STUDIJŲ KOKYBĖS VERTINIMO CENTRAS
CENTRE FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

PRODUCTION and MANUFACTURING ENGINEERING FIELD OF STUDY

OVERVIEW REPORT

Prepared by the chairpersons of the Production and Manufacturing Engineering field of study expert panels:

1. Prof. dr. Gita Revalde
2. Prof. dr. Jasmina Casals-Terré

SKVC coordinator: Dr. Ona Šakaliene

Report prepared in 2025
Report language: English

©SKVC

I. INTRODUCTION

Overview report is based on the external evaluation of the Production and Manufacturing Engineering field of study in the following Lithuanian Higher Education Institutions (HEIs):

- Vilnius Gediminas Technical University (VILNIUS TECH)
- Kaunas University of Technology (KTU)
- Vytautas Magnus University (VDU)
- Klaipėda University (KU)
- Kauno kolegija (KK)
- Šiaulių Valstybinė kolegija (ŠVK)

The external evaluation was organised by the Centre for Quality Assessment in Higher Education (SKVC), Lithuania.

This Overview report focuses on the main findings of the external evaluation of the field of study from a general point of view. External evaluation reports containing more detailed information on the field of study in the relevant HEIs, including evaluation points, commendations, and recommendations, are available on SKVC's website.

Based on the findings of the evaluation, the decision has been made to give a positive evaluation to the following HEIs and cycles:

-Vilnius Gediminas Technical University (VILNIUS TECH) first and second cycle studies;
-Kaunas University of Technology (KTU) first and second cycle studies;
- Klaipeda university (KU) second cycle studies;
-Vytautas Magnus University (VDU) second cycle studies;
-Kauno kolegija (KK) first cycle studies;
-Šiaulių Valstybinė kolegija (ŠVK) first cycle studies.

Upon receiving a positive evaluation, SKVC decides to grant full accreditation to the Production and Manufacturing Engineering field of study and first and second cycle for a period of 7 years:

- Vilnius Gediminas Technical University (VILNIUS TECH) first and second cycle studies;
- Kaunas University of Technology (KTU) first and second cycle studies;
- Klaipeda university (KU) second cycle studies;
-Šiaulių Valstybinė kolegija (ŠVK) first cycle studies.

Provide partial accreditation for a period of 3 years:

- Vytautas Magnus University (VDU) second cycle studies.
- Kauno kolegija (KK)

II. OVERVIEW BY EVALUATION AREAS

1. STUDY AIMS, LEARNING OUTCOMES AND CURRICULUM

This report synthesises the external quality evaluation of the Production and Manufacturing Engineering study field in Lithuanian higher education institutions, including Kaunas University of Technology, Vilnius Gediminas Technical University, Vytautas Magnus University, Kauno kolegija, Klaipėda University, and Šiauliai State College. The programmes demonstrate overall strong alignment with academic, scientific, and professional standards. All programmes comply with the regulatory framework established by the Ministry of Education, Science, and Sport of Lithuania and are consistent with institutional strategies and national economic priorities.

A key overarching observation is the high relevance of the programmes to labour market needs. The production and manufacturing sector plays a significant role in Lithuania's economy, generating approximately one-fifth of the national GDP. Stakeholders across regions -including SBA Furniture Group, Vakarų laivų gamykla, Philip Morris, LINPRA, VMG Group, Hella, and the Lithuanian Plastics Cluster—consistently confirm the growing demand for qualified engineering professionals. The programmes are therefore appropriately designed to address both current and anticipated workforce needs.

The panels emphasise as a major strength the well-structured and coherent curricula, which ensure a logical progression from fundamental engineering principles to advanced, specialised knowledge. The programmes effectively combine theoretical instruction with practical training, fostering key competences in Industry 4.0 domains such as automation, robotics, and digitalisation, alongside analytical, problem-solving, and research skills. Master's-level studies are distinctly research-oriented, integrating scientific inquiry, sustainability, and technological innovation, and culminating in theses that are frequently aligned with real industrial challenges.

Another significant positive aspect is the strong and systematic engagement with industry. Close collaboration with employers is reflected in curriculum development, the provision of internships, and opportunities for practical training. Social partners express a high level of satisfaction with graduate competences, particularly their readiness for professional practice. Additionally, initiatives such as joint study programmes with international partner institutions and the inclusion of design-based and interdisciplinary learning components further enhance the quality and relevance of studies.

