

EVALUATION REPORT IN MODULE 3

NAME OF EVALUATED UNIT: Faculty of Mechanical Engineering (FME)

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

Indicator 3.1 is a non-evaluated indicator that provides basic information about the evaluated unit such as its mission and vision, organizational structure, size and staffing, or R&D&I capacities.

Commentary:

The Faculty of Mechanical Engineering (FME) was founded in 1953. FME is a university faculty that combines education with scientific and research activities. In the field of education, FME covers the entire area of education 27 - Engineering, Technologies and Materials in the entire spectrum of study programs, which are based on the tradition of training mechanical engineers in the region and cooperation with industry. More than eleven thousand graduates have graduated from FME so far. The development of FME is focused on the following areas: Materials, Nanomaterials and Composites, Advanced Technologies and Nanotechnologies, Sustainable Transport and Mobility, Machine and Equipment Design, Production Systems, Automation and Robotics, and Energy and Renewable Resources. Strategic areas in R&D&I include: Polymer Systems, Metallic Materials and Functional Surfaces, Lightweight Parts and Metamaterials, Machining of Conventional Metallic and Composite Materials, 3D Additive Technologies, Artificial Intelligence - Machine Learning and Automation and Design. In the areas of Construction, these are: Innovation of Technical Systems, Safe and Ecological Means of Transport, Machines for the Production of Fiber and Nanofiber Structures, Single-Purpose Machines and Equipment, Robotization and Automation in Industry and Service Robotics and Glass Machines for the 21st Century. In the areas of Mechanics and Power Engineering, these are: Mechanics of Intelligent Materials and Their Thermomechanical Reactions, Vibration Isolation and Energy Processes. The organizational structure of R&D&I FME is divided according to the type of research into departments: Applied Mechanics, Engineering Technology, Materials Science, Engineering Technology, Machine Parts and Mechanisms, Machining and Assembly, Department of Vehicles and Engines, Department of Glass Machines and Robotics, Department of Textile Machine Design and Department of Production Systems and Automation.

The size and staffing indicators reflect a compact unit with broad pedagogical responsibilities. In 2023, FME reported about 115 (of which 30.07 women) full-time employees. Academic degrees included 9.77 (1.93) professors, 22.59 (6.10) associate professors and 44.24 (5.8) assistant professors, 84.59 (14.85) FTEs were researchers/researchers engaged in teaching, and 17.64 (1.20) were classified as early career researchers (Table 3.1.1). The current age structure – characterised by many assistant professors over 40 and a relatively small number of professors under 60 – suggests a potential risk (Table 3.1.2), suggesting that institutions need to pay more attention to career management.

The number of students in 2023 was 637 (425 bachelor's, 157 master's and 55 doctoral) (Table 3.1.4). In 2023, the faculty offered 17 study programmes, 15 of which were in English (Table 3.1.5).

R&D&I capacities are implemented in teaching and research. FME connects basic research with applied research and envisages strengthening and developing study programmes with the aim of obtaining institutional accreditation.

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

Evaluate the position of the evaluated unit in the R&D&I research community based on the facts presented in indicator 3.2 and its annexed tables (3.2.1 to 3.2.5).

Rating [1–5]:

4 - Very good

Qualitative assessment:¹

FME is a crucial workplace in the field of science and research, both nationally and internationally. Its results and benefits are evident in basic and applied research, in teaching with the support of the development of the scientific community. His key achievements include the prestigious R&D&I award, participation in editorial boards of scientific journals, invited lectures at foreign institutions and involvement in the evaluation of research projects.

Participation in editorial boards demonstrates the multidisciplinary reach of journals and journals. These are the journals Mathematical Models in Engineering, European Mechanical Science, ACC Journal The MM Science Journal and Corrosion Science. FME staff are included as editorial board members and reviewers. Journals are included in lower categories, i.e. Q3, Q4.

Faculty members have received national recognition in various areas, including the Gold Medal for the fight against COVID-19 of the Czech Red Cross (Jaroslav Beran) and the Josef Hlávka Award for Scientific Literature of the Czech Literary Fund Foundation and the J., M. and Z. Hlávka Foundation (Jan Valenta, a multidisciplinary team of authors led by Professor Lukáš).

The most important lectures of foreign scientists and other guests relevant to R&D&I at FME are shown in Table 3.2.4, which includes lecturers from universities, e.g. Afeka Academic College of Engineering Tel Aviv, REE Automotive, Israel, University of Rome, INSA of Rennes, France, Yamanashi University, Japan, University of Waterloo, and others.

