



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

**KAUNO TECHNIKOS KOLEGIJOS
STUDIJŲ PROGRAMOS *MEDŽIAGŲ APDIRBIMO INŽINERIJA*
(valstybinis kodas – 653H30001)
VERTINIMO IŠVADOS**

**EVALUATION REPORT
OF *MATERIAL PROCESSING ENGINEERING*
(state code –653H30001)
STUDY PROGRAMME
at KAUNAS TECHNICAL COLLEGE**

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Išvados parengtos anglų kalba
Report language – English

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Medžiagų apdirbimo inžinerija</i>
Valstybinis kodas	653H30001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Mechanikos inžinerija
Studijų programos rūšis	Koleginės studijos
Studijų pakopa	pirmoji
Studijų forma (trukmė metais)	nuolatinė (3), iššęstinė (4)
Studijų programos apimtis kreditais	180
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Mechanikos inžinerijos profesinio bakalauro laipsnis
Studijų programos įregistravimo data	2008-06-28

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Material processing engineering</i>
State code	653H30001
Study area	Technology Sciences
Study field	Mechanical Engineering
Type of the study programme	College studies
Study cycle	First
Study mode (length in years)	Full-time (3), part-time (4)
Volume of the study programme in credits	180
Degree and (or) professional qualifications awarded	Professional Bachelor in Mechanics Engineering
Date of registration of the study programme	28-06-2008

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The Centre for Quality Assessment in Higher Education

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I. INTRODUCTION

1.1. Background of the evaluation process

The evaluation of on-going study programmes is based on the **Methodology for evaluation of Higher Education study programmes**, approved by Order No 1-01-162 of 20 December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC).

The evaluation is intended to help higher education institutions to constantly improve their study programmes and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: 1) *self-evaluation and self-evaluation report prepared by Higher Education Institution (hereafter – HEI)*; 2) *visit of the review team at the higher education institution*; 3) *production of the evaluation report by the review team and its publication*; 4) *follow-up activities*.

On the basis of external evaluation report of the study programme SKVC takes a decision to accredit study programme either for 6 years or for 3 years. If the programme evaluation is negative such a programme is not accredited.

The programme is **accredited for 6 years** if all evaluation areas are evaluated as “very good” (4 points) or “good” (3 points).

The programme is **accredited for 3 years** if none of the areas was evaluated as “unsatisfactory” (1 point) and at least one evaluation area was evaluated as “satisfactory” (2 points).

The programme **is not accredited** if at least one of evaluation areas was evaluated as "unsatisfactory" (1 point).

1.2. General

The Application documentation submitted by the HEI follows the outline recommended by the SKVC. Along with the self-evaluation report (SER) and annexes, the following additional documents have been provided by the HEI during the site-visit:

No.	Name of the document
1	KTC study quality assurance policy and quality improvement strategy for 2014-2016
2	A set of methodological guidelines for the preparation for the final thesis

1.3. Background of the HEI/Faculty/Study field/ Additional information

Kaunas Technical College (KTC) is well known in the market of education of Lithuania as educational institution with the traditions of engineering specialist training. Its beginning goes back to 1920, when the Kaunas Higher Technical School was founded.

Today KTC is a higher education institution that provides public service, trains specialists of engineering field and runs the following study programmes with a Professional Bachelor Degree:

- Material Processing Engineering
- Automobile Technical Maintenance
- Motor Transport Electronics
- Electronics Engineering
- Electrical Energy
- Road Engineering
- Civil Engineering
- Heritage Buildings Engineering
- Automobile Electric Systems Engineering

KTC mission is to train high quality engineering specialists based on high quality principles. KTC wants to meet both the local and global labour market requirements.

In September 2013 KTC introduced a new organisational structure. According to this structure, the study programme in Material Processing Engineering is supervised by the Committee of Transport and Mechanics. The committee reports to the Deputy Director for Academic Activity, who reports to the KTC Director. The committee is also responsible for the programme Automobile Technical Maintenance.

The study programme started in 2009 under the title of Automated Material Processing Technologies. The current title was given 2013. The programme is offered in full-time and part-time mode.

