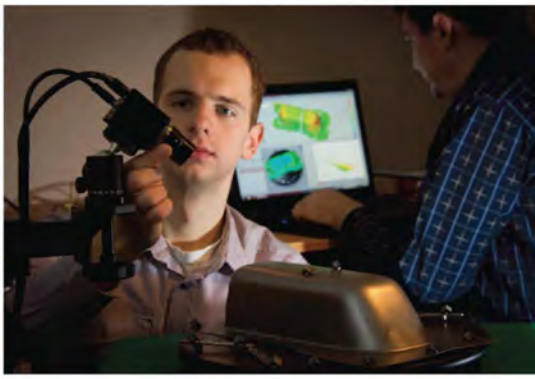

FACULTY OF MECHANICAL ENGINEERING
TECHNICAL UNIVERSITY OF KOŠICE
SLOVAKIA

ANNUAL REPORT
2014

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2014

Technical University of Košice
Faculty of Mechanical Engineering

ANNUAL REPORT 2014

Editors: Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
prof. Ing. Michal Kelemen, PhD.

Publisher:
Deans Office of FME TU of Košice, Letná 9/B, 042 00 Košice Slovakia
www.sjf.tuke.sk

Design:
doc. Ing. Jaroslav Jarema, CSc.

Photo:
Ing. Róbert Klik and archive FME TUKE

Edition:
211 pages, 50 pieces, 1st edition, May 2015

ISBN 978-80-553-2235-3

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 2015

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

MANAGEMENT OF THE FACULTY

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prof. Ing. Janette BREZINOVÁ, PhD.
VICE - DEAN RESPONSIBLE FOR STUDY IN 1st A 2nd DEGREE

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Ing. Alžbeta ZAPACHOVÁ
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Ing. Ján Kostka
***Members*:**
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prof. Ing. Dušan Šimšík, PhD. – KARaKR
prof. Ing. Alexander Gmiterko, CSc. – KM
prof. Ing. Mikuláš Hajduk, PhD. – KR
prof. Ing. Emil Evin, CSc. – KAV
prof. Ing. Ildikó Maňková, CSc. – KPPT
doc. Ing. Ján Viňáš, PhD. – KSTaM
prof. Ing. Jozef Kováč, CSc. – KPIaM
prof. Ing. František Šimčák, CSc. – KAMaSI
prof. Ing. Mária Čarnogurská, CSc. – KET
prof. Ing. Jaroslav Homišin, CSc. – KKAaDI
prof. Ing. Peter Demeč, CSc. – KVT
prof. Ing. Hana Pačaiová, PhD. – KBaKP
doc. Ing. Kamil Madáč, CSc. – PaEC
Students:
Ing. Marek Kliment
Bc. Michal Grajcar
Bc. Miroslava Jámborová
Bc. Matúš Ondáš
Jakub Brezina
Stanislav Kolečanyi
Jozef Kostka

EDUCATION

Accreditation for:

Bachelor level

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	745	53	798
ENGINEER	796	159	955
DOCTORAL	63	69	132
			1885

Habilitations and Inaugurations

Habilitations

doc. Ing. Kazimierz Dzierzek, PhD.

Thesis:	Programovanie pri použití PLC GE Intelligent Platforms
Lecture:	Simulácia priemyselných objektov

doc. Ing. Jaroslaw Sidun, PhD.

Thesis:	Procesy degradácie fixácií tvárovej časti lebky a ich vplyv na tkanivové reakcie
Lecture:	Charakteristika vplyvu frettingu a frettingu - korózie degradácie implantovaných materiálov

doc. Ing. Michal Puškár, PhD.

Thesis:	Optimalizačné metódy a inovačné konštrukčné riešenia spaľovacieho motora
Lecture:	Trendy v smerovaní vývoja spaľovacích motorov

doc. Ing. Róbert Huňady, PhD.

Thesis:	Modálna analýza mechanických sústav novodobými prostriedkami experimentálnej mechaniky
Lecture:	Vibrodiagnostická analýza strojov

doc. Ing. Michaela Balážiková, PhD.

Thesis:	Riadenie akustických rizík
Lecture:	Akustické riziko ako súčasť bezpečnostných analýz

doc. Ing. Anna Guzanová, PhD.

Thesis:	Štúdium vybraných vlastností žiarovo striekaných povlakov
Lecture:	Metódy hodnotenia vlastností vrstiev a povlakov

doc. Ing. Peter Frankovský, PhD.

Thesis:	Metóda PhotoStress a možnosti jej aplikácie pri statickej a dynamickej napäťovej analýze
Lecture:	Korekcie poradia izochromatických pruhov vo vzťahu k voľbe typu fotoelastických povrstvení

doc. Ing. Ján Semjon, PhD.

Thesis:	Návrh rotačných osi polohovacich a manipulačných jednotiek na báze presných reduktorov
Lecture:	Metodika overovania parametrov polohovacích aktuátorov

doc. RNDr. Marianna Trebuňová, PhD.

Thesis:	Stanovenie profilu biomechaniky vzoriek proteomickou analýzou

Lecture: Proteomika v bioinžinierskom výskume

Dr. h. c. doc. Ing. Milan Fiľo, PhD.

Thesis: Logistika ako entita modelovania a simulácie v priemyselnom inžinierstve

Lecture: Analytické logistické metódy a ich využitie pri riešení úloh priemyselnej praxe

Inauguration

prof. Ing. Eva Zdravecká, CSc.

Lecture: Improvement of tribological properties of mechanical systems by coating

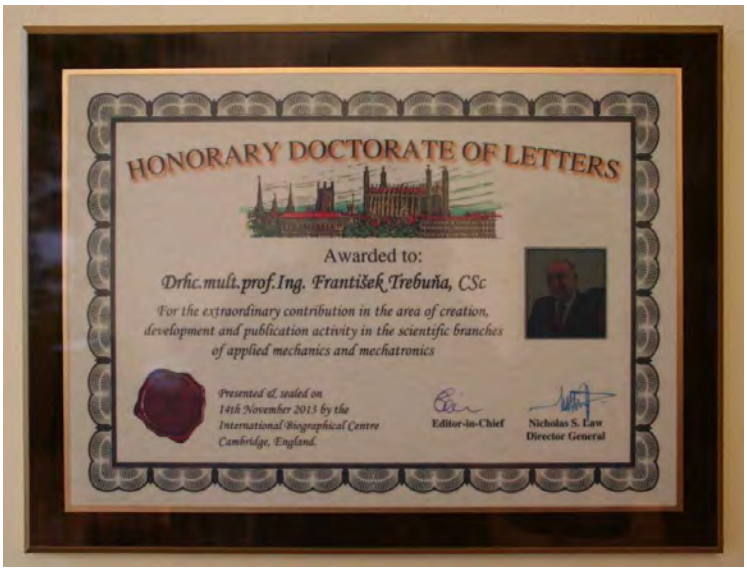
Distinguished Awards

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.


Dušan Čaplovič

udeľuje

Veľkú medailu
Samuela Mikovíniho

Dr. h. c. prof. Ing. Jozefovi Živčákovi, PhD.,

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

prof. Ing. Dušanovi Šimšíkovi, PhD.,

2014 Page 16

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

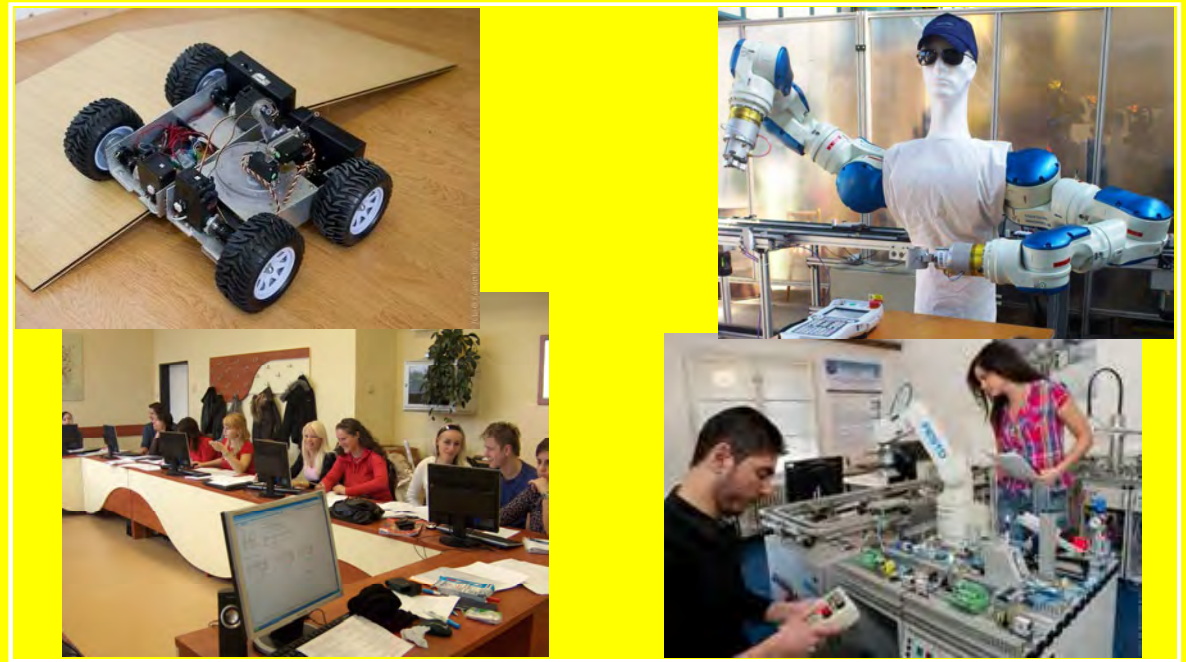
medaili Georgia Agricoly

prof. Ing. Ivo Vondrák, CSc.
rector magnificus

Věst. No.: 128

V Ostravě 15. listopadu 2013

INSTITUTE OF AUTOMATION, ROBOTICS AND MECHATRONICS



- Department of Applied Mathematics and Informatics
- Department of Mechatronics
- Department of Automation, Control and Human Machine Interaction
- Department of Robotics

Department of Applied Mathematics and Informatics

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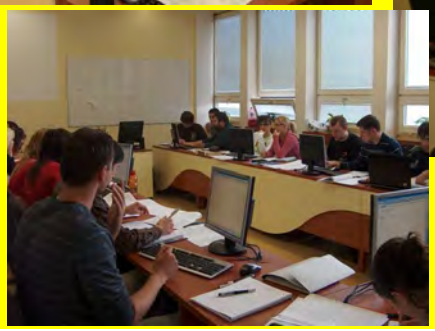

Staff

- 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 2014
04/2014	Seminar on Graph Theory, GC University Lahore, Pakistan (prof. RNDr. Martin Bača, CSc.)
04/2014	15th Conference of Košice Mathematicians, Herľany (doc. RNDr. Andrea Feňovčíková, PhD.)
05/2014	Deskriptívna geometria na slovenských univerzitách včera a dnes, Žilina, Slovenská republika (RNDr. Lucia Gálisová, PhD.)
06/2014	The European Conference Physics of Magnetism 2014, Poznaň, Poľsko (RNDr. Lucia Gálisová, PhD.)
09/2014	The Eleventh International School on Theoretical Physic, Rzeszów, Poľsko (RNDr. Lucia Gálisová, PhD.)
09/2014	18th Conference of Czech and Slovak Physicists, Olomouc, Česká republika (RNDr. Lucia Gálisová, PhD.)
12/2014	The 8th International Workshop on Graph Labeling, Kalasalingam University, Anand Nagar, India (prof. RNDr. Martin Bača, CSc., doc. RNDr. Andrea Feňovčíková, PhD.)
12/2014	International Conference on Theoretical Computer Science and Discrete Mathematics, SSN College of Engineering, Chennai, India (prof. RNDr. Martin Bača, CSc., doc. RNDr. Andrea Feňovčíková, PhD.)
12/2014	International Workshop on Parallel Computing VIT University, Chennai, India (prof. RNDr. Martin Bača, CSc., doc. RNDr. Andrea Feňovčíková, PhD.)
12/2014	Workshop on Graph Theory, AYYA Nadar Janaki Ammal College, Sivakasi, India (prof. RNDr. Martin Bača, CSc., doc. RNDr. Andrea Feňovčíková, 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.
- ✓ Repetitorium in Mathematics
- ✓ Selected Chapters from Mathematics
- ✓ Seminary in Mathematics
- ✓ Statistical Software

Master study

- ✓ Applied Mathematics
- ✓ Engineering Statistics
- ✓ Mathematical Methods in Automatization
- ✓ Mathematical Modelling
- ✓ Mathematics I.
- ✓ Statistical Methods

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
Hudák Miroslav	Project in terms of customers registration TU Košice
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.
- ✓ Labelings 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	**University Science Park TECHNICOM for Innovation Applications with the Support of Knowledge-Based Technologies**
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	**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.

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.

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 project	1/0922/12
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	**Mathematical support of the education in the area of biomedical engineering with orientation on the work in specialized laboratories**
Type of the project	Grant project KEGA
Number of the project	072TUKE - 4/2014
Principal investigator	prof. RNDr. Dušan Knežo, CSc.
Time period of the project	2014 - 2016
Annotation of the project	The project is aimed at the modernizing and the improving of the mathematical support education in biomedical engineering with a focus on work in specialized laboratories, in particular to support mathematical modeling and preparation, implementation, evaluation and interpretation of experiments in these laboratories. The primary aim of the project is to support of the study of lesson Mathematics modeling for II. degree study program of Biomedical engineering and the promotion of the working in specialized laboratories, in particular in making theses for II. and III. degree study for this program. The project will be developed university textbooks, scientific monograph and selected parts of the project results will be processed for modern web forms of the education.

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 (5.3.2014-12.4.2014)
Bača Martin, prof. RNDr., CSc.	India (28.11.2014-12.12.2014)
Andrea Feňovčíková, doc. RNDr., PhD.	India (28.11.2014-12.12.2014)

VISITS OF STAFF MEMBERS FROM FOREIGN INSTITUTIONS

Employees and students	Country
Diari Indriati	University of Sebelas Maret, Surakarta, Indonesia (3.9.2014-21.11.2014)
Rismawati Ramdani	Institut Teknologi Bandung, Indonesia (17.10.2014-30.12.2014)
Des Welyyanti	Institut Teknologi Bandung, Indonesia (3.9.2014-21.11.2014)

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Union of Slovak Mathematicians and Physicists
Mirian Andrejiová, RNDr., PhD.
Martin Bača, prof. RNDr., CSc.
Andrea Feňovčíková, doc. 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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Research reports

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Department of Mechatronics

Contact

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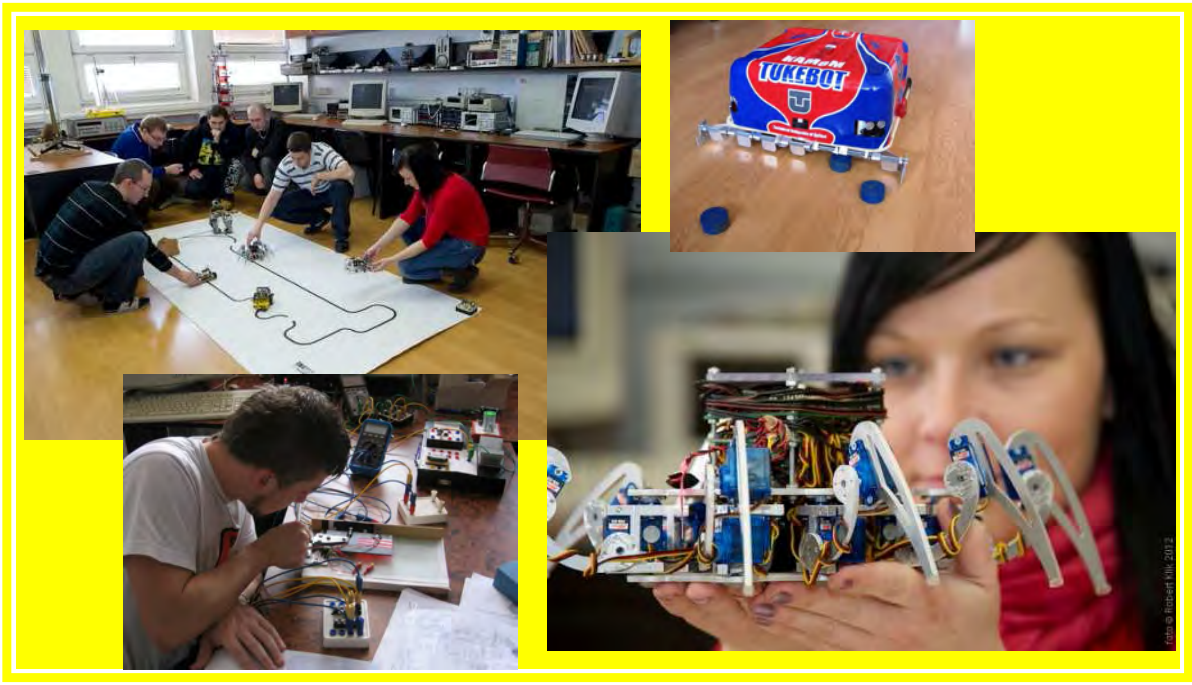

Staff

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

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
5/2014	Department's competition of student scientific and technical activities.

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Mechatronics**

PhD. degree:

- **Mechatronics**

Master's degree:

- **Mechatronics**

Number of the students

(till 30. 10.2014) on the study programs guaranteed by the department:

first year of engineer study:
- 10 internal form of study

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

Number of the graduates (2013/2014)

on the study programs guaranteed by the department:

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

GRADUATE PROFILE

BACHELOR'S PROGRAMS (Bc.)

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.)

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.)

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)

- ✓ Term Project
- ✓ Computer Modelling of Dynamics Systems
- ✓ Measurement of Non - electrical Quantities
- ✓ Mechatronics Systems

Mechanical engineering (Bachelor study)

- ✓ Informatics
- ✓ Basic of mechatronics
- ✓ Informatics

Management of technical and environmental risks in engineering (Bachelor study)

- ✓ Informatics

Automotive Production (Bachelor study)

- ✓ Informatics

Technology, management and innovation of engineering production (Bachelor study)

- ✓ Informatics

Applied mechanics (Master study)

- ✓ Theory of Dynamic Systems

Mechanical engineering (Master study)

- ✓ Mechatronics
- ✓ Theory of Dynamic Systems

Automation and control of machines and processes (Master study)

- ✓ Theory of Engineering Experiments
- ✓ Mechatronic Systems

Biomedical engineering (Master study)

- ✓ Mechatronics for Biomedical Engineering

The measurement (Master study)

- ✓ Theory of dynamic systems
- ✓ Logical systems

Mechatronics (Master study)

- ✓ Diplom Project
- ✓ Control of Engineering Systems
- ✓ Electromechanical Systems
- ✓ Mechatronics system design
- ✓ Measurements in Mechatronics
- ✓ Microprocessor Systems
- ✓ Term Project I.
- ✓ Term Project II.
- ✓ Mechatronics I.
- ✓ Mechatronics II
- ✓ Theory of dynamic systems

GRADUATE THESES

BACHELOR'S THESES:

Dávid Heldák	Design of mechanical part of power drive of one-wheeled robot
Tomáš Hrivňák	Algorithms of locomotion control for linefollowing robot
František Jančík	Conceptual proposal by autonomous control of airship.
Filip Kancír	Calculation of the kinematic mechanism of horizontal shaping machines using MSC Adams
Patrik Lovič	Analysis of friction influence on snake robot rectilinear motion
Matej Marcinčák	Basic operations with programmable logic controller - B&R X20 CP1584
Peter Orečný	Analysis of possibilities of sensor furnishing of mobile robots
Juraj Smolár	Design of control system of didactic manipulator
Pavol Šlosár	Speed control of DC motor using input/output measuring device
Maroš Vaššo	Design of simple moving robot

MASTER'S THESES:

Maroš Grieš	Design of manipulator intended for pickin up of components
Lukáš Hlopko	Vehicle Lateral Control
Lukáš Javor	Semiactive suspension system of a working machine
František Kičák	Design of robot indeted for competition in line follower category
Marek Kuffa	Analysis, design and implementation of inverted pendulum
Dávid Líška	Undulatory three link locomotion system for didactic purpoe
Boris Marečák	Mechatronic proposal of a measuring instrument for ground plan form of a ski
Peter Nestorovič	Design of wheeled robot with improved ability of crossing rangy terrain
Tomáš Pipík	Concept of mechatronics system for defeating obstacles
Matej Poláček	Design of inspection robot model based on crawler chassis
Daniel Šimšaj	Design of two-legged walking robot
Michal Škuta	Design of Paralel Two-wheeled Vehicle
Martin Varga	Analysis and modeling of motion of humanoid robot hand

PhD. THESES:

Miloslav Čurilla	Vibroisolation Dynamics Influence on the Performance Motion Control of Mechatronic System
Erik Prada	Periodic and aperiodic method of locomotion redundant robotic system

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ Development of computer methods and algorithms for numerical simulation and optimisation of systems.
- ✓ Methods of experimental and numerical modelling of mechatronic systems
- ✓ 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	**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	Element design of experimental chain and software for numerical

project	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	**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	**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.
Title of the project	**Increasing of knowledge base of students in area of application of embedded systems in mechatronic systems**
Type of the project	KEGA
Number of the project	048TUKE-4/2014
Principal investigator	prof. Ing. Alexander Gmiterko, CSc.
Time period of the project	2014 - 2016
Annotation of the project	Project deals with extending and establishment of new forms and devices of education in area of mechatronic systems with focusing on embedded systems, which are as inseparable integral part of mechatronic systems. Embedded systems are as subsystem, which is dedicated for controlling of functions in mechatronic systems. Aim of the project is to design and integration of new didactic instruments of mechanical, electrical and electromechanical subsystems into education process with aim to supply education with focusing to embedded systems included in mechatronic systems. Created new procedures, methods and forms in education will be oriented to improvement of knowledge and skills of students in study programs Mechatronics and Mechanical Engineering and also other similar study program.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Employees and students	Country
Peter Frankovský, doc. Ing. PhD.	Uniwersytet Zielonogórski Instytut Budowy i Eksploatacji Maszyn Wydział Mechaniczny Poľsko
František Menda, Ing.	Universita degli studi di Palermo, Dipartimento di ingegneria chimica, gestionale, informatica, meccanica Taliansko

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Slovak Association for Mechanics

Peter Frankovský,doc. Ing., PhD

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

IEEE Institute of Electrical and Electronics Engineers

Alexander Gmiterko, prof. Ing., PhD.

PUBLICATIONS

Books:

[1] TREBUŇA, František - ŠIMČÁK, František - FRANKOVSKÝ, Peter - HUŇADY, Róbert - PÁSTOR, Miroslav: **Využitie optických metód v experimentálnej mechanike** 1 / - 1. vyd - Košice : TU - 2014. - 392 s.. - ISBN 978-80-553-1863-9.

