

# A-LEVEL DESIGN AND TECHNOLOGY

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Sixth Form Open Evening – 3<sup>rd</sup> November 2021



**KING EDWARD VI  
ASTON SCHOOL**

*Educational excellence for our City*

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**KING EDWARD VI  
FOUNDATION  
BIRMINGHAM**

*Educational excellence for our City*

# What is A-level Design and Technology?

- A creative and thought-provoking qualification that embeds the practical skills, theoretical knowledge and confidence to succeed in a wide range of careers but especially within the creative industries.
- Topics include historical, social, cultural, environmental and economic influences on Design and Technology
- Our students learn what it is to be a designer as well as acquiring the skills and knowledge sought by higher education and employers



## Provision and Contextual Analysis


Slow	Typically rated up to 3kW. Often used to charge overnight or at a workplace.	8-10 hours	
Fast	Typically rated at either 7kW or 22kW. Tend to be installed in car parks, supermarkets, leisure centres and houses with off-street parking.	3-4 hours	
Rapid	Typically rated from 43kW. Only compatible with EVs with rapid-charging capability.	30-60 mins	



The image above shows EV charging stations in major locations in the UK such as London, Birmingham, Bristol and etc. There are now more than 30,000 charge points across the UK with 10,000 charging station added in 2019 alone.

Workplace charging points are popular amongst employees and are a great alternative to public charging in a safe environment. Workplaces that offer such facilities increase the interest, understanding and adoption of EV within companies and help businesses meet c02 emission targets.

Demonstrating the moving mechanism of the prototype



Included stopper to ensure extended form's length is constant

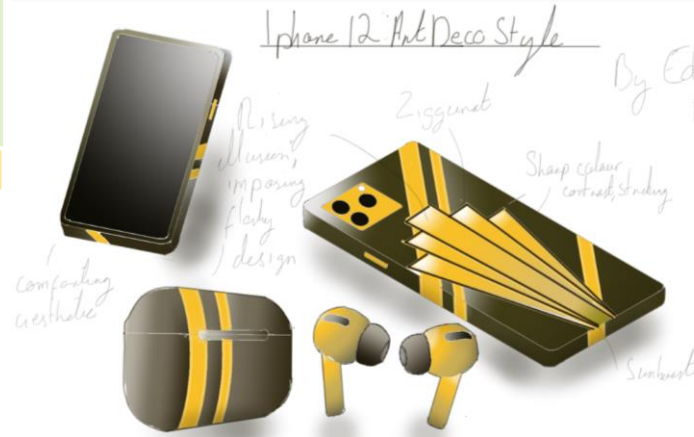


Product 11

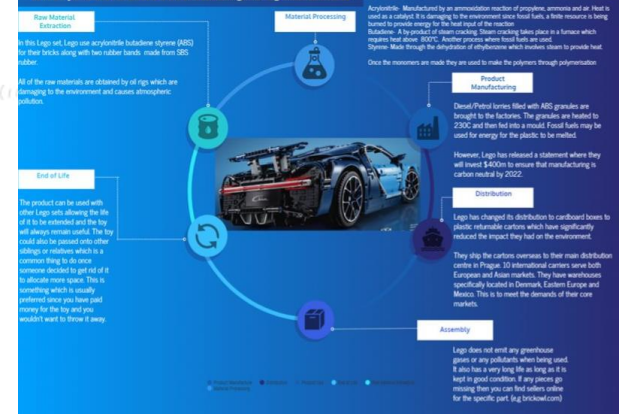
[illegible]

After some further review, it seems its currently implausible to alter charging periods and sockets due to current technologies, therefore improvements have to be made via product experience and ease of use which will be just as effective to consumers and pedestrians alike.

The next stage is to establish who the end users will be and what are their requirements for charging ports and development, in detail, what is expected from the final product.



## Life Cycle Assessment of the Lego Bugatti Chiron



Students are encouraged to take part in extra-curricular opportunities, including competitions, to help develop their knowledge and skills.

# Assessment – what to expect



## Paper 1

### What's assessed

Technical principles

### How it's assessed

- Written exam: 2 hours and 30 minutes
- 120 marks
- 30% of A-level

## Paper 2

### What's assessed

Designing and making principles

### How it's assessed

- Written exam: 1 hour and 30 minutes
- 80 marks
- 20% of A-level

### Questions

Mixture of short answer and extended response questions.

#### Section A:

- Product Analysis: 30 marks
- Up to 6 short answer questions based on visual stimulus of product(s).

#### Section B:

- Commercial manufacture: 50 marks
- Mixture of short and extended response questions

## Non-exam assessment (NEA)

### What's assessed

Practical application of technical principles, designing and making principles.

### How it's assessed

- Substantial design and make project
- 100 marks
- 50% of A-level

### Evidence

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

At Aston we teach the AQA7552 course.  
Students will sit two examinations in Year 13, combined  
these are worth 50% of the A-level.  
A non-examined assessment (NEA) project begins in Year 12  
and is submitted in Year 13, this is worth 50% of the A-level.



# Non-Examined Assessment (NEA)

The NEA project is completely guided by the students.

It offers the creative freedom to undertake a project that is of real interest.

Although a significant work commitment, the outcomes and portfolios produced are consistently excellent.

## Primary Research

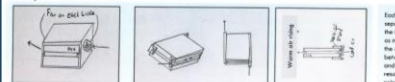
### Airflow Research



### Storage & Cable Management



### Concept Sketches



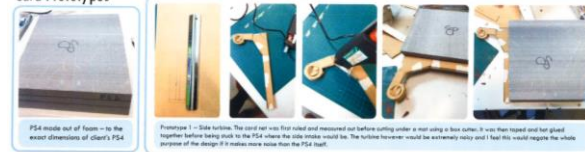
Once disassembled, you can see that the PS4 has a single turbine forcing air into the cooling chamber right above the CPU. This chamber is full of very fine stainless steel, where the star can accurately control temperature. The PS4 has a slower-type design which makes it more difficult to design for a more compact design.

There are already existing products on the market that claim to be the cooling of the PS4 by holding them hot dry, but these are too ineffective for the intended purpose. The PS4's design is more than the size of the intake, so holding them hot dry is a solution to a problem that isn't there.

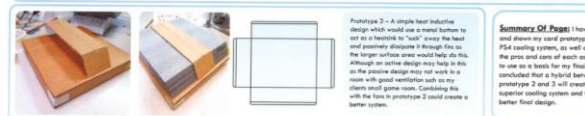
Leading on from the airflow research, the lack of airflow in the middle cabinet where the PS4 is kept, with only a single hole on the back that is meant for cables, further restricting the cool air from coming in. This would cause the hot exhaust air and the cool air coming in and mixing further reducing the difference in temperature between the intake air and the CPU. The cable management for this is meant, as the wires have to travel on the floor before making their way under the cabinet.

**Summary Of Phase 1:** I have conducted primary research into the PS4's cooling system, including fan speed, fan noise, and fan vibration. I have also conducted research into the PS4's design, including the fan's location and the fan's speed. I have also conducted research into the PS4's design, including the fan's location and the fan's speed. I have also conducted research into the PS4's design, including the fan's location and the fan's speed.

## Card Prototypes

