How to Succeed in Design & Technology

Course Information

Exam Board	**OCR Cambridge Nationals**
Exam Structure	**40% written examination (1hr30min) and 60% NEA (A3 portfolio)**
Specification weblink	**OCR Level 1/Level 2 Cambridge National in Engineering Design specification**
Practice exam papers weblink	**Technologystudent.co.uk**

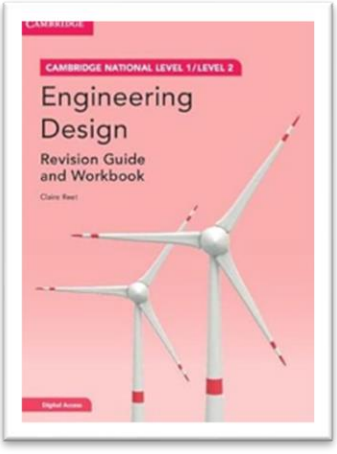
Units/Topics studied

- R038 – Principles of engineering design
- R039 - Communicating Designs
- R040 – Design, evaluation and modelling

Revision strategies and materials, course work required:

For the theoretical examination:

- **Practice revising by using:** Flash cards, brainstorms, practice extended writing answers, learn key words, practice technical drawing (orthographic, isometric and perspective)
- **For quick curriculum knowledge go to**: Technologystudent.com
- **For key words, class work catch up and detailed explanations use:**
  OCR Level 1/2 Cambridge National in Engineering
  Exam board: OCR
  Fully updated for the 2022+ OCR Design and Technology J822 specification
  This approachable and comprehensive GCSE textbook has become a favourite with teachers and students. It covers all the topics and disciplines from the new 2022 specification for OCR J822 Engineering Deign (L1P-D*).
  This book is laid out in with clear illustrations to keep you focussed on exactly what you need to know without missing anything. Absolutely no page clutter. There are exam-style questions on each topic to test your understanding every step of the way.



For R039 (independent, controlled conditions):

- **Unit R039: Communicating Designs**
- **Module 1: Sketching and Drawing Techniques**
- **What to do: Students will learn and practice various sketching and drawing techniques to communicate their design ideas.**
- **Focus: Freehand sketching, isometric and orthographic projections.**
- **Module 2: Technical Drawing**
- **What to do: Students will create detailed technical drawings using standard conventions: Orthographic projections and Exploded diagrams.**
- **Focus: Dimensioning, annotations, and using drawing tools to produce accurate representations.**
- **Module 3: Computer-Aided Design (CAD)**
- **What to do: Students will use CAD software to create digital models of their designs.**
- **Focus: Developing skills in using CAD tools to produce and modify design drawings.**

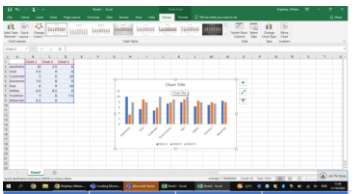
For R040 (independent, controlled conditions):

- **Unit R040: Design, Evaluation, and Modelling**
- **Module 1: Designing Solutions**
- **What to do: Students will develop design solutions based on given specifications and constraints.**
- **Focus: Research, brainstorming, and creating initial design concepts.**
- **Module 2: Evaluating Designs**
- **What to do: Students will evaluate their own and others' designs to identify strengths and areas for improvement.**
- **Focus: Testing, analysis, and providing constructive feedback.**
- **Module 3: Modelling and Prototyping**
- **What to do: Students will create physical or virtual models and prototypes to test their design ideas.**
- **Focus: Building and refining models, using materials and tools effectively.**

These modules are designed to help students develop practical skills in engineering design, preparing them for further education or careers in engineering

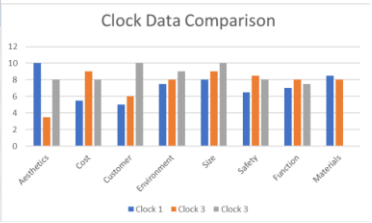
Examples of Design Pages from an NEA portfoilio:

