



# Principal Moderator Feedback

Summer 2019

Pearson Edexcel GCE  
In Design & Technology: Product Design  
9DT0/02

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In the first year of this submission we did see a range of material areas represented and centres did try to embrace elements of an iterative method, however; it is important that candidates are encouraged to adopt a broad approach in terms of the identification of design possibilities. In real terms that does mean the use of a real client or real stakeholders if they are to access the highest levels of the assessment criteria. The guidance within centres should ensure that the candidates move on from the legacy methodology of a linear approach to the design process and adopt a more cyclical/ iterative approach, whereby the candidates seek opinion, research, develop, review and manufacture always with the notion in mind that in any of these sections change is a possibility.

The main area of concern in this, the first year of the submission, was the lack of this approach thus affecting much of the designing phase along with artefacts that were not at the correct level for this A-level standard.

However; where the centres had embraced this change the work was well structured and had a real commercial feel to it, these centres were commended in the E9 reports. The material area breakdown was approximately 60% for Resistant Material style product and 40% in concept or architectural, with limited numbers of Electronics and Textiles products.

### **Centre Admin:**

The moderation team did encounter many errors in terms of addition discrepancies on the CAB booklets, we also saw transcription errors from the CAB to the online system, all of which did slow the moderation process. Centres must ensure that the additions are checked and then are transcribed correctly on to the system. It is the responsibility of the centre to ensure that these marks are correctly entered. It is also a requirement that the CAB booklets are signed appropriately.

In a limited number of cases it was clear that internal moderation had not been undertaken. It is imperative that cross moderation between members of staff takes place within the centre to ensure that the standard applied is the same across the whole candidature.

### **Part 1: Identifying opportunities for design:**

#### **Grid One: Identification of a design possibility.**

In this section we are looking for the candidates to identify design possibilities and explore them. This will then allow them to fine tune their thinking and come up with an initial statement of intent. This section should have a commercial approach and is therefore most successful when the candidate has a meaningful narrative with a client or realistic stakeholders.

This section was rather weak across the whole of the submission which then went on to affect the Research and the Specification. The moderation team felt that this element was rarely completed to a reasonable standard. There was too much evidence of product led rather than client/stakeholder/market led solutions at this early stage. It

often appeared that the candidate knew what they wanted to make and retrospectively fitted a willing 'client' into the token role of a client. For example, we often saw statement such as 'my parents need a larger dining table or better lighting in the dining room', or 'I am redesigning the sixth form centre', this does not allow them to explore possibilities. It was often more successfully completed with the exploration of a broader starting point; however, it could also be successfully undertaken as part of a meaningful narrative with a single client.

Most students were able to write a brief description of what they intended to make for their projects. However, there were plenty of centres that did not recognise the need to design for a client or user group. In such cases it was clear that the students were designing for their own personal needs.

In this assessment criterion, the client designer relationship must be established and then drawn upon throughout the whole of the process. Centres must not fall into the trap of following a linear design process as per the legacy A-level. This new submission does demand a more user-centred approach which does mean ensuring that clients/stakeholders and experimentation influence their design thinking throughout the process.

In the best cases we saw the candidates identifying somewhat broader areas of possibility such as sustainable housing or the conservation work of a zoo which may have eventually been 'honed' into designs for a sustainable zoo hotel experience, or furniture for an element of the zoo e.g. furniture within the primates house that incorporates an opportunity to plug a personal device in to access an interactive information display.

## **Grid Two: Investigation of needs and research.**

In this section we must see a clear plan of action in terms of the research, the needs, wants and values of the client/stakeholders should be established and a perceptive selection of both research sources and a sound linkage between the design needs and the research must be evidenced. In effect, the research must have a justification that relates to the design context.

Almost all candidates failed to present clear links from their client's needs to the needs of their prototypes. Often interviews with the client or user lacked credibility and failed to draw out the pertinent details needed. Candidates should be encouraged to produce a detailed analysis of the problem and a research plan to direct their research to the relevant areas and gather the research they require. This should of course be succinct and focused.

Given that this grid now has a possible 15 marks, the research was often generic and where it was completed in detail the candidate often did not analyse, summarise or conclude their findings. Product analysis was often superficial with most candidates conducting most of their research using the internet with very little primary research carried out.

Site visits were often covered by an image of Google Maps, with no real assessment of the landscape presented, for example a view of the site as a sectional view showing changes of level or issues of the land structure. Few candidates drew conclusions from

their research. Research must have meaning and should be succinct. Some centres produced more than 30 pages.

