Questions matter

Notes and guidance: Non-exam assessment

This resource provides guidance and advice to allow students to demonstrate their ability during their Non-exam assessment (NEA) for the A-level Design and Technology: Product Design specification.

The NEA assesses the practical application of core technical principals, core designing and making principals and additional specialist knowledge. Central to the success of the NEA is the student's selection of a context that will provide the opportunity to challenge themselves as a designer. Care should be taken, and guidance sought, to ensure that the context chosen offers the student the scope and complexity for a piece of work that is worthy of consideration for the award of an A-level.

The student is expected to explore their context in depth, whilst identifying a relevant client whose needs should be met through the design solution. The student should conduct a wide variety of research and experiment with practical investigations before deciding on the product they will make.

If students are fixated on making a prototype they have conceived at the start of the NEA then the scope of research, investigation and design will be narrow. If the context is broader then there will be greater possibilities for exploration. A broad context will allow for greater exploration of design opportunities and therefore allow the student to have greater potential overall.

The final prototype should be innovative with a creative flare. The NEA should feature reflective thinking and imagination throughout. The NEA should be reflective of the student's development work alongside the client's input in terms of requirements and preferences. Evidence of risk taking is encouraged, and students should showcase their skills across all areas whilst avoiding a teacher-led approach.

It should be noted that it is not expected that the assessment criteria be seen as a linear process and that aspects from this, and other assessment criteria, might be present throughout the student's portfolio. Wherever it takes place, it is expected that this work will be rewarded.

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Contexts

At A-level, a context should be a generic, succinct starting statement from which the student identifies, plans and carries out wide-ranging investigations to look for original and challenging design opportunities or design problems within the context. Analysis of this work is then used to develop the design brief and specification. The brief should emerge from the context investigations, and there should be no preconceived ideas about the design brief so the student should be encouraged to keep an open mind as to the type of prototype that will develop.

A fundamental requirement of the A-level NEA assessment criteria is that students should have no preconceived ideas about what they are going to design and make. They need to be clear that the design brief must emerge from their investigations. If a design brief is presented at the start or early on in the NEA rather than a context, the student will struggle to meet the assessment criteria. All investigative work should relate directly to the context rather than research and investigate around an already conceived design brief idea. All investigations should be explained and analysed before writing the design brief.

It is only after completion of these investigations and initial design concepts in Section A that the student should be considering formulating a design brief for Section B, producing both a design brief and specification.

Context examples with extensive opportunities

Example context 1

Playing a musical instrument often involves transporting the instrument and its accessories to concerts, often on public transport. What issues are there with transporting the instruments and how can they be alleviated.

Areas of investigation:

- Conduct a focus group of musicians, possibly with their instruments, and ask them to explain some of the issues they have getting their equipment to concerts.
- Follow a specific musician transporting their equipment on public transport and document the problems that they face in more detail.
- Review the products that are currently available on the market to help musicians transport their instruments. Visiting music shops, online information, conducting product analysis on these products and interviews with musicians.
- Decide on a specific client and instrument and measure the dimensions of the instrument that they play.

Example context 2

With small, rugged sport cameras becoming more popular, their use by people involved in extreme sports has increased. How can the effects of high-speed movement over rough terrain on video quality be minimised.

Areas of investigation:

- Conduct interviews with a range of people involved in extreme sports and discuss the issues that they face trying to get high quality video in their sports.

- Look at how image stabilisation is achieved in professional film making and could they be developed to suite a consumer product.
- Review mechanisms from other areas which require stabilising equipment and analyse if these are transferable.

Example context 3

People with missing limbs face many challenges carrying out everyday tasks.

Areas of investigation:

- Talk to a disabled support group and interview several amputees to see what challenges they face carrying out day-to-day tasks.
- Visit the prosthetics department of a local hospital to see what adaptations they make to existing products to help amputees.
- Select a client who is an amputee and photograph them carrying out tasks that they find difficult.
- Review existing products that are available to help amputees by visiting a specialist shop or look at products online.

