



# Level 3 Diploma in Advanced Manufacturing and Engineering Product Design and Development Technician (Development Competence)

## Qualification Specification

### Overview

This qualification has been developed to provide learners with a skills and knowledge they will need to carry out the role of a Product Design and Development Technician.

It covers the relevant H&S requirements to ensure that all aspects of the Product Design and Development Technician role can be carried out safely.

### Typical Job

Product Design and Development Technician

Qualification code:	603/0926/X
Level:	3
GL:	1500
TQT:	1620
Minimum learning age:	16

Issue: B



## Purpose of qualification

### What is this qualification?

This qualification is a competency qualification which sits on the National Qualification Framework (NQF) and has been approved by the Advanced Manufacturing and Engineering Sector employer groups which is made up a range of employers, providers and professional institutions.

The qualification focuses on the skills, knowledge and behaviours required to achieve the development phase requirements of relevant apprenticeship standards. This arrangement ensures that when the learner completes the qualification they will have gained knowledge and practical experience of some of the situations that they could face within the occupational sector in which it is being delivered.

It covers specific skills knowledge and behaviours of a range of engineering disciplines which have been developed in consultation with engineering industry specialists and training providers to ensure that it meets the needs of industry employers and learners.

### What does this qualification cover?

The content and structure of this qualification has been developed to provide the specific level of skills, knowledge and behaviours required to be achieved and assessed to demonstrate full occupational competence in the Development Phase of the apprenticeship. The qualification Units are listed in Section 3.

The qualification has a min **1,500** GL (hours) and **1,620** TQT.

The GL (hrs) values can include the following examples in line with regulatory requirements (this is not an exhaustive list and other examples could be used as outlined in regulatory guidance):

Supervised Teaching and Learning and Supervised Work-based Learning. All forms of assessment which takes place under immediate guidance or supervision of an appropriate individual (Lecturer, Supervisor, Tutor, Mentor, etc.), including where the assessment is competence based and may be turned into a learning opportunity.

- Supervised E-Learning, Oral and written questioning, Workplace induction.

**Supervised work:** Student works under supervision of employer/direct supervisor.

**Final assessment:** Student is supervised by employer/direct supervisor during the assessment.

## Who is this qualification for?

- Learners who are working towards a relevant apprenticeship standard.
- Learners who are looking to advance to the development phase of a relevant apprenticeship standard.

## Who supports the qualification?

This qualification is:

- Accredited by Ofqual at level 3.
- Supported by Enginuity.
- Supported by Advanced Manufacturing and Engineering Sector.

## What could this qualification lead to?

### Typical job roles include:

- Product Design and Development Technician.
- This qualification will provide progression onto other suitable and appropriate level 3 and level 4 Engineering qualifications.

## Entry requirements

Learners must be at least 16 years old. There are no formal entry requirements for this qualification; however centres should ensure that the learners have the potential to achieve this qualification. Learners must have the minimum levels of literacy and numeracy to complete the learning outcomes and the external assessment.

Centres should make learners with particular requirements aware of the content of the qualification and they should be given every opportunity to successfully complete the qualification. EAL will consider any reasonable suggestions for, and from, those with disabilities that would help them to achieve the learning outcomes without compromising the standards required.

When used as part of an apprenticeship standard, apprentices must have achieved the requirements of the foundation phase of the apprenticeship in line with the apprenticeship standard they are working towards.

## How is the qualification achieved?

The qualification is achieved when all the necessary units have been completed. The centre will then be able to apply for the learner's certificate of achievement. The learners will also receive a certificate of unit credit, listing all the units they have achieved.

## What will be assessed?

This qualification is gained when all the performance, skills, knowledge and behaviours have been demonstrated across the assessment criteria for each unit selected.

The assessment criteria within the Units of Competence have been specifically developed to cover a wide range of activities relevant to the role carried out by a Product Design and Development Technician. The evidence produced for the units will, therefore, depend on the skills and knowledge required by an employer and specified in the Apprentices Training Plan.

## Grading criteria

This qualification is not graded, learners can achieve a Pass or be Referred.

To achieve a pass, learners must be able to demonstrate their performance, skills, knowledge and behaviours across all units mandatory and optional units.