Candidates must ensure that research remains selective and focused to that of the brief and offers a sound insight to the design context. It was deemed that research lacked the perceptive selection of sources for many candidates. Therefore client/stakeholder input at this stage is vital.

In the best cases the candidates produced very focussed research that had relevant ergonomic information and had real evidence of a meaningful client narrative that then went on to further influence the research that was undertaken. This would be a very good example of an iterative approach. For example, a candidate may be looking at PET bottle crushing methods in a village location at the recycling skip to save space in the skip. The research may highlight the need for multiple bottle crushing capability and therefore influence future designs.

### **Grid Three: Specification.**

This section should be characterised by a fully re-worked design brief that reflects the client's needs and is a product of the investigations that have been undertaken. It should reflect the changes that have been made to the candidates initial thinking, this again evidences the iterative/commercial approach to the design work. The specification should then be realistic, technical and measurable.

A lot of candidates failed to provide a well refined brief which was a product of the research that had been undertaken. Very few candidates took the key details from Grid 2 to form the detailed specification.

Several centres did not include a developed design brief. Some centres failed to address the refined design brief and often centres saw this as a tick box criterion rather than moving the details on from the initial project statement in Grid 1. Candidates who failed to conduct focused and detailed research then produced specifications that lacked details, had limited justifications and were generally superficial. Many candidates missed basic opportunities to add measurable and technical elements to their specification that they could have established in their research.

However; most candidates did write a design specification, but it was deemed that many points lacked the technical and measurable aspects required at this level. For instance, we would often see specification points such as "The artefact must be made from sustainable materials". The research has been undertaken and therefore the candidate should be able to specify the materials or at least a selection of those materials.

In this submission we also saw specification points that lacked measurable elements, again we might see points stating, "the servery must be large enough to cope". This again should be fully researched and have evidence of consultation with the client with some measurable evidence such as number of meals served, or footfall and areas needed for queue lines all of which should have been researched and then reflected in the specification.

Candidates should also seek to justify why and where the points were derived from and perhaps how they could test these points later in the evaluation. If the points are

measurable or a product of sound research then they should be easy to justify. This section could be under-taken in approximately 1-2 detailed sides of A3 paper (or electronic equivalent).

Centre annotation often claimed the specifications were technical and measurable when often they were not, sustainability still only referred to superficially. Across the whole submission it was the norm that centre marking in this criterion was deemed to be lenient.

## **Part 2: Designing a prototype:**

### **Grid Four: Design ideas.**

This section should be characterised by candidates using a range of design strategies to produce a range of design ideas that are realistic, workable and address the criteria in the specification criteria from the previous section. Candidates should be thinking like a commercial designer and apply their knowledge of technical skills and materials and back it up with the research they have carried out previously and indeed any additional research that may be required. They must try to be imaginative and draw inspiration for many areas such as nature, industry, design movements and new technology.

Many candidates performed adequately in this grid, however the use of detailed sub-systems to explain the concepts in more detail were often missing, along with a lack of details about potential manufacturing processes that could be used. Most candidates were able to present a few alternatives for their selected projects; however, the expanding or clarification of ideas was still superficial at times showing little progression or refinement.

Often candidates annotated their design work with descriptions and explanations of functions, rather than potential materials, processes and techniques that they could use.

It is imperative in future submissions that the candidates are encouraged to adopt an analytical approach especially in the accompanying annotation and not be simply descriptive. Candidates may benefit by exploring ideas in more detail using part sketches and exploded diagrams. Most candidates had made use of some design strategies to generate design proposals but often candidates lacked a sophisticated range of design strategies required at A-level.

In terms of the design strategies that we are looking for we should see 2D and 3D drawings, sub-assembly drawings, the use of inspiration materials, the work of other designers and the use of research undertaken. This of course is not an exhaustive list, merely some examples.

Centres should look to develop how candidates reference the client throughout the generation of ideas and tie in the wants and needs of the end user. This again illustrates the need for the candidates to be responsive to the market and the client or stakeholders.

We did see some excellent design work that was supported by very astute technical annotation which was very heartening. These candidates had a mastery of the graphic

communication skills required and adopted a very creative approach to the resolution of the design issue that they had explored and the brief that they had developed. They also evidenced the client narrative that allows for an iterative approach.

