

FRAMEWORK CURRICULUM for the training occupation

Industrial mechanic

(Decision of the Standing Conference of 25.03.2004, Germany)

Industrial mechanic	Contents of the learning fields
1st year of training Learning field 1	Manufacturing of components with hand-held tools Time reference 80 hours
Formulating objectives The students prepare to make typical construction elements hand-held tools. To do so, they evaluate layout plans and simple technical drawings off. You create and modify part drawings and sketches for functional unit components and simple assemblies. Bills of material and work schedules are also with the help of application programs developed and supplemented. Based on the theoretical foundations of the technologies to be used, they are planning the steps with the required tools, materials, semi-finished products and tools. You determine the necessary technological data and perform the necessary calculations by. The students select, use and create the appropriate test equipment corresponding test protocols. In experiments, selected work steps are tested, the work results are evaluated and the results are evaluated Production costs calculated roughly. The students document and present the work results. They observe the regulations of labor and environmental protection.	
Contents <ul style="list-style-type: none">• part drawings, Group or assembly drawings• technical documentation and sources of information• functional specifications• production plans• ferrous and non-ferrous metals• properties of metallic materials• plastics• general tolerances• semi-finished and standard parts• bench tools, power tools• excipients• basics and methods of cutting and forming• check• material, labor and tool costs• mass of components, quantity calculation• presentation techniques• standardize	

Industrial mechanic	Contents of the learning fields
1st year of training Learning field 2	Manufacture of components with machines Time reference 80 hours
<p>Formulating objectives</p> <p>The pupils prepare the mechanical production of job-typical ones components. For this they evaluate group drawings, layout plans and parts lists. You also create and change part drawings and the corresponding work plans with help from application programs.</p> <p>They select materials according to their specific properties and arrange them product related to. They plan the production processes, determine the technological data and carry out the necessary calculations by.</p> <p>They understand the basic structure and the mode of action of the machines and select them as well as the corresponding tools, order-related and functional, technological and economic criteria and prepare the machines for use.</p> <p>The students develop assessment criteria, select test equipment and apply. They create and interpret test reports. They present the work results, optimize the work processes and develop alternatives.</p> <p>They use the modern media and presentation forms. In tests they test selected work steps as well as alternative possibilities and evaluate the work results. They know the influences of the manufacturing process on dimensions and surface quality. they sit down with the influences on the manufacturing process apart and take into account the meaning the product quality. They observe the regulations of labor and environmental protection.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • technical drawings and information sources • production plans • functional specifications • selection criteria for test equipment and applications • ISO tolerances • surface details • measurement error • drilling, countersinking, rubbing, milling, turning • functional units of machines and their mode of action • service life of tools • production data and their calculations • coolants and lubricants • basics of quality management • tool and machine costs, material consumption, working hours 	

Industrial mechanic	Contents of the learning fields
1st year of training	Production of simple assemblies
Learning field 3	Time reference 80 hours
Formulating objectives	
<p>The students prepare to produce simple assemblies. Read this they describe typical group and group drawings, layout plans and simple circuit diagrams and can describe and explain the functional relationships of the modules. You create and change part and group drawings as well as parts lists and apply Information from technical documentation. Also using tutorials plan simple controls and select the appropriate components.</p> <p>They describe the proper assembly of assemblies and compare installation suggestions also with the use of technical and English terms. Items become systematic and labeled as standard. The students use assembly instructions and develop assembly plans taking into account assembly aids and customer-specific conditions.</p> <p>They distinguish joining methods according to their principles of action and arrange them according to application to. They select the required tools, standard parts and devices product related and organize simple assembly work in a team.</p> <p>They develop test criteria for functional tests, create test plans and test protocols and document and present these. They evaluate test results, eliminate quality defects, optimize assembly processes and take into account their cost effectiveness. They observe the regulations of labor and environmental protection.</p>	
Contents	
<ul style="list-style-type: none"> • partial, group and total drawings, arrangement plans • technical information sources • functional specifications • BOM and assembly plans • installation guides • tools, devices • materials, additives and additives • basics of positive, positive and cohesive joining • standard parts • basics of quality management • functional test • force and torque calculations • basics of control technology • work organization 	

Industrial mechanic	Contents of the learning fields
1st year of training Learning field 4	Maintenance of technical systems Time reference 80 hours
<p>Formulating objectives</p> <p>The pupils prepare the maintenance of technical systems in particular of Resources and determine their operational readiness. They rate the Importance of this maintenance measure in terms of safety, availability and economy.</p> <p>You also read layout plans, maintenance plans and instructions in English. You plan maintenance work and determine the necessary tools and auxiliaries. They turn the basics of electrical engineering and control technology and explain simple circuit diagrams in different device techniques.</p> <p>They observe the regulations of labor and environmental protection. In doing so they take into account especially the safety regulations for electrical equipment. They measure and calculate electrical and physical quantities. They evaluate and discuss their work results and represent these.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • basic terms of maintenance • maintenance plans • schematics • operating instructions • business organization • causes of wear, causes of fault • lubricating and cooling lubricants, disposal • corrosion protection and anti-corrosion agent • functional test • maintenance and breakdown costs, consequences of failures • damage analysis • sizes in the electric circuit, Ohm's Law • electricity hazards, electrical safety • standards and regulations 	