Textbooks:

[1] VIRGALA, Ivan - KELEMEN, Michal: **Mikroprocesorová technika 1** / - 1. vyd. - Košice : TU - 2014. - 120 s.. - ISBN 978-80-553-1669-7.

[2] KELEMEN, Michal - MIKOVÁ, Ľubica - VIRGALA, Ivan: **Informatika** / - 1. vyd. - Košice : TU - 2014. - 123 s.. - ISBN 978-80-553-1830-1.

[3] GMITERKO, Alexander - KELEMEN, Michal - VIRGALA, Ivan - PRADA, Erik - LIPTÁK, Tomáš: **Elektromechanické systémy 1** / - 1. vyd. - Košice : TU - 2014. - 188 s.. - ISBN 978-80-553-1869-1.

Journals:

[1] PUŠKÁR, Michal - BIGOŠ, Peter - KELEMEN, Michal - TONHAJZER, Roman - ŠIMA, Martin: **Measuring method for feedback provision during development of fuel map in hexadecimal format for high-speed racing engines** / - 2014. In: Measurement. Vol. 50, no. 1 (2014), p. 203-212. - ISSN 0263-2241

[2] FEDORKO, Gabriel - MOLNÁR, Vieroslav - GRINČOVÁ, Anna - DOVICA, Miroslav - TÓTH, Teodor - HUSÁKOVÁ, Nikoleta - TARABA, Vladimír - KELEMEN, Michal: **Failure analysis of irreversible changes in the construction of rubber-textile conveyor belt damaged by sharp-edge material impact** / - 2014. In: Engineering Failure Analysis. Vol. 39 (2014), p. 135-148. - ISSN 1350-6307

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[1] VIRGALA, Ivan - SUROVEC, Róbert - GMITERKO, Alexander - JEZNÝ, Jaromír - MIKOVÁ, Ľubica - LIPTÁK, Tomáš - PRADA, Erik - MALAVAL, Loic: **TransBridge – inovatívne metódy v navrhovaní robotických mechanizmov** Záverečná programová a finančná správa/ - Košice : TU - 2014. - 21 s..

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Department of Automation, Control and Human Machine Interactions

Contact

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Address:	Letná 9, 042 00 Košice, SR
Phone no.:	+421 55 602 2654
Fax.:	+421 55 602 2654

Staff

- Professors: **1**
- Assoc. Professors: **4**
- Assist. Professors: **0**
- Researchers: **1**
- PhD. students: **6 internal, 4 external**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2014
2/2014	Int. Conference ARTEP2014, Stará Lesná, Slovakia. Co-organising of the conference.
6/2014	Final examinations of Master students in study program “Automation and control of machines and processes”

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. 2014)
on the study programs guaranteed by the department:
first year of study:
– 13 internal form of study

second year of study:
– 8 internal form of study

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

– 8 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

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
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

JOBBÁGY, Boris	Development of robotics devices with pneumatic muscles for upper limb rehabilitation

Karchňák, Ján	Inertial sensors in monitoring of physical activities and events
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
Rákay Róbert	Simulation of a wireless network using NS2 simulator

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.
- ✓ Wireless sensors networks. Tele – monitoring and control.

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	10/2010 - 09/2013 (extended till 2015)

project	
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	**Implementation of wireless technologies into the design of new products and services to protect human health**
Type of the project	Grant project VEGA
Number of the project	VEGA 1/0911/14
Principal investigator	prof. Ing. Dušan Šimšík, PhD.
Time period of the project	01/2014 - 12/2016
Annotation of the project	The project is focused on identification of needs for monitoring, diagnostics and rehabilitation of vulnerable persons (elderly people, people with disabilities) using information and communication technologies, automation tools, wireless sensors and actuators networks. A complex approach will be used for the development of new sophisticated rehabilitation devices with mechatronical units as well for new services for support of the social inclusion, security and health of vulnerable citizens. Our design methodology will be based on principles of design for all and user-oriented design focused on the development of social inclusion. Proposed devices and ICT services will be tested in laboratory conditions (living lab) with the prospective users. The elements of telemedicine and rehabilitation based on the use of robotics and biological signals will be applied to control devices and monitor physiological status of users.

INTERNATIONAL PROJECTS

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

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Employees and students	**Country**
Šimšík Dušan, prof. Ing., PhD.	Armenia, Georgia, Germany, Italy, UK

Galajdová Alena, doc., Ing., PhD.	Armenia, Georgia, Germany, UK
Jobbágy, Boris, Ing., PhD.	Czech Republic
Líška Ondrej, doc. Ing., CSc.	Czech Republic, Greece
Šeminský Jaroslav, doc. Ing., PhD.	Czech Republic
Vldislav Maxim, doc. Ing., PhD.	South Korea

VISITS OF STAFF MEMBERS FROM FOREIGN INSTITUTIONS

Employees	Country
Vítečková, Miluše, prof. Ing., CSc.	Czech Republic
Šeda, Miloš, prof. RNDr. Ing. Ph.D	Czech Republic
Janáčová, Dagmar, prof. Ing., CSc.	Czech Republic

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Dušan Šimšík, prof. Ing., PhD.

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

Member of SASI (Slovak Association of Mechanical Engineers)

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

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

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

Dušan Šimšík, prof. Ing., PhD.
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
Alena Galajdová, 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;

PUBLICATIONS

Journals

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[2] ŐHLSCHLÄGER, Kamil - ŠEMINSKÝ Jaroslav – OLEJNÍK, Matej: **Some trends in development of industial robot effectors**. In: Interdisciplinarity in theory and practice. No. 3 (2014), p. 89-93. - ISSN 2344-2409 Spôsob prístupu: http://www.itpb.eu/index.php/ct-menu-item-3/14-engineering/88-some-trends-in-development-of-industrial-robot-effectors.

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Department of Robotics

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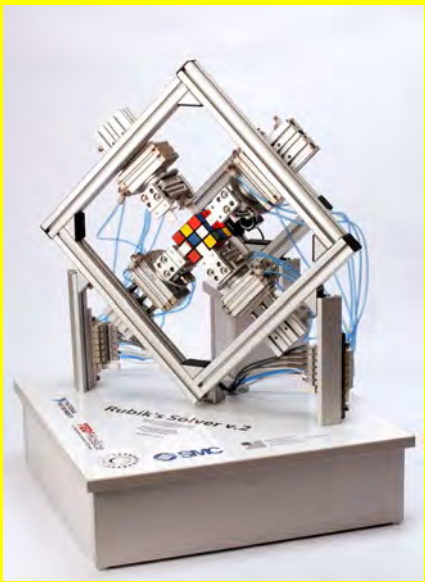

Staff

- Professors: **1**
- Assoc. Professors: **2**
- Lectures: **4**
- Researchers: **3**
- PhD Students: **2 full-time, 5 distance**

Activities at the department

Date	Title of the event, activity characterizing the life at the Department in 2014
3/2014	Lecture of expert from the practice - Ing. Ladislav Vargovčík, PhD., ZŤS VVÚ Košice
5/2014	ŠVOČ – Student's Scientific and Professional Activity (1. place – Richard Očovay)
5/2014	Robtep 2014 – International Conference
5/2014	doc. Ing. Ján Semjon, PhD. – Defended his Habilitation Thesis and gained "Associate Professor" degree
9/2014	Researchers' Night 2014 Košice – presentation of Rubik´s Cube Solver
10/2014	Third place in Robot Climbing Competition "Na komín 2014"
11/2014	Lecture of expert from the practice – Ing. Jaromír Jezný, PhD., ZŤS VVÚ Košice
12/2014	Robotics and Manufacturing Systems – International Conference

EDUCATION AT THE DEPARTMENT
STUDY PROGRAMMES

Master's degree:

- **Robotic technology**

Number of the students (till 31. 12. 2014)
on the study programmes guaranteed by the institute:
first year of studies:
– 12 internal form of study
second year of studies:
– 20 internal form of study
– 9 external form of study

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

- 20 students in the internal form of engineering study
- 11 students in the external form of engineering study

Doctoral degree:

- **Production systems**

Number of the students (till 31. 12. 2014)
on the study programmes guaranteed by the institute:
Internal students: 2
External students: 5

GRADUATE PROFILE

MASTERS PROGRAMMES (ING.)

Robotic technology

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.

DOCTORAL PROGRAMMES (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
- ✓ Diploma thesis
- ✓ Diploma project
- ✓ Evolution trends in robotics
- ✓ Evolution trends in production technology
- ✓ Experimental methods
- ✓ Final work
- ✓ Final project
- ✓ Fluid mechanisms
- ✓ History of Technique design
- ✓ Information systems in maintenance
- ✓ Innovation and renewal of machinery and devices
- ✓ Laboratory practice
- ✓ Machines and robots programming
- ✓ Operation of robotic systems
- ✓ Peripheral devices of production systems
- ✓ Project management
- ✓ 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
- ✓ Technology for integrated production
- ✓ Theory of Robot Design
- ✓ Thesis seminar

GRADUATE THESES

MASTER'S THESES:

Robotic technology

Tomáš Laubert	Design of service robot for outdoor sweepers
Miroslav Gurega	Design of service robot for rescue operations
Richard Harsányi	Automating the process of packaging

Vojtech Szabó	Innovation welding shop for pallets with the robot KAWASAKI
Kristián Urbančík	Proposal of robotic workstation with a visual system
Michal Smolko	Proposal of multirobotic system for service activities
Lukáš Mizia	Design of palletizing device
Marek Hatrák	Proposal automation manufacturing facility for the production of food devices
Dana Germeková	Proposal for manufacturing automation of special tools
Katarína Ferenčíková	Proposal for a rotary tilting module robot arm
Ľuboš Pillár	Proposal algorithms for assembly of selected types of components with double-arm robot
Juraj Čirip	Design of personal eight legs walking robot
Peter Kubaško	Automated device dosage for biomass
Richard Očovay	Design of service robot for competition MiniSumo
Ľuboš Svitaň	Proposal for a modification of material flow to production line
Michal Špak	The proposal management service robot
František Novotný	Proposal robotic workstation for handling selected types of components
Rudolf Pastrnák	Conceptual design intersection for conveyor system
Richard Takáč	The service robot to pull cables in confined spaces
Richard Bodnár	Proposal robotic transport trucks
Dušan Sukop	Interaction of robotic workstation environment with CCTV
Henrich Papcun	Proposal of a robotic workstation for renovation pins and flanges
René Béreš	Technical equipment of rescue service robot
Rastislav Petrila	Model diagnostics mobile machine system
Vladimír Molnár	Automation of turbine lubrication
Vladimír Pikla	Automation of the inspection workstation with control based on PLC
Tomáš Kertész	The study applications of contactless measuring means for working precision measuring of robot
Viktor Sivačko	Proposal gripping effector-based flexible members for robot handling
Maroš Haľža	Proposal control sorting conveyor system
Viktor Voda	The implementation of robotic technology in the manufacturing process of pneumatic conveyor
Tomáš Papuga	Proposal for a automation workstation for arc welding

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ Multirobotics systems profilation
- ✓ 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 systems with unoriented 3D objects

Research characteristics:

The main fields of research of the Department of 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 reconfigurability as well as research in the field of intelligent robotics systems and intelligent manipulation 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 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 expertise:

- ✓ Multirobotic systems and robot cooperation
- ✓ Intelligent robotic systems and manipulation
- ✓ Kinematics structures
- ✓ Construction of production machines and robots
- ✓ Virtual laboratories and Virtual models
- ✓ Modular and 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**
Main solutionist	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	**2011 - 2014**
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.

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 un-oriented 3D objects**
Type of the project	OPVaV
Number of the project	**26220220164**
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**
Main solutionist	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	**2011 - 2015**
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.

INTERNATIONAL PROJECTS

Title of the project	**RoboReha – Robotics in Rehabilitation**
Type of the project	LdV - TOI
Number of the project	**13310 0530**
Main solutionist	Mikuláš Hajduk, prof. Ing., PhD.
Time period of the project	**2013 - 2015**
Annotation of the project	The global objective of the project is to create teaching-training and informational materials for the new field of rehabilitation - robotic rehabilitation and support the training of medical workers, increase educational level of rehabilitation workers focused on the latest trends in the world.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUCIONS

Employees and students	**State**
Hajduk Mikuláš, prof. Ing., PhD.	Czech Republic, Poland, Romania
Jánoš Rudolf, Ing., PhD.	Germany, Romania
Koukolová Lucia, Ing. PhD.	Poland
Semjon Ján, Ing., PhD.	Germany, Czech Republic, Romania
Sukop Marek, Ing., PhD.	Poland, Czech Republic, Romania
Vagaš Marek, Ing., PhD.	Germany
Varga Jozef, Ing.	Germany, Romania

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Cluster AT+R
Ján **Semjon**, doc. Ing., PhD.

PUBLICATIONS

Journals

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[15] SUKOP, Marek: **Modification and improvement of image processing algorithms of robot soccer for other uses**. In: Transfer inovácií. Č. 30 (2014), s. 111-113. - ISSN 1337-7094

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INSTITUTE OF TECHNOLOGIES AND MANAGEMENT

- Department of Mechanical Engineering Technologies and Materials
- Department of Automotive Production
- Department of Computer Aided Engineering Production
- Department of Industrial Engineering and Management

Department of Mechanical Engineering Technology and Materials

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Staff

- Professors: **2**
- Assoc. Professors: **5**
- Assist. Professors **6**
- Researchers: **1**
- PhD. Students: **6**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2014
06/2014	PRO-TECH-MA 2014 international scientific conference
10/2014	Surface Engineering 2014 scientific coference
10/2014	Scientific workshop: Czech and Slovak Galvanizers Association

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Technology, Management and Innovation of Mechanical Engineering**

Master's degree:

- **Mechanical Engineering Technology**

PhD. degree:

- **Mechanical Engineering Technology and Material**

Number of the students (till 30. 10. 2014) on the study programs guaranteed by the department:
first year of bachelor study:
– 167 internal form of study
– 30 external form of study
second year of bachelor study:
– 45 internal form of study
– 19 external form of study
first year of engineer study:
– 25 internal form of study
– 11 external form of study
second year of engineer study:
– 19 internal form of study
– 15 external form of study

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

– 17 students in the internal form of engineering study
– 3 PhD. students in the internal form of study (defended PhD. thesis)
– 1PhD. students in the external form of study(defended PhD. thesis)
–

GRADUATE PROFILE

BACHELOR'S PROGRAMS (Bc.)

Technology, Management and Innovation of Mechanical Engineering

Graduates of the Production technology program and study program Technology, 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.)

Mechanical Engineering Technology

Graduates of master degree in program Mechanical Engineering Technology are able to systematically and complexly solve problems of preproduction, processing and after processing stage with support of CAx Technology. 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 Technology and in educational program – mechanical engineering Technology 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 Technology 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.

PhD. PROGRAMS (PhD.)

Mechanical Engineering Technology and Materials

The third degree of university study in field of Mechanical Engineering Technology 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

- ✓ Applied Database Systems
- ✓ Applied Informatics
- ✓ Applied Informatics in Technology
- ✓ Assembly Technology and Joining
- ✓ Bachelor Theses
- ✓ Basis of Mechanical Production
- ✓ Basis of NC Machines Programming
- ✓ 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
- ✓ CAx Technology in Preparation and Management of Production
- ✓ Certification and Standardization
- ✓ Computer aided mechanical production
- ✓ Computer aided production planing - CAP
- ✓ Computer Aided Simulation
- ✓ Computer Design of Dies and Tools
- ✓ Creative Work Methodics
- ✓ Design and production of dies and tools II
- ✓ Design and Production of Tools I.
- ✓ Design and Production of Tools II.

- ✓ Design of Fixtures
- ✓ Design of Production Systems
- ✓ Design of Technological Processes
- ✓ Diploma Thesis
- ✓ Geometrical Specifications of Products
- ✓ Informatics and PC I.
- ✓ Informatics and PC II.
- ✓ Machines and Tools for Plastics Processing I.
- ✓ Machines and Tools for Plastics Processing II.
- ✓ Materials Engineering
- ✓ Materials for Automotive Production
- ✓ Materials I.
- ✓ Materials II.
- ✓ Materials Science
- ✓ Measurement and Testing
- ✓ Mechanical Technology and Materials I.
- ✓ Mechanical Technology and Materials II.
- ✓ Mechanical Technology and Materials III.
- ✓ 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
- ✓ New Materials
- ✓ Non - conventional Materials and Technology I.
- ✓ Non - conventional Materials and Technology II.

- ✓ Design of Production Systems
- ✓ Design of Technological Processes
- ✓ Diploma Thesis
- ✓ Geometrical Specifications of Products
- ✓ Informatics and PC I.
- ✓ Informatics and PC II.
- ✓ Machines and Tools for Plastics Processing I.
- ✓ Machines and Tools for Plastics Processing II.
- ✓ Materials Engineering
- ✓ Materials for Automotive Production
- ✓ Materials I.
- ✓ Materials II.
- ✓ Materials Science
- ✓ Measurement and Testing
- ✓ Mechanical Technology and Materials I.
- ✓ Mechanical Technology and Materials II.
- ✓ Mechanical Technology and Materials III.
- ✓ 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
- ✓ New Materials
- ✓ Non - conventional Materials and Technology I.
- ✓ Non - conventional Materials and Technology II.

GRADUATE THESES

BACHELOR'S THESES:

Tomáš Laho	Preparation of the technological processes at the NC machines for the flanged components
Richard Petrigáč	Impact of the ionized air on the tribologické characteristics of the cutting process
Ján Dlhý	Application of the termovíznej technics in the technological processes
Peter Dzurik	Preparation of the technological processes for the production of the components at the NC machines
Ladislav Marton	Design technological process from recovery packaging in company DOMITRI spol.sro.
Ladislav Karčák	CAD desogn of fixture to measure microgeometry and wear of tool insert
Filip Kopnický	Proposal and validation of program for CAD desing of form tools
Pavol Horevaj	Possibilities of material joining in automotive industry
Lukáš Lelák	Utilizing technology of bonding aluminum parts in the construction of cars
Lenka Snopeková	Proposal for a database application of filler metals for thermal spraying of ceramic materials

Dominik Šipoš	PC application for making hypermedia documents in mechanical technology
Adam Varga	Environmentally acceptable blasting means and their use in the pretreatment surface
Dávid Papp	Computer Aided creation of documents from the Field of a Surface Treatment
Tomáš Pirohanič	Design and implementation of database of fillers for polymer composites
Peter Geľo	The processing of an overview of hardness evaluation of polymers with computer support
Ján Petro	The processing of study of innovative composite materials in the construction of the automobiles with computer support
Pavol Varchoľak	Application of thermal analysis methods of composites in practice
Matúš Halža	Analysis of degradation processes of continuous galvanizing line
Lukáš Gregorovič	Evaluation of rugosity selected engineering surfaces
Ján Čajkovský	Actual trends in local protection of car bodies
Martin Palko	Design of workplace for testing of welds in ZASTROVA, a.s and its evaluation
Peter Jurčišin-Kukľa	Technology of rotary swaging and its utilization at car parts production
Peter Mulidrán	Hydromechanical deep-drawing at car-body parts production
Ladislav Pankulič	Corrosion monitoring of coated sheets for car body
Jozef Palenčár	Influence of welding technology on corrosion resistance of coated sheets for car body
Ján Darivčák	Analysis of the truck retarders
Branislav Ňachaj	Surface treatment technology in automotive production
Gergő Horváth	Development of thin layers in the engineering and automobile manufacturing
Matúš Porubčan	The present situation, prospects of the development and using of nanostructured coatings
Miroslav Pališin	Analyse of methods of materials testing
Marek Juda	Application proposal for moulding mixtures testing in casting
Alexander Rozsypal	Analysis of trends in reducing weight car body
Ondrej Drabík	Monitoring cutting edge wear by shank cutters
Pavol Hejda	Comparison of properties for high strength steel sheets used in fine blanking.
Peter Hudák	Computer aided single point cutting tool geometry
Zoltán Lengyel	Computer aided geometric modeling of twist drills
Jozef Priščák	Selected progressive surface treatments and possibilities of their application in automotive industry
Branislav Dravecký	Microforming and its application in automotive industry
Jozef Balta	Innovation of machinery of the HWS mill
Lukáš Gazdura	Monitoring of welding processes parameters
Matúš Michaliček	Joining of materials in automotive industry using constructive adhesives
Ján Šofranko	Design of milk bottling line for food industry
Norbert Vavrek	Evolutionary techniques in optimizing machining parameters
Radoslav Košík	Optimization of machining process by PSO methodology - Particle Swarm Optimization
Lukáš Popély	Destructive and non-destructive methods of evaluation of the materials and coatings
Tomáš Zsigmondy	Design of database for wear resistant materials and coatings

Erik Kuta	NanoTechnology and nanotribology
Erik Kónya	Analysis of configuration automotive factories

MASTER'S THESES:

Antónia Makišová	Opportunities for modelling of the abrasion technological characteristics
Milan Havrila	Combined design of fixtures by means of CAD and shape accuracy
Erik Krafčík	Testing of cutting tools from ISCAR for milling of selected materials
Erik Fiľo	Research on the formation and properties of ceramic coatings
Peter Marcin	Measurement of corrosion properties of automotive sheet-metal
Ján Chudovský	Design and verification of coating systems for surface protection of high-alloys
Róbert Jakubčák	Wear of blades of continuous blasting equipment
Zoltán Fodor	Study of surface pretreatment process by unconventional blasting materials
Zuzana Jureková	Influence of degradation environment on mechanical properties of composites
Denisa Mandryková	Cut surface quality rating of material after progressive Technology cutting
Jaroslav Jaskievič	Termogravimetric characterization of polymer materials
Tibor Ivan	Influence of additives on technological properties of polymer composites
František Ruda	Study of selected properties of coatings intended for extreme tribocorrosion conditions
Peter Beller	Properties of thermally sprayed coatings in terms of thermal fatigue
Ivana Tomašovová	The research of stress-strain states at different deep-drawing methods
Martin Špiľko	Technology proposal and stamping die design for cutting of square flanged rotary symmetrical pressing.
Michal Ungrady	Experimental stamping die for its life cycle testing
Ľuboslav Kyseľ	The proposal of the layer for Al alloy gear
Dávid Banyay	Properties of CN and DLC layers
Štefan Turik	The evaluation of properties of thin layers for cutting tools
Martin Rusnák	Influence of annealing way by production at properties of thinplates
Štefan Palonder	Evaluation of formability of thin steel sheets
Radovan Bučko	Proposal of software for the evaluation of hydraulic bulge test
Tomáš Novotný	Simulation and optimalization of technological parameters by cups drawing of TRIP steel sheets
Marek Krajč	Experimental verification of the cutting conditions on the quality of shear surface when cutting blanks from TRIP steels
Stanislav Straka	Verification of PVD coating influence to deep drawing process
Slavomíra Iľková	Influence of mechanical production on the working environment
Viktor Dobrančin	Wear resistant surface layers
Miloš Vachaľ	Assessment of weldability using destructive testing
Cyril Bendžala	Optimizing the welding process during production of wagon undercarriage
Simona Chytilová	Utilization of flame thermal spraying technology in engineering production
Dominik Milkovič	Structure design of 3 axis CNC milling machine
Peter Širotník	Utilization of RMS methodology when optimizing turning process of AS17 alloy with diamond cutting tools
Mária Vincová	Influence of process parameters of wear resistant coatings on abrasive wear resistance
Patrik Palgut	Design of new friction couple with DLC coatings at linear sliding movement

	in CAD system
Igor Babič	Monitoring of the parameters of the abrasive wear test

PhD. THESES:

Jozef Stahovec	Study of machining quality for chosen types of form surfaces

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 Technology 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	**University Science Park TECHNICOM for Innovation Applications Supported by Knowledge Technology**
Type of the project	ITMS
Number of the project	26220220182
Principal investigator	prof. Ing. Emil Spišák, CSc.
Time period of the project	2013 - 2015
Annotation of the project	The aim of the center is to create a sustainable business of projection-development department to support product innovation and technology, optimization of manufacturing processes and rapid reconfigurable production. To meet that objective will be created “Development and production center for the creation and delivery of prototype products, tools, molds, jigs and laboratory equipment” integrating product design, reverse engineering, production of prototypes (using Rapid Prototyping

and Rapid Tooling); research and development in manufacturing technologies and optimization of manufacturing and assembly processes.

