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Good practices of competitions in the metalworking sector in vocational schools in Estonia

Erasmus+ project SmartGrowth

The Federation of Estonian Engineering Industry, 2022

Erasmus+ program Cooperation Partnerships in VET project “Baltic VET competition for smart growth”, project No. 2021-1-LV01-KA220-VET-000025155.

1. Good practices of VET (vocational education and training) competitions in metalworking sector

VET competitions are often the first bigger challenge for vocational students in various fields. Vocational students in Estonia have the opportunity to test their knowledge and skills at local and national vocational championships. Local championships are usually taking place in vocational schools and the biggest national championship is the major Noor Mester (*Young Master*) vocational education event. The best of the best can represent Estonia at the international professional championships - the European Championships EuroSkills and the World Championships WorldSkills. Youth professional competitions have been organized in Estonia since 2006, the biggest competition Noor Meister has been organized since 2015. The competitions are organized throughout the year in several formats.

Vocational championships are the best way to introduce and popularize vocational training and to give young people the opportunity to compare their skills. Speed, accuracy and the use of acquired theoretical and practical knowledge are taken into account when solving competition tasks.The competitions offer spectators the opportunity to get acquainted with different professions and vocational schools and see with their own eyes how young masters do their work. In addition, professional competitions are a place where employers can get to know future workers.Youth professional competitions have been organized in Estonia since 2006.

The development and organization of the VET competition system is based on the following objectives:

- To increase the popularity of vocational education and specialties among young people;
- Appreciate mastery and motivate learners;
- Promote cooperation between the parties.

In the first section we will provide an overview of the local and national VET championships in Estonia, mostly concentrating on the metalworking sector.

http://www.kutseharidus.ee/hea-teada/kmv/

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1.1. Noor Meister

Noor Meister is a major event in vocational education that brings together national professional championships in various disciplines, with the aim of introducing and popularizing vocational training and giving young people the opportunity to compare their skills. In addition, Noor Meister has a vocational education fair, where vocational schools will introduce their own school and learning opportunities. Workshops are open where you can try your hand at different disciplines, and you will see many performers and surprises on stage.
http://www.kutseharidus.ee/hea-teada/kmv/

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Noor Meister competition is organized in different formats:

- Individual competition Noor Meister - competitions take place in vocational schools.
- Competitions in the TV show "Noor Meister" - competitions take place in vocational schools / partners as part of the filming of the TV show "Noor Meister".
- Skills Festival "Noor Meister"

Welders competitions for Noor Meister have always been organized in Lasnamäe School of Mechanics, because there are the best conditions for welders' competition. The conditions have been compiled by Harno (*Estonian Education and Youth Board*), who is also the organizer of the competition. The school side is responsible for the technical part - drawings, materials, judges, etc.

Noor Meister is an individual competition in which two competitors from each Estonian VET school can take part. The competitor must prepare the welded structure according to the drawing, then submit the structure to the judges for marking and after the marking the welding work can be started. The competition consists of two tasks: construction assembly and welding.

The best welder's professional championship is intended for young people up to 26 years of age (incl.) who study in vocational education institutions in the field of mechanics and metalworking. The organization of the competition is financed from the ESF program "Development of Vocational and Higher Education Meeting the Needs of the Labor Market" and from the state budget.

Photo from Noor Meister 2021 welder's professional championship 6.10.2021 at Tallinn Lasnamäe School of Mechanics

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1.1.1. Noor Meister welder 's professional championship 2020

Welder 's professional championship
29.04.2020, Tallinn Lasnamäe School of Mechanics

The Best Welder 2020 Professional Championship was intended for young people up to the age of 26 who are studying in the curricula of mechanics and metalworking at vocational schools. Individual competition for students of vocational schools. Up to two competitors from one school are expected to participate.
The competitor must assemble the welded structure according to the drawing, then submit the structure to the judges for marking and after marking the welding work can begin.

The competition work consists of 2 tasks:
Task 1: Design
Task 2: Welding the structure

Professional knowledge and skills required to solve the competition task:
• reads working drawings
• uses welding equipment
• selects welding modes
• prepares parts for welding
• welds angle seams in positions PB, PF, PG
• welds joint welds in positions PF, PH

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• welds the pipe in position PH according to quality grade C

• evaluates the quality of seams by visual inspection and measurement

• uses safe work techniques

• knows and can handle waste

https://noormeister.ee/kutsevoistlus/keevitajad/

1.1.2. Noor Meister welder 's professional championship 2021

On October 6, 2021, the professional competition "Noormester" 2021 Best Welder was held at the Lasnamäe School of Mechanics. The preparatory work for the organizers of the competition started already in March-April. In cooperation with the representative of the BLRT Group and the judges, they agreed on the main directions of the competition task, selected the level of complexity of the construction and determined the evaluation criteria. Compared to previous years, the construction of welding work was a bit more complicated this year, while the time given for welding the work was shortened. The aim was to give the competitors a more realistic picture of what is happening in the world of work, where in addition to the quality of the work, the time factor is also important.

6 vocational schools participated in the competition, two competitors from each school and a supervisor. The competition started evenly, where each competitor did his best to win. No one had any major problems with welding, but for some, the time factor became fatal. It is not easy to stay within the allowed time limit and at the same time maintain the quality of welding work. It so happened that some of the work was not completed on time and resulted in a decent deficit in terms of scoring. In addition to the technical parameters of the welding process, the evaluation criteria included the organization of the workplace, the use of personal protective equipment and compliance with waste management requirements. The judges did their job and we can be proud of the results of the competition.

Photos from Noor Meister 2021 Best Welder

School principal Dimitri Koromnov, 2nd place Edgar Jermoshkin, Best Welder 2021 Kaur-Gabriel Rajasalu and supervisor Alexei Fedjukin.