## How will it be assessed?

**Performance evidence** must be a product of the Apprentices work, such as items that have been produced or worked on, plans, charts, reports, standard operating procedures, documents produced as part of a work activity, records or photographs of the completed activity together with evidence of the way the Apprentice carried out the activities, such as witness testimonies, assessor observations or authenticated Apprentice reports of the activity undertaken.

**Knowledge and understanding** are key components of competent performance, but it is unlikely that performance evidence alone will provide enough evidence in this area. Where the Apprentices knowledge and understanding is not apparent from performance evidence, it must be assessed by other means and be supported by suitable evidence.

## Structure

This qualification can be obtained by the learner by completing all **three** mandatory units plus a minimum of **four** optional units.

**Mandatory Units:** *All three mandatory units must be completed*

EAL Code	Unit Title	GL(hrs)	Ofqual Code
AUEC3-001	Complying with Statutory Regulations and Organisational Safety Requirements	13	Y/615/3996
AUEC3-002	Using and Interpreting Engineering Data and Documentation	13	D/615/3997
AUEC3-003	Working Efficiently and Effectively in Advanced Manufacturing and Engineering	42	K/615/3999

**Optional Units:**

*A minimum of **four** optional units must be completed from the following:*

EAL Code	Unit Title	GL(hrs)	Ofqual Code
AUEC3-014	Carrying Out Condition Monitoring of Plant and Equipment	371	R/615/4001
AUEC3-020	Producing Off-line Programs for Programmable Logic Controller Equipment	819	D/615/4003
AUEC3-021	Producing Operating Programs for Industrial Robots	819	H/615/4004
AUEC3-023	Producing Mechanical Engineering Drawings Using Computer Aided Techniques	1477	K/615/4005
AUEC3-024	Producing Engineering Drawings/Models Using 3D Computer Aided Techniques	1477	M/615/4006
AUEC3-025	Producing Electrical Engineering Drawings Using Computer Aided Techniques	1477	T/615/4007
AUEC3-026	Producing Electronic Engineering Drawings Using Computer Aided Techniques	1477	A/615/4008
AUEC3-027	Producing Fabrication/Structural Engineering Drawings Using Computer Aided Techniques	1477	F/615/4009
AUEC3-028	Producing Fluid Power Engineering Drawings Using Computer Aided Techniques	1477	T/615/4010
AUEC3-029	Producing Engineering Systems/Services Drawings Using Computer Aided Techniques	1477	A/615/4011
AUEC3-030	Inspecting Mechanical Products	1400	L/615/4014
AUEC3-031	Inspecting Components Using Co-ordinate Measuring Machines (CMM)	1379	D/615/4017
AUEC3-032	Inspecting Fabricated Components and Structures	1400	K/615/4022
AUEC3-033	Carrying Out Visual Inspection of Welded Fabrications	1400	K/615/4019
AUEC3-034	Inspecting and Testing Electrical Products	1400	M/615/4023
AUEC3-035	Inspecting and Testing Electronic Products	1400	T/615/4024
AUEC3-036	Checking and Calibrating Mechanical Inspection Equipment	1372	A/615/4025
AUEC3-037	Checking and Calibrating Electrical and Electronic Test Equipment	1372	F/615/4026
AUEC3-038	Checking and Calibrating Process Control Instrumentation	1372	J/615/4027