Target Market Analysis



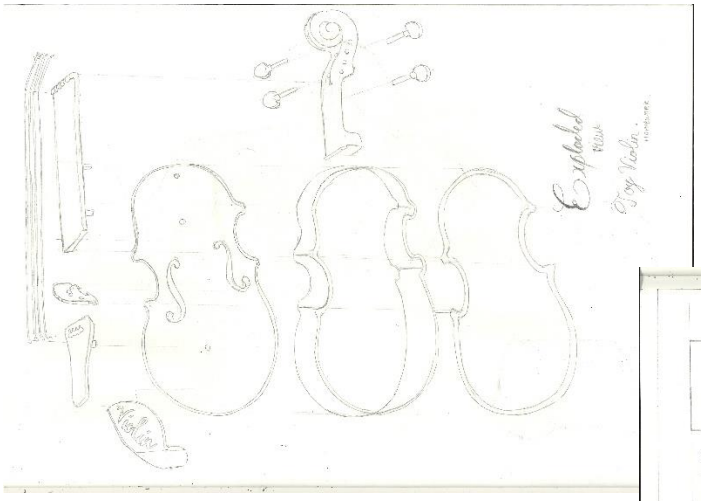
In the table below, you can see the ratings of A.C.C.E.S.S.F.M in the form of the clocks I did a review on. This is to show the value of each clock and make your life easier to choose one for your astonishing house.

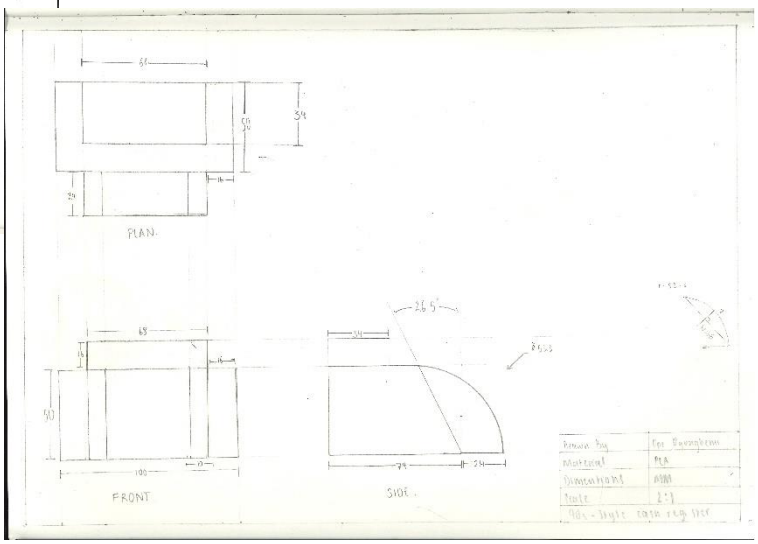
	Clock 1	Clock 2	Clock 3
Aesthetics	10	3.5	8
Cost	5.5	9	8
Customer	5	6	10
Environment	7.5	8	9
Size	8	9	10
Safety	6.5	8.5	8
Function	7	8	7.5
Materials	8.5	8	9



