



FACULTY OF MECHANICAL ENGINEERING

**ANNUAL
REPORT**

2019

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INTRODUCTION

1 INTRODUCTION

Faculty of Mechanical Engineering (FME) of Technical University in Liberec (TUL) is the founding faculty of the University in Liberec. During its existence, it has always fulfilled goals, visions, tasks and demands placed on it by the state and Technical University in Liberec under any conditions. The faculty is an integral part of this university and since its origin, it has always claimed responsibility for the university development as a community of faculties.

The annual report on activities of the FME TUL for 2019 presents information on the faculty, pedagogical activities, scientific research and creative activities, international collaboration, partnerships, internationalization and presents information on the fulfillment of the Strategic Plan regarding educational, scientific, research, development, artistic and other creative activities of the Faculty for the period 2016–2020 and its Implementation Plan for 2019.

In 2019, activities of the Faculty of Mechanical Engineering TUL were huge, indeed, and covered all three essential activities that the faculty is naturally expected to fulfill as its mission. From the annual report, it is evident that the Faculty managed to meet all goals with the support of members from the academic community as well as other staff.

In some areas and activities, the faculty has achieved high-quality, excellent results and outputs, e.g. in the area of qualification growth of academic staff, age structure, and staff evaluation; also in science and research, projects, publications, and research strategies. FME reached very good results in the evaluation of teaching quality at all levels of study programs, in the accreditation of study programs; in the field of legislation and setting up processes within the faculty. Promotion of the faculty is successful as well as the interest and number of applicants for studying in a foreign language. The faculty is leading by example in students' involvement in internal processes, and last but not least, there was a significant renewal of infrastructure, laboratory, instrumentation and return of laboratory areas to the faculty.

On the contrary, there is still lack of deep interest in studying technical fields among a young generation, which is supported by the demographic curve, insufficient funding for technical public universities and faculties, leaving of young academics into industry, the ambiguity of public R&D funding, low staff diversity, insufficient management and administration support at the University and high administrative burden of academic staff.

For effective development of the faculty, it is necessary to perform high quality, responsible and competitive activities based on sufficient knowledge and competencies of academic staff, on personal development and teams, and willingness to work for the benefit of the faculty.

Results and outputs clearly demonstrate that we are all able to accomplish requirements in most indicators. Thus, I would like to thank all members of the academic community with high seriousness and respect and other faculty staff for contributing to very good results as well as position of the faculty and university on a national and international scale.

*Prof. Dr. Ing. Petr Lenfeld
The Dean
Faculty of Mechanical Engineering
TU in Liberec*

FACULTY STRUCTURE

2 FACULTY STRUCTURE

2.1 Fakulty Bodies

Dean

Head of Dean's Office

Academic Senate of the FME TUL

Chair

Vice-Chair for the Chamber of Academics

Vice-Chair for the Chamber of Students

Secretary - member of the Academic Senate

Members of the Chamber of Academic Staff

Members of the Chamber of Students

Delegate for AS FME TUL for participation
till January in meetings of AS TUL 30, 2019

FME TUL representative of the Higher Education Council

Academic Senate TU in Liberec

Academic representatives for FME TUL

Student representative for FME TUL

Scientific Board of the FME TUL

Chair

Members from TUL

Members

Prof. Dr. Ing. Petr Lenfeld

Ing. Anna Benešová

from June 30, 2017 to June 30, 2020

Prof. Ing. Iva Nová, CSc.

Ing. Aleš Lufinka, Ph.D.

Ing. Tomáš Kořínek

Assoc. Prof. Ing. Jaromír Moravec, Ph.D.

Prof. Ing. Jaroslav Beran, CSc.

Ing. Luboš Běhálek, Ph.D.

Ing. Martin Lachman, Ph.D.

Ing. Rudolf Martonka, Ph.D.

Assoc. Prof. Ing. Lubomír Moc, CSc.

Assoc. Prof. Ing. Pavel Solfronk, Ph.D.

Prof. Ing. Ladislav Ševčík, CSc.

Ing. Petr Zelený, Ph.D.

Bc. Jan Bayer

Ing. Ondřej Bařka

Ing. Martin Borůvka, till December 3, 2019

Ing. Tomáš Kořínek, till December 13, 2019

Ondřej Fridrich, from March 2019

Robert Janoušek, from March 2019

David Němec, from December 13, 2019

Vojtěch Keller, from December 13, 2019

Ing. Petr Kulhavý, till February, 2019

Ing. Pavel Srb, till February, 2019

Assoc. prof. Ing. Lubomír Moc, CSc.

Ing. Rudolf Martonka, Ph.D., till August 28, 2019

Ing. Pavel Brabec, Ph.D., from November 27, 2019

Prof. Ing. Jaroslav Beran, CSc.

Ing. Vlastimil Hotař, Ph.D.

Ing. Petr Kulhavý, till February 25, 2019

from February 9, 2018 till 2022

Prof. Dr. Ing. Petr Lenfeld

Prof. Ing. Jaroslav Beran, CSc.

Assoc. Prof. Ing. Martin Bílek, Ph.D.

Prof. Ing. Karel Fraňa, Ph.D.

Assoc. Prof. Ing. Josef Janeček, CSc.

Assoc. Prof. Ing. Dora Kroisová, Ph.D.

Assoc. Prof. Petr Lepšík, Ph.D., from May 1, 2019

Prof. RNDr. David Lukáš, CSc.

Prof. Ing. Petr Louda, CSc.

Assoc. Prof. Ing. Miroslav Malý, CSc.

Prof. Dr. Ing. Pavel Němeček

Prof. Ing. Iva Nová, CSc.

Prof. Ing. Lubomír Pešík, CSc.

Assoc. Prof. Ing. Iva Petříková, Ph.D.

Prof. RNDr. Jan Pícek, CSc.

Prof. Ing. Zdeněk Plíva, CSc.

External Members

UP DFJP Pardubice
FJFI ČVUT Praha
FS ČVUT Praha
FAV ZČU v Plzni
UO FVT Brno
FS VŠB-TU Ostrava
SjF STU Bratislava
ÚT AV ČR, v.v.i. Praha
Professor Emeritus
Professor Emeritus
FSI VUT v Brně
FS ČVUT v Praze
Emeritus member
FS ČVUT v Praze
ČEZ, a.s., Jaderná elektrárna Temelín
Benteler ČR, s.r.o.
GDK spol. s r.o.

Disciplinary Committee

Chair

Members

Committee for Economic Affairs

Chair

Members

Assoc.Prof. Ing. Ludvík Prášil, CSc.

Assoc.prof. Ing. Ivo Drahotský, Ph.D.
Prof. Ing. Nikolaj Ganev, CSc.
Prof. Ing. Stanislav Holý, CSc.
Prof. Ing. Vladislav Laš, CSc.
Col. Prof. Ing. Martin Macko, CSc.,
Prof. Ing. Petr Noskiewi, CSc.
Assoc. Prof. Ing. František Palčák, CSc.
Prof. Ing. Jaromír Příhoda, CSc.
Prof. Ing. Jaroslav Purmenský, DrSc.
Prof. RNDr. Miroslav Raab, CSc.
Assoc.Prof. Ing. Pavel Rumišek, CSc.
Prof. Ing. Milan Růžicka, CSc.
Assoc.Prof. Ing. Jiří Sloupenský, CSc.
Prof. RNDr. Petr Špatenka, CSc.
Ing. Pavel Šimák
Assoc.Prof. Ing. Jiří Vejvoda, CSc.
Ing. Petr Kůsa, Ph.D.

Prof. Ing. Václav Dvořák, Ph.D.
Assoc. Prof. Ing. Martin Bílek, Ph.D.
Ing. Jan Hujer, do 28.2.2018
Ing. Petr Kulhavý, do 28.2.2018
Ing. Martina Češková, od 1.3.2018
Ing. Martin Ďurák, od 1.3.2018

Ing. Anna Benešová, Head of Dean's Office
Ing. Luboš Běhálek, Ph.D.
Assoc. Prof. Ing. Martin Bílek, Ph.D.
Assoc. Prof. Ing. Lubomír Moc, CSc.
Prof. Dr. Ing. Pavel Němeček
Ing. Alena Šírková

Industrial Committee – co. representatives

AGC Automotive Czech a.s., Bílina, Chudeřice; Benteler ČR s.r.o., Chrastava; BOS Automotive Products CZ s.r.o., Klášterec nad Ohří; Continental Automotive Czech Republic s.r.o., Jičín; EDAG Engineering CZ spol. s r.o., Mladá Boleslav; Faurecia Emissions Control Technologies, Mladá Boleslav, s.r.o., Mladá Boleslav; Foxconn CZ s.r.o., Pardubice; GDK, spol. s r.o., Kolová; Grupo Antolin Turnov s.r.o.; Kamax, s.r.o., Turnov; Knorr Bremse ČR, s.r.o., Liberec; KOH-I-NOOR PONAS s.r.o., Polička; KSM Castings a.s., Hrádek nad Nisou; Magna Exteriors & Interiors(Bohemia), s.r.o., Liberec; Preciosa a.s., Jablonec nad Nisou; Rieter CZ s.r.o., Ústí nad Orlicí; Škoda Auto a.s.; Mladá Boleslav; TOS Varnsdorf a.s.; ZF TRW Automotive Czech, s.r.o., Jablonec nad Nisou.

Conception and Quality of Activities at FME TUL – Dean's advisory team

Chair

Members

Prof. Dr. Ing. Petr Lenfeld
Prof. Ing. Václav Dvořák, Ph.D.
Assoc. Prof. Ing. Štěpánka Dvořáčková, Ph.D.
Ing. Vlastimil Hotař, Ph.D.
Assoc. Prof. Ing. Petr Lepšík, Ph.D.
Assoc. Prof. Ing. Jaromír Moravec, Ph.D.
Ing. Petr Zelený, Ph.D.
Assoc. Prof. Ing. Pavel Solfronk, Ph.D.
Ing. Adam Hotař, Ph.D.
Ing. Jan Valtera, Ph.D.
Mgr. Radka Dvořáková
RNDr. Iveta Lukášová

2.2 Faculty Structure

The Faculty is divided into the Dean's Office, Study Department and ten departments.

Organizational Unit

Members

Dean's office

Dean
Vice-dean for Science, Research and Collaboration
with Industry
Vice-Dean for Doctoral Studies and Development
2019

Vice-Dean for Education and Student's Affairs
Vice-Dean for International and Public Relations
Head of Dean's Office
Dean's Secretary

Prof. Dr. Ing. Petr Lenfeld

Prof. Dr. Ing. Pavel Němeček
Assoc. Prof. Ing. Martin Bílek, Ph.D., till April 30,

Assoc. Prof. Petr Lepšík, Ph.D., from May 1, 2019
Assoc. Prof. Ing. Dora Kroisová, Ph.D.
Prof. Ing. Karel Fraňa, Ph.D.
Ing. Anna Benešová
Pavla Kholová

Department of development and projects

Strategy, conception, quality
Financial manager
Project manager
Administrator of OP projects

RNDr. Iveta Lukášová
Ing. Tomáš Kysilka
Ing. Pavlína Křečková, from september 2019
Ing. Zuzana Horčíčková, Ph.D.

Study department

Head of Study department
Study department officer
Officer for International Relations

Mgr. Radka Dvořáková
Ing. Mgr. Dana Semotjuková
Ing. Marcela Válková

Departments

Department of Applied Mechanics
Department of Engineering Technology
Department of Material Science
Department of Power Engineering Equipment
30th.

Assoc. Prof. Iva Petříková, Ph.D.
Assoc. Prof. Ing. Jaromír Moravec, Ph.D.
Prof. Ing. Petr Louda, CSc.
Assoc. Prof. Ing. Václav Dvořák, Ph.D., till August

Assoc. Prof. Ing. Petra Dančová, Ph.D.,
authorized from September 1.

Department Machine Design
Elements and Mechanism
Department of Machining and Assembly
Department of Vehicles and Engines
Department of Glass Producing
Machines and Robotics
Department of Textile Machine Design
Department of Manufacturing Systems
and Automation

Prof. Ing. Ladislav Ševčík, CSc.
Assoc. Prof. Ing. Jan Jersák, CSc.
Ing. Robert Voženílek, Ph.D.

Ing. Vlastimil Hotař, Ph.D., from January 1.
Assoc. Prof. Ing. Martin Bílek, Ph.D.
Ing. Petr Zelený, Ph.D.

2.3 Personnel Structure of the Faculty

In 2019, a total of 151 employees were active at FME TUL (119.08FTEs), of whom 102 were academicians (77.9 FTEs). The total number of teachers decreased year-on-year by 2.7 (FTE).

Teaching in Bachelor's, Master's and Doctoral degree programs was provided mainly by 15 internal professors and 29 associate professors in the position of study subjects guarantors, tutors, lecturers and supervisors of final student theses. 51 senior lecturers and 5 lecturers were also involved in the fulfilment of the pedagogical tasks.

See annexed tables 2.3.

2.4 Procedures to the Appointment of a Professor and Associate Professor

In 2019, one professor and one associate professor was appointed. Two habilitation processes were commenced.

See text appendix 2.4.

EDUCATIONAL ACTIVITIES

3 EDUCATIONAL ACTIVITIES

The Faculty carries out and guarantees the professional level of all three types of study programs.

3.1 Accredited Degree Programs and Fields

In 2019, 11 study programs were carried out at the FME, which had been accredited both in Czech and English, in full-time as well part-time form.

Further, in 2019, the National Accreditation Office discussed details about accreditation of new follow-up Master's programs – 6 Czech and 5 in English.

Overview is provided in table annex 3.1.

3.2 Offer of Degree Programs in English

- In 2019, the Faculty of Mechanical Engineering offered studies in English in the follow-up full-time Master's degree study program and in all doctoral degree programs.
- Teaching in English also took place in the short-term ERASMUS+, CEEPUS, IAESTE and IP TUL programs in all study programs. See Chapter 5 below for further details.

3.3 Interest in Studies and Admission Procedure

623 applicants showed interest in studying at the Faculty of Mechanical Engineering TUL (compared to 2018, it is by 28 applicants fewer). From the total number of applicants, 420 students enrolled, i.e. approximately 62 %, in comparison with 2018, it was 61 %. In the academic year 2019/20, 842 students were enrolled, i.e. by 20 students more than in 2018.

The structure of students does not change. The proportion of students remains approximately the same in all types of study programs. In the Bachelor's program, 65% of students are enrolled, in Master's programs, it is approximately 24%, and in doctoral programs 11% from the total number of enrolled students.

BSP	475 applicants, 336 enrolled. Approx. 46 % enrolled students in the first year of Bachelor's studies are from Secondary Technical Schools and 11% from Grammar Schools of an A-level. Remaining students are from other secondary schools, including foreign ones.
MSP	3 applicants, 2 enrolled. Both graduates successfully graduated in BSP at FME TUL, thus they were admitted into the 4th year.
NMSP	124 applicants, 68 enrolled. From the mentioned number of applicants, 55% applied and 14% enrolled into the study program taught in English. 80 % of applicants were enrolled in the study program taught in Czech. These were graduates of the Bachelor's study program at Faculty of Mechanical Engineering TUL, while others were graduates of other mechanical faculties.
DSP	21 applicants, 19 enrolled. 2 enrolled applicants were graduates of the Faculty of Mechanical Engineering TUL, while others had completed their previous degree at another Czech university, or abroad.

3.4 Numbers of Students and Graduates

The number of unsuccessful students during the first year of studies is still high, especially in the Bachelor's degree program. Students are admitted according to their study results at secondary school.

During the first year of studies in the academic year 2018/19, 165 BSP students and 14 MSP students finished their studies unsuccessfully. The average duration of studies that lead to graduation exceeds the standard length of study.

- BSP** In the academic year 2019/2020, 552 students were enrolled, 464 students in full-time study program and 88 in a part-time form. The share of BSP graduates increased compared to 2018. In 2019, 41 students successfully completed their studies, i.e. (33 % of the total number of graduates). The average duration of BSP shortened in to 4,02 in 2019 (in 2018, it was 4.78 years).
- MSP** In the academic year 2019/2020, 206 students were enrolled (146 in full-time study and 60 in part-time form). In 2019, 65 students successfully completed their studies, i.e. 56 % of the total number of graduates (in 2018, it was 58 %). The average length of study of NMSP graduates was 2,63 years.
- DSP** 84 students enrolled to studies in the academic year 2019/2020 (40 in full-time study and 44 part-time). In 2019, 11 students successfully completed their studies, i.e. 9 % from the total number of graduates). The average length of study shortened in comparison with the year 2018. In 2019, it was 6,91 years (in 2018, it was 8 years).

3.5 Credit System and Study Evaluation

For the evaluation of the course of studies in Bachelor's and follow-up Master's degree programs, the credit system ECTS (European Credit Transfer System) is used.

Bilingual Diploma Supplement, supported by consistent use of the credit system, has been automatically received by each TUL graduate since 2005 as a supplement to his/her diploma..

For successful completion of the studies in 2019 it was required to obtain:

- 180 credits in BSP.
- 120 credits in NMSP.
- 300 credits in MSP (five-year).

3.6 Scholarships

Scholarships paid in 2019 were awarded in accordance with the Scholarship Regulations of the FME TUL and in accordance with the valid directives of the Dean of the FME TUL.

- In total, scholarships were paid out to 797 students.
- The total amount of scholarships paid was CZK 11.239 million.
- The amount of scholarships paid in 2019 increased by CZK 287.000 compared to 2018.

Preciosa Foundation Jablonec nad Nisou Scholarship

A total of 5 students of the Faculty of Mechanical Engineering received scholarships amounting to 25.000 CZK.

3.7 Students' Creative Activity

Follow-up studies

FME TUL Dean's Award

Ing. Aleš Hrouda – Field: Applied Mechanics

Thesis topic: Deformation determination and stress in the vicinity of dents in a steel tube via experiment and calculation.

Ing. Jakub Roháč – Field: Machines and Equipment Design

Thesis topic: Design of an additional device for burning pipes for the CNC Kompakt Laser machine

Petr Valeš – Field: Engineering Technology and Materials

Thesis topic: Study of the structure and properties of polymer composites based on PLA and coffee grounds.

Prize of the Governor of the Liberec Region

Ing. Kristýna Kubíková – Field: Productions Systems and Processes

Prize awarded for excellent results during her studies.

TUL Rector's Award

Ing. Myka Mae Campo Duran – Field: Design of machines and equipment
Prize awarded for excellent results during his studies.

Preciosa Foundation Award

Ing. Tomáš Uličný – Field: Production Systems and Processes
Theses topic: Optimization proposal of the supply system in the production plant AGC Automotive

Graduated with Honours

Ing. Jan Černý
Ing. Zdeněk Drábek
Ing. Myka Mae Campo Duran
Ing. Matěj Havlíček
Ing. Michal Jarý
Ing. Kristýna Kubíková
Ing. Gafaru Moro
Ing. Tomáš Uličný

Bachelor's Studies**Deans Award**

Bc. Ondřej Friedrich (KTS)
Thesis topic: Equipment for centrifugal casting of hollow fibers in membrane modules

Graduated with Honours

Bc. Michal Fanta

Student Grant Competition at the Faculty

Within the student grant competition, 22 projects amounting to the total volume of CZK 6.2 million were being solved. See table in annex 4.5 for an overview.

Student Scientific and Professional Activities of SVOČ 2019

The eleventh annual competition to encourage talented students in Bachelor's, Master's and PhD study programs was organized by the Faculty of Textile Engineering, Mechanical Engineering, Mechatronics, Informatics and Interdisciplinary Studies and the Faculty of Economics. The aim of the competition is to support creative types of students who have the prerequisites for scientific and development activities at TUL technical faculties. 44 students participated in the competition, including 9 students from the Faculty of Mechanical Engineering. The event was supported by IP TUL 2019.

Mechanical Engineering Section – placing in the Bachelor's and follow/up Master's study program section:

Jakub Haluška – Solution for 3D printing of gel materials with application for bio gel
Veronika Truxová – 3D printing of photo-polymer ceramic materials by using glass technology
František Manlig – Optimization of genetic algorithm

Mechanical Engineering Section – placing in the PhD study program section:

Ing. Tomáš Kořínek – Numerical simulation of turbulent flow: influence of turbulent model on friction losses
Ing. Iuliia Krasnikova – Determining the ploughing forces by different methods when turning stainless steel
Ing. Sergej Babak – Effect of cutting modes and tool wear on the microhardness of the surface layer after face milling of structural and stainless steels

StudentFormula TUL – 0.3 version

Rules of the international competition of university racing teams Formula Student require a change of a racing car every year. This is an opportunity for student teams to continually improve their monopost. Following the formulas of Eliška and Markétka, students presented the third version "Anička" to the public in June 2019. The laboratory and workshops of our university supplied a wide range of components for this version. The new formula, even with the costs of participating in the races, required approximately CZK 2 million. In 2019, the FME TUL Racing team participated in races in Italy on the Riccardo Paletti circuit and in the Czech Republic on the circuit in Most. Other activities of EF

students were ensuring partners, marketing, organizing events and during competitions fulfilling the discipline of presenting a fictitious business plan of the formula. In Italy, the team ranked 32nd out of 52 teams and in the Czech Republic 23rd out of 32 teams. The construction of the student formula is sponsored by companies and industrial enterprises. See Annex 6.

UNI.lab

The company Škoda Auto a.s. opened the shared laboratory UNI.Lab at FME TUL. Here, students can get acquainted with the possibilities of their future career in the co. after graduation. In addition, students and representatives of the car factory can exchange views and experience on current development in the automotive industry. Great emphasis is placed on topics such as electro mobility, digitization and automation. The shared laboratory, which is the first facility of its kind in the Czech Republic, supports education in the areas of Industry 4.0.

Student Design Office

Organized by the Department of Textile and Single-Purpose Machines for BSP and NMSP students – the possibility of gaining internship by participating in projects and grants. There is a computer laboratory of the department with seven workstations, or it is possible to use the Laboratory of Digital Prototype according to the schedule options.

3.8 Educational Promotion Activities

Adaptation course for freshmen

From 13th to 15th September, an adaptation course took place in Janov nad Nisou, which was attended by 50 students entering the 1st year of full-time Bachelor's Studies at our faculty.

Review Course for future freshmen

From 16th to 26th September, an optional refresher course was organized, where secondary school mathematics, geometry and physics was revised. It was attended by 93 students entering the 1st year of full-time Bachelor's Study FME TUL.

Summer school of mechanics of composite materials and structures 2019

From 12th to 14th September, the 6th year of the courses was organized. Co-organized by the Department of Applied Mechanics FME TUL, as a member of the Society for Mechanics, together with the UWB in Pilsen and TU in Prague.

Doctoral Studies

Seminars for doctoral students:

- Scientific writing for doctoral students – Part III Conclusions/ Discussion sections – 13 doctoral students
- Industrial rights and database searches (November 11, 2019) – 5 doctoral students
- The issue of publishing scientific articles (November 20, 2019) – 6 doctoral students

English language courses:

- Elementary English (11–12/2019) – 4 doctoral students
- Intermediate English – 6 doctoral students (01–10/2019)
- Upper-intermediate English – 6 doctoral students (11–12/2019)

Intensive English language training

- English Language Training Camp (27.–30.August., 2.–6. September, 2019, 27 hours) – 5 doctoral students
- Academic writing (2-day-long seminar + 2-week-long on-line course), realized by ACADEMY OF SCIENCES CZ, – 2 doctoral students

Round Table – Vice-dean for Doctoral Studies, doctoral students:

- Mapping current needs of doctoral students FME TUL (April 17, 2019) - 14 doctoral students
- How to prepare for the colloquium - information for students of the 1st year of DSP (June 12, 2019) - 12 doctoral students
- How to compile an individual study plan (ISP) (10/2019) - 5 doctoral students / 1. year DSP
- Meeting with doctoral students - fulfilling needs of doctoral students defined at the meeting on April 17, 2019 (October 30, 2019) - 15 doctoral students
- Colloquia - public debate on the focus of dissertations at presence of the expert committee, 1 st year doctoral students:

September 24, 2019 – DSP Construction/Design of Machines and Equipment – 8 doctoral students
September 26, 2019 – DSP Applied Mechanics – 3 doctoral students
September 27, 2019 – DSP Technology and Materials – 7 doctoral students

Open days for those, who are interested in studies

- Open Day at FME TUL – February 2019.
- Open Day TUL – November 2019.

Education Fairs

Study in degree programs and opportunities for graduates were promoted at education fairs (organized by TUL/active participation of FME):

- XII. European Fair of Higher Education Gaudeamus – Prague, Letňany – January 2019 (TUL, FME).
- XXVI. Fair of Post-Secondary Education Gaudeamus in Brno – October (TUL, FME).
- Begin Edu Fair – Moscow, Jekatěrinburg, Petersburg – October (TUL, FME).

UNI.Lab

In February, Faculty of Mechanical Engineering and Škoda Auto a.s. ceremoniously opened the university laboratory on the grounds of our faculty. The shared laboratory should lead to strengthening of faculty's possibilities in education and research, and widening the offer of practical activities for students in the development and production of cars.

T-Forum 2019

The 25th annual event of the Job Fair T-Forum for Students was attended by representatives of 50 industrial companies. The fair is traditionally organized by a branch of the IAESTE organization at the Technical University of Liberec in co-organization of the Department of Vehicles and Engines of the FME TUL. The fair is one of the largest personnel events in the region. December 2019.

Night of Scientists at TUL

On September 27th, we opened laboratories for the public followed by great public interest.

Study Promotion at FME TUL

- In 2019, promotion of studies at FME TUL was mainly realized in a virtual form.
- Promotion through FB and Faculty websites.
- FB campaigns for selected age groups of secondary school students – DOD, applications for studies.
- For the purposes of promotion on the website, via other virtual channels and for the presentation of the university and laboratories during visits to foreign universities, videos – invitation “Open House” and “Presentation of the FME Departments.”
- Update of a promotional-information web “Come and study at the Machinery Faculty in Liberec”.
- Promotional files with the offer of study possibilities at the Faculty of Mechanical Engineering were handed over to Secondary Technical Schools and Grammar Schools.
- Presentation and offer at www.edulk.cz / available for headmasters of schools.

