FINNISH EDUCATION
EVALUATION CENTRE

ACCREDITATION OF THE DEGREE PROGRAMMES IN MECHANICAL ENGINEERING AND PRODUCTION TECHNOLOGY AT SAIMAA UNIVERSITY OF APPLIED SCIENCES

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1.1 Aim of the accreditation

The aim of FINEEC's Engineering Programme Accreditations is to support enhancement of quality in engineering programmes and to provide higher education institutions with the means to decide if an engineering study programme provides its graduates with the academic qualifications necessary for a career in the engineering profession.

The accreditation assesses the way an engineering degree programme is planned, delivered and developed to ensure that the students reach the programme outcomes; and how the programme outcomes align with the reference programme outcomes set in the FINEEC Engineering Programme Accreditations manual. The reference programme outcomes describe the knowledge, skills and competencies that engineering students should have acquired by the time they have completed a degree programme in engineering.

The accreditation evaluates the extent to which the set standards for programme's planning, implementation, resources and quality management are met.

1.2 Degree programmes in Mechanical Engineering and Production Technology

The engineering programmes under review were the Degree Programme in Mechanical Engineering and Production Technology (International programme) and the Degree Programme in Mechanical Engineering (Finnish programme *konetekniikka*) at Saimaa University of Applied Sciences, located in the city of Lappeenranta in Finland.

The degree awarded from both programmes is Bachelor of Engineering of 240 ECTS credits. The international programme is delivered over 3.5 years and the Finnish over 4 years of full-time study, both including a 30 ECTS practical training. Students in both programmes have an opportunity

to take a double degree by completing 60 ECTS in a partner university abroad. The international programme includes a compulsory 30 ECTS period abroad. The intake to each programme is 20 students per year.

According to the self-evaluation report, the aim of the programmes is that a bachelor of mechanical engineering has a strong basic competence of technology which can be applied in several different professions and work tasks. Students whose study orientation is machine design are professionals of innovative design and product development. Students oriented in manufacturing and production processes are experts in production, project management, sales and services of industry.

1.3 The accreditation process

The accreditation was conducted in accordance with the principles set in the FINEEC standards and procedures for engineering programme accreditation document. The schedule of the review process was the following:

- The accreditation team was appointed by the FINEEC Committee for Engineering Education on 17 December 2015.
- Saimaa University of Applied Sciences submitted the self-evaluation report on 28 December 2015.
- A site visit to the programme was conducted on 2–3 February 2016. The programme of the visit is illustrated in table 1.
- Decision making meeting of FINEEC Committee for Engineering Education on 6 April 2016.

Table 1: Schedule of the site visit

First visit day		Second visit day	
8.45–9.15	Short presentation of the evidence room		
9.15–10.00	Study of evidence provided by the programme	9.00–09.40	Interview of external stakeholders
10.00–11.00	Interview of the management of the HEI and of the programme	09.50–10.40	Interview of alumni
11.15–12.30	Interview of academic staff of the programme	10.45–12.00	Study of evidence provided by the programme
13.30–14.15	Interview of support staff	13.00–13.50	Interview of students
14.30–15.45	Evaluation visit to the relevant facilities	13.50–16.30	Study of evidence provided by the programme and private meeting of the review team
15.45–17.00	Study of evidence provided by the programme	16.30–17.00	Preliminary feedback to the management

1.4 The accreditation team

Chair of the accreditation team:

David Taylor, Professor of Materials Engineering at Trinity College Dublin, Ireland.

Members of the accreditation team:

Kirsi Kalliokoski, Mechanical Designer at Konecranes Ltd, Finland.

Robert Kristof, Master's degree student in Robotic Systems with Artificial Intelligence at Politehnica University Timisoara, Romania.

Antti Perttula, head of Aircraft Engineering studies at Tampere University of Applied Sciences, Finland.

Senior advisor **Touko Apajalahti** from the Finnish Education Evaluation Centre acted as the project manager in the accreditation.

1.5 Evidence used in the accreditation

The results of the accreditation and the analysis in the accreditation report are based on the following evidence:

- Self-evaluation report of the programme, including the following appendices:
    1. Records from the advisory board meeting
    2. Company feedback of thesis form
    3. Report of the stakeholders' inquiry
    4. Course feedback form
    5. Student's development discussion 1st year form
    6. Student's development discussion 2nd and 3rd year form
    7. Summary from group's eldest meeting 20 April 2015
    8. Thesis feedback from students form
    9. General feedback from students form
    10. Inquiry for graduates 2014 report
    11. Annual Agreement of aims and results 2015
    12. Quantitative aims in annual agreement 2015
    13. Strategy of Saimaa UAS 2010–2015
    14. Personnel strategy of Saimaa UAS 2010–2015
    15. Action plan of Saimaa UAS 2015
    16. Personnel plan of Saimaa UAS 2013–2015
    17. Personnel and education plan 2015 (appendix to personnel plan)

