Projects 2013

Research infrastructure projects in 2013

Institute/workplace	Operation programme	ITMS	Title of project	Time Period of Project
Faculty of Materials Science and Technology	Research	26250120053	A comprehensive modernisation of material and non-material (information and communication) educational infrastructure of the Bottova Campus	10/2012-09/2014
Faculty of Materials Science and Technology	Research	26110230116	The development of human resources in the field of research and development for the material research Workplace of the Institute of University Scientific Park_CAMBO	10/2013-06/2015
Institute of Production Technologies + MIKON, s.r.o.	Research	26220220137	Industrial research into silent blocks for excessive load under extreme temperatures in the field of industrial application	11/2011-10/2015
Institute of Materials Science	Research	26220220137	Industrial research into silent blocks for excessive load under extreme temperatures in the field of industrial application	11/2011-10/2015
Institute of Materials + VUJE, a.s.	Research	26220220077	Increasing the power security of the Slovak Republic	07/2010-12/2013
Institute of Applied Informatics, Automation and Mathematics	Education	26110230042	Implementation of the internal system of quality assurance in education	01/2012-12/2013
Institute of Applied Informatics, Automation and Mathematics + Qintec, s.r.o. Trnava	Research	26220220159	Research into monitoring and assessing the non-standard states in the vicinity of a nuclear power plant	04/2012-09/2014
Institute of Industrial Engineering, Management and Quality	Education	26110230115	Centre for the development of competencies for the field of Industrial Engineering and Management	10/2013-09/2015

Institute of Industrial Engineering, Management and Quality	Education	26110230055	Rationalisation and improvement of the industrial management study programme to support career guidance	01/2012 - 12/2013
Division of Knowledge Management	Education	26110230113	Knowledge-based Faculty for economic practice	10/2013-09/2015
Research Centre of Progressive Technologies	Research	26210120017	Centre for research and development in the field of the electron-beam and progressive arc technologies of welding, cladding and surface-finishing (WeldCenter)	10/2012-03/2014
Institute of Production Technologies	Research	26210120020	Technical infrastructure of research and development for the field of the contact and contact-free methods of measurement	10/2012-03/2014
Faculty of Materials Science and Technology	Research	26220220179	University Scientific Park „ CAMPUS MTF STU“ - CAMBO	03/2013-06/2015
Research Centre of Progressive Technologies	Education	26110230116	Human Resources Development in the field of research and development for the UVP-CAMBO	10/2013-06/2015
Faculty of Materials Science and Technology and Faculty of Civil Engineering Bratislava	Research	26250120070	Complex modernisation of the educational, material, information and communication infrastructure of the CAMPUS Bottova II, and reconstruction of the Kočovce training centre	04/2014-10/2015

INSTITUTE OF MATERIALS SCIENCE

Projects of the Institute

Project Title	**Excellence Centre for functionalised multiphase materials (FUN-MAT)**
Coordinator	prof. Ing. Jozef Janovec, DrSc.
Start Date	04/08/2011
End Date	31/12/2014
Programme	-- Other domestic --
Annotation	The aim of the project is to gain new physics knowledge in the field of multiphase complex alloys, ceramics, composites and catalythically active surfaces of metals, plasmonic effects, fotovoltaic and thermoelastic polymer structures, as well as from the field of biosensors. The acquired knowledge should enable targeted functionalisation of materials with the goal to achieve required specific properties such as mechanical toughness, chemical selectivity, increased quantum efficiency of light conversion and others. The final aim will be a marked added value in research, development and the implementation of unique high-tech solutions based on a multidisciplinary approach and the connection of research subjects with the expertise in the field of physics of solids, quantum optics, materials engineering, anorganic chemistry, chemistry of polymers and biology.

Project Title	**Characterisation of special glasses via physical methods**
Coordinator	doc. Ing. Marian Kubliha, PhD.
Start Date	01/01/2012
End Date	31/12/2013
Programme	APVV, SR - Czech Rep.
Annotation	The project is focused on the support of long-time co-operation between the Slovak and Czech partners in the field of study into special glasses, particularly in the case of special glasses on the basis of chalkogenides and exides of heavy metals for optoelectronic applications requiring very low contents of impurities and defects (e.g. content of OH groups usually does not exceed 0.0001 mol%). To analyse glasses, highly sensitive measuring methods of selected physical quantities are used along with conventional ones. Partners from the Czech Republic will prepare special glasses and carry out analysis of their optical properties. Researchers from the Slovak Republic will conduct analysis of electrical and dielectric properties in order to determine the quality of the prepared glasses, their homogeneity, amount and type of defects. The examined glasses are determined for the fields of photonics in the form of fibres transmitting the energy of lasers and optical signals (passive and active applications) as well as for the generation of radiation. The 4f-4f shining transition is generally used after doping the glasses with rare earths serving also as active elements.

Project Title	**Interactions in bio and nanosystems**
Coordinator at MTF	prof. RNDr. Miroslav Urban, DrSc.
Start Date	01/05/2011
End Date	31/10/2014

Programme	APVV, General Call
Annotation	The bonding characteristics, including chemical and hydrogen bonds to weak intermolecular interactions are essential in apparently remote areas like biophysics and material sciences. Recently, benchmarking data was obtained for properties of molecules and their interactions, using the Coupled Cluster CCSD (T) method capable of recovering a substantial part of the electron correlation. It provides reliable predictions of molecular properties. Innovations developed within the project remit to allow CC molecular calculations with more than 80 correlated electrons and basis sets with up to 1500 functions. Real applications require properties of large molecules and clusters, inaccessible to rigorous methods. As a result computationally less demanding DFT and semi-empirical methods will be used. The accuracy control of appropriate methods using relativistic CC data for smaller model systems is essential in this project. Intermolecular interactions will be exploited "in silico" drug design, "docking and scoring" analysis and the description of the ligand-active site of the protein. The activity of "Aurora" kinase inhibitions in tumour cells, molecules with angiostatic activity, blocking the vascular endothelial growth factor receptor-2 will be investigated. Reference data for metal ligand interactions related to the SAMS formation and catalysis on surfaces and cavities will be obtained. A model will be proposed as part of the research findings in order to summarise the application of Au-nanoparticles in relation to material sciences and drug design. Polymer interactions based on HCNB clusters will also be studied.
Project Title	**Solidification and properties of novel peritectic TiAl-based alloys**
Coordinator at MTF	Ing. Svetozár Demian
Start Date	01/05/2011
End Date	31/10/2014
Programme	APVV, General Call
Annotation	Peritectic alloys based on TiAl are excellent candidates for near net shape casting of light-weight structural components for aircraft and automotive engines, industrial gas turbines and new generation of nuclear reactors. To advance the knowledge in the emerging casting technology sector of TiAl-based alloys, the SOPERIT project aims to investigate microstructure formation and segregation during solidification and solid phase transformations of novel peritectic TiAl-based alloys. The attention is directed to understand the effect of solidification parameters and alloying on the primary solidification phase, solidification path, phase equilibria, the columnar-to-equiaxed transition (CET, texture formation and nucleation activity of peritectic phase which will open up new opportunities for alloy and process design. The novel peritectic alloys with a fine grain structure will be designed and their microstructure and properties (chemical, physical and mechanical) will be characterised. Fine grain structure will be achieved through appropriate alloying affecting nucleation of peritectic phase and solid phase transformations. Unique CET experiments will provide advanced knowledge about the mechanisms of nucleation of exquiaxed grains, associated segregation and the necessary input data for CET modelling. Parallel to these research activities, laboratory near net shape casting techniques based on plasma melting in a water-cooled crystalliser and gravity casting into ceramic moulds will be developed.