Practical part of the competition

Practical part of the competition

1.2. Welding Competition Viru Welder

Viru Welder takes place every year in Ida-Virumaa Vocational Education Center and the competition is focused solely on welding. The international competition usually has participants from other vocational schools in Estonia (Tallinn Lasnamäe Mechanical School, Tallinn Industrial Education Center, Pärnu County Vocational Education Center, Rakvere Vocational School, Tartu Vocational Training Center and Viljandi Vocational Training Center), but over the years also from Latvia, Lithuania, Ukraine, Russia, Sweden and others. According to the

established tradition, the working language of the competition was English in addition to Estonian and Russian.

The event provides an opportunity to compare the level of both students and their instructors, to follow each other's example and thus develop the welding profession holistically. Therefore, the interest in the competition is growing over the years. In 2019 TIG welding competition was added to the traditional arc and MAG welding competition.

Two-member teams take part in the competition, they must demonstrate their skills in state-of-the-art welding simulators and apparatus, the results of which will be judged by a jury of top specialists in the metal industry. In 2020 the welders competed in four categories: the best MIG / MAG, MMA welder, the best TIG welder and the best team. The competition consists of two parts, the first is theoretical and the second is practical.

In 2020 the drawings were in Estonian, English and Russian. The tests were in 5 languages: Estonian, English, Latvian, Lithuanian, Russian. All tests were performed in online and duplicated on paper in case of hacker attacks (which took place during the competition).

Example of a timetable for the 2020 Viru Welder competition

VIRU WELDER 2020

Jõhvi, Kutse 13, Eesti

Timetable

Time	Activity	Place
26.02.2020		
12.00 – 14.00	Arrival and registration at home (inform about your arrival time and transport)	[illegible] Jõhvi õppekeskus, Kutse 13
14.00 – 15.00	Lunch	Study restaurant La Fontes
15.00 – 17.00	Getting acquainted with the competition venue, online registration	Welding labs
17.30	Heating	Narva-Jõesuu
18.30	Dinner, free time, spa	Narva-Jõesuu
27.02.2020		
7.30	Departure from the hotel	
8.15 – 09.00	Arrival at school, registration and dressing	F-226
9.00 – 9.10	Opening of the competition	Assembly hall
09.30 – 10.20	Test (theoretical part)	F-241, F-246
10.20 – 10.45	Coffee break	Assembly hall
10.45 – 11.30	Instruction, independent work – preparation of materials for the practical part of the competition.	F-226
11.30 – 12.30	Practical work /1-14/ MMA	F-125
	Practical work /11-20/ MIG/MAG	F-132
12.30 – 13.30	Practical work /11-20/ MMA	F-135
	Practical work /1-10/ MIG/MAG	F-132
13.30 – 14.00	Completion of work and lunch	Study restaurant La Fontes
14.00 – 15.00	Judges evaluate the works	F-120
14.00 – 15.00	TIG welding	F-146
15.00 – 16.00	Summary	

VIRU WELDER 2020

	FOR INSTRUCTORS ONLY	
11.30 - 12.30	*Welder contest*	*F-142*
12.30 - 13.00	*Meeting for representatives of Estonian vocational schools on vocational examinations*	*F-236*
14.00 - 16.00	*Speed master class for instructors*	*Rakery Gymnasium*
16.00	Award ceremony and ceremonial closing of the competition	Aula
17.00	Back to the hotel	Narva-Jõesuu
18.00	Dinner and free time	Free time
28.02.2020		
9.00	Check-out and back home	

VIRU WELDER 2020

General conditions

- The competition can be attended by 2 students from each educational institution together with a supervisor
- Competitors are up to 20 years old. Preference is given to 1-1. course students who have completed middle school.
- The competition consists of 2 stages - a theoretical part and a practical part
- The evaluation is done individually
- Awards will be given to 3 best students in the individual competition and the best team.

NB! Important information
MIG / MAG welding wire **G3Si1**
Gas - M20
Electrode - Elga **P48P** (2.5mm and 3.2mm)
The seam must be cut-sold

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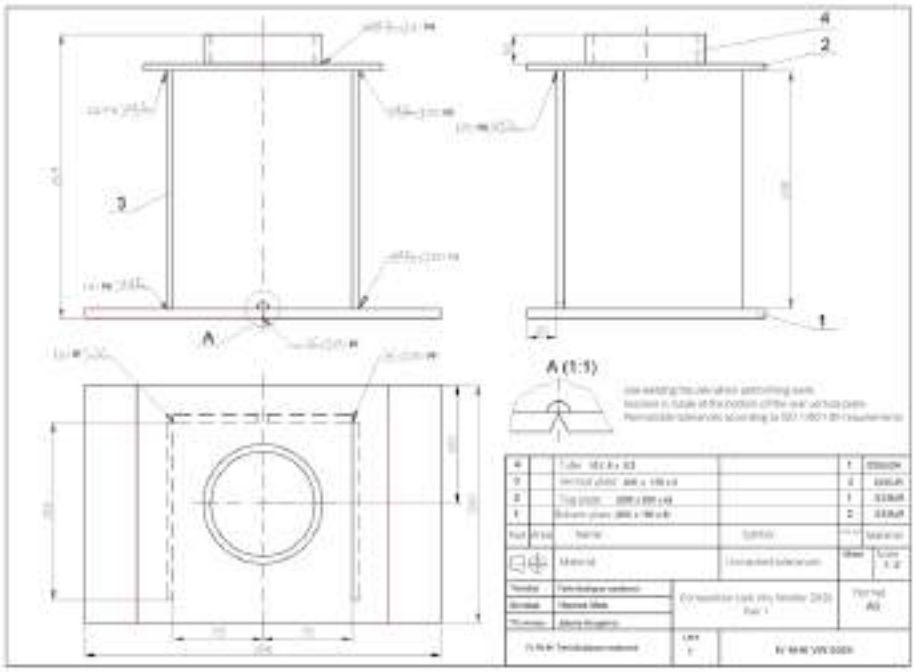
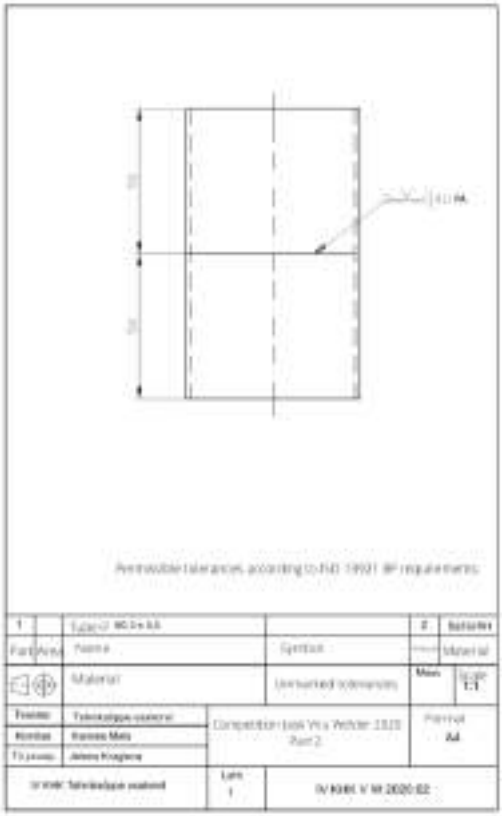
Examples of tasks from Viru Welder 2020





