

# GCSE Engineering notes and guidance: NEA 2022

---

Ofqual released the following proposal to modify the assessment requirements for GCSE Engineering in response to disruption to education caused by the coronavirus (Covid-19) pandemic:

“Permit exam board to accept clear and detailed intentions of prototypes. Exam board to provide clarification about their requirements. Permit students to watch a demonstration of using machinery/tools/processes.”

This document identifies the changes we have made to our specifications in response to these modifications.

## Summary

The following sections of the NEA have some changes for students examining in 2022:

- problem solving
- engineering skills used
- testing and evaluating.

The following sections of the NEA have no changes for students examining in 2022:

- drawings and conventions
- production planning
- applying systems technology.

There are no planned changes to the exam. The same specification content should be covered as always, and the exam questions and associated mark schemes will look the same as in previous years of this specification.

NEA will still count as 40% of the overall GCSE qualification.

## Changes in detail

### Problem solving

Problem solving should be evident in the prototype design but students aren't required to demonstrate this in a final prototype.

Level/mark	Problem analysis	Problem solving	Modelling	Communicating	Production of a prototype
3 (11-15 marks)	The problem has been analysed thoroughly, resulting in a comprehensive and accurate description of the problem to be solved, including consideration of relevant variables that may affect the engineered solution.	A range of alternative, well-explained methods of solving the problem is considered in detail. Choice is justified with reference to the demands of the problem, resulting in an appropriate solution being selected and developed fully.	Excellent modelling is demonstrated using a range of techniques, including 3D, graphical and mathematical. All aspects are well-explained and demonstrate that the final outcome should function as desired.	All information is consistently well-organised and presented in an appropriate format. All aspects of decision making are well conveyed.	<b>Content removed</b>
2 (6-10 marks)	The problem is accurately identified with most aspects of the problem having been analysed.	Consideration of other methods of solving the problem is limited to a single alternative suggestion with some detail, or a small number of methods that lack development. A mostly appropriate solution is chosen for further development.	Good modelling of several aspects of the development is demonstrated. Some drawings or records of other forms of modelling are annotated and it is clear from the drawings that the majority of ideas are workable.	Most information is organised and presented in an appropriate format. This conveys some aspects of decision making but not all choices are explained.	<b>Content removed</b>

1 (1-5 marks)	The problem is accurately identified, but inconclusively analysed.	A single method of solving the problem is generated. Choices are stated but not followed through sufficiently to solve the problem.	Incomplete or partially effective modelling is demonstrated. An attempt at annotation of drawings/modelling may have been made, but it is not always clear from the descriptions or explanations that the ideas are workable.	Information is confused and not always presented in the most appropriate format. The reasoning behind why decisions were made is unclear.	<b>Content removed</b>
0	Nothing worthy of credit				

### Engineering skills used

- This section has been reduced from 15 to 10 marks.
- Students will no longer be assessed on the skill of making, but will be required to show their ‘intentions of prototypes’ and demonstrate their understanding of the processes involved in making.
- The assessment no longer requires students to make a final prototype - instead, they can show their understanding of the processes involved in making by writing about them. However, making skills are important for progression to future study, and for students’ understanding, so we’d encourage you to continue to allow students to make wherever possible. This is one way of demonstrating the knowledge tested in the 2022 ‘Engineering skills’ section and is the best way to inspire and enthuse students in the subject.

