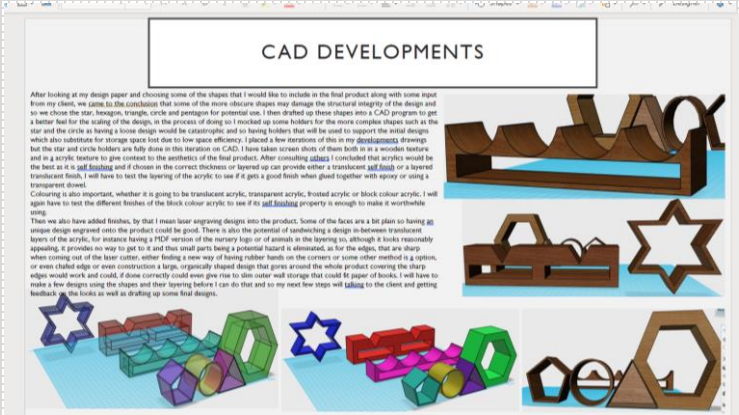
A LEVEL

DESIGN & TECHNOLOGY

PRODUCT DESIGN



Sixth Form

Year 12 Scheme of Work

Autumn 1 – Developing Practical Skills and Theory Knowledge - Lamp

Autumn 2 - Developing CAD and Forming Skills

Spring 1 – Mock NEA

Spring 2 – Mock NEA

Summer 1 – NEA – Begin Year 13 Main Project

Year 12

Developed concept ideas

Implementation of cad

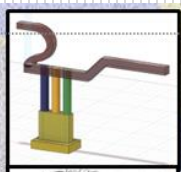
After choosing my four favourite designs I went and created versions of them in blender however I found this software to be not as optimal as others so opted for Fusion360 instead which is a computer aided design software which allowed me to recreate my sketches into 3D renders. I did this because it means I can easily change sections of my product as well as integrate certain features which would not be possible to be shown as sketches e.g., how different sections will be joined or what they will look like from different angles. Another positive of using fusion360 is that I have the capability of 3D printing smaller scaled designed so that I have a physical object which can inspect for weak points and get my clients feedback on.

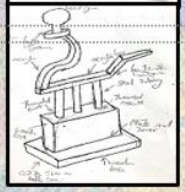
Conclusion

I believe creating my designs in software such as fusion360 was a good idea because it gives me an idea of what my sketched designs would fully look like however it had its drawbacks in the fact that I had to teach myself how to use the software and took a lot of trial and error to achieve models I am happy with.

Design A

This product features a hollowed out steel tube which threads into in insert inside of the wooden base which will be painted red. Throughout the steel tube are wooden boxes which will help in place with set screws and each painted a different vibrant colour to match the Memphis design style and to add to this on the middle box there is an acrylic bar which is bent into a zigzag which a plastic ball fixed on the edge and it is held in place with glue for the ball and at the other end the acrylic in inset into the wood so it is firmly held in place and is strong enough to hold its self-upright. And the bulb will be located at the top of the steel tubing on the wooden disk which also has a hole in for the cables to be able to go through.





Design B

This product features a wooden base with a box fixed on top with a mortise and tenor joint and above this is 3 acrylic poles each of different colours which are also inset 20mm into the wooden box and on top of these there is a singular piece of acrylic featuring 5 major bends in order to achieve its peculiar shape and this will be achieved by using the heat gun to concentrate hot air on areas so that I can bend them to their desired angles. The base will be cut to size on the table saw to achieve precise cuts and then painted a bold yellow colour in order to stand out and be easily identifiable as a Memphis product.

