Institute for Apprenticeships & Technical Education

AUTOMATION AND CONTROLS ENGINEERING TECHNICIAN

Details of standard

Occupation summary

This occupation is found in cross sector (e.g. Automotive, Food & Drink, Oil & Gas, Pharmaceutical, Construction), companies involved in manufacturing (discrete or process), logistics or utilities environments. These employers may be directly involved in these activities or as a provider of services (e.g. systems integration, field service, technical consultancy) to these companies.

The broad purpose of the occupation is twofold.

Where the role is based inside a manufacturing (discrete or process), logistics or utilities environments, a fully competent Automation & Control Engineering Technician will be able to install, maintain, fault find and optimise hardware and software for automation systems.

Where the role is based in a service provider, OEM (Original Equipment Manufacturer) or approved solutions provider in large or SME (Small to Medium Enterprise) companies, the Automation & Control Engineering Technician will be the interface between the vendor and it's customer and will be able to competently provide high quality, engineering services such as installation, commissioning, fault finding (the activity of testing an installation prior to handover) and support.

For both iterations of this role, this would involve the above duties across a range of hardware such as on Programmable Logic Controllers (PLC), Human Machine Interfaces (HMI), robots and Industrial Networks (e.g. PROFIBUS, DeviceNet, PROFINET, ModBus). Use of physical tools, software tools and instruments (e.g. multi-meter), are fundamental to carrying out tasks associated with building (e.g. control panels), installing (e.g. site cabling) and maintaining of automation systems.

This occupation will give employers the ability to maintain successful operational capability.

In their daily work, an employee in this occupation will be part of a multi-disciplinary team for example as a member or leader of a project team, maintenance team, service team that will work alongside other stakeholders for example design, production or coordination that interfaces with internal and external customers alike. Monitoring of the operation of these systems can be carried out either within in-situ control rooms/offices or remotely via web based/GPRS based mobile communications.

An employee in this occupation will be responsible for the ordering, coordination of services, working to established operating procedures for resources such as equipment and software to ensure functionality of automation systems are maintained. In a large company, they would generally report to an engineering manager whereas they may have greater responsibility and autonomy in an SME. Individuals in service provision would certainly find themselves working in a more autonomous situation. In either situation they would be responsible for their own actions and to protect those around them with respect to health, safety and the environment.

Typical job titles include:

Automation and controls engineering technician

Occupation duties

DUTY	CRITERIA FOR MEASURING PERFORMANCE	KSBS
Duty 1 Setup of a wide range of hardware and software found on industrial networks and control systems including, but not limited to PLC's, Robots, Human Machine Interfaces (HMIs), Supervisory Control and Data Acquisition (SCADA) systems, variable speed drives, soft-starters, energy monitoring equipment, instrumentation, safety systems and servo drives	The set-up duty is concerned with the preparation of devices either on the control system itself or devices such as laptops on which programming and set-up tools will be deployed. This duty can take place during commissioning or as a result of making a change or replacing devices of an existing operational system.Criteria for measurement: -Software installed on PCs correctly, using the right version of the software for the hardware being configured.Hardware settings correctly applied to devices to meet specifications of the job.Systems made operational after changes or updates including configuration / re-configuration via software tools All safety standards met or exceededDevices set up correctly using manufacturers technical information.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B5 B6 B7 B8 B9 B11
Duty 2 Program a wide range of hardware using a range of software tools on control systems including, but not limited to PLC's, Robots, Human Machine Interfaces (HMIs), Supervisory Control and Data Acquisition (SCADA) systems, variable speed drives, soft-starters, energy monitoring equipment, instrumentation, safety systems and servo drives	This duty is normally carried out prior to installation of a control system but will also be deployed during factory acceptance testing, during commissioning and post operation optimization. Criteria for measurement: -	K1 K2 K3 K4 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S7 S8 B1 B2 B3 B4 B6 B7 B8 B9 B11

