material Flows and Logistics
- ✓ CAD – Systems
- ✓ Technical Documentation
- ✓ Transport Systems
- ✓ Elements of Design

GRADUATE THESES

MASTER'S THESES:

Transport Engineering and Logistics

Benko, Peter	Desing project of front - loader for minitractor
Kolcun, Ivan	Design project of apron conveyer for carrying sinter
Kyšeľa, Matej	Optimisation of Material Supply Chain for Machines SMD
Matta, Ondrej	Application of Two-Mass Flywheels in the Automotive Industry
Dzurovčín, Milan	Evaluation of Technical State of Gearboxes for Rolling Mills
Klimek, Lukáš	Design Project of Positioning Equipment for Lacquering of Bagger Undercarriage
Kolcun, Jozef	Suggestion of Material Flow Optimisation in Production Process
Fedič, Marek	Proposal of Design Solution for Interconnection of Two Paralell Transport Lines
Šoltys, Daniel	Design and Dimensioning of Vibrating Feeder
Pira, Martin	Proposal of Material Handling in Welding Operation

Bezák, Michal	Project and Solution in Handling Process of Spraying and Assembly
Mati, Tomáš	Design Project of Crushing Showel
Dzido, Marián	Project of Driving System of Caterpillar Terrain Vehicle
Burda, Jozef	Project of Driving System of Wheeled Terrain Vehicle
Vaľko, Štefan	Design Project of Cableway Car
Palla, Matej	Design Project of Crane
Malecký, Stanislav	Design Project of Lifting Equipment
Berdis, Daniel	Design Project of Positioning Table
Švajko, Michal	Design Poject of Console Crane
Vidňanský, Ján	Design Project of Trailer Truck
Valkovič, Jozef	Opening Mechanism of Roof for Large Volume Freight Railway Wagon Tagnpps
Mendzezof, Pavol	Mechanism for Opening of Side Planking for Railway Freight Wagon Hbbiins.
Kukura, Martin	Assessment of Fillet Welds using the FEM Computations
Kolesár, Ján	Mechanisms of Stanchions applied for Wagon Shimmns
Dzvoník, Róbert	Design Project of Shears Mechanisms for Hydraulically Controlled Lifting Platform
Bočinec, Matúš	Design Project of Lift Engine Framework
Buliščák, Miroslav	Design of Tractor Trailer for Handling with Containers in Agriculture

PhD. THESES:

Transport Machines and Machinery

Petróci Ján	Increasing the output characteristics and reliability of the one-wheeled vehicle power unit
Thonhajzer Roman	Optimization of construction and management systems of one-wheeled transport vehicles power unit
Šima Martin	New methods for efficience increasing of driving units for transport vehicles
Boslai Róbert	Creating parametric 3D model of the car and its treatment using selected parameters
Siman Marián	Simulation of fuel mixture flow in the internal space of piston combustion engine

Parts of Machines and Mechanisms

Čopan Pavol	Application of new tuning method of torsionally oscillating mechanical systems
Moravič Marek	Control of dangerous vibration of mechanical systems drives
Baran Peter	Research and development of dual mass flywheel
Vrábel Peter	Control of dangerous vibrations and noise reduction in

mechanical system drives

RESEARCH AT THE DEPARTMENT

Area of research:

Transport Engineering and Logistics

- ✓ Optimisation of material flows
- ✓ Identification and simulation of logistic relations in production control and supplying
- ✓ New concepts of more perfect handling machines and machinery with high - level reliability characteristics
- ✓ Experimental verification of dynamic properties of steel supporting structures of transport machines from the point of view of their reliability and residual durability

Section of Machine Design and Machine Parts

- ✓ Tuning - up of torsion vibrating mechanical systems by pneumatic tuners with regard to dangerous torsion vibration
- ✓ Diagnostics of various types of mechanical systems and equipment from the point of view of torsion vibration and excited mechanical oscillations supplying
- ✓ Research, development and design of new types of elastic shaft couplings
- ✓ Optimisation of mechanical systems from the point of view dangerous torsion vibration

Research characteristics:

Up to the year 1990 there were solved at our Department various research tasks from the area of machine design and operation of the transport, building and agricultural machinery, with regard to analysis of dynamic characteristics and operational reliability, above all. The most important institutions cooperating with our Department were: Institute for Mechanics of Slovak Academy of Science, Institute for Research and Development of Engineering in Martin, Institute for Research and Development of Engineering in Zvolen, East - Slovak Metalworks in Kosice.
The important success of the Department was obtained at the International Engineering Fair in Brno in 1975 as a result of cooperation with the Institute for Research and Development of Engineering in Zvolen, as well as the ”Gold Medal Award” in 1976 repeatedly, in cooperation with the crane - building factory in Brezno.
After 1990 there are two most important areas of our research activities: durability and reliability of steel supporting structures of lifting machines; logistics and material flows.
The above - mentioned research areas are diversified into the following important topics: optimisation of material flows, identification and simulation of logistic relations in production control and supplying, new concepts of more perfect handling machines and machinery with high - level reliability characteristics, experimental verification of dynamic properties of steel supporting structures of transport machines from the point of view of their reliability and residual durability.

Cooperation with practice is focused on following topics: experimental measurement of operational loads of steel supporting structures of transport and handling machines and machinery, prediction of durability, project and realization of heavy load transportation, structural design of new components of manipulation equipment, suggestion and solution of inter - operational transport, logistic project of a Shopping - Functional Centre.
The most important cooperating partners are: US - Steel Košice, Cargo Bratislava, Transport Research Institute Žilina, Whirlpool Poprad, Wagon - works Poprad.

Areas of expertises:

Section of Transport Machines and Logistics

- ✓ Optimisation of material flows
- ✓ Identification and simulation of logistic relations of production control and supplying
- ✓ New concepts of more perfect handling machines and machinery with high - level reliability characteristics
- ✓ Experimental verification of dynamic properties of steel supporting structures of transport machines from the point of view of their reliability and residual durability

Section of Machine Design and Machine Parts

- ✓ Research, development and design of new types of elastic shaft couplings
- ✓ Optimisation of mechanical systems taking into consideration dangerous torsion vibrations
- ✓ Tuning - up of torsion vibrating mechanical systems by means of pneumatic tuners with emphasize on dangerous torsion vibration
- ✓ Diagnostics of various types of mechanical systems and equipment with regard to torsion vibration and excited mechanical oscillation

PROJECTS OF THE DEPARTMENT

NATIONAL PROJECTS

Title of the project	**Innovative processes in construction of driving units applied in transport means, machines and optimisation of material flows and logistics in order to save energy and to increase reliability with regard to application purposes in the practice**
Type of the project	Grant project VEGA
Number of the project	1/10356/11
Principal investigator	prof. Ing. Peter Bigoš, CSc.
Time period of the project	01/2010 - 12/2013

Annotation of the project	This scientific project is oriented in two main areas: the first one is innovation of constructional elements of driving unit, which is applied in transport vehicle in order to reach the maximum possible power output and torque, whilst keeping the constant stroke volume; to increase its reliability and to reduce emissions significantly. The second one is projection of logistic systems in material flows generally, as well as application of them in the production, in the transport and in the services. Within the framework of the both above - mentioned cases there will be solved innovative tasks in order to achieve the required technical parameters, to optimise the whole system, to save energy and to increase reliability taking into consideration possible application purposes in the practice.
Title of the project	**Research and application of universal regulation system in order to master the Source of mechanical systems excitation**
Type of the project	Grant project VEGA
Number of the project	1/0688/12
Principal investigator	prof. Ing. Jaroslav Homišin, CSc.
Time period of the project	01/2010 - 12/2015
Annotation of the project	In general terms the mechanical systems (MS) means the system of driving and driven machines arranged to perform the required work. We divide them into MS operating with constant speed and MS working with a range of speed. In terms of dynamics we understand MS as a system of masses connected with flexible links, it means systems that are able to oscillate. Especially piston machines bring heavy torsional excitation into the system, which causes oscillation, vibration, and hence their noise. Governing of the torsional vibration, as a source of MS excitation, on a basis of results of our research, can be achieved by applying a pneumatic coupling tuned by the proposed universal control system. On this basis, it can be concluded that with given connection a new continuous tuning method in steady state a connection of MS is created. Therefore, the aim of project will be the research, application and analysis of the function of universal control system for governing the MS excitation source with proposed method.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Transport Engineering and Logistics

Machine Design and Machine Parts

Employees and students

Baran Peter, Ing.

Country

Czech Republic (30. 9. 2013 - 10. 1. 2014)

PUBLICATIONS

Books

[1] KELEMEN, Michal - PUŠKÁR, Michal - VIRGALA, Ivan - MIKOVÁ, Ľubica: **Meranie v mechatronike** / 2013, 1. vyd. - Košice : TU - 146 s.. - ISBN 978-80-553-1388-7.

[2] HOMIŠIN, Jaroslav - MEDVECKÁ-BEŇOVÁ, Silvia - VOJTKOVÁ, Jarmila: **Praktické riešenie úloh v predmetoch konštruovania** / 2013, 1. vyd. - Košice : Edícia študijnej literatúry TU - 2013. - 115 s.. - ISBN 978-80-553-1571-3.

Journals

[1] HUDÁK, Radovan - ŠARIK, Martin - DADEJ, Róbert - ŽIVČÁK, Jozef - HARACHOVÁ, Daniela: **Material and thermal analysis of laser sinterted products** / - 2013.In: Acta Mechanica et Automatica. Vol. 7, no. 1 (2013), p. 15-19. - ISSN 1898-4088 Spôsob prístupu: http://www.actawm.pb.edu.pl/volume/vol7no1/HUDAK_SARIK_DADEJ_ZIVCAK_HARACHOVA_2013_003.pdf .

[2] PUŠKÁR, Michal - BIGOŠ, Peter - BALÁŽIKOVÁ, Michaela - PEŤKOVÁ, Viera: **The measurement method solving the problems of engine output characteristics caused by change in atmospheric conditions on the principle of the theory of optimal temperature range of exhaust system** / - 2013.In: Measurement : Journal of the International Measurement Confederation (IMEKO). Vol. 46, no. 1 (2013), p. 467–475. - ISSN 0263-2241 Spôsob prístupu: http://www.sciencedirect.com/science/article/pii/S0263224112002977.

[3] PUŠKÁR, Michal - BIGOŠ, Peter - KELEMEN, Michal - MARKULIK, Štefan - PUŠKÁROVÁ, Paula: **Method for accurate measurement of output ignition curves for combustion engines** / - 2013.In: Measurement. Vol. 46, no. 4 (2013), p. 1379–1384. - ISSN 0263-2241

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[5] PUŠKÁR, Michal - BIGOŠ, Peter: **Measuring of accoustic wave influences generated at various configurations of racing engine inlet and exhaust system on brake mean effective pressure** / - 2013.In: Measurement. Vol. 46, no. 9 (2013), p. 3389–3400. - ISSN 0263-2241 Spôsob prístupu: http://www.sciencedirect.com/science/article/pii/S0263224113002005.

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[7] KOPAS, Melichar - PAULIKOVÁ, Alena: **Chosen essential aspects of high-lift truck operation** / - 2013.In: Zdvihací zařízení v teorii a praxi. No. 1 (2013), p. 24-28. - ISSN 1802-2812 Spôsob prístupu: http://www.342.vsb.cz/zdvihacizarizeni/ZZvTaP_1-2013.pdf.

[8] FALTINOVÁ, Eva - KOPAS, Melichar: **Determination of dynamic stability of mobile working machines in vertical plain** / - 2013.In: Zdvihací zařízení v teorii a praxi. No. 1 (2013), p. 9-14. - ISSN 1802-2812 Spôsob prístupu: http://www.342.vsb.cz/zdvihacizarizeni/ZZvTaP_1-2013.pdf.

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INSTITUTE OF SAFETY, QUALITY AND ENVIRONMENTAL SCIENCE

- Department of Safety and Quality of Production
- Department of Environmentalistics
- Department of Power Engineering

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Staff

- Professors: **3**
- Assoc. Professors: **1**
- Assist. Professors: **6**
- Researchers: **4**
- PhD. Students: **5 internal, 7 external**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
2/2013	National Forum on Maintenance 2013
10/2013	Conference: MachineDiagnostics DIS
11/2013	Conference: Current Issues of Occupational Safety and Health

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Occupational Safety and Health**
- **Quality of Production**

Master's degree:

- **Safety of Technical Systems**
- **Production Quality Engineering**

PhD. degree:

- **Safety of Technical Systems**

Number of the students (until 30. 10. 2013)
on the study programs guaranteed by the department:
first year of study:

- 58 internal form of study
- 25 external form of study

second year of study:

- 35 internal form of study
- 32 external form of study

Number of the graduates (2012/2013)
on the study programs guaranteed by the department:

- 35 students in the internal form of engineering study
- 32 students in the external form of engineering study

- 5 PhD. students in the internal form of study (defended PhD. thesis)

- 7 PhD. students in the external form of study (defended PhD. thesis)

GRADUATE PROFILE

BACHELOR'S PROGRAMS (Bc.)

