

**Professional Education Competence Centre
“Riga Technical College”**

MECHANICAL ENGINEERING

Qualifications

**MACHINE DESIGN Specialist
MECHATRONICS Specialist**

First level higher professional education

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Introduction

Herewith the Study Programme “**MECHANICAL ENGINEERING**” of the first level higher professional education of Auto Transport and Production Technologies’ Department of Professional Education Competence Centre “Riga Technical College” (hereinafter referred to as RTC) with obtainable qualification MACHINE DESIGN SPECIALIST OR MECHATRONICS SPECIALIST is being submitted for evaluation.

RTC Study Programme “Mechanical Engineering” with qualification Mechatronics Specialist was commenced in 2001 and has been accredited till December 31, 2013 (Accreditation paper No. 035-1270; Resolution of Accreditation Commission No. 3052 as of October 10, 2007).

The Study Programme was updated in 2010 and approved of at RTC Council meeting on February 10, 2011, Minutes No. 6. Licence No. 041003-15 has been received for realization of the Study Programme, which is valid till March 3rd 2014.

In study programme “Mechanical engineering” optimization was made, an integration of similar study programme, thus developing integrated programme with several specialization outputs.

Given that study courses for Mechatronics Specialist and Machine Design Specialist are shared, two qualifications are possible in study programme “Mechanical Engineering”: “Machine Design Specialist” or “Mechatronics Specialist”.

A new speciality Machine Design specialist was developed in the Study Programme “Mechanical Engineering” with duration of studies 2,5 years (full-time studies) and duration of studies 3 years (part-time studies), scope - 100 credit points.

In study programme “Mechanical Engineering” both qualifications have common General education study courses (20 CP) and Industry’s study courses (24 CP), and 31 CP accordingly for professional competence of Mechatronics specialist and Machine Design specialist.

Evaluation is performed within the framework of agreement No. 2011/0012/1DP/1.1.2.2.1/11/IPIA/VIAA/001 of the **European Social Fund Project “Evaluation of Higher Education Programmes and Suggestions for Quality Improvement”**.

1. Quality

1.1. Aims and tasks

Aim of first level higher professional education study programme "Mechanical Engineering" is:

- To train the student for work in metal working and machine design sector;
- to facilitate acquisition of knowledge and skills, which ensure the student with development of organizer's abilities and qualities for work of middle-level manager;
- To ensure students the possibility to prepare for continuation of their education in study programmes of a higher level and raise their professional qualification at courses and seminars.

Tasks:

- to render basic knowledge and professional competence and to train persons for independent, highly qualified work in the sphere of metal working and machine design, that is connected with designing, production, installation and technical service of equipment and devices.

In order to implement the set task, the programme envisages rendering knowledge, developing the necessary knowledge, skills and attitudes for performing professional activities in compliance with qualification.

Machine Design specialists and Mechatronics specialists who have acquired this study programme are able to work not only at various industrial enterprises, but also to continue studies at Riga Technical University or other HEI.

1.2. Study content and organisation

The Programme complies with the requirements of MC LR Regulations No. 141 "Regulations on State Standard of the First Level Professional Higher Education".

The scope of the Programme is 100 credits (hereinafter - CP)/150 ECTS in compliance with the state standard of the 1st level professional higher education, study courses are 75 CP (general education study courses 20 CP, branch study courses 24 CP, Mechatronics or Machine Design branch study courses 31 CP, practices 16 CP and qualification work 9 CP. Practice is organised in compliance with MC LR Regulations No. 276 "On procedure of study practice organisation". Studies are regulated by RTC Regulations, study programme, study plan, study course programme and study process schedule. Study programme and study plan determine study courses to be acquired, their forms, scope, distribution by semesters and succession. The study process schedule determines time-limits of the academic year. Study course programmes

determine themes of studies and practices. During implementation of the programme students take 10 examinations, 23 tests “with evaluation” and 16 tests “without evaluation”, and also write 5 course papers.

Duration of study programme implementation is the following:

- Full-time intramural studies - 2,5 years ;
- Part-time intramural studies - 3 years.

One CP corresponds to 40 working hours per week, i.e.

- Full-time study programme - 20 contact hours and 20 hours of independent work;
- Part-time study programme - 16 contact hours and 24 hours on independent work.

Practice both for full-time and part-time students takes 40 hours per week.

Mechanical Engineering study programme envisages acquisition of general education and branch professional study courses at theoretical and practical classes, during practice and independent studies. General education study courses include theoretical courses of humanitarian and social sciences, which develop social, communicative and managerial skills. Branch study courses correspond to the profession of correspondingly mechatronics specialist and machine design specialist profession.

Basic methods of studies are lectures, seminars, practical work, test works, field trips to enterprises and production units, development of course papers. For mastering of specific themes guest lecturers are invited, for conducting practical classes – practitioners from enterprises /organisations.

At the beginning of their study course, students are familiarised with the themes and contents of study courses and evaluation criteria within the specific study course. If necessary the student in collaboration with the lecturer can develop an individual plan. Special attention will be paid to suggestions of graduates, who are employed at enterprises and suggest introducing corrections in the contents of study course. Students participate in the improvement of study process, one of activities are student questionnaires on the quality of study courses. Open questions give students the opportunity to express their opinion and suggestions that could improve quality of the outlined material and increase benefit from the study programme in general. Analysis of questionnaires allows detecting “strong” and “weak” points of the academic staff and issues requiring special attention or additions. In order to secure the principle of democracy students can express their opinion anonymously.

Each lecturer has an e-mail address and students can contact him, ask questions and receive answers after study hours. Lecturers use Skype in their work with students as well.

In securing connection between students, academic staff and programme administration a great role is played by student self-government (Minutes No. 40-2008 of RTC Council meeting as of 02.12.2008), where students' suggestions are heard, summarised and then the programme administration is being informed, so that recommendations can be collectively discussed and the process of studies improved.

