Qualification specification

NCFE Level 1/2 Technical Award in Engineering
QN: 603/2963/4

This qualification is now withdrawn

Endorsed by

Society of Operations Engineers

Contents

Summary of changes

This section summarises the changes to this qualification specification since the last version.

Version	Publication Date	Summary of amendments
v1.0	September 2018	First publication
v1.1	November 2018	The following sentence in the Internal assessment summary has been amended from: *The **suggested** completion time for this internal synoptic project is 21 hours of supervised time* To: *The completion time for this internal synoptic project is 21 hours of supervised time.*
v2.0	December 2018	The first and second Internal submission attempts dates have changed from: *Recommended submission date for the first submission – March* To: ***Submission date for the first submission – by 31 March*** *Recommended submission date for the second submission – May* To: ***Submission date for the second submission – by 31 May***
v2.1	August 2019	p.15 the following wording has been removed: The paper will include: • 11 multiple-choice questions worth 11 marks in total • a varying number of short-answer questions each worth between one and 6 marks to a total of 38 marks • three 9-mark extended-response questions worth 27 marks.
v2.2	October 2019	Society of Operations Engineers endorsement information added.
v2.3	November 2019	Information regarding the wellbeing and safeguarding of learners added to Section 4 (page 70) Information regarding the aggregation methods and grade thresholds added to Section 2 (page 26)

v2.4	March 2020	iAchieve information removed.
v2.5	September 2020	The Modification list in the Tools, Equipment and Machines section (Unit 01 - Learning Outcome 5.1.2) has been updated.
v2.6	November 2020	Link to External Assessment Timetable updated (page 15)
v2.7	January 2021	The Modification list in the Tools, Equipment and Machines section (Unit 01 - Learning Outcome 5.1.2) has been updated.
v2.8	February 2022	Paragraph added in regarding external quality assurance for graded qualifications.
v2.9	June 2022	Further information added to the qualification structure and assessment section to confirm that unless otherwise stated in this specification, all learners taking this qualification must be assessed in English and all assessment evidence presented for external quality assurance must be in English. Information added to the entry guidance section to advise that registration is at the discretion of the centre, in accordance with equality legislation and should be made on the Portal. Information added to the support for centres section about how to access support handbooks.

Section 1

Qualification overview

Qualification overview

Introduction

We want to make your experience of working with NCFE as pleasant and easy as possible. This qualification specification contains everything you need to know about this qualification and should be used by everyone involved in the planning, delivery and assessment of the NCFE Level 1/2 Technical Award in Engineering.

All information contained in this specification is correct at the time of publishing.

To ensure that you're using the most up-to-date version of this qualification specification please check the issue date in the page headers against that of the qualification specification on the NCFE website.

If you advertise this qualification using a different or shortened name you must ensure that learners are aware that their final certificate will state the regulated qualification title of NCFE Level 1/2 Technical Award in Engineering.

About this qualification

This is a regulated qualification. The regulated number for this qualification is 603/2963/4.

This qualification is part of a suite of technical award qualifications that have been developed to meet the Department for Education's (DfE's) requirements for high-quality, rigorous qualifications which:

- have appropriate content for the learner to acquire core knowledge and practical skills
- allow the qualification to be graded
- provide synoptic assessment
- enable progression to a range of study and employment opportunities.

This qualification features on the DfE list of approved technical award qualifications for Key Stage 4 performance tables.

This qualification is endorsed by the Society of Operations Engineers and the Environment Agency.

Qualification structure and assessment

Qualification title			NCFE Level L1/2 Technical Award in Engineering	
Qualification Number (QN)			603/2963/4	
Level			Combined Level 1/2	
Guided Learning Hours (GLH)			120 plus 1 hour 30 minutes' external assessment	
Unit 01	48 GLH	40% Weighting	**Externally** assessed: **written examination** (externally marked)	**Unit grades:** NYA, L1P, L1M, L1D, L2P, L2M, L2D
Unit 02	72 GLH	60% Weighting	**Internally** assessed: **synoptic project*** (externally quality assured)	**Unit grades:** NYA, L1P, L1M, L1D, L2P, L2M, L2D
TOTAL	**120 GLH**	**100%**	**Overall qualification grades:** NYA, L1P, L1M, L1D, L1D*, L2P, L2M, L2D, L2D*	

* The internal synoptic project requires effective use of integrated knowledge, understanding and skills from across the full breadth of the qualification content.

The learning outcomes for each unit are provided in Section 3.

To achieve the NCFE Level 1/2 Technical Award in Engineering, learners must successfully demonstrate their achievement across the assessment objectives of the units as detailed in this qualification specification. Learners must achieve a minimum of a **Level 1 Pass** in the **internal** and **external assessment** to achieve the overall qualification.

A partial certificate can be requested for learners who don't achieve the full qualification but who have achieved at least one whole unit.

Grades are awarded for this qualification. For further information about grading and submitting these grades to NCFE, please see Section 2 and Section 4.

Unless stated otherwise in this qualification specification, all learners taking this qualification must be assessed in English and all assessment evidence presented for external quality assurance must be in English.

Total Qualification Time (TQT)

Total Qualification Time (TQT) represents an estimate of the total amount of time that a learner is expected to spend to achieve the qualification. TQT comprises the Guided Learning Hours (GLH) for the qualification and hours spent in private study, preparation for assessment and undertaking assessment. The table below shows the GLH listed separately and the overall TQT:

Qualification	GLH	TQT
NCFE Level 1/2 Technical Award in Engineering	120	157

Entry guidance

There are no specific recommended prior learning requirements for this qualification.

Registration is at the discretion of the centre, in accordance with equality legislation, and should be made on the Portal.

This qualification has been developed for learners aged 14–16 in schools and colleges but is also accessible for post-16 learners.

It is a vocational qualification equivalent to GCSE grades 8.5–1.

Centres are responsible for ensuring that this qualification is appropriate for the age and ability of learners. They need to make sure that learners can fulfil the requirements of the learning outcomes and comply with the relevant literacy, numeracy, and health and safety aspects of the qualification.

This Level 1/2 qualification is appropriate for learners who are looking to develop a significant core of knowledge and understanding and know how to apply these needed qualities to the engineering sector.

14–16 Purpose Statement

Who is this qualification for?

This qualification is designed for learners who want an introduction to engineering that includes a vocational and project-based element. The qualification will appeal to learners who wish to pursue a career in the engineering sector or progress to further study.

The NCFE Level 1/2 Technical Award in Engineering complements GCSE qualifications. It is aimed at 14–16 year olds studying Key Stage 4 curriculum who are interested in the engineering industry. This qualification is designed to match the rigour and challenge of GCSE study. The qualification is graded Level 1 Pass/Merit/Distinction/Distinction* and Level 2 Pass/Merit/Distinction/Distinction* (equivalent to GCSE grades 8.5–1). More information on grading can be found in Section 2.

This Level 1/2 qualification is appropriate for learners who are looking to develop a significant core of knowledge and understanding in engineering and be able to apply their learning.

This qualification has been designed to sit alongside the requirements of core GCSE subjects and is appropriate for learners who are motivated and challenged by learning through hands-on experiences and through content which is concrete and directly related to those experiences.

It is distinct from GCSE Engineering, as it encourages the learner to use knowledge and practical tools to focus on developing transferrable skills in practical engineering accompanied by the theoretical knowledge to help with progression into employment and onto further education.

The study of engineering is the application of maths and science to solve real world problems. This involves an understanding of the different disciplines of engineering and how they have shaped the products and projects of the modern world. Learners will be able to read technical drawings, select appropriate materials along with tools and machinery, and know how to carry out a practical task, working in a safe manner in line with current health and safety legislation.

The qualification focuses on an applied study of the engineering sector and learners will gain a broad understanding and knowledge of working in the sector.

What will the learner study as part of this qualification?

This qualification shows learners how to:

- understand engineering disciplines
- understand how science and maths are applied in engineering
- understand how to read engineering drawings
- understand properties and characteristics of engineering materials and know why specific materials are selected for engineering applications
- understand engineering tools, equipment and machines
- produce hand-drawn engineering drawings
- produce Computer Aided Design (CADD) engineering drawings
- demonstrate production planning techniques
- demonstrate processing skills and techniques applied to materials for a manufacturing task
- understand how to create, present and review art and design work

The disciplines that a learner will study within the qualification include:

- mechanical
- electrical and electronic
- aerospace
- communications
- chemical
- civil
- automotive
- biomedical
- software.

If you wish to offer an engineering discipline which does not appear in the above list, please contact our Quality Assurance team on 0191 239 8000 for further information.

What knowledge and skills will the learner develop as part of this qualification and how might these be of use and value in further studies?

Learners will develop skills and knowledge:

- in adapting their own ideas and responding to feedback
- in evaluating their own work
- analysing data and making decisions
- that are essential for the engineering sector, such as understanding how to read drawings; responding to data; independent working; working to deadlines; efficient use of resources
- practical application of tools and machinery, whilst adhering to health and safety legislation and guidance
- an appreciation of materials technology and applications.

The knowledge and skills gained will provide a secure foundation for careers in the engineering industry.

Which subjects will complement this course?

The following GCSE subject areas will complement this qualification by further broadening application of engineering skills in the context of engineering:

- design and technology
- manufacturing
- maths
- English
- science.

This list is not exhaustive and a range of other subject areas may also be appropriate.

This qualification is not part of a subject suite.

Progression opportunities - what could this qualification lead to?

Depending on the grade the learner achieves in this qualification, they could progress to Level 2 and Level 3 qualifications and/or GCSE/A Levels.

Learners who achieve at **Level 1** might consider progression to Level 2 qualifications post-16, such as:

- a GCSE in Engineering
- study at Level 2 in a range of technical routes that have been designed for progression to employment, apprenticeships and further study. An example might include the Level 2 Technical Certificate in Engineering. Technical certificate qualifications provide post-16 learners with the knowledge and skills they need for skilled employment or for further technical study.

Learners who achieve at **Level 2** might consider progression to Level 3 qualifications post-16 such as:

- Level 3 Applied General in Engineering. This qualification prepares learners for progression to higher education in the engineering sector
- Level 3 Technical Level National Foundation Diploma in Engineering. This qualification prepares learners for progression into employment or onto an apprenticeship through specialising in a technical occupation in the engineering sector. Technical Level qualifications provide post-16 learners with the knowledge and skills they need for skilled employment or for further technical study
- A Levels in Maths, Further Maths, Biology, Chemistry, Physics, and Design and Technology. These will support progression to higher education
- learners could progress into employment or onto an apprenticeship
- this qualification will also prepare learners for recruitment into the armed forces in the Army, Royal Air Force or the Royal Navy.

The understanding and skills gained through this qualification could be useful to progress onto an apprenticeship in the engineering sector through a variety of occupations which are available within sectors such as an Aerospace Software Development Engineer, Aircraft Maintenance Certifying Engineer, Automotive Engine Test Engineer and Food and Drink Engineer.