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Appendix 1: theoretical part from Viru Welder competition 2020

Photos from Viru Welder 2020

Theoretical part of the competition

Practical part of the competition

Practical part of the competition

1.3. Competitions in vocational schools

1.3.1. Pärnumaa Vocational Education Center

Pärnumaa Vocational Education Center organizes professional competitions at the school for welders and assembly locksmiths regularly in the second half of January each year for the past 7 years. During this time the school is open for middle- and secondary school students. For the past few years assembly locksmith field of study has not been opened due to an absence of students

and lack of student interest. However, the school is organizing VET competitions for January 2023, where welders and assembly locksmiths can compete as the new National Curriculum for Mechanical and Metalworking (2021) has also made it possible to teach assembly again.

Competitions usually take place on two days, on the first day MMA, MIG, MAG welders compete and on the second day TIG welder professionals compete.

(Picture of the welders competition in Pärnumaa Vocational Education Center 25-26 January 2022. Pictures by Lembit Miil, Pärnu County Vocational Education Center: Mechanical and metal work curriculum manager).

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Winners of MIG-MAG welders in Pärnumaa Vocational Education Center 25-26 January 2022

Winners of TIG welders in Pärnumaa Vocational Education Center 25-26 January 2022

The competition has a theory part (40 questions worth 40 points) and a technical part for 60 points. The competition is open for all students of the school, however there is a limit of 20 participants due to the limited size of the school's technical park, which does not allow for more participants in one day. Usually the participants are from the school's final, third year, who have to take the school's and national vocational exams in the spring. However younger and adult students have also participated in the competition. Pärnu metal industry business professionals have usually been involved in the evaluation of student's work. In addition to school prizes and honorary letters, more active partners from the Pärnu metal industry have added their own prizes.

Pärnumaa Vocational Education Center students have participated in national Viru Welder and Noor Meister competitions and in 2021 one metalworks (welder) student participated in the EuroSkills competition in Austria.

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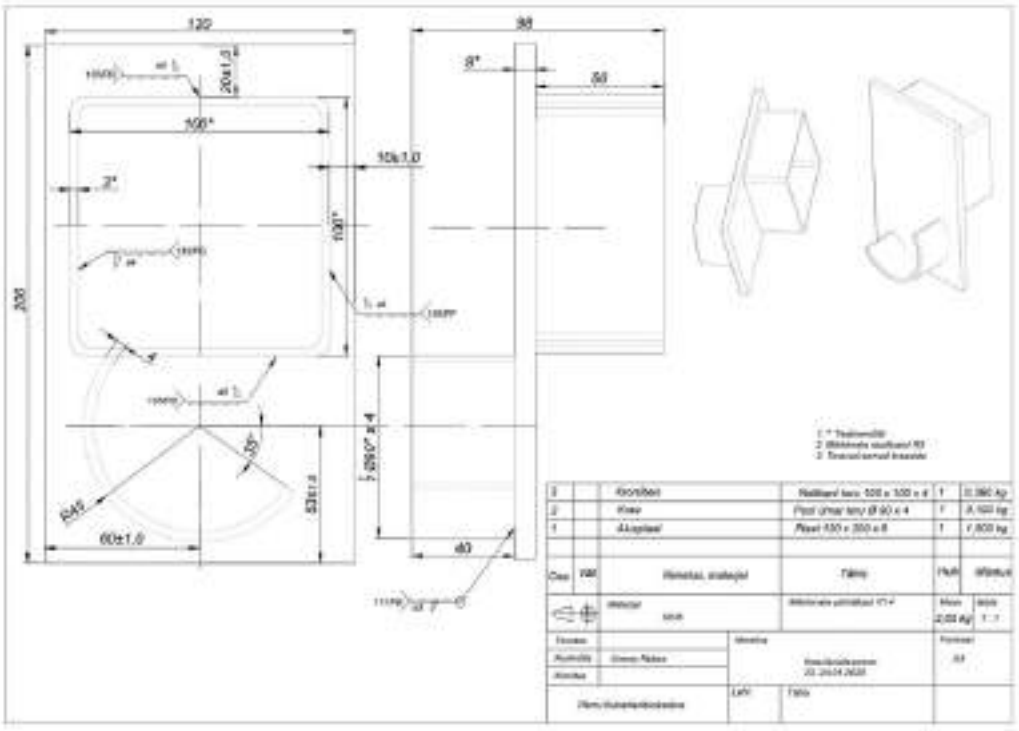
Examples of welding tasks for welders in Pärnumaa Vocational Education Center 25-26 January 2022