### **Grid Five: Development of design ideas.**

This section should show that the candidates are drawing on their research, and indeed, in the best cases completing further relevant research in response to the client/end user. This should be evidenced in the annotation that supports the design work.

Candidates should use modelling to good effect to test out aspects of the design possibilities which, as a result of the modelling, allow the candidates, in conjunction with the interested stakeholders, to develop the prototype further. This, of course, again would allow the candidates to evidence further iterations of potential solutions.

This section should have allowed the candidature to illustrate a real understanding of the notion of iterative design, for instance, if eventually your client settled on the issue of benches to allow for the servicing of laptops, then modelling of the tooling and/or the movements required would enhance the final solution. This would be a product of both, systems and observational modelling, allowing for iterations at this stage. Historically this section was often the weakest section in the portfolios.

Moderators reported that they often saw limited evidence of an iterative approach here. Assessment in this criterion was deemed to be therefore somewhat lenient. Although candidates showed clear skill in the use of a few CAD software packages, it was often used to present ideas and not as a development tool. The development section should not be a step by step guide showing how the CAD drawings were completed layer by layer. To access the top marks, centres must encourage candidates to develop ideas into a detailed proposal.

Candidates often failed to take the opportunity to present on-going research that would have benefitted their final design proposal. A true iterative design approach was rarely seen, with most candidates infrequently consulting their client's opinion, or analysing their design proposal before presenting another one.

Some candidates carried out realistic modelling or testing of aspects of their design ideas but often, candidates still struggled to complete this well due to an already fixed design idea.

We are expecting the modelling process to test aspects of the proposal and/or allow for client/user visualisation which again may lead to further iterations of the proposals.

Many candidates attempted 3D modelling, but this appeared often to be holistic. The modelling did not drive the ideas forward as it should within the iterative process. Some centres demonstrated their making of the outcome here and used that to show modelling when in fact it was actual manufacturing of the finished design.

Where this section was completed well the candidates had used modelling to test sub-elements of the proposals and there was clear evidence of the informative client interaction that illustrates a more 'rounded' approach to the design process including further research, market testing and excellent technical annotation that draws on research undertaken, or stakeholder intervention. For instance, we did see some good examples of mechanical modelling of the reverse motion linkage systems for a

cantilever folding style table including some calculations. (Which were credited in the next section). The modelling allowed the candidate to look at the size and weight of the top and discuss this to good effect with the client.

### **Grid Six: Final design solution.**

In this section we are looking for the candidates to be making some final refinements and then presenting a detailed final design solution that enabled third party manufacture to take place. The candidates should then produce a manufacturing specification that details the technical information needed for manufacture. This is often well completed if the candidates produce cutting lists, parts drawings or a tabulated illustration of the operations that need to be undertaken on each part including tools, processes etc. Incorporated into this, calculations regarding, for instance, strength or avoidance of waste would be evidenced.

Assessment on this criterion was deemed to be lenient. For many candidates there was significant technical information missing in this section. More dimensioned drawings submitted but very few exploded drawings clearly showing the construction detail. Most candidates covered the manufacturing specification superficially. It was rare to see a cutting list, and even rarer to see an exploded assembly drawing. Often candidates would present orthographic drawings of components but would fail to include enough dimensional detail or link it back to the assembled design proposal to explain its context within the design. Not all candidates understood what constitutes a final design solution where they could have used several components including production plans, orthographic drawings, flow charts, exploded diagrams, manufacturing specification and calculations related to materials and costings.

Several centres had attempted some calculations of costings, which was good to see.

Final design drawings were seldom reviewed by the client or tested against the design specification, therefore testing the solution against the needs wants and values of the client. Most candidates included a Gantt chart and many a flowchart, a legacy of the old A-level specification, these on occasions lacked the detail required to access the highest levels of this criterion

A key element is providing enough information for a third party to manufacture the solution but not all candidates had this at the core, if the candidates always have this 'rule of thumb' in mind often the other elements are a product of the rule.

Where this section was completed well, we saw very good detailed final drawings often using CAD and each operation that contributed to the manufacture detailed therefore evidencing the candidates understanding of a range of tools materials and processes.



### **Grid Seven: Review of development and Final Idea.**

This section is where the candidates must undertake an intellectual analysis of the work they have undertaken so far, the commentary must be analytical and evaluative it must not be simply descriptive. In the best cases there should be strength and weakness analysis that provides balance and should consider all factors such as materials, processes, techniques and have reference to feedback. The evaluative element must be balanced and ensure that any conclusions undertaken can be supported.

