



## COMPETENCE MATRIX INTERNATIONAL SERVICE TECHNICIANS



Trasmettiamo  
valori e saperi ©



MAN Diesel & Turbo



**Leonardo da Vinci**  
istituto tecnico industriale



Via Peruzzi, 9 – Carpi (MO)  
Tel. +39 059 695241  
Fax + 39 059 643028  
Cod. Fisc. 81004250361



Lifelong  
Learning

**Website**

[servicetechnician.eu](http://servicetechnician.eu)

**Disclaimer**

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

# Competence Matrix

## “International Service Technicians”

### Introduction

The Competence Matrix displays work-related competence descriptions and the progress of competence development (steps of competence development) for “International Service Technicians”. The main aim of a Competence Matrix is to enhance the transparency of competences and qualifications and thus mutual understanding between different countries and different contexts and to compare qualifications with one another. The Competence Matrix for “International Service Technicians” was developed in the course of a Leonardo da Vinci-project with partners from 5 European countries; the matrix displays the competence requirements of “International Service Technicians” in the countries Italy, The Netherlands and Norway.

The vertical axis of the table contains the competence areas, based on the various core work tasks of an “International Service Technician”. These core work tasks are comprehensive tasks within the work context of an “International Service Technician” and are empirically derived (identified in the professional context and the educational systems of the respective countries). The horizontal axis shows the steps of competence development described in learning outcomes, which indicate the progress of competence development. Since an “International Service Technician” should have mechanical (e.g. reading and interpreting mechanical drawings) and at the same time electrical skills (e.g. writing and reading of switchboards, fixing failures, program PLC etc.) the Competence Matrix “Mechatronics” as developed in the course of the VQTS-project was used and adjusted to the core work tasks of an International Service Technician and extended by 5 new competence areas. When interpreting a Competence Matrix, one should consider that the description of a higher step of competence development always includes the previous step(s) of competence development.

A Competence Matrix can also be used to indicate Organisational Profiles. The Organisational Profile is formed from individual parts of the matrix and reflects the range and extent of competence development offered by a specific training programme in the field of “International Service Technicians”. An Organisational Profile shows the stages of competence development to be achieved in a specific training programme. By using an Organisational Profile, the competences acquired so far by a person in training can also be made visible (Individual Profile). An individual profile illustrates the stages of competence development already achieved by a person in a particular time. This procedure can be used as a starting point for training providers to communicate on the Organisational Profile of their own training programmes, to understand the training programmes in the partner countries and to identify communalities /differences in the training programmes. Since the Organisational Profiles in the Matrix indicate which step of competence development a specific training programme leads to, and which steps of competence development are not covered, the Matrix could also be used as a starting point to develop specific training programmes for “International Service Technicians”.

The first of the following two tables shows the general competence matrix for “International Service Technicians” as agreed in the course of the project. The second table indicates the Organisational Profiles of 3 training programmes in the 3 participating VET Schools (ROC Midden Nederland, The Netherlands; Borgund Vidaregåande Skole , Norway; Istituto Tecnico Industriale Statale “Leonardo da Vinci”, Italy). The orange profile indicates the organisational profile of the VET schools in the Netherlands and Italy. The grey profile indicates the organisational profile of graduates from the VET school in Norway (2 years school and 2 years company training).

