WorldSkills Occupational Standards (WSOS)

General notes on the WSOS

The WSOS specifies the knowledge, understanding, and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSOS).

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WorldSkills Occupational Standards

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The individual needs to know and understand:

- The scope and limits of the workshop and the workspace
- Standards for the environment, safety, hygiene, and prevention of accidents
- Safety equipment (how to use, when to use, etc.)
- Different types of energy supplies for the CNC Lathe (electric, hydraulic, pneumatic)
- Basic Machine maintenance (Coolant-Maintenance, Machine-Lubrication, settings etc.)
- Machine Accessories such clamping devices, tailstock, part-catching devices, etc.
- The use and care of the available computer operating systems
- Programming, setting operating of CNC lathe with live tooling
- CNC-programming Systems (Din-ISO (G-Code writing), CAM software)
- Principles of technical design and process planning
- Mathematics, especially calculations in trigonometry
- Principles of cutting- and chip-removal technology
- The importance of effective communications and teamwork
- The importance of machinery-handbooks, datasheets, and tables
- The calibration, accuracy and use of measurement- and gauging tools

The individual shall be able to:

- Organize the workspace for optimal safety and performance
- Check the condition and functionality of the workspace, equipment, tools and materials
- Interpret and apply quality standards and regulations
- Promote and apply health and safety regulations and best practice
- Set up and operate CNC lathes safely
- Use computer related professional software effectively
- Consistently apply mathematical and geometrical principles for the programming processes of CNC Turning
- Select and apply appropriate cutting technology for the provided material, equipment and cutting tools
- Interpret and apply manufacturers' instructions
- Find appropriate data in a handbook, tables, or charts
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The individual needs to know and understand:
- ISO E and/or ISO A (European and American) drawing representation
- Technical terms and symbols used in drawings and plans
- Standards, symbols, and tables
- Technical data sheets
- Drawing legends

The individual shall be able to:
- Interpret engineering drawings and follow specifications
- Locate and identify dimensions of features
- Locate and identify surface finish requirements
- Locate and identify geometric specifications
- Make 3D mental representations of the parts
- Identify the materials that parts are made of
- Identify critical sequences (with a high possibility of damage or unsafe practice)

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The individual needs to know and understand:
- The importance of good planning for reliable machining operation
- Successful timing of the selected sequences
- Identification of critical sections
- How material, tools and machine accessories will react in different cutting processes
- How material and clamping devices will react in the clamping process
- Methods of work holding techniques
- Methods to avoid crash or collision for the selected sequences
- The identification of work piece-features and the appropriate machining and measuring processes
## Section

The individual shall be able to:

- Imagine solutions with reference to the capacities of the workshop environment and the required work (size of batch, complexity)
- Identify the features of work pieces and the appropriate machining and measuring processes
- Identify and prepare the best work holding methods
- Identify, prepare, and calibrate the correct measuring tools
- Identify and prepare the correct cutting tools
- Identify critical sections (with a high possibility of damage or unsafe practice) and consider alternatives
- Imagine innovative ways of using the environment to solve technical issues
- Check if the potential solutions will be reliable until the end of the process
- Weigh each solution and choose the best (considering speed, safety, and price)
- Make a final choice and lock the strategy
- Plan the operations and sequences (machining strategy) based on specified data
- Create awareness actions for critical operations where no alternative is available

| 4 Programming | 10 |

The individual needs to know and understand:

- CNC Programming as the creation of a logical process plan
- Different methods and techniques to generate programs (manual, CAM etc.)
- CAM system programming and the techniques of tool-modelling and profile drawing
- Cutting effects on temperature, bending, force etc.
- Geometric complex constructions in work piece design
- Work holding devices
- Tool holding devices
- Machine-accessories
- How to select the cutting tools for machining the required materials and operations
- Mathematics (especially trigonometry)
- Speeds and feeds for different materials and tools and work holding devices
- How to choose the correct postprocessors
- Generating G-Code
- Dialoguing with the CNC Lathe
- How to use canned cycles to program work piece features (classic turning features as well as driven-tool features)
## Section

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The individual shall be able to:
- Select the best methods according to the production type and part specification
- Use skill specific software and related hardware
- Generate programs using CAD/CAM systems
- Create CNC programs using the provided drawings and software
- Create or edit programs directly on the control (without CAD/CAM)

### 5 Metrology

The individual needs to know and understand:
- Chip removal behaviour of provided materials and tools
- Temperature behaviour of provided materials, tools, and accessories
- Effects of cutting forces on material, tools, and accessories
- The range of tools and gauging instruments and their applications
- How temperature may influence measurements

The individual shall be able to:
- Select appropriate measuring- or gauging instruments
- Calibrate measuring tools
- Use selected tools to make measurements on all components on drawings
- The properties, uses, and handling of ferrous and non-ferrous materials

### 6 Setting and operating CNC lathe

The individual needs to know and understand:
- The different steps that lead to the setup of the machine
- The different modes of machine operation
- The power up sequence
- How to initialize CNC lathes
- How to manipulate CNC lathes
- Mounting tools and setting tool parameters
- How to modify clamping devices, such as jaws, etc.
- How to transfer a CNC program to a CNC lathe, using provided software, cable, memory devices, or wireless technology
- How to test a programme, simulate, do a dry run etc.
- How to clamp a part correctly, and safely
- How to set a work shift and offset system
- How to run a programme safely
- How to stop and restart cycles
- How to make an emergency stop
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