Workshops and seminars for secondary school students

- Students of selected grammar schools and the Technical Lyceum Liberec were invited to the lecture by Dr. Dana Drábová from the State Office for Nuclear Safety on April 4, which was followed by a visit to laboratories of FME TUL followed by broad information on the offer of study possibilities in technical fields.
- Workshop for students of 8th and 9th grades of Elementary School Ruprechtice Liberec. In the laboratory KMP, workshop was focused on promotion of studies in technical fields, active tour of laboratory of mechanics (testing of materials, gyroscopes, smart materials, composite materials) on 19 October.
- Promotional visit of the Vice-Dean for educational and pedagogical activities at the Secondary Industrial School in Mladá Boleslav.
- Visits by students of the Higher Vocational School and Varnsdorf Secondary School, at the faculty on November 13 and the Higher Vocational School, Secondary Industrial School and Čáslav Business Academy on 21 November.

- Presentation of the Faculty of Mechanical Engineering at a meeting with students' participation on March 1 at ÚJOP UK in Prague, and on March 4 at ÚJOP in Liberec.
- Meeting with principals of secondary schools in the Liberec Region, on 26 March, within the meeting of principals of our region. Rich possibilities of study majors at FME TUL as well as professional issues were presented, also effective collaboration of the faculty with secondary schools, e.g. popular educational lectures, possibilities of using instrumentation for students of secondary schools, etc. Natural materials in technology, on 15 May, Assoc. Prof. Dora Kroisová gave a lecture for students of the Podještědské Grammar School. The lecture was finished by the observation of samples from natural materials.

Promotion of Studies for Foreigners at the FME TUL

- **Welcome Week at TUL**
From 29 January to 3 February, the traditional Welcome Week for newly arrived Erasmus+ international students took place in the summer term (ST) 2018/2019. We welcomed 31 new students in the summer term 2018/2019 from France, Portugal, Spain, Turkey and Poland within Erasmus+ Program and 1 Ph.D. student from Thailand for an internship within the Erasmus+ Credit Mobility Program. Another 3 students from Turkey continued their studies at the faculty in the summer semester and 1 student from Turkey continued their internship in winter term. During SS 2018/2019, 3 students from France, 1 student from Lithuania and 1 student from the University of Turkey, 2 students from Israel came for an internship within the Erasmus+ Program, Erasmus+ Credit Mobility.
- **Presentation of the Faculty of Mechanical Engineering at ÚJOP UK in Prague**
On March 1, faculty management visited the Institute of Language and Vocational Training of Charles University in Prague. The meeting was attended by 15 foreign students, who are preparing for further studies in the Czech Republic at ÚJOP UK in Prague. There were presented study possibilities, conditions of the admission procedure and especially, the field of science and research, in which FME TUL specializes.
- **Presentation of the Faculty of Mechanical Engineering at ÚJOP UK in Liberec**
On March 4, faculty management visited the Institute of Language and Vocational Training of Charles University in Liberec. The meeting was attended by about 20 foreign students – who are preparing for further studies in the Czech Republic at ÚJOP UK in Liberec. Students were presented with various possibilities of studying at the Faculty of Mechanical Engineering, conditions of the admission procedure. They were also acquainted with the areas of research at the Faculty. This was followed by a short discussion.
- **BSc WING / SWEET-Liberec 2019**
From 29 April to 3 May, study trip was organized, where participated students from FHS St. Gallen, who study a program combining economics and technical disciplines. As part of their program, they also attended selected lectures by representatives of KSA, KSR, KMT and KVM departments. Students also visited TUL laboratories and took part in excursions to Magna and DGS Druckguss Systeme s.r.o. Further, individual consultations were held on selected topics with individual academic staff at TUL.
- **Welcome Days at TUL**
In the period 24 – 29 September, Welcome Days were traditionally organized for foreign students of the Erasmus+ Program before the start of winter semester 2019/2020. A total of 38 students from France, Portugal, Spain, Turkey, Slovakia and Greece started studying at FME TUL in the winter semester 2019/2020. 1 foreign student from Turkey started an internship at the Faculty of Mechanical Engineering within the Erasmus+ Program in the winter semester, at the same time an internship of 1 student from Turkey took place and 2 Erasmus + students from Lithuania who arrived during summer months.
- **Orientation Week**
It was organized by the TUL International Office in cooperation with ESN and held for students who are government scholarship holders as well as for self-paying students from India, who started studying NMSP, DSP at the Faculty of Mechanical Engineering in WS 2019/2020. During the Orientation Week, the university had been introduced to students, they were provided with practical information about studying at the Faculty, students were enrolled to studies and other administrative tasks were carried out.
- **International Day 2019**
On 5 November, International Day was held at the University under the auspices of the International Office of TUL. In the framework of this event, a fair of opportunities to work and study in foreign countries was organized. The aim was to promote mobility of foreign students.

In addition to lectures by students with experience from studying abroad and presentations of agencies enabling various types of stays abroad, the program also included a lecture "Why do Slovaks like Euro and Czechs do not?". The fair also opened an exhibition of photographs and posters from internships of TUL students abroad as part of the Erasmus+ program. Furthermore, in addition to presentations of organizations mediating stays abroad, the program also included a lecture by the Army. gen. Ing. Jiří Šedivý on the topic "The Security Role of the European Union and NATO in the 21st Century."

- In cooperation with the Institute of Vocational and Language Training of Charles University, Centre in Liberec, foreign students preparing for their studies in the Czech Republic paid their visit to the Faculty of Mechanical Engineering on 23 November.
- On 25 November, a regular seminar was held for students of the Faculty of Mechanical Engineering on possibilities of studying or internships abroad, mainly within ERASMUS+ Program.

Presentation of departments to students of the second and third years of Bachelor's study programs at the Faculty of Mechanical Engineering

In February, a presentation of FME activities and laboratories was held with representatives of individual departments introducing their activities. The event was designed for Bachelor students who are about making decision and thinking about their final thesis or professional work experience; and are weighing at which department they will carry out their activities. In the framework of the event, a questionnaire survey of students on the quality of Bc. study was conducted as well.

CroBoPlast

On March 27, a meeting of the academic, industrial and research spheres of CroBoPlast was held, dealing with plastics processing technologies in Oberlausitz-Liberec region and took place at HS Zittau/Görlitz for the second time, with students participation. This meeting was finished by a successful solution of the cross-border project GreK supported by OP Cooperation Program Czech Republic – Free State of Saxony 27.

3.9 Quality of Teaching

Teaching is organized in accordance with accredited study plans and is guaranteed by educators who prove their professional competence through professional and publishing activities.

Lecturers are mainly professors and associate professors of the Faculty of Mechanical Engineering and in selected cases other experts from ranks of the university academic staff. External workers from industry and the Academy of Sciences are also involved in teaching, see the table annex 6.4.3.

In the context of professionally focused seminars and lectures, other experts from the application and academic areas have presented here, see chapter 6.5.

Activities to support the quality of teaching are specified in detail in the annual reports of each department. In summary:

- Investment development of classrooms and laboratories was carried out from resources of FRIM and OP RDE projects. In summary, for educational and R&D activities in the amount of approx. 51.02 mil., See chapter 7.2.
- 16 scripts were published to support teaching: 7 in English electronically, 5 in Czech, 1 in Czech electronically, 3 in German.
- Functional models and didactic aids for teaching are implemented on an ongoing basis, documented in detail in annual reports of departments.

Quality Assessment of Teaching and Learning

- A system of evaluation of teaching quality in IS STAG was introduced. Students have the opportunity to evaluate courses in the IS STAG system anonymously. The event is organized by the Student Chamber of TUL. In the winter semester 2018/19, 152 students participated in the evaluation, in summer semester 2018/19, 64 students of the Faculty of Mechanical Engineering got involved.
- A system of Bachelor's studies evaluation at the end of the third semester was introduced. In February 2019, 61 students were involved.
- In 2019, the evaluation of Bachelor's and Master's studies by graduates was piloted. It will be introduced as a standard as part of the system of evaluation of teaching and study quality.

- In 2019, for the first time, a questionnaire survey had been conducted among BSP and NMSP graduates, which concerned their employment. In March 2019, 89 graduates who completed their studies in 2018 were asked to complete an online questionnaire. Responses were sent by 56 graduates.
- Some departments carry out evaluation of lessons within the end of instruction period for their own feedback.

3.10 Lifelong Learning

In the context of lifelong learning, the Faculty conducts traditionally a wide range of professional seminars and trainings that are content-structured according to the requirements of industrial firms and companies.

Lifelong learning is an important item of cooperation with industry:

- A total of 19 professional seminars and courses were organized.
- Courses were attended by 160 participants.
- The volume of obtained funds amounted to 683.000 CZK.

SCIENTIFIC RESEARCH ACTIVITIES

4 SCIENTIFIC-RESEARCH ACTIVITIES

4.1 Focus of Scientific and Research Activities

The scientific and research base are traditional fields that accentuate needs of applied research and development in the Czech Republic. In comparison with other Faculties of Mechanical Engineering, FME TUL is pretty subtle. However, it is able to provide rich spectrum of essential engineering fields necessary for preservation, sustainability, and development of the field. Regarding social importance for national economy, its role is absolutely irreplaceable.

FME TUL focuses on needs of applied research and development in the Czech republic with the emphases on topics and current issues of the 21st century.

It mainly reflects and accentuates needs of applied research and development in the Czech Republic, with the emphasis on:

- Research and development of traditional and modern materials.
- Research, development and innovation of standard and progressive technologies.
- Reducing energy intensity.
- Weight reduction.
- Construction of special machines and equipment.
- Sustainable transport.

Areas that are being developed:

- Materials, nanomaterials, composites.
- Progressive technologies and nanotechnologies.
- Construction of machines and equipment.
- Production systems, automation and robotics.
- Sustainable transportation and mobility.
- Energetics and renewable resources.

4.2 Institutional support

In 2019, the faculty received funds for institutional support in the amount of 33.147 million CZK – from which 31.697 million for non-investment purposes and CZK 1.45 million for investments. It represents 29.2% of funds for R&D activities of FME TUL from the Czech budget. This amount was allocated to departments to support research and stabilize research teams.

4.3 National Competence Centres

In 2019, two competence centers were launched with the participation of FME:

- The National Centre of Competence of Mechanical Engineering, led by VÚTS a.s., participants on behalf of the Faculty of Mechanical Engineering are teams from the Department of Textile Machine Design and from the Department of Applied Mechanics.
- Josef Božek National Centre of ground vehicles led by the Czech Technical University in Prague, the participant for the Faculty of Mechanical Engineering is the Department of Vehicles.
- See appendix 4.3.

4.4 Research Projects

In 2019, a total of 15 projects budget were solved at the faculty supported from the Czech budget. It concerned 1 international project H2020, two projects supported from the OP RDE call (TUL holder, FME TUL coordinator) and 5 projects supported from the OP EIC. Two other OP RDE projects were solved to support the development of doctoral study programs (these are not research projects, but support, among other things, development of R&D infrastructure for doctoral studies.)

The volume of grant support obtained by the faculty from the Czech budget for solving science and research projects amounted to approximately CZK 73.65 million (CZK 4.4 million for investments), which represents approximately 65% of the total volume of earmarked funds obtained.

The volume of support from EU funds for the solution of science, research and applications projects amounted to CZK 39.82 million (of which CZK 18.19 million for investments), which represents approximately 35% of the total volume of earmarked funds obtained.

For overviews of projects and financial subsidies see table and text appendices 4.4.

4.4.1. Overview of Scientific and Research Projects Supported from the Czech Budget

- TA CR: TN01000026 – Josef Božek Competence Center for Civil Engineering. 2019–2020.
- TA CR: TN01000015 – Engineering Competence Center. 2019–2020.
- TA CR: TJ02000175 – Research of end gauges in terms of thermal expansion and non-standard material composition. 2019–2021.
- TA CR: TH04020189 Thermal nano-insulation for automotive, aerospace and astronautics. 2019–2022.
- TA CR: TH04010506 Robot with a parallel measuring arm as an alternative to CNC machining centers and other machines for precise operations. 2019–2020.
- TA CR: TH02020799 – Product development for the automotive industry from the alloy. AlSi5Mg. 2016–2019.
- TA CR: TH03010378 – Development of a new range of anti-fire pumps for extreme conditions. 2018–2020.
- MIT CR: FV40127 – Plasma-nitriding increase of useful properties of welds and parts created by means of additive technologies. 2019–2022.
- MIT CR: FV40144 – Design and manufacturing of a prototype device for local repairs of the inorganic surfaces functionality. 2019–2022.
- MIT CR: TRIO: FV10467 – Development of progressive rolling technology in the production of caps. 2016–2019.
- MIT CR: TRIO: FV20241 – Modular line of tool bin for tool machines. 2017–2019.
- MIT CR: TRIO: FV20547 – Special transformation mechanisms in drives with electronic cams. 2017–2020.
- MIT CR: TRIO: FV30091 – Research and development of a new generation of automatic machines for the production of self-supporting coils. 2019–2020.
- MI CR: VI20172019055 – Application of geopolymers composites as a fire barrier (AGK). 2017–2020.
- MI CR: VI20172020052 – Applied research in the field of new generation personal protective equipment for needs IZS. 2017–2022.

Project of commercialization R&D results submitted and solved under INATI

- TA CR-GAMA: TG01010117 – PROSYKO – 1 partially solved project by FME. 2014–2019.

4.4.2 Overview of Scientific and Research Projects Supported from the EU

- EU/EK. H2020: A novel process for manufacturing complex shaped Fe-Al intermetallic parts resistant to extreme environments. 2016–2019.
- EU/MEYS CR. 8J19FR018. Evaluation of cavitation erosion potential for liquid industrial applications. 2019–2018.
- EU/MEYS CR. OP RDE. CZ.02.1.01/0.0/0.0/16_019/0000843. Hybrid materials for hierarchical structures. TUL project / 3 research programs / FME, FTE, Cxl. Led by the academician from FME TUL 2018–2022.
- EU/MEYS CR. OP RDE. CZ.02.1.01/0.0/0.0/16_025/0007424. 3D printing in construction and architecture. TUL project / 3 research programs / FME, FA, FTE, FM. Led by the academician FME TUL. 2018–2022.
- EU/MIT CR. OP EIC. CZ.01.1.02/0.0/0.0/16_084/0010282. Development of textile products from non-combustible and recyclable materials. 2018–2019.
- EU/MIT CR. OP EIC. CZ.01.1.02/0.0/0.0/17_107/0012526. Integration of microcomputers into lighting systems. 2018–2020.
- EU/MIT CR. OP EIC. CZ.01.1.02/0.0/17_176/0015557. Research and development of a new universal drip-free quick coupling. 2019–2022.
- EU/MIT CR. OP EIC. CZ.01.1.02/0.0/0.0/17_107/0012381. Research and development of special sewing machines for automated accelerated sewing of shaped parts of outdoor wear. 2019–2020.

- EU/MPO ČR. OP PIK. CZ.01.1.02/0.0/0.0/15_019/0004815.
Testing stand for pre-certification tests of internal combustion engines. 2016–2019.

Projects for supporting the development of new doctoral study programs

- EU/MŠMT ČR. OP VVV. CZ.02.2.69/0.0/0.0/16_018/0002718
Development of research-oriented study programs. 2017–2022.
- EU/MŠMT ČR. OP VVV. CZ.02.1.01/0.0/0.0/6_017/0002650
Research infrastructures for educational purposes. 2017–2022.

4.5 Students Grant Competition

As part of support for specific research carried out through the Student Grant Competition, 22 projects with a total volume of financial support of CZK 6.08 million were solved, which represents 5.4% of the total volume of financial resources for R&D activities (8.3% of the Czech budget). For an overview of projects, see Table Annex 4.5.

4.6 Contract Research and Development

FME TUL carries out a significant volume of contract research for the industrial sphere in the Czech Republic and abroad. Cooperation with the application sphere initiates R&D partnerships for the solution of joint projects of applied research, introduces new topics for VVI FS TUL and, last but not least, forms an important item of the faculty budget. Contract research addresses topics specified from the perspective of clear expectations of contracting authorities. In addition to technical, technological and design solutions that lead to economic benefits for clients, important aspects are social, environmental, personnel, etc. Revenues from contract research are used to co-finance projects, to acquire and develop R&D infrastructure, to support researchers and to create a reserve fund. The offer and connection correspond to the capacity possibilities of FME TUL.

Contract research and development as part of ancillary activities forms an important segment of the faculty's activities. The revenue from the contract research of FME TUL in 2019 amounted to approximately CZK 10.54 million.

Contract research and development carried out by the academics of the Faculty of Mechanical Engineering under INATI amounted to approximately CZK 9.35 million.

An important item is the pre-application contract research carried out within the NANOPROGRES cluster by the Department of Textile and Single-Purpose Machines FS TUL. This is the construction of special machines for the production of nanofibers. The research is declared under INATI.

See table annexes 4.6.

4.7 Supplementary Activity

Supplementary Activity belongs to one of the strengths of the faculty. It includes a wide portfolio of activities, e.g. measurement, testing, simulation, analysis, etc. Revenue from additional activities of FME TUL departments amounted to CZK 2.17 million, the volume under DFS amounted to CZK 1.45 million. See table annexes 4.6.

FME TUL provides expert activities in the field of mechanical engineering, and various technical fields. In 2019, 6 expert assessments were prepared.

FME TUL provides Authorized Measurements of Pollutant Emissions according to § 15 par. 1 let. a) of the Act on air protection. In 2019, one measurement was carried out.

4.8 The Institute for Nanomaterials, Advanced Technology and Innovation

Sustainability of the project finished in 2018, see text appendix 4.7.

In 2019, a dislocation decision transferred laboratories to FME TUL developed by the faculty till 2019 under CxI within the Competitive Engineering and Materials Research programs:

- Laboratory of Hydrodynamics (Applied Mechanics) – KST
- Lab of Propellant Units – KVM
- Lab of textile machines innovation – KTS

- Lab of prototype technologies and processes – KSA
- Lab of progressive engineering technologies – KSP
- Lab of chip technologies and processes – KOM

4.9 Results of Research and Development Activities

In 2019, 171 results of scientific research and development activities were created at FME TUL. It can be stated that the absolute number of results created in 2019 copies both years 2017 and 2018, when the Methodology 2017+ was already applied. In accordance with the methodology, the share of bibliometrizable results in the whole has been gradually increasing year-on-year since 2017, with authors more focusing on the creation of category results. J – peer-reviewed professional article compared to results of category D – article in proceedings. A closer look shows that the largest year-on-year increase, both in absolute and percentage terms, is reported at FME TUL in the Jimp category – articles contained in the Web of Science database (see Tables 4.9.5 and 4.9.6).

In 2019, a total of 6 results were selected for evaluation within Module 1 of the 2017+ Methodology, where FME TUL academics participated as authors or co-authors (see Table 4.9.8). The decrease in number of nominated results to 2018 was caused by a decrease in the total quota of submitted selected results allocated to TUL by the RVVI department on the basis of data from the R&D&I IS.

As in 2018, in 2019 approximately 88% of the outputs of FME TUL were included in the field of 2. Engineering and technology according to the Frascati manual. The year-on-year increase in outputs occurred only in the industry 5. Social sciences (see Tables 4.9.9 and 4.9.10).

Within the field 2, Engineering and Technology, in 2019 the sub-fields 2.3 Mechanical Engineering (40%) and 2.5 Materials Engineering (39%) remain the most frequently represented. There was a year-on-year increase in the absolute and percentage representation of results in the field 2.10. Nanotechnology (14%). See Tables 4.9.11 and 4.9.12 for details.

With the support of specific research, 32 articles were created in the professional periodical in 2019, 29 articles in the proceedings and 6 functional samples. A total of 71 outputs were created with SGS support (see Table 4.9.13).

In 2019, 22 articles in professional periodicals were created from institutional support funds and 8 articles in the proceedings. In addition, 3 patents were created. A total of 33 outputs with IP support were created (see table 4.9.14).

In order to maintain the continuity of data, the tables and data in this chapter are kept in the same format as in previous years.

4.10 Technology, Knowledge and Service Transfer (TKST)

The forms of TKST reflect the character of universities, i.e. the character of faculties, the quality of research, development and teaching, the level of infrastructure and the background of the services provided by the university to the academic community. The commonly presented notion of commercialization for TKST implies that TKST must result in 'commercialization or monetization'.

TKST forms at the FME TUL are included in already mentioned and financially in other chapters:

- Collaborative research and development. Text annexes 4.3, 4.4, 4.9.
- Collaborative or contract research within OP EIC projects. Text annexes 7.4.1.
- Pre-application research and development supported by OP VVV.
- Contract research and development. Table annex 4.6, Text annex 4.6
- Contract research and development in the framework of NANOPROGRES cluster. See text above 4.6, Table annex 4.6.
- Expert activity – provision of authorized and expert services. Table annex 6.4.
- Provision of professional services – Complementary Activity. See text above 4.6, Table annex 4.6.
- Education for the industrial, economic and public spheres. Table annex 3.10.
- Commercialization of R&D results and outputs:
 - Sale of licenses:

Project TA01020313. Material selection and testing procedure for enthalpy exchangers, procedure of heat exchanger surface of the plate heat exchanger. The annual payment for 2019 was CZK 90.000.

- MI CR: VG20122014078. Applied research of a new generation of protective masks with nanofilters to increase protection of persons from a design, technological and material point of view. Protective breathing mask with a common inhaler and exhalation opening. European industrial design (circle variant). European industrial design (rectangle variant). The annual payment for 2019 will be quantified together with 2020V ČR: VG20122014078.
- Implementation of “proof of concept” projects, scientific activities leading to commercial application:
- In 2019, one partial FME TUL project was solved within the TUL project PROSYKO. The project is supported by the TA CR/GAMA program, Subprogram 1 is focused on supporting the verification of the practical usability of R&D results, which arise in research organizations and have the potential for use in new or improved products. The volume of funds for FME TUL amounted to 321 thous. CZK. The project is managed under TUL/CNATI, see text appendix 4.9.

INTERNATIONAL COOPERATION

5 INTERNATIONAL COOPERATION

In the area of international co-operation, activities focused on student and academic staff mobility, strengthening internationalization in teaching, developing existing co-operation with partner foreign institutions and preparing contracts for bilateral co-operation with other research institutions prevailed. International cooperation in all areas of the Faculty was based on 89 contractual relations.

5.1 1 Internationalization in Education

As part of the internationalization of the environment at the Faculty of Science in 2019, teaching at the NMSP in English continued in Engineering Technology and Materials, Production Systems and Processes for 3 students from India - self-payers 2016/2017, from whom, 2 students unsuccessfully completed their studies in 2019 and 1 student continued to study at NMSP in English in Engineering Technology and Materials in 2019.

At the same time, 6 students from India – self-payers 2017/2018 successfully completed the study of NMSP in English in 2019 in the fields of Machine and Equipment Design, Production Systems and Processes, and also continued teaching NMSP in English in the field of Machine and Equipment Design for 3 students from India – self-payer 2017/2018.

At the same time, NMSP was taught in English in fields of Machine and Equipment Construction, Production Systems and Processes for 17 students from India and Turkey – self-payers 2018/2019, of which 1 student from India unsuccessfully completed his studies in 2019.

9 students from India – self-payers 2019/2020 - were newly admitted to study NMSP in English in the fields of Machine and Equipment Construction, Production Systems and Processes.

In 2019, 4 government scholarship holders (Syria, 2x Philippines, Ghana) successfully completed studies of the follow-up Master's Degree program in English N2301 Mechanical Engineering, field of study Machinery and Equipment Design, with the specialization Energy Equipment.

Teaching of 7 government scholarship holders continued in English (Myanmar, Ethiopia, 2x Ghana, Jordan, Cambodia, Peru) in the follow-up Master's program N2301 Mechanical Engineering, Machine Design – specialization Energy Equipment, and 3 government scholarship holders (Kosovo, Lebanon, Ghana) of the Doctoral Study Program P2302 Machinery and Equipment, in Machine Construction and Equipment, with the focus on equipment for thermal engineering.

Newly, also started teaching of 5 government scholarship holders (Ethiopia, Zambia, 2x Bosnia and Herzegovina, Georgia) in the follow-up Master's program N2301 Mechanical Engineering, Machinery and Equipment, in specialization Energy Equipment in the English language.

As a part of the faculty scholarship, 2 students from Vietnam continued their studies in Doctoral Study programs in fields of Applied Mechanics, Construction of Machines and Equipment in the English Language, of which 1 student successfully completed DSP studies in the field of Machine and Equipment Design in 2019.

At the same time, other 7 foreign students of DSP – self-payers (Germany, 2x Poland, 2x Egypt, Libya, Israel) continued their studies in English at the faculty, from whom, in 2019 1 student – self-payers (Germany) successfully completed DSP studies in English. in the field of Machinery and Equipment Construction.

In 2019, 15 foreign self-paying students (12x Brazil, India, France, China) came for a short-term internship, which was successfully completed in 2019.

5.2 International Cooperation in Education

In the area of international cooperation in education, efforts have been directed to establishing new International contacts and activities, it was continued in the process of implementation of initiated activities and development of existing cooperation in the form of study mobilities for students and Faculty members stays at foreign institutions and reciprocally hosting foreign students and experts at the Faculty of Mechanical Engineering within exchange programs and projects.

