



Summary of proposals of the OSKA expert panel on the **manufacturing of metal products, machinery and equipment**

Based on the results of the study, the expert panel on the manufacturing of metal products, machinery and equipment makes the following proposals:

KEY MESSAGE 1: The sector of manufacturing of metal products, machinery and equipment needs skilled workers whose skills and knowledge are suitable for starting work in the sector after graduating vocational education and training (VET).

The objective is to offer VET in accordance with the demands of the labour market and to support retraining and in-service training of skilled workers.

Activities:

- **In order to decrease the number of skilled workers without vocational qualification¹** in main occupations (e.g. finishers, assemblers, machine operators), the VET institutions open modules offering short-term sector oriented studies (3-6 months) based on the existing VET curricula, which are suitable for:
 - acquiring basic knowledge in the form of in-service training, apprenticeship training or distance learning;
 - providing vocational pre-training for young people, e.g. in the form of the so-called orientation year, where the students with (or without) basic education can acquire basic skills necessary for working in simpler occupations (and for continuing the studies, if desired);
 - the trainees in the framework of labour market services of the Unemployment Insurance Fund;
- VET institutions in cooperation with the Ministry of Education and Research and the Unemployment Insurance Fund adjust the number of study places for **machine-tool operators** in degree courses, in-service training as well as retraining – decrease the training volume of operators of conventional metalworking machine tools and increase the training of operators and setters of CNC machine tools proportionally; in addition, the VET institutions analyse the reasons of dropping out and try to remove the obstacles of completing studies;
- The Ministry of Education and Research and the Unemployment Insurance Fund adjust the number of study places for **welders** in in-service training and retraining – decrease the

¹ This proposal also contributes to achieving the objectives of the VET programme to decrease the proportion of adults without professional and vocational qualification: Lifelong learning strategy training programme 2015-2018 (Ministry of Education and Research).



training volume of the so-called traditional welding methods and increase the training of the operators/setters of welding robots proportionally;

- In order to apply the possibilities of apprenticeship training in the manufacturing of metal products, machinery and equipment:
 - the Ministry of Education and Research in cooperation with Foundation Innove and professional associations² analyses the practical issues of apprenticeship training and creates a framework to match the form of study to the needs and possibilities of the companies;
 - professional associations in cooperation with the Estonian Employers' Confederation and Foundation Innove organise an information campaign for the companies of the sector, introducing the possibilities of apprenticeship training;
 - the professional associations and regional development centres take the role of information mediator for creating apprenticeship training groups between companies;
- VET institutions in cooperation with companies and curriculum advisers modernise the study of speciality-specific numeracy, **reading of drawings** (including navigating international standards, e.g. EN, ISO, DIN, etc.), **spatial thinking, knowledge of occupational safety requirements, team work and knowledge of various production equipment** in all curricula of the sector;
- In addition to teaching single work operations, VET institutions apply **project-based study** based on comprehensive work processes in all curricula with the purpose of increasing the level of practical skills necessary for manufacture (e.g. welding assemblies, using and preparing accessories – jigs – used in welding);
- VET institutions in cooperation with companies enhance **sector specific ICT studies** in all curricula of the sector, e.g. supplement the curricula of operators of manufacturing equipment with the studies of various programming languages and quick set-up skills (the so-called SMED basic skills study) so that operators could acquire set-up skills;
- The Estonian Qualifications Authority initiates **an analysis of whether the descriptions of sector specific ICT competences and the competences of the machine setters in the relevant occupational standards comply with the demands of the labour market** and organises the updating of standards based on the results of the analysis;
- The Ministry of Education and Research in cooperation with the Ministry of Economic Affairs and Communications commissions the training of basic ICT skills for the employees in the sector;

² In the proposals, the professional associations are the Federation of Estonian Engineering Industry and the Association of Estonian Boatyards (unless the wording is specified in a specific proposal).