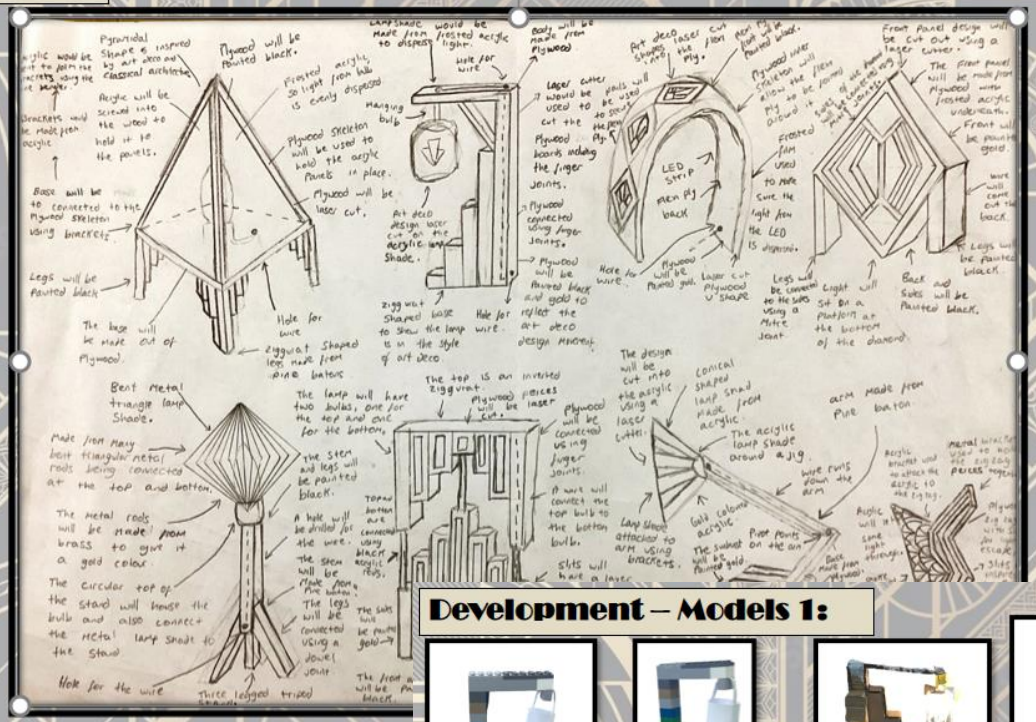
Design C

This product starts off with a wooden rhombus as the base which will be painted a vivid and bold colour before carving out a small section for the acrylic bar to sit in before I bend it around a 90 degree curve which is where it meets another wooden box fixed on top with glue or screws and on the top of this wooden box is another piece of clear acrylic which will be secured in a similar fashion to the first piece and this will bend around another 90 degree curve before bending back in the opposite direction to create a flat section where on the far end 2 vacuum formed semi spheres will enclose a bulb but separated by small pieces of acrylic bar to allow light to get through.

Design D

From the top of this product there is 2 acrylic bars which intersect at a 90 degree angle and these are connected at their base to 2 more acrylic bars which are bend around 180 degrees to create semicircles which both connect on a wooden disk which is where the light will sit and this is surrounded by a large acrylic cone segment which goes all the way round and I will create this by laser cutting out the flat plan of the shape then heating it and bending it round to create the desired shaped. The wooden disk also connects to a wooden pole which goes down to a square wooden base which could be vinyl wrapped into order to get a specific design which cannot be easily painted on.

Initial Ideas:



Year 12

Development – Models 1:

Model Analysis:

The model was used to test the stability of the design. Through using this model, I found that the design was unstable as it could be easily pushed over. This was because it had no supports on the front or back of the design making it vulnerable to falling over backwards or forwards. In the next model I will address this issue by making supports on the front to make it more stable. Another problem with this model is that the different coloured Lego bricks distracted you when looking at the shape of the design. To improve this in my next model I will use cardboard as it is one colour and will not distract you when looking at the shape of the design. However making the model out of Lego was quick and easy. In addition, you can easily make adjustments to earlier iterations.

Model Analysis:

The model was used to test wether the the added supports of the front would improve the stability of the design. The added supports improved stability of the design, as it stopped falling over. However the weight of the bulb and lamp shade posed a new problem, as the the arm started to bow under the weight. This means that in any future models I will need to add more layers of cardboard on the arm to support the weight of the bulb and lap shade. One good this about the model is that masking tape can easily be applied to change the position of the arm, and changes can easily be attached to the cardboard using hot glue or masking tape. In the next iterations of the design I am going to see wether the lamp would look better if the lamp was placed differently.

