TRALES
Transnational learning factories
Erasmus+ KA210
Small-scale partnerships in VET

ŠOLSKI CENTER
ŠKOFJA LOKA
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TRALES – literature research and translation

PRACTICAL TRAINING CATALOGUE

TOOLMAKER – training regulations

Program: 3-year secondary vocational education (school form or apprenticeship form of education)

1. Targeted objectives

The objectives of practical training are:

- developing specific skills and competences for metalworking,
- selection or identification of processing technologies and technological procedures on the basis of technical and technological documentation,
- independent production of products on conventional and / or CNC machine tools,
- performing measuring procedures and assembling and testing machine parts and tools,
- applying knowledge, respecting the law and the basics of the profession and gaining practical experience,
- compliance with the rules of safety and health at work, fire safety and environmental protection,
- developing a responsible attitude towards the environment and nature and the use of energy,
- use of professional terminology and IT technology and communication and cooperation in the work environment,
- maintenance of a tidy workplace and work equipment,
- developing responsibility for one's own work and ensuring quality in the production process.

2. Expected learning outcomes

The student / apprentice is trained for performing the following work processes:

Label	Work process	Serial Nr.	Operational learning objectives
COMPULSORY PART			Student/Apprentice:
A*	Work preparation	1	• uses personal protective equipment and is familiar with the risk assessment at the workplace
		2	• prepares the workplace and maintains order and cleanliness in the workplace
		3	• takes over the technological documentation and prepares the appropriate machine tools, tools, equipment and accessories, as well as the material or raw materials
B*	Measurements and drawing	4	• selects and uses a measuring tool suitable for the procedure (callipers, micrometers, measuring clocks, comparators, angles, protractors, calibers,),
		5	• checks the accuracy of the measuring tool and maintains it correctly,
		6	• checks the accuracy of product manufacturing by measuring,
		7	• transfers the dimensions and shape of the product from the drawing to the working surface (drawing, dotting…),
		8	• measures the hardness before and / or after the treatment process,
C	Basic metalworking and re-shaping procedures and processes	9	• manufactures products on the basis of technical documentation with various machining procedures of manual processing (sawing, filing, drilling, sinking, reaming, threading, grinding, polishing…) and controls them,
		10	• distinguishes the machining capabilities of different materials and selects the appropriate tool,
		11	• performs machine cutting of sheet metal or profiles,

Label	Work process	Serial Nr.	Operational learning objectives
		12	• manufactures and controls a simple product by bending or bending processes of sheet metal or wire,
Č	Milling	13	• prepares the machine for start-up, selects the cutting blades / tool and sets the parameters,
		14	• monitors the durability of tools and, in case of wear, sharpens tools or replaces cutting blades,
		15	• uses fastening and fixture accessories on the machine for fixing workpieces and tools,
		16	• checks the condition of the milling machine and fluid levels (oils, coolants),
		17	• manufactures the product / machine part on the basis of a technical drawing on a milling machine,
D	Turning	18	• prepares the machine for start-up, selects the tool, sets the parameters and takes into account the deadlock on the spindles,
		19	• monitors the durability of tools and, in case of wear, sharpens tools or replaces cutting blades,
		20	• uses fastening and fixture accessories on the machine for fixing workpieces and tools,
		21	• checks the condition of the turning machine and fluid levels (oils, coolants),
		22	• manufactures a machine part on the basis of a technical drawing on a lathe,
		23	• turns threads and cones,
E	Grinding	24	• prepares the machine, tools and fixture accessories and aligns the grinding wheels,
		25	• independently processes the product on a grinding machine (surface or round grinding) and evaluates the quality of the treated surface,
		26	• checks the condition of the grinding machine and fluid levels (oils, coolants),
F	Machine drilling, reaming, sinking	27	• prepares the machine, fixes the tools and sets the machining process parameters,

Label	Work process	Serial Nr.	Operational learning objectives
		28	• monitors the durability of tools and, in case of wear, sharpens tools,
		29	• manufactures a machine part on the basis of a technical drawing on a drilling machine,
		30	• cuts threads, sinks and reams,
G	Basics of material joining	31	• prepares the elements for joining,
		32	• performs a soft / hard soldering process,
		33	• uses different techniques of welding - arc welding (REO, MIG / MAG, TIG),
		34	• uses gas welding and knows how to regulate the flame,
		35	• cleans and checks the quality of the joint,
		36	• performs the process of gluing / joining of non-metallic materials,
H	Heat treatment	37	• performs the heat treatment process (annealing, hardening, tempering, cementation,
I	Surface protection	38	• prepares the surface and protects machine parts with coating,
J	Assembly of machine parts	39	• systematically assembles tool parts into subassemblies and assemblies,
		40	• carries out the assembly of machine parts and assemblies on the basis of a component drawing and performs a test, if necessary,
K*	Maintenance of machines, tools and equipment	41	• performs a daily inspection of the machine and performs simple maintenance work (cleaning and lubrication),
		42	• performs preventive maintenance of machines, equipment and accessories,
L	Computer aided technologies: CNC turning, CNC milling	43	• checks and prepares the CNC machine for work,
		44	• fixes tools and workpieces, selects fixture accessories and adjusts tools,
		45	• transfers or manually enters the program into the CNC machine, sets technological parameters, tests and performs corrections,

