TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

ANNUAL REPORT 2016

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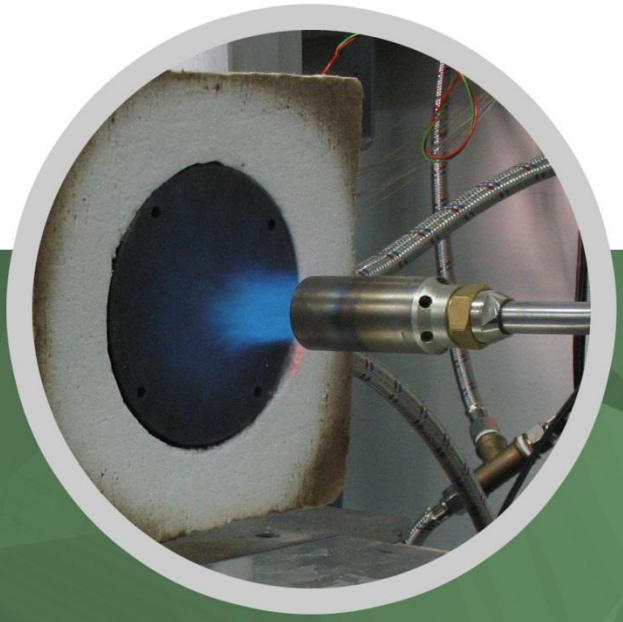
OBSAH

INTRODUCTION



TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

1 INTRODUCTION

The Faculty of Mechanical Engineering TUL is the oldest faculty of the Technical University of Liberec and throughout its existence it has always tried to fulfill its goals, tasks, visions and mission not only for the development of the Faculty, but also for the Technical University in Liberec. The Faculty of Mechanical Engineering has always claimed responsibility for the development of the university, although in some areas it was not for the benefit of the Faculty.

However, quality fulfillment of all tasks and activities is possible only with the support of not only the academic community of the Faculty, but also other members and staff of the Faculty. Therefore, I would like to thank all members of the academic community and other faculty for their work and their work not only for the very good results and position of the faculty and university in the national and international scale, but also the development of the faculty in all three basic activities. At the same time, I would like to wish everyone to endure their enthusiasm and commitment to the years to come, which will certainly be different from previous years, both in terms of new legislation and in terms of a new approach to the evaluation of colleges and universities.

The Annual Report of the Faculty for the year 2016 presents summary information for the first year of implementation of the Strategic Plan of the Faculty of Mechanical Engineering of the Technical University of Liberec for the period 2016-2020 in individual areas of activities (educational and pedagogical activities, scientific research, international cooperation, partnership and internationalization).

prof. Dr. Ing. Petr Lenfeld
Dean
Faculty of Mechanical Engineering TUL

FACULTY STRUCTURE

TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

2 FACULTY STRUCTURE

2.1 Faculty Bodies — Members

Dean	prof. Dr. Ing. Petr Lenfeld
Head of Dean's Office	Ing. Anna Benešová

Academic Senate of the Faculty of Mechanical Engineering TU in Liberec

Chair	doc. Ing. Lukáš Čapek, Ph.D.
Vice-Chair for the Chamber of Academics	prof. Ing. Ladislav Ševčík, CSc.
Vice-chair for the Chamber of Students	Ing. Ondřej Řídký
Secretary	Ing. Rudolf Martonka, Ph.D.
Members of the Chamber of Academic Staff	prof. Ing. Jaroslav Beran, CSc.
	Ing. Luboš Běhálek, Ph.D.
	Ing. Jiří Blekta, Ph.D. – do 7.2.2016
	doc. Ing. Václav Dvořák, Ph.D.
	Ing. Vlastimil Hotař, Ph.D.
	Ing. Michaela Kolnerová, Ph.D.
	doc. Ing. Lubomír Moc, CSc.
	Ing. Aleš Lufinka, Ph.D. – od 7.2.2016
	prof. Ing. Iva Nová, CSc.
	Ing. Robert Voženílek, Ph.D.
Memebers of the Chamber of Students	Ing. Martin Borůvka
	Ing. Jan Hujer
	Ing. Lukáš Zuzánek
	Ing. Jiří Komárek
	Ing. Andrii Shynkarenko

Academic Senate TU Liberec

Academic representatives for FS TUL	prof. Ing. Jaroslav Beran, CSc.
	doc. Ing. Lubomír Moc, CSc.
Student representative for FS TUL	Ing. Jan Vácha

FME TUL representatives of the Higher Education Council

Ing. Rudolf Martonka, Ph.D.

Scientific Board of the Faculty of Mechanical Engineering TU in Liberec

Chair	prof. Dr. Ing. Petr Lenfeld
Members from TUL	doc. Ing. Martin Bílek, Ph.D.
	prof. Ing. Jaroslav Beran, CSc.
	doc. Ing. Karel Fraňa, Ph.D.
	doc. Ing. Josef Janeček, CSc.
	prof. RNDr. David Lukáš, CSc.
	prof. Ing. Petr Louda, CSc.
	doc. Ing. Miroslav Malý, CSc.
	Ing. Ivo Matoušek, Ph.D.
	prof. Ing. Iva Nová, CSc.
	prof. Ing. Miroslav Olehla, CSc.
	prof. Ing. Lubomír Pešík, CSc.
	doc. Ing. Iva Petríková, Ph.D.
	doc. Ing. Ludvík Prášil, CSc.
	prof. Ing. Jan Skalla, CSc.
External members	
UP DFJP Pardubice	doc. Ing. Ivo Drahotský, Ph.D.
FJFI ČVUT Praha	prof. Ing. Nikolaj Ganev, CSc.
FS ČVUT Praha	prof. Ing. Stanislav Holý, CSc.
FAV ZČU Plzeň	prof. ing. Vladislav Laš, CSc.
FT UTB Zlín	doc. Ing. David Maňas, Ph.D.
ÚT AV ČR, v. v. i. Praha	prof. Ing. František Maršík, DrSc.

Magna Exteriors (Bohemia), s.r.o., Liberec	Ing. Pavel Neumann
FS VŠB-TU Ostrava	prof. Ing. Petr Noskievič, CSc.
SjF STU Bratislava	doc. Ing. František Palčák, CSc.
ÚT AV ČR, v. v. i. Praha	prof. Ing. Jaromír Příhoda, CSc.
Professor emeritus	prof. Ing. Jaroslav Purmenský, DrSc.
Professor emeritus	prof. RNDr. Miroslav Raab, CSc.
FSI VUT in Brno	doc. Ing. Pavel Rumíšek, CSc.
FS ČVUT in Prague	prof. Ing. Milan Růžička, CSc.
Rieter CZ, s.r.o.	Ing. Jiří Sloupenský, CSc.
FS ČVUT in Prague	prof. RNDr. Petr Špatenka, CSc.
ČEZ, a.s., Jaderná elektrárna Temelín	Ing. Pavel Šimák
Benteler ČR s.r.o. Stráž nad Nisou	doc. Ing. Jiří Vejvoda, CSc.

Disciplinary Committee

Chair	doc. Ing. Václav Dvořák, Ph.D.
Members	doc. Ing. Martin Bílek, Ph.D.
	Ing. Jan Hujer
	Ing. Petr Kulhavý

2.2 Faculty structure

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

Organizational unit	Members
Dean‘s Office	
Dean	prof. Dr. Ing. Petr Lenfeld
Vice-Dean for Doctoral Studies and Development	doc. Ing. Martin Bílek, Ph.D.
Vice-Dean for Education and Student’s Affairs	Ing. Ivo Matoušek, Ph.D.
Vice-Dean for International and Public Relations	doc. Ing. Karel Fraňa, Ph.D.
Head of Dean’s Office	Ing. Anna Benešová
Dean’s Secretariat	Pavla Kholová
Department of Development and project	
Development and projects manager	RNDr. Iveta Lukášová
Financial manager	Ing. Tomáš Kysilka
Study Department	
Head of the Study department	Mgr. Radka Dvořáková
Study department officer	Ing. Mgr. Dana Semotjuková
International relations	Ing. Marcela Válková
Departments	
Department of Applied Mechanics / DAM	doc. Ing. Iva Petríková, Ph.D.
Department of Engineering Technology / DET	Ing. Jaromír Moravec, Ph.D.
Department of Material Science / DMS	prof. Ing. Petr Louda, CSc.
Department of Power Engineering Equipment / DPE	doc. Ing. Václav Dvořák, Ph.D.
Department of the Design of Machine Elements and Mechanism / DMM	prof. Ing. Ladislav Ševčík, CSc.
Department of Machining and Assembly / DMA	doc. Ing. Jan Jersák, CSc.
Department of Vehicles and Engines / DVE	Ing. Robert Voženílek, Ph.D.
Department of Glass Producting Machines and Robotics / DGR	doc. Ing. František Novotný, CSc.
Department of Textile Machine Design / DTD	prof. Ing. Jaroslav Beran, CSc.
Department of Manufacturing Systems and Automation / DMA	Ing. Petr Zelený, Ph.D.

2.3 Personnel Structure of the Faculty

In 2016 a total of 143 employees (107.65 FTEs) were active at FS TUL of which 107 were academic staff (80.45 FTEs). The total number of teachers decreased year-on-year by 3.6 FTE.

Teaching in Bachelor's, Master's and Doctoral degree programs was provided mainly by 20 internal professors and 26 associate professors in the position of study subjects guarantors, tutors, lecturers and supervisors of final student theses. 50 senior lecturers and 4 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 2016 one professor was appointed
In 2016, one professorship was discontinued and another professorship was initiated.
In 2016, two habilitation procedures initiated in 2015 were successfully completed.
In 2016, two other habilitation procedures initiated in 2016 were successfully completed.
In 2016, another 3 habilitation procedures were initiated.

See text appendix 2.4.

EDUCATIONAL ACTIVITIES

TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

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

The Faculty guarantees teaching in 6 degree programs. All programs are accredited both in Czech and English, in full-time and part-time form of study.

See annexed tables 3.1.

Teaching at detached workplaces

There was no tuition in 2016 at the detached workplaces.

3.2 Offer of Degree Programmes in English

- In 2016, the Faculty of Mechanical Engineering offered study in English in the follow-up Master's degree program and in all doctoral degree programs.
- In the academic year 2015/16, 27 students studied in English at the Faculty of Mechanical Engineering in the summer semester. 23 students were enrolled as self-funded payers, 4 as government scholarship holders under the program “Ensuring the study of energy in English”. The Government of the Czech Republic offers scholarships to foreigners from developing countries through the Ministry of Education, Youth and Sports to support studies at public universities in the Czech Republic.
- In the academic year 2016/17 in the winter semester, 42 students were enrolled at the Faculty of Mechanical Engineering. 36 students were enrolled as self-funded payers, 6 as government scholarship holders.
- English lessons were also held under the short-term ERASMUS +, CEEPUS, IAESTE and IP TUL programs. See chapter 5.3 for details.

3.3 Interest in Studies and Admission Procedures

726 applicants expressed an interest in studying at the Faculty of Mechanical Engineering TU in Liberec (compared to 2015 it is 50 applicants less). Of the total number of applicants, 491 students enrolled, i.e. approximately 68% (71.4% in 2015). 946 students enrolled in all years of study in the academic year 2016/17 (i.e. 113 less than in 2015).

The structure of students does not change; the proportion of students in each type of study remains approximately the same. 64% of students enrolled in the bachelor's program, approximately 24% in master's programs, and 12% of the total number of students enrolled in the doctoral programs.

Approximately half of the applicants are from secondary technical schools, one fifth from grammar schools and about one third comes from the other high schools.

BSP 549 applied, 369 enrolled. Applicants from secondary technical schools (approx. 53% of the total number of enrolled students) applied for study in the bachelor's programs of BSP, 20% from grammar schools and 27% from other secondary schools.

MSP 19 applied, 12 enrolled.

NMSP 143 applied, 97 enrolled. Of these, 41 applied and 13 enrolled in a program taught in English. The applicants for the Czech Master's program were in most cases graduates of bachelor studies at the Technical University of Liberec and in individual cases from other faculties.

DSP 15 applied, 13 enrolled. Four applicants for doctoral programs were graduates from the Faculty of Mechanical Engineering of the Technical University in Liberec, the other graduated from a master degree at another university.

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 a secondary school.

During the first year of studies in the academic year 2016/17, 203 BSP students and 6 NMSP 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 2016/2017, 604 students were enrolled (of which 447 in the full-time study and 157 in the part-time-study form). In 2018, 87 students successfully completed their studies (47% of the total number of graduates). The average duration of BSP graduates in 2016 was 4.39 years.

(N)MSP In the academic year 2016/2017, 224 students were enrolled (54 in the full-time study and 73 in the part-time study form). In 2016, 82 students successfully completed their studies (45% of the total number of graduates - in 2017 is was 49%). The average length of study of NMSP graduates was 2.67 years.

DSP 118 students enrolled to studies in the academic year 2016/2017 (of which 66 in the full-time study and 52 in the part-time study). In 2016, 15 students successfully completed their studies (8% of the total number of graduates). The average length of study for graduates was 7,4 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 2016 it was required to obtain:

- 180 credits in BSP.
- 180 credits in 3-year NMSP and 120 credits in 2-year NMSP.
- 300 credits in MSP (five-year).

3.6 Scholarships

Scholarships paid in 2016 were awarded in accordance with the Scholarship Regulations of the Faculty of Mechanical Engineering TUL and in accordance with the valid directives of the Dean of the Faculty of Mechanical Engineering.

- In total, scholarships were paid out to 886 students.
- The total amount of scholarships paid was CZK 10.03 million.
- The amount of scholarships paid in 2016 decreased by CZK 2.51 million compared to 2015.

Preciosa Foundation Jablonec nad Nisou Scholarship
A total of 10 students of the Faculty of Mechanical Engineering received scholarships amounting to 25,000 CZK.

3.7 The Students‘ Creative Activity

FOLLOW-UP STUDIES

Prize of the Governor of the Liberec Region
Ing. Aleš Hloucal
Branch: Design of machinery and equipment
Thesis topic: Construction of crawler undercarriage for wheelchairs

TUL Rector’s Award
Ing. Jiří Tůma

Branch: Engineering Technology and Materials
Thesis topic: Recyclate detection in plastic parts

Preciosa Foundation Award
Ing. Jitka Kulifay
Branch: Inovative Engineering
Thesis topic: Design of compact DLP 3D printer

Ing. Josef Vašata
Branch: Production systems and processes
Thesis topic: Design and manufacture of equipment for extrusion of ABS and other materials for 3D printers

FS TUL Dean's Award
Ing. David Koreček
Branch: Engineering technology and materials
Thesis topic: Determination of a suitable material model for numerical simulation of drawing of sheet metal stamping from titanium alloy

Ing. Jan Fryc
Branch: Machine and Equipment Design
Thesis topic: Structural design of fog lamp placement

Ing. Martin Dvořák
Branch: Innovative Engineering
Thesis topic: Design of the storage facility in DENSO Manufacturing Czech s.r.o.

Ing. Jan Šáfr
Branch: Production systems and processes
Thesis topic: Design of FDM technology 3D printer

Graduated with honours

Ing. Martin Dvořák
Ing. Jiří Jankele
Ing. Janka Styková
Ing. Jan Šáfr
Ing. Selma Kunosic
Ing. Angelyn Mae Saligao Guanlao

BACHELOR'S STUDIES

Dean's Award

Bc. Diana Gregorová – KMP Department
Thesis topic: Dynamics of system of bodies, application to teaching aids

Bc. Jaroslav Pulec – KEZ Department
Thesis topic: Experimental research of the flow of bodies in the drawing tank
Bc. Michal Stehlík – KSP Department
Thesis topic: Influence of controlled melt gasification on metallurgy and Alsi7Mg0,3 alloy

Bc. Jana Svobodová – KTS Department
Thesis topic: Analysis of magnetic kinetic energy accumulators

Student section of the ČEEP 2015 competition – Czech energy and ecological project, construction and innovation - patronage of the rectors of five universities

Ing. Jan Kruliš – NMSP graduate, June 2015
Thesis topic: Study of the extended expansion vehicle engine

General partner Enviros Prize, s.r.o. 2nd place, 20 000 CZK reward

Ing. Tomáš Hojný – NMSP graduate, June 2016
Thesis topic:Optimization of hybrid vehicle drive by means of simulation calculations
TUL Rector's Prize and reward 20.000 CZK.
CTU Prague - Dean of the Faculty of Mechanical Engineering Prize and reward 10.000 CZK.

Student grant competition at the faculty
Within the student grant competition, 20 projects with a total volume of CZK 6.58 million were solved. See table annex 4.5 for an overview.

Student scientific and professional activity SVOČ
Eighth year of competition to support talented students in bachelor's and master's and doctoral fields of study were organized by the faculties 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 with prerequisites for scientific and development activities at TUL technical faculties. The competition was attended by 50 students, including 19 students from the Faculty of Mechanical Engineering. The event was supported by IP TUL 2016.

Mechanical Engineering Section - placing in the bachelor's and master's category:
Vladimír Toman – Innovation of the safety element at the pedal mechanism
Martin Dvořák – Storage facility design in DENSO MANUFACTURING CZECH s.r.o.
Diana Gregorová – Demonstration subject for teaching dynamics
Mechanical Engineering Section - placing in the doctoral study category:
Ing. Ondřej Bat´ka – Analysis and optimization of electrode for nanofibers production by means of AC-electrospinning
Ing. Martin Švec – Influence of heat treatment and high temperature deformation on structure and a coefficient of thermal expansion of niobium alloyed aluminum aluminides
Ing. Miloš Čadek – Construction of the student formula TUL

Workshop for doctoral students of FME TUL and FTT TUL
Between September 20 - 23, the traditional meeting of doctoral students took place in Harrachov for the first time in the guest house Bílá voda. A total of 6 students of the Faculty of Mechanical Engineering and 26 students of the Faculty of Textiles presented their professional work.

FPV Racing Propeller2016 Liberec
The first year of the Czech FPV Drone University Competition took place on 21st October with the participation of 15 competitors from all over the Czech Republic. The race took place on a half-kilometer course in the center of the campus on University Square. The organizers were Andrii Shynkarenko and Iaroslav Kovalenko, PhD students of the Department of Production Systems and Automation.

CREO UNIVERSITY CHAMPION
The third year of the fastest constructor competition was organized on October, 26 by the Department of Textiles and Single-purpose Machines. The winner of the third year of the competition and thus the fastest designer was Petr Jiránek, the second was Jan Bělík and the third place was taken by Marek Hrdlička.

Student Formula TUL
An international competition involving more than 500 university teams from around the world. The aim of the competition is to design and construct an innovative formula that will stand up against other teams in challenging races and disciplines testing the car's characteristics and the capabilities of the entire team. FS TUL team was established in 2016.

Preciosa CRYSTAL CHALLENGE 2016
Department of Production Systems and Automation supported the winning team DENALI DESIGN, whose member was a student of the Department of KSA David Ryvol. The team received a check for CZK 25,000 thanks to their presentation of the idea of making a wireless glass charging station. The support of the team consisted in the implementation of their design using 3D printing.

Brückenbauwettbewerb 2016

Student teams from our faculty were successful again in the international bridge construction competition. The competition took place at the Brandenburgische Technische Universität Cottbus-Senftenberg with the participation of student teams from BTU Cottbus-Senftenberg, TU Wroclaw, TU Liberec and Zielona Góra University. At the same time, the competition was held at Shanghai Second Polytechnic University in China, so participants could follow their colleagues in China via the online connection and vice versa. Our students promoted to victory. This year's event took place on November 17 at the Brandenburg Technical University in Cottbus-Senftenberg with the participation of our 4 teams:

- „Hard Workers team“ – Tomáš Kořínek, Matěj Burda, Jan Hujer – 1st place.
- "Tacoma team" – Martin Dvořák, Tomáš Tisovsky, Ondřej Baťka – 5th place.
- Team "Nizuro" – Nikola Stripačuková, Roman Rybáček, Zuzana Šolcová – 9th place.
- Team "Lbc.TUL" – Jakub Haluška, Aleš Hrouda, Jakub Čech.

3.8 Educational promotion activities

Open days for those interested in studies

- Open Day at FME TUL – February 2016.
- Open Day at FME TUL – December 2016.
- Students visits to TUL – SPŠ Hradec Králové, VOŠ a SPŠ from Děčín, VOŠ a SPŠ from Rychnov nad Kněžnou, SPŠ Teplice.

Education Fairs

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

- European Fair of Higher Education Gaudeamus – January 2016 (TUL, FME).
- EAIE 2016 in Liverpool – September 2015 (TUL).
- Educa 2015 Education Fair in Liberec – October 2016 (TUL).
- European Fair of Higher Education Gaudeamus Nitra – October 2016 (TUL).
- European Fair of Higher Education Gaudeamus in Brno – November 2016 (TUL, FME).
- EHEF 2016 in New Delhi – September 2016 (TUL).
- Study Abroad Fall Fair 2016, South Korea – October / November 2016 (TUL, FME).

T-Forum 2016

The 22nd annual event of the Job Fair T-Forum for Students was attended by representatives of 60 industrial companies. The fair is traditionally organized by a branch of the IAESTE organization at the Technical University of Liberec in co-organization with the Department of Vehicles and Engines of the FME TUL. The fair is one of the largest personnel events in the region.