Section 2

Assessment and grading guidance

Assessment and grading guidance

Qualification structure

The following table provides an overview of the units, guided learning hours (GLH), unit weightings, types of assessment, unit grades and qualification grades available within this qualification.

Unit 01	48 GLH	40% Weighting	**Externally** assessed: **written examination**	**Unit grades:** NYA, L1P, L1M, L1D, L2P, L2M, L2D
Unit 02	72 GLH	60% Weighting	**Internally** assessed: **synoptic project***	**Unit grades:** NYA, L1P, L1M, L1D, L2P, L2M, L2D
TOTAL	**120 GLH**	**100%**	**Overall qualification grades:** NYA, L1P, L1M, L1D, L1D*, L2P, L2M, L2D, L2D*	

* The internal synoptic project requires effective use of integrated knowledge, understanding and skills from across the full breadth of the qualification content.

Learners must achieve a minimum of a **Level 1 Pass** in the external assessment and the internal assessment to achieve the overall qualification.

Assessment summary

This qualification has **two** assessments: **one** external written examination and **one** internal synoptic project.

External assessment	
Assessment method	**Description**
Externally set **written examination** **Externally marked**	**40%** of the technical award. Written examination: • 80 marks • 1 hour 30 minutes • a mixture of multiple-choice, short-answer and extended-response questions. The written examination will assess the learner's knowledge and understanding of content from Unit 01 and target assessment objectives AO1, AO2 and AO3.
External examination availability	The examination windows are expected in **March** and **November** every year; however, these are subject to change so please refer to the Assessment Window Guide available on our website. Learners will have **one** opportunity to resit.

Internal assessment	
Assessment method	**Description**
Externally set **synoptic project** **Internally graded** Externally quality assured	**60%** of the technical award. The completion time for this internal synoptic project is **21 hours** of supervised time. The synoptic project will assess the learner's ability to effectively draw together their knowledge, understanding and skills from across the whole vocational area. The synoptic project will target assessment objectives AO1, AO2, AO3, AO4 and AO5. The synoptic project will be externally set by NCFE, internally graded by the centre and externally quality assured by NCFE.
Internal synoptic project availability	The learner should not undertake the synoptic project assessment until **all teaching content** from Unit 01 and Unit 02 has been delivered. This is to ensure that learners are in a position to complete the synoptic project successfully. A different synoptic project brief will be released every **December**. Therefore learners must use the synoptic project brief released in the **December** of the academic session they wish to finish the overall qualification. Learners will have **one** opportunity to resubmit.

External assessment

The external assessment will be in the form of a written examination, which will assess the learner's knowledge and understanding of content from Unit 01.

A variety of assessment styles will be used, including multiple-choice, short-answer and extended-response questions. This will enable learners to demonstrate their breadth of knowledge and understanding of the subject and ensure achievement at the appropriate level, including stretch and challenge. Questions will be written in plain English and in a way that is supportive and accessible to all learners of all abilities.

As far as possible, real-world case studies and contexts which are relevant to the sector will be used. This is to engage and stimulate learners under examination conditions and to facilitate the drawing out of a wide range of knowledge and skills developed throughout their learning.

All questions will be compulsory, with available marks clearly identified. The written examination will be carefully constructed following a rigorous quality control process to ensure that the assessment is valid.

Synoptic assessment

Synoptic assessment is an important part of a high-quality vocational qualification because it shows that learners have achieved a holistic understanding of the sector and that they can make effective connections between different aspects of the subject content and across the breadth of the assessment objectives in an integrated way. The Department for Education (DfE) has consulted with Awarding Organisations and agreed the following definition for synoptic assessment:

*"**A form of assessment which requires a candidate to demonstrate that s/he can identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories, and knowledge from across the whole vocational area, which are relevant to a key task.**"*

Synoptic assessment enables learners to show that they can transfer knowledge and skills learnt in one context to resolve problems raised in another. To support the development of a synoptic approach, the qualification encourages learners to make links between elements of the course and to demonstrate how they have integrated and applied their increasing knowledge and skills.

As learners progress through the course, they will use and build upon knowledge and skills learnt across units. The internal synoptic project will test the learners' ability to respond to a real-world situation.

Assessment objectives

The assessment of our technical awards is mapped against assessment objectives (AOs). These AOs provide a consistent framework for learners and are applied synoptically, allowing learners to show their knowledge, understanding and skills from across the full breadth of the qualification.

The AOs that will be assessed against the content in our technical awards are:

AO1	**Recall knowledge and show understanding** The emphasis here is for learners to recall and communicate the fundamental elements of knowledge and understanding.
AO2	**Apply knowledge and understanding** The emphasis here is for learners to apply their knowledge and understanding to real-world contexts and novel situations, including finding creative solutions.
AO3	**Analyse and evaluate knowledge and understanding** The emphasis here is for learners to develop analytical thinking skills to make reasoned judgements and reach conclusions.
AO4	**Demonstrate and apply technical skills and processes** The emphasis here is for learners to demonstrate the essential technical skills relevant to the vocational sector, by applying the appropriate processes, tools and techniques.
AO5	**Manage and evaluate the project** The emphasis here is for learners to develop the necessary skills of forethought, time management, self-reliance and self-reflection.

Assessment objective weightings

The table below shows the approximate weightings for each of the AOs in the technical award assessments.

AOs	External assessment (approx. %)	Internal assessment (approx. %)	Overall weighting (approx. %)
AO1	18%	6%	24%
AO2	14%	9%	23%
AO3	8%	12%	20%
AO4		27%	27%
AO5		6%	6%
Overall weighting of assessments	**40%**	**60%**	**100%**

External assessment

The table below shows the approximate weightings and the raw marks available for each AO in the external assessment. It is based on an 80-mark external assessment.

AOs	External assessment (approx. %)	Raw marks available (approx.)
AO1	45%	36 marks
AO2	35%	28 marks
AO3	20%	16 marks
Total	**100%**	**80 marks**

Our technical awards are modular, which means that a learner can take and resit external assessments in different assessment windows. External assessments may vary slightly in levels of difficulty and therefore what represented a Level 2 Pass in one assessment window may not be appropriate in the following assessment window.

To resolve this issue, we convert raw marks to uniform marks. The Uniform Mark Scale (UMS) also allows us to account for the relative weighting of the assessment to the qualification as a whole. The UMS for the external assessment is shown below.

Grade	UMS Marks
Level 2 Distinction	138–160
Level 2 Merit	115–137
Level 2 Pass	92–114
Level 1 Distinction	70–91
Level 1 Merit	47–69
Level 1 Pass	24–46
NYA	0–23

In order to achieve the external assessment unit, learners must achieve an overall grade of a Level 1 Pass.

The raw mark grade boundaries are set after each assessment window. NCFE sets these boundaries judgementally, following both qualitative and quantitative analysis, and then converts them to UMS. For example:

Assessment Window 1 - The raw mark grade boundary for a Level 2 Pass has been judged to be at 48 marks and a Level 2 Merit at 56 marks.

Grade	Raw Mark	UMS Mark
Level 2 Merit	56	115
Level 2 Pass	55	112
	54	109
	53	106
	52	104
	51	101
	50	98
	49	95
	48	92

Assessment Window 2 - The raw mark grade boundary for a Level 2 Pass has been judged to be at 50 marks and a Level 2 Merit at 58 marks.

Grade	Raw mark	UMS mark
Level 2 Merit	58	115
Level 2 Pass	57	112
	56	109
	55	106
	54	104
	53	101
	52	98
	51	95
	50	92

Although the raw mark grade boundaries in Assessment Window 1 and Assessment Window 2 are different, they have the same value in terms of UMS marks when contributing to the qualification as a whole.

NCFE will publish the raw mark grade boundaries following the completion of each assessment window.

Internal assessment

Assessment objectives

The table below shows the approximate weightings for each AO in the internal assessment.

AOs	Internal assessment (approx. %)
AO1	10%
AO2	15%
AO3	20%
AO4	45%
AO5	10%
Total	**100%**

Internal synoptic project brief

The internal assessment will be in the form of a synoptic project, which will be externally set by NCFE to ensure quality and rigour. A different synoptic project brief will be released each **December**, which will assess the learner in each of the AOs.

We will carefully map and design the synoptic project brief each year to ensure comparability in the level of difficulty.

A sample of a synoptic project brief and a synoptic project portfolio can be accessed on the qualification webpage.

Descriptors

Descriptors have been written for each AO. The descriptors are pitched at different levels in language and expectation and describe the learner's performance at that band.

Assessors will use the descriptors to determine the banding decision for each AO. This banding is based on the assessment of the final piece of work that the learner submits.

Each AO is weighted and contributes differently to the overall unit grade. This is explained further in the section 'Calculating the overall internal synoptic project grade'.

If the learner has insufficient evidence to meet the 'Band1' Pass criteria for any of the AOs, a grade of 'Not Yet Achieved' will be awarded for that AO.

The descriptors for each AO in the synoptic project are as follows:

AO1 Recall knowledge and show understanding	
Band	**Descriptors**
3	Learners recall and communicate a **wide range** of **comprehensive** engineering knowledge and understanding. Subject-specific terminology is used **accurately** and **consistently throughout** the project.
2	Learners recall and communicate **a range** of engineering knowledge and understanding. Subject-specific terminology is used **appropriately** on **occasion**.
1	Learners recall and communicate **basic** engineering knowledge and understanding. Subject-specific terminology is **basic** and **inconsistent**.
NYA	No rewardable material.

AO2 Apply knowledge and understanding	
Band	**Descriptors**
3	Learners **accurately** apply knowledge and understanding of maths, science and engineering theory, which is **relevant** to the context and situation.
2	Learners' application of knowledge and understanding of maths, science and engineering theory is **mostly accurate** and has **some relevance** to the context and situation.
1	Learners' application of knowledge and understanding of maths, science and engineering theory is of **limited accuracy** and **relevance** to the context and situation.
NYA	No rewardable material.

AO3 Analyse and evaluate knowledge and understanding	
Band	**Descriptors**
3	Learners **critically** analyse and evaluate engineering information, **systematically** judging and reaching **reasoned** and **valid** conclusions.
2	Learners **appropriately** analyse and evaluate engineering information, judging and reaching **suitable** conclusions.
1	Learners **respond simply** to engineering information and **provide comments**.
NYA	No rewardable material.

AO4 Demonstrate and apply technical skills and processes	
Band	**Descriptors**
3	Learners demonstrate and apply **relevant** engineering technical skills **effectively**, by applying and using **appropriate** engineering processes, tools and techniques. Learners demonstrate and apply engineering technical skills to develop a **complete** and **effective** solution/outcome.
2	Learners demonstrate and apply **mostly relevant** engineering technical skills by applying and using **mostly appropriate** engineering processes, tools and techniques. Learners demonstrate and apply engineering technical skills to develop a **mostly complete** and **working** solution/outcome.
1	Learners demonstrate and apply **basic** engineering technical skills by applying and using, **in a limited way,** engineering processes, tools and techniques. Learners demonstrate and apply engineering technical skills to develop a **partially complete** solution/outcome.
NYA	No rewardable material.

