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SLOVAK AUSTRIAN GERMAN ALIANCE
VOCATIONAL EDUCATION AND TRAINING

CURRICULUM

OUTPUT IDENTIFICATION:
O3 – Education of trainers for the course "Metal Technology"

Project Number:
2015-1-SK01-KA202-008951
Project Description:
Slovak-Austrian-German-Alliance for Vocational Education and Training
Short Project Description:
SAGA for VET
Start of the Project:
01.09.2015
End of the project:
01.09.2017
Official Designation of the Project Client:
Newport Group, a.s.

Field of study - Metals Technology

The field of study - Metals Technology is drawn up as a model curriculum

(2) Besides the basic module that is mandatory for all apprentices, one from the following modules has to be elected:

1. Construction Machinery Technology (H1)
2. Automotive Technology (H2)
3. Metal and Sheet Metal Construction Technology (H3)
4. Steel Construction Technology (H4)
5. Blacksmith Technology (H5)
6. Equipment Technology (H6)
7. Welding Technology (H7)
8. Machining Technology (H8)

The other main module or one from the following ones can be chosen for deepening and specialization of the education:

1. I. Automation Technologies (S1)
2. Design Technologies (S2)
3. Construction technologies (S3)
4. Process and Design Technologies (S4)

The Profession Profile

Apprentices educated in the basic and main module the Construction Machinery Technology are able to carry out the following activities after completing the education at an educational establishment and in vocational school:

1. To produce relevant workpieces and structural parts, taking into account the relevant prescribed standards and wavelength interconnection to the torque transmission,
2. Drawing up sketches of single but also complex drawings using CAD technology,
3. Programming and operating of CNC machines,
4. A formation, assembling, reinforcing and assembling of structural parts, machines, apparatus, devices and structures according to the instructions and plans compliant with mechanical, pneumatic and hydraulic systems,
5. A disassembly, maintenance and management of construction parts, machines, apparatus, devices and structures in connection with mechanical, pneumatic and hydraulic systems,
6. A systematic searching, bounding and preventing from errors creation, damages and the malfunction of structural parts, machines, apparatus, devices and structures in connection with the mechanical, pneumatic and hydraulic systems,
7. Collecting and documentation of technical data about the workflow and the work results,
8. Drawing up works after the adjustment of the relevant safety regulations, standards, and quality norms and environmental protection.

Apprentices educated in the basic and main module the Automotive Technologies are able to carry out the following activities after completing the education at the educational establishment and in vocational school:

1. Drawing up parts from different materials used for the automobiles manufacture
2. Construction, assembling and construction of automobile structures (for example trucks, semi-trailers),
3. Assembling, setting up and damages searching (manually via EDV technology) and troubleshooting on the braking system,
4. Assembling, setting up and the testing of electric (light system), hydraulic, pneumatic and electronic equipment of the vehicle,
5. A systematic searching, bounding and removing of errors, damages and faults on the automobile bodyworks, superstructures and trailers, as well as their checking,

6. A systematic search, bounding and removing of errors, damages and faults on the electric (lighting), hydraulic, pneumatic equipment of the vehicle,
7. Collecting and documentation of technical data about the workflow and the work results,
8. Drawing up works after the adjustment of the relevant safety regulations, standards, and quality norms and environmental protection.

Apprentices educated in the basic and main module the Metal and Steel Construction Technology are able to carry out the following activities after completing the education at an educational establishment and in vocational school:

1. A preparation of parts in sheet-metal and metal structures like sheet-metal profiles, windows, doors, windows metal fitting, locks, facade elements,
2. The production and assembly of structures like sheet-metal profiles, windows, doors, windows metal fitting, locks, facade elements,
3. The maintenance and repair of structures like sheet-metal profiles, windows, doors, windows metal fitting, locks, facade elements,
4. A manufacture and installation of formwork protection elements, protection against humidity, heat and fire.
5. Manufacturing and assembly of electrical, pneumatic and hydraulic actuators,
6. Collecting and documentation of technical data about the workflow and the work results,
7. Drawing up works after the adjustment of the relevant safety regulations, standards, and quality norms and environmental protection.