<p><b>4</b> Simple understanding of building and adapting mechatronic systems and facilities on the basis of client needs and site plans)</p>	<p>He/She can use machine and basic tools (e.g. hammers, pliers, screwdrivers, wrenches) controlled either manually or via computer-program to fabricate (according to production designs and customer requirements) the individual components for mechatronic systems. He/she can provide simple designs and descriptions of mechatronic subsystems and can use basic 2D CAD applications.</p>	<p>He/She can build simple mechatronic subsystems by using engineering drawing and can install the devices according to specific production needs. He/She can act on extensive knowledge of standards and regulations (e.g. on surface treatments) and is able to use 3D CAD functions (e.g. interference check).</p>	<p>He/She can build mechatronic systems by using both original construction techniques and previously designed parts. He/She fully understands 2D CAD functions and the main 3D CAD functions and can document system developments (e.g. assembly and exploded drawings).</p>	<p>He/She can design and build autonomous mechatronic subsystems and, with suitable measuring and testing facilities, can assess the necessary production accuracy. He/She can make independent adaptations to the various devices (including selection of drives, sensors, PLC) and can use CNC programs for building the system.</p>	<p>He/She can make independent adaptations to the various devices (including selection of drives, sensors, PLC) and can use CNC programs for building the system. He/She can, through a digital mock up, assemble and simulate the functioning system and use computer-aided computations (e.g. FEM). He/She can perform cost-benefit analyses (e.g. as a basis for deciding whether components should be bought or individually constructed.)</p>	<p>He/She can independently develop complex mechatronic systems and can calculate the economic usefulness of the system. He/She can optimise CNC programs for the manufacturing of complex mechatronic devices and systems and monitor the automated quantity of an open loop control system.</p>
<p><b>5</b> Putting mechatronic systems into operation and providing clients with technical support</p>	<p>He/She can, according to specifications and blueprints, put mechatronic devices into operation and provide support to the client in the hand-over phase.</p>	<p>He/She, after considering the enterprise's needs and basic conditions, can put the mechatronic systems into operation, create the necessary documentation, advise the customer on safe operations of the devices, and advise on future technology selection. Base documentation is usually drafted, finalized and issued by the central technical office that is in charge of it. IS technicians can take notes of documentation which needs to be reviewed, but they usually report issues back to their central technical office.</p>	<p>He/She, after considering all basic conditions, can master the start-up of interconnected mechatronic systems and machines, and can provide the necessary documentation including a manual. He/She can review client needs and configure machines that provide solutions. He/She can train the customer where necessary and provide support for safe operating procedures.</p>	<p>He/She can evaluate customer requirements for mechatronic facilities, develop solutions, and can plan the system's implementation and operation.</p>	<p>He/She can direct, including scheduling and time management, the start-up of the project from the creation of a proposal to the client's acceptance. He/She can be business savvy and be able to inform customers on new products, spare parts and equipment.</p>	

**Table 1: Competence Matrix "International Service Technicians"**

Competence area	Steps of competence development			
<p><b>1</b> Maintaining and assuring the reliability of mechatronic systems</p>	<p>He/She can operate in a safe environment (it is pre-requisite for most companies around the world). IS technician should be well-read with regard to safety rules and regulations on the job. He/She can perform the basic scheduled maintenance on mechatronic machines and systems and adhere to the equipment maintenance plans. He/She is able to operate with logical and analytical methodology, finding the best solution and timing in terms of effectiveness of intervention, efficiency, time, group management etc.</p>	<p>He/She can master the maintenance procedures for mechatronic systems such as the use of service documents and maintenance plans and, if faced with new challenges, can make the necessary adaptations.</p>	<p>He/She can use preventive maintenance to assure the trouble-free operation of mechatronic systems. In addition, he/she can modify operational sequences to implement quality-assurance measures</p>	<p>He/She can develop the necessary procedures for maintenance of mechatronic devices and systems, and can schedule the maintenance and quality-assurance procedures. He/She, thanks to his/her technical expertise and deep knowledge of machinery, is able to anticipate possible problems and promptly inform his/her main business about them.</p>
<p><b>2</b> Installing and dismantling mechatronic systems and facilities</p>	<p>He/She can use written instructions to install and dismantle individual components (sensors, actuators, drives, motors, transport systems, racks) that form a functional group of mechatronic systems.</p>	<p>He/She can master the installation and dismantling of mechatronic systems that use several technologies (mechanics, hydraulics, pneumatics, electrical-mechanics, electronics), set up the connexion technology, and check the efficiency of the overall system.</p>	<p>He/She can provide independent mechatronic solutions for the construction of production lines, assure their overall ability to function, and, in addition, can use both existing and modified standard components.</p>	
<p><b>3</b> Installing and adjusting mechatronic components in systems and production lines</p>	<p>He/She is able to install and adjust standardized mechatronic components, e.g. individual electro-pneumatic valves, sensor and actuator units.</p>	<p>He/She can install and adjust components of mechatronic subsystems (e.g., linear drives, measuring systems, transport systems).</p>	<p>He/She can install and adjust complex mechatronic facilities that include diverse technologies and instrumentation and control (I&amp;C) equipment, adjust the associated parameters, test the facility's overall functions, and assure their reliability</p>	