The assessment is broken down into five sections, each focusing on an important aspect of the NEA. Teachers and students should engage with the marking criteria within each section in order to have a clear understanding of the expectation within each area of assessment. The NEA is an iterative process. With this in mind, sections can be assessed within each other and are not confined to the area that details the marking criteria. For example, Section E focuses on evaluation which does not necessarily only feature post-prototype production. Students can attain marks through evaluative methods throughout all sections and, where this is the case, credit must be acknowledged.

Section A: Identifying and investigating design possibilities

Section 4.5.1 of the specification.

This section is worth 20 marks.

Choosing a context that is challenging and will allow the student to access all the marking criteria is vital. The context should be broad enough to allow the student to demonstrate their creative flair, whilst giving them range of opportunities to demonstrate skills in each section. Choosing a context that will lead to a non-functional model, such as architectural models or a product modelling exercise, should be considered carefully as this type of project doesn't always allow the student to access all the marks available in Criteria D and E.

The student should carry out a wide range of primary and secondary research. Research work can be credited at any stage of the project but should relate directly to the development of the prototype. For example, research into different types of material should be in the development section of the project. Practical investigations into potential materials and manufacturing processes used in the manufacture of the prototype can also be credited in this section. Primary research can include shop visits, focus groups, interviews with users and product analysis (disassembly).

Secondary research can include analysis of ergonomic/anthropometric data (although if this is related to the measurements of the client this can count as primary research), analysis of products found on the internet and information from books or articles, such as relating to safety standards like BSI and CE. Mood boards can used but should be analysed in detail. A summary analysis of the information that you have provided can help in the development of a Design Specification.

Having a real client is vital to the success of the project. A real client can help by evaluating the project at key stages of its development. Interviewing the client, and documenting the issues that they would like the prototype to solve, is high-quality primary research.

When planning their time, students often use Gantt charts. These are best employed when they are updated during the project and variations from the original plan are explained. Students are also required to produce a range of first concept ideas. These should be as creative as possible and reflect the results of the research work carried out.

Outcomes:

- Develop a broad context that allows access to all the marking criteria fully.
- Conduct a wide range of primary and secondary investigations that relate directly to the content.
- A clearly defined client for the prototype.
- Produce evidence of practical experimentation in the development of the prototype.

Key considerations within Section A

- All actions should be documented and justified to evidence your thought process.
- Engage with your client/intended user. Use their input to make ongoing design decisions.
- Consider the value of your investigations.
- Employ reflective thinking.

Section B: Producing a design brief and specification

Section 4.5.2 of the specification.

This section is worth 10 marks.

The design brief should relate directly to the research work carried out in Section A and include a clear statement of how it will address the context and how the prototype will meet the needs of the client. At A-level, students are expected to develop their own criteria for the specification and not rely on set formats. The specification should include measurable success criteria for the prototype such as size, weight, cost, dimensions and anthropometric data. These will support the evaluation of the prototype at the end of the project.

Outcomes:

- A demanding design brief that contains a statement of intent without being too prescriptive as to the nature of the final prototype.
- A comprehensive Design Specification which covers all of the requirements that the prototype must meet, including both measurable criteria and qualitative statements.

Key considerations within Section B

- Focus on the issues that the prototype is meant to be addressing rather than the exact nature of the outcome.
- The design specification should guide the student's ongoing thinking and should consider both materials, sizes and costings, amongst other aspects of the prototype.
- Plans supporting the development of the prototype should be updates during the course of the project.

Section C: Development of design proposals

Section 4.5.3 of the specification.

This section is worth 25 marks

The ideas at the start of this section should link to the first concepts from Section A. Students should start with creative and innovative ideas of what the final prototype might look like and relate these ideas to the information that they have collected in the previous sections. Many projects are too linear and give the impression that the student has a preconceived idea of what they want to make before they have started to design their prototype. Students should consider how they could use different materials and manufacturing processes in the making of their prototype; this should ensure a diverse range of designs. The experimentation with materials and processes should develop an understanding of the shapes and forms that can be produced and support the realisation of the prototype. This work counts as research and can be credited in Section A as well.