Apprentices educated in the basic and main module the Steel Constructions Technology are able to carry out the following activities after completing the education at an educational establishment and in vocational school:

1. Preparation and processing of metal parts for the buildings and halls construction, portals, containers, etc.,
2. Folding, assembly and construction of structures, halls, portals, containers, etc.
3. The maintenance and repair of structures, like buildings, halls, portals, containers, etc.
4. Testing, training, maintenance and protection of outdoor areas, including the corrosion protection,
5. Collecting and documentation of technical data about the workflow and the work results,
6. Drawing up works after the adjustment of the relevant safety regulations, standards, and quality norms and environmental protection.

Apprentices educated in the basic and main module the Blacksmith Technologies are able to carry out the following activities after completing the education at the educational establishment and in vocational school:

1. Design and illustration of metal-machining works on paper and on the model,
2. Hand forging using the strength hammer according to the design, pattern and template. The manufacture of forged products (like railings, grilles, gates, doors, fences)
3. Construction, assembling, setting up and repair of forged products (like railings, grilles, gates, doors, fences),
4. Preparation of the forging tools and equipment
5. Heat treatment of metallic substances used for heat formation or material assessment,
6. The restoration and preservation of historical metal works,
7. Collecting and documentation of technical data about the workflow and the work results,
8. Drawing up works after the adjustment of the relevant safety regulations, standards, and quality norms and environmental protection.

Apprentices educated in the basic and main module the Tools Technologies are able to carry out the following activities after completing the education at the educational establishment and in vocational school:

1. The production and processing of simple and complex construction parts on conventional and CNC machines with respect to front standards,
2. The construction, setting up, starting the operation and test of machines and structural units using the cutting, forming and spray technology,
3. The maintenance and repair of machines and structural units using the cutting, forming and spray technology,
4. The systematic search, bounding and removing of errors, damages and faults on the machines and design unit using cutting, forming and spray technology,
5. The use, heat treatment and test of hardness,
6. Carrying out of the test series and the first model.
7. Collecting and documentation of technical data about the workflow and the work results,
8. Drawing up works after the adjustment of the relevant safety regulations, standards, and quality norms and environmental protection.

Apprentices educated in the basic and main module the Welding Technologies are able to carry out the following activities after completing the education at the educational establishment and in vocational school:

1. 1. The manual and machine processing of simple substances,
2. The manual and machine preparation of welding joints,
3. The performance of various welding processes on metals,
4. The additional modification of the welding joints, as well as the welding errors detection and repair,
5. The mechanical and thermal straightening of welding structures,
6. Material testing and their documentation,

7. The use of the methods used for corrosion protection on rivets and constructions,
8. Collecting and documentation of technical data about the workflow and the work results,
9. Drawing up works after the adjustment of the relevant safety regulations, standards, and quality norms and environmental protection.

Apprentices educated in the basic and main module the Machining Technologies are able to carry out the following activities after completing the education at the educational establishment and in vocational school:

1. The production, programming and changing of the production programs for computer-aided CNC machines and production equipment according to the relevant standards,
2. Assumption and customize computer-aided CAD designs in production programs (CAM),
3. The determination of processing parameters and searching of the relevant processing tool,
4. preparation, putting into service and operation of machining tools and manufacturing equipment for the material processing,
5. The maintenance and repair of production machines and equipment for the material processing,
6. A systematic search, bounding and removing of errors, damages and faults in the design and production facilities for the material processing,
7. Collecting and documentation of technical data about the workflow and the work results,
8. Drawing up works after the adjustment of the relevant safety regulations, standards, and quality norms and environmental protection.
9. A customers consultancy about the operational quality management.

Apprentices educated in the basic and main module the Automatic Technologies are able to carry out the following activities after completing the education at the educational establishment and in vocational school:

1. The installation, putting into service and tests of measurement-technical equipment, structural parts and steering and regulatory techniques' groups, as well as structural parts and groups of the tires and machines and equipment hydraulics,
2. A systematic searching, bounding and removing of errors, damages and faults on measurement-technical equipment, structural parts and steering and

regulatory techniques' groups, as well as structural parts and groups of the tires and machines and equipment hydraulics,
3. The maintenance and repair of measurement-technical equipment, structural parts and steering and regulatory techniques' groups, as well as structural parts and groups of the tires and machines and equipment hydraulics,
4. programming and parameter identification of programmable management of machineries and equipment,
5. Customer consultancy in questions of the automatization.

Apprentices educated in the basic and main module the Design Technologies are able to carry out the following activities after completing the education at the educational establishment and in vocational school:

1. 1. A manual and computer-aided creation of drawn designs,
2. Planning, designing and creative formation of products, single parts and structural groups according to own ideas or by designed template of metal structures,
3. Making calculations in connection with the products production, single parts or structural groups of metal structures,
4. Data gaining about customers in connection with production and manipulation with various
5. products used for manipulation improvement,
6. Customer consultancy in questions of metal structures formation.