Occupational Safety and Health

The study programme prepares students for the profession of safety technicians in enterprises. Graduates are able to analyse and solve issues of prevention, identify hazards and evaluate risks at work in various industries and sectors. Students of this programme obtain an overview of European and national OSH legislation and its application in practice. The study programme also focuses on design and implementation of safety management systems and their integration with other systems, (e.g. quality and environmental management systems), as well as their incorporation in other comprehensive systems – e.g. prevention of major industrial accidents, fire protection. Graduates of this study programme can find employment as safety managers or OSH coordinators.

Quality of Production

The study programme provides an overview of production procedures of industrial technologies, process solutions, basic metrological skills, auditing and certification procedures, methodology of statistic regulation of production processes, and the utilization of information technology. The graduates are able to design and implement quality management systems and manage or supervise complex processes and productions.

MASTER'S PROGRAMS (Ing.)

Safety of Technical Systems

The programme covers a wide area of the assessment of technical safety of machines and devices. The most important part of study programme is the analysis of technical risk by employing modern identification methods that integrate several scientific disciplines. High standard of technical safety is the primary requirement in the construction of modern machines and systems. The graduates of this programme have the potential to succeed as safety managers, design engineers, OSH coordinators and safety engineers.

Production Quality Engineering

The study programme provides instruction related to production procedures of industrial technologies, process solutions, metrological skills, auditing and certification procedures, methodology of statistic regulation of production processes and the utilization of information technology. The graduates are able to design and implement quality management systems and manage or supervise complex processes and productions. They can find employment as senior quality managers, as they possess the knowledge and skills that enable them to manage production processes in industrial enterprises, efficiently use information technology and process complex data.

DOCTORAL PROGRAMMES (PhD.)

Safety of Technical Systems

PhD. graduates have a good command of scientific methods and approaches to OSH, testing and evaluating various factors that influence the level of safety, defining and managing the safety culture and determining individual indicators for its application and evaluation. They have the potential to succeed as senior managers in the field of OSH management system and integrated systems, academic or research staff, and experts on OSH, fire protection and major industrial accidents prevention.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Power machines and equipments

- ✓ Fundamentals of H&S
- ✓ Legislative of H&S
- ✓ Semester Project
- ✓ Safety Protection at Workplace
- ✓ Risk Management
- ✓ Explosion and Fire Protection
- ✓ Quality of Production
- ✓ CAD – Modeling Simulation
- ✓ CA – Techniques for Risk Analysis
- ✓ Technical Diagnostics I.
- ✓ Maintenance Management I.
- ✓ Selected Chapters of H&S
- ✓ Final Project
- ✓ Final Work
- ✓ Quality Management Systems
- ✓ Crises Management
- ✓ Dangerous Substances and Personal Protection
- ✓ Quality Production Engineering I.
- ✓ CA - Methods of Construction Design I.
- ✓ Total Quality Management
- ✓ Maintenance Management II.
- ✓ Selected Chapters from Experimental Methods and Examine of Machines and Equipments
- ✓ Theoretical Basics of Selected Technical Diagnostics Methods
- ✓ QMS Documentation
- ✓ Selected Chapters from Quality Management System
- ✓ Occupational Safety in Production
- ✓ CA - Methods of Construction Design I.
- ✓ CA - Methods of Construction Design II.
- ✓ CA - Methods of Construction Design III.
- ✓ Diploma Work
- ✓ Diploma Project
- ✓ Integrated Management Systems
- ✓ Design of Safety Systems
- ✓ Legislation and Safety for Machine Design, Production and Operation
- ✓ Major Hazards Accidents
- ✓ Technical Diagnostics II.
- ✓ Development Trends in Branch
- ✓ Technical Tools of Fire Prevention
- ✓ Crises Management II.
- ✓ Selected Chapters of Quality Management System
- ✓ Quality Production Engineering II.
- ✓ Generic Management
- ✓ Accreditation, Certification, Audit
- ✓ Risk Predetermination and Risk Assessment
- ✓ Complex of Integrated Operating Management - Quality, Safety, Environment

GRADUATE THESES

BACHELOR'S THESES:

Occupational Safety and Health

Bálint Tomáš	The safety of internet banking and online stores
Bogačiková Michaela	The impact of hazardous materials on the working environment in the platform safety and security
Britan Peter	Maintenance of systems using heat pumps
Fehér Maroš	Utilization ergonomic analysis in the identification occupational risks
Gajdošová Andrea	Tools to identify potential terrorist attacks
Hrabčák Tomáš	Hydrogen as a safe fuel in public transport
Hrčka Martin	Ultrasound diagnosis of leakages
Hurtuková Silvia	Safety at work with laser
Kaňuk Patrik	OSH Act Amendments since 2010 and their practical impact
Klima Lukáš	The interaction between ergonomic analysis and risk management systems to ensure the safety and health at work
Klimeš Kamil	The identification and proposal of measures to reduce psychosocial risks for selected professions
Knutelský Ján	The effect of a magnetic field effect on employees at work
Liptáková Andrea	Risk analysis of selected laboratory
Lukáč Peter	Application to magnetometry selected technology
Matuška Martin	Risk analysis of mobile resources in the field of chemical safety
Mihalovič Radovan	Occupational risks in new technologies
Miňová Nikoleta	Lifting machine interface Safety and Security
Miškovič Tomáš	Safety at work with industrial robots
Olšiaková Alena	Technical diagnostics performed in an explosive environment
Pačinda Peter	Safety and health at work of pregnant women and mothers
Palenčár Martin	Safety measures in the choosen organization
Podolinská Petra	Risk analysis in the production of wagons
Rákoczy Peter	Ergonomic risks assessment by means of Nordic Questionnaire
Sopková Mária	Risks in surface stone quarries - Olcnava
Sovák Štefan	The development of ideas within the safety and security platform for the field of chemical safety
Šipoš Vladimír	The impact of new and emerging risks in the safety and health at work
Varga Dávid	Risk analysis of storage toxic substances and possible measures
Vidíš Radoslav	Safety precautions at work on helipads

Quality of Production

Beláková Lucia	Comparison of older and newer editions of the standard ISO

	19011 from 2002 and 2011.
Bene Peter	Aplication of P-D-C-A cycle on incoming control of the selected process
Betáková Soňa	The influence of corporate culture on employee in organization
Čarná Lucia	Corporate culture as part of process improvement through people
Dziaková Petra	Perceptions of the organization by managing customer complaints
Dzurenda Matúš	Comparison of selected processes performed by Insoursouring and Outsourcing
Faith Gabriel	Energy management system and method of implementation
Ivánová Soňa	Communication - an aimportant factor in any organization
Janošková Ivana	The financial aspects of the implementation and maintenance of management systems
Kandravá Marina	Performance measurement and evaluation processes
Kramarčík Martin	Draft methodology for defrining customer requirements
Krešňak Marek	New trends and factors affecting the quality of the educational process
Minarčik Tomáš	Electronic documentation management in terms of quality management system
Stašová Anita	Proposal of the employee evaluation.
Šoltésová Veronika	Motivation and employee evaluation as a tool for improving the quality of companies
Takáčová Miroslava	Quality assessment of public universities
Tomko Tomáš	Statistical inspection
Čierny Dominik	Control o non-conforming products in terms of production organization
Ecker Matej	Quantification and qualification of quality parameters in services
Fabiniová Katarína	The first level of QMS documentation
Goleňa Ivan	Continuous improvement as complex activities within the organization's management
Havasi Gabriel	Increasing process efficieny through optimization of material flow
Hoššo Stanislav	Statistical process control
Jureková Terézia	Development and quality of human resources in the Slovak Republic
Kožár Matúš	The application of the process approach in terms of a small engineering manufactory.
Nagyová Veronika	Proposal for control documentation on the production line
Rjapošová Erika	Application of standards EN ISO 19011:2012 in Quality Management System

MASTER'S THESES:

Safety of Technical Systems

Bodisová Veronika	Operation and maintenance of CNC machines in a

	particular company
Bartha Gabriel	Risk analysis in selected activities in the car repair workshop
Burík Vladimír	Application of boiler equipment used for combustion of biomass
Čarná Zuzana	Evacualtion plan for area under Ruzin dam
Dancák Maroš	Guide of selected applications from ReliaSoft for data analysis and create reports
Haburajová Natália	Design ergonomics program as a tool to prevent risk in a particular work environment
Haščák Maroš	Residual risk assessment in maintenance of rail vehicles in metallurgy industry
Imreová Timea	Guide of RCM ++ application from ReliaSoft in maintenance focusing on reliability
Jambrich Štefan	Risk analysis of the heat pump system
Jankovičová Janette	Possible risks of fires in technological equipment and minimize the possibility of minimize
Juhászová Zuzana	Continuity in the chosen company
Kerekešová Katarína	Flood Plan for choosen village
Kisbenedeková Zita	Coordination of health and safety during construction works
Kordiaková Lenka	Proposal an integrated management system during implementation process of OSH management system in software organization
Košíková Mária	Rescue of persons by means of air rescue services
Kozák Jozef	Human reliability and BBS safety program
Kožlejová Emília	Risks to Safety and Security Interface - civil security and safety at work
Krajňáková Albína	Application of virtual reality methods for modeling risk in the workplace
Krempaská Mária	Risk analysis and liquidation possibilities of forest fires
Ludrovská Martina	Psychical and physical loading of members of the Slovak Police Corps
Mlynáriková Ivana	The risk assessment phase of the life cycle of photovoltaic devices
Németh Tibor	Safety measures in magnesite treatment process
Pasternáková Petra	Risk analysis for the inappropriate use of child seats and design innovation in terms of their health and safety
Plichtová Mariana	Safety measures at selected technological equipment
Schuster Jaroslav	Risk analysis in the logistics center Getrag Ford Transmissions
Šestina Matúš	Risk analysis of devices which makes use of hydrogen combustion
Šomšák Tomáš	Health and safety in forestry works
Štofej Jozef	Proposal of safety elements for the selected technology

Tindira Richard	Assessment and risk management for selected technical equipment
Tóth Ľudovít	Risk assessment and measures proposal for processing of husked beech veneer
Tulenková Anna	Optimalization of safety elements in the paintshop
Višňovská Dominika	Implementing Behaviour Based Safety of workplace
Vojtko Tomáš	Legislative action in the acoustic field, non-auditory effects of noise and their implementation in the process of risk assessment

Production Quality Engineering

Gmitro Milan	MSA application for measuring equipment
Jakšová Silvia	Proposal to evaluate the effectiveness of staff education in selected organizations
Miroslava Katonová	Software support for quality management in the engineering
Kravec Maroš	Implementation requirements for quality, safety and environmental aspects products within a single model of risk management in selected organizations
Kuzárová Jana	Application of the method Balanced Scorecard in the selected organizations
Mikolayová Ivana	Risk analysis in quality management system
Potočný Jaroslav	Creating a procedure for effective identifying and eliminating waste in manufacturing
Puliková Hrehová Miroslava	Application SPC tools in practice
Rošková Veronika	Evaluation and optimization of the production process with using statistical tools of quality management
Sedláčik Stefan	Design of database for monitoring quality parameters of instruments.
Stebilová Zuzana	Cost analyses of poor quality by using non-conforming components.
Ščurková Zuzana	The steamline analysis of internal business costs on cost of poor quality of the selected proces.
Škotková Petronela	Using QA matrix for the analysis of the most frequent errors in the produciton process.
Šuchová Viktória	Improving the quality of service in terms of the railway company.
Urbanová Jana	A study of the process implementation of kaizen philosophy methods in medical facilities SR.
Bajusová Paula	Application of a new model of excellence in organization.
Beniač Rastislav	Optimalization of welding technology process on the selected product.