Students have the opportunity to participate in exchange of experience in other higher educational institutions of similar level in Latvia or practice abroad (the EU Life-Long Learning Programme Erasmus sub-programme for Mobility and Cooperation in Higher Education), afterwards they will familiarise other students and academic staff of the department with examples of good practice. Three mechatronics students were on practice in Germany in academic year 2010/2011, one is at practice in Germany currently and four students have submitted applications for practice.

Practices are connected with and comply with the theoretical part of the course. Acquisition of professional skills is included in the study programme.

Aim of practice: to secure connection between knowledge acquired at college and real working environment, and to give students the opportunity to acquire skills and knowledge of practical work.

Task of practice: to deepen and strengthen theoretical knowledge by using it for solution of specific practical tasks, to develop skills of the emerging specialist.

The following practices and qualification practices are planned within the study programme:

Practice name/ speciality	Locksmith practice	Bench practice	Electric installation and measurement practice	Practice at the enterprise	Qualification practice
Mechatronics specialist	2 CP	2 CP	3 CP	4 CP	5 CP
Machine Design Specialist	2 CP	4 CP		5 CP	5 CP

Practice at enterprises is envisaged after acquisition of theoretical study course and is planned at structural unit of an enterprise/organisation. Its aim is to consolidate knowledge and its use in real working environment. During the practice students prepare practice summary, which is submitted and defended upon completion of practice.

Production – technological and qualification practices are organised at the leading enterprises of the sector: “Dambis” Ltd., SC “Aldaris”, SC „Laima”, “Festo” Ltd, Sc “Cēsu

alus”, “Jāņa sēta” Ltd., “VALPRO” Ltd., SC “Rīgas Piensaimnieks”, SC “Valmieras piens”, SC “Knauf”, “Talsu tehnika” Ltd. and others.

Qualification practice is envisaged, so that students can develop their qualification work using information on work organisation of a structural unit of a real enterprise, to evaluate production activity of the enterprise, peculiarities of its production and to perform analyses of production quality.

1.3. Studies and evaluation of knowledge

Evaluation of student knowledge complies with Regulations of MC LR on State standard of the first level professional higher education (No. 141 as of 20.03.2001), and Decree of Ministry of Education and Science of the Republic of Latvia (hereinafter referred to as LR MES) No. 208 as of 14.04.1998, and resolutions of RTC.

One of the main basic principles of evaluation is the principle of summation of positive achievements.

Tasks:

- To facilitate students' responsibility for the achieved result in the process of studies;
- To motivate students to improve learning achievements by performing self-evaluation;
- To perform the necessary correction of study process for improvement of results.

For successful acquisition of the course students are familiarised with content of the course and evaluation criteria. Evaluation within the framework of study courses is achieved by fulfilling requirements put forward in course programmes. The prospective study results are clearly stated; skills of problem solution are being developed in practise. Great attention is paid to one of the most commonly used study work methods - case studies, where actual material of foreign and local enterprises is used.

In tasks of course papers and qualification works is envisaged comparison of various solutions/variants/options with the desirable ones, thus developing in practice skills of problem solving.

Students are provided with assistance and consultations of academic personnel, control of intermediate results is also performed in order to provide for achievement of the study programme results in due time and to increase study motivation.

On commencing the study course the student's previous training is of great importance. Student matriculation takes place in compliance with “Matriculation Procedure” developed by

RTC, which was issued pursuant to articles 45, 46 and 83 of the Law on Higher Educational Establishments.

Student can choose themes of independent work and papers according to their topical issues (if the student is employed at the respective enterprise). When presenting their papers they give the opportunity to other students to get familiarised with production units and enterprises of the specific industry.

That is why special attention is paid to study forms: work in small groups, development of study papers and research projects, discussion of these in groups and public presentation.

Dialogue between the lecturer and the student is a specific study work form, the aim of which is to create a working environment characterised by good fellowship, mutual understanding and tolerance, and to develop optimal communication of lecturer's knowledge and practical experience to students. During implementation of study programme the following dialogue forms have been developed:

- Students' familiarisation with detailed course descriptions,
- Studies in small groups, allowing to involve each student into conversation,
- Public presentation and evaluation of qualification paper,
- Weekly individual consultations,
- Cumulative study work evaluation system and result analyses,
- Public presentation of practice and analyses of its results,
- Evaluation of practice involving students and practice managers,
- Organisation of student questionnaires on study programme courses.

Study process is structured as an active process that is captivating for students. Foreign languages are integrated into study courses, motivating students to read literature published in foreign languages and inviting guest lecturers from abroad.

Process oriented evaluation is carried out during the process of study content acquisition as well, in order to compare the estimated students' knowledge reference with the real results. An important condition is familiarisation of students with the estimated results, with methods of result analyses, with those arguments on which are based conclusions on basic deficiencies or shortcomings in their works and possible reasons of these. In the result both lecturers and students develop their skills to acquire and organise information, to process and derive new knowledge, which provides for the student's joint responsibility for his study achievements and their compliance with aims and tasks of study subjects. Evaluation of results achieved during the practice is determined during each practice, envisaging evaluation criteria and documents to be filled in during the practice.

At the beginning of a new study semester, at the meeting of department analyses of students' study results is performed and the academic personnel can get familiarised with results of examinations, student questionnaires and recommendations for improvement of study quality.

Study programme is supplemented and updated on the bases of market studies, and consultations with employers and practitioners.

In the process of studies we use new IT possibilities, the Internet resources, interactive boards, projectors, Paper Show, Skype, software for engineering technical calculations and design. Consultations of academic personnel take place according to consultation schedule. Each lecturer has an e-mail address; students can contact him both individually and in groups, ask questions and get the answers. Regular evaluation of student knowledge takes place through tests, test works; at seminars students present their knowledge they had independently acquired at theoretical courses and practical classes.

1.4. Study provision and management

The system of studies is structured in compliance with the Law on Education, Law on Higher Educational Establishments and Professional Education with the purpose to promote achievement of aims set forth in study programmes and to facilitate execution of tasks. The system in RTC is defined by documents regulating relations between students and college and RTC by-laws.