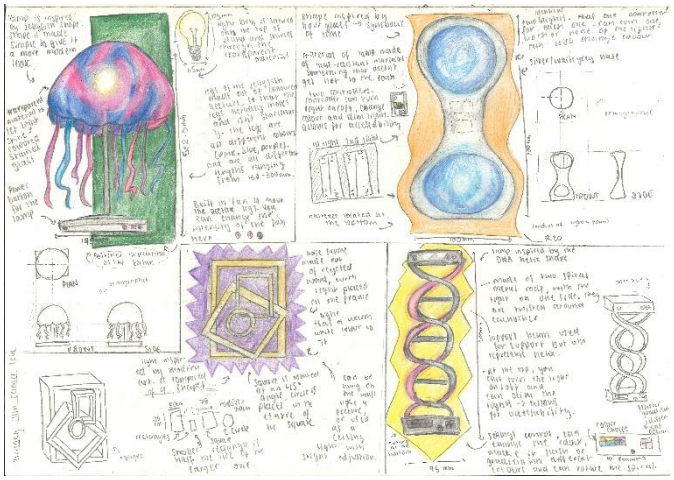
Analysing Existing Products

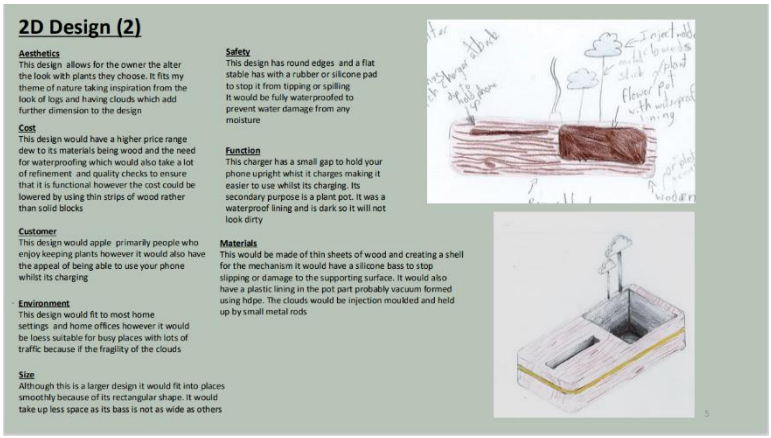
Technical Drawings



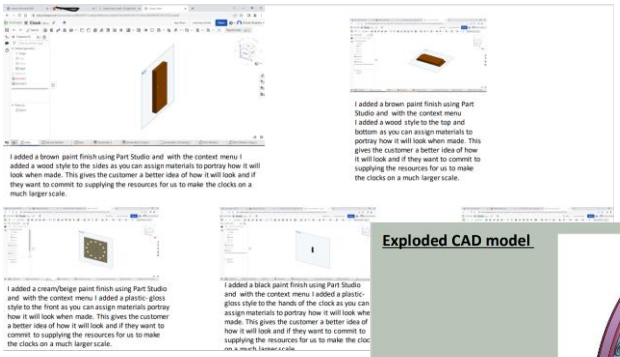


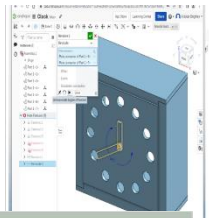
Generating design sheets

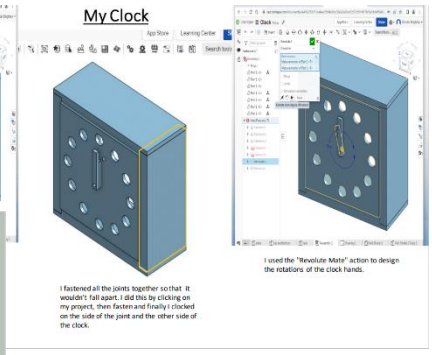


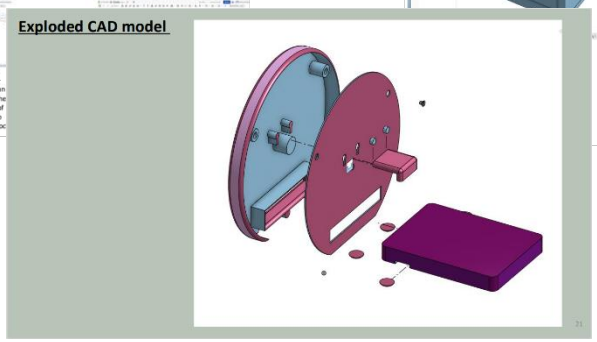


Using CAD to develop a concept

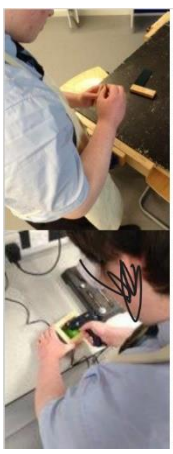






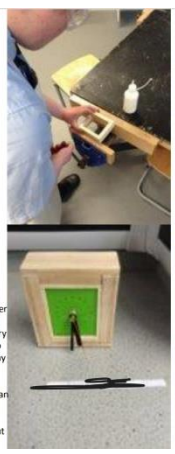


Modelling an idea and analysing the result



Here, I am inserting the construction sticks so that I have something to attach the clock face. to the construction sticks are a thin piece of wood, roughly one millimeter wide. Also, they have been perfectly measured to be pushed and forced in. This is so it doesn't require any more glue. Even though I was trying to be accurate, we had a 2mm tolerance to allow for any mistakes. This a lot less than what is allowed for beginners and a lot more than what is used for professional builders. This shows that we know – to an extent – what we are doing, which is shown by the product. However, if we had the expense to hire experienced builders, this clock would have come out as a masterpiece from my original design ideas.

As you can see here, I am gluing the clock face into the framework of the clock. I am using a hot glue gun as it is the most effective glue to use in this situation due to the short drying time to give an example of how it would be processed in a large factory in high quantities. Also, using a hot glue gun generates a stronger bond than usual; this will further the sturdiness of the product. To add to this further, glue sticks provide a long shelf-life as it can never "dry out" and won't turn bad. Even though I was trying to be accurate, we had a 2mm tolerance to allow for any mistakes. This a lot less than what is allowed for beginners and a lot more than what is used for professional builders. This shows that we know – to an extent – what we are doing, which is shown by the product. However, if we had the expense to hire experienced builders, this clock would have come out as a masterpiece from my original design ideas.