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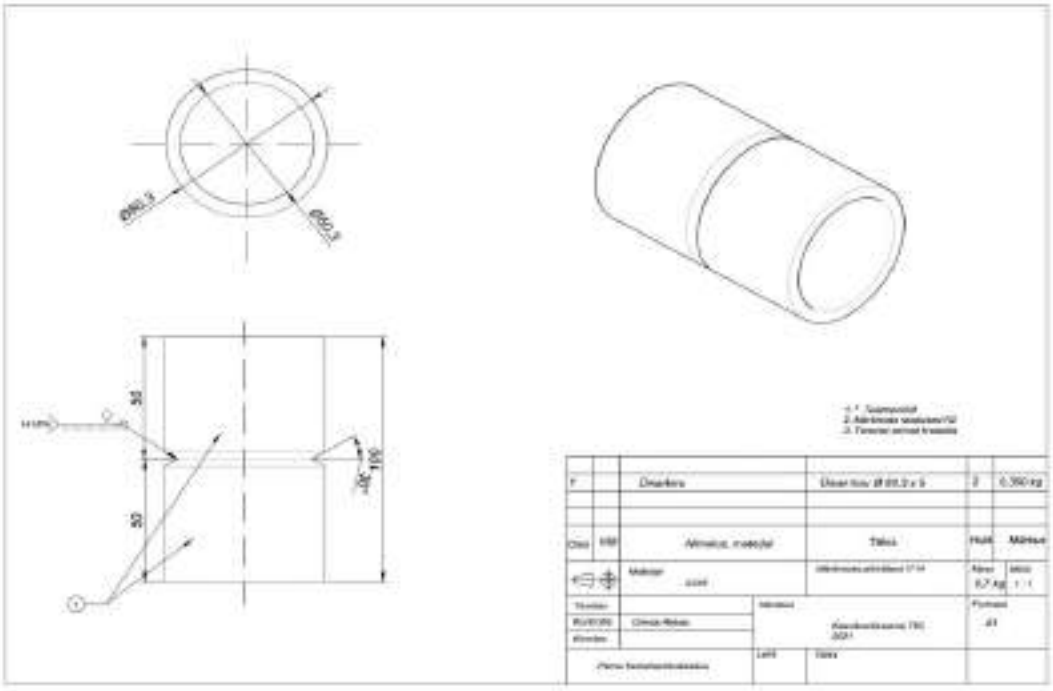


1.3.2. Rakvere Vocational School

In welding competitions, students are given a drawing with the details of the workpiece right at the beginning of the competition, so all students are in equal condition. The result is checked by visual inspection and defects are based on professional and vocational standards.

Design preparation

- Each participant prepares the design according to the drawing and according to the welding process.
- The order of compilation and scoring is determined by each student individually.
- After compilation, the sample exam work is submitted to the assessors for review and inspection, after which permission to start welding is granted.

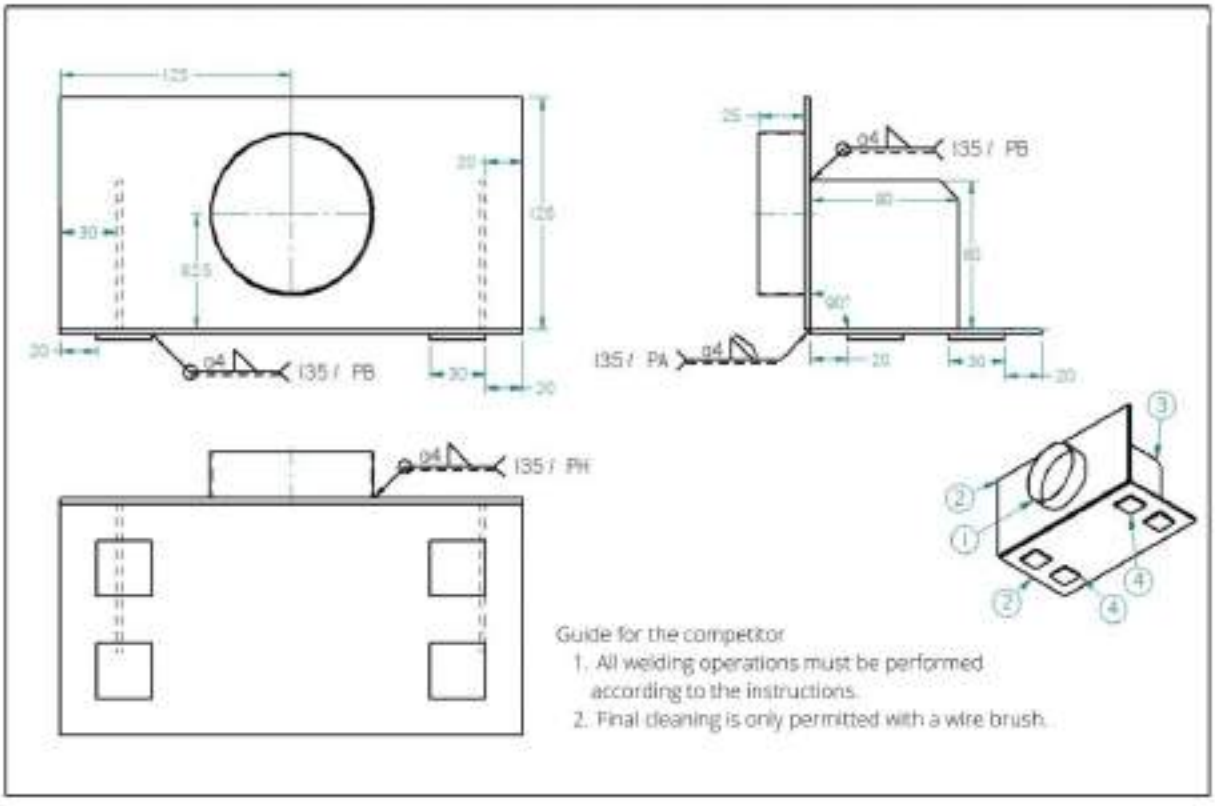
Welding of the structure

- The student places the structure on the welding table and starts welding, all seams must be welded in the position shown in the figure.