Project Title	**Preparation and characterisation of composites with the polymer matrix – elastomer, reactoplast**
Coordinator	Mgr. Ondrej Bošák, PhD.
Start Date	01/01/2012
End Date	31/12/2013
Programme	APVV, SR - Czech Rep.
Annotation	The project is aimed at mutual co-operation in the field of preparation and study of newly developed materials on the base of rubber mixtures and composites based on polymer substances filled with non-oriented and oriented fibres and nanotubes. Partnering workplaces in the Czech Republic are able to prepare examined materials and diagnose common technical applications. The Slovak partner will focus on diagnostic methods either in the field of interaction of the electromagnetic field with material, or in the area of characterisation of the thermo-mechanical behaviour at elevated temperatures.
Project Title	**Research and development of advanced materials, processing and automation technologies for direct manufacturing and application**
Coordinator	doc. Ing. Martin Kusý, PhD.
Start Date	01/09/2011
End Date	31/08/2014
Programme	Other international
Annotation	The subject of the research is focused on advanced materials, processing and automation technologies for direct manufacturing and its application.
Project Title	**Structure, properties and processes at surfaces and interfaces of materials from first principles calculations.**
Coordinator	RNDr. Andrej Antušek, PhD.
Start Date	01/01/2012
End Date	31/12/2015
Program	VEGA
Annotation	The project is focused on density functional calculations of surface and interface structures relevant for materials science and chemistry. Through the application of methods of theoretical and computational chemistry the research will address the growth of a thin layer and the subsequent thermodynamic properties of such structures with possible applications in brazing and joining technology. Using our previous experience with intermolecular interactions, the research will model interactions of molecules with surfaces, with a focus on increasing the understanding of the bonding mechanism. For smaller model systems accurate relativistic CCSD (T) calculations will be used as benchmarks to verify DFT results. Wave function calculations may also be useful for the selection of a proper DFT functional.
Project Title	**Study of phase equilibria in advanced materials using aimed experiments and computational thermodynamics.**
Coordinator	Ing. Roman Čička, PhD.
Start Date	01/01/2011
End Date	31/12/2013
Program	VEGA
Annotation	The aim of the research project is to contribute to the thermodynamic description by creating and assessing the thermodynamic databases of

selected materials systems for PB-free solders, advanced steels and complex metallic alloys. In the experimental part of the study the chemical and phase compositions of samples in investigated systems will be determined, their thermodynamic properties will be measured and phase transitions will be characterised. This data will be analysed and compared to results of computations of phase equilibria, using the CALPHAD method and the Thermocalc software. Based on this procedure, the thermodynamic description of phases in the investigated systems will be optimised and values of interaction parameters of components will be refined. These results should be useful for planning further research of new alloys in these systems, aimed to improve the properties of existing materials.

Project Title	**Study of crystal structure and thermodynamic properties of aluminium-base and zinc-base complex metallic alloys**
Coordinator	prof. Ing. Jozef Janovec, DrSc.
Start Date	01/07/2012
End Date	31/12/2015
Programme	APVV, General Call
Annotation	The project is focused on the study of phases, their equilibria, and transformations due to changes in temperature and chemical composition in aluminium-base and zinc-base complex metallic alloys, as well as on the determination of their crystal structure, This study will be carried out using experimenal (X-ray diffraction, DTA, DSC, TEM, electron diffraction, SEM, EDX, WDX, and EBSD) and theoretical (CALPHAD, DFT and empirical potentials) tools. Selection of alloys will be focused on systems where one component is either aluminium or zinc, and the remaining components are formed by transition metals. The project may significantly contribute to complementation and clarification of phase diagrams in areas that are less well-known and poorly studied. The emphasis will be placed on areas where structurally complex and quasicrystalline phases could be supposed. The contribution to finding of new quasicrystalline and structurally complex phases is anticipated. Theoretical study of these phases will lead to a more detailed description of their crystal structure, as well as to a deeper understanding of the relationship between the structure and physical properties.

Project Title	**Study into structural and mechanical stability of a new extremely hard coating for the construction and tool materials.**
Coordinator	doc. Ing. Ľubomír Čaplovič, PhD.
Start Date	01/01/2012
End Date	31/12/2014
Programme	VEGA
Annotation	The project is aimed at analysing the effect of structural, material and technological parameters of the current advanced coatings applied on the construction and tool materials in specific conditions of their application. The latest analytical techniques (HRSEM, HRTEM, EBSD, RTG diffraction) will be used to examine the mechanism of forming wear-resistant types of PVD coatings on selected types of materials. The following evaluation of mechanical and tribological characteristics will be used to describe the influence of dynamic and static load of the layers on their operational

reliability. The goal is to find a correlation between the internal construction of coatings, their interphase interfaces with substrate, structural tension relations in the layers, way of heat treatment prior to and post the PVD application and their tribological properties.

Project Title	**Effects of inhomogeneities on functional properties of high-temperature superconducting wires**
Coordinator	Mgr. Michal Skarba, PhD.
Start Date	01/01/2011
End Date	31/12/2014
Program	VEGA
Annotation	Non-metallic superconductors based on a mixture of Y, Ba and Cu oxides (YBCO) are well known materials showing superconductive properties at relatively high temperatures. Structural analysis of micrometer superconductive layers on metallic substrate enables an understanding of the relationship between the parameters of preparation of layer and its properties. During deposition of layer on metallic substrate and during further processing, defects in the structure of thin layers of YBCO develop. These defects significantly affect the electromagnetic properties of superconductors, especially critical current and ac losses. Information about defects in layers of YBCO, inferred from structural analysis, is useful for decreased imperfections of production of superconductive layers. It is also necessary for the development of superconductive devices, because they can have a significant influence on their working characteristics. Evaluations of structure of thin superconductive layers will be performed mainly with (high-resolution) TEM.