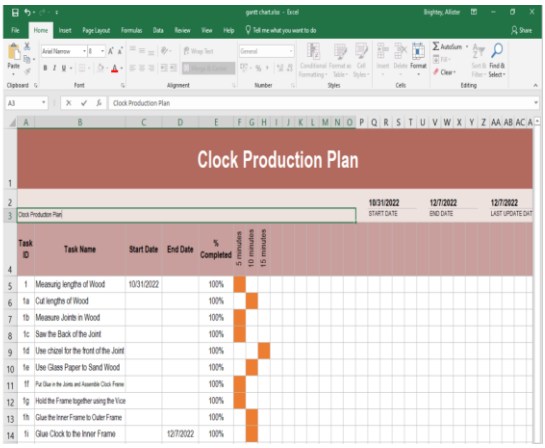
As you can see, I am inserting the clock's infrastructure into the vice. This is to ensure the clock will dry in the correct locus. Furthermore, it prevents the glue sticking to any other surface and sabotage the product for the customer. In addition, letting the glue in the framework dry this way will improve the sturdiness of the product. Even though I was trying to be accurate, we had a 2mm tolerance to allow for any mistakes. This a lot less than what is allowed for beginners and a lot more than what is used for professional builders. This shows that we know – to an extent – what we are doing, which is shown by the product. However, if we had the expense to hire experienced builders, this clock would have come out as a masterpiece from my original design ideas.

Here is my finished product and I believe I did a great job making this clock. I followed all my steps in my production plan and took even more precautions to guarantee the clocks quality and my safety. The finished clock: has a flush front (with the sides) and back (with the sides), giving an aesthetically appealing first view, and the glossy middle area adds to this. However, it is not fully flat on the front, this is because the middle area of plastic is indented slightly to create depth and "imperfection" to this structure. The reason I say imperfection is that if it were perfectly flat, it would look out of place in modern society and ergo, it is not perfectly flat but is more aesthetically pleasing. However, I do believe that the clock hands have not been well-measured as they are not proportionate to the rest of the clock, so in future, I would shorten the hands.

Planning for manufacture Gant chart

This is My Simple Gantt Chart

This is my pre-production plan in the format of a simple Gantt Chart. This layout of a production plan is great as it perfectly displays what you need to do and how long it has taken you to do previous tasks. Also, it is a great representation of organisation.