Label	Work process	Serial Nr.	Operational learning objectives
		46	• manufactures a product on a CNC lathe or CNC milling machine,
M*	Quality assurance	47	• monitors the work process and takes care of quality assurance in accordance with the instructions and standards,
ELECTIVE PART – metal-designer			
N	Material removal processes and special fine processing operations	48	• sets technological parameters, prepares workpieces and tools and performs the processing procedure (wire or immersion erosion, laser cutting, ultrasonic or water jet cutting…),
		49	• performs fine surface treatment procedures (mech. skimming, sandblasting, honing, gluing, polishing, superfinish),
ELECTIVE PART – tool-maker			
O	Manufacture, assembly, repair, maintenance and testing of tools	50	• manufactures, assembles, repairs, sharpens, maintains and tests tools and tool elements (cutting, bending, combined tools, forging tools, extrusion, injection molding, die casting…).

Notes:

* Generic competences that need to be developed throughout the practical training together with other work processes.

Elective: The student / apprentice chooses one of two work processes according to the specific professional competences of the metal designer under the N code or the specific professional competences of the toolmaker under the O code.

3. VOCATIONAL COMPETENCES

Product or service	Elements	Vocational competences
Production of shafts with thread, taper and hinges Production of machine parts on a milling machine Grinding of the cutting tool element Sharpening of a face cylindrical cutter Manufacturing a simple product on a CNC machine Production of a cutting tool element (punch, matrix, tool base, guide sheet) Production of a tool element for injection molding of plastics (core, ejector...) Manufacturing a machining tool element Tool inspection and repair	• machine and tools selection • machine and tools preparation for work • correct selection sequence of operations • selection and preparation of material and clamping of the workpiece • correct selection of technological parameters • adequate accuracy of the product • adequate surface quality • functionality of the product • assessment of work performed • environment and healh protection • proforma invoice preparation	• making and reading workshop drawings and other technical drawings; documentation in technical terminology • knowledge of the applicability of procedures and technical characteristics of machines, tools and preparations; • understanding and application of technical standards; • knowledge of the type and properties of materials and their use in technology; • knowledge of standard mechanical engineering elements; • knowledge of the applicability of procedures and technical characteristics of machines, tools and preparations; • knowledge of the applicability of manual and machine cutting procedures; • knowledge of heat treatment procedures; • knowledge of metal protection procedures; • knowledge of methods and preparations for optimal clamping of the workpiece; • preparing a list of necessary materials, tools and equipment; • adequacy and control of material in terms of quality and quantity; • setting work procedure, sequence of work operations, work phases and regime; • rational use of materials and energy sources; • appropriate selection and use of measuring and technical means to control the accuracy and quality of the product; • setting safety and protective measures to protect human health and the environment;

		• responsibility planning and preparation of own work procedure or group work; • communication and problem solving; • use of protective means; • developing entrepreneurial qualities; • ecological waste storage; • creating a work report; • setting the time for the production of the service based on the work order; • setting the price of work, material and costs; • use of standard computer and hardware equipment; • checking the functionality of the product and correcting errors; • critical assessment of the work performed, - services;

4. At the final examination, the candidate demonstrates the following professional and key competences:

- interconnection of practical knowledge and theoretical knowledge, laws and basics;
- understanding and application of technical regulations and standards in the preparation of technical documentation;
- understanding technical instructions, preparing a work report;
- planning, monitoring and supplementing workshop documentation;
- making and reading technical - workshop drawings and other technical documentation;
- creation of simple technical documentation with the help of software;
- work in a team, communicate with colleagues and superiors;
- active participation in ensuring healthy and safe work;
- communication using professional terminology in the field of ICT technologies;
- design, preparation and archiving of basic documents according to the instructions;
- searching for data on the Internet and communicating via e-mail;
- separate metallic and non-metallic materials, correctly choose the material and processing process according to the requirements of the product;
- use of appropriate measuring devices for performing technical measurements;
- preparation of the workplace, tools and devices;
- separate materials for making tools, to identify tools, to order tools;
- make simple machine parts using individual treatments;
- plan and organize his/her work;
- use technical and technological documentation and appropriate professional terminology;
- determine the procedure for the manufacture of the desired product or semi-product;
- determine the sequence of processing or manufacturing processes;
- prepare the workplace, work equipment, tools and materials in the workshop;
- determine and set machining parameters on classic cutting machines and manufacture products;
- machine or work process management;
- monitor the operation of the machine or production line and change the parameters of the work process;
- make a product on a conventional and CNC machine;
- create a program for simple 2-D shapes of workpieces with the help of a computer and simulate the machining process on a computer;
- manufacture and control products, change and correct cutting tools according to the required dimensions and tolerances of the product;
- take care of the economical use of materials, tools and energy sources;
- eliminate disturbances in the work process;
- find and eliminate any error in the operation of the controller or system;
- intervene in the process of operation of machines, set operating parameters to the requirements of safe operation and quality processing;
- control the quality of work in accordance with the standards and regulations;
- make tool components;
- assemble and test tools;
- install, set and direct the measuring and control elements of the tool assembly.