



# **Unit of learning outcomes for basic qualification in metal industry**

**No. 1**

**Basics of manual metal processing using  
simple machine production techniques**

**May 2011**



## Unit of Learning Outcomes – Unit No. 1

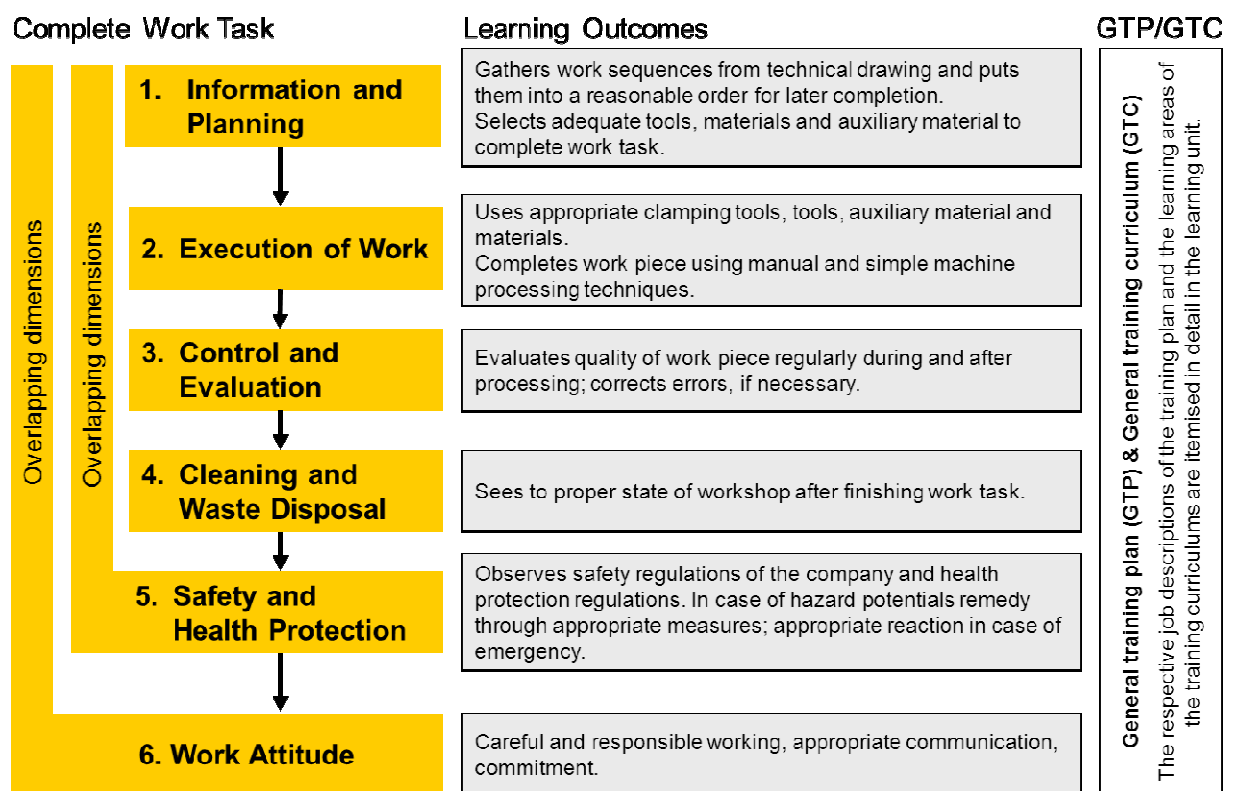
### Prevocational Training in Metal Working with Test Criteria