18. Strategy of 2016–2020
19. Curriculum analysis
20. Inquiry for companies 2013 carried out by students
21. Process description of timetables
22. Degree regulations
23. Structures of the curriculum of Mechanical Engineering and Production Technology (international programme)
24. Structures of the curriculum of Mechanical Engineering (konetekniikka)
25. Subject Specific Competences of the academic staff
26. Recruiting process of Saimaa UAS
27. Form of personal development discussion of staff
28. Handbook for teacher tutors
29. Double Degree agreement with Fachhochschule Schmalkalden
30. Organisation structure of Saimaa UAS
31. Quality management in Saimaa UAS –description
32. Admission statistics & results 2015
33. Statistics on time taken to complete the programme
34. Graduated students opinions on education
35. Internal audit report of Mechanical Engineering and Production Technology 2011

- Saimaa UAS online study guide and the Moodle learning environment
- CV documents of teaching staff
- Evidence gathered by the programme to the evidence room, which included course material, thesis works and project works among other things
- Tour of the relevant facilities: automation laboratory, other laboratories and library
- Interviews with management, teaching staff, support staff, students, alumni and external stakeholders

2 Evaluation of the fulfilment of the accreditation standards

2.1. Planning of the programme

Standard 1: The programme aims, which describe the educational task and purpose of the programme, are consistent with the mission of the higher education institution and reflect the identified needs of employers and other stakeholders.

The educational mission of the UAS is clearly articulated. At the programme level for the degrees in Mechanical/Production Engineering in English and in Finnish, the overall programme aims are clearly stated and are very consistent with the aims of the institution. These aims have been developed as a result of extensive discussions with stakeholders, including students, teaching staff, support staff and potential employers from the local area. These discussions are ongoing, in a carefully planned manner, giving ample opportunity for the institution to response to changing conditions. It is evident that considerable effort has gone in to the planning process at programme level.

Based on the team's assessment, the programmes meet ***the standard 1 fully.***

Standard 2: The programme learning outcomes, which describe the knowledge, understanding, skills and abilities that the programme enables graduates to demonstrate, are consistent with the programme aims, with relevant national qualifications frameworks (if applicable) and with the FINEEC reference programme learning outcomes.

The programmes have a set of stated learning outcomes which have been adapted from the institution's general learning outcomes. These learning outcomes are comprehensive and clearly stated, covering the range of skills and competencies required for mechanical/production engineers working in industry. These programme learning outcomes differ

from the FINEEC reference learning outcomes, however a careful examination shows that the two sets of learning outcomes are compatible, covering essentially the same skills and competencies.

Based on the team's assessment, the programmes meet ***the standard 2 fully.***

Standard 3: The course level learning outcomes, including thesis work and possible practical training, aggregate to the programme's learning outcomes.

The course level learning outcomes were poorly stated. These should have been present in the individual course descriptions (for taught courses) and in similar descriptions for all other credit-earning activities, such as the thesis project, work placement period, etc. Unfortunately, some of the above descriptions were not available, in some that were available the learning outcomes were not stated, and in most of the other descriptions, the outcomes, though stated, were stated poorly and/or were incomplete.

A spreadsheet was also provided, containing a matrix linking the individual learning outcomes to the courses, showing which particular learning outcomes were being addressed in a given course. However, much of the information contained in this matrix was not reflected in the individual course descriptions.

During the visit, the team had the opportunity to examine evidence, including examples of examination questions, tests, lecture material etc., which was provided in hard copy or electronically via Moodle. The impression gained from the examination of this evidence, along with a laboratory tour and interviews with staff, was that in many cases the relevant learning outcomes were indeed being addressed at course level. However it was not possible to confirm this finding for every individual course during the time available.

The lack of well-developed descriptions for the courses, thesis project, placement, etc. was a major obstacle for the assessment of this programme. Until these descriptions are available it is not possible to decide whether the course-level learning outcomes aggregate to the programme level outcomes.

Based on the team's assessment, the programmes meet ***the standard 3 only after the following conditions are met:***

- The course level learning outcome descriptions must be developed, especially in the areas regarding multidisciplinary competences and communication, so that it is clear how they aggregate to the programme level learning outcomes. Descriptions and learning outcomes should also be developed for all other credit-earning elements, such as the thesis project and practical training.

Standard 4: The curriculum gives comprehensive information on all the individual courses of the programme, including thesis work and possible practical training, and is accessible to students.

It was not possible to verify this, owing to the deficiencies of the course descriptions as mentioned above in the previous section. In addition to a lack of (or incomplete statement of) learning outcomes, the course descriptions also contained insufficient information about the teaching methods and the assessment methods. In some cases the information that was provided was confusing and difficult to interpret, for example as regards the percentage of the final mark to be awarded to in-class tests and to the final examination.

When the team conducted interviews with a group of students we found that, by and large, they understood the curriculum details, because these were explained to them orally by the teachers and, in some cases, could be found in Moodle. However it is important that this information is readily available at all times via the course descriptions.

Based on the team's assessment, the programmes meet ***the standard 4 only after the following conditions are met:***

- The course descriptions in the curriculum must be developed to give comprehensive information on all individual courses, practical training and thesis.

Standard 5: The curriculum and the course timetable enable students to graduate in the expected time.

This information was not initially available to the team owing to deficiencies in the course descriptions as mentioned above. However, the picture became clear during the visit as a result of examining the evidence provided and interviews with staff and students.

The team are satisfied that the individual elements of the programme are suitably planned and the overall timetable is suitable, such that students can graduate in the expected time. In fact, some students told us that they were able to graduate in a shorter time than expected, by taking extra courses, including some courses offered by LUT. However, based on the interviews, the programme could still pay attention to the balance of workload between different teaching periods.

