

General Mechanics

Module M 01 Basic Training Metal Works			256 h
Evaluation criteria Trainees are able to read and interpret drawings as per ISO Trainees manufacture workpieces according to technical drawings within the required tolerances and the allowed time			
Capacity 2: Manufacture of metal workpieces by manual working techniques according to technical drawing Capacity 1: Reading and interpreting technical drawings Capacity 3: Producing simple technical drawings and lists of items	Content 2: marking out, chiselling, filing Content 1: types of technical drawings, 3-view drawing, isometric view, diametric views Content 3: use of drawing instruments, use of mini drawing board	32 h	
Technology	Technical Communication	Technical Mathematics	Week
Distinguish between metals and non-metals according to properties and requirements. Classification of light metals and heavy metals. Describe and explain the crystalline structure of metals.	Comprehension of the relevance of technical communication with respect to production planning and production. Conventions in technical drawing: fonts, line types and drawing layout.	Repetition of the basic mathematical operations. SI quantities and units of measurements	1
Computer Applications	Workshop Practice	Laboratory Exercises	
Observing the rules in the computer lab. Acquiring basic knowledge in the use of hardware and software. Creating files and folders, erasing of files and folders.	Picking up the trainees from their scope of experience to support understanding. Observing the rules in the training workshop. Paying attention to work safety. Getting familiar with the bench workplace. Getting familiar with the bench tools and the vise.	Recognising dangers at the workplace and explaining measures to avoid accidents Describing and exercising of first aid measures Identifying materials by simple workshop methods and classifying them. Exercising of waste disposal as per the environmental regulations.	

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Capacity 4: Planning the work sequence for given jobs Capacity 6: Calculating length of workpieces, surface areas, volumes and mass	Content 4: Working out the production plan Content 6: Units of length, metric system and imperial system, area and volume and its conversion		32 h
Technology	Technical Communication	Technical Mathematics	Week
From the iron ore to steel – manufacturing processes for cast iron and steel.	Elaboration of the production plan for given jobs. Filling in the title block of technical drawings according to standard. Drawing of basic geometric constructions. Drawing of flat workpieces in front view and dimensioning according to ISO standards. General dimensioning tolerances as per ISO standards	Calculation of length of parts. Calculation of subdivisions and centre distances of holes. Calculation of circumference of circles. Calculation of composite length of bent workpieces.	2
Computer Applications	Workshop Practice	Laboratory Exercises	
Introduction to text processing in Word. Formating, highlighting, fonts and sizes of letters. Saving text, copying, pasting and erasing.	Planning the production process according to the specifications and identifying and providing the tools required for the job. Marking out and stamping of metal parts. Sawing metal parts with the hacksaw. Use of the steel rule and the marking gauge.	Identifying and recording properties of materials by simple material testing methods such as bending back and forth, judgement by sight, spark testing, inspection of the appearance of the surface area. Testing the malleability by hammering metal parts.	

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Capacity 2: Manufacture of metal workpieces by manual working techniques according to technical drawing Capacity 5: Selecting suitable measuring instruments for given jobs Capacity 3: Producing simple technical drawings and lists of items	Content 2: Filing of work pieces according to accurate dimensions and shape as per technical drawing Content 5: Use of the steel rule, bevel protractor, measuring tape and the vernier calliper Content 3: Use of drawing instruments		32 h
Technology	Technical Communication	Technical Mathematics	Week
Explaining the principle of the vernier scale. Identifying the different types of vernier callipers. Reading of measurements with the vernier calliper. Identifying the angles on the cutting edge. Wedge angle, clearance angle and rake angle and its influence on the cutting process.	Introduction to projection methods: First angle and third angle projection. Drawing of a simple workpiece in the first angle projection. Dimensioning according to ISO standards.	Units of surface area and its conversion. Calculation of the surface area of rectangular, angular and round items. Calculation of the surface area of composite areas.	3
Computer Applications	Workshop Practice	Laboratory Exercises	
Exercising with the text processing software. Writing the curriculum vitae in Word.	Distinguishing files by shape and cut. Determining the angles on the file tooth. Selecting files according to the given job. Filing workpieces to measurement and shape according to specifications. Inspecting of the workpiece for size, flatness, angularity and parallelism.	Identifying and recording the magnitude of cutting force at different wedge angles.	