## Optional Units: Continued

AUEC3-039	Preparing Mechanical Testing Equipment	679	L/615/4028
AUEC3-040	Carrying Out Mechanical Testing	679	R/615/4029
AUEC3-041	Analysing and Interpret the Results of Mechanical Tests	679	J/615/4030
AUEC3-042	Providing Operational Support for Computer Control Programs	518	R/615/4032
AUEC3-043	Loading and Proving Computer Control Programs	217	Y/615/4033
AUEC3-044	Producing Operating Programs for Co-ordinate Measuring Machines (CMM)	819	D/615/4034
AUEC3-045	Producing Off-line Programs for CNC Laser Profiling Machines	819	K/615/4036
AUEC3-046	Producing Off-line Programs for CNC Fabrication Machines	819	T/615/4038
AUEC3-047	Producing Off-line Programs for CNC Turning Machines	819	A/615/4039
AUEC3-048	Producing Off-line Programs for CNC Milling Machines	819	M/615/4040
AUEC3-049	Producing Off-line Programs for CNC Grinding Machines	819	T/615/4041
AUEC3-050	Producing Off-line Programs for CNC Gear Cutting Machines	819	A/615/4042
AUEC3-051	Producing Off-line Programs for CNC Electro-Discharge Machining	819	F/615/4043
AUEC3-052	Producing Off-line Programs for CNC Boring Machines	819	L/615/4045
AUEC3-053	Producing Off-line Programs for CNC Machining Centres	819	R/615/4046
AUEC3-054	Resolving Engineering or Manufacturing Support Problems	378	Y/615/4047
AUEC3-055	Planning Engineering Activities	378	M/615/4054
AUEC3-056	Implementing Engineering Activities	378	A/615/4056
AUEC3-057	Monitoring Engineering Activities	378	Y/615/4064
AUEC3-058	Producing Technical Information for Engineering Activities	378	D/615/4065
AUEC3-059	Obtaining Resources for Engineering Activities	378	H/615/4066
AUEC3-060	Obtaining and Controlling Materials for Engineering Activities	378	K/615/4067
AUEC3-061	Providing Technical Sales and Marketing Support for Engineering Activities	378	M/615/4068
AUEC3-062	Implementing Quality Control Systems and Procedures in an Engineering Environment	378	T/615/4069
AUEC3-063	Scheduling Engineering Activities	378	K/615/4070
AUEC3-064	Determining Engineering Requirements for the Supply of Products or Services	378	M/615/4071
AUEC3-065	Carrying Out Fault Diagnosis on Engineering Plant and Equipment	476	T/615/4072
AUEC3-066	Supporting Logistics Operations in an Engineering Manufacturing Environment	378	Y/615/4078

## Optional Units: Continued

AUEC3-067	Providing Technical Advice and Guidance on Engineering Activities	378	F/615/4091
AUEC3-068	Carrying Out Project Management of Engineering Activities	378	T/615/4119
AUEC3-069	Developing and Maintaining Effective Customer Relationships	182	F/615/4124
AUEC3-070	Handing Over and Exchanging Responsibility for Control of Engineering Activities	182	D/615/4129
AUEC3-071	Carrying Out Health and Safety Risk Assessments on Engineering Activities	378	Y/615/4145
AUEC3-072	Producing Contractual Arrangements to Supply or Procure Goods or Services for Engineering Activities	378	J/615/4173
AUEC3-073	Using and Maintaining Business Procedures and Protocols in an Engineering Environment	378	Y/615/4176
AUEC3-074	Applying Workplace Organisation Techniques	126	H/615/4181
AUEC3-075	Applying Continuous Improvement Techniques (Kaizen)	161	A/615/4185
AUEC3-076	Developing Visual Management Systems	119	R/615/4189
AUEC3-077	Creating Flexible Production and Manpower Systems	98	K/615/4196
AUEC3-078	Carrying Out Problem Solving Activities	107	H/615/4200
AUEC3-079	Analysing and Selecting Parts for Improvement	168	M/615/4202
AUEC3-080	Applying Lead Time Analysis	119	L/615/4207
AUEC3-081	Carrying Out Value Stream Mapping (VSM)	154	R/615/4208
AUEC3-082	Applying Set-up Reduction Techniques	168	L/615/4210
AUEC3-083	Applying Total Productive Maintenance (TPM)	133	R/615/4211
AUEC3-084	Applying Flow Process Analysis	168	Y/615/4212
AUEC3-085	Applying Policy Deployment (Hoshin Kanri, Quality Operating Systems, Business Plan Deployment)	119	K/615/4215
AUEC3-086	Applying Value Management (Value Engineering and Value Analysis)	133	A/615/4218
AUEC3-087	Creating Standard Operating Procedures	105	K/615/4229
AUEC3-088	Applying Six Sigma Methodology to a Project	168	D/615/4230
AUEC3-089	Carrying Out Six Sigma Process Mapping	168	H/615/4231
AUEC3-090	Applying Basic Statistical Analysis	126	K/615/4232
AUEC3-091	Applying Failure Modes and Effects Analysis (FMEA)	119	M/615/4233
AUEC3-092	Applying Mistake/Error Proofing (Poka Yoke)	119	K/615/4294
AUEC3-093	Carrying Out Statistical Process Control (SPC) Procedures	105	D/615/4308
AUEC3-094	Applying Six Sigma Metrics to a Project	119	F/615/4317
AUEC3-095	Producing a Characteristic Selection Matrix	119	J/615/4318