AO5 Manage and evaluate the project	
Band	**Descriptors**
3	Learners manage the project, including preparation and planning of **a wide range of** project stages, time frames and resources. Learners evaluate **a range of** their approaches, skills and accomplishments.
2	Learners manage the project, including preparation and planning of **a range of** project stages, time frames and resources. Learners evaluate **some of** their approaches, skills and accomplishments.
1	Learners manage the project, including preparation and planning of **a limited range** of project stages, time frames and resources. Learners **provide comments** on **some of** their approaches, skills and accomplishments.
NYA	No rewardable material.

Calculating the overall internal synoptic project grade

To calculate the overall grade for the internal synoptic project follow these 3 steps:

Step 1: Award a suitable band for each AO after selecting the descriptor that best reflects the learner's evidence, assessing the whole project in an integrated way.

The table below shows an example of the bands achieved by a learner for each AO in the internal synoptic project:

AO	Band
AO1	3
AO2	2
AO3	1
AO4	2
AO5	1

Step 2: Once the whole project has been assessed and appropriate bands for each AO selected, the overall grade for the internal synoptic project can be calculated using the learner grade calculator. The learner grade calculator can be accessed via our website on the qualification page.

The overall grade for the internal synoptic project is based on the combination of bands awarded for each AO and the relative weighting of each AO.

The example shown in the table in **Step 1** would be graded at a L2P overall.

Step 3: Once you have the overall grade for the internal synoptic project, this can be converted to a UMS score using the table below.

Grade	Max UMS 240 (60%)
L2D	240
L2M	206
L2P	171
L1D	137
L1M	103
L1P	69
NYA	0

For example, a L2P equates to 171 UMS.

The UMS score will be used to calculate the overall qualification grade. This is explained in the section 'Calculating the overall qualification grade'.

Internal submission attempts

Learners will only have **two** submission attempts:

First submission

Submission date for the first submission – by 31 March.

Learners should submit the project when all tasks have been completed. The Assessor will assess the project holistically, selecting the appropriate band for each Assessment Objective based on all evidence submitted.

Once the work has been assessed, graded and internally quality assured, the unit grade should be submitted to NCFE via the Portal. This will be classed as the first submission. The submitted unit grade will trigger the first external quality assurance visit. It is recommended that centres plan this visit into timetables and confirm the date with the External Quality Assurer at the earliest opportunity.

Ahead of the visit, the External Quality Assurer will select a number of learner portfolios from which to sample assessment decisions and determine whether the descriptors have been applied consistently and in accordance with the qualification specification. If the External Quality Assurer agrees with the assessment decisions they will bank all of the submitted grades. If the External Quality Assurer determines that the grading is too harsh, too lenient or inconsistent from one learner to the next, they will then reject the grades. In this situation, the centre would be required to assess, grade and internally quality assure all learner work again. The External Quality Assurer will then bank the resubmitted grades. Assessors can provide learners with feedback to support them with their second submission, should this be required.

Centres are strongly advised to arrange a date early for a second visit, with the External Quality Assurer, to ensure they receive the visit when they need it.

Second submission

Submission date for the second submission – by 31 May.

Learners will have **one** opportunity to resubmit the internal assessment after the first attempt and this will be classed as the **second** submission, for the same internal synoptic project assessment brief. The **second** submission should be used for learners who receive a 'Not Yet Achieved' for their first submission or wish to improve their grades.

Work revised and resubmitted by learners will again need to be assessed, graded, internally quality assured and submitted to NCFE, ready for a second visit from the External Quality Assurer.

If a learner receives a 'Not Yet Achieved' for the **overall unit grade** on the **second** submission, the learner **will not achieve the internal assessment and therefore will not achieve the overall qualification**.

Only once the internal assessment unit grade has been banked and the external assessment completed, will a centre be able to claim certification of the qualification for learners.

Calculating the overall qualification grade

Learners must achieve a minimum of a **Level 1 Pass** in both the external assessment and the internal assessment to achieve the overall qualification.

The relationship between uniform marks for the external and internal assessments and overall qualification grades is shown in the tables below.

Grade	External assessment UMS	Internal assessment UMS
Maximum UMS (400)	**160 (40%)**	**240 (60%)**
Level 2 Distinction	138–160	240
Level 2 Merit	115–137	206
Level 2 Pass	92–114	171
Level 1 Distinction	70–91	137
Level 1 Merit	47–69	103
Level 1 Pass	24–46	69
NYA	0–23	0

Overall qualification grade	UMS
Maximum UMS	**400**
Level 2 Distinction*	378–400
Level 2 Distinction	361–377
Level 2 Merit	304–360
Level 2 Pass	246–303
Level 1 Distinction*	207–245
Level 1 Distinction	190–206
Level 1 Merit	133–189
Level 1 Pass	93–132
NYA	0–92

To award a Level 2 Distinction*, a learner must achieve a grade of Level 2 Distinction in the external assessment and a grade of Level 2 Distinction in the internal assessment (total minimum of 378 UMS).

Examples:

Learner	External assessment	Internal assessment	Overall qualification grade
Learner A	24 UMS (L1P)	206 UMS (L2M)	230 UMS = **L1D***
Learner B	24 UMS (L1P)	240 UMS (L2D)	264 UMS = **L2P**
Learner C	20 UMS (NYA)	240 UMS (L2D)	**NYA**
Learner D	160 UMS (L2D)	0 UMS (NYA)	**NYA**

Grade calculator

To help Assessors calculate the internal assessment grades and overall qualification grades, we have created a grade calculator which is available on the qualification webpage under 'Support Materials'. This can be used by the learner to track their performance and targets set themselves or by the Teacher to use for the full learner group/class as a grade tracking log. This will also assist Assessors with benchmarking and target setting learners grades following completion of the external assessment.

***Whilst NCFE do not anticipate any changes to our aggregation methods or any overall grade thresholds there may be exceptional circumstances in which it is necessary to do so to secure the maintenance of standards over time. Therefore overall grade thresholds published within this qualification specification may be subject to change*.**

Section 3

Unit content and assessment guidance

Unit content and assessment guidance

This section provides details of the unit content of this qualification.

The unit summary provides:

- Unit title and number
- Unit summary
- Guided learning hours
- Level
- Mandatory/optional
- An indication of how the unit is assessed.
- Unit percentage weighting contribution towards the overall qualification grade.

The learning outcomes overview provides a summary of the learning outcomes for the whole unit.

Following the unit summary and learning outcome overview, there's detailed information for each unit containing:

- Learning outcomes
- Teaching content
- Suggested teaching approach to support delivery and assessment
- Learning resources available
- Useful websites.

Information in the teaching content section **must** be covered by the Teacher during the delivery of the unit and should be considered as **mandatory** teaching content.

Anything within the **suggested teaching approach** section is advisory and optional, and is intended to **provide useful advice and guidance to support delivery of the teaching content.**

The regulated unit number is indicated in brackets for each unit (eg M/100/7116). However, to make cross-referencing assessment and quality assurance easier, we've used a sequential numbering system in this document for each unit. The numbering system used within a unit refers to learning outcome, subject topic and teaching content: for example 1.1.1 refers to the learning outcome (first number **1**), the subject topic within that learning content (second number 1.**1**) and the teaching content within that learning outcome (third number 1.1.**1**). This will support signposting feedback and tracking.

For further information or guidance about the qualification please contact our Product Development team on 0191 239 8000.

Unit 01 Understanding the engineering world (H/616/8968)

Unit summary

Unit introduction	In this unit the learner will develop knowledge and understanding of how different engineering disciplines have shaped the world we live in. The learner will gain an understanding of how science and maths are applied to engineering solutions and how to read and interpret engineering drawings. The learner will have the opportunity to explore the properties and characteristics of materials in relation to why specific materials are selected for engineering applications. The learner will understand use of tools and equipment within the engineering industry.
Guided learning hours	48
Level	Combined L1/L2
Assessment	Externally assessed written examination
Unit weighting	40%

Learning outcomes overview

Learning outcomes
LO1: Understand engineering disciplines
LO2: Understand how science and mathematics is applied in engineering
LO3: Understand how to read engineering drawings
LO4: Understand the properties and characteristics of engineering materials and know why specific materials are selected for engineering applications
LO5: Understand engineering tools, equipment and machines

Learning outcome 1: Understand engineering disciplines

Teaching content

Information in this section must be covered by the Teacher during the delivery of the unit.
 	
In this learning outcome, the learner will know and understand how different engineering disciplines are applied to projects and products. The learner will know and understand the health and safety legislation that influences engineering.
 	
1.1 Engineering Disciplines through Projects and Products
In this learning outcome, the learner will understand different engineering disciplines and how their application has solved problems and shaped the modern world through projects and products.
 	
1.1.1 Engineering disciplines
The learner will understand how specific engineering projects and products have shaped the modern world. This must include:
• Mechanical
  ○ Hydraulics (Pascal's principle), gears and pulleys
• Electrical and electronic
  ○ power station, household appliances, integrated circuits
• Aerospace
  ○ aircraft, space vehicles, missiles
• Communications

- telephone, radio and fibre optic
- Chemical
  - pharmaceuticals, fossil fuels, food and drinks
- Civil
  - bridges, roads and railways
- Automotive
  - cars, motorcycles and trains
- Biomedical
  - prosthetics, medical devices and radiotherapy
- Software
  - applications, systems and computer programming.

1.2 The Health and Safety Legislation Governing Engineering

The learner will understand how the engineering industry complies with government legislation.

1.2.1 Health and safety legislation

The learner will know and understand the personal safety measures for each engineering discipline. This will include personal protective equipment and an understanding of the relevant health and safety requirements to ensure they comply with the following legislation. This must include:

- Health and Safety at Work Act etc
  - general responsibilities of employers to their employees
  - general responsibilities of employers and self-employed to persons other than their employees
  - general responsibilities of employees at work
- Personal Protective Equipment at Work regulations
  - eyes and ears – goggles, safety glasses, visors and ear protectors
  - head and face – hard hats, helmets, bump caps
  - respiratory – disposable filtering face-piece, full face respirators, breathing mask
  - hand and arm – gloves, gauntlets, mitts, armlets
  - clothing – disposable overalls, high visibility vest, aprons and boiler suits
  - footwear – safety boots with protective toe caps, gaiters, spats
- Manual Handling Operations Regulations
- Control of Substances Hazardous to Health (COSHH)
  - chemicals
  - fumes
  - dust
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)
  - report forms
  - reportable incidents
  - person responsible.

Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.

Suggested teaching approach

In this section, we provide useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

Delivery of this learning outcome could take place through the study of different engineering disciplines with references to the development of products and projects which have affected the way in which we interact with the modern world.