The timetable offers a reasonable balance between contact hours (lectures, labs etc.) and free time available for individual study.

Based on the team's assessment, the programmes meet ***the standard 5 fully.***

Standard 6: The criteria and process for student admission and transfer are clearly specified and published. Students should be informed of the qualifications necessary to enter the programme.

The criteria for admission and for subsequent transfer from one year to the next were clearly explained in the self-evaluation document. Students confirmed that they understood these criteria and processes. The criteria allow for students to enter the programme from a wide range of backgrounds and educational histories, including foreign students and those who are returning to the education system after a period in the workforce.

Based on the team's assessment, the programmes meet ***the standard 6 fully.***

Standard 7: Students are informed of regulations and guidelines that concern recognition of prior learning, progress of studies and graduation.

Procedures are in place to allow credit for prior learning in other higher-education institutions, and these are understood by the students. The regulations regarding process to graduation are also clearly stated and understood.

Based on the team's assessment, the programmes meet ***the standard 7 fully.***

Strengths, good practice and areas for further development regarding section 2.1: planning of the programme.

The team notes the following strengths and good practice in this section:

- A well-developed institutional policy on teaching and learning, complete with a comprehensive set of learning outcomes, which correspond quite closely to the FINEEC reference outcomes.
- Good correspondence between the aims and outcomes of this programme and those of the institution as a whole.
- Clear regulations and procedures for admission, progression and graduation.
- A small class size which gives the students excellent access to the teaching and support staff and allows many problems to be overcome in an informal way.

The team sees the following as areas for further development in this section:

- Detailed descriptions are needed for all individual courses and all other credit-earning activities, such as the thesis project, work placement etc.
- It would have been useful to include a description and diagram showing the various routes which a student can take through the programme, including different methods of entry, various optional courses which can lead to specialisation, time in a foreign university, placement period, summer courses, etc.

2.2. Implementation of teaching and learning

Standard 8: The teaching and learning process, including the assessment of students, enables students to demonstrate that they have achieved the intended course and programme level learning outcomes. Students have an active role in co-creating the learning process and the assessment of students reflects this approach

Findings relating to specific learning outcomes will be covered below. One difficulty with the programme as a whole is the fact that students spend a large part of the third year studying in a foreign university. This is optional for the Finnish students but compulsory for the foreign students. In the case of a few universities – those with which the double diploma system operates – detailed learning agreements have been made. However for other universities that students may study in, there is little information available about the courses and learning outcomes being addressed. So the team were unable to validate the learning outcomes for this part of the programme.

It was not clear exactly which learning outcomes are addressed by the work placement period. This period is worth 30 credits but is assessed only by a written report. Thought could be given to assessing this aspect of the programme more thoroughly.

Knowledge and understanding

- knowledge and understanding of mathematics and other basic sciences underlying their engineering specialisation, at a level necessary to achieve the other programme learning outcomes;
- knowledge and understanding of engineering disciplines underlying their specialisation, at a level necessary to achieve the other programme learning outcomes, including some awareness at the forefront;
- knowledge and understanding of applicable materials, equipment and tools, engineering technologies and processes, and of their limitations, in their specialisation
- knowledge and understanding of applicable techniques and methods of analysis, design and investigation, and of their limitations, in their specialisation;

Notwithstanding some deficiencies in the documentation, especially in the individual course descriptions, the team were satisfied that the learning outcomes in this category were being well addressed. Courses in the first and second year cover basic mathematics and physics, along with applied engineering sciences, at an appropriate level. The students are also being

introduced to engineering processes and technologies appropriate for mechanical and production engineering. Evidence from examination papers and Moodle tests showed that the student's understanding of these topics was being adequately and carefully assessed. These courses provide good preparation for the work to be carried out in the thesis project, and in subsequent employment in industry.

Engineering practice

- ability to analyse complex engineering products, processes and systems, and to correctly interpret the outcomes of such analyses, by being able to select and having the practical skills to apply relevant established analytical, computational and experimental techniques and methods
- ability to identify, formulate and solve complex engineering problems, by being able to select and having the practical skills to apply relevant established analytical, computational and experimental techniques and methods
- ability to develop and design complex products (devices, artefacts, etc.), processes and systems to meet established requirements that can include societal, health and safety, environmental, economic and industrial constraints, by being able to select and having the practical skills to apply relevant design methodologies
- practical skills for realising complex engineering designs
- ability to use the awareness of the forefront of their engineering specialisation in design and development
- ability to apply norms of engineering practice in their engineering specialisation;
- ability to consult and apply codes of practice and safety regulations in their engineering specialisation

The university has good facilities and competent staff to enable high level engineering education. The teaching methods have strong engineering focus with practical examples, home work and laboratory practise on top of normal theoretical lecturing. The interviews with alumni and employers confirmed that the programme gives strong practical engineering skills to the graduates.

There were examples available to prove the students have been able to solve complex practical engineering challenges during their studies, such as a gearbox design for a local wind power company. Another example is a yearly competition of self-made muscle-powered vehicles, which enable students to combine design skills with practical workshop skills. All students take part in the competition, working in teams.

The compulsory practical placements provide students with possibilities to obtain awareness of the industry's current trends and apply the knowledge for design and development purposes.

