



The NI Apprenticeship in Engineering Maintenance

DRAFT

Framework for Northern Ireland

1. Occupational Framework Title

The NI Apprenticeship in Engineering Maintenance

2. Occupational Profile

Engineering Maintenance Technicians maintain the safety and effective operation of equipment in the Engineering Sector. Technicians work across a broad range of job roles in the Mechanical, Electronics, Electrical, Fluid Power, Food and Drink, Lift Services, Mechatronics/Systems Maintenance and Medical Equipment Sectors.

CORE OCCUPATIONAL STANDARD

Across the job roles in Engineering Maintenance, Technicians will be able to understand and demonstrate the following core knowledge, skills, behaviours and transversal skills relevant to their chosen specialism.

Core Knowledge

- Understand the typical hazards that can occur
- What health, safety and environmental procedures and precautions to follow
- How to use engineering data, drawings and reports
- The use of servicing schedules
- Fault-finding and diagnostic techniques and applications
- Dismantling and reassembly methods and techniques for repairing equipment
- The procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance process
- How to use appropriate lifting and handling equipment in the maintenance activity
- What tools/equipment are required and how to check the condition and use them
- Appropriate checking/electronic test methods and equipment
- How to analyse test results
- How to deal with faults and problems
- Hand over procedures

Core Skills

- Carry out scheduled servicing activities on a range of equipment
- Diagnose faults on a range of equipment, at both assembly and component level
- Apply a range of dismantling and assembling techniques to remove and replace faulty components or equipment
- Inspect and test equipment, circuits, systems and installations
- Repair a range of equipment and systems at board and component level
- Use the correct sequence for reconnecting equipment, and test before restoring power
- Install a range of equipment, making the required connections, checks and adjustments
- Use diagnostic monitoring equipment

- Prevent equipment problems by identifying potential causes rather than waiting for a problem to occur

Core Behaviours and Transversal Skills

The following transversal skills and behaviours should be developed through naturally occurring activities in the job role within the apprenticeship. They should be included and recorded in the competence and knowledge qualifications.

Behaviours

- A strong work ethic
- Dependability
- Integrity
- Positive attitude
- Responsibility
- Motivation
- Team player
- Honesty and commitment

Skills

- Literacy
- Numeracy
- Communication
- Digital Skills
- Self-management
- Working with others
- Work professionalism
- Problem solving and decision making

Specialist Pathways

| Specialist Pathway | Knowledge | Skills |
|-------------------------------|---|---|
| <i>Mechanical Maintenance</i> | <p>How to implement a systematic and structured approach to carrying out planned maintenance</p> <p>The functions of different types of mechanical equipment and how they work</p> <p>Methods and techniques for installing and connecting mechanical equipment</p> | <p>Restore mechanical components to usable condition using a range of tools (hand, machine, portable power) and shaping and fitting technique</p> <p>Produce mechanical components using hand fitting and manual machining techniques</p> |
| <i>Electronic Maintenance</i> | <p>The different types of cabling and their uses</p> <p>Understand the concepts of analogue/ digital electronics</p> <p>The functions of digital circuits and components and how they work</p> <p>An appreciation of Standard Operating Procedures</p> | <p>Use electrostatic discharge procedures</p> <p>Read electronic schematic diagrams</p> <p>How to use core electronic equipment</p> <p>Ability to adapt / learn different equipment programs</p> <p>Soldering</p> |
| <i>Electrical Maintenance</i> | <p>The different types of cabling and their uses</p> <p>The functions of electrical circuits and components and how they work</p> | <p>Modify, rewire and update electrical circuits</p> <p>Read electrical schematic diagrams</p> <p>Soldering</p> <p>Cable harness assembly and box build</p> |