<p><b>6</b> Supervising and evaluating both the process sequences of mechatronic systems and facilities and the operational sequence</p>	<p>He/She can supervise process sequences according to specifications.</p>	<p>He/She can independently supervise the process sequences, evaluate the results, and prepare simple work schedules.</p>	<p>He/She can operate and supervise mechatronic facilities, choose testing and monitoring plans, seek the optimal results of the production line according to material-flow and provide work schedules.</p>	<p>He/She can 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.</p>	<p>He/She can 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).</p>
<p><b>7</b> Installing, configuring and testing hardware and software components for control and regulation of mechatronic systems and facilities</p>	<p>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).</p>	<p>He/She can master the selection of hardware and software for mechatronic systems (sensors, actuators, interfaces, communication procedures) and can provide and test simple programmable logic control programs (PLC) according to production process requirements.</p>	<p>He/She can 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.</p>	<p>He/She can develop, test, and configure hardware and software solutions for networked mechatronic systems; and can monitor system conditions with suitable measuring and visualisation tools.</p>	
<p><b>8</b> Preparing and distributing the technical information for adjustment of each enterprise's mechatronic systems</p>	<p>He/She can provide descriptions and designs of mechatronic subsystems and is familiar with the basic CAD applications.</p>	<p>He/She can fully understand the management of technical information documents for mechatronic systems and can prepare and adapt these documents according to an enterprise's specific operating requirements. IS technician can take notes of any variations to be made to the technical documentation. Such variations will then be communicated to the central technical office that, for security and standardization reasons, is responsible for drafting and issuing the complete documentation. He/She is able to understand that the system parameters are important for the equipment's functions and can independently assess and document the wear and general conditions of the mechatronic equipment.</p>	<p>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 can understand that the system parameters are important for the equipment's functions and can independently assess and document the wear and general conditions of the mechatronic equipment.</p>		
<p><b>9</b> Diagnosing and repairing malfunctions, also in emergency service, with mechatronic systems and facilities, advising clients on avoiding malfunctions, and modifying and expanding mechatronic systems</p>	<p>He/She can diagnose and repair errors and malfunctions in the simple components and devices in the mechatronic systems. He/She can use the necessary checking, measuring, and diagnostic tools.</p>	<p>He/She can independently correct problems in mechatronic production equipment with the help of (computer-aided) diagnostic systems and the use of expert systems, databases, and error documentations.</p>	<p>He/She can 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.</p>	<p>He/She can develop, through analyses of malfunctions in the mechatronic equipment, a monitoring and diagnostic system. He/She is able to operate emergency services under minimal supervision so that they can organize, plan and install spare parts in compliance with urgent requests.</p>	
<p><b>10</b> Project management</p>	<p>He/she can work with a plan and is able to schedule his/her work.</p>	<p>He/she can work and make simple time and resource schedules for an IST project.</p>	<p>He/she can work and make advanced time and resource schedules and also together with external contractors. He/she can report to the customer about the results.</p>	<p>He/she can manage an IST project based on time and resource schedules and be responsible for the result in terms of time, quality, communication, information and organisation.</p>	