The university has invested a lot in the new education environments like the log loading machine simulator and in the machine automation laboratory with conveyer belts and robot. Particularly the machine automation laboratory was used in a creative way, integrating many different competence areas to the tasks: analysis, design and realisation of designs, norms and safety regulations. In the laboratory, students create a mini-factory, solve problems related to it and analyse it to for example increase its efficiency. Assessment is done based on the involvement of each student in solving the factory's problems.

Investigations and information retrieval

- ability to conduct searches of literature, to consult and to critically use scientific databases and other appropriate sources of information, and to carry out simulation and analysis, in order to pursue detailed investigations and research of technical issues
- ability and practical skills to design and conduct experimental investigations, interpret data and draw conclusions
- ability to work in a laboratory/workshop setting

Though many courses claimed to address these learning outcomes (according to the spreadsheet provided) these learning outcomes were very rarely mentioned in the individual course descriptions. However, during the visit, some evidence was found to show that these outcomes are indeed being addressed.

The institution contains an excellent library, which gives the students access to a wide range of books and also to patents, standards and databases. There was some evidence that certain courses required students to make use of the library to search for information, for example the course in Machine Design. Other courses may also be doing this but if so it was not made clear. For example the course in Strength of Materials claimed this learning outcome but there was no evidence of the use of information sources during this course.

Students are required to work in laboratories and workshops, to carry out experiments and manufacturing operations and to work with technical staff in these activities. A good example is the project involving creation of a human-powered vehicle, which is constructed mostly by the students themselves. They are also required to analyse the data from experiments and to write reports. There was evidence of excellent integration of lab work into the teaching and assessment process in some courses, such as Pneumatics, PLCs and Mechatronics. There was little evidence that students are being required to design experiments for themselves. A part of

the laboratories' quality management system is equipment calibration. The calibration system has been implemented well and also students are being trained on calibration methodology and how to handle measuring equipment at the university.

The library is a very good one, with very skilled staff and possibilities to use resources also from other technical universities. However the great potential of the library was not being fully utilized. As part of courses students could do more information seeking using the library facilities.

The university has very good co-operation with local private firms. They offer good topics for projects and possibilities to carry out research work with them.

Multidisciplinary competences

- awareness of the wider multidisciplinary context of engineering
- awareness of societal, health and safety, environmental, economic and industrial implications of engineering practice and recognition of the constraints that they pose
- awareness of economic, organisational and managerial issues (such as project management, risk and change management) in the industrial and business context
- ability to gather and interpret relevant data and handle complexity to inform judgements that include reflection on relevant social and ethical issues;
- ability to manage complex technical or professional activities or projects, taking responsibility for decision making
- ability to recognise the need for and to engage in independent life-long learning
- ability to follow developments in science and technology

According to the curriculum analysis in the self-evaluation report, many courses claimed to address these learning outcomes, but again these learning outcomes were rarely mentioned in the individual course descriptions. The main elements to gain multidisciplinary competences are the various project work assignments which are used throughout the curriculum. These projects require also non-technical considerations from the students.

Overall, the interviews and the study of course material from Moodle revealed that the curriculum includes these aspects. For example several courses invite the students to reflect on wider issues such as sustainability and safety in the context of design, material selection etc. In some exercises (for example in PLCs and Mechatronics) students are required to present ideas and solutions to company management. However, the team's view is that these aspects should be made more explicitly visible in the course descriptions and should be systematically addressed also by the assessment methods and assessment criteria.

Communication and team-working

- ability to communicate effectively information, ideas, problems and solutions with the engineering community
- ability to communicate effectively information, ideas, problems and solutions with the society at large;
- ability to function effectively in a national and an international context;
- ability to function effectively as an individual and as a member of a team;
- ability to cooperate effectively with engineers and non-engineers.

Team-working and communication skills are mostly developed in the projects the students have to make together during the studies. In the international programme, the teams are usually grouped into multicultural teams, to replicate as much as possible the working experience in a company. The international students and students in the Finnish programme could be integrated more in this sense, to strengthen the international skills of the Finnish students.

Regarding communication skills, the Finnish programme has a dedicated communications course in Finnish. In the international programme, communication skills are addressed in the Finnish language courses. All courses involve some element of report writing, and in some courses students are also required to present their work orally.

As far as the interviewed external stakeholders confirmed, the students have both good team-working and communication skills. Also the current students and the alumni also consider that they have developed good communication and team-working skills. In addition to the language courses of Saimaa UAS, the students can participate in language courses organised by Lappeenranta University of Technology (LUT). However, this possibility can be limited in certain languages due to priority given to LUT students

In the international programme, the different level of English language can sometimes pose problems for teamwork. Another language-related problem in the international programme is the Finnish language. The interviewed students felt that there are enough compulsory courses to introduce to the language and Finnish culture but that there should be more possibilities to develop working-life level Finnish skills, including the necessary vocabulary of engineering terms in Finnish. As this is probably a wider request than only in this programme, the team recommends the institution to analyse possibilities for further Finnish language acquisition.

Based on the team's assessment, the programmes meet ***the standard 8 only after the following conditions are met:***

- The assessment methods' connection to the learning outcomes should be made clear, to enable students to demonstrate how the different categories of learning outcomes are achieved.