	Devices are correctly parameterized according to required functionality and purpose.Effective software solutions (programs) are implemented and correct functionality is achieved.All safety standards met or exceededThe customer's requirement for functionality is understood and delivered in line with expectations	
Duty 3 Commission a wide range of hardware and/or software found in industrial networks and control systems including, but not limited to PLC's, Robots, Human Machine Interfaces (HMIs), Supervisory Control and Data Acquisition (SCADA) systems, variable speed drives, soft-starters, energy monitoring equipment, instrumentation, safety systems and servo drives	Commissioning is the pre-operation phase of testing of functionality prior to systems being released for full operational requirements. Criteria for measurement: -All wired electrical systems are connected correctlySafe power-up checks are implemented in compliance with method statementsCorrect functionality of device performance measures up to functional requirementsAll safety standards met or exceededUse and understanding of a wide range of supporting documentation including electrical schematic diagrams, Functional Design Specification (FDS) or User Requirement Specification (URS), manufacturers data sheets and operation manuals to ensure correct functionality	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B6 B7 B8 B9 B11

	is delivered in line with requirements.	
Duty 4 Service a wide range of hardware found on today's industrial networks and control systems including, but not limited to PLC's, Robots, Human Machine Interfaces (HMIs), Supervisory Control and Data Acquisition (SCADA) systems, variable speed drives, soft-starters, energy monitoring equipment, instrumentation, safety systems and servo drives	is proactive activity would take place over the operational lifecycle of a control system.Criteria for measurement: -Latest firmware upgrades are downloaded into existing devicesAscertain effectiveness of hardware performance against required functionality.Interpret and use manufacturers guidelines to aid service requirements of devices.All safety standards met or exceededDocumentation updated indicating that servicing has taken place.	K1 K2 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B6 B7 B8 B9 B11
Duty 5 Maintain a wide range of hardware and software found on today's industrial networks and control systems including, but not limited to PLC's, Robots, Human Machine Interfaces (HMIs), Supervisory Control and Data Acquisition (SCADA) systems, variable speed drives, soft-starters, energy monitoring equipment, instrumentation, safety systems and servo drives	his proactive activity would take place over the operational lifecycle of a control system.Criteria for measurement: -Latest firmware upgrades downloaded into existing devicesRelevant versions of software configuration tools on computers/laptops are maintained.Effectiveness of hardware performance against required functionality ascertained.Interpret and use manufacturers guidelines to aid maintenance requirements of devices.All safety standards met or exceededDocumentation updated indicating that	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B6 B7 B8 B9 B11

	maintenance has taken place	
Duty 6 Develop or modify automation and control system programs using a variety of different programing tools, languages and techniques	This activity would take place primarily at the beginning of a project but would also be utilised during testing & commissioning and during the operational lifecycle of the automation system for optimisation and additional functional requirements.Criteria for measurement: -Program functionality in the required language (e.g. ladder logic), to a given specification or requirements.Understand and explain existing software solutions written in languages (e.g. ladder logic).Plan software solutions prior to development.Accurate and clear supporting documentation of the program is provided.All safety standards met or exceeded.Documentation/operator manuals are updated reflecting any changes made to existing systems.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B6 B7 B8 B9 B11
Duty 7 Test and validate automation & control systems to ensure that they are safe, functional and satisfy the requirements of a system specification, complying with national and/or international standards	This activity would take place during commissioning and over the operational lifecycle of a control system.Criteria for measurement: -Manufacturers or system specific operational information used to gauge existing performance against required	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B6 B7 B8 B9 B11

	performance.Processes for recording test & validation activities are updated and maintained.All safety standards met or exceeded.Appropriate national/international standards have been complied with.	
Duty 8 Support and maintain the integration of electrical/electronic safety devices within an automation & control system	This activity would take place over the operational lifecycle of a control system.Criteria for measurement: -Safety devices specified for the function and their suitability is understood.Effective lock-off and safe isolation procedures carried out.Manufacturers product information with regards installation, operation and replacement are understood and applied.Risk assessments for electrical safety circuits are understood and applied.Terminology and relevance of safety levels (e.g. SIL 3 or PLe) are understood	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B6 B7 B8 B9 B11
Duty 9 Install, support and maintain devices linked to and across Industrial Networking infrastructures including configuration and programming duties to ensure that the flow of data across these devices is maintained	This activity would take place over the operational lifecycle of a control system.Criteria for measurement: -Firmware on all devices are kept up to date in line with manufacturer recommendations and available updates.Appropriate network topologies are	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B6 B7 B8 B9 B11