Project Title	**Study of relaxation mechanisms in composites with special carbon-based filling**
Coordinator	doc. Ing. Marian Kubliha, PhD.
Start Date	01/01/2013
End Date	31/12/2015
Programme	VEGA
Annotation	The project is aimed at the implementation of measurements of selected physical parameters in the study of composites with polymeric matrix with an emphasis on the investigation of relaxation mechanisms in the structure. In the case of the matrix formed from reactoplast, the project is oriented on the evaluation of the impact of nanoparticles and carbon fibres (content and the arrangement of the individual phases) on mechanisms of dielectric behaviour. In the case of the matrix based on elastomers, the critical processes are examined in the formation of rubber mixture vulcanisers, as well as in their thermo-mechanical degradation. Correlations between the composition of the investigated system and the values of the rheological, electrical, dielectric quantities at non-isothermal heating of rubber mixtures are described. Important characteristics such as the resistance to thermo-mechanical exposure and the reproducibility of the properties defined by the values of the physical properties are discussed, too.

Project Title	**Study of the turbulent accretion process in accreting binary systems through flickering activity**
Coordinator	Mgr. Andrej Dobrotka, PhD.
Start Date	01/01/2013
End Date	01/01/2015
Programme	VEGA
Annotation	The main purpose of the project is to study turbulent flow in the high Reynolds number (Re) regime, not accessible in today's laboratories. Accretion systems are unique cosmic experiments to do so. The turbulence minimum dimension scales in the fluid are described by the Re. The largest scales of fluid motion are set by the overall geometry of the flow and are dissipating into smaller eddies up to the minimal dimension scale. From the basic fluid mechanics it is well known that higher Re numbers yield a smaller minimal dimension scale. From Re about 10^6 the dissipation toward smaller scales of turbulent elements is so strong that the fluid becomes quasilaminar. The bigger eddies should dissipate and hence disappear. Today Re estimates from Earth point towards a value of about 10^8. What is happening then? The typical Re in an accretion disc of cataclysmic variables is of about 10^12 and one of the possibilities to explain flickering is turbulence in the disc.

Project Title	**The Influence of exposure conditions on the evolution of binary and ternary phases in aluminium-based complex metallic alloys**
Coordinator	prof. Ing. Jozef Janovec, DrSc.
Start Date	01/01/2012
End Date	31/12/2014
Programme	VEGA
Annotation	The evolution of binary and ternary phases under thermal activation in Al-based CMAs will be studied with the intention to make the concerned phase diagrams more precise. The Al-TM-TM (TM=transition metal) alloys will be annealed for long-terms at various temperatures and then quenched to fix the microstructure at annealing temperature. To analyse the phases, XRD, TEM, SEM, DTA, EDX, WDX, and EBSD, thermodynamic simulations will be used. Attention will be paid to the systems investigated insufficiently until now. Based on the experimental results and the available theoretical knowledge, precise thermodynamic parameters will be determined for the identified phases and the related databases will be modified. The use of advanced experimental methods gives rise to methodological innovations. The project is expected to contribute to the basic knowledge and perhaps to the discovery of new phases exhibiting original properties.

Project Title : Chemical sputtering: Computational modelling of interactions in the carbon-containing films exposed to molecular ions and hydrogen EURATOM CU
Coordinator: prof. RNDr. Miroslav Urban, DrSc
Start Date: 01/01/2010
End Date: 01/09/2014
Programme: Euromat The formation of small hydrocarbons, their chemistry and cracking pattern upon the electron (e-) impact and/or the thermodynamics of the formation of saturated lower hydrocarbons. Interaction energies of the hydrogen, nitrogen and molecular ions with compounds representing and model for

interactions with hydrogenated carbon films. Calculations of ionisation potentials of small hydrocarbons, CxHy (CxHyDz) and their ions, their properties and thermodynamic stability.

INSTITUTE OF PRODUCTION TECHNOLOGIES

PROJECTS OF THE INSTITUTE

Project title	**Design, implementation and use of joint programs regarding quality in manufacturing engineering**
Coordinator	Ing. Ladislav Morovič, PhD.
Start Date	2012
End Date	2013
Programme	Networking of university researchers
Annotation	The aim of the project is to increase the level of students' education and flexibility in the field of production engineering and production engineering quality in the central European region. The primary goal is to implement a common Masters and Doctoral study programmes and improve co-operation within the network.

Project title	**Investigation of dynamic characteristics of the cutting process in 5 - axis milling in context of 5 - axis machining at the Centre of Excellence.**
Coordinator	doc. Ing. Peter Pokorný, PhD.
Start Date	01/01/2011
End Date	31/12/2013
Programme	VEGA
Annotation	The project aims to explore the dynamic characteristics of the cutting process. In this context, the project studies the distribution and effect of cutting forces in the 5-axis milling. The chatter as well as its origination, effect and ultimately the conditions for its elimination are important dynamic characteristics as well. The project therefore addresses the causes of the chatter in 5 - axis milling and deals with the solutions for milling without the chatter. The suitable choice of CAM milling strategies with regard to the desired shape and quality of a part is also an important parameter in the process of 5 - axis milling. The project therefore also analyse the impact of various 5 - axis milling CAM strategies on dynamic characteristics of the cutting process.

Project title	**Joining of surface treated thin steel sheets by modern joining methods**
Coordinator	prof. Ing. Milan Marônek, CSc.
Start Date	27/04/2011
End Date	31/12/2013
Programme	VEGA
Annotation	The scientific project deals with joining (welding and adhesive joining) of steel sheets with a different kind of surface treatment. The surface layer significantly influences arc stability of technological process and the