This section was the weakest area in most folders and was deemed to be particularly lenient throughout the centres submissions. The Moderators were asked to look for helpful evidence elsewhere in the folders, and centres should be aware that the awarding of these marks can run from ideas through to the evaluation of the design proposal and the evaluation of the work of others can be drawn from all relevant areas that may even be from grid 2, provided that centres do not double award.

Many centres broke their folders with formal review of designs which sometimes seemed to be a tick box exercise rather than an opportunity to fully examine the thoughts of the client to help steer the development of the designs, therefore giving limited strength and weakness analysis and so the evaluation did lack balance.

Some centres approached it through a traditional way of evaluating ideas after each section and included client comments etc, but they often referred to using rather basic comments from a client that were often simple statements relating to whether they liked or disliked the design rather than suggestions for moving the design forward. This was the section that was clearly a struggle for most centres. In this grid many candidates failed to reach the higher marks mainly as a result of not utilising their client feedback on a regular basis or making clear design decisions about each aspect of their development.

Candidates failed to realise that the work in this section must be analytical in nature; it must review the development from client feedback, and the evaluative commentary must have some balance in terms of advantages and disadvantages but more importantly a full dialogue throughout where the client/stakeholders are consulted, and the design moves forward from these discussions. Candidates should also be incorporating new research at this stage or go off at tangents to meet with other experts to help solve certain problems. Experimental modelling in 3D or by CAD will also inform the review of the development by moving the design forward.

This is a section of the assessment criteria that requires attention in future submissions if the candidates are to access the very highest levels of this criterion.

### **Grid Eight: Communication of design ideas.**

This section splits into three distinct sections in that we should see evidence of more traditional communication techniques along with CAD and in a more overt emphasis on written communication.

It is pleasing to report that many candidates met the higher-level descriptors within this grid, in most cases the assessment was broadly in line with the specification criteria.

Centres that had access to more advanced CAD programs regularly produced work of a very high standard. Centres should be aware that the awarding of these marks can run

throughout the ideas and development sections, and candidates should make use of sketch work, which should be enhanced with a range of techniques including colour to show possible material effects or styles of finish. In the best submissions the annotation was mature and evaluative with real reference to technical elements that reflected the client and illustrated sound knowledge and understanding.

Where there were small differences it was often because some elements were weaker than others. Many centres effectively used CAD, but this was often at a cost as there was a lack of hand drawn sketches that could have shown greater detail in the designs. Indeed, some centres relied wholly on the use of CAD. Candidates need to be reminded that they are being awarded for a range of design strategies that can include a good range of traditional hand drawn sketches; CAD and detailed annotations which should be used to convey making information therefore centres must place a greater emphasis on the use of technical language, it is also important to remember that we are looking for the selection of technique that are fit for purpose to effectively communicate the candidates design thinking.

In a limited number of cases the candidates had some low-level drawing skills that affected the quality of the work, but it was often complimented with some useful CAD. Generally, this section was completed well and assessed well. Submissions rarely had a limited range of communication even at low level responses. Students are using traditional sketch skills, and CAD was used in almost all folders to some level. Written annotation was found to be reasonable but there were some poor examples of one-word annotation on designs.

### **Part 3: Making a final prototype:**

#### **Grid Nine: Tools and equipment.**

In this section, candidates are expected to demonstrate a range of accomplished making skills at an advanced level standard in relation to a sophisticated design problem. The level of demand, range of skills and complexity in the production of a high-quality fully functioning prototype that meets the end user needs and wants but also provides a suitable level of challenge that is higher than both GCSE or AS level qualifications.

Centres need to ensure that the level of skills used in the manufacture optimises the use of tools and equipment at an A-level standard. Some projects were too simplistic and lacking enough rigor. This may be the result of a rather simplistic starting point, or a lack of detail in the design not really developing all aspects of the proposal which would have therefore illustrated a good range of processes.

The manufacturing diary cannot be undervalued in this and in the next section it does provide evidence that underpins the centre award, and all centres that submitted this evidence were commended in the E9 report. Occasionally candidates presented a making diary that had no real evidence of them having made the product, but rather images of components in various stages of completion, or it appeared that construction occurred at home, this should be avoided.