	installed and maintained.Appropriate software configurations and program solutions are implementedSituations where updating firmware should not be carried out are identified.All safety standards met or exceededDocumentation that requires change subject to update activities are maintained.Back-ups of previous configurations are implemented.	
Duty 10 Provide effective fault escalation support to first line service personnel that lead to successful return to operation of automation & control systems	This reactive activity would take place over the operational lifecycle of a control system.Criteria for measurement: -Information about a faulty situation is obtained and used to provide a suitable solution.Communicate effectively with all stakeholders.All safety standards met or exceeded, Safety of others is ensured during start/re-start of a system.Technical information from sources such as operator manuals, electrical schematics, software configurations is understood and applied.Other resources such as manufacturer technical support facilities used effectively.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 S1 S2 S3 S4 S5 S6 S7 S8 B1 B2 B3 B4 B5 B6 B7 B8 B9 B11
Duty 11 Supervise/manage/oversee activities such as installation of automation & control equipment and industrial networks	This activity would take place during the installation lifecycle of a control system.Criteria for measurement: -Technical	K1 K2 K3 K4 K5 K6 K7 K9 K11 K12 K13 S1 S2 S3 S5 S6 S7 S8

	information such as electrical schematics, wiring schedules are understood and appliedA safe working environment is maintained.Manufacturers product guidelines regarding installation of equipment are understood and applied.Effective communication with all installation parties is maintained in order to escalate/resolve issues.	B1 B2 B3 B4 B5 B6 B7 B8 B9 B11
Duty 12 Upkeep and maintenance of own knowledge of by actively engaging in a program of CPD for example to keep abreast of changes to legislation, standards (e.g. quality), state of technology	Criteria for measurement: -Appropriate seminars, exhibitions and training courses are attendedEngaged in promoting engineering activities such as careers fairsParticipated in skills competitions (e.g. World Skills)	K6 K7 K9 K12 K13 S2 S3 B1 B2 B3 B5 B6 B7 B8 B9 B10 B11
Duty 13 Apply relevant safety legislation, and any extra company requirements when working with industrial networking, automation & control systems	urses and site inductions.Criteria for measurement: -Relevant safety legislation is appliedEffective risk assessment is carried out prior to work activities.All safety standards met or exceededSafe working environment is maintained.	K3 K4 K6 K7 K11 K12 K13 S1 S2 S3 S5 S6 S7 S8 B1 B2 B3 B4 B5 B6 B7 B8 B9 B11
Duty 14 Carry out effective risk assessments when undertaking engineering activities on automation systems	The duty will usually be carried out prior to undertaking work activities that may be proactive (e.g. commissioning) or reactive in nature (e.g.fault finding). Criteria for measurement: -Appropriate hazard identification .Appropriate risks identified and	K3 K4 K6 K7 K9 K11 K12 K13 S1 S2 S3 S5 S6 S7 S8 B1 B2 B3 B4 B5 B6 B7 B8 B9 B11

	reduced.Probability of occurrence identified and if necessary, reduced.A risk assessment document is produced

KSBs

Knowledge

K1: Engineering maths - mathematical principles and theories that underpin engineering

K2: Engineering principles - the underlying principles of electrical and electronic circuits and devices

K3: Functional solutions - Create functional solutions; identifying and justifying a solution to a given engineering need

K4: Safety procedures - relevant safety procedures required to operate on automation equipment in an industrial environment

K5: Single and three phase circuits - single phase and three phase supplies on AC and DC motor and control circuits

K6: Automation knowledge - Programmable Logic Controllers (PLC), Variable Speed Drives (VSD), Human Machine Interface (HMI) & Supervisory Control and Data Acquisition (SCADA), robotics hardware and software tools to carry out configuration, programming and fault finding duties