Title	Basics of manual metal processing using simple machine production techniques
Respective qualified jobs and credits to be scored (in relation to entire training). (calculation based on 60 points per year)	<p>Industrial metal-working occupations (3,5 years) (plant mechanic, industrial mechanic, construction mechanic, tool mechanic, milling machine operator)</p> <p style="text-align: right;">(...) credit points</p> <p>Metal worker (3,5 years) (...) credit points Machinery and plant operator (2 years) (...) credit points</p>
Dual Vocational Training System	<p>The dual vocational training system combines part-time vocational school with practical work experience. The training in companies and vocational schools is based on the general training plan and the general training curriculum so that uniform national qualification standards are guaranteed.</p> <p>The dual vocational training system sees itself as a holistic system in which the vocational education has to place the skills, knowledge and competences (vocational actionability), which are essential for the exercise of a qualified vocational operation in a changing working environment (See: Vocational Training Act Section 1, Paras. 3).</p>
General training plan	Legal basis for the training in companies according to respective job
General training curriculum	Legal basis for the education in vocational schools according to respective job
Prevocational training	<p>Training preparation is an integral part of the vocational training (see: Vocational Training Act).</p> <p>Training modules used in schemes to prepare individuals for vocational education and training contain parts of the vocational training offered for recognized occupations.</p> <p>The “unit of learning outcome” is one of four units which are illustrating the first year of apprenticeship of the occupations above.</p>
Brief description of learning outcomes	<p>The trainees are able to plan and execute an entire work task. Based on a technical drawing they determine the task and plan the work process with the help of a work schedule. They prepare the task consisting of theoretical and practical basics of processing techniques and materials science as well as of manual and of simple machine production procedures, and then complete the task. They control the result, and clean up. They observe the basic aspects of work-, health- and environmental protection.</p>

## Outline of unit of learning outcomes

The following figure shows the sequences of a complete work task including information and planning, execution of the task, control and evaluation as well as cleaning up the workplace and waste disposal. One dimension that concerns all work sequences is the observation of safety instructions and health protection regulations. Another overlapping dimension is the work attitude as prerequisite for a successful execution of a work assignment. Learning outcomes as well as occupational profile positions of the general training plan and the general training curriculum are allocated to each work sequence.

### Learning Unit No. 1: Basics of manual metal processing



Learning Unit No. 1: Basics of manual metal processing

Complete Work Task	Learning Objectives	STP 67C
1. Information and Planning	Gathers work sequences from technical drawing and puts them into a reasonable order for later completion. Selects adequate tools, materials and auxiliary material to complete work task.	<b>General training plan (GTP) &amp; General training curriculum (GTC)</b> The respective job descriptions of the training job and the learning units for the training curriculum are dimensioned in the training plan.
2. Execution of Work	Uses appropriate clamping tools, tools, auxiliary material and materials. Completes work piece using manual and simple machine processing techniques.	
3. Control and Evaluation	Evaluates quality of work piece regularly during and after processing; corrects errors, if necessary.	
4. Cleaning and Waste Disposal	Sees to proper state of workshop after finishing work task.	
5. Safety and Health Protection	Observes safety regulations of the company and health protection regulations. In case of hazard potentials remedy through appropriate measures, appropriate reaction in case of emergency.	
6. Work Attitude	Careful and responsible working, appropriate communication, commitment.	

**1. Information and Planning**

Gathers work sequences from technical drawing and puts them into a reasonable order for later completion.

Selects adequate tools, materials and auxiliary materials to complete work task.

Learning outcome: Gathering work sequences from the technical drawing and putting them into a reasonable order for later completion.

#### EQF-Dimensions

<b>Knowledge</b>	Knows and is able to name the major drawing practice standards, drawing instruments
<b>Skills</b>	Gathers all relevant information for processing from technical drawings and sketches. Care: handles drawings with care. Communication: in case of uncertainty: asks appropriate (clarification questions) and adequate (choice of language) questions; listens attentively
<b>Competences</b>	Plans the work sequences according to information gathered from the technical drawing and puts them into a reasonable order. <sup>1</sup> Care: pays attention during the planning process to the work sequences being complete.
<b>Training plan and training curriculum</b>	Industrial metal-working occupations: 5b, 6c, LF 1; metal worker: 5b-c, 6a, LF 1; machinery and plant operator: 6a-b, 7a, LF 1 of industrial metal -working occupations;
<b>Test criteria</b>	Preparation of a work schedule with the help of a technical drawing

Learning outcome: gathering work sequences from the technical drawing and putting them into a reasonable order for later completion.