Model Analysis:

The model was used to test wether the lamp would improve its aesthetics if the arm was in the centre of the the two supports. This was because in the last model the design looked disproportional as the new support look like it had been stuck on the first model with no thought . I thought it may improve its aesthetics if the arm as in between both supports to make the the promotion of the design more equal. I preferred the arm to be in the middle of both supports, but this provided another issue – the balance of the arm. In the last model the added support balanced the arm, but when the arm is in the middle of both supports, there is nothing to balance the weight of the lamp and shade. It could be stood up, but it was unstable; to fix this issue the arm could extend past the base, and a counter weight could be added to balance the weight of the light. This is an issue I will address in my next model.

Whats Assessed?

Year 13

Paper 1

Technical principles

2hours 30 minutes

30% of final mark

120 marks

Technical Principles Includes:

Materials and their applications.
Performance characteristics of materials.
Enhancement of materials.
Forming, redistribution and addition processes.
The use of finishes.
Modern and industrial scales of practice
Digital design and Manufacture
The requirements for product design and development
Health and Safety
Protecting designs and intellectual property
Designs for manufacturing, maintenance, repair and disposal
Feasibility studies
Enterprise and marketing in the development of products.
Design communication.

Whats Assessed?

Year 13

Paper 2

Designing and Making Principles

1 hour 30 minutes

20% of final mark

80 marks

Designing and Making Principles Include:

Design methods and processes
Design theory
Technology and Cultural Changes
Design Processes
Critical Analysis and Evaluation
Selecting appropriate tools and equipment and processes
Accuracy in design and manufacture
Responsible Design
Design for manufacture and project management
National and international standards in product design.

Whats Assessed?