Basic documents and structural units that regulate monitor and determine the process, procedure and organisation of studies:

- RTC Council
- Study programme administration
- Student Self-government
- Study programme
- Study courses description
- Study plan for full-time and part-time studies

The respective documents are available in RTC structural units and in Study Department. Normative documents regulating activities of the College can be found at RTC home page: www.rtk.lv, in the section for students.

Student cards are issued to matriculated students. From the beginning of studies the students are granted all rights of RTC students envisaged by the Law on Education, Law on Higher educational Establishments and other mandatory documents. When commencing their

studies students receive informative material, containing the most important information on study organisation and practical procedures.

RTC Council operates in the College in compliance with RTC Regulations and structure, in which are included student representatives who are nominated by RTC Student Council. Thus RTC students are involved in decision taking in RTC.

With the purpose to establish relationships of administrative, academic staff and students, lecturer E.Tozhe (E.Tože) has developed RTC Code of Ethics, which is based on the European School Council document, Law of Education, Administrative Offence Code of Latvia and RTC by-laws. In RTC library it is available to all students, lecturers and employees, it can also be found at the group's tutor and principal deputy in pedagogical work.

*The task of Code of Ethics is to stimulate students and academic staff as well as other employees of the College to be just, honest and reliable, to perform their direct duties responsibly and conscientiously, and to follow ethic basic principles in mutual communication and behaviour.*¹

Conflict situations can be solved through negotiations, with participation of conflicting parties and the Head of Department, or if compromise is impossible – on the basis of an official application and Resolution of Department meeting, which is approved of or corrected by order of RTC Principal.

1.5. Scientific research (creative) work of the academic staff and students

In realisation of the study programme “Mechanical Engineering” is involved academic staff with qualification in the corresponding sectors: Doctors of science – 6, Masters – 16, higher professional education – 4.

Creative work of the academic staff is closely connected with aims and tasks of the study programme.

Once a year an exhibition of course works, independent works and qualification works takes place for all College study programmes, where the complete academic staffs have an opportunity to get familiarised with the work of their colleagues.

A scientific and practical conference is held annually, where students and academic staff present their scientific research works.

In Science and Technology's Days “Robotics 2008” two mechatronics students participate with a robot constructed by them.

¹ Tože E. “Introduction of Code of Ethics in work of RTC lecturers, employees and students”

Mechanical Engineering students participated in EuroSkills - 2008 in Holland and Euroskills -2010 in Portugal, where they were awarded Silver award in Mechatronics in the category of mobile robots programming.

Assistant M. Šteinbergs participated in Euroskills – 2010, Rotterdam, Holland as an expert and docent A.Kazuša participated in Wordskills – 2011, London, UK as an observer.

When analysing employment of graduates after graduation of the College, we see that 63% work in the acquired speciality, 7% continue their studies at the next educational level, a certain part of graduates work in a different sector, but often in a related profession.

1.6. Quality assurance and guaranties

Internal Quality Management System operates at Professional Education Competence Centre “Riga Technical College”, which complies with requirements of Standards and Guidelines for the Quality Assurance in the European Higher Education Area (ESG) established by ENQA.

Study programme quality is evaluated by administration of the study programme, departments, which implement the study programme, and other involved structural units, Council of the College, professional associations and employers as well as student Self-government.

Operation of internal quality assurance mechanism of the study programme of the First level professional higher education in RTC is ensured at various levels:

1. Study department performs:
 - Supervision of RTC study courses (hereinafter referred to as SC), which includes compliance of SC with the higher education programme, its content,
 - Questionnaires of students at College level. The purpose of questionnaires is to clarify students’ adaptation in the College system and satisfaction of all students with the study process, lectures, and practical classes. Results of questionnaires are available in Study Department,
 - Provision of premises and technical equipment for stream lectures (35- 80 seats),
 - Development of study process schedule in correspondence with study plans and the existing situation,
2. Department level::

- Once a year the manager of the study programme submits his report to Study Department, prior to that it is evaluated at Department meeting.

- Students are involved in study programme quality evaluation by participating in questionnaires, as a result students' opinion is clarified and recommendations for improvement of study programme implementation and possibilities for perfection of lecturer's work are received.

- RTC General Service Department sees to it that premises and technical equipment are provided for in compliance with the latest standards, thus facilitating development of departments and increasing the quality of study programme implementation.

3. College and administration level.

- Once in a semester a questionnaire among students of the study programme is organised concerning the performance quality of lecturers and evaluation of study programme. The input is summed up and the summarised results are discussed at Department's meeting, administration meeting and Council meeting.

- Once per academic year the contents of the study programme courses, methodical materials, the latest study literature and methodical guidelines of study papers (papers, practice reports, course papers) are revised;

Academic staff has the opportunity to participate in courses and seminars on the latest study and pedagogical methods, besides attendance of efficiency courses at seminars and exhibitions organised by employers is facilitated.

Academic staff and study programme administration take part in various events and projects on exchange of experience; collaborate with HEI and competence centres abroad, meet representatives of the corresponding institutions and social partners, mutually discuss current events in the sector, analysing the results and making corrections in study programmes.

2. Resources

2.1. Aims and tasks

Employers and professional organisations evaluate the resources for acquisition of study programme approvingly and as complying with the aims.

Auto Transport and Production Technologies Department in cooperation with academic staff of RTU Transport Mechanical Engineering Faculty and MASOC implemented ESF project – “Study programme Mechanics and Metalworking improvement and implementation” (Agreement No. 2007/0083/VPD1/ESF/PIAA/06/APK/3.2.3.2/0027/0098),

within the framework of the project questionnaire of employers was carried out on RTK study programme “Mechanical Engineering” graduates’ preparedness and compliance of contents of this study programme to labour market.

Results of the questionnaire showed, that in general students and employers give positive evaluation to knowledge and professional competence of the graduates, their work at enterprises and study programme contents. According to recommendations of employers changes were made in duration of studies (from 3 to 2, 5 years) as well as correction in the study course content.