Strengths, good practice and areas for further development regarding section 2.2: implementation of teaching and learning

The team notes the following strengths and good practice in this section:

- The students' knowledge and understanding of basic and applied engineering sciences is well taught and well assessed.
- Students are given good experience of laboratory and workshop activities.
- There is some evidence that the excellent library facilities are being made use of, though further evidence in this area is required.

The team sees the following as areas for further development in this section:

- Course descriptions must be greatly improved to provide complete information on learning outcomes, course content, teaching methods and assessment methods.
- Further evidence should be provided to show that there is adequate attention being paid to certain learning outcomes, especially the following categories: Investigations and Information Retrieval; Multidisciplinary Competencies; and Communication and Team Working.
- Examination papers, including student answers, should be retained and provided as evidence of the achievement of learning outcomes.

2.3. Resources

Standard 9: The academic staff are sufficient in number and qualification to enable students to achieve the programme learning outcomes. There are arrangements in place to keep the pedagogical and professional competence of the academic staff up to date.

The teaching staff are appointed according to pre-defined criteria. There are six academic staff members in the programme teaching mechanical engineering and four of them teach in both programmes. They all have the officially required competences: at least a master's degree, pedagogic studies and at least three years working experience.

In addition there are also three academic staff members that teach mathematical subjects (mathematics, physics) and three teachers from the Language Centre teaching Finnish, English and Swedish to students. They all also fulfil the competence requirements.

Part-time teachers and lecturers can be hired in case some special competence is needed and the permanent staff don't have it. The part-time lecturers often come from Lappeenranta University of Technology.

The recruiting policy is described in the personnel strategy and personnel plan. The rector decides on staff recruitment. The academic staff can participate in the interviews of applicants which are held during the recruiting process.

The pedagogical studies must be accomplished within 3 years of recruitment. The academic staff have ways to develop their pedagogic competence also during their career. They can do further studies and mentoring, and attend to common development days of the institution with pedagogical themes.

All teachers have a certain amount of working hours reserved in their annual working plans to update or deepen their pedagogical or substance knowledge. They have twice a year development reviews with the degree programme manager and they define the development goals and actions together. Also an important part of knowledge sharing are conferences and direct contacts to companies. The staff are also encouraged to take part in international expert exchange as well as language lessons to staff in English and Russian, too.

For pedagogic development at a broader level, the institution has a specific work group of all degree programme managers, which works to improve the educational processes throughout the institution.

Based on the team's assessment, the programmes meet ***the standard 9 fully.***

Standard 10: An effective team of technical and administrative staff supports the programme. There are arrangements in place to keep the competence of the support staff up to date.

The support staff are organised at UAS level and this group supports all the degree programmes and activities in common. Based on the self-evaluation report and on the discussions during the site visit, the accreditation team's view is that the support staff are competent and capable to support the programme in an effective way.

There are three employees and one supervisor working in the laboratories related to the programme. Two of them have long experience in the organisation and previously in other companies, the third one has worked at the institution for a couple of years and has also graduated from the programme.

IT-services organise technical support for students. They have instructions also in English to help foreign students. The helpdesk services can be easily contacted, either through an online feedback form or visiting the helpdesk personally.

The communication services develop and maintain communication systems: updating the web sites, maintaining Moodle system and supporting teachers in using it, marketing programmes and publishing the admission information. There is also a marketing team to promote the education of Saimaa UAS in different kind of happenings, fairs and school visits.

There are also financial office and administration, strategic planning and quality management that support the programme in their tasks and develop feedback systems.

The principles of personal development of the support staff are similar to those of the academic staff. The individual needs to develop one's competence are defined through daily work and twice a year in personal development discussions. The personnel can participate in courses and education when the supervisor sees it is necessary, and are encouraged to study further. One important way to update the competences is to take part in RDI projects. Getting to know new equipment, machines and computer programmes is also used as a way to learn new skills and keeping up to the current developments in the field.

Additionally, development of languages skills is important according to the institution. Saimaa UAS offers English and Russian language courses for the staff. In practice, the language skills are improved by the daily work done together with international students. The staff are also encouraged to take part in international expert exchange.

Based on the team's assessment, the programmes meet ***the standard 10 fully.***

Standard 11: The students are provided adequate and accessible support services to enable the achievement of the programme learning outcomes.

The student affairs office organises common student services at the institution. There are staff working in administrative tasks such as timetables, curricula planning, making statistics to ministry, taking care of the feedback system or handling student financial aid. Students can contact them daily either meeting in person, by e-mail and by electronic services. Based on the interviews, the students commented that the services were useful and accessible. There is also an international office that will be integrated to the student affairs office in beginning of 2016. The international office helps students in international exchange issues.

Saimaa UAS has teacher tutors who support students during studies. Every student has personal development discussions with the tutor teacher once a year. The first one is at the beginning of the studies where the personal curriculum plan is drafted, which helps in starting the studies. Tutors and other teachers have appointment times during the studies and according to the interviews, the teachers are easy to reach. The group sizes are small and teachers know all the students personally.

There are also student tutors to support other students in studies and everyday life. This is especially important to international students. Tutors are second and third year students and they have been trained to the task. The student union organises student tutors and free time activities for students. The church provides additional student activities. The chaplain has office hours in the campus and works with all students regardless of their religion.