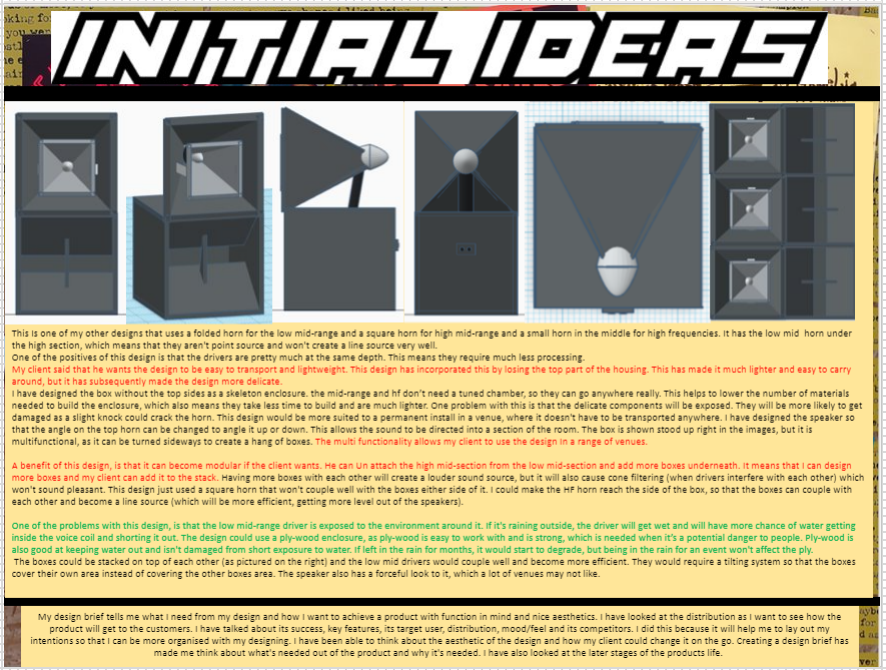
NEA – Year 12/13

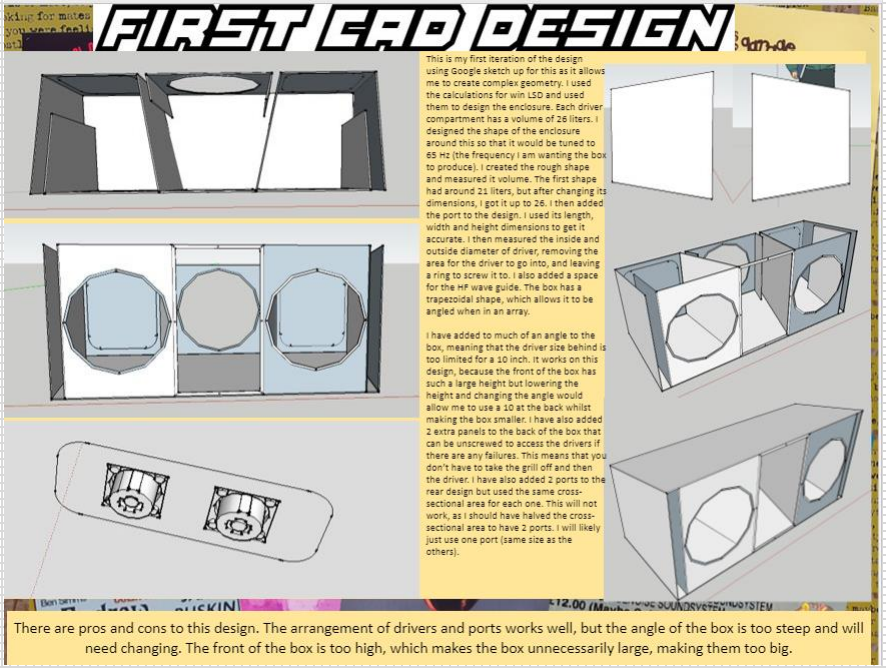
Practical application of technical principles and design and making principles