Suitable examples of products and projects should be selected to explore engineering over time, and Teachers should lead discussion of how engineering has developed to encompass a wide range of disciplines. Discussion could include how engineered products and projects have shaped the modern world and could make reference to local, national and international products and projects. This could be delivered through site visits, digital presentations and Teacher-led class discussion.

Delivery should explore how and why health and safety legislation has developed and how it is applied different engineering disciplines and projects. The learner should understand how and why legislation has been developed to ensure the safety of employees, employers and visitors to the workplace.

External visits/guest speakers:
It would be useful for the learner to review a commercial engineering environment, to understand health and safety in a practical setting. This could be undertaken with external site visits or through guest speakers.

Resources:
Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.legislation.gov.uk/ukpga/1974/37/contents
- www.hse.gov.uk/toolbox/ppe.htm
- www.hse.gov.uk/pubns/indg174.pdf
- www.hse.gov.uk/pubns/books/l23.htm
- www.hse.gov.uk/coshh/index.htm
- www.hse.gov.uk/riddor
- www.technologystudent.com
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com
- www.eng-tips.com
- www.design-technology.info/home.htm.

*See website disclaimer in Section 5 of this qualification specification

Learning outcome 2: Understand how science and mathematics is applied in engineering

Teaching content
Information in this section must be covered by the Teacher during the delivery of the unit. In this learning outcome the learner will understand the use of basic SI units of measurement and how mathematical and scientific equations are applied to the products and projects within various engineering disciplines. **2.1 Application of SI Units of Measurement** In this learning outcome the learner will understand how SI units of measurement are used in engineering products and projects. **2.1.1 SI units of measurement** • Current – ampere o microamp o milliamp o amp o kiloamp • Luminous intensity – candela o microcandela o millicandela o candela • Thermodynamic temperature – kelvin o kelvin o degrees Celsius (accepted for use within the SI) • Mass – kilogram o milligram o gram o kilogram • Length – metre o micrometre o millimetre o centimetre o metre o kilometre • Amount of substance – mole o nanomole o micromole o millimole o mole • Time – second o microsecond o millisecond o second o minute (accepted for use within the SI) o hour (accepted for use within the SI).

2.1.2 Application of basic SI units in projects and products

- Hydraulics (Pascal's principle), gears and pulleys
- Power stations, household appliances, integrated circuits
- Aircraft, space vehicles, missiles
- Telephone, radio and fibre-optic communications
- Pharmaceuticals, fossil fuels, food and drinks
- Bridges, roads and railways
- Cars, motorcycles and trains
- Prosthetics, medical devices and radiotherapy
- Applications, systems and computer programming.

2.2 Equations used to Describe and Calculate Energy, Forces and Motion, Electrical, Geometry

In this learning outcome the learner will understand how mathematical and scientific equations are used in engineering disciplines to calculate the properties of energy, forces and motion, electrical and geometry in the development of products and projects.

2.2.1 Equations for properties

- Energy
  - efficiency — efficiency (%) = (useful energy out ÷ total energy in) x 100
  - power — $P = E \div t$ — power = energy ÷ time
  - work done — $W = F \times d$ — work done = force x distance
- Forces and motion
  - speed — $s = d \div t$ — speed = distance ÷ time
  - acceleration — $a = (v-u) \div t$ — acceleration = change in velocity ÷ time
  - force — $F = m \times a$ — force = mass x acceleration
  - moment of force pivot — $m = F \times d$ — moment = force x perpendicular distance from
  - weight — $w = m \times g$ — weight = mass x gravity
  - momentum — $p = m \times v$ — momentum = mass x velocity
  - density — $d = m \div v$ — density = mass ÷ volume
  - pressure — $p = F \div A$ — pressure = force ÷ area
- Electricity
  - power — $P = V \times I$ — power = voltage x current
  - voltage — $V = I \times R$ — voltage = current x resistance
  - current — $I = P \div V$ — current = power ÷ voltage
  - resistance — $R = V \div I$ — resistance = voltage ÷ current
- Geometric
  - area - square — length of side^2
  - area - rectangle — length of side 1 x length of side 2
  - area - triangle — (length of base x height of triangle) ÷ 2
  - area - circle — π x radius^2
  - volume - cube — length of side^3
  - volume - pyramid — (1/3) x (base area) x height of pyramid
  - volume - cylinder — π x radius^2 x height of cylinder

2.2.2 Application of equations in projects and products

- Hydraulics (Pascal's principle), gears and pulleys
- Power stations, household appliances, integrated circuits
- Aircraft, space vehicles, missiles
- Telephone, radio and fibre-optic communications
- Pharmaceuticals, fossil fuels, food and drinks
- Bridges, roads and railways
- Car, motorcycles and trains
- Prosthetics, medical devices and radiotherapy
- Applications, systems and computer programming.

Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.

Suggested teaching approach

In this section, we provide some useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

Delivery of this learning outcome should take place through the study of basic SI units of measurement and equations, using examples of engineered products and projects to describe how mathematics and science are applied to develop engineering solutions.

The Teacher could talk the learner through each equation in context, eg acceleration in the design of a car, force in the building of a bridge, area of a site for building development or power in the efficiency of wind turbines. The Teacher should provide practical situations which the learner can relate and apply equations to. The learner should then consider situations and apply equations to conclude answers. This could be done through a site visit to a bridge, where the learner is given the facts about the bridge: length, height, average traffic volumes, typical weather conditions and speed limits. The learner could then discuss which equations may have been considered in the design and, using the information provided, produce an analysis.

External visits/guest speakers:
It would be useful for the learner to visit engineered project sites or engineering companies to be able to review products and projects to ascertain which equations may have been applied in the development stages.

Resources:
Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.technologystudent.com
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com
- www.eng-tips.com
- www.design-technology.info/home.htm.

*See website disclaimer in Section 5 of this qualification specification.

Learning outcome 3: Understand how to read engineering drawings

Teaching content
Information in this section must be covered by the Teacher during the delivery of the unit. In this learning outcome the learner will be able to read and interpret engineering drawings accurately. The learner will be able to understand specific drawing conventions used throughout the engineering industry, and the purpose of using British Standards. **3.1 Reading Engineering Drawings** **3.1.1 Drawing conventions** The learner must be able to read and understand all the elements which are included in an engineering drawing: • Lines o visible o hidden o centre o construction o dimension • Tolerance o + or – dimensioning o limits of size • Content of title block o author o drawing number o date o title o materials o scale o sheet number o system of measurement o projection • Scale o ratio • System of measurement o imperial and metric, conversion • Two-dimensional projection o first angle projection and symbol o third angle projection and symbol • Three-dimensional projection o axonometric, isometric o two-point perspective.

3.1.2 British Standards

- British Standard BS 8888
  - purpose of the standard
  - how it fits with the ISO standards
  - how the standard is applied to engineering drawings.

Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.

Suggested teaching approach

In this section, we provide useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

Delivery of this learning outcome should be supported by the use of example drawings of engineering products/projects from a range of engineering disciplines.

The learner should consider the impact that the quality of drawings could have on the manufacturing process of an engineered product. The learner should be encouraged to consider how an engineering drawing is used to communicate information from design to realisation within an engineering process and the possible effects of inaccuracies or missed information.

The learner should be able to read and understand all elements which are included in an engineering drawing: lines, tolerance, content of a title block, scale, system of measurement, projection. The learner should be able to understand the purpose of British Standard BS 8888 and the benefits of using a recognised standard for the communication of technical information in the engineering industry.

It would be beneficial for the learners to be given examples of engineering drawings alongside physical products to enable them to visualise and enhance understanding of two- and three-dimensional projection.

Resources:
Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.engineeringdrawing.org
- www.technologystudent.com
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com
- www.eng-tips.com
- www.design-technology.info.

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Learning outcome 4: Understand the properties and characteristics of engineering materials and why specific materials are selected for engineering applications

Teaching content
Information in this section must be covered by the Teacher during the delivery of the unit. In this learning outcome, learners will know and understand the properties and characteristics of materials and why they are selected for engineering products and projects. **4.1 Properties and Characteristics of Materials** Learners will understand how materials exhibit properties and characteristics in engineering products and projects. **4.1.1 Properties** • Chemical o heat of combustion o toxicity o oxidation state ● Electrical and magnetic o conductivity o resistance o magnetism ● Mechanical o strength o hardness o toughness o elasticity o plasticity o ductility o durability o malleability ● Optical o reflectivity o photosensitivity ● Thermal o flammability o thermal conductivity o melting point. **4.1.2 Characteristics** ● Aesthetics o colour o surface texture o finish effect ● Environmental impact o extraction of raw material o fossil fuels o sustainability

4.1.3 Materials

- Metals
  - ferrous alloys– mild steel, cast iron, stainless steel
  - pure non-ferrous – aluminium, copper, lead
  - non-ferrous alloys – brass, pewter, solder
- Polymers
  - thermoset – epoxy resin, urea formaldehyde, polyester resin
  - thermoplastic – acrylic, polypropylene, high-impact polystyrene
  - elastomers – rubber, neoprene, silicone
- Wood
  - hardwood – oak, ash and balsa
  - softwood – Scots pine, cedar, spruce
  - manufactured board – plywood, MDF, chipboard
- Ceramics
  - glass
  - cement
  - brick
  - diamond
  - pottery
- Composite
  - concrete
  - glass reinforced plastic (GRP)
  - carbon fibre reinforced polymer (CFRP).

Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.

Suggested teaching approach

In this section, we provide useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

Delivery of this learning outcome should take place through the handling and physical testing of the common engineering materials, to understand how materials perform when exposed to different demands.

Testing could be carried out by the Teacher, an expert, by presentation of testing on video, or by the learners themselves. By handling samples of different engineering materials, learners should be able to make judgements about their properties and characteristics.

Observations and testing should enable learners to draw conclusions as to why specific materials have been selected to perform different engineering functions.

Learners should consider a range of engineered products and be able to explain what they are made from and the properties and characteristics of the materials used in the manufacturing process. Learners should have an ability to draw conclusions about the suitability of the material and why materials have been selected for the manufacture of a variety of products. Products could include non-stick saucepan, a plug, safety gloves, a pair of spectacles, traditional wooden toy or a ballpoint pen.

Resources:
Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.technologystudent.com/
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com/
- www.eng-tips.com/
- www.design-technology.info/home.htm.

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Learning outcome 5: Understand engineering tools, equipment and machines

Teaching content
Information in this section must be covered by the Teacher during the delivery of the unit. In this learning outcome, learners will know and understand how tools, equipment and machines are safely and correctly used in the engineering industry for manufacturing. **5.1 Tools, Equipment and Machines** Learners will know and understand the health and safety, control measures, safe and correct use of common tools, equipment and machines used in the engineering industry for manufacturing including those used for marking-out, cutting, modifying, joining and finishing (as listed in 5.1.1 – 5.1.4). **5.1.1 Marking-out** • Scriber • Steel rule • Engineer's square • Marking gauge • Centre/dot punch • Calipers. **5.1.2 Modification** • Handheld Saw o Hacksaw o Junior hacksaw o Tenon o Coping • Electric Saw o Jigsaw o Scroll saw • Tin snips • Computer-Aided Manufacture laser cutter • Pilers • Hammer o Ball-peen o Claw • Cordless drill • Angle grinder • Router • Lathe • Pillar drill • Computer Numerical Control milling machine • Computer Numerical Control lathe • File.