Budický Tibor	Draft of constructional design to remove the current non-conformance.
Compeľová Jana	Draft operational procedures for the control of measuring instruments and equipment.
Radoslav Dronzek	Elaboration of a documented procedure for process control orders.
Gemzová Mária	Methodic proposal of employee measurement satisfaction.
Gregová Daniela	The use of quality management tools for the analysis of the production process errors.
Horničák Miroslav	Application of Poka Yoke to minimize human error.
Horšuláková Jana	Use quality tools to reduce costs through quality circles.
Horváth Viktor	The application of lean manufacturing techniques in the selected process.
Hovanec Martin	Interlaboratory measurement to improve the quality of parts.
Choma Vladimír	The plan of quality control in the production of a new prototype.
Jančura Ladislav	Reducing of non conformities in NT compressor on the production assembly line.
Jenčuráková Dana	Proposal to improve the corporate culture.
Kessel Ján	Process increase in efficiency of recruitment materials using radio frequency chips.
Kisbenedek Tamás	Implementation of QMS in the selected organization engaged in providing services in the area of OSH.
Košalková Mária	Application Design Whirlpool Production System for nascent production line.
Kozák Jozef	Human reliability and program BBS
Kuzmíková Martina	Process analysis with Opex method and proposal actions on ensure the competence of selected process.
Mlynár Tomáš	Application of Six Sigma principles in selected process
Odstrčilová Ivana	Draft methodology for measuring customer satisfaction.
Oravec Juraj	Analysis of the influence of geometric characteristics of the compressor components
Pentrák Peter	Elaboration of a documented procedure for process control orders.
Regecová Ľubica	Methodic proposal of employee measurement satisfaction.
Repko Jozef	The use of quality management tools for the analysis of the production process errors.
Rimský Henrich	Application of Poka Yoke to minimize human error.
Spišiak Martin	Use quality tools to reduce costs through quality circles.
Szalontaiová Henrieta	The application of lean manufacturing techniques in the selected process.
Šefčík Jaroslav	Interlaboratory measurement to improve the quality of

	parts.
Šrobár Jaroslav	Analysis of the influence of geometric characteristics of the compressor components
Štubňová Magdaléna	Elaboration of a documented procedure for process control orders.
Truhan Martin	Methodic proposal of employee measurement satisfaction.
Vasičák Miroslav	The use of quality management tools for the analysis of the production process errors.
Vrábľová Denisa	Application of Poka Yoke to minimize human error.
Zahurancová Bernadeta	Use quality tools to reduce costs through quality circles.

PhD. THESES:

Safety of Technical Systems

Firmentová Katarína	Management og Quality and safety in building processes.
Erdélyi Štefan	Maintenance management of technical facilities for alternative sources of energy.
Hudák Ľuboš	Methodology of machine safety evaluations during whole life cycle of them.
Kalafut František	Development of criteria for the integration of management practices for risk management at the interface of safety and security.
Kardošová Alica	Synergic procedures between ergonomic analysis and risk management systems in the new technologies.
Konečný Branislav	Model of integrated safety and security within hydrogen technology.
Remiašová Andrea	Model of human mistake evaluation and its application in the management systems.
Savari Michal	Riskmanagement systems for competitive company.
Forrai Filip	Application of barrier models in selected sector of critical infrastructure.
Hijj Ján	Emergency plan as a tool for program of continuity
Kamenický Lukáš	Quantification and Classification of managerial processes integrated management system in terms of safety and quality.

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ Research into methods and approaches to management of new and emerging risks related to new technology and renewable energy sources.
- ✓ Analysis of technical, environmental and human risks, aiming for sustainable development of mechanical engineering production and products.
- ✓ Risk management processes related to machines and technological systems in the safety & security interface.

- ✓ Research into risks related to industrial technologies within the integrated safety as a precondition for sustainable development.
- ✓ Effective maintenance management methods utilizing KPI (Key performance indicators).
- ✓ Ergonomic analyses as risk prevention measures.
- ✓ Application of quality management related to industrial technologies and final products.
- ✓ Objectification of quality parameters in the field of research and education.

Innovation procedures:

- ✓ Design of vehicles with minimum fuel consumption, in connection with the Shell - Eco Marathon competition.
- ✓ Design of hydrogen - powered vehicles.
- ✓ Audit structure and effective certification procedures for companies and organizations.
- ✓ Leadership in the national policy on the quality of tertiary education in the Slovak Republic and also within the EU Structural Funds.
- ✓ Implementation of a project whose objective is to establish a certification and consulting centre for technical, environmental and human risks; a partial task included in the project of establishing a University Scientific Park at the Technical University of Košice.

Scientific analyses:

- ✓ Risks related to manufacturing technologies – analyses and development of effective prevention methods.
- ✓ Safety & security interface as a part of integrated safety – extended causal dependence.
- ✓ Safety of critical infrastructure.
- ✓ Major industrial accidents – effective risk minimization.
- ✓ Development of technical diagnostic methods for an integrated approach to preventing machine and system failures related to the development and implementation of new techniques and technology.
- ✓ Determination of quality parameters for new products in accordance with the legislation and customer requirements.

Department of Safety and Quality of Production offers drawing up fallback procedures for industries in accordance with Act of the National Council of the Slovak Republic No 261/2002, Coll. on the Prevention of Major Industrial Accidents:

- ✓ Categorization of the enterprise and preliminary risk assessment.
- ✓ Notification of the categorization findings.
- ✓ Risk evaluation (in collaboration with BESTOFT company).
- ✓ Major industrial accidents prevention programme.
- ✓ Safety management system.
- ✓ Fallback procedures, including scenarios and complete building floor plans.
- ✓ Safety reports.

Scientific analyses:

Co - organizing National Maintenance Forum conferences in Slovakia and DIAGO conferences in the Czech Republic

PROJECTS OF THE DEPARTMENT

Title of the project	**Research Centre for the management of technical, environmental and human risks, aiming for continuous development of production and products in mechanical engineering**
Number of the project	ITMS26220120060
Principal Investigator	Dr.h.c. mult. prof. Ing. Juraj Sinay, DrSc.
Years of implementation:	2010 – 2013
Annotation of the project:	Establishing a sustainable centre conducting research in the management of technical, environmental and human risks, with the aim of achieving continuous progress in mechanical engineering production and products.

Title of the project	**Research centre for efficient integration of renewable energy sources -** VUKONZE
Number of the project	ITMS26220120064
Principal Investigator	Dr.h.c. mult. prof. Ing. Juraj Sinay, DrSc.
Years of implementation:	2010 – 2013
Annotation of the project:	The aim of the project is creating the VUKONZE Centre (research into the efficiency of integrated systems of renewable energy sources).

Title of the project	**New technologies for energy - efficient, cost - effective and environmentally friendly utilization of biomass**
Number of the project	ITMS26220120063
Principal Investigator	prof. Ing. Hana Pačaiová, PhD.
Years of implementation:	2010 - 2013
Annotation of the project:	The purpose is to develop a risk assessment model for a new technical solution of biomass utilization. This model takes into account the existing and emerging risks and allows for the implementation of quality management processes based on the evaluation of life - cycle costs of the proposed solutions.

Title of the project	**University Science Park TECHNICOM for Innovation Application Supported by Knowledge Technology**
Number of the project	ITMS26220220182
Principal Investigator	Dr.h.c. mult. prof. Ing. Juraj Sinay, DrSc.

Years of implementation: 2013 - 2015

Annotation of the project: The aim of this activity is to establish a sustainable training activities, advisory and certification center for risk management in machine safety, health and safety at work and environmental risks throughout the life cycle of machines, mechanical systems, vehicles and motorcycles final products as well as within renewable energy.

NATIONAL PROJECTS

Title of the project **Research into new and newly emerging risks related to industrial technologies within integrated safety as a precondition for the management of sustainable development**

Number of the project APVV - 0337 - 11

Principal Investigator Dr.h.c. mult. prof. Ing. Juraj Sinay, DrSc.

Years of implementation: 2012 - 2015

Annotation of the project Model based on integrated risk analysis will be developed to support the management of sustainable development of industrial technologies of mechanical engineering products. The model will focus on risks related to new technologies and products in particular phases of their life cycle. Its aim will be to define particular phases of causal dependence in the occurrence of negative phenomena. Methods of qualification and quantification will be developed, aiming at risk minimization.

Title of the project **Research into the processof management of risks related to machines and technical systems in the safety & security interface – safety of technical systems, occupational safety and civil security**

Number of the project 1/0107/12

Principal Investigator Dr.h.c. mult. prof. Ing. Juraj Sinay, DrSc.

Years of implementation: 2012 - 2015

Annotation of the project: Effective risk management process covering the safety of machines and technical systems as well as civil security is one of current priorities in enterprises. It is substantially dependent on the relevance of risk identification and quantification. Due to the overlap between safety and security risk management, there is a need to develop methods of the application of technical solutions which take human factors into consideration. The risk minimization precautions utilize modern ICT, maintenance technologies, and methods of technical diagnostics. KPI parameters are designed to assess the effectiveness of the proposed measures.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Employees and students	Country
Sinay Juraj, prof. Ing., DrSc.	Czech Republic, Germany
Pačaiová Hana, prof. Ing., PhD.	Czech Republic
Oravec Milan, prof. Ing., PhD.	Czech Republic, Germany
Kamenický Lukáš	Germany
Kalafút František	Czech Republic, Germany
Konečný Branislav	Czech Republic
Vargová Slavomíra	Germany
Namešanská Jana	Czech Republic
Erdélyi Štefan	Czech Republic
Kardošová Alica	Hungary

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Juraj Sinay, prof. Ing., DrSc.

- ✓ Member of SOK/ Joint Trade Union Committee for the defence of doctoral dissertations in the field of transport and handling equipment and Chairman of SOK in the field of technical safety systems and safety.
- ✓ Chairman of the Joint Commission for the PhD. defence in the fields of transport and handling equipment, machinery and safety of technical systems.
- ✓ Chairman of the Scientific Council of TU Košice, Scientific Council of Zvolen, the Scientific Board of VSB TU Ostrava, the Scientific Council of the University of Trenčín in Trenčín A. Dubčeka and Scientific Council of the Faculty of Mechanical Engineering, TU.

Hana Pačaiová, prof. Ing., PhD.

- ✓ Member of accreditation group for education (No. 124/2006 Coll.).
- ✓ Member of Supervisory Board of Slovak Maintenance Society.
- ✓ Member of Association of Technical Diagnostics SR.

Milan Oravec, prof. Ing., PhD.

- ✓ Member of Editorial Board Safety of Work, ASPOS

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

Juraj Sinay, prof. Ing., DrSc.

- ✓ Member of the Working Group IVSS, Sektion Maschinenschutz based in Manheim, FRG.
- ✓ Member of the Gesellschaft für Sicherheitswissenschaften /security company for technology/ VDI Wuppertal, FRG. Member of the Conference of the German - speaking professor of traffic engineering in Europe, based in Berlin - FRG.

- ✓ Member of the editorial board of safe work Editorial Board member of the Human Factors and Ergonomics in Manufacturing, ISSN1520 - 6564, Wiley New York/ USA.

Hana Pačaiová, prof. Ing., PhD.

- ✓ Member of the organizational Board of the conference AHFE.

PUBLICATIONS

Journals

[1] NAMEŠANSKÁ, Jana - PAČAIOVÁ, Hana: Rozdelenie **KPIs do oblasti riadenia v organizacii** / - 2013. In: Q-magazin. No. 1 (2013), p. 1-4. - ISSN 1213-0451

[2] PUŠKÁR, Michal - BIGOŠ, Peter - BALÁŽIKOVÁ, Michaela - PEŤKOVÁ, Viera: **The measurement method solving the problems of engine output characteristics caused by change in atmospheric conditions on the principle of the theory of optimal temperature range of exhaust system** / - 2013. In: Measurement : Journal of the International Measurement Confederation (IMEKO). Vol. 46, no. 1 (2013), p. 467–475. - ISSN 0263-2241.