Study Promotion

- Promotion through FB and Faculty websites.
- FB campaigns for selected age groups of secondary school students – DOD, applications for study.
- Lecture for students of Grammar School and Secondary School in Jilemnice about study at FME TUL (DAM / March 2016).
- Workshop for students of the Gymnázium F. X. Šalda in Liberec in the DAM laboratory and the offer of topics for student high school theses (May 2016).
- Excursion of secondary school students at our faculty
- During the course of January and February, two hundred senior-year students from SPŠ Hradec Králové, VOŠ and SPŠ Děčín, VOŠ and SPŠ from Rychnov nad Kněžnou and SPŠ Teplice visited our faculty.
- Promotion of the study by personal visits and presentations at selected grammar schools – the eight-year grammar school in Mladá Boleslav, Pekařovo gymnázium Mladá Boleslav, the grammar school in Žatec, the grammar school in Dobruška.

Promotion of Studies at the FME TUL for foreigners

- Welcome Days at TUL 17–21 February
  On February 18, 2016, traditionally, before the start of the summer semester, Welcome Days were held for international students who came to the university under the Erasmus+ program. In the summer semester 2015/2016, we welcomed 37 new students from France, Spain, Portugal, Turkey, Lithuania, Poland, Bulgaria and Hungary at the Faculty of Mechanical Engineering. Another 4 students from Turkey and 4 students from Portugal extended their studies from the winter semester and continued their studies in the summer semester.

- Welcome Days at TUL 21–29 September
  On September 21, 2016, traditionally before the start of the winter semester 2016/2017 Welcome Days were held for Erasmus+ foreign students from France, Poland, Portugal, Spain, Turkey, Greece, Lithuania, Romania and Germany, who enrolled at TUL in winter semester 2016/2017 in total number of 38 students.

- Orientation Day 19–25 September
  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-funded students from India, who started studying NMSP, DSP at the Faculty of Mechanical Engineering in WS 2016/2017. During the Orientation Week, the students were introduced to the university, they were provided with practical information about studying at the Faculty, students were enrolled to studies and other administrative tasks related to the admission of students were carried out.

- Adaptation/Integration Course
  On 7 October, the TUL International Office in cooperation with the Faculty of Mechanical Engineering organized an adaptation and integration course under the auspices of the Ministry of the Interior "Welcome to the Czech Republic", which was intended for newcomers to foreign students. The aim was to acquaint them with residence legislation, education in the Czech Republic, employment and other information about life in the Czech Republic

- In cooperation with the Institute for Vocational and Language Training at Charles University on 26 November, a group of 6 technically oriented foreign students prepared to study in the Czech Republic.

- FME TUL – seminar for students of the Faculty of Mechanical Engineering on the possibilities of study within the ERASMUS+ program – December 2016

Presentation of the departments of the FME to students of the second and third years of the Bc study program

- In February, a presentation of the activities of departments and laboratories was held. The event was designed for undergraduate students who decide about their final theses or professional practices and who decide which department they will carry out their activities at.

Promotion of studies within the project GreK – Cooperation Program Czech Republic – Free State of Saxony 2014–2020

- The events were organized by the Department of Engineering Technology.

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 the ranks of university academic staff. External workers from industry and the CAS are also involved in the 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.

The innovation of the subject content is ensured by the individual departments of the faculty continuously and is reflected in the contents of the subjects of study and in the innovation

of teaching and study texts. It reflects the needs of both industrial practice and the content of the Faculty's scientific and research activities.

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

- The normal technical and investment development of classrooms and laboratories was carried out using FRIM and IP TUL projects, see chapter 7.2.
- In support of teaching, 9 scripts were issued in the first edition, 8 in English. In the next edition 4 scripts were published in the Czech language.
- Innovation of lecture presentations, electronic texts, didactic aids and experimental teaching devices was carried out as standard. It is documented in detail in the annual reports of the departments.
- Students have the opportunity to evaluate subjects anonymously in the IS STAG system. The event is organized by the Student Chamber of TUL. In the winter semester 2016/1, 110 students participated in the evaluation and in the summer semester 2016/2017 it was 61 students of the Faculty of Mechanical Engineering.
- Some departments (KEZ, KOM) and teachers carry out the evaluation of lessons for their own feedback.

3.10 Lifelong Learning

In the context of lifelong learning, i.e. non-accredited training courses, the Faculty conducts traditionally a wide range of professional seminars and training that are content-structured according to the requirements of industrial companies.

Lifelong learning is an important item of cooperation with industry:

- A total of 43 professional seminars and courses were organized.
- Courses were attended by 348 participants.
- The volume of funds received was CZK 1.58 million.

SCIENTIFIC-RESEARCH ACTIVITIES

TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

4 SCIENTIFIC-RESEARCH ACTIVITIES

4.1 Focus of Scientific and Research Activities

The scientific and research base are traditional fields that accentuate the needs of applied research and development in the Czech Republic.

Areas that are being developed:

- Competitive machines and equipment.
- Material engineering.
- Progressive technological and production processes.
- Energy storage and transfer.

It mainly reflects and accentuates the needs of applied research and development in the CR, with an 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.

In 2016, scientific and research activity of the Faculty continued as well as in research programs of the Centre for Nanomaterials, Advanced Technology and Innovation (hereinafter referred to as "CNATI"). In terms of project sustainability, the Faculty develops two research programs:

- Competitive Engineering.
- Material Research.

4.2 Institutional Support

In the year 2016, the Faculty obtained funds for institutional support in the amount of 29,286 mil. CZK, which represents 62% of the R&D activities. This amount was allocated to the departments to support research and stabilize research teams.

4.3 National Competence Centres

In 2016, the Josef Božek Automotive Research Competence Center, which is held by the Czech Technical University in Prague, continued its activities. A team from the Department of Vehicles and Engines is represented as a co-investigator. Research activities are conducted under the Institute CxI. See appendix 4.3.

4.4 Research Projects

The scientific and research activities of the Faculty were focused, as in previous years, mainly on applied and experimental research and development. The Faculty was involved as a co-beneficiary in projects of TA CR, MIT CR, MoI CR, ME CR, GA CR, H2020 and in the role of beneficiaries in MEYS CR projects.

In 2016, 16 projects were solved at the faculty. Out of the total number of projects solved, 6 new projects were launched in 2016, at the end of the year 4 projects were successfully completed. Three international projects were solved, including one H2020 and two R&D mobility projects.

The volume of targeted support obtained by the faculty for solving science and research projects amounted to approx. CZK 11.35 million, which represents about 24% of the total volume of earmarked financial resources.

The volume of additional targeted support obtained by the faculty's academic staff under CNATI and the share in projects of other components amounted to CZK 8.6 million.

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

Overview of Scientific and Research Projects Supported from the Czech Budget

- TA CR: TA04021338 – Development of CDF code for desulfurization plant design
- TA CR: TA03030978 – Research and development of a discountless damper
- TA CR: TA01010879 – New systems for length gauging and evaluation their quality
- TA CR: TH01010690 – Development of progressive technology of felt hat production
- TA CR: TH02020032 – Product development for automotive industry from AlSi5Mg alloy
- TRIO: FV10709 – Numerical welding simulation and service life prediction of welded structures in the field of land transport, steel structures and energy
- TRIO: FV10510 – Low Temperature Repair of Creep Resistant Cast Turbine Components
- TRIO: FV10467 – Development of progressive fulling technology in hat production
- TRIO: FV10215 – Highly efficient jet loom for leno fabrics
- GA CR: P108/12/1452 – Optimization of high temperature mechanical properties of aluminides
- Fe3Al type iron with carbide elements
- GA CR: GA14-08888S – Flow Field Control by Fluid Oscillations
- EU/ME CR: LIFE + - Demonstration of diesel exhaust emission monitoring
- during real operation
- H2020: A novel process for manufacturing complex shaped Fe-Al intermetallic parts resistant to extreme environments
- ACTION: Czech Republic/Austria – Multidisciplinary cooperation in research of influence of process parameters on mechanical properties of diffusion created heterogeneous welds
- MOB ILITY-7AMB: CZ/Poland – Research of processes in supersonic ejectors with isobutane

Projects submitted and solved by the academic staff of FME under CNATI

- TA CR: TE01020020 – Josef Božek Automotive Industry Competence Center
- TA R: TA04011009 – Research of utility properties and application possibilities of light polymer composites for body building
- TA ČR: TH01031152 – Increasing the efficiency of machines and equipment by reducing friction losses of the machine and its components
- TA ČR: TH01021093 – New technology of matting and prototype of machinery for glass surface treatment

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

- TAČR-GAMA: TG01010117 – PROSYKO – 2 sub-projects

4.5 Student Grant Competition

Within the support of specific research carried out through the Student Grant Competition, 20 projects with a total volume of CZK 6.58 million were solved, which represents 14% of the total volume of financial resources from the Czech budget. For an overview of projects, see annex 4.5.

4.6 Contract Research and Development

Contractual research and development within supplementary activities form an important segment of the Faculty's activities. In 2016, the contractual research earnings of the Faculty of Mechanical Engineering amounted to approximately CZK 9.59 million, of which approx. CZK 8.70 million with the results applied to the RIV database.

Contract research and development carried out by academic staff of the Faculty of Mechanical Engineering under CxI amounted to approximately CZK 6.75 million with the results applied to the RIV database.

See spreadsheet annexes 4.6.1.

4.7 Supplementary Activity

The proceeds of additional activities of the Faculty of Mechanical Engineering amounted to CZK 3.43 million. In addition, the Faculty of Mechanical Engineering provides expertise in the fields

of mechanical engineering, machine building and technical fields (various). In 2016, revenues from services from this activity amounted to CZK 42,680.

The Faculty was granted an Authorization for Measurement of Pollutant Emissions pursuant to Section 15, Paragraph a) of the Air Protection Act. The volume of services from this activity is declining, in 2016 one contract was executed.

4.8 The Institute for Nanomaterials, Advanced Technology and Innovation

The Faculty of Mechanical Engineering develops laboratories for two research programs within the existing infrastructure.

Competitive Engineering	**Professional guarantor**
Laboratory of Textile Machinery Innovation	prof. Ing. Jaroslav Beran, CSc.
Laboratory of progressive engineering technologies*	Ing. Jiří Bobek, Ph.D.
Laboratoř of Hydrodynamics *	doc. Ing. Michal Petrů, Ph.D.
Power Unit Laboratory	Ing. Robert Voženílek, Ph.D.
Laboratory of Robotic Systems	doc. Ing. František Novotný, CSc.
Laboratory of Chip Technology	doc. Ing. Jan Jersák, CSc.
Laboratory of prototype technologies and processes *	Ing. Jiří Šafka, Ph.D.
Material Research	
Laboratory of nanolayers evaluation	prof. Ing. Petr Louda, CSc.

4.9 Results of Research and Development Activities

Within the five-year evaluation period it can be stated that the most numerous group of outputs at the Faculty is the category of articles published in a professional periodical. The second most numerous category is articles in the proceedings. The results of applied research follow. In this area the functional sample, prototype, patent and utility model are the most frequently represented among the output categories. It is possible to record the trend of decreasing absolute number of R&D outputs (see the table annex 4.9.1).

In 2016, the trend in the growth of patents was confirmed. On the contrary, the reported number of utility models and functional samples decreased significantly. No software output and proven technology were reported at FS TUL in 2016.

The Faculty of Mechanical Engineering has registered the following selected results in the IS R&D with the year of application 2015 (year of data collection 2016) (see table annex 4.9.2.):

- 68 results – type J (article in periodical)
- 127 results – type D (article in proceedings)
- 14 results – P type (patent)
- 19 results – type F/U (utility model)
- 9 results – type GB (functional sample)

For the year 2016 (year of data collection 2017) it is planned to insert the following number of outputs into the RVVI system (see table annex 4.9.3):

- 63 results – type J (article in periodical).
- 150 results – type D (article in proceedings)).
- 16 results – type P (patent).
- 7 results – type F/U (utility model).
- 6 results – type GB (functional sample).

In 2016, a total of 32 outputs were published in journals at FS TUL. These are included in the WoS, eventually Scopus databases. 70 articles were published in the conference proceedings and are also included in the mentioned databases.

In 2016, significant R&D results for the II. pillar evaluation were selected. A summary of these results is given in table annex 4.9.4. Within the university selection of significant results by the II. Pillar, the following were chosen and sent to the evaluation panels:

HOTAŘ, A., KEJZLAR, P., PALM, M. a MLNAŘÍK, J. The effect of Zr on high-temperature oxidation behaviour of Fe3Al-based alloys. Corrosion Science. 1. vyd. KIDLINGTON, OXFORD: ELSEVIER, 2015, roč. 100, č. November 2015. S. 147 – 157. ISSN 0010-938X.

POPOV, A. a DUGIN, A. A comparison of experimental estimation methods of the ploughing force in orthogonal cutting. International Journal of Machine Tools and Manufacture. 0. vyd., 2013, roč. 65, č. February 2013. ISSN 0890-6955.

Due to a change in the principles of evaluation of research organizations, other parameters were included in the Annual Report compared to previous years. It is a branch division of outputs at FME TUL and the number of main results created with the support of specific research and IP.

From the performed analysis it is clear that more than 92% of all outputs in the last two years were included in the field J – Industry. Another field in which the faculty has included outputs is B – Physics and Mathematics (approx. 5%), see the table annexes 4.9.5 and 4.9.6.

In the field of J – Industry, the most numerous sub-sectors in 2016 are JQ – Machinery and Tools (20%), JR – Other Engineering (17%), JP – Industrial Processes and Processing (13%), NPP – Non-Nuclear Energy, Consumption and energy use (13%), JI – Composite materials (8%) and JJ – Other materials (8%). Table annexes 4.9.7 and 4.9.8 contain the breakdowns of sub-areas JA to JY in 2015 and 2016.

In the framework of specific research, 18 articles in professional periodicals and 68 articles in proceedings have been created recently. Two functional samples were also produced under this support. In total, 88 outputs were generated and reported with SGS support in 2016. The summary data for the period 2016 are given in the table annex 4.9.9.

With the subvention of institutional support funds, 23 articles in professional periodicals and 32 articles in proceedings were created in 2016. Nine patents were also created under this support. In total, 66 outputs generated with IP support were reported in 2016. Summary data for the period 2016–2016 can be viewed in the table annex 4.9.10.

Over the five-year reporting period, the number of points has decreased significantly for the results applied in the RIV database (the reference period 2010–2014). In 2017, results for the third period were published according to the new methodology of validity of evaluation of research organizations results, which is valid for the years 2013–2016 (hereinafter Methodology 2013). In pillar I according to this methodology, FS gained a total of 4,268.72 points, in pillar III it gained 787.97 points and 5530.03 points were taken over from previous periods for the results applied in 2010–2011. During the reporting period, Pillar II was allocated 10% less in this reporting era than in the previous year. Overviews of results and scores are given in the table annex 4.9.

4.10 Commercialization of results and outputs of scientific research activities

The strategy for the commercialization of research and development results at the FME is oriented in two main directions:

- For the transfer of new technologies and machinery through contractual or collaborative research and for the sale of licenses or the sale of patents and utility models.
  - Project VG20122014078. Protective masks (half masks) with filters made of nanofiber material (PUV 2013-28991/Spacer for fixation of material storage spacing, PUV 2013-28691/ Protective breathing mask with common inhalation and exhalation opening, PUV 2013-28708 /Flat filter with shape unstable filter material containing nanofibers layer, PV 2013-1049/ Fixing storage of filter or other material, PV 2013-826 / Protective breathing mask with common inhalation and exhalation aperture, PV 2013-835 Flat filter with shape unstable filter material containing nanofibers layer; masks).
  - Income from the initial license fee in 2016 was CZK 1 million.
  - Project TA01020313. Material selection and testing procedure for enthalpy exchangers, design of heat exchanger surface of plate heat exchanger.
  - The annual income for 2016 was CZK 100,000.
- For the implementation of “proof of concept” type of projects, see the text annex 4.9.
  - In 2016 two partial projects PROSYKO were solved. The project is supported by the TA CR/GAMA program, Sub-program 1 is aimed at supporting the verification of the practical

applicability of R&D results that arise in research organizations and have a high potential for application in new or improved products, production processes or services with high added value. The project is managed under CNATI.

INTERNATIONAL COOPERATION

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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 69 contractual relations.

5.1 Internationalization in Education

In the field of internationalization of the environment at the Faculty of Mechanical Engineering in 2016, the NMSP continued teaching English in the fields of Machine and Equipment Design and Engineering Technology and Materials for 14 self-paying students from India.

Newly, 13 self-paying students from India were admitted to study the NMSP in English in the fields of Machine and Equipment Design, Engineering Technology and Materials and Manufacturing Systems and Processes.

In 2016, three government scholarship holders (Bosnia and Herzegovina, Egypt, Philippines) successfully completed the follow-up master's program N2301 Mechanical Engineering, Machine Design and Equipment with the focus on energy equipment.

At the same time, one student (Egypt) who received a government scholarship of the Czech Republic to study the follow-up Master's program N2301 Mechanical Engineering, specialization Machine Design, with the focus on energy equipment, continued with his studies.

Teaching of four government scholarship holders was newly started (2x Egypt, Ghana, Taiwan) for the follow-up master's program N2301 Mechanical Engineering, branch Design of Machines and Equipment, specialization Power Engineering, and also for one government scholarship holder (Kosovo) in the doctoral degree program P2302 Machines and equipment, specialization Equipment for thermal technology.

Two students from Vietnam continued their studies with the faculty scholarship.

In 2016, 2 students (Kosovo) - self-payers successfully completed their studies.

In 2016, three new DSP students (Germany, Poland, Egypt), self-payers, were accepted.
At the same time, other foreign students - self-payers - continued their studies at the faculty: 4 DSP students (Germany, Poland, Thailand, India).

Two foreign students – self-payers – came for a short-term internship in 2016. One of them successfully completed his internship in 2016.

5.2 International Cooperation in Education

In the area of international cooperation in education, efforts were focused on establishing further international contacts and activities and the ongoing activities continued.

Students' educational activities carried out within the framework of projects

- Institutional development project IRP FME TUL – TUL was solved as an important partner within the international educational area – continuation and deepening of existing cooperation with Canadian, resp. US partner universities (Internal No. 12280).
- As part of the IRP FME TUL project, one Czech student stayed in 2016 at the Canadian Conestoga College of Technology and Advance Learning.
- 3 long-term (min. 28 days) and 3 short-term stays of doctoral students were carried out in order to grow professionally and strengthen existing contacts with foreign partner institutions with the financial support of the TUL 2016 Mobility Institutional Development Plan.
- In 2016, one long-term stay of a doctoral student was completed with the financial support of the TUL 2015 Institutional Development Plan of the Mobility Fund.

- In 2016, one 1 month stay of a doctoral student was carried out at a foreign partner institution with a financial support from other sources (7AMB, Joint Czech-Polish Research Projects), also two DSP student stays on a 2 month internship outside programs were carried out.
- In 2016, short-term several-day activities of students were funded with financial support from other sources – there were five short-term visits of doctoral students (Cooperation Program Czech Republic – Free State of Saxony, BauQu), one short-term student visit research projects), one short-term DSP student trip (HORIZONT 2020, EQUINOX), one short-term DSP student trip (SGS) and 14 student trips with the financial support from the Czech Republic Cooperation Program – Free State of Saxony, GreK.

Academic educational activities carried out within the framework of mobility

- A total of 9 short-term stays of faculty academics associated with lectures at partner institutions under the Erasmus + and CEEPUS programs were carried out.
- A total of 9 members of foreign academic staff were recruited for a short-term Erasmus+ and CEEPUS teaching stay.

5.3 International Cooperation in the Field of Scientific and Research Mobility

- Eight 5 days lasting visits abroad of young academics were carried out in order to grow professionally and to strengthen existing contacts with foreign partner institutions. The visits were financially supported by the TUL 2016 Mobility Fund.
- One academic worker stayed for professional growth under the auspices of CRP TUL 2016.
- Four short-term stays of foreign academic staff from partner universities in Germany, Italy and Poland were carried out at the faculty with the financial support of the TUL 2016 Mobility Fund.
- There were 2 long-term stays of a young academic employee of the FS at a foreign partner institution in Germany lasting at least 3 weeks with financial support from other sources (Cooperation Program Czech Republic – Free State of Saxony, BauQu), 3 short stays of in Germany with financial support from other sources (Cooperation Program Czech Republic – Free State of Saxony, BauQu), 5 short-term stays of several days of academic staff of the CF in Germany with financial support from other sources (EC OP – sustainability), 8 short-term several-day stays of a FS academic in Germany with financial support from other sources (Cooperation Program Czech Republic – Free State of Saxony, GreK), 3 short-term several-day stays of a FS academic at foreign partner institutions from other sources (HORIZONT 2020, EQUINOX), 2 short-term stays of several days of academic staff of the FS in Poland with financial support from other sources (7AMB, Joint Czech-Polish Research Projects) Resources (SGS).
- There were two short-term stays of foreign academic staff at the aFculty within the project AKTION Czech Republic – Austria.
- There was 1 stay of a foreign academic worker at the Faculty lasting at least 28 days and 3 short stays of several days of foreign academic staff at the faculty within the project 7AMB, Joint Czech-Polish Research Projects.
- There were 3 short-term stays of foreign academic staff at the Faculty as part of the project Cooperation Program Czech Republic – Free State of Saxony, GreK.