Student-centred learning is supported through flexible study pathways, including elective modules, international mobility opportunities (e.g., Erasmus+), and independent research projects. Students report high satisfaction with teaching quality, the applicability of acquired knowledge, and overall skill development. The availability of modern infrastructure and interdepartmental cooperation further contributes to an effective learning environment.

Despite these strengths, the expert panels identified several areas for improvement. A recurring recommendation is to further strengthen the integration of emerging and future-oriented technologies, including artificial intelligence in manufacturing, machine learning applications,

industrial metaverse solutions, and advanced robotics. Expanding interdisciplinary linkages, particularly with fields such as biomedical engineering, is also encouraged to better prepare graduates to address complex societal challenges.

The panels also highlight the need to enhance the visibility and attractiveness of programmes in order to increase student enrolment, particularly among domestic secondary school and college graduates. This includes the development of more targeted marketing strategies and closer collaboration with industry stakeholders to promote engineering careers.

Furthermore, while industry collaboration is well established, it could be further deepened through increased involvement in real-world, project-based learning and broader access to such opportunities for all students, including international cohorts. The internationalisation of programmes, although progressing, remains at a developmental stage, particularly regarding the integration of international students into both academic and industrial environments.

Additional areas for enhancement include improving the transparency and clarity of learning outcomes and assessment practices, as well as strengthening academic integrity frameworks, particularly in relation to plagiarism detection and the use of AI-driven research tools.

Attention should be paid to the weaknesses of the VDU second-cycle programme Agricultural Engineering and Management and the programme at Kauno kolegija, which resulted in partial study field accreditation for a period of three years. The title and content of the programme should be consistent and accurately reflect each other. Management-specific courses that provide master's-level competencies within this programme appear to be underrepresented or even absent. There is a lack of management engineering components (e.g. production planning and control; operations design and development; operations and supply chain management). It was also noted that the implementation of the master's thesis must be reviewed.

While assessing the Production and Manufacturing Engineering study field programme "Visual Communication Engineering" at Kauno kolegija, experts determined that the programme title does not align with its content. There is also a need to better align the programme's learning outcomes with the Production and Manufacturing Engineering study field and the available facilities.

In conclusion, the Production and Manufacturing Engineering study field in Lithuanian higher education institutions demonstrates solid academic quality, strong labour market relevance, and effective stakeholder engagement. The programmes are well positioned to respond to evolving industry demands.

2. LINKS BETWEEN SCIENTIFIC (OR ARTISTIC) RESEARCH AND HIGHER EDUCATION

The expert evaluation highlights that universities in the Production and Manufacturing Engineering field demonstrate a strong research orientation, actively participating in academic networks and collaborative projects at national and international levels. Research activities are supported through diverse funding sources: including public funding, EU programmes, industry partnerships, and institutional resources enabling engagement with advanced technologies and contributing to scientific progress. Academic staff are closely involved in research that is well aligned with study programmes, ensuring the effective integration of up-to-date scientific knowledge into teaching and learning processes.

Student involvement in research is a notable strength, as learners contribute to both theoretical and applied projects, particularly through theses and coursework, thereby reinforcing the link between studies and real-world applications. Although participation may occasionally be constrained due to high employment rates among students, this is also seen as beneficial, as it allows them to engage in industry-relevant research topics. In several programmes, research activities are embedded as a compulsory component, further supporting the development of analytical and problem-solving competences.

The programmes reflect current technological advancements, particularly in Industry 4.0, automation, and digitalisation, with continuous curriculum updates and the introduction of new subjects in response to evolving industry needs. Students benefit from active involvement in applied research, industrial collaborations, and practical training, enhancing their readiness for both national and international labour markets.

However, the panels recommend further strengthening international industry collaboration to broaden students' exposure to diverse professional contexts. Additionally, greater emphasis should be placed on emerging global challenges such as: climate change, renewable energy, and smart manufacturing as well as on the integration of operational technologies and IT systems, particularly at the second-cycle level. Overall, the study field demonstrates a strong synergy between research, studies, and industry practice, with further potential for development in internationalisation and thematic diversification.

