

Faculty of Mechanical Engineering TUL – Student Grant Competition – 2013-2015

Number	Project title	Principal investigator	Period	Project subsidy CZK
28000	Experimental and numerical investigation in fluid mechanics, thermodynamics and heat transfer	Ing. Petra Dančová, Ph.D	2013-2015	1 539 000
The project is focused on the research: Flow and temperature fields and moisture transfer in recuperative and regenerative heat exchangers. Mixing process in ejectors. Energy balance and flux of energy and momentum in the nozzles, diffusers and ejectors. Active and passive control of flow fields using synthetic jets. Mathematical modeling in fluid mechanics. Stratification processes in energy storage. Thermoacoustic effect.				
28001	Development of twisting device for multicomponent nano-yarns production and product analysis	Ing. Lukáš Stanislav	2013	332 000
During previous years we have successfully developed a micromanipulator for the production of individual nanofibers. For the expansion of production capabilities it is necessary to add a twisting device that serves for granting twist to a group of parallel nano/microfibres. Thus the fibers may already be taken as practically usable product.				
28002	Research on new materials and healing methods for medical use, structures from shape memory materials, composites and optimization of mechanical and mechatronic systems	Ing. David Cirkl, Ph.D.	2013-2015	972 000
Multidomain project comprises issues of biomechanics, vibroisolation and composites mechanics. Project deals with fatigue tests of stent-grafts made from memory shape material (NiTi). Tissue adhesives are investigated as a substitution for suture wound closure. The vibroisolation issues are represented by development of gyroscopic platform and balancing of industrial sewing machine.				
28003	Modern trends in the Material Engineering	prof. Ing. Petr Louda, CSc.	2013-2015	1 502 000
A wide range of scientific sub-themes that clearly lead to innovation and increasing of knowledge about material sciences is solved by PhD students and their supervisors in the accredited doctoral studies of Material Engineering. The project will deal with the themes of development of new materials. First of all there's very perspective field of bionics or research of nanofiber systems. As next will be studied possibilities of using of geopolymer composite materials for high-temperature applications, e.g. in nuclear energetics. Next the research of structural changes of material for dynamically loaded parts, corrosion resistance of intermetallic systems or the effect of chemical composition and microstructure on the high-temperature mechanical and corrosion properties. There will also be dealt with themes such as nondestructive ultrasonic and magnetic structuroscopy and physical properties of dynamically loaded castings. Research into the properties of powder metallurgy products and nanocomposites. The use of martensitic transformation initiated by plastic deformation on isothermally hardened iron. Application of plasma surface modification in medicine. A wide range of scientific sub-themes that clearly lead to innovation and increasing of knowledge about material sciences is solved by PhD students and their supervisors in the accredited doctoral studies of Material Engineering. The project will deal with the themes of development of new materials. First of all there's very perspective field of bionics or research of nanofiber systems. As next will be studied possibilities of using of geopolymer composite materials for high-temperature applications, e.g. in nuclear energetics. Next the research of structural changes of material for dynamically loaded parts, corrosion resistance of intermetallic systems or the effect of chemical composition and microstructure on the high-temperature mechanical and corrosion properties. There will also be dealt with themes such as nondestructive ultrasonic and magnetic structuroscopy and physical properties of dynamically loaded castings. Research into the properties of powder metallurgy products and nanocomposites. The use of martensitic transformation initiated by plastic deformation on isothermally hardened iron. Application of plasma surface modification in medicine.				