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 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	prof. 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	**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	**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 Technology, 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	**Research and development of advanced composite coatings and layers for engineering products innovation**
Type of the project	Grant project VEGA
Number of the project	1/0600/13
Principal investigator	doc. Ing. Janette Brezinová, PhD.
Time period of the project	2013 - 2016
Annotation of the project	The project is aimed at research selected properties of composite layers, functional and protective coatings deposited by progressive Technology of thermal spraying and surfacing. Subject of investigation will be quality of composite layers exposed in conditions of thermal cyclic loading, tribological and corrosion stress simulating real operating load. Properties of the surfaces will be evaluated using fractal analysis. To meet determined scientific goals there will be utilized progressive corrosion monitoring methods (electrochemical noise analysis – ENA, electrochemical impedance spectroscopy - EIS) together with innovative tribo techniques (pin-on-disc, ball-on-disc). Quailty of layers will be evaluated using indentation fracture toughness (IFT). Research will continue with the study and testing surface treatment of composite materials, design and optimization the application technology.

Title of the project	**Research and optimization of drawability and joinability evaluation of high-strength steel sheets and aluminium sheets**
Type of the project	Grant project VEGA
Number of the project	1/0872/14
Principal investigator	Prof. Ing. Emil Spišák, CSc.
Time period of the project	2014 - 2016
Annotation of the project	The progressive Technology of processing of light metals and their alloys according to industry demands are the main aims of the research. It is mainly about high-strength steels, aluminium and magnesium alloys. In the area of forming, the research is oriented to the forming processes and incremental forming processes with the focus on the defining the correlation among mechanical properties of materials, technological parameters of the process and index of integrity of surface layers of high-strength steels and aluminium and its alloys drawn parts. The project focuses on the research of limiting formability and joinability of progressively conceived materials on the base of ferrous and non-ferrous metals. The formablity will be evaluated in various stress-strain relations (uniaxial tension, biaxial tension, cupping test). The aim of the project is obtaining the original knowledge about technological formability and joinability of the materials with experimental research and numerical simulation.

INTERNATIONAL PROJECTS

Title of the project	**Assesment of the optimum removal conditions to explain tool edge design for avanced milling cutters.**
Type of the project	MŠ DAAD
Number of the project	DAAD
Principal investigator	doc. Ing. Jozef Beňo, CSc.
Time period of the project	2014
Annotation of the project	Project based scientific exchange programme includes investigation of the performance of advanced milling tools. Main objective of research is influence and effect of tool edge microgemetry on milling tool performance while this property include testing of tool edge wear as well as stress loading at the tool edges. Project, therefore, includes also the aspects of the tool edge damage as well as tool edge chipping due to tool edge workpiece contact and its loading during milling.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

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Beňo Jozef, doc., Ing., CSc.	Crakow University of Technology, Cracow, Poland University of Novi Sad, Novi Sad, Serbia Otto von Guericke University, Magdeburg, Germany University of Miskolc, Miskolc, Hungary
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Stahovec Jozef, Ing.	University of Miskolc, Miskolc, Hungary Crakow University of Technology, Cracow, Poland Otto von Guericke University, Magdeburg, Germany

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Moravskyj Volodymyr	Lviv Polytechnic National University, Ukraine
Emmer Thomas	Otto von Guericke University, Magdeburg, Germany
Skories Mike	Otto von Guericke University, Magdeburg, Germany
Niebuhr Michael	Otto von Guericke University, Magdeburg, Germany
Debski Hubert	Lublin University of Technology, Lublin, Poland
Rudawska Anna	Lublin University of Technology, Lublin, Poland

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

International Deep - Drawing Research Group
Emil Spišák, prof. Ing.,CSc.

Journal Tribologia (PL)
Eva Zdravecká, prof. Ing.,CSc.

Advances in Science and Technology Research Journal
Emil Spišák, prof. Ing.,CSc.

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

Slovak Metal Science Society

Janette Brezinová, doc. Ing., PhD.
Ján Viňáš, doc. Ing., PhD.
Anna Guzanová, Ing., PhD.

Slovak Welding Society

Ján Viňáš, doc. Ing., PhD.

Slovak Society for Surface Treatment

Dagmar Draganovská, Ing., PhD.

Slovak Association of Mechanical Engineers

Emil Spišák, prof. Ing.,CSc.
Ľudmila Dulebová, Ing., PhD.

Slovak Association for Tribology and Tribotechnology

Eva Zdravecká, prof. Ing.,CSc.

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Research reports

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Department of Automotive Production

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Staff

- Professors: **3**
- Assoc. Professors: **0**
- Assist. Professors **6**
- Researchers: **1**
- PhD. Students: **1 internal**

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Automotive Production**

Master's degree:

- **Automobile Production**
- **Plastics Processing**

Number of the students
in academic year 2013/2014:
Bachelor's study:
third year of study
– 66 internal for of study
Master's study:
first year of study:
– 39 internal form of study
second year of study:
– 34 internal form of study
PhD. degree:
– 1 PhD. students in the internal form of study
in academic year 2014/2015:
Bachelor's study:
first year of study:
– 69 internal form of study
third year of study:
– 35 internal form of study
Master's study:
first year of study:
– 49 internal form of study
second year of study:
– 41 internal form of study
PhD. degree:
– 1 PhD. students in the internal form of study
Number of the graduates (2013/2014)
on the study programs guaranteed by the department:
– 66 students in the internal form of bachelor study
– 34 students in the internal form of engineering study

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. He is 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.

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.

Plastics Processing

Study program "Plastic Processing" is implemented within the field of study "Production Technologies", in line with the actual trends of development plastics based component base. Graduate obtains complete second-level degree in plastics processing. Graduate will gain following skills: appling of the acquired theoretical knowledge about the composition, structure and performance of plastics in their processing by the design of the product, ability to not only solve the current problems in the application of plastics in various applications but specifically will also guarantee their technological processing with a guarantee of reliability especially mechanical as well as other specific characteristics in real assemblies. Gained skills of graduate provide him a deep knowledge of manufacturing technologies for plastics processing and enable to manage teams of workers in this area alone lead even large projects and take responsibility for complex solutions. Graduate will gain experience with hypothesis formulation, experimental design, testing hypotheses and data analyzing. He will be able of creative and systematic analysis approach and synthesis technology systems and processes, on the other hand, access to analysis and synthesis derived from mathematical and physical description of the individual functional blocks of these systems, subsequently verified by experiments on real objects capable of analyzing the mechanical properties of the system in terms of management principles its movement to the creation of the system hardware and software control system.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Bachelor degree:
Innovations of Processes and Products
Delivery Systems in Automobile Production
Technologies of Automobile Production
Design of Tools, Fixtures and Machines in Mechanical Engineering
Projection of automotive workstations and workshops
Testing in Automobile Production

Fundamentals of Engineering Materials
Design of Tools, Fixtures and Machines in Mechanical Engineering
Design of tools, fixtures and machines for mechanical manufacturing
Design of Fixtures

Master degree:
Automotive Manufacturing Management
CAx Technologies in Preparation and Management of Production
Small business I
Technical Creativity
Automotive Supply Chain Management
Laboratory project
Production Design
Small business II
Automotive Operation and Maintenance
Innovations in Automotive Manufacturing
Testing of automobile and components
Research and Development Management
Strategic Planning
Automobile Design
Automotive Manufacturing Management
Design of Automotive Production
Innovations in Automotive Manufacturing
Technology of Automotive Production
CA Methods in Technological Processes III.
CA Methods in Technological Processes III.
Diploma Project
The Design of Plastic Moldings (CAD)
Computer Design of Dies and Tools
Semestral project
Machines and tools for plastics processing I
Machines and tools for plastics processing II

GRADUATE THESES

BACHELOR 'S THESES:

Automotive Production

Varga Ľuboš	Analysis of deformation of the selected automotive component in CAD system
Rozsypal Alexander	Analysis of trends in reducing weight car body
Čajkovský Ján	Actual trends in local protection of car bodies
Štofaňák Ján	Project of LPG gear motorcycle.
Ryzner Pavel	Dashboards analysis of the premium-class cars
Tkáč Michal	Comparison of the deformation properties of materials under bending stress
Soták Ján	Edit car type old-timer to improve the operating characteristics
Petro Pavol	Analysis of non-traditional design concepts of the Future Cars
Stariak Gabriel	Analysis of intelligent subsystems cars
Darivčák Ján	Analysis of the truck retarders
Pavela Michal	The layout of rebuilding the garage Autonova Poprad
Bomba Juraj	Application of Selective Catalytic Reduction emissions of trucks
Adam Michal	Analysis of the truck cabs versions
Galeštok Pavol	Analyses how to increase the efficiency of internal combustion engines of passenger cars
Gaži Róbert	Analysis of the development of electronic assistance systems of passenger cars
Dudžáková Mária	Sustainable development analysis of manufacturing processes in the automotive industry
Gáll Marek	Project of motorcycle carburetor assembly
Puškár Dušan	Innovations of two stroke combustion engines
Palenčár Jozef	Influence of welding technology on corrosion resistance of coated sheets for car body
Pankulič Ladislav	Corrosion monitoring of coated sheets for car body

Roth Gűnter	Design of manufacturing technology of automobile component by fineblanking.
Michna Dominik	Design of manufacturing technology of hub by die forging.
Bánková Beáta	Strategies of material selection in car body structure in terms of safeness
Lelák Lukáš	Utilizing technology of bonding aluminum parts in the construction of cars
Kónya Erik	Analysis of configuration automotive factories
Horevaj Pavol	Possibilities of material joining in automotive industry
Mulidrán Peter	Hydromechanical deep-drawing at car-body parts production
Jurčišin-Kukľa Peter	Technology of rotary swaging and its utilization at car parts production
Michaliček Matúš	Joining of materials in automotive industry using constructive adhesives
Kollárik Igor	Analysis of the structures of hybrid drives in automobiles
Horváth Gergő	Development of thin layers in the engineering and automobile manufacturing
Ňachaj Branislav	Surface treatment technology in automotive production
Ercegová Annamária	The customer service of the passenger cars
Večurkovský Ľuboš	Analysis of the engine control units
Jabrik Gábor	Hard coatings prepared by hybrid techniques
Toth Martin	KAIZEN of the selected process in automotive production
Zubko Michal	Analytic design study of the student car
Dudáš Eduard	Student car interior - design study
Marič František	Innovative modifications of commercial vehicles for the needs of small business
Szabó Adam	Analysis of application of cars connectivity systems to improve safety in transport
Fuchsová Vladimíra	Project of proposal a workplace to tuning adaptation of vehicles
Lukáčová Lucia	Specifics of individual vehicle production
Baňas Tomáš	Analysis of additional protection of chassis cars
Dudžák Gabriel	Simulation systems for testing cars and components
Javorský Martin	Strategical partnership in the automotive industry
Krempaský Patrik	Chassis innovations of off-road vehicles
Kravčík Patrik	Innovation solutions for service of automotive bodies
Vrabeľ Radovan	Analysysis of the innovation potential global supplier - Magma International
Divulit Maroš	Analysysis of the innovation potential global supplier - Delphi Automotivei
Koronczi Adrián	Analysis of inovative subsystems for smart cars
Bujňák Jozef	Applications use of CNC programming in the automotive industry
Maňko Richard	Modern engines fuel consumption.
Balog Tomáš	Economic return of hybrid engines development depending on ecological contribution.
Bielický Peter	The Efficiency of electric cars in the town agglomeration.
Knoška Vladimír	Electric engines of small city cars.
Škrak Róbert	Middle class cars spare parts quality benchmarking.
Fecko Matúš	Atypical structural modifications cars (Extreme Car).
Dermek Lukáš	Creating e-learning module for teaching 5S method

Kmec Miroslav	Creating e-learning module for teaching reengineering
Šteiner Peter	Creating e-learning module for CAD design
Lehocký Pavel	Creation of 3D CAD models of production machines
Monka Ján	Gear lever construction analysis and gear lever design in CAD system
Lumnitzer Ján	Design concept of a student car.
Szabó Dávid	Student car exterior - design study
Poliak Tomáš	On-line 3D model configurators and their application in assembly design
Kolcun Dominik	Analysis of assembly workstations with rotary table application
Ondík Jakub	Project of drum brake assembly
Köblös Gabriel	Project of fuel pump assembly
Kirner Tomáš	Technical -economic analysis of the production of auto body parts from sheet metal blanks

MASTER'S THESES:

Automotive Production

Šoltés Róbert	Vehicle weight decreasing through aplication of new materials.
Žido Miroslav	An innovative project in the company MOPS PRESS Snina
Špirko Dávid	Evaluation parameters forming machines and operational testing
Kender Ján	Design of crawler-type vehicle for emergency services
Oravec Michal	Optimization of the production cycle lines in the company Magneti Marelli
Orolin Patrik	Rebuilding a car engine for amateur racing uphill.
Madeja Pavol	An innovative project in plastics manufacturing company PRIMA Ltd. Poprad
Marcin Peter	Measurement of corrosion properties of automotive sheet-metal
Szabó Tamás	Computer design of front axle for race cars
Mihalčo Vladimír	Research and development centers specialized to testing of innovations in the automotive industry
Turik Peter	Innovations of automobile production laboratories aimed at engineering services to Product Design
Katančík Peter	Virtual tools to support education and training in design of innovations for automotive production
Gibeľ Ondrej	Analysis of the potential of spin-offs for innovation in automobile manufacturing
Zakopjan Ján	Compression analysis of innovation cycles in agile enterprises
Akuratný Michal	KAIZEN of the automatic assembly line for the electronic latch platforms of passenger cars
Gavenda Lukáš	Creation of production workshop for selected automotive component assembly
Hegedűs Martin	Selected component assembly analysis by using video recording
Kelíšek Ľubomír	Concept and design proposal of the urban car
Varga Robert	Design of the vehicle for young people´s spare time and sport activities
Macák Jakub	3D measuring and digitizing of a car component using the coordinate measuring machine FARO Platinum Arm
Michalik Michal	Application of fiber composites in the manufacturing of lightweight components
Ondrej Emil	3D digitizing optimisation for project design processes.
Landová	Experimental structure of the composites matrix for applying in the car production.

Mariana	
Širilla Peter	Testing of crumpling zone material substitution possibility.
Pero Lukáš	Innovation project - manufacturing of the overhead system for the passenger car
Korečko Martin	MPV back seat - options for improvement of design parameters.
Volner Jakub	Innovation of the passenger car´s backseat metal structure.
Kuzemka Igor	Design of the backseat armrest height adjustment system
Kandera Tomáš	Testing of the lean techniques at the lean assembly laboratory workstation
Fejerčák Tomáš	Innovative product development to provide production services.
Probala Daniel	The management of logistics and supply chains
Babej Martin	Innovative product development - Reconfigurable garage.

RESEARCH AT THE DEPARTMENT

The research activities focus on:

- ✓ Techniques for the development of automotive components (reverse and simultaneous engineering,
- ✓ DFX methods - design for manufacturing, assembly, disassembly,
- ✓ Innovations in design and control of automobile production (methodology of innovative projects, the implementation of lean manufacturing and agile manufacturing, supply network management)
- ✓ Components and manufacturing processes for automotive production based on advanced materials, application of ultra-light materials.
- ✓ Support of ultra-light car component innovations aimed at reducing of car weight and emissions.
- ✓ Concept design of ultralight vehicles and vehicles using alternative energy sources.
- ✓ Prediction of safety characteristics for ultra-light and thin-walled automotive components

PROJECTS OF THE DEPARTMENT

NATIONAL PROJECTS

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	**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 aspects of extrusion and injection moulding of thermoplastic polymer composites and nanocomposites**
Type of the project	Seventh Framework Programme
Number of the project	**PIRSES-GA-2010-269177**
Principal investigator	prof. Ing. František Greškovič, CSc.
Time period of the project	(04/2011 – 03/2015)
Annotation of the	The most important objective of the project is to strengthen the research

project

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, while twin screw extrusion – at the West Saxon University of Applied Science in Zwickau. Actions connected with injection moulding will be carried out at the Technical University of Kosice. Experiments on the properties of thermoplastic composites will be performed at the Lviv Polytechnic National University. 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.

PUBLICATIONS

Journals

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Patents

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Department of Computer Supported Technologies

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Staff

- Professors: **1**
- Assoc. Professors: **2**
- Assist. Professors **3**
- Researchers: **1**
- PhD. Students: **3**

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2014
4/2014	Sheet Metalworking – Our Passion, Your Solution. Workshop for sutents, LVD Group Belgium – doc. Ing. Ján Slota, PhD. in cooperation with C. M. Muresan, M. Poliak and V. Palaiová
3/2015	Competition for student in CNC programming – prof. Ing Ildiko Maňková, Ing. Peter Ižol, PhD., in company support – Sova Digital, Didaktik, Nexten, Autodesk

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Computer Aided Manufacturing Technology**

PhD. degree:

- **Mechanical Engineering Technologies and Materials**

Master's degree:

- **Computer Aided Manufacturing Technology**

Number of the students (till 30.10. 2014)
on the study programs guaranteed by the department:

- first year of bachelor study: 46
- second year of bachelor study: 59
- third year of bachelor study: 65
- first year of engineer study: 47
- second year of engineer study: 45

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

- 49 students in the form of engineering study
- 61 students in the form of bachelor study
- 2 PhD. students (defended PhD. thesis)

GRADUATE PROFILE

BACHELOR'S PROGRAMS (Bc.)

Computer Aided Manufacturing Technology

Graduate of bachelor student program Computer Aided Manufacturing Technology is able to solve problems related with introducing and running of production – technological systems. Graduates have knowledge about production technologies (machining, forming, welding, surface treatment, assembly, transporting and logistics, materials, machines tools, facilities of operational and interoperable manipulation and transport, control of production processes). Mentioned special accomplishments have expanded of knowledge from computing techniques, CA systems and 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 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.

MASTER'S PROGRAMS (Ing.)

Computer Aided Manufacturing Technology

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/CAE with 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

- ✓ Application of CAx in Technology
- ✓ Bachelor Project
- ✓ CA Methods
- ✓ CA Technologies
- ✓ CAD in Manufacturing Technology
- ✓ CAD/CAM Systems – Automatization of the Technical Preparation of Manufacturing Process
- ✓ CAM Programming in Technical Processes
- ✓ Computer Aided Methods in Manufacturing Production
- ✓ Diploma Project
- ✓ Diploma Thesis
- ✓ Engineering Processes Automatization
- ✓ Laboratory Project
- ✓ Measurement and Testing
- ✓ NC Machines Programming
- ✓ Precise Manufacturing and Nano Technologies
- ✓ Precision and Manufacturing Process Evaluation
- ✓ Progressive Technologies Theory
- ✓ Semestral Project
- ✓ Technological Informations Processing
- ✓ Process Monitoring
- ✓ Theory of Machining, Tools and Jigs

GRADUATE THESES

BACHELOR'S THESES:

Blaško Tomáš	Evolution of CNC Machines
Bujňák Jozef	Applications Use of CNC Programming in the Automotive Industry
Čižmarik Igor	CAM Software and NC Programme Creation Focused to HSM
Čupka Michal	Design of CNC Milling Machine for Easy Manufacturable Materials
Džubara Miroslav	CAE Analysis of Injection Mould Cooling
Herbert Jaroslav	Tools Database and Their Utilization at the KTaM
Hredzáková Patrícia	The Implementation of CAM System as Support in Engineering Production
Choma Michal	Creating of 3D Component Models by Generating from Drawing
Janák Marek	The Feature of iMachining Strategies for Machining Area
Ovčačík Filip	Methods of Evaluation of Surface Texture After Machining
Pelle Zsolt	Design of Blanking Tool for Production Part of Shieldbox Type
Seková Denisa	Possibilities of Thickness Measurement on Pressings
Šeteščák Peter	Database System for Rapid Prototyping Laboratory
Sýkora Peter	Using Photogrammetric System Argus for Pressings Shape Evaluation
Toth Martin	KAIZEN of the Selected Process in Automotive Production
Tóth Jozef	Design of Bending Tool for Pneumatic Press
Vaľko Marek	CAD Systems at Design of RC Flying Equipment

MASTER'S THESES:

Akuratný Michal	KAIZEN of the Automatic Assembly Line for the Electronic Latch Platforms of Passenger Cars
Bollo Tomáš	Monitoring the Mechanical Load of Cutting Tool Edge When Milling
Dolnačko Martin	Transport of Bulbs into the Machine for Production of Automobile Light Bulbs R10W
Dráb Pavol	Injection Mould Design for Molding of Samples with Weldline
Falat Jakub	CNC Technologies at Stamping Die´s Active Parts Manufacturing
Gelata Lukáš	The Comparison of CAM Systems in Terms of Choice of Strategies for the Selected Component
Greš Miroslav	Proposal of High-speed Rotary Sand Dryer
Janečko Matej	Verification Strategies Toolpaths Generated in the CAM Systems in Production of Shaped Surfaces
Kohút Peter	Mechanical Joining of Materials by Clinching Method as an Alternative to Resistance Spot Welding
Komloš Tomáš	Design of Tandem Die for Cutting and Bending
Kovaľ Karol	Testing of Cutting Inserts When Turninghardened Steel
Kubík René	Analysis of Resistance Spot Welding Parameters on the Quality of Welded Joints of Dual Phase Steels HCT 600 X
Lutter Patrik	Design of CNC Machine Using Unit-Built Standard Parts
Melková Jana	Tests of Steel Sheets on Erichsen Testing Device
Ondra Ľudovít	The Optimization of Production Facilities on the Vario Line
Pirožek Peter	Optimization of Sheet-Metal Part Production in Whirlpool Slovakia
Pitoňák Martin	Creation of Postprocessor and Simulation of Milling Machine
Porvazník Ján	Assembly and Dissasembly Rationalisation of Cylinder for Continuous Casting Segments