<b>11 Self supporting, analytical and proactive in problem solving</b>	He/she can solve simple problems and is able to create an environment in which he/she is able to solve a problem alone or in a group, with appropriate support. (E.g. Vehicles are delivered to the enterprise with some options, but meanwhile the customer demands more options without payment. The International Service Technician needs to convince the customer that the options he/she wants were not requested at the sales stage and agree a suitable solution).		He/she can solve integrated problems in an efficient way. Is able to obtain resources and information to solve the problem. (E.g. A newly employed technician can clearly understand tasks and carry them out in collaboration with other colleagues. He/she respects and takes advantage of knowledge from expert colleagues. (E.g. a group of foreign visitors is coming and the colleague who is in charge of the group is ill.)		He/she can solve complex problems in an efficient way under difficult circumstances (e.g. An IST needs to be able to take into account climatic, security and other types of challenging circumstances. Thus enabling the necessary work to be carried out with as little risk to personnel and equipment as possible, and stop work when risk to personnel or equipment is too high.) He/she provides initiatives to solve the problem and keeps in contact with the customer about the job (e.g. An IST should be able to see and suggest solutions to problems and communicate them both to the customer and his own management for approval. Further, he/she must keep the customer informed about the progress of the work).	
<b>12 Travel Skills</b>	He/she can ask for essential travel information and can find services in airports, stations etc.	He/she can make simple travel plans on his/her own, can deal with local currency and buy tickets and services. (E.g. how to manage when medical assistance is needed; hiring a car and managing heavy traffic in a big city; and solve insurance problems in car accidents)	He/She can make complex travel plans and arrangements and can organise support to deal with problems. (e.g. when the flight must be rescheduled he/she needs to change his/her ticket with the travel agent. When the flight is missed he/she should be able to arrange the next flight.)		He/She can make complex travel plans and manage unforeseen situations (delays, cancellations, re-bookings). He/She can find alternative solutions to reach her/his destination. He/She can stay calm and use reasoning to solve problems (e.g. he/she knows how to react when for example his/her passport is stolen or travel is through several countries in order to reach his/her final destination).	
<b>13 Foreign language competences<sup>1</sup></b>	A2: He/She can understand sentences and frequently used expressions related to areas of most immediate relevance. (e.g. very basic personal and family information, shopping, local geography, employment). He/She can communicate in simple and routine work related tasks requiring a simple and direct exchange of information on familiar and routine matters. He/She can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.	B1: He/She can understand the main points of clear input on familiar matters regularly encountered in work, school, leisure, etc. He/She can deal with most situations likely to arise whilst travelling in an area where the foreign language is spoken. He/She can produce simple connected text on topics that are familiar or of personal interest. He/She can describe experiences and events, dreams, hopes & ambitions and briefly give reasons and explanations for opinions and plans.	B2: He/She can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. He/She can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. He/She can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.	C1: He/She can understand a wide range of demanding, longer texts, and recognise implicit meaning. He/She can express him/herself fluently and spontaneously without much obvious searching for expressions. He/She can use language flexibly and effectively for social, academic and professional purposes. He/She can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.	C2: He/She can understand with ease virtually everything heard or read. He/She can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. He/She can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in the most complex situations.	
<b>14 Intercultural competences<sup>2</sup></b>	1 Basic - General Profile He/She at this level is on the ladder of progression. He/She will be willing to deal positively with an intercultural situation. He/She can respond to it, but this will be piecemeal and improvised rather than principled, even though mostly successful in avoiding short-term difficulties, which will mostly be based on fragmentary information.		2 Intermediate - General Profile He/She at this level has begun to introduce simple principles to apply to an intercultural situation, rather than improvise. He/She reactively responds to isolated features of the situation. He/She is able to demonstrate a basic strategy and some coherent knowledge for dealing with intercultural situations.		3 Full - General Profile He/She at this level will combine a strategic and principled approach to a situation to take the role of a mediator seeking to bring about the most favourable outcome. Knowledge of his/her own culture and that of others, including work parameters, will be both coherent and sophisticated.	

<sup>1</sup> Common European Framework of Reference for Languages.

<sup>2</sup> INCA Framework on intercultural competences.

Online: [http://www.incaproject.org/en\\_downloads/2\\_INCA\\_Framework\\_Assessor\\_version\\_eng.pdf](http://www.incaproject.org/en_downloads/2_INCA_Framework_Assessor_version_eng.pdf)