- Professional associations encourage **companies to support senior skilled workers in acquiring basic ICT skills** during in-service training. Those employees will be therefore ready to gain sector specific ICT skills during further in-service training and retraining;³
- During admission the VET institutions combine individual interviews of the candidates with the visits to the companies of the sector **in order to decrease the number of students dropping out of VET** to make sure that the candidate is suitable and wishes to work in the sector and to ensure that the candidate is informed of the content and future perspectives of the chosen speciality;
- VET institutions use **modern ICT solutions** (e.g. learning videos, e-learning etc.) to simplify the participation of working students in distance learning and improve the image of VET in the sector;
- VET institutions in cooperation with professional associations organise the production and collection of learning videos with the help of the alumni working in the companies of the sector in order to provide VET institutions **up-to-date learning materials**;
- The Ministry of Education and Research **orders trainings on developing e-learning materials** for VET teachers from the Information Technology Foundation for Education⁴; VET institutions ensure **the participation of the teachers in the trainings**; thematic seminars will be organised in cooperation with parties interested for sharing best practices of e-learning between the VET institutions;
- The Ministry of Education and Research nominates, by the example of Germany and Finland, **leading regional training centres (East, West, South and North Estonia)** on the basis of the VET institutions with the objective of:
 - ensuring quality learning and efficient use of resources;
 - developing a cross-use system of machine-tools and technologies between VET institutions that enables offering VET students the experience of working with different machine-tools during their studies;
 - enabling VET students to participate in practical work (including manufacture of simple products to the order of companies) all year round if desired;
 - promoting cooperation between VET institutions and companies of the sector in organising development and training activities;
 - promoting cooperation between higher education and VET institutions for cross-use of resources;
 - organising retraining and in-service training for adults;
- The Ministry of Education and Research in cooperation with the Ministry of Economic Affairs and Communications develops a legal framework which will allow **leading regional training centres to participate in the business of the sector** in cooperation with partner

³ This proposal also contributes to achieving the objectives of the VET programme to increase the rate of participation of 25-64-year-old adults in lifelong learning: Lifelong learning strategy training programme 2015-2018 (HTM).

⁴ Information Technology Foundation for Education. <http://www.hitsa.ee/>.



higher education institutions and partner companies to **promote entrepreneurship education of the sector** and regularly upgrade the equipment (machine-tools, simulators, etc.) of leader schools (including sales of old machine-tools on the secondary market, getting new machine-tools and simulators in cooperation with companies);

- When **assigning operating subsidies for VET institutions**, The Ministry of Education and Research considers the **higher expenses of sector-specific vocational studies** (incl. operating, upgrading and developing the machinery; use of materials and accessories, and organisation of internships; remuneration of teaching staff etc.);
- When developing employment policies, the Ministry of Economic Affairs and Communications takes into account the need of the sector to recruit **skilled workers as rental employees** to cover the needs of project-based manufacture.

KEY MESSAGE 2: The sector needs more engineers whose skills and knowledge are suitable for starting work in the sector after graduation, for developing businesses that create bigger added value.

The objective is to ensure the training of young specialists in the necessary number and with suitable skills for supporting the sustainable development and international competitiveness of the sector.

Activities:

- Higher education institutions (HEIs) apply measures for increasing **the number of graduates with practical skills**,⁵ including:
 - **decrease the drop outs** at the bachelor's level by one third (e.g. by making the studies more practical and connected to real life) and at the professional higher education and master's level by 50% (e.g. by increasing the flexibility of studies);⁶
 - **gradually decrease the number of bachelor's study places** by 15 over the next five years;
 - **gradually increase the number of professional higher education study places** by 40 over the next five years;
- The HEIs in cooperation with companies improve **the study of sector-specific ICT** (e.g. various CAD/CAM software, automation of processes, robotics), **professional foreign language, knowledge of quality standards, team work skills, communication skills and**

⁵ See also chapter 6 "Comparison of the demand and supply of labour force", subchapter 6.3 "Primary conclusions".

⁶ The suggestions are made based on the average indicators of academic years 2012/2013–2014/2015.



management methods common in the industry (e.g. LEAN-management⁷) in all curricula of the sector;

- The HEIs introduce **product development, marketing, sales, supply chain, quality and project management modules** in the curricula of the sector as a possible choice;
- HEIs in cooperation with professional associations and companies use more **project-based and case-based studies** offering the engineering studies (including topics of thesis) based on solving problems and tasks given by companies;
- HEIs use **modern ICT** (including online studies) **solutions** in order to simplify the participation of specialists in distance learning and improve the image of the higher education in the sector;
- The Ministry of Education and Research in cooperation with professional associations and companies expands the activities of the existing Kristjan Jaak⁸ scholarship programme with the measure **“Kristjan Jaak master’s studies abroad” to favour the studying of specific engineering skills in the sectors⁹ that are a priority to the state.** If Estonia lacks the corresponding know-how or opening very small study groups is not cost-efficient, bind scholarship recipients of the programme with contractual obligations to start professional work in Estonia during 1-2 years after graduating and work here for 3-5 years;
- When **assigning operating subsidies for HEIs with the the sector specific programmes**, The Ministry of Education and Research considers the specificities of the programmes¹⁰, which in the case of technical specialities are expenses related to teaching new technologies, including managing and upgrading equipment and laboratories; employing (foreign) guest teachers (including from companies) and organisation of student internships;
- **In order to increase the number of foreign students who stay to work in Estonia**, the Ministry of Education and Research plans resources for **teaching Estonian** at a sufficient level for **foreign students studying technical specialities** as a measure of national importance¹¹; **professional associations** together with state initiatives (e.g. Work in Estonia) **support HEIs in finding internships in companies** for future top and middle level specialists studying in Estonia.