Seman Jozef	The Simulation of 5 Axis Machining on the Machine GROB G350
Stolárik Tomáš	Design of Fixture for Machining of Crane´s Chassis
Šiser Marek	The Influence of the Tool Run off to the Upright Surfaces Precision at Milling
Šofranko Peter	Solving the Interleaving of Assembly in Production of Automotive Light Bulbs P21/5W 12V
Štefaňák Lukáš	Numerical Simulation of Tin Car-Body Production
Vagaský Dušan	Design of Workplace Assemlby Line “Rational”
Vojtek Damián	Advanced Structures in FDM Prototypes

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.
- ✓ 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	**Implementation of Model for Nanometrological Process Control for Cutting Portion of Tool Evaluation when Precise Machining**
Type of the project	Grant Project APPV
Number of the project	SK–AT–0021–12
Principal investigator	prof. Ing. Ildikó Maňková, CSc.
Time period of the project	2013 - 2014
Annotation of the project	Project on quality control of tool’s cutting parts when precision machining. Objectives of project are centered on application procedures from both metrology and nanometrology being used for cutting tool edges. Application procedures are planned to be used for production of precision holes when drilling as well as for milling by ball end milling cutters when producing free form surfaces. Project is aimed to elaborate methodology of measurement and control of active parts at metal cutting tools as edge radii, rounding of edges, coating thickness as well as entire tool edge

sharpness. Measurements of profiles and edge rounding are assumed definite directions when verifying proposed methodology. As a part of verifying, experimental procedures are assumed to be carried out in order to identify such aspects as mechanisms of machined surface formation, change at active parts of tool edge due to gradual tool wear as well as inaccuracy of machined surfaces. Implementation of methods of quality and environment management into precision machining as well as nanometrological procedures of cutting tool assessment are assumed to be key contribution of project solution. Recommendations for final modifications of active parts of metal cutting tools are expected to be results of project solution. Publishing of scientific results in leading journals worldwide, elaboration of master and PhD theses as well as efficient utilization of high rated laboratory technique of participant workplaces are expected to be the value added in the project.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Employees and students	Country
Ján Slota, doc. Ing., PhD.	MECAS ESI, s.r.o., Plzeň, Czech Republic Politechnika Rzeszowska, Rzeszow, Poland Politechnika Lubelska, Lublin, Poland Škoda Auto, a.s., Mladá Boleslav, Czech Republic Tatra Trucks, a.s., Kopřivnice, Czech Republic Aufeer Design, a.s., Mladá Boleslav, Czech Republic Technical University in Liberec – Institute of Nanomaterials, Progressive Technologies and Innovations, Liberec, Czech Republic EUROBLECH, Hannover, Germany
Ildikó Maňková, prof. Ing., CSc.	Technische Universitat Wien, Wien, Austria Polytechnika Krakowska, Crakow, Poland Otto von Guericke Universitat Magdeburg, Magdeburg, Germany Univerzita Tomas Bati Zlín, Zlín,Czech Republic
Ivan Gajdoš, Ing., PhD.	The State School of Higher Education in Chełm, Chełm, Poland Lublin University of Technology, Lublin, Poland Lviv Polytechnic National University, Lviv, Ukraine

VISITS OF STAFF MEMBERS FROM FOREIGN INSTITUTIONS

Employees and students	Country
Hubert Debski, Ph.D. Eng.	Lublin University of Technology, Lublin, Poland
Anna Rudawska, Ph.D. Eng.	Lublin University of Technology, Lublin, Poland
Cornel Radu Muresan	LVD, Gullegem, Belgium
Janusz Sikora	Lublin University of Technology, Lublin, Poland
Malgorzata Gieviska	Lublin University of Technology, Lublin, Poland
Róbert Kowalczyk	Politechnika Krakow, Krakow, Poland
Malgorzata Kowalczyk, Dr.	Politechnika Krakow, Krakow, Poland
Wojciech Zebala, Prof.	Politechnika Krakow, Krakow, Poland
Gregorz Struzkiewicz, Prof.	Politechnika Krakow, Krakow, Poland

Marin Gostimirovic, Prof.	University of Novi Sad, Novi Sad, Serbia
Pavel Kovac, Prof.	University of Novi Sad, Novi Sad, Serbia
Boris Savkovic	University of Novi Sad, Novi Sad, Serbia
Pierre Charles Simon	GMD, France
Régis Duplessy	Eurostyle Systems, France
Gert Thienpont	LVD, Belgium
Patrick Huyghe	Syntrawest, Belgium
Richard Horvath	Obuda University, Budapest, Hungary
Dregely Kiss Agota, Dr.	Obuda University, Budapest, Hungary
Cezarius Zmuda	Lublin University of Technology, Lublin, Poland
Jerzy Rumwicz	Lublin University of Technology, Lublin, Poland
Bronislaw Samujlo	Lublin University of Technology, Lublin, Poland
Tomasz Jachowicz	Lublin University of Technology, Lublin, Poland
Thomas Emmer	Otto von Guericke University, Magdeburg, Germany
Konrad Schmidt	Otto von Guericke University, Magdeburg, Germany
Sascha Schmidt	Otto von Guericke University, Magdeburg, Germany
Janos Kundrák, Prof.DrSc.	University of Miskolc, Miskolc, Hungary
Balazs Mikó, Dr.	Obuda University, Budapest, Hungary
Tadeusz Otko, Dr.	Cracow University of Technology, Cracow, Poland
Numan Duraktasa, Prof.	Vienna University of Technology, Vienna, Austria
Imrich Lukovics, Prof.	Tomáš Baťa University in Zlín, Zlín, Czech Republic
Jiří Čop, Ing.	Tomáš Baťa University in Zlín, Zlín, Czech Republic
Gokcen Bas, Dr.	Vienna University of Technology, Vienna, Austria
Dominika Teterycz	Lublin University of Technology, Lublin, Poland
Natalia Wojtowicz	Lublin University of Technology, Lublin, Poland
Agnieska Suwata	Lublin University of Technology, Lublin, Poland
Katarzyna Kowalczyk	Lublin University of Technology, Lublin, Poland
Kamil Gawron	Lublin University of Technology, Lublin, Poland
Jerzy Runowicz	Lublin University of Technology, Lublin, Poland
Bronislaw Samujto	Lublin University of Technology, Lublin, Poland
Grzegor Gmor	Lublin University of Technology, Lublin, Poland
István Sztankovics	University of Miskolc, Miskolc, Hungary

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

International Deep - Drawing Research Group
Ján Slota, doc. Ing., PhD.

Society of Plastic Engineers
Ivan Gajdoš, Ing., PhD.

Instutute of Research Engineers and Doctors

Ivan Gajdoš, Ing., PhD.

PUBLICATIONS

Textbooks

[1] GAJDOŠ, Ivan – SLOTA, Ján: **Počítačová simulácia vstrekovania plastov – Návody na cvičenia** – 1. vyd. – Košice: TU – 2014. 108 s. ISBN 978-80-553-1647-5

Journals

[2] VRABEĽ, Marek - MAŇKOVÁ, Ildikó - BEŇO, Jozef - KANDRÁČ, Ladislav - STAHOVEC, Jozef: **Adaptive control system to assist the surface workpiece quality when drilling**. In: Applied Mechanics and Materials. Vol. 474 (2014), p. 212-217. - ISSN 1660-9336

[3] KANDRÁČ, Ladislav - MAŇKOVÁ, Ildikó - VRABEĽ, Marek - BEŇO, Jozef: **Finite element simulation of cutting forces in orthogonal machining of Titanium alloy Ti-6Al-4V**. In: Applied Mechanics and Materials. Vol. 474 (2014), p. 192-199. - ISSN 1660-9336

[4] MAŇKOVÁ, Ildikó - BEŇO, Jozef - VRABEĽ, Marek: **Effect of Workpiece Hardness on Surface Microgeometry when Hard Turning with Ceramic Inserts.** In: Key Engineering Materials. Vol. 581 (2014), p. 176-181. - ISSN 1013-9826

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[36] VARGA, Ján - STAHOVEC, Jozef - BEŇO, Jozef - VRABEĽ, Marek: **Assessment of surface quality for chosen milling strategies when producing relief surfaces.** In: Advances in Science and Technology : Research Journal. Vol. 8, no. 22 (2014), p. 37-41. - ISSN 2299-8624

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Conference Proceedings

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Cracow University of Technology, 2014 Vol. 4 (2014), p. 52-74. - ISBN 978-83-7242-765-6

[2] KANDRÁČ, Ladislav - MAŇKOVÁ, Ildikó - VRABEĽ, Marek - BEŇO, Jozef - STAHOVEC, Jozef: **State of the art in hole making process of titanium alloys.** In: Development in Machining Technology : Scientific Research Reports. - Cracow : Cracow University of Technology, 2014 P. 90-117. - ISBN 978-83-7242-765-6

[3] STAHOVEC, Jozef - BEŇO, Jozef - VRABEĽ, Marek - MAŇKOVÁ, Ildikó - KANDRÁČ, Ladislav: **Cutting force prediction in ball-end milling process.** In: Development in Machining Technology: Scientific Research Reports. - Cracow : Cracow University of Technology, 2014 Vol. 4 (2014), p. 32-45. - ISBN 978-83-7242-765-6

[4] GAJDOŠ, Ivan - SPIŠÁK, Emil - GREŠKOVIČ, František - DULEBA, Branislav. **Warpage optimization of moldings by DOE.** In: Technological and design aspects of extrusion and injection moulding of thermoplastic polymer composites and nanocomposites : volume 2. - Košice : TU, 2014 S. 37-52. - ISBN 978-80-553-1677-2

[5] JACHOWICZ, Tomasz - KRASINSKYI, Volodymyr - GAJDOŠ, Ivan: **The investigation of the influence of pro-degradant content on chosen properties of polymer composite.** In: Technological and design aspects of extrusion and injection moulding of thermoplastic polymer composites and nanocomposites : volume 2. - Košice : TU, 2014 S. 53-77. - ISBN 978-80-553-1677-2

[6] GRYTSENKO, Oleksandr - SUBERLYAK, Oleh - HNATCHUK, Natalia - GAJDOŠ, Ivan: **The features of film composition hydrogel materials obtaining technology by centrifugal molding.** In: Technological and design aspects of extrusion and injection moulding of thermoplastic polymer composites and nanocomposites : volume 2. - Košice : TU, 2014 S. 213-229. - ISBN 978-80-553-1677-2

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Research reports

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[8] EVIN, Emil - TOMÁŠ, Miroslav - KMEC, Jozef - NÉMETH, Stanislav - KATALINČ, Branko - WESELLÝ, Emil: **The Deformation Properties of High Strength Steel Sheets for Auto-Body Components.** In: Procedia Engineering : 24th DAAAM International Symposium on Intelligent Manufacturing and Automation 2013 : 23-26 October 2013, Zadar, Croatia. Vol. 69 (2014), p. 758-767. - ISSN 1877-7058

[9] VÉGH, Alexander - DOVICA, Miroslav - VRABEĽ, Marek - MAŇKOVÁ, Ildikó: **Využitie neurónových sietí pre modelovanie a predikciu integrity povrchu.** In: Automatizácia a riadenie v teórii a praxi : ARTEP 2014 : workshop odborníkov z univerzít, vysokých škôl a praxe v oblasti automatizácie a riadenia : 5. - 7. február 2014, Stará Lesná. - Košice : TU, 2014 S. 48-1-48-5. - ISBN 978-80-553-1580-5

[10] EVIN, Emil - TOMÁŠ, Miroslav - NÉMETH, Stanislav - KASENČÁK, Martin: **Potencionálne možnosti aplikácií nehrdzavejúcich ocelí pre tenkostenné komponenty automobilov.** In: High-tech Technológie 2014 - zdroj inovácií EÚ : vedecký seminár : 27. november 2014, Bratislava. - Trnava : AlumniPress, 2014 S. 1-6. - ISBN 978-80-8096-205-0

[11] BREZINOVÁ, Janette - KONCZ, Juraj - TOMÁŠ, Miroslav - SLOTA, Ján: **Corrosion Behaviour of Automotive Steel Sheets Depending on the Degree of Deformation.** In: Key Engineering Materials : Materials in Engineering Practice 2014 : 9. Scientific-Technical Conference : Herľany 12.-13.6.2014. Vol. 635 (2014), p. 57-60. - ISSN 1662-9795

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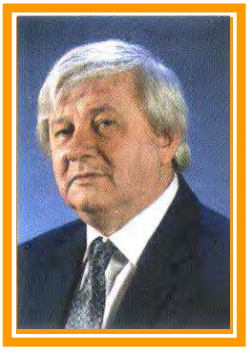
Department of Industrial Engineering and Management



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Staff

- Professors: **2**
- Assoc. Professors: **4**
- Lectures: **5**
- Researchers: **2**
- PhD Students: **6**

Activities at the department

Date	Title of the event, activity characterizing the life at the Institute in 2014
07/2014	Journal Transfer inovácií 29/2014
12/2014	Journal Transfer inovácií 30/2014
12/2014	17th International Scientific Conference Trends and Innovative Approaches in Business Processes, Košice © 2014

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 (2014/2015)
on the study programmes guaranteed by the department:
Bachelor's degree:
- 0 internal form of study
- 0 external form of study

Master's degree:
- 56 internal form of study
- 20 external form of study

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

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

Master's degree:
- 45 internal form of study
- 22 external form of study

Doctoral degree:
- 2 internal form of study
- 3 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
- ✓ Introduction to Economics
- ✓ Laboratory exercises II. – automobile assembly
- ✓ Machine Ergonomics
- ✓ Management and Business Economics
- ✓ Management of Changes
- ✓ Management of Investment Business Development
- ✓ Marketing
- ✓ Marketing Strategy of Enterprises
- ✓ 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
- ✓ Operations Management
- ✓ Personal Management
- ✓ 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

Albert Peter	Applications of the strategic maps in the companies and other organizations
Antoničová Simona	Statistical control of the production process
Arvaiová Silvia	Study of working time usage for the selected working activity
Balázs Peter	Statistical quality control methods in the chosen company
Bartko Radovan	Usage analysis of technical facilities in warehousing
Berešová Štefánia	The use of the cluster analysis in modeling of supply process in company
Buliak Patrik	Analysis of the utilization of structural funds for the programming period 2007-2013
Cienka Jana	Reduction possibilities of continuous production times
Czakó Norbert	Development and usage of systems for production planning and control
Čabalová Nikola	Possibilities of State aid application in the chosen company
Čekľovská Natália	The ergonomic design of selected species production tools
Demeter Martin	Case study of material management supervision
Dudra Lukáš	Calculation of the new product price
Ďugelová Monika	Evaluation of difficulty of working operations in selected company
Ďuricová Lucia	Analysis of the production process on case study of small engineering company
Eliaš Jakub	Production management improving through modern managerial methods
Eliášová Veronika	Marketing studies offer tractor loader on the Slovak market.
Filčáková Veronika	Production controlling in an industrial company
Filická Veronika	Purchasing management in an industrial company
Galajdová Natália	The draft methodology of quality control in welding engineering company
Gazdová Marianna	Competence regional business networks
Gondek Adam	Risk assessment in the field of mechanical engineering
Greger Lukáš	Specifics of the production logistics according to the production type
Hlivák Marek	Pro-activity in the management of the industrial companies
Horváthová Veronika	Possibilities of power cycle slimming
Hrabovská Evelína	The measurement of performance in logistics warehouse
Hudačinová Marcela	Evaluation of business competitiveness on the global market
Hudák Slavomír	Database storage and storage resources
Idesová Ivana	Computer support for the controlling an industrial company
Járay Branislav	Investment demands of a prototype workshop modernization
Javor Marek	Support of the new products development by modern CAx systems
Kalická Ivana	Client processes and their improvement
Karafová Tímea	Customer oriented quality improvement in practice
Kinlovičová Adela	Competitiveness of the mechanical engineering industry of Slovakia in the European Union
Klenotič Matej	Work difficulty analysis in the working system
Kohútová Patrícia	Analysis of the possibilities of increasing the company competitiveness
Komanická Michaela	Introducing a new product into production in selected enterprise
Kostolníková Dominika	Information and communication technology to support project management
Košárová Petra	Logistic models of small mechanical products
Kramárová Anna	The study of production processes to increase its competitiveness in the chosen company
Lancošová Katarína	Draft of the measures to optimize the manufacturing process application software Tecnomatix Plant Simulation

Legát Matej	Software support for the financial and economic analyse
Lepieš Branislav	Workload evaluation in selected manufacturing company
Libič Ladislav	Specifics of production process management in an industrial company
Lucík Michal	Providing computing for small and medium businesses
Ľubiščáková Zuzana	Assembly in piece production
Macinská Katarína	Criteria for the layout of the assembly workplace
Maguška Marián	Innovation as a tool for business development
Matvejová Elena	The application of lean manufacturing principles in lawnmowers assembly
Miškanin Frederik	Factual and graphical database handling equipment
Mlaka Tomáš	Case study of using Tecnomatix Plant Simulation for the selected process
Molnárová Daniela	Identification of the risks of industrial companies
Novák Jozef	Production logistics in industrial company
Novák Vladimír	Innovative production technology of selected engineering products
Novotný Dušan	A case study in Siemens PLM Software Tecnomatix Process Designer
Ondáš Matúš	Introduction in to PLM Software Teamcenter
Ondira Jakub	Comparison of selected software tools for creating layouts
Pribiš Matúš	Analysis of the production process using the selected module Siemens PLM Tecnomatix
Ondrejová Daniela	Methods of the risk assessment for handling of loads
Palaščáková Nikola	Management decisions on how to implement an integrated management system
Polák Lukáš *(s 240903 8891)*	Production technology of equipment prototype
Polák Lukáš *(s 240903 8102)*	The use of the process maps in the companies
Puškárová Jana	Preventing errors in the manufacture of products from aluminum alloys for the automotive industry
Rakašová Monika	Development of personal management concepts and their application in practice
Romaňák Vladimír	Optimization of car´s discs production
Sabová Daniela	Analysis of the selected operating process in the production company
Smolnický Michal	Ergonomic principles of risk assessment at work
Solej Lukáš	Spatial perception and its impact on safety at work
Sopko Peter	Innovation of ergonomic solutions of engineering production products
Šťastná Andrea	Study of trends of drive wheel development in motor vehicles
Štefaňák Lukáš	Marketing strategy of small production and trading company
Štober Martin	Reference solutions of prototyping production of handling equipment
Thinschmidtová Daniela	The application of the concept of lean workplace in the selected manufacturing company
Timuľáková Katarína	Simulation experiment of the production system realized in Plant Simulation
Tomčo Marián	Support for small and medium enterprises in developing innovative technologies
Tomčová Dominika	Marketing development in international business of mechanical engineering company
Tóthová Veronika	Systems of handling with end-of-life electronic devices and their application to the selected product
Vaňo Dávid	Comparison of disassembly characteristics of selected group of mobile phones
Veliký Peter	Development trends of businesses competence networks
Verčimáková Alexandra	Innovative processes and equipment for disassembly

Babič Marián	Application of CAx systems in material flow solving
Hingiszová Veronika	Material management in U.S.Steel Košice, s.r.o.
Chlebana Peter	Introduction in to Software Module Tecnomatix Process Simulate
Mádrová Lívia	Service innovation
Mesterová Slávka	Logistics business activities
Murza Miloš	Introduction to Process Designer module of the software package Siemens PLM Tecnomatix
Ogurčáková Angelika	Production management in a small engineering company
Rusič Juraj	Implementation of innovative processes on the tinning lines
Ruščák Róbert	Maintenance activities and their impact on the production
Sokolová Katarína	Management of supply chain relations in a commercial company
Tomková Lucia	The application of the concept of lean enterprise in RV-Trade s.r.o.
Vaverčák Matúš	Development trends of drives for land vehicles

MASTERS THESES:

Industrial Engineering

Benčíková Kristína	Space utilization optimizing in the production process using Process Designer
Bodnár Tomáš	Implementation of PLM systems from portfolio Siemens Tecnomatix in the manufacturing process of the selected company
Bysterská Jana	Implementation of probability approaches at investment decision
Cmárová Jana	Production innovation of selected species of plastic products
Čontošová Mária	Possibilities for improving the production process using simulation in Plant Simulation
Dic Michal	Application of Project Management in Best Košice
Dubík Eduard	Proposal to increase efficiency of operations in a distribution warehouse
Evin Tomáš	Mobile production systems for small business
Gaspareková Monika	Project optimization of production order for railway systems
Grega Vladimír	Usage of CAx systems in designing and production optimizing of the selected engineering product
Hovanec Ľuboš	Performance evaluation of an industrial enterprise
Hrabovská Valéria	Application of modern methods of workload assessment
Hudák Miroslav	Project in terms of customer registration TU Košice
Jakab Arpád	Proposal of production process inovation of mobile phone cover
Janáčiková Marta	Marketing communication tools and their application in the current business environment
Jellúš Erik	Optimization of the production activities in the selected company
Kleinová Veronika	Optimization of ergonomic parameters installer
Kollárik Štefan	Feasibility study dismantling of electronic products
Kováčová Zita	Management of selected business processes with application of theory constraints

Kron Richard	Rating the effectiveness of business processes in the industrial enterprise
Kuliková Ľudmila	Optimization of selected business processes in order to increase productivity
Lacková Zdenka	Application of work analysis and measurement methods in selected production company
Lajošová Beáta	Evaluation of competitiveness of PRINTGRAF, s.r.o.
Maďariová Monika	Interactive design methods based on the use of project table
Mattová Ivana	Utilization of selected methods for assessing the physical load in practice
Mikulová Katarína	The application of innovative methods in improving manufacturing processes
Molčan Vladimír	Evaluation of investments in alternative forms of use of agricultural biomass
Murgáč Pavol	Application of Lean Design at the entrance control product
Nagyová Lívia	Implementing of the Balanced Scorecard to enhance the competitiveness of the company
Olejník Tomáš	The role of supporting processes to ensure the main production process
Oravcová Michaela	Project managing Load Cells
Pavolová Veronika	Feasibility study of ergonomic laboratory
Poláková Katarína	Performance measurement processes in the chosen company
Popperová Miroslava	Proactive crisis management on principles of the controlling
Popovičová Zuzana	Study the possibility of using non-operating buildings
Rosenfelderová Timea	Mobile phone remanufacturing and recycling
Sabol Peter	Application of methods of setting disassembly time and procedure for the selected product
Sesztáková Klaudia	Automation of control activities for inspections and tests of reserved technical equipment
Stupianská Lucia	Proposal of optimal design of the production workplace in Process Designer
Šofranko Boris	Application of marketing strategies for SMEs
Šturm Milan	Feasibility study of agile assembly systems
Troško Lóránt	Reference solutions of rehabilitation manipulators in AutoCAD system
Vaník Lukáš	Feasibility study prototype production workshop / service
Vaško Radovan	Reverse logistics of end-of-life electronic products
Voiteková Barbora	Innovative retrofit manufacturing systems engineering production
Baloghová Viktória	Innovative study of the operation that provides services
Barbarič Róbert	Implementation of DOE methodology in engineering practice
Bederka Matúš	Optimization of vehicle maintenance in internal plant transport industrial plant
Béreš Karol	Process optimization of cutting out of tolerance sections of coils on dynamoline
Berková Zuzana	The use of controlling in the project management