	subsequent quality of weld and adhesive joints. As the new joining technologies (laser beam welding, arc welding methods with controlled metal transfer, hybrid welding methods, MIG brazing and adhesive bonding) are gradually being applied in practice, there is the necessity to know the suitability of these joining methods to the defined surface treatment or to specify the range of process parameters leading to quality joint formation.
Project title	**Technological heritability of laser micromachining process and its influence on technological and exploatation properties of material.**
Coordinator	prof. Ing. Peter Šugár, CSc.
Start Date	01/01/2011
End Date	31/12/2014
Programme	VEGA
Annotation	The goal of the project is to research of the laser micromachining process (laser micromilling and so called laser microstructuring) during machining of metals by solid-state Nd: YAG laser. Two fields of interest are solved in this project. The first is the assignment of laser-induced surface degradation relevancy on changes in corrosion resistance ofstainless steels and Ti-alloys with the different degree of deformation strengthening (thin sheet plates made by technology of drawing and metal spinning). The second area of interest is to define optimal technological conditions of laser structuring in the processes of incremental forming tools and semifinished products surfaces modifications.
Project title	**Effect of the 5-axis grinding parameters on the geometrical precision of shank cutting tools**
Coordinator	doc. Ing. Štefan Václav, PhD.
Start Date	01/01/2012
End Date	31/12/2013
Programme	VEGA
Annotation	The project deals with the precision of cutting tools (drills and milling cutters) made by 5-axis CNC sharpening technology. Researchers in this project use a new method of experiment planning, where acquired relations will be dimensionally homogeneous and indicators of equations (dimension constants) will gain a physical sense. The project output will be dissemination of the theory of highly-parametrical grinding, a shift from 3-axis to 5-axis grinding. A unique contribution will be also the determination of tool life by means of specific cutting entropy. The goal is the verification of the originally manufactured tools for 5-axis milling machines and their subsequent measurement of geometry prior to and post machining on both the Zoller 5-axis measuring machine and optical scanner.
Project title	**Implementation of an online classroom for the dynamic education of secondary technical school and university students focused on design and manufacturing of freeform surfaces**
Coordinator	prof. Dr. Ing. Jozef Peterka
Start Date	01/01/2012
End Date	31/12/2013
Programme	KEGA
Annotation	The project aim is to develop an online classroom for the dynamic training of secondary school and university students and the pilot implementation of the online classroom for training the wider public in the field of CNC machines

and CAD/CAM systems programming as well as for accredited study programs of Computer-Aided Production Technologies (Bc.) and Computer-Aided Design and Production (Master) at STU MTF. The project will comprise the elaboration of complex materials (texts, presentations, multimedia videos, sample tasks) placed on the designed internet website available for all potential interested parties. Results will be applicable to the whole Slovak Republic as well as abroad.

Project title	**Research into the metallurgical joining and other technological processes of processing the magnesium and other light alloys by progressive and suitable environment-friendly technologies**
Coordinator	prof. Ing. Milan Turňa, PhD.
Start Date	01/01/2012
End Date	31/12/2013
Programme	VEGA
Annotation	The project will focus on the design, experimental verification and scientific justification of technological processing of Mg alloys. Selection of progressive and environment-friendly technologies of metallurgical joining and forming. Welding and soldering/brazing the Mg alloys with other metals (Al, Ti, steels). Design and quality control of joints by using advanced non-destructive and destructive methods. A detailed study will be conducted of the interface of combined joints with the AZ91and AZ31 alloys, thus contributing to the research into the mechanisms and their origin and participation into the development of a new Mg alloy of ML5 type. The investigation of heat distribution by concentrated energy sources and comparison with AWJC. Verification for the possible use of microplasma polishing of surfaces of the Mg and Al alloys will be made. The study will focus on the strain/stress-deformation states of materials in processing the Mg and Al alloys (ISF, MS, Thixoforming) in order to optimise the parameters of forming processes and predict utility properties of products. The justification of the economic and environmental priorities of the individual technologies will also be given.

Project title	**Research into the effect of parameters of selected technological processes on the integrity of surface layers**
Coordinator	doc. Ing. Jozef Bílik, PhD.
Start Date	01/01/2012
End Date	31/12/2014
Programme	VEGA
Annotation	The project is aimed at examining the effect of selected technological parameters and technological impact on the properties and integrity of surface layers in order to predict the utility and life-cycle of products. The goal is to determine the effect of speed and transformation size on the integrity of surface layers made by ramming, charging, spinning, rolling, shooting or cold-drawing of pipes and wires. To assess integrity, the research will use conventional methods of qualitative analysis as well as the results attained by the application of stereological materialography, Abott-Fireston curves and evaluation of tribological properties. The attained results will be applied in the prediction of utility properties of formings and parts in practice.

Project title	**Research into the weldability of duplex and superduplex stainless steels by concentrated energy sources**
Coordinator	prof. Ing. Koloman Ulrich, PhD.

Start Date	01/01/2011
End Date	31/12/2013
Program	VEGA
Annotation	The aim of the scientific project is the investigation and proposed solutions to problems regarding the weldability of duplex steels with laser and electron beam. The welding of duplex steels with arc processes has been solved and is currently used in practice. Welding with laser and electron beams, generally presents a problem with attaining a suitable proportion of the structural components austenite/ferrite (around 50/50 %) and results in poor corrosion resistance. The balance of phase's ferrite-austenite is important primarily from the aspect of corrosion, which is the main of priority of duplex steels.

Project title	**Development of a lead-free solder for the application at higher temperatures and research of material solderability of metallic and ceramic materials.**
Coordinator	doc. Ing. Roman Koleňák, PhD.
Start Date	01/01/2011
End Date	31/12/2013
Program	VEGA
Annotation	The project is aimed at the development of a lead-free solder for the application at higher temperatures. The developed solder is designed for environmentally friendly soldering of metallic and ceramic materials. The developed solder will be used for solderability tests of ceramic and metallic materials with the application of flux and without flux through the use of ultrasound power. The structural character of the solder under diverse soldering conditions will be studied, including the interactions on the soldered metal - solder boundary. The qualitative solderability criteria of wettability, spreadability, capillarity, diffusion and erosion at normal and extreme soldering conditions will be determined. The shear strength of joints fabricated with the developed solder in metallic and ceramic materials will also be determined. The ageing tests and thermal cycling tests of soldered joints will be also performed.

Project Title	**Research on the weld joints properties of duplex and superduplex steels**
Coordinator	prof. Ing. Koloman Ulrich, PhD.
Start Date	01/10/2013
End Date	31/12/2016
Programme	APVV
Annotation	The project is focused on the basic research conditions and procedures for creating the weld joints by laser and electron beam in selected types of duplex stainless steels with a ferritic-austenitic structure. Concentrated energy sources, due to their flexibility allow for the immediate application of preheating before the welding process and post-heating after the welding process using a defocused or rasterised beam, which provides great research potential. The weldability of duplex and superduplex steels, the structural analysis and the tests of mechanical properties, as well as corrosion properties will be investigated at particular stages of the project. All processes

of the technological network participate in creating the final properties of the product. For this reason the experimental research programme will also cover the analysis of weld joints created from materials influenced by different types and levels of deformation, as well as the sheet forming of weld joints. A special focus will be devoted to finding the correlation between the crucial technological parameters of the process and the properties of the weld joint. The project has the aim to push the knowledge boundaries of the welding process of selected duplex stainless steels through the application of concentrated energy sources, such as laser and electron beam.