## Optional Units: Continued

AUEC3-096	Carrying Out Measurement Systems Analysis (MSA)	119	L/615/4319
AUEC3-097	Carrying Out Capability Studies	168	F/615/4320
AUEC3-098	Producing Multi-Variance Charts	119	J/615/4321
AUEC3-099	Applying Hypothesis Testing	119	R/615/4323
AUEC3-100	Assembling Sub-Assembly Units to Vehicles	525	Y/615/4324
AUEC3-101	Assembling Power Plant Units	525	M/615/4331
AUEC3-102	Assembling the Front Suspension Sub-Assembly	525	F/615/4334
AUEC3-103	Assembling Braking Systems to Vehicles	525	J/615/4335
AUEC3-104	Assembling Vehicle Body Sub-Assemblies	581	R/615/4337
AUEC3-105	Assembling Body Sub-Assemblies to Produce a Vehicle	679	Y/615/4338
AUEC3-106	Preparing Vehicle Body Surfaces for Finishing	581	D/615/4339
AUEC3-107	Spraying Vehicle Body Surfaces	777	F/615/4351
AUEC3-108	Flattening and Polishing Vehicle Bodies	581	T/615/4055
AUEC3-109	Assembling and Fitting Wiring Looms to Vehicles	525	H/615/4312
AUEC3-110	Assembling Electrical and Electronic Equipment to Vehicles	581	H/615/4309
AUEC3-111	Diagnosing and Rectifying Faults in Vehicle Electrical and Electronic Systems	560	L/615/4305
AUEC3-112	Trimming of Body Components for Vehicles	329	A/615/4302
AUEC3-113	Machining and Hand Sewing of Vehicle Trim Components	427	D/615/4289
AUEC3-114	Assembling Trim Components to Vehicles	280	F/615/4284
AUEC3-115	Making Vehicle Trim Prototypes and Patterns	476	T/615/4279
AUEC3-116	Manufacturing Vehicle Composite Mouldings Using Pre-Preg Laminating Techniques	840	L/615/4272
AUEC3-117	Assembling Composite Vehicle Components	840	J/615/4268
AUEC3-118	Bonding Vehicle Composite Components	280	H/615/4262
AUEC3-119	Trimming Vehicle Composite Mouldings Using Hand Tools	434	D/615/4261
AUEC3-120	Repairing Defects in Vehicle Composite Mouldings	749	D/615/4258
AUEC3-121	Applying Finishes to Vehicle Composite Mouldings	434	Y/615/4257
AUEC3-122	Marking Out Components for Experimental Vehicle Engineering	189	R/615/4256
AUEC3-123	Using Hand Fitting Techniques to Produce Components for Experimental Vehicle Engineering	525	L/615/4255
AUEC3-124	Assembling and Disassembling Mechanical Equipment on Experimental Vehicles	679	J/615/4254