Students' Educational Activities Carried out within the Framework of Projects

- In 2019, the institutional project IP FME TUL (12451) – "Development of the Faculty of Mechanical Engineering TUL" was solved, within the sub-project "International cooperation FME TUL" was solved too, with the priority goal 3: Internationalization. The aim of the subproject was to support international student activities, FME TUL through the FME TUL Mobility Fund as well as the continuation and deepening of current cooperation.
- Within the project IP FME TUL 12451, an internship of a Czech student started at the Canadian partner university Conestoga College Institute of Technology and Advanced Learning in 2019.
- In 2019, there were organized 3 short-term stays of Doctoral students of FME (1x15 days, 2x4 days) for the purpose of professional growth, development of research activities and strengthening of existing contacts with foreign partner institutions (France, Germany) with the financial support of IP Mobility Fund FME TUL.
- A short-term stay of a foreign doctoral student (Serbia) was carried out at FME for 7 days with financial support of the IP Mobility Fund FME TUL 2019.
- There were 3 short-term stays of FME TUL students at summer schools in Germany and Denmark with the financial support of the TUL Mobility Program.
- 1 internship of a doctoral student was realized for 17 days at partner institutions in France within the Ministry of Education, Youth and Sports-8J-CR-France.
- In 2019, short-term several-day activities were organized with the financial support from other sources – 54 students short-term trips with the support from the Cooperation Program Czech Republic – Free State of Saxony (GreK), 1 short-term study stay of DSP students with financial support from the Cooperation Program Czech Republic - Free State of Saxony (BauQu) and 7 short-term study stays of DSP students with financial support from HyHi.
- In 2019, a one-semester study stay was successfully completed by 1 student at the Faculty of Mechanical Engineering from the partner National University of Technology, Taiwan within the framework of interuniversity collaboration.

International Cooperation in the Field of Scientific and Research Mobility

See below in chapter 5.4.

5.3 International Cooperation in the Field of Scientific and Research Mobility

In the framework of international cooperation in the field of scientific research mobility, efforts have been directed at developing the existing scientific-research activities with foreign partner institutions, establishing new International contacts and developing joint activities in the field of science and research internationally

- In 2019, the institutional project IP FME TUL (12451) – "Development of the Faculty of Mechanical Engineering TUL" was solved, within which the sub-project "International cooperation FME TUL" was solved as a priority goal 3: Internationalization. The aim of the subproject was to support international activities of academics. FME TUL in educational and scientific research areas through the FME TUL Mobility Fund as well as the continuation and deepening of current cooperation between FME TUL and partner foreign universities.
- There were carried out 3 foreign stays of academic staff of the faculty in the length of min. 15 days for the purpose of professional growth and strengthening of existing contacts with foreign partner institutions with the financial support of the IP Mobility Fund FME TUL 2019.
- 6 multi-day stays of academic staff were realized, three of them for 12 days and three for 4 days, for the purpose of professional growth, establishing new or strengthening existing contacts with foreign partner institutions and also for professional participation in foreign events for financial support of the IP Mobility Fund FME TUL 2019.
- 2 short-term stays of foreign academic staff from partner universities in Bulgaria and Poland lasting for 7 and 13 days were carried out at the faculty with the financial support of the IP Mobility Fund FME TUL 2019.
- Two short-term stays of several academic staff of FS TUL and 1 other staff of FS at foreign partner institutions in Belgium and Greece were carried out with financial support from other sources (HORIZONT 2020, Project EQUINOX).
- There were 11 realized short-term several-day stays of academic staff of the Faculty in Germany with financial support from other sources (Cooperation Program Czech Republic – Free State Saxony, Project BauQu), 13 short-term several daily stays of academic staff

in Germany with financial support from other sources (Cooperation Program Czech Republic – Free State of Saxony, GreK Project), 9 short-term several-day stays of FS academics in Germany, Italy, Austria and Poland with financial support from other sources (OP RDE 16003, Technology Transfer), 4 short-term several-day stays of CF academics in Germany with financial support from other sources (Cooperation Program Czech Republic - Free State of Saxony, Pokrok.digital Project), 15 short-term several-day stays of FS academics in Germany, France, Greece, Hungary, Poland, Portugal and Slovakia with financial support from other sources (HyHi, 16015)

- In 2019, 1 long-term research stay of a foreign academian from Vietnam continued at the faculty within the HyHi project (16015).
- A stay of an academic FME TUL at foreign institutions was carried out in India for 10 days in the category of other stays.
- There were realized 5 short-term stays of foreign academics from Finland, Hungary and Bulgaria at the faculty in the category of other arrivals.

5.4 International Mobility

The mobility of students, academics and other employees of the FS was realized mainly within the ERASMUS +, ERASMUS + KA107 – Credit Mobility, CEEPUS, Institutional Development Program programs. A significant share of mobility was also realized within other sources.

The mobility of international students and academics at the Faculty of Mechanical Engineering TUL took place primarily within the ERASMUS +, ERASMUS + KA107 – Credit Mobility and CEEPUS programs. Foreign academic staff also took advantage of the offer of stays within the IRP Mobility Fund and foreign students used the offer of internships within the IAESTE program. Mobility of foreign students and academics was also realized within other sources.

The Faculty motivates students of all study programs to carry out a study stay abroad. The priority is given to increase the number of doctoral students going on mobilities. Since 2010, foreign study stays or internships have been included into the Doctoral study plans/programs. In newly accredited Ph.D. studies internships or study visits abroad are compulsory.

In 2019, the total foreign mobility of academics and other Faculty staff as well as foreign mobility of Faculty students increased. By contrast, the overall mobility of foreign students and academics decreased slightly.

Stays of Foreign Students and Foreign Academics at FME TUL

In 2019, the total number of visits of foreign students and foreign academics in the framework of mobility programs and other resources at the Faculty slightly decreased in comparison with 2018, while in the individual categories of mobility, the largest decline was recorded in the stays of foreign students coming primarily with financial support from other sources and the stays of foreign academics coming under the Erasmus+ program. Student arrivals under the Erasmus+ program remained at the 2018 level, while the IAESTE and CEEPUS programs increased. Arrivals of foreign academics under the Erasmus+ program decreased significantly compared to 2018, arrivals under the CEEPUS program increased. Arrivals of foreign academics within the TUL Mobility Fund remained at the 2017 level. Arrivals of foreign students and academics financed from other sources dropped significantly compared to 2018. By contrast, the number of foreign students in the categories of government scholarship holders and self-payers increased. Other activities of foreign academic students decreased slightly compared to 2018.

- 22 students' study visits or internship were realized abroad that were successfully completed or started in 2019, within the Erasmus + program, with the majority of stays represented by the mobility of students at the Bachelor's and Follow-up Study program.
- 1 study stay of a DSP student within the Erasmus+ KA107 program (credit mobility, stay started in 2018) at a partner university in Thailand in the length of min. 31 days in 2019.
- There were 11 stays of academics within the Erasmus+ program, with short-term teaching stays of 5 days predominating.
- 3 stays were realized in the category of other staff within the Erasmus+ program in the length of less than 5 days in the category of training.
- 6-5-day Erasmus+ KA107 academic trips were organized (credit mobility) to partner universities in Azerbaijan, Thailand and Israel.

- There were 5 teaching stays of academics of the faculty within the CEEPUS program at partner universities in Serbia and Slovakia in the length of 5 days.
- 3 short-term stays were realized for students of Doctoral Study Programs with the financial support of the IP Mobility Fund FME TUL 2019 (France, Germany), of which 2 trips were shorter than 5 days.
- 9 trips of faculty academics took place within the IP Mobility Fund FME TUL 2019, of which 3 stays of min. 15 days, 3 stays of 12 days and 3 trips of less than 5 days.
- One student stay abroad lasted for one semester, which started within IP FME TUL 12451 – "Development of the Faculty of Mechanical Engineering TUL" at a partner university in Canada.
- There were carried out 3 short-term stays of FME students at summer schools in Germany and Denmark with the financial support of the TUL Mobility Program.
- 14 stays of foreign students were realized at the Faculty of Mechanical Engineering from the European area within Erasmus+ Program, which successfully completed or started in 2019. 11 foreign students completed an internship at the faculty.
- 1 study stay of a foreign DSP student from Slovakia lasted for three months at the Faculty of Mechanical Engineering within the CEEPUS program.
- There were 5 stays of foreign students coming from Kazakhstan, Tunisia and from Thailand within the IAESTE program in the category of internship lasting min. one month or more.
- 2 study stays of foreign students from a partner university in Vietnam were successfully completed at the Faculty of Mechanical Engineering within the Erasmus+ KA107 program (credit mobility, stay started in 2018) lasting 31 days in 2019.
- There were organized 3 stays of foreign students from partner universities in Thailand and Israel at the Faculty of Mechanical Engineering within the Erasmus + KA107 program (credit mobility). 1 PhD student stay was lasting for three months, the remaining 2 Bachelor's students carried out an internship at the faculty lasting for three months.
- A total of 14 stays of foreign academics took place at the Faculty of Mechanical Engineering within the Erasmus+ Program. 5 of them were teaching stays and 9 arrivals in the training category, while 4 arrivals within the Erasmus + were shorter than 5 days.
- A total of 4 stays of foreign academics from partner universities in Israel took place and Azerbaijan at the Faculty of Mechanical Engineering under the Erasmus + KA107 program (credit mobility), 1 teaching stay and 3 stays in the training category, all arrivals lasting min. for five days.
- A total of 4 teaching stays of foreign academics were carried out at the Faculty of Mechanical Engineering within the CEEPUS program (Serbia, Poland, Slovakia), with 1 arrival lasting for 30 days, 1 arrival lasting for 15 days, 1 arrival lasting for 12 days and 1 arrival for a period of 7 days.
- 1 short-term stay of a foreign doctoral student (Serbia) was carried out lasting for 7 days with the financial support of the IP Mobility Fund FME TUL 2019.
- 17-day stay of a doctoral student at a partner institution in France within the Framework Program 8J/ Mobility Support (MEYS)
- Short-term several-day activities of students with the financial support from other sources – 54 short-term trips of students with financial support from the Cooperation Program Czech Republic – Free State of Saxony (GreK), 1 short-term departure of a DSP student with financial support from the Cooperation Program Czech Republic - Free State Saxony (BauQu) and 7 short-term trips of DSP students with financial support from HyHi, 1 trip lasted for 8 days
- One-semester stay of 1 student from the partner national University of Taipei University of Technology, Taiwan, was successfully completed within the interuniversity cooperation.
- There were 2 short-term several-day stays of an academic staff member of the Faculty and 1 other staff member of the Faculty at foreign partner institutions in Belgium and Greece with the financial support from other sources (HORIZONT 2020, EQUINOX Project).
- 11 short-term several-day stays were organized of academic staff of FME TUL in Germany with financial support from other sources (Cooperation Program Czech Republic – Free State of Saxony, BauQu Project), 13 short-term several-day stays of academic staff of FME in Germany with financial support from other sources (Cooperation Program Czech Republic – Free State of Saxony, GreK Project), 9 short-term several-day stays of FS TUL academic staff in Germany, Italy, Austria and Poland with financial support from other sources (OP RDE 16003, Transfer technology), 4 short-term several-day stays of FS academics in Germany with financial support from other sources (Cooperation Program Czech Republic - Free State of Saxony, Digital Project), 15 short-term several-day stays of FME TUL academics in Germany, France, Greece, Hungary, Poland, Portugal and Slovakia with the support of other sources (HyHi, 16015).
- A long-term research stay of a foreign scientist continues at FME TUL within the project HyHi (16015).

- 2 short-term stays of foreign academics were organized at FME TUL within the project HyHi (16015).
- A stay of an academic staff member of FME TUL lasted for 10 days at a foreign institution in the category of other trips.
- There were realized 5 short-term stays of foreign academic staff at FME TUL in the category of other arrivals.
- FME TUL provided teaching of selected subjects for students within the Erasmus+ Program who came to FME.

Within ERASMUS+ Program

- A total of 73 inter-institutional agreements with partner universities were valid, from which 6 new inter-institutional agreements were concluded in 2019.
- Within the Call 2017 Erasmus+ KA107 Credit Mobility - Faculty of Mechanical Engineering received a total of 3 projects to develop collaboration with existing foreign partners in Canada, Thailand and Vietnam. Projects were successfully completed in 2019.
- Within the Call 2018 Erasmus+ KA107 Credit Mobility, FME TUL submitted 2 projects, to deepen existing cooperation with the partner institution in Israel and Azerbaijan. The faculty was successful in the case of Israel. Cooperation with Azerbaijan has been supported to a limited extent from TUL (Erasmus+) resources. In 2019, the planned activities were successfully implemented.
- As part of the 2019 Erasmus+ KA107 Credit Mobility Call, FME TUL applied for 4 projects to develop cooperation with partner universities in Canada, Malaysia, Ukraine and Azerbaijan. The faculty was successful in projects with Malaysia and Azerbaijan. Cooperation with Canada and Ukraine was supported to a limited extent from TUL (Erasmus +) resources.

Within CEEPUS Program

In 2019, FME TUL was an active participant in for nets CEEPUS III Program.

- CIII-RS-0304 Technical Characteristics Researching of Modern Products in Machine Industry (Machine Design, Fluid Technics and Calculations) with the Purpose of Improvement Their Market Characteristics and Better Placement on the Market.
- CIII-BG-0722 Computer Aided Design of Automated Systems for Assembling.
- CIII-RO-0013 Teaching and Research of Environment – Oriented Technologies in Manufacturing.
- CIII-RS-1012 Building Knowledge and Experience Exchange in CFDg.

5.5 International Collaboration Supported by Projects and Grants

In addition to the above mobility programs, scientific research and development cooperation is being flourished supported by scientific research and development projects

Scientific-research Projects

- EU/EK. H2020: A novel process for manufacturing complex shaped Fe-Al intermetallic parts resistant to extreme environments. 2016–2019.
- EU/MEYS CR. 8J19FR018. Evaluation of cavitation erosion potential for liquid industrial applications. 2019–2018.

Development Projects – Cross-Border Projects in Education

- EU – European Fund for Social Development. Reg.100252772. Cross-border cooperative teaching regarding plastics processing technology Zittau-Liberec. 2016–2019.
- EU – European Fund for Social Development. Reg. 100252950. Creating partnerships in the field of building technology research to educate scientific followers in border areas. 2016–2019.
- EU – European Fund for Social Development. Reg. 100281976. Practically oriented development of competencies in production technology in the regions through digital cooperation. 2017–2019.

See text annexes 4.4 a 7.4.

PARTNERSHIP AND COOPERATION

6 PARTNERSHIP AND COOPERATION

Partnership and cooperation with scientific-research institutions and industry partners is one of the pillars of the Faculty's stability.

6.1 Membership in Czech and Foreign Associations and Organizations

FS TUL Membership in Institutions and Organizations of Educational and Professional Character

- Association of Deans of Technical Faculties
- Czech Society for Mechanics
- FME TUL is accredited FEANI and is listed in the "Index FEANI"

Membership of Departments

- Confederation of Industry and Transport CZ
- Automotive Industry Association – AutoSAP
- Association of the Glass and Ceramics Industry
- Company for Machine Tools (at FME TU in Prague)

Platforms and Clusters

- Czech Technology Platform of Engineering, o. s.
- Josef Božek National Competence Centre
- National Competence Centre of Engineering
- CENEN-net – a free academic community
- INInet platform
- NESEFF (Network for Energy Supply and Energy Efficiency)
- The European Innovation Partnership – Sustainable substitution in extreme conditions
- iNETME – NET for Mechanical Engineering, program INTEREXCELLENCE (FME TUL involvement in the project LTI19001/solver TU Brno)

6.2 Cooperation with Universities and Research Organizations

Forms of cooperation with universities and research organizations include a wide range of activities.

Meetings, Hosting, Missions

- Visit at the University in Novy Sad
In the week from March 11th to 15th, within CEEPUS program, our teachers visited the University in Novy Sad, Faculty of Technical Science, Department of Energy and Processing Engineering. The Vice-Dean for Educational and Pedagogical activities Assoc. Prof. Dora Kroisová, Ph.D. together with Ing. Pavel Hanus, Ph.D. from the Department of Materials FS TUL and doc. Ing. Jaromir Moravec, Ph.D. from the Department of Engineering Technology FME TUL got acquainted with Master's and Doctoral Students. Professional issues and the issue of mutual cooperation was next point of the visit.
- Visit at TUL of the Vice-Rector for Science and Research from the University of Dunaújváros in Hungary. On March 14, during a visit to TUL, the Vice-Rector for Science and Research of the University of Dunaújváros, Dr. György Ágoston Ph.D. laboratories of the Faculty of Mechanical Engineering were introduced. The overall organization and program was covered by the Rector's Office and Foreign Department of TUL.
- Visit from Karelia University of Applied University in Finland.
From 10th to 11th June, we welcomed representatives of a partner university from Finland, Jukka Tulonen, a teacher from Mechanical Engineering, and a representative of the Kaija Saramäki Foreign Department. The Faculty of Mechanical Engineering newly concluded an inter-institutional agreement with them in 2018 within the Erasmus+ Program. 4 students stayed at FME 2018/2019 and 1 student from our FME student reciprocated to Finland. Guests met with the Vice-Dean for Doctoral Studies and Development Assoc. Prof. Lepšík. This was followed by a tour to the Laboratory of Chip Technologies and Processes and the Laboratory of Advanced Engineering Technologies. After that, a meeting with representatives of the foreign department followed. In the afternoon, they visited Magna Exteriors (Bohemia) s.r.o. Next day, they paid a visit to the Laboratory of Prototype Technologies and Processes at the CNATI TUL.

- Introducing of the University from Novy Sad at FME TUL
On June 19, Assoc. Prof. Siniša Bikić, Ph.D. introduced Faculty from Technical Sciences and Department of Energy and Process Engineering in Novy Sad. Prof. Bikić lectures on fluid mechanics, hydraulics and pneumatics and computational fluid dynamics, deals with the measurement of nanofluids and fluid flow. Siniša Bikić is very active in the international cooperation CEEPUS.
- Visit from Israel, Afeka College at our faculty. From October 18 to 22, we welcomed representatives from Afeka College at our faculty. Our faculty signed a cooperation agreement in 2017, and last year we won a joint project to develop cooperation. This year, two students from Afeka College worked at the Department of Vehicles and Engines and at the Department of Production Systems and Automation. Prof. Moshe Tsuva, the Dean of the Faculty of Mechanical Engineering at Afeka College, has visited our faculty for several times. In 2018, he presented the main scientific activities and possibilities of cooperation within the seminar.

Informal Cooperation of Faculty Workplaces

Departments cooperate with related workplaces in the Czech Republic and Slovakia at both scientific research and pedagogical levels. Members of the departments regularly meet in committees for the habilitation procedure, defense of doctoral theses, publish joint publications, etc.

Departmental meetings

- Meeting of 10 departments and institutes engaged in Production Technology and Robotics from the Czech Republic and Slovakia, in Trnava from 9th to 11th September, 2019. Participation of two representatives from the Department of Glass Machines and Robotics FME TUL.
- Departmental meetings regarding Departments of Applied Mechanics from the Czech Republic in Cvikov from 9 to 11 September, organized by the Department of Applied Mechanic FME TUL.
- Meeting of Machine Design departments. It took place as part of the 60th International Conference of Machine Design Departments. Hnanice, from 10 to 13th September 2019, organized by Technical University in Brno.

Scientific and research cooperation supported by projects and grants

The Faculty participated together with research organizations and universities in the solution of 2 projects of a collaborative nature (MIT CR), 2 Centers of Competence (TA CR), 1 project of foreign R&D cooperation (H2020).

Cooperation supported by the OP Enterprise and Innovation for Competitiveness

Faculty participated in the solution of 4 projects supported by the OP EIC and another project was launched at the end of 2019. See text annex 7.4.2.

Cooperation supported by the OP Cross-border Cooperation

The Faculty participates together with German universities in the solution of 3 projects supported by the OP Cooperation Program Czech Republic – Free State of Saxony 2014–2020.

Accredited collaboration in education

Accreditation granted to the Faculty of Mechanical Engineering of the Technical University in Liberec for the implementation of a doctoral study program in cooperation with other institutions:

- To complete the DSP Mechanical Engineering, together with the Institute of Thermomechanics of the ASCR, v.v.i. for the field of study Applied Mechanics. For graduation, together with the Institute of Macromolecular Chemistry of the Academy of Sciences of the Czech Republic, v.v.i. for the field of study Materials Engineering. Standard study period 4 years, Czech and English version.
- Newly granted accreditation for DSP Applied Mechanics, started for AR 2018/2019: together with the Institute of Thermomechanics and the Institute of Physics of the ASCR, v.v.i. Standard study period 4 years, Czech and English version.

6.3 Conferences, Symposia, Fairs

ITMA 2019

From 20 to 26 June, The ITMA International Trade Fair for Textile Machinery, the world's largest exhibitor of textile machinery and accessories, took place in Barcelona. Technical University in Liberec,

Faculty of Mechanical Engineering, Faculty of Textiles and Faculty of Science and Education, introduced a line for the production of linear composite material containing nanofibers. The TUL interfaculty team led by Professor Beran from the Faculty of Mechanical Engineering and Professor Lukáš from the Faculty of Science, Humanities and Education participated in the development of this line.

Future Port Prague 2019

From 10 to 11 September, the third year of the conference and fair. The exhibition of the Association of Nanotechnology Industry of the Czech Republic presented the nanotechnological novelty Fiber Flow nanopistoles - a prototype of a hand-held portable device for the production of nanofibers from polymer solutions by centrifugal forces, developed at the Department of Textile and Single-Purpose Machines.

SESIA 2019

From 18-20 September, a traditional meeting of Deans of Faculties of Mechanical Engineering from the Czech Republic and the Slovak Republic took place. This time under the auspices of the Technical University in Trenčín. One of the points of joint discussion was the issue of the number of students and discussions on grant issues for research projects.

XI. International Conference Production Systems of Today and Tomorrow

From 7 to 8 November, organized by the Department of Production Systems and Automation. The main topic of the 11th year of the conference was "Use of human capital = use of human resources – human flexibility, knowledge and skills." Number of participants: 52, 7 from abroad.

24th year of the seminar Calculations of structures by the finite element method 2019

Department of Applied Mechanics organized the seminar on 21 November. Number of participants was 28.

XIV. Experimental Fluid Mechanics 2019

From 19 to 22 November, the Department of Power Engineering organized the conference in Františkové Lázně. The 14th year of the conference was focused on experimental research in the field of fluid mechanics and thermodynamics. Total number of participants: 134, 78 were from abroad.

61. MSV in Brno

From 17 to 11 October, Faculty of Mechanical Engineering traditionally at the Brno Exhibition Grounds. The exposition of FME focused on the field of geopolymers and biopolymers and the use of nanomaterials in medical applications. The faculty presents, for example, equipment for braiding nanofiber structures that can be seeded with living cells, examples of geopolymers, examples of injection molding of geopolymers with cellulose nanocrystals.

6.4 Collaboration with the industry

Forms of collaboration cover research, scientific and educational activities.

Industrial Board of FME TU in Liberec

The Industrial Board is an advisory working group established by the Dean of the Faculty of Mechanical Engineering Technical University in Liberec. It includes 17 representatives of industrial enterprises and companies.

Scientific-research collaborative cooperation with the application sphere

The Faculty participated with industrial partners in the position of co-investigator in the implementation of 4 projects supported by the TA CR and 6 projects supported by the MPO CR. In the position of the solver, 2 projects were implemented supported by the Ministry of the Interior of the Czech Republic. See text section 4.4.

Research and Scientific Contracted Activities and Supplementary Actions

Research and scientific supplementary activities represent an important segment of the faculty's activities. See text sections 4.6 and 4.7 for details.

Expert Activities

Faculty holds an expert license for the fields of Mechanical Engineering, Technical Fields (various), Energy, Glass. In 2019, 6 reviews were prepared.

The Faculty is the holder of the Authorization for measuring pollutant emissions according to § 15 par. 1 a) of the Act on air protection. In 2019, one measurement was performed. See Table Annex 6.4.2.

Education of employees from industrial practice

Education of employees from the industrial sphere forms an important segment of FME activities. A total of 19 professional courses were implemented with the participation of 160 participants. The volume of funds obtained from this activity amounted to CZK 0.68 million.

Cooperation in education supported by OP Cross-border Cooperation Projects

Regional plastics companies and research institutions are involved in the GreK project, which deals with the construction and consolidation of cross-border cooperative teaching of modern plastics processing methods between the University of Zittau / Görlitz and the Technical University of Liberec.

Professional practice of students in companies

All bachelor's and master's students, or follow-up master's, study programs of the faculty completed the compulsory course Professional Practice in Enterprises in the range of 2–6 weeks according to fields (Bc study compulsory optional subject Professional Practice, Mg study compulsory course Professional Practice in companies in the range of 2–4 weeks according to fields).

Involvement of experts from companies and institutions in teaching

The standard form of cooperation are lectures by experts from practice, supervision of final theses and professionals involved in student internships. See Table Annex 6.4.3. As part of professionally focused seminars and lectures, other experts from the application spoke and academia, see chapter 6.5.

Excursion of students to industrial enterprises and institutes

In 2019, one- and multi-day excursions of students took place through the individual departments to industrial enterprises, companies and institutes:

Škoda Auto a.s. Mladá Boleslav – toolshop, pressing shop; Modelárna Liaz spol. s r.o. Liberec; Commercial foundry of gray and ductile alloy Turnov a.s.; KSM Castings CZ a.s. Hrádek nad Nisou; Matador Automotive ČR s.r.o. Liberec; Preciosa Ornela a.s. in Desné an in Zásada; Šroubárna Turnov a.s.; VÚTS a.s.; Orthopedic Clinic FN Motol, Denso Manufacturing Liberec, s.r.o., Beneš a Lát a.s. Slaná u Semil, Bodycote HT s.r.o. Vratislavice nad Nisou; RONAL ČR s.r.o. Jičín; Jikon – tool shop s.r.o.; HomeCredit Arena; Regional center of optics TOPTEC Turnov; Wind Power Plant in Jindřichovice pod Smrkem; ATREA s.r.o. – passive houses Koberovy; Dam Josefův Důl; Coal Power Station in Mělník, Aerodynamic laboratory in Nový Knín (workplace at Institute of Thermomechanics Academy of Sciences CZ, v.v.i.), Nuclear Power Station Temelín; ZVZ Milevsko.