Substantial design and make project

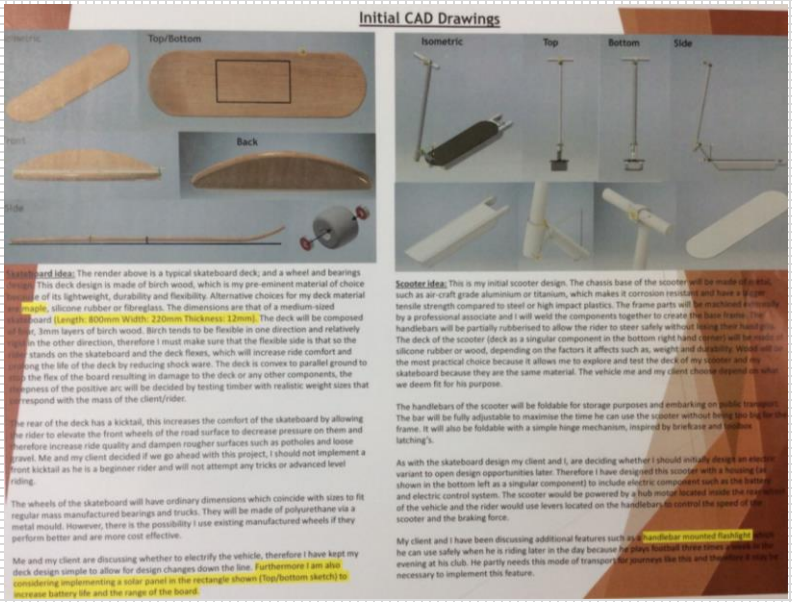
50% of final mark

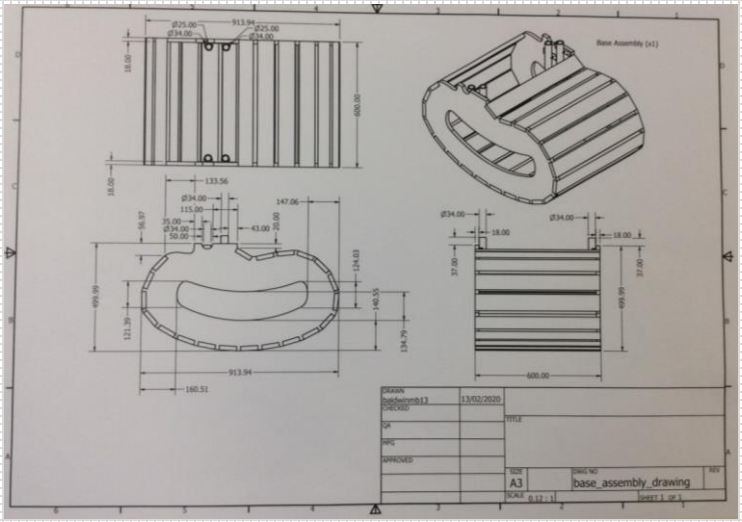
Written or digital design portfolio and photographic evidence of final prototype.





NEA


Initial CAD Drawings
Top/Bottom
Back
Side
Isometric
Top
Bottom
Side
Skateboard idea: The render above is a typical skateboard deck; and a wheel and bearings design. This deck design is made of birch wood, which is my pre-eminent material of choice because of its lightweight, durability and flexibility. Alternative choices for my deck material are maple, silicone rubber or fibreglass. The dimensions are that of a medium-sized skateboard (Length: 800mm Width: 220mm Thickness: 12mm). The deck will be composed of four, 3mm layers of birch wood. Birch tends to be flexible in one direction and relatively rigid in the other direction, therefore I must make sure that the flexible side is that so the rider stands on the skateboard and the deck flexes, which will increase ride comfort and prolong the life of the deck by reducing shock ware. The deck is convex to parallel ground to stop the flex of the board resulting in damage to the deck or any other components, the steepness of the positive arc will be decided by testing timber with realistic weight sizes that correspond with the mass of the client/rider.
The rear of the deck has a kicktail, this increases the comfort of the skateboard by allowing the rider to elevate the front wheels of the road surface to decrease pressure on them and therefore increase ride quality and dampen rougher surfaces such as potholes and loose gravel. Me and my client decided if we go ahead with this project, I should not implement a front kicktail as he is a beginner rider and will not attempt any tricks or advanced level riding.
The wheels of the skateboard will have ordinary dimensions which coincide with sizes to fit regular mass manufactured bearings and trucks. They will be made of polyurethane via a metal mould. However, there is the possibility I use existing manufactured wheels if they perform better and are more cost effective.
Me and my client are discussing whether to electrify the vehicle, therefore I have kept my deck design simple to allow for design changes down the line. Furthermore I am also considering implementing a solar panel in the rectangle shown (Top/bottom sketch) to increase battery life and the range of the board.
Scooter idea: This is my initial scooter design. The chassis base of the scooter will be made of a metal, such as air-craft grade aluminium or titanium, which makes it corrosion resistant and have a greater tensile strength compared to steel or high impact plastics. The frame parts will be machined externally by a professional associate and I will weld the components together to create the base frame. The handlebars will be partially rubberised to allow the rider to steer safely without losing their hand grip. The deck of the scooter (deck as a singular component in the bottom right hand corner) will be made of silicone rubber or wood, depending on the factors it affects such as, weight and durability. Wood will be the most practical choice because it allows me to explore and test the deck of my scooter and my skateboard because they are the same material. The vehicle me and my client choose depend on what we deem fit for his purpose.
The handlebars of the scooter will be foldable for storage purposes and embarking on public transport. The bar will be fully adjustable to maximise the time he can use the scooter without being too big for the frame. It will also be foldable with a simple hinge mechanism, inspired by briefcase and toolbox latching's.
As with the skateboard design my client and I, are deciding whether I should initially design an electric variant to open design opportunities later. Therefore I have designed this scooter with a housing (as shown in the bottom left as a singular component) to include electric components such as the battery and electric control system. The scooter would be powered by a hub motor located inside the rear wheel of the vehicle and the rider would use levers located on the handlebars to control the speed of the scooter and the braking force.
My client and I have been discussing additional features such as a handlebar mounted flashlight which he can use safely when he is riding later in the day because he plays football three times a week in the evening at his club. He partly needs this mode of transport for journeys like this and therefore it may be necessary to implement this feature.