After realization of the project expert working team together with employers developed a new profession standard – Machine Design Specialist and optimized study programme Mechanical Engineering.

RTC technical equipment provides for realisation of the study programme and compliance to requirements of the labour market in the sectors of mechatronics, metalworking and machine design.

In general, out of the overall amount of study programme contact hours (2500 hrs.), theory makes 37%, practical works – 23%, practices – 25%, development of qualification work - 15%. Such distribution is appropriate for achievement of aims of professional study programme.

2.2. Study content and organisation

In some study courses several lecturers are planned, one reads lectures, another conducts laboratory works or practical works. Specific professional study courses are conducted by guest docents/guest lecturers/guest assistants. (Table No.1)

List of study programme academic staff

Table No.1

N o.	Name, surname	Academic position	Scientific degree	Study course	Amount CP
1.	Rūta Kelberere	Lecturer	MA. environment	Higher Mathematics	6
2.	Jānis Rozenblats	Docent	Dr. paed.	Physics	3
3.	Jekaterina Čerņevska	Assistant	MA. philol.	The English language	3
4.	Monika Martinsone	Docent	MA. oec.	Entrepreneurship economics	3
5.	Sandra Stūrīte	Assistant	MSc. ch.	Labour, environment and civil protection	2
	Vladimirs Viskovs	Assistant	Mg.		
6.	Lilita Jonāne	Docent	MSc. hyst.	Organisations	2

				psychology	
7.	Jānis Pujāts	Assistant	MA.	Latvia and Europe	1
8.	Veronika Iesmiņa	Assistant	Ing. MSc paed.	Materials science	2
9.	Anda Kazuša	Docent	MSc .TQM MA. paed.	Descriptive geometry and engineering graphics	2
10.	Veronika Iesmiņa	Assistant	Ing MA. paed.	Theoretical mechanics	2
	Kristiāns Štekelis	Assistant	MSc Ing.		
11.	Veronika Iesmiņa	Assistant	Ing. MA. paed.	Strength of materials	2
	Kristiāns Štekelis	Assistant	MSc Ing.		
12.	Veronika Iesmiņa	Assistant	Ing MA. paed.	General metrology	2
13.	Veronika Iesmiņa	Assistant	Ing. MA. paed.	Machine elements	2
14.	Anda Kazuša	Docent	MSc. TQM MA .paed.	Computer aided design (CAD)	3
	Natālija Mozga *	Guest docent	Dr.sc.ing.		
15.	Kristiāns Štekelis	Assistant	MSc. ing	Engineering Calculations software in Machine Design	2
16.	Juris Krizbergs	Guest Docent	Dr.sc.ing.	Machine Design technology	2
17.	Romualds Jakubānis	Docent	Dr.	Hydraulics and pneumatics	2
	Miks Šteinbergs	Assistant	Prof .higher ed. (1 level)		
18.	Anda Kazuša	Docent	M .sc .TQM MA. paed.	Quality management basics	2
19.	Rasma Baļule	Lecturer	MA.	Electrical engineering	4
20.	Arnis Boguts	Assistant	MA.	Electronics	4
21.	Kristiāns Štekelis	Assistant	MSc. ing	Engineering graphics - schemes	1
22.	Ivars Alksnis	Assistant	Ing.	Electric appliances	3
23.	Veronika Iesmiņa	Assistant	Ing. MA. paed.	Machine elements	1
24.	Juris Krizbergs	Guest Docent		Basic programming	4
25.	Andris Gordjušins	Guest Assistant	MSc.ing.	Programmable controllers	4
	Miks Šteinbergs	Assistant	Prof. higher ed. (1.level)		
26.	Oskars Liniņš	Guest	Dr.sc. ing.	Automation	3

		Docent		elements	
27.	Oskars Liniņš	Guest Docent	Dr. sc. ing.	Automatic regulation techniques	4
28.	Andris Gordjušins	Assistant	MSc. Ing.	Robotics	3
	Kristiāns Štekelis	Assistant	MSc. ing.		3
29.	Veronika Iesmiņa	Assistant	Ing. MA. paed.	Material science additional sections	1
31.	Anda Kazuša	Docent	MSc. TQM MA. paed.	Engineering graphics additional sections	2
32.	Juris Krizbergs	Guest Docent	Dr. sc. ing.	Computer aided design (CAD) additional sections	2
	Natālija Mozga	Guest Docent	Dr. sc. ing.		
33.	Juris Krizbergs	Guest Docent	Dr. sc. ing.	Computer aided manufacturing (CAM)	3
	Natālija Mozga	Guest Docent	Dr. sc. ing.		
34.	Veronika Iesmiņa	Assistant	Ing. Ma. paed.	Machine elements additional sections	2
35.	Romualds Jakubānis	Docent	Ing.	CNC programming	3
36.	Oskars Liniņš	Guest Docent	Dr.sc.ing.	Basics designing	3
37.	Andris Kamols	Guest Docent	Dr.sc.ing.	Machine design equipment, appliance and instruments	4
				Processing theories and processes	2
38.	Juris Krizbergs	Guest Docent	Dr.sc.ing.	Machine design technology additional sections	2
39.	Oskars Liniņš	Guest Docent	Dr.sc.ing.	Automation of production process	2
41.	Jānis Vilcāns *	Vieslektors	MSc.ing.	Pressure processing technologies and equipment	2
42.	Ainārs Veips/ Oskars Lubiņš	Assistant	prof. higher ed. (1.lev.)	Bench practice	6
43.	Jānis Rozenbahs	Assistant	prof. higher ed. (1.lev.)	Locksmith work	2

44.	Viktors Zaičenko	Assistant	MA.	Electric installation and measurements	3
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* Intention agreements have been concluded on work in the study programme according to the study plan

We pay great attention to the organisation and management of practices, practical works, laboratory works and seminars. In RTC library, lecture rooms and laboratories are available work descriptions and methodical materials, computers. Quality of these works execution essentially impacts the final evaluation of the study course. In practice programmes, which students receive at commencing practice, is described its contents, documentation to be submitted to practice manager and practice evaluation criteria. Themes of course papers and qualification works are considered and approved of at department meeting.