- The participant welds the seams in a random order in which at least one stop is made during the welding of both the root and cover penetrations (continuation / lock).
- The corners must be welded without interruption.
- Assessors have the right to reduce the student's work score for non-compliance or error in the preparation of safety requirements. In the event of a serious violation, the student may be immediately removed from the test.
- Tolerance on the assembly is +/- 2mm.
- Communication with each other is forbidden.
- The measuring instruments must be returned to the teacher's desk immediately after you have finished them!

Example from Rakvere Vocational School welding exam:

1	Pipe Ø 78x2	1 pcs
2	Plate 250x125x3	2 pcs
3	Plate 80x80x3	2 pcs
4	Plate 30x30x3	4 pcs



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1.3.3. Tartu Vocational Training Center

In Tartu Vocational Training Center there is an annual mechatronics competition called Aasta Tegija (*Maker of the Year).* The competition is based on the practical work style of the vocational exam, but always contains a surprise. If the standard components of the electropneumatics study stand are used in the vocational exam, then one of the key components of the competition is always something suitable for the occasion. This type of school competition has taken place since 2019. Before that, the tasks were considerably different. Topics have been CNC, electronic circuits, and programming.

In 2022, the regular competition was a retro competition dedicated to the 100th anniversary of the school, which consisted of the use of relay automation from telephone exchanges.

Example 1 of 2022 Tartu Vocational Training Center competition task for mechatronics professional competition

VOCO Maker of the Year 2022 competition
MECHATRONIC
March 6, 2022

Twister

1. Purpose

Automate the control of the rotary shaft pneumatic lines.

2. Setting a task

The triangular eccentric at the end of the shaft joint is moved by means of two pneumatic cylinders. The back line system allows the shaft type to be rotated at a moderate speed and ensures that the position of the shaft type is precisely determined after each complete revolution. In the lower position of the device, the cylinders are in the home position, the eccentric with the tip at the top, the emergency button is not activated and the signal lamps do not light up.

When the corresponding start button (S1, S2, S3) is pressed, the device starts operating.

The device can be used in three modes:

- in automatic mode (rotation takes place until the "Stop" (NC) button is pressed, after which the machine stops at the next position suitable for the sub-position) - one in full speed mode - 6 in full speed mode The operating mode is selected by pressing the corresponding start button. The selection of the mode is indicated by the corresponding signal lamp.

When the start button of the corresponding mode is pressed, the device starts working in the selected mode. The job ends after the specified work cycles have been traversed or the "Stop" button is pressed automatically.
The mode indicator lamp then turns off. During operation (when the mode lamp is lit), the device may not respond to any start button.

The start can only take place from the sub-position of the device.

The device has an emergency button with normally connected (NC) contacts, which can be used to interrupt the process at any time. Applying the emergency button stops the process and moves the target selector to the sub-position of the device. A red signal lamp (Emergency) indicates that the process has stopped. The signal lamp goes out deactivation.

3. Select:

Equipment according to the selection of super-objects.

4. Draw:

Pneumatic circuit and electrical circuit.

5. Compile:

Control program and perform the necessary electrical and pneumatic connections on the stand.

Example 2 from Tartu Vocational Training Center

The practical work is to make the details of the assembly according to the given drawing and to assemble them together.

The student can pre-cut on a laser machine two blanks measuring 75x60x6 and 70x60x6 mm.

During the competition, the student performs the necessary operations: marks, drills, deepens and threads according to the drawing.

When the details are ready, he must assemble them according to the drawing.

The following components must be used to assemble the parts:

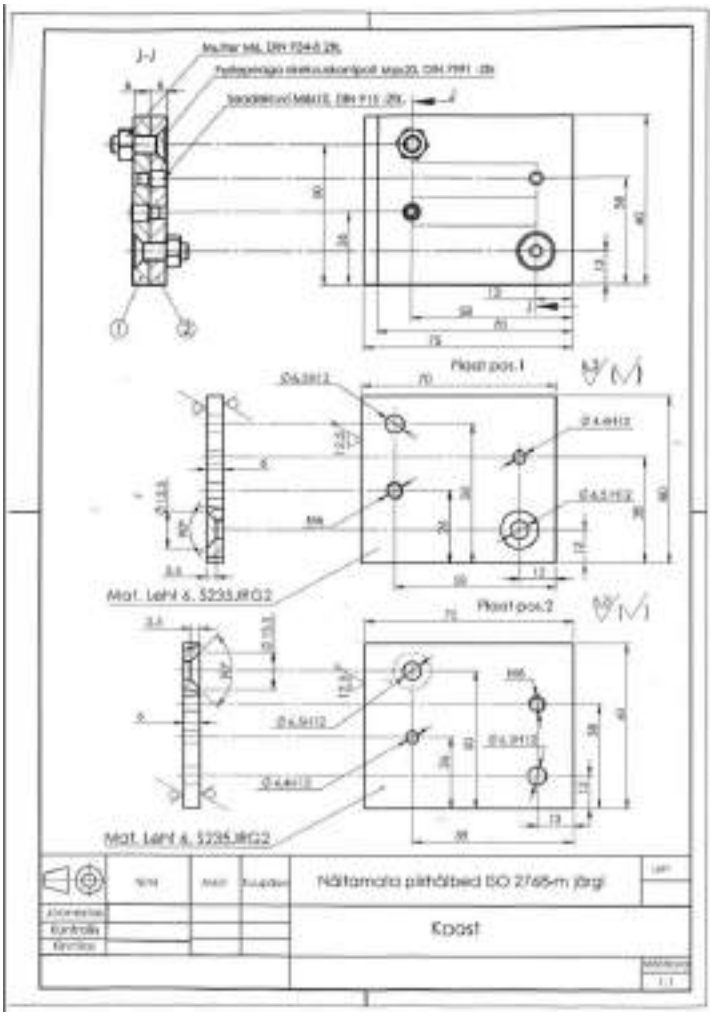
1. adjusting screw M6x10 - 2 pcs .;
2. Hexagon socket head cap bolt M6x20 - 2 pcs .;
3. nut M6 - 2 pcs .;