5.1.3 Joining

- Riveting gun
- Screwdriver (Phillips, Torx, slotted, Pozidriv)
- Spanner
- Hot glue gun
- Soldering iron
- Nail gun
- Components (nails, screws, rivets, nuts and bolts).

5.1.4 Finishing

- Hand sander
- Disc sander
- Buffing wheel.

5.2 Safe and Correct Use

The learner will understand the safe and correct use of common tools, equipment and machines used in the engineering industry.

5.2.1 Control measures

- Training requirements
- Risk assessment
- Guards and safety zones
- Isolation and emergency power cut off
- Personal protective equipment (PPE) (eyes and ears, head and face, respirator, gloves, clothing, footwear)
- Extraction and ventilation for each piece of equipment.

Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.

Suggested teaching approach

In this section, we provide useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

Through delivery of this learning outcome the learner will be able to identify tools, equipment and machines commonly associated with an engineering workshop. The learner should understand what each of the tools, pieces of equipment and machines are used for and be able to state which are the most appropriate to select to perform a series of techniques on various materials for marking out, modifying, joining and finishing.

The learner should understand the safe and correct use of tools equipment and machines and be able to discuss the different training requirements and control measures.

Through the delivery of this learning outcome, before any practical tasks be undertaken the learner should demonstrate an ability to maintain a safe working environment. This should include ensuring their own personal safety, the safety of those in the same work space and the correct usage and storage of tools and equipment in line with appropriate health and safety legislation. The learner should undertake all practical tasks whilst maintaining a safe working environment, selecting the correct personal protective equipment, undertaking full training before using any tools or equipment and in the full knowledge of the safety rules of the workshop.

Resources:
Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.technologystudent.com
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com
- www.eng-tips.com
- www.design-technology.info.

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Unit 02 Skills and techniques in engineering (K/616/8969)

Unit summary

Unit introduction	The learner will produce hand drafted and Computer-Aided Design (CAD) engineering drawings. The learners will produce a production plan for the manufacture of an engineered product which will demonstrate the application of skills and techniques to prepare, mark-out, modify, join and finish materials.
Guided learning hours	72
Level	Combined L1/L2
Assessment	Internal synoptic project
Unit weighting	60%

Learning outcomes overview

Learning outcomes
LO1: Produce hand drawn engineering drawings
LO2: Produce Computer-Aided Design (CAD) engineering drawings
LO3: Demonstrate production planning techniques
LO4: Demonstrate processing skills and techniques applied to materials for a manufacturing task

Learning outcome 1: Produce hand drawn engineering drawings

Teaching content

Information in this section must be covered by the Teacher during the delivery of the unit.

In this learning outcome, the learner will be able to produce hand drawn engineering drawings. The learner will be able to apply specific drawing conventions and use layouts recognised within the engineering industry following British Standard.

1.1 Engineering Drawings

1.1.1 A freehand sketch

- Rendering
  - colour
  - direction of light
  - surface finish
  - texture
- Annotation
  - materials
  - manufacturing details
- Dimensions
  - angles
  - lengths
  - diameters.

1.1.2 An A3 hand drafted isometric drawing sheet

- Three-dimensional with 30° angle applied to the sides
- Scale
- Dimension
  - angles
  - lengths
  - diameters
- Unit of measurement
  - imperial
  - metric
- Lines
  - visible
  - hidden
  - centre
  - construction
- Tolerance
- Title block.

1.1.3 An A3 hand drafted orthographic drawing sheet

- First or third angle projection
- Scale
- Dimension
  - angles
  - lengths
  - diameters
- Unit of measurement
  - imperial
  - metric
- Lines
  - visible
  - hidden
  - centre
  - construction
- Tolerance
- Title block.

Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.

Suggested teaching approach

In this section, we provide some useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

Delivery of this learning outcome should give the learner the appropriate skills to produce hand-drawn engineering drawings. This learning outcome focuses on the ability to draw, not design, and does not assess the learner's creative ability.

The learner should have the ability to produce a freehand sketch without the need for drawing instruments other than pencils, eraser and sharpener. The drawing should make use of rendering techniques to show colour, surface finish and texture. All information required to manufacture the item should be included in the drawing. By handling existing products, the learner should understand how the direction of light cast over a product affects the interpretation of tone and shade applied to make the drawing more realistic.

The learner should also have an ability to produce formal engineering hand drafted A3 isometric and orthographic drawing sheets with consideration for British Standard BS 8888. The drawing sheets should evidence through application their understanding of scale, dimension (angles, lengths, and diameters), units of measurement (imperial or metric), construction lines, tolerance and a title block.

The drawing in isometric should be drawn in three dimensions and with a 30-degree angle at each side.

The drawing in orthographic could be drawn in either first or third angle, but must show the corresponding projection symbol or the angle of projection should be stated in the title block.

The learner may produce the hand drafted A3 isometric and/or orthographic drawing sheets making use of drawing instruments (eg drawing board, T-square, ellipse stencil, French curves, compasses, IsoSketch, set square, protractor).

Resources:
Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.engineeringdrawing.org
- www.technologystudent.com
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com
- www.eng-tips.com
- www.design-technology.info.

*See website disclaimer in Section 5 of this qualification specification.

Learning outcome 2: Produce Computer Aided Design (CAD) engineering drawings

Teaching content

Information in this section must be covered by the Teacher during the delivery of the unit.
 	
In this learning outcome, the learner will be able to use CAD software to produce engineering drawings. The learner will be able to apply specific drawing conventions and use layouts recognised within the engineering industry following British Standard BS 8888.
 	
2.1 Engineering Drawings
 	
2.1.1 An A3 CAD isometric drawing sheet
• Three-dimensional with 30° angle applied to the sides
• Scale
• Dimension
  ○ angles
  ○ lengths
  ○ diameters
• Unit of measurement
  ○ imperial
  ○ metric
• Lines
  ○ visible
  ○ hidden
  ○ centre
  ○ construction
• Tolerance
• Title block.
 	
2.1.2 An A3 CAD orthographic drawing sheet
• First or third angle projection
• Scale
• Dimension
  ○ angles
  ○ lengths
  ○ diameters
• Unit of measurement
  ○ imperial
  ○ metric
• Lines
  ○ visible
  ○ hidden
  ○ centre
  ○ construction
• Tolerance
• Title block.
 	
Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.

Suggested teaching approach

In this section, we provide some useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

Delivery of this learning outcome should give the learner the appropriate skills to produce CAD (Computer Aided Design) engineering drawings. This learning outcome focuses on the ability to draw and does not take into consideration the learner's design or creative abilities.

The learner should have an ability to produce CAD A3 isometric and orthographic drawing sheets with consideration for British Standard BS 8888. The drawing sheets should demonstrate: an understanding of scale, dimension (angles, lengths, and diameters), units of measurement (imperial or metric), various lines (visible, hidden, centre or construction), tolerance and a completed title block.

The drawing in isometric should be drawn in three dimensions and with a 30-degree angle at each side.

The drawing in orthographic could be drawn in either first or third angle, but must show the corresponding projection symbol or the angle of projection should be stated in the title block.

The learner may produce the CAD A3 isometric and orthographic drawing sheets by making use of any CAD software available to them with the capability of producing both two-dimensional and three-dimensional drawings. It is accepted that in some CAD packages foreshortening may occur in the production of isometric views taken from 3D models.

Resources:
Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.engineeringdrawing.org
- www.autodesk.com/education/free-software/all
- www.onshape.com
- www.freecadweb.org
- www.technologystudent.com
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com
- www.eng-tips.com
- www.design-technology.info.

**See website disclaimer in Section 5 of this qualification specification.*

Learning outcome 3: Demonstrate production planning techniques

Teaching content
Information in this section must be covered by the Teacher during the delivery of the unit. In this learning outcome the learner will be able to plan the manufacturing process of an engineered product, for a manufacturing task. The learner will be able to plan the process, giving consideration to the individual stages of manufacture, to include health and safety factors. **3.1 Production Planning** **3.1.1 Risk assessment** • Hazards (something with the potential to cause harm) • Risks (the likelihood the hazard will cause harm) • Control measures o actions o activities o equipment that is used to prevent eliminate or reduce the risk of a hazard occurring. **3.1.2 Production plan** • Tools and equipment • Health and safety • Quality control • Flow chart symbols o start o end o arrows o input o output o process o decision • Time plan. **Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.**

Suggested teaching approach

In this section, we provide some useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

Through the delivery of this learning outcome the learner should develop skills to plan a manufacturing task.

The risk assessment should include the identified hazards, the level of risk of each hazard occurring and control measures which need to be considered to ensure a safe working environment.

Planning should begin with a risk assessment of all the workshop environment and the selected tools and equipment required to undertake the fulfilment of the manufacturing task.
The risk assessment should include the identified hazards, the level of risk of each hazard occurring and control measures which need to be considered to ensure a safe working environment.
Control measures that could be introduced to the learner through the delivery of the learning outcome are PPE, guards, safety zones, extraction and ventilation, isolation and emergency cut-off.

The learner should be able to demonstrate the ability to complete a thorough production plan which should provide information about all the stages of manufacture, to ensure the final outcome is manufactured to meet all the needs set out in a given brief.

The production plan should:

- include details of the selected tools and equipment with explanation for why they have been selected
- break down the manufacture into separate stages which detail the tasks which must be undertaken. These tasks should also include timings to incorporate a time plan and ensure the task can be completed within a given time frame
- include what quality control checks must be undertaken throughout the manufacture to check that a product meets the requirements set out in the given brief and is completed to a high standard. This should be documented with a flow diagram using the correct flow chart symbols.

Resources:
Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.technologystudent.com
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com
- www.eng-tips.com
- www.design-technology.info.

*See website disclaimer in Section 5 of this qualification specification.