2.3. Studies and evaluation of knowledge

Study provision corresponds to possibilities of modern technologies; computers, multimedia and internet, interactive whiteboards, paper show are used. Computers are used in practical works, which allows mastering the latest information technologies and data bases.

In Study course Automated Designing, Computer Design of Technological Processes, Basic Programming, Engineering Calculations software in Machine Design professional software programmes are used in computer rooms.

Students can copy study materials.

2.4. Study provision and management

In implementation of study programme are involved Riga Technical University, Association of Mechanical Engineering and Metalworking Industries of Latvia (MASOC) and RTK structural units:

- Department of General Studies and Management
- Auto Transport and Production Technologies Department
- Power Industry Department
- Information Technologies and Communications Department

In departments teaching of theoretical and practical part of the corresponding study course is ensured.

The following RTC support staff will also be involved in implementation of the study programmes: Study Department, Study Practice and Production Department, Research and

Methodical Development Department, Study Process Development Assurance Department, Library, Information Centre, Accountancy, Hall of Residence, Coffee-bar.

On the basis of agreement concluded with State Education Agency on April 02, 2010 RTC has implemented European Regional Development Fund activity programme "Infrastructure and Services" operational programme Priority 3.1. "Infrastructure for Strengthening Human Capital" 3.1.2 measure "Infrastructure of Higher Education" 3.1.2.1 Activity "Modernization of Premises and Devices for Improvement of Study Programme Quality at Higher Educational Establishments, including Provision of Education Opportunities for Individuals with Functional Disabilities" 3.1.2.1.1 sub activity Modernization of Premises and Devices for Improvement of Study Programme Quality at Higher Educational Establishments, including Provision of Education Opportunities for Individuals with Functional Disabilities". In 2010/2011 academic year the renovation of RTC study block was carried out, thus improving study environment and providing for better quality of study process.

At 16 Braslas Street was arranged locksmith workshop with 30 working places and the corresponding provision for implementation of locksmith working practice.

For realization of the programme students are provided with the necessary metal working benches. RTC upper secondary vocational school implements the 3rd professional qualification level CNC (computer numerical control) benches adjuster programme. In CNC workshop students can acquire knowledge and practical competence on CNC benches adjustment and programming.

For acquisition of computerised design systems there are two computer classes with 32 computers and software: AutoCAD, SolidWorks, and CosmosWorks. For students to acquire knowledge on metal-cutting benches and computer numerical control (CNC) benches, training in CAM system MASTERCAM is provided, bench practice for CNC benches, for metal-cutting benches – turner's benches and milling cutters. In organising practice the College cooperates with enterprises of Association of Mechanical Engineering and Metalworking Industries of Latvia (MASOC) - Peruza, REM, Grandeg, Jauda, Leax Baltic and others. MASOC associates 155 enterprises of Mechanical Engineering and Metalworking Industries of Latvia.

Students have the opportunity to practice abroad participating in the EU Life-long learning programme Erasmus sub-programme for mobility and cooperation in higher education.

In order to get a notion of manufacturing process automation, Festo process techniques stands are available: level control, flow control, temperature control, as well as FluidLab software.

Within the framework of the ESF project, “Improvement and implementation of study programmes Mechanics and Metalworking” were purchased Methodical aids of Technical Mechanics practical works, stands for training pneumatic processes.

In February 2011 RTC opened the most modern soldering laboratory in the Baltic States. There are 26 benches there or 48 working places. Each bench is equipped with a multimeter, 2 power packs, 2 solder stations, a generator, an oscilloscope, a set of tools and a set of wires. Two benches are additionally equipped with a microscope, an infrared solder station and a vast warming appliance.

In the process of studies we use material and technical base - CAD/CAM/CAE programmes, works of technical mechanics laboratory, CNC tools.

The library is RTC structural unit and operates in compliance with internal normative acts; the main task of the library is to provide for study process with the necessary informative resources and services in compliance with programme requirements in all specialities. Regular stocktaking of store, cataloguing, student, academic staff and employees' attendance and informative and bibliographic material service is performed.

In the reading-room (97 m²) there are 27 working places, 5 computers and a copy-machine. In reading-room students and academic staff have free access to reference literature, latest editions, and fiction. The library subscribes 28 publications. There are 2 rooms in the library for book stock (193 m²), for study literature, fiction and archive of periodicals, study literature in technical specialities, methodical materials, State Standards of Latvia.

In the year 2011 there were 35 705 units in the library's stock, including 25 537 books, out of which 22 032 were textbooks. There are 22 audio-visual and electronic documents and 12 DVDs in the library.

Employees of the library use the electronic general catalogue of 9 libraries of the national significance. The library uses services of National Library of Latvia (LNB), Riga Technical University Inter-library loan system. Starting from year 2009 literature ordering and delivering in LNB Inter-library loan system is available electronically. Library has in its store literature and teaching aids in foreign languages – the English, German and Russian languages.

The Hall of residence and other AII services are available for guest docents and students of exchange programmes in compliance with RTC internal regulations.

2.5. Scientific research (creative) work of the academic staff and students

Lecture rooms where lectures of study programme “Mechanical Engineering” take place are provided with computers, Internet, clerical aids, textbooks, audio/video equipment. Materials can be copied. Computers and Internet can be used for development of independent papers or for independent studies. Academic staff and students in their scientific (creative) work can use the following:

- *Electronic Catalogue of Libraries of State Significance*

<http://www.lnb.lv/lv/lasitajiem/katalogi-datubazes-kartotekas/valsts-nozimes-biblioteku-elektroniskais-kopkatalogs>;

- In database of the International project OAPEN (Open Access Publishing in European Networks) **OAPEN Online Library** are available collections of electronic books scientific literature of various sectors and popular and science literature <http://www.oapen.org/home>

- **Digital Book Index** offers free access to more than 165 000 electronic books of more than 1800 publishers <http://www.digitalbookindex.org/about.htm>

GoogleScholar, (<http://scholar.google.lv/>) search-engine of scientific publications in the Internet; social networks, e.g. **ResearchGate** (<http://www.researchgate.net/>), which is the largest social network of scientists and researches in the world.