Base Assembly (x1)
DRAWN
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13/02/2020
CHECKED
QA
MFG
APPROVED
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SIZE
A3
DWG NO
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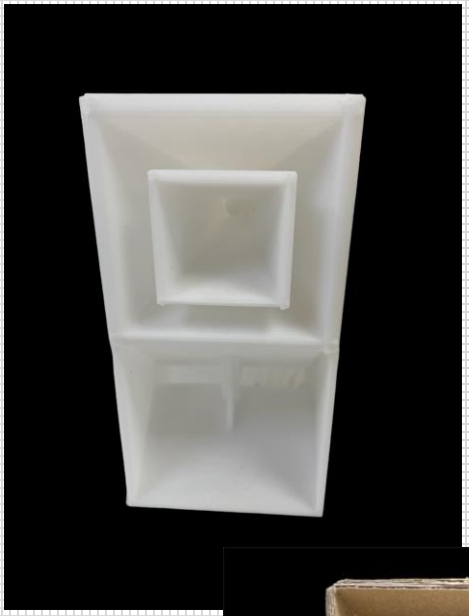
REV
SCALE 0.12 : 1
SHEET 1 OF 1

Last Years NEA



Student Voice

I enjoy Product Design because it is fun being able to think of an idea completely out of nowhere and bring that idea to life. Product Design is a good subject to take because it will develop practical skills and also teamwork with your classmates.

It allows you to be a lot more freer with how you decide to work practical wise and the theory isn't too dissimilar to the GCSE so isn't a big step up.

For me, DT is a fun and creative break from the more difficult subjects I take. A level DT is more engaging and you get to try things you have never done before.

A LEVEL PRODUCT DESIGN

Visit to
Pool Bank
Vintage Interiors


Design & Technology
Paris
Musée
YvesSaintLaurent
Paris
June 2024

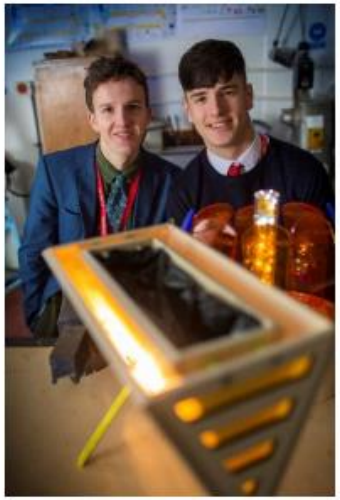
Prince Henry's Grammar School

SIXTH FORM

Product Design

Course Leader: Mrs C Burton

Why Study Product Design?



This creative and thought-provoking qualification gives students the practical skills, theoretical knowledge and confidence to succeed in a number of careers, especially those in highly sought after Science, Technology, Engineering and Mathematics (S.T.E.M) and creative industries.

Students will investigate historical, social, cultural, environmental and economic influences on design and technology, whilst enjoying opportunities to put their learning into practice by producing prototypes of their choice.

Students will gain a real understanding of what it means to be a designer, alongside the knowledge and skills sought by higher education and employers.

Course Content and Assessment

A Level Subject content:

1. Technical principles
2. Designing and making principles

Assessments

- Paper 1: Technical principles (written exam 2.5hrs) 30% of A Level
- Paper 2: Designing and making principles (written exam: 1.5hrs) 20% of A Level. Mixture of short answer and long response questions.
  Section A: Product Analysis (up to 6 short answer questions based on visual stimulus of product(s)).
  Section B: Commercial manufacture (mixture of short and extended response questions).
- Non-exam Assessment: Practical application of technical principles, designing and making principles (substantial design and make project) 50% of A Level.
  Evidence: Written or digital design portfolio and photographic evidence of final prototype.

Progression Routes

Product Design is an excellent qualification in its own right. It can also be used as a stepping stone into Higher or Further Education to study the many and varied subjects within areas such as Industrial Design, Graphic Design, Web Design, Architecture, Arts or Engineering courses and many others.