Excursions of academic staff to industrial enterprises and institutes

During the year, excursions of academic staff to industrial companies and visits at professional seminars took place in companies: Rieter a.s., VÚTS a.s., BTTO s.r.o., Hagal s.r.o., Jikon – tool shop s.r.o., TONAK a.s., Hronovský - Náchod, NPP Temelín and NPP Dukovany ČEZ a.s.

6.5 Professional events and lectures

Use of energy chains and special flexible cables – by Hennlich

On 18 February, the Department of Textile and Single-Purpose Machines organized a seminar focused on the issue of mobile power supplies, media, data and related design methodologies, including the use of energy chains and special flexible cables.

Fair of subsidy and innovation opportunities

On March 6, the Fair of Subsidy and Innovation Opportunities was held in České Budějovice. The program focused on information on subsidy titles from the most requested operational programs and other sources of subsidies and support in the Czech Republic. This year, for the first time, representatives of universities and research organizations have also presented themselves at the fair. Throughout the event, there were lectures on examples of good practice and the possibility of cooperation of innovative institutions with the business sphere. Our faculty was represented by Prof.

Pavel Němeček, who, among other things, met with Mr. Ivan Hac from the Ministry of Industry and Trade of the Czech Republic and Mr. Tomáš Cílek from the Regional Development Agency of South Bohemia on the topic of cooperation with the FME TUL.

CroBoPlast

On March 27, the second meeting of the academic, industrial and research sphere of CroBoPlast, dealing with plastics processing technologies in the Oberlausitz-Liberec region took place on the premises of HS Zittau/Görlitz. This meeting ended a successful solution of the cross-border project GreK supported by the OP Cooperation Program Czech Republic – Free State of Saxony.

Engineering Forum – Liberec 2019

On March 27, the sixth year of the Engineering Forum was organized, hosted by the FME TUL in the auditorium and in laboratories. The topic was Modern production technologies and materials. The organizer of the Engineering Forum is Exponex company. The forum is held twice a year. Participants were representatives of the academic sphere from TUL, the University of West Bohemia in Pilsen, CTU and VŠB-Technical University of Ostrava, representatives from the companies Škoda Auto a.s., DMG MORI Czech, Raptech and Arburg.

ZF Group from Jablonec n/N introduced itself to students

ZF Group is engaged in production and development of brakes and other components for the automotive industry. They hire people with a technical focus. The company is one of the key partners of the FME TUL Racing Team, which is currently constructing the third formula for international Formula Student races. ZF Group is one of the important partners, with which the faculty cooperates in listing topics of diploma theses, in the organization of internships and practice.

HR Point – meeting of HR professionals

On May 16, traditionally at TUL together with Czechinvest. The theme of this year's HR meeting was corporate culture and benefits: What is important for people and what is not when looking for a new job? Why do they stay with you and why do they leave their employers? How are the benefits changing and what is the trend for the future?

Education as a Challenge of Industry 4.0

On May 23, technical faculties of TUL together with the Statutory City of Liberec. The most professional people and experts discussed what fundamental changes will bring this industrial revolution, how the labor market will change and who will be most affected. Smart technologies will increasingly replace human labor. Concepts such as digitization, robotics and artificial intelligence will become a common part of production processes. Experts call this progress the Fourth Industrial Revolution. Digitization and automation of production and the advent of smart technologies in production are expected to develop rapidly in the next 10 years. Machines will increasingly replace human labor that will move to other areas.

Announcement of the 4th year TECHNOWIZZ competition

It took place on September 12 at TUL under the auspices of FME. At the press conference TECHNOWIZZ, representatives of AGC Ing. Tomáš Brokeš, the Dean of FME TUL Prof. Petr Lenfeld and a representative of the Ústí nad Labem Community Foundation, Mrs. Kateřina Valešová gave a speech to announce the new year of TECHNOWIZZ. This was followed by a tour to laboratories – robots, nanofibers, plastics. The foundation announces a competition regularly. The goal is to contribute to the development of secondary schools focused on technical fields in the region and to motivate their students to improve their knowledge and practical skills to find easily a promising job in technical fields.

News 2019

On November 23, the Department of Production Systems and Automation organized a professional seminar with the co. Dormet Pramet.

Machine Vision

On November 25, the Department of Textile and Single-Purpose Machines organized a seminar on the topic of MVchine vision and information regarding the product portfolio and services of the Sensopart company, which is represented by the Axima company in CZ.

6.6 Awards

Award of the Liberec Region Governor

Ing. Kristýna Kubíková – Field: Production systems and Processes
Awarded for excellent study results throughout the overall studies.

Preciosa Foundation Award

Ing. Tomáš Uličný – Field: Production Systems and Processes

Topic of DT: Optimization Proposal of the Supply system in production plant AGC Automotive Chudeřice

Rector's Award

Ing. Myka Mae Campo Duran – Filed: Construction of machines and equipment

Awarded for excellent results during the whole study.

6.7 Our Sponsors**ČEZ a.s.**

Annual financial support and offer of other professional events: summer schools for students, excursions of employees and students to nuclear power stations, organization of professional lectures at TUL – 200.000 CZK.

ŠKODA AUTO a.s.

Car rental for faculty use. StudentFormula TUL support.

StudentFormula support TUL 2019

AGC Automotive Czech a.s, EDAG, ENTRY ENGINEERING s.r.o., GDK spol. s r.o., GRM Systems s.r.o., MAGNA Exteriors (Bohemia) s.r.o., Millers Oils, SV Metal, ŠKODA AUTO a.s., TUV SUD, WÜRTH, spol. s r.o., ZF TRW Automotive Czech s.r.o., Kovo Děčín, Kordcarbon, PLASTIC - Carbon Composite, Aufeer design, KAMAX s.r.o., ANSYS, Dormer Pramet, Stránský-Petržík, Sea-line, Chemex, Bokatech, Vítkovice Cylinders, HABERKORN s.r.o. Trelleborg, Fehrer Bohemia s.r.o., 3D wiser, WEDM, Ecumaster.cz, PEKM Kabeltechnik, Eibach, s-drive s.r.o. Financial and material support (materials, services) – approx. 900.000 CZK.

Promotion of companies on the FME TUL website

Forms of “thank you” to companies for support and paid advertising of the companies.

DEVELOPMENT OF THE FACULTY

7 DEVELOPMENT OF THE FACULTY

The Faculty's own development took place in all areas of its activities with the financial support of grants and projects.

7.1 Quality and Culture of Academic Life

Inner impulses for development of the faculty

- Individual language courses organized by CDV TUL and individual language courses.
- Education of academic staff in the so-called academic skills and competencies within the TUL project OP RDE Roliz.
- Education of academics in professional competencies within the TUL project of the OP RDE Technology Transfer.
- See table and text appendices 7.1.

Alumni Meeting

- In 2019, a meeting of the year 1984 graduates of FME TUL was organized.
- On the occasion of the 30th anniversary of November 1989, various events were organized by graduates of FME and FTE.

7.2 Infrastructure

Due to the reconstruction of the E1 building, departments DSP, DOM, DSA and DST operated in temporary premises in the E2, and G buildings.

The investment development of laboratories and classrooms of the Faculty of Mechanical Engineering in the amount of CZK 51.02 million took place from the following funds:

- FRIM – approx. CZK 15.23 million, acquisition and co-financing of investments for departments DMP, DSP, DMT, DEZ, DVM, DSR, DSA.
- Institutional support - acquisition of investments of DMP, DMT, DVM in the amount of 1.45 mil.
- OP RDE – faculty project ViFME TUL, retrofitting of DSP laboratories in the amount of CZK 1.78 million.
- OP RDE – university project 3D printing, retrofitting of laboratories DVM, DSA in the amount of CZK 0.81 million.
- OP RDE – HyHi university project, retrofitting of DMP, DSP laboratories in the amount of CZK 15.60 million.
- OP RDE – university project Vi4.0 (Industry 4), retrofitting of DSP, DVM, DTS in the amount of CZK 13.16 million.
- MI CR – faculty R&D project VI20172020052 – DSP CZK 2.99 million.

7.3 Development Project

Institutional development plan of TUL for the year 2019

Within the IP TUL, the faculty was a solver of 5 partial projects within the FME TUL project Development of FME TUL, see table annex 7.3. in the Framework of IP TUL.

Quality ensuring

- Promotion and presentation of FME TUL.

Diversity and accessibility

- Support of classes in English – Study texts in the English language.
- Support of SVOČ events at TUL – FME TUL.
- SW MS Project 2016 concerning teaching of subjects Project Management in FMSP.

Internationalization

- TUL as a significant partner at the international level.

High quality and relevant research, R&D

- Support for personal and professional growth of DSP students.

Inner competition

- Increasing the comfort of teaching programming in the newly accredited BSP.

7.4 Projects financed from the EU structural funds in the period 2014–2020

In 2019, the solution of two faculty projects financed from the EU structural funds under the Research, Development, Education Program continued, and the solution of two university projects of a scientific and application nature coordinated by the Faculty of Mechanical Engineering was started. See table and text appendix 7.4. In 2019, the solution of three faculty projects financed from the EU structural funds under the Cross-border Cooperation Program/Cooperation Program Czech Republic – Free State of Saxony continued. See text and table appendix 7.4.

EXTERNAL AND INNER EVALUATION OF THE FACULTY

8 EXTERNAL AND INNER EVALUATION OF THE FACULTY

8.1 External evaluation of the faculty

Accreditation Procedure

- In January, BSP Engineering and BSP Mechanical Engineering accreditations were granted for a period of 10 years. Applications were submitted in July 2018.
- In February 2019, applications for accreditation of FMSP Materials and Technologies and FMSP Materials and Technologies were submitted to the National Institutes of Accreditation (NIA). Accreditations were granted in June for a period of 10 years.
- In February 2019, applications for accreditation of FMSP Machines and Equipment Design and FMSP Machines and Equipment Design were submitted to the NIU. Accreditations were granted in October for a period of 10 years.
- In June 2019, applications for accreditation of FMSP Applied Mechanics and FMSP Applied Mechanics were submitted to the NIA. Accreditations were granted in October for a period of 10 years.
- In June 2019, an application was submitted to the NIA for accreditation of the Habilitation Procedure and the Professorship Appointment Procedure in the field of Applied Mechanics. Accreditation was granted in October for a period of 10 years.
- In June, applications for FMSP Energetics accreditation were submitted to the NIA.
- In October 2019, applications for accreditation of FMSP Automotive Engineering, FMSP Innovation and Industrial Engineering were submitted to the NIA.
- 3 FME TUL academics and one student are members of accreditation commissions for the assessment of study programs.

Quality Standards of FME TU in Liberec

- In parallel with the preparation of accreditation files, quality standards of FME activities were continuously updated in the so-called Self-Assessment Report.

Self-Assessment Report on the evaluation of research organizations in the university segment during 2020

- In November, the processing of documents for Module 3 Social Relevance M2017+ was commenced.

FEANI

- FME TUL is FEANI accredited and is listed in the "FEANI Index".

Interest in graduates and their quality

- The interest in graduates of the Faculty of Mechanical Engineering is high. Demand for graduates exceeds the supply. Faculty monitors the number of graduates in records of the Industrial Property Office of the Czech Republic, which monitors the number of graduates by 30 April and 30 September of the relevant year.

Meeting of Deans of Mechanical Engineering Faculties of Czech and Slovak Universities – SESIA 2019

- 18–20 September, a traditional meeting of Deans of Faculties of Mechanical Engineering from the Czech Republic and the Slovak Republic took place. This time under the auspices of the Technical University in Trenčín. One of the points of the joint meeting was the issue of the number of students and the discussion on the grant issue of scientific research projects.

Regional activities

- Strategy of Liberec Region 2021+
Participation of FME representatives in the working groups Education, Employment and Employability and Entrepreneurship, Innovation, Research and Development.
- HR Point – meeting of HR professionals
Traditionally at TUL together with CzechInvest.
- T – Forum

The fair is traditionally organized by the branch of the IAESTE organization at the Technical University in Liberec with the co-organization of the Department of Vehicles and Engines FME TUL. The fair is one of the largest HR events in the region.

- **Engineering Forum**

The sixth year, organized by Exponex, was hosted by the Faculty of Mechanical Engineering. The topic was Modern Production Technologies and Materials.

8.2 Inner Evaluation of the Faculty

- There is a regular annual evaluation of results regarding individual departments, see Annual Reports on Departmental Activities 2019 - stored in the electronic archive of FME TUL.
- Regular monthly Dean's Board is organized with the participation of vice-deans, heads of departments, secretaries, study department, development and project department.
- 3 meetings of the FME TUL Scientific Board.
- 5 meetings of the FME TUL Academic Senate.
- 1 meeting of the FME TUL Industrial Board.
- Meetings of guarantors' working group concerning new accreditations.
- 7 meetings of DSP Subjects Councils.
- 1 meeting of the FME TUL Economic Board.
- Disciplinary Board has not met.
- Three-level evaluation of teaching and study by students: IS STAG, questionnaire surveys at the end of the third semester, questionnaire surveys of Bachelor and Master graduates.

Strategy of R&D and Innovations of FME TUL +2030

In 2019, the process of discussions on the direction of FME TUL started in the field of VVI. Based on discussions that took place from April to November, outlines of the scientific-research direction of FME and an outline of measures for personnel and financial strengthening for the fulfillment of the Faculty Strategy were presented.

Process steps 2019 – meeting of the faculty management with heads of departments:

- April: Faculty from the point of view of numbers, Analysis of R&D outputs at FME TUL.
- May 2019: Personal characteristics, Internationalization, Doctoral Study Programs.
- September 2019: Research programs of departments – presentation.
- October, November: Facilitated all-day meeting. Preparation of R&D strategy FME TUL 2020–2025 with a view to 2030.
- December 2019: Meeting of VR FME TUL – presentation and discussion of basic scientific research areas and research programs.
- Steps in 2020: Submission for discussion and approval by AS FME TUL, submission and approval by VR FME TUL, introduction to the academic community FME TUL.

8.3 Economic Faculty management and Control Activities

- In accordance with Act No. 320/2001 Coll., The Financial Control Act, the implementing decree No. 416/2004 Coll. and the Rector's Directive on the internal control system, all types of management control took place at the Faculty of Mechanical Engineering, i.e. preliminary, continuous and subsequent.
- Minutes are documents from the Dean's Board, the minutes from individual inspections and the Report on inspection activities of departments for the year 2019.
- The Head of Dean's Office provided trainings on budgets for the administrators of departments.
- Continuous and subsequent inspections of selected projects, projects of student's grant competition and process inspections took place at the departments, i.e. the inspection of the drawing of the FME TUL budget and the inventory of assets.

8.4 Looking back at history of the faculty

Sad Announcements

At the age of 88, Professor Bohuslav Stříž, Rector Emeritus of the Technical University, died on January 14, 2019 in Liberec, which he led from 1985 to 1990. Professor Stříž led our Faculty of Mechanical Engineering in the role of the Dean from 1976 to 1985. Mr. Professor was a good teacher,

as a scientist he dealt with mechanics in the fields of plasticity, fracture mechanics, multi-axis stress of fiber systems, etc. He dedicated 59 years to the University in Liberec.

Mrs. Vlasta Vozáková died on February 6 at the age of 76. In the years 1972–1985, she worked as the Head of Dean's Office of the Faculty of Mechanical Engineering, then she worked in the office of the Rector of the VŠST, later TUL. Vlasta Vozáková was an inseparable figure of our university.

Honor to their memory!

CONCLUSION

9 CONCLUSION

EDUCATION

In 2019, teaching was organized in 11 study programs, which are accredited in Czech and English, both in full-time and part-time forms.

In the course of 2019, the process of preparation of all SPs was completed, BSP accreditation and another 4 FMSPs were granted. Last two SPs were submitted to the NIA in June with the expected result in October 2020.

623 applicants showed interest in studying at FME TUL. Compared to 2018, it is by 28 applicants fewer. In the academic year 2019/20, 842 students were enrolled in the study of all years, i.e. 20 students more than in 2018.

The structure of students does not change, share of students in individual types of study remains approximately the same. 65% of students are enrolled in the Bachelor's Program, approximately 24% in master's programs, and 11% of the total number of enrolled students in Doctoral Study Programs.

The number of unsuccessful students is still high during the first year of study, especially in the Bachelor's Degree Program. Students are admitted according to grades from their high schools.

The share of BSP graduates increased compared to 2018. Compared to 2018, the average period of study of BSP graduates was reduced to 4.02 years (in 2018 it was 4.78 years). The average study time of NMSP graduates was 2.63 years. The average period of study of DSP graduates was shortened compared to 2018, in 2019 it was 6.91 years (in 2018 it was 8 years).

SCIENCE AND RESEARCH

A total of 15 projects supported from the Czech budget were solved at the faculty in 2019, one international project H2020, two projects supported by the OP RDE call (TUL holder, FS TUL coordinator) and 5 projects supported by the OP EIC. Two other OP RDE projects were solved to support the development of doctoral study programs.

The volume of grant support from the Czech budget obtained by the faculty for solving science and research projects amounted to approximately CZK 73.65 million (of which CZK 4.4 million for investments), which represents approximately 65% of the total volume of earmarked funds obtained.

The volume of support from EU funds for the solution of science, research and applications projects amounted to CZK 39.82 million (of which CZK 18.19 million for investments), which represents approximately 35% of the total volume of earmarked funds obtained.

Within the support for specific research carried out through the Student Grant Competition, 22 projects with a total volume of financial support of CZK 6.08 million were solved, which represents 5.4% of the total volume of financial resources for R&D activities (8.3% of the Czech budget).

In 2019, 171 results of scientific research and development activities were created at FME TUL. It can be stated that the absolute number of results created in 2019 copies the years 2017 and 2018, when the Methodology 2017+ was already applied. As in 2018, in 2019 approximately 88% of the outputs of FS TUL were included in field 2. Engineering and technology according to the Frascati manual.

In April 2019, a process of discussions on the direction of FS TUL in the field of VVI was launched. Based on the discussions that took place from April to November, the outlines of the scientific-research direction of the Faculty of Mechanical Engineering and an outline of measures for personnel and financial strengthening for the fulfillment of the Faculty Strategy were presented. In December, the CoR FME TUL was submitted for discussion with the expectation of further steps in January and February 2020.

INTERNATIONAL COOPERATION

Within the framework of international cooperation, the faculty focused mainly on strengthening cooperation in the field of education and scientific research activities with existing foreign partners.

In the field of internationalization of studies, the faculty successfully continued to admit foreign self-paying students and government scholarship holders to study programs taught in English.

The faculty was also successful in obtaining projects under the Erasmus+ KA107 program for the development of activities with partner universities outside the EU. The faculty's reserve in the field of international cooperation is the lack of an offer of double or joint degree programs for foreign students and longer-term hosting of foreign academic staff at the faculty.

PARTNERSHIP AND COOPERATION

Partnership and cooperation with scientific research institutions and partners from the industrial sphere represents one of the pillars of faculty's stability.

In addition to collaborative research, contract research and ancillary activities form an important segment of cooperation. The revenue from the contract research of FS TUL in 2019 amounted to approximately CZK 10.54 million. Contract research and development carried out by the academics of the FME TUL under the NATI TUL amounted to approx. 9.35 mil.

Collaborating entities from the industrial sphere are typical users of the results. Other standard interactions include: meetings of industry and academia, membership of industry in the Industrial Council of FME TUL, in the Scientific Council of FME TUL, joint professional events and seminars, support of student activities, cooperation with local governments and municipalities, cooperation with practice in education (seminars of experts from practice), management, consultations and assessments of qualification theses, practice and excursions of students to industrial enterprises, membership of academics in professional associations and organizations.

Annual Report was approved by the Academic Senate FME TUL
on 27 May, 2020.

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2.3 HR structure of the faculty

Tab. 2.3.1 Average recalculated numbers and qualifying structure of employees by December 31

Year	Academic employees					Scientists	Other employees	Total
	Professor s	Associate Professor s	Expert assistants	Assistan ts	Lecturer s			
2000	8,6	29,7	47,4			–	39,6	125,4
2001	8,7	33,7	47,3			6,6	37,7	134,0
2002	8,5	34,4	50,9			5,4	31,4	130,6
2003	10,1	31,4	52,0			7,7	26,3	127,5
2004	11,6	29,2	22,5	31,1		3,1	26,2	123,7
2005	12,1	28,4	31,3	17,4		13,2	29	131,4
2006	11,7	28,0	34,3	19,6		5,8	25,5	124,9
2007	10,1	27,5	48,9	5,3		1,1	29,7	122,5
2008	9,7	26,7	51,5	6,9		1,6	32,4	128,8
2009	12,6	24,9	50,3	7,7		5	34,6	135,1
2010	14,9	28,4	46,7	7,7	9,9	3	41,0	151,6
2011	16,5	26,4	51,7	6,2	8,8	0	34,2	143,8
2012	14,6	21,94	47,0	6,5	7,9	0	34,8	132,7
2013	13,5	23,5	43,3	6,8	6,5	0	44,2	136,8
2014	12,65	22,35	43,15	5,1	2,75	2,5	37,3	125,8
2015	11,45	21,3	41,05	6,3	3	0,7	29,6	113,4
2016	12,65	20,3	39,2	4,7	3,6	1,5	25,7	107,65
2017	12,9	21,4	38,05	6,8	1,2	1,6	25,25	107,05
2018	11,9	20,3	36,7	8,9	0	3,9	34,2	115,9
2019	12,5	20,8	41	4,2	1,4	12,03	27,15	119,08

Tab. 2.3.2 Number of employees (physical) and their qualifying structure

Year	Academic employees					Scientists	Other employees	Total
	Professor s	Associate Professor s	Expert assistants	Assistan ts	Lecturer s			
2008	19	33	65	12	0	9	46	184
2009	24	32	60	10	0	10	52	188
2010	24	33	60	13	0	5	54	189
2011	23	31	55	10	14	0	47	180
2012	22	27	54	8	11	0	43	165
2013	22	27	50	8	8	0	54	169
2014	21	28	52	7	4	3	50	165
2015	20	27	52	9	3	1	39	151

2016	20	26	50	7	4	2	34	143
2017	20	26	51	9	2	2	33	143
2018	18	27	51	8	0	11	33	148
2019	15	29	51	5	2	17	32	151

Tab. 2.3.3 Age Structure of Academic employees by December 31, 2019

Age	Academic employees										Scientists	
	Professors		Associate Professors		Expert assistants		Assistants		Lecturers			
	celk.	ženy	celk.	ženy	celk.	ženy	celk.	ženy	celk.	ženy	celk.	ženy
do 29											4	
30-39			3	1	21	1	4	1			9	2
40-49	2		10	2	26	5	1				3	1
50-59	3		4	3	2	1					1	
60-69	6	1	5		1				1	1		
nad 70	4	1	7		1				1			
Total	15	2	29	6	51	7	5	1	2	1	17	3

Tab. 2.3.4 Structure of academics (employment contracts) according to the workload by December, 2019

Volume of work load in %	Total	Professors	Associate Professors	CSc., Dr., Ph.D.	Others
Up to 0,3	16	1	7	7	1
Up to 0,5	13	2	4	7	
Up to 0,7	4	1	1	1	1
More than 0,7	69	11	17	36	5
Total	102	15	29	51	7

3.1 Accredited study programs and fields

According to Article II of Act No. 137/2016 Coll. Accredited study programs carried out by higher education institutions in accordance with existing legal regulations on the last day before the date of entry into force of this Act shall become study programs accredited in accordance with the Act on the date of entry into force of this Act. No. 111/1998 Coll., as amended with effect from the date of entry into force of this Act, and are accredited for a specified period, but at least for a period ending by 31 December 2024; it is maintained for this time as well as the current division of these study programs into study fields. It was possible to admit applicants to these programs, which are marked * in the table.