28004	Research of the machining and assembly processes in terms of improving their quality	Ing. Jaroslav Votoček	2013-2015	656 000
Research of the influence of the technological processing conditions on the properties of the machined components, evaluation of the process media and durability of the cutting tools. Further will be research the influence of machining and assembly processes to the quality of each components.				
28005	Research of the procedural quantities influence on the technological processes final products quality	doc. Ing. Heinz Neumann, CSc. Ing. Jaromír Moravec, Ph.D.	2013-2015	2 110 000
This project deals with the research of the procedural quantities influence of forming, plastics processing, welding and casting technological processes on the manufactured product final quality. Analysis of the procedural quantities time behavior enables creation of mathematical models and simulation calculations for research, development and process innovation. Results from simulations are verified by the experimental measurement.				
28006	Research and development in the field of automation, robotics and glass-producing machines	Ing. Vlastimil Hotař, Ph.D.	2013-2015	891 000
This project is focused on efficiency improving, construction and optimization of robots, manipulators, effectors, equipment and specific constructional nodes for glass industry. Furthermore, it deals with application and development of image analysis, its evaluation, numerical simulation of the forming process and glass properties analysis and evaluation.				
28007	Innovation of products and equipment in engineering practice	prof. Ing. Ladislav Ševčík, CSc.	2013-2015	1 524 000
The project will be dealt with product innovation, market research, planning, innovation, custom design, strength calculations of machine nodes and components, optimization and strength calculations of machine parts, using the FEM and the creation and production drawings. These include research and development work of students equipments.				
28008	Research of the structures and the procesess of textile and single-purpose machines	Ing. Josef Skřivánek Ing. Jiří Komárek	2013-2015	1 231 000
The subject of research is the design and optimization of new structures textile and single-purpose machines with using the principles of mechatronic components including the desing of new operating and control members. Further research will be the subject of optimization the selected textile processes and their numerical simulation to optimize machinery.				
28009	Development and testing of vehicles and their parts	Ing. Robert Voženílek, Ph.D.	2013-2015	1 752 000
The project will focus on the design and configuration of new assemblies, parts and systems in the development of vehicles and internal combustion engines. Verification of real properties of the proposed units, components and systems will be carried out in specialized test equipment.				
28010	Complex optimization of manufacturing systems and processes 2	Ing. Petr Zelený, Ph.D.	2013-2015	826 000
The project solves actual industry needs in the area of comprehensive production systems and processes optimization. It is divided into several activities such research on the use of 3D scanning, digitizing and Rapid Prototyping technologies, physical modelling of hydraulic and pneumatic mechanisms, design, simulation and optimization of NC programs.				
28011	Determination of change of mechanical properties of structural materials in different climatic conditions	Ing. Rudolf Martonka, Ph.D.	2013-2014	402 000
Structural parts of construction materials, such as polyurethane foam and organic, recyclable replacement, used in different climatic conditions change				

in a certain range of its mechanical properties. The project describes this range and determine the applicability of the structural material for the product.				
28012	Research and development of devices for production of nanofibersRS	Ing. Karel Pejchar Ing. Jan Valtera	2013-2015	1 391 000
The research is focused on the optimization of designed spinning devices enabling the repeatable production of nanofibers and their processing. Within the spinning process optimization, a new device for polymers supply will be designed and tested. Attention will be focused on analysis of electric field in the spinning space by means of numerical simulations, experiments and following optimizations of spinning equipment which processes different polymeric materials.				
28013	Possibilities of utilizing higher alcohols for fast gasoline replacement	Ing. Martin Pechout	2013-2015	929 000
Aim of this project is experimental investigation of mixture formation, combustion development and other parameters of common spark ignition engines operating on selected butanol isomers as a partial gasoline replacement from renewable non-food resources. Results will be published in journals with non-zero impact factor and foreign conferences.				
28014	Monitoring and evaluation of large objects using 3D scanning	Ing. Radek Havlík	2013-2015	776 000
This project is focused on the research of implementation of thermographic, aerodynamic and photometric data in to a 3D model in a real environment (RE). Thanks to 3D scanner Trimble CX we get the model RE. The goal of this project is creating methods for 3D data scanning and its implementation in to clouds of points or 3D models and their evaluation.				
21015	Use of waste heat in thermoacoustic devices	Ing. Martin Veselý	2014-2016	281 000
Aim of this project is investigation of using thermoacoustic devices as devices to utilization waste heat. Research will deal with commissioning of the equipment in laboratory conditions and the ability to apply this knowledge in practice. They conducted experiments the research findings will be used for further development.				
21072	The ploughing force determination	Ing. Andrey Dugin	2015	167 000
Accuracy is the most important parameter during the designing of cutting tools for micromachining. Durin the micromachining with small uncut chip thickness (for example in micromilling) ploughing forces may be higher than forces on the front face of cutting tool. The accuracy of the designing of tools for micromachining depends on the the accuracy of the determination of ploughing forces.				
21001	Research and development of control structures of pneumatic, hydraulic and electrical components	Ing. Radek Votrubec, Ph.D.	2014-(2016)	513 000 (160 000)
The research is divided into three topics. The first is the development of innovative control algorithms of actuators of vibration isolation systems. The second thematic area is design of control system of rotary pneumatic motor. The third topic is research of the controller of precise positioning device and electric drives.				
21070	Development of the system of devices for nanofibers yarns production and their optimalization for ophthalmological implants	Ing. Andrii Shynkarenko	2015-2016	250 000 (250 000)
The aim of the project in year 2016 is to develop collecting and twisting mechanism, which will be added to the existing rotating collector for parallel yarns developing. Collector was developed in year 2015 in this project. Afterwards collecting and twisting ability will be tested.				
21071	Development and prototype production of compact DLP 3D printer	Ing. Iaroslav Kovalenko	2015-2017	365 000 (580 000)
The main aim of the individual student project is to develop a prototype of the 3D printer which produces high precision models using photopolymers. Step by				

step all layers are cured by projecting entire section of the part. This device will be used mostly for printing equipment for dental medicine.				
21016	Management SGC	DFS	2013-2015	411 000
FME			2013-2015	18 867 000