| | | |
|---|--|--|
| <p><i>Fluid Power Maintenance</i></p> | <p>How to follow the correct decontamination procedures, environmental control and company operating procedures</p> <p>The functions of different types of fluid power components and seals and how they work</p> | |
| <p><i>Food and Drink Maintenance</i></p> | <p>Comply with health and safety and other relevant food and drink regulations, directives and guidelines</p> | <p>The specific health and safety food and drink precautions to be applied during the maintenance activities, and their effects on others and the responsibility these requirements place on you not to compromise food safety</p> |
| <p><i>Lift Servicing Maintenance</i></p> | <p>How to reduce the risks of a phase to earth shock</p> <p>The functions of different types of lift equipment and how they work</p> <p>Safe methods of manual handling and use of mechanical lifting devices</p> | <p>Make checks and adjustments on lift/escalator equipment</p> |
| <p><i>Mechatronics Maintenance</i></p> | <p>How to reduce the risks of a phase to earth shock</p> <p>How to follow the correct decontamination procedures, environmental control and company operating procedures</p> <p>How the plant or system functions, and the working purpose of the various units within it</p> <p>How to recognise installation defects in plant or systems equipment</p> | |
| <p><i>Medical Equipment Maintenance</i></p> | <p>How the medical equipment functions, its operating sequence, the function/purpose of individual units/components and how they interact.</p> | <p>Use electrostatic discharge procedures</p> |

3. Entry requirements

As a guide, the NI Apprenticeship in Engineering Maintenance is suitable for applicants who have five GCSEs grade C (or equivalent new grade 4) or above including Maths, English, and a Science. Candidates may be considered on an exceptional basis for entry if they do not meet the stated requirements. If applicants have shown an interest in engineering, or have previous work experience or employment in the sector, then this would be relevant to include in their application.

Typically applicants would have:

- completed a NI Traineeship in Engineering Maintenance at Level 2 **or**
- completed a NI Traineeship in another related area **or**
- Essential Skills qualifications **or**
- applied as a direct entry from school

and be:

- willing to undertake a course of training both on-the-job and off-the-job and apply this learning in the workplace
- able to follow instructions and diagrams, with literacy and numeracy to work with data
- a good team worker, who can also work under own initiative
- keen and motivated to work in an engineering or manufacturing environment
- Apprentices must complete the NVQ Extended Diploma at Level 3 as it contains the Performing Engineering Operations (PEO) foundation basic training required by all engineering apprentices. However if the relevant PEO units have already been achieved and certificated in a previous programme, then they will be able to credit these against the requirements of the Extended Diploma.
- The Level 3 NVQ Diploma may only be used by adult apprentices 25 years old and over, or apprentices 16-24 years who have achieved a NI Level 2 Traineeship in a relevant occupation, who must:
 - a) have received appropriate health and safety training relevant to work area/environment that they will be working and
 - b) have worked in an engineering or manufacturing environment and have skills knowledge and understanding broadly comparable to relevant practical NVQ/SVQ Level 2 units detailed in Performing Engineering Operations, Performing Manufacturing Operations or other skill specific NVQ/SVQ Level 2 in engineering or manufacturing.

4. Duration

This Apprenticeship in Engineering Maintenance typically takes 42 months for apprentices starting this apprenticeship with no or little engineering experience.

Adult apprentices or those with relevant experience or who have already achieved some of the required qualifications may require less time to complete the programme.

5. National Occupational Standards (NOS)

This Apprenticeship in Engineering Maintenance is underpinned by National Occupational Standards (NOS) which indicate the standards of competency performance that apprentices must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding.

The relevant NOS for this framework are in Engineering Maintenance Suite 3, where:

- the competency qualifications standards are linked directly to the NOS
- the underpinning knowledge qualification specifications are linked where possible to the NOS

Specific details of these can be found in [Appendix 1](#).

6. Qualifications

Qualifications are based on competency and knowledge. Competence and technical knowledge are separately identified and separately assessed to ensure apprentices not only demonstrate the competence to do the job, but also develop the underpinning technical skills, knowledge and understanding of the wider industry and market.

If apprentices have already achieved any of the qualifications, or have relevant experience of working in the sector, this prior achievement can be recognised.

The relevant competency qualifications derived from these NOS are:

- Level 3 NVQ Extended Diploma in Engineering Maintenance
- Level 3 NVQ Diploma in Engineering Maintenance
- SVQ 3 Engineering Maintenance at SCQF Level 6

They contain pathways relevant to the job roles listed in Section 2.