## Optional Units: Continued

AUEC3-125	Assembling and Disassembling Electrical and Electronic Equipment on Experimental Vehicles	679	F/615/4253
AUEC3-126	Fabricating Structural Components for Experimental Vehicle Engineering	581	A/615/4252
AUEC3-127	Machining Components for Experimental Vehicle Engineering	679	T/615/4251
AUEC3-128	Cutting and Shaping Sheet Metal for Experimental Vehicle Engineering	581	M/615/4250
AUEC3-129	Assembling Structures for Experimental Vehicle Engineering Using a Manual/Semi-Automatic Welding Process	581	A/615/4249
AUEC3-130	Assembling Components for Experimental Vehicle Engineering by Resistance Spot Welding	56	T/615/4248
AUEC3-131	Carrying Out Fault Diagnosis on Experimental Vehicles	511	F/615/4172
AUEC3-132	Conducting and Monitoring Static Tests on Vehicles	581	T/615/4170
AUEC3-133	Conducting and Monitoring Road Tests on Vehicles	581	F/615/4169
AUEC3-134	Removal and Fitting Fuel Systems to Prototype Engines for Test	630	A/615/4168
AUEC3-135	Installing Electrical/Electronic Engine/Transmission Control Units to Prototype Vehicles	679	T/615/4167
AUEC3-136	Setting Up and Testing Prototype Vehicle Electrical/Electronic Engine/Transmission Control Units	581	M/615/4166
AUEC3-137	Setting Up and Testing Prototype Vehicle Data Acquisition Systems	581	J/615/4142
AUEC3-138	Stripping and Rebuilding Prototype Engines for Test	728	J/615/4139
AUEC3-139	Building Prototype Engines for Test	679	A/615/4137
AUEC3-140	Testing Prototype Engines (Fixed Dynamometer)	581	M/615/4135
AUEC3-141	Testing Prototype Engines Installed in Vehicles	581	Y/615/4131
AUEC3-142	Dressing Prototype Engines for Test	630	R/615/4127
AUEC3-143	Producing Pattern, Corebox or Model Components using Woodworking Machines	581	J/615/4125
AUEC3-144	Producing Pattern, Corebox, or Model Components using Woodworking Hand Tools	679	T/615/4122
AUEC3-145	Setting CNC Machine Tools for Operation	679	K/615/4117
AUEC3-146	Producing Pattern, Corebox or Model Components Using CNC Machines	609	Y/615/4114
AUEC3-147	Installing Mechanical Equipment	1162	M/615/4104
AUEC3-148	Installing Electrical/Electronic Equipment	1162	H/615/4102
AUEC3-149	Installing Equipment to Produce an Engineered System	1211	D/615/4101
AUEC3-150	Commissioning Mechanical Equipment and Systems	1162	Y/615/4100
AUEC3-151	Commissioning Electrical/Electronic Equipment and Systems	1162	J/615/4092
AUEC3-152	Commissioning Engineered Systems	1211	A/615/4090
AUEC3-153	Testing Post-production Electronic Components and Circuits	434	J/615/4089



## Optional Units: Continued

AUEC3-154	Locating and Diagnosing Faults in Post-production Electronic Components and Circuits	448	F/615/4088
AUEC3-155	Preparing Facilities for Testing Electronic Components and Circuits	1162	A/615/4087
AUEC3-156	Mounting Electrical Components in Enclosures	532	T/615/4086
AUEC3-157	Wiring Electrical Components and Equipment in Enclosures	581	M/615/4085
AUEC3-158	Selecting and Preparing Materials and Components for Electrical Assembly	1162	K/615/4084
AUEC3-159	Setting Special-Purpose Machines for Production	889	H/615/4083
AUEC3-160	Assembling Mechanical Products	679	Y/615/4081
AUEC3-161	Fitting Electrical/Electronic Components to Mechanical Assemblies	581	R/615/4080
AUEC3-162	Checking that Completed Assemblies Comply with Specification	280	D/615/4079

### Note:

#### Optional unit selection requirements and barred combinations:

Only **one** of the CAD units AUEC3-023, 024, 025, 026, 027, 028, 029 may be undertaken as the apprentices' choice of optional units. However they can be undertaken as additional units if required by the employer.

Only **one** of the computer control programming units AUEC3-045, 046, 047, 048, 049, 050, 051, 052, 053 may be undertaken as the apprentices' choice of optional units. However they can be undertaken as additional units if required by the employer.

The **four** optional units are a minimum requirement, therefore employers may require their apprentices to achieve more units in order to meet their specific business needs or to meet minimum qualification GL (hrs).

The overall Guided Learning (GL) in hours for the mandatory and optional units must equate to a minimum of **1500 GL (hrs)**.

If the overall Guided Learning (GL) in hours for the mandatory and optional units does not equate to a minimum of **1500 GL (hrs)** then additional optional units will need to be selected to achieve a minimum of **1500 GL (hrs)**.