Dancáková Božena	Prediction model of the financial health of industrial companies in Slovakia
Demečko Michal	Implementation of the 5S in selected workplaces in ArcelorMittal Frýdek-Místek a.s.
Dobrocká Slávka	The application of work evaluation methods in selected production company
Fejerčák Michal	Innovative retrofiv Manufacturing Systems Engineering production - building blocks
Gergelyová Lucia	Possibilities to increase production efficiency in Kipech Production Hotel, Ltd.
Harcsár Eva	Improvement of production processes in the enterprise Laserkov
Kondik Mária	Controlling in the project management
Kozel Tomáš	Support of the value chain creation through service innovation
Mojdis Marek	The application of the lean logistics in the company
Moroz Richard	Agile business structure
Nagy-Salóci Róbert	Process innovation company focused on wood products
Oravec František	Managing project and evaluation of motivation system in the selected company
Pečeňák Marián	The concept of parking solutions in specific conurbation
Popović Radko	Draft assembly line using the SW Process Designer (Simulate) - Tecnomatix
Rusnák Ján	Laser based coil banding
Švec Ján	Technical preparation of production - recreational electric-bike
Valent Milan	Management of project funded EU of Project Manager

PhD THESES:

Industrial Engineering

Ing. Klaudia Mund	Change management implications for the improvement of a process at an international automotive company
Mgr. Pavol Paška	Rozvoj komunikácie v krízovom a pokrízovom riadení podnikov
Ing. Jana Halčinová	Využitie zhlukovej analýzy v modelovaní vnútropodnikových výrobných a nevýrobných procesoch
Ing. Darina Šimová- Bialková	Efektívnosť vynaložených prostriedkov na podporu malého a stredného podnikania z prostriedkov EÚ fondov

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

PROJECTS OF THE INSTITUTE

Title of the project	**Package of accessories for further reform of education at TUKE – Faculty of Mechanical Engineering TUKE**

Type of the project	EU project
Number of the project	**ITMS: 26110230093**
Main solutionist	prof. Ing. Jozef Kováč, CSc., doc. Ing. Juraj Šebo, PhD., doc. Ing. Peter Trebuňa, PhD., Ing. Jaroslava Janeková, PhD., Ing. Peter Malega, PhD.
Time period of the project	**2013-2015**
Annotation of the project	The goal of the package is to improve a quality of education and development of human resources in the area of research and development, in order to achieve continuous adaptation of universities to the current and prospective needs of the knowledge society. A scientific education and transfer of know-how and results of research and development activities between universities, research and development institutions and enterprises would be supported.
Title of the project	**University science park TECHNICOM for innovative applications with support of knowledge-based technology - Faculty of Mechanical Engineering TUKE.** - Activity A.3.3 Pilot systems in the engineering field. PP 3 Research, development and implementation centre for innovative research and development services for flexible technology and reconfigurable production
Type of the project	EU project
Number of the project	**ITMS: 26220220182**
Main solutionist	prof. Ing. Jozef Kováč, CSc., doc. Ing. Peter Trebuňa,PhD., doc. Ing. Juraj Šebo, PhD., doc. Ing. Vladimír Rudy, PhD., Ing. Peter Malega, PhD.
Time period of the project	**2013-2015**

Annotation of the project	Specific goal is establishing a sustainable activities for design-research facility intended for support of product and technology innovation, optimalization of production processes and rapid reconfigurability of a production.
	Major areas includes:
	• Development, prototype production and testing of engineering products
	  • Innovations of engineering products and technology
	  • Optimalization of production and assembly processes
	  • Development, prototype production, testing, optimalization and use of tools, instruments, forms and agents
	  • Guidenance in case of optimalization of production processes and reconfiguration of production facilities, particularly with a focus on innovation level, competitiveness, material efficiency and environmental friendliness of industrial technological applications

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.

PUBLICATIONS

Monographs

[1] KÁDÁROVÁ, Jaroslava - MARKOVIČ, Jaromír - MIHOK, Jozef: **Antikrizisnoe upravlenije predprijatiem** . 1. vyd - Ostrava : Amos - 2014. - 230 p.. - ISBN 978-80-87691-08-3.

[2] DAŇOVÁ, Monika - DUFINEC, Imrich - FABIANOVÁ, Jana - JANEKOVÁ, Jaroslava: **Vybrané aspekty implementácie controllingu do podnikového riadenia** Kolektívna odborná monografia k problematike vnútropodnikového riadenia - 1. vyd - Košice : VŠBM - 2013. - 125 s.. - ISBN 978-80-89282-84-5.

Journals

[1] TREBUŇA, Peter - TREBUŇA, František - ŠIMČÁK, František: **Analysis of possible causes of cracks initiation on barking drum**. In: Engineering Failure Analysis. Vol. 45 (2014), p. 106-117. - ISSN 1350-6307.

[2] TREBUŇA, Peter - KLIMENT, Marek - FIĽO, Milan - MARKOVIČ, Jaromír - HALČINOVÁ, Jana: **PLM systems, their history and application today in business process modeling**. In: Mechanics : Scientific researches and methodical development. No. 7 (2013), p. 129-133. - ISSN 2227-1104.

[3] KRAUSZOVÁ, Andrea - SZOMBATHYOVÁ, Edita: **Use of simulation program Flexim at optimization of production process**.In: Annals of Faculty Engineering Hunedoara - International Journal of Engineering. Vol. 12, no. 2 (2014), p. 161-164. - ISSN 1584-2665

[4] MARKOVIČ, Jaromír - HALČINOVÁ, Jana - TREBUŇA, Peter: **Appraisal of employee's work history by use of cluster analysis**. In: Intercathedra. Vol. 11, no. 30 (2014), p. 46-50. - ISSN 1640-3622.

[5] MARKOVIČ, Jaromír - KLIMENT, Marek - TREBUŇA, Peter: **PLM systems and representation methods in Plant Simulation of material flow in the production unit**. In: Intercathedra. Vol. 30, no. 1 (2014), p. 50-56. - ISSN 1640-3622.

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[8] KŁOS, Sławomir - TREBUŇA, Peter: **Using the AHP method to select an ERP system for an sme manufacturing company**. In: Management and Production Engineering Review. Vol. 5, no. 3 (2014), p. 14-22. - ISSN 2082-1344.

[9] TAUŠ, Peter - KUDELAS, Dušan - TAUŠOVÁ, Marcela - KOŠČO, Ján - MIHOK, Jozef: **Technicko-ekonomické zhodnotenie hybridných solárnych systémov na rodinnom dome**. In: Energetika. Vol. 64, no. 8-9 (2014), p. 450-453. - ISSN 0375-8842.

[10] KŁOS, Sławomir - TREBUŇA, Peter: **Using the AHP method to select an ERP system for an sme manufacturing.** In: Management and Production Engineering Review. Vol. 5, no. 3 (2014), p. 14-22. - ISSN 2082-1344.

[11] MALEGA, Peter: **Escalation Management as the Necessary Form of Incident Management Process**. In: Journal of Emerging Trends in Computing and Information Sciences. Vol. 5, no. 8 (2014), p. 641-646. - ISSN 2079-8407

[12] MARKOVIČ, Jaromír - KLIMENT, Marek - TREBUŇA, Peter: **PLM systems and representation methods in Plant simulation of material flow in the production unit**. In: Intercathedra. Vol. 30, no. 1 (2014), p. 50-56. - ISSN 1640-3622.

[13] MARKOVIČ, Jaromír - HALČINOVÁ, Jana - TREBUŇA, Peter: **Appraisal of employee´s work history by use of cluster analysis**. In: Intercathedra. Vol. 30, no. 1 (2014), p. 46-49. - ISSN 1640-3622.

[14] JOBBÁGY, Boris (30%) - ŠIMŠÍK, Dušan (30%) - MAREK, Jiří (10%) - KARCHŇÁK, Ján (15%) - ONOFREJOVÁ, Daniela: **Robotic exoskeleton for rehabilitation of the upper limb**. In: American Journal of Mechanical Engineering. Vol. 2, no. 7 (2014), p. 299-302. - ISSN 2328-4102.

[15] KLIMENT, Marek - TREBUŇA, Peter - STRAKA, Martin: **Tecnomatix plant simulation, its features and its integration into business processes in logistics systems**. In: American Journal of Mechanical Engineering. Vol. 2, no. 7 (2014), p. 286-289. - ISSN 2328-4102.

[16] PEKARČÍKOVÁ, Miriam - TREBUŇA, Peter - MARKOVIČ, Jaromír: **Time structure optimization of logistics chain during assembly**. In: American Journal of Mechanical Engineering. Vol. 2, no. 7 (2014), p. 262-264. - ISSN 2328-4102

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[20] MIHOK, Jozef: **Reducing of the acquisition costs for products**. In: Acta Mechanica Slovaca. Roč. 17, č. 4 (2013), s. 84-89. - ISSN 1335-2393.

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[22] TURISOVÁ, Renáta: **Uplatnenie CRM systémov v podnikovej praxi**. In: Podniková revue. Roč. 12, č. 30 (2013), s. 62-68. - ISSN 1335-9746.

[23] KÁDÁROVÁ, Jaroslava - TURISOVÁ, Renáta: **Strategic mapping process of industrial companies**. In: Acta Oeconomica Cassoviensia. Roč. 6, č. 1 (2013), s. 5-13. - ISSN 1337-6020.

[24] PEKARČÍKOVÁ, Miriam - FIĽO, Milan: **Prístup k stanoveniu poistnej zásoby s cieľom zabezpečenia proti vzniku deficitu**. In: Strojárstvo Extra. Roč. 18, č. 4 (2014), s. 88-89. - ISSN 1335-2938.

[25] TREBUŇA, Peter - HALČINOVÁ, Jana - FIĽO, Milan: **Jadro aglomeratívnych metód zhlukovej analýzy**. In: Strojárstvo. Roč. 18, č. 4 (2013), s. 85-85. - ISSN 1335-2938.

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[28] FERENCZ, Vojtech - DUGAS, Jaroslav - TURISOVÁ, Renáta - KRIŠTANOVÁ, Anna: **Marketingový informačný systém**. In: Journal of Innovations and Applied Statistics. Roč. 4, č. 1 (2014), s. 31-44. - ISSN 1338-5224

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INSTITUTE OF DESIGN MACHINE AND PROCESS ENGINEERING

- Department of Applied Mechanics and Mechanical Engineering
- Department of Power Engineering
- Department of Construction, Automotive and Transport Engineering
- Department of Production Systems
- Department of Process and Environmental Engineering

Department of Applied Mechanics and Mechanical Engineering

Contact

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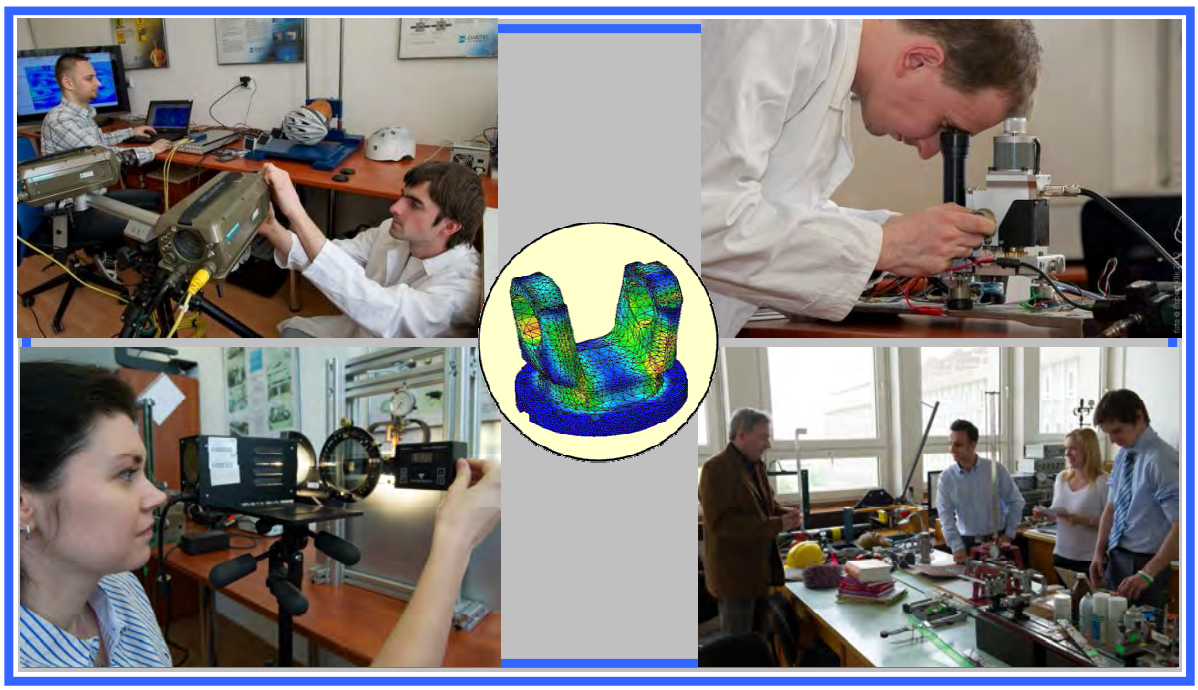

Staff

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

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2014
4/2014	Department's competition of student scientific and technical activities.
6/2014	Bc. Michal Tchír – prize for the best bachelor thesis in the competition of SOVA Digital a.s.
11/2014	International Conference Modelling of Mechanical and Mechatronic Systems MMaMS 2014: 25th-27th November 2014, High Tatras

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Mechanical Engineering**

Master's degree:

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

PhD. degree:

- **Applied Mechanics**

Number of the students

(till 30.10.2014) on the study programs guaranteed by the department:
first year of bachelor study:
– 73 internal form of study
second year of bachelor study:
– 80 internal form of study
– 5 external form of study
third year of bachelor study:
– 43 internal form of study
– 14 external form of study

first year of engineer study:
– 25 internal form of study

second year of engineer study:
– 21 internal form of study
– 9 external form of study

Number of the graduates (2013/2014)

on the study programs guaranteed by the department:

– 3 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.

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.

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.

LIST OF SUBJECTS GUARANTEED BY THE DEPARTMENT

Mechanical engineering (Bachelor study)

- ✓ Statics
- ✓ Elasticity and strenght I.
- ✓ Elasticity and strenght II.
- ✓ Kinematics
- ✓ Dynamics
- ✓ Computer mechanics
- ✓ Modelling of technical objects
- ✓ Finite element method (ANSYS)
- ✓ Bachelor project
- ✓ Final work
- ✓ Basic engineering experiment
- ✓ Monitoring and data analysis in the experiment

Management of technical and environmental risks in engineering (Bachelor study)

- ✓ Elasticity and strength
- ✓ Mechanics I.
- ✓ Mechanics II.

Technology, management and innovation of engineering production (Bachelor study)

- ✓ Elasticity and strength
- ✓ Mechanics I.
- ✓ Mechanics II.

Automotive Production (Bachelor study)

- ✓ Elasticity and strength
- ✓ Mechanics I.
- ✓ Mechanics II.

Prosthetics and Orthotics (Bachelor study)

- ✓ Statics
- ✓ Elasticity and strenght I.
- ✓ Elasticity and strenght II.
- ✓ Kinematics
- ✓ Dynamics
- ✓ Computer mechanics

Applied mechanics (Master study)

- ✓ Vibrations of mechanical systems
- ✓ Term project
- ✓ Diploma project
- ✓ Diploma work
- ✓ Noise and vibrations
- ✓ Theory of the mechanics
- ✓ Thermal stresses
- ✓ Numerical methods in mechanics I.
- ✓ Nonlinear mechanics and continuum mechanics
- ✓ Kinematics and dynamics of compound dynamical systems
- ✓ Plasticity and creep
- ✓ Theory of the elasticity
- ✓ Theory of engineering experiment
- ✓ Limit status of the constructions
- ✓ Mechanics of composite materials
- ✓ Numerical methods in mechanics II.
- ✓ Stochastic mechanics
- ✓ Thinwalled supporting elements
- ✓ Theory of mechatronical systems, modeling, design, optimalization

Mechanical engineering (Master study)

- ✓ Applied mechanics
- ✓ Term project
- ✓ Diploma project
- ✓ Diploma work
- ✓ Plasticity and creep
- ✓ Numerical methods of mechanics
- ✓ Theory of engineering experiment
- ✓ Construction of process devices

Automotive Production (Master study)

- ✓ Theory of engineering experiment

Automation and control of machines and processes (Master study)

- ✓ Theory of engineering experiments

Transport systems and logistic (Master study)

- ✓ Building mechanics
- ✓ Numerical methods of mechanics

Mechatronics (Master study)

- ✓ Vibrations control
- ✓ Numerical methods in mechanics I.
- ✓ Numerical methods in mechanics II.
- ✓ Computer aided design of mechatronic systems
- ✓ Training education
- ✓ Dynamics of rotors
- ✓ Theory of engineering experiment
- ✓ Mechanics of composite materials
- ✓ Theory of modeling and design systems
- ✓ Optimization of mechatronics systems

Machine tools and equipments (Master study)

- ✓ Numerical methods of mechanics of production machines

Materials of utility coating (Master study)

- ✓ Finite element method

Robotics techniques (Master study)

- ✓ Mechanics of robots
- ✓ Numerical methods of robot mechanics

Machines and Machinery for Building Industry, Agriculture and Dressing (Master study)

- ✓ Numerical methods of mechanics

Plastics Processing (Master study)

- ✓ Degradation processes and prediction of lifetime plastics
- ✓ Finite element method

GRADUATE THESES

BACHELOR'S THESES:

Bárczi Gábor	Characteristic and graphical design of isostatic lines in the PhotoStress method
Belička Martin	Simulation of press mechanism using software MSC Adams
Bendžuch Ján	Design of aid for bending analysis of straight beams.
Budzák Pavol	Design of equipment for aperture adjusting on stone-breaker
Compeľ Branislav	The mechanical system of the machine tool and its dynamics
Čajka Martin	Design of fixture for testing optical coatings for plane stress states
Čarák Peter	Use of transmission photoelasticity to identity bottlenecks riveted joints
Čirč Patrik	The calculation of leaf springs of railway wagons wheels
Demko František	Motion analysis of mechanical system machine tool
Dominik Lukáš	Kinematic analysis and design of control of a pointing device
Gavláková Dominika	Strength analysis the crank arm of steam engine
Gombita Peter	Reduction of residual stresses in machine parts and possibilities of their identification
Házy Mikuláš	Proposal for equipment for testing torque transmitting elements
Hrabinská Tatiana	The use of digital image correlation by the analysis of the construction members during their combined loading
Hreško Ľubomír	Problems of the vibroinsulation of mechanical systems.
Hríb Michal	Addressing the dynamics of the drive system of the lift method of virtual work
Janco Tomáš	Design of undercarriage of car determined for roads and rails
Janičko Marek	Thermal computations in finite element method
Juhásová Mária	The possibilities of finite element mesh creation in FEM programs
Kaluja Tomáš	Optimization of the basic elements of the lifting device based on strength and stiffness analysis
Köteles Róbert	Locomotion robotic system with using of side cyclic moving.
Kožej Lukáš	Mapping of unknow environment of robot
Lojka Marcel	Modeling of nonlinear mechanical systems described by differential equations.
Maduda Michal	Forward and inverse dynamics of an open kinematic chain with two degrees of freedom.
Marcinko Peter	Proposal of the measurement chain to check the vibration of mechanical parts of machinery
Mastiľák Marek	Using of FEM to strength analysis of hoarding board

Matoniak Jozef	Possible applications of photoelastic coating on shape-complex structural elements
Mihok Dušan	Design of construction of mini sumo robot
Mikulová Zuzana	The impact of changes in position loads to stress of the structural members subjected to bending
Neupauer Dominik	Experimental analysis of the impact of the target size of the impact force
Ondráček Lukáš	Analysis of the impact of speed on drilling accuracy of residual stress
Rochlitz Tomáš	Static, kinematic and dynamic analysis and optimization of a lift mechanism
Romančík Jaroslav	Creation and acquisition of fatigue curves of selected construction materials
Schweiger Ján	The proposal and stress analysis of work platform lift
Slovinský Peter	Design of arm of manipulation equipment
Szapola Tomáš	The use of digital image correlation in the deformation analysis of small areas structural elements
Šimco Peter	The influence of measuring transducer on experimental modal analysis results
Šuták Miroslav	Determination of circular plates modal parameters by the optical measuring systems
Tchír Michal	Proposal of a two-channel analyzer for experimental modal analysis
Ujhelský Peter	Proposal of control of hydraulic pump for ensuring synchronous lifting of freight
Vikor Michal	Possible applications of experimental separation methods in determination of principal stresses by means of PhotoStress method
Zeleňák Radoslav	Proposal of an active vibroinsulation of a mechanical system
Dzurilla Ladislav	Design of didactic model of six legged robot
Fano Miroslav	Hardware simulator of mechatronic systems dSpace
Franková Martina	The numerical solution of mechanics problems in Ansys APDL program
Grich Ján	Determination of damper parameters in the washing machine
Heligmanová Dominika	Modeling and modification of chassi of DVD player
Homola Marek	Assessment of the buckling resistance of compressed bars using analytical and numerical methods
Hudák Daniel	Wheel dynamic from point of view vehicle traction control
Manko Ladislav	Modular system for prototype design of control systems for mechatronic systems on the base of microcontrolers
Poláková Eva	Dynamics drive the main lift tower crane
Stariat Martin	Analysis of the slide plane motion mechanism using software MSC Adams
Šebestová Eva	The comparison of experimental modal analysis results acquired by PULSE and DIC system
Zadžorová Norika	The testing of an optical coating under the uniaxial bending loading

MASTER'S THESES:

Bikár Róbert	Physical nonlinearities in the finite element method
Guoth Miroslav	Design and strength analysis of the manipulation device frame
Hvizdoš Erik	Use model similarities in the verification of stress value for the optical method
Kiráľ Matej	Influence of material model on computed resistance of imperfect structural member
Kišeľová Katarína	Computation of impact by the finite element method
Kostka Ján	The use of PhotoStress method in stress analysis of structural elements under consideration of the effect of centrifugal forces
Kovalčík Ján	Stability computations of thin plates
Kula Tomáš	Proposal for a fire and recovery superstructure for military tracked vehicle chassis
Lenart Marek	Strain gauge application methods for estimating the fatigue life of the material
Mudroň Martin	Analysis of fatigue defects cumulation in shaft

Roszkos-Cosmin Štefan	Design and construction of ultra-light trailer with a gross weight of 750 kg
Siheľský Dárius	Numerical model of glued laminated profile for dynamic problems
Šubová Lýdia	Experimental assessment of the impact of tenseness on the modal parameters of system
Urbančok Marek	Proposal of load unit for testing the measuring device SINT MTS3000-Ring Core
Zahurančík Michal	Design and strength calculation of a tractor loader
Zbornáková Jana	Utilization of software tools in stress analysis of structural elements by means of PhotoStress method