The support process is the same for the Finnish and foreign students but there is more work with the foreign students. The English skills of foreign students vary a lot. They also need more help to get placements.

Health services are organised for the students and there is also a nurse at the campus.

Based on the team's assessment, the programmes meet ***the standard 11 fully.***

Standard 12: The classrooms, computing facilities, software, laboratories, workshops, libraries and associated equipment and services are sufficient and accessible to enable students to achieve the programme learning outcomes.

After taking a tour through the relevant facilities, the team considers them well equipped for academic purposes. One example of a good learning environment is the automation laboratory where students will learn how software programs, electrical actuators as part of robot's arm and mechanical pneumatic driving lifting devices are linked together to make a working automated system. Another example is the loading machine simulator, where students could design and project real machinery and test them in a virtual reality in order to see the hydraulic and dynamic data. Also, a 3D printing machine and an automated plasma cutting machine are available for the programme's use.

All of the laboratories have a supervisor that is trained to use the equipment and also helps the students during the class hours. Students can use some equipment when they have a project, with the approval of the supervisor, however, they need to be supervised by authorised personnel.

The computer rooms are open for students around the clock throughout the week. The university aims to update 20% of the computers annually and updates the special software for learning at the request of the degree programme manager. Also printing possibilities exist for students with a monthly quota that can be expanded when the programme informs the IT-services of courses that require a lot of printing.

Saimaa University of Applied Sciences has recently moved into a new campus, next to Lappeenranta University of Technology, which has opened good possibilities for co-operation. An important asset is a joint library with Lappeenranta University of Technology, which is the only scientific library in South East Finland. Among the resources of the library there are text books, dictionaries, standards, printed journals, e-journals and e-books. The opening hours are suitable for students and they can lend books with the library card. The students can also study in the library in special rooms.

Another good thing about being close to Lappeenranta University of Technology is that they have co-operation regarding laboratories, so Saimaa University of Applied Science has access to equipment that is more usually used for university research. The two universities are

planning the renovation of the oldest building on the campus, which would make it possible to combine the mechanical engineering laboratory operations so that both universities' machines could go to the same halls.

Based on the team's assessment, the programmes meet ***the standard 12 fully.***

Standard 13: The HEI and the programme have external partnerships that are adequate to the achievement of the programme learning outcomes.

The university has good partnerships with the companies, especially the industrial companies in the region, which are in a development or growth phase, bringing new technology to market. Most of the companies are part of the advisory board which discusses the needs of all interested parties: the students, the companies and the university.

In this partnership the companies use a lot of student projects, as the project based learning is very helpful. Also, the companies offer placement opportunities, as it is mandatory for students to have a working experience in the mechanical engineering field. Mostly, students have to find the placement, but also the university staff helps, as some companies contact them to find suitable students for opening working positions.

Saimaa University of Applied Sciences has international contacts with almost 100 partner universities all over the world and with some of them has also several Double Degree agreements. In order to get a Double Degree, the students must go abroad for one year. Mostly, the focus is to cooperate with Russia, Western Europe, the Nordic countries, EU member states and also China and Malaysia in Asia. There are also several teacher exchanges with the partner universities, where they can also see their research work. In this exchange they usually receive teachers that present new things that they don't have in their university. SAIMAA's teachers go abroad mostly to keep themselves updated, to have new experiences and also some of them get motivated.

The university has cooperation with Lappeenranta University of Technology in research, teaching, because the teachers from LUT have courses at SAIMAA, and development projects in industry. Also some of the graduates from SAIMAA are continuing their studies in LUT master's programme and some have applied for a doctor degree. Other side are commercialisation projects, lots of practical sides in those projects, such as marketing studies etc.

The Lappeenranta area has a lot of competences in green energy solutions like solar voltage cells and wind turbines. Both universities together help local enterprises in this area and they are the notable research institutions in this area in the whole of Finland. As an example of how these partnerships are used to benefit the programme, students of the programme have designed a new type of gearbox for wind turbines. In the green energy area new

innovations are developed very fast, and the team sees that this opens good possibilities for the programme, but it is vital for the institution to be able to participate in global research community continuously.

*Based on the team's assessment, the programmes meet **the standard 13 fully.***

Standard 14: The financial resources are sufficient to implement the learning process as planned and to further develop it.

The budget is prepared at the faculty level, which means that the budget of the programmes in mechanical engineering are part of the budget of the faculty of technology, and also economic indicators are monitored at faculty level. However, the degree programme managers participate in the budgeting process of the faculty which ensures that the financial needs of individual degree programmes are taken into account.

Regarding investments the management gathers proposals from the faculties and then discusses and sets priorities. Thus, the investment needs of the programmes in mechanical engineering are channelled through the faculty of technology. In the interviews, this was not seen as a problem. The institution has mainly been able to carry out the faculty's wishes for investments. A quite big recent investment in mechanical engineering is the virtual reality simulator, and there are plans to renew the 3D printer with a new modern one.

Future strategy is to invest together with Lappeenranta University of Technology to a common lab where the aim is to have a nice set of modern equipment. In previous years, investment to laboratories has been carried out through RDI projects such the prototype laboratory.

The team considers that the financial resources are sufficient in order to develop a good learning process.