[3] [BALÁŽIKOVÁ, Michaela - KOTIANOVÁ, Zuzana: **Emerging risks in conducting deformation measurements using selected methods** / - 2013. In: Monitoring and expertise in Safety Engineering. Vol. 3, no. 1 (2013), p. 1-8. - ISSN 2217-6608

[4] PUŠKÁR, Michal - BIGOŠ, Peter - KELEMEN, Michal - MARKULIK, Štefan - PUŠKÁROVÁ, Paula: **Method for accurate measurement of output ignition curves for combustion engines** / - 2013. In: Measurement. Vol. 46, no. 4 (2013), p. 1379–1384. - ISSN 0263-2241 SINAY, Juraj - BALÁŽIKOVÁ, Michaela: Acoustic risk management /- 2012. In: Human Factors and Ergonomics in Manufacturing & Service Industries. Vol. 22, no. 3 (2012), p. 1-10. - ISSN 1090-8471

[5] TOMAŠKOVÁ, Marianna: **Bolier- a special group of restricted technical devices** / - 2013. In: Monitoring and Expertise in safety Engineering. Vol. 3, no. 1 (2013), p. 63-70. - ISSN 2217-6608

[6] BALÁŽIKOVÁ, Michaela - KOTIANOVÁ, Zuzana: **Novi rizici pri mereni deformacija odabranim metodama** / - 2013. In: Monitoring and Expertise in Safety Engineering. Vol. 3, no. 1 (2013), p. 1-9. - ISSN 2217-7248

[7] TOMAŠKOVÁ, Marianna: **Kotlovi – posebna grupa kontrolisanich techničkich urečaja** / - 2013. In: Monitoring and Expertise in Safety Engineering. Vol. 3, no. 1 (2013), p. 67-74. - ISSN 2217-7248

[8] ORAVEC, Milan - VARGOVÁ, Slavomíra - GLATZ, Juraj - IŽARÍKOVÁ, Gabriela: **Využitie magnetometrie pri identifikovaní objektov** / - 2013. In: The Sience for Population Protection. Vol. 5, no. 1 (2013), p. 63-80. - ISSN 1803-568X

[9] TOMAŠKOVÁ, Marianna: **Požar ako važny faktor, vlivajuščij na rabotu požarnych** / - 2013. In: Požarovvzryvo-bezopasnosť. Vol. 22, no. 6 (2013), p. 8-12. - ISSN 0869-7493 8

[10] BALÁŽIKOVÁ, Michaela - GLATZ, Juraj: **Riziká pri zásahu hasičov v obytných objektoch využívajúcich alternatívne zdroje energie - slnečná energia** / - 2013. In: Bezpečnosť práce v praxi. Roč. 3, č. 5 (2013), s. 14-17. - ISSN 1338-2691

[11] VARGOVÁ, Slavomíra - SINAY, Juraj: **Návrh metodiky pre oblasť riešenia komplexnej analýzy rizík v rámci spoločnej platformy safety a security** / - 2013. In: Transfer inovácií. Č. 25 (2013), s. 264-267. - ISSN 1337-7094

[12] NAMEŠANSKÁ, Jana - PAČAIOVÁ, Hana: **Návrh štruktúry kľúčových ukazovateľov pre meranie výkonnosti procesov** / - 2013. In: Transfer inovácií. Č. 25 (2013), s. 204-207. - ISSN 1337-7094

[13] KRAJŇÁK, Stanislav - ŠVIDEROVÁ, Katarína - SIMAN, Daniel - TOMPOŠ, Adrián: **Úloha virtuálnej reality pri posudzovaní vznikajúcich rizík** / - 2013. In: Produktivita a Inovácie. Roč. 14, č. 2 (2013), s. 27-30. - ISSN 1339-2271

[14] TOMAŠKOVÁ, Marianna: **Vplyv stresu na psychiku hasičov** / - 2013. In: Bezpečnosť práce v praxi. Roč. 3, č. 6 (2013), s. 10-12. - ISSN 1338-2691.

[15] PAČAIOVÁ, Hana - ZOBEL, Štefan: **Risk Based Inspection, prekážky a príležitosti pri predchádzaní haváriám** / - 2013. In: ATP journal. Č. 8 (2013), s. 36-38. - ISSN 1335-2237

[16] PAČAIOVÁ, Hana - KOTIANOVÁ, Zuzana - NAGYOVÁ, Anna - ALEŠ, Bernatík: **Risk Assessment Methodology in SME** / - 2013. In: Acta Mechanica Slovaca. Roč. 17, č. 2 (2013), s. 30-35. - ISSN 1335-2393

[17] ORAVEC, Milan - VARGOVÁ, Slavomíra - GLATZ, Juraj: **Identification of objects by magnetometry** / - 2013. In: Acta Mechanica Slovaca. Roč. 17, č. 2 (2013), s. 44-52. - ISSN 1335-2393

[18] SINAY, Juraj - ŠVIDEROVÁ, Katarína - TOMPOŠ, Adrián: **Occupational safety and calculation of risk for all employees** / - 2013. In: Acta Mechanica Slovaca. Roč. 17, č. 2 (2013), s. 38-43. - ISSN 1335-2393

[19] KLOUDA, Karel - SINAY, Juraj - CEJPEK, Jiří - LACH, Karel: **Identification of nano- and microparticle aerosols generated in selected operation** / - 2013. In:

Acta Mechanica Slovaca. Roč. 17, č. 2 (2013), s. 90-102. - ISSN 1335-2393

[20] SINAY,Juraj - KARDOŠOVÁ, Alica: **Vzájomný vzťah parametrov nových a novo vznikajúcich rizík** / - 2013. In: Transfer inovácií. Č. 25 (2013), s. 137-140. - ISSN 1337-7094

[21] HOVANEC, Michal - PAČAIOVÁ, Hana: **Progresívne metódy pri optimalizácií pracoviska** / - 2013. In: Transfer inovácií. Č. 25 (2013), s. 78-80. - ISSN 1337-7094

[22] TOMPOŠ, Adrián: **Využitie softvérovej aplikácie v údržbe zameranej na spoľahlivosť** / - 2013. In: Spravodaj ATD SR. Roč. 10, č. 1 (2013), s. 20-24. - ISSN 1337-8252

[23] SINAY, Juraj - MARKULIK, Štefan - KAMENICKÝ, Lukáš: **Kvalita produkcie & bezpečnosť a ochrana zdravia - predpoklad pre integráciu v rámci manažérskych systémov** / - 2013. In: Kvalita. Roč. 21, č. 3 (2013), s. 35-37. - ISSN 1335-9231

[24] TOMAŠKOVÁ, Marianna: **Je bezpečnosť práce pri pracovných činnostiach aktuálna?** / - 2013. In: Bezpečnosť práce v praxi. Roč. 3, č. 2 (2013), s. 1,4. - ISSN 1338-2691

Conference Proceedings

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Monographic

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Departments of Environmentalistics

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Staff

- Professors: **3**
- Assoc. Professors: **3**
- Assist. Professors: **6**
- Researchers: **3**
- PhD Students: **10 internal, 8 external**

Activities at the Department

Date	Title of the event, activity characterizing the life at the Institute in 2013
05/2013	Accreditation of the Laboratory for objectivisation physical environmental factors
07/2013	Organization of International CEEPUS Summer School Courses, Košice
10/2013	Organisation of the 4th conference “Assesment of quality environment”, Herlany,
11/2013	Coorganization 4th International Conference “To Protect our Global Environment for Future Generation “ICEEE 2013 , Budapest, Hungary

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Technology of environmental protection**
- **Environmental Management**
- **Management of technical and environmental risks**

Master's degree:

- **Technology of environmental protection**
- **Environmental Management**

Doctoral degree:

- **Technology of environmental protection**

Number of the students

first year of bachelor's studies:

– 23 internal form of study

– 0 external form of study

second year of bachelor's studies:

– 52 internal form of study

– 0 external form of study

first year of engineering studies:

– 37 internal form of study

– 20 external form of study

Number of the students on the study programmes guaranteed by the institute (2012/2013):

Bachelor's degree: 60

on the study programs guaranteed by the department:

– 44 internal form of study

– 16 external form of study

Master's degree: 53

on the study programs guaranteed by the department:

– 34 internal form of engineering study

– 19 external form of engineering study

Doctoral degree: **3**

3 PhD students in the internal form of

study (defended PhD. thesis)

GRADUATE PROFILE

BACHELOR PROGRAMS (Bc.)

Technology of environmental protection

Greening in the engineering must be focused on a complex life cycle from design through its stages of production and consumption to disposal for its survival. To this end, graduates receive, not just Bachelors fundamentals of environmental engineering, but also comprehensive knowledge in the field of environmental protection technology aimed at greening in the area of mechanical engineering. Study program is taught in daily form and in the distance form.

Environmental Management

The study is designed so that graduates could work with information sources, they knew they evaluate and effectively use and master the different communication tools. Students get knowledge of computer technology and its application possibilities in environmental protection.
Graduates of the Department of Environmental Management have knowledge of the variability of the operation of the man - environment. They can define the environmental problems, prioritize their problems and to the efficient operation and saving people in the environment. They are qualified to work with all age groups of the population in order to shape their environmental awareness. Study program is taught in daily form and in the distance form.

Management of technical and environmental risks

The structure of the study program “Management and technical environmental risks” is primarily focused on the possibility of its graduates to pursue in a wide range of corporate, public and the central government sector with a focus on industrial technology. The structure of the study program enables to graduates of study program to be ready to study in II. Degree/ step of university study and with possible profiling of graduates by compulsory optional courses, especially for quality programs Quality production (Engineering of Quality Production), Safety of Technical Systems, Environmental Management or Environmental Engineering of Environment. The graduates will have a general knowledge from the area of mechanical engineering and from wider range of management activities. They are not closely profiling, which allows them to wider application also in the labour market.

MASTER´S DEGREE (Ing.)

Technology of environmental protection

The study is focused on issues of development and environmental protection. Students after a common basis of science and engineering studies are profiling on the impact of machine production on the environment, treatment of industrial waste, machinery and equipment for environment, greening of products and production processes, monitoring of environmental technology and protection of the biosphere. Study program is taught in daily form and in the distance form.

Environmental Management

Graduates of the Department of Environmental Management have knowledge of the variability of the operation of the man - environment. They have knowledge of environmental aspects and impacts, they know the principles of rational use of natural resources and regulatory limits and standards for the environment. The knowledge they can apply in managing environmental processes, including the prevention of environmental risks and accidents. Study program is taught in daily form and in the distance form.

DOCTORAL PROGRAMMES (PhD.)

Technology of environmental protection

Studying in the third level Degree in Technique of environmental protection and equipment is designed to prepare highly qualified specialists of scientific research and development in all areas and workplaces, where they apply scientific knowledge of the all fields of creation and environmental protection. Doctoral program, and III study program degree focuses on the acquisition of knowledge based on current scientific knowledge in the field. The study is a reflection of individual creative student activities in scientific research and his own contribution to scientific knowledge. PhD students in their studies dealing with the science and research development and environmental protection. They deal with monitoring, objectivizzation and evaluation of the environment. They work in various scientific and research projects. The standard length of study for a doctoral program in full-time is 3 years and, the distance form of more than 5 years.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Technology of environmental protection

- ✓ Basics of environmentalistis
- ✓ Recyclation and a recycling technologies I.
- ✓ Environment and industrial production
- ✓ Machines and machinery to environmental protection I.
- ✓ Separate processes
- ✓ Technics of working environmet
- ✓ Waste management
- ✓ Environmental engineering
- ✓ Semester projekt
- ✓ Theory of environmental control
- ✓ Technologies of environment protection
- ✓ Separate processes
- ✓ Machines and machinery
- ✓ Environmet and engineering production
- ✓ Basics of toxicology
- ✓ Recyclation and a recycling technologies II.
- ✓ Assessment of environmental impacts
- ✓ Environmental toxicology
- ✓ Final project
- ✓ Ecologization of products and production
- ✓ Computer support of environmental protection control
- ✓ Machines and machinery to environmental protection II.
- ✓ Environmental management systéms
- ✓ Noise and vibrations
- ✓ Engineering of protection of water and soil
- ✓ Lagislative aspects of environmental productions

- ✓ Ecologization of products and production
- ✓ Methodology of environmental impacts assessment
- ✓ Constatnly sustained progress
- ✓ Semestral project
- ✓ Environmental legislation
- ✓ Objectivization of environmental factors
- ✓ Planning of environmental production
- ✓ Environmental safety of workplaces
- ✓ Ergonomics
- ✓ Diploma project
- ✓ Recyclating oriented construction
- ✓ Diploma thesis
- ✓ Monitoring and diagnostics of environment
- ✓ Planning of environmental suitable production
- ✓ Final thesis

Environmental management

- ✓ Applied chemics and biochemics
- ✓ Environmental measurements monitoring
- ✓ Basics of environmentalistics
- ✓ Theory of control in environmentalistics
- ✓ Computer applications II.
- ✓ Environmental engineering
- ✓ Environment and industrial production
- ✓ intelligent production systems
- ✓ Semestral project
- ✓ Environmental politics and legislation
- ✓ Computer applications I.
- ✓ Environmental toxicology
- ✓ Theory and proceedings of control in environmentalistics
- ✓ Computer networks and database systems for environmentalistics
- ✓ Basics of toxicology
- ✓ Environment and engineering production
- ✓ Environmental legislation
- ✓ Programming systems
- ✓ Technologies of environmental protection
- ✓ Assessment of impact on population health
- ✓ Semester project
- ✓ Environmental education and management
- ✓ Systems of environmental management
- ✓ Systems of environmental protection and controll
- ✓ Methodology of assessment of impact on environment
- ✓ Monitoring and diagnostics of environment
- ✓ Constatnly sustained progress
- ✓ Environmental management systems
- ✓ Management of risk of chemicals
- ✓ Computer networks for environmentalistics
- ✓ Waste engineering and recycling management
- ✓ Waste engineering
- ✓ Semester project
- ✓ Ecologization for products and production
- ✓ Economical efficiency of environmental management
- ✓ Semester project
- ✓ Ecodesign
- ✓ Planning of environmental production
- ✓ Integrated management of environment
- ✓ Recyclating oriented construction
- ✓ Planning of environmental production