#### EQF-Dimensions

<b>Knowledge</b>	Names materials and auxiliary materials as well as their properties and fields of application from the title block of the technical drawing. Assigns materials and auxiliary materials according to their properties to fields of application.
<b>Skills</b>	/
<b>Training plan and training curriculum</b>	Industrial metal-working occupations: 7a-b; LF 1; metal worker: 6c, LF 1; machinery and plant operator: 5a-b, 7b; LF 1 of industrial metal -working occupations.
<b>Test criteria</b>	Naming 3 different kinds of metal and one specific property for each of them. Ascribing 5 auxiliary materials and three kinds of energy.

<sup>1</sup> The execution of a complete work task implies work attitudes that are generally called "social and personal competences". The companies consider them as prerequisite for an apprenticeship. The "unit of learning outcomes" lists them under "work attitude" (sequence no. 6). Furthermore, they are mentioned in the respective sequences of the work task in order to show at what point they are especially relevant. The draft of the German National Qualification Framework (G-NQF/GQF) mentions, apart from knowledge and skills, also social competence and self competence.

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Complete Work Task	Learning Outcomes	STP67C
1. Information and Planning	Gathers work sequences from technical drawing and puts them into a reasonable order for later completion. Selects adequate tools, materials and auxiliary material to complete work task.	<b>General training plan (TP) 1: General training curriculum (TC)</b> The respective job descriptions of the training plan and the learning areas of the learning curriculum are introduced in detail in the learning plan.
2. Execution of Work	Uses appropriate clamping tools, tools, auxiliary material and materials. Completes work piece using manual and simple machine processing techniques.	
3. Control and Evaluation	Evaluates quality of work piece regularly during and after processing; corrects errors, if necessary.	
4. Cleaning and Waste Disposal	Sees to proper state of workshop after finishing work task.	
5. Safety and Health Protection	Observes safety regulations of the company and health protection regulations. In case of hazard potentials remedy through appropriate measures, appropriate reaction in case of emergency.	
6. Work Attitude	Careful and responsible working; appropriate communication, commitment.	

Gathers work sequences from technical drawing and puts them into a reasonable order for later completion.

**Selects adequate tools, materials and auxiliary materials to complete work task.**

**1. Information and Planning**

Learning outcome: selecting appropriate tools, materials and auxiliary material to complete work task.

**EQF-Dimensions**

<b>Knowledge</b>	Names the major groups of manufacturing method: primary shaping, metal forming, cutting, joining, coating and changing of substance property. Names tools, materials and products, the relation between cutting edge geometry, materials and tools, as well as procedures of manual processing.
<b>Skills</b>	/
<b>Competences</b>	Evaluates and selects appropriate tools, materials and auxiliary material subject to procedures and materials. Communication: in case of uncertainty: asks appropriate (for clarification) and adequate (choice of language) questions; listens attentively. Makes arrangements with colleagues to co-ordinate use of materials and machines.
<b>Training plan and training curriculum</b>	Industrial metal-working occupations: 6a-b, 6l, LF 1; metal worker: 6b, 10a, LF 1; machinery and plant operator: 7b, 9a, LF 1 of industrial metal -working occupations.
<b>Test criteria</b>	Naming four major groups of manufacturing methods with one example for each. Naming edges and faces at cutting wedge and explaining relation to material (solid vs. soft). Technical naming of tools and work equipment. Selecting all necessary tools based on technical drawing. Selecting all necessary auxiliary materials based on technical drawing.