In a limited number of centres the work produced lacked any complexity or the required skill that is needed to access the higher marks in this grid in all material areas, but with some centres in 'graphics' style projects especially architectural models there were missed opportunities to use materials creatively to mimic the real equivalent materials. Centres should also try to avoid projects that relied heavily on repetitive processes and this was clearly evident with candidates that had overused CAM in the manufacture of products, that said, if the product was complex and had many interacting parts produced using CAM that would be more acceptable. It is also important that the candidates are aware of why they are using tools, materials and processes. This often is evident within the photographic diary and moderators were told to look for this.

There were some exceptional products especially in terms of furniture and outdoor pursuits products and when architectural models were done well, they were also of the highest quality mimicking commercial modelling but using a range of materials and processes. These centres are to be commended. The use of CAM was also of good quality and when the candidates embraced the assessment criterion, they enhanced their submission with a range of other tools and processes.

### **Grid Ten: Quality and Accuracy.**

This section should be characterised by demonstrating high level making skills that evidence accuracy leading to a quality artefact that is fully functioning prototype that meets the end user needs identified in the specification. We should also see candidates not being afraid to consult with the interested parties and amend the design during the manufacturing as a result of this consultation or indeed in response to issues during the manufacturing process if necessary, therefore evidencing an iterative approach during the process of manufacture.

At the top end of the range, excellent making was demonstrated with superb quality and finish. However, at the lower end of the range, dimensional accuracy was poor and finishing was often neglected. There was, on occasion, work that was not suitable for A-level, for example rather simple desk storage boxes or corporate identification products that demonstrated some good designing but little in terms of advanced level skills. Some candidates produced some outstanding work in this section. However, where the photographic diary was missing the assessment of the manufacture became somewhat harder.

The candidates may benefit by providing evidence of any changes that occurred during the manufacturing stage along with any additional part sketches to explore the relevant change to demonstrate an iterative approach to manufacturing. This can sit in the folder as part of the diary but before the final evaluation to clearly demonstrate an iterative approach to manufacture supported by client feedback to justify changes. Candidates must be encouraged to ensure that the quality of finish is at the highest level and the finished prototypes are accurate if they are to gain the best marks available. Candidates can model prototypes for the manufacturing, but they should be full size prototypes so that they can be fully tested against the specification criteria. The exception is architectural models or concept models that are too large or require complex tooling. However, these can still be tested in a variety of ways.

## **Grid Eleven: Testing and evaluation.**

In this section we are looking for the candidate's ability to discern the difference between testing and evaluating. The notion of testing implies putting the product into service and considering its success, especially in terms of the specification and the clients' needs wants and values, whereas in the evaluation phase we are looking for a critical review including strengths and weaknesses which will then give a balanced conclusion supported by all of the analysis undertaken. This could lead to further suggested modifications therefore illustrating a post manufacture iterative approach. The definitions in appendix 5 of Analyse and Evaluate in the specification may help with candidate's further understanding.

Most candidates performed at a reasonable standard in this final grid. Testing against the design specification was almost always seen along with client testing. However quantitative testing against the manufacturing specification was not evidenced in a number of centre submissions often a result of a rather weak 'front end' of the portfolio and therefore a specification that lacked measurable elements.

Modifications after testing were occasionally presented, which is to be commended, however in some cases not really in any great detail. Life cycle analysis of the final prototype was presented but often these were generic and lacked real detail and analysis or gave examples of actual impact. The candidates need to link the LCA to their final prototype. This is also true of ethical, moral and social aspects.

Candidates need to include more detailed testing with client or user groups. On occasion this was done well but often the user group commentaries were rather bland statements from classmates. More centres could encourage the product to be tested in the environment it was designed for, so a packaged product could be tested in a retail environment. An architectural model could be shown in a public library and feedback gathered while full sized products can be placed in the spaces specified by their clients. Candidates could also take opportunities to use social media to gather feedback.

Most candidates evaluated against the specification and gave some good evaluative comments, but many candidates had produced very poor specifications so when it came to evaluating against the measurable and technical aspects the evaluations were limited. Most candidates had addressed a life cycle analysis of their product outcome however the links at times were very tenuous. Client feedback which is key in evaluating the success of the whole process was on occasion limited to subjective views.

In future submissions, candidates should be encouraged to test with reality and provide balance in their evaluation alongside a related analysis of moral and social aspects whilst taking account of environmental concerns.

### **General:**

The centres should make full use of the NEA guidance on the Edexcel website and check on the site for further exemplar materials that will be posted later in the year.