Learning outcome 4: Demonstrate processing skills and techniques applied to materials for a manufacturing task

Teaching content
Information in this section must be covered by the Teacher during the delivery of the unit. In this learning outcome the learner will demonstrate a variety of processing skills and manufacturing techniques: preparing, modifying, joining and finishing techniques applied to materials for a manufacturing task, whilst maintaining safe and correct use of tools, equipment and machines. **4.1 Skills and Techniques** The learner will demonstrate a variety of processing skills and manufacturing techniques - preparing, modifying, joining and finishing. **4.1.1 Prepare materials** • Cleaning • Marking out. **4.1.2 Modify shape and size of materials** • Cutting • Drilling • Bending • Casting • Computer-Aided Manufacture. **4.1.3 Join materials** • Riveting • Gluing • Bolting • Soldering. **4.1.4 Finish materials** • Filing • Sanding • Polishing • Applying a surface finish. **4.2 Safe and Correct Use of Tools, Equipment and Machines** The learner will maintain safe and correct use of common tools, equipment and machines used in the engineering industry whilst undertaking manufacturing techniques. **4.2.1 Preparation and use** • Handheld tools • Power tools • Fixed machines • Computer Numerical Control/Computer-Aided Manufacture machines

4.2.2 Control measures

- Guards and safety zones
- Isolation and emergency power cut-off
- Personal protective equipment (PPE)
  - eyes and ears
  - head and face
  - respirator
  - gloves, clothing
  - footwear
- Extraction and ventilation.

Anything within this section of the unit is what must be taught as part of the area of content. These are subject to assessment.

Suggested teaching approach

In this section, we provide some useful advice and guidance to support the delivery of the teaching content. For further detail, please refer to the Scheme of Work available on the NCFE website.

The learner should be able to select the appropriate tools and equipment and apply the correct skills and techniques, based on the properties and characteristics of the materials, to prepare, mark-out, modify shape and size, join and finish materials for a manufacturing task.

Delivery should allow the learner to develop skills in using techniques within a workshop environment.

The learner should be able to apply techniques for preparation, marking-out, modifying shape and size, joining and finishing for a variety of engineering materials to manufacture an item.

The processing of the different materials should not be manufactured entirely with the use of CAM; however, the learner should have an ability to apply CAM in some aspects of the manufacture. This is to ensure the learner can demonstrate their ability to undertake traditional manufacturing techniques alongside more modern practices. The selection of tools, equipment and machines should demonstrate the learner's knowledge of working properties to enable them to select the most appropriate technique for each processing task.

Throughout this learning outcome the learner should demonstrate an ability to maintain a safe working environment before any practical tasks are undertaken. This should include ensuring their own personal safety, the safety of those in the same work space and the correct usage and storage of tools and equipment in line with appropriate health and safety legislation. The learner should undertake all practical tasks whilst maintaining a safe working environment, selecting the correct personal protective equipment, undertaking full training before using any tools or equipment, and in the full knowledge of the safety rules of the workshop.

Resources:

Classroom teaching pack:

- PowerPoint (PPT)
- lesson plans
- scheme of work
- worksheets
- revision workbook.

Useful websites:

- www.technologystudent.com
- www.bbc.co.uk/education/subjects/zvg4d2p
- www.young-engineers.co.uk
- www.raeng.org.uk
- www.theiet.org
- www.howstuffworks.com
- www.eng-tips.com
- www.design-technology.info.

*See website disclaimer in Section 5 of this qualification specification.

Section 4

Assessment and Quality Assurance

Assessment and Quality Assurance

External assessment

Each learner is required to undertake an external assessment.

External assessments are set and marked by NCFE. The assessment assesses learners' knowledge, understanding and skills across Unit 01 of the qualification.

The external assessment will take place at the end of the Unit 01 after all the teaching content has been delivered.

Any stimulus material used by the centre or work completed during the teaching of the unit cannot be used as evidence in the external assessment.

The external assessment for this qualification consists of 1 exam.

The external assessment is as follows:

- Written exam – 1 hour 30 minutes' invigilated external assessment

The external assessment must be conducted under timed external assessment conditions and must be invigilated in accordance with our Regulations for Conduct of External Assessments, which can be found on the NCFE website.

The external assessment must not be altered in any way by the centre.

Sample papers and mark schemes for the external assessment will be made available on the qualification webpage under 'Support Materials'. We'll update the website with the latest past paper soon after a live assessment has been sat.

There are 2 specific assessment dates during the year. The examination windows are expected in **March** and **November** every year; however, these are subject to change so please refer to the **Assessment Window Guide** available on the NCFE website for specific dates.

Learners will have **one** opportunity to resit. Resits of the external assessment will be **different** from the original assessment.

To access the external assessment, centres must have entered learners using the NCFE Portal. When you make your registrations in the NCFE Portal you will be prompted to select an assessment date for your learners. NCFE will issue external assessment papers to the learner for the assessment date selected at registration. If you want your learners to sit the external assessment in a different assessment date you will need to contact your Customer Support Assistant and arrange a transfer of entry.

Centres must enter learners at least 10 working days in advance of the assessment date. Late entries will be considered on a case-by-case basis and will incur a late entry fee.

The external assessment material will be sent out in time for the assessment date. The material must be kept secure at all times throughout the assessment period.

You must return the External Assessment Register and all learner work to NCFE one working day after the external assessment date. The last date that NCFE will accept learner work is the next working day from the exam being sat. Any late returns will incur a fee. Please refer to the Assessment Arrangements document on the NCFE website for confirmation of this date.

Learners are entitled to one resit of the external assessment, which will be chargeable. This means that learners can have a total of 2 attempts at the external assessment. Resits of the external assessment will be different from the original assessment. '**Did Not Attend**', **will not** be classed as an attempt at the external assessment. If you know before the assessment date that a learner is no longer able to sit the external assessment, please contact NCFE to cancel or transfer the entry.

For guidance on conducting external assessments, please refer to our Regulations for Conduct of External Assessments, which can be found on the NCFE website or contact the Quality Assurance team on 0191 239 8000.

External quality assurance (CACHE and NCFE graded qualifications)

Summatively assessed and internally quality assured grades for at least one completed unit must be submitted via the Portal, prior to an EQA review taking place. Following the EQA review, the unit grades will either be accepted and banked by your External Quality Assurer or, if they disagree with the grades, they will be rejected. If a grade is rejected, centres must reassess, regrade, internally quality assure and resubmit the new unit grade in line with EQA actions.

Internal assessment

Internally assessed work should be completed by the learner in accordance with the qualification specification and synoptic internal project brief. To support with this, we have also created a sample synoptic project brief and sample portfolio of learner work, which is available on the qualification page under support materials. A representative number of assessment hours should be timetabled into the scheme of work. Internal assessment hours must be administered outside of scheduled teaching and learning hours and should be supervised and assessed by the Teacher.

Any work submitted for internal assessment must be completed during scheduled assessment hours in accordance with the scheme of work, and must be authenticated and attributable to the learner. The Teacher must be satisfied that the work produced is the learner's own and the learner must declare that the work is their own.

In practice, this means that all of the synoptic internal project will be completed in normal class time within scheduled assessment hours and kept separate from any teaching and learning hours.

The internally assessed synoptic component is based on 100% coverage of the qualification content which is assessed holistically against descriptors.

Delivery guidance

This guidance aims to offer support and information on how to administer the internal synoptic project assessment for all Level 1/2 Technical Awards.

Remember: Assessment must evidence a learner's own knowledge, understanding and skills within their chosen subject. Evidence must be gathered through effective and reliable internal assessment and this guidance document is designed to support Teachers and deliverers of each of the above qualifications in doing so, to ensure the integrity of all internal assessments. The learner should not undertake the internal synoptic project assessment until **'all teaching content'** has been delivered from Unit 01 and Unit 02. This is to ensure that learners are in a position to complete the synoptic project successfully by selecting and applying their knowledge and skills in a fully integrated and synoptic way.

Timings and planning

The assessment must not take place until the Teaching and Learning of all content from Units 01 and 02 has been delivered to the learners.

The internal synoptic project is recommended to be completed within approximately 21 hours. Centres can administer the timings as they find suitable for the learner whilst ensuring the supervised conditions are met.

Resources

Learners must have access to the appropriate resources required to complete the internal synoptic project. These include the following:

- research materials
- learner log.

This list is not exhaustive and you must make reference to the Qualification Specific Information Document (QSID) available on the NCFE website.

Health and safety

All learners must be informed and aware of any relevant health and safety considerations that need to be made to ensure they carry out their work in a safe manner.

Learners must be supervised at all times to ensure health and safety practices are observed. Where learners are seen to be working in an unsafe manner, at the discretion of the Teacher, the learner may be removed from the assessment and the remaining time rescheduled.

Observation

Where an observation of learner performance is required, NCFE have provided an observation report. This is to be completed at the time of observation taking place. The observation report must capture what the learner has done to meet the assessment objectives. This must be signed by both the teacher and the learner directly after the observation has taken place alongside immediate feedback.

Learners must be made aware in advance of when they will be observed and an agreed time and date set and must be carried out in accordance with the **supervised conditions for internal assessment.**

Submitting evidence

Any evidence submitted for internal assessment must be completed during scheduled assessment hours in accordance with the scheme of work, and must be authenticated and attributable to the learner. In practice, this means that all of the synoptic internal project can be completed in normal class time within scheduled assessment hours but must be kept separate from any teaching and learning hours.

The learners will be provided with examples of types of evidence that they are to submit. For further information regarding these evidence types and what electronic evidence is allowed for this qualification, please refer to the Qualification Specific Information Document (QSID) found on the NCFE website.

Learners are allowed to rework any evidence that they have produced for this internal synoptic project but only during the timed supervised sessions. This rework **must not** be as a result of Teacher feedback, but that the learner has identified areas for improvement on their own. Once the evidence has been submitted for assessment, no further amendments to the evidence can be made until after the External Quality Assurance (EQA) visit. Once the EQA process has been completed, learners will have the opportunity for a second and final resubmission.

Authentication of learner work

Learners are required to sign declarations of authenticity, as is the Teacher/Assessor. The relevant form is included in this assignment pack. This is to ensure authenticity and to prevent potential malpractice and maladministration. Learners must be made aware of the importance of this declaration and the impact this could have on their overall grade, if the evidence was found not to be that of the learner.

Any evidence created by the learner as part of this synoptic project must be securely stored at all times. Where evidence is completed across multiple timed sessions, all evidence must be collected in, after each session and stored securely to ensure learners and others do not have access to this.

Accessibility and fairness

To promote accessibility and fairness for all learners and to ensure diversity and equality, we expect centres to be aware of and meet the requirements of relevant NCFE policies and government legislation. You must ensure that:

- all of your processes concerned with assessment are carried out in a fair and objective manner
- you continue to adhere to current equal opportunities legislation
- you continue to operate an effective equality and diversity policy, with which learners are familiar and which applies to all learners using our products and services
- you continue to operate an effective appeals procedure, with which learners are familiar and which applies to all learners using our products and services.

To promote accessibility, a learner may request a reasonable adjustment. Reasonable adjustments are approved or set in place before the assessment activity takes place; they constitute an arrangement to give the learner access to the assessment activity. A reasonable adjustment is any action that helps to reduce the effect of a disability or difficulty that places the learner at a substantial disadvantage in the assessment situation, without having an effect on the integrity of what is being assessed. Where a learner may wish to request a reasonable adjustment and/or a special consideration, you should refer to the guidance documents. For this and all of our policies please go to our website.