PhD. THESES:

Kalina Matúš	Electronic speckle pattern interferometry as a tool for determination of strain and stress states in supporting members of constructions
Schrötter Martin	Using of current modal analysis methods by investigation of mechanical system dynamic characteristics
Šároši Peter	Influence of rotation on natural frequencies shift of rotating parts

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 now days 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	**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	**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	2012 - 2015

project	
Annotation of the project	Development of non - traditional experimental treatments of deformation and stress analysis in supporting elements of mechanical and mechatronic systems with privileged 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	**Analysis of causes of mechanical systems failures by the qualification of strains and stress fields**
Type of the project	VEGA
Number of the project	VEGA 1/0393/14
Principal investigator	prof. Ing. František Šimčák, CSc.
Time period of the project	2014 - 2017
Annotation of the project	Failures of machines and equipments are mostly caused by crossing of critical states that are defined by limit values of stresses and deformations in locations of critical loading. The project is oriented to development of methods for analysis of failure cases in supporting elements of mechanical systems by the quantification of strain and stress fields with the help of using experimental and numerical methods of mechanics. The suggested treatments will be used for the reliability and residual life assessment of machines and equipments.
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 project	VEGA 1/0090/12
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	**Modelling of stress state during nanoindentation and mechanical loading in composite systems(MONACO)**
Type of the project	VEGA
Number of the project	VEGA 2/0098/14
Principal investigator	doc. Ing. Vladimír Ivančo, CSc.
Time period of the project	2014 - 2016
Annotation of the project	Project deals with the mathematical and experimental modelling of stress states during instrumented indentation and scratch testing under uniaxial - and multiaxial loading of fixed beam in composite systems by means of finite element modeling and experimental testing in model systems. The aim of the project is to create a knowledge basis for the optimization of the conditions for the measurement of nanohardness and scratch resistance of thin hard coatings on hard and soft substrates using instrumented indentation and scratch testing and on the increase of mechanical bonding of beams under loading mimicking bicortical dental implants.
Title of the project	**Using of modern optical methods of experimental mechanics for**

	development of knowledge basis of students of second and third 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 of mechanics (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 and third level of high school education. Above-mentioned methods are up-to-date and they are able to detect deformations, strains and stresses on 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 by numerical methods. Elaborated procedures will cultivate creative and innovative thinking of students mainly in the area of structural members optimization as well as in evaluation of life span and reliability of structures. The main output of the project will be two monographs, in which the theoretical basics, principles and applications of individual methods will be described.
Title of the project	**Using of modern numerical methods of mechanics as a base of scientific design to the development of knowledge base of students at the second and third level of university study**
Type of the project	KEGA
Number of the project	KEGA 054TUKE-4/2014
Principal investigator	prof. Ing. Jozef Bocko, CSc.
Time period of the project	2014 - 2016
Annotation of the project	Project is oriented to the implementation of modern numerical methods of mechanics (procedures that use the finite element methods, nonlinear continuum mechanics, plasticity, kinematics and dynamics of multibody systems) into education process in the 2nd and 3rd level of university education. These methods allow to use computer modeling and design of multibody systems – mechanisms, vehicles, robots, power systems or structures – to the phase of creation of virtual prototype. The areas of research in question are dynamically growing parts of numerical mechanics allowing simulation of behavior of continua and multibody systems. In the continuum mechanics we will concern our attention to the behavior of structures under static and dynamic loading and to determination of deformations and stresses. In the solution of problems of multibody dynamics we will determine positions, velocities and accelerations of individual parts of systems. Application of described treatments is connected with creation of new models and using scripts to the standard program products that are used in this area of mechanics. The procedures will advance creative and innovation thinking of students, especially in the area of optimization of supporting structural elements and mechanisms, i.e. in the area that significantly influences resulting parameters of products in mechanical engineering. Very important output of the project will be a monograph in which will be described theoretical basis of numerical modeling of mechanical systems and their optimization together with applications in the area of passive, semi-active and active vibroinsulation of mechanical systems, dynamics of power systems, static and dynamic balancing of mechanisms, analysis of supporting elements of structures by the finite element method in static and dynamic area. The

	results of project will be also published in journals and conference proceedings.
Title of the project	**University scientific park TECHNICOM for innovative applications with support of knowledge technologies**
Type of the project	EU – OP Research and development
Number of the project	ITMS 26220220182
Principal investigator	prof. Ing. Jozef Bocko, CSc.
Time period of the project	2013 - 2015
Annotation of the project	The aim of project is to create projection engineering workplace for numerical and experimental modelling of mechanical and mechatronic systems. The workplace will serve as a support point for creation of mechanical and mechatronic structures for industry.
Title of the project	**Package of element for quality improvement of education on TUKE (Package 2)**
Type of the project	EU – OP Education
Number of the project	ITMS 26110230070
Principal investigator	prof. Ing. Jozef Bocko, CSc.
Time period of the project	2013 - 2015
Annotation of the project	Innovation of study programs for labour market and development of study programs in world language.
Title of the project	**Package of quality improvement TUKE by nets (Package 3)**
Type of the project	EU – OP Education
Number of the project	ITMS 26110230086
Principal investigator	prof. Ing. Jozef Bocko, CSc.
Time period of the project	2013 - 2015
Annotation of the project	The aim of project is to ensure implementation and transfer of knowledge in education process on TUKE, to increase quality and develop human sources in research and development.
Title of the project	**Package of supplements for further reform of education on TUKE (Package 4)**
Type of the project	EU – OP Education
Number of the project	ITMS 26110230093
Principal investigator	Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
Time period of the project	2013 - 2015
Annotation of the project	Innovation of study programs for labour market and development of study programs in electronic form by using ICT.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUTIONS

Employees and students	**Country**
Jozef Bocko, prof. Ing., CSc.	Universidad Politécnica de Valencia, Spain
Novotný Ladislav Ing., PhD.	Universidade Federal do Ceará, Brazil

Glodová Iveta Ing. Technische Universität Wien, Austria

VISITS OF STAFF MEMBERS FROM FOREIGN INSTITUTIONS

Employees and students	Country
Nicolas Hennache	IFMA Clermont-Ferrand University, France
Matthieu Perrusset	IFMA Clermont-Ferrand University, France
Amadeo Sánchez Calabuig	Polytechnic university of Valencia, Spain

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., 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

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Technical Scientific Committee IMEKO Technical Mechanics

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International Biographical Centre Cambridge, England

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

PUBLICATIONS

Books:

[1] TREBUŇA, František - ŠIMČÁK, František - FRANKOVSKÝ, Peter - HUŇADY, Róbert - PÁSTOR, Miroslav: **Využitie optických metód v experimentálnej mechanike 1** / - 1. vyd - Košice : TU - 2014. - 392 s.. - ISBN 978-80-553-1863-9.

Journals:

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patterns by using high-speed digital image correlation / - 2014. In: American Journal of Mechanical Engineering. Vol. 2, no. 7 (2014), p. 247-251. - ISSN 2328-4102

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Research reports:

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Staff

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

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2014
2/2014	Lecture of a representative of Atlas COPCO (Ing. Juraj Novodvorský)
3/2014	Lecture of a representative of SWEP Slovakia s.r.o. (Dipl. Ing. Igor Ďurčanský)
4/2014	Lecture of an energy auditor (Ing. Ľudovít Tkáčik)
11/2014	Lecture of a representative of Nuclear Power Plant (Ing. Ľuboš Fedorko)
12/2014	Lecture of a representative of Buderus (doc. Ing. Michal Strama, CSc.)

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. 2014) on the study programs guaranteed by the department:

first year of study:
- 6 internal form of study
- 0 external form of study

second year of study:
- 16 internal form of study
- 0 external form of study

Number of the graduates (2013/2014)

on the study programs guaranteed by the department:

- 22 students in the internal form of master's degree
- 0 students in the external form of master's degree
- 1 PhD. students in the internal form of study (defended PhD. thesis)
- 1 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:

Bučko Blažej	Active noise elimination of fans.
Dobrotková Slávka	Analysis of costs associated with removing the customer from SHS system and propose a new source of heat supply.
Drotár Daniel	Utilization of waste heat from the compressor for warehouse heating in the company Magneti Marelli.
Hrižová Zuzana	Analysis of the potential uses of biomass in conditions of the Košice Region and their energy and economic analysis.
Chýlová Lucia	Determination of temperature fields in containers of radioactive waste.
Lopraisová Lucia	Increasing energy efficiency of production line in the company Magneti Marelli.
Maslaňáková Monika	Proposal for solutions of office air conditioning.
Múdra Elena	Recycling of the selected type of WEEE by application of plasma melting technology.
Oravec Roman	Effect of thermal contact resistance of contact surfaces on the total heat transfer.
Pirčáková Mária	Solidification and stabilization of fly ash by plasma technology.
Puškárová Mária	Possibilities of electricity storage from alternative sources in the form of hydrogen.
Revák Marek	Proposal of possibility for increasing the efficiency of heating in the bivalent source's accumulation tank.
Rusinková Erika	The heating comparison of the classic fuels and alternative fuels.
Sobrová Martina	Energy and economic analysis of the possibility of using landfill gas in

	Slovakia.
Stahovcová Dominika	Optimization of heating the object of selected firm.
Tarbaj Tibor	Calculation, design and construction of facilities to drastically reduce the volume of PET packaging.
Záboly Ladislav	The solution of dehumidification of swimming pool area.
Žažkovič Branislav	Research of cooling intensity of ribbed heat exchanger surface.

PhD. THESES:

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
Širilová 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
- ✓ Hydrogen - processing technologies
- ✓ Plasma technology for waste treatment
- ✓ Mathematical and physical modelling of power engineering systems

- ✓ Mechanics of non - rigid materials (fluids)
- ✓ Heat and mass transfer
- ✓ 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 - 12/2014
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	Package 4: The package of supplements for further education reform on TUKE, Activity 2.1 Innovation of study programs for the labor market and the creation of study programs
Project number	ITMS 26110230093
Principal investigator	prof. Ing. František Greškovič, CSc.
Time period of the project	01/2014 - 04/2015
Annotation of the project	Currently, major employers require, inter alia, to respond the changing socio-economic conditions thus they interested in highly qualified professionals. Reform of the education provides job seekers in the labor

market some competitive advantage. The aim of this activity is therefore to develop new study programs and upgrade existing study programs with implementation of vocational subjects with a focus on current practical problems by parallel support to use the ICT tools.

NATIONAL PROJECTS

Title of the project	**Research of the possibilities of stabilization fly ash characteristics from selected waste types and of its volume reduction by the plasma melting technology**
Type of the project	Grant VEGA
Project number	1/0004/14
Principal investigator	prof. Ing. Mária Čarnogurská, CSc.
Time period of the project	01/2014 - 12/2016
Annotation of the project	Basic research of physical characteristics of vitrified slag arising at the plasma processing of the different types of fly ashes, verification of the supposed characteristics of arose product, particularly in term of its influence on environment, and research of the possibility of inert slag application particularly in building industry are the main target of the project. Evidence of the quality of arising product and its inertial nature should by confirmed by accredited analyses. The experiments realized by now on the developed 10 kVA plasma reactor in the department establish a perspective of fly ash disposal from coal power plants and municipal waste combustion by the mentioned technology, because the output product assures, depending on fly ash characteristics, its stability in the form of arose glassy structure, volume reduction up to approx. 60 %, according to current information, and it does not damage environment.

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".

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

The Slovak Chamber of Auditors
Peter Horbaj, prof. Ing., CSc.

Plynár Vodár + Kúrenár (SK)
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

Journals

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[10] KORBA, J., JASMINSKÁ, N., BRESTOVIČ, T.: **Meranie uskladňovacích kapacít materiálov pre adsorpčné uskladnenie vodíka.** In: Seminár z energetických procesov: Zborník vedeckých prác z konferencie pre doktorandov a mladých vedeckých pracovníkov: 1. ročník : 11. december 2014, Košice. - Košice : TU, 2014 S. 62-65. ISBN 978-80-553-1870-7.

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Department of Construction, Automotive and Transport Engineering

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Staff

- Professors: **2**
- Assoc. Professors: **5**
- Assist. Professors **7**
- Researchers: **1**
- PhD. Students: **5 internal, 1 external**

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. 2014)
on the study programs guaranteed by the department:
first year of study:
– 16 internal form of study
second year of study:
– 17 internal form of study

Number of the graduates (2013/2014)
on the study programs guaranteed by the department:
– 17 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)
– 0 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

Bujňák, Peter Design proposal of braking and feeding equipment for wagon of cable way

Čekanová, Eva	Streamlining supply lines running car factory
Piller, Tomáš	Design of service elevator
Farkas, Tamás	Proportioning logistics flows in the automotive industry
Morová, Veronika	Optimization of material flows in power supply company
Gbúr, Marek	Design of pipe conveyor
Frimmer, Michal	Design of semi-portal crane 5t/12m
Petrášová, Miriama	Optimisation of logistic processes in production line
Kocák, Peter	RFID technologies in logistic processes
Brajer, Jakub	Logistics and internal transport in a new metallurgical plant
Brenkus, Metod	Proposal of handling device for demagnetising of steel castings type BARBER
Brza, Štefan	Design proposal of manipulator specified for magnetising of steel castings type BARBER
Hvižďak, Martin	Versatile manipulator and conveyor for castings type BARBER
Hanečák, Milan	Design proposal and development of experimental terrain vehicle with drive 4x4
Desiatnik, Tomáš	Creation of 3-D surface models for car-body selected parts
Murín, Milan	Design proposal of rear axle of passenger car
Hasara, Igo	Design of front axle of passenger car

PhD. THESES:

Transport Machines and Machinery

Petróci Ján	Increasing the output characteristics and reliability of the one-wheeled vehicle power unit
Tonhajzer 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

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	**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.

Title of the project	**Research of the new methods and innovative design solutions to increase efficiency and to reduce emissions of a vehicle drive unit with an assessment of the potential operational risks**
Type of the project	Grant project VEGA
Number of the project	1/0197/14
Principal investigator	doc. Ing. Michal Puškár, PhD.
Time period of the project	01/2014 - 12/2016
Annotation of the project	The research project is focused on the research of new methods and innovative solutions to increase efficiency and to reduce emissions of vehicle drive unit. In the first phase there will be to develop the new designs of the individual parts for a drive unit, which will be also used with some positives of destructive phenomena such as detonation combustion maintained to the required level. The research will be based on in-depth analysis and theoretical modelling of detonations. The theoretical basis will be an empirical model for time estimation required to ignite the fuel-air mixture and a detonation model based on chemical kinetics. Trend towards domination of detonation combustion are concentrated predominately on HCCI (Homogeneous Charge Compression Ignition) technology that enables combustion of very lean mixture with a high burning rate. Using the generated model of detonations in the second

phase the HCCI engine model will be designed. It will be optimized and assessed in terms of
operational risks.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUCIONS

Employees and students	Country
Baran Peter, Ing.	Czech Republic (30. 9. 2013 - 10. 1. 2014)
Moravič Marek, Ing.	Czech Republic (20. 10. 2014 - 21. 11. 2014)

PUBLICATIONS

Books

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[2] HOMIŠIN, Jaroslav - GREGA, Robert - KRAJŇÁK, Jozef - KAŠŠAY, Peter: Základy konštruovania v strojárstve / - 2014, 2. upravené vyd - Košice : TU. - 328 s.. - ISBN 978-80-553-1593-5.

Journals

[1] PUŠKÁR, Michal - BIGOŠ, Peter - KELEMEN, Michal - TONHAJZER, Roman - ŠIMA, Martin: Measuring method for feedback provision during development of fuel map in hexadecimal format for high-speed racing engines / 2014.In: Measurement. Vol. 50, no. 1 (2014), p. 203-212. - ISSN 0263-2241.

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Patents

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Department of Production Systems

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Staff

- Professors: **1**
- Assoc. Professors: **2**
- Lectures: **1**
- Researchers: **2**
- PhD Students: **2 internal**

Activities at the department

Date	Title of the event, activity characterizing the life at the Institute in 2014
4/2014	Forum engineers and technicians Slovakia 2014. Active lecture: Recent trends in the construction of production equipment – Jozef SVETLÍK, doc., Ing., PhD., Hotel Centrum, Košice
10/2014	Active lecture: "Simplified modal analysis of the grinding spindle". The scientific conference DETERIORATION, DEPENDABILITY, DIAGNOSTICS – Peter DEMEČ, prof., Ing., CSc., 8. October, 2014, University of defence, Brno
10/2014	Active lecture: "Modularity of technical systems". The scientific conference DETERIORATION, DEPENDABILITY, DIAGNOSTICS – Jozef SVETLÍK, doc., Ing., PhD., 8. October, 2014, University of defence, Brno
12/2015	FLL - First Lego League Competition – Jozef SVETLÍK, doc., Ing., PhD., Atrium Optima, SjF, TU Košice

EDUCATION AT THE DEPARTMENT
STUDY PROGRAMMES

Bachelor's degree:

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

Number of the students (till 31. 01. 2015)
on the study programmes guaranteed by the institute:

third year of studies:
– 6 internal form of study

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

- 10 students in the internal form of bachelor study

Master's degree:

- **Production machinery and equipment**

Number of the students (till 31. 01. 2015)
on the study programmes guaranteed by the institute:
first year of studies:
– 10 internal form of study

PhD. degree:

- **Production systems**

Number of the students (till 31. 01. 2015)
on the study programmes guaranteed by the institute:
Internal students: 2

GRADUATE PROFILE

BACHELOR PROGRAMMES (Bc.)

Control and diagnostics of production, robotic and transport technics

Study program Control and diagnostics of production, transport and robotic technics 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.

MASTERS PROGRAMMES (ING.)

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

- ✓ Basics of service and maintenance
- ✓ Diploma project
- ✓ Evolution trends in production technology
- ✓ Experimental methods
- ✓ Final work
- ✓ Machines design
- ✓ Machine tools automation
- ✓ Machine tools building theory
- ✓ Maintenance of machinery and devices
- ✓ Methodology of Recovery Machine
- ✓ Modelling of technical structures
- ✓ Modules for construction of production machinery and equipment
- ✓ Service systems
- ✓ Technical diagnostic
- ✓ Technology for integrated production
- ✓ Thesis seminar
- ✓ Trends in Production Engineering

GRADUATE THESES

BACHELOR THESES:

Control and diagnostics of production, robotic and transport technology

Pavol Makara	Service robot for competition
Denis Vitko	Conceptual design of the wheel module for service robot
Ivan Lichvar	Endpoint study the reliability of pneumatic
Juraj Rerko	Non-standard forms of maintenance robots
Matúš Pagáč	Designing of robotic workstations by means of multitouch table
Adrian Piliš	Proposal of integration complex maintenance system
Ladislav Kiraľ	Proposal security measures for grinders
Martin Horný	Stabilizing element for the camera on a mobile robot
Filip Špakovský	The assessment of maintenance for industrial robots
Juraj Boldižár	The principles for calibration at industrial robots

RESEARCH AT THE DEPARTMENT

Area of research:

- ✓ Virtual prototyping of machining machines
- ✓ Modular reconfigurable manufacturing systems
- ✓ Auxiliary equipment production machinery
- ✓ Maintenance and diagnostics of production machines
- ✓ Methodology of recovery machines
- ✓ Machine design

Research characteristics:

The main fields of research of the Department of Production Systems are production technology, maintenance and diagnostics of production machines and reconfigurable manufacturing systems. Research tasks in the field of production technology are oriented to address current needs such as modularity systems and solutions of manufacturing systems based on modularity and reconfigurability as well as research in the field of intelligent manufacturing 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 supports research in education in the field of manufacturing machines by creating and implementing e-learning form of education using virtual laboratories connectable via the internet.

Areas of expertises:

- ✓ Multimachines systems and machines cooperation
- ✓ Modular manufacturing structures
- ✓ Construction of production machines
- ✓ Virtual laboratories and Virtual models
- ✓ Intelligent manufacturing systems

PROJECTS OF THE INSTITUTE

NATIONAL PROJECTS

Type of the project VEGA
Number of the project **1/0854/12**

Main solutionist	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	**023TUKE-4/2012**
Main solutionist	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.