Two 4 and 3 mm Allen keys must be used for assembly and a 10 mm Allen key for fastening the nut.

NB! As a result of the assembled parts, there must be no gap between them.

The time given for the practical work is 3-4 hours. The conformity of the finished work to the working drawing is assessed (each dimension that is within tolerance gives 1 point).

In addition, compliance with safety requirements and work culture are assessed.



1.3.4. CADrina

Kadrina Secondary School, in cooperation with Aru Grupp AS, launched the elective course "Fundamentals of Business Management and Technology" in 2004, which developed into a real-technical field of study and today it has become an engineering-technical field of study. Under this course, high school students receive in-depth training in programming - AutoCad, Solidworks (as well as other computer drawing programs), as well as basic knowledge of various engineering and business disciplines - technical drawing, logistics, organizational management and culture, logic and design.

With the launch of the new direction the focus has remained the same - CAD drawing, but the outputs have changed. You can qualify between three different outputs:

- Self-propelled project - cooperation with Auvetech OÜ
- CNC bench operator - cooperation with Rakvere Vocational School
- Product development - cooperation with local companies

In order to raise the level of the field of study and to test oneself, it was decided to organize a computer drawing competition as CAD, where various design tasks have to be solved using CAD programs. The first computer drawing competition as a CAD took place in 2010.

The aim of the competition is also to show engineering graphics from an exciting aspect and to introduce the engineering focus of Kadrina Secondary School and the curriculum to future high school students. At the heart of the event are real engineering projects (skateboard park, bridge, formula, airplane, etc.) designed under the eyes of the spectators, using CAD design software.

CADrina 2013 was already in two parts, initially a preliminary round was held and the four best teams made it to the finals in the evening. Today, the preliminary round has moved to the web and the six best teams will reach the finals. The competition programs have expanded. Initially, all drawing was done in AutoCAD, now it is Solidworks, and there will be more. It is important that the final result can be checked on a uniform basis and presented in the same format.

There are three members in the team who can / can solve the task individually in the preliminary round and then format the resulting drawings into a single sat-type file. The time for this is three hours. In the final, there will be three individual rounds, a '40 minutes, and then one short round, the so-called quick finish (15 minutes), where the whole team will be together and one will operate the computer.

Tasks have been prepared by Commuun OÜ and Reib OÜ. In this case (CADrina 2022) school furniture must be drawn. The theme of CADrina has been pushed out in the autumn of 2022 from the jubilee of Kadrina Secondary School "Education is the light on the way to the future" and then school furniture. Many different things have been drawn in the past - from bicycles to planes, not to mention ships and apartment buildings.

Whereas initially CADrina was only a computer drawing competition, in the last eight years it has become an IT and NUTIfestival CADrina, which includes extracurricular activities, workshops and other exciting activities for everyone.

During the event, young people from basic school who are considering choosing a upper secondary school have a good opportunity to get acquainted with learning and development opportunities at Kadrina Secondary School.

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2. Requirements of Euroskills & Wordskills in the VET metalworking sector

2.1. Euroskills

EuroSkills aims to introduce different professions and skills of young masters and thus develop vocational training across Europe. The European Professional Championships take place every two years. The EuroSkills competitions provide a good opportunity to get acquainted with different professions and to compare the level of specialties taught in Estonia with other European countries. The competitions also reflect the professional standards and qualification requirements of European countries. Young professionals in each country have the opportunity to test their skills and knowledge and compare them with young Europeans in the same field. Our vocational teachers also participate as experts in the juries of the EuroSkills competition. The experience gained also provides a good opportunity for the further development of specialties in Estonian vocational schools.

The EuroSkills competition is coordinated by the European Organization for the Promotion of Skills (ESPO), which was set up in 2007. All countries that have joined the organization are involved in the development of the competition.
http://www.kutseharidus.ee/hea-teada/kmv/
https://www.harno.ee/uudised/eesti-noored-osalevad-euroopa-kutsemeistrivoistlustel

2.2. WorldSkills

Estonia has been a member of WorldSkills since the beginning of 2007. Estonia's representative in the WorldSkills organization is the Education and Youth Board on the proposal of the Ministry of Education and Research.

WorldSkills competitions take place every two years and are one of the most important places to test and demonstrate professional skills. The competition takes place over several days and during the competition the competitors test their skills according to strict international standards. In each competition area, technical performance as well as teamwork, communication and the ability to work on projects are assessed. The final results will be evaluated with gold, silver and bronze medals.

http://www.kutseharidus.ee/hea-teada/kmv/

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3. Requirements of qualification exams in the metalworking sector

3.1. CNC machine operator, CNC milling machine operator, level 4 and CNC Operator, EstQF Level 5 (milling machine, lathe)

Working on metalworking machines, level 4 and 5, the professional standard consists of two compulsory, two specialization and transversal competencies.