**Table 2: Competence Matrix “International Service Technicians” indicating Organisational Profiles**

Competence area	Steps of competence development			
<p><b>1</b> Maintaining and assuring the reliability of mechatronic systems</p>	<p>He/She can operate in a safe environment (it is pre-requisite for most companies around the world). IS technician should be well-read with regard to safety rules and regulations on the job. He/She can perform the basic scheduled maintenance on mechatronic machines and systems and adhere to the equipment maintenance plans. He/She is able to operate with logical and analytical methodology, finding the best solution and timing in terms of effectiveness of intervention, efficiency, time, group management etc.</p>	<p>He/She can master the maintenance procedures for mechatronic systems, such as the use of service documents and maintenance plans and, if faced with new challenges, can make the necessary adaptations.</p>	<p>He/She can use preventive maintenance to assure the trouble-free operation of mechatronic systems. In addition, he/she can modify operational sequences to implement quality-assurance measures</p>	<p>He/She can develop the necessary procedures for maintenance of mechatronic devices and systems, and can schedule the maintenance and quality-assurance procedures. He/She, thanks to his/her technical expertise and deep knowledge of machinery, is able to anticipate possible problems and promptly inform his/her main business about them.</p>
<p><b>2</b> Installing and dismantling mechatronic systems and facilities</p>	<p>He/She can use written instructions to install and dismantle individual components (sensors, actuators, drives, motors, transport systems, racks) that form a functional group of mechatronic systems.</p>	<p>He/She can master the installation and dismantling of mechatronic systems that use several technologies (mechanics, hydraulics, pneumatics, electrical-mechanics, electronics), set up the connexion technology, and check the efficiency of the overall system.</p>	<p>He/She can provide independent mechatronic solutions for the construction of production lines, assure their overall ability to function, and, in addition, can use both existing and modified standard components.</p>	
<p><b>3</b> Installing and adjusting mechatronic components in systems and production lines</p>	<p>He/She is able to install and adjust standardized mechatronic components, e.g. individual electro-pneumatic valves, sensor and actuator units.</p>	<p>He/She can install and adjust components of mechatronic subsystems (e.g., linear drives, measuring systems, transport systems).</p>	<p>He/She can install and adjust complex mechatronic facilities that include diverse technologies and instrumentation and control (I&amp;C) equipment, adjust the associated parameters, test the facilities overall functions, and assure their reliability.</p>	



<p><b>4</b> Simple understanding of building and adapting mechatronic systems and facilities on the basis of client needs and site plans )</p>	<p>He/She can use machine tools controlled either manually or via computer-program to fabricate (according to production designs and customer requirements) the individual components for mechatronic systems. He/she can provide simple designs and descriptions of mechatronic subsystems and can use basic 2D CAD applications.</p>	<p>He/She can build simple mechatronic subsystems by using engineering drawing and can install the devices according to specific production needs. He/She can act on extensive knowledge of standards and regulations (e.g. on surface treatments) and is able to use 3D CAD functions (e.g. interference check).</p>	<p>He/She can build mechatronic systems by using both original construction techniques and previously designed parts. He/She fully understands 2D CAD functions and the main 3D CAD functions and can document system developments (e.g. assembly and exploded drawings).</p>	<p>He/She can design and build autonomous mechatronic subsystems and, with suitable measuring and testing facilities, can assess the necessary production accuracy. He/She can make independent adaptations to the various devices (including selection of drives, sensors, PLC) and can use CNC programs for building the system.</p>	<p>He/She can make independent adaptations to the various devices (including selection of drives, sensors, PLC) and can use CNC programs for building the system. He/She can, through a digital mock up, assemble and simulate the functioning system and use computer-aided computations (e.g. FEM). He/She can perform cost-benefit analyses (e.g. as a basis for deciding whether components should be bought or individually constructed.)</p>	<p>He/She can independently develop complex mechatronic systems and can calculate the economic usefulness of the system. He/She can optimise CNC programs for the manufacturing of complex mechatronic devices and systems and monitor the automated quantity of an open loop control system.</p>
<p><b>5</b> Putting mechatronic systems into operation and providing clients with technical support</p>	<p>He/She can, according to specifications and blueprints, put mechatronic devices into operation and provide support to the client in the hand-over phase.</p>	<p>He/She, after considering the enterprise's needs and basic conditions, can put the mechatronic systems into operation, create the necessary documentation, advise the customer on safe operations of the devices, and advise on future technology selection. Base documentation is usually drafted, finalized and issued by the central technical office that is in charge of it. IS technicians can take notes of documentation which needs to be reviewed, but they usually report issues back to their central technical office.</p>	<p>He/She, after considering all basic conditions, can master the start-up of interconnected mechatronic systems and machines, and can provide the necessary documentation including a manual. He/She can review client needs and configure machines that provide solutions. He/She can train the customer where necessary and provide support for safe operating procedures.</p>	<p>He/She can evaluate customer requirements for mechatronic facilities, develop solutions, and can plan the system's implementation and operation.</p>	<p>He/She can direct, including scheduling and time management, the start-up of the project from the creation of a proposal to the client's acceptance. He/She can be business savvy and be able to inform customers on new products, spare parts and equipment.</p>	