3. STUDENT ADMISSION AND SUPPORT

The expert panels conclude that admission policies within the Production and Manufacturing Engineering study field are transparent, consistently applied, and fully aligned with national regulations and institutional procedures, including centralised admission through the LAMA BPO. Entry requirements for first- and second-cycle studies are clearly defined and appropriate to the intended learning outcomes, ensuring fair and merit-based access. Institutions demonstrate good practice in the recognition of foreign qualifications, prior learning, and non-formal and informal competences, thereby supporting flexible learning pathways and lifelong learning in line with ESG principles.

A wide range of student support services is available and effectively implemented, addressing academic, social, financial, and psychological needs. Targeted initiatives such as mentorship schemes, bridging courses, and structured support programmes (e.g., GUIDed, GIFTed, SKILLed) provide targeted academic and career guidance (for example KTU). Since students in this field are in high demand, universities take good care of them and support them in many ways. HEI's also actively promote student mobility by participating in Erasmus+ and bilateral partnerships with institutions across Europe, Asia and the Americas. The students have options to choose physical, mixed or fully virtual mobility, though some logistical and financial challenges remain. These programs are continuously promoted through events and consultations. However, due to the family or work reasons, sometimes, especially at the second study cycle, students cannot use fully the provided possibilities.

4. TEACHING AND LEARNING, STUDENT ASSESSMENT, AND GRADUATE EMPLOYMENT

The teaching methodologies in the Production and Manufacturing Engineering programmes are designed to be flexible and student-centered, ensuring that learners achieve the intended learning outcomes effectively. Study programmes are regularly updated to reflect the latest scientific and technological developments. Assessment methods are aligned with learning objectives to ensure meaningful feedback and support student progress. Study programmes are regularly updated to reflect the latest scientific and technological developments. Assessment methods are aligned with learning objectives to ensure meaningful feedback and support student progress. The HEI' promote inclusivity by supporting socially vulnerable students and those with disabilities through various measures, including physical accessibility, financial aid, flexible assessments, counseling services, and accessible learning materials.

Employment rates among graduates in this study field are excellent, as there is a significant shortage of qualified professionals in Lithuanian industry. However, considering the growing number of international students, there is a need to address issues that were raised during meetings with them - particularly regarding their difficulties in finding employment after graduation. One of the main challenges is their insufficient knowledge of the national language, which limits their integration into the labour market.

While HEI's are already collaborating with companies, there is a need to further strengthen this cooperation by placing greater emphasis on internships and practical training opportunities. Expanding the availability of internships, deepening partnerships with both local and international companies, and integrating more hands-on learning into the curriculum would offer students valuable real-world experience. These measures would support the development of practical skills, improve employability, and facilitate a smoother transition from education to the labour market.

The institutions maintain a strong commitment to academic integrity, with clear policies and procedures to prevent plagiarism and uphold ethical standards. A respectful and non-discriminatory environment is actively promoted, with targeted initiatives to support students with disabilities or special needs.

5. TEACHING STAFF

The expert panels conclude that the teaching staff in the Production and Manufacturing Engineering study field is sufficiently qualified and appropriately resourced to ensure the achievement of intended learning outcomes. Academic personnel demonstrate strong scientific competence, with the majority holding doctoral degrees and actively participating in national and EU-funded research and innovation projects, thereby contributing to research-informed teaching in line with ESG (Environmental, Social, Governance) standards. The staffing levels are adequate to cover programmes delivery, and the overall quality of teaching is supported by relevant academic and professional expertise.

At the same time, several strategic development areas are identified, further strengthening of engagement with industry and broader societal stakeholders within the teaching process is recommended. The current age profile of academic staff indicates a need for proactive succession planning, including the recruitment and development of early-career academics, as well as enhanced opportunities for pedagogical training and professional development.

In addition, a more targeted and strategic approach to staff mobility and international cooperationparticularly through partnerships with leading institutions and participation in centres of excellence would further enhance teaching quality and innovation capacity. Although the general level of English proficiency is adequate, its more consistent use as a working and teaching language

would support internationalisation efforts. It is a pity that this cannot be said about VMU and Colleges because here still is need to improve English language level. Finally, the relatively high teaching workload may limit staff engagement in research and industry collaboration; therefore, a more balanced workload distribution is recommended to strengthen the integration of research, innovation, and teaching.