5.4 International mobility

The mobility of students, academics and other staff of FS TUL was realized mainly within the ERASMUS +, CEEPUS, Institutional Development Program and other sources.

The mobility of foreign students and academics at the Faculty of Mechanical Engineering TUL took place mainly within the ERASMUS+ and CEEPUS programs. International students also took advantage of the IAESTE program. Mobility of foreign students and academics was also realized within other sources.

The Faculty motivates students of all study programs to study abroad. The priority is to increase the mobility of doctoral students. Since 2010, foreign study visits or internships have been included in the study plans of doctoral study programs.

In 2016, the overall mobility of both students, academics and other faculty staff as well as the mobility of foreign students and academics increased.

Stays of foreign students and foreign academics

In 2016, the total number of stays of foreign students and foreign academics within mobility programs and other resources at the faculty increased compared to 2015, while in individual mobility categories the increase was recorded in stays of foreign students coming primarily under the Erasmus+ program. Arrivals of students under IAESTE increased slightly and remained at CEEPUS level at 2015. Arrivals of foreign academics under Erasmus + decreased compared to 2015, while they increased slightly under CEEPUS and AKTION. Arrivals of foreign academics within the TUL Mobility Fund remained at the 2015 level. On the other hand, arrivals of foreign students and academics from other sources increased. Other activities of foreign students and academics also increased compared to 2015.

International mobility of academics and other faculty staff

The overall international mobility of academics and other faculty staff increased in 2016 in terms of programs and other resources compared to 2015, and in addition to the Erasmus and CEEPUS programs, TUL development projects and, above all, other sources were used. International mobility of students of the Faculty within the framework of mobility programs decreased in 2015, while in individual mobility categories a decrease was recorded in the students' trips within the Erasmus+ and IRP TUL programs. Within the CEEPUS program, there was a slight increase in the number of students' visits. The number of students of the faculty was increased with financial support from other sources as well as other student activities abroad. International mobility of faculty staff decreased within the CEEPUS and IRP TUL programs. Erasmus+ faculty staff visits remained at the 2015 level and academic staff visits from other sources increased. Other academic activities abroad decreased compared to 2015.

- There were 27 student work one semester lasting „work and study“ stays under the Erasmus+ program, with most of the trips being students' mobility for undergraduate and follow-up study programs.
- There were 3 student stays of DSP students lasting at least 1 month within the framework of the CEEPUS program.
- Nine Erasmus+ and CEEPUS academic visits took place, with half of the visits being short-term stays of 5 days.
- One Erasmus + staff trip was made.
- There were 110 stays of foreign students at the Faculty of Mechanical Engineering from the European area within the framework of Erasmus+, CEEPUS and IAESTE programs, 1 from Mexico and 1 from Japan within IAESTE.
- Nine short-term study visits of foreign academics at the Faculty of Mechanical Engineering were carried out under the Erasmus+ and CEEPUS programs, lasting about 5 days.
- There were 2 short-term arrivals of academics under the AKTION program.
- 3 student stays of one month or more and 3 several-day student stays within the Mobility Fund TUL 2016 were carried out.
- One long-term stay of a DSP student within the Mobility Fund TUL 2015 was completed.
- There was 1 academic 1 month lasting stay and 7 academic 5 or more days lasting visits under the TUL Mobility Fund 2016.
- 1 academic visit within CRP TUL 2016 took place.
- 4 short stays of foreign academics within the TUL Mobility Fund were carried out.
- One student stay abroad for one semester was launched within the IRP FS TUL 12280 TUL as an important partner within the international educational area – „Continuation and intensification of existing cooperation with American partner universities. ”
- One academic stay was held at a partner institution within the IRP FME TUL 12280 “TUL as an important partner within the international educational area – continuation and deepening of the existing cooperation with American partner universities. ”
- One doctoral student stayed at a foreign partner institution for 1 month with financial support from other sources (7AMB, Joint Czech-Polish Research Projects).
- There were 21 short-term several-day student trips with financial support from other sources (Czech Republic – Free State of Saxony, 7AMB, HORIZONT 2020, SGS). Reciprocally, there were 19 short-term arrivals of foreign students with financial support from other sources.

- There were 2 long-term stays of an academic worker with financial support from other sources (Cooperation Program Czech Republic – Free State of Saxony, BauQu) lasting 3 weeks.
- There were 22 short-term several-day lasting visits of academic staff with financial support from other sources (Cooperation Programs Czech Republic – Free State of Saxony, 7AMB, HORIZONT 2020, OP EC, SGC). Reciprocally, there was one stay of a foreign academic employee with the duration of 1 month and 6 short-term mobilities of foreign academics with financial support from other sources took place.
- There were 2 DSP student stays outside the programs lasting for 2 months.
- Six internships of foreign students at the faculty with 1 month or longer duration were carried out outside the programs.
- The Faculty of Mechanical Engineering provided tuition of selected courses for Erasmus+ students who came to FTT and FMI.

Within the ERASMUS+ program

- A total of 54 inter-institutional contracts with partner universities were in force, of which 5 new inter-institutional contracts were signed in 2016.

Within the framework of cooperation in the European area

- One new contract was concluded with the Université de Franche-Comté (France) for continued cooperation

As part of cooperation in the Asian area

- 1 new contract with Apollo Engineering College (India).

Negotiations to conclude further bilateral agreements on student, academic and science and research exchanges with universities

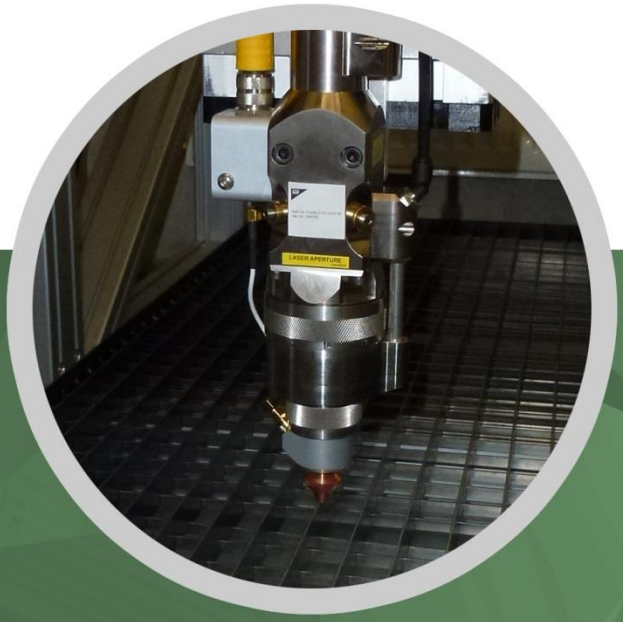
- Azerbaijan Technical University (Azerbaijan).

Under the CEEPUS program

In 2016, the Faculty of Mechanical Engineering was an active participant in 3 networks of the CEEPUS III program.

- CIII-RS-0304 Technical Characteristics Research of Modern Products in Machine Industry (Machine Design, Fluid Technology and Calculations) with 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 in the Environment – Oriented Technologies in Manufacturing.

PARTNERSHIP AND COOPERATION



TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

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

Membership of Departments

- Automotive Industry Association
- Association of the Glass and Ceramics Industry
- Confederation of Industry and Transport
- Company for Machine Tools (at FS CTU in Prague)

Platforms and Clusters

- Czech Technology Platform of Engineering, o.s.
- Josef Božek National Competence Centre
- CENEN-net – a free academic community
- ININet platform
- NESEFF (Network for energy supply and energy efficiency)
- COST: Proposal Title: Solutions for Critical Raw Materials Under Extreme Conditions Proposal Acronym: CRM-EXTREME
- EIP: European Innovation Partnership (EIP) – Sustainable substitution in extreme conditions

6.2 Cooperation with Universities and Research Organizations

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

Meetings, Hosting, Mission

- **Visit of US University representatives to the Faculty of Mechanical Engineering**
  On April 21st, we welcomed representatives of the American universities from the University of Vermont and the University of Arizona. The visit was held as part of the Fulbrigh-Workshop Bringing More US students in STEM to Czech Universitites, which took place on 19–20 April in Prague. Michael Guyer from the University of Vermont and Carol Bender from the University of Arizona inspected the labs of the Department of Engineering Technology, Vehicles and Engines, Manufacturing Systems, and the Nanospider Laboratory. The excursion was followed by negotiations on possible cooperation, especially in the area of exchange of academic staff and students. At the same time, an independent meeting was held at the Department of Applied Mechanics on a purpose to discuss possible cooperation in the field of biomechanics.
- **Representatives of University Sains Malaysia (University of Science, USM) at TUL**
  During the meeting of May 4, in the morning, the Faculty of Mechanical Engineering was represented by the Vice-Dean Ing. Ivo Matoušek, Ph.D. In the afternoon, a tour of the DET, DAM, DVE and DMA laboratories of the Faculty of Mechanical Engineering took place.
- **Representatives of Kao Yuan University, Taiwan at TUL**
  During the visit on May 5, a tour of the KSP, KMP, KVM and KSA laboratories of the Faculty of Mechanical Engineering took place.
- **Lbc County and TUL Technology Mission in Waterloo and Kitchener, Ontario**
  From May 8–12 the delegation of representatives of the Liberec Region and TUL attended the Technology Days in the province of Ontario, Canada. Economic presentations of the Liberec and Waterloo regions, academic meetings at the University of Waterloo and the

Conestoga College Institute were held. The Faculty of Mechanical Engineering was represented by prof. Petr Lenfeld, Dean of the Faculty, and doc. Karel Fraňa, Vice-Dean for External Relations

- **Vice-Rector of Çankırı Karatekin University at the Faculty of Mechanical Engineering**
  Faculty of Mechanical Engineering welcomed prof. Riza Gürbüze, vice-rector of Cankiri Karatekin University. The aim of the visit was a possible exchange of academics and Turkish students at the FS within the framework of NMSP and DSP. The professor has come to gain inspiration and experience from our Faculty of Mechanical Engineering in the field of teaching, curricula, building and using laboratories in connection with the newly established mechanical department at Cankiri Karatekin University.
- **Visit from Nha Trang University**
  On October 21, we welcomed the Dean of the Faculty of Mechanical Engineering at Nha Trang University, Mr. Nguyen Van Tuong, Ph.D., and the Director for Academic Affairs, Mr. Tran Doan Hung, Ph.D. The aim of the visit was to set up further cooperation in the area of student exchanges and academic staff and to this end submit a joint Erasmus+ credit mobility project.
- **Negotiations on cooperation between the Czech Republic and Germany**
  On Friday 9 September, negotiations were held on cooperation between the Czech Republic and Germany, led by Mr. Pavel Bělobrádek on behalf of the Czech side and by Minister of Science Eva-Maria Stange on behalf of the German side. The main attention was paid to cooperation between the Academy of Sciences of the Czech Republic and Charles University and German research institutes Fraunhofer and Max-Planck-Institut, etc. On behalf of TUL, doc. Ing. Karel Fraňa attended the meeting. In a press release, Ms Eva-Maria Stange mentioned, inter alia, the cooperation between TU Dresden and TU in Liberec, particularly in the area of cross-border cooperation.
- **Mission of our academics in the USA**
  On 17–20 October, 2016, a mission of automotive experts, managers and university representatives was held in the US, South Carolina, and Georgia. The event was organized by the US Embassy in Washington together with CzechInvest with the financial support of the Czech Ministry of Foreign Affairs. The delegation also included representatives of the Faculty of Mechanical Engineering TU in Liberec – Ing. Pavel Brabec, Ph.D., from the Department of Vehicles and Engines, and Ing. Jan Valtera, Ph.D., from the Department of Textile and Special Purpose Machines.

Informal cooperation of faculty departments
The 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 habilitation, doctoral thesis defense, publish joint publications, etc.

Meeting of departments and institutes of production machines and robotics 2016

- The meeting was organized from 8 to 9 September by The Department of Glass Machinery and Robotics with the participation of the Department of Production Systems and Automation at the International Center for Spiritual Renewal in Hejnice and it was attended by 10 universities from the Czech Republic and Slovakia.

Principia Cybernetica 2016 in Zlín

- Meeting of Departments of Cybernetics and Automation of Mechanical and Technological Faculties on 7–9 September.

Scientific and research cooperation supported by projects and grants
The faculty, together with universities and research organizations, participated in the solution of 2 projects of a collaborative nature (TACR, MIT CR), 3 scientific research projects (GAČR, LIFE +) of domestic and three projects of foreign R&D cooperation (H2020, 7AMB).

Cooperation supported by OP Enterprise and Innovation for Competitiveness
The faculty participated in the project Development of systems of bonding various substrates for the progressive joining of components of body modules. It is a project solved in the form of contractual cooperation within the framework of the Call for Potential – I. Call. See Annex 7.4.2.

Cooperation supported by the OP Cross-border Cooperation
Together with the German universities, the faculty participates in two projects OP/Cooperation Program Czech Republic –- Free State of Saxony 2014–2020.

Accredited cooperation in education
Accreditation granted to the Faculty of Mechanical Engineering TU in Liberec for the implementation of the study program in cooperation with other institutions:

- Together with the Institute of Thermomechanics AS CR, v.v.i. for the Doctoral study program Mechanical Engineering with a degree in Applied Mechanics. Full-time and part-time form, standard length of study 4 years. For teaching in both Czech and English.
- Together with the Institute of Macromolecular Chemistry of the AS CR, v.v.i. for the doctoral study program Mechanical Engineering with a degree in Material Engineering. Full-time and part-time form, standard length of study 4 years. For teaching in both Czech and English.

6.3 Conferences, Symposia, Fairs

SESIA 2016
From 12 to 14 September a meeting of academic officials and secretaries of mechanical faculties of the Czech Republic and Slovakia took place in Pilsen. This year's event was organized by the Faculty of Mechanical Engineering of the University of West Bohemia in Pilsen.
The main points of the meeting were the implementation of the new Higher Education Act in the Czech Republic and the results of comprehensive accreditation and accredited study programs in the SR, student development, resolving domestic and foreign scientific research projects and grants, engaging in the Horizon 2020 programming period 4.0 and possibilities of further cooperation between individual faculties. The cognitive part of the meeting included an excursion to the Borská pole industrial zone.

34th International Conference MME
The Faculty of Economics and Mechanical Engineering of TUL joined together to organize the 34th annual international conference Mathematical Methods in Economics 2016, which took place at TUL from 7th to 9th September. The organizers of the conference are Czech and Slovak companies for operational research and the Czech Econometric Society. The conference was attended by 200 experts not only from the Czech Republic and neighboring countries, but also by speakers from Brazil, Egypt, Finland, Italy and Iran.
Number of participants: 247, of which 61 were from abroad.

XII. International Conference TMM 2016
Organized on 6–8. September 2016 Department of Textile and Special Purpose Machines at TUL. 48 lecturers from 14 countries of the world were on the program.
Number of participants: 53, of which 20 from abroad.

XI. Experimental Fluid Mechanics 2016
Organized on 15–18. November, Department of Energy Facilities in Mariánské Lázně. The 11th year of the conference focused on research in the field of fluid mechanics, and thermodynamics.
Number of participants: 242, of which 175 from abroad.

6.4 Cooperation with industrial practice
Forms of cooperation with industrial practice include scientific research and pedagogical activities.

Industrial Council of the Faculty of Mechanical Engineering TU in Liberec
The Industrial Council is an advisory working group established by the Dean of the Faculty of Mechanical Engineering TU in Liberec. It includes 17 representatives of industrial companies and enterprises. Two meetings took place in 2016.

Scientific and research collaborative cooperation with the application sphere
The Faculty participated as co-researcher in the implementation of 3 projects supported by TA CR and 3 projects supported by the Ministry of Industry and Trade.

Scientific and research contractual and ancillary activities
Scientific and research supplementary activities represent an important segment of the Faculty's activities. See chapter 4.6 for details.

Expert activity
The Faculty holds an expert certificate for the fields of Engineering, Technical (various), Energy, Glass. In 2016, 4 reports were prepared. See table annex 6.4.1.
The Faculty holds an Authorization for Measurement of Pollutant Emissions pursuant to Section 15, Para. a) of the Air Protection Act. One authorized measurement was carried out in 2016. 6.4.2.

Training of industrial workers
The education of workers from the industrial sphere is an important segment of the FME. Altogether 47 professional seminars and courses were organized. The courses were attended by about 504 participants. The volume of funds obtained from this activity was approximately CZK 1.58 million.

Cooperation in education supported by OP Cross-border Cooperation projects
Within the GreK project, which aims to build and strengthen cross-border cooperative teaching of modern plastics processing methods between the Zittau/Görlitz University and the Technical University of Liberec, regional plastics companies and research institutions are involved.

Professional practice of students in companies
All bachelor and master students follow-up master's, study programs of the faculty have completed the compulsory course Professional Practice in Enterprises within 2-6 weeks by fields (Bc study – compulsory elective course Professional Practice, Mgr study - compulsory course Professional Practice in Enterprises within 2–4 weeks by fields).

Bachelor and master theses
Entering bachelor's and master's theses in cooperation with experts from industrial companies is a standard activity of all departments of the FME. See table annex 6.4.3.

Involvement of experts from companies and institutions in teaching
Standard forms of cooperation are lectures by practitioners and leading theses and experts involved in student practice. See table annex 6.4.3.
Other experts from the application and academic spheres spoke in professional seminars and lectures, see chapter 6.5 below**.**

Excursion of students to industrial enterprises and institutes
In 2016, individual departments organized excursions of students to industrial companies:
ŠKODA AUTO a.s. (Mlada Boleslav, Vrchlabi); SILON s.r.o. Plana nad Luznici; IMG Bohemia s.r.o., Plana nad Luznici; PURUM Ltd., Plana nad Luznici; CZ Strakonice a.s., Strakonice; ČZ Řetězy s.r.o.; Kautex Textron Bohemia s.r.o. Knezmost, VYVA PLAST sro, Turnov; Lucid spol. s r.o. Jablonec nad Nisou; Modelarna Liaz spol. s r.o. Liberec; KSM Castings CZ a.s. Hradek nad Nisou; Commercial gray and ductile iron foundry Turnov a.s .; Matador Automo

6.4 Cooperation with Industry
Forms of cooperation with industry include scientific-research and pedagogical activities.

Industrial Board of the Faculty of Mechanical Engineering TU in Liberec
The Industrial Board is an advisory working group established by the Dean of the FME TU in Liberec. It includes 17 representatives of industrial companies and enterprises. In 2016, two meetings took place.

Scientific–Research Collaborative Cooperation with the Application Sphere
The Faculty together with industrial partners, participated in a role of co-solver in the implementation of 3 projects supported by TA CR and 3 projects supported by the Ministry of Industry and Trade of the Czech Republic.

Scientific-Research Contractual and Complementary Activities
Scientific and research complementary activities represent an important segment of the Faculty's activities. See chapter 4.6 for details.

Expert Activity
The Faculty holds an expert certificate for the fields of Mechanical Engineering, Technical fields (various), Energetics, Glass. In 2017, 4 were prepared. See the table annex 6.4.1.
The Faculty holds an Authorization for Measurement of Pollutant Emissions pursuant to Section 15 Paragraph 1 a) of the Air Protection Act. In 2016, one authorized measurements were carried out. See table annex 6.4.2.

Education of Industrial Workers
Education of workers from the industrial sphere is an important segment of the Faculty of Mechanical Engineering's activity. A total of 47 professional seminars and courses were organized. The courses were attended by 504 participants. The volume of funds obtained through this activity amounted to approximately CZK 1,58 million.

Cooperation in Education Supported by OP Cross-border Cooperation Projects
Within the GreK project, which aims to build and strengthen cross-border cooperative teaching of modern plastics processing methods between the Zittau/Görlitz University and the Technical University of Liberec, regional plastics companies and research institutions are involved.

Professional Work Experience of Students in Companies
All students of Bachelor and Master's, or follow-up Master's study programmes of the Faculty have completed the compulsory subject Professional Work Experience in Companies in the length of 2–6 weeks according to their study branches (Bachelor studies – compulsory elective course Professional Practice, Master studies – compulsory course Professional Practice in Companies in the length of 2–4 weeks according to the study branches).

Bachelor and Master theses
Assignment of Bachelor's and Master's theses in cooperation with experts from industrial companies is a standard activity of all departments of the Faculty of Mechanical Engineering. See table annex 6.4.3.

Involvement of Experts from Companies and Institutions in Teaching
Standard forms of cooperation are lectures by experts, supervision of theses and experts participating in the students' work experience. See table annex 6.4.3.
In the context of professionally focused seminars and lectures, other experts from the application sphere and academic sphere presented, see chapter 6.5.

