

6.b Robotics programming (set up automotive robot) assembly and manufacturing robots, collaborative robots)

Functional Area: R&D/Op&Log

Pre-Requisites: COMPETENCE 6-A

Assessment criteria	Knowledge
<p>LO6b.1. Programs robots and/or motion control systems, using programming and data processing techniques.</p> <p>Starting from a trajectory of an end effector the student has to describe/calculate:</p> <ul style="list-style-type: none"> • Number of actuated joints and affordable dimension of the robot arms • Sequence of displacements of the different joints • Motion law (acceleration, velocity, displacement vs time) • Possibility of singularity points and how to avoid it 	<ul style="list-style-type: none"> • Advanced on Motion Lows • Advanced Methods for program commercial robots and cobots • Advanced Languages for program commercial robots and cobots • Advanced Tele-operational and remote robotic • Integration of Robots and Cobots for operations and assembly process • Design of a robotic manufacturing process • Design of a robotic assembly process
<p>Starting from a given manufacturing process (with 2 or more operations) the student has to:</p> <ul style="list-style-type: none"> • Describe the order of the operations • Kinds of robots to use for the single operational • Estimation of time cycle for the single operational • Total number of robots needed to perform the manufacturing process (considering also the parallelisation of a task according to the time cycles) <p>Starting from a given assembly process (with 2 or more operations) the student has to:</p> <ul style="list-style-type: none"> • Describe the order of the operations • Kinds of robots to use for the single operational 	<p>Skills</p> <ul style="list-style-type: none"> • Understand a motion low description and representation also with second order information (Acceleration, displacements and velocity vs time) • Create a motion low starting from a given trajectory of end effector; • Describe the operations that a robot has to perform in order to perform a manufacturing process • Describe the operations that a robot has to perform in order to perform an assembly process • Understand the issues on remote control of robots (latency, computational effort, different networks protocols) • Program a robot for simple tasks

<ul style="list-style-type: none"> • Estimation of time cycle for the single operational • Total number of robots needed to perform the manufacturing process (considering also the parallelisation of a task according to the time cycles) • Open questions on Advance Remote controlling, tele operational and Safety aspects • Practical tasks on advanced programming robots 	<ul style="list-style-type: none"> • Manage the maintenance of a robotic station
	<p>Transferable skills</p>
	<ul style="list-style-type: none"> • Understand descriptions, specifications and documentations of commercial robots (in English) • Ability to communicate the designed behavior of a robot/cobot • Create code for robotic controlling • Create a maintenance program for a robotic station