Tab. 3.1.1 Outline of Accredited programs and fields guaranteed by FME

STUD PROG	Study program	KKOV	Major Field of Education	Accreditation till	Standard length of study Form of study			
					B	M,N	P	F
B2301*	Engineering	2301R000		1.3.2019	3			P, K
B0715A270008	Mechanical Engineering	–	Mechanical Engineering, Technologies and Materials	5.1.2029	3			P, K

N2301*	Engineering	3909T010	Innovative Engineering	1.11.2020		2		P, K
		2302T002	Construction of machines and equipment	31.7.2020		2		P, K
		2301T048	Mechanical Engineering, Technologies and Materials	31.7.2020		2		P, K
		2301T049	Production systems and processes	31.8.2024		2		P, K
N0715A270020	Applied Mechanics	–	Mechanical Engineering, Technologies and Materials	25.10.2029		2		P, K
	Automobile Engineering	–	Mechanical Engineering, Technologies and Materials	9.4.2025		2		P, K
N0713A070005	Energetics	–	Energetics	8.1.2030		2		P, K
N0788A270004	Innovative and Industrial Engineering	–	Mechanical Engineering, Technologies and Materials	8.1.2030		2		P, K
N0715A270019	Construction of Machines and Equipment	–	Mechanical Engineering, Technologies and Materials	2.10.2029		2		P, K
N0715A270015	Materials and Technologies	–	Mechanical Engineering, Technologies and Materials	29.6.2029		2		P, K
N0722A27001	Technologies of Plastic and Composites	–	Mechanical Engineering, Technologies and Materials	28.12.2028		2		P, K
M2301 *	Engineering	3901T003	Applied Mechanics	31.3.2020		5		P, K
P2301*	Engineering	3901V003	Applied Mechanics	1.3.2018			4	P, K
		2301V031	Production systems and Processes	10.2.2018			4	P, K
		3911V011	Material Engineering	10.2.2018			4	P, K
P2302*	Machines and Equipment	2302V010	Construction of Machines and Equipment	31.12.2017			4	P, K
P2303*	Mechanical technology	2303V002	Mechanical Engineering Technology	10.2.2018			4	P, K
P0715D270001	Construction of Machines and Equipment	–	Mechanical Engineering, Technologies and Materials	19.5.2023			4	P, K
P0788D270002	Technologies and Materials	–	Mechanical Engineering, Technologies and Materials	19.5.2023			4	P, K
P0715D270004	Applied Mechanics	–	Mechanical Engineering, Technologies and Materials	6.6.2028			4	P, K

STUDPROG – codes of study programs

KKOV – code of a major

B – Bachelor's Study Program

N – Follow-up Master's Study Program

M – Master's study Program

P – Doctoral Study Program

F – form of study: P – full-time, K – part-time

3.2 Offer of Studies in the English Language

According to Article II of Act No. 137/2016 Coll. Accredited study programs carried out by higher education institutions in accordance with existing legal regulations on the last day before the date of entry into force of this Act shall become study programs accredited in accordance with the Act on the date of entry into force of this Act. No. 111/1998 Coll., as amended with effect from the date of entry into force of this Act, and are accredited for a specified period, but at least for a period ending on 31 December 2024; it is maintained for this time as well as the current division of these study programs into study fields. It was possible to admit applicants to these programs, which are marked * in the table, until 31.12.2019

Tab. 3.2.1 Outline of Accredited Programs and Fields in the English Language

STUD PROG	Study Program	KKOV	Major Field of Education	Accreditation till	Standard length of study Form of study			
					B	M,N	P	F
B2301*	Mechanical Engineering	2301R000		1.03.2019	3			P
B0715A270009	Mechanical Engineering		Mechanical Engineering, Technologies and Materials	5.1.2029	3			P
N2301*	Mechanical Engineering	3909T010	Innovation Engineering	1.11.2020		2		P, K
		2301T048	Engineering Technology and Materials	31.7.2020		2		P, K
		2302T010	Machines and Equipment Design	31.7.2020		2		P, K
		2301T049	Manufacturing Systems and Processes	31.8.2024		2		P, K
N0715A270021	Applied Mechanics	–	Mechanical Engineering, Technologies and Materials	25.10.2029		2		P
N0713A070006	Energetics	–	Energetics	8.1.2030		2		P
N0788A270005	Innovation and Industrial Engineering	–	Mechanical Engineering, Technologies and Materials	8.1.2030		2		P
P0715D270002	Machines and Equipment Design	–	Mechanical Engineering, Technologies and Materials	2.10.2029		2		P
N0715A270016	Materials and Technology	–	Mechanical Engineering, Technologies and Materials	29.6.2029		2		P
N0715A270002	Polymers and Composites Technology	–	Mechanical Engineering, Technologies and Materials	28.12.2028		2		P
M2301*	Mechanical Engineering	3901T003	Applied Mechanics	31.3.2020		5		P, K
P2301*	Mechanical Engineering	3901V003	Applied Mechanics	1.3.2018			4	P, K
		2301V031	Manufacturing Systems and Processes	10.2.2018			4	P, K
		3911V011	Material Engineering	10.02.2018			4	P, K
P2302*	Machines and Equipment	2302V010	Machines and Equipment Design	31.12.2017			4	P, K
P2303*	Engineering Technology	2303V002	Engineering Technology	10.02.2018			4	P, K

P0715D270002	Machines and Equipment Design	–	Mechanical Engineering, Technologies and Materials	19.5.2023			4	P, K
P0788D270001	Technologies and Materials	–	Mechanical Engineering, Technologies and Materials	19.5.2023			4	P, K
P0715D270003	Applied Mechanics	–	Mechanical Engineering, Technologies and Materials	6.6.2028			4	P, K

STUDPROG – codes of study programs
KKOV – code of a major
B – Bachelor's Study Program
N – Follow-up Master's Study Program
M – Master's study Program
P – Doctoral Study Program
F – form of study: P – full-time, K – part-time

3.3 Interest in Studies and Conditions of Admission

Tab. 3.3.1 Applicants in the academic year 2019/2020

Code	Study Program	Number of Applicants				
		Enrolled	Admitted	Admitted after Entrance Exams	Admitted in total	Enrolled
B0715A270008	Mechanical Engineering (K)	81	80	0	80	71
B0715A270008	Mechanical Engineering (P)	394	311	0	311	265
N2301	Engineering (K)	24	21	0	21	20
N2301	Engineering (P)	38	36	0	36	33
N2301	Mechanical Engineering (P)	55	12	4	16	9
N0722A27001	Technology of plastic and composites (K)	4	3	0	3	3
N0722A27001	Technology of plastic and composites (P)	3	3	0	3	3
M2301	Engineering (P)	3	3	0	3	2
P0715D270001	Machines and Equipment Design (K)	3	3	0	3	3
	Machines and Equipment Design (P)	1	0	0	0	0
P0715D270002	Machines and Equipment Design (K)	0	0	0	0	0
	Machines and Equipment Design (P)	3	3	0	3	0
P0715D270004	Applied Mechanics (K)	1	1	0	1	1
	Applied Mechanics (P)	1	1	0	1	1
P0715D270003	Applied Mechanics (K)	0	0	0	0	0
	Applied Mechanics (P)	1	1	0	1	0

P0788D270002	Technologies and Materials (K)	5	5	0	5	5
	Technologies and Materials (P)	4	3	0	3	3
P0788D0270001	Technologies and Materials (K)	0	0	0	0	0
	Technologies and Materials (P)	2	2	0	2	1
Faculty of Mechanical Engineering in Total		623	488	4	492	420

Note.: P – full-time study, K – part-time study, RD – reconsideration of a decision.

3.4 Number of students and graduates

Tab. 3.4.1 Number of students enrolled by October 31, 2019

KKOV	Study program	ČR			Foreigners			Total		
		P	K	Total	P	K	Total	P	K	Total
B2301	Engineering	176	17	193	12	0	12	188	17	205
B0715A270008	Mechanical Engineering	246	69	315	14	2	16	260	71	331
B0715A270009	Mechanical Engineering (AJ)	0	0	0	16	0	16	16	0	16
N2301	Engineering	67	51	118	1	6	7	68	57	125
N2301	Mechanical Engineering (AJ)	0	0	0	70	0	70	70	0	70
N0722A27001	Technology of plastic and composites	3	3	6	0	0	0	3	3	6
M2301	Engineering	5	0	5	0	0	0	5	0	5
P0715D270001	Machines and Equipment Design	1	4	5	1	1	2	2	5	7
P0715D270002	Machines and Equipment Design (AJ)	0	0	0	1	2	3	1	2	3
P0715D270004	Applied Mechanics	4	0	4	0	0	0	4	0	4
P0715D270003	Applied Mechanics (AJ)	0	0	0	1	0	1	1	0	1
P0788D270002	Technology and Materials	6	8	14	1	0	1	7	8	15
P0788D0270001	Technologies and Materials (AJ)	0	0	0	1	0	1	1	0	1
P2301	Mechanical Engineering	6	7	13	3	5	8	9	12	21
P2301	Mechanical Engineering (AJ)	0	0	0	2	2	4	2	2	4
P2302	Machines and Equipment	7	9	16	0	0	0	7	9	16

P2302	Machines and Equipment (AJ)	0	0	0	2	1	3	2	1	3
P2303	Engineering Technologie	2	5	7	2	0	2	4	5	9
P2303	Engineering Technology (AJ)	0	0	0	0	0	0	0	0	0
Faculty of FME TUL in Total		523	173	696	127	19	146	650	192	842

Tab. 3.4.2 Structure of foreign students enrolled by October 31, 2019

Type	Form	Study in Czech		Study in English			Total
		Governme ntal scholars	Others	Governme ntal Scholars	Self-payers	Short stays	
Bachelor's	K	0	2	0	0	0	2
	P	0	26	0	0	16	42
Follow-up	K	0	6	0	0	0	6
	P	0	1	12	32	26	71
Master's	K	0	0	0	0	0	0
	P	0	0	0	0	0	0
Doctoral	K	0	6	0	5	0	11
	P	0	7	3	4	0	14
Total		0	48	15	41	42	146

Tab. 3.4.3 Number of students by October 31, 2019 and number of graduates in 2019
(from 1 January 2019 to 31 December 2019)

Study program	Number of Students		Number of Graduates	
	Full-time	Part-time	Full-time	Part-time
BSP	464	88	38	3
NMSP (MSP) – study in the Czech Language	76	60	30	25
FMSP (MSP) – in the English language	70	0	10	0
DSP – in Czech	33	39	6	3
DSP – in English	7	5	1	1
Total	650	192	85	32

Tab. 3.4.4 Alumni Outline according to the Length of Studies

Study program	Form	Termination Date	Number of Graduates	Average length of study
MSP	P	February 2019	2	3,00
	P	June 2019	1	5,00
	K	February 2019	0	–
	K	June 2019	0	–

Total MSP		February + June	3	3,67
FMSP	P	February 2019	2	3,50
	P	June 2019	35	2,20
	K	February 2019	1	4,00
	K	June 2019	24	3,12
Total FMSP		February + June	62	2,63
Total MSP + FMSP		February + June	65	–
BSP	P	February 2019	6	5,00
	P	August 2019	32	3,72
	K	February 2019	0	–
	K	August 2019	3	5,33
Celkem BSP		February + August	41	4,02
DSP	P		8	6,88
	K		3	7,00
Total DSP			11	6,91
Total number of graduates (BSP, MSP, FMSP, DSP)			117	3,48

Tab. 3.4.5 Number of graduates in study programs and majors between 2009–2019

Program Field Major	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
B2341 Engineering	53	103	114	129	130	77	–	–	–	–	–
B2301 Mechanical Engineering					6	30	50	87	62	45	41
M2301 a N2301 Mechanical Engineering	103	96	68	64	65	72	129	82	72	78	65
Major Applied Mechanics M2301	6	4	1	6	9	3	1	1	1	1	3
Engineering Mechanics	4	6	2	–	4	8	2	1	–	1	2
Fluid Mechanics and Thermodynamics	–	–	2	1	2	1	1	–	1	–	1
Major Innovative Engineering	13	9	10	10	13	13	6	7	5	3	3
Product Innovation	13	9	10	10	13	13	6	7	5	3	3
Major Machine and Equipment Design							25	26	31	34	25
Textile Machine Design							5	2	1	4	3
Glass Machines and Robotics							3	1	1	–	–
Production Machines							3	4	11	13	3
Motor vehicles							12	13	11	9	8
Power Engineering Equipment							2	6	7	8	11

Device technology							–	–	–	–	–
Major Engineering Technology and Materials							36	29	22	28	10
Processing of Plastic							10	10	9	9	5
Foundry Industry, welding and metal forming							11	13	6	12	3
Material Engineering							6	4	4	2	–
Machining and assembling							9	2	3	5	2
Major Production systems and processes							8	13	13	12	24
Production Systems							6	13	13	11	22
Automated control systems							2	–	–	1	2
TOTAL P2301+P2302+P2303	9	17	12	14	5	23	8	15	13	12	11
P2301 Mechanical Engineering	3	8	9	5	1	10	4	6	3	5	3
Major Applied Mechanics	–	5	4	2	–	3	2	3	1	–	2
Engineering Mechanics	–	5	3	1	–	2	–	3	–	–	1
Mechanics of fluids and thermodynamics	–	–	1	1	–	1	2	–	1	–	1
Material Engineering	2	2	4	3	–	5	1	3	1	1	1
Production Systems and Processes	1	1	1	0	1	2	1	–	1	4	–
Applied cybernetics	–	1	–	–	1	1	1	–	–	2	–
Automation technical preparation of production	–	–	–	–	–	1	–	–	1	2	–
Machine automation and production processes in engineering	–	–	–	–	–	–	–	–	–	–	–
Production systems with industrial robots	1	1	–	–	–	–	–	–	–	–	–
P2302 Machine and Equipment	2	3	1	3	3	10	1	4	4	5	6
Machine and Equipment Design	2	3	1	3	3	10	1	4	4	5	6
Parts and Mechanism	–	1	–	2	1	1	–	1	1	2	3
Wheeled transport and handling machines	1	1	1	–	1	4	–	1	–	1	–
Machine tools and assembly machines	–	–	–	–	–	1	–	–	–	1	–
Reciprocating internal combustion engines	1	1	–	1	–	1	–	–	3	–	2
Glass and ceramic machines	–	–	–	–	–	–	–	–	–	–	1
Technical machines diagnostics	–	–	–	–	–	–	–	–	–	–	–

Textile and clothing machines	–	–	–	–	–	3	–	1	–	1	–
Equipment for thermal engineering	–	–	–	–	1	–	1	1	–	–	–
P2303 Engineering technology	4	6	2	6	1	3	3	5	6	2	2
Engineering technology	4	6	2	6	1	3	3	5	6	2	2
Material Engineering	–	–	–	–	–	–	–	–	–	–	–
Machining and assembly	1	1	–	–	–	1	1	–	2	–	–
Foundry Engineering	1	1	2	3	–	1	–	–	1	–	–
Welding	–	2	–	–	–	–	–	–	1	–	–
Metal Forming	2	2	–	3	–	–	–	–	2	1	–
Processing of Plastic	–	–	–	–	1	1	2	5	–	1	2
Total per year	165	216	194	207	206	202	187	184	147	135	117

Tab. 3.4.6 Number of students in Doctoral Studies in 2019 (by October 31, 2019)

Department	Full-time	Part-time	Total	Defended 2019
KMP	3	0	3	1
KSP	4	4	8	2
KMT	6	12	18	1
KEZ	12	7	19	1
KST	2	8	10	3
KOM	3	1	4	0
KVM	7	2	9	2
KSR	0	1	1	1
KTS	1	2	3	0
KSA	2	7	9	0
Total	40	44	84	11

3.6 Scholarships

Tab. 3.6.1 Paid out scholarships in 2019

According to STAG / Definition	Number of students
Merit scholarship /for excellent study results according to § 91, par. 2 (a)	114
Research, development, innovation activity/for research, development activity according to a special legal regulation, § 91, par. 2 (c)	134
Creative results for deepening knowledge/for excellent scientific, research, development, artistic or other creative results contributing to deepening knowledge according to § 91 par. b)	70
Social scholarships / in case of a difficult social situation	3
Extraordinary and accommodation scholarship / in cases worthy of special attention according to § 91 par. 2 letter e)	405 (400)

Studies abroad / to support studies abroad according to par. 91, 4 letter a)	17
Foreign scholarship / to support studies in CZ according to 91 par. 2, let. a)	29
Doctoral scholarship / DSP students according to § 91 par. 4, let. c)	25
Total	797

Tab. 3.6.2 Amount of scholarships paid out in the year 2019

Financial Sources of Scholarships	Type of Scholarship	Amount (thous. in CZK)
State Budget	DSP students	2 676
State Budget – Governmental Scholarships	Foreign students	2 105
Scholarship fund FME TUL	Composed of:	3 772
	Merit Scholarships	2 000
	Extraordinary Scholarships	43
	Support to study abroad	216
	Support to study in CZ	411
		1 102
Others (SGS, IP, grants, gifts)		2 686
Total		11 239

3.9 Quality of teaching

Tab. 3.9.1 Publishing Activities FME TUL in the year 2019

Year	Number of published titles								
2019	Book In Czech	Book In English	Learning text	Web application	University textbooks In Czech	University textbooks In English/German	Didactic tools	Virtual models	Functional model/Exp. equipment
Total	1		2	*	4+1el.	7el./3	*	*	*

* Documented in detail in annual reports of departments.

3.10 Lifelong Learning

Tab. 3.10.1 Courses of LL in 2019 – education for the business sphere

Technical Science		
Course length	Number of Courses	Number of Participants
Up to 15 hours	12	93
16–100 hours	7	67
101 and more hours	0	0

4.1 Scientific and Research Activities

Tab. 4.1.1 Subsidy of FME TUL for scientific and research activities in the year 2019

Resources	Share (%)	Subsidy (in CZK thous.)		
		NIV	INV	Total
Institutional Support	29,3	31 697	1 450	33 147
Grant Support (TA CR, MIT CR, MI CR)	30,4	31 440	2 985	34 425
Support of Special Research (SGC)	5,4	6 083	0	6 083
CZ Sources in Total	65	69 220	4 435	73 655
Some transferred to co-researchers (project 16298)		736	0	736
OP RDI – Excellent R&D (Hyhi) *	20,6	7 673	15 605	23 278
OP RDI – Pre-application R&D (3D Print)*	4,7	4 513	808	5 321
OP RDI – Doctoral SP (DspFSTUL,VIFSTULTUL)*	2,1	624	1 775	2 399
OP EIC – Applications	6,1	6 865	0	6 865
OP EIC – Innovative Vouchers	0,4	489		489
HORIZON	1,1	1 225	0	1 225
EU Sources in Total	35	21 389	18 188	39 577
CZ and EU Sources Altogether		90 609	22 623	113 232

Only subsidies are listed received by FME TUL and amounts received by the faculty within sub-projects TUL (Hyhi, 3D Print).

It does not include other NIV resources for R&D, which the faculty received within the co-research on projects of other components and on projects solved under CxI.

INV subsidies are not included from OP RDE Vi4.0 within TUL (CZK 13.16 million).

* Amount includes only the subsidy, i.e. 95% of costs, 5% is co-financed from FME TUL.

Tab. 4.1.2 Subsidy development on Scientific and Research activity (in CZK mil.)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
FME / CZ	64,9	73,7	57,1	59,7	63,5	44,5	47,2	61,1	56,7	73,7
From which INV	3,9	5,8	2,9	4,7	2,8	0	0	7,1	2,9	4,4
From which non-public	1,8	2,1	0,9		0,5	0,6	0,5			
FME*							8,5	8	2,5	
FME / EU										39,6
From which INV										18,0

* Between 2010–2013, the NATI TUL project was solved with the participation of FME TUL academics – data on the financial contribution of FME TUL to the solution NATI TUL are not available. In following years, the share is under other components without a share in the NPÚ of NATI TUL project.

4.1.3 Structure of grant support of FME TUL on R&D in 2019

Provider	Program	Subsidy (in CZK thous.)		
		NIV	INV	Total
TA CR	National Competence Centers (2018–2022)	13 036	0	13 036
TA CR	EPSILON (2015-2025)	5 377	0	5 377
TA CR	ZÉTA 2	157	0	157
TA CR	GAMA	321	0	321
MIT CR	TRIO	3 927	0	3 927
MI CR	Program BV	7 886	2 985	10 871
MEYS CR	Specific research	6 083	0	6 083
Total		36 787	2 985	39 772

4.1.4 Share of FME TUL on project under NATI and FM

Provider	Program	Share (in CZK thous.)
TA CR	EPSILON (2015–2025)	1 816
MIT CR	TRIO	443
EU-MIT CR	OP EIC	2 648

* Data are based on annual reports of departments.

Tab. 4.1.5 Targeted support for research projects FME TUL (grants and specific projects)

Resource (in CZK thous.)	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Support	49 431	39 349	35 884	34 590	15 700	17 933	31 781	26 190	39 772
From which non-public sources	749	900	*	499	615	494			
From which investments	2 116	2 962	4 664	2 760	0	0	7 100	2 222	2 985

* In previous years, the contract research project of the KSR, VZ and the Center was solved and included.

4.4 Research and scientific projects

Tab. 4.4.1 Scientific and research projects solved in 2019 – about CZ budget

Provider	Program	FME TUL in the position		in 2019	
		Recipient	Co-recipient	End of Solution	Start od Solution
GA CR	GA-Standard projekty	–	–	–	–
TA CR	NCK (2018–2022)	–	2	–	2
TA CR	EPSILON (2015–2025)	–	4	–	2
TA CR	ZÉTA 2	–	1	–	1
MIT CR	TRIO	–	7	2	3
MI CR	Program BV	2	–	–	–

Total	2	14	1	8
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Tab. 4.4.2 Scientific and Research, Application Projects solved in 2019 – supported from EU funds

Provider	Program	FME TUL in the position		In 2019	
		Coordinator for TUL	Co-receiver	End of Solution	Start of Solution
EU / MEYS CR	OP RDE – Capacity building for DspFSTUL, ViFSTUL	2*	–	–	–
EU / MEYS CR	OP RDE – Excellent Research	1**	–	–	–
EU / MEYS CR	OP RDE – Pre-applied Research	1**	–	–	–
EU / MIT CR	OP EIC	–	5	1	2
H2020	H2020-SC-2015-one-stage	–	1	1	–
Total		4	6	1	2

* Receiver and coordinator FME TUL. ** Receiver TUL, main guarantor academic from FME TUL.

4.5 Students' Grant

Tab. 4.5.1 Outline of Students' Grant Competition in 2019

Int. no.	Name of the Project Solver	Length of solving	Grant (CZK thous.)
21209	Research, Development and Application of Advanced Method and Technology in Technical Mechanics, Biomechanics and Strength Flexibility	2019–2021	435
	Ing. Michal Sivčák, Ph.D.		
21208	Research and Development for Material and Production Innovation with Application Potential in Mechanical Engineering	2019–2021	435
	Ing. Luboš Běhálek, Ph.D.		
21285	Study and Evaluation of Metal and Non-Metal Structures	2019–2021	283
	Ing. Martin Švec, Ph.D.		
21991	Experimental, Numerical and Theoretical Research in Fluid Mechanics and Thermo-mechanics	2019–2021	235
	Ing. Jan Kracík		
21992	Production, Equipment and Progress Innovation in Technical Practice	2019–2021	235
	Ing. Rudolf Martonka, Ph.D.		
21282	Study and Evaluation of Machining Processes focused on Tool and Cutting Conditions	2019–2021	166
	Ing. Iuliia Krasnikova		
21276	Increasing of Vehicle Drive train Performance	2019–2021	268
	Ing. Pavel Brabec, Ph.D.		
21281	Research and Development in Automation of Glass, Industrial and Service Robotics	2019–2021	150
	Ing. Marie Stará, Ph.D.		
21288	Research of Processes Concerning Textile and Single Purpose Machines II	2019–2021	342

	Ing. Jiří Komárek		
21278	Optimization in Production Systems, 3D Technology and Automation	2019–2021	435
	Ing. František Koblasa, Ph.D.		
21287	Research and Development of Equipment for Production of Area and Linear Nano-fiber Structures	2019–2021	350
	Ing. Ondřej Bařka		
21286	Advanced Analyses Usage for Prediction of Area Forming Processes	2019–2021	301
	Ing. David Koreček		
21277	Experimental and Numerical Research in Current Machines	2019–2021	150
	Ing. Lukáš Vojta		
21279	Development and Application of 3D Printed Functional Parts in the Project Formula Student TUL	2019–2021	349
	Ing. Jiří Šafka, Ph.D.		
21227	Fluid Interaction with the Solid Structure	2018–2019	178
	Ing. Tomáš Kořinek		
21283	Vibrational Identification of Damage in Linear Rolling Guide	2019–2021	243
	Ing. Radka Jírová		
21284	Advanced Biocomposite Materials Based on Nano-structural Layers	2019–2020	342
	Ing. Martin Borůvka		
21289	Development of Autonomous Productive System	2019–2020	350
	Ing. Martin Ševic		
21225	Research of Application Usage - Forming Inserts produced by 3D Print in the Construction of Forms via Plastic Injection	2018–2020	241
	Ing. Martina Češková		
21226	Experimental, Numerical and Theoretical Research in the Application of Ejector Cooling	2018–2019	150
	Ing. Vu Van Nguyen		
21227	Fluid Interaction with a Solid Structure	2018–2019	178
	Ing. Tomáš Kořinek		
21293	Development of Multifunctional Robotized System for Manipulation with Nanostructures	2019	295
	Ing. Andrii Shynkarenko		
21016	Organization SGS – DFS	2019	151
FME in Total		6 083	

4.6 Research and Scientific Activity, Ancillary Activity

Tab. 4.6.1 Overview of revenues from contractual and ancillary activities in 2019

Department	Contractual research under FME (CZK in thous.)	Ancillary activity under FME (CZK in thous.)	Contractual research under NATI (CZK in thous.)	Ancillary activity under NATI (CZK in thous.)
KMP	73	0	0	0
KSP	1 830	954	126	0
KMT	866	512	0	0

KEZ	299	123	0	0
KST	3 456	123	0	0
KOM	101	17	0	0
KVM	3 003	317	3 283	0
KSR	0	76	0	0
KTS	665	0	5 937	0
KSA	170	45	0	0
Total	10 463	2 167	9 346	0
+ DFS		1 449		

Tab. 4.6.2 Development of the fund volume from contract research and additional activities

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Revenue (CZK in thous.)	9 600	8 171	8 131	9 373	12 115	11 692	13 351	16 759	13 262	14 201
Profit share in revenues (%)	22,2	22,1	22	29	21,5	20,2	21,8	22,6	20,6	15,3

4.9 Results of R&D and Scientific activity at FME TUL

Tab. 4.9.5 Number of faculty outputs in 2015–2019

Type of Outputs	Number of Outputs in the Year					Total
	2015	2016	2017	2018	2019	
J – Article in professional periodicals	68	65	64	73	83	353
D – Article in Proceedings	127	100	78	65	55	425
FP – Industrial Design	0	0	0	0	0	0
FU – Utility Model	19	7	7	5	6	44
GA – Prototype	0	4	1	9	0	14
GB – Functional Sample	9	6	16	14	14	59
B – Professional Book	6	2	0	1	0	9
P – Patent	14	16	13	6	6	55
R – Software	3	1	0	0	1	5
ZA – Pilot Plant	1	0	0	1	0	2
ZB – Proven Technology	4	0	5	2	4	15
M – Conference organization	4	2	3	3	1	13
W – Workshopu Organization	8	1	0	0	1	10
Total	263	204	187	179	171	

Note: Data 2015–2016 taken from www.rvvi.cz, data for 2017 and 2019 taken from publikace.tul.cz (current data in the database on 23.3.2020).