The self-evaluation report of the study programme in Material Processing Engineering was developed in accordance to the Director's order from September 2014. The programme is evaluated by an international team of experts for the first time.

1.4. The Review Team

The review team was completed according *Description of experts' recruitment*, approved by order No. 1-01-151 of Acting Director of the Centre for Quality Assessment in Higher Education. The Review Visit to HEI was conducted by the team on *23th February 2015*.

- 1. Prof. dr. Olav Aarna (team leader)**, *Member of the Management Board and adviser of Estonian Qualification Authority, Vice-Rector for Research at Estonian Business School, Estonia.*
 - 2. Prof. dr. Hartmut Ulrich**, *Professor for Mechatronics and Fluid Power Technology, Institute for Mechanical Engineering, University of Applied Sciences Ruhrwest, Germany.*
 - 3. Prof. dr. Jolanta Janutėnienė**, *Head of the Dep. of Mechanical Engineering, Faculty of Sea Mechanics, Klaipėda University, Lithuania.*
 - 4. Prof. dr. Mikael Enelund**, *Professor at the Department of Applied Mechanics, Chalmers University of Technology, Sweden.*
 - 5. Dr. Vaidas Liesionis**, *Marketing Director at Machinery plant "Astra" AB, Lithuania.*
 - 6. Mr. Eduardas Gvozdas**, *student of Vilnius University study programmes Laser Physics and Optical Technologies, International Business Economics and Management.*
- Evaluation coordinator Ms. Natalja Bogdanova**

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

The aim of the study programme is to train qualified automated material processing technology specialists with analytical thinking. The graduates should be able 1) to organize, prepare and implement technological process of manufacturing and repair; 2) to design and construct manufacturing means; 3) to organize equipment maintenance and repair; 4) to organize business company's (department's) activity.

In the SER the programme aims are clearly defined and well formulated using active verbs (SER 1.1 p.8). The four general aims of the programme are decomposed into 16 specific aims and LOs (SER 1.1 p.9), and subsequently down to the course level.

The interrelations between the courses and the LOs are clearly documented (SER, table 3 p.1.2.2). There is a comprehensible and traceable chain from the study programme's LOs to the

LOs of each course, as well to the corresponding teaching and learning methods and assessment criteria.

Unfortunately this clear structure could not be found on website of the programme in English, although it should be available for all interested parties, incl. potential students and social partners.

The name of the study programme reflects its aims and LOs. The name was changed three times since introduction of the programme, but now it is well understandable for students and other stakeholders.

The programme addresses identified needs of the national metal working and processing industry for engineers who are able to design and operate conventional metal processing and parts machining manufacturing processes. When the evaluation team asked the students for the reasons to study this programme or when the alumni were asked, why they hadn't continued with a master's studies, all referred to the multiple employment opportunities with the KTC professional bachelor's degree. Social partners also emphasized, that they urgently need graduates with exactly the skills the graduates gain at KTC.

The LOs of the programme meet most of the requirements of the EUR-ACE framework standards for the first cycle engineering curricula. The review team recommends to widen the programme LOs for better matching with the EUR-ACE standards. For instance, the graduates of the first cycle are expected to:

- be able to solve engineering problems, with their level of knowledge and understanding and which may involve considerations from outside their field of specialisation;
- have the ability to select and apply relevant analytic and modelling methods,
- have an understanding of design methodologies and an ability to use them.

The LOs of the programme do not fully cover these expectations. They are very much focussed on the specific needs of particular industry; besides, they seldom address analytical modelling and systematic problem solving methods.

2.2. Curriculum design

The curriculum meets all legal requirements of a professional bachelor's programme. The number of credits and their distribution among different modules are in accordance with the requirements defined in the Order of the Minister of Education of the Republic of Lithuania on the Legal Requirements of the First Degree and Integrated Study Programmes.