2.6. Quality assurance and guaranties

Financial resources necessary for implementation of Study programme are sufficient (see R.2.1., R.2.2., R.2.3.) and their use is kept under regular control. Application of financial resources is controlled by RTC auditing commission and annual reports are published.

In Mechanical Engineering study programme in year 2008 within the framework of ESF project material and technical basis and methodical materials were replenished:

- Methodical means of Technical Mechanics practical works:
- Stand for pneumatic process teaching

Donation of a private person

CNC Milling machine axle (the fourth axle).

In study process we use training laboratories in RTU and LAU, Technical faculty, and students of these HEU use RTC equipment.

RTC financing consists of state subsidies, own income from paid services, financing acquired in the result of international cooperation projects and voluntary donations. State subsidies completely cover study process costs. The amount of state subsidies is allocated and distributed on the basis of costs of student places envisaged in LR laws and regulations.

3. Sustainability

3.1. Aims and tasks

In Mechanical Engineering study programme aims and tasks of higher education are taken into account, as well as interests of regional development and State as a whole, which are related to needs of students and employers.

RTC is in the central focal point among the main factors that impact the economic development of Latvia. In the sector of education RTC is between educational establishments of elementary and general education and higher educational establishments. RTC prepares specialists for electronics, information technologies, communication, power industry, transport, wood processing and machine design sectors, which guide future economic development of Latvia.²

Machine design is a strategic sector: it is a sector with high value added, where vast knowledge and experience is needed and which supplies all other sectors of national economy with machines, production systems, and component parts and related services, as well as with technologies and knowledge necessary for these sectors. Machine design is not a congeneric, but a very manifold sector that includes a lot of sub-sectors.³ According to suggestion of Association of Mechanical Engineering and Metalworking Industries of Latvia optimization of study programme Mechanical Engineering was performed as well as integration of similar study programme, thus developing a united programme with several specialisation outputs.

Considering that a certain part of study courses for Mechatronics specialist and Machine Design specialist are common, there are two possible qualifications for study programme “Mechanical Engineering”: “Machine Design specialist” or “Mechatronics specialist”.

3.2. Study content and organisation

² Riga Technical College development strategy concept for years 2008-2014.

³ Statement of European Economic and Social Committee

In RTC are counted all the corresponding study courses credit points and their evaluation, received in other AII study programmes of Latvia (Article 47 of the Law on HEI). Thus students have the opportunity to acquire specific modules, subjects and/or take practice (in full amount or partly) in other AII study programmes of Latvia.

Academic staff has the opportunity to participate in courses and seminars on the latest teaching and pedagogical methods, besides rising of one's skills at seminars and exhibitions organised by employers is promoted. Docent A. Kazuša and Assistant M. Šteinbergs participate in ESF project "Promotion of theoretical knowledge and practical competence of teachers of professional subjects and practice managers" (agreement No. 2010/0043/1DP/1.2.1.1.2/09/IPIA/VIAA/001) "Methodical aid for teachers for development and implementation of teaching in electronic environment". Assistants A. Veips and V. Iesmiņa attended international metal working and machine design exhibition in Germany, Docent A. Kazuša attended international exhibition in Portugal and WorldSkills-2011, in London.

This academic year we plan experience exchange in Finland for one representative of academic staff and one student. Within the framework of Life-long education programme Erasmus sub-programme for mobility and cooperation guest lecturer from Sweden has been invited, two members of academic staff will go to Estonia, to international enterprise Festo, which is one of the world leaders in Mechatronics sector, so that they get familiarised with the latest developments in the sector and didactics department.

Academic staff participates in various experience exchange events, projects, cooperates with HEI and competence centres abroad, meets representatives of respective institutions and social partners, discussing current events of the sector, analysing the results and making corrections in study programmes. Bilateral Cooperation agreements have been concluded with Riga Technical University (RTU), Latvian University of Agriculture (LUA), Vidzeme University of Applied Sciences and three educational establishments in Europe.

In year 2007 academic staff acquired educational programme of professional development guided by RTU Humanitarian Institute "Development of academic staff competence in the sphere of pedagogics and IT" (ESF co-financed project) and received certificates for acquisition of this programme.

Guest-Assistant A. Gordjušins in 2011 was awarded Master's degree and Assistant K. Štekelis is in his first year of doctoral programme in LLU.

3.3. Studies and evaluation of knowledge

In order to ensure sustainability of study programmes it is crucial to follow changeable demands of labour market. In compliance with recommendations of social partners we will make amendments in study courses or study plans. When a new study direction was developed – Machine design specialist - the study course was coordinated with MASOC representatives.

In study programme and in every study course are clearly formulated knowledge, skills and competence, which students will acquire within the framework of programme and study course. Skills, knowledge and competences to be acquired are connected with competences and skills determined by Machine Design specialist un Mechatronics specialist standard, which are based on changeable demands of labour market, since by introducing changes the sustainability of study programme is ensured.

Annually we participate in international exhibition “School” where potential students can receive information on educational establishment. RTC organises Open Doors days, where one can get familiarised with material and technical basis, study programmes, meet academic staff and students. Information on study programmes can be found at home page www.rtk.lv, where information on study programmes, matriculation regulations etc. can be found. In Professional Education Competence Centre “Riga Technical College” there is an upper-secondary vocational school, where trainees of the third professional level are studying; many of them choose to continue studies at the next educational level.

3.4. Study provision and management

Contents and implementation of the study programme complies with the main aims of higher education (HE):

- Personality development,
- Development of democratic society,
- Solution of science development tasks,
- Consideration of labour market requirements.