6. LEARNING FACILITIES AND RESOURCES

The buildings and infrastructure for Manufacturing and Production study field in KTU and Vilnius Tech are modern and well equipped. In Vilnius Tech new building is provided equipped with modern learning facilities.
Appropriate facilities are provided for both staff and students, including teaching rooms, work and study spaces, social areas, laboratory facilities, libraries, and IT infrastructure. Lecture halls, computer labs, and specialized engineering laboratories are well equipped, giving students access to state-of-the-art tools and technologies. The libraries offer an extensive collection of books, journals, and electronic resources, supporting both academic learning and research activities.
It can be seen that significant investments have been made to develop and maintain a modern infrastructure. Given the fast pace of technological advancement, equipment obsolescence may be a concern particularly regarding computers and other rapidly evolving technologies such as electronics, software, sensors, robotics, and lasers. Therefore, the increased level of external partnerships and collaboration with industry in lab facilities and upgrading of lab facilities is advisable. This in particular will be relevant for master programmes, where the research-based work could benefit from an increased engagement with technology providers and industrial partners.
Mostly, there is a systematic and annual process for upgrading facilities and equipment; faculty members are informed about procedure how to apply for materials, new equipment, books, etc.
While the infrastructure creates strong conditions for education and innovation, resource planning and upgrades can be challenging due to funding limitations for colleges.

Another area of concern relates to the extent to which students engage with laboratory spaces and how these resources are integrated into experimental and research-based thesis work. While the facilities appear primarily designed for instructional purposes, their potential to support more advanced, research-driven learning could be better realized. Additionally, enhanced support for students across all levels and backgrounds is recommended to ensure equitable access to learning opportunities, particularly in relation to industrial engagement.

7. QUALITY ASSURANCE AND PUBLIC INFORMATION

The Production and Manufacturing Engineering programmes have well-established quality assurance systems to ensure high educational standards. Graduates are highly valued in the job market, both in Lithuania and internationally, with strong demand from manufacturing and technology companies.

In KTU, Vilnius Tech, VMU the quality assurance systems are well organized. Mechanisms have been established to collect feedback from students, as well as to ensure close cooperation with academic staff. Student opinions are regularly gathered, analyzed, and used to improve study programmes, thus contributing to continuous quality enhancement. Higher education institutions

take a careful and individualized approach to students' requests to modify or improve the study process, and students are well informed about whom to contact in case of any issues.

One area where improvements could be made is in conducting regular surveys of key industry companies. However, it is understandable that the provision of such feedback also requires the active involvement and interest of the companies themselves, which is not always consistently ensured. Collaboration with industry is of critical importance for aligning study programs with labor market needs, yet this remains a systemic challenge for the education system as a whole, as well as for socially responsible manufacturing and business sectors.

The employability of graduates is excellent, as there is a strong demand for mechanical engineering specialists in Lithuania. Employability is well-tracked and monitored from various perspectives. However, information about graduate employability should be made publicly accessible on the universities websites. Highlighting the high employability rates and successful careers of graduates could attract more students to this study field, especially given that the low enrollment numbers in this area have become a state-level concern.

III. RECOMMENDATIONS

STRATEGIC RECOMMENDATIONS FOR THE PRODUCTION AND MANUFACTURING ENGINEERING FIELD OF STUDY

Strategic recommendations at an institutional level (for HEIs)

- Continue striving to enhance quality in both studies and research through close internal and external cooperation with stakeholders. In this process, it is essential to ensure synergetic collaboration between the university's senior administration, structural units, and academic staff. When developing quality assurance systems, it is important to avoid overburdening teaching staff with excessive bureaucratic tasks, so that the focus remains on meaningful academic and pedagogical improvement.
- Cooperation with industry is of paramount importance in a professionally oriented study field such as Manufacturing and Production. Even when such collaboration already exists, there is always room for improvement. Given the rapid pace of technological advancement, maintaining a high quality of graduates requires joint efforts. Universities often cannot afford to purchase the latest industrial equipment due to high costs; therefore, cooperation with industry becomes essential. Through partnerships, universities can arrange internships and practical training on industry premises, allowing students to gain hands-on experience with modern technologies in real-life production environments.
- The cooperation with industry should be organised on a systematic and regular basis at all levels of HEI's starting from hihger adminsitration to the faculty level. Strategic partnerships with major players are important to improve internship and employability opportunities for all types of students (also for international students).