<p><b>6</b> Supervising and evaluating both the process sequences of mechatronic systems and facilities and the operational sequence</p>	<p>He/She can supervise process sequences according to specifications.</p>	<p>He/She can independently supervise the process sequences, evaluate the results, and prepare simple work schedules.</p>	<p>He/She can operate and supervise mechatronic facilities, choose testing and monitoring plans, seek the optimal results of the production line according to material-flow and provide work schedules.</p>	<p>He/She can 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.</p>	<p>He/She can 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).</p>
<p><b>7</b> Installing, configuring and testing hardware and software components for control and regulation of mechatronic systems and facilities</p>	<p>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).</p>	<p>He/She can master the selection of hardware and software for mechatronic systems (sensors, actuators, interfaces, communication procedures) and can provide and test simple programmable logic control programs (PLC) according to production process requirements.</p>	<p>He/She can 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.</p>	<p>He/She can develop, test, and configure hardware and software solutions for networked mechatronic systems; and can monitor system conditions with suitable measuring and visualisation tools.</p>	
<p><b>8</b> Preparing and distributing the technical information for adjustment of each enterprise's mechatronic systems</p>	<p>He/She can provide descriptions and designs of mechatronic subsystems and is familiar with the basic CAD applications.</p>	<p>He/She can fully understand the management of technical information documents for mechatronic systems and can prepare and adapt these documents according to an enterprise's specific operating requirements. IS technician can take notes of any variations to be made to the technical documentation. Such variations will then be communicated to the central technical office that, for security and standardization reasons, is responsible for drafting and issuing the complete documentation. He/She is able to understand that the system parameters are important for the equipment's functions and can independently assess and document the wear and general conditions of the mechatronic equipment.</p>		<p>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 can understand that the system parameters are important for the equipment's functions and can independently assess and document the wear and general conditions of the mechatronic equipment.</p>	
<p><b>9</b> Diagnosing and repairing malfunctions, also in emergency service, with mechatronic systems and facilities, advising clients on avoiding malfunctions, and modifying and expanding mechatronic systems.</p>	<p>He/She can diagnose and repair errors and malfunctions in the simple components and devices in the mechatronic systems. He/She can use the necessary checking, measuring, and diagnostic tools.</p>	<p>He/She can independently correct problems in mechatronic production equipment with the help of (computer-aided) diagnostic systems and the use of expert systems, databases, and error documentations.</p>	<p>He/She can 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.</p>	<p>He/She can develop, through analyses of malfunctions in the mechatronic equipment, a monitoring and diagnostic system. He/She is able to operate emergency services under minimal supervision so that they can organize, plan and install spare parts in compliance with urgent requests.</p>	
<p><b>10</b> Project management</p>	<p>He/she can work with a plan and is able to schedule his/her work.</p>	<p>He/she can work and make simple time and resource schedules for an IST project.</p>	<p>He/she can work and make advanced time and resource schedules and also together with external contractors. He/she can report to the customer about the results.</p>	<p>He/she can manage an IST project based on time and resource schedules and be responsible for the result in terms of time, quality, communication, information and organisation.</p>	