Representatives of employers, study programme lecturers, students are involved in the process of study results evaluation. The quality of study programme is evaluated by study programme administration, departments implementing the study programme and other involved structural units, Council of the College, Professional associations, employers and student Self-government.

Internal quality management system has been developed, thus ensuring operation of internal quality mechanism at various levels: at the level of study departments, at the level of Department and at College administration level.

In the process of study programme acquisition, we motivate students for professional growth, i.e. to continue studies in order to acquire higher professional education of the second level.

Upon evaluation and analyses of results through academic semesters and academic year, we use results of analyses for planning of the next development period. This analysis is based on the results of examinations, results of student's questionnaires, recommendations of academic staff and social partners and resolutions of monthly Department meetings.

Both experienced representatives of employers and study programme and College leading academic staff are involved in evaluation of study process results. In evaluation of State Qualification Examination (SQE) are involved:

Chairman - **Oskars LINIŅŠ**, RTU Apparatus Department professor, Dr.sc.ing.

Deputy Chairman - **Jānis NIPERS**, RTC Deputy Principal in study and research work, Master of Environmental Sc.,

Members: **Vilnis Rantiņš**, President of Association of Mechanical Engineering and Metalworking Industries of Latvia, Ing.

Valters Asars – “FESTO” Ltd, Head of didactics department, M.sc.ing,

Secretary **Anda Kazuša**, RTC, Head of Auto transport and production technologies department, docent, MAsc.TQM, MA.paed.

Results of qualification works, shortcomings of students' training and their achievements are depicted in SQE reports. The indicated shortcomings we perceive as tasks for improvement of study process quality.

3.5. Scientific research (creative) work of the academic staff and students

Academic staff is involved in scientific research work, themes of scientific research (creative) works are current, related to interests of the region, study programme contents and future development. Results of research work are published in internationally available and reviewed editions. Results of scientific research and creative work are used practically, including them in innovative activities.

In 2008 a project of scientific infrastructure provision - “Checking of electronic control blocks operation and their programming using sensor technologies” was implemented.

From 2010 the third year student A. Vītols participates in RTU student business incubator project “Production of steel constructions”.

ESF project “Advancement of theoretical knowledge and practical competence of academic staff and practice managers of professional subjects” (Agreement No. 010/0043/1DP/1.2.1.1.2/09/IPIA/VIAA/001), in project participate Riga Technical University, Daugavpils University, Ventspils University College, Vidzeme University of Applied Sciences and Riga Technical College. One of the activities is organisation of international competitions and participation in them and application of e-environment in the study process, participant from RTC are docent A.Kazuša and assistant M. Šteinbergs.

Bilateral cooperation agreements have been concluded with Riga Technical University, Vidzemes University of Applied Sciences, Lapland Vocational College in Finland, Kaunas Technological University in Lithuania, Bradford University in Great Britain and Copenhagen Technical Education Centre in Denmark (Teknisk Erhvervsskole Center - TEC). Academic staff participates in development and implementation of various projects - ESF projects, Leonardo da Vinci Life-long learning and Erasmus projects.

3.6. Quality assurance and guaranties

Department meetings are held once a moth, at which regular plan development and discussion takes place. Once a year student questionnaires on study programme and academic staff are organised. Employers and professional associations are involved in Study programme evaluation.

During development of this study programme experience of European Higher Professional Education System was taken into account.

Riga Technical College study programme *Mechanical Engineering* can be evaluated in comparison with similar programmes realised in HEI all over the world.

While preparing the study programme for licensing comparison of similar study programmes with study courses of HEI in Germany(Augsburg University of Applied Sciences, University of Applied Sciences Aachen, University of Applied Sciences Berlin, University of Applied Sciences Berlin) and Turkey (Sabanci University) was prformed. Comparison was performed within the ESF project “**Improvement and implementation of study programme Mechanics and metal working**” Agreement No. 2007/0083/VPD1/ESF/PIAA/06/APK/3.2.3.2/0027/0098.

Agreement has been concluded between Riga Technical College and Vidzemes University of Applied Sciences on possibilities for RTC students in the event of liquidation of 1st level higher professional programme “Mechanical Engineering” to continue studies at Vidzemes University of Applied Sciences.

Upon graduation of RTC it is possible to continue studies at the next educational level; agreement has been concluded with RTU.

During evaluation of study programme “Mechanical Engineering” were determined its strengths, weaknesses, opportunities and threats, as well as ways of their solutions:

Study programme’s strengths that open perspectives, development options:

- Updated “Mechanical Engineering” study programme - two qualifications- Machine Design specialist or Mechatronics specialist;
- Is provided continuation of studies at the next educational level;
- Quality provision is provided basing on recommendations of students, graduates, employers, in cooperation with sector professional associations;
- Opportunities to react actively to changes in development of the sector and needs of labour market, correspondingly developing the study programme;
- Good cooperation with RTU and LAU, both in involvement of academic staff, and in use of training laboratories, exchange of methodical materials;
- Social partners get involved in the study process, this provides for good active feedback and allows to evaluate critically the study course and practice contents and quality as well;
- The Department employs four young assistants (up to 30 years of age);
- Use of possibilities offered by EU Life-long learning programme sub programme Erasmus for mobility and cooperation in higher education;
- Improvement of professional skills of academic staff;
- Participation in international competitions and the 2nd place won at Euroskills 2010;
- Student and academic staff activities in various projects and events;
- Studies of assistants in doctoral programme;
- RTC new laboratory for electric measurements practice.

Weaknesses of the programme:

- Intensive renewal and enlargement of laboratory equipment is necessary;
- Inertia of academic staff in scientific work;
- Wish of applicants to study in budget places, notwithstanding their interests;
- The existing computers lack power for adjustment of new software;
- Unclear position of the state in issues of education, there is no sufficient financing for renewal of material and technical basis;
- Financial situation of students’ families (difficulties in combining work with studies, families go abroad in search of work, unemployment in the family)

Threats:

- The number of budget places is cut down every year taking into account the economic situation in Latvia, the number of students who can afford paid studies reduces;
- Demand of employers for specialists of narrow profile;
- Small number of state grants for students;
- Wages in Latvia are not competitive;
- Salaries of young lecturers can not satisfy needs of young families.