- ✓ assessment of acttivities impact on environment
- ✓ Diploma project
- ✓ Computer support for control of environmental protection
- ✓ Accreditation and certification in environmentalistics
- ✓ Ergonomics
- ✓ Diploma thesis
- ✓ Prevention nad correction of nevironmental damage
- ✓ Assessment and marking of environmental suitable products
- ✓ Final project
- ✓ Final thesis

Management of technical and environmental risks

- ✓ Machinery and equipment for environmental
- ✓ Greening of products and production
- ✓ Recycling and recycling technologies
- ✓ Final project
- ✓ Final thesis

GRADUATE THESES

BACHELOR'S THESES:

Technology of environmental protection

Babejová – Kmecová Paulína	Soil contamination monitoring in burdened regions of Slovak Republic
Bartoš Viktor	Analysis and use of materials for the construction of noise barriers in practice
Bendzsuch Tomáš	Effect of selected engineering technologies on the environment
Benková Gabriela	Design and analysis of options to reduce the negative Impacts of selected technologies on the environment
Boháčová Bernadett	Closing of waste dump household refuse and their restoration
Géczyová Adriána	Comparison of the light intensity values obtained by their measuring and simulation
Gulyas Gergö	The analysis of waste produced in mechanical engineering company
Hoangová Dominika	The disposal with metallic waste and its impact on the environment
Kapustová Ľubica	Design of model for calculation of thermal-humidity parameters using MS Office excel
Kerekešová Tímea	Methodology of measurement of selected immission and its impact on human health
Kis-Gézciová Kinga	Energetic waste utilization
Kulínová Lenka	Posibilities of using of geothermal energy in selected locality in Slovakia

Matyiová Barbara	The application sound insulation materials in mechanical engineering company
Miškayová Daniela	The current state of municipal waste separation in the chosen locality
Onderčín Pavol	Water Jet technology and its impact on the environment
Pustaiová Katarína	Options visualization of the physical work environment factors
Riňak Daniel	Intelligent wiring as an environmental approach of modern households
Roszka Lukáš	Analysis of equipment used for the collection of solid aerosol particles
Sobeková Jana	Possibilities of rain water modification for drink purposes
Súkeníková Anna	Methodology of measurement of solid aerosols in the workplace
Teperová Andrea	Prevent of waste creation and possibilities of its recycling
Trojčáková Barbora	Analysis of machinery and equipment to eliminate dust in industrial plants
Varga Jakub	Analysis and use of fuel cells in the automotive industry
Vavreková Denisa	The impact of engineering production on the quality of surface waters and underground waters
Višňovský Peter	The analysis of biomass using for energy purposes

Environmental Management

Bachledová Judita	Design of public lihgt system for exterior places using of the specialized simulating software
Baranová Eva	Monitoring of soils in the industrial areas
Beganič Tomáš	Methods of noise reduction in industrial plants
Bemberáková Dagmara	Wear tires recyclation
Blašková Andrea	The comparison of possibilities of recovery of degraded polymer waste
Bucková Katarína	Measurement and analysis of acoustic parameters of the materials used in construction
Bučková Katarína	Ways of reducing traffic noise
Čerkalová Antónia	Analysis software for creating exterior noise maps
Dvorská Diana	Evaluation and elimination of the effects of dust transport on humans
Gajdošová Lucia	Rational use of natural resources in relation to sustainable development, use of alternative energy sources
Gibeľová Terézia	Assessment of the situation before and after the introduction of separate collection system at the chosen location and increasing efficiency
Goliaš Richard	Occurrence of heavy metals in Kosice and around

Hakošová Anna	The analysis of atmosphere after introduction of innovative technology in combustion processes
Hudák Pavel	Polychlorinated Biphenyls and Eastern Slovakia
Kašai Ján	Measurement and analysis of electromagnetic fields around antennas for wireless transmission
Katrincová Eva	The impact assessment of selected engineering operation on the environment
Klimová Zuzana	The impact of railway traffic on environment and its comparison to other traffic types
Krzánová Andrea	Prediction of disturbing light by the simulation of light scene
MarčákovávKatarína	Assessment of the effectiveness of anti-dust measures in selected company
Maršíková Michaela	Environmental aspects of the use of wind energy in Slovakia
Matiová Kristína	Upgrading of public light systems
Pivovarníková Martina	Introduction of environmental management systems into small and medium companies
Poľašková Monika	The comparison of the extend of degradation of selected polymer in mechanical engineering production
Rosoľanka Ján	Investigation of traffic intensity in the choosen locality and its impact on the production of noise
Sabolová Jana	Analysis of low frequency noise assessment methodologies
Sabovčíková Katarína	Application of noise visualization with focusing on acoustic holography
Širilová Edina	Analysis software for creating interior noise maps in industrial plants
Šütö Miroslav	Program options of calculation and visualization of the electromagnetic field
Šütőová Marcela	System of water management in environmental management framework of municipality Valaliky
Tamás Kristina	Analysis of solid aerosols in industrial operations and their impact on the human body
Tarbaj Roman	The range of EURO standards in reduction of emissions quantity
Uličná Ivana	Possibilities of using psychoacoustics in practice
Verčimáková Martina	Working environment optimalisation in the therm of ergonomy
Vevericová Adriana	Eliminating the impact of pollutants in selected engineering company
Vyšňová Lenka	Analysis of the sources of noise, the time course and their impact on the human body

MASTER'S THESES:

Technology of environmental protection

Andrejová Katarína	Influence of laser technology on environment - temperature measuring by thermal imaging camera
Barathová Jana	Description of registration of environmental management system in T-systems Slovakia to EMAS III
Bernacký Anton	System of assignation of increasing the value and recycling of packagings and packagings waste
Borovský Martin	Options treatment and recycling end of life equipment for processing of solar energy
Dorotová Zuzana	Application of the Systems for Noise Visualization at the Evaluation of Acoustic Impermeability of Structures
Eiben Valéria	The evaluation of train sets in the terms of noise
Gnebus Ján	The methods of collection and processing of selected environmental samples
Gulyášová Lívia	The impact of modernisation of railway junction in Cierna nad Tisou on environment
Horňák Róbert	Experimental verification of biomass cultivation at decantating plants
Hučko Radovan	Modeling of noise in automobile interior using CAD-systems
Hurajt Marián	Design of pressure tank for hydrogen storage
Janočková Renáta	The implementation of environmental management by STN EN ISO 14 001 in selected company
Jenčo Róbert	The proposal of internal procedure for sampling, objectification and assessment of employees exposure to solid aerosol
Jezný Tomáš	Design and evaluation of sandwich structures for acoustic systems
Kocsiová Tímea	The analyssis of effectivity of method for evaluation of mechanical products level
Kračúnová Alena	The algorithm of management of renewable energy sources in thermalpark
Kubíniová Jana	Percieved indoor air quality, performance and productivity
Leczová Mária	Analysis of the impact of machining technology in a working environment
Lešňovská Ľudmila	The design of equipment to store of wind energy and its using
Lumnitzer Peter	The impact of the noise type for determination of insulation index of dividing elements in mechanical plants
Maková Zuzana	The analysis of thermal properties of VORTEC tube by thermovision
Mažeríková Štefánia	The application of checklist method in design with respect to environmental aspects
Mikolajová Júlia	The methodology of assessment of strategic development documents - The Case Study
Mokráňová Andrea	The possibilities of using thermovision by identification of mechanical equipment failure

Paulišinová Laura	Analysis of the impact of mobile phones and electromagnetic radiation on human health
Péter Jozef	Influence of plasma technology on the environment - measuring of temperature by thermal imaging camera
Repka Robert	Creating a mathematical model (noise map) in vicinity of the Technical University in Košice
Semanová Gabriela	The implementation of SEM by EMAS III. - The Case Study
Serbinová Beáta	Technical and Technological Means of Environmental Protection
Sláviková Františka	Analysis of the clinical signs of selected physical environmental factors on human health
Štofanová Jana	Creating interior noise map of production hall in the industrial company SCA Hygiene Products Ltd.
Tóth Mario	The impact analysis of production activities in engineering company on employees and environment
Valichnáčová Barbora	Influence of plasma technology on environment - niose measurement
Varga Vladimír	Legislative Means of Environmental Protection
Vasko Rastislav	The environmental impact assessment - The case study
Vavráková Lenka	Electromagnetic noise in environment and its assessment
Vysocký Vojtech	The proposal of scheme for measuring employee exposure to solid aerosol and objectification for interlaboratory test

Environmental Management

Adamkovičová Gabriela	Proposal of Methodology for Measuring of the Intensity of Electromagnetic field of mobile operator transmitters
Baranová Jana	Analysis and assessment of sound quality in car interiors
Beláková Denisa	Organizational and institutional means in environmental protection of mechanical engineering complexes
Bogačiková Andrea	The impact of fixation and positioning of a sensor on measured vibration values
Bolcarovičová Natália	Progressive energy saving lighting systems in industrial workplaces
Dovcová Andrea	Proposal of methodology for noise exposition assessment for work classes
Duleba Rastslav	Global system of thermo-humidity microclimate evaluation
Džoganová Veronika	Analysis of selected acoustic descriptors of new developed acoustic materials on the recyclated materials base
Galvánková Martina	Influence of laser technology on environment - noise measurement
Hrižová Zuzana	The design of biogas reactor with continual filling of biomass
Joppová Lucia	Spectrophotometric determination of heavy metals in environmental samples

Kolcunová Miroslava	Assessing the effectiveness of noise measures on the vacuum cleaner suction nozzles
Leitnerová Lívia	The project of electrolytical wastewater tratment plant with an output to water tanks
Rajňáková Kristína	The analysis and specification of possibilities of contact and contactless temperature diagnostics of machinery and equipment
Sasák Maroš	Determination of reflection coeficient of sound in saved exteriors

PhD THESES:

Technology of environmental protection

Maguľáková, Lenka	Methodology development for assessment of effectiveness system utilization for energy production from alternative sources
Polačeková, Jana	Research of the psychoacoustic Effects and optimization of the Noise disturbing perceptions of a products
Rusinová, Lenka	Research and development of the methodology of improving acoustic quality products

RESEARCH AT THE INSTITUTE

Area of research:

- ✓ Physical factors of working environment
- ✓ Chemical factors of working environment
- ✓ Ergonomy
- ✓ Environmental protection technologies.
- ✓ Implementation and modification of technology for reducing cyanobacteriums in backwaters
- ✓ Environmental measurement and monitoring
- ✓ Environmental management systems
- ✓ Assessment of environmental impacts
- ✓ Ecologization of products and production
- ✓ Recyclating oriented construction
- ✓ Planning of environmental production
- ✓ Waste management
- ✓ Objectivization and vizualization of environmental factors

Research characteristics:

Research of the department is directed to the greening of products and production, environmental design of production systems, techniques and technologies for production and environmental protection and management of environmental aspects and impacts of monitoring, simulation, computer support, assessment, evaluation and optimization.

The scientific - research activities are oriented to the principles of recycling-oriented production and engineering evaluation of the environmental profile, methods of evaluation of environmental products and productions, waste water treatment methods, modeling removal products and recycling of logistics etc.

Areas of expertises:

- ✓ Processing of assessments for the assessment of environmental impacts
- ✓ Acoustic and vibrations
- ✓ Thermal-humidity microclimate
- ✓ Light and illumination
- ✓ Noise maps
- ✓ Thermovision
- ✓ Electro-magnetic radiation
- ✓ Acoustic characteristics of materials
- ✓ Environmental management
- ✓ Environmental impact assessment
- ✓ Pollutions measurement
- ✓ Odors and volatile organics compounds
- ✓ Working performance and productivity

PROJECTS OF THE INSTITUTE

Title of the project	**Implementation and modification of technology for reducing cyanobacteriums in backwaters**
Type of the project	OP Research and Development,
Number of the project	ITMS: 26220220028
Main solutionist	prof. Ing. Dušan ŠEBO, PhD.
Time period of the project	2010-2013
Annotation of the project	Main aim of project is to apply unconventional technology to reduce eutrophication of stagnant water, contaminated mainly cyanobacteria and lower eyelids. Project activities are focused on the modification and adaptation of existing equipment and the Faculty of Mechanical Engineering, Technical University of Kosice, which was used for wastewater treatment in the previous work of the Department of Environmental and Process Control. The device will be used for experimental purposes and doctoral education in science and environment and industrial engineering education station. Expected outcomes are mainly in verification technology, but also new patent solutions, publicity activities and transfer the acquired knowledge into practice.