Students should explain why design decisions are being made during development and use their Design Specification to help evaluate their initial designs. The client can also be used at this stage to give feedback on the ideas. Once a suitable design has been selected, it will require further development through modelling in compliant materials and computer-aided design (CAD). The design should not be finalised at this stage, and changes in materials, processes, finishes, proportions and form should be experimented with.

Once the design has been finalised, the student should evaluate it again with the support of the client. Dimensioned drawings of the final product can then be produced. Ideally, these should be of sufficient detail for third party manufacture. The use of CAD in all aspects of the development of the prototype is encouraged, but a variety of communication methods is preferred.

A detailed manufacturing plan, including information on equipment, materials, components, quality assurance (QA), Health and Safety and time, is required. The planning at this stage should allow for further development of the prototype, as issues may arise during its manufacture.

Outcomes:

- Designs which are directly to the research, design brief and specification and the first concepts.
- Creative and innovative initial designs.
- A range of different materials and manufacturing processes experimented with to inform decisions during the development of the prototype.
- Continued liaison with the client to evaluate the development of the prototype.
- A variety of presentation techniques used: freehand sketching, modelling, Engineering drawings and CAD renderings.

Key considerations within Section C

- Students should experiment with a range of ideas and avoid being linear in their approach to the development of their prototype.
- They should ensure that their final design meets the criteria set out in the Brief and Specification.
- Their manufacturing specification is suitable for a third party to manufacture the prototype.

Section D: Development of design prototypes

Section 4.5.4 of the specification.

This section is worth 25 marks.

The manufacture of the prototype should relate directly to the designs produced in the previous section. These designs may be altered, and the manufacturing progresses and the justification for these changes should be detailed in the project.

Many students limit their score in this section by using simple/repetitive techniques or relying too heavily on the use of 3D printing, laser cutting or other computer-aided manufacturing (CAM) techniques. If the final prototype is going to manufactured solely using CAM techniques, the student should have experimented with a range of hand and conventional machines during the modelling phase of the development. Where CAM is used, there should be a description of how the student has set the machine up for manufacturing the components. Screenshots of how the feeds, speeds, laser power or infill settings are set should be explained by the student.

Students should include a manufacturing diary of how their prototype was produced. This should show how the processes were carried out, how risk assessments were used during the production and how quality control and assurance techniques were used to ensure that the prototype was manufactured accurately.

Outcomes:

- Justification for the choice of materials and manufacturing processes used during the realisation of the prototype.
- A photographic diary of the production of the prototype, including screenshots of any CAM processes. This should include details of how Health and Safety and QA/QC were implemented during the process.
- An explanation of any changes made to the prototype arising from material or manufacturing process choice or client feedback.

Key considerations within Section D

- Ensure that the photographs in the diary are of a suitable size and level of detail to show the processes being used.
- A clear explanation of any changes to the final design.

Section E: Analysing and evaluating

This section is worth 20 marks.

Evaluation should be used as an ongoing process and appear in each section of the project as appropriate. Students should ensure that they have evaluated each aspect of their work and explained how used their findings to make ongoing design decisions. Where ongoing evaluation appears in the project, one method of identifying it is to highlight it using different coloured text of a colour-coded text box.

Throughout the project, formal evaluation should be used following different key stages. These typically follow the:

- summative analysis of the initial research work
- the initial concepts in Section A
- initial ideas
- modelling
- the final design
- the production of the final prototype.

At each of these stages, the client should be used to give third party feedback.

The summative evaluation of the project should include:

- a thorough testing of the prototype in the environment in which it was designed for. This should include the client and possibly other potential users interacting with the prototype and giving feedback. Qualitative feedback should detail the users' views on the final prototype. These statements should comment on the positive and negative aspects of the prototype and how it could be further developed
- a detailed analysis of how the prototype meets the criteria set out in the Design Specification. This can be set out as a table with the initial criteria in one column and the evaluative comment in the other. The quality of analysis is vital in this section and is often omitted by students.

Students should describe further modifications that they would make to the prototype if they were to revise their design. This should be supported by sketches, models or CAD drawings showing alterations to the design and giving the reasons behind the revisions. This section can be combined with details on how the prototype would have to be changed if it was to be manufactured commercially. Too often, this section simply states a manufacturing process that could be used, such as injection moulding, rather than explaining why injection moulding has been chosen from a range of different commercial processes considered. Higher scoring projects will show how the design has to be changed to allow for commercial manufacture.