The profession of a worker on metal cutting machine is specialization-based, it is possible to specialize in two directions:

(a) worker, miller on conventional and APJ metal cutting machines;

(b) worker on conventional and APJ metal cutting machines, lathe.

Performance requirements:

1. Act purposefully and responsibly, guided by the requirements of the profession;

2. Participate in teamwork, work for the best mutual result;

3. Communicate with co-workers politely and correctly, present information in a clear and comprehensible manner;

4. Seize opportunities for self-improvement and keep an interest of developments in professional technology;

5. English level A2 to be able to read international vocational information

6. Use of digital skills at least at the level of the independent user in terms of information processing and communication and at least at the level of the basic user in terms of safety and problem solving

3.2. Sheet Metal, CNC Machine Operator, EstQF Level 4

Performance requirements:

1. Based on basic knowledge of mathematics, physics, automation, mechanics, sheet metal materials (including surface quality requirements, material defects, coatings, protective films), properties and sizing of alloys.
2. Able to read technical drawings, understand and use professional terminology.
3. Prepare a safe workplace based on the work process, following the requirements of occupational safety and environmental protection at all stages of the work process.
4. Is accurate and correct in their work, using time efficiently, adhering to deadlines and agreements.
5. Works in a motivated and organized manner and follows the given instructions and procedures.
6. Uses opportunities for self-improvement.
7. Participates in teamwork, contributes to the achievement of a common result, cooperates with co-workers.
8. Understands the role of the company in the industry, is aware of the consequences of its activities.
9. Can give constructive feedback on the capacity of the process, actively participates in making suggestions for improvement.
10. Uses a computer in their daily work in terms of information processing and communication at the basic user level.
11. Uses enterprise information management software (ERP, etc.).
12. Uses English at the A1 level in their work.

3.3. Welder, EstQF Level 3

Performance requirements:

1. Work based on basic theoretical knowledge in their work: basic properties and marking of metals and their alloys; weldability of metals; selection and marking of welding materials;

preheating and post-heating of welding; basic welding techniques; principles of construction and adjustment of semi-automatic welding equipment; metal cutting equipment and their safe use; quality levels according to welding defects (EVS-EN-ISO 5817).

2. Reads technical drawings and the specification of the welding procedure, understands and uses the symbols of welds and joints and professional terminology.

3. Observes the requirements of occupational safety, environmental protection and fire work, uses personal protective equipment and checks their condition.

4. Is accurate and correct in their work, uses time efficiently, adheres to deadlines and agreements.

5. Works in a motivated and organized manner and follows the given instructions and procedures.

6. Uses opportunities for self-improvement.

7. Participates in teamwork, shares relevant information with co-workers.

8. Understands their place in the company, he / she is aware of the consequences of their actions.

3.4. Welder, EstQF Level 4

Performance requirements:

1. Work based on basic theoretical knowledge in their work: basic properties and marking of metals and their alloys; weldability of metals; selection and marking of welding materials; preheating and post-heating of welding; basic welding techniques; principles of construction and adjustment of welding equipment; metal cutting equipment and their safe use; quality levels C according to welding defects (EVS-EN-ISO 5817); welder qualification standards (EVS-EN-ISO 9606).

2. Reads technical drawings and the specification of the welding procedure, understands and uses the symbols of welds and joints and professional terminology.

3. Observes the requirements of occupational safety, environmental protection and fire work, uses personal protective equipment and ensures their condition.

4. Is accurate and correct in their work, uses time efficiently, adheres to deadlines and agreements.

5. Works in a motivated and organized manner and follows the given instructions and procedures.

6. Uses opportunities for self-improvement.

7. Participates in teamwork, shares relevant information with co-workers.

8. Understands their place in the company, he / she is aware of the consequences of their actions.

3.5. Welder, EstQF Level 5

Performance requirements:

1. Works based on theoretical knowledge: basic properties and marking of metals and their alloys; weldability of metals; selection and marking of welding materials; preheating and post-heating of welding; basic welding techniques; principles of construction and adjustment (adjustment) of welding equipment; metal cutting equipment and their safe use; quality levels C according to welding defects (EVS-EN-ISO 5817); welder qualification standards (EVS-EN-ISO 9606); Welding Quality System Standard (EVS-EN-ISO 3834).

2. Reads technical drawings and specification of welding procedure, understands and uses symbols and professional terminology of welds and joints.

3. Observes the requirements of occupational safety, environmental protection and fire work, uses personal protective equipment and ensures their condition.

4. Is accurate and correct in their work, uses time efficiently, adheres to deadlines and agreements.

5. Works in a motivated and organized manner and follows the given instructions and procedures.

6. Uses opportunities for self-improvement.

7. Participates in teamwork, shares relevant information with co-workers, is ready to organize the work of others.

8. Understands their place in the company and the role of the company in the industry, he / she is aware of the consequences of their actions

4. Analyses of requirements for metalworking sector VET students proposals for common tasks of skills competitions

Today's metalworking industry needs students with good practical skills. The school provides theoretical and practical opportunities and knowledge, but sometimes it is not enough to work at skilled work right away. The proposal is to do more apprenticeships and competitions so that students have the opportunity to compare their skills with other students from other schools, which also increases motivation.

When students have the opportunity to focus on one specific skill building, their skills develop much faster. This is why it is good to have separate theoretical and practical parts of competitions. Competitions also give the opportunity to meet other students and possibly participate in international competitions.

A part that all vocational schools should pay more attention to teaching AutoCAD drawing as well as other computer drawing programs, so that students are able to create their own visual drawings.