This table summarises what qualifications must be taken - qualification details are given in [Appendix 2](#).

| Competency | Knowledge (Technical Certificate) |
|---|---|
| Apprentices must complete a work based NVQ L3/SVQ 3 as selected by their employer and offered by one of these Awarding Organisations: <ul style="list-style-type: none"> • EAL • City & Guilds • Pearson | Apprentices must complete one of the Technical Certificate listed in Appendix 2 Each Technical Certificate is relevant to both NVQ and SVQ qualifications, so there is no restriction by qualification choice. |

7. Assessment

Qualifications must be assessed and this can be through a variety of different methods. Some may be assessed internally (such as by tests or project work) or externally (such as by exams) or require a portfolio of evidence.

The competence qualifications must be assessed in a work environment. The knowledge qualification may have some type of external assessment.

Assessors must hold the Level 3 Award in Assessing Competence in the Work Environment and have current, verifiable, relevant and sufficient technical competence to evaluate and judge performance and knowledge evidence requirements.

8. Enhancements

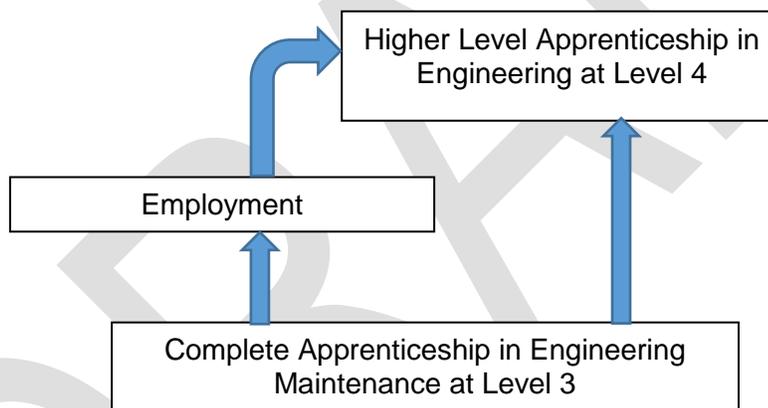
No additional enhancements have been identified by employers to date but in the Food and Drink sector they could include Food Safety and Hygiene and HACCP (Hazard analysis and critical control points) courses/qualifications.

9. Progression

When apprentices have completed this framework, they have two options open to them.

They can gain employment within an engineering company, perhaps in one of the skilled job roles described earlier, leading to internal promotion to team leader or supervisory roles. In time, they may also choose to complete a Higher Level Apprenticeship in Engineering.

Alternatively it gives an opportunity to progress directly to a Higher Level Apprenticeship in Engineering.



The following websites are useful to help apprentices plan career progression:

www.apprenticeships.org.uk/types-of-apprenticeships/engineering-and-manufacturing-technologies.aspx

nationalcareersservice.direct.gov.uk/advice/planning/jobfamily/Pages/manufactureandengineering.aspx

Appendix 1

The Level 3 NVQ Diploma in Engineering Maintenance qualification is derived from the following standards:

| | URN | Title of the Occupational Standard |
|--|-------------|---|
| Core NOS for all pathways | SEMMAN12301 | Complying with statutory regulations and organisational safety requirements |
| | SEMMAN2302 | Using and interpreting engineering data and documentation |
| | SEMMAN303 | Working efficiently and effectively in engineering |
| | SEMEM304 | Handing over and confirming completion of maintenance activities |
| Mechanical Pathway Available NOS | SEMEM305 | Carrying out fault diagnosis on mechanical equipment |
| | SEMEM306 | Maintaining mechanical equipment |
| | SEMEM308 | Producing replacement components for maintenance activities |
| | SEMEM309 | Carrying out preventative planned maintenance on mechanical equipment |
| | SEMEM310 | Carrying out condition monitoring of plant and equipment |
| | SEMEM380 | Assisting in the installation of mechanical equipment |
| | SEMEM388 | Apply Total Productive Maintenance (TPM) |
| Electrical Pathway Available NOS | SEMEM311 | Carrying out fault diagnosis on electrical equipment and circuits |
| | SEMEM312 | Maintaining electrical equipment |
| | SEMEM313 | Modifying or rewiring electrical circuits |
| | SEMEM314 | Testing electrical equipment and circuits |
| | SEMEM315 | Carrying out preventative planned maintenance on electrical equipment |
| | SEMEM310 | Carrying out condition monitoring of plant and equipment |
| | SEMEM380 | Assisting in the installation of mechanical equipment |
| | SEMEM388 | Apply Total Productive Maintenance (TPM) |
| Electronic Pathway Available NOS | SEMEM316 | Carrying out fault diagnosis on electronic equipment and circuits |
| | SEMEM317 | Testing electronic equipment and circuits |
| | SEMEM318 | Repairing electronic equipment |
| Fluid Power Pathway Available NOS | SEMEM319 | Carrying out fault diagnosis on fluid power equipment and circuits |
| | SEMEM321 | Carrying out preventative planned maintenance on fluid power equipment |
| | SEMEM322 | Testing fluid power equipment and systems |
| | SEMEM310 | Carrying out condition monitoring of plant and equipment |
| | SEMEM382 | Assisting in the installation of fluid power equipment |
| | SEMEM388 | Apply Total Productive Maintenance (TPM) |
| Engineered Systems Pathway Available NOS | SEMEM323 | Carrying out fault diagnosis on engineered systems |
| | SEMEM324 | Maintaining mechanical equipment within an engineered system |
| | SEMEM325 | Maintaining electrical equipment within an engineered system |
| | SEMEM326 | Maintaining fluid power equipment within an engineered system |
| | SEMEM327 | Maintaining process controller equipment within an engineered system |
| | SEMEM328 | Carrying out preventative planned maintenance on engineered systems |
| | SEMEM310 | Carrying out condition monitoring of plant and equipment |
| | SEMEM383 | Assisting in the installation equipment to produce an engineered system |
| | SEMEM388 | Apply Total Productive Maintenance (TPM) |

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| Services Maintenance Pathway Available NOS | SEM329 | Reading and extracting information from service drawings and specifications |
| | SEM330 | Carrying out fault diagnosis on services and systems |
| | SEM331 | Maintaining fresh water distribution systems and equipment |
| | SEM332 | Maintaining waste/foul water distribution systems and equipment |
| | SEM333 | Maintaining workplace environmental control systems |
| | SEM334 | Maintaining emergency power generation equipment |
| | SEM335 | Maintaining heating and ventilation systems |
| | SEM336 | Maintaining air conditioning and ventilation systems |
| | SEM337 | Maintaining gas distribution systems and equipment |
| | SEM338 | Maintaining compressed air systems and equipment |
| | SEM339 | Maintaining process control systems |
| | SEM340 | Maintaining instrumentation and control systems |
| | SEM341 | Maintaining industrial refrigeration equipment |
| | SEM342 | Maintaining environmental control equipment |
| | SEM343 | Carrying out preventative planned maintenance on services systems and equipment |
| | SEM372 | Maintaining medical device and surgical instrument decontamination |
| | SEM373 | Maintaining medical gas pipeline systems and equipment |
| | SEM310 | Carrying out condition monitoring of plant and equipment |
| | SEM384 | Assisting in the installation of engineering services equipment |
| | SEM388 | Apply Total Productive Maintenance (TPM) |

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| Lift Servicing Pathway Available NOS | SEM344 | Carrying out fault diagnosis on lifts |
| | SEM345 | Inspecting and servicing lift equipment |
| | SEM346 | Checking lift function |
| | SEM347 | Rectifying faults in lifts |

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|---|--------|---|
| Lift Repair Pathway Available NOS | SEM344 | Carrying out fault diagnosis on lifts |
| | SEM346 | Checking lift function |
| | SEM347 | Rectifying faults in lifts |
| | SEM348 | Repairing/replacing lift doors, chains, ropes and equipment |

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| Escalator Repair and Service pathway Available NOS | SEM349 | Carrying out fault diagnosis on escalators |
| | SEM350 | Rectifying faults in escalators |
| | SEM351 | Inspecting and servicing escalators |
| | SEM352 | Testing and reinstating escalator installations |

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|---|--------|---|
| Communication Electronics Pathway Available NOS | SEM316 | Carrying out fault diagnosis on electronic equipment and circuits |
| | SEM353 | Carrying out fault diagnosis on communication electronic systems |
| | SEM317 | Testing electronic equipment and circuits |
| | SEM354 | Testing communication-electronic systems |
| | SEM318 | Repairing electronic equipment |
| | SEM355 | Repairing communication-electronic systems |
| | SEM356 | Carrying out preventative planned maintenance on communication-electronic systems |
| | SEM357 | Modifying communication-electronic systems |
| | SEM358 | Configuring communication-electronic systems |
| | SEM359 | Installing communication-electronic systems |