*Based on the team's assessment, the programmes meet **the standard 14 fully.***

Strengths, good practice and areas for further development regarding section 2.3: resources

The team notes the following strengths and good practice in this section:

- Teachers know all the students and teachers are easy to reach.
- Group sizes are small and staff have time to solve students' problems.
- Every student has personal development discussions with the tutor teacher once a year.
- The laboratories are well equipped

2.4. Quality management

Standard 15: The quality management procedures of the programme are consistent with the quality policy of the higher education institution.

There is a clear quality management system in place in the institution and a quality policy document in use with all relevant items in place. The quality policy aims to ensure that the institution fulfils its tasks and achieves its strategic goals, building a culture of continuous development.

Based on the self-evaluation material and the interviews, the quality policy steers the quality management in the programme in a meaningful way, and the programme follows the institution's policies in its operations.

Based on the team's assessment, the programmes meet ***the standard 15 fully.***

Standard 16: The organisation and decision-making processes of the programme are fit for effective management.

The vice-rector of education has an overall responsibility for the management and decision-making. The degree programme is led by a degree programme manager, whose supervisor is the vice-rector. The responsibilities are clearly defined: the degree programme manager has most of the degree-programme-level decision-making powers and also acts as a supervisor for the programme staff. The responsibility for financial resources is, however, at the faculty of technology level, which is reasonable taking into account the small size of the programme.

The management of the programme follows the operations management cycle of Saimaa UAS, where the programme annually agrees on its aims and targeted results with the institution's management. This is followed by a half-year check on if the set aims can be reached or if they should be updated. For the programme staff, the aims are set in personnel development discussions, which are also arranged twice a year.

As part of quality management there is a scorecard system in place to monitor teaching and other activities related to the programme in a systematic and regular manner. The amount of graduates and drop-outs is monitored monthly as is also student's study progress. If needed, the programme manager and the tutor teachers can see the real-time situation of students' credit accumulation from an online system, which allows for effective action to be taken if needed. In addition, staffs publication activity, national student survey results, international student and staff exchange and open UAS credits are monitored every 3 months.

The interviews confirmed that the responsibilities are taken seriously and that the organisational structure works in an effective way, avoiding overly complex decision-making chains.

Based on the team's assessment, the programmes meet ***the standard 16 fully.***

Standard 17: The programme reviews and develops the programme aims, curriculum, teaching and learning process, resources and partnerships and quality management in a systematic and regular manner, taking into account analysis of results of student admissions, students' study progress, achieved learning levels, student, graduate and employer feedback and graduate's employment data.

When it comes to the development work that takes place at the level of the whole institution, the staff development days were seen as important in the interviews. This are open seminars that can include for example topics related to pedagogical development. A regularly arranged seminar is the annual review event, where the strategy and common development themes are discussed in group work together with management and staff. In addition, Saimaa UAS performs internal audits: mechanical engineering was last audited internally in 2011. An external audit of the quality system is carried out by FINEEC every six years, the next audit upcoming in autumn 2016.

On the personal level, the development discussions provide a way to discuss individual development needs related to the performance and development of the programme. In practice, the development work happens in a more continuous manner, within daily discussions and in organised staff meetings, which the programme sees as an effective way to develop the programme.

All the performance results and other information that the quality system produces are visible for staff in the intranet and provide a basis both for the informal discussions and for the annual update of the programme. The programme is updated annually, the main focus being on the curriculum. All teachers participate in the update and in the end, the degree programme manager approves the curriculum in the online SoleOPS-system. As the team witnessed a considerable lack in the course descriptions put in the system, the team sees that the curriculum update process should include also a component by which the quality of the course descriptions would be assured.

For the needs of the regular programme development, information is produced systematically through software such as the WinhaPro student database, database for international exchanges and publications database. The results of student admissions are analysed by the degree programme manager, in addition to the institution-level analysis conducted by the management and the communications services. In this analysis, the focus is on the numerical trends and applicant profile. Regarding the achieved learning levels, there is no target-setting for grades, but the programme manager and teachers follow the grades. If notable changes happen in the

grades of a given course, then action is taken to develop the course. The analysis of achieved learning levels could be made more systematic, and be connected also to the programme level learning outcomes. Also graduate's employment data is used for developing the programme. The UAS gets general level annual data from the Statistics Finland, but the more useful graduate data is obtained from the survey sent by Saimaa UAS to its graduates one year after graduation. Based on the data, placements in Finland have been good; only problem is that it is very difficult for foreign students to get a placement in Finland, which is something the programme can try to solve using its good connections to the local companies. Additional information is also gotten directly from the companies in the region who employ students from the programme.

Based on the interviews, student feedback is highly valued in the development of the programme. At the same time, feedback is the main way students are involved in development work. Teachers are responsible for analysing the course feedback of individual courses, and for taking action upon the feedback; the feedback is also usually discussed among the whole teaching staff. The programme manager has access to all feedback.

The official course feedback, collected through the feedback system, suffers from a rather low response rate which is typical for online feedback systems. This leads to the sample size being often too small for informed decision making. The programme should pay attention to getting the response rates higher.

According to the staff, the most valuable student feedback is acquired during face-to-face discussions between teachers and student. This is working well, however for external parties, and maybe also for management of the university, it would make sense to create at least a summary documents of the informal discussions, highlighting major findings.