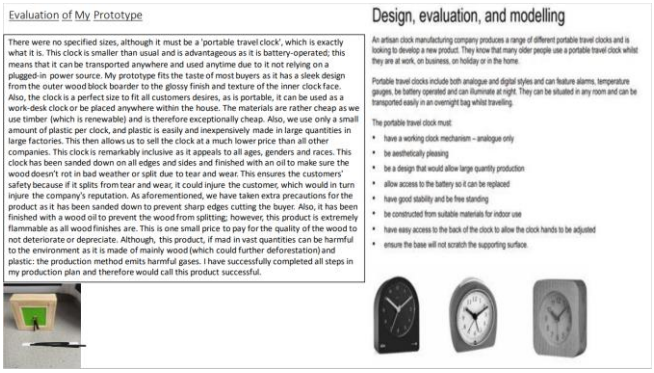


Clock Production Plan

Task ID	Task Name	Start Date	End Date	% Completed
1	Measurig lengths of Wood	10/31/2022		100%
1a	Cut lengths of Wood			100%
1b	Measure Joints in Wood			100%
1c	Saw the Back of the Joint			100%
1d	Use chizel for the front of the Joint			100%
1e	Use Glass Paper to Sand Wood			100%
1f	Put Glue in the Joints and Assemble Clock Frame			100%
1g	Hold the Frame together using the Vice			100%
1h	Glue the Inner Frame to Outer Frame			100%
1i	Glue Clock to the Inner Frame		12/7/2022	100%

10/31/2022 START DATE | 12/7/2022 END DATE | 12/7/2022 LAST UPDATE DAT

Final prototype photography taken by the student



Evaluation of My Prototype

There were no specified sizes, although it must be a 'portable travel clock', which is exactly what it is. This clock is smaller than usual and is advantageous as it is battery-operated; this means that it can be transported anywhere and used anytime due to it not relying on a plugged-in power source. My prototype fits the taste of most buyers as it has a sleek design from the outer wood block boarder to the glossy finish and texture of the inner clock face. Also, the clock is a perfect size to fit all customers desires, as is portable, it can be used as a work-desk clock or be placed anywhere within the house. The materials are rather cheap as we use timber (which is renewable) and is therefore exceptionally cheap. Also, we use only a small amount of plastic per clock, and plastic is easily and inexpensively made in large quantities in large factories. This then allows us to sell the clock at a much lower price than all other companies. This clock is remarkably inclusive as it appeals to all ages, genders and races. This clock has been sanded down on all edges and sides and finished with an oil to make sure the wood doesn't rot in bad weather or split due to tear and wear. This ensures the customers' safety because if it splits from tear and wear, it could injure the customer, which would in turn injure the company's reputation. As aforementioned, we have taken extra precautions for the product as it has been sanded down to prevent sharp edges cutting the buyer. Also, it has been finished with a wood oil to prevent the wood from splitting; however, this product is extremely flammable as all wood finishes are. This is one small price to pay for the quality of the wood to not deteriorate or depreciate. Although, this product, if mad in vast quantities can be harmful to the environment as it is made of mainly wood (which could further deforestation) and plastic: the production method emits harmful gases. I have successfully completed all steps in my production plan and therefore would call this product successful.

Design, evaluation, and modelling

An artisan clock manufacturing company produces a range of different portable travel clocks and is looking to develop a new product. They know that many older people use a portable travel clock whilst they are at work, on business, on holiday or in the home.

Portable travel clocks include both analogue and digital styles and can feature alarms, temperature gauges, be battery operated and can illuminate at night. They can be situated in any room and can be transported easily in an overnight bag whilst travelling.

The portable travel clock must:

- have a working clock mechanism – analogue only
- be aesthetically pleasing
- be a design that would allow large quantity production
- allow access to the battery so it can be replaced
- have good stability and be free standing
- be constructed from suitable materials for indoor use
- have easy access to the back of the clock to allow the clock hands to be adjusted
- ensure the base will not scratch the supporting surface.