Tab. 4.9.6 Number of selected outputs according to departments in 2018 and 2019
(number of results)

Workplace	Year 2018													Total	
	Year 2019														
	B	BN	C	D	DN	FU	GA	GB	J	JI	JN	JR	P	Numb.	Perc. (%)
KMP				6	3					7	1	1		18	8,5
				7				1		10	2	1		21	9,6
KSP		1		12		1				1	9	1		25	11,7
		6		4	1					7	10		1	29	13,3
KMT				6	8	1				7	9	6	1	38	17,8
				5	5	4			3	12	5	6	2	42	19,3
KEZ		1		15	3		2		1		1	4		27	12,7
		2		5	2			1		2	6	1		19	8,7
KSA	1			4	2				1		7	1		16	7,5
				9	16			3		2	5		1	36	16,5
KST			1	8	1	2	4	2		2	1		1	22	10,3
				16	2	2		2		3	4			29	13,3
KOM										3	3			6	2,8
											2			2	0,9
KVM				13	11	1			1	1	1		1	29	13,6
			1	8	4					4				17	7,8
KSR			1	1	5			5		2		4		18	8,5
			1					2		1		3		7	3,2
KTS				3	1			7					3	14	6,6
				4	3			5		2			2	16	7,4
Total	1	2	2	68	34	5	6	14	3	23	34	17	6	213	
	0	8	2	58	33	6	0	14	3	43	30	11	6	218	

Note: Data taken from the publication tul.cz (current data in the database from the day March 23, 2020).

Tab. 4.9.7 Number of Selected Outputs from Departments in 2018 and 2019 (result share)

Workplace	Year 2018													Total	
	Year 2019														
	B	BN	C	D	DN	FU	GA	GB	J	JI	JN	JR	P	Number	Perc. (%)
KMP				6	3					5,15	1			15,15	8,0
				7				1		3,95	1,17	1		14,12	7,7
KSP		0,25		11,09		1				0,75	9	1		23,09	12,2
		6		4	1					4,39	9,79		1	26,18	14,3
KMT				4,15	6,25	1			0,25	5,07	6,03	4	0,65	27,4	14,5

				3,77	2	4			2,5	8,84	4,5	4,55	1,64	31,8	17,4
KEZ		1		13,32	2,33		2		1		0,66	4		24,31	12,9
		2		4,49	1,62			0,8		1,85	5,34	0,62		16,72	9,1
KSA	0,5			4	2				1		5,64	1		14,14	7,5
				5,7	13,14			2,5		1,54	4,67		0,98	28,53	15,6
KST			1	8	1	1,51	2,64	1,86			1		0,62	17,63	9,3
				15,18	2	1,6		1,67		2,6	4			27,05	14,8
KOM										2,67	4,5			7,17	3,8
											2			2	1,1
KVM				13	10,88	1			1	1	1		0,75	28,63	15,2
			1	8	3,5					2,41				14,91	8,1
KSR			1	1	4,75			5		2		4		17,75	9,4
			1					1,83		1		3		6,83	3,7
KTS				3	1			7					2,66	13,66	7,2
				4	3			4,57		1,89			1,66	15,12	8,2
Total	0,5	1,25	2	63,56	31,21	4,51	4,64	13,86	3,25	16,64	28,83	14	4,68	188,93	
	0	8	2	52,14	26,26	5,6	0	12,37	2,5	28,47	31,47	9,17	5,28	183,26	

Note: Data taken from tul.cz (current data in database from March 23, 2020).

Tab. 4.9.8 Results included in the faculty round of significant results selection within Methodology 17+ in 2019

Name of result	Author	Type of result	Field	Co-Authorship
Prototype of a modular production line for the production of sophisticated adhesive wound covers	Ševčík Ladislav	GA Prototyp	2.3.2	FME/FTE/NATI
Line for the production of linear composite material containing nanofibers	Beran Jaroslav Valtera Jan Skřivánek Josef Bílek Martin	GB functional sample	2.10.1	FME/FTE/FM/NATI
Equipment for the preparation of nanofiber membrane with the integrated granulate	Beran Jaroslav Valtera Jan Skřivánek Josef	GB functional sample	2.10.2	FME/FTE/NATI
Fractal dimension used for evaluation of oxidation behavior of Fe-Al-Cr-Zr-C alloys	Hotař Adam Hotař Vlastimil	Jim	2.5.1	FME
Lamella for lamella fire doors, in particular for high-speed lamella fire doors, and lamella fire doors, in particular high-speed lamella fire doors, comprising these lamellas	Kovačič Vladimír	P – patent	2.3.2	FME/FTE/NATI
Optimization of welding technology and construction of weldments with regard to greater resistance to fatigue	Moravec Jaromír Nováková Iva	ZB proven technology	2.5.1	FME

damage				
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Tab. 4.9.9 Frequency of results generated by FME in 2018 according to Methodology 17+ (according to the classification of Frascati manual)

Classification of fields	No. Of Outputs	Recalculated share (%)
1 Science	23	8,7
2 Engineering and Technology	232	87,9
3 Medical and healthcare sciences	8	3
5 Social Sciences	1	0,4
Total	264	100

Note: Data taken from the publication database tul.cz from 18 March, 2019.

Tab. 4.9.10 Frequency of results made by FME TUL in 2019 according to Methodology 17+ (according to the classification of Frascati manual)

Classification of fields	No. Of Outputs	Recalculated share (%)
1 Science	17	7,2
2 Engineering and Technology	207	87,7
3 Medical and healthcare sciences	6	2,5
5 Social Sciences	6	2,5
Total	236	100

Note: Data taken from the publication database tul.cz from March 9, 2020.

Tab. 4.9.11 Frequency of results made by FME TUL in 2019 – Engineering and Technology (according to the classification of Frascati manual)

Classification of fields	No. Of Outputs	Recalculated share (%)
2.1 Civil Engineering	2	0,9
2.2 Electrical engineering, electronic engineering, information engineering	11	4,7
2.3 Mechanical Engineering	95	40,9
2.4 Chemical Engineering	1	0,4
2.5 Material Engineering	89	38,4
2.6 Midicial Engineering	0	0
2.7 Environmental Engineering	9	3,9
2.9 Industrial biotechnology	2	0,9
2.10 Nanotechnology	23	9,9
2.11 Other Engineering Fields and Technology	0	0
Total	232	100

Note: Data taken from the publication database tul.cz from 17 March, 2019.

Tab. 4.9.12 Frequency of results created by FME in 2019 in the field of Engineering and Technology (according to the classification of fields in Frascati Manual)

Classification of fields	Number of outputs	Recalculated shares (%)
2.1 Civil engineering	1	0,5
2.2 Electrical engineering, electronic engineering, information engineering	8	3,9
2.3 Mechanical engineering	82	39,6
2.4 Chemical engineering	0	0,0
2.5 Material engineering	80	38,6
2.6 Medical engineering	0	0,0
2.7 Environmental engineering	6	2,9
2.9 Industrial biotechnology	1	0,5
2.10 Nanotechnology	29	14,0
2.11 Other engineering and technology	0	0,0
Total	207	100

Note: Data taken from the database publikace.tul.cz on March 9th, 2020.

Tab. 4.9.13 Number of outputs of SGS projects in 2018 and 2019

Type of outcomes	No. of outcomes		Recalculated share of FME TUL outputs	
	2018	2019	2018	2019
J – Article in a professional periodical	27	32	23,65	27,21
D – Article in proceedings	29	29	27,92	25,47
FP – Industrial Design	0	0	0	0
FU – Utility model	0	0	0	0
GA – Prototype	0	0	0	0
GB – Functional specimen	1	6	1	5,17
B – Professional book	0	0	0	0
P – Patent	1	0	1	0
R – Software	0	1	0	0,5
ZA – Pilot plant	0	0	0	0
ZB – Proven technology	0	0	0	0
C – Chapter in a monograph	0	0	0	0
O – Other results	0	3	0	2,79
Total	58	71	53,57	61,14

Note: Data taken from publikace.tul.cz (current data in the database on 23.3.2020).

Tab. 4.9.14 Number of outputs financed from Institutional Support in 2018 and 2019

Type of outputs	No. of outputs		Recalculated share of FME outputs	
	2018	2019	2018	2019
J – Article in a professional periodical	27	18	18,86	10,8

D – Article in proceedings	12	8	15,57	6,24
FP – Industrial Design	0	0	0	0
FU – Utility mode	0	0	0	0
GA – Prototype	0	0	0	0
GB – Functional specimen	0	0	0	0
B – Professional book	1	0	0,5	0
P – Patent	5	3	4,08	2,3
R – Software	0	0	0	0
ZA – Pilot Plant	0	0	0	0
ZB – Proven Technology	0	0	0	0
C – Chapter in monograph	0	1	0	1
O – Other results	3	3	2,19	2,93
Total	48	33	41,2	23,27

Note: Data taken from publikace.tul.cz (current data in the database on 23rd March, 2020).

5.2 International Collaboration in Education

Tab. 5.2.1 Overview of collaboration based on interuniversity agreements 2019

Type of contract / State	Partner institution
Inter-university cooperation	
Azerbaijan	Azerbaijan Technical University
France	Université de Franche-Comté, ISIFC
Canada	Conestoga College Institute of Technology and Advance Learning, Ontario
Kazakhstan	Kazakh – British Technical University
Norway	Ostfold University College
Russia	National Research University „Moscow Power Engineering Ins.“
Slovenia	Trenčianska univerzita Alexandra Dubčeka
Germany	Hof University of Applied Sciences
Germany	BTU Cottbus - Senftenberg
Ukraine	Dnipro University of Technology
Vietnam	Nha Trang University, Faculty of Mechanical Engineering
Contracts with institutes / institutions	
PL	Institute for Engineering of Polymer Materials and Dyes, Torun
Germany	Bundesanstalt für Materialforschung und prüfung (BAM)
USA	ATCC – Material Transfer Agreement
Italy	Brembo S.p.A.
India	Europe Study Centre
Erasmus – bilateral contracts	
See chapter 5.4	73 institutions
Total	89 institutions

5.3 International R&D mobility and development projects

Tab. 5.3.1. CEEPUS – Mobility allowance – arrivals of academics and students

Year	2015	2016	2017	2018	2019
Allowance (CZK)	213 764	100 600	71 100	63 600	182 500 *

* Drawn only 86 100 CZK – transferred to the TUL operating funds 96 400 CZK.

Tab. 5.3.2 International projects

Provider	Program	Solution time	Foreign partner	Type of collaboration
EU	OP	2015–2019	Hochschule Zittau/Görlitz Technische Universität Dresden	Development
EU	OP	2016–2019	Technische Universität Dresden	Development
EU	OP	2017–2019	Technische Universität Dresden	Development
MŠMT ČR	7AMB	2019–2020	Université Grenoble Alpes	Research mobility

See the text appendix for details 5.3.

5.4 International mobility

Tab. 5.4.1 Foreign mobility within the programs in 2019

Program	ERASMUS+			Erasmus+ KA107	CEEPUS	IAESTE
	C	U	Z			
Number of sent students	22*	17	5	1**	0	0
Number of admitted students	114***	72	42	5****	1*****	8*****
Number of sent academic / other staff	14*****	14	0	6	5	0
Number of admitted academic/other staff	14*****	14	0	4*****	4*****	0
Total	164	117	47	16	10	8

C – total, U – finished, Z – started.

* 3 Ph.D., 2 study visit shorter than 28 days in 2019.

** Ph.D. student, study visit at least 28 days in 2019.

*** Of which 10 arrivals shorter than 28 days in 2019.

**** Of which 1 Ph.D. student, 3 arrivals in the length of 3 months, 2 arrivals in the length of min. 28 days in 2019.

***** Ph.D. student, arrival for the length of 3 months.

***** All arrivals in the length of at least 28 days in 2019.

***** Of which 3 departures of other employees and 5 departures shorter than 5 days.

***** Of which 4 arrivals shorter than 5 days.

***** All arrivals in the length of min. 5 days.

***** Of which 1 arrival lasted for 30 days, 1 arrival for 15 days, 1 arrival for 12 days and 1 arrival for 7 days.

Note: Also included student stays started in the previous year as well as stays shorter than 4 weeks (28 days) and stays of academics/other staff less than 5 days.

Tab. 5.4.2 Other foreign activities out of the programs in 2019

Activity	Conference Active Participation	Conference Passive Participation	Negotiation about collaboration	Others
Sent students	10	2	1	29*

Admitted students	0	0	0	3**
Sent Academic / other staff	16	8	9	30***
Admitted Academic / other staff	79****	0	3	5*****
Total	105	10	13	67

* Trade fairs, workshop, training, language / professional course, Student formula, additional activity.

** Internship lasting for 3 and 2 months (foreigner, internship in the Czech language), course

*** Of which 1x trip in the length of 10 days and 1x in the length of 4 days (internship), fairs, exhibitions, workshop, training, meetings departments, SESIA, departure within the additional activity

**** EFM conference participants included, no distinction between active and passive participation.

***** Lecture, professional visit.

Note: Other trips to conferences / meetings financed within the projects are included in tab. 5.4.3 under others resources

Tab. 5.4.3 Mobility within development projects, other resources, government scholarships and self-payers in 2019

Program	Government scholarship	Development projects	Other resources	Self-payers
No. of sent students	0	4*	66**	0
No. of admitted přijatých studentů	21***	1****	1*****	66*****
Počet vyslaných akad./ost. pracovníků	0	9*****	55*****	0
Počet přijatých akad./ost. pracovníků	0	2*****	3*****	0
Celkem	21	16	124	66

* Supported by 3 students from the IP Mobility Fund FS TUL 2019 - of which study visits shorter than 5 days, supported 1 student from IP FS 12451 (Canada) – one-semester study stay.

** 1x study trip in the length of 17 days (MOBILITY-7AMB-CR-France), 3x study trip to the primary school in the length of min. 5 days within the TUL Mobility Program, 1x short-term trip within the project Cooperation Program Czech Republic – Free State of Saxony (BauQu), 54x short-term trip within the project Cooperation Program Czech Republic – Free State of Saxony (GreK - excursion, meeting) , and 7x short – term trip within HyHi – 16015 (meeting, conference, workshop), of which 1x trip in the length of min. 5 days.

*** 19x students in English, including studies started in previous years, of which 4 successfully completed in 2019 (Ajami, Duran, Moro, Salonga), Linn, Huluka, Ayisi, Sai, Hdaib, Phan, Rubio, Amare, Džomba, Elezovic, Kardava, Samuvanga – FMSP, Cubreli, Kouta and Bediako – DSP study. 2x arrival government scholarship PL – internship, of which 1x semester, 1x in the length of min. 28 days

**** Ph.D. student, arrival within the IP Mobility Fund FME TUL in the length of min. 5 days.

***** 1x one - semester student stay (study, interuniversity cooperation Taiwan).

***** Of which 51 students – FMSP and Ph.D. study (incl. students ending 2019), 15 students - internships in the duration of min. 1 month, several months of internships prevailed.

***** 9x IP Mobility Fund FME TUL 2019 (3 business trips in the length of min. 15 days, 3 trips in the length of 12 days, 3 trips in less than 5 days).

***** 11x business trips (BauQu), 3x business trip (EQUINOX, H2020, professional meeting), 13x Czech-Saxony, GreK – meetings, excursions), 4x business trips (Czech-Saxony, Digital – workshop), 9x business trips OP RDE 16003, Technology transfer, lecture, workshop, fair), 15x business trips (HyHi, 16015 – conference, meeting)

***** Arrivals within the IP Mobility Fund FS TUL 2019, both in the length of min. 5 days.

***** 1x long-term stay (R&D worker) and 2x short-term stay within the project HyHi (16015).

Tab. 5.4.4 Mobility within programs, IRP, government scholarship holders, self-payers, other resources in 2019

Country	Number of sent students	Number of Admitted students	Number of sent employees	Number of admitted employees
Republic of Azerbaijan			1 (Erasmus KA107, for 5 days)	1 (Erasmus KA107, for 5 days)
Belgium			1 (other resources, – H2020)	
Bosnia and Herzegovina		1 (IAESTE) + 2 (government scholarship)		
Brazil		12 (self-payer, internship)		
Bulgaria			1 (Erasmus, for 5 days)	1 (IP FOM FME TUL, for 7 days)
China		1 (self-payer, internship)		
Denmark	1 (other resources for 11 days)			
Egypt		2 (self-payer)		
Ethiopia		2 (government scholarship)		
The Philippines		2 (government scholarship finishing in 2019)		
Finland		4 (Erasmus)	1 (Erasmus, shorter than 5 days)	
France	1 (Erasmus) + 1 (IP FOM FME TUL, for 15 days) + 1 (other resources for 17 days)	26 (Erasmus) + 1 (self-payer, internship)	3 (other resources, – HyHi)	
Ghana		4 (government scholarship 1x finishing in 2019)		
Georgia		1 (government scholarship)		
India		40 (self-payer, 1x internship)		
Italy			1 (other resources Transfer techn.)	
Izrael		2 (Erasmus KA107) + 1 (self-payer)	4 (Erasmus KA107, for 5 days)	3 (Erasmus KA107, for 2x5 and 7 days)
Jordan		1 (government scholarship)		
Cambodia		1 (government scholarship)		
Canada	1 (IP FME 12451)			
Kazakhstan		1 (IAESTE)		
Kosovo		1 (government		

		scholarship)		
Cyprus		1 (IAESTE)		
Libanon		1 (government scholarship)		
Libia		1 (self-payer)		
Lithuania		4 (Erasmus, 1x shorter than 28 days)		
Hungary	1 (other resources, business trip HyHi)	1 (Erasmus)	2 (other resources, business trip – HyHi)	
Malaysia			2 (IP FOM FME TUL, for 17 days)	
Malta				1 (Erasmus, for 5 days)
Myanmar		1 (government scholarship)		
Germany	9 (Erasmus) + 2 (IP FOM FME TUL, shorter than 5 days) + 60 (other resources, TUL, BauQu, GreK, HyHi)	2 (Erasmus) + 1 (self-payer)	3 (Erasmus, for 5 days) + 1 (IP FOM FME TUL, shorter than 5 days) + 39 (other resources-BauQu, GreK, POKROK, Transfer techn., HyHi)	1 (other resources, arrival, HyHi)
Nigeria		1 (self-payer)		
Peru		1 (government scholarship)		
Poland		4 (Erasmus) + 2 (government scholarship PL) + 1 (IP FOM FME TUL, for 7 days) + 2 (self-payers)	2 (IP FOM FME TUL, for 15 days and 12 days) + 2 (other resources, Transfer techn., HyHi)	6 (Erasmus, 2x shorter than for 5 days) + 1 (CEEPUS, within 15 days) + 1 (IP FOM FME TUL, within 13 days)
Portugal	9 (Erasmus, 2x shorter than 28 days)	18 (Erasmus) + 1 (IAESTE)	1 (other resources, – HyHi)	
Austria			1 (other resources, – TT)	
Greece		1 (Erasmus) + 2 (IAESTE)	4 (other resources, – H2020, HyHi)	
Slovakia	1 (other resources, – HyHi)	2 (Erasmus, 1x shorter than 28 days) + 1 (CEEPUS)	6 (Erasmus, 2x other employees, 4x shorter than 5 days) + 2 (CEEPUS, for 5 days) + 1/other resources – HyHi)	1 (Erasmus, for 5 days) + 1 (CEEPUS, for 12 days)
Serbia			3 (CEEPUS, for 5 days)	2 (CEEPUS, for 30 and 7 days)
Syria		1 (finishing government scholarship 2019)		
Spain	1 (another resource)	12 (Erasmus,	2 (IP FOM FME	

	,HyHi)	4x shorter than 28 days)	TUL, for 12 days)	
Sweden	1 (Erasmus)			1 (other resources, – HyHi)
Taiwan		1 (international collaboration, other resources, semestral stay)		
Thailand	1 (Erasmus KA107) + 1 (other resources, trip 8 days, HyHi)	1 (Erasmus KA107) + 1 (IAESTE)	1 (Erasmus KA107, for 5 days)	
Tunisia		1 (IAESTE)		
Turkey		40 (Erasmus, 4x shorter than 28 days) + 2 (self-payers)		6 (Erasmus, 2x shorter than 5 days)
UK	2 (Erasmus)		3 (Erasmus, for 5 days)	
Ukraine			2 (IP FOM FME TUL, shorter than 5 days)	
Vietnam		2 (Erasmus KA107) + 2 (self-payer)		1 (other resources, R&D worker)
Zambia		1 (government scholarship)		

Note: Student stays started in the previous year and shorter than 4 weeks (28 days) and stays of academics / other staff lasting less than 5 days included.

Tab. 5.4.5 Development of foreign mobility and other activities

Activity	Number of departures and arrivals a year								
	2013	2014	2015	2016	2017	2018	2019		
	Total	Total	Total	Total	Total	Total	P	OA	C
Sent students	68	111	94	106	98	121	93*	42	135
Admitted students	78	98	134	204	238	235	217**	3	220
Academic/other sent employees	137	117	135	107	137	185	89***	63	152
Academic/other admitted employees	50	51	52	58	139	116	27****	87	114
Total	333	377	415	475	612	657	426	195	621

C – Total; OA – other activities (Tab. 5.4.2).

P – In the Framework of programs: * 4 study/business trips – IRP, 66 study/business trips – other resources, (Tab.5.4.1., 5.4.3)

** from which 21 x government scholarships, 66 arrivals – self-payers, 1 arrival – other sources,

*** from which 9x IRP, 55x other resources,

**** from which 2x IRP, 3x other resources.

6.4 Expert activities

Tab. 6.4.1 Expert assessments

Year	Number of assessments	Service (CZK thous.)
2012	0	0
2013	2	undifferentiated
2014	4	26,40
2015	3	259,98
2016	4	42,68
2017	0	0
2018	4	69,70
2019	6	234,594

Tab. 6.4.2 Authorized emission measurement

Year	2014	2015	2016	2017	2018	2019
Service (CZK thous.)	64,41	23,00	16,00	24,00	15,56	5

Tab. 6.4.3 Numbers of experts from the application sphere involved in teaching and practice in accredited study programs FME TUL in 2019

Department	Persons having an employment relationship with a university or part of the university			Persons not having an employment relationship with a university or its part		
	Participation in teaching	Supervision of final works	Participation in practice	Participation in teaching	Supervision of final works	Participation in practice
KMP	6	0	0	0	0	0
KSP	1	1	0	0	0	0
KMT	1	1	0	0	0	0
KEZ	1	0	0	0	0	0
KST	0	0	0	0	0	0
KOM	0	0	0	0	0	0
KVM	3	1	1	3	0	8***
KSR	0	0	0	1	0	0
KTS	0	0	0	0	0	0
KSA	1	0	0	0	0	0
Total	13	3	1	4	0	8

Note: As part of the teaching, other experts from practice attend the lectures – detailed in the General Report of the KSP.

7.1 Quality and Culture of the Academic Life

Tab. 7.1.1 Courses of further education for FME employees in 2019*

Character of courses	No. of courses	No. of participants
Focused on educational skills	*	*

Courses focused on general skills	*	*
Language oriented courses **		24Z + 7S
Professional courses	*	*

* Specification, see text appendix 7.1, further specified in the General Report of the Departments.

** Courses organized by TUL, language schools, courses organized and provided at departments.

7.3 Development and investment projects financed by Ministry of Education

Tab. 7.3.1 Institutional development plan TUL for the year 2019 – partial projects of FME TUL

No.	Name of the sub-project FME TUL Investigator / Workplace	Allocated resources (CZK thous.)		
		NIV	INV	Total
12451	Quality assurance prof. Dr. Ing. Petr Lenfeld / DFS	330	0	330
	Diversity and availability doc. Ing. Dora Kroisová, Ph.D.	425	0	425
	Internationalization prof. Ing. Karel Fraňa, Ph.D.	530	0	530
	Quality and relevant research, development, innovation doc. Ing. Petr Lepšík, Ph.D.	91,5	0	91,5
12452	Ing. Martin Lachman, Ph.D. Increasing the comfort of teaching programming in the new BSP	450	0	450
Total FME TUL		1 376,5	0	1 376,5

7.4 Project financed from structural funds EU 2014–2020

7.4.1 OP Research, development and education

Tab. 7.4.1.1 Involvement in OP Research and Development Projects – FME TUL recipient

Project name Registration number	Grant 2019 (CZK thous.)	Realization
Development of doctoral study programs FME TUL CZ.02.2.69/0.0/0.0/16_018/0002718	326	2017–2022
Development of research infrastructure for doctoral study programs FME TUL CZ.02.1.01/0.0/0.0/16_017/0002650	2 073	2017–2022

Tab. 7.4.1.2 Involvement of FME TUL into Research and Development Projects – TUL recipient

Project name Registration number	Grant 2019 (CZK thous.)	Realization
Development of human resources TUL for increasing relevance, quality and access to education in the conditions of Industry 4.0 - Vi4.0 CZ.02.2.69/0.0/0.0/16_015/0002329	13 600	2017–2022

Tab. 7.4.1.3 Involvement of FME TUL in university projects OP RDE – FME TUL project coordinator

Project name Registration number	Grant 2019 (v tis. Kč)	Realization
Hybrid materials for hierarchical structures – HyHi CZ.02.1.01/0.0/0.0/16_019/0000843	23 277	2018–2022
3D printing in construction and architecture - 3D STAR CZ.02.1.01/0.0/0.0/16_025/0007424	5 321	2018–2022

7.4.2 OP Business and innovation**Tab. 7.4.2.1 OP Business and innovation – FME TUL partner of the project**

Project name Registration number	Grant 2019 (CZK thous.)	Realization
Development of textile products from non-combustible and recyclable materials CZ.01.1.02/0.0/0.0/16_084/0010282	4 209	2018-2020
Integration of microcomputers into lighting systems CZ.01.1.02/0.0/0.0/17_107/0012526	1 278	2018–2020
Test bench for pre-certification tests of internal combustion engines* CZ.01.1.02/0.0/0.0/15_019/0004815	1 120	2016– 2019*
Research and development of special sewing machines for automated accelerated sewing of shaped parts of outerwear CZ.01.1.02/0.0/0.0/17_107/0012381	236	2019–2020
Research and development of a new universal drip-free quick coupling CZ.01.1.02/0.0/0.0/17_176/0015557	Started in 12/2019	2019–2022

* Conducted under the FME and CXI.