Project Title	**Research on new soldering alloys for fluxless soldering with the application of beam technologies and ultrasound**
Coordinator	doc. Ing. Roman Koleňák, PhD.
Start Date	01/10/2013
End Date	31/05/2017
Programme	APVV
Annotation	The project is oriented towards the research of environmentally friendly solder alloys and conditions of soldering with progressive technologies. The designed and experimentally manufactured solders will be used for the soldering of metallic and ceramic materials at higher application temperatures. To ensure the wettability of ceramic and hard-to-solder materials, the solders will be alloyed with active elements and metals from the group of lanthanides. The tests of technological solderability of ceramic and metallic materials will be performed through the use of new soldering alloys for flux-free soldering, with the application of laser technologies, power ultrasound and electron beam. The structural characteristics of solders and soldered joints will be studied under different soldering conditions. Interactions in the boundary of joined material and the solder will be investigated. Qualitative criteria of solderability such as wettability, spreadability, diffusion and erosion will be determined at standard and extreme soldering conditions for research to investigate the application conditions of soldering. The shear strength of soldered joints fabricated in metallic and ceramic materials will be determined.

Project Title	**Study of environmentally-friendly binder as a biological base for moulding sands**
Coordinator	Ing. Roland Šuba, PhD.
Start Date	01/01/2011
End Date	31/12/2013
Programme	VEGA
Annotation	Foundry personnel using conventional binders are exposed to numerous known carcinogens. The main aim of foundries is to achieve a decreased amount of toxic agents in the foundries air, by achieving the required mechanical properties of moulds and cores, the appropriate disintegrated properties after moulding and the regenerating of sand material. The non-toxic, biodegradable, water soluble binders with rapid thermal breakdown can help to meet and even exceed these requirements.

INSTITUTE OF PRODUCTION SYSTEMS AND APPLIED MECHANICS

PROJECTS OF THE INSTITUTE

Project title	**Analysis of non-equilibrium thermal, metallurgical and stress-strain processes in production technologies involving rapid cooling and solidification of metallic materials.**
Coordinator	doc. RNDr. Mária Behúlová, CSc.
Date from	01/01/2011
Date to	31/12/2014
Programme	VEGA
Annotation	Rapid cooling and solidification of materials in non-equilibrium conditions is used in several advanced technologies of production and the processing of metallic materials. The research in the framework of the submitted project will be focused on experimental investigation, numerical simulation and analysis of non-equilibrium thermal, metallurgical and stress-strain processes in technologies of preparation of rapidly solidified powders using inert gas atomisation of melt, material forming in semi-solid state and also the laser welding and surface heat treatment. The main aim of the project is the identification of common characteristics, phenomena and non-equilibrium processes leading to the development of refined microstructures in the conditions of rapid cooling and solidification of materials. In the theoretical field, the project should contribute to the explanation of physical and metallurgical reasons and mechanisms of metastable structures development in the high-alloyed materials on the base of iron and aluminium.

Project title	**Application of innovative layers and coatings for reconstruction of tribologicaly loaded surfaces.**
Coordinator	Ing. Eva Labašová, PhD.
Date from	01/01/2011
Date to	31/12/2013
Programme	VEGA
Annotation	The operation of technical systems results for interacting elements to the surface changes of elements. These changes are caused by the surface wearing and in many cases; the degradation of a tribological surface is caused as the consequence of unstable operational processes. Geometric changes of tribological surfaces (TS) generate improper transfers of power effects, causing further degradation of the TS element which often leads to element damage. Early diagnostics of incorrect functionality of TS and its subsequent reconstruction by innovative layers leads to regeneration of the correct tribological functionality of surface, prolongation of element life -time and renewal of the correct operational state of the technical system. The objective of the project is to analyse tribological layers properties in terms of material and geometrical parameters. Using numerical analysis will examine the stress-strain states of loaded TS with innovative layers. The results of computational analysis, wear and life will be verified experimentally.

Project Title	**Numerical, symbolic and experimental analysis of nonconservative mechanical systems**

Coordinator	Ing. Tibor Nánási, CSc.
Date from	01/01/2011
Date to	31/12/2013
Programme	VEGA
Annotation	Undesired vibration and excessive noise is persistently accompanying even the operation of the most advanced technological systems. The proposed project focuses on the development of analytical, numerical and experimental methods of analysis of complex mechanical systems with non-conservative couplings. Such an approach may be found in contradiction with common practice when the non-conservative problems are using artificial assumptions, transformed to a form which can be approached by conservative methods. The project involves also design and building of equipment for the measurement of damping as a function of frequency and temperature as well as equipment allowing for the non-conservative loading of the structure under consideration.

Project Title	**Research into the possibilities of "intelligence" implementation in the assembly process.**
Coordinator	doc. Ing. Peter Košťál, PhD.
Date from	01/01/2012
Date to	31/12/2014
Programme	VEGA
Annotation	The intelligent assembly paradigm includes a new approach to assembly system structure design. For the manipulation and assembly the industrial robot is used and equipped with the industrial vision system. Intelligent behaviours are based on the monitoring of important parameters of the system and its environment and the flexible reaction to changes. Realisation and utilisation of this design paradigm as an "intelligent assembly system" enables the flexible system to react to the production requirements as soon as the environment changes. Results of these flexible reactions are a smaller layout space through decreasing the production and investment costs and by increasing productivity.

Project title	**Analysis of the combined formation of laser weld joints of titanium and aluminium alloys using numerical simulation.**
Coordinator	Ing. Eva Babalová, PhD.
Date from	15/02/2013
Date to	31/12/2013
Programme	Programme to support young researchers
Annotation	The project is focused on numerical simulation and analysis of the welding processes of titanium and aluminium alloys under different technological conditions. The main aim of the project is the development of a simulation model for laser welding of combined materials including the design of alternative geometries of welded joints, definition of the nonlinear temperature-dependent material models established by measuring the thermophysical and mechanical properties of welded materials, as well as the determination of boundary conditions and loads focused on the optimisation of the model for the laser heat source and the whole process of laser welding. The project includes also the realisation of welding experiments, the

production of experimental combinations of welded joints of titanium-aluminium alloy and the metallographic analysis and assessment of the welds quality.

Project title	**Research into the possibilities for increasing the efficiency of assembly in the intelligent assembly cell**
Coordinator	Ing. Radovan Holubek, PhD.
Date from	15/02/2013
Date to	31/12/2013
Programme	Programme to support young researchers
Annotation	The project is focused on the visualisation of the assembly process in real time in the Intelligent Assembly Cell. The Intelligent assembly cell concept includes proposed new solutions to create structures of assembly systems. It is the developed design of an assembly system under the project of an intelligent assembly cell at the Institute of Production Systems and Applied Mechanics. After running the process and debugging, the process analysis was evaluated and it is necessary to then increase the efficiency of the cell. Deployment of monitoring, visualisation and simulation are predicted defects that reduce the overall system effectiveness. The project aims to develop an efficient intelligent manufacturing system integrating real time data collection, simulation, optimisation and synthesis. The analysis carried out at the beginning of project solution, was chosen as a suitable tool to increase the efficiency of the visualisation for assembly processes in the IAC. During the assembly process, on the visualisation panel, we can verify and compare the current position of each arm of the Cartesian robot, and the used tool or gripper.

