

Faculty of Mechanical Engineering TUL – Student Grant Competition – 2019-2021

Number	Project title	Principal investigator	Period	Project subsidy CZK
21209	Research, development and application of advanced methods and technologies in technical mechanics, biomechanics and strength and elasticity	Ing. Michal Sivčák, Ph.D.	2019-2021	435 000
Multidisciplinary project deals with application of optimization and control algorithms in problems of classical mechanics, research and development of shape memory polymeric composites - smart materials and creating of the prototype thermoplastic insole to eliminate common foot deformities. Project also deals with development of the seat with ability to change pressure profile in contact zone between seat and seating person.				
21208	Research and development for innovation of materials and production technologies with application potential in mechanical engineering	Ing. Luboš Běhálek, Ph.D.	2019-2021	435 000
The project deals with research and development for innovations of materials and technologies of plastics processing, metal forming, welding and heat treatment, focusing on their physical, technological and construction parameters. The development of progressive materials is solved from a strength, chemical and environmental point of view for applications in mechanical engineering.				
21285	The study and evaluation of the structure and properties of metallic and non-metallic materials of surfaces.	Ing. Martin Švec, Ph.D.	2019-2021	283 000
The project will be dealt with problem of the development of new materials in two main areas – 1) The study and evaluation of structures and properties of metallic materials; 2) The study and evaluation of structures and properties of non-metallic materials. In the first research area there will be solved four sub-themes – 1.1.) Intermetallics (research will focus on the study of influence of the structure and chemical composition on high-temperature mechanical properties of iron aluminides); 1.2.) Non-destructive testing of metallic materials (the main focus of the work will consist in research of surface integrity); 1.3.) The study of Thin layers (it will be studied selected types of thin layers for industry and also for medical purposes and it will be carried out the study of their properties with respect to desired application use); 1.4.) The study of tribological properties of metallic materials (the tribological properties of engines parts will be studied). The second research area, focused on the study of non-metallic materials, will deal with – 2.1.) Geopolymers (it will be tested and evaluated the possibilities of geopolymer's using in high-temperature applications – e.g. Fireproof barriers, 2.2.) Green synthesis of nanoparticles of metal oxides and the influence of their additive on motor oils on the tribological properties of milling pairs, 2.3.) Plasma modification.				
21991	Experimental, theoretical and numerical research in fluid mechanics and thermomechanics	Ing. Jan Křacík	2019-2021	235 000
The theme of the department project is experimental theoretical and numerical research in fluid mechanics and thermomechanics. Specifically, the project aims at: the research of the flow in nozzles, diffusers and ejectors, the research of synthetic jets, the research of the flow around objects, the research of cavitation phenomenon, heat transfer, multiphase flow and renewable energy sources. Within the frame of the project, the utilization of measurement techniques such as thermoanemometry, PIV (Particle Image Velocimetry) or PLIF (Planar Laser Induced Fluorescence) is planned.				
21992	Innovation of the products, equipments and processes in engineering practice	Ing. Rudolf Martonka, Ph.D.	2019-2021	235 000
The project will address product innovation, market research of existing solutions, innovation planning. Designing innovative solutions for the product. Design and control of innovative products using strength calculations, FEM methods. This is primarily a project supporting research and development work in the field of				