Opportunities

- To continue improving study programme;
- To develop scientific and research work of academic staff and students;
- To develop new and improve the existing methodical materials, to create e-materials;
- To be more active and effective in involvement of employers in the process of studies;
- To perform internal control of study quality using questionnaires of students and employers;
- By implementing development of professional education competence centre “Riga Technical College” its material technical basis will be used for training of students;
- To look for opportunities for modernising and supplementing of material technical provision, to involve employers and professional associations.

3.7. Number of cooperation agreements

The following bilateral agreements have been concluded with:

1. Riga Technical University.
2. Vidzemes University of Applied Sciences
3. Technical Department of Latvian Agricultural University
4. Bradford University, Great Britain.
5. Copenhagen Technical Education Centre, Denmark.

4. Cooperation, overlapping

4.1. Aims and tasks

Study programme “Mechanical Engineering” with qualification Machine Design Specialist and Mechatronics Specialist was established similarly with RTU Apparatus Design Institute study programme “Mechatronics” and German study programme “Machine Design”/ “Machine Design Technologist”.

In RTC study programme several courses were developed taking into account wishes and recommendations of employers, which are necessary for these specialists in labour market of Latvia and Europe. Since 2008 Mechatronics specialists are prepared by Vidzemes University of Applied Sciences, where duration of study programme is 2 years. In RTC duration of study programme is 2, 5 years, since there are more practices both in College and at enterprises, in compliance with corresponding recommendations of employers. Machine Design specialists, 1st level higher professional education, are not trained in other HEI of Latvia.

4.2. Study content and organisation

Pursuant to article 47 of the Law on Higher Educational Establishments and on the basis of handed in academic references, in RTC are recounted all the corresponding study courses credit points and their evaluations received in other AII study programmes of Latvia. Students have the opportunity to acquire specific modules, study courses and/or take practice (in full amount or partly) in other AII study programmes of Latvia.

In accordance with CV data of academic staff Assistants A. Gordjušins, M. Šteinbergs, J. Vilcāns, O. Lubiņš, guest docents A.Kamolš, J. Krizbergs, O.Liniņš have sufficient knowledge of the English language to be able to prepare and implement study programmes in the foreign language.

In RTC work are involved lecturers from RTU, guest docents A. Kamolš, O. Liniņš, J. Krizbergs from RTU, assistant A.Gordjušins from the Institute of Solid state Physics. Mobility of academic staff takes place - are implemented and planned mobility projects of students and academic staff within the framework of allocated grants of “Erasmus” programme. In academic year 2010/2011 two lecturers of Mechanical Engineering study programme were in Sweden, this academic year two lecturers will also go to Estonia and it is planned to welcome a guest lecturer from Sweden. Two lecturers of our academic staff participated in Lifelong Learning Programme projects in Czech Republic and Germany. This year three students have been at practice in Germany.

It would be very advisable to perfect knowledge of foreign languages. There are possibilities to attend the courses of English for academic staff, the aim of which is to provide successful participation in international projects.

RTC actively cooperates with other higher education establishments in Latvia and abroad. Bilateral cooperation agreements have been concluded with Riga Technical University,

Lapland Vocational College in Finland, Bradford University in Great Britain, and Copenhagen Technical Education Centre in Denmark (Teknisk Erhvervsskole Center - TEC).

4.3 Studies and knowledge evaluation

In internal evaluation of results of study programme activity are involved academic staffs of other AII study programmes of Latvia and cooperation partners from abroad.

Academic staff of the College actively participates in events organised by MASOC and attends seminars and events organised by association.

Development and updating of profession standards, and projects.

4.4. Study provision and management

Study programme has developed partner relationship with other colleges and HEI of Latvia and abroad and it gives a real contribution in achievement of study results, in mobility of academic staff and students.

RTC and Auto Transport and Production Technologies Department has very good partner relationship with various employer organizations. RTC graduates have become leading specialists at enterprises and assist RTC both with practice placements and job offers for students, field trips to enterprises, besides they familiarise academic staff with the latest technologies at enterprises and render guest lectures for students.

Together with employers are organized professional competitions – Young professional.

4.5. Scientific research (creative) work of the academic staff and students

Academic staff is involved in scientific research work, themes of scientific research (creative) works are current, related to interests of the region, study programme contents and future development. Results of research work are published in internationally available editions and data bases. Results of scientific research and creative work are used practically, including them in innovative activities.

Academic staff has scientific publications in international editions, scientific publications in Latvian editions, monographs, text books and methodical literature, conference theses, participation in scientific and academic projects, patents.

For two years already in cooperation with Bradford University creative work shops “Biodīzelis. Bioplastika” and “London Eyes” have been held in RTC.

With support of RTU Student Council we participated in International event “Innovation days – 2008”. In the near future together with RTU Robotics hobby group we plan to participate in the exhibition School-2012.

4.6. Quality assurance and guaranties

RTC cooperates as an associated member:

- Latvian Electroenergy and Energy Construction Association (LEEA);
- Latvian Information and Communications Technology Association (LIKTA);
- Latvian Authorized Automobile Dealers Association (LPAA);
- LR MES Education Quality Service, expert (College association delegation);
- LR Higher Education Quality Evaluation centre (AIKNC), expert;
- Latvian Electrical Engineering and Electronics Industry Association (LEtERA), member of the board,
- Association of Mechanical Engineering and Metalworking Industries of Latvia

(MASOC), expert.

RTC is a member:

- Employers’ Confederation of Latvia.

Academic staffs together with association representatives participate as experts in working groups on development of profession standards - docent A.Kazuša, docent R. Jakubānis, guest docent J. Krizbergs.

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