Industrial mechanic	Contents of the learning fields
2nd year of training Learning field 5	Finishing of items with machine tools Time reference 80 hours
<p>Formulating objectives</p> <p>The students produce orders based on the working and working conditions Environmental protection Workpieces made of different materials on machine tools. They take group drawings, part drawings, sketches and parts lists necessary information. You also create and modify sketches and part drawings with help of application programs. The students choose technological aspects of suitable manufacturing processes. You decide whether before the cutting manufacturing process for changing material properties are carried out have to.</p> <p>You define necessary technological data and select the required ones excipients. For the selected manufacturing process you create work plans, choose clamping tools for workpieces and tools, and set up the machine for production.</p> <p>The students develop test plans based on the regulations for Quality management. They select test equipment, maintain and interpret test protocols. You document and present the work results, evaluate and develop them alternatives.</p> <p>They examine the influences of the manufacturing process on dimensions, surface quality and shape. They determine the production costs and assess the profitability of the selected ones manufacturing processes. The students justify their decisions and react appropriately criticism of her work.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • technical information sources • machining production processes • processing parameters • cutting materials • materials Standards • annealing • main usage time • coolants • test instructions • test equipment selection and monitoring • attributive and variable inspection characteristics • tolerances of shape and position 	

Industrial mechanic	Contents of the learning fields
2nd year of training Learning field 6	Install and start up control systems Time reference 60 hours
<p>Formulating objectives</p> <p>The students install control systems and take them in business. From schematics and other documentation, they are used for control in different device techniques to be used control technology components as well as the functional sequence. They use manufacturer documents, also in English language.</p> <p>The students plan and realize the structure of the control. you take the control system in consideration of the occupational safety in operation. You develop strategies for troubleshooting and optimization of the control technology systems and apply them.</p> <p>They also document and present their results using appropriate ones Application programs.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • technology scheme • pneumatic and hydraulic power parts • supply unit • sensors • material, energy, information flow • circuit diagrams • print media • pressures, forces, • speeds, volume flow • modes • plant safety 	

Industrial mechanic	Contents of the learning fields
2nd year of training Learning field 7	Mounting of technical subsystems Time reference 40 hours
Formulating objectives	
<p>The students are planning to install technical subsystems. With help of technical drawings, layout plans and parts lists they lead one Functional analysis by.</p> <p>They create assembly plans taking into account the functions and properties of the components. The students determine the parameters required for the assembly, select the necessary tools and aids and assemble the modules. You carry out the functional check and create test reports. They rate test results, optimize assembly processes and take into account their cost-effectiveness. They document and present the work results. They turn different forms of visualization.</p>	
Contents	
<ul style="list-style-type: none"> • axes and waves • bearings • rolling • guides • seals • friction, thermal expansion • shaft-hub-connections • surface pressure • strength characteristics of fit • fit systems 	

Industrial mechanic	Contents of the learning fields
2nd year of training Learning field 8	Finished on numerically controlled machine tools Time reference 60 hours
<p>Formulating objectives</p> <p>The students produce components through individual and series production numerically controlled machine tools. They read and create sketches and partial drawings and remove the necessary information for the CNC production.</p> <p>They determine the technological and geometric data for processing and create work and tool plans. The students plan the clamping for workpieces and tools and set up the machine tool. You also develop CNC programs through graphical programming procedures and check they through simulations.</p> <p>Using selected elements of quality management, they create test plans also with regard to series production. You select test equipment, evaluate the test results and on this basis optimize the manufacturing process by influences of manufacturing parameters on dimensions, surface quality and productivity account.</p> <p>They observe the regulations of occupational safety on CNC machines.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • coordinate Work plan, tool plan, setup sheet • structure and function of CNC machines • coordinate systems • reference points • geometry data • technology data • program structure • tool offsets • attributive and variable feature check 	

Industrial mechanic	Contents of the learning fields
2nd year of training Learning field 9	Repair of technical systems Time reference 40 hours
<p>Formulating objectives</p> <p>The students are repairing technical systems. they're planning repair measures for technical systems taking into account operational and economic demands. To do this, they procure the necessary technical information.</p> <p>The students dismantle subsystems into assemblies and components taking into account the respective interfaces and choose the required tools and aids. They analyze errors and document them. You determine the replacement components, plan the replacement and choose suitable supplies and supplies out. They replace the defective components and assemble the system. During repair, they decide if and which support from others specialist departments is necessary.</p> <p>The students check the function and prepare the acceptance. You plan the professional disposal of the defective parts and the consumed auxiliary materials. You apply the regulations on safety at work and environmental protection.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • total drawings • schematics • condition and failure-related repair • downtimes, downtime costs • wear reserve • wear • lubricants • troubleshooting • repair instructions • inspection reports • spare Parts Lists • disassembly / assembly plans • acceptance report 	