INSTITUTE OF APPLIED INFORMATICS, AUTOMATION AND MATHEMATICS

Projects of the Institute

Name of the project	**Project IPID**
Duration of project	01/2011 - 12/2014
Programme	DAAAD - The German Academic Exchange Service
Annotation	
Within the IPID programme, doctoral students of both universities (TU Ilmenau, Germany and STU MTF) have the chance to participate in mobility at the partner university. The programme aim is to enable both domestic and foreign doctoral students to acquire a multi-national dissertation, thus educating high-quality young researchers for both Slovakia and Germany, and establishing scientific co-operation between the two countries.	

The programme involves two activities:

1. Fulfilling the partial objective of the "Autonomy microsystems for biosensorics" project.
   The project aim is to examine and design modern technologies for microtechnologically constructed biosensors which are independent in terms of power and able to communicate with each other in local networks, transferrable and implantable into a human organism. The intention is strongly interdisciplinary, and therefore structured to various branches and faculties.

2. Multi-national network of PhD students.
   The programme simultaneously supports the establishment of a multi-national network for PhD students' education which would enable the exchange and mobility of PhD students and support the perspective of multi-national study programmes and double doctoral degrees.

Name of the project	**Workplace:** Automation and ICT Implementation of Production Processes and Systems – University Scientific Park
ITMS of project	26220220179
Duration of project	03/2013 - 06/2015
Operational programme	Research and development

Annotation

The aim of the project is ***to build*** *a* modern and unique university integrated scientific park and to prepare ***highly-qualified operative staff*** for it, to train ***management*** for the needs of the regional and the whole country as well as central-European large industrial enterprises in the transfer of the application science results directly into practice.

After the project implementation, CAMPUS MTF STU University Scientific Park will possess a research workplace of Automation and ICT Implementation of Production Processes and Systems with several specialised research laboratories forming the core of the related part of the University Scientific Park, oriented on the development of the control and information technologies. The specified part of the University Scientific Park, i.e. Automation and ICT Implementation of Production Processes and Systems, is in compliance with the intention of the governmental research and technology policy and the Strategy for Europe 2020.

The Park and its laboratories will form a fundamental pillar of the research and development infrastructure in accordance with the University system priority to support the transfer of research and development results into practice, currently preferably in the region and the following geographical expansion.URP will deal with the research and development projects within the defined research areas, while using progressive technologies of implementation.

Name of the project	**Implementation of the internal system of quality assurance in education**
ITMS of project	26110230042
Duration of project	01/2012 - 12/2013
Operational programme	OPV – 01- 02/02/2010 -SORO
Annotation	
The aim of the project is to design and verify the system of objective quality assessment and effective and purposeful education in order to achieve continual adaptation of tertiary education institutions to current and future needs of knowledge society. It will enable the introduction of the system of direct quality measurement of tertiary education, while improving the outputs and approximating the educational system to the society needs. The project objectives are: • to design and verify the system of objective quality assessment of education in the Bachelor's study programmes in STU MTF; • to design and verify the measures aimed at eliminating the information disproportion in the bachelor study programmes in STU MTF; • to design and verify the measures for increasing the education quality in the Bachelor's study programmes in STU MTF; • to design and verify the evaluation of measures in the Bachelor's study programmes in STU MTF.	

Project Title	**Identification and evaluation of shapes and surfaces of materials scanned by laser confocal microscope**
Coordinator	Ing. Tomáš Bezák, PhD.
Start date	01/01/2012
End Date	01/01/2015
Programme	KEGA
Annotation	Laser confocal microscopy (LCM) is gradually taking place in many workplaces in Slovakia despite the undisputed financial costliness. Particularly biological science divisions appear to be the core area, where the representation of the LCM grows faster. In contrast the episcopic illumination system typical for metallurgical applications systems is limited and currently there are two devices in Slovakia and they may be still considered as unique. The advantage of laser confocal microscopy compared to conventional light microscopy is in the markedly increased depth of sharpness, which at a magnification of 100x is up to the value of 10 mm. However, this benefit is achieved with a substantial time-consumption of scanning and subsequent need for robust image processing software tools. Complexity, robustness and effort on the universality of commercial instruments have resulted in difficulty satisfying the specific application requirements.

Project Title	**Study of flexible mechatronics system variable parameters influence on its control**
Coordinator	Dr.h.c. prof. Dr. Ing. Oliver Moravčík
Start Date	01.01.2013
End date	31.12.2015
Programme	VEGA
Annotation	Within the context of using new flexible materials and derated mechanism constructions in the mechatronics systems, presently a large focus is dedicated to the elimination of spurious frequencies in drives and motional mechanisms in research. Because of the extensity of this issue this project deals with the elected type of mechatronics system only. The basic aim of adaptive control in this type of system is to eliminate ineligible influences. The proposed project is focused on: - Physical and mathematical analysis of parameters influencing control; - Design and verification of chosen advanced control methods; - Investigation of sensitivity and robustness of the solution. The basic objective of the project is to design in an appropriate manner the flexible mechatronics system adaptive control.

Project title	**Elaboration of interactive multimedia textbook "Mechatronics" for secondary vocational schools**
Coordinator	doc. Ing. Pavol Božek, CSc.
Start Date	01/01/2012
Programme	KEGA
Annotation	Various multimedia techniques allow for better, more intensive and efficient perception of information (texts, drawings, pictures, speech, music, animations and videos) in specific subjects. Students are not able to remember the enormous amount of information in the current teaching/learning practice. It is therefore crucial to be able to organise the information, grasp the aim and fundamentals of the subject studied. Multimedia and hypertext are the right tools for supporting the work with information in the related study material, as it is easy to search and focus on it. The project is centred on the preparation and elaboration of a new educational application for engineering secondary schools in the Slovak Republic with the aim of increasing the quality of teaching within the subject of "Mechatronics".