Level/mark	Skill	Understanding of a range of processes and materials	Quality control and working to tolerances	Level of demand	Explanation of processes
7 – 10 marks	<b>Content removed</b>	Very detailed descriptions of how to safely use a wide range of appropriate: <ul style="list-style-type: none"> <li>• materials</li> <li>• parts</li> <li>• components</li> <li>• processes</li> <li>• tools</li> <li>• equipment.</li> </ul>	<b>Content removed</b>	<b>Content removed</b>	Clear and detailed explanations of which alternative processes were considered, justifying why particular methods have been chosen.
4 – 6 marks	<b>Content removed</b>	Detailed descriptions of how to safely use a small range of appropriate: <ul style="list-style-type: none"> <li>• materials</li> <li>• parts</li> <li>• components</li> <li>• processes</li> <li>• tools</li> <li>• equipment.</li> </ul>	<b>Content removed</b>	<b>Content removed</b>	Simple explanation of why particular processes were chosen.
1 – 3 marks	<b>Content removed</b>	Descriptions of how to safely use a very limited range of: <ul style="list-style-type: none"> <li>• materials</li> <li>• parts</li> <li>• components</li> <li>• processes</li> <li>• tools</li> <li>• equipment.</li> </ul>	<b>Content removed</b>	<b>Content removed</b>	The processes that have been used are chosen.
0	Nothing worthy of credit				

Any reference to making **skills** has been removed from the assessment criteria, but there is a need to demonstrate **understanding** of tools, materials and equipment etc. This can still be shown through practical demonstration, where possible, or through detailed documentation of the processes that would take place if making were possible in cases where it is not.

Centres are encouraged to continue to allow students to do practical work where possible, but there is now no requirement to do so within the assessment criteria. Students may access the full range of marks by documenting the processes in detail as this shows their understanding of such processes. Similarly, they may access the full range of marks by showing their understanding of the processes through making.

If a student does not make, their evidence of 'Understanding of a range of processes and materials' should be to a greater depth than that shown in the production planning stage.

Students are still required to show evidence of an explanation of processes including alternative processes they have considered and justification for those they have chosen.

In this section, the headings of 'Skill', 'Quality control and working to tolerances' and 'Level of demand' have been removed.

### Testing and evaluating

- Marks remain the same.
- There's no expectation to test a final made prototype, but students should test their prototype designs.

Level/mark	Testing	Evaluating
5 (9-10 marks)	Undertaken detailed and objective testing of all aspects of the design using a variety of testing techniques to compare with a comprehensive specification. An explanation of how quality is maintained through testing, detailing methods that ensure the work is within tolerance.	A comprehensive analysis and evaluation of all aspects of the completed design, both systems operation and manufacture.  Well-reasoned suggestions made for how and why possible improvements could be made to the design.
4 (7-8 marks)	Undertaken appropriate testing of most aspects of the design and provided an informative comparison to the product specification. Quality control methods applied consistently to ensure all aspects of work are within tolerance.	A detailed analysis and evaluation of the completed design, explaining how and why either systems operation or possible manufacture could/needs to be improved.

3 (5-6 marks)	Undertaken a range of basic testing of the design using a variety of techniques comparing the results to the product specification. An explanation of the method used to ensure quality is maintained.	An analysis and evaluation of the completed design, explaining why it needs to be improved.
2 (3-4 marks)	Undertaken testing of limited aspects of the design with comparison to the product specification, using a single technique. Some quality issues addressed.	A limited analysis and evaluation of an aspect of the completed design, stating why it needs to be improved.
1 (1-2 marks)	Undertaken testing of a single aspect of the design with comparison to the product specification. Has a minimal awareness of quality issues.	Limited analysis and evaluation of an incomplete design.

Analysis and evaluation throughout the design process can take place in relation to prototype ideas and models as always.

As there may not be a final made prototype, we of course will not expect students to test this in the usual way. We would like to see students testing their prototype designs. This may be done by testing various iterations of models or perhaps through computer aided design and simulated testing. Circuits can be simulated and many 3D modelling applications allow testing through finite element analysis, which can highlight stress concentrations. Gearing and levers can be simulated or modelled in easily manipulated materials to check their efficiency. Also, remember that fully modelled solutions have always been acceptable in this specification.

The amendment in marks for the 'Engineering skills used' section leaves the final NEA worth a maximum of 75 marks (rather than 80 in the original specification). This mark will be scaled to ensure that the NEA remains worth 40% of the qualification. We have provided marked example portfolios using the 2021 assessment criteria which are available on e-AQA and Centre Services.