Industrial mechanic	Contents of the learning fields
3rd year of training Learning field 10	Manufacture and commissioning of technical systems Time reference 80 hours
<p>Formulating objectives</p> <p>The students make technical systems and put them into operation. Based on general drawings they describe functional relationships of components and assemblies. They accept change orders, make sketches carry out necessary calculations and select suitable manufacturing processes.</p> <p>The students choose components and assemblies according to function or default. You also plan the work process with consideration of ergonomic aspects. They determine mounting tools and assemble the items for mounting. The pupils decide if specialist departments should be consulted.</p> <p>They add subsystems to complete systems and put them into operation. The required Parameters are set, checked and documented. The students create instruction manuals. You log the transfer of the technical system the customers.</p> <p>The students observe the regulations of occupational safety and environmental protection as well as economic aspects.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • specifications • transmission • clutches • pump • electric motors • mechanical and electrical characteristics and characteristics • welding, gluing • hoists • striking loads • safety equipment • customer meeting 	

Industrial mechanic	Contents of the learning fields
3rd year of training Learning field 11	Monitor the product and process quality Time reference 60 hours
<p>Formulating objectives</p> <p>The students monitor the product and process quality and lead machine and process capability studies after order and instruction by. they're planning the execution, record process data and also evaluate the determined parameters help of graphics.</p> <p>They distinguish systematic from random variables and determine these for selected processes based on cause and effect relationships. The students apply statistical quality assurance procedures in the ongoing production also using application software. They document compliance the process and product quality according to customer specifications. They monitor the production process with methods of quality assurance in mass and series production. They take process characteristics for variable and attributive product characteristics auf and lead and interpret process control charts.</p> <p>They document the chronological course of a process and derive corrective measures from the quality data in the process. They present quality data, discuss consequences for the production process and secure the results.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • quality standards • statistical process regulation • control charts • cause and effect diagrams • machine capability indices • process capability indices • normal distribution • histograms • standard deviation, arithmetic mean, median, range • test instructions 	

Industrial mechanic	Contents of the learning fields
3rd year of training Learning field 12	Maintenance of technical systems Time reference 60 hours
<p>Formulating objectives</p> <p>The students maintain technical systems by taking improve availability and reliability planning and execution. You take sales orders for the maintenance of technical systems. They investigate systems for the causes of detected errors. They use it for that technical documents also in English. They delineate subsystems and determine the input and output variables.</p> <p>The students select suitable test methods and test equipment and apply these. From the cause of the error and the error rate they determine Vulnerabilities, analyze and evaluate them using appropriate methods also in terms of load and wear. They advise the customer regarding possible measures to improve and prepare the necessary documents and plans. The students get the necessary components, set the functionality of the technical system and document their results.</p> <p>After completing the maintenance, they hand over the technical system to the customer. They take into account economic and legal consequences of maintenance work and their influence on the quality requirements of the production and the product. They observe the regulations of labor and environmental protection.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • failure-related, condition-based and preventive maintenance • damage analysis • materials testing • heat treatment method • statistical error analysis • Pareto • estimates • downtime • maintenance costs • product liability in compliance with quality management 	

Industrial mechanic	Contents of the learning fields
3rd year of training Learning field 13	Ensuring the operability automated systems Time reference 80 hours
<p>Formulating objectives</p> <p>The students ensure the operability of automated systems. For this analyze automated systems using technical documentation also in English.</p> <p>For individual subsystems they develop taking into account the given process flow and the manufacturer's documentation Solutions for process optimization. To remedy malfunctions, they develop strategies for fault isolation, apply them and eliminate the mistakes taking into account economic aspects.</p> <p>The students modify, test, document and present systems their solutions. They take into account necessary occupational safety measures handling of manufacturing and handling systems. They assess the economic and social aspects of automation technology.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • electro-pneumatic and electro-hydraulic functional units • control regulation • programmable controllers modes • sequential function language, function module language • flexible handling systems • interfaces • maintenance rules • safety equipment 	

Industrial mechanic	Contents of the learning fields
4th year of training Learning field 14	Planning and implementation of Technical Systems Time reference 80 hours
<p>Formulating objectives</p> <p>The students plan and realize technical systems. They analyze project orders in terms of their feasibility and define the objectives. The pupils take over the project organization, document the project progress, analyze and evaluate the course and guide necessary measures on. They observe the requirements of quality management and thereby ensure quality of products and processes.</p> <p>They create documentation and present their results. They use current ones information and communication media. The students assess project results and action processes under learned organizational, technical, environmental and economic aspects.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • specifications • Work Breakdown Structure • Evaluation 	

Industrial mechanic	Contents of the learning fields
4th year of training Learning field 15	Optimizing technical systems Time reference 60 hours
<p>Formulating objectives</p> <p>The students optimize technical systems. They are investigating trouble-free operating systems and production processes with regard to optimization options in terms of ergonomics, health, environmental protection and economics.</p> <p>They elaborate suggestions for improvement also considering technological developments as well as new materials and supplies. The students present the suggestions that moderate the decision-making in working groups, appreciate the economic benefits and decide on a redirection of the optimization suggestions to the company suggestion system. You plan optimization measures and decide on your own responsibility execution. They document the work carried out.</p>	
<p>Contents</p> <ul style="list-style-type: none"> • labor organization • idea management • knowledge management 	