VISITS OF STAFF MEMBERS TO FOREIGN INSTITUCIONS

Employees and students	**State**
Demeč Peter, prof. Ing., CSc.	Czech Republic
Svetlík Jozef, doc., Ing., PhD.	Czech Republic
Hoľvová Patrícia, Ing.	Czech Republic
Pešková Alena, Ing.	Hungary

MEMBERSHIP IN SLOVAK PROFESSIONAL ORGANISATIONS

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] SVETLÍK, Jozef: **Modulárna architektúra výrobnej techniky**, 1. vyd – Košice : SjF TU - 2014. - 141 s. - ISBN 978-80-553-1928-5

[2] DEMEČ, Peter - MIČIETOVÁ, Anna: **Výrobná technika** stroje, 1. vyd - Košice : TU - 2014. - 271 s. - ISBN 978-80-553-1888-2

Journals

[1] STEJSKAL, Tomáš: **Development prospect of maintenance**, 2014.In: International Scientific Herald. No. 8(27) (2014), p. 228-230. - ISSN 2218-5348

[2] SVETLÍK, Jozef - HOĽVOVÁ, Patrícia - VARCHOLA, Michal: **Aplication for exoskeleton design elements** , 2014.In: International Scientific Herald. No. 8 (27) (2014), p. 130-132. - ISSN 2218-

[3] SVETLÍK, Jozef - ŽILINSKÝ, Adam: **Innovations in cax systems**, 2014.In: International Scientific Herald. No. 8 (27) (2014), p. 212-214. - ISSN 2218-5348

[4] SOBOTOVÁ, Lýdia - DEMEČ, Peter: **Laser Marking Systems as an Optimisation Method at Marking of Machines and Workpieces**, 2014.In: Transactions of the Universities of Košice. Č. 2 (2014), s. 83-88. - ISSN 1335-2334

[5] DEMEČ, Peter: **Simplified calculation of the table drilling machine stiffness**, 2014.In: Technológ. Roč. 6, č. 2 (2014), s. 31-34. - ISSN 1337-8996

[6] TULEJA, Peter - ŠIDLOVSKÁ, Ľuboslava: **Unilateral gripping with active vacuum suction cup: Calculation of gripping force and number of suction cups**, 2014.In: Transfer inovácií. Č. 29 (2014), s. 332-335. - ISSN 1337-7094

[7] ŠIDLOVSKÁ, Ľuboslava - TULEJA, Peter: **Unilateral gripping with active vacuum suction cup: Calculate of flow,** 2014.In: Transfer inovácií. Č. 29 (2014), s. 240-243. - ISSN 1337-7094

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[9] VALENČÍK, Štefan: **Technológie a techniky integrácie údržby**, 2014.In: Transfer inovácií. Č. 29 (2014), s. 130-132. - ISSN 1337-7094

[10] VALENČÍK, Štefan - STEJSKAL, Tomáš: **Development and use of production base**, 2014.In: Transfer inovácií. Č. 29 (2014), s. 162-163. - ISSN 1337-7094

[11] STEJSKAL, Tomáš - VALENČÍK, Štefan: **Creation CMMS applications in MS**, 2014.In: Transfer inovácií. Č. 29 (2014), s. 168-170. - ISSN 1337-7094

[12] STEJSKAL, Tomáš: **Možnosti tvorby diagnostických ukazovateľov výrobných strojov pri použití laserového interferometra**, 2014.In: Spravodaj ATD SR. Roč. 11, č. 2 (2014), s. 15-16. - ISSN 1337-8252

[13] PALAŠČÁKOVÁ, Dominika - DEMEČ, Peter: **Industrial information application for the production process**, 2014.In: Acta Mechanica Slovaca. Roč. 18, č. 1 (2014), s. 44-48. - ISSN 1335-2393

[14] STEJSKAL, Tomáš - TURISOVÁ, Renáta: **Optimum density measurements for the determination of the parameters of failures verified by Monte Carlo method**, 2014.In: Journal of innovations and applied statistics. Roč. 4, č. 2 (2014), s. 21-27. - ISSN 1338-5224

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[17] VALENČÍK, Štefan: **Methodology and strategy of coordination of maintenance and capacity**, 2014.In: Transfer inovácií. Č. 30 (2014), s. 83-85. - ISSN 1337-7094

[18] ŽILINSKÝ, Adam - SVETLÍK, Jozef - DRABIKOVÁ, Elena: **New CAD softwares in engineering**, 2014.In: Transfer inovácií. Č. 30 (2014), s. 137-140. - ISSN 1337-7094

[19] SVETLÍK, Jozef - ŽILINSKÝ, Adam: **Renovation of technical equipment in industry**, 2014.In: Transfer inovácií. Č. 30 (2014), s. 29-33. - ISSN 1337-7094

[20] STEJSKAL, Tomáš: **Stationarity versus correlation of signals**, 2014.In: Transfer inovácií. Č. 30 (2014), s. 121-123. - ISSN 1337-7094

[21] HOĽVOVÁ, Patrícia: **Exoskeletons**, 2014.In: Deterioration, Dependability, Diagnostics : Proceedings. - Brno : University of defence, 2014 P. 219-226. - ISBN 978-80-7231-969-5

[22] DEMEČ, Peter: **Simplified analysis of the grinding spindle forced vibrations**, 2014.In: Deterioration, Dependability, Diagnostics : Proceedings. - Brno : University of defence, 2014 P. 205-212. - ISBN 978-80-7231-969-5

[23] SVETLÍK, Jozef: **Modularity of technical systems**, 2014.In: Deterioration, Dependability, Diagnostics : Proceedings. - Brno : University of defence, 2014 P. 271-278. - ISBN 978-80-7231-969-5

Conference Proceedings

[1] ŠIDLOVSKÁ, Ľuboslava - TULEJA, Peter: **Analysis of flow rates in the design of effector for unilateral gripping with active vacuum suction cup**, 2014.In: Applied Mechanics and Materials : ROBTEP 2014 : 13th International Conference on Idndustrial, Service and Humanoid Robotics, Štrbské Pleso, Slovakia, 15-17 May 2014. Vol. 613 (2014), p. 304-309. - ISBN 978-303835202-0 - ISSN 1660-9336

[2] TULEJA, Peter - ŠIDLOVSKÁ, Ľuboslava: **Analysis of power relations in the design of effector for unilateral gripping with active vacuum suction cup**, 2014.In: Applied Mechanics and Materials : ROBTEP 2014 : 13th International Conference on Idndustrial, Service and Humanoid Robotics, Štrbské Pleso, Slovakia, 15-17 May 2014. Vol. 613 (2014), p. 286-291. - ISBN 978-303835202-0 - ISSN 1660-9336

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[4] SVETLÍK, Jozef - BARON, Petr - DOBRÁNSKY, Jozef - KOČIŠKO, Marek: **Implementation of computer system for support of technological preparation of production for technologies of surface processing**, 2014.In: Applied Mechanics and Materials : ROBTEP 2014 : 13th International Conference on Idndustrial, Service and Humanoid Robotics, Štrbské Pleso, Slovakia, 15-17 May 2014. Vol. 613 (2014), p. 418-425. - ISBN 978-303835202-0 - ISSN 1660-9336

[5] TURISOVÁ, Renáta - SVETLÍK, Jozef: **The structural design of the basic module for construction of modular machines**, 2014.In: Applied Mechanics and Materials : ROBTEP 2014 : 13th International Conference on Industrial, Service and Humanoid Robotics, Štrbské Pleso, Slovakia, 15-17 May 2014. Vol. 613 (2014), p. 434-440. - ISBN 978-303835202-0 - ISSN 16609336

[6] HOĽVOVÁ, Patrícia: **Analysis of design today exoskeletons in the health field**, 2014.In: Applied Mechanics and Materials : ROBTEP 2014 : 13th International Conference on Industrial, Service and Humanoid Robotics, Štrbské Pleso, Slovakia, 15-17 May 2014. Vol. 613 (2014), p. 320-324. - ISBN 978-303835202-0 - ISSN 1660-9336

[7] ŽILINSKÝ, Adam: **Integration of Complex Maintenance System in Operation**, 2014.In: Applied Mechanics and Materials : ROBTEP 2014 : 13th International Conference on Industrial, Service and Humanoid Robotics, Štrbské Pleso, Slovakia, 15-17 May 2014. Vol. 613 (2014), p. 446-451. - ISBN 978-303835202-0 - ISSN 1660-9336

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[9] STEJSKAL, Tomáš: **2D-Shape Analysis using Shape Invariants**, 2014.In: Applied Mechanics and Materials : Industrial and Service Robotics : 13th International Conference Robtep 2014 : May 15th - 17th 2014, Strbske Pleso, High Tatras, Slovakia. Vol. 613 (2014), p. 452-457. - ISSN 1660-9336

[10] VALENČÍK, Štefan: **Sustainable maintenance of modern manufacturing**, 2014.In: Trendy a inovatívne prístupy v podnikových procesoch : 17. medzinárodná vedecká konferencia : zborník príspevkov : Košice, 19.12.2014. - Košice : TU, 2014 S. 1-3. - ISBN 978-80-553-1864-6

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Department of Process and Environmental Engineering

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Staff

- Professors: **2**
- Assoc. Professors: **3**
- Assist. Professors: **6**
- Researchers: **2**
- PhD. Students: **11 internal, 8 external**

Activities at the department

Date	Title of the event, activity characterizing the life at the Institute in 2014
5/2014	Reaccreditation of the Laboratory for objectivisation physical environmental factors
10/2014	Organisation of the 5th conference “Assesment of quality environment”, Herlany
11/2014	Coorganization 5th International Conference “To Protect our Global Environment for Future Generation “ICEEE 2014, Budapest, Hungary

EDUCATION AT THE DEPARTMENT
STUDY PROGRAMMES

Bachelor's degree:

- **Technology of Environmental Protection**
- **Environmental Management**
- **Management of Technical and Environmental Risks in Mechanical Engineering**

Number of the students (till 31. 01. 2015)
on the study programmes guaranteed by the institute:

third year of studies:
– 6 internal form of study

Number of the graduates (2013/2014)
on the study programs guaranteed by the department:
– 9_52 (33+19) internal form of study
– 0 external form of study

Master's degree:

- **Technology of Environmental Protection**
- **Environmental Management**

Number of the students (till 31. 01. 2015)
on the study programs guaranteed by the department:
– 31 internal form of engineering study
– 19 external form of engineering study

PhD. degree:

- **Technology of Environmental Protection**

Number of the students (till 31. 01. 2015)
2 PhD students in the internal and 3 in external form of study (defended PhD. thesis)

GRADUATE PROFILE

BACHELOR PROGRAMMES (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.

Technology of Environmental Protection

The structure of the study program “Management of technical and environmental risks in mechanical engineering” 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 master´s degree of university study and with possible profiling of graduates by compulsory optional courses, especially for programs: Quality production (Engineering of Quality Production), Safety of Technical Systems, Environmental Management or Technology of Environmental Protection. 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.

MASTERS PROGRAMMES (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.

PhD. PROGRAM (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, objectivization 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 environmentalist
- ✓ Recyclation and a recycling technologies I.
- ✓ Environment and industrial production
- ✓ Machines and machinery to environmental
- ✓ Environmental management
- ✓ systems
- ✓ Noise and vibrations
- ✓ Engineering of protection of water and soil

protection I.
- ✓ Separate processes
- ✓ Techniques of working environment
- ✓ Waste management
- ✓ Environmental engineering
- ✓ Semester project
- ✓ Theory of environmental control
- ✓ Technologies of environment protection
- ✓ Separate processes
- ✓ Machines and machinery
- ✓ Environment 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.
- ✓ Legislative aspects of environmental productions
- ✓ Ecologization of products and production
- ✓ Methodology of environmental impacts assessment
- ✓ Constantly sustained progress
- ✓ Semester 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 environmentalist
- ✓ Theory of control in environmentalist
- ✓ Computer applications II.
- ✓ Environmental engineering
- ✓ Environment and industrial production
- ✓ Intelligent production systems
- ✓ Semester project
- ✓ Environmental politics and legislation
- ✓ Computer applications I.
- ✓ Environmental toxicology
- ✓ Theory and proceedings of control in environmentalist
- ✓ Computer networks and database systems for environmentalist
- ✓ 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 control
- ✓ Methodology of assessment of impact on environment
- ✓ Monitoring and diagnostics of environment
- ✓ Constantly 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 activities impact on environment
- ✓ Diploma project
- ✓ Computer support for control of environmental protection
- ✓ Accreditation and certification in environmentalistics
- ✓ Ergonomics
- ✓ Diploma thesis
- ✓ Prevention and correction of environmental damage
- ✓ Assessment and marking of environmental suitable products
- ✓ Final project
- ✓ Final thesis

Management of Technical and Environmental Risks in Mechanical Engineering

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

GRADUATE THESES

BACHELOR THESES:

Technology of Environmental Protection

Antalíková Natália	Quality evaluation of chosen upper water
Belanský Matej	Recycling of polyethylene terephtalate
Blašková Mária	Analysis of current approaches to assessing the impact of noise and vibration on human health
Bockaničová Zuzana	Comparasion of technical solutions of waste heat from combustion
Došová Michaela	Persistent organic pollutants and the environment
Drozdová Ľuboslava	The methods analysis of software products designed for modeling and visualization of sound in industrial plants
Fečová Alexandra	Analysis of collection and recovery plastic waste in the Slovak republic
Filús Michal	The impact of road surfaces on traffic noise
Glevaňák Róbert	Possibilities of PET waste reuse in mechanical engineering
Gregová Jakubová Tatiana	Simulation of sound propagation in the interior and its use in industry
Hanigovská Patrícia	Possibilities of used accumulators processing
Hudáková Viktória	Analysis of Safety and Health at work in the Slovak Republic
Kiššová Lenka	Analysis and processing of the metal packaging and the metal waste in Slovakia
Kočiš Viktor	Remediation of old environmental burdens
Komlošová Martina	The impact of noise and vibration on health in timber harvesting
Korcsmárosová Agnesa	Analysis of noise and vibration sources and their impact on the workers health in timber harvesting
Korolová Ivana	Analysis of materials suitable for the construction of noise barriers
Kožuchová Zuzana	Influence of physical factors emerging from timber harvesting on workers health and the elimination of their negative effects
Kurjatniková Iveta	The impact of the media used in the technology of water jet on the environment
Lipták Martin	Assessment of efficiency acoustic measures in the working environment
Mattová Dominika	Analysis of methods for degreasing tools and forms from an environmental perspective
Mičko Martin	The potential of renewable energy usage in and around Košice
Mihaľ Jozef	Analysis of noise sources automobile and tire noise impact assessments for various types of road surfaces
Nohavica Patrik	Options visualization rail noise
Nováková Stanislava	Options to reduce noise exposure of employees
Pipa Michal	Analysis of noise reduction in industrial plants
Polčová Nikoleta	Usage of plants for municipal waste water cleaning
Radačovský Branislav	Analysis of the fuel cells in the automotive industry
Branislav Rozgonyi Robert	Simulation of noise from ground traffic
Rozgonyiová Valéria	Separated collection of the municipal waste in the east Slovak region
Szabó Ľudovít	The use of acoustic materials in workplace of industrial plants
Šandl Karol	The coordination of transport phases for a mechanical engineering product in regard to an analysis from cradle to cradle

Vartovníková Monika	Analysis and possibilities of minimalization of illegal dump sites
Vasko Gabriel	Innovative methods of recovery of the waste wood
Volčko Martin	Analysis of the use of wind energy in the Slovak Republic

Environmental Management

Badidová Anna	Processing of mathematical model (noise map) for dissemination of the noise emission in outdoor of selected organisation
Bilančíková Natália	Alternative energy sources and their use in Slovakia
Cifruľák Vladimír	Proposal of recycling lines for processing of plastic waste
Čurilová Jana	Analysis of corrosion surface treatment technology components and their impact on the environment
Drozdová Jana	The possibilities of using the equipment for monitoring of the solid aerosols
Dubcová Lucia	Implementation of cleaner production in engineering company
Grochalová Eva	Environmental Quality of The Environment in Slovak Republic
Jámborová Miroslava	Application of EURO standards in reduction of emission quantity
Juhász Ján	Application of noise control measures in the chosen location
Kajlová Patrícia	Impact of selected degraded plastic on environment
Kotuľak Jozef	Effect of vibration and shock on human health
Kovaľová Kočišová Lucia	Proposal for a biogas plant on the chosen location
Kravecová Martina	Analysis of materials and measures to reduce the impact of electromagnetic fields on living and working environment
Maďoranová Marieta	Visualization methods selected physical factors in water jet technology
Mihalovová Michaela	Effect of solid aerosols on human health based on its biological effects
Mikulová Alžbeta	Effect of chemical Industry on Zemplin region
Mochťák Patrik	Analysis of the use of materials for the construction of noise barrier
Sochová Marcela	Analysis of processing of generated waste in chosen location
Stasiuková Elena	Analysis of psychoacoustic parameters in selected workplace

MASTER'S THESES:

Technology of Environmental Protection

Bistika Ludvik	The proposal of methodology of assessment psychoacoustic quality of the engineering products
Bobáľová Jana	The algorithm of joint exploitation of the unconventional energy sources
Daxner Július	Determining of the Development of water Quality in selected water flow by the Environmental Indicators
Durajová Iveta	Anaslysis to assessment the quality of the working environment
Fiľakovská Vladimíra	Simulation of artificial lighting
Forgáč Stanislav	Application of binaural measurement techniques for determining sound reduction parameters of hearing protectors
Gajdošová Lucia	New knowledges in the processing of the selected plastic waste
Guľvaš Viliam	Treatment of silicone rubber waste using plasma gasification technology
Hegedüs Tomáš	Coordination of technical systems and equipment for the storage of hazardous substances in the framework of the environmental and the working protection
Holub Tomáš	Valuation and assessment of efficiency acoustic measures for selected equipment
Ihnátová Michala	Measuring the impact of action of the Electroplating facilities in the backwaters
Jamrišková Lenka	Geothermal energy and its potential of using for greenhouses heating

Klimková Mária	The Study of mobile phones use in the working population
Kondela Julián	Elimination of particulate pollutants from the air in company KOSIT, a.s.
Kondor Miroslav	Increasing resistance machinery in the waste-water treatment plant to flood the targeted environmental protection
Kyjovský Ján	Measurement of electromagnetic field and sound parameters near high voltage systems
Macáková Petra	Comparison of sound insulation properties of selected materials
Mako Richard	Proposal of Wi-Fi remote control of the Catamaran to collect cyanobacteria
Medvecká Simona	Use of nanomaterials in environmental protection and potential risks of their applications
Melník Róbert	Calculation and visualization parameters of the electromagnetic field in the vicinity of tram tracks
Modráková Monika	Modeling and visualization of the railway noise for different mode
Moravanský Radoslav	Intelligent lighting systems
Moravská Andrea	The use of spectral methods for the analysis of selected heavy metals in various environmental samples
Pisanská Miroslava	The proposal of sandwich structures for different spectral composition of the sound
Pisko Peter	Comparison and analysis of computational models for mathematical modeling of sound propagation in the interior
Rusnák Miroslav	Ecological degreasing of the metal materials
Sčensná Dominika	Analysis and Evaluation of the Environmental risks associated with the Industrial Production
Sirotňáková Jana	The Study of an operational characteristics of the heat pump
Šofranková Melinda	The application of technologies for safe CO_2 collection and storage
Takáč Peter	The study of water quality at the site and its impact on health and environment
Timanová Jaroslava	Setting up of separate collection systems in towns and cities in Slovakia
Uhliarik Ivan	Methodology for sampling of liquid aerosols in the working environment
Vašková Jana	Risk Management as a tool to minimize of health hazards of workers

Environmental Management

Babjaková Jana	Proposal of the optimal integrated waste management system in selected area
Baranová Jana	Methodology for the sampling of solid aerosols for employees using protective helmets
Baranová Júlia	Study of selected properties of solid environmental samples from areas contaminated heavy industry
Begová Andrea	Application of the Multicriterial method for Assessing the Environmental level of Engineering product in practice
Dulebová Martina	Planning and dimensioning of the heat pumps air – water
Džubarová Ľudmila	Ecological labeling of the products from plastic regranulate
Eperješiová Ľubomíra	Geothermal energy and its potential of using swimming pool water and water parks heating
Hujdičová Michaela	Vibration Analysis of selected device by experimental and numerical methods
Hužvárová Martina	Noise in the Environment and its Impact on the Health
Chnupa Jozef	Coordination of technical support production and handling systems used in the work environment
Javorská Mária	Overview study of recycled plastic boards processing by using of selected technologies
Kačová Zuzana	Health risk Assessment in the selected industrial plant
Koscelníková Erika	The Use of The Thermovision to identify of heat losses of the Engineering Product
Nickelová Ivona	Evaluation of the Physical Factors (Microclimate conditions) of the Work Environment
Sušková Alexandra	Recyclability and proposal of overall logistics management system with

	photovoltaic panels
Szemánová Monika	Application of laboratory methods for monitoring the properties of water from areas of environmental burdens
Škultétyová Denisa	Complex Evaluation Method of an engineering product by the analysis of its life cycle

PhD THESES:

Technology of Environmental Protection

Abdulla Mohamed Naje	Application methodology of the thermal-insulation materials for the conditions of Libya
Džoganová Zdenka	Optimization of selected psychoacoustic parameters of sound by car production
Ruman Peter	Development and verification of equipment for revitalization of the stagnant water
Schödel J. Ulrich	Analytical assessment of fossil fuels, their oxidation and environmental impact, as well as the evaluation of possible alternatives in the form of biogas
Schödel Klaus Christian	Research and development of asses methodology of automobile production's impacts on environment and its application in practice conditions

RESEARCH AT THE DEPARTMENT

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

NATIONAL PROJECTS

Type of the project	OP Research and Development
Number of the project	**ITMS: 26220220028**
Principal investigator	prof. Ing. Dušan ŠEBO, PhD.
Time period of the project	**2012 - 2014**
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	**e-learning of robotics with implementation of a virtual laboratory with remote management of real facilities on Internet base**
Type of the project	OP Research and Development
Number of the project	**ITMS: 26220220028**
Principal investigator	prof. Ing. Dušan ŠEBO, PhD.
Time period of the project	**2010-2014**
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**
Principal investigator	Dr.h.c. prof. Ing. Miroslav BADIDA, PhD.
Time period of the project	**10/2010 –5/2014**
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.

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**
Principal investigator	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**
Principal investigator	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	**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**
Principal investigator	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**
Principal investigator	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.

Title of the project	**Pilot projects in the field of engineering (activity A.3.3)**
Type of the project	OP Research and development
Number of the project	**ITMS 26220220182**
Principal investigator	Dr.h.c. prof. Ing. Miroslav BADIDA, PhD.
Time period of the project	**2014 - 2015**
Annotation of the project	The solution of project is focused on the development of new knowledge, techniques and methods, which they cover the full innovation cycle. It is allowing accelerate infiltration of innovation in conditions of the small and medium-sized enterprises in the form of knowledge intensive services. The aim of this project is building of a superior laboratory base, developing results of the solutions of the project centres of excellence (ITMS 26220120060) and other complementary activities of solvers and their enrichment about key aspects of knowledge-based economy, including the creation of a network of innovative partnerships. The department is involved on the project PP4: establishment of training, counseling and certified centres for risk management in safety engineering, safety and occupational health and environmental risks.

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**
Principal investigator	prof. Ing. Ervin LUMNITZER, PhD.
Time period of the project	**2011 - 2014**
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, Czech, Germany
Lumnitzer Ervin, prof. Ing. PhD.	Poland, Serbia, Ireland
Králiková Ružena, doc., Ing., CSc.	Hungary, Czech, , Ireland

Sobotová Lýdia, doc., Ing., PhD.	Hungary
Hricová Beáta, Ing., PhD.	Serbia, Hungary, Poland, Ireland
Moravec Marek, Ing., PhD.	Serbia, Hungary, Ireland
Lukáčová Katarína, Ing., PhD.	Serbia, Hungary, Ireland
Liptai Pavol, Ing., PhD.	Serbia, Hungary, Ireland
Piňosová Miriam, Ing., PhD.	Serbia, Hungary, Irela
Lazarová Petra, Ing.	Czech, Poland
Karková Monika, Ing.	Czech
Dzuro Tibor , Ing.	Hungary, Poland
Bek Zdenka, Ing.	Poland, Ireland
Goga Bodnárová Alexandra, Ing.	Poland, Serbia, Ireland
Jezný Tomáš, Ing.	Croatia, Czech, Germany
Hurajt Marián, Ing.	Croatia, Czech, Germany

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
Badida Miroslav, Dr.h.c. prof. Ing. PhD.
Lumnitzer Ervin, prof. Ing. PhD. - Vice chairman
Liptai Pavol, Ing. PhD.

Journal "Fyzikálne faktory prostredia" – Physical Factors of Environment
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., PhD.

Journal of Environmental Protection, Safety, Education and Management
Lumnitzer Ervin, prof. Ing. PhD.

MEMBERSHIP IN INTERNATIONAL PROFESSIONAL ORGANISATIONS

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

Czech Illumination Association (ČSO)
Králiková Ružena, doc., Ing., PhD.

ICEEE International Council of Environmental Engineering Education, Budapest, Hungary
Badida Miroslav, Dr.h.c.,prof.,Ing., PhD.
Sobotová Lýdia, doc., Ing., PhD.
Moravec Marek, Ing. PhD.

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

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

International Journal of Engineering, Romania
Badida Miroslav, Dr.h.c., prof., Ing.,PhD.
Lumnitzer Ervin, prof., Ing., PhD.
Hricová Beáta, Ing., PhD.

Journal The Holistic Approach to Environment, Croatia
Králiková Ružena, doc., Ing., PhD.