Apprentices in special module Construction Technologies are able to carry out following activities after completing the education at

the educational establishment and in vocational school:

1. 1. The implementation of computer characters and structures (CAD, CAM),
2. Performance and technical calculations using formulas, tables, and computer equipment,
3. The production of technical documents like forms, documentation, test, control and initial plans, etc. using computer-aided systems,
4. The implementation of the structural systematics, as well as functional solutions processing,
5. Characters construction like structural parts and groups, equipment, machines and components,
6. Customer consultancy in questions of metal structures structure.

Apprentices educated in the basic and main module the Process and Design Technologies are able to carry out the following activities after completing the education at the educational establishment and in vocational school:

1. A cooperation in the implementation of the operational system of production management,
2. The implementation of methods for the processes evaluation and the continuous processes and quality improvement,
3. The collection, evaluation and appraisal of process and qualitative data, as well as an indication of possible remedial and innovative measures,
4. A computer documentation of evaluated and process steps,
5. A cooperation on the organization and development of projects.

Technical education

Mechanical Technologies

The competence area, safety and ergonomics

The roles of education and learning

Pupils

- know and apply knowledge of the operational safety regulations, as well as environmental standards and quality in connection with single competence areas,
- know the optimum use of working systems in connection with a compliance between human, machine and world of work; and they can do works in an ergonomically correct position,
- know risks associated with handling of dangerous labor means on the basis of the instruction on dangers from the beginning of their studies.

Teaching Material:

Operational safety regulations. Environment and quality norms. Ergonomics. Instructions about dangers.

The competence area Materials and Remedial Substances

The roles of education and learning

Pupils

- familiar with operational-specific working and auxiliary tools
- are able of their proper selection and use
- are informed about the waste removal in accordance with the relevant regulations
- of the performance group with deepening of studying offer, or those who are preparing for the final vocational exam, can additionally solve complex issues to the content of single teaching materials.

Teaching Material:

Working and auxiliary tools. Types. Properties. Standardization. Processing. Use. Waste removing.

The competence area of Mechanics, electrical engineering and electronics.

The roles of education and learning

Pupils

- know and understand the basic laws and principles of mechanics, electrical engineering and electronics,
- are able to solve basic tasks associated with this profession.

Teaching Material:

- Mechanics, electrical engineering, electronics:

Sizes and units. Basic laws and principles. Wiring and structural elements. Structural parts and groups.

The competence area Machines and Equipment

The roles of education and learning

Pupils are familiar with the construction and methods of the activity of single sector-specific tools, machines, apparatus and equipment. They can vocationally choose and use them.

Teaching Material:

- Tools, machines, devices and equipment:

Types. Structure. Deployment. Ways of use.

The competence area Machines elements

The roles of education and learning

Pupils know single machine parts and can assign a practical way of use to them.

Teaching Material:

- Single machine parts:

Standards. Fits and tolerances. Power transfer elements. Warehouse. Binding elements. Safety elements.

The competence area of Production and Welding Technique

The roles of education and learning

Pupils know metallic-technical technologies of production and welding technique. They know to choose and use them in right way.

Teaching Material:

- Technologies of construction:

Cutting and plastic working machining. Grouting and disconnections technologies. Heat and surface treatment. Corrosion and corrosion protection.

- Welding techniques:

Welding metallurgy and materials characteristics. Welding methods and their use.

Welding procedures. Supplemental treatment.

The competence area Automatization Technology

The roles of education and learning

Pupils

- know specific measuring and test processes,
- know how to use controling and regulatory systems in their study process within the automatization technology,
- of the performance group with deepening of studying offer, or those who are preparing for the final vocational exam, can additionally solve complex issues to the content of single teaching materials.

Teaching Material:

- Measuring and testing technology:

Electrical and non-electrical quantities. Measuring and test processes.

- Automatization technology:

Terms. Quantities. Mechanical, hydraulic, pneumatic, electrical and electronic controling and regulatory systems. CNC-technologies.

The competence area of Structural Physics

The roles of education and learning

Pupils

- know the basic laws and principles of construction physics and know how to use and apply them on the basis of practical examples
- of the performance group with deepening of studying offer, or those who are preparing for the final vocational exam, can additionally solve complex issues to the content of single teaching materials.