Entry Requirements

Students should have completed a GCSE Design and Technology course, attaining grade 5 or above in any area of the subject. Candidates may also be considered without prior experience if they have achieved at least grade 5 in GCSE Maths, English and Science.

Student Case Study

Prince Henry's Grammar School
Sixth Form

Product Design

Case Study

Student Name Jamie Webster

BA(Hons) Industrial Design at Loughborough University

Please could you outline your day to day routine at work?

I'm currently working on 2 major projects; one with an organisation called LIVES that operate in Lincoln, designing an educational product that teaches/engages primary school children the importance of CPR and how to perform it. The other designing a catalogue of shopping centre Christmas decorations for a company called Fizzco projects to be manufactured for display in 2018.

How has studying Product Design aided you in your current job?

I received an unconditional offer from Loughborough when I showed them my AS and current A2 portfolio at interview. I mastered the C.A.D software I needed through this course and felt like I had a head start at university.

Student Case Study

Prince Henry's Grammar School
Sixth Form

Product Design

Case Study

Student Name Ella Churchill

BA(Hons) PR and Marketing Relations at Leeds Beckett University

Please could you outline your day to day routine at work?

Ella is currently sitting her fourth year after carrying out a placement year at Toyota GB and Lexus UK's head office in London. Her placement year saw her working in the Social Media department for the two automotive brands, in close quarters with the Press department.

How has studying Product Design aided you in your current job?

Studying Product Design at PHGS helped me greatly when it came to coursework at university. I've had to complete several portfolio tasks throughout my 4 years and felt at ease after completing at least 2, comprehensive and successful portfolios throughout the A level design course.

Student Case Study

Prince Henry's Grammar School
Sixth Form

Product Design

Case Study

Student Name Chris Brown

BA(Hons) Product design at Nottingham Trent University

Please could you outline your day to day routine at work?

One of the great things about design is that you don't really have a day to day routine as every day is different and you never know what is going to crop up. That's one of the reasons I got into design!

What do you like about your job?

For me, I love the fact that each and every project is different, one minute you can be making a standard project look attractive, the next you can be fine tuning a new design to make sure the function is flawless. I also like the fact I am able to be creative and put my style into the work I do. The design world seems to have a more relaxed atmosphere to it than other career pathways (until a deadline looms!), which is nice to work in and around, again making the job enjoyable.

Construction manager

Site manager

Construction managers organise the work on building projects, making sure it's completed safely, within budget and on time.

Average salary
(a year)

£27,000 to £70,000
Starter — Experienced

Skills and knowledge

You'll need:

- knowledge of building and construction
- maths knowledge
- the ability to organise your time and workload
- leadership skills
- knowledge of engineering science and technology
- business management skills
- the ability to use your initiative
- excellent verbal communication skills
- you will be expected to use a computer confidently as part of this job.

CAD technician

Computer-aided design (CAD) technicians use software to design buildings, machinery, goods and components.

Average salary
(a year)

£15,000 to £35,000
Starter — Experienced

Typical hours
(a week)

39 to 41
a week

Skills and knowledge

You'll need:

- design skills and knowledge
- maths skills
- to be thorough and pay attention to detail
- excellent verbal communication skills
- knowledge of engineering science and technology
- thinking and reasoning skills
- the ability to work well with others
- the ability to use your initiative
- you will be expected to know how to use a computer and tools to benefit this job.

Electronics engineer

Electronics engineers design and develop systems for industry, from mobile communications to manufacturing and aerospace.

Average salary
(a year)

£21,000 to £65,000
Starter — Experienced

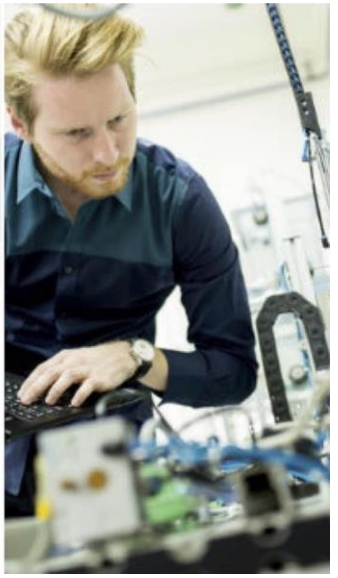
Typical hours

42 to 44
a week

Skills and knowledge

You'll need:

- knowledge of computer operating systems, hardware and software
- knowledge of engineering science and technology
- maths knowledge
- to be thorough and pay attention to detail
- analytical thinking skills
- design skills and knowledge
- the ability to work well with others
- to be flexible and open to change
- being able to use a computer terminal or hand-held device may be beneficial for this job.