Title of the project	**Management Research Centre for technical, environmental and human risks for sustainable production and products in engineering**
Activity	1.2. Design of knowledge center to knowledge base support

	for the objectification of working environmental factors
Type of the project	ESF – European structural fonds
Number of the project	ITMS 26220120060
Main solutionist	Dr.h.c. prof. Ing. Miroslav BADIDA, PhD.
Time period of the project	10/2010 – 10/2013
Annotation of the project	In the present the existing database represents large amount of knowledge, experience and information that refer to objectification and estimation of environmental factors. There were gained theoretical knowledge by realized research, and also experience pursuant to which we can create basics of knowledge. There are many experienced workers at workplace, who are specialists in particular specific areas of environment and working environment, whose actual experience and theoretical knowledge represents high entry value of project and guarantee not only creating of quality knowledge basis in the research process, but also knowledge centre. Gained information will create knowledge basis for objectification of environmental factors, which will be implemented during creating of situational models of environmental risk in industrial workplaces. During realizing this phase will be work out situational models of environmental risk which will be basics for control and effective elimination of environmental risk and for safety planning of industrial workplaces and products. To achieve this activities, we need to harmonize with legislative requirements and therefore it is necessary in frame of this activity to obtain normative literature, methodical operations, and technical foreign and home literature.

NATIONAL PROJECTS

TITLE OF THE PROJECT	**Using of the results of scientific-research activities in teaching proces of "fundamentals of environmental" and "environmental engineering" with using of multimedia technology**
Type of the project	Grant project KEGA
Number of the project	049TUKE-4/2012
Main solutionist	Dr.h.c. prof. Ing. Miroslav BADIDA, PhD.
Time period of the project	2012 – 2014
Annotation of the project	Proposed project is aimed for the use of the results from scientific-research activities of researches workplace, international partners and results and knowledge's and experiences selected international universities by the teaching process of "Fundamentals of Environmental" and "Environmental Engineering" with using of multimedia

technology. The work will emerge from a consistent analysis of state of art this problematic and study of approaches to the problematic on top international universities. It will be implemented all the knowledge's and experience obtained in these workplaces. It would be created preconditions for extension of the scientific-research laboratories / non-ionizing radiation, thermography, lighting, dust monitoring …/ and also personnel, technical, software and methodical conditions for successful accreditation of ties laboratories. It would be transfer practical knowledge's of the researcher of the projects obtained by solving a wide range of research tasks, or tasks for praxes in to teaching process for effective support of multimedia technologies. It would be dedicated advanced university books "Fundamental of Environmental" and "Environmental Engineering". It would be significant strengthening the laboratory work of students on our faculty.

Title of the project	**ICT aided new forms of learning and increasing the efficiency of education for environmental study programs**
Type of the project	Grant project KEGA
Number of the project	032TUKE-4/2012
Main solutionist	doc. Ing. Ružena KRÁLIKOVÁ, PhD.
Time period of the project	2012 - 2014
Annotation of the project	Modern information and communication technologies (IKT) bring globally significant changes in the educational process. Compared to the traditional forms of education they enable to achieve higher effect and often have motivational nature for students. The project focuses on the application of new lecturing methods and enhancing the effectiveness of learning with support of IKT. By realisation of the project it is expected to create and access educational web site dedicated to specific problem in the field of environment protection technologies area as the knowledge base of several subject of study programs of the 1st, 2nd and 3rd degree of university study. Realisation of the project will lead to implementation of knowledge and experience of investigators in the educational process and conditions for improving and streamlining the existing forms of education.

Title of the project	**Create a professional profile of scientific research portal platform "Acta Mechanica Slovaca"**
Type of the project	Grant project KEGA
Number of the project	064TUKE-4/2011
Main solutionist	Ing. Beáta HRICOVÁ, PhD.
Time period of the	2011 – 2013

project

Annotation of the project	The target of the project is to design a portal system processing scientific research results employees and students of the faculty for knowledge increasing and cognitive level,that defines the real knowledge limiting orientation of research areas as information and knowledge results in terms of factual and reprographic sources available for the entire scientific community.
Title of the project	**Research and development of application procedures for solution of acoustic design for industrial products**
Type of the project	Grant project VEGA
Number of the project	VEGA 1/1216/12
Main solutionist	prof. Ing. Ervin LUMNITZER, PhD.
Time period of the project	2012 - 2014
Annotation of the project	Technical properties of the industrial machines, devices and products are today still increased and customers also require fullfilment of the properties which increase their environmental quality. One of the most important characteristics is acoustic design. Technical acoustic and its development is nowadays very actual topic. Market requires products optimization not exactly only for quantity but also for the quality of the emitted noise. The important role are also psychoacoustics parameters, such as roughness of the noise, spectral characteristics, sharpness and timbre. Output noise emitted by the machines or devices can not disturb the people, often is required the level of the acoustic impulses and the properties have to be designed with applicable qualities of the emitted noise that is characterized by the acoustic design. Important role in these field represents nonspecific effects of the noise to human as non hearing effects.
Title of the project	**Identification of potential noise reduction of machines and equipment by visualization of applying methods**
Type of the project	Grant project APVV
Number of the project	APVV-0432-12
Main solutionist	prof. Ing. Ervin LUMNITZER, PhD.
Time period of the project	2013 - 2015
Annotation of the project	Technical properties of the industrial machines, devices and products are today still increased and customers also require fullfilment of the properties which increase their environmental quality. One of the most important characteristics is acoustic design. Technical acoustic and its development is nowadays

very actual topic. Market requires products optimization not exactly only for quantity but also for the quality of the emitted noise. The important role are also psychoacoustics parameters,such as roughness of the noise, spectral characteristics, sharpness and timbre. Output noise emitted by the machines or devices can not disturb the people, often is required the level of the acoustic impulses and the properties have to be designed with applicable qualities of the emitted noise that is characterized by the acoustic design. Important role in these field represents nonspecific effects of the noise to human as non hearing effects.

INTERNATIONAL PROJECTS

Title of the project	**Development and improvement of automotive and urban engineering studies in Serbia - DIAUSS**
Type of the project	TEMPUS project
Number of the project	TEMPUS : JP 516729-2011
Main solutionist	prof. Ing. Ervin LUMNITZER, PhD.
Annotation of the project	The project deals with the development and improvement of the impact the automotive industry on the urbanized territory of Serbia. The project solves transport infrastructure, construction of urban settlements, as well as structure of transport and technical parameters of the current vehicles. Manufacturers of cars, architects, designers, but also designers and technicians enter to the project. The project result will be optimized transport infrastructure with minimized technical, economic and environmental impacts on the population.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUCIONS

Employees and students	State
Badida Miroslav,Dr.h.c.,prof.,Ing., PhD.	Hungary, Schweiz
Lumnitzer Ervin, prof. Ing. PhD.	Serbia
Králiková Ružena, doc., Ing., CSc.	Hungary, Poland, Schweiz
Sobotová Lýdia, doc., Ing., PhD.	Hungary, Poland, Schweiz
Hricová Beáta, Ing., PhD.	Serbia, Hungary, Schweiz
Moravec Marek, Ing., PhD.	Serbia, Hungary, Schweiz
Lukáčová Katarína, Ing., PhD.	Serbia, Hungary, Schweiz
Liptai Pavol, Ing., PhD.	Serbia, Hungary, Schweiz

Piňosová Miriam, Ing., PhD.	Serbia, Hungary, Schweiz
Rusinová Lenka, Ing., PhD.	Serbia
Džoganová Zdenka, Ing.	Hungary, Poland
Ruman Peter, Ing.	Hungary, Poland
Dzuro Tibor , Ing.	Hungary, Poland
Bek Zdenka, Ing.	Poland
Lazarová Petra, Ing.	Poland
Goga Bodnárová Alexandra, Ing.	Poland, Serbia
Selecká Lenka, Ing.	Poland
Dzuro, Ing.	Malta

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Automotive Industry Association of the Slovak Republic – Environmental Legislative ENLA
Badida Miroslav, Dr.h.c. prof. Ing. PhD.

Slovak Acoustical Society
Lumnitzer Ervin, prof. Ing. PhD.
Liptai Pavol, Ing. PhD.

Journal "Hodnotenie faktorov prostredia" - Assesment Environmental Factors
Lumnitzer Ervin, prof. Ing. PhD.

Journal „Acta Mechanica Slovaca"
Badida Miroslav, Dr.h.c. prof. Ing. PhD.
Piňosová Miriam, Ing., PhD.

Journal „Strojárstvo" – Mechanical Engineering
Badida Miroslav, Dr.h.c. ,prof., Ing., PhD.

SASI Slovak Association of Mechanical Engineers at the Association of Slovak Scientific and Technological Societies
Badida Miroslav, Dr.h.c., prof. ,Ing. ,PhD.
Sobotová Lýdia, doc., Ing., PhD.
Králiková Ružena, doc., Ing., CSc.

Slovak Light-Technical Association at the Association of Slovak Scientific and Technological Societies
Králiková Ružena, doc., Ing., CSc.

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

European Acoustic Association
Badida Miroslav, Dr.h.c., prof., Ing., PhD.
Lumnitzer Ervin, prof., Ing., PhD.

Journal Acta Polytechnica Hungarica
Badida Miroslav, Dr.h.c., prof., Ing., PhD.
Member of Editor Cometee

ICEEE International Council of Environmental

Engineering Education,Budapest, Hungary
Badida Miroslav, Dr.h.c., prof. ,Ing., PhD.

DAAAM International Vienna
Badida Miroslav, Dr.h.c., prof., Ing., PhD.
Králiková Ružena, doc., Ing., CSc.

Journal of Engineering Hunedoara, Romania
Badida Miroslav, Dr.h.c., prof., Ing. ,PhD.
Member of Editor Cometee

European *Strategy* Forum on Research Infrastructures **ESFRI, Brussel, Belgium**
Badida Miroslav, Dr.h.c., prof., Ing., PhD.

Journal: The Holistic Approach to Environment, Croatia
Králiková Ružena, doc., Ing., CSc.
Member of Editor Cometee

PUBLICATIONS

Textbooks

[1] BADIDA, Miroslav - LADOMERSKÝ, Juraj - KRÁLIKOVÁ, Ružena -SOBOTOVÁ, Lýdia - BARTKO, Ladislav: Základy environmentalistiky. TU v Košiciach, Strojnícka fakulta, Eelfa, s.r.o., Košice 2013, 302 s., ISBN 978-80-8086-219-0

[2] KRÁLIKOVÁ, Ružena - BADIDA, Miroslav - BARTKO, Ladislav **Technológie ochrany životného prostredia 1. Ochrana ovzdušia** - 1. vyd. - Košice : TU - 2013. - 125 s.. - ISBN 978-80-553-1485-3.

[3] LUMNITZER, Ervin - LIPTAI, Pavol: **Matematické modelovanie šírenia hluku. Objektivizácia a hodnotenie faktorov prostredia.** TUKE Košice 2013. s. 138. ISBN 978-80-553-1574-4.

[4] LUMNITZER, Ervin - PIŇOSOVÁ, Miriam - BADIDA, Miroslav -ROVNÝ, Ivan: **Hodnotenie vplyvov fyzikálnych faktorov na zdravie človeka. Objektivizácia a hodnotenie faktorov prostredia**. TUKE Košice 2014. s. 172.

Monographic

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Department of Power Engineering

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Staff

- Professors: **2**
- Assoc. Professors: **1**
- Assist. Professors: **3**
- Researchers: **1**
- PhD. Students: **4 internal, 3 external**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
2/2013	Lecture of a representative of Atlas COPCO (Ing. Juraj Novodvorský)
2/2013	Lecture of a representative of Buderus (doc. Ing. Michal Strama, CSc.)
4/2013	Lecture of an energy auditor (Ing. Ľudovít Tkáčik)
5/2013	Lecture of a representative of Dalkia Eastern Slovakia (Ing. Ľuboš Kertész)
5/2013	Lecture of a representative of Nuclear Power Plant (Ing. Ľuboš Fedorko)
11/2013	Lecture of a representative of SWEP Slovakia s.r.o. (Dipl. Ing. Igor Ďurčanský)
12/2013	Lecture of a representative of FMMI VŠB TU Ostrava (prof. Ing. Miroslav Příhoda, CSc.)
12/2013	Lecture of a representative of FS VUT Brno (Ing. Richard Nekvasil, PhD.)

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Master's degree:

- **Power Machines and Equipments**

PhD. degree:

- **Power Machines and Machinery**

Number of the students

(till 31. 12. 2013) on the study programs guaranteed by the department:

first year of study:

- 16 internal form of study
- 0 external form of study

second year of study:

- 11 internal form of study
- 7 external form of study

Number of the graduates (2012/2013)

on the study programs guaranteed by the department:

- 19 students in the internal form of master's degree
- 6 students in the external form of master's degree
- 0 PhD. students in the internal form of study (defended PhD. thesis)

– 2 PhD. student in the external form of study

GRADUATE PROFILE

MASTERS'S PROGRAM (Ing.)