Table 3.2.5 shows the involvement of employees in the work of evaluators and emphasizes their long-term role in the INTER-EXCELLENCE / INTERA(CTION) programmes of the Ministry of Education, Youth and Sports, P101 – Mechanical Engineering GAČR, Operational Programme Research, Development and Education, CZ.02.2.69/0.0/0.0/19_073/0016944/, etc.

Recommendations:

Expansion of FME staff's participation in the editorial boards of highly renowned journals (D1, D2, Q1), which is closely related to the increase in quality scientific publications and the expansion of a higher position in the international academic and scientific community.

From the point of view of the quality and topics of the lectures of foreign guests, it is recommended that they move towards the expertise associated with FME activities. Cooperation with foreign guests can be reflected in R&D international projects and contacts.

¹ Provide verbal assessment of the indicator and briefly comment on the reasons for awarding the specific rating. Follow a similar procedure for the other indicators.

RESEARCH PROJECTS

3.3 Research projects

Evaluate the most important research projects of the evaluated unit, especially regarding the results achieved and the application potential of the project, the proportionality with respect to the R&D&I capacities of the evaluated unit, the degree of interdisciplinarity and collaboration with other parts of the evaluated HEI, and the consistency with the declared mission and vision of the evaluated unit. Use the data from the full list of research projects and contract research activities in Tables 3.3.1 and 3.3.2 to supplement the evaluation.

Rating [1–5]:

4 - Very good

Qualitative assessment:

FME focuses on joint research conducted with industrial partners within R&D and contract research projects or within institutional support. In the evaluated period, FME academic staff implemented a total of 48 projects, five of which were international. The largest number of R&D projects are projects focused on applications: Six projects for the TRIO programme of the Ministry of Industry and Trade, 13 for the Operational Programme Enterprise and Innovation for Competitiveness of the Ministry of Industry and Trade, 26 for the Technology Agency of the Czech Republic (NCC, EPSILON, M.ERA.Net, Theta programmes) and one for the Ministry of Education, Youth and Sports of the Czech Republic (EUREKA programme). In these cases, the main investigators were industrial partners. FME was the principal investigator of two projects for the Ministry of the Interior of the Czech Republic.

The list of projects shows their interdisciplinarity, which brings wide cooperation between TUL workplaces and other institutions. In the period under review, collaborative research accounted for 38% of the funds, institutional support for 29% (with a slight increasing tendency) and specific research for 4.5-5%. An important item in the evaluated period was funds from the Operational Programme Research, Development and Education, the share of which was 14%. Contract research accounts for almost 10% of FME's budget (with an increasing tendency) with a total volume of CZK 65 million.

It can be stated that cooperation within the projects is at a very high level.

Recommendations:

To continue the high level of cooperation between faculties, universities and companies.

3.4 Research results with existing or prospective impact on society

Evaluate the research results already applied in practice or intended to be applied in practice. When evaluating, consider whether the results are proportionate to the R&D&I capacities of the evaluated unit, how they contribute to the fulfilment of the mission and vision of the evaluated unit and, if stated in the self-evaluation, how the results take into account the gender dimension and sustainability. Use the data from the full results summary in Table 3.4.1 to supplement the evaluation.

Rating [1–5]:

5 - Outstanding

Qualitative assessment:

FME is characterized by a quantitative and qualitative increase in the results of creative activities with application potential and prospective impact on society. Out of a total of 322 non-bibliometric results, 44 patents, 47 utility models, 26 prototypes, 25 verified technologies and two pilot devices were created. In addition, 143 functional samples were created (Table 3.4.1). Most of the results

are implemented in practice, where problems are solved in the areas of equipment, applications of new technologies and materials, in the power industry, in the quality of production of parts, etc. One of the main goals is economic savings of the proposed measures and sustainability. The area of gender is reflected in the involvement of women in research teams and individual projects.

Recommendations:

To continue the established trend and outputs in solving projects applied in practice.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

Evaluate the effectiveness of the transfer of results into practice by the unit being evaluated. Pay attention to whether the composition of the stated users of the results or the way the R&D&I results are commercialised (if stated) is consistent with the R&D&I results produced and the mission and vision of the evaluated unit and how successful the evaluated unit is in its activities, such as attracting new users of the results, commercialising the R&D&I results and obtaining funding from non-public, non-grant sources.