Tab. 7.4.2.2 OP Prague – The growth pole of the Czech Republic

Call Name	Grant 2019 (CZK thous.)	Realization
Prague innovative voucher Analysis of available nanotechnologies for antireflection layers	489	2018-2019

7.4.3 OP Cross-border collaboration**Tab. 7.4.3.1 Program Cooperation program Czech Republic – Free State of Saxony
FME TUL Partner of the Project**

Project name Registration number	Grant 2019 (CZK thous.)	Realization
Cross-border cooperative teaching of plastics processing technologies Zittau-Liberec - GreK 100252772	2 051	2016–2019
Building partnerships in the field of building technology research to educate scientific followers in the border region - BauQu 100252950	249	2016–2019
Practically oriented development of competencies in production technology in the regions through cooperation.digital - PROGRESS.digital 100281976	1 025	2017–2019

TEXT
ATTACHEMENTS

TEXT ATTACHEMENTS

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2.4 Professorial and habilitation proceedings

Professorial proceeding

Name and surname: **doc. Ing. Václav Dvořák, Ph.D.**
Workplace: TUL, Faculty of Mechanical Engineering, Department of Power Equipment
Field: Applied Mechanics
Date of initiation of proceedings: 28 November, 2018
Defended before SC FME TUL: 24 April, 2019
Defended before SC TUL: 27 May, 2019
Appointment date: 18 December, 2019

Habilitation proceedings

Name and surname: **Ing. Petra Dančová, Ph.D.**
Workplace: TUL, Faculty of Mechanical Engineering, Department of Power Equipment
Field: Applied Mechanics
Name of habilitation work: Experimental Methods in Non-isothermal Flow Problems
Topic of the habilitation lecture: Aerodynamics of Airplane Wings
Initiation of proceedings: 3 December, 2018
Defended before SC FME TUL: 24 April, 2019
Appointment date: 1 July, 2019

Name and surname: **Ing. Tran Huu Nam, Ph.D.**
Workplace: TUL, Faculty of Mechanical Engineering, Department of Applied Mechanics
Field: Applied Mechanics
Name of habilitation work: Research and development of aligned multi-walled carbon nanotube sheets, their preps and composites
Topic of the habilitation lecture: Failure theories for composite lamina (Subject: Mechanics of Composite Materials)
Initiation of proceedings: 28 February, 2019

Name and surname: **Ing. Vlastimil Hotař, Ph.D.**
Workplace: TUL, Faculty of Mechanical Engineering, Department of Glass Producing Machines and Robotics
Field: Construction of machines and equipment
Name of Habilitation Work: Advanced Methods of Image Acquisition, Interpretation and Application in Industrial Practice
Topic of the habilitation lecture: Imaging Application systems for objective evaluation of glass products
Initiation of proceedings: 2 May, 2019

3.4 List of Doctoral Graduates in 2019

Name and surname: **Ing. Tomáš Kořínek**
Field: 3901V003 Applied Mechanics
Major: Fluid mechanics and thermodynamics
Training workplace: Department of Power Devices
Supervisor: prof. Ing. Karel Fraňa, Ph.D.
Topic of dissertation work: Quality of Indoor Areas with Regard to the Spread of Harmful Substances
Date of defense: 4 December, 2019
Length of study: 4 years

Name and surname: **Ing. Jan Škoda**
Field: 3901V003 Applied Mechanics
Major: Engineering Mechanics
Training workplace: Department of Applied Mechanics
Supervisor: prof. RNDr. Jan Šklíba, CSc.
Topic of dissertation work: Vibro-Insulation System with Gyroscopic Stabilizer

Date of defense: 23 February. 2019
Length of study: 8 years

Name and surname: **Ing. Lukáš Voleský**
Field: 3911V011 Material Engineering
Training workplace: Department of Materials
Supervisor: prof. Ing. Petr Louda, CSc.
Topic of dissertation thesis: Study about Degradation Processes of Modified Implant Surfaces
Date of defense: 10 January, 2019
Length of study: 8 years

Name and surname: **Dipl. Ing. Michael Oeljeklaus**
Field: 2302V010 Machines and Equipment Design
Major: Machines and Equipment Design
Training workplace: Department of Machine Parts and Mechanisms
Supervisor: prof. Ing. Lubomír Pešík, CSc.
Topic of dissertation thesis: Diagnostic System for Low-Speed Bearings
Date of defense: 14 May, 2019
Length of study: 3 years

Name and surname: **Nguyen Van Ha, M.Sc.**
Field: 2302V010 Machines and Equipment Design
Major: Machines and Equipment Design
Training workplace: Department of Machine Parts and Mechanisms
Supervisor: prof. Ing. Ladislav Ševčík, CSc.
Topic of dissertation thesis: Modern Transmission Mechanism of Production Machines
Date of defense: 14 May, 2019
Length of study: 4 years

Name and surname: **Ing. Petr Kulhavý**
Field: 2302V010 Machines and Equipment Design
Major: Machine Parts and Mechanisms
Training workplace: Department of Machine Parts and Mechanisms
Supervisor: doc. Ing. Vítězslav Fliegel, CSc.
Topic of Dissertation Thesis: Design of Prototype Composite Frames from Pre-Impregnated Fibers
Date of defense: 24 June, 2019
Length of study: 6 years

Name and surname: **Ing. Ondřej Matúšek**
Field: 2302V010 Machines and Equipment Design
Major: Glass and Ceramic Machines
Training workplace: Department of Glass Producing Machines and Robotics
Supervisor: doc. Ing. František Novotný, CSc.
Topic of Dissertation Thesis: Advanced techniques for sensing shiny and hardly detectable materials
Date of defense: May 13, 2019
Length of study: 8 years

Name and surname: **Ing. Josef Popelka**
Field: 2302V010 Machines and Equipment Design
Major: Reciprocating internal combustion engines
Training workplace: Department of Vehicles and Engines
Supervisor: prof. Ing. Celestýn Scholz, Ph.D.
Topic of Dissertation Thesis: Analysis of the Efficiency of the Car's Drive Chain
Date of defense: November 25, 2019
Length of study: 9 years

Name and surname: **Ing. Petr Starý**
Field: 2302V010 Machines and Equipment Design
Major: Reciprocating internal combustion engines
Training workplace: Department of Vehicles and Engines

Supervisor: prof. Ing. Celestýn Scholz, Ph.D.
 Topic of Dissertation Thesis: Injection Dynamics of the Common Rail System
 Date of defense: February 5 2019
 Length of study: 8 years

Name and surname: **Ing. Monika Kučerová**
 Field: 2303V002 Engineering Technology
 Major: Plastics processing
 Training workplace: Department of Engineering Technology
 Supervisor: prof. Dr. Ing. Petr Lenfeld
 Topic of the Dissertation: Research on local shrinkage of PLA and PLLA biopolymers
 Date of defense: December 2, 2019
 Length of study: 7 years

Name and surname: **Ing. Martin Borůvka**
 Field: 2303V002 Engineering Technology
 Major: Plastics processing
 Training workplace: Department of Engineering Technology
 Supervisor: prof. Dr. Ing. Petr Lenfeld
 Topic of the Dissertation: Research of application possibilities of bio-composite materials filled with cellulose nanocrystals
 Date of defense: December 2, 2019
 Length of study: 7 years

4.3 National Competence Centers

Josef Božek Automotive Competence Center for Ground Transport Units

Provider: TA CR
 Program: NCK National Competence Centers (2018–2022)
 Project Identification Code: TN01000026
 Recipient: ČVUT in Prague
 Other participants: 23 business entities
 Technical University of Liberec, FME TUL
 Pardubice University
 ZČU in Plzeň
 VŠB-TU Ostrava
 VÚT in Brno
 Solution period: 2019–2020
 TUL guarantor: Ing. Robert Voženílek, Ph.D., Department of Vehicles and Engines
 Internal TUL number: 17112
 Grant FME 2019: total / INV / NIV – 4 245 403 / 0 / 4 245 403 CZK

Competence Center ENGINEERING

Provider: TA CR
 Program: NCK National Competence Centers (2018–2022)
 Project Identification Code: TN01000015
 Recipient: VÚTS, a.s.
 Other participants: 19 business entities
 Technical University of Liberec, FME TUL
 ČVÚT in Prague
 ZČU in Plzeň
 VŠB-TU Ostrava
 VÚT v Brně
 Institute of Physical Materials AS ČR, v.v.i.
 Solution period: 2019–2020
 TUL guarantor: prof. Ing. Jaroslav Beran, CSc.

Partial Project:

Line for the production of flat composite nanofibrous materials using AC electrospinning
 Solver: prof. Ing. Jaroslav Beran, CSc.
 Internal TUL number: 17121

Grants FME 2019: Total / INV / NIV – 3 220 000 / 0 / 3 220 000 CZK

Partial project:

Automatization and Robotization of Production Processes in Textile Industry

Internal TUL number: 17122

Solver: doc. Ing. Martin Bílek, Ph.D.

FME Grants 2019: total / INV / NIV – 400 000 / 0 / 400 000 CZK

+ own 100 000 CZK

Partial project:

Measuring insoles sensing plantar pressures to prevent overloading of the musculoskeletal system

TUL internal number: 17123

Solver: doc. PhDr. Soňa Jandová, Ph.D.

Solution period: 2019-2020

Grant FME 2019: total / INV / NIV – 350 000 / 0 / 350 000 CZK

Use of funds in 2019: 325 000 CZK, 25 000 CZK transfer to 2020

Partial Project:

Wireless diagnostic system for predicting fault conditions of machine units

Internal TUL number: 17124

Solver: doc. Ing. Iva Petříková, Ph.D.

Solution Period: 2019-2020

Grant FME 2019: total / INV / NINV – 600 000 / 0 / 600 000 CZK

4.4 Scientific-research projects

TA CR – ZÉTA 2

Research of end gauges in terms of thermal expansion and non-standard material composition

Provider: TA CR

Program: ZÉTA 2

Project Identification Code: TJ02000175

Receiver: Czech Metrological Institute

Co-receiver: TUL, Faculty of Mechanical Engineering

Ing. Miloslav Ledvina, Ph.D., Department of Machining and Assembly

Solution Period: 2019–2021

Internal TUL number: 17119

FME Grants 2019: celkem / INV / NIV – 157 000 / 0 / 157 000 CZK

From which KOM: 104 500 CZK

KMT: 30 000 CZK

KSP: 22 500 CZK

TA CR – EPSILON

Thermal nanoinsulation for automotive and aerospace

Provider: TA CR

Program: EPSILON

Project Identification Code: TH04020189

Receiver: STARMANS electronic s.r.o.

Co-receiver: TUL, Faculty of Mechanical Engineering

Co-receiver's solver: prof. Ing. Petr Louda, CSc., Department of Materials

Solution period: 2019–2022

Internal TUL number: 17114

Grant FME 2019: total / INV / NIV – 1 500 000 / 0 / 1 500 000 CZK

Robot with a parallel measuring arm as an alternative to CNC machining centers and other machines for precise operations

Provider: TA CR

Program: EPSILON

Project Identification Code: TH04010506

Receiver: Machine Building s.r.o.

Co-receiver: TUL, Faculty of Mechanical Engineering

Co-receiver's solver: Ing. Michal Sivčák, Ph.D., Department of Applied Mechanics
Solution period: 2019–2020
Internal TUL number: 17116
Grant FME 2019: in total / INV / NIV – 1 876 999 / 0 / 1 876 999 CZK

Product development for the automotive industry from AlSi5Mg alloy

Provider: TA CR
Program: EPSILON
Project Identification Number: TH02020799
Receiver: TOP ALULIT s.r.o.
Co-receiver: TUL, Faculty of Mechanical Engineering
Co-receiver's solver: doc. Ing. Jiří Machuta / Ing. Jiří Sobotka, Ph.D.
Department of Engineering Technology
Solution Period: 2016–2019
Internal TUL number: 17025
Grant FME 2019: total / INV / NIV – 1 000 400 / 0 / 1 000 400 CZK

Development of a new range concerning anti-fire pumps for extreme conditions

Provider: TA CR
Program: EPSILON
Project Identification Code: TH03010378
Receiver: Pavliš a Hartman spol. s r.o.
Co-receiver: TUL, Faculty of Mechanical Engineering
Co-receiver's solver: prof. Ing. Václav Dvořák, Ph.D.,
Department of Power Engineering Equipment (till 30 September, 2019)
Solution Period: 2018–2020
TUL Internal Number: 17036
Grant FME 2019: total / INV / NIV – 1 000 000 / 0 / 1 000 000 CZK
From which KEZ: 737 738 CZK
From which KMP: 262 262 CZK

MIT CR – TRIO

Plasma-nitriding increase of useful properties concerning welds and parts created by additive technologies

Provider: MIT CR
Program: TRIO (2019–2022)
Project Identification Code: FV 40127
Receiver: JIMALU, s.r.o.
Co-receiver: TUL, Faculty of Mechanical Engineering
Co-receiver's solver: doc. Ing. Jaromír Moravec, Ph.D.,
Department of Engineering Technology
TUL Internal Number: 17753
Solution Period: 2019–2022
Grant FME 2019: total / INV / NIV – 576 000 / 0 / 576 000 CZK

Research and development of a new generation of automatic machines for the production of self-supporting coils

Provider: MIT CR
Program: TRIO – 1. Call
Project Identification Code: FV30091
Receiver: JiKoN – nástrojárna, s.r.o.
Co-receiver: TUL, Faculty of Mechanical Engineering
Co-receiver's solver: doc. Ing. Martin Bílek, Ph.D.
Department of Textile Machine Design
TUL Internal Number: 17066
Solution Period: 2018–2020 (started in 2019)
Grant FME 2019: total / INV / NIV – 689 665 / 0 / 689 665 CZK

Design and manufacturing of a prototype device for local repairs concerning the functionality of inorganic surfaces

Provider: MIT CR
Program: TRIO (2019-2022)
Project Identification Code: FV 40144
Receiver: NEUFE, spol. s r.o.
Co-receiver: TUL, Faculty of Mechanical Engineering
Co-receiver's solver: doc. Ing. Jaromír Moravec, Ph.D.,
Department of Engineering Technology
TUL Internal Number: 17752
Solution Period: 2019–2022
Grant FME 2019: total / INV / NIV – 386 000 / 0 / 386 000 CZK

Development of progressive rolling technology in the cap production

Provider: MIT CR
Program: TRIO – 1. call
Project Identification Code: FV10467
Receiver: TONAK a.s.
Co-receiver: TUL, Faculty of Mechanical Engineering
Solver: prof. Ing. Jaroslav Beran, CSc.,
Department of Textile Machine Design
TUL Internal Number: 17776
Solution Period: 2016–2019
Grant FME 2019: total / INV / NIV – 849 137 / 0 / 849 137 CZK

Modular range of machine tool holders

Provider: MIT CR
Program: TRIO – 2. Call
Project Identification Code: FV20241
Receiver: VÚTS a.s.
Co-receiver: TUL, Faculty of Mechanical Engineering
Solver: doc. Ing. David Círk, Ph.D.,
Department of Applied Mechanics
TUL Internal Number: 17782
Solution Period: 2017–2019
Grant FME 2019: total / INV / NIV – 484 954 / 0 / 450 000 CZK

Special transformer mechanisms in drives with electronic cams

Provider: MIT CR
Program: TRIO – 2. Call
Project Identification Code: FV20547
Receiver: VÚTS a.s.
Co-receiver: TUL, Faculty of Mechanical Engineering
Solver: prof. Ing. Petr Louda, CSc., since 2019 Ing. Totka Bakalova, PhD.
Department of Materials
TUL Internal Number: 17778
Solution Period: 2017–2020
Grant FME 2019: total / INV / NIV – 941 436 / 0 / 941 436 CZK

MI CR**Application of geopolymer composites as fire barriers (AGK)**

Provider: MI CR
Program: Safety Research ČR 2015-2020 (BV III/1-VS)
Project Identification Code: VI 20172019055
Receiver: TUL, CNATI/2017, 2018/performed within FME TUL
Solver: prof. Ing. Petr Louda, CSc.
Solution Period: 2017–2020
TUL Internal Number: 16299
Grants FME 2019: total / INV / NIV – 3 039 693 / 0 / 3 039 693 CZK

Applied research in the field of new generation personal protective equipment for IRS needs

Provider:	MI CR
Program:	Program of safety research
Identification code of project:	VI20172020052
Receiver:	TUL, Faculty of Mechanical Engineering
Co-receiver:	Clean air s.r.o.
Solver:	Ing. Martin Seidl, Ph.D., Department of Engineering Technology
TUL Internal Number:	16298
Solution Period:	2017–2020
TUL Grant for 2019:	total / INV / NIV – 8 567 000 / 2 985 000 / 5 582 000 CZK
From which FME 2019:	total / INV / NIV – 7 831 000 / 2 985 000 / 4 846 000 CZK
Co-receiver:	total / INV / NIV – 736 000 / 0 / 736 000 CZK
From which:	
Grants of Cxl:	total / INV / NIV – 1 926 500 / 0 / 926 500 CZK
FME Grants:	total / INV / NIV – 5 441 000 / 2 985 000 / 2 456 000 CZK
From which:	
Grants KSP 2019:	total / INV / NIV – 4 489 000 / 2 985 000 / 1 504 000 CZK
Grants KSA 2019:	total / INV / NIV – 457 000 / 0 / 457 000 CZK
Grants KEZ 2019:	total / INV / NIV – 272 500 / 0 / 272 500 CZK
Grants KTS 2019:	total / INV / NIV – 120 000 / 0 / 120 000 CZK
Grants KMP 2019:	total / INV / NIV – 102 500 / 0 / 102 500 CZK

Liberec Region**Development and application of SMART textile materials to increase the antibacterial and self-cleaning properties of textiles**

Provider:	Liberec region
Program:	Program no. 2.2. / Regional innovation program / Innovation vouchers for projekt
Receiver:	Mc Bike s.r.o.
Co-solver:	TUL, Faculty of Mechanical Engineering, Department of Materials prof. Ing. Petr Louda, CSc.
Solution Period:	2019
Grants:	240 000 CZK

EU – HORIZONT 2020**EQUINOX – A novel process for manufacturing complex shaped Fe-Al intermetallic parts resistant to extreme environments**

Provider:	EU – European Fund for Regional Development
Program:	H2020 – H2020-SC-2015-one-stage
Project Identification Code:	689 510
Lead partner:	National Technical University of Athens, School of Chemical Engineering
Participant:	TUL, Faculty of Mechanical Engineering
Solver:	Ing. Pavel Hanus, Ph.D., Department of Materials
Internal TUL number:	DZG93/2210
Period:	2016–2019
Grant in total:	total / INV / NIV – 6 982 665 / 0 / 6 982 665 CZK
Grant 2019:	total / INV / NIV – 0 / 0 / 0 CZK (project was financed from a part of the subsidy provided to the EK in 2018, difference between the grant and total cost of the project will be covered by the billing payment in 2020)
Drawing 2019/KSP:	total / INV / NIV – 208 500 / 0 / 208 500 CZK
Drawing 2019/KMT:	total / INV / NIV – 551 000 / 0 / 551 000 CZK
Drawing 2019/Cxl:	total / INV / NIV – 465 000 / 0 / 465 000 CZK
Drawn in 2019:	total / INV / NIV – 1 224 500 / 0 / 1 224 500 CZK

Research and Development Projects under CNATI and other part of TUL

Academics of the Faculty of Mechanical Engineering are solvers, co-researchers or participate in solving projects on other parts of TUL.

TA CR – EPSILON

Implementation of advanced fillers in the production of extruded composite profiles used by progressive additive technologies in the field of 3D printing

Provider: TA CR
Program: EPSILON (2017-2019)
Project Identification No.: TH02020424
Receiver: ZD Haňovice, s.r.o.
Co-receiver: TUL, CNATI
Co-receiver's Solver: Ing. Jiří Bobek, Ph.D., NATI
TUL Internal No: 14013
Solution Period: 2017–2019
Grant CxI 2019: total / INV / NIV – 2 620 000 / 0 / 2 620 000 CZK
Share of FME/KSP 2019: total / INV / NIV – 596 237 / 0 / 596 237 CZK

Development of technical means for a quick change of assortment on a machine for the preparation of the production of industrial sorting screens

Provider: TA CR
Program: EPSILON
Project Identification No.: TH02010964
Receiver: SIKR s.r.o.
Co-receiver: TUL, CNATI
Responsible Solver : doc. Dr. Ing. Ivan Mašín a doc. Ing. Michal Petrů, Ph.D.
Solution Period: 2017–2019
TUL Internal No.: 11018
Grant CxI 2019: 974 632 CZK
Non-Public Resources 2019: 100 000 CZK
Share of FME/KST 2019: 295 758 CZK

Functional development of a bi-system liquid filter for process water recycling using modern modeling methods

Provider: TA CR
Program: EPSILON
Project Identification No.: TH02020949
Receiver: ALFICO, s.r.o.
Co-receiver: TUL, CNATI
Responsible Solver: doc. Ing. Michal Petrů, Ph.D.
Solution Period: 2017–2019
TUL Internal No: 117019
Grant CxI 2019: 1 083 208 CZK
Non-Public Resources 2019: 100 000 CZK
Share of FME/KST 2019: 155 455 CZK

Development of a burner for a gas infrared radiator on the principle of kinetic combustion spalování

Provider: TA CR
Program: EPSILON
Project Identification No.: TH03020122
Receiver: LERSEN, s.r.o.
Co-Receiver: TUL, CNATI
Responsible Solver: Ing. Tomáš Martinec, Ph.D.
Solution Period: 2018–2020
TUL Internal No.: 17028
Grant CxI 2019: 1 451 992 CZK
Non-public Resources 2019: 100 000 CZK
Share of FME/KST 2019: 169 874 CZK

Development of an autonomous IoT device for evaluating operational data of agricultural implements

Provider: TA CR
Program: EPSILON
Project Identification No.: TH03010277
Receiver: BEDNAR FMT, s.r.o.
Co-Receiver: TUL, CNATI
Responsible Solver: doc. Ing. Michal Petrů, Ph.D.
Solution Period: 2018–2020
TUL Internal No.: 17029
Grant CxI 2019: 1 807 000 CZK
Share of FME/KTS 2019: 58 788 CZK

Development of technical means for a quick change concerning assortment on a machine for the preparation of the industrial sorting screens production

Provider: TA CR
Project Identification No.: TH02010964
Receiver: SIKR s.r.o.
Co-Receiver: TUL, CNATI
Responsible Solver: doc. Ing. Michal Petrů, Ph.D. (doc. Ivan Mašín)
Solution Period: 2017–2019
TUL Internal No.: 17018
Grant CxI 2019: 974 632 CZK
Non-public Resources 2019: 100 000 CZK
Share of FME/KTS 2019: 295 758 CZK

Development of a burner for a gas infrared radiator on the principle of kinetic combustion

Provider: TA CR
Project Identification No.: TH03020122
Receiver: LERSEN, s.r.o.
Spolupříjemce: TUL, CNATI
Responsible Solver: Ing. Tomáš Martinec, Ph.D.
Solution Period: 2018–2020
Interní číslo TUL: 17028
Grant CxI 2019: 1 451 992
Non-public Resources 2019: 100 000 CZK
Share of FME/KTS 2019: 169 874 CZK

Development of an intelligent gas air heater for industrial halls using methods of advanced mathematical modeling of temperature fields and air flow

Provider: TA CR
Project Identification No.: TK02020096
Receiver: LERSEN, s.r.o.
Co-Receiver: TUL, NATI
Responsible Solver: doc. Ing. Michal Petrů, Ph.D.
Solution Period: 2019–2022
Internal TUL No.: 17125
Grant CxI 2019: 683 525 CZK
Non-public Resources 2019: 50 000 CZK
Share of FME/KTS 2019: 109 890 CZK

Equipment for non-contact evaluation of shape accuracy of car windows

Provider: TA CR
Program: EPSILON
Project Identification No.: TH04010256
Receiver: FOR G, s.r.o.
Co-receiver: TUL, NATI
Responsible Solver: doc. Ing. František Novotný, CSc.
Solution Period: 2019–2021

Internal No.: 11077
TUL Grant: 1 192 000 CZK
Share of FME/KSR 2019: 167 000 CZK

MIT CR

Development of CNC machining processes and methods of measuring high-precision optical elements from hard materials with an unfavorable radius-diameter ratio

Provider: MIT CR
Program: MIT TRIO, 4.VS
Identification code: FV40387
Receiver: TOMS – Technology, s.r.o.
Co-Receiver: TUL, FMI
Co-receiver's Solver: Ing. Vít Lédl, Ph.D., FMI
TUL Internal No.: 17754
Solution Period: 2019–2022
TUL Grant 2019: 791 000 CZK
Share of FME/KEZ 2019: 162 991 CZK

Conversion of mercury to solidified mercuric sulphide

Provider: MPO ČR
Program: MPO TRIO, 4.VS
Identification code: FV40270
Receiver: BOME s.r.o.
Co-Receiver: TUL, CxI
Co-receiver's Solver: Ing. Vít Lédl, Ph.D., FM
TUL Internal No.: 17069
Solution Period: 2019–2020
TUL Grant 2019: 636 000 CZK
Share of FME /KSA 2019: 75 000 CZK

Introduction of a new EPB technology into the windshield production process

Provider: TA ČR
Program: MPO TRIO
Identification code: FV40180
Receiver: AGC Automotive Czech a.s.
Co-Receiver: TUL, CxI
Solver: doc. Ing. František Novotný, CSc.
Solution Period: 2019–2022
Internal No.: 17759
TUL Grant: 1 283 000 CZK
Share of FME/KSR 2019: 205 000 CZK

4.7 Center for Nanomaterials Advanced Technologies and Innovations

Sustainability period of the project finished in 2018. In 2019, selected laboratories were transferred under the administration of FME.