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Competence Work Task	Learning Outcomes	OTF 67C
1. Information and Planning	Gathers work sequences from technical drawing and puts them into a reasonable order for later completion. Selects adequate tools, materials and auxiliary material to complete work task.	<b>OTF 67C</b> <b>General training (GTP) &amp; General training curriculum (GTC)</b> The respective job descriptions of the training plan and the learning objectives of the training curriculum are determined in detail in the training plan.
2. Execution of Work	Uses appropriate clamping tools, tools, auxiliary material and materials. Completes work piece using manual and simple machine processing techniques.	
3. Control and Evaluation	Evaluates quality of work piece regularly during and after processing; corrects errors, if necessary.	
4. Cleaning and Waste Disposal	Sees to proper state of workshop after finishing work task.	
5. Safety and Health Protection	Observes safety regulations of the company and health protection regulations. In case of hazard potentials remedy through appropriate measures; appropriate reaction in case of emergency.	
6. Work Attitude	Careful and responsible working, appropriate communication, commitment.	

Uses appropriate clamping tools, tools, auxiliary material and materials. Completes work piece using manual and simple machine processing techniques.

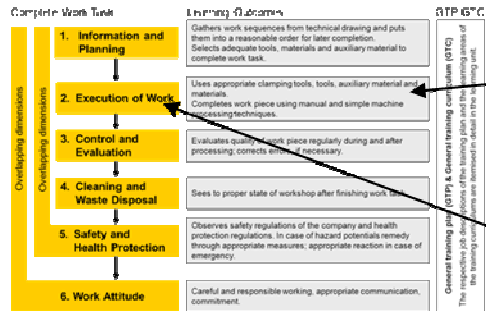
**2. Execution of Work**

Learning outcome: Using appropriate clamping tools, tools, auxiliary material and materials.

**EQF-Dimensions**

<b>Knowledge</b>	Names regular clamping tools and respective fields of application.
<b>Skills</b>	Aligns work pieces and tools and clamps them according to material. Sense of responsibility: works carefully during aligning and clamping process. Care: handles material and clamping tools carefully.
<b>Competences</b>	Evaluates clamping tools according to work assignment, material, tools and safety regulations; and selects them respectively.
<b>Training plan and training curriculum</b>	Industrial metal-working occupations: 8b, LF 1; metal worker: 10a, LF 1; machinery and plant operator: 9a, LF 1 of industrial metal -working occupations.
<b>Test criteria</b>	Naming three clamping tools and respective fields of application. Reasonable and secure clamping of work pieces and tools according to work sequences. Selection of appropriate tools, auxiliary material and clamping tools.

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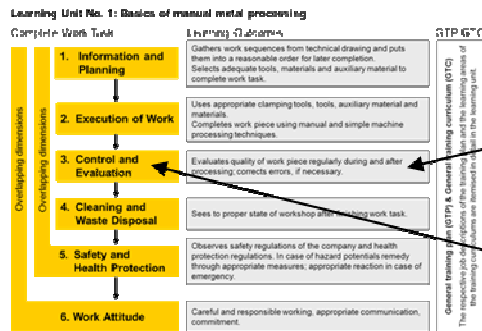
**2. Execution of Work**

Uses appropriate clamping tools, tools, auxiliary material and materials.  
Completes work piece using manual and simple machine processing techniques.

Learning outcome: Completing work piece using manual and simple machine processing techniques.