Differentiating between teaching and learning

Teaching and learning and your role as a Teacher

- Teaching and learning occurs in experiences both inside and outside the classroom where learner skills, knowledge and understanding are developed
- Support materials to aid learning can be provided
- Instructions on completing tasks can be given to learners
- Intervention by teachers to ensure learning is appropriate
- Informal assessment can be used to assess and track progress
- Feedback and guidance on how to improve work can be given.

The role of the Teacher is to deliver the course material in line with the qualification specification, through teaching and learning, to develop the learner's understanding, knowledge and skills. Remember, work created by the learners as part of teaching and learning or for use as formative assessment by the Teacher, cannot be used as evidence in an assessment.

Assessment and your role as an Assessor

- Assessment is carried out in a controlled environment under the supervision of an assessor (usually the teacher)
- The assessor may not offer guidance on how to meet the tasks, assessment objective and grading descriptors
- Group work and how learners interact with each other is clearly defined
- Steps to prevent plagiarism are taken
- Templates and other scaffolding techniques may not be provided to learners
- no work completed during teaching and learning is allowed to be submitted as part of the assessment

- specific, detailed feedback on how to improve may not be provided to learners
- assessments must not be completed by learners at home.

The role of an Assessor is to administer the internal assessment, assess the learner evidence produced against the assessment objectives and to provide feedback to the learner regarding their achievement.

It is always worth reminding your learners of your varying roles as a Teacher and an Assessor, so they know what to expect during both teaching and learning and assessment.

Conditions for supervised assessment

The internal synoptic project must be administered in line with the conditions for supervised assessment, these are highlighted below to include the following:

- how the delivery of an assessment must look
- feedback during the assessment
- feedback after the assessment.

Further guidance on how to administer the internal synoptic project and on providing feedback during teaching and learning and each stage of the assessment can be found in the Internal assessment writing and delivery: Guide for centres on the NCFE website.

How the delivery of an assessment must look

At the start of the internal assessment taking place Assessors should:

- provide the learner with information regarding the time available for the internal assessment brief, to include the submission deadline
- make the learner aware that you are now the assessor and not the teacher
- make the learner aware that you can no longer provide guidance and support including feedback, on what to do in order to complete and achieve this assessment
- make the learner aware that the project they will be completing is an assessed piece of work that will go towards their final grade
- ensure that each learner is aware of the assessment objectives that are being met. these should be available to the learner throughout the assessment
- brief the learners on plagiarism and explain that it must be their own work or clearly referenced if sourced research material is used
- explain to the learner when and who will mark/assess their work and when they will receive feedback*
- provide the learner with information regarding the IQA and EQA processes
- raise the centre appeals procedure with the learners and make sure they are aware of this in the event that they disagree with your mark
- the assessor must ensure that all the **conditions for supervised assessment** are met.

During the administration of the internal assessment:

- All work must be completed within supervised timetabled sessions

- Work must not be carried out at home
- All work must be locked away securely and learners must not be allowed access to their work outside of the timetabled sessions
- Specific, detailed feedback must not be provided to learners.

*****Usually, the Teacher and the Assessor is the same person, it is really important to ensure your learners are aware of this and the difference in roles.

Feedback during the assessment

Once the learner begins working on the internal assessment, the Teacher/Assessor **must not** provide any specific feedback on the evidence produced by the learner until the work has been assessed. Learners must demonstrate themselves that they can provide evidence for the assessment brief independently, using their knowledge, skills and understanding gained through the teaching and learning of the qualification delivery.

We understand it is important to continue giving general feedback and support during assessment, which could include:

- referring the learners to the assessment objectives and descriptors to keep them on track
- clarification of what the project brief requirements are
- general feedback on timekeeping, attendance and punctuality, attitudes and behaviours.

However it is not appropriate for Teachers/Assessors to:

- coach learners on how to produce the evidence or what evidence to produce (unless the brief specifically states what the evidence should be)
- give them a specific list of actions they need to take in order to achieve a particular grade.

Remember: the Assessor **must not** provide feedback or guidance on how to improve the evidence to achieve higher grades at this point; this will happen when the learners are given feedback after their work has been assessed. Feedback will not coach the learner.
All work must be completed independently by the learner and must not be a product of Teacher guided feedback.

Feedback after the assessment

Giving feedback following assessment must include feedback on improvement and progression and not coaching to achieve a specific grade. Feedback should be clear and constructive on the tasks/assessment objectives the learner has achieved or not achieved.

Provide justification and explanation of the assessment decisions that have been made, make reference to the assessment objectives and where appropriate the grading descriptors. It is also good practice to give general feedback on timekeeping, attendance and punctuality, attitudes and behaviours.

Remember: Teachers **must not** give explicit instructions or step by step guidance on how to improve a grade.

You should:

- focus on what the learner has done well and why
- encourage the learner to work out how to apply successful techniques elsewhere
- make all comments general so that the learner can apply them to new situations
- encourage self-regulation and criticism (eg 'you know the key features of making an evaluation, check whether these are included in your own work')
- reference learning points (eg 'your answer might be better if you included strategies we discussed earlier in unit 01')
- limit your comments to 1 or 2 key areas
- always refer to the assessment objective
- provide justification for your decision
- always record feedback given to individual learners.

You must not:

- provide templates or model answers
- give feedback on specific elements of tasks
- give specific feedback on how to achieve a higher grade
- list negative points for correction.

Remember: if a learner has not yet achieved an Assessment Objective you must submit this grade as the learners first attempt and discuss with them any resubmission opportunities. Learners are allowed two attempts at the synoptic internal assessment.

For further guidance on evidence submission and the internal and external quality assurance processes, please refer to the guidance on the NCFE website.

Guidance on grading of learner evidence

It is reasonable to establish a consistent approach to the way in which learner's work is graded so that learners feel valued and have a clear understanding of how well they are doing, and what the next steps are in their learning. The colour of the pen does not matter so long as it is in contrast to the learner's writing.

The internal synoptic project assesses learner's knowledge from across 100% of the qualification's content.

The project is graded against each Assessment Objective (AO). For each AO there are descriptors which demonstrate the level and standard of evidence to be submitted by the learner to achieve that band and support the assessment decisions for that assessment objective.

When making assessment decisions these must be recorded and reported to learners. The Assessor must ensure:

- they clearly identify and record the band awarded per AO using the descriptors
- indicate and record which AOs have been achieved and the evidence that has attributed to this
- indicate which AOs have not been achieved where applicable
- they provide formal feedback** to learners.

Once the work has been assessed, graded and internally quality assured, the grade should be submitted to NCFE. This will be classed as the first submission. The submitted grade will trigger your first external quality assurance visit. It is recommended that you schedule your visit in plenty of time to ensure you get the date you require.

Please refer to the External Quality Assurance section for guidance on first and second submissions.
** For information on how and when to provide appropriate feedback please see the conditions for supervised assessment.

Supervision of learners and your role as an Assessor

Guidance on how to administer the internal assessment and the support you provide learners can be found on the NCFE website.

Feedback to learners

Guidance on providing feedback during teaching and learning and each stage of the assessment can be found on the NCFE website

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Late submissions

Teachers and Assessors should encourage learners to understand the importance of deadlines and when they need to submit their internal assessments. Assessors do not have to accept late work and may refuse it.

Learners may only be given extra time for legitimate reasons such as illness. If you accept a late submission, you should follow the usual assessment process.

Grades should not be reduced as a result of late submission.

Submitting unit grades

Assessment: The internally assessed unit must be assessed and graded by a centre's Assessor. It is the responsibility of the Assessor to make informed judgements about the range of evidence the learner has produced, which should demonstrate their competence to meet the assessment objectives (AOs) and descriptors as detailed in the Qualification Specification.

Internal Quality Assurance: A reasonable sample of portfolios must then be checked by an Internal Quality Assurer to ensure consistency with national standards. See the NCFE website for further information on sampling.

Internal quality assurance is the process of ensuring that everyone who assesses a particular unit in a centre is assessing to the same standards. It's the responsibility of Internal Quality Assurers to ensure that Assessors' decisions are sampled and monitored to ensure consistency and fairness. Internal Quality Assurers are also responsible for supporting Assessors by offering advice and guidance.

The Internal Quality Assurer provides the vital link between the Assessors and the External Quality Assurer and acts as the centre's quality assurance agent.

External Quality Assurance: Learners may revise and redraft work, within the controlled conditions of the internal assessment, up until it's submitted to the Assessor for end-of-unit assessment and grading. Once the work has been assessed, graded and internally quality assured, the grade should be submitted to NCFE. This will be classed as the first attempt.

External quality assurance of internal assessment work is carried out to ensure that assessment and grading decisions are in line with required standards. External quality assurance is carried out by External Quality Assurers who are appointed, trained and monitored by NCFE. External Quality Assurers are responsible for monitoring and sampling learner evidence to ensure that internal assessment decisions are valid, reliable, fair and consistent with national standards. Centres are notified of their External Quality Assurer's contact details on registration of learners with NCFE.

Following the external quality assurance visit the unit grade will either be accepted, or banked by your External Quality Assurer or, if they disagree with the grade, they will be rejected. If the grade is rejected, the work cannot be given back to the learner. If a grade is rejected, centres must reassess, re-grade and internally quality assure the work and resubmit the new unit grade.

Once the grades for the internally assessed unit of the qualification have been accepted and banked by your External Quality Assurer, learners are permitted one opportunity to revise and redraft their work. The additional work will need to be assessed, graded and internally quality assured again, and the centre will be required to resubmit the updated grade to NCFE for further external quality assurance. Learners are only permitted one resubmission of internally assessed work.

Why would the unit grades be rejected by an External Quality Assurer?

This would occur if the External Quality Assurer did not agree with the grades the centre had submitted. It may be that the centre had been grading too harshly, too leniently or inconsistently from one learner to the next. In this situation, the centre would be required to assess, grade and internally quality assure all learners' work again.

Presenting evidence

Written

Any copied material must be suitably acknowledged, and quotations must be clearly marked and a reference provided wherever possible to ensure that learner work can be authenticated.

The use of word frames/templates provided by Teachers which give learners an advantage in meeting the learning outcomes must be avoided. If you're unsure whether a word frame/template does give learners an advantage, please contact your External Quality Assurer for advice prior to using it. If, on your external quality assurance visit, your External Quality Assurer identifies that a word frame/template has been used which gives learners an advantage in achieving the learning outcomes, then the evidence will not be accepted and the unit grade may be rejected.

Recorded

Where audio-visual evidence of multiple learners is used, centres must ensure that each learner that is being assessed is clearly visible and can be identified by the Quality Assurer.

The recorded evidence should allow the learner to demonstrate the learning outcomes clearly but should only show work relevant to what is being assessed. For example if a performance/participation is done as part of a group, the Examiner/Quality Assurer will need to be able to see how each learner being assessed has contributed and met the learning outcomes.