Project Title	**Research in the area of utilising the inertial navigation system in roboto-technology**
Coordinator	doc. Ing. Pavol Božek, CSc.
Start Date	01/01/2012
End Date	--
Programme	VEGA
Annotation	The research project deals with the design of an inertial navigation system (further on INS) which will be used for calibration of a robotised workplace. Calibration is necessary to adjust the simulation of the production equipment model to real geometric conditions. Design of the production equipment model as well as development of the related robotic programs by means of a simulation system represents a real picture of reality. Absolute compliance with reality cannot be supposed however. Deviation of reality from simulation may occur due to various reasons (position of workpiece, geometric precision

of tool, mutual position of robotic axes etc.) The designed INS will be used for their calibration without using calibration means, which will significantly simplify calibration in practice. The aim of the research project is the design, simulation and experimental verification of the original processor system for processing the data from electronic gyroscopes enabling calibration and simplification of inspections and measurements in production.

Project title	**The data mining usage in manufacturing systems control**
Coordinator	doc. Ing. Pavel Važan, PhD.
Start Date	01/01/2011
End Date	31/12/2013
Programme	VEGA
Annotation	The project is focused on the use of data mining techniques for gaining knowledge of manufacturing systems. The knowledge will be used in the management of these systems. The simulation models of manufacturing systems will be developed in order to obtain the necessary data about controlled production systems. Various control strategies will be implemented in these simulation models. The researchers will develop a way of storing the data obtained from the simulation models in the data warehouse (it will include thousands of records) and create a data mining model using specific methods and selected techniques for specific problems of production system management. The collected knowledge about production management system and designed parameters of a particular management strategy will be tested on a simulation model of the production system. Proposal of the data-mining methodology for storing operation data of the production process will be an important benefit of the project.

INSTITUTE OF INDUSTRIAL ENGINEERING AND MANAGEMENT

Projects of the Institute

Project Title	**Rationalisation and improvement of the "Industrial Management" study programme with the aim to support career consultancy**
Coordinator	doc. Ing. Jana Šujanová, CSc.
Start Date	01/01/2012
End Date	31/12/2013
Programme	ESF
Annotation	The project is aimed at improving the Industrial Management study programme by using ICT and other modern methods of education in terms of career consultancy. Based on the "Principles of education quality management in STU Bratislava" as well as the practice requirements for graduates of the Industrial Management study programme, the project will introduce the changes with the aim to: - improve the graduates' employability in the labour market, - train graduates for the development and implementation of innovations of work procedures, products and services,

- enable the checking of the study achievements,
- respond to the requirement regarding the implementation of the European Qualifications Framework,
- provide prerequisites for the continual monitoring of the study achievements and thus enabling flexible innovation of the study programme contents and methods.

Project Title	**Identification of key parameters of sustainable performance of industrial companies under the conditions of a multicultural environment**
Coordinator	prof. Ing. Miloš Čambál, CSc.
Start Date	01/01/2012
End Date	31/12/2014
Programme	VEGA
Annotation	This project investigates the approaches to organisation performance management in terms of performance sustainability. The emphasis is on "sustainability", since currently used models of performance management have a detrimental impact on the decisive groups of employees (long-time over-loading, burn-out syndrome, health troubles of various character), decreased their performance and thus also performance of the whole organisation and its competitiveness. The project is aimed at solving the subject under the specific conditions of multicultural organisations (with orientation on industrial companies), requiring the approaches different from those applied in monocultural organisations.

Project Title	**Information Quality Management in project management of industrial companies in SR**
Coordinator	doc. Ing. Jana Šujanová, CSc.
Start Date	01/01/2012
End Date	31/12/2014
Programme	VEGA
Annotation	The project focuses on the results of the projects worked on in the Institute of Industrial Engineering, Management and Quality of STU MTF in Trnava: - VEGA 1/2578/05: Analysis of current world-wide trends of project management, research of current state of the subject in Slovakia and a proposal of its implementation in the conditions of Slovakia; - ESF 11230220391: Modular system of distant education in project management with e-learning and information technologies support; - VEGA 1/0491/09: Maturity inspection of project management processes as a tool of increasing competitiveness of industrial companies. Partial outcome of the above-mentioned projects was the identification of shortcomings in the field of information and information management quality, negatively influencing the projects' impact. The project aim is to design a methodology of information quality management in project management of industrial companies in SR.

Project Title	**Research into the factors influencing the selection and implementation of the tools of integrated marketing communication with regard to the**

	information security and customer protection
Coordinator	prof. Ing. Jarmila Šalgovičová, CSc.
Start Date	01/01/2012
End date	31/12/2014
Programme	VEGA
Annotation	The project is aimed at investigating and evaluating the factors influencing selection and subsequent implementation of the tools of integrated marketing communication in the conditions of various types of organisations. The application of tools should represent an optimum model corresponding with various aspects of information security management in compliance with the EU rules on one hand, and security and safety requirements on the other hand. Project output will be a proposal of the methodology procedure of practical application of evaluation, verification, selection and following implementation of the integrated marketing communication tools in various types of organisations via utilising optimum software with the aim to improve the level of integrated marketing communication in the organisations oriented on customer, product quality and information security.

Project Title	**Implementation of the subject " Corporate Social Responsibility Entrepreneurship" into the study programme Industrial Management in the second degree at MTF STU Trnava**
Coordinator	prof. Ing. Peter Sakál, CSc.
Start Date	01.01.2012
End Date	31.12.2014
Programme	KEGA
Annotation	The content of the project concerns the implementation of the subject "Corporate Social Responsibility Entrepreneurship" into the study programme Industrial Management in context of the strategy of corporate social sustainable development of the EU. Firstly accepted in Gothenburg in 2001 and consequently revised in 2006 and 2009. The strategies include, Europe 2020 for Employment and Growth, Enterprise 2020, key findings from the council meeting on 19th November, 2010 about education for sustainable development (2010/C 327/05), and also from the Organisation of United Nations (OSN) summit from 20th-22nd September, 2010 regarding the millenium development aims and the present accepted norms. The project also considers ISO 26000 relating to corporate social responsible entrepreneurship

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Project Title	**Transformation of the ergonomics programme into the company management structure through integration and utilisation QMS, EMS, HSMS**
Coordinator	prof. Ing. Jozef Sablik, CSc.
Start Date	01/01/2013
End Date	31/12/2015
Programme	VEGA
Annotation	The project is aimed to confirm the need, definition of the possibilities and proposal of the process using an integrated QMS/EMS/HSMS for transformation of the content of the ergonomic programme into structured

activities of management for the company. Application of the project outputs envisages the creation of conditions that improve the work process, which guarantee a long term high level of work performance with minimal risk to safety and health of employees in accordance with the philosophy of sustainable development.