Teaching Material:

- Structural Physics

Object protection from heat, formwork and fire.

The competence area Project Management

The roles of education and learning

Pupils know to organize and plan practical and working processes.

Teaching Material:

- Work processes organization:

Concept and project planning. Preparation for work. Documentation of work processes.

- Planning processes:

Technical documents. Choice and material gaining. Supervision of the working procedures to ensure quality planning.

APPLIED MATHEMATICS

The competence area Mathematical Calculations

The roles of education and learning

Pupils

- know logically and economically plan and solve mathematical tasks from their field of study,
- understand the mathematical symbolism and can use computers, files and formula sets in accordance with the purpose,
- of the performance group with deepening of studying offer, or those who are preparing for the final vocational exam, can additionally solve complex issues to the content of single teaching materials.

Teaching Material:

- Mathematical principles:

With regard to the profession, carried out calculations of lengths, areas and volumes. Mass and weight calculations. Angle functions.

- Mechanics calculations:

Movement. Force. Moment. Work, performance and influence degree. Friction. Heat and thermal expansivity. Hydraulics. Tyre. Toughness.

- Calculations related to the electric engineering:

Ohm's law. Resistance. Electrical work and output.

- The calculations related to the production technique:

Calculations related to the machining. CNC-technologies.

- Calculations related to the propellant technology:

Driving and cogged belt. Cogged wheel.

- Supplementary skills:

The use in practice of the usual computer, tables, formula sets.

COMPUTER TECHNICAL DRAWING

The competence area of Professional Marks and Drawings

The roles of education and learning

Pupils

- can draw up and read hand sketches and standardized technical drawings to know separately and economically work,
- know the construction, functions and graphic information processing of computer systems. They draw up technical drawings using computers.

Teaching Material:

- Technical drawings:

Standard characters. The drawing up of relevant hand sketches. Drawings of product parts and its composition. Binding techniques. Development and intersection. Reading and interpreting of technical documentation and professional characters.

- Computer characters and drawings:

A system construction, system functions and graphic information processing. Drawing up of technical drawings.

SPECIALIZED PRACTISE

The competence area, safety and ergonomics

The roles of education and learning

Pupils

- know about the protection and prevention from injuries and know protective measures in relation to single competence areas. They also can use and apply them.
- know the optimum use of working systems in connection with a compliance between human, machine and world of work; and they can do works in an ergonomically correct position,
- know risks associated with handling of dangerous labor means on the basis of the instruction on dangers from the beginning of their studies.

Teaching Material:

Protection and prevention from injuries. Protection measures. Ergonomics. Instructions about dangers.

The competence area Specialized practise

The roles of education and learning

Pupils

- can professionally use labor and additional tools needed for specific field of study. They also can dispose them correctly,
- use and maintain tools, machines and equipment,
- know to perform a specific labor procedures and techniques, as well as welding techniques within the welding technologies.

Teaching Material:

- Working and auxiliary tools.

Types. Processing. Controling. Waste removing.

- Tools, devices and machines:

Types. Controling. Maintenance.

- Measurement. Drawing. Cutting and plastic working machining. Slits and separating. Heat and surface treatment. Special labor and test techniques.
- Welding techniques:

Welding with different working substances and processes. Supplemental treatment of welds.

PROJECT PRACTICE

The competence area Projects of Metals Technology

The roles of education and learning

Pupils

- can carry out, project and draw various specific tasks of main module “Construction Machinery Technology”, “Automotive Technology” or “Metal and Sheet-metal Construction Technology” or “Blacksmith Technology”, “Tools Technology” or “Welding Technology”, Machining Technology” and / or special module “Automatization Technology” or “Design Technology”, “Construction Technology” or “Process and Design Technologies” like complex works after taking into consideration specific measures for quality detection,
- can carry out various general, language, operational, technical, mathematical and representing specialized analysis and evaluations in accordance with relevant professional practise,
- can document and present labor-oriented solutions.

Teaching Material:

- Project planning:

Production of labor and attachable plans according to the template and task assignment. The setting of labor processes. The choice of the used tool, machines, devices and equipment.

- Project performance:

Production, assessment and evaluation of test and diagnostic results. Collection and exploration of required materials and substances. Works performance after taking in consideration all measures used for quality ensuring according to the stated labor processes.

- Project representation:

Documentation, presentation and evaluation of project works.