4.9 Commercialisation of Research and Development Outcomes and Results

PROSYKO – Proactive system of commercialisation at TU of Liberec

Provider: TA CR
Program: GAMA, Podprogram 1
Typy of project: „Proof of concept stage“
Identification code: TG01010117
Receiver: TUL, NATI
Solver: Ing. Stanislav Petrík, Ph.D.
Solution Period: 2014–2019
Internal TUL No.: 17862
Partial project solved at FME: Ekological technology combing for surface treatment felt structures

Solver:	Ing. Šimon Kovář, Ph.D., Department of Textile Machine Design
Internal no. of partial project:	14163
Solution period:	2017–2019
Funds of FME 2019:	total / INV / NIV – 321 280 / 0 / 21 280 CZK

5.2 International Cooperation in Education

CEEPUS is a Central European exchange program focused on regional cooperation between universities within university networks. In 2019, the Faculty of Mechanical Engineering was an active participant in 4 networks of the program CEEPUS III:

- CIII-RS-0304 Technical Characteristics Researching of Modern Products in Machine Industry (Machine Design, Fluid Technics and Calculations) with the Purpose of Improvement Their Market Characteristics and Better Placement on the Market.
- CIII-BG-0722 Computer Aided Design of Automated Systems for Assembling.
- CIII-RO-0013 Teaching and Research of Environment – Oriented Technologies in Manufacturing.
- CIII-RS-1012 Building Knowledge and Experience Exchange in CFDg.

Solver:	TUL, Faculty of Mechanical Engineering
Internal TUL No.:	10060
Grant FME 2019:	182 500 CZK, drawn 86 100 CZK, balance of 96 400 CZK transferred to the TUL fund of Operating Resources

ERASMUS+ KA107 – Credit Mobility

Call 2017

Faculty of Mechanical Engineering was successful in the 2017 Call and won a total of 3 projects, particularly, a project with partner universities in Canada, Thailand and Vietnam. In 2019, the study stay of a student of the Faculty of Mechanical Engineering at a partner university in Thailand was completed (started in 2018). Reciprocally, a study stay of a foreign student from Thailand at the Faculty of Mechanical Engineering took place in 2019, and 2 study stays of foreign students from Vietnam, which started in 2018. In 2019, an academic staff member of the Faculty of Mechanical Engineering partner university in Thailand. All 3 projects were successfully completed in 2019.

Call 2018

Under the 2018 call, the Faculty of Mechanical Engineering submitted 2 projects, one project for cooperation with Israel, and other one for cooperation with Azerbaijan. The project with Israel was successful and was supported under KA107. Cooperation with Azerbaijan was to a limited extent supported by TUL (Erasmus +) resources. In 2019, arrivals of foreign academics from Israel to the Faculty of Mechanical Engineering took place, namely, 2 arrivals in the training category and 1 arrival in the teaching category. Reciprocally, the academics of the Faculty of Mechanical Engineering traveled to Israel, 4 trips also in the training category. At the same time, in 2019, the academic of the faculty went to the partner university in Azerbaijan in the category of training.

Call 2019

Under the 2019 call, the Faculty of Mechanical Engineering submitted a total of 4 projects for cooperation with partner universities in Canada (FS submitted together with FM), Malaysia, Azerbaijan and Ukraine (FS submitted together with FM). Under this call, it was successful and won 2 projects, namely a project with Malaysia and Azerbaijan. Projects with Canada and Ukraine will be supported by TUL (Erasmus+) resources. In 2019, the first activities were launched and the arrival of a foreign academic from Azerbaijan to the faculty also took place in the training category.

Provider:	DZS
Program:	Erasmus+ KA107 – Credit Mobility
Solver:	TUL/FME TUL

Goal: Development and support of cooperation with partner universities in countries outside the EU.

Development of FME TUL – partial: Development of International Collaboration FME TUL

Provider:	Ministry of Education CR
Program:	Institutional development plan TUL (IP TUL)
Solver:	TUL, Faculty of Mechanical Engineering

Internal TUL No.: 12451
Grant FME 2019: 530 000 CZK / drawn 492 840,62 CZK

Goal of the Project:

The aim of the project was to support international cooperation of students and academics of the Faculty of Mechanical Engineering TUL in the educational and scientific research areas, to further support long-term research stays and also ensure the continuation and deepening of the current cooperation between FME TUL and foreign partner universities.

5.3 International Projects Research and Development

EQUINOX – A novel process for manufacturing complex shaped Fe-Al intermetallic parts resistant to extreme environments

Provider: EU – European Fund for Regional Development
Program: H2020 – H2020-SC-2015-one-stage
Identification Code: 689 510
Lead partner: National Technical University of Athens,
School of Chemical Engineering
Participant: TUL, FME
Solver: Ing. Pavel Hanus, Ph.D., Department of Materials
Internal TUL no.: DZG93/2210
Period: 2016–2019
In detail: see above 4.4 R&D Projects

Evaluation of cavitation erosion potential for liquid industrial applications

Provider: EU / Ministry of Education CR
Program: Framework Program 8J / Support for the Mobility of Researchers and workers in the framework of international cooperation in R&D&I
Identification Code: 8J19FR018
Partner of the Project: Université Grenoble Alpes (Grenoble Cedex 9)
Receiver: TUL, Faculty of Mechanical Engineering
Solver: Ing. Miloš Müller, Ph.D., Department of Power Engineering
Solution Period: 2019–2020
Internal TUL No.: 18305
Grant 2019: 65 000 CZK

Development Projects – see below 7.4.4 OP Cross-border Cooperation

5.4 International Mobility

The European Union Education Program 2014-2020 Erasmus + supports cooperation and mobility in all spheres of education, training, sports and youth.

Inter-institutional agreements valid in 2019 in the Framework of ERASMUS+:

- Universiteit Gent (Belgie)
- Technical University of Sofia (BG)
- Technical University of Sofia – Plovdiv (BG)
- Technical University of Gabrovo (BG)
- Trakia University – Stara Zagora (BG)
- University of Southern Denmark (DK)
- Aalto University of Technology TKK (FI)
- Karelia University of Applied Sciences (FI)
- Université de Bourgogne – Dijon (FR)
- University of Angers (FR)
- INSA Rennes (FR)
- Université de Franche-Comté Besançon (FR)
- Université de Technologie de Belfort-Montbéliard (FR)
- Ecole Nationale Mines d'Ales (FR)

- Universite de Savoie (FR)
- Groupe ESAIP (FR)
- Université de Haute Alsace (FR)
- BTU Cottbus-Senftenberg (DE)
- Technische Universität Dresden (DE)
- The University of Applied Sciences Emden/Leer (DE)
- Hochschule Hof (DE)
- Westsächsische Hochschule Zwickau (DE)
- Technische Universität Darmstadt (DE)
- Chemnitz University of Technology (DE)
- RWTH Aachen University (DE)
- Hochschule Zittau/Görlitz (DE)
- Technological Educational Institute of Crete (GR)
- Budapest University of Technology and Economics (HU)
- The University of Dunaújváros (HU)
- Aleksandras Stulginskis University (LT)
- Vilnius College of Technologies and Design (LT)
- University of Malta (MT)
- Koszalin University of Technology (PL)
- Technical University of Lodz (PL)
- Wrocław University of Technology (PL)
- University of Bielsko-Biala (PL)
- Poznań University of Technology (PL)
- UTP University of Science and Technology in Bydgoszcz (PL)
- Kielce University of Technology (PL)
- Universidade de Coimbra (PT)
- Universidade do Porto (PT)
- Universidade do Minho (PT)
- Universidade da Beira Interior (PT)
- University POLITECHNICA of Bucharest (RO)
- University of Zilina (SK)
- Technical University of Košice (SK)
- TU Zvolen (SK)
- Universita Alexandra Dubčeka Trenčín (SK)
- Universidad Politécnica de Valencia (ES)
- Universidade de Oviedo Gijón (ES)
- Universidad del País Vasco, Bilbao (ES)
- Erciyes University (TR)
- Osmaniye Korkut Ata University (TR)
- Karadeniz Technical University (TR)
- Cukurova Üniversitesi (TR)
- Trakya Üniversitesi (TR)
- Istanbul University (TR)
- Marmara University (TR)
- USAK University (TR)
- Dogus University (TR)
- Bursa Teknik Üniversitesi (TR)
- Bursa Uludağ University (TR)
- Hacettepe University (TR)
- Karabük University (TR)
- Firat University (TR)
- Yıldız Technical University (TR)
- University of the West of Scotland (UK)

New inter-institutional agreements concluded in 2019 for cooperation in the field of student, academic and research exchanges:

- Bulgarian Academy of Sciences (BG) – Erasmus+

- Université de Valenciennes et du Hainaut-Cambresis (FR) – Erasmus+
- Ostbayerische Technische Hochschule Amberg-Weiden (DE) – Erasmus+
- Vilniaus Gedimino Technikos Universitetas (LT)
- AGH University of Science and Technology (PL)
- Manisa Celal Bayar University (TR)

Valid bilateral cooperation in the field of mutual exchanges of students, academics as well as in science and research within the transatlantic cooperation in 2019:

- Conestoga College Institute of Technology and Advance Learning, Ontario (CAN)
- Nha Trang University (Vietnam)
- Kazakh – British Technical University (Kazachstán)
- Azerbaijan Technical University (Azerbaijan)

Other valid interuniversity and interinstitutional agreements of the Faculty of Mechanical Engineering are listed in the Tab. 5.4.2.

7.1 Quality and Culture of Academic

- **Language courses**

Organized by departments, CDV TUL, within TUL OP VVV, language schools outside TUL. English predominates, minor German, French, Russian. Czech language courses for PhD students.

- **Professional courses - provided by departments**

3D construction printing course (Copenhagen, Denmark); Accredited course "Rescue from the war"; Spring School "3D printing and ceramic processes" (Maubeuge, France); Training on SW "Polyworks", Inspector module, Modeler module (by NMS s.r.o.); SW Comsol multi I, II; SUPro – meeting of Creo users; Metrology (Czech Metrology Institute); Crane and lashing course (AZ Cranes); Magma 5 simulation software.

- **Professional courses organized within the university project OP RDE – RoLiZ – focused on pedagogical and general skills**

Effective work with software or Wonderful life in the cloud, Working with students' cultural diversity, Selected topics in political science and sociology, Assertiveness, Didactics, How to learn foreign languages, Communication skills for academics, Metrology, Working with students' cultural diversity, Working with scientific information or citations easily and playfully, Selected topics from political science and sociology, Fundamentals of law, Project planning and management using MS Project software, Rhetoric, Search and advanced analysis of patents, LabView – advanced methods of image processing, Social psychology, Speech technique, Current issues of migration and the world of work, Communication skills for academics, Git – version management not only for programmers, E-learning at TUL - for advanced, Python - programming for all, The role of educators in adult education, Introduction to adult education, Social psychology, First aid course. Academics and staff of FS / participants of at least one of the courses:

Běhálek Luboš, Brabec Pavel, Brdlík Pavel, Círk David, Dvořáčková Štěpánka, Fraňa Karel, Hajková Pavlína, Hanus Pavel, Havlík Radek, Horák Marcel, Hotař Adam, Hotař Vlastimil, Hruš Tomáš, Jágrová Jitka, Jandová Soňa, Keller Petr, Koblasa František, Kočnarová Pavlína, Kovačič Vladimír, Kroisová Dora, Lemfeldová Kateřina, Lenfeld Petr, Lepšík Petr, Mendřický Radomír, Moučka Michal, Němeček Pavel, Nová Iva, Novotný Petr, Pazourková Prokopčáková Petra, Petříková Iva, Pospíšil David, Semerádová Lenka, Sivčák Lubomír, Sivčák Michal, Skřivánek Josef, Vavruška Jan, Vestfálová Magda, Vodičková Věra.

PhD students / participants in at least one of the courses:

Garan Maryna, Hadač Ondřej, Hujer Jan, Kořínek Tomáš, Manlig František, Shynkarenko Andrii.

Courses, seminars, workshops organized within the university project OP RDE – TT Technology transfer

Courses:

Register of contracts in practice; Valuation of technologies for negotiating with an investor; Practical use of CRM / Customer relationship management system; Technology transfer from the perspective of GDPR;

Methodology 2017+/Working with databases; Technology transfer from the point of view of the application sphere and current requirements of the company; License agreement and its use in technology transfer;

Seminars and workshops:

Transfer of research results into practice / Foreign experience; Commercialization of research results, or how to sell what we have come up with; Experiences of the Technology Transfer between University College and Industry in Israel; Cooperation and possibilities of TT with representatives of business incubator Lipo.Ink; Introduction to the University of Novi Sad and the Collaboration with Industry in Research and Education; Supplier quality systems in the automotive industry; Introduction to the issue of materials and objects in contact with food, meals and drinking water; Transfer of research results into practice, approaches to their evaluation / Experience of domestic experts; Knowledge transfer platform;

Other activities:

7th National Transfer Conference; Summer school for managers of research organizations and representatives of technology transfer centers; External specialization studies in the field of industrial property protection; Participation in the ICPER 2019 conference/International Conference on Production, Energy and Reliability; Participation in training at BTU Cottbus-Senftenberg on the topic of technology transfer. Academics and FME staff:

Bílek Martin, Němeček Pavel, Lenfeld Petr, Baudyšová Jitka, Benešová Anna, Kysilka Tomáš, Lukášová Iveta, Fraňa Karel, Voženílek Robert, Brabec Pavel, Popelka Josef.

Studenti PhD: Břoušek Josef, Shehab Attia, Shehab Salem.

See Table Appendix 3.5.1

7.4 Project financed from the Structural EU Funds

7.4.1 OP Research, Development and Education

DspFME TUL – Development of research-oriented study programs (Call PO2_02_16_018)

Project deals with the development of new doctoral study programs FME TUL while meeting all requirements in the technical field in accordance the current knowledge of economy and international standards. Study programs cover the scientific research area of machine design and construction, production technologies, materials and mechanics.

Receiver:	Technical University in Liberec, Faculty of Mechanical Engineering
Provider:	MEYS CR – EU
Program:	OP RDE
Priority Axes:	PO1 – Capacity building for quality research
Investment priority:	1 – Improving the quality, efficiency, and access to tertiary and equivalent education, especially for disadvantaged groups, in order to increase participation and educational attainment
Registration No.:	CZ.02.2.69/0.0/0.0/16_018/0002718
Responsible Solver:	doc. Ing. Martin Bílek, Ph.D., FME
Solution Period:	2017–2022
Internal TUL No.:	16005
Grant in total:	3 064 815 CZK / 2 911 575 Kč dotace Ministry of Education / 153 240 CZK co-financed by FME TUL
Drawn FME 2019:	total / INV / NIV – 325 968 / 0 / 325 968 CZK It is a grant from MŠMT without any co-financing of FME TUL

ViFS TUL – Research infrastructures for educational purposes – Building or Modernization (Call PO2_02_16_017)

The project deals with the development of instrumentation and laboratory equipment for the implementation of three new doctoral study programs FS TUL.

Receiver:	Technical University in Liberec, Faculty of Mechanical Engineering
Provider:	MEYS CR – EU
Program:	OP Research and Development
Priority axes:	PO1 – Capacity building for quality research

Investment axis: 1 – Posílení výzkumné a inovační infrastruktury a kapacit pro rozvoj vynikající úrovně výzkumu a inovací a podpora odborných středisek, zejména těch, jež jsou předmětem celoevropského zájmu

Registration number: CZ.02.1.01/0.0/0.0/16_017/0002650

Responsible Solver: doc. Ing. Martin Bílek, Ph.D., DFS

Solution Period: 2017–2022

Internal TUL no.: 16006

Grant in total: 51 966 649 CZK / 49 368 317 CZK grant Ministry of Education / 2 598 332 CZK co-financing of FME TUL 5 %

Drawn FME 2019: total / INV / NIV – 2 072 846 / 1 775 346 / 297 500 CZK concerns Ministry of Education resources without co-financing

From which NIV: KMP 18 000 CZK, KSP 27 000 CZK, KMT 29 000 CZK, KEZ 30 500 CZK, KST 33 000 CZK, KOM 23 000 CZK, KVM 27 000 CZK, KSR 29 000 CZK, KTS 27 500 CZK, KSA 28 500 Kč, DFS 48 000 CZK

From which INV: KSP 1 775 346 CZK

HyHi – Hybrid materials for hierarchical structures

Provider: MEYS CR – EU

Program: OP VVV Excellent Research

Priority axis: 1 – Capacity building for quality research

Investment priority: 1 – Strengthening research and innovation infrastructure and capacities to develop excellence in research and innovation and supporting centers of expertise, especially those of pan-European interest

Registration no.: CZ.02.1.01/0.0/0.0/16_019/0000843

Receiver: TUL

TUL Solver: prof. Dr. Ing. Petr Lenfeld

Internal TUL no.: FME 16015 / FTE 16016 / NATI 16017

Solution Period: 2018–2022

Grant in total: total / INV / NIV – 228 497 881 / 31 406 269 / 197 091 611 CZK (95% represent total costs, 5% co-financed by TUL)

Drawn FME 2019: total / INV / NIV – 23 277 460 / 15 604 460 / 7 673 000 CZK

From which NIV: KMP 686 000 CZK, KSP 3 539 000 CZK, KMT 1 337 500 Kč, KEZ 1 018 500 CZK, KST 486 000 CZK, KOM 187 500 CZK, DFS 418 500 CZK

From which INV: KMP 1 753 000 CZK, 13 850 780 CZK

3D STAR – 3D printing in Construction and Architecture

Receiver: Technical University in Liberec

Co-receiver: ČVUT Praha, Klokner's Institute

Grant Provider: MEYS CR – EU

Program: OP RDE Pre-Application Research

Registration project no.: CZ.02.1.01/0.0/0.0/16_025/0007424

TUL Solver: Ing. Petr Zelený, Ph.D.

Solution Period: 2018–2022

Internal TUL No.: 16018

TUL Grant in Total: 72 698 912 CZK

Grant FME 2019: total / INV / NIV – 5 321 055 / 807 717 / 4 513 338 CZK

From which KSA: total / INV / NIV – 3 155 986 / 494 274 / 2 661 712 CZK

KVM: 2 165 069 / 313 443 / 1 851 626 CZK

OP Research, Development and Education – share of FME on Project Parts

Modular platform for autonomous chassis of specialized electric vehicles for the transport of cargo and equipment

Provider: Ministry of Education CZ

Program: OP RDE – Pre-Application Research

Identification Code: CZ.02.1.01/0.0/0.0/16_025/0007293

Receiver: TUL, NATI, FME, FMI, FTE

Project Solver: doc. Ing. Michal Petrů, Ph.D., Department of Machine Design

Solution Period: 2018–2022

Internal TUL No.:	16023
Grant in Total 2019:	23 834 391 CZK
Share of KVM:	512 962 CZK
Share of KST:	743 332 CZK

7.4.2 OP Entrepreneurship and Innovation for Competitiveness

Research and development of a new universal drip-free quick coupling

Provider:	MIT CR – EU
Program:	OP Entrepreneurship and Innovation for Competitiveness
Call:	Application – Call VI
Identification code:	CZ.01.1.02/0.0/0.0/17_176/0015557
Receiver:	KNOMI, s r.o.
Co-receiver:	TUL, Faculty of Mechanical Engineering
Solver:	doc. Ing. Petr Lepšík, Ph.D., Department of Machine Element Design and Mechanisms
Solution Period:	2019–2022
Internal No.:	14767
FME Grant 2019:	21 926 CZK (started in December)

Research and development of special sewing machines for automated accelerated sewing of shaped parts of outerwear

Provider:	MIT CR – EU
Program:	OP Entrepreneurship and Innovation for Competitiveness
Call:	Application – Call IV.
Identification code:	CZ.01.1.02/0.0/0.0/17_107/0012381
Receiver:	AMF Reece CR, s.r.o.
Co-receiver:	TUL, Faculty of Mechanical Engineering, Department of Textile Machine Design
Solver:	prof. Ing. Jaroslav Beran, CSc.
Solution Period:	2019–2020
Internal TUL No.:	17071
Grants FME 2019:	total / INV / NIV – 235 938 / 0 / 235 938 CZK

Development of textile products from non-combustible and recyclable materials

Provider:	MIT CR – EU
Program:	OP Entrepreneurship and Innovation for Competitiveness
Call:	Application – Call III.
Identification code:	CZ.01.1.02/0.0/0.0/16_084/0010282
Receiver:	Aligard s.r.o.
Co-receiver:	TUL, Faculty of Material Engineering, Department of Materials
Solver:	prof. Ing. Petr Louda, CSc.
Solution Period:	2018–2019
Internal No.:	17065
Grants FME 2019:	total / INV / NIV – 4 209 318 / 0 / 4 209 318 CZK
From which:	grant (75 %) 3 156 989 Kč, gift (25 %) 1 052 329 CZK

Integration of microcomputers into lighting systems

Project:	CZ.01.1.02/0.0/0.0/17_107/0011226
Program:	OP Entrepreneurship and Innovation for Competitiveness
Call:	Aplikace – Call III.
Receiver:	SANS SOUCI, s.r.o.
Co-receiver:	TUL, Faculty of Material Engineering, Department of Materials
Solver:	prof. Ing. Petr Louda, CSc.
Internal No.:	17049
Solution Period:	2018–2020
Grant FME 2019:	total / INV / NIV – 1 277 477 / 0 / 1 277 477 CZK
From which:	grant (75%) 958 108 Kč, gift (25%) 319 369 CZK

Testing station for precertification testing of internal combustion engines

Provider: MIT CR
Program: OP EIC
Call: Aplikace
Project: CZ.01.1.02/0.0/0.0/15_019/0004815
Receiver: TES Vsetín s.r.o.
Co-receiver: TUL, Faculty of Mechanical Engineering, NATI
Solver: Ing. Pavel Brabec, Ph.D., Department of Vehicles and Engines
Internal No.: 17059 FS, 17058 CxI
Solution Period: 2017–2019
Grant FS 2019: drawn / INV / NIV – 1 1220 203 / 0 / 1 120 203 CZK
Gift – Receiver: 282 383 CZK

OP Prague – Pole of Growth CZ**Development of a specific anti-reflection layer**

Provider: MIT CR – Prague
Program: Prague voucher for innovation projects
Příjemce: SANS SOUCI, s.r.o.
Spoluřešitel: TUL, Faculty of Mechanical Engineering, Department of Materials
prof. Ing. Petr Louda, CSc.
Internal number: 16061
Solution Period: 2018-2019
Grant FME/KMT: 488 953 CZK

OP Entrepreneurship and innovation for competitiveness – share of FME on projects**Industrial research and experimental development of a small city electric car and tools for its production**

Provider: MIT CR – EU
Program: OP Entrepreneurship and innovation for competitiveness
Call: Application
Identification code of the project: CZ.01.1.02/0.0/0.0/16_084/0009908
Receiver: COMBATRA, spol. s r.o.
Other participants: TUL, NATI
Solution Period: 2017–2020
TUL Guarantor: Ing. Robert Voženílek, Ph.D.
Internal TUL number: 17063
Grant 2019: total / INV / NIV – 1 323 985 / 0 / 1 323 985 CZK

Construction of an actively controlled pram using modern technologies

Provider: MIT CR – EU
Call: Application
Identification code: CZ.01.1.02/0.0/0.0/15_013/0004773
Receiver: TUL, NATI
Responsible Solver: doc. Ing. Michal Petrů, Ph.D.
Solution Period: 2016–2018
TUL Internal No: 11053
Share of KTS in 2018: 67 536 Kč

7.4.3 OP Cross-border cooperation**GreK****Cross-border cooperative teaching of plastics processing technologies Zittau-Liberec**

Program: Program between CR and Free State of Saxony 2014–2020
Priority axes: 3 – Investments into education, professional schooling and training
Specific aim: 3.2 Improving youth employment
Grant Provider: EU – European fund for regional development
Registration no.: 100252772
Lead partner: Hochschule Zittau/Görlitz (HSZG)

Project partner:	Technische Universität Dresden (TUD)
Project partner:	TUL, Faculty of Mechanical Engineering
TUL Responsible Solver:	Ing. Luboš Běhálek, Ph.D., Department of Engineering Technology
Solution Period:	2016–2019
TUL Internal no.:	15401
Grant in total:	272 727 EUR
Grant FME 2019:	2 051 000 CZK

*the subsidy for the previous period is paid only after the approval of the final project billing in 2020

BauQu

Building partnerships in the field of building technology research to educate scientific followers in the border region

Program:	Program of the cooperation between CR and Free State of Saxony 2014–2020
Grant Provider:	EU – European Fund for Regional Development
Project registration number:	100252950
Lead partner:	Technische Universität Dresden (TUD)
Project partner:	TUL, Faculty of Mechanical Engineering
TUL solver:	prof. Ing. Karel Fraňa, Ph.D., Department of Power Engineering Equipment
Solution period:	2016–2019
Internal TUL number:	15402
FME Grant 2019:	in total / INV / NIV – 249 000 / 0 / 249 000 CZK

POKROK.digital

Practically oriented development of competencies in production technology in the regions through cooperation.digital

Program:	Program of the cooperation between CR and Free State of Saxony 2014–2020
Grant Provider:	EU – European Fund for Regional Development
Registration number:	100281976
Lead partner:	Technische Universität Dresden (TUD)
Project partner:	TUL, Faculty of Mechanical Engineering
TUL solver:	Ing. František Koblasa, Ph.D. Department of Production Systems and Automation
Solution period:	2017–2019
Internal TUL number:	15402
Grant in total:	256 085,90 EUR
Drawn by FME 2019:	total / INV / NIV – 1 025 005 / 0 / 1 05 005 CZK

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