Power Machines and Equipments

The alumnus of the study programme will receive 2nd stage of study's knowledge in order to perform qualified solution of problems in the wide area of power engineering; focused on the mechanical engineering, metallurgy, ecology and economic and legislation aspects. The knowledge is supported by modern information technologies; at activities related to the production, distribution, projection and operation in various companies and institutions concerning power engineering.

PhD. PROGRAM (PhD.)

Power Machines and Machinery

The study of the third stage of university study is focused on preparation of high - qualified employees of scientific research and development in the all fields of power engineering. Doctoral study programme, as the study programme of the third stage of study, is focused on receiving knowledge based on the present state of scientific knowing in the given area.The study is reflection of independent creative activity of a student at scientific research and his/her own contribution to scientific knowledge. Standard length of the doctoral study for internal students is at least 3 yeas and maximum 4 years; for external students maximum 5 years.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

- ✓ Audits, Certifications and Legislation in Power Engineering
- ✓ Cogeneration Systems
- ✓ Combustion Equipments and Heat Exchangers
- ✓ Computational Support of Power Equipments Projection I.
- ✓ Computational Support of Power Equipments Projection II.
- ✓ Cooling Equipments and Heat Pumps
- ✓ Design of Power Equipments I.
- ✓ Design of Power Equipments II.
- ✓ Diagnostic Methods in Power Engineering
- ✓ Diploma Project
- ✓ Diploma Thesis
- ✓ Energy Management
- ✓ Energy Resources and Conversion
- ✓ Foundations of Nuclear Power Engineering
- ✓ Fuel Economy
- ✓ Heat and Mass Transfer
- ✓ Heat Supply
- ✓ Industrial Pneumatic Technology
- ✓ Industrial Pollution Control
- ✓ Measuring and Measurement Methods in Power Engineering
- ✓ Measurement, Control and Automation of Heat Processes
- ✓ Modelling and Simulation of Heat Processes
- ✓ Performance and Maintenance of Power Equipments
- ✓ Pumps, Compressors
- ✓ Semester Project
- ✓ Steam, Gas and Water Turbines
- ✓ Technical Equipments for Ventilation and Air Conditioning

- ✓ Waste Disposal in Power Engineering
- ✓ Water Economy
- ✓ Working Environment Technology

GRADUATE THESES

MASTER'S THESES:

Bérešová Martina	The heat balance a family house with swimming pool using renewable energy sources.
Boldi Peter	Analysis of the potential for diversification in the supply of heat Košice combination of natural gas and renewable energy.
Boršč Milan	Design of electrical heating coil output in the bivalent source´s tank for the selected family house.
Copáková Anna	Study of factors influencing measurement accuracy of ultrasonic flowmeter for gases.
Csáji Štefan	Design of fluidmeter on CCA base.
Čisár Július	Heating of family house by using solar collectors.
Čižík Miroslav	Possibilities supply of biogas to natural gas distribution lines.
Drábus Ján	Increasing the efficiency of the operation of the selected heat exchanger station.
Fečová Silvia	Designing the heat exchanger based on thermoelectric modules and its experimental verification.
Haluška Patrik	Design of the autonomic power supply for a house with electricity and heat.
Hanschildová Jana	Assess the suitability of the location of diffusers and operating mode for selected air conditioner.
Janusková Lucia	Filtration time period effect of natural gas on pressure drop of filter cartridge in case of filters located in KS01 V. Kapušany.
Korba Ján	Reduction of wear and tear on the NT compressor piston.
Lakatová Nikola	The use of photovoltaic panels in the selected family house.
Makara Michal	High pure oxygen production by electrolysis water with backward energy utilization.
Medveď Milan	Effect of management parameters on the power of pump with frequency transducer in the heating system.
Nemčík Marek	Design of energy source of biomass in the company Bukoza Energo a. s.
Oravetz František	Design of the inlet facility of boiler.
Palenčárová Daša	Design of tank water heaters.
Pivarníková Anna	Proposal of heating system by combined way of heating natural gas – dendromass.
Rehánek Daniel	Optimalization of jet cooling in furnace on dangerous waste burning.
Roth Patrik	Design of heating of infrared heaters industrial buildings.
Rimbala Matúš	Impact of changes in cross-sectional shape of the flow characteristic of the selected valve.

Širilová Ľubomíra	Determination of heat loss in ventilation ducts of panel houses.
Urban Ján	Design of aerodynamical tunnel for experimental purposes.

PhD. THESES:

Fedorko Ľuboš	Determination of actual parameters of combustion turbine in time
Korba Ján	Research and development of advanced methods for hydrogen storage
Kubík Michal	Research of the shape influence of the natural gas cooler's outer heat - exchanging area on its cooling performance
Lengyelová Marta	Research the possibility of using the plasma reactor to produce electricity and heat from municipal solid waste
Nováček Erich	The proposal of solar power plants for the conditions in Slovakia
Širirilová Ľubomíra	Research stabilization of fly ash properties from fluidized bed boilers and reducing its volume using plasma technology
Václav Juraj	Modelling manifestations of temperature fields on the packaging devices for the transport of spent nuclear fuel

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ Plasma technology
- ✓ Renewable energy sources
- ✓ Plasma treatment of dangerous wastes.
- ✓ Storage of excessive electric power made of alternative energy sources; in the form of hydrogen.
- ✓ Research of intensification of storage capacities of hydrogen for adsorption and absorption materials.
- ✓ Research of cooling intensity of curved heat - exchanging areas.
- ✓ Filtration of natural gas before compression in the process of natural gas transport.
- ✓ Flow and heat transfer in natural gas coolers.
- ✓ Numerical simulations of heat transfer in specific technical applications and porous materials.

Research characteristics:

The research is focused on utilization and optimization of renewable energy sources. Emphasis was on hydrogen technologies which represent ecologically clean energy. In the framework of grant projects and projects funded by the European Structural Funds, utilization of solar power using photovoltaic cells in order to produce

hydrogen, which is used as interlink in the process of energy storage, is solved. The research in the area of plasma treatment of wastes is solved too. This technology enables the dangerous waste to decrease its volume by high - temperature separation of thermally decomposable waste components.
On the basis of co - operation with industrial practice, the potential for solution of current issues from practice was created. The issues focused on the transport issues of natural gas which is related to filtration, compression and cooling of gas in compressor stations.
The department has high specialised staff altogether with doctoral students in order to solve tasks like these.

Areas of expertises:

- ✓ CAD systems (Pro - Engineer, Siemens NX, ...)
- ✓ CFD systems (ANSYS_CFX)
- ✓ Dimensional analysis
- ✓ Heat and mass transfer
- ✓ Hydrogen - processing technologies
- ✓ Mathematical and physical modelling of power engineering systems
- ✓ Mechanics of non - rigid materials (fluids)
- ✓ Thermodynamics
- ✓ Thermogravimetry

PROJECTS OF THE DEPARTMENT

Title of the project	**Centre of efficiency research of integration of combined systems of renewable energy sources**
Type of the project	OP Research and Development, Implementation of knowledge and technologies obtained by research and development
Project number	ITMS 26220220064
Principal investigator	prof. Ing. Peter Horbaj, PhD.
Time period of the project	03/2010 - 02/2014
Annotation of the project	Technology for utilization of hydrogen as an alternative fuel for the future. The actual application of photovoltaic panels as an energy source in the home is especially problematic for large investment costs and instability of sunshine. Perpendicular to the surface lands in Košice year we have 1 275 – 1 325 $kWh \cdot m^{-2}$ per year. In doing so, the average incident solar radiation per day in August 2007 was approximately 6.83 $kWh \cdot m^{-2}$ per day, but in December 2007 was only 0.206 $kWh \cdot m^{-2}$ per day. Instability of performance is a problem especially during the daily fluctuations, where it is necessary to accumulate energy for lighting shortfalls article. When power loss occurs panel taking power from the battery,

thus compensating for the daily delivery of inequalities. The problem with conventional electrical battery life is relatively low (much lower than that of the solar panel) and subsequent environmental problems arising from the disposal of batteries. Another disadvantage is the low energy storage capacity per unit volume. Therefore, as a good alternative solution seems to use hydrogen as medium in which energy is stored as chemical energy.

The function of the PV unit is accumulating in the electrolytic production of hydrogen from water and excess energy for lighting would decrease subsequently consumes hydrogen to produce the necessary electricity in a fuel cell. Preferred is the use of electrolyzers and PEM fuel cells with membranes for their high efficiency. One of the advantages of involving the production of waste heat in fuel cells that could be used in the process of heating, as well as the use of pure oxygen, produced as a by product.

Title of the project	**Package of innovative elements for the reform of the system of education at TUKE**
Type of the project	OP Research and Development, Implementation of knowledge and technologies obtained by research and development as engines of wise society
Project number	ITMS 26110230018
Principal investigator	prof. Ing. Peter Horbaj, PhD.
Time period of the project	06/2010 - 02/2013
Annotation of the project	Preparation of study materials for teaching the study programmes guaranteed by the department in English language: Guarantors and teachers in cooperation with guarantors processed study materials of the subjects' curriculum in a world language and prepared study materials in a world language. Teachers, employees and research employees participated in the process of the preparation.

NATIONAL PROJECTS

Title of the project	**Research of the causes of cooling performance decrease of natural gas coolers; development of methodology for their primary diagnostics and consequent eliminations**
Type of the project	Grant VEGA
Project number	1/0006/11
Principal investigator	prof. Ing. Mária Čarnogurská, CSc.
Time period of the	01/2011 - 12/2013

project	
Annotation of the project	The main aim of the project is research of the causes of significant decrease of cooling performance of natural gas coolers during their long - term operation in the Slovak Republic; Creation of multi - purpose methodology for their diagnostics. The assumed cause of the decrease is cumulated deposit on the inner heat - exchanging area. The methodology is to determinate deposit thickness on the inner heat - exchanging area and must be based on a non - destructive principle. Composition and physical properties of the deposit are not known. This makes the possibility of analytical assessment of the deposit effect on the cooling performance more difficult. The subject of the project solution will also be experimental research of physical properties of the deposit. The developed methodology will consequently be verified by concrete types of coolers operated at particular compressor stations.
Title of the project	**Research on the effectiveness of new methods for adsorption and absorptionof hydrogen storage**
Type of the project	Grant VEGA
Project number	1/0686/13
Principal investigator	doc. Ing. Tomáš Brestovič, CSc.
Time period of the project	01/2013 - 12/2015
Annotation of the project	Purpose of project is research of hydrogen adsorption storage on active surfaces of substances as well as absorption hydrogen storage in order to obtain the highest possible mass ratio of gas and storage substance. For optimal storage properties is necessary research for formation of the surfaces with the high absorption area with the option of used powder catalysts, and basic research of the composition and metal alloys processing for absorption storage of hydrogen. Major part of project is the creation of mathematical and physical model for determination of adsorption curves of individual types of storage materials, which will be serve to description and simplification of storage cryogenic tanks. Those should assure sufficient kinetics of supplying fuel cells by stored hydrogen. The part of the project result is verification of those procedures, which are expressed by appropriate mathematical and graphical interpretations on the functional laboratory tank.

Title of the project	**Hydrogen and hydrogen technologies**
Type of the project	Grant KEGA
Project number	1041TUKE-4/2013
Principal investigator	Ing. Natália Jasminská, PhD.
Time period of the project	01/2013 - 12/2015
Annotation of the project	Summary of the present research project is based on the research of production process of hydrogen by electrolysis of water through solar energy with its subsequent storage in the adsorbent materials at cryogenic temperatures. Thus obtained and stored hydrogen can be used to generate electricity in the fuel cell. Hydrogen research is focused on the development and application of target findings, in which knowledge and ability will be implemented in the preparation of innovative educational programs in applied energy systems through education in specialized laboratories. Comprehensive research and development will be dedicated to hydrogen economy and the use of hydrogen in fuel cells for transportation, or in the area of decentralized energy. Within the project is planned to complete the laboratory of "Hydrogen Technologies ", where will be realized experimental measurements of hydrogen technologies, the results of which will be summarized in a scientific monograph entitled "Hydrogen and hydrogen technologies".

Visits of staff members to foreign institutions

Employees and students	Country
Čarnogurská Mária, prof. Ing., CSc.	Czech Republic (16.5. - 22.5.2013)
Kubík Michal, Ing.	Czech Republic (03.06. – 28.06.2013)

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

The Slovak Chamber of Auditors	**Plynár Vodár + Kúrenár (SK)**
Peter Horbaj, prof. Ing., CSc.	Peter Lukáč, Ing., PhD.

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

Journal of Applied Science in the Thermodynamics and Fluid Mechanics (CZ)
Mária Čarnogurská, prof. Ing., CSc.