<p><b>11</b> <b>Self supporting, analytical and proactive in problem solving</b></p>	<p>He/she can solve simple problems and is able to create an environment in which he/she is able to solve a problem alone or in a group, with appropriate support. (E.g. Vehicles are delivered to the enterprise with some options, but meanwhile the customer demands more options without payment. The International Service Technician needs to convince the customer that the options he/she wants were not requested at the sales stage and agree a suitable solution).</p>		<p>He/she can solve integrated problems in an efficient way. Is able to obtain resources and information to solve the problem. (E.g. A newly employed technician can clearly understand tasks and carry them out in collaboration with other colleagues. He/she respects and takes advantage of knowledge from expert colleagues. (E.g. a group of foreign visitors is coming and the colleague who is in charge of the group is ill.)</p>		<p>He/she can solve complex problems in an efficient way under difficult circumstances (e.g. An IST needs to be able to take into account climatic, security and other types of challenging circumstances. Thus enabling the necessary work to be carried out with as little risk to personnel and equipment as possible, and stop work when risk to personnel or equipment is too high.) He/she provides initiatives to solve the problem and keeps in contact with the customer about the job (e.g. An IST should be able to see and suggest solutions to problems and communicate them both to the customer and his own management for approval. Further, he/she must keep the customer informed about the progress of the work).</p>	
<p><b>12</b> <b>Travel Skills</b></p>	<p>He/she can ask for essential travel information and can find services in airports, stations etc.</p>	<p>S/he can make simple travel plans on his/her own, can deal with local currency and buy tickets and services.</p>	<p>S/he can make complex travel plans and arrangements and can organise support to deal with problems. (e.g. when the flight must be rescheduled he/she needs to change his/her ticket with the travel agent. When the flight is missed he/she should be able to arrange the next flight.)</p>	<p>He/She can make complex travel plans and manage unforeseen situations (delays, cancellations, re-bookings). He/She can find alternative solutions to reach her/his destination. He/She can stay calm and use reasoning to solve problems (e.g. he/she knows how to react when for example his/her passport is stolen or travel is through several countries in order to reach his/her final destination).</p>		
<p><b>13</b> <b>Foreign language competences<sup>3</sup></b></p>	<p>A2: He/She can understand sentences and frequently used expressions related to areas of most immediate relevance. (e.g. very basic personal and family information, shopping, local geography, employment). He/She can communicate in simple and routine work-related tasks requiring a simple and direct exchange of information on familiar and routine matters. He/She can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.</p>	<p>B1: He/She can understand the main points of clear input on familiar matters regularly encountered in work, school, leisure, etc. He/She can deal with most situations likely to arise whilst travelling in an area where the foreign language is spoken. He/She can produce simple connected text on topics that are familiar or of personal interest. He/She can describe experiences and events, dreams, hopes &amp; ambitions and briefly give reasons and explanations for opinions and plans.</p>	<p>B2: He/She can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. He/She can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. He/She can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.</p>	<p>C1: He/She can understand a wide range of demanding, longer texts, and recognise implicit meaning. He/She can express him/herself fluently and spontaneously without much obvious searching for expressions. He/She can use language flexibly and effectively for social, academic and professional purposes. He/She can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.</p>	<p>C2: He/She can understand with ease virtually everything heard or read. He/She can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. He/She can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in the most complex situations.</p>	
<p><b>14</b> <b>Intercultural competences<sup>4</sup></b></p>	<p>1 Basic – General Profile He/She at this level is on the ladder of progression. He/She will be willing to deal positively with an intercultural situation. He/She can respond to it, but this will be piecemeal and improvised rather than principled, even though mostly successful in avoiding short-term difficulties, which will mostly be based on fragmentary information.</p>		<p>2 Intermediate – General Profile He/She at this level has begun to introduce simple principles to apply to an intercultural situation, rather than improvise. He/She reactively responds to isolated features of the situation. He/She is able to demonstrate a basic strategy and some coherent knowledge for dealing with intercultural situations.</p>		<p>Full – General Profile He/She at this level will combine a strategic and principled approach to a situation to take the role of a mediator seeking to bring about the most favourable outcome. Knowledge of his/her own culture and that of others, including work parameters, will be both coherent and sophisticated.</p>	

<sup>3</sup> Common European Framework of Reference for Languages.

<sup>4</sup> INCA Framework on intercultural competences.

Online: [http://www.incaproject.org/en\\_downloads/2\\_INCA\\_Framework\\_Assessor\\_version\\_eng.pdf](http://www.incaproject.org/en_downloads/2_INCA_Framework_Assessor_version_eng.pdf)