**EQF-Dimensions**

<b>Knowledge</b>	Names relevant machine parameter for simple machine processing.
<b>Skills</b>	<p>Uses tools securely, properly and according to procedure, subject to respective work sequences and requirements (drawing).</p> <p>Completes work piece using manual and simple machine processing techniques according to assignment and time schedule.</p> <p>Commitment: works steadily.</p>
<b>Competences</b>	<p>Checks proper condition of tools, auxiliary material and materials regularly and, if necessary, makes corrections.</p> <p>Resource-oriented use of tools, auxiliary material and materials.</p> <p>Care: handles tools, auxiliary material and material carefully.</p> <p>Sense of responsibility: evaluates what precautions must be taken while working with tools and machines.</p>
<b>Training plan and training curriculum</b>	Industrial metal-working occupations: 4c, 8a, 8c-e, LF 1; metal worker: 10b-f, LF 1; machinery and plant operator: 9b-c, LF 1 of industrial metal -working occupations.
<b>Test criteria</b>	<p>Completing work sample using at least three manufacturing methods of the major groups of primary shaping, cutting and/or joining.</p> <p>Completing work sample according to the usual and fixed tolerance values and fits (e.g. filing +/- 0.1 mm, fits etc.).</p> <p>Observing sequences of processing.</p> <p>Regular checking of proper state of tools, machines, auxiliary material and materials; if necessary, autonomous corrections.</p>



Evaluates quality of work piece regularly during and after processing; corrects errors, if necessary.

**3. Control and Evaluation**

Learning outcome: Evaluating quality of work piece regularly during and after processing; correcting errors, if necessary.

**EQF-Dimensions**

<b>Knowledge</b>	Names major test procedures / mediums to evaluate form errors and measures.
<b>Skills</b>	Considers major reasons for measurement errors. Uses appropriate test mediums to check required quality of the work piece.
<b>Competences</b>	Evaluates regularly the results of the work sequences by application of appropriate test mediums and corrects errors according to requirements. Care: handles test mediums with care.
<b>Training plan and training curriculum</b>	Industrial metal-working occupations: 6k, LF 1; metal worker 7a, 8a-f, LF 1; machinery and plant operator 8a-b, LF 1 of industrial metal -working occupations.
<b>Test criteria</b>	Naming two measuring instruments and two gauges. Naming two reasons for measurement errors. Correct application of appropriate test mediums. Regular checking by application of test procedures during work process, and correction of measurement errors. Evaluation of final result.



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Complete With Title	LEARNING OUTCOMES	STP 6-7C
1. Information and Planning	Gathers work sequences from technical drawing and puts them into a reasonable order for later completion. Selects adequate tools, materials and auxiliary material to complete work task.	<p>General training competences (GTC): The respective job descriptions of the learning plan and the learning areas of the learning curriculum are detailed in detail in the learning unit.</p> <p>General knowledge (GTP): General training competences (GTC): The respective job descriptions of the learning plan and the learning areas of the learning curriculum are detailed in detail in the learning unit.</p>
2. Execution of Work	Uses appropriate clamping tools, tools, auxiliary material and materials. Completes work piece using manual and simple machine processing techniques.	
3. Control and Evaluation	Evaluates quality of work piece regularly during and after processing, corrects errors, if necessary.	
4. Cleaning and Waste Disposal	Sees to proper state of workshop after finishing work task.	
5. Safety and Health Protection	Observes safety regulations of the company and health protection regulations. In case of hazard potentials remedy through appropriate measures, appropriate reaction in case of emergency.	
6. Work Attitude	Careful and responsible working, appropriate communication, commitment.	

Sees to proper state of workshop after finishing work task.

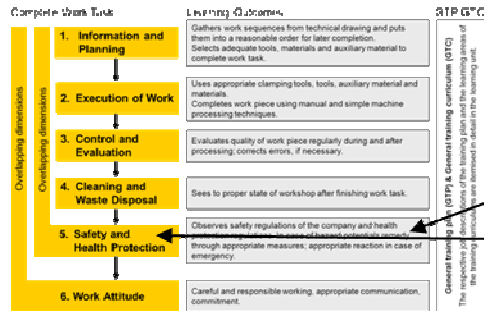
4. Cleaning and Waste Disposal

Learning outcome: Seeing to proper state of workshop after finishing work task.