Students Excursion to Industrial Companies and Institutes
In 2017 and one and several-day excursions of students to industrial companies and firms were realized by individual departments:
ŠKODA AUTO a.s. (Mladá Boleslav, Vrchlabí); SILON s.r.o. Planá nad Lužnicí; IMG Bohemia s.r.o., Planá nad Lužnicí; PURUM s.r.o., Planá nad Lužnicí; ČZ Strakonice a.s., Strakonice; ČZ Řetězy s.r.o.; Kautex Textron Bohemia s.r.o. Kněžmost, VYVA PLAST s.r.o., Turnov; Lucid spol. s r.o. Jablonec nad Nisou; Modelárna Liaz spol. s r.o. Liberec; KSM Castings CZ a.s. Hrádek nad Nisou; Komerční slévárna šedé a tvárné litiny Turnov a.s.; Matador Automotive ČR s.r.o. Liberec; Magna Bohemia s.r.o. Liberec; TOS VARNSDORF, a.s.; ASSA ABLOY Czech&Slovakia s.r.o., Rychnov nad Kněžnou; Vanad 2000 a.s.; Misan s.r.o. (Lysá nad Labem); TRW Automotiv Czech s.r.o. (Jablonec nad Nisou); Preciosa Ornela a.s. v Desné a v Zásadě; TONAK a.s. (Nový Jičín, Strakonice); MODELÁRNA LIAZ, spol. s r.o.; technoinvest a.s.; Větrná elektrárna Jindřichovice pod Smrkem; ČEZ a.s. – elektrárny Temelín, Mělník, Orlík; ZVVZ Milevsko; Mondi Štětí a.s.; Pivovar Protivín, a.s.; Ústav termomechaniky AV ČR/aerodynamická laboratoř; DENSO MANUFACTURING CZECH s.r.o.

Excursion of Academic Staff to Industrial Companies and Institutes
During the year, academic staff excursions to industrial companies took place and professional seminars were attended in the following companies: PRECIOSA-LUSTRY,a.s., Kamenický Šenov; Festool CZ, s.r.o.; Festo, s.r.o.; KS-Europe s.r.o., Šťáhlavy; ŠKODA AUTO a.s.; Johnson controls a.s.; Rieter a.s.; Nanovia s.r.o.

6.5 Professional Events and Lectures

Presentation of projects of foreign trainees
On 26 February 2016, three trainees took part in the Department of Production Systems and Automation. Under the CEEPUS program, PhD students from Poznan University of Technology have come to the Department of Manufacturing Systems and Automation for a one-month stay. Ing. Frankowski and Ing. Popielas arrived within the CEEPUS network CIII-RS-0304 and Ing. Klunejko arrived in CEEPUS network CIII-RO-0013. The Faculty of Mechanical Engineering participates in both of the above-mentioned CEEPUS networks.
Each of the PhD students dealt with a professional topic in cooperation with the department staff. The presentation was attended by Vice-Dean Ivo Matoušek, who noted a high level of work on the topic: Comparison of mechanical properties of parts produced by 3D printing technology FDM from Nylon, The use of Microsoft Kinect in ergonomic studies, programming of the model of railway transport system.

Presentation by Metrotest
Presentation of the company and familiarization with microhardness testers Q60A by Qness took place for academics and students at the Department of Material on March 13th.

Presentation by Mbtech
The company presentation for students and academics was held at the Department of Textiles and dedicated machines on April 11th.

Modern methods of metallographic sample preparation
The seminar was organized by the Department of Materials on 5 April.

ROUTECH technical innovations
The company presentation for students and academics was held at the Department of Textiles and Dedicated Machines on April 11th.

Defectoscopy and other non-destructive methods
A lecture by an expert from CEZ on 26 April.

Olympus presentation
The company presentation for students and academics was held at the Department of Materials on 5 May.

New aspects for tribologically induced CO2 and emission reduction
Prof. Jens Hadler lectured at the Faculty of Mechanical Engineering on May 9th.

Development and perspectives of the Czech textile industry
Lecture by Ing. Vladimír Šimůnek, sales representative of textile engineering companies, was organized by the Department of Textile and Single-purpose Machines on 16 May.

Advances in comprehensive analysis
The seminar was organized by the Department of Material in cooperation with Pragolab s.r.o. on May 17th.

3D printing and 3D scanning
On May 19, the Department of Production Systems and Automation organized a professional public lecture in cooperation with CxI.

How to effectively teach students with different levels of English in English
English language specialists from the British Council led TUL courses. For the FME the one-week course was completed by Ing. Jiří Sobotka, Ph.D. Michael Fenkl, Ph.D. Petr Žabka and Ing. Vlastimil Hotař, Ph.D.

Energy savings in buildings in practice
On September 24th, the Department of Energy Equipment organized a seminar aimed at linking the topic, the university and the business sector. The seminar is a part of a development project supported by IP TUL. Number of participants 25, number of lectures 14.

Planning and managing joint projects, Finding innovative opportunities
As part of the sustainability of the project, the Department of Machine Parts and Mechanisms organized two seminars in December.

FACULTY DEVELOPMENT

TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

7 FACULTY DEVELOPMENT

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

7.1 Academic life, quality, and culture

Internal impulses for Faculty development

- Individual Language courses organized by CDV TUL and individual language courses.
- Education of academic staff in so-called academic skills and competences.
- Training of academic staff in professional courses within the TUL of OP RDE.
- Completion of courses in higher education pedagogy.
- See table and text appendices 7.1.

Quality assurance of activities

- There was a regular monthly Dean Board, represented by Vice-Deans, Heads of Departments, Head of Dean's Office and representatives of the Student Affairs Office and Department of Development and Projects.
- There were 5 meetings of the Scientific Board of the FME TU in Liberec.
- There were 4 meetings of the Academic Senate of the FME TU in Liberec.
- The meeting of the Academic Community with the Dean of the FMEngineering TU in Liberec took place in December.

Meeting of Alumni

In 2016, meetings of alumni classes of 1961, 1966 and 1976 took place.

7.2 Infrastructure

In 2016, the reconstruction of building C started. Department of Power Engineering Equipment resides in the temporary premises in building F during the reconstruction.

The investment development of the laboratories and classrooms of the Faculty of Mechanical Engineering came from the following resources:

- FRIM – departments about CZK 1,07 mil. (DMS, DET, DGR, DTD, DMA).
- IRP TUL – innovation of the computer room G201 (KMP) and contribution to the retrofitting of the laboratory workplace (KSP) with the purchase of a halogen moisture analyzer and laboratory vacuum dryer for polymers incl. accessories.

7.3 Development Projects

TUL Institutional Development Plan for 2016

Within the framework of IP TUL, the Faculty was the researcher of 7 partial projects, see the table annex 7.3.

- Modernization of the G201 computer room.
- Innovation of teaching the subject of bioengineering.
- Support for self-paying students at FS TUL.
- TUL as an important partner in the international educational space.
- Energy savings in buildings in practice.
- Implementation of model assemblies in education.
- Monitoring of the quality of utility properties of polymers, including their composites, depending on the moisture content.

7.4 Projects Funded by the EU Structural Funds in 2014–2020

In 2016, two projects financed from the European Union Structural Funds were launched under the Cross-border Cooperation Programs: the Czech Republic – Free State of Saxony Cooperation Program. See appendix 7.4.

EXTERNAL AND INTERNAL EVALUATION OF THE FACULTY

TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

8 EXTERNAL AND INTERNAL EVALUATION OF THE FACULTY

8.1 External Evaluation of the Faculty

Accreditation procedure

- The basis for the external evaluation of the quality of education is mainly accreditation procedures. In 2016, the accreditation of NMSP N2301 Mechanical Engineering in the study branch Production Systems and Processes was extended.

Quality Standars of Activities of the Faculty of Mechanical Engineering TU in Liberec

- The demand for graduates of the Faculty of Mechanical Engineering is high and the demand for graduates exceeds the supply. The Faculty monitors the number of graduates registered by the Labor Office of the CR – the Regional Office in Liberec, which monitors the number of graduates as of 30 April and 30 September of the relevant year.
  Evaluation of the Employers' Club o.p.s.
- This year, a record 290 employers from all over the Czech Republic participated in the evaluation of higher education faculties in terms of their contribution to the labor market and graduates' qualifications. The Faculty of Mechanical Engineering TU in Liberec ranked fourth among the top 20 universities.

Comparative evaluation of universities and faculties

- The Center for Educational Policy of the Faculty of Education of Charles University elaborated profiles of 21 Czech public universities and 130 faculties in the Czech Republic in 2016. The basic comparison of faculties was carried out in the area of R&D and creative orientation, International Openness and attractiveness, Regional development and social inclusion, Applicant interest and student level, Evaluation of studies, courses and teachers, Focus on practice and further education, Employment of graduates in the labor market.

Meeting of Deans of Mechanical Engineering Faculties of Czech and Slovak Universities SESIA 2016

- In the period from September 12 to 14. September a meeting of academic officials and secretaries of machinery faculties CR and SR was held in Pilsen. This year's event was organized by the Faculty of Mechanical Engineering of the University of West Bohemia in Pilsen. The main points of the meeting were the implementation of the new Higher Education Act in the Czech Republic and the results of comprehensive accreditation and accredited study programs in the SR, student development, resolving domestic and foreign scientific research projects and grants, engaging in the Horizon 2020 programming period 4.0 and possibilities of further cooperation between individual faculties. The cognitive part of the meeting included an excursion to the Borská pole industrial zone.

8.2 Internal Evaluation of the Faculty

- A regular annual evaluation of the results of activities of individual departments was carried out. Annual reports on the activities of the departments are stored in the Electronic Archive of the Faculty of Mechanical Engineering TUL.
- Regular monthly meetings of the Dean were attended by Vice-Deans, Heads of Departments, Secretary and representatives of the Study and Development and Projects Departments. Meetings of the Scientific Board of the FME TU in Liberec were held.
- Four sessions of the Academic Senate of the FME TU in Liberec were held.
- The meeting of the academic community with the Dean of the FMEngineering TU in Liberec took place in December 2016.
- With effect from 1 January 2016, the Department of Development was approved in the organizational structure of the Faculty and projects.
- Annual Report on the Faculty's Activities was submitted in 2016.

8.3 Management of the Faculty and Control Activities

- In accordance with Act No. 320/2001 Coll., Act on Financial Control, Implementing Decree No. 416/2004 Coll. and the Rector's directive on the internal control system, all types of control control were carried out at the Faculty, i.e. preliminary, continuous and subsequent.
- The evidence of those are the minutes of meetings of the Faculty management and leaders, minutes of individual inspections and Reports of the Department's Audit Activities for 2017.
- The Head of the Dean's Office of the Faculty trained departmental budget administrators.
- Continuous and follow-up inspections of selected projects, student grant competition projects were carried out at the departments, and processes were checked, i.e. the budget of FME TUL and the inventory of property were checked.
- In 2016, SAO audits on "State funds intended for targeted support of research and development through the budget chapter Technology Agency of the Czech Republic" were completed on two TAČR projects.
  TA01010879 entitled "Development of prototype device for determination of primary stability of total hip replacement"
  TA01010946 entitled "Research on utility properties and application possibilities of polymeric materials with natural fillers and nanofillers based on synthetic and PLA matrices"
- Annual Report on the Faculty's Financial Performance was submitted in 2016.

CONCLUSION

TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

9 CONCLUSION

The 2016 Annual Report of the Faculty of Mechanical Engineering TU in Liberec presents information on the Faculty, pedagogical and educational activities, scientific research activities, international cooperation, partnership and internationalization. The activities of the Faculty in 2016 were very extensive, diverse and covered a wide range of activities, which are mentioned in the previous chapters and in the following annexes to the Annual Report, which the faculties must, by their nature, provide.

The faculty has achieved very good results in some areas and activities, despite the fact that the current legislation, unfulfilled promises and system inconsistencies and the ever-growing and overwhelming administration are a significant obstacle to the faculty's development and performance of the faculty's responsibilities. A relatively big disadvantage is the still persisting demographic problem, which, despite maximum efforts, does not allow us to increase the number of applicants. On the other hand, the number of applicants for foreign language studies is increasing. In 2016, the faculty's qualification structure, which is essential for its development, was significantly improved. In the field of science and research, the faculty maintained its position in terms of the number of points for scientific research results and outputs and also maintained the volume of contract research.

Therefore, let me once again thank all members of the academic community who, with their work, their activities and their efforts, despite all the existing pitfalls, have contributed to the development of the faculty and the university, for which they are grateful and appreciated.

In Liberec, April 11, 2017

prof. Dr. Ing. Petr Lenfeld
Dean
Faculty of Mechanical Engineering TU Liberec

The Annual Report was approved by the Academic Senate
of the Faculty of Mechanical Engineering TU in Liberec on April 19, 2017.

TABLE ANNEXES

TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

TABULKOVÉ PŘÍLOHY

2.3 Personnel Structure of the Faculty

Tab. 2.3.1 Average recalculated numbers and qualification structure of employees as of December 31

Year	Academic Staff					Scientific workers	Other staff	Total
	Professors	Associate professors	Seniors Lecturers	Lecturers	Tutors			
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

Tab. 2.3.2 Number of staff (physical) and qualification structure of faculty staff

Year	Academic Staff					Scientific Workers	Other staff	Total
	Professors	Associate professors	Senior Lecturers	Lecturers	Tutors			
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

Tab. 2.3.3 Age Structure of Faculty Academic Staff as of 31 December 2016

Age	Academic Staff										Scientific workers	
	Professors		Associate Proffesors		Senior Lecturers		Lecturers		Tutors			
	total	women	total	women	total	women	total	women	total	women	total	women
under 29	0	0	0	0	0	0	0	0	1	0	0	0
30-39	0	0	3	0	23	2	3	0	3	0	2	0
40-49	1	0	8	0	21	4	0	0	0	0	0	0
50-59	4	0	6	2	3	1	1	1	0	0	0	0
60-69	7	1	4	0	2	0	2	1	0	0	0	0
over 70	8	1	5	0	1	0	1	0	0	0	0	0
Total	20	2	26	2	50	7	7	2	4	0	2	0

Tab. 2.3.4 Structure of Academic Staff (employment agreements) of the Faculty according to the Extent of Workload as of 31 December 2016

Workload extent in %	Total	Professors	Associate Proffesors	CSc., Dr., Ph.D.	Other
do 0,3	21	8	3	9	1
do 0,5	16	4	6	4	2
do 0,7	7	1	2	3	1
nad 0,7	66	9	16	34	7
Celkem	110	22	27	50	11

3.1 Accredited Study Programmes and Branches

Pursuant to Article II of Act No. 137/2016 Coll., the accredited study programmes which are carried out by higher education institutions under the existing legal regulations on the last day before the date of entry into force of this Act, become degree programmes accredited under the Act No. 111/1998 Coll. as amended as of the effective date of this Act and are accredited for a specified period, but for at least 3 years from the effective date of this Act; for this period, the current division of these study programmes into branches of study remains unchanged.

Tab. 3.1.1 Overview of Accredited Study Programmes and Branches Guaranteed by the FME

STUD PROG	Study programme	KKOV	Study branch	Accreditation till	Standard length of studies Study form			
					B	M,N	P	F, A
B 2301	Mechanical Engineering			01.3.2019	3			P, K A
N 2301 (3 years)	Mechanical Engineering	2303T002	Engineering Technology *	31.10.2016		3		P, K A
		2302T002	Machines and Equipment Design *	31.10.2016		3		P, K A
		2301T030	Manufacturing systems *	31.10.2016		3		P, K A
		3902T021	Automated control systems in engineering *	31.10.2016		3		P, K A

		3901T003	Applied Mechanics*	31.10.2016		3		P, K, A
N 2301 (2 years)	Mechanical Engineering	3909T010	Innovation Engineering	01.11.2020		2		P, K A
		2302T002	Machines and Equipment Design	31.7.2020		2		P, K A
		2301T048	Engineering Technology and Materials	31.7.2020		2		P, K, A
		2301T049	Manufacturing Systems and Processes	31.8.2024		2		P, K, A
M 2301	Mechanical Engineering	3901T003	Applied Mechanics	31.3.2020		5		P, K, A
P 2301	Mechanical Engineering	3901V003	Applied Mechanics	1.3.2018			4	P, K A
		2301V031	Manufacturing Systems and Processes	10.2.2018			4	P, K A
		3911V011	Material Engineering	10.2.2018			4	P, K A
P2302	Machines and Equipment	2302V010	Machines and Equipment Design	31.12.2017			4	P, K A
P2303	Engineering Technology	2303V002	Engineering Technology	10.2.2018			4	P, K A

STUDPROG – study programmes codes
KKOV – study branch code
B – Bachelor's study programme
N – Master's study programme following up a Bachelor's study programme
M – Master's study programme
P – PhD. Study programme
F – form of study: P – full-time
K – part-time (combined) form of studies
A – Study programmes (study branches) carried out in English

3.2 Studies Offered in English

Pursuant to Article II of Act No. 137/2016 Coll., the accredited study programmes which are carried out by higher education institutions under the existing legal regulations on the last day before the date of entry into force of this Act, become degree programmes accredited under the Act No. 111/1998 Coll. as amended as of the effective date of this Act and are accredited for a specified period, but for at least 3 years from the effective date of this Act; for this period, the current division of these study programmes into branches of study remains unchanged.

Tab. 3.2.1 Overview of Accredited Study Programmes and Branches in English

STUD PROG	Study programme	KKOV	Study branch	Accreditation till	Standard length of studies Study form			
					B	N	P	F, A
B2301	Mechanical Engineering			01.03.2019	3			P, K A
N2301 (3 years)	Mechanical Engineering	2303T002	Engineering Technology *	31.10.2016		3		P, K A
		3901T003	Applied Mechanics *	31.10.2016		3		P, K A
		3902T021	Automated Control Systems in Mechanical Engineering *	31.10.2016		3		P, K A

		2301T030	Manufacturing Systems *	31.10.2016		3		P, K A
		2302T010	Machines and Equipment Design *	31.8.2024		3		P, K A
N2301 (2 years)	Mechanical Engineering	3909T010	Innovation Engineering	1.11.2020		2		P, K A
		2301T048	Engineering Technology and Materials	31.07.2020		2		P, K A
		2302T010	Machines and Equipment Design	31.07.2020		2		P, K A
		2301T049	Manufacturing Systems and Processes	31.07.2016		2		P, K A
M2301	Mechanical Engineering	3901T003	Applied Mechanics	31.03.2020		5		P, K A
P2301	Mechanical Engineering	3901V003	Applied Mechanics	1.03.2018			4	P, K A
		2301V031	Manufacturing Systems and Processes	10.02.2018			4	P, K A
		3911V011	Material Engineering	10.02.2018			4	P,K A
P2302	Machines and Equipment	2302V010	Machines and Equipment Design	31.12.2017			4	P,K A
P2303	Engineering Technology	2303V002	Engineering Technology	10.02.2018			4	P,K A

STUDPROG – study programmes codes
KKOV – study branch code
B – Bachelor's study programme
N – Master's study programme following up a Bachelor's study programme
M – Master's study programme
P – PhD. Study programme
F – form of study: P – full-time, K – part-time (combined) form of studies
A – Study programmes (study branches) carried out in English

3.3 Interest in Studies and Requirements for the Admission Procedure

Tab. 3.3.1 Applicants for studies in Bachelor's and Master's programmes for the academic year 2016/2017

Code	Study programme	Number of Applicants				
		Applied to studies	Accepted to studies	Acceptred after PŘ	Accepted in total	Enrolled
B2301	Mechanical Engineering (K)	145	134	0	134	120
B2301	Mechanical Engineering (P)	404	317	0	317	249
N2301	Mechanical Engineering (K)	38	35	0	35	34
N2301	Mechanical Engineering (P)	105	67	3	70	63
M2301	Mechanical Engineering (P)	19	15	0	15	12
P2301	Mechanical Engineering (K)	3	2	0	2	2
	Mechanical Engineering (P)	2	2	0	2	2
P2302	Machines and Equipment (K)	3	3	0	3	3
	Machines and Equipment (P)	3	3	0	3	2
P2303	Engineering Technology (K)	1	1	0	1	1

	Engineering Technology (P)	3	3	0	3	3
Faculty in total		**726**	**582**	**3**	**585**	**491**

Note.: P – full-time form of studies, K – part-time/combined form of studies, PŘ – review of the decision.