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Appendices

1. Theoretical part from Viru Welder competition 2020

Test

	Choose the appropriate answer	A. double joint weld B. corner seam C. I- joint stitch D. assembly weld
	Choose the appropriate answer	A. round wire weld B. contour stitching C. joint D. stud joint
	Choose the appropriate answer	A. I- joint stitch B. corner seam C. n- seam D. the weld is made on the opposite side
	Choose the appropriate answer	A. horizontal weld B. lower position weld C. ceiling weld D. upright welding
	Choose the appropriate answer	A. contour stitching B. assembly seam montage welding C reinforced weld quality control D. dangerous gases
	Which welding method is indicated in the figure	A. TIG B. MAG C. MIG D. MMA
	Choose the appropriate answer	A. the welding seam is made on the front B. the welding seam is made on the opposite side C. the welding seam is made during assembly D. contour stitching

	What do the numbers 34 represent on the steel 34CrAlMo5-10?	A. 34% C B. 34% Cr C. 0.34% C D. 3.4% C
	Which of the symbols in the steel S355 K2 G3 marking indicates the breaking work of this steel grade J°C	A. K2 B. S C. 355 D. G3
	What does the letter S in the S355 J2 G3 steel marking mean?	A. Structural steel B. steel with a high S content C. mechanical engineering steel D. alloy steel
	Select the correct electrode cover type according to the symbol "E 46 3 1Ni B 54 H5"	A. rutile coating B. acidic coating C. alkaline coating D. cellulose coating
	What do the numbers "275" in the "S275K2" steel marking mean?	A. impact resistance B. current limit C. elongation at break D. % C
	The electrodes are labeled EN ISO 2560 as follows: E 38 0 RR Which explanation is correct? 2 answers	A. E - coated electrode for MMA welding B. 38 = 38% electrode metal transition to the weld C. 0 = only weld at temperatures above 0°C D. RR = thick rutile coating
	What is the impact of increasing the carbon content of steel?	A. increases elongation at break B. raises the melting point C. increases strength D. impairs weldability
	Select the correct symbol for welding process 111.	A.MMA B.TIG C.MAG D.MIG E.WPS
	Select the correct symbol for the welding process 135.	A.MMA B.TIG C.MAG D.MIG E.WPS

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	Select the correct symbol for welding process 141.	A.MMA B.TIG C.MAG D.MIG E.WPS
	Select the correct symbol for welding process 131.	A.MMA B.TIG C.MAG D.MIG
	At what temperature is crushing work defined for S355J2 steel?	A. -20 B. 20 C. 355 D. 35
	What is the name of the document describing the welding interface technology?	AW IG B.EN C.ISO D.WPS
	What do the letters PE mean in the designation of a weld?	A. down position B. Ceiling position C. Ceiling horizontal position D. vertical bottom up position
	What do the letters PF mean in a weld designation?	A. down position B. Ceiling position C. Ceiling horizontal position D. vertical bottom up position
	What is the symbol "ISO 2560-AE 46 3 1Ni B 54 H5" ?	A. Coated electrode B. welding wire C. welder's certificate D. WPS number
	What is meant by " ISO 2560-AE 46 3 1Ni B 54 H5 " numbers "46"?	A. mechanical properties of the weld seam B. Chemical composition of the weld C. electrode cover D. thickness of metals
	What does the number "3" mean in the symbol " ISO 2560-AE 46 3 1Ni B 54 H5 "?	A. mechanical properties of the weld seam B. Impact strength C.electrode cover D. thickness of metals

	What is the symbol "T 46 3 1Ni BM 4 H5"?	A. slag fill wire B. full wire C. coated electrode D. electrode for TIG welding
	Which material is marked " P355Q"?	A. steel for pressure vessels B. structural steel C. high speed steel D. Reinforcing bars
	What is the sign G 46 3 M G3Si1?	A. slag fill wire B full wire C. coated electrode D. electrode for TIG welding
	46 " mean in the sign "G 46 3 M G3Si1" ?	A. mechanical properties of the weld seam B. Chemical composition of the weld C. electrode cover D. thickness of metals
	What does "G 50 4 MG4Si4 "first number" 4 "?	A. mechanical properties of the weld seam B. Impact strength C. electrode cover D. thickness of metals
	According to which parameters are the feed rollers selected for MAG welding?	A. by the diameter of the cassette (wire spool) B. by wire diameter C. by welding speed D. by chemical composition of the shielding gas
	Why are precautionary measures required when welding in tanks?	A. formation of water B. risk of deformation C. wall burnout D. Risk of explosion and suffocation
	What is the main function of a coated electrode coating?	A. Protect the coated electrode from the external environment B. to prevent the effects of magnetic blowing C. Add oxygen and nitrogen to the weld D. welding arc stabilization
	Which element degrades the properties of steel?	A. Mn B. Ni C. S D. no answer

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	In which cases is it not allowed to perform arc welding work?	A. when optical radiation occurs B. if the object to be welded is too hot C. if there are defective wires in the welding circuit D. if there is no description of the operation
	Which shielding gas reacts more strongly with the alloy (molten metal)?	A. Ar B. He C. CO_2 D. gas mixture
	What changes as the welding arc lengthens?	A. increases the strength of the weld B. the width of the weld increases C. the depth of welding increases D. welding current increases
	Which shielding gas has a higher tendency to splash in the welding process?	A. Ar C. CO_2 C. M 22 D. M 11
	Which shielding gases are not used In MIG / MAG welding ?	A. H_2 B. Ar C. He D. CO_2
	What does the gas mixture M21 consist of ?	A. $CO_2 + N_2$ B. $CO_2 + Ar$ C. $CO_2 + O_2$ D. $CO_2 + H_2$

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