Project Title	**The concept of the HCS 3E model vs. the concept of Corporate Social Responsibility (CSR)**
Coordinator	prof. Ing. Peter Sakál, CSc.
Start Date	03/09/2009
End Date	07/06/2013
Programme	APVV
Annotation	The project aims at disseminating the results of research projects No. 019/2001: "Transforming Industry in Slovakia Through Participatory Ergonomics" and KEGA No. 3-3111-05. The research is currently being conducted in co-operation with CHIRANA PROGRESS, s.r.o. Company in Piešťany in the field of sustainable development (SD) and Corporate Social Responsibility (CSR). The aim of the research is to contribute to meeting the vision of Agenda 21 and the Lisbon strategy in individual pillars of SD strategy under the conditions of research activity and pedagogical process in the STU MTF workplaces in Trnava

Project Title	**Festival of Science as a Platform for Intensifying Cooperation between V4 Region Universities**
Coordinator	doc. Mgr. Dagmar Cagáňová,PhD.
Start Date	01/09/2013
End Date	31/08/2014
Programme	International Visegrad Fund
Annotation	The **main project feature** is to establish a basis for active V4 scientific cooperation using best practice exchange and knowledge transfer. It is an opportunity for linking academic and business institutions from V4 countries that will ensure collaboration in research, education and increased international mobility of university teachers and students. It will also contribute to the popularisation of science for professionals and public and ensure continuation of activities to the future.

Project Title	**Knowledge exchange in the framework of alternative economic systems for the promotion of sustainable regional development** **Acronym : ALTECS**
Coordinator	doc. Mgr. Dagmar Cagáňová,PhD.
Start Date	01/09/2013
End Date	31/12/2014
Programme	**European Territorial Co-operation (ETC) Slovak Republic – Austria**
Annotation	The project ALTECS is implemented by the Vienna University of Economics and Business, the Slovak University of Technology in Bratislava, the Ministry of Life, the Vienna Chamber of Commerce and Industry, and the Slovak Chamber of Commerce and Industry Trnava in the framework of the funding programme European Territorial Co-operation (ETC) Slovak Republic – Austria. The objective of the ALTECS project is to set the first steps for a sustainable

regional development based on knowledge exchange between companies and students and using knowledge to pursue and implement a responsible and resource conserving economic way.

In order to advance ecological, economic, and social sustainability, regional know-how founded on the important pillars science and economy and generated among the involved target groups in the context of a summer university is made available. The realisation of the summer university will be designed together with the "OeAD-WohnraumverwaltungsGmbH" as the initiator and implementing body of this educational method. In this regard, those companies shall be supported that wish to follow a socially, ecologically, and economically exemplary pattern or already represent best practice and can thus give valuable advice. Economy students from Austria and the Slovak Republic will be involved from the sector of science. They will enlarge and also share their knowledge in the field of sustainability in order to elaborate new perspectives for sustainable regional development in the framework of peer group projects together with small and medium-sized enterprises (SMEs). Long-term orientation as an essential indicator of sustainability is achieved in the establishment of a regular platform and network events that will simultaneously accelerate knowledge exchange. The shared set-up and the realisation of the educational programme also fosters relations with the neighbouring country (cultural, economic, ecological, and social) as well as solidarity in the border region and promotes a common responsibility for the cross-border economic area.

INSTITUTE OF SAFETY, ENVIRONMENT AND QUALITY

Projects of the Institute

Project Title	**E-learning as a Handbook of Health and Safety in Welding**
Coordinator	Ing. Zuzana Szabová, PhD.
Start Date	01/01/2013
End Date	31/12/2015
Programme	KEGA
Annotation	The project aims to create a comprehensive handbook on safety and health (OSN) and fire protection in the classic, special, modified and hybrid technologies, welding, brazing and thermal cutting of materials. The guide to health and safety in welding will be available on the Internet for students of all forms of study within e-learning and for use by experts. The guide will be an important tool and source of information in assessing risks for a wide range of subjects using the technology of metallurgical bonding and cutting of materials. There will also be taken into account the effective application in existing social practice. The guide will simplify access to the information and bring a new perspective for solving practical problems of safety and health in welding.

Project Title	**Progressive methods of material fire-technical characteristics determination in fire engineering**
Coordinator	prof. Ing. Karol Balog, PhD.
Start Date	24/10/2013
End Date	30/09/2017
Programme	APVV
Annotation	The contribution to research in the area of fire engineering is in accordance with world trends through the utilisation of the progressive methods for the determination of important fire-technical characteristics for the calculation and modelling of compartment fires. The characterisation and verification of the laboratory testing methods will utilise modern equipment for obtaining the unique material characteristics and their alterations due heat and fire. The behaviour of the solid and liquid materials will be predicted in the process of initiation and propagation of combustion on the ground. New methods will be applied for the determination of critical boundary conditions of testing for representative materials in the progressive material structures for the improving of outputs from the fire scenarios used.

Project Title	**Construction of an educational laboratory for fire reconstruction on a laboratory scale**
Coordinator	Ing. Jozef Martinka, PhD.
Start Date	01/01/2013
End Date	31/12/2015
Program	KEGA
Annotation	Investigation of fires causes is one of the most difficult tasks for fire protection. Correctly determined the cause of the fire can be a thin line between justice and miscarriages of justice, and a key tool for the determination respectively. Verification of the fire cause is its reconstruction on a laboratory scale. Reconstruction of a fire on a laboratory scale is divided into the reconstruction of initiation and the reconstruction of progress (development) of the fire. Reconstruction of initiation gives an answer to the question whether a specific ignition sources could be the cause of the fire. Reconstruction of the fire development provides valuable data about the behaviour of materials and products in the fire under conditions similar to the fire. The basic assumptions for the applicability of laboratory tests for the reconstruction of fire are the proper selection, design and implementation of laboratory tests. Currently there is no specialised facility for the reconstruction of fire on a laboratory scale, and no training centre to prepare specialists for the execution of the tests in the Slovak Republic.

RESEARCH CENTRE OF PROGRESSIVE TECHNOLOGIES

Name of project	**Human Resources Development in the field of research and development for the UVP-CAMBO**
ITMS of project	26110230116
Duration of project	10/2013-06/2015
Operational programme	OPV-2013/1.2./07-SORO
Annotation	
In October 2013, 14 researchers and operators were sent to Helmholtz-Zentrum Dresden Rossendorf to attend a 2-year educational programme within the working groups oriented on materials research and projects on the utilisation of ion beams. Their knowledge is being theoretically enhanced by attending specialised lectures and on-site training to use the unique equipment. The intention is that they will continue their scientific work in the Workplace of Materials Research after the construction of Slovakion is accomplished.	

Name of project	**University Scientific Park „ CAMPUS MTF STU“ - CAMBO**
ITMS of project	26220220179
Duration of project	03/2013-06/2015
Operational programme	OPVaV - 2012/2.2/08-RO

Name of project	Implementation of an internal quality assurance system in education
ITMS of project	26110230042

Name of project	The data-mining usage in the manufacturing systems control.
ITMS of project	VEGA 1/0214/11