Fina Exam – Classification

Final exam is divided into a theoretical and practical examination.

- Theoretical exam includes subjects: Technology, applied mathematics and technical drawing.
- Theoretical exam is cancelled when candidate successfully and positively graduated from last grade of vocational school or if they are able to document successful graduation corresponding with graduation in vocational high school or university.
- Practical exam includes subjects: Examination and technical interview.

Theoretical Exam - General Assumptions

- Theoretical exam has to be performed in written form. It may be performed in electronic form while the selection board has to be aware and understand any basic parts of the examination.
- The theoretical exam is carried out before the practical exam.
- Tasks must meet the scope, level and purpose of the final exam and also requirements of the work practice. Candidates must be informed separately about the tasks related to the theoretical part.
- Written works of candidates must be signed properly.

Technologies:

The exam has to include tasks of the following fields:

1. the study of material,
2. Fundamentals and principles of mechanics (statics, dynamics, study of strength, hydraulics, study of heat)
3. Operational tools, labor and supplementary tools,
4. Tools, machines, devices and equipment,
5. Design technique, pneumatics and hydraulics,
6. Work preparation, labor process and quality check.
7.

- The exam can be performed through an electronic questionnaire. It is necessary to assign four questions from each field in such a case.
- It is necessary to formulate tasks so they can be answered within 60 minutes. It is necessary to complete the exam after 80 minutes.

Applied Mathematics

The exam has to include tasks of the following fields:

1. 1. The lengths, areas, volumes and angles calculations,
2. The calculations relating to the mechanics (work, output, heat, power),
3. Calculations related to the design technique (like cutting speed, device power, speed),
4. Calculations of propulsion (calculations of cogged wheels and V-belt).
5.

- Candidates can use the calculating devices, formulas and tables during the examination.
- It is necessary to formulate tasks so they can be answered within 60 minutes. It is necessary to complete the exam after 80 minutes.

Professional features

- The exam has to contain the making of the producing drawing of a mechanical producing subject.
- It is necessary to formulate tasks so they can be answered within 60 minutes. It is necessary to complete the exam after 80 minutes.

Practical exam

Examination

The examination is based on the equipment of the operational labor requirement.

- The labor requirement includes knowledge and skills that candidate received within the educational process stipulated in the agreed module. A part of the labor requirements always form Labor planning, measures used for ensuring the health protection at work, or other measures necessary for the environment protection and quality control. Single steps in handling of this labor requirement have to be documented.
- The board makes out the examination that can be carried out in range of seven hours, after taking into consideration a purpose of the final exam, requirements for labor practise and graduated main module. Once, the other main or special module was arranged, the examination can be carried out in range of ten hours.
- The expanded instructions according to the paragraph 3, during the extended period of exam in graduating various main modules, includes the following tasks:

1. Operating labor request that includes the knowledge and skills that were arranged during study in other main module. This labor requirement can be integrated into the one of the main module or even can complete it. A part of the labor requirement can be labor planning, measures used for ensuring the health protection at work, or other measures necessary for the environment protection and quality control. Single steps in handling of this labor requirement have to be documented.

- The expanded instructions according to the paragraph 3, during the extended period of exam in graduating various main modules, includes the following tasks:

1. Operating labor request that includes the knowledge and skills that were arranged during study in specialized module. This labor requirement can be integrated into the one of the main module or even can complete it. A part of the labor requirement can be labor planning, measures used for ensuring the health protection at work, or other measures necessary for the environment protection and quality control. Single steps in handling of this labor requirement have to be documented.
2. Written assignment of instructions that include the knowledge that candidate gained during study in specialized module. The board gives templates, that can help in tasks solving, to candidate for assignment of instructions. On the basis of these documents, the candidate has to develop tasks solutions that must be documented in written form.

Technical interview

The technical interview has to be perform in front of the complete board.

- The board has to set such themes from the labor practise to candidate that can answer gained knowledge and skills on the basis of the module stated in the curriculum. The candidate has to develop relevant solution suggestions. Tests of materials, tools and other demonstration objects can be used and gained for their support. It is necessary to include relevant assessment of themes to relevant safety and protective measures, and to measures used for labor injuries prevention.
- The technical interview of each candidate should take at least 15 minutes in current exam from other main or specialized module for at least 25 minutes. It is possible in some cases to extend the technical interview for 10 minutes, if the board cannot agree on the undoubted evaluation of the candidate's performance.