The modules are logically and evenly distributed over semesters. During the first semesters, the students acquire general engineering competences in mathematics, physics, mechanics, strength of materials and CAD. Further they focus more on speciality related subjects, e.g. the manufacturing equipment and technologies. During the last three semesters the student can select one out of two specializations “Exploitation and maintenance of manufacturing machinery” or “Management of manufacturing technologies”. Senior management of KTC explained to the review team, that the third specialization in “Wood Engineering” will be introduced soon, as there is a clear need from the industry.

The sequence of modules in the curriculum allows the students to switch to another programme in Automobile Technical Maintenance, if students’ interests are changing.

The curriculum includes four practical placements: one in the second semester, second in the third semester, professional activity practice in the fourth semester, manufacturing technology practice in the fifth semester and final practice before preparing the graduation thesis. Nearly all modules include practical assignments and working in the labs of KTC.

The same curriculum is offered for full-time and part-time students, only the temporal arrangement is different.

The review team rated the curriculum design as excellent. The programme management team has developed an excellent LOs based structure for the curriculum. It is extraordinary because of its very stringent and transparent composition of modules to meet exactly the stated aims of the programme.

Each course description exemplifies the logical chain from the programme aims to their implementation by the teachers. In the course description it is also mentioned which ones of the 16 LOs of the programme are addressed in the course, the corresponding LOs are detailed according to the course content, teaching and learning methods and assessment criteria are also presented. The review team checked the syllabi of several courses and found a high consistency to the overall programme aims and LOs. This is a prerequisite that the graduates will achieve the intended LOs and aimed qualification.

In the review team’s opinion, this systematic approach to the programme design can serve as an example of best practice for other HEIs. It is clear what the students are able to do after graduation, what their qualification is and what employment positions they can reach.

From the interviews with students and teachers the review team concluded, that this structure works not only on paper, but is implemented in the reality. Hence, the programme prepares the graduates for professional activities in the field of materials process engineering in a very straightforward way.

However, the description of the graduation thesis module was missing in the SER. The module in the Methodology of Applied Research prepares students for the graduation project, but detailed written information about the thesis itself was not available in English. The complete module description for the thesis should be added to the programme description on the KTC web site.

2.3. Teaching staff

Teaching staff is formed in accordance to all legal requirements. The study programme employs 27 teachers: four associated professors, two of them working as adjunct faculty members, 20 lecturers: 16 of them working as core faculty and two as adjunct faculty. Visiting faculty is employed according to the programme's needs.

The number of teachers is sufficient for the present number of students in the programme (35 freshmen in 2014). Even if the number of students will increase in the forthcoming years, the programme delivery would be guaranteed.

More than 55% of the teaching staff have got a master's degree, 8 have doctoral degree. The legal requirements are completely fulfilled.

The teachers are highly engaged and motivated. As skilled and enthusiastic teachers and engineers they inspire the students. They have always "open doors" for students' issues. Teachers are interested in the students' feedback on the courses and continuously improving delivery of their courses.

The review team got confirmation about close cooperation between the teachers. They regularly meet each other once a month to discuss issues of the programme, students' progress and course LOs.

However, the review team identified, that a clear understanding of constructive alignment, the connections and correlation between the programme LOs, teaching/learning activities and assessment of students among teachers was missing. Teachers misinterpret the use of LOs for assessment. More specifically, general perception is that LOs describe the expected level of grade "Excellent" instead of threshold level grade "Satisfactory". Nevertheless, many teachers are practicing intuitively an appropriate teaching style.

The KTC does not have a systematic professional development programme for teachers to improve their pedagogical and didactic skills. Therefore, the review team recommends systematically train teachers for better understanding and implementation of the constructive alignment approach.

The teachers' participation in research work is limited to co-operation with social partners and local industry. Only fairly seldom they publish research papers or visit scientific conferences. Also, some teachers do not speak English and only a few make use of the ERASMUS programme (two teachers in 2010, according to the SER). If KTC wishes to attract students from abroad it has to develop international learning environment.

2.4. Facilities and learning resources

The premises at KTC are adequate both in size and quantity. There are enough workplaces for students in the classrooms and laboratories, and in the library for independent work.

