9.a Utilize, choose, customize monitoring and data management systems *(monitor automated machines, record test data)*

Functional Area: Op&Log/R&D

Pre-Requisites:

Assessment criteria	Knowledge
LO9a.1: Defines and designs monitoring and data management systems. 1.Identifies the elements that make up the regulatory loop of industrial systems, relating their function to the elements that make up the automation processes with technologies, such as data acquisition intelligent sensors and IoT Data acquisition Intelligent sensors, IoT 2.Integrates industrial communications and monitoring systems into the overall assembly of discrete and continuous process mechatronics systems controlled by PLC. Remote and diagnostics control systems. Remote management Remote diagnostic 3.Differentiates the different operating modes and their specific characteristics from real or simulated systems, in real and digital systems. Digital twin and Virtual commissioning • Digital twin • Virtual commissioning	3. Identification and functions of the elements of the regulating loop: 1.1 Components of a regulation and control system. **Intelligent sensors** 1.2 Control and power schemes. 1.3 Types of control (open and closed loop). 1.4 Control of discrete event processes. 1.5 Control of continuous processes. 1.6 Transfer function. Stability. 1.7 Elements of controlled systems. Regulators. 1.8 Typology and functional characteristics. 1.9 Control systems (P, PI, PID). **1.10 Data acquisition** **1.11 Databases and spreadsheet applied** **1.12 IoT** **4. Integration of industrial communications:** 1.1 Industrial communications and distributed control: communication elements, communication networks, industrial communications and standardization. 1.2 Integral control of processes. CIM fundamentals. Automation pyramid. 1.3 Communication protocols: functions and characteristics, standardization and levels. 1.4 Most extended industrial networks and field buses to the European market (AS-y, Profibus, Ethernet Industrial and Profinet, among others.

	1.5 Physical configurations. Communication programming. Fault diagnosis.
	1.6 Machine-user interface: different types of HMI interface such as operating panels or screens tactile.
	1.7 SCADA systems: system description. **Diagnostic control and remote control.**
	1.8 Databases and spreadsheet applied
	(NEW **Knowledge relationated with assessment criteria 3)**
	5. Characterisation of different operating modes and their specific characteristics of real or simulated systems, in real and digital systems. Digital twin and Virtual commissioning
	5.1 Components of a real and simulated system.
	5.2 Characteristics and parameters of the components of Digital Twin
	5.3 Start-up in simulated systems. Virtual commissioning
	5.4 Modes of operation of simulated systems.
	5.5 Relationship between the different operating modes (PLC, CNC, Robots, among others).
	5.5 Simulation software for simulated systems
	Skills
	3. Identifies the elements that make up the regulatory loop of industrial systems, relating their function with the elements that make up the automation processes.
	3.1 Identifies the different types of regulation used in industry, especially in the field of continuous processes.
	3.2 Relates the characteristics and variables of a continuous process to its regulatory ties.
	3.3 Establishes the relationship between the parameters of a PID controller and the response of the variables of a process.
	3.4 Identifies the equipment, elements and devices of electrotechnical technology (automata, temperature regulators and level regulators, among

	others) and fluidics of the automatic systems, defining their function, the typology
	and characteristics. **Intelligent sensors**
	3.5 Obtains information from documentation and schematics. **Data acquisition**
	3.6 Identifies the devices and components that configure the global automatic system (control,
	regulation, force, protections, measures, and inputs and outputs, among others), explaining the characteristics and the functioning of each. **IoT. Intelligent sensors**
	3.7 Differentiates the different operating modes and their specific characteristics from real or simulated systems. Virtual commissioning and digital twin
	3.8 Calculates the magnitudes and basic parameters of a system, and contrasts them with the real values measured in the aforementioned system.
	3.9 knows the Basic Databases and Spreadsheet
	4. Integrates industrial communications and monitoring systems into the overall assembly of systems mechatronics of discrete and continuous processes controlled by PLC, verifying the operation.
	4.1 Establishes the relationship between industrial communication systems in the market and pyramid levels CIM (computer integrated manufacturing).
	4.2 Determines the types of communication of the European market according to the technical characteristics of the requirements.
	4.3 Relates the different monitoring systems and/or display and actuation equipment (HMI user machine interface) to the requirements of automated systems. Diagnostic control and remote control.
	4.4 Relates the Basic Databases and Spreadsheet
	Transferable skills

	• Understand descriptions, specifications, manuals and other info typical of the profession in English and prepare them for next phase of project/Customer in understandable manner • Ability to communicate effectively, orally and in writing with "engineering" community and with "society", extrapolating concepts for "non-experts) through an abstraction approach