⁷ Lean manufacturing – a concept of management, the purpose of which is manufacturing with as few resources as possible.

⁸ <http://adm.archimedes.ee/stipendiumid/kristjan-jaak/>.

⁹ <http://kasvustrateegia.mkm.ee/>.

¹⁰ <https://www.riigiteataja.ee/akt/127112012002>.

¹¹ <https://www.riigiteataja.ee/akt/127112012002>.



KEY MESSAGE 3: Degree studies of the sector are not attractive enough.

The purpose is to improve the popularity of the sector related education at the level of general, vocational and higher education and to improve the image of the sector related education.

Activities:

- The developers of national curricula for general education and the compilers of standard-determining tests and state examinations use **more industry-centred examples when associating general education with real life** (e.g. example exercises in sciences and natural sciences); study materials should reflect more the work of main occupations of the industry;
- **The professional associations take an active role in cooperation** with initiatives like “Back to school” (Tagasi Kooli) to promote the cooperative relationships of specialists working in the sector with schools and to popularise the occupations of the sector;
- Estonian Youth Work Centre, *Rajaleidja* Regional Guidance Centres of Foundation Innove and other organisations offering career guidance for young people focus their work on priority economic sectors, **focusing on promoting the image of the so-called growth sectors among young people** (e.g. for making the specialities related to industry more visible by financing youth information fair *Teeviit*, visits to industrial companies organised by the *Rajaleidja* Regional Guidance Centres, etc.); there should be special activities for **promoting the image of the sector as a possible career option among girls**;
- The Ministry of Education and Research in cooperation with Foundation Innove **considers**, upon planning the activities of the **VET image promotion** programme PRÕM (including the Year of Skills), **the proposals** of the OSKA study;
- The Ministry of Education and Research in cooperation with Foundation Innove finds **solutions** for HEIs and VET institutions, companies and cation schools **to further cooperation in providing sector related hobby education**, including supporting organisation of technology hobby groups for schools, offering elective courses on engineering and visiting thematic exhibitions and companies;
- Foundation Innove in cooperation with companies finds means for **scholarships to VET students during the training period of the international vocational skills competitions**;
- The Federation of Estonian Engineering Industry, the Estonian Union of Mechanical Engineers, the awarding bodies and the Estonian Qualifications Authority contribute more to **informing** companies and students about the **occupational qualifications system**; professional associations initiate a discussion about the possibility of binding the salary



levels of main professions (e.g. in engineering professions) with the occupational qualification level.

KEY MESSAGE 4: The vocational and higher education institutions lack sector specific teaching staff.

The purpose is to ensure a new generation of sector specific teaching staff who train the labour force necessary for the sector and to increase the proportion of trainers and internship supervisors among the practitioners of the sector.

Activities:

- The professional associations take the lead in **formulating the agreement of best practices** between the employers and schools to promote mutual communication, to foster cooperation and to implement the recommendation of the OSKA study;
- HEIs develop **supervisor/trainer modules** for the sector related study programmes or offer the students **the opportunity to minor as a technology teacher** in cooperation with HEIs training vocational teachers;
- The Ministry of Education and Research in the framework of activities supporting lifelong learning provides **the possibility to study of didactics** (e.g. courses lasting 6-9 months) for **the labour market practitioners** who have experience in the sector (e.g. internship supervisors, retiring specialists, etc.) to prepare trainers who could contribute to training the new generation of specialists and skilled workers;
- HEIs and VET institutions use resellers of machines and machine-tools and equipment as **guest teaching staff** to give the students the most up-to-date know-how about new technologies and devices; companies with the help of professional associations **take an active role in sharing the know-how of the sector** (e.g. providing trainers, conducting training visits, etc.) with HEIs and VET institutions;
- Tallinn University of Technology and Tallinn University in cooperation with professional associations promote **the participation of vocational teacher training students in practical training in the companies** of the sector;
- The **companies** of the sector **find supervisors/mentors** for teacher training students and vocational teachers undergoing internships and support them in every way in gaining practical skills and new knowledge.