- Although there is a **strong group of experienced researchers**, some HEI's faculty members could **increase their research activity** to better integrate **scientific advancements into teaching**. This could be facilitated by **reducing teaching hours**, which are currently **higher than in many European institutions**, allowing more time for **research and industry collaboration**.

- To **enhance research competencies**, especially for **early-career faculty**, institutions could organize **workshops and training sessions** on **grant writing, research planning, and project management**, helping teachers secure funding and expand their research portfolios.

- It is also important to **promote and enhance student-centered learning approaches**, such the promotion and funding of **project-based activities**, as well as **debates and discussions on industry-relevant topics**.

- Furthermore, fostering a **culture of continuous professional development** is essential. Institutions should actively promote **pedagogical training, teaching innovation, and a commitment to high-quality learning experiences**. This requires **institutional policies** that emphasize **teaching excellence, ongoing faculty development, and student engagement in the learning process**. Encouraging the use of **formative assessment and modern teaching strategies** would further enhance educational outcomes.

Strategic recommendations at the national level (for the Ministry of Education, Science and Sport)

- During the meeting with stakeholders, it was clearly stated that there is a significant demand for engineers in the production and manufacturing sectors in Lithuania. However, the number of students enrolled in these programs is too low, creating challenges in meeting industry needs. According to explanations provided, this is largely due to the fact that secondary school graduates often choose not to pursue studies in STEM fields for various reasons - primarily because such programs require strong knowledge of mathematics and physics. Therefore, special initiatives and support measures are needed to encourage more students to enter these critical fields, which are essential for the growth and competitiveness of Lithuanian industry. It is equally important to guide and motivate students already during their school years toward STEM-related study paths, raising awareness of career opportunities and the societal importance of engineering and manufacturing professions.
- To **increase funding** in the field of **Production and Manufacturing Engineering**. This area is rapidly evolving, with **significant advancements** in **automation, digital manufacturing, and Industry 4.0 technologies**. Lithuanian institutions have demonstrated **strong research capabilities** and **high-quality teaching**, contributing to global innovation. However, maintaining **world-class standards** will require **consistent and long-term financial investment**, particularly as these fields demand **cutting-edge technology and modernized infrastructure**.
- It is recommended to **implement a systematic, comprehensive, and periodic evaluation protocol** for **teaching quality**, ensuring continuous **improvement in educational outcomes**. Furthermore, for academic promotion, it is crucial to **balance the evaluation of teaching quality with scientific output**, reinforcing the importance of **pedagogical excellence alongside research achievements**.

Recommendations on the evaluation process for Centre for Quality Assessment in Higher Education (SKVC)

- It is recommended to improve the payment system for external experts by separating reimbursements (such as travel, accommodation, and per diem expenses) from the service contract fee. The current practice, where the expert receives the entire amount including reimbursements under a single contract, results in the need to pay taxes on the reimbursed part as well. This creates an administrative and financial burden that could be avoided by clearly distinguishing between taxable service fees and non-taxable reimbursements. It would be advisable to follow EU best practices in this regard, where reimbursements are processed separately and are not subject to taxation as part of the expert's fee.
- The evaluation process for the Production and Manufacturing Engineering study field is well-structured and effective, with the involvement of international experts ensuring a high level of objectivity and minimizing conflicts of interest. The external review process, conducted under the Lithuanian Centre for Quality Assessment in Higher Education (SKVC), provides valuable insights into the strengths and areas for improvement within the evaluated institutions.
- However, a more in-depth assessment of the effectiveness of teaching and evaluation methods is recommended. For instance, with the incorporation of examples of continuous and formative assessments, student-centered learning approaches, and periodic student feedback that would help the experts to understand that students develop the necessary competencies in line with industry and academic standards.
- To maintain an up-to-date and seamless accreditation process, it is advised that future evaluations be conducted when the program is fully developed, not when it is just implemented. This would prevent gaps in quality assurance and in the number and quality of evidences and ensure that institutions remain aligned with evolving educational and industry requirements.