EQF-Dimensions

<b>Knowledge</b>	Names the possibilities and regulations for safe and environmentally correct disposal on the premises, the storage system, workshop rules as well as basics of health-, work- and environment protection
<b>Skills</b>	Disposal of remains of (auxiliary) materials. Stows away tools, materials, products according to storage system of the workshop. Carefully cleans up the workplace according to health-, work- and environment regulations as well as of workshop rules.
<b>Competences</b>	Checks and evaluates the orderliness of workplace and workshop, makes corrections independently or upon consultation.
<b>Training plan and training curriculum</b>	Industrial metal-working occupations: 4b, 4d, LF 1; metal worker: 4b, 4d, 12a-b, LF 1; machinery and plant operator: 4b, 4d, 12b, LF 1
<b>Test criteria</b>	Naming of internal facilities for disposal of waste and hazardous material. Cleaning up workplace by using appropriate instruments and auxiliary material. Cleaning of tools and, in some cases, machines; proper stowing away of tools. Final evaluation of cleaning up and corrections, if necessary.

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**5. Safety and Health Protection**

Observes safety regulations of the company and health protection regulations. In case of hazard potentials remedy through appropriate measures; appropriate reaction in case of emergency.

Learning outcomes: Observing safety regulations of the company and health protection regulations. In case of hazard potentials remedy through appropriate measures; appropriate reaction in case of emergency.

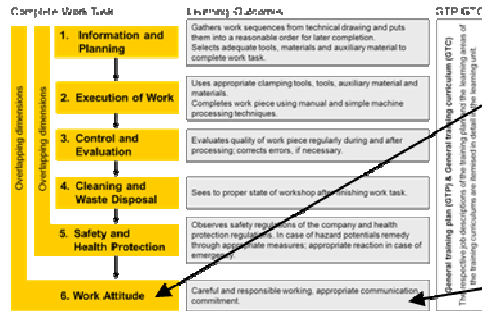
**EQF-Dimensions**

<b>Knowledge</b>	Names required reactions and measures in case of accidents Names safety regulations corresponding to work assignment: uses required personal protection equipment, observes safety signs. Observes health protection regulations.
<b>Skills</b>	Based on common hazardous situations identifies hazard potentials and takes immediate remedial action. Applies safety regulations corresponding to work assignment: uses required personal protection equipment, observes safety signs. Adapts workplace subject to ergonomic requirements and work assignment. Keeps his / her workplace in order.
<b>Competences</b>	/

**Training plan and training curriculum** Industrial metal-working occupations: 3a-e, 6a, LF 1; metal worker: 3a-d, LF 1; machinery and plant operator: 3a-d, 7c, LF 1 of industrial metal-working occupations.

**Test criteria** Naming four parts of personal protection equipment.  
Explaining five relevant safety signs.  
Naming three measures and/or steps to be taken in case of accidents.  
Taking appropriate measures or behaviour for health protection and safety; orderly state of workplace.

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**6. Work Attitude**

Careful and responsible working, appropriate communication; commitment.

Learning outcomes: Careful and responsible working, appropriate communication; commitment.

**Features of work attitude and personality**

<b>Sense of responsibility</b>	Works carefully while clamping. Considers required safety measures for use of tools and machines.
<b>Carefulness</b>	Minds completeness of each work sequence during planning process. Handles drawings, tools, machines and materials carefully and selects them respectively. Works carefully and accurate.
<b>Appropriate, target-oriented communication</b>	Asks appropriate and proper questions in case of uncertainties, listens attentively. Makes arrangement with colleagues to co-ordinate use of materials and machines.
<b>Commitment</b>	Works steadily on the work assignment.
<b>Training plan and training curriculum</b>	No reference.
<b>Test criteria</b>	Selection and application of required safety measures for working with tools and machines. Selection and careful handling of appropriate tools, machines and materials. Comprehensible questions in case of uncertainties. Making arrangements with colleagues to co-ordinate use of materials and machines. Continuous working on the work piece. Producing a work piece accurate to measurement.