All laboratories are very clean, tidy and well kept. The quality of labs differs substantially. For instance, the laboratory for welding is very well equipped with brand new welding working places. The mechatronics laboratory is equipped with a new flexible automated manufacturing line and a hydraulic operation training stand.

On the other hand, the metalwork laboratory with lathes and grinding machines is very old. At KTC the students can only practice elementary machining processes but not what is required in the modern industry. During the lab tour it was explained that the students get acquainted to modern machines and processes during their final practice in the industry. In the review team's opinion, it can only be assumed as a proper chance for the students to get acquainted with technologies, however, it cannot replace the practice at the college.

From the discussions with lecturers and students the review team got the feedback that all parties are aware that a part of the equipment is outworn and needs updating. Teachers and students compensate this lack of modern equipment with study trips to industrial partners. In the opinion of the review team, it seems to work at the moment, but it cannot be a solution in a long run. If KTC relies too much on social partners and their support – especially regarding modern process technologies – very important elements of the study programme stay outside the control of the programme management. The review team recommends updating the laboratory equipment to offer the students possibilities to practice with standard and modern machines and processes in house according to the requirements of local and global labour market.

KTC has enough computer workstations and software licences for computer aided drawing and design. The review team recommends considering to offer CAD software licenses also for students for the period of their studies at KTC.

For nearly all courses relevant textbooks are available in the library or in electronic form in the Moodle virtual learning environment. The students have also access to electronic research databases.

2.5. Study process and students' performance assessment

There are several study programmes in mechanical engineering in Lithuania, but none of them is similar to the one at KTC. Nevertheless, the number of students admitted has been low starting from launching the programme. From 2009 to 2013 the average number of students admitted was about 15 and increased to 35 in 2014. KTC is conducting different marketing events for upper secondary school pupils to attract more potential students. The review team recommends to attract also students from outside Kaunas region.

The student admission process is clearly defined and is conducted according to the national regulations. The admission requirements are published on the KTC website.

The organization of studies, the mandatory attendance of lectures and practical trainings accommodate the needs of full-time students and part-time students. For full-time students the programme is offered in two semesters a year during working days. For part time students three study sessions are organized per year, in October, January and April/May.

The course descriptions contain detailed assessment procedures. Possible repetitions of failed exams are properly organized in order to enable the students to pass the exams according to the planned curriculum.

High drop-out rate of more than 50% in the full-time studies and 40% in the part-time studies (SER, p.112 in 1.5.1) was discussed with senior management, teachers and students. The review team is convinced that the reasons for this are mostly related to students' personal circumstances and decisions rather than the organization of the study process.

The college and the programme management are very student supportive. They are in close contact with the students and provide, within their possibilities, the adequate environment to achieve the LOs in time.

The students are involved in applied research projects for the local industry. Most of the bachelor's thesis the team could review were small-scale research and design projects solving current technical problems. The review team would have expected a wider variety of topics and a higher academic level of the final theses.

The international mobility of the students is very low. Although KTC is participating in the Erasmus programme, the students don't use the opportunities to go abroad and no foreign

exchange students come to KTC. The management of KTC is aware of the situation. In the review team's opinion, KTC has taken the right decisions to find more co-operation partners for internships in foreign companies and to improve the students' language skills, especially in English.

To conclude, the review team found high satisfaction of current students, alumni and social partners with the quality of the study programme.

2.6. Programme management

The KTC has developed the "KTC study quality assurance policy and quality improvement strategy for 2014-2016". This document describes general principles of quality management and establishes organisational structure for quality management at KTC. The programme in Material Process Engineering is supervised by the Committee of Transport and Mechanics. The committee reports to the Deputy Director for Academic Activity, who reports to the KTC Director. The committee is also responsible for the programme in Automobile Technical Maintenance.

The programme committee coordinates the programme development, continuous improvement and implementation. The committee is chaired by a very dedicated teacher. Participation of teachers, social partners and students' representatives ensures that the interests of all stakeholders are taken into account. The review team got clear evidence that coherent quality assurance and programme development processes are implemented at KTC.