K7: Instrumentation knowledge - instrumentation used to measure flow, temperature, pressure etc and the means by which they transmit measurement data

K8: Use of software tools - Justification in the utilisation of software tools would be for but not limited to the changing of hardware configurations, firmware updates, software modifications and commissioning

K9: Industrial networking knowledge - the application, installation and operational characteristics of industrial communication networks at Supervisory (e.g. Ethernet), Cell (e.g. PROFINET/PROFIBUS) and Field (e.g. AS-Interface) levels

K10: Use of diagnostic tools - diagnostic tools and equipment including web-based diagnostics incorporated into network devices and other software tools (e.g. PROFITrace)

K11: Understand technical documents - Ability to follow electrical system circuit diagrams, understand the operation of the various components that make up an automation system

K12: Safety legislation and responsibilities - electrical safety system legislation & directives

K13: Quality systems - quality assurance principles to ensure operation, consistency and quantification of enhancement of manufacturing and process applications

Skills

S1: Safety Effective - The ability to work safely in an industrial environment and where required, produce risk assessment/method statement documentation. Be able to apply the principles of functional machinery and/or process safety including SIL (Safety Integrated Level) and PL (Performance Level) terminology

S2: Engineering documentation - Production and interpretation of a range of technical documentation (device manuals, operating procedures, schematics, fault reports etc), and working with company documentation systems

S3: Project engineering capabilities - Support of installation, commissioning, shut-down, start-up and maintenance/service/support of a wide range of systems and devices

S4: Diagnostic capabilities - Fault finding, diagnosis, rectification and reporting of automation control systems and controls applications via the utilisation of formal problem solving methods and diagnostic tools/software

S5: Instrumentation configuration and calibration - Set-up, calibrate and commission a wide variety of field level instrumentation that interfaces to automation & control systems

S6: Industrial Networks configuration and support - configure, assist commissioning and continued support of industrial network solutions at all hierarchical levels of control system integration using the requisite tools and or software

S7: HMI & SCADA configuration and programming - Make changes to existing systems or implement new configurations

S8: PLC/Robot configuration and programming - Implement complex PLC/Robot program content and configurations to affect changes to increase availability and or efficiency of automation controlled machinery and the ability to configure PLC and or Robot hardware and program a wide variety of PLC's and or Robot's

Behaviours

B1: Zero Harm - Always prioritise on Health and Safety best practice

B2: Resilience - Sound and established ability to work effectively both in a team and alone

B3: Personal excellence - Interact professionally with clients and stakeholders

B4: Communicative - High quality communication skills

B5: Ethical - Strong professional and business ethics

B6: Commitment - A focus on quality in all the tasks assigned

B7: Continual development - Willingness to learn new processes, methods and technologies

B8: Responsibility - Strong commitment and accountability and ability to apply independent judgement

B9: Personal Values - Respect and tolerance of others

B10: Ambassadorial - To be a role model of engineering practice and to promote engineering in order to sustain a pipeline of future talent

B11: Reflection - Evaluate outcomes of own performance across all duties

Qualifications

English & Maths

Apprentices without level 2 English and maths will need to achieve this level prior to taking the End-Point Assessment. For those with an education, health and care plan or a legacy statement, the apprenticeship's English and maths minimum requirement is Entry Level 3. A British Sign Language (BSL) qualification is an alternative to the English qualification for those whose primary language is BSL.

Other mandatory qualifications

Technical engineering qualification covering at least one of the following areas: Electrical/Electronic Engineering, General Engineering, Manufacturing Engineering, Operations Engineering

Level: 4

Professional recognition

This standard aligns with the following professional recognition:

- Institute of Engineering and Technology (IET) for Engineering Technician (EngTech)
- Institutue of Mechanical Engineers (IMechE) for Engineering Technician (EngTech)

Additional details

Occupational Level:

4

Duration (months):

48

Review

This apprenticeship standard will be reviewed after three years

Find an apprenticeship

Postcode (optional)

Version log

VERSION	CHANGE DETAIL	EARLIEST START DATE	LATEST START DATE	LATEST END DATE
1.0	Approved for delivery	03/07/2019	Not set	Not set