To help our Examiners and Quality Assurers to identify clearly when a particular learner is performing/participating we'd recommend including the following information:

- the learner clearly identifies themselves at the start of any recording
- the exact timing of the start and finish times so that the Examiner/Quality Assurer can go straight to that spot on the tape/recording
- a running order list **and** a description of each learner
- information about where the performance/recorded evidence took place
- what type of audience they were performing to (if applicable).

Centres must also ensure that the camera and microphone are set up in a suitable place to ensure good quality audio. This will allow the Examiner/Quality Assurer to hear both the learner(s) and the Assessor (if applicable).

We have set out an example used for a performance:

Test High School

Recorded evidence starts: 4 mins 30 seconds into the recording and finishes at 16 mins 27 seconds.
Venue: School hall
Audience: Teachers, parents and friends

Band 1:
Lead singer – James Doyle (blond hair, front of stage)
Drummer – Diana Nisbett
Guitar 1 – Deepak Lahiri (black hair, blue jumper)
Guitar 2 – Deb Antani (brown hair, left hand side)

Performance of XXX:
Lead male – Su Jin
Lead female – Maya Solomon

Choir:
Caterina Petracci (black hair, back row 3rd from left)
Leonard Kalymniou (brown hair, back row 5th from left)
Luke Falconer (blond hair, front row 3rd from right)

If learners are not clearly identified, NCFE may not be able to quality assure or examine the work.

Staffing requirements

Centres delivering any of NCFE's qualifications must:

- have a sufficient number of appropriately qualified/experienced Assessors to assess the volume of learners they intend to register
- have a sufficient number of appropriately qualified/experienced Internal Quality Assurers to internally quality assure the anticipated number of Assessors and learners
- ensure that all staff involved in assessment and internal quality assurance are provided with appropriate training and undertake meaningful and relevant continuing professional development
- Implement effective internal quality assurance systems and processes to ensure all assessment decisions are reliable, valid, authentic, sufficient and current. This should include standardisation to ensure consistency of assessment
- provide all staff involved in the assessment process with sufficient time and resources to carry out their roles effectively.

Assessors and Internal Quality Assurance

Staff involved in the Assessment and Internal Quality Assurance of this qualification must be able to demonstrate that they have (or are working towards) the relevant expertise and/or occupational competence, at the same level or higher as the units being assessed and internally quality assured. This may be gained through experience and/or qualifications.

Resource requirements

Although NCFE does not specify the resource requirements for this qualification, centres are expected to have appropriate equipment to allow learners to cover all of the learning outcomes. NCFE does not stipulate the equipment centres should use. However, centres must offer learners access to equipment appropriate to Engineering. These might typically include (as available within centres):

- drawing equipment; boards, templates, rules, scales, set squares
- CAD equipment: computers, printer, 2D and 3D CAD software
- hand tools
- power tools
- fixed machinery
- personal protective equipment
- research materials: books, journals, documents, internet access.

This qualification has been developed for learners aged 14–16. Resources and materials used in the delivery of this qualification, must be age-appropriate and due consideration should be given to the wellbeing and safeguarding of learners in line with your Institute's safeguarding policy when developing or selecting delivery materials.

Support for learners

Evidence and Grading Tracker

The Evidence and Grading Tracker can help learners keep track of their work. This blank document can be downloaded free of charge from the NCFE website. You don't have to use the Evidence and Grading Tracker – you can devise your own evidence-tracking document instead.

Customer Support Team

Our award winning Customer Support team will support you with approvals, registrations, external quality assurance, external assessment, results and certification. You can contact your Customer Support Assistant on 0191 239 8000 or email customersupport@ncfe.org.uk.

Support for centres

There are a number of documents available on the NCFE website that centres might find useful.

Support handbook

This qualification specification must be used alongside the mandatory support handbook which can be found on the NCFE website. This contains additional supporting information to help with planning, delivery and assessment.

This qualification specification contains all the qualification-specific information you will need that is not covered in the support handbook.

Subject maps

Our suite of subject maps showcase the qualifications we have available within each specialist sector and how they connect to each other. They demonstrate how you can plot routes for your learners at different levels from entry level right through to higher education or the workforce, with supporting qualifications along the way.

Fees and pricing

The current fees and pricing guide is available on the NCFE website.

Training and support

We can provide training sessions for Assessors and Internal Quality Assurers. Bespoke subject-specific training is also available. For further information please contact our Quality Assurance team on 0191 239 8000.

Learning resources

We offer a wide range of learning resources and materials to support the delivery of our qualifications. Please check the qualifications page on the NCFE website for more information and to see what is available for this qualification.

The resources and materials used in the delivery of this qualification must be age-appropriate and due consideration should be given to the wellbeing and safeguarding of learners in line with your institute's safeguarding policy when developing or selecting delivery materials.

Sample portfolio

NCFE has produced a sample portfolio to help Teachers to benchmark their learners' achievements. The sample portfolio includes:

- Sample internal synoptic project brief
- Sample internal synoptic project portfolio of learner work.

Delivery guide

NCFE has produced a delivery guide to help Teachers understand how the qualification could be delivered.

For all supporting documents, please visit the NCFE website for more information. All learning resources, sample portfolios and delivery guides will be available on the qualification webpages under the 'support materials' section.

Work experience

Work experience can be very valuable to learners to gain a realistic insight into the career or job they may be interested in. The following websites provide useful information and guidance:

- www.bbc.co.uk/careers/work-experience/
- www.creativeskillset.org/
- www.hse.gov.uk/youngpeople/workexperience/index.htm

Performance measures

Claiming certificates for qualifications to count in Progress 8

There are 2 key submission dates for awarding organisations to submit data on vocational qualifications to count in Progress 8 performance measures:

- 1 August is the regular summer vocational submission date
- 25 August is the summer delayed awards deadline

For achievements to count in Progress 8 performance measures, you should ensure the following is completed before **1 August**:

- all applicable external assessments have been completed and the results are showing on the NCFE Portal
- all EQA visits have been completed and the internal unit grade banked on the NCFE Portal
- all certificates have been claimed on the NCFE Portal
- please refer to the published results deadline and consider the EAR request timescales when planning for the submission dates. As published in our **Enquires about Results policy**:
    - for a clerical check, within 10 working days from receipt of external assessment results.
    - for a reassessment, within 10 working days from receipt of external assessment results or if a clerical check has been previously requested within 5 working days of receiving the result of the clerical check.
    - NCFE will aim to review your request within a day of it being received. If this is not possible it will be acknowledged within 1 working day of receipt with notification provided of what action will be taken.
    - NCFE aims to conclude:
        - clerical check requests within 5 working days upon receipt of a fully completed request
        - re-assessment within 30 working days upon receipt of a fully completed request.

These steps should be completed by 1 August for our first submission. Any certificates claimed after that date will be included in our final submission on 23 August.

It's worth noting that qualifications awarded after 25 August could still count towards the Progress 8 performance measures, but would have to be added via the September school checking exercise.

School accountability measures (performance points)

This V Cert qualification has been developed to meet the criteria set by the DfE to be included in the Key Stage 4 performance tables. Each grade has been assigned a points value. Please check the Register of Regulated Qualifications website register.ofqual.gov.uk/ for further information.

Discounting

If a learner is taking a GCSE and a V Cert in the same year, that both have the same discount code (eg an Art GCSE and our Craft V Cert), then **technically** the first entry should count which would be our V Cert as the external assessment is first. However, because we don't upload V Cert data until August to the Department for Education (DfE), the exam entry for the V Cert is classed as the date the centre claims the certification.

- If the centre delivers the Art GCSE exam first and then claims the V Cert afterwards, the Art GCSE will count.
- If the centre delivers the V Cert first and claims the certificate before the Art GCSE exam is sat, then the V Cert will count.
- If the centre delivers the GCSE and the exam is sat on the same day the V Cert certificate is claimed, then it is the best result which counts.

If a GCSE and a V Cert are taken together and they do **not** have the same discount code (eg an Art GCSE and our Business V Cert), then the best result will be counted. This only applies to bucket 3 of the Progress 8 measure.

Discount codes for V Cert qualifications can be found on our website www.ncfe.org.uk. We advise centres to refer to the Discounting and early entry guidance document provided by the DfE. For more information on discounting please contact the DfE directly.

Qualification dates

Regulated qualifications have operational end dates and certification end dates.

We review qualifications regularly, working with sector representatives, vocational experts and stakeholders to make any changes necessary to meet sector needs and to reflect recent developments.

If a decision is made to withdraw a qualification, we will set an operational end date and provide reasonable notice to our centres. We will also take all reasonable steps to protect the interest of learners.

An operational end date will only show on the Ofqual Register of Regulated Qualifications www.register.ofqual.gov.uk and on our website if a decision has been made to withdraw a qualification. After this date we can no longer accept learner registrations. However, certification is allowed until the certification end date so that learners have time to complete any programmes of study. The certification end date will only show on the Ofqual Register once an operational end date has been set. After this date we can no longer process certification claims.

Where a qualification has an external assessment this can only be taken up to the last assessment date set by us. No external assessments will be permitted after this date so learners will need to be entered in sufficient time.

Section 5

General information

General information

Equal opportunities

NCFE fully supports the principle of equal opportunities and opposes all unlawful or unfair discrimination on the grounds of ability, age, colour, culture, disability, domestic circumstances, employment status, gender, marital status, nationality, political orientation, racial origin, religious beliefs, sexual orientation and social background. NCFE aims to ensure that equality of opportunity is promoted and that unlawful or unfair discrimination, whether direct or indirect, is eliminated both in its own employment practices and in access to its qualifications. A copy of our Diversity and Equality policy is available on the NCFE website.

Diversity, access and inclusion

Our qualifications and associated assessments are designed to be accessible, inclusive and non-discriminatory. NCFE regularly evaluates and monitors the 6 diversity strands (gender, age, race, disability, religion, sexual orientation) throughout the development process as well as delivery, external quality assurance and external assessment processes of live qualifications. This ensures that positive attitudes and good relations are promoted, discriminatory language is not used and our assessment procedures are fully inclusive.

Learners who require reasonable adjustments or special consideration should discuss their requirements with their Teacher who should refer to our Reasonable Adjustments and Special Considerations policy for guidance.

For more information on the Reasonable Adjustments and Special Considerations policy please see the NCFE website.

Website disclaimer

The information contained in the referenced websites within the unit ‘useful websites’ section is for general information purposes only. We make no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, suitability or availability with respect to those referenced websites or the information, products, services, or related graphics contained on the website for any purpose. Any reliance you place on such information is therefore strictly at your own risk.

Through the referenced websites you are able to link to other websites which are not under the control of NCFE. We have no control over the nature, content and availability of those sites. The inclusion of any links does not necessarily imply a recommendation or endorse the views expressed within them.

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Information in this qualification specification is correct at the time of publishing but may be subject to change.

To continue to improve our levels of customer service, telephone calls may be recorded for training and quality purposes.