3.4 Number of Students and Alumni

Tab. 3.4.1 Number of Students Enrolled to studies as of 31 October 2016

KKOV	Study programme	Czech Republic			Foreigners			Total		
		P	K	total	P	K	total	P	K	total
B2301	Mechanical Engineering	366	148	514	81	9	90	447	157	604
M2301	Mechanical Engineering	14	0	14	1	0	1	15	0	15
N2301	Mechanical Engineering	86	70	156	50	3	53	136	73	209
P2301	Mechanical Engineering	21	13	34	11	4	15	32	17	49
P2302	Machines and Equipment	19	18	37	5	3	8	24	21	45
P2303	Engineering Technology	7	14	21	3	0	3	10	14	24
Faculty in total		**513**	**263**	**776**	**151**	**19**	**170**	**664**	**282**	**946**

Tab. 3.4.2 Number of International Students Enrolled as of 31 October 2016

Type	Form	Year							Total
		1.	2.	3.	4.	5.	6.	7.	
Bachelor‘s	K	3	2	4					9
	P	56	16	9					81
Follow-up	K	3							3
	P	32	17	1					50
Master‘s	K								0
	P				1				1
PhD	K	3		3	1				7
	P	4	6	1	4	2		2	19
Celkem	**P + K**	**101**	**41**	**18**	**6**	**2**		**2**	**170**

Tab. 3.4.3 Number of students as of 31 October 2017 Number of Alumni in 2017
(from 1.1.2016 to 31.12.2016)

Study programme	Number of students		Number of Alumni	
	Full-time	Part-time	Full-time	Part-time
Bachelor’s programme	447	157	70	17
NMSP (MSP) – Studies in Czech	151	73	50	32
NMSP (MSP) – Studies in English	66	52	8	7
Total	**664**	**282**	**128**	**56**

Tab. 3.4.4 Overview of Alumni and their Length of Studies

Study programme	Form	Date of graduation	Number of Alumni	Average length of studies
MSP	P			
	P			
	K			
	K			
Total MSP		0	**0**	**0**
NMSP	P	February 2016	0	–
	P	June 2016	50	2,38
	K	February 2016	2	6,5
	K	June 2016	30	2,9
Total NMSP		February + June	**82**	**2,67**
Total MSP + NMSP		February + June	**82**	–
BSP	P	February 2016	6	5,5
	P	August 2016	64	3,7
	K	February 2016	6	7,5
	K	August 2016	11	6,09
Total BSP		February + August	**87**	**4,39**
DSP	P		8	6,38
	K		7	8,57
Total DSP			**15**	**7,4**
Total alumni (BSP, MSP, NMSP, DSP)			**184**	**3,83**

Tab. 3.4.5 Number of Alumni in Study Programmes and Specializations between 2006–2016

Programme Branch Specialization	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
B2341 Engineering	**40**	**54**	**38**	**53**	**103**	**114**	**129**	**130**	**77**	–	–
Branch Materials and Technology	**27**	**37**	**18**	**20**	**40**	**41**	**53**	**60**	**30**	–	–
Specialization Material Engineering	12	13	4	6	16	16	13	12	4	–	–
Specialization Machining and Assembly	2	–	2	–	7	4	20	14	7	–	–
Specialization Engineering Metallurgy	2	2	3	4	5	12	5	11	5	–	–
Specialization Metal and Plastic Moulding	11	22	9	10	12	9	15	23	14	–	–
Branch Machines and Equipment	**8**	**10**	**13**	**15**	**27**	**28**	**51**	**47**	**18**	–	–
Specialization Transport Machinery and Equipment	5	5	7	11	11	21	22	28	9	–	–
Specialization Energy Machinery and Equipment	2	2	–	2	8	6	9	5	1	–	–

Specialization Glass Machinery	–	–	2	1	2	1	5	2	6	–	–
Specialization Machine Building	1	3	4	1	6	10	15	12	2	–	–
Branch Production Systems	**5**	**7**	**7**	**18**	**36**	**35**	**25**	**23**	**29**	–	–
Specialization Engineering Informatics	1	1	–	–	2	1	3	2	1	–	–
Specialization Production Management	4	6	5	15	16	14	17	12	14	–	–
Specialization Production systems	–	–	2	3	18	20	5	9	14	–	–
B2301 Mechanical Engineering								**6**	**30**	**50**	**87**
M2301 a N2301 Mechanical Engeeniring	**87**	**112**	**110**	**103**	**96**	**68**	**64**	**65**	**72**	**129**	**82**
Branch Applied Mechanics	**6**	**5**	**3**	**4**	**6**	**4**	**1**	**6**	**9**	**3**	**1**
Specialization Engineering Mechanics	5	4	1	4	6	2	–	4	8	2	1
Specialization Mechanics of Fluids and Thermodynamics	1	1	2	–	–	2	1	2	1	1	–
Branch Automated control systems in Engineering	**10**	**2**	**7**	**4**	**4**	**3**	**4**	**3**	**1**	**2**	–
Specialization Engineering Automation	10	2	7	4	4	3	4	1	–	2	–
Specialization Automatic Control of Technical Processes	–	–	–	–	–	–	–	2	1	–	–
Branch Machines and Equipment Design	**36**	**46**	**33**	**22**	**34**	**18**	**15**	**19**	**19**	**23**	**4**
Specialization Wheeled and Transport Handling Machines	14	18	12	10	14	6	5	7	4	5	2
Specialization Machine Tools and Assembly Machinery	–	3	2	2	1	3	2	1	1	2	–
Specialization Reciprocating Internal Combustion Engines	8	7	3	5	6	3	4	3	5	8	1
Specialization Glass and Ceramic Machinery	1	7	–	4	6	3	1	1	–	2	–
Specialization Heat Technology	6	10	10	–	3	2	3	3	4	5	1
Specialization Textile machines	7	1	6	1	4	1	–	4	5	1	–
Branch Engineering Technology	**30**	**56**	**55**	**50**	**32**	**24**	**23**	**17**	**20**	**20**	**2**
Specialization Material Engineering	17	8	13	8	15	8	4	2	5	4	2
Specialization Machining and Assembly	7	11	9	13	8	6	2	9	5	4	–
Specialization Engineering Metallurgy	5	10	16	9	7	6	3	2	3	3	–
Specialization Metal and Plastic Moulding	10	22	22	13	9	9	14	4	7	9	_
Branch Flexible Manufacturing Systems for Engineering Production	**5**	**3**	**8**	**10**	**11**	**9**	**11**	**7**	**10**	**6**	_
Branch Innovative Engineering	**–**	**–**	**4**	**13**	**9**	**10**	**10**	**13**	**13**	**6**	**7**
Specialization Product Innovation	–	–	4	13	9	10	10	13	13	6	7

Specialization Process Innovation	–	–	–	–	–	–	–	–	–	–	–
Branch Machines and Equipment Design										**25**	**26**
Specialization Textile Machine Design										5	2
Specialization Glass Machinery and Robotics										3	1
Specialization Manufacturing Machines										3	4
Specialization Motor Vehicles										12	13
Specialization Power Engineering Equipment										2	6
Specialization Instrumentation										0	–
Branch Engineering Technology and Materials										**36**	**29**
Specialization Zpracování plastů										10	10
Specialization Slévárenství, svařování a tváření kovů										11	13
Specialization Material Engineering										6	4
Specialization Machining and Assembly										9	2
Branch Production Systems and Processes										**8**	**13**
Specialization Production Systems										6	13
Specialization Automated control systems										2	–
TOTAL P2301+P2302+P2303	**21**	**9**	**16**	**9**	**17**	**12**	**14**	**5**	**23**	**8**	**15**
P2301 Mechanical Engineering	**7**	**5**	**6**	**3**	**8**	**9**	**5**	**1**	**10**	**4**	**6**
Branch Applied Machanics	**4**	**3**	**1**	**–**	**5**	**4**	**2**	**–**	**3**	**2**	**3**
Specialization Engineering Mechanics	4	3	–	–	5	3	1	–	2	–	3
Specialization Mechanics of Fluids and Thermodynamics	–	–	1	–	–	1	1	–	1	2	–
Branch Material Engineering	**–**	**1**	**3**	**2**	**2**	**4**	**3**	**–**	**5**	**1**	**3**
Branch Production Systems and Processes	**3**	**1**	**2**	**1**	**1**	**1**	**0**	**1**	**2**	**1**	–
Specialization Applied Cybernetics	1	2	–	–	1	–	–	1	1	1	–
Specialization Automation of technical preparation of production	–	–	–	–	–	–	–	–	1	–	–
Specialization Automation of machines and production processes	1	–	–	–	–	–	–	–	–	–	–
Specialization Manufacturing systems with industrial robots	1	–	–	1	1	–	–	–	–	–	–

P2302 Machines and Equipment	**6**	**2**	**5**	**2**	**3**	**1**	**3**	**3**	**10**	**1**	**4**
Branch Machines and Equipment Design	**6**	**2**	**5**	**2**	**3**	**1**	**3**	**3**	**10**	**1**	**4**
Specialization Machine Elements and Mechanisms	2	2	1	–	1	–	2	1	1	–	1
Specialization Wheeled Transport and Handling Machines	–	–	–	1	1	1	–	1	4	–	1
Specialization Machine Tools and Assembly Machinery	1	–	–	–	–	–	–	–	1	–	–
Specialization Reciprocating Internal Combustion Engines	–	–	2	1	1	–	1	–	1	–	–
Specialization Glass and ceramic Machinery	–	–	2	–	–	–	–	–	–	–	–
Specialization Technical Diagnostics of Machines	1	–	–	–	–	–	–	–	–	–	–
Specialization Textile and Sewing Machines	2	–	–	–	–	–	–	–	3	–	1
Specialization Thermal Equipment	–	–	–	–	–	–	–	1	–	1	1
P2303 Engineering Technology	**8**	**2**	**5**	**4**	**6**	**2**	**6**	**1**	**3**	**3**	**5**
Branch Engineering Technology	**8**	**2**	**5**	**4**	**6**	**2**	**6**	**1**	**3**	**3**	**5**
Specialization Material Engineering	3	1	–	–	–	–	–	–	–	–	–
Specialization Machining and Assembly	–	–	–	1	1	–	–	–	1	1	–
Specialization Casting	3	1	2	1	1	2	3	–	1	–	–
Specialization Welding	–	–	1	–	2	–	–	–	–	–	–
Specialization Metal Forming	2	–	1	2	2	–	3	–	–	–	–
Specialization Polymer manufacturing	–	–	1	–	–	–	–	1	1	2	5
Total for each year	**148**	**175**	**164**	**165**	**216**	**194**	**207**	**206**	**202**	**187**	**184**

Tab. 3.4.6 Number of Students of PhD study programmes in 2017 (as of 31 October 2016)

Department	Full-time	Part-time	Total	Defended 2016
KMP	2	0	2	3
KSP	8	11	19	5
KMT	15	5	20	3
KEZ	11	5	16	1
KST	6	9	15	1
KOM	2	4	6	0
KVM	9	8	17	1
KSR	3	0	3	0
KTS	5	2	7	1

KSA	5	8	13	0
Total	**66**	**52**	**118**	**15**

3.6 Scholarships

Tab. 3.6.1 Scholarships Paid to Students in 2016

Scholarship type	Number of students
Merit based	73
For outstanding research, development or other creative results contributing to deepen knowledge	209
In a difficult social situation	7
Accommodation scholarship	475
To support studies abroad	24
To support studies in the Czech Republic	52
For PhD students (DSP)	46
Total	**886**

Tab. 3.6.2 Amount of Scholarships Paid in 2016

Financial source of scholarships	Scholarship Type	Amount (in ths. CZK)
State budget	To DSP students	3 240
State budget – government scholarships	To international students	969
Scholarship fund of FS TUL		3 410
	Of which:	
	Merit-based scholarships	1 414
	extraordinary scholarships	986
	To support studies abroad	279
	To support studies in the Czech Republic	731
Other (SGS, IP, grants, donations)		2 411
Total		**10 030**

3.9 Quality of Teaching

Tab. 3.9.1 Publication Activity of FS TUL in 2017

Year	Number of published titles								
2015	Book in Czech	2015	Book in Czech	2015	Book in Czech	2015	Book in Czech	2015	Book in Czech
Total	1**	0	0	0	2 + 4*	8	6	40	2

* Next edition. ** Published by CTU in Prague.
Documented in detail in the annual reports of the departments.

3.10 Lifelong learning

Tab. 3.10.1 Lifelong Learning Courses in 2016 – Education for Business

Technical Sciences		
Course length	Course length	Course length
to 15 hours	14	112
16–100 hours	29	206
101 and more hours	0	0

4.1 Scientific-Research Activity

Tab. 4.1.1 Subsidies to FS TUL for scientific-research activity in 2016

Source	Share (%)	Subsidy (in ths. CZK)		
		NIV	INV	Total
Institutional Support	62,0	29 286	0	29 286
Grant support	24,0	11 353	0	11 353
Specific research support (SGC)	14,0	6 580	0	6 580
Total		47 219	–	47 219
Of which transferred to co-investigators				0
+ Non-public sources		494	0	494

Tab. 4.1.2 Development of subsidies for scientific and research activities

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FME	74,1	79,1	76,2	64,9	73,7	57,1	59,7	63,5	44,5	47,2
Of which INV			4,9	3,9	5,8	2,9	4,7	2,8		
Of which non-public			2	1,8	2,1	0,9		0,5	0,6	0,5
FME*										8,5

* FME under other components

4.1.3 Grant support to FS TUL for S&R in 2016

Provider	Program	Subsidy (in ths. CZK)		
		NIV	INV	Total
GA CR	GA-Standard projects	1 938	0	1 938
TA CR	ALFA (2011-2016)	3 098	0	3 098
TA CR	EPSILON (2015-2025)	1 554	0	1 612
MIT CR	TRIO	2 509	0	2 509
MoI CR	Program BV	1 224	0	1 224
H2020	H2020-SC-2015-one-stage	1 030	0	1 030
MEYS CR	7AMB / Shared Czech-Polish SP	0,1	0	0,1

Total	11 353	0	11 353
Of which transferred to co-investigator			0
Non-public sources			494

4.1.4 Targeted support for scientific research projects in 2017 – FME TUL share on solving projects under other TUL components

Provider	**Program**	**Component**
TA CR	Competence Centres (2012–2019)	CNATI
TA CR	ALFA (2011-2016)	CNATI
TA CR	EPSILON (2015-2025)	CNATI
TA CR	DELTA (2015-2025)	CNATI
TA CR	GAMA	CNATI
MEYS CR	NPU	CNATI
MoI CR	Security research (2015-2020)	CNATI
MoFA CR	Program to support medical applied research	FTME
Total share of FME approx.		8,49 mil CZK

Tab. 4.1.5 Targeted support for scientific and research projects of FME TUL (grants and special-purpose)

Source (in ths. CZK)	Year								
	2008	2009	2010	2011	2012	2013	2014	2015	2016
Targeted support FME	19 552	76 186	63 783	49 431	39 349	35 884	34 590	15 700	17 933
Of which non-public sources	1 200	2 000	900	749	900	*	499	615	494

* In previous years, a contract research project of the DGR, VZ and the Centre was solved and counted.

4.4 Scientific-Research Projects

Tab. 4.4.1 Scientific and research projects solved in 2016

Provider	Program	FS TUL as		Of which in 2017	
		Beneficiary	Co-beneficiary	End of solution	
GA CR	GA-Standardní projekty	0	2	1	1
TA CR	ALFA (2011-2016)	0	3	2	0
TA CR	EPSILON (2015-2025)	0	1	0	0
MIT CR	TRIO	0	4	0	4
EU / ME CR	LIFE+	0	1	1	0
H2020	H2020-SC-2015-one-stage	0	1	0	1
MEYS CR	7AMB ČS-polské VP	1	0	0	1
MEYS CR	ACTION	1	0	1	0

Total	**2**	**12**	**5**	**7**

4.5 Student Grant Competition

Tab. 4.5.1 List of student grant competition projects in 2016

Int.č.	Name of Projects Researcher	Solution period	Subsidy (in ths. CZK)
21001	Research and development of control structures of pneumatic, hydraulic and electrical components Ing. Radek Votrubec, Ph.D.	2014–2016	160
21070	Development of the system of devices for nanofibers yarns production and their optimalization for ophthalmological implants Ing. Andrii Shynkareno	2015–2016	250
21071	Development and prototype production of compact DLP 3D printer Ing. Iaroslav Kovalenko	2015–2017	290
21120	Research on advanced composites materials, polymeric materials, development and simulation of mechanical and mechatronic systems Ing. David Cirkl, Ph.D.	2016–2018	371
21121	Advanced Analysis Utilization the for the Research of the Special Material Types Application Possibilities in the Industrial Production Ing. Bc. Jiří Sobotka, Ph.D.	2016–2018	308
21122	Research of physical, thermal and technological parameters for the application of production technologies Ing. Jiří Machuta, Ph.D.	2016–2018	415
21123	Study and evaluation of the material's structure and properties Ing. Adam Hotař, Ph.D.	2016–2018	442
21124	Experimental and numerical investigation in applied fluid mechanics and energy devices doc. Ing. Václav Dvořák, Ph.D.	2016–2018	453
21125	Innovation of products and equipment i engineering practice Ing. Rudolf Martonka, Ph.D.	2016–2018	428
21126	Improving the quality of machining and assembly processes Ing. Miloslav Ledvina	2016–2018	186
21127	Modern methods of development and testing of vehicles and their parts Ing. Pavel Brabec, Ph.D.	2016–2018	549
21128	Research and development in the field of glass-producing machines, industrial and service robotics Ing. Vlastimil Hotař, Ph.D.	2016–2018	237
21129	Research of the structures and the procesess of textile and single-purpose machines Ing. Šimon Kovář, Ph.D.	2016–2018	356
21130	Research and development in the field of 3D technology, manufacturing systems and automation Ing. Radomír Mendřický, Ph.D.	2016–2018	354

21131	Research and development of devices for production of nanofibrous materials using AC-elektrospinning process	2016–2018	350
	Ing. Ondřej Bat´ka		
21132	Innovation of technical systems structures with the use of composite materials	2016–2018	226
	Ing. Petr Lepšík, Ph.D.		
21133	New approaches in transparent material acquisition	2016	226
	Ing. Ondřej Matúšek		
21134	Research of mechanical properties of selected living tissue and materials used in medicine	2016–2018	297
	Ing. Marek Kovář		
21135	Experimental and numerical research of real fluid	2016–2018	253
	Ing. Jan Novosád		
21136	Low Temperature Combustion in a single cylinder research engine	2016–2017	252
	Ing. Luboš Dittrich		
21016	Management SGC	2016	156
FS total			**6 580**

4.6 Scientific-research Conntractual and Complementary Activity

Tab. 4.6.1 Overview of Revenue of Contractual and Complementary Activity in 2016

Department	Contractual Research under FME (ths. CZK)		Complementary Activity under FME (ths. CZK)		Contractual Research under CNATI (ths. CZK)	Complementary Activity under CNATI (ths. CZK)
	N	U	N	U		
DAM	0	715	0	0	108	0
DET	0	3 109,3	0	461,8	1 669,6	0
DMS	0	85	0	0	696	0
DPE	0	1 491	0	0	113,45	0
DMM	358	2 426,4	0	1 439,8	99,6	0
DMA	0	0	0	0	22,4	0
DVE	0	499,5	0	1 275	660,7	0
DGR	64	0	0	1 009	0	10,4
DTD	62,5	0	0	2 565	13,3	0
DMA	399	376	0	0	0	40,2
Total	883,5	8 702,2	0	6 750,1	3 383,1	50,6
DFME					412,3	

Note: U - results be applied to RIV, N - results will not be applied to RIV.

Tab. 4.6.2 Development of the volume of funds from contractual research and supplementary activities

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Revenue (thousands of CZK)	11 720	11 597	9 499	9 600	8 171	8 131	9 373	12 115	11 692	13 351

Share of the profit on the revenues (%)	16,9	17,7	16,5	22,2	22,1	22	29	21,5	20,2	21,8

4.9 Results of Scientific Research and Development Activities of FME TUL

Tab. 4.9.1 Evaluation of results of FS TUL according to methodology for 2014 (evaluated period 2010–2014)

	Number of results	Result points	Points adjusted According to Annex 8 of the Methodology
Pillar I	425	5 098,62	4 268,72
Pillar II *			1 053,96
Pillar III			787,97**
H12apl	232,463	10 645,182	5 530,03
Total score			11 640,68***

* Pillar II was initialized in 2013 by an allocation of 1/9 of the sum of Pillar I, Pillar III points and applied research results from past evaluations. For 2014, this allocation was reduced by 10%. In 2015, this allocation was reduced by another 10%.
** Adjusted patent points 158.57, applied research projects and contract research 629.399 points.
*** Total number of points allocated without settlement between TUL components.

Tab. 4.9.5 Number of Faculty Outputs in 2012–2016

Type of output	Year					Total
	2012	2013	2014	2015	2016	
J – Article in a professional periodical	101	65	58	68	63	354
D – Article in proceedings	137	149	170	127	150	732
FP – industrial pattern	0	3	2	0	0	5
FU – utility model	19	18	17	19	7	80
GA – prototype	5	4	7	0	4	20
GB – Functional sample	37	13	16	9	6	81
B – professional book	6	1	2	6	1	16
P – patent	9	9	5	14	16	53
S – software	15	3	3	3	0	24
ZA – pilot plant	0	0	1	1	0	2
ZB – Proven technology	4	2	5	4	0	15
M – organizing a conference	8	4	0	4	4	20
W – organizing of workshop	8	11	6	8	0	33
Total	349	282	292	263	249	1435

Note.: Dates from 2012–2015 taken from www.rvvi.cz, dates for 2016 taken from publikace.tul.cz (data in the databases as of February 14, 2017).