Rating [1–5]:

5 - Outstanding

Qualitative assessment:

The transfer of technology, know-how and services is FME's strength. Within the framework of education, these are key profile courses, professional courses, semester and qualification theses, seminars, excursions to companies and a number of other activities (75 professional trainings with 701 participants, CZK 2.41 million). A significant part of the application-oriented results was created in the implementation of R&D&I projects and contract research carried out with industrial partners and is thus directly used in practice. In contract research, projects worth CZK 15.18 million were solved. Table 3.5.1 shows revenues from non-public sources divided by branch specialization in the total amount of approximately CZK 30,594 million.

Recommendations:

The evaluation in this area is excellent, so it is recommended to continue with all steps.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

Evaluate how active and successful the evaluated unit is in the field of popularisation of R&D&I and communication with the public.

Rating [1–5]:

4 - Very good

Qualitative assessment:

FME demonstrates strong public engagement and science communication. Activities include schools, cultural institutions, public services and the media. Evidence of the use of practice is present in selected programs, e.g. T-Forum: Job Fair organized by FME in cooperation with IAEST, FME Open Days, ITMA International Textile Machinery Fair, Professional lectures and seminars of partners from the industrial sphere at FME, ScienceFest at TUL and many other activities. The popularization also includes the projects "Formula Student", Motoring and Internal Combustion Engines, Electromobility and Development of Autonomous Vehicles.

An integral part of the popularization process are short videos on YouTube and other social networks.

Recommendations:

FME offers a wide range of popularization activities. It would be appropriate to assess the impact on students' interest in studying at FME for the purpose of feedback.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

Evaluate how the evaluated unit has reflected the recommendations from the previous evaluation of the IEP, if applicable.

If the evaluated unit has not been evaluated before, the indicator will be marked as N/A – Not Applicable.

Rating [1–5]:

4 - Very good

Qualitative assessment:

The scope and taxonomy of the previous assessment cycle is slightly different from the current Module 3 framework. FME addressed the relevant recommendations of the previous review and listed implementation measures with demonstrable results in the self-assessment report. FME defines its strengths, which it wants to continue in the coming years, these are: improving the personnel situation, especially in the number of associate professors and professors, guaranteeing study programs and R&D research, focusing on interdisciplinary projects, maintaining a leading position in the region in the field of technology, expanding the research focus of the faculty and strengthening the international dimension of the faculty.

Recommendations:

No new corrective actions are required in respect of the previous period.

It is recommended to continue to support the policy and development of FME with a focus on interconnection with the European and global research area.

EVALUATED UNIT RATING

Evaluation of unit

Having evaluated the individual criteria of module M3, please summarise your evaluation in the context of the module, describing and justifying the strengths and weaknesses of the unit being evaluated.

3.1 Introductory information about the unit under evaluation	NOT RATED
3.2 Recognition by the research community	4 - Very good
3.3 Research projects	4 - Very good
3.4 Research results with existing or prospective impact on society	5 - Outstanding
3.5 Transfer of results into practice	5 - Outstanding

3.6 The most important activities in the field of popularization of R&D&I and communication with the public	4 - Very good
3.7 Implementation of the recommendations in Module	4 - Very good
Average rating [1–5]:	4 - Very good
Grade [A–D]:	B
Summary assessment: FME is historically a very well-established faculty with a good reputation in the Czech Republic and abroad. The performance of the faculty is overall very good, according to the criteria of module 3, with a few elements close to excellent. An important area for the further development of FME will be the strengthening of the system of career advancement of employees, which is necessary in the areas of education and accreditation processes, as well as for solving and leading projects. The outputs are proportional to the available R&D&I capacities, which are compact but perform a wide range of educational and research tasks. FME's policy towards the transfer of results into practice is important, where cooperation with industrial companies leading to the application of the results created within this cooperation is obvious. The quality of the work is also evidenced by the number of 322 non-bibliometric results. Most of the results are implemented in practice, where problems are solved in the areas of equipment, applications of new technologies and materials, in the power industry, in the quality of production of parts, and others. FME's presentation activities are applied in schools, cultural institutions, public services and the media. Evidence of the use of practice is present in selected programs, e.g. T-Forum: Job Fair organized by FME in cooperation with IAEST, FME Open Days, ITMA International Textile Machinery Fair, Professional lectures and seminars of partners from the industrial sphere at FME, ScienceFest at TUL and many other activities.	
Summary recommendations: Recommendations for further development: 1. Maintain the current ever-growing trend of FME 2. Increase the number of publications in Q1, D1, D2 3. Introduce an individual career planning and succession system to increase the proportion of associate professors and professors with regard to gender balance 4. Support young researchers on editorial boards, support invited lectures, etc. 5. Develop international cooperation	