Journal of TECHNIC (CZ)
Mária Čarnogurská, prof. Ing., CSc.

PUBLICATIONS

Books

[1] BRESTOVIČ, T., JASMINSKÁ, N., FEDORKO, Ľ.: **Jadrová energetika**. Košice TU, 2013. 433 s. ISBN 978-80-553-1576-8.

[2] ČARNOGURSKÁ, M., LÁZÁR, M.: **Plazmové spracovanie a zhodnocovanie odpadu** . Košice TU, 2013. 164 s. ISBN 978-80-553-1514-0.

Journals

[1] ZELEŇÁKOVÁ, M., ČARNOGURSKÁ, M., ŠLEZINGR, M., SŁYŚ, D., PURCZ, P.: **A model based on dimensional analysis for prediction of nitrogen and phosphorus concentrations at the river station Ižkovce, Slovakia.** In: Hydrology and Earth System Sciences. Vol. 17, no. 1 (2013), p. 201-209. - ISSN 1027-5606. ***CC.***

[2] ZELEŇÁKOVÁ, M. ČARNOGURSKÁ, M.: **A dimensional analysis - based model for the prediction of nitrogen concentrations in Laborec River, Slovakia.** In: Water and Environment Journal: Promoting Sustainable Solutions. Vol. 27, no. 2 (2013), p. 284-291. ISSN 1747-6585. ***CC.***

[3] JASMINSKÁ, N., BRESTOVIČ, T., ČARNOGURSKÁ, M.: **The effect of temperature pyrolysis process of used tires on the quality of output products.** In: Acta Mechanica et Automatica. Vol. 17, no. 1 (2013), p. 20-25. ISSN 1898-4088. ***SCOPUS.***

[4] LÁZÁR, M., JASMINSKÁ, N., LENGYELOVÁ, M.: **Experiment of gasification of the synthetically mixed sample of waste in nitrogen atmosphere**. In: Acta mechanica et automatica. Vol. 7, no. 1 (2013), p. 34-37. ISSN 1898-4088. ***SCOPUS.***

[5] PYSZKO, R., PŘÍHODA, M., BURDA, J., FOJTÍK, P., KUBIN, T., VACULÍK, M., VELIČKA, M., ČARNOGURSKÁ, M.: **Cooling nozzles characteristics for numerical models of continuous casting. In:** Metalurgia. Vol. 52, no. 4 (2013), p. 437-440. ISSN 0543-5846. ***SCOPUS.***

[6] ČARNOGURSKÁ, M., PŘÍHODA, M., KUBÍK, M., GÁLLIK, R., HRŠÁK, D.: **Methodology of the Sediment Thickness Calculation on the Heat Exchange Area of a Coolers Natural Gas**. In: *International Journal of Mechanic Systems Engieneering*. Vol. 3, no. 1 (2013), p. 14-19. ISSN 2226-6461.

[7] BRESTOVIČ, T., JASMINSKÁ, Natália, KIZEK, J.: **Heat-Energetic Balance of Fuel Cells**. In: *Abidance of scientific evolutio*n. Roč. 2, č. 1 (2013), p. 4-12. ISSN 1338-4996.

[8] JASMINSKÁ, N., GÁLLIK, R.: **The Contribution to the Design of Heating and Hot Water Supply System Based on Low Temperature Heat Pump Sytem in Combination with Solar Collectors.** In: The Holistic Approach to environment. Vol. 3, No. 3 (2013), p. 175-188. ISSN 1848-0071.

[9] JASMINSKÁ, N., BRESTOVIČ, T., AZARIOVÁ, K.: **Kalkulačný model pre zlepšenie energetickej hospodárnosti budov**. In: Energetika. Roč. 63, č. 12 (2013), s. 712-714. ISSN 0375 - 8842.

[10] LÁZÁR, M., LENGYELOVÁ, M.: **Solidifikácia a stabilizácia popolčeka vitrifikačnou metódou.** In: Energetika. Vol. 63, no. 1 (2013), p. 39-41. ISSN 0375-8842.

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[14] JASMINSKÁ, N., BRESTOVIČ, T.: **New trends in hydrogen adsorption storage.** In: Abidance of scientific evolution. Roč. 2, č. 1 (2013), s. 13-18. ISSN 1338-4996.

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[2] AZARIOVÁ, K., JASMINSKÁ, N., BRESTOVIČ, T.: **Zjednodušená modelácia energetickej hospodárnosti budovy pred výstavbou**. In: 5. Cassotherm : zborník z 5. ročníka odbornej konferencie s medzinárodnou účasťou : 14.-15.05.2013, Košice, Slovakia. - Košice : Elsewa, 2013 s. 155-159. ISBN 978-80-89385-24-9.

[3] BRESTOVIČ, T., JASMINSKÁ, N.: **Uskladňovanie vodíka v uhlíkových štruktúrach.** In: 5. Cassotherm : zborník z 5. ročníka odbornej konferencie s medzinárodnou účasťou : 14.-15.05.2013, Košice, Slovakia. - Košice : Elsewa, 2013 s. 46-51. ISBN 978-80-89385-24-9.

[4] BRESTOVIČ, T., JASMINSKÁ, N., KUBÍK, M.: **Vývoj softvérovej podpory pre ANSYS CFX**. In: 32. stretnutie katedier mechaniky tekutín a termomechaniky: zborník príspevkov: 25. - 28. júna 2013, Tatranská Lomnica. - Žilina : Edis, 2013 s. 5-8. ISBN 978-80-554-0715-9.

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[12] JASMINSKÁ, N., BRESTOVIČ, T.: **Possibilities of hydrogen storage**. In: Elektroenergetika 2013. Proceedings of the 7th International Scientific Symposium on Elektrical Power Engineering. p. 218-221. ISBN 978-80-553-1442-6.

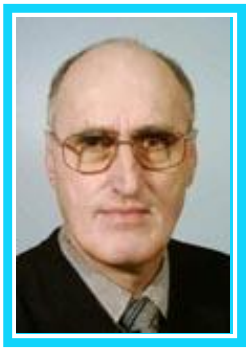
[13] LENGYELOVÁ, M., HORBAJ, P., LÁZÁR, M.: **Niekoľko poznámok k zneškodňovaniu komunálneho odpadu v EU.** In: RESpect 2013 : 8. ročník medzinárodnej vedeckej konferencie : 26. - 28. marec 2013, Poráčska dolina. - Košice: TU, 2013 s. 135-140. ISBN 978-80-553-1405-1.

[14] PŘÍHODA, M., ČARNOGURSKÁ, M.: **Využití termické účinnosti pro hodnocení efektivnosti rekuperačních výměníků tepla**. In: 32. stretnutie katedier mechaniky tekutín a termomechaniky : zborník príspevkov : 25. - 28. júna 2013, Tatranská Lomnica. - Žilina : Edis, 2013 s. 239-242. ISBN 978-80-554-0715-9.

DEAN'S OFFICE OF THE FACULTY OF MECHANICAL ENGINEERING

- Computer and Editorial Centre

Computer and Editorial Centre



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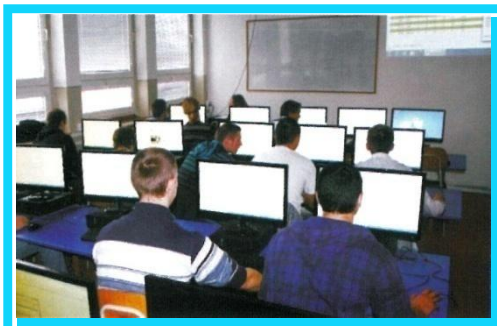

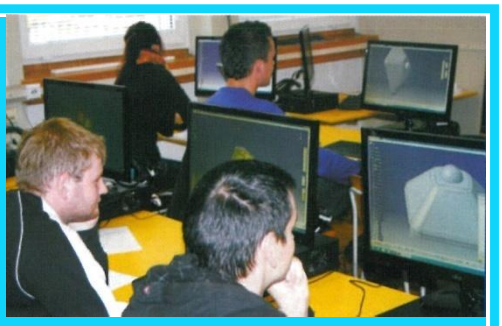

Staff

- Assoc. Professors: **1**
- Assist. Professors: **1**
- Researchers: **2**
- Secretary: **2**
- PhD. Students: **1 internal, 2 external**

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

- ✓ Basic of Information and Computer Systems
- ✓ Basic Informatics
- ✓ CA Methods in Mechanical Design
- ✓ CA Methods in Mechanical Design I.
- ✓ CA Methods in Mechanical Design II.
- ✓ CA Methods in Mechanical Design III.
- ✓ CAD
- ✓ CAD Methods in Mechanical Design
- ✓ CAD - Introduction to Solid Modeling
- ✓ CAD - Introduction to Surface Modeling
- ✓ Computer Aided Design
- ✓ Concepts of Information and Computing Systems
- ✓ Informatics and PC I.
- ✓ Informatics and PC II.
- ✓ Information Systems in Maintenance
- ✓ Information Technology
- ✓ Introduction to Computer Technology
- ✓ Introduction to PC Hardware
- ✓ Introduction to PC Software
- ✓ Introduction to Programming Languages and Tools
- ✓ Maintenance Information Systems
- ✓ Modeling and Simulation of Systems
- ✓ Processes Design by CAD
- ✓ Information training and information literacy
- ✓ Programming techniques

GRADUATE THESES

PhD. THESES:

Lórant Harsanyi	Optimization design CNC engraving machine to achieve the highest quality machining
Jaroslav Melko	Adaptive control CNC milling machine to increase the working accuracy
Adrián Rjabušin	Application module in the selected CAD system focused on CNC machining

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ CAD systems
- ✓ CNC Machining
- ✓ Programming techniques
- ✓ CA TEchnologies
- ✓ IT Technologies

Research charakteristics:
The main fields of research of the Computer Centre is optimizing of machinining of complex shape surfaces and development of application for CAD systems focused on mechanical problems.

Area of expertises:

- ✓ Computer Hardware
- ✓ Computer Software
- ✓ Server Administration
- ✓ Wifi Administration
- ✓ CA - Technologies

Projects of the Department:

Increasing the academic qualifications of TUKE research staff

This project deals with improving the qualifications of researchers. Expanding knowledge of CA technology, finite element analysis, design and construction machines, flow and others.

PUBLICATIONS

Books

[1] MADÁČ, Kamil - KRÁĽ, Ján ml. - MELKO, Jaroslav: **CA methods and mechanical design 1 Creo parametric 2.0**/ - 1. vyd - Košice : SjF TU - 2013. - 316 s.. - ISBN 978-80-553-1579-9.

[2] FABIAN, Michal - PAVLIK, Andrej: **CAD - úvod do objemového modelovania** / - 1. vyd. - Košice : TU - 2013. - 130 s.. - ISBN 978-80-553-1363-4.

[3] FABIAN, Michal - PAVLIK, Andrej: **CAD - úvod do povrchového modelovania** / - 1. vyd. - Košice : TU - 2013. - 97 s.. - ISBN 978-80-553-1364-1.

Journals

[1] KRÁĽ, Ján ml. - KRÁĽ, Ján: **Calculation of the shape of tool cutting edge for production of involute worm** / - 2013. In: Advances in Science and Technology : Research Journal. Vol. 7, no. 17 (2013), p. 1-5. - ISSN 2299-8624 Spôsob prístupu: http://www.astrj.pollub.pl.

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[3] MADÁČ, Kamil - MADÁČ, Andrej: **Rotácia gravitačného poľa Slnka** / - 2013. In: It-strojár. (2013), s. 1-9. - ISSN 1338-0761 Spôsob prístupu: http://www.it-strojar.sk.

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[6] RJABUŠIN, Adrián - KRÁĽ, Ján - MADÁČ, Kamil - MELKO, Jaroslav: **Prehľad modulov pre CNC obrábanie v CAD programoch** / - 2013. In: It-strojár. (2013), s. 1-12. - ISSN 1338-0761 Spôsob prístupu: http://www.it-strojar.sk.

[7] MELKO, Jaroslav - RJABUŠIN, Adrián - KRÁĽ, Ján - MADÁČ, Kamil: **Prehľad adaptívnych riadiacich systémov**/ - 2013. In: It-strojár. (2013), s. 1-4. - ISSN 1338-0761 Spôsob prístupu: http://www.it-strojar.sk.

[8] VARGA, Jozef - MADÁČ, Kamil: **Modulárna koncepcia swivel walker** / - 2013. In: Novus Scientia 2013 : 12. ročník medzinárodnej vedeckej konferencie doktorandov strojníckych fakúlt technických univerzít a vysokých škôl : 10. apríl 2013, Košice. - Košice : TU, 2013 S. 1-3. - ISBN 978-80-553-1380-1