Tab. 4.9.6 Number of Selected Outputs by Departments in 2016 and 2017 (number of results)

Workplace	Year 2015 / Year 2016													Total	
	J	D	FP	FU	GA	GB	B	P	S	ZA	ZB	M	W	Number	Share (%)
DAM	10	11	0	2	0	0	0	1	0	0	0	1	0	25	8,2
	4	9	0	0	0	0	0	0	0	0	0	0	0	13	5,1
DET	9	30	2	5	0	1	0	4	0	0	0	0	0	51	16,7
	19	33	0	5	0	0	0	2	0	0	0	0	0	59	23,3
DMS	23	26	0	2	0	0	0	2	0	0	0	1	0	54	17,6
	14	12	0	0	0	0	0	2	0	0	0	0	0	28	11,1
DPE	7	16	0	0	1	0	3	0	0	0	0	1	0	28	9,2
	2	24	0	0	0	0	1	1	0	0	0	2	0	30	11,9
DMA	6	36	0	0	0	1	2	1	0	0	0	1	2	49	16,0
	5	22	0	0	0	2	0	0	0	0	0	0	0	29	11,5
DMM	1	25	0	0	0	0	1	2	0	0	0	0	5	34	11,1
	6	19	0	0	3	1	0	2	0	0	0	0	0	31	12,3
DMA	2	4	0	0	0	0	0	1	0	0	0	0	0	7	2,3
	7	3	0	0	0	0	0	0	0	0	0	1	0	11	4,3
DVE	9	19	0	0	0	1	0	2	0	0	0	0	0	31	10,1
	3	16	0	0	0	0	0	3	0	0	0	0	1	23	9,1
DGR	3	5	0	0	0	0	0	0	0	0	0	0	0	8	2,6
	2	7	0	0	0	0	0	0	0	0	0	0	0	9	3,6
DTD	4	3	0	4	0	4	0	3	0	0	0	0	1	19	6,2
	1	5	0	2	0	3	0	8	0	0	0	1	0	20	7,9
Total	74	175	2	13	1	7	6	16	0	0	0	4	8	306	
	63	150	0	7	3	6	1	18	0	0	0	4	1	253	

Note.: Data taken from publikace.tul.cz (data in the database as of 14 February 2017).

Tab. 4.9.7 Number of Selected Outputs of Faculty Departments in 2015 and 2016 (share of results)

Workplace	Year 2015 / Year 2016													Total	
	J	D	FP	FU	GA	GB	B	P	S	ZA	ZB	M	W	Number	Share (%)
DAM	2,5	10,7	0	1,3	0	0	0	1	0	0	0	1	0	16,5	7,9
	5,7	7,3	0	0	0	0	0	0	0	0	0	0	0	13	6,8
DET	8,2	27	0	3	0	1	0	3,5	0	0	0	0	0	42,7	20,4
	15	24,8	0	4,4	0	0	0	2	0	0	0	0	0	46,2	24,1
DMS	11	16	0	1,5	0	0	0	0,3	0	0	0	0,4	0	29,2	13,9

	7,5	8,9	0	0	0	0	0	0,8	0	0	0	0	0	17,2	9,0
DPE	4,9	9,7	0	0	1	0	2,3	0	0	0	0	1	0	18,9	9,0
	1,5	19	0	0	0	0	0,5	0,5	0	0	0	2	0	23,5	12,2
DMA	4,2	27,3	0	0	0	1	2	1	0	0	0	1	0	36,5	17,4
	3,5	18,2	0	0	0	2	0	0	0	0	0	0	0	23,7	12,4
DMM	1	14,7	0	0	0	0	0,3	0,8	0	0	0	0	5	21,8	10,4
	4,7	14,8	0	0	0,9	0,3	0	0,4	0	0	0	0	0	21,1	11,0
DMA	2	2,7	0	0	0	0	0	0,7	0	0	0	0	0	5,4	2,6
	3,7	1	0	0	0	0	0	0	0	0	0	1	0	5,7	3,0
DVE	3,1	14	0	0	0	0,3	0	1,7	0	0	0	0	0	19,1	9,1
	1,3	13,8	0	0	0	0	0	2,7	0	0	0	0	1	18,8	9,8
DGR	2,5	5	0	0	0	0	0	0	0	0	0	0	0	7,5	3,6
	2	7	0	0	0	0	0	0	0	0	0	0	0	9	4,7
DTD	2,3	1,7	0	2,7	0	2,8	0	2,3	0	0	0	0	0,2	12	5,7
	1	2,9	0	1,1	0	2,1	0	5,9	0	0	0	0,7	0	13,7	7,1
Total	41,7	128,8	0	8,5	1	5,1	4,6	11,3	0	0	0	3,4	5,2	209,6	
	45,9	117,7	0	5,5	0,9	4,4	0,5	12,3	0	0	0	3,7	1	191,9	

Note.: Data taken from publikace.tul.cz (data in the database as of February 14, 2017).

Tab. 4.9.8 Results included in the faculty round of selection of significant results within the II. Pillar

Name of Result	Author	Result type	Application year	Workplace
Counterflow enthalpy heat exchanger	Dvořák Václav, Hazuka Filip, Chlup Jaroslav, Vít Tomáš	G – prototype	2014	DPE
Method of determining cooling ability of a medium for particular processed materials including possibility to simulate heat treatment of dimensional parts	Moravec Jaromír, Nováková Iva	P – patent	2015	DET
The effect of Zr on high-temperature oxidation behaviour of Fe_3Al-based alloys	A. Hotař, P. Kejzlar, M. Palm, J. Mlnařík	J – Article in a professional periodical	2015	DMS
A comparison of experimental estimation methods of the ploughing force in orthogonal cutting	Alexey Popov, Andrey Dugin	J – Article in a professional periodical	2013	DMA

A method for production polymer nanofibers spinning solution or melt of polymer in electric field and the formation of a linear polymeric nanofibres created in this way	Amler E., Beran J., Bílek M., Buzgo M., Chvojka J., Kočiš L., Košťáková E., Lukáš D., Míčková A., Mikeš P., Pokorný P., Valtera J.	P – Patent	2013	DTD
Suspension of Vehicle Wheel, Especially of Vehicle for Rough Terrain Driving	Šír Miroslav	P – Patent	2015	DAM
Compensation device for proportional pneumatic distributor	Michal Moučka	P – Patent	2015	DMA

Tab. 4.9.9 Results produced by FS in 2016 in A-K Branches (according to Classification of CEP & CEZ & RIV Branches)

Branch Classification	Number of outputs	Recalculated shares (%)
A Social Sciences	1	0,25
B Physics and mathematics	12	11,25
D Earth sciences	1	0,62
E Biosciences	2	0,18
J Industry	1	0,5
Total	2	2
A Social Sciences	223	185,48
B Physics and mathematics	242	200,28

Note.: Data taken from publikace.tul.cz (data in the database as of 15 February 2017)

Tab. 4.9.10 Frequency of Results produced by FS in 2017 in Branches A–K (according to the Branch Classification CEP & CEZ & RIV)

Branch Classification	Number of outputs	Recalculated shares (%)
A Social sciences	1	0,25
B Physics and mathematics	24	19,25
D Earth sciences	1	0,05
E Bioscience	1	0,95
J Industry	423	366,83
Total	450	387,33

Note.: Data taken from publikace.tul.cz (data in the database as of 15 February 2017)

Tab. 4.9.11 Results produced by FS in 2015 in JA-JY Branches (according to Classification of CEP & CEZ & RIV Branches)

Branch Classification	Number of outputs	Recalculated shares (%)
JA Electronics and optoelectronics, electrical engineering	1	1
JB Sensors, measuring and regulation	27	22,56
JD Use of computers, robotics and its applications	12	10,95

JE Non-nuclear energy, energy consumption and use	10	7,58
JG Metallurgy, metal materials	30	26,46
JH Ceramics, refractory materials and glass	3	2,67
JI Composite materials	11	6,83
JJ Other materials	11	5,32
JK Corrosion and surface treatment of material	3	2,85
JL Material fatigue and fracture mechanics	2	2
JO Ground transport systems and equipment	6	5,42
JP Industrial processes and processing	23	18,08
JQ Machinery and tools	20	18,09
JR Other mechanical engineering	21	15,41
JS Reliability and quality management, testing	22	22
JT Propulsion, engines and fuels	21	13,76
Total	**223**	**180,98**

Note.: Data taken from publikace.tul.cz (data in the database as of 15 February 2017)

Tab. 4.9.11 Results produced by FS in 2016 in JA-JY Branches (according to Classification of CEP & CEZ & RIV Branches)

Branch Classification	Number of outputs	Recalculated shares (%)
JA Electronics and optoelectronics, electrical engineering	6	3,42
JB Sensors, measuring and regulation	2	2
JD Use of computers, robotics and its applications	1	1
JE Non-nuclear energy, energy consumption and use	55	53,52
JG Metallurgy, metal materials	23	17,47
JH Ceramics, refractory materials and glass	5	3,9
JI Composite materials	35	28,42
JJ Other materials	35	19,17
JK Corrosion and surface treatment of material	16	15,53
JL Material fatigue and fracture mechanics	1	1
JO Ground transport systems and equipment	1	1
JP Industrial processes and processing	57	47,71
JQ Machinery and tools	87	79,68
JR Other mechanical engineering	71	66,01
JS Reliability and quality management, testing	9	9
JT Propulsion, engines and fuels	19	17
Total	**423**	**365,83**

Note.: Data taken from publikace.tul.cz (data in the database as of 15 February 2017)

Tab. 4.9.13 Number of Outputs of the SGC projects between 2015 and 2016

Type of output	Number of outputs		Recalculated share of FME outputs	
	2015	2016	2015	2016
J – Article in a professional periodical	20	18	14,3	17,8
D – Article in proceedings	65	68	57,69	63,35
FP – industrial pattern	0	0	0	0
FU – utility model	0	0	0	0
GA – prototype	0	0	0	0
GB – functional sample	1	2	1	2
B – professional book	2	0	2	0
P – patent	1	0	1	0
S – software	1	0	1	0
ZA – pilot plant	0	0	0	0
ZB – Proven technology	0	0	0	0
C – Chapter in a monograph	4	0	0,7	0
O – other outputs	1	0	1	0
Total	**95**	**88**	**78,69**	**83,15**

Note: Data taken from the database publikace.tul.cz as of February 15, 2017.

Tab. 4.9.14 Number of Outputs financed from Institutional Support between 2015 and 2016

Type of output	Number of outputs		Recalculated share of FME outputs	
	2015	2016	2015	2016
J – Article in a professional periodical	18	23	11,66	14,39
D – Article in proceedings	47	32	37,35	27,64
FP – industrial pattern	0	0	0	0
FU – utility model	1	0	1	0
GA – prototype	0	0	0	0
GB – functional sample	1	0	1	0
B – professional book	4	1	2,67	0,5
P – patent	6	9	4,09	6,37
S – software	0	0	0	0
ZA – pilot plant	0	0	0	0
ZB – Proven technology	0	0	0	0
C – Chapter in a monograph	1	0	0,25	0
O – other outputs	1	1	1	1
Total	**79**	**66**	**59,02**	**49,9**

Note: Data taken from the database publikace.tul.cz as of February 15, 2017.

5.2 International Cooperation in Education

Tab. 5.2.1 Overview of cooperation based on inter-university agreements 2016

Type of Agreement / Country	Partner institution
Inter-university cooperation	
Brazil	Pontifícia Universidade Católica do Rio de Janeiro
Bulgaria	Technical University of Sofia
France	Université de Franche-Comté, ISIFC
India	Apollo Engineering College
Indonesia	Diponegoro University
Canada	Conestoga College Institute of Technology and Advance Learning, Ontario
Canada	University of Waterloo, Ontario
Kazakhstan	Kazakh – British Technical University
Norway	Ostfold University College
Slovakia	Trenčianska univerzita Alexandra Dubčeka
Germany	Hof University of Applied Sciences
Thailand	King Mongkuts´s University of Technology North Bangkok
Vietnam	Nha Trang University, Faculty of Mechanical Engineering
Agreements with institutes/institutions	
PL	Institute for Engineering of Polymer Materials and Dyes, Torun
USA	ATCC – Material Transfer Agreement
Erasmus – inter-institutional agreements	
See chapter 5.4	54 institutions
Total	**69**

5.3 International S&R mobility and development projects

Tab. 5.3.1. CEEPUS – mobility funds – incoming academic staff and students

Year	2012	2013	2014	2015	2016
Contribution (CZK)	137 000	207 000	127 576	213 764	100 600

Tab. 5.3.2 International projects

Provider	Program	Solution period	Foreign Partner	Type of collaboration
MEYS CR	AKTION	2015-2016	Technische Universität Graz, Rakousko	Mobility S&R
MEYS CR	AMB	2016-2017	Politechnika Bialostocka, Polsko	Mobility S&R
EU	H2020	2016-2018	National Technical University of Athens	S&R
EU	OP	2015-2019	Hochschule Zittau/Görlitz	Development

			Technische Universität Dresden	
EU	OP	2016-2019	Technische Universität Dresden	Development

See Annex 5.3 for details.

5.4 International Mobility

Tab. 5.4.1 International mobility under programs in 2016

Program	ERASMUS			CEEPUS	IAESTE	AKTION
	C	U	Z			
Number of outgoing students	27*	20	7	3	0	0
Number of incoming students	97	59	38	5**	10***	0
Number of outgoing academic/other staff	9****	9	0	1	0	0
Number of incoming academic/other staff	4*****	4	0	5******	0	2
Total	**137**	**92**	**45**	**14**	**10**	**2**

C – total, U – completed, Z – started.
* of which 4 Ph.D., all mobilities in the length of at least 28 days in 2017.
** all incoming stays in the length of at least 14 days in 2017.
*** NMSP students, all mobilities in the length of at least 28 days in 2017
**** all incoming stays in the length of at least 28 days in 2017.
***** of which 1 mobility shorter than 5 days.
****** of which 7 incoming stays in the length of less than 5 days.
******* Incoming stays in the length of at least 5 days.

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

Tab. 5.4.2 Other International Activities outside Programs in 2016

Activity	Conference Active participation	Conference Passive participation	Negotiation on cooperation	Other
Outgoing students	10	1	1	33*
Incoming students	9	0	0	14**
Outgoing academic/other staff	16	1	20	26***
Incoming academic/other staff	27	4	2	3****
Total	**62**	**6**	**23**	**76**

* Of which 2 internship in the length of at least 28 days (outside programs), professional training course.
** Of which 6 internship in the length of at least 28 days (outside programs), 8 professional training courses.
*** Fair, training, seminar, presentation, excursion, meeting of departments, various.
**** Lecture, professional course.
Note.: Conference participation does not include 175 participants of Experimental Fluid Mechanics 2016 conference due to no distinction between student and academic status.

Tab. 5.4.3 Mobility in the framework of government scholarships, development projects, other sources in 2016

Program	Government scholarships	Development projects	Other sources	Self-funding students
Number of outgoing students	1	8*	22**	0
Number of incoming students	9***	0	19****	41*****
Number of outgoing academic /other staff	0	10******	24*******	0
Number of incoming academic /other staff	0	4********	7*********	0
Total	**10**	**22**	**72**	**41**

* 6 students supported from IRP Mobility Fund TUL 2016 - of which 3 stays lasting less than 28 days, 1 Mobility Fund TUL 2015 stay completed, 1 student supported from IRP FS 12280.

** 1x internship lasting at least 28 days and 1 short stay within 7AMB, Joint Czech-Polish. research projects, 4 short trips within the project Cooperation Program Czech Republic. Free State of Saxony, BauQu, 14 credit. trips within the Czech Republic Cooperation Program. Free State of Saxony, GreK, x short stay within HORIZONT 2020, EQUINOX, 1x short stay within SGC.

*** Kunosic, Kabl, Guanlao, Attia, Habashy, Salem, Aidoo, Tsao – NMSP study, Cubreli – DSP study.

**** 17 short-term stays within the project Czech Republic – Free State of Saxony, 2 short-term stays within the project Norwegian funds (DMM/project submitted under CNATI).

***** Of which 38 students – NMSP and Ph.D. study, 3 students – internships lasting at least 28 days.

****** 8 Mobility Fund TUL 2016 stays, of which 2 trips supported from FOM 2016 partly, all in the length of at least 5 days, 1 CRP, 1 stay within IRP FME 12280.

******* 2 trips / internship of min. 3 weeks (Czech-Saxony, BauQu), 3 credit mobilities (BauQu), 5 credit (s) mobilities within the EC OP (sustainability), 2 credit mobilities (7AMP, Poland), 3 credit mobilities (EQUINOX), 8 credit mobilities (GreK), 1 credit mobilities within SGS.

******** Arrivals under the IRP Mobility Fund 2016, of which 1 stay shorter than 5 days.

********* 1 stay of at least 28 days (7AMP, Poland), 3 credit mobilities (7AMP, Poland), 3 credit mobilitied GreK).

Tab. 5.4.4 Mobility under Programs, IRP, government scholarships, self-funding students, other sources according to countries in 2016

Country	Number of outgoing students	Number of incoming students	Number of outgoing staff	Number of incoming staff
Belgium		1 (IAESTE)		
Bosnia and Herzegovina		1 (IAESTE), 1 (government scholarship)		
Brazil		2 (self-funding student)		
Bulgaria		1 (Erasmus)	1 (CEEPUS)	2(CEEPUS)
China	1 (government scholarship)			
Egypt		4 (government scholarship) + 1 (self-funding student)		
Philippines		1 (government scholarship)		
Finland	1 (Erasmus)			
France	3 (Erasmus)	23 (Erasmus)	4 (Erasmus, oh which 1 was „other workship stays in the length of 5 days)	1 (Erasmus, shorter than 5 days)

Ghana		1 (government scholarship)		
Croatia		1 (IAESTE)		
India		28 (self-funding student)		
Indonesia			1 (FOM partly financed)	
Italy	1 (FOM, shorter than 28 days)			1 (FOM, shorter than 5 days)
Izrael	1 (FOM, shorter than 28 days)			
Japan		1 (IAESTE)		
Canada	1 (IRP 12280)		1 (IRP 12280)	
Kosovo		2 (self-funding student) + 1 (government scholarship)		
Cyprus		1 (IAESTE)		
Lithuania		7 (Erasmus)	1 (Erasmus, 5 days lasting stay)	
Hungary		2 (Erasmus)		2 (CEEPUS)
Malta			1 (CRP)	
Mexico		1 (IAESTE)		
Germany	11 (Erasmus) + 18 (other sources, short-term stays)	4 (Erasmus) + 2 (self-funding student) + 17 (other sources, short-term stays)	2 (Erasmus, pobyty v délce=5 days) + 2 (FOM) + 18 (other sources, of which 2 stays in the length of 3 weeks)	2 (FOM, 5 days) + 3 (other sources, short-term stay)
Norway		2 (other sources, short-term stay)		
New Zealand	1 (FOM)			
Poland	1 (Erasmus) + 3 (other sources, of which 1 stay lasting more than 28 days)	4 (Erasmus) + 3 (CEEPUS) + 1 (IAESTE) + 2 (self-funding student)	3 (other sources)	1 (Erasmus, shorter than 5 days) + 1 (CEEPUS) + 1 (FOM, longer than 5 days + 4 (other sources, of which 1 stay lasting longer than 28 days)
Portugal	7 (Erasmus)	17 (Erasmus)	1 (Erasmus,1 stay longer than 5 days)	
Austria				2 (AKTION)
Romania		1 (Erasmus)		
Greece		2 (Erasmus)	2 (other sources)	
Slovakia	3 (Erasmus) + 1 (CEEPUS) + 1 (FOM, shorter than 28 days)	2(CEEPUS)	1 (Erasmus, in the length of 5 days)	
Slovenia	2 (CEEPUS)			

Spain	1 (other sources, short-term stay)	9 (Erasmus)	1 (FOM) + 1 (other sources)	
Switzerland	1 (FOM)	1 (IAESTE)		
Taiwan		1 (government scholarship)		
Thailand	2 (FOM)	1 (self-funding student)	3 (FOM)	
Turkey	1 (Erasmus)	27 (Erasmus) + 1 (self-funding student)		2 (Erasmus, of which 1 stay shorter than 5 days)
USA			1 (FOM partly financed)	
Great Britain		2 (IAESTE)		
Vietnam		2 (self-funding student)		

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

Tab. 5.4.5 Development of international mobility and other activities

Activity	Number of outgoing and incoming mobilities								
	2010	2011	2012	2013	2014	2015	2016		
	Total	Total	Total	Total	Total	Total	P	OA	C
Outgoing students	80	91	56	68	111	94	61*	45	106
Incoming students	44	54	52	78	98	134	181**	23	204
Outgoing academic/other staff	147	95	108	137	117	135	44***	63	107
Incoming academic/other staff	71	229	31	50	51	52	22****	36	58
Total	**342**	**469**	**247**	**333**	**377**	**415**	**308**	**167**	**475**

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

P – within programs: * of which 8 outgoing – IRP, 1 stay – government scholarship and 22 outgoing – other sources,

(Tab.5.4.1., 5.4.3) ** of which 9 government scholarships, 41 incoming – self-funding and 19 incoming – other sources,

*** of which 9 IRP, 1 CRP, 24 other sources,

**** of which 4 IRP, 7 other sources.

6.4 Expert Activity

Tab. 6.4.1 Expert Activity

Year	Number of reviews	Service (ths. CZK)
2012	0	0
2013	2	undifferentiated
2014	4	26,40
2015	3	259,98
2016	4	42,68

Tab. 6.4.2 Authorized emission measurement

Year	2012	2013	2014	2015	2016
Service (ths.CZK)	112,33	110,00	64,41	23,00	16,00

Tab. 6.4.3 Experts from the application sphere involved in teaching and practice in accredited study programmes of FME TUL in 2016