Regular students' surveys are carried out and the results are reviewed by the teachers and the programme committee. However, the participation rate of the students in these reviews is quite low. This compensates somehow by everyday informal contacts and feedback loops in a comparatively small organisation. However, this approach cannot be taken as sustainable enough. Having in mind increasing number of students in the programme, the review team strongly recommends to formalise all processes related to the programme management.

2.7. Examples of excellence *

The review team highly appreciates coherent description of LOs on all levels, from study programme down to every single course, including teaching and learning activities and assessment of students.

III. RECOMMENDATIONS

1. Review the programme learning outcomes to include all learning outcomes of the EUR-ACE framework standards for the first cycle study programmes in engineering and better reflect the latest developments in production technologies.
2. Complete description of the graduation process following the model adopted for other courses of the programme. Describe the expected learning outcomes of the graduation process, definition of the problem to be solved in the thesis and assessment criteria.
3. Make study programme and course learning outcomes available on the KTC website in English.
4. Consider marketing the programme across Lithuania.
5. Train teachers for a better understanding and implementation of the constructive alignment: the relationship between the programme learning outcomes, teaching and learning activities, and students' assessment.
6. Update the laboratory equipment to offer the students possibilities to practice with standard and modern machines and processes in house according to the requirements of local and global labour market.
7. Prepare students for the global market needs and improve their English language and inter-cultural skills.
8. Involve students more in the quality assurance and programme development processes.
9. Formalise all programme management and quality assurance processes.

IV. SUMMARY

The study programme in Material Processing Engineering at Kaunas Technical College (KTC) is in accordance with the national and European regulations, market survey results and labour market trends. The aims and learning outcomes of the programme are clearly defined. The programme prepares students for practical engineering professions in the field of material processing engineering. The graduates are in high demand on the regional labour market.

Learning outcomes of the programme meet most of the requirements of the EUR-ACE framework standards for the first cycle study programmes in engineering. However, learning outcomes of the programme should be reviewed to include all learning outcomes of this European standard and better reflect the latest developments in production technologies.

The methodology used by KTC for the curriculum design is considered to be an example of excellence. The taxonomy used and the learning outcomes of each course refer to the overall aims of the programme. It is very clear what the students are expected to know and able to do upon graduation, what their qualification is, and what employment positions they can fulfil.

Teaching staff of the programme is competent to teach the students. They are highly dedicated and motivated. However, the teachers should more participate in research and improve their English language skills in order to better prepare the students for tomorrow's needs and of a global market.

KTC is currently updating the laboratories. Some of them are already very modern, but others are out-of-date and need to be modernized, especially the metal machining laboratory. To compensate the lack of modern equipment, study trips to industrial partners are organized. However, to be prepared for professional activities in the field of materials process engineering the students must have the possibility to practice new production technologies also at KTC, not just by chance in the industry.

The study process and student assessment are well organized. KTC has to further develop the learning outcomes based assessment to fully accomplish constructive alignment approach. The problem of high drop-out rates has been identified and countermeasures have been introduced. The students' participation in international exchange programmes is very low. The need for international orientation has to be better communicated to the students and steps towards more international learning environment taken by KTC.

The programme management is well adopted for the current low number of students. However, the quality assurance system has to be made more formalized and less dependent on the actors.

V. GENERAL ASSESSMENT

The study programme *Material processing engineering* (state code – 653H30001) at Kaunas Technical College is given **positive** evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	3
2.	Curriculum design	4
3.	Teaching staff	3
4.	Facilities and learning resources	2
5.	Study process and students' performance assessment	3
6.	Programme management	3
	Total:	18

*1 (unsatisfactory) - there are essential shortcomings that must be eliminated;

2 (satisfactory) - meets the established minimum requirements, needs improvement;

3 (good) - the field develops systematically, has distinctive features;

4 (very good) - the field is exceptionally good.

Grupės vadovas:

Team leader:

Prof. dr. Olav Aarna

Grupės nariai:

Team members:

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Prof. dr. Jolanta, Janutėnienė

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