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Capacity 2: Manufacture of metal workpieces by manual working techniques according to technical drawing Capacity 1: Reading and interpreting technical drawings Capacity 9: Realizing the significance of national and international standards	Content 1: Centre punching, centre drilling, drilling Content 2: Drawing standards as per ISO Content 9: Use of technical tables		32 h
Technology	Technical Communication	Technical Mathematics	Week
Describing the drilling process and its motions: Circular cutting motion and linear feed. Types and construction of the twist drill. Sources of accidents and safety measures in drilling. Use of the technical tables to determine cutting speed and feed.	Drawing of workpieces in 3-views with hidden lines. Dimensioning of the workpiece as per ISO standard. Use of the technical tables to understand different drawing standards.	Units of volume and its conversion. Calculation of the volume of bodies such as: Cube, square prism, cylinder, cone and pyramid Volume calculation with mathematical formulas found in the technical tables.	4
Computer Applications	Workshop Practice	Laboratory Exercises	
Designing tables with the word software	Marking out of centres of holes and punching with the centre punch. Pre-drilling with the centre drill. Drilling holes in metal workpieces. Determination of the cutting angles with the help of the technical tables. Off-hand re-sharpening of twist drills. Adhering to the safety rules on drilling	Analysing the cutting conditions on drilling with varying angles of point.	

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Capacity 2: Manufacture of metal workpieces by manual working techniques according to technical drawing Capacity 3: Producing simple technical drawings and lists of items		Content 2: Countersinking and reaming Content 3: 3-view technical drawings	32 h
Technology	Technical Communication	Technical Mathematics	Week
Identifying of countersinking tools for counter-boring, countersinking and spotfacing. Decribing the construction of countersinking tools. Identifying of different types of reamers and its construction.	Drawing of workpieces with holes, counterbores and countersinks. Dimensioning of holes and countersinks.	Mass and density of materials and its units. Calculation of the mass of bodies.	5
Computer Applications	Workshop Practice	Laboratory Exercises	
Working with tables – Design of a production planning sheet	Production of counterbores and countersinks to accommodate bolt heads. Reaming with hand reamer and machine reamer. Fitting of workpieces with bolts and dowel pins.	Analysing the errors in tool geometry on twist drills: lips with uneven angles, lips of different lengths, wrong angle of point, different clearance angles...	

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Capacity 2: Manufacture of metal workpieces by manual working techniques according to technical drawing		Content 2: joining methods	32 h
Capacity 3: Producing simple technical drawings and lists of items		Content 3: Drawing of threads according to ISO	
Technology	Technical Communication	Technical Mathematics	Week
Distinguishing between temporary and permanent joints. Different types of threads as per ISO: metric thread, imperial thread, trapezoidal thread, pipe thread, round thread, buttress thread. Fine threads and multiple threads.	Drawing of internal and external threads as per ISO. Graphic representation of forces.	Units of forces and its conversion. Calculation of the resulting force by graphic methods such as the parallelogram of forces.	6
Computer Applications	Workshop Practice	Laboratory Exercises	
Elaboration of a document for the work stages required to manufacture an internal thread manually. Embedding of graphics into the word document.	Determination of the diameter for pre-drilling the hole prior to tapping the thread. Tapping of threads manually. Manufacture of external threads with the threading die.	Determining the strength of threaded joints and fasteners.	

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Capacity 2: Manufacture of metal workpieces by manual working techniques according to technical drawing	Content 2: Screws, bolt, nuts, washers and screw locks	32 h	
Capacity 11: Working in a team to reach agreement and optimum results	Content 11: Communication methods		
Capacity 8 : Documenting the work sequence and the results of jobs	Content 8: Elaboration of assessment sheets		
Technology	Technical Communication	Technical Mathematics	Week
Distinguishing different types of threads and its applications. Distinguishing different types of screws, bolts, nuts and screw locks according to ISO standard, shape and property class. Describing the screw locks, its applications and locking principle.	Drawing of bolted workpieces according to ISO standard.	Calculation of the strength of bolted joints with the help of technical tables	7
Computer Applications	Workshop Practice	Laboratory Exercises	
Designing an assessment sheet for self-evaluation of workshop practice exercises.	Joining of workpieces by bolting, locking and dowelling. Self-evaluating of the results of jobs.	Testing of screw locks.	

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Capacity 7: Presenting the project results Capacity 10: Calculating the cost of manual jobs		Content 7: Visualisation methods such as posters, mind maps, transparencies.... Content 10: Material costs and labour costs	32 h
Technology	Technical Communication	Technical Mathematics	Week
Working in a team and presentation of a project applying visualisation methods.	An introduction to visualisation methods: Mind map, posters, transparencies and use of the OH-projector and the data projector.	Determining material costs and labour costs and calculating the cost of a workpiece.	8
Computer Applications	Workshop Practice	Laboratory Exercises	
Elaboration of a document for cost calculation of jobs.	Maintaining of workshop equipment, machines and tools.	Maintaining of workshop equipment, machines and tools.	