NEA criteria

- The NEA can be submitted as a written or digital design portfolio inclusive of photographic and video evidence of the final prototype. Videos should be included as a separate file rather than imbedded in the document.
- Students should produce a concise folder that does not exceed 45 pages.
- Failure to follow these guidelines will result in the student being penalised as a result of not meeting the expectations of the assessment requirements.
- Students who exceed the recommended page allowance will self-penalise by not being appropriately focused on the demands of the task.
- Students that produce work shorter than the recommended pages will self-penalise by not carrying out the appropriate coverage of the assessment objectives.
- There are no definitive time constraints on the production of the NEA in light of it being an iterative assignment. However, the manufacture of the final prototype must be carried out under the supervision of the school/college.
- Where processes are carried out beyond this supervision, it must be clearly documented in the candidate record form (CRF).
- The moderator will use the CRF during the moderation process to support the marks awarded by the assessing teacher. It is imperative that the student documents where they have met the design criteria and the assessing teacher acknowledges where marks have been awarded.

NEA checklist

Section	Item	Check
Administration	A front cover with name, candidate number, centre name, centre number and NEA title.	
	Every page is numbered and features candidate number.	
	If the NEA is being submitted as a PowerPoint, make sure the font does not exceed 18pt.	
	A candidate record form (CRF) that references where the student has met the criteria within each section.	
	The CRF has been signed by the candidate and the assessing teacher.	
Section A	Does the context present challenge? Does it avoid fixation? Is there a scope for extensive investigation?	
	Has the student employed a range of carefully selected primary and secondary activities?	
	Has a relevant intended user been identified with a problem/solution that needs to be addressed and complies with the context? Is this intended user non-fictional?	
	Has an initial brief been identified?	
	Is there evidence of practical experimentation that reflects the inspiration of research findings?	
	Has a range of initial concepts been presented in the form of illustration?	
	Do the research activities present value to the ongoing investigation? Are the findings concise and supportive of the student's task?	
	Is there evidence of continuous engagement with the intended user in order to consider their input to the ongoing investigation?	
Section B	Has the research been analysed and reflected upon in order to construct a developed brief?	
	Does the brief acknowledge the task, who it is for and why it been considered? Does the brief avoid fixation?	

Section	Item	Check
Section B continued…	Do the specification points direct the students ongoing thinking towards addressing the demands of the task?	
	Is their acknowledgement of costs, quantities and time constraints as well continuous reference to the intended user and their needs/preferences?	
	Is there credible evidence of time management?	
Section C	Do the developed ideas reflect the research findings and initial concepts?	
	Are the possible design solutions compliant with the brief and design specification?	
	Is there evidence of modelling and practical experimentation to determine suitability?	
	Does the student engage with the intended user and use their feedback to support ongoing development?	
	Is there detailed annotation throughout to evidence the student's thinking and understanding of key terminology, equipment, machinery and processes?	
	Is there a working sketch inclusive of fabric and component information?	
	Does the student evidence a production plan that is a working document in that it has been open to adaptation?	
Section D	There is justified explanation for all the equipment, machinery, fabric, components and processes used throughout the development of the prototype.	
	There is photographic evidence to support the documentation of the prototype(s) production as well as a range of close up photos.	
	Where modifications have been made, the reasons for which have been explained in detail.	
	Is there acknowledgement for risk assessment and health and safety considerations? Has the student acknowledged quality control and quality assurance?	
	Does the student consider the original specification points during the manufacturing process?	

Section	Item	Check
Section E	Does the student make detailed comparisons between the final prototype and the brief and original design specification to determine if it is fit for purpose/function?	
	Does the student test the final prototype by means of the intended user? Are these tests meaningful and do they provide insightful feedback?	
	Does the student use the evaluative findings to consider improvements/modifications that would be made to the prototype if it were to be made again?	
	Has the student considered different methods of production for the prototype?	