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|------------------|--------|---|
| Servicing | SEM360 | Carrying out fault diagnosis on medical equipment |
| | SEM361 | Testing medical equipment |

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|----------------------------------|---------------|---|
| Medical Equipment Pathway | SEM362 | Carrying out scheduled servicing on medical equipment |
| | SEM363 | Servicing cardiovascular equipment |
| | SEM364 | Servicing physiological monitoring and infusion equipment |
| | SEM365 | Servicing anaesthetic and ventilation equipment |
| | SEM366 | Servicing operating theatre and surgical equipment |
| | SEM367 | Servicing medical imaging equipment |
| | SEM368 | Servicing laboratory equipment |
| | SEM369 | Servicing dental equipment |
| | SEM370 | Servicing medical therapeutic equipment |
| | SEM371 | Servicing mechanical and electromechanical assistive technology equipment |
| | SEM386 | Servicing radiotherapy equipment |
| | SEM387 | Servicing clinical computing equipment |
| | Available NOS | |

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| Instrumentation and Control Pathway | SEM374 | Carrying out fault diagnosis on instrumentation and control equipment and circuits |
| | SEM375 | Maintaining instrumentation and control equipment and circuits |
| | SEM376 | Carrying out preventative planned maintenance on instrumentation and control |
| | SEM377 | Repairing/overhauling instrumentation and control equipment |
| | SEM378 | Testing and calibrating instrumentation and control equipment and circuits |
| | SEM385 | Assisting in the installation of instrumentation and control equipment |
| | SEM388 | Apply Total Productive Maintenance (TPM) |
| | Available NOS | |

Appendix 2

Qualifications - Apprentices need to complete:

One Competency qualification and **One** Knowledge Certificate

| Competency | | Knowledge (Technical Certificate) | |
|--|------------|---|------------|
| Title | QAN | Title | QAN |
| <p>This qualification allows candidates to achieve PEO Level 2 foundation training if required or not already achieved by a Traineeship)</p> | | | |
| EAL Level 3 NVQ Extended Diploma in Engineering Maintenance | 600/2084/2 | EAL Level 3 Certificate in Engineering Technologies | 601/5800/1 |
| | | or | |
| Pearson Level 3 NVQ Extended Diploma in Engineering Maintenance | 601/2543/3 | EAL Level 3 Diploma in Engineering Technologies | 601/5801/3 |
| | | or | |
| City & Guilds Level 3 NVQ Extended Diploma in Engineering Maintenance | 601/0079/5 | EAL Level 3 Diploma in Engineering Technologies | 601/5801/3 |
| | | or | |
| | | EAL Level 3 Extended Diploma in Engineering Technologies | 601/5802/5 |
| | | or | |
| <p>OR this qualification for use in the framework by older apprentices aged 25 years and above</p> | | | |
| EAL Level 3 NVQ Diploma in Engineering Maintenance | 501/0544/9 | EAL Level 3 Technical Extended Diploma in Engineering Technologies | 603/0564/2 |
| | | or | |
| City & Guilds Level 3 NVQ Diploma in Engineering | 501/0458/5 | Pearson BTEC Level 3 Diploma in Advanced Manufacturing Engineering (Development | 601/9054/1 |

Maintenance

Pearson Level 3 NVQ
Diploma in Engineering Maintenance 501/0631/4

EAL SVQ 3 Engineering Maintenance at SCQF Level 6 (can be used by apprentices aged 16 years and over) GL2M 23

Technical Knowledge)

or

Pearson BTEC Level 3 Extended Diploma in Advanced Manufacturing Engineering (Development Technical Knowledge) 601/906 0/7

or

City & Guilds Level 3 Diploma in Engineering 600/0882/9

or

City & Guilds Level 3 Advanced Technical Certificate in Engineering 601/4535/3

or

City & Guilds Level 3 Advanced Technical Diploma in Engineering 601/4507/9

or

City & Guilds Level 3 Advanced Technical Extended Diploma in Engineering 601/4506/7