Acta Technica Corviniensis : Bulletin of Engineering, Romania
Badida Miroslav, Dr.h.c., prof., Ing.,PhD.**Lumnitzer Ervin**, prof., Ing., PhD.**Hricová Beáta**, Ing., PhD.

PUBLICATIONS

Monograph

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Textbooks

[1] KUČERKA, Daniel - KMEC, Ján - SOBOTOVÁ, Lýdia - RUSNÁKOVÁ, Soňa - Hrmo Roman - TIMKO, Milan - PODAŘIL, Martin - HUSÁR, Štefan - KUČERKOVÁ, Monika: **Strojárska technológia 1** 1. diel - 1. vyd. - České Budějovice: Vysoká škola technická a ekonomická v Českých Budějovicích - 2014. - 136 s., ISBN 978-80-7468-058-8.

[2] LUMNITZER, Ervin - PIŇOSOVÁ, Miriama - BADIDA, Miroslav - ROVNÝ, Ivan: **Hodnotenie vplyvov fyzikálnych faktorov na zdravie človeka** Objektivizácia a hodnotenie faktorov prostredia - 1. vyd - Košice : TU - 2014. - 159 s., - ISBN 978-80-553-1632-1.

Journals

[1] KOCÚROVÁ, Lívia - BALOGH, Ioseph S. - FATĽOVÁ, Martina - BAZEĽ, Yaroslav - SIMON, András - SERBIN, Rastislav - BADIDA, Miroslav - RUSNÁK, Radoslav - ANDRUCH, Vasil: **A Novel, Donor-Active Solvent-Assisted Liquid-Phase Microextraction Procedure for Spectrometric Determination of Zinc** - 2014. In: Journal of the Brazilian Chemical Society. Vol. 25, no. 2 (2014), p. 313-319. - ISSN 0103-5053

[2] FIĽO, Milan - LUMNITZER, Ervin: **The Use of simulation procedures for the management effectiveness of integrated production** - 2014. In: Annals of Faculty Engineering Hunedoara - International Journal of Engineering. Vol. 12, no. 1 (2014), p. 175-178. - ISSN 1584-2665

[3] KRÁLIKOVÁ, Ružena - ANDREJIOVÁ, Miriam: **Using of Multidimensional Statistical Method to Analyse of Heavy Metals Contaminated Soil** - 2014. In: Asian Journal of Agricultural and Food Sciences. Vol. 2, no. 2 (2014), p. 89-95. - ISSN 2321-1571

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[6] GOGA BODNÁROVÁ, Alexandra - FARKAŠOVSKÁ, Zuzana - LUMNITZER, Ervin: **Effects of noise determination of index sound insulation of the separating elements in engineering manufacture** - 2014. In: Acta Technica Corviniensis - Bulletin of Engineering. Vol. 7, no. 4 (2014), p. 109-114. - ISSN 2067-3809

[7] HRICOVÁ, Beata - PIŇOSOVÁ, Miriama: **Thermography as a tool for identifying of heat losses** - 2014. In: Annals of Faculty Engineering Hunedoara - International Journal of Engineering. Vol. 12, no. 4 (2014), p. 47-50. - ISSN 1584-2673

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[2] KRÁLIKOVÁ, Ružena - SOKOLOVÁ, Hana - WESSELY, Emil: **Thermal Environment Evaluation According to Indices in Industrial Workplaces** - 2014. In: Procedia Engineering: 24th DAAAM International Symposium on Intelligent Manufacturing and Automation 2013: 23-26 October 2013, Zadar, Croatia. No. 69 (2014), p. 158-167. - ISSN 1877-7058

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[4] LUMNITZER, Ervin - PIŇOSOVÁ, Miriama - GOGA BODNÁROVÁ, Alexandra - HRICOVÁ, Beata: **Approach to valuation of acoustical material properties** - 2014. In: SGEM 2014: 14th international multidiscilinary scientific geoconference: GeoConference on Ecology, Economics, Education and Legislation: conference proceedings: volume 1: 17-26, June, 2014, Albena, Bulgaria. - Sofia: STEF92 Technology, 2014 P. 45-50. - ISBN 978-619-7105-17-9

[5] KRÁLIKOVÁ, Ružena - BADIDA, Miroslav - SOBOTOVÁ, Lýdia - DOBROVIČ, Ján: **Approach to design of energy saving illumination in industry plants** - 2014. In: SGEM 2014: 14th international multidiscilinary scientific geoconference: GeoConference on Ecology, Economics, Education and Legislation : 17-26, June, 2014, Albena, Bulgaria. - Sofia: STEF92 Technology Ltd., 2014 P. 37-43. - ISBN 978-619-7105-17-9

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INSTITUTE OF SAFETY AND BIOMEDICAL ENGINEERING

- Department of Safety and Quality
- Department of Biomedical Engineering and Measurement

Department of Safety and Quality of Production

Contact

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Staff

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

Activities at the department

Date	Title of the event, activity characterizing the life at the department in 2013
2/2014	National Forum on Maintenance 2014
10/2014	Conference: MachineDiagnostics DIS
11/2014	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 graduates (2013/2014)
on the study programs guaranteed by the department:

– 40 students in the internal form of engineering study
– 27 students in the external form of engineering study

– 3 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.)

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

Červeňák Pavol	Information Technology Safety.
Longauerová Tatiana	Effect of discontinuity of social processes on safety at work.
Gondová Lívia	Impact of work environment on health and safety at work in selected activities
Molčanová Zuzana	Diagnosis of technology using magnetic fields.
Cibulková Zuzana	Administrative security of the SR.
Tkáč Matúš	Energy management system for small and medium businesses.
Harvanková Ivana	OSH in selected industries.
Vojaček Jaroslav	Application and monitoring of KPI using software platforms.
Karková Dana	Risk assessment in selected industries.
Peňáková Lucia	New trends in active safety vehicles.
Furíková Ivana	Safe working and movement in forest terrain.
Horáčková Martina	Safety and protection of workers at the selected working.
Jurková Stanislava	Risk assessment, disease and injury in the implementation of selected activities.
Pastyrik Martin	Riziká pri práci hasiča.
Martincová Andrea	Possibilities of using non-traditional means of intervention in the floods.
Tomičová Miriam	Safety precautions at work on machinery equipment - presses.
Nagyová Marta	Safety precautions while working with hazardous substances.
Palaščák Peter	Integrated management approaches on the boundary Safety/Security.
Sochová Martina	Definition of conditions for identification of essential parameters of efficiency - KPI in simple definition of risk.
Weiserová Mária	Analysis of industrial risks on the boundary Safety/Security.
Lizáková Mária	OHS with radiation in the radiology department.
Dudjaková Lucia	Supply maintenance activities and their impact on security in the enterprise.
Takáč Tomáš	Risk analysis during the work with industrial robots.
Čaga Miroslav	New trends in familiarizing employees with OHS.
Varga Lukáš	Optimization of the working environment when carrying out maintenance activities.
Salvová Veronika	Analysis and evaluation of risks in the production of bio fuels.
Dúcsová Magdaléna	OHS during the manual rewinding of electric motors.
Sabol Miloš	The application of security measures at selected maintenance activities.
Šandor Štefan	OHS on classified electric technical equipments.

Tóthová Lucia	Factors influencing the Human Factors and their impact on health and safety at work.
Zarembová Veronika	Synergic effect of risk factors in the workplace.
Krištofčíková Lucia	The analysis of workplaces with increased risk for diseases of the musculoskeletal system in selected technologies.
Čopaková Erika	Identification of occupational accidents and occupational diseases in selected industry.
Dubravská Angelika	Utilization ergonomics in optimizing workplace.
Tutko Ján	The application of preventive ergonomic programs to eliminate occupational accidents and occupational diseases.
Kostrubová Janka	The identification of occupational diseases in selected employment.
Štefaníková Ivana	The impact of ergonomics in ensuring health and safety at work in the selected workplace.
Rímska Erika	Occupational Health and Safety for employees in selected work activities.
Sorokáč Michal	Obligations on employers to ensure the safety and health from risks related to noise exposure and their application in practice.

Quality of Production

Ľubomír Fidler	Improving the efficiency of processes in manufacturing production
Denisa Navalanyová	Minimizing unproductive human activities using software support at work
Dávid Skrip	Virtual factory - new opportunities to support performance improvement processes in the production process
Dominika Juhászová	Implementation of management system according ISO 50001
Michaela Hynková	Mutual comparison improving the quality of services through ISO 9004 and ITSM-ITIL
Tomáš Cifra	Comparison of selected approaches for support of quality management
Matúš Kamenický	Data analysis in the selected process in engineering production
Kamil Šurina	Process control as a tool for quality assurance in production
Miriama Gergeľová	Impact of work environment on employee performance
Patrik Pristáš	Application of the Japanese 5S method in the process of storage in a selected organization
Martina Milkovičová	Assessment of compatibility standards ISO 9001 and ISO 3834
Michaela Fedorová	Statistical production process control
Natália Irchová	Analysis of the shortcomings in the implementation of quality management system
Miloš Fedák	Employees education as a part of control quality in organization
Jakub Nábožný	Product quality a part of sustainable development
Ľuboslava Lechmanová	Machinery capability assessment methods
Alexandra Zukalová	Use of VRIO analysis in the decision process.
Ľubomír Fidler	Improving the efficiency of processes in manufacturing production
Denisa Navalanyová	Minimizing unproductive human activities using software support at work
Dávid Skrip	Virtual factory - new opportunities to support performance improvement processes in the production process
Dominika Juhászová	Implementation of management system according ISO 50001
Michaela Hynková	Mutual comparison improving the quality of services through ISO 9004 and ITSM-ITIL
Tomáš Cifra	Comparison of selected approaches for support of quality management
Matúš Kamenický	Data analysis in the selected process in engineering production

Kamil Šurina	Process control as a tool for quality assurance in production
Miriama Gergeľová	Impact of work environment on employee performance
Ján Suchanovský	Design of parameters for management of main processes in the engineering organization
Štefan Cifra	Selected activities of metrology as a support process of quality management
Milan Borko	External forms of motivation as a tool for increasing productivity
Marcel Bekeš	The impact of customer satisfaction on loyalty
Dušan Danko	OHSAS processes controls like support elements of the production quality
Marcela Vašková	Efectiveness increasing of manufacturing organizations by using continual improvement tools
Miroslava Peťovská	Communication with customer as with the aim to improve provided service quality
Nikola Királyová	Quality management system as a part of the integrated management systems

MASTER'S THESES:

Safety of Technical Systems

Plavnický Vladimír	Safety planning in enterprises and VUC.
Roško Radomír	Fire safety biogas plants.
Čandová Monika	Measures to ensure air quality in manufacturing.
Bebko Matúš	Use of flying robotic systems for identifying critical parts of the selected system
Freňáková Viktória	Risk prediction - The risk assessment for existing production line.
Mycio Viliam	Optimalization of using alternative energy sources according customer satisfaction.
Kankula Valéria	Human reliability assessment as a part; of Safety management system.
Laurová Ivana	Application of safety measures at selected technological equipment.
Malčický Roman	The risk analysis in the process of drilling geothermal wells.
Stanko Juraj	Application of safety elements in mobile devices with hydrogen as a power source.
Ziolkovský Tomáš	Ergonomic analysis of muscle-skeletal load when working with computers.
Popovičová Mária	Critical analysis of risk estimation procedure by means of complex method.
Cmar Jakub	Management of technical risks in urban conglomerations.
Köver Milan	Understanding safety in selected industrial professions - Analysis and Risk Assessment.
Sulyok Patrik	Analysis and risk assessment of selected technological equipment.
Ridilová Miroslava	Assessment of noise exposure chosen profession in order to protect health.
Jobbágyová Viera	Safety requirements for the protection of workers from risks related to exposure to noise and dust.
Benedik Peter	The system connection that ensure the protection of employees working in train hall
Hanák Jozef	Design and assessment of security devices for rail transportation and crossovers.
Vasilová Mária	Risk reduction measures when welding subgroups TATRAVAGÓNKA, as Poprad

Ištocy Slavomír	Security plans in the chosen company.
Prasol Tomáš	Magnetic materials and their use in safety technology.
Szabó Bartko Gabriel	Effect of selected nanomaterials (InTech) for employees in the selected mode.
Čuchranová Lenka	Safety aspects in using of high-risk equipment
Vasiľová Gabriela	Risk analysis during recognition of fires in engineering plants
Kollárová Júlia	Operability and safety of selected technical facilities

Production Quality Engineering

Viliam Hans	Proposal of KPI structure for the maintenance of such support production process
Lucia Zahurancová	Improving employee performance through new training procedures
Miriama Petrovičová	Modification of the current QMS in relation to the requirements of IRIS in production organizations
Tímea Páricsiová	Eliminating waste in the production process using tool 3MU
Andrea Jendroľová	Optimization of visual inspection in engineering production
Veronika Delejová	Control of nonconforming product in final inspection in the manufacture of automotive components
Jana Mochnaľová	Optimization of the production process of aluminum casting using statistical methods of quality management
Ivana Lešková	Defects in the production process
Gabriela Bérešová	Use of quality tools in the production process
Zuzana Tóthová	Evaluation of service quality and competitiveness of selected organization
Ivana Lešaničová	Analysis of the transport process as one of the basic parameters affecting the quality of the product
Zuzana Sičáková	Implementation of Six Sigma methodology in the selected organizations
Lukáš Bugáň	Proposal of the performance evaluation of key indicators for TUKE
Miroslav Běhunčík	Aplication of KAIZEN aproach as a tool of continual improvement in organization
Pavol Verčimák	Solution propossal for minimizing nonconformities occurrence in the selected process
Beáta Illésová	Changes application through Reengineering in manufacturing production
Peter Olejník	Customs control using characteristics of project management in selected organization
Nicol Haviarová	Improvement of mutual relation with customers by using CRM systems
Katarína Miklušová	Optimization of workers working shifts and deployment of production lines in order to increase productivity
Peter Pekarčik	Application Portfolio at Tecnomatix simulation and optimization of material flows
Katarína Štrbáková	Identify new and emerging risks in planning and optimization of production systems in terms of performance improvement processes
Katarína Bodnárová	Processing demand as one of the main processes in the conclusion of the business contract
Ján Ivančák	The application of process approach in selected organization
Peter Garanyi	Process of improving the IT organization
Anita Jašeková	Use of statistical methods in the evaluation of quality the production process
Silvia Uliková	Statistical control of annealing process in wet atmosphere in purpose of

	strip cleanliness increasing
Peter Zaťko	Quality and prosperity of the organization through human resources
Mária Rusnáková	Improving quality in the production and processing of paper
Adriana Kacsenyáková	The proposal to streamline inventory management system in selected organizations
Štefan Béreš	Proposal structure and key performance indicators to measure human resources management processes
Aneta Nedbalová	Aplication of model CAF in selected organization
Emil Hric	Application of Kaizen strategy in a selected organization
Oto Körtvély	Complaints control by the 8D method in the selected organization
Michal Dudáš	Process quality and its improvement through Kaizen in a Magnetti Marelli
Martin Palko	Analysis of nonconforming product in a selected organization
Lukáš Bozogaň	Quality Management System implementation for selected organization
Marcel Ulik	Evaluation of customer satisfaction in company OBAL – SERVIS, a.s. Košice
Jakub Farkaš	Aplication of continual improvement tool in manufacturing process
Petronela Virostková	Preventive approach in processes management
Mária Kolačkovská Olexová	TPM conception as a support of TQM
Jakub Mach	Model of maintenance management cost optimalization.

PhD. THESES:

Safety of Technical Systems

Erdélyi Štefan	Maintenance management of technical facilities for alternative sources of energy.
Kalafút František	Integration of management practices for risk management at the interface of Safety and Security
Kardošová Alica	Ergonomic analysis and risk management systems in the new technologies

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 – 2014
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 – 2014
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	**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
Hovanec Michal	Germany

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.

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Department of Biomedical Engineering and Measurement

Contact

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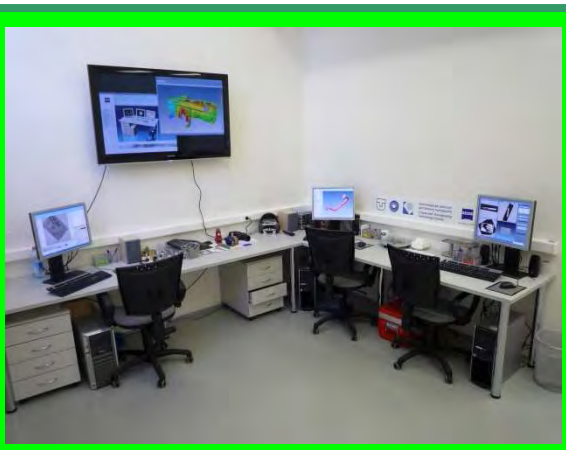

Staff

- 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 2014
07/2014	YBERC 2014, Bratislava

EDUCATION AT THE DEPARTMENT

STUDY PROGRAMS

Bachelor's degree:

- **Prosthetics and Orthotics**

Number of the students (till 31.12.2015),
on the study programs guaranteed by department 11.

Number of the graduates (2014/2015),
on the study programs guaranteed by the department:
- 11 students in the internal form of bachelor study

Master's degree:

- **Biomedical engineering**

Number of the students (till 31.12.2015),
on the study programs guaranteed by department 33:

Number of the graduates (2014/2015),
on the study programs guaranteed by the department:
- 23 students in the internal form of engineering study
- 10 students in the external form of bachelor 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 (- 2013/14)

Boháčik, Richard	Metrological verification of full body 3D scanner
Červená, Veronika	Safety elements of medical devices
Franková, Klaudia	Stability evaluation in selected locomotions
Havrillová, Barbora	Evaluation of human hand range of motion
Hoľáková, Erika	Comparison of subtractive and additive technologies of the production of custom dental products
Hreňo, Andrej	Equipment for training forearm muscles to use myoelectric prostheses
Kebísková, Jana	Methodics of finger force measurement

Lacková, Daniela	Application of surface layers plasma coating on implants produced by direct metal laser sintering
Lazur, Jozef	Analysis of 3D bioprinter components, modules and construction
Marková, Lucia	Analysis of certification and registration proces of custom implants.
Mendová, Katarína	Use of 3D scanner in orthotic measurements
Palková, Romana	Electrochemical deposition of bioactive and biocompatible coatings on the surface of implants
Petrišáková, Barbara	Evaluation of human foot range of motion
Pindroch, Ondrej	Analysis of biocompatibility tests of Ti64 implants
Rybnický, Michal	Prevention and orthosis treatment in biomechanical stress index
Škvareková, Martina	Diagnostics of conservation treatment of hand arthritis
Šoltésová, Viktória	Application of Thermovison systems in parasitology
Tokár, Tibor	Analysis of selected joints injuries in volleyball
Tomko, Jakub	Cyclic stresses of dynamic orthesis elements
Velebír, Ján	Metrological verification of 3D Objet Eden printer
Zummer, Lukáš	Testing of dental replacement coatings wear

MASTER'S THESES:

Biomedical engineering (- 2013/14)

Balogová, Alena	Decomposition of 3D bioplotter and analysis of input biomaterials
Ďáková, Ľuboslava	Active elimination of vibrations on magnet of MRI device
Glittová, Darina	Analysis of materials porosity by metrotomography
Hack, Jakub	Evaluation of hip joints dysplasia
Hospodárová, Miroslava	Biomechanical testing of spinal implants
Klimeková, Mária	Biomechanical testing of dental implants
Nalevanková, Martina	Clothing design with orthotic support
Semanová, Michaela	Utilization of polymers and ceramics of custom implants production by additive manufacturing
Schnitzer, Marek	Biomechanical and material innovation of osteosynthetic devices
Vargová, Blažena	Utilization of 3D printing in prosthetics and orthotics
Vystavilová, Michaela	Manufacturing of plastic dental products by 3D printing technology

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	**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	**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
Sidun Jaroslaw . Assoc. Professor, Eng., PhD	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.

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DEAN'S OFFICE OF THE FACULTY OF MECHANICAL ENGINEERING

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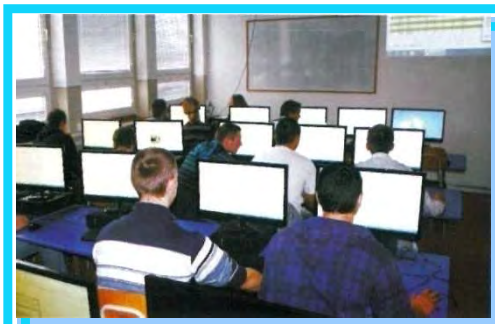

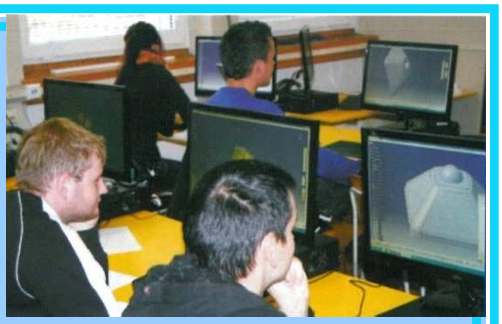

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- ✓ CA Methods in Mechanical Design III.
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- ✓ CAD - Introduction to Solid Modeling
- ✓ CAD - Introduction to Surface Modeling
- ✓ Computer Aided Design
- ✓ Concepts of Information and Computing Systems
- ✓ Construction and CAD
- ✓ 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
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- ✓ Programming techniques
- ✓ CA TEchnologies
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- ✓ Computer Software
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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

Journals

[1] KRÁĽ, Ján ml. – KONEČNÝ,Branislav - KRÁĽ, Ján - MADÁČ, Kamil - FEDORKO, Gabriel - MOLNÁR, Vieroslav: **Degradation and chemical change of longlife oils following intensive use in automobile engines** / - 2014. In: Mesurement. Vol. 50, no. 1 (2014), p. 34-42. - ISSN 0263-2241

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ANNUAL REPORT 2014

Editors: Dr.h.c. mult. prof. Ing. František Trebuňa, CSc.
prof. Ing. Michal Kelemen, PhD.

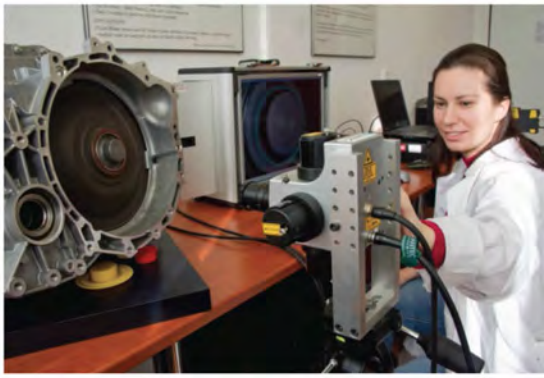
Publisher:
Deans Office of FME TU of Košice, Letná 9/B, 042 00 Košice Slovakia
www.sjf.tuke.sk

Design:
doc. Ing. Jaroslav Jarema, CSc.

Photo:
Ing. Róbert Klik and archive FME TUKE

Edition:
211 pages, 50 pieces, 1st edition, May 2015

ISBN 978-80-553-2235-3



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