Department	Persons in labour-law relationship with the university or its unit			Persons without labour-law relationship with the university or its unit		
	Participating in instruction	Supervision of final thesis	Involved in practice	Participating in instruction	Supervision of final thesis	Involved in practice
DAM	5	1	0	0	0	3
DET	0	0	0	0	3	16
DMS	0	0	0	0	0	0
DPE	4	1	2	0	0	1
DMM	0	0	0	0	0	0
DMA	0	0	0	0	7	11
DVE	1	1	1	4	12	19
DGR	1	0	0	0	0	0
DTD	1	0	0	0	0	3
DMA	1	1	0	0	0	1
Total	13	4	3	4	22	54

7.1 Quality and Culture of Academic Life

Tab. 7.1.1 Overview of Courses of further education of FME engineering employees in 2016

Course characteristics	Number of courses	Number of participants
Oriented towards pedagogical skills	2	11
Courses oriented towards general skills	2*	5* + 24**
Courses oriented to languages **	12	22

** Courses organized by CDV TUL, language schools, courses organized by departments.

7.3 Development and Investment Projects financed by MEYS CR

Tab. 7.3.1 Institutional Development Plan for 2016 – partial projects run by FME TUL

Int. No.	Project title FME TUL Researcher / Workplace	Allocated funds (ths. CZK)		
		INV	NIV	Total
12228	Innovation of the computer lab G201 Ing. Michal Sivčák, Ph.D. / DAM	260	0	260
12270	Creation of study texts in English for international students Ing. Ivo Matoušek, Ph.D. / DFME	0	250	250

12280	TUL as an important partner in the international learning space – strengthening existing cooperation with partner universities from Canada and the USA Ing. Marcela Válková / DFME	0	100	100
12289	Energy savings in buildings in practice Ing. Petra Dančová, Ph.D. / DPE	0	160	160
12290	Implementation of model assemblies in practice Ing. Rudolf Martonka, Ph.D. / DMM	0	75	75
12241	Innovation of teaching subjects in biomechanics Ing. Marek Kovář / DAM	0	100	100
12304	Monitoring of quality and utility properties of polymers including their composites depending on moisture content Ing. Luboš Běhálek, Ph.D. * co-funding: 179 810 CZK from FRIM 2200	330	0	330
Total FS TUL		590	685	1 275

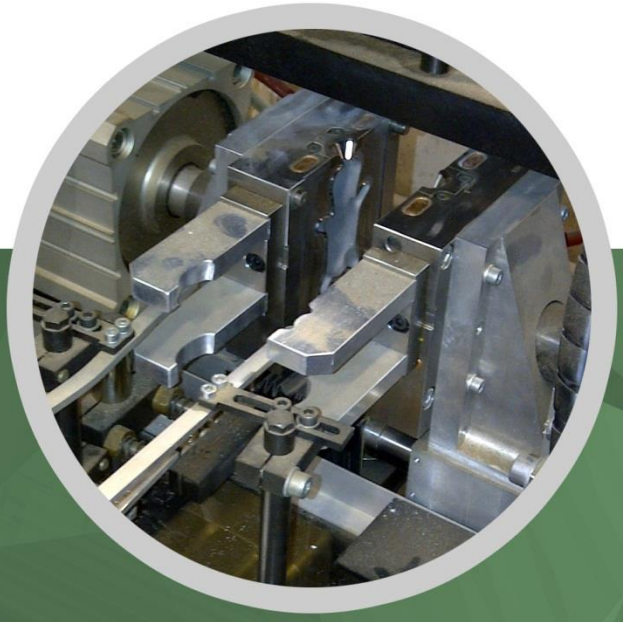
7.4 Projects financed from EU Structural FUnds 2014-2020

7.4.3 OP Research, Development and Education

Tab. 7.4.3 Involvement in Cooperation Program Czech Republic – Free State of Saxony projects

Registration number	Name of the project	Subsidy (CZK)	Implementation
100252772	Cross-border cooperative teaching of plastics processing technologies Zittau-Liberec	290 000	2015–2019
100252950	Building partnerships in building technology research to educate scientific followers in the border region – BauQu	862 560	2016–2019

TEXT
ANNEXES



TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

TEXT ANNEXES

2.4 Appointing procedures of Associate Professors and Professors

Professor procedures

Name and surname:	**doc. Dr. Ing. Pavel Němeček**
Workplace:	Faculty of Mechanical Engineering TU of Liberec, Department of Vehicles and Engines
Branch:	Design of Machines and Equipment
Topic of professor lecture:	Acoustic absorption in car construction
Date of initiation of the procedure:	March 31, 2015
Defended in front of SB FS TUL:	October 7, 2015
Defended in front of SB TUL:	November 30, 2015
Appointment date:	May 17, 2016

Name and surname:	**doc. Dr. Ing. František Manlig**
Workplace:	Faculty of Mechanical Engineering TU of Liberec, Department of Production Systems and Automation
Branch:	Production systems and processes
Topic of professor lecture:	Complex optimization of production systems with support of computer simulation
Date of initiation of the procedure:	October 1, 2015
Date of termination of the procedure:	April 6, 2016

Name and surname:	**doc. Ing. Karel Fraňa, Ph.D.**
Workplace:	Faculty of Mechanical Engineering TU of Liberec, Department of Power Engineering
Branch:	Design of Machines and Equipment
Topic of professor lecture:	Saving energy and reducing energy intensity
Date of initiation of the procedure:	February 19, 2016
Defended in front of SB FS:	October 21, 2016
Defended in front of SB TUL:	November 28, 2016
Appointment date:	submitted to the Ministry of Education, Youth and Sports of the Czech Republic

Associate Professors (Habilition) procedures

Name and surname:	**Ing. Michal Petrů, Ph.D.**
Workplace:	Faculty of Mechanical Engineering TU of Liberec, Department of Machine Parts and Mechanisms
Branch:	Machines and Equipment Design
Title of habilitation thesis:	Numerical modeling to support research and development of long fiber reinforced composite frames
Topic of habilitation lecture:	Modeling of machine parts in CAD systems using parametric equations
Date of initiation of the procedure:	January 20, 2016
Defended in front of SB TUL:	September 21, 2016
Appointment date:	October 1, 2016

Name and surname:	**Ing. Jaromír Moravec, Ph.D.**
Workplace:	Faculty of Mechanical Engineering University of Liberec, Department of Engineering Technology
Branch:	Technologies and Materials
Title of habilitation thesis:	Methodical procedures applicable to the input of numerical simulations of welding and heat treatment
Topic of habilitation lecture:	Joining of materials by welding – advantages, disadvantages, possibilities, applications
Date of initiation of the procedure:	January 20, 2016
Defended in front of SB TUL:	October 29, 2016
Appointment date:	October 1, 2016

Name and surname:	**Ing. Jiří Machuta, Ph.D.**
Workplace:	Faculty of Mechanical Engineering TUniversity of Liberec, Department of Engineering Technology
Branch:	Technologies and Materials
Title of habilitation thesis:	Contribution to knowledge about quality of selected foundry mold materials and influence of their parameters on casting quality
Topic of habilitation lecture:	Simulation programs designed for solidification and cooling of castings
Date of initiation of the procedure:	March 21, 2016
Defended in front of SB TUL:	November 30, 2016
Appointment date:	The proceedings are in progress

Name and surname:	**Ing. Páv, Ph.D.**
Workplace:	ŠKODA AUTO a.s. Mladá Boleslav, Faculty of Mechanical Engineerin TU of Liberec, Department of Vehicles and Engines
Branch:	Machines and Equipment Design
Title of habilitation thesis:	Adaptive combustion model of a homogeneous mixture in a cylinder of a spark-ignition internal combustion engine
Topic of habilitation lecture:	High pressure indication of piston engine
Date of initiation of the procedure:	February 9, 2016
Defended in front of SB TUL:	November 30, 2016
Appointment date:	The proceedings are in progress

Name and surname:	**Ing. Štěpánka Dvořáčková, Ph.D.**
Workplace:	Faculty of Mechanical Engineering TUniversity of Liberec, Department of Machining and Assembly
Branch:	Technologies and materials
Title of habilitation thesis:	Contactless system for measuring the length of gauge blocks
Topic of habilitation lecture:	Verification of working gauges in practice
Date of initiation of the procedure:	May 20, 2016
Status:	The proceedings are in progress

Name and surname:	**RNDr. Věra Vodičková, Ph.D.**
Workplace:	Faculty of Mechanical Engineering TU of Liberec, Department of Materials
Branch:	Technologies and materials
Title of habilitation thesis:	Phase structure and high temperature mechanical properties of aluminides based on FeAl and Fe3Al in the presence of additives
Topic of habilitation lecture:	Structural analysis of metallic materials, current methods and possibilities
Date of initiation of the procedure:	October 5, 2016
Status:	The proceedings are in progress

Name and surname:	**Ing. Petr Jirásko, Ph.D.**
Workplace:	VÚTS, a.s.
Branch:	Applied Mechanics
Title of habilitation thesis:	Mechatronics of Drive Mechanisms (Monographs)
Topic of habilitation lecture:	Methodology of application of mechatronic systems in drives of working members of production machine mechanisms
Date of initiation of the procedure:	November 25, 2016
Status:	The proceedings are in progress

3.4 List of Doctoral Graduates in 2016

Name and surname:	**Ing. Robert Záboj**
Study Branch:	2303V002 Engineering Technology
Specialization:	Plastics processing
Supervising workplace:	Department of Engineering Technology
Supervisor:	prof. Dr. Ing. Petr Lenfeld
Dissertation topic:	Research of influence of injection parameters (melt temperature, pressure, velocity) on local shrinkage of injection
Date of defense:	19. ledna 2016

Name and surname:	**Ing. Martin Seidl**
Study Branch:	2303V002 Engineering Technology
Specialization:	Plastics processing
Supervising workplace:	Department of Engineering Technology
Supervisor:	prof. Dr. Ing. Petr Lenfeld
Dissertation topic:	Research of the effects of preparation technology and components of three-phase polymer composites filled with natural fibers on the processability and kinetics of first-order phase transitions
Date of defense:	January 19, 2016

Name and surname:	**Ing. Petr Henyš**
Study Branch:	3901V003 Applied Mechanics
Specialization:	Engineering mechanics
Supervising workplace:	Department of Mechanics, Elasticity and Strength
Supervisor:	doc. Ing. Lukáš Čapek, Ph.D.
Dissertation topic:	Diagnostic tool for initial fixation of acetabular implant
Date of defense:	February 19, 2016

Name and surname:	**Ing. Michal Ackermann**
Study Branch:	3901V003 Applied Mechanics
Specialization:	Engineering mechanics
Supervising workplace:	Department of Mechanics, Elasticity and Strength
Supervisor:	doc. Ing. Lukáš Čapek, Ph.D.
Dissertation topic:	Fatigue properties of shape memory alloys with regard to their use in medicine
Date of defense:	February 19, 2016

Name and surname:	**MUDr. Pavel Buchvald**
Study Branch:	3901V003 Applied Mechanics
Specialization:	Engineering mechanics
Supervising workplace:	Department of Mechanics, Elasticity and Strength
Supervisor:	prof. Ing. Miroslav Václavík, CSc.
Dissertation topic:	Possibilities of fixation of tooth fractures of the second cervical vertebra
Date of defense:	February 19, 2016

Name and surname:	**mgr inz Przemyslaw Ceynowa**
Study Branch:	3911V011 Material Engineering
Supervising workplace:	Department of Materials
Supervisor:	prof. Dr. Stanislaw Mitura, DrSc.
Dissertation topic:	Modification of Diamond Nanopowders by MW PACVD Rotary Reactor Chamber
Date of defense:	February 26, 2016

Name and surname:	**Ing. Radovan Kovář**
Study Branch:	2302V010 Machines and Equipment
Specialization:	Machine parts and Mechanisms
Supervising workplace:	Department of Machine Parts and Mechanisms
Supervisor:	prof. Ing. Ladislav Ševčík, CSc.

Dissertation topic:	Development of nodes of the line for the production of inorganic materials
Date of defense:	April 6, 2016

Name and surname:	**Ing. Lenka Volfová**
Study Branch:	3911V011 Materials Engineering
Supervising workplace:	Department of Materials
Supervisor:	prof. RNDr. Petr Špatenka, CSc.
Dissertation topic:	Influence of diffusion on PECVD functional layers
Date of defense:	June 22, 2016

Name and surname:	**Ing. Pavel Petera**
Study Branch:	2303V002 Engineering Technology
Specialization:	Plastics processing
Supervising workplace:	Department of Engineering Technology
Supervisor:	prof. Dr. Ing. Petr Lenfeld
Dissertation topic:	Influence of film preforming parameters on the quality of complicated parts in IMD technology
Date of defense:	September 22, 2016

Name and surname:	**Ing. Jiří Habr**
Study Branch:	2303V002 Engineering Technology
Specialization:	Plastics processing
Supervising workplace:	Department of Engineering Technology
Supervisor:	prof. Dr. Ing. Petr Lenfeld
Dissertation topic:	Research of technology of preparation and processing of composites with PLA matrix and fibers of plant origin
Date of defense:	September 22, 2016

Name and surname:	**Ing. Roman Paclt**
Study Branch:	2303V002 Engineering Technology
Specialization:	Plastics processing
Supervising workplace:	Department of Engineering Technology
Supervisor:	prof. Dr. Ing. Petr Lenfeld
Dissertation topic:	Influence of preheating of inserts on the quality of hybrid joint
Date of defense:	September 22, 2016

Name and surname:	**Ing. Markéta Petříková**
Study Branch:	2302V010 Machines and Equipment
Specialization:	Equipment for thermal engineering
Supervising workplace:	Department of Power Engineering
Supervisor:	doc. Ing. Jaroslav Šulc, CSc.
Dissertation topic:	Methodology for experimental two-dimensional analysis of self-excited oscillations
Date of defense:	October 20, 2016

Name and surname:	**Ing. Martin Švec**
Study Branch:	3911V011 Material Engineering
Supervising workplace:	Department of Materials
Supervisor:	prof. RNDr. Petr Kratochvíl, DrSc.
Dissertation topic:	Structure and high-temperature mechanical properties of iron aluminides with niobium and zirconium carbide-forming additives
Date of defense:	October 24, 2016

Name and surname:	**Ing. Martin Mazač**
Study Branch:	2302V010 Machines and Equipment
Specialization:	Wheeled transport and handling machines
Supervising workplace:	Department of Vehicles and Engines
Supervisor:	doc. Ing. Miroslav Malý, CSc.

Dissertation topic:	Analysis of temperatures in the pinion of the permanent transmission
Date of defense:	December 12, 2016

Name and surname:	**Ing. Josef Skřivánek**
Study Branch:	2302V010 Machines and Equipment
Specialization:	Textile Machines
Supervising workplace:	Department of Textile and Single-purpose Machines
Supervisor:	doc. Ing. Martin Bílek, Ph.D.
Dissertation topic:	Small-diameter knitting machine drive system
Date of defense:	December 12, 2016

4.3 Competence centre

Josef Božek Automotive Industry Competence Centre
Innovations in the design of vehicles and powertrains with internal combustion engines and electric motors to reduce fossil fuel consumption and emissions, maximize safety, comfort and driving pleasure, align with regulatory requirements and interact with infrastructure and other vehicles, and compete in emerging markets. Dual order of innovations being developed for immediately applicable output or basis for subsequent development. Use of knowledge database as an integrating element of complex topic and wide team.

Provider:	TA ČR
Program:	TE Centres of Competence (2012–2019)
Project identification code:	TE01020020
Beneficiary:	CTU Prague
Other project participants:	Technical University of Liberec, CxI VSB-TU Ostrava Brno University of Technology
Companies:	Škoda Auto a.s.; Honeywell, spol. s r.o.; ČZ a.s.; Ricardo Prague s.r.o.; AICTA Design Work, s.r.o.; MOTORPAL, a.s.; BRANO a.s.; TATRA, a.s.; TÜV SÜD Czech s.r.o.
Solution period:	2012–2017
Guarantor for TUL:	prof. Ing. Celestýn Scholz, Ph.D., Department of Vehicles and Engines
Internal number TUL:	17880
Subsidy CxI 2016:	total / INV /NIV – 1 928 000 / 0 / 1 928 000 CZK
Out of that FS TUL subsidy:	total / INV /NIV – 1 284 048 / 0 / 1 284 048 CZK

4.4 Science-Research Projects

TA CR – ALFA

Development of CDF code for desulfurization plant design

Provider:	TA CR
Program:	ALFA (2011–2016)
Project identification code:	TA04021338
Beneficiary:	DIZ Bohemia s.r.o.
Co-beneficiary:	TUL, Faculty of Mechanical Engineering
Researcher co-beneficiary:	Assoc. prof. Ing. Tomáš Vít, Ph.D., Department of Power Engineering Equipment
Internal number TUL:	17855
Solution period:	2014–2017
Subsidy Fme TUL 2017:	total / INV / NIV – 1 445 000 / 0 / 1 445 000 CZK

Research and development of discountless shock absorber

Provider:	TA CR
Program:	ALFA (2011–2016)

Project identification code:	TA 01010879
Beneficiary:	Brano a.s.
Co-beneficiary:	TUL, Faculty of Mechanical Engineering
Researcher co-beneficiary:	prof. Ing. Jan Šklíba, CSc., Department of Mechanics, Elasticity and Strength
Internal number TUL:	17800
Solution period:	2013–2016
Subsidy FME TUL 2016:	total / INV / NIV – 1 301 000 / 0 / 1 301 000 CZK

New systems for checking the length of gauge blocks and evaluating the quality of their surfaces

Provider:	TA CR
Program:	ALFA (2011–2016)
Project identification code:	TA 01010879
Beneficiary:	Institute of Scientific Instruments AV ČR, v.v.i. (Brno)
Co-beneficiary:	TUL, FME
Co-beneficiary:	ČMI, Mesing s.r.o.
Researcher co-beneficiary:	Ing. Štěpánka Dvořáčková, Ph.D., Department of Machining and Assembly
Internal number TUL:	17861/19861
Solution period:	2013–2016
Subsidy in 2016:	total / INV / NIV – 4 940 000 /0/ 4 940 000 CZK
Subsidies to other beneficiaries:	total / INV / NIV – 4 588 000 /0/ 4 588 000 CZK
Subsidy FME TUL:	total / INV / NIV – 352 000 /0/ 352 000 CZK
Of which DET:	total / INV / NIV – 307 550 /0/ 307 550 CZK
Of which DMA:	total / INV / NIV – 44 450 /0/ 44 450 CZK

TA CR – EPSILON

Development of progressive technology of felt hat production

Provider:	TA CR
Program:	EPSILON
Project identification code:	TH 01010690
Beneficiary:	Tonak, a.s.
Co-beneficiary:	TUL, Faculty of Mechanical Engineering
Researcher co-beneficiary:	prof. Ing. Jaroslav Beran, CSc, Department of Textile and Special Purpose Machines
Solution period:	2015–2017
Internal number TUL:	17009
Subsidy FME TUL 2016:	total / INV / NIV – 1 612 151 / 0 / 1 612 151 CZK

MIT CR – TRIO

Numerical simulation of welding and life prediction of welded structures in the area of land transport, steel structures and power engineering

Provider:	MIT CR
Program:	TRIO – 1st call
Project identification code:	FV10709
Beneficiary:	MECAS ESI s.r.o.
Co-beneficiary:	TUL, Faculty of Mechanical Engineering
Researcher co-beneficiary:	doc. Ing. Jaromír Moravec, Department of Engineering Technology
Internal number TUL:	17772
Solution period:	2016–2018
Total subsidy in 2016:	total / INV / NIV – 1 542 000 / 0 / 1 542 000 CZK
Subsidy FME TUL/DET:	total / INV / NIV – 720 000 / 0 / 720 000 CZK
Of which FME pays to CNATI:	total / INV / NIV – 360 000 / 0 / 360 000 CZK

Low-temperature repairs of creep-resistant cast turbine components

Provider:	MIT CR
Program:	TRIO – 1st call

Project identification code: FV10510
Beneficiary: Siemens s.r.o.
Co-beneficiary: TUL, Faculty of Mechanical Engineering
Researcher co-beneficiary: doc. Ing. Jaromír Moravec, Ph.D., Department of Engineering Technology
Internal number TUL: 17773
Solution period: 2016–2017
Total subsidy in 2016: total / INV / NIV – 2 508 537 / 0 / 2 508 537 CZK
Of which FME TUL/DET: total / INV / NIV – 1 070 000 / 0 / 1 070 000 CZK

Highly efficient jet weaving machine for production of leno fabrics
Provider: MIT CR
Program: TRIO – 1st call
Project identification code: FV10215
Beneficiary: VÚTS a.s.
Co-beneficiary: TUL, Faculty of Mechanical Engineering
Researcher co-beneficiary: doc. Ing. Iva Petríková, Ph.D., Department of Mechanics, Elasticity and Strength
Internal number TUL: 17762
Solution period: 2016–2019
Subsidy in 2016: total / INV / NIV – 350 000 / 0 / 350 000 CZK

Development of progressive kicking technology in hat production
Provider: MIT CR
Program: TRIO – 1st call
Project identification code: FV10467
Beneficiary: TONAK a.s.
Co-beneficiary: TUL, Faculty of Mechanical Engineering
Researcher co-beneficiary: prof. Ing. Jaroslav Beran, CSc., Department of Textile and Special Purpose Machines
Internal number TUL: 17776
Solution period: 2016–2019
Subsidy in 2016: total / INV / NIV – 369 000 / 0 / 369 000 CZK