WHY PRODUCT DESIGN?

Civil engineer

Engineering consultant

Civil engineers design and manage construction projects, from bridges and buildings to transport links and sports stadiums.

Average salary
(a year)

£24,000 to £80,000
Starter — Experienced

Typical hours
(a week)

40 to 42
a week

Skills and knowledge

You'll need:

- knowledge of engineering science and technology
- maths knowledge
- knowledge of building and construction
- design skills and knowledge
- excellent verbal communication skills
- knowledge of English language
- thinking and reasoning skills
- the ability to read English
- you will be expected to use a computer confidently as part of this job.

Product designer

Industrial designer, 3D designer, prototype designer, inventor

Product designers create new products and improve existing ones.

Average salary
(a year)

£19,000 to £50,000
Starter — Experienced

Typical hours
(a week)

40 to 42
a week

Skills and knowledge

You'll need:

- design skills and knowledge
- knowledge of engineering science and technology
- the ability to come up with new ways of doing things
- to be thorough and pay attention to detail
- analytical thinking skills
- persistence and determination
- the ability to use, repair and maintain machines and tools
- thinking and reasoning skills
- you will be expected to use a computer confidently as part of this job.

Skills and knowledge

You'll need:

- knowledge of engineering science and technology
- maths knowledge
- design skills and knowledge
- to be thorough and pay attention to detail
- excellent verbal communication skills
- science skills
- analytical thinking skills
- the ability to read English
- you will be expected to use a computer confidently as part of this job.

Aerospace engineer

Aeronautical engineer

Aerospace engineers design, build and maintain planes, spacecraft and satellites.

Average salary
(a year)

£20,000 to £60,000
Starter — Experienced

Typical hours
(a week)

39 to 41
a week

WHY PRODUCT DESIGN?

Energy engineer

Renewable energy engineer

Energy engineers research, design and build power generation plants, and work in the oil and gas industry.

Average salary
(a year)

£20,000 to £80,000
Starter Experienced

Typical hours
(a week)

41 to 43
a week

Skills and knowledge

You'll need:

- knowledge of engineering science and technology
- maths knowledge
- analytical thinking skills
- to be thorough and pay attention to detail
- thinking and reasoning skills
- excellent verbal communication skills
- the ability to use your initiative
- knowledge of building and construction
- you will be expected to use a computer confidently as part of this job.

Skills and knowledge

You'll need:

- design skills and knowledge
- to be thorough and pay attention to detail
- knowledge of engineering science and technology
- patience and the ability to remain calm in stressful situations
- knowledge of manufacturing production and processes
- the ability to come up with new ways of doing things
- to be flexible and open to change
- analytical thinking skills
- being able to use a computer terminal or hand-held device may be beneficial for this job.

Model maker

Model makers design and create 3D models for TV and film, and for use in engineering, construction and architecture.

Average salary
(a year)

£16,000 to £30,000
Starter Experienced

Typical hours
(a week)

43 to 45
variable

Skills and knowledge

You'll need:

- knowledge of engineering science and technology
- maths knowledge
- knowledge of building and construction
- design skills and knowledge
- excellent verbal communication skills
- knowledge of English language
- thinking and reasoning skills
- the ability to read English
- you will be expected to use a computer confidently as part of this job.

Structural engineer

Structural engineers help to design and build large structures and buildings, like hospitals, sports stadiums and bridges.

Average salary
(a year)

£22,000 to £50,000
Starter Experienced

Typical hours
(a week)

40 to 42
a week

WHY PRODUCT DESIGN?