There are also representatives of student groups, the so-called group eldest, who act as more formal links between students and the degree programme staff. Each student group chooses its representative. They have meetings once a year with the programme manager for feedback. This feedback is documented and saved in the intranet where everyone can see it and its results.

The good contacts to the industry are also visible when it comes to the development of the programme. The interviewed staff mentioned that the most useful working life input comes from the discussions that take place when students are doing their practical placements or thesis work, and in the common RDI projects. This information is not documented, but the accreditation team sees that documenting at least the most important feedback obtained in this way could better serve the needs of curriculum development. A more formal way for industry feedback for curriculum development is the enquiry to companies on future competence needs that is carried out by students whenever a bigger curriculum renewal takes place.

The UAS is developing a database for recording action taken based on feedback, but at the time of the site-visit it was not yet really in use. As evidence of the enhancement effect, the interviews confirmed that both students and external parties find that the quality of teaching is good. New graduated engineers who are joining the firms have the necessary competences to start working. This applies both to Finnish and foreign students.

*Based on the team's assessment, the programmes meet **the standard 17 fully.***

Standard 18: The programme provides public, up to date information about its objectives, teaching and learning process, resources, quality management procedures and results.

There are different communication channels to students and external stakeholders. The website gives and general information on Saimaa UAS and its activities, regarding also admissions. There is a separate section on quality management procedures.

The programme aims and the curriculum are accessible on the UAS website. The programme aims are clearly stated, in the same way as to students internally. However, as the public information about the curriculum comes from the same SoleOPS-system that is used internally, the shortages in the course descriptions affect also the publicly provided information.

For students, more information on courses can be found on Moodle platform, which is also used in teaching and learning. Course material is provided there but not all the courses. Also email and social media are used purposefully. For example, all student groups have their own Facebook groups.

As there is a considerable portion of international students in the programmes, the team sees possibilities in developing the information that is provided to external stakeholders in English.

*Based on the team's assessment, the programmes meet **the standard 18 fully.***

Strengths, good practice and areas for further development regarding section 2.4: quality management

The team notes the following strengths and good practice in this section:

- A clear management structure and effective decision-making strategy.
- A well-defined system allowing the programme to be regularly assessed and updated as a result of feedback from the various stakeholder groups.
- Accessible information about the programme.

The team sees the following as areas for further development in this section:

- The programme should pay attention to getting the response rates of formal course feedback higher.
- The programme could benefit from developing practical ways to document also the informal feedback from students and industry.
- The curriculum update process should include also a component where the quality of the course descriptions would be assured. This could ensure also the completeness of the public information provided by the programme.
- Information provided in English could be increased.

3
Overall evaluation of the programme

Upon reviewing the programme the team highlights the following **key strengths and good practice**:

- Small community that enables natural interaction and individual support between teaching staff and students.
- The programme gives strong practical skills to the graduates.
- Innovative teaching methods are used in some courses in the programme.
- Library facilities and services are strong.

The team recommends that the programme is accredited with the following conditions:

- The course level learning outcome descriptions must be developed, especially in the areas regarding multidisciplinary competences and communication, so that it is clear how they aggregate to the programme level learning outcomes.
- The course descriptions in the curriculum must be developed to give comprehensive information on all individual courses and all other credit-earning elements, such as the thesis project and practical training.
- The assessment methods' connection to the learning outcomes should be made clear, to enable students to demonstrate how the different categories of learning outcomes are achieved.

In the accreditation team's view, the conditions should be met before the end of September 2016.

4
FINEEC Committee for Engineering Education's decision

In its meeting on 6 April 2016, the FINEEC Committee for Engineering Education decided, based on the proposal and report of the accreditation team, that the Degree programme in Mechanical Engineering and the Degree Programme in Mechanical Engineering and Production Technology at Saimaa University of Applied Sciences are conditionally accredited.

The course level learning outcome descriptions must be developed so that it is clear how they aggregate to the programme level learning outcomes. Special attention should be paid to the areas regarding multidisciplinary competences and communication. The course descriptions in the curriculum must be developed to give comprehensive information on all individual courses and all other credit-earning elements, such as the thesis project and practical training. The assessment methods' connection to the learning outcomes should be made clear, to enable students to demonstrate how all different categories of learning outcomes are achieved.

The accreditation is valid until 30 September 2016 by which Saimaa University of Applied Sciences should report to the Finnish Education Evaluation Centre on how they have met the set conditions. If the FINEEC Committee for Engineering Education then finds that the conditions have been successfully met, the validity of the accreditation will be extended until 6 April 2022.

The Finnish Education Evaluation Centre (FINEEC) is an independent, national evaluation agency responsible for the external evaluations of education from early childhood education to higher education in Finland. It implements system and thematic evaluations, learning outcome evaluations and field-specific evaluations. Moreover, FINEEC supports providers of education and training and higher education institutions in matters related to evaluation and quality assurance, as well as advances the evaluation of education.

Engineering programme accreditation is a degree programme specific evaluation that can lead to the European EUR-ACE® Label. The accreditation aims to support the enhancement of quality in engineering degree programmes and increase the international comparability and recognition of engineering degrees within Europe. The accreditation is voluntary for Finnish higher education institutions and degree programmes. This report presents the process and results of the accreditation of Degree Programmes in Mechanical Engineering at Saimaa University of Applied Sciences in Lappeenranta, Finland.

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