GA CR – GA

Optimization of pulsating current generation in fluid mechanics
Provider: GA CR
Project: GA – standard projects
Project identification code: GA16-16596S
Beneficiary: Institute of Thermomechanics, AV ČR, v.v.i.
Another participant: Technical University of Liberec
TUL researcher: doc. Ing. Tomáš Vít, Ph.D., Department of Power Engineering Equipment
Internal number TUL: 17277
Solution period: 2016–2018
Subsidy FME 2016: total / INV / NIV – 939 000 / 0 / 939 000 CZK

Řízení proudových polí pomocí oscilací tekutiny
Provider: GA CR
Project: GA – standard projects
Project identification code: GA14-08888S
Beneficiary: Institute of Thermomechanics, AV ČR, v.v.i.
Another participant: Technical University of Liberec
TUL researcher: doc. Ing. Tomáš Vít, Ph.D., Department of Power Engineering Equipment
Internal number TUL: 17269
Solution period: 2014–2016
Subsidy FME 2016: total / INV / NIV – 999 000 / 0 / 999 000 CZK

EU / MEnv CR

Demonstration of diesel exhaust emission monitoring during real operation

Provider:	EU / MEnv CR
Program:	LIFE+
Registration number:	17650
Designation of the project:	MEDETOX
Beneficiary:	Institute of Experimental Medicine AV ČR
Another participant:	TUL, Faculty of Mechanical Engineering
TUL researcher:	Michal Vojtíšek M.Sc. Ph.D., Department of Vehicles and Engines
Internal number TUL:	17650
Solution period:	2011–2016
Subsidy FME 2016:	total / INV / NIV – 1 224 185 CZK
Public resources (14730):	302 362 CZK

5.3 International Projects

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

Provider:	EU – European Regional Development Fund
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
Researcher:	Ing. Pavel Hanus, Ph.D., Department of Materials
Internal number TUL:	DZG93/2210
Period:	2016–2018
Total subsidy:	total / INV / NIV – 4 061 810 / 0 / 4 061 810 CZK
(advance payment for 18 months)	
Subsidy FME TUL 2016:	total / INV / NIV – 1 030 000 / 0 / 1 030 000 CZK
Of which FME/DMS 2016:	total / INV / NIV – 799 000 / 0 / 799 000 CZK
FME/DET 2016:	total / INV / NIV – 231 000 / 0 / 231 000 CZK

Research of processes in supersonic ejectors with isobutane

Provider:	MEYS CR
Program:	7AMB, Joint Czech-Polish research projects
Project identification code:	7AMB16PL011
Partner organization:	Politechnika Bialostocka, Poland,
Beneficiary:	TUL, Faculty of Mechanical Engineering
Researcher:	doc. Ing. Václav Dvořák, Ph.D., Department of Engineering Technology
Internal number TUL:	18001
Period:	2016–2017
Subsidy 2016:	76 000 CZK

Interdisciplinary cooperation in the field of research focused on the influence ofprocess parameters on the mechanical properties of diffusion heterogeneous welds

Provider:	MEYS CR
Program:	AKTION Czech Republic – Austria
Partner organization:	Technische Universität Graz
Beneficiary:	TUL, Faculty of Mechanical Engineering
Researcher:	doc. Ing. Jaromír Moravec, Ph.D., Department of Engineering Technology
Internal number TUL:	1008
Period:	2015–2016
Subsidy 2016:	17 000 CZK

R&D projects solved under CNATI and other TUL units

Academic staff of Faculty of Mechanical Engineering are researchers, co-researchers or participate in project research.

NP – MEYS CR

see 4.7

OP RDI – Commercialization of results

see 7.4.3

TA CR – Centres of competence

see 4.3

TA CR – ALFA

Research of utility properties and application possibilities of lightweight polymer composites for body building

Provider:	TA CR
Program:	ALFA (2011-2016)
Project identification code:	TA04011009
Beneficiary:	TUL, CNATI
Co-beneficiary:	Magna Exteriors s.r.o.
Researcher beneficiary:	prof. Dr. Ing. Petr Lenfeld, Department of Engineering Technology
Internal number TUL:	14141
Solution period:	2014–2017
Subsidy total in 2016:	total / INV / NIV – 3 228 040 /0/ 3 228 040 CZK
Subsidy co-beneficiary:	total / INV / NIV – 525 000 /0/ 525 000 CZK
Subsidy CNATI 2016:	total / INV / NIV – 2 703 040 /0/ 2 703 040 CZK
Of which DET/FME 2016:	total / INV / NIV – 2 162 432 /0/ 2 162 432 CZK

Research and development of the use of nanomaterials in ball production

Provider:	Technology Agency of the Czech Republic
Program:	ALFA (2011-2016)
Project identification code:	TA 04010237
Beneficiary:	GALA a.s.
Co-beneficiary:	TUL, CxI
Researcher co-beneficiary:	Ing. Pavel Pokorný, Ph.D., Faculty of Textile Engineering, KNT
Solution period:;	2015–2016
Internal number TUL:	17859
Co-researcher co-benefeciary:	prof. Ing. Jaroslav Beran, CSc., Department of Textile and Single-purpose Machines
Subsidy FME 2016:	total / INV / NIV – 290 665 / 0 / 290 665 CZK

TA CR – EPSILON

Increasing the efficiency of machines and equipment by reducing friction losses of the machine and its components

Provider:	TA CR
Program:	TE Epsilon – 1st public tender
Project identification code:	TH01021093
Beneficiary:	VÚHŽ a.s., Dobrá
Other project participants:	TUL, CxI
Solution period:	2015–2017
Guarantor for TUL:	Ing. Robert Voženílek, Ph.D.
Internal number TUL:	17007
Subsidy CNATI 2017:	total / INV /NIV – 1 105 000 / 0 / 1 105 000 CZK
Of which FME TUL:	0 CZK

New technology of matting and prototype of machinery for glass surface treatment

Provider:	TA CR

Program:	EPSILON
Project identification code:	TH01031152
Beneficiary:	Sklopan Liberec
Co-beneficiary:	TUL, CNATI
Researcher co-beneficiary:	Assoc. prof. Ing. František Novotný, CSc.
Solution period:	2015–2017
Internal number TUL:	17008
Subsidy CNATI 2016:	total / INV / NIV – 4 017 487 / 0 / 4 017 487 CZK
Of which FME 2016:	total / INV / NIV – 602 623 / 0 / 602 623 CZK

TA CR – DELTA

Technology development and production of one-piece GFRP blades for wind power plants

Provider:	TA CR
Program:	DELTA (2015-2025)
Project identification code:	TH01020796
Beneficiary:	LENAM, s r.o.
Co-beneficiary:	TUL, CNATI
Researcher co-beneficiary:	Assoc. prof. Ing. Michal Petrů, Ph.D.
Solution period of project:	2014–2019
Internal number TUL:	17013
Co-researcher co-beneficiary:	Department of Machine Parts and Mechanisms
Subsidy FME 2016:	total / INV / NIV – 199 255 / 0 / 199 255 CZK

MoI CR – Security research program CR

Development of flood protection systems to increase population and infrastructure protection

Provider:	MoI CR
Program:	Security research program ČR 2015-2020 (BV III/1-VS)
Project identification code:	VI20152018046
Beneficiary:	JaP – Jacina, s.r.o.
Co-beneficiary:	TUL, CxI
Researcher co-beneficiary:	Ing. Michal Petrů, Ph.D.
Solution period of project:	2015–2018
Internal number TUL:	17302
Co-researcher co-beneficiary:	Department of Machine Parts and Mechanisms
Co-researcher co-beneficiary:	Department of Power Engineering Equipment
Subsidy KST FS 2016:	total/ INV / NIV – 345 317 / 0 / 345 317 CZK
Subsidy KEZ FS 2016	total/ INV / NIV – 144 000 / 0 / 144 000 CZK

Use of modern modeling methods in the development and testing of fire closures

Provider:	MoI CR
Program:	Security research program ČR 2015-2020 (BV III/1-VS)
Project identification code:	VI20152018046
Beneficiary:	JaP – Jacina, s.r.o.
Co-beneficiary:	TUL, CNATI
Researcher co-beneficiary:	Ing. Tomáš Martinec, Ph.D.
Solution period of project:	2015–2018
Internal number TUL:	17301
Co-researcher co-beneficiary:	Department of Machine Parts and Mechanisms
Subsidy FME 2016:	total / INV / NIV – 268 651 / 0 / 268 651 CZK

MoFA CR – Program for the support of medical applied research (2015–2022)

Nanofibrous biodegradable small diameter vascular replacement

Provider:	MoFA CR
Program:	Program to support medical applied research
Project identification code:	NV15-29241A

Beneficiary: TUL, Faculty of Textile Engineering
Researcher: prof. RNDr. David Lukáš, CSc.
Co-beneficiary: Palacký University in Olomouc,
University of Defence Hradec Králové
Solution period projektu: 2015–2018
Internal number TUL: 6300
Co-researcher co-beneficiary: doc. Ing. Lukáš Čapek, Ph.D.
Department of Mechanics, Elasticity and Strength
Subsidy FME 2016: total / INV / NIV – 144 774 / 0 / 144 774 CZK

4.7 Institute for Nanomaterials, Advanced Technologies and Innovation

Development of the Institute for Nanomaterials, Advanced Technologies and Innovation (CNATI++)
The main objective of the project is to support the use of the newly built research infrastructure (see above) of the university workplace CxI, a new building, acquired high-end instruments and equipment and research teams. The implementation of the submitted CxI++ project will significantly contribute to the efficiency of utilization of this infrastructure, its stability, long-term sustainability and its further systematically managed development while maintaining the set structure of the professional profile of the university workplace. The project deals with seven research topics, which are solved by academic staff of the Faculty of Mechanical Engineering.

In 2016, a total of 20 academics of the Faculty of Mechanical Engineering participated in the project with a total volume of approximately 6.07 part-time jobs.

Provider of subsidy: MEYS CR
Program of support: NPU
Beneficiary: Technical University of Liberec, CNATI
Registration Number**:** LO1201
Subsidy total for project: 175 711 ths. CZK
Implementation period: 2014–2018
Internal number TUL: 16001
FME TUL in 2016: 1 890 647 CZK
DPE 119 436 CZK
DMA 175 711 CZK
DTD 1 365 500 CZK
DMM 230 000 CZK

4.9 Commercialization of R&D Results and Outputs

PROSYKO – Proactive system of commercialization at TU in Liberec
Provider: TA CR
Program: GAMA, Sub-program 1
Project type: „Proof of concept stage“
Project identification code: TG01010117
Beneficiary: TUL, CNATI
Researcher responsible: Ing. Stanislav Petrík, Ph.D.
Solution period of project: 2014–2018
Internal number TUL: 17862

- Internal number of partial project: 14155
  Solution period of partial project: 2014–2016
  Subsidy FME 2016: 375 872 CZK
  Partial project solved by FS: Equipment for determination of limit states of sheet deformation
  Researcher: doc. Ing. Pavel Solfronk, Ph.D., DET
- Internal number of partial project: 14157
  Solution period of partial project: 2015–2017
  Subsidy FME 2016: 360 960 CZK
  Partial project solved by FS: High-speed yarn winding system for spinning machines
  Researcher: Ing. Jan Valtera, Ph.D.,
  Department of Textile Machine Design

5.2 International Cooperation in Education

TUL as an important partner in the international educational space – continuation and deepening of existing cooperation with partner universities from Canada or the USA

Provider:	MEYS CR
Program:	Institutional Development Plan TUL (IP TUL)
Researcher:	TUL, Faculty of Mechanical Engineering
Internal number TUL:	12208
Subsidy FS 2016:	100 000 CZK

Project Objective:
The objective of the project was to carry out motivational study stays of selected students of FME at partner from Canada or the USA. The long-term goal is to maintain and further develop contacts and activities with these universities.

5.3 International Projects

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

Provider:	EU – European Regional Development Fund
Program:	H2020
Lead partner:	National Technical University of Athens, School of Chemical Engineering
Participant:	TUL, Faculty of Mechanical Engineering
Researcherl:	Ing. Pavel Hanus, Ph.D., Department of Material Science
Internal number TUL:	DZG93/2210
Period:	2016–2018

Research of processes in supersonic ejectors with isobutane

Provider:	MEYS
Program:	7AMB, Joint Czech-Polish Research Projects
Project identification code:	7AMB16PL011
Partner organization:	Politechnika Bialostocka, Poland,
Beneficiary:	TUL, Faculty of Mechanical Engineering
Researcher:	Assoc. prof. Ing. Václav Dvořák, Ph.D., Department of Power Engineering Equipment
Internal number TUL:	18001
Period:	2016–2017

Interdisciplinary cooperation in the field of research focused on the influence ofprocess parameters on the mechanical properties of diffusion heterogeneous welds

Provider:	MEYS
Program:	AKTION Czech Republic – Austria
Partner organization:	Technische Universität Graz
Beneficiary:	TUL, Faculty of Mechanical Engineering
Researcherl:	doc. Ing. Jaromír Moravec, Ph.D., ¨ Department of Engineering Technology
Internal number TUL:	1008
Period:	2015–2016

Developmnet projects – see below 7.4.4 OP Cross-border cooperation

5.4 International mobility

The new European Union Education Program 2014-2020 Erasmus+ promotes cooperation and mobility in all fields of education, training and sport and youth.

Inter-institutional agreements valid in 2016 under ERASMUS+:

- Universiteit Gent (Belgium)

- Technical University of Sofia (BG)
- Technical University of Sofia – Plovdiv (BG)
- Technical University of Gabrovo (BG)
- Aalto University of Technology TKK (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)
- WestsächsischeHochschule Zwickau (DE)
- Technische Universität Darmstadt (DE)
- Chemnitz University of Technology (DE)
- RWTH Aachen University (DE)
- Hochschule Zittau/Görlitz (DE)
- Hochschule Albstadt-Sigmaringen (DE)
- Budapest University of Technology and Economics (HU)
- Vilnius College of Technologies and Design (LT)
- Koszalin University of Technology (PL)
- Technical University of Lodz (PL)
- Wroclaw 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)
- Universita Alexandra Dubčeka Trenčín (SK)
- Universidad Politécnica de Valencia (ES)
- Universidade de Oviedo Gijón (ES)
- Universidad del Pais Vasco, Bilbao (ES)
- Erciyes University (TR)
- Osmaniye Korkut Ata University (TR)
- Karadeniz Technical University (TR)
- Cukurova Universitesi (TR)
- Trakya Universitesi (TR)
- Istanbul University (TR)
- USAK University (TR)
- Dogus University (TR)
- Bursa Teknik Üniversitesi (TR)

New inter-institutional agreements concluded in 2016 for cooperation in the area of exchanges of students, academic staff and in the field of science and research:

- Trakia University – Stara Zagora (BG) – Erasmus+
- Aleksandre Stulginskis University (LT) – Erasmus+
- Hacettepe University (TR) – Erasmus+
- Karabuk University (TR) – Erasmus+
- Cumhuriyet University (TR) – Erasmus+
- Université de Franche-Comté (Francie)

- Apollo Engineering College (India)

Valid for bilateral agreements cooperation in areas of mutual exchanges of students, academic staff and research and development in 2017 as part of transatlantic cooperation:

- University of Waterloo (CAN)
- Conestoga College Institute of Technology and Advance Learning, Ontario (CAN)
- Nha Trang University (Vietnam)
- Diponegoro University (Indonésie)
- PUC do Rio de Janeiro (Brazílie)
- Kazakh – British Technical University (Kazachstán)
- King Mongkuts´s University of Technology North Bangkok (Thajsko)
- Other valid inter-institutional agreements Faculty of Mechanical Engineering are listed in Tab. 5.2.1.

Negotiations started on concluding further bilateral agreements in the area of mutual exchange of students, academic staff and science and research with universities:

- Azerbaijan Technical University (Azerbaijan)
- Poznan University of Technolgy – Erasmus+
- TU Zvolen – Erasmus+
- University of Bielsko-Biala – Erasmus+

7.1 Quality and Culture of Academic Life

Courses focused on pedagogical skills:

- In 20016, another Course of University Education 2016 took place – 1st year was completed by:
  Ing. Šimon Kovář, Ph.D.
  Ing. Rudolf Martonka, Ph.D.
  Ing. Ladislav Perk
  Ing. Marie Stará, Ph.D.
  Ing. Miroslav Vavroušek
  Ing. Radek Votrubec, Ph.D.
  Ing. Petr Žabka, Ph.D.

- How to effectively teach in English:
  English language specialists from the British Council led TUL courses. At the FME, a one-week course was completed by:
  Ing. Jiří Sobotka, Ph.D.
  Ing. Michael Fenkl, Ph.D.
  Ing. Petr Žabka, Ph.D.
  Ing. Vlastimil Hotař, Ph.D.

General skills courses including language skills:

- Language courses – English prevails.
- Seminar: EFFECTIVE WRITING: How to increase the chances of successful publication of R&D results in English.
- First aid course.

Professional courses
ANSYS SpaceClaim Direct Modeler, ECCOMAS advanced course, Mechanics of composite materials and structures, Modification of matrix and interface of composite materials and their evaluation, Workshop on Computational Fatigue Analysis 2016 - Vibration Fatigue Analysis Prague CTU, Comsol Multiphysics course simulation software Magma 5 MAGMA Core + Mold, Training „Operation of the measuring arm ROMER Absolute Arm COMPACT 7512, measuring and inspection with PC-DMIS CAD ++ software, CLAD LabVieW 1Z, Operation of pressure vessels.

7.4 Projects financed from EU Structural Funds

7.4.1 OP Research, Development and Education

In 2016, two faculty projects were prepared and submitted by the Department of Development and Projects of FS TUL:

- **Development of research-oriented study programmes** (Call PO2_02_16_018)
  The project deals with the development of new doctoral study programmes of FS TUL which meet the requirements for doctoral study of technical direction in accordance with the requirements of the knowledge economy and in accordance with international standards. The study programmes cover the scientific and research areas of machine design and construction, production technology of processes and materials and mechanics.
- **Research infrastructures for educational purposes – building or upgrading**
  (Call PO2_02_16_017)
  The project deals with the development of instrumentation and laboratory equipment for the implementation of three new doctoral study programmes of FS TUL.

These projects were conditional on the simultaneous submission of projects in calls PO2_02_16_015 and PO2_02_016. These were prepared by the TUL Operational Programs Department with the participation of all TUL faculties. The expected date of the announcement of the results of the above-mentioned calls is April 2017.

In 2016, the Department of Development and Projects of the Faculty of Mechanical Engineering TUL prepared and submitted an interdisciplinary research project within the framework of the Excellent Research Call (PO1-02_16_019). The project was submitted under FTT TUL according to the principal investigator.

- **NanoMedTech – nanofiber materials for medical and technical applications**
  The project deals with research, development and applications of nanofiber materials for medical and technical use.
  The expected date of the announcement of the results of the above calls is February 2017.

7.4.2 OP Entrepreneurship and Innovation for competitiveness

Development of systems for bonding various substrates for progressive joining of body module components

Project:	CZ.01.1.2.0.15_019.01263
Program:	OP Entrepreneurship and innovation for competitiveness
Priority axis:	01.1 Development of research and development for innovation
Name of priority axis:	01.1.02 Promoting business investment in research and innovation and creating links and synergies between enterprises, R&D centres and the higher education sector, in particular by promoting investment in product and service development, technology transfer
Main applicant/Beneficiary:	Magna Exteriors (Bohemia) s.r.o.
Contracting partner:	TUL, Faculty of Mechanical Engineering, Department of Engineering Technology
Researchers responsible:	Assoc. prof. Ing. Pavel Solfronk, Ph.D., Ing. Pavel Doubek, Ph.D.
Project start:	November 2016

7.4.3 OP Crossboarder Cooperation

GreK

Cross-border cooperative teaching of plastics processing technology Zittau-Liberec

Program:	Cooperation program Czech Republic – Free State of Saxony 2014–2020
Priority axis:	3 – Investments in education, training and vocational training
Specific objective:	3.2 Improving youth employment

Registration number of project:	100252772
Provider of subsidy:	EU – European Regional Development Fund
Lead partner:	Hochschule Zittau/Görlitz (HSZG)
Project partner:	Technische Universität Dresden (TUD)
Project partner:	TUL, Faculty of Mechanical Engineering
Researcher responsible at TUL:	Ing. Luboš Běhálek, Ph.D., Department of Engineering Technology
Solution period:	2015–2019
Internal number TUL:	15401
Subsidy total:	272 727,40 €
Subsidy FME 2017:	290 083 CZK
Of which DET 2017:	290 083 CZK

BauQu

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

Program:	Cooperation program Czech Republic – Free State of Saxony 2014–2020
Provider of subsidy:	EU – European Regional Development Fund
Lead partner:	Technische Universität Dresden (TUD)
Project partner:	TUL, Faculty of Mechanical Engineering
Researcher responsible at TUL:	Assoc. prof. Ing. Karel Fraňa, Ph.D., Department of Power Engineering Equipment
Solution period:	2016-2019
Internal number TUL:	15402
Subsidy total in 2016:	31 923 EUR (862 560 CZK)

FACULTY OF MECHANICAL ENGINEERING
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Faculty of Mechanical Engineering