THEME Competence Matrix - Mechatronics

LT - Automatinių sistemų eksploatavimo mechatronikas / Mechatronic of the exploitation of the automated systems
NL - Eerste Monteur Mechatronica / Mechatronic fitter
FIN Kunnossapitoasentaja / Maintenance Fitter
FIN Automaatioasentaja - Sähköasentaja / Automation Assembler - Electrician

COMPETENCE AREAS	STEPS OF COMPETENCE DEVELOPMENT			
1. Maintaining and assuring the reliability of mechatronic systems.	He/She is able to perform the basic scheduled maintenance on mechatronic machines and systems and adhere to the equipment maintenance plans.	He/She is able to master the maintenance procedures for mechatronic systems such as the use of service documents and maintenance plans and, if faced with new challenges, is able to make the necessary adaptations.	He/She is able to use preventive maintenance to assure the trouble-free operation of mechatronic systems. In addition, he/she is able to modify operational sequences to implement quality-assurance measures.	He/She is able to develop the necessary procedures for maintenance of mechatronic devices and systems, and is able to schedule the maintenance and quality-assurance procedures.
2. Installing and dismantling mechatronic systems and facilities	He/She is able to use written instructions to install and dismantle individual components (e.g. sensors, actuators, drives, motors, transport systems, racks) that form a functional group of mechatronic systems.	He/She is able to master the selection of hardware and software for mechatronic systems (e.g. sensors, actuators, interfaces, communication procedures) and is able to provide and test simple programmable logic control programs (PLC) according to production process requirements.	He/She is able to provide independent mechatronic solutions for the construction of production lines, assure their overall ability to function, and, in addition, is able to use both existing and modified standard components.	
3. Installing and adjusting mechatronic components in systems and production lines	He/She is able to install and adjust mechatronic components (e.g. individual electro pneumatic standardized valves, sensor and actuator units).	He/She is able to install and adjust components of mechatronic subsystems (e.g. linear drives, measuring systems, transport drives, measuring systems, transport systems).	He/She is able to install and adjust complex mechatronic facilities that include diverse technologies and instrumentation and control (I&C) equipment, adjust the associated parameters, test the facilities overall functions and assure their reliability.	

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| 4. Designing, adapting, and building mechatronic systems and facilities on the basis of client needs and site plans | He/She is able to use machine tools controlled either manually or via a computer program to fabricate (according to production designs and customer requirements) the individual components for mechatronic systems. He/She is able to provide simple designs and descriptions of mechatronic subsystems and is able to use basic CAD applications. | He/She is able to build simple mechatronic subsystems by using engineering drawing and is able to install the devices according to specific production needs. He/She is able to act on extensive knowledge of standards and regulations (e.g., on surface treatments) and is able to use CAD's more advanced functions (e.g., interference check). | He/She is able to build mechatronic systems by using both, original construction techniques and previously signed parts. He/She is able to fully understand CAD functions and is able to document system developments (e.g. parts lists, descriptions of function, operating instructions). | He/She is able to design and build autonomous mechatronic subsystems and, with suitable measuring and testing facilities, is able to assess the necessary production accuracy. He/She is able to document the results with quality-control systems. | He/She is able to make independent adaptations to the various devices (including selection of drives, sensors, PLC) and is able to use CNC programs for building the system. He/She is able to assemble, through a digital mock up, and simulate the functioning system and use computer aided computations (e.g. FEM). He/She is able to perform cost-benefit analyses (e.g. as a basis for deciding whether components should be bought or individually constructed.) | He/She is able to develop independently complex mechatronic systems and is able to calculate the economic usefulness of the system. He/She is able to optimise CNC programs for the manufacturing of complex mechatronic devices and systems and monitor the automated quantity of an open loop control system. |

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5. Putting mechatronic systems into operation and providing clients with technical and economic support	He/She is able to put, according to specifications and blueprints, mechatronic devices into operation and provide support to the client in the hand-over phase.	He/She is able to put, after considering the enterprise's needs and basic conditions, the mechatronic systems into operation, create the necessary documentation, advise the customer on safe operations of the devices, and advise on future technology selection.	He/She is able to master, after considering all basic conditions, the start-up of interconnected mechatronic systems and machines, and is able to provide the necessary documentation including a manual. He/She is able to review client needs and configure machines that provide solutions. He/She is able to train the customer where necessary and provide support for safety operating procedures.	He/She is able to evaluate customer requirements for mechatronic facilities, develop solutions, and is able to plan the system's implementation and operation.	He/She is able to direct, including scheduling and time management, the start-up of the project from the creation of a proposal to the client's acceptance.

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6. Supervising and evaluating both the process sequences of mechatronic systems and facilities and the operational sequence (including quality assurance)	He/She is able to supervise process sequences according to specifications as well as implement any requested quality control measures.	He/She is able to supervise independently the process sequences, evaluate the results, operate an accompanying statistical process control (SPC) for the quality control plan, and prepare simple work schedules, including production schedule and time management.	He/She is able to operate and supervise mechatronic facilities, choose testing and monitoring plans, set up the accompanying SPC, seek the optimal results of the production line according to material flow, and provide work schedules including standard production times.	He/She is able to master the monitoring of complex mechatronic systems using virtual instruments and PPS systems as well as open loop control for the optimisation of machinery arrangement, material flow analysis, and scheduling.	He/She is able to optimise the process cycles of mechatronic production lines, provide instructions on modifying the PPS systems (e.g. adjustment to SAP systems) and introduce quality systems for continuous improvement processes (CIP/KVP).
7. Installing, configuring, programming and testing hardware and software components for control and regulation of mechatronic systems and facilities	He/She is able to install and configure programs for hardware and software components as well as set up simple programmable logic control programs (PLC).	He/She is able to master the selection of hardware and software for mechatronic systems (e.g. sensors, actuators, interfaces, communication procedures) and is able to provide and test simple programmable logic control programs (PLC) according to production process requirements.	He/She is able to integrate and configure program-, control- and regulation mechanisms in mechatronic systems, program simple devices (in co-operation with developers), and simulate the program sequence before start-up.	He/She is able to develop, test, and configure hardware and software solutions for networked mechatronic systems, and is able to monitor system conditions with suitable measuring and visualisation tools.	

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8. Preparing and distributing the technical information for adjustment of each enterprise's mechatronic systems	He/She is able to provide descriptions and designs of mechatronic subsystems and is familiar with the basic CAD applications.	He/She is able to fully understand the management of technical information documents for mechatronic systems and is able to prepare and adapt these documents according to an enterprise's specific operating requirements.	He/She is able to analyse complex operational sequences separately in order to understand the connections and draw up maintenance and production procedures. He/She is able to understand that the system parameters are important for the equipments' functions and is able to independently assess and document the wear and general conditions of the mechatronic equipment.	
9. Diagnosing and repairing malfunctions with mechatronic systems and facilities, advising clients on avoiding malfunctions, and modifying and expanding mechatronic systems	He/She is able to diagnose and repair errors and malfunctions on the simple components and devices in the mechatronic systems. He/She is able to use the necessary checking, measuring and diagnostic tools.	He/She is able to correct independently problems in mechatronic production equipment with the help of (computer-aided) diagnostic systems and the use of expert systems, databases, and error documentations.	He/She is able to diagnose and repair errors and disturbances in complex mechatronic equipment and is able to advise clients on how to avoid sources of malfunctions through changes or upgrades in the equipment and system.	He/She is able to develop, through analyses of malfunctions in the mechatronic equipment, a monitoring and diagnostic system.

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