Machine and Equipment Innovation.				
21282	Study and assessment of machining processes with focus on tool and cutting conditions	Ing. Iuliia Krasnikova	2019-2021	166 000
The project focuses on solving a number of scientific topics and issues that help to develop and innovate knowledge in machining and related areas. The studied subject will be divided into several different directions focusing on: research of cutting forces and stresses on the rear surface, researching the causes of deformation of machined surface of engineering components, research on wear on the on the rear surface.				
21276	Increasing efficiency of vehicle propulsion systems	Ing. Pavel Brabec, Ph.D.	2019-2021	268 000
The main motivation of the project is to increase the total efficiency of the propulsion unit by optimizing sub-assemblies, thereby reducing fuel consumption and emissions generated by their operation. Part of the results will be created with the support of simulation software. Verification of real properties of the proposed units, components and systems will be carried out in specialized test equipment.				
21281	Research and development in glass-producing machines, industrial and service robotics	Ing. Marie Stará, Ph.D.	2019-2021	150 000
Project is focused on students' integration into a research team of a department. It focuses on research, development and optimization of chosen parts of automation in glass industry, design of robotic peripheries and service robots, application and development of tools for image analysis.				
21288	Research of the procesess of textile and single-purpose machines II	Ing. Jiří Komárek, Ph.D.	2019-2021	342 000
The subject of the research is design of new and modification of existing structures of textile and single-purpose machines for automation of processes, optimization of selected textile processes with aim of optimization of machinery and research of new processes of fabrication of textile structures.				
21278	The optimization of production systems, 3D technologies and automation	Ing. František Koblasa, Ph.D.	2019-2021	435 000
This project is focused on the design, planning and control of manufacturing systems optimization. The emphasis is put on using progressive manufacturing systems beginning with additive manufacturing, CNC machining and 3D digitization to information systems ending with autonomous logistics systems.				
21287	Research and development of devices for production linear and flat nanofibrous materials	Ing. Ondřej Bařka	2019-2021	350 000
The project focuses on the research of new equipments for the production of linear and flat nanofibrous structures using AC-electrospinning technology. It will be focused on the analysis of physical principles of spinning process, simulation of electric field, device design and experiments.				
21286	Utilization of Advanced Analysis for Sheet Metal Process Prediction	Ing. David Koreček	2019-2021	301 000
Project deals with the utilization of advanced FEA models for numerical simulation of sheet metal forming and subsequent material spring-back. For the proper prediction of process by the numerical simulation there is necessary to define relevant material models, which is done by means of material characteristics and process parameters.				
21277	Experimental and numerical research in jet machines	Ing. Lukáš Vojta	2019-2021	150 000
The project focuses on the experimental and numerical research of turbomachines and the extension of the students' expertise in this field. Ejectors and fans would be among the studied jet machines. These would be ejectors working with air or one of the available low GWP refrigerants. Numerical research will be directed to the use of real gas models, but also to the ideal gas model. Experimental research will serve to validate these calculations performed in commercial				

software Ansys Fluent.				
21279	Research and application of 3D printed functional parts in the Formula Student project at TUL	Ing. Jiří Šafka, Ph.D.	2019-2021	349 000
The research project deals with evaluation of mechanical properties of the parts produced using 3D printing technology. With the use of 3D printing technology it is possible to effectively influence the resulting geometry of components. The main aim is to find suitable technological and technical procedures for the production of special components for the Student Formula team at TUL.				
21227	An interaction of fluid with solid structure	Ing. Tomáš Kořínek	2018-2019	178 000
This project deals with an interaction of fluid with a solid structure. The research is based from numerical simulations and experiment. A new approach for turbulence modelling, Partially-Averaged Navier-Stokes will be tested on numerical simulations. Experiment deals with adsorption of CO2 on activated carbon. numerical simulations with PANS approach.				
21283	Vibration damage identification of linear guiding system	Ing. Radka Jírová	2019-2021	243 000
Linear guiding systems are used in machines for a relative translational motion of components, especially for the handling equipment, which are basis of production lines. For minimization of production losses, high reliability and fault prediction is required.				
21284	Advanced performance biocomposites based on nanostructured layers and interleaving veils	Ing. Martin Borůvka	2019-2020	342 000
Sustainable development of modern society and growing environmental awareness stir up the interest in biopolymer materials that are renewable, biodegradable and non-toxic. Research of these advanced nanostructured materials will help expand their potential to meet structural applications.				
21289	Development of an autonomous production system	Ing. Martin Ševic	2019-2020	350 000
The project deals with the development and optimization of the control algorithms of individual parts of the production system and the optimal way of their communication. The entire production system behaves fully autonomously, organizes itself and adapts the production requirements in real time.				
21225	Research of application of cavity inserts produced by additive manufacturing used for polymer injection mould design	Ing. Martina Češková	2018-2020	241 000
The project is focused on a complex research of injection mould cavity inserts design and manufactory using additive manufacturing for prototyping and small-scale production and the evaluation of the impact on properties of injection moulded parts.				
21226	Experimental, numerical and mathematical study on ejector refrigeration	Ing. Vu Van Nguyen	2018-2019	150 000
The project aims for a study on impacts of using Hydrofluoroolefins (HFOs) for ejector refrigeration technology (ERT). We employ experimental, mathematical works and numerical simulations to achieve the goals. The goals are a detail refrigerant assessment of HFOs and a design of the ejector refrigeration system for local climate conditions in Czechia.				
21293	Development of a multifunctional robotic system for manipulation with nanostructures	Ing. Andrii nShynkarenko	2019	295 000

The aim of the project is to build a multifunctional robotic system. The main element would be a robotic arm. A precise hydraulic dosing pipette will be implemented as effector. The primary use of the device will be placing a bio-material or medical substances on a flat or tubular nanofibrous structures.

21016	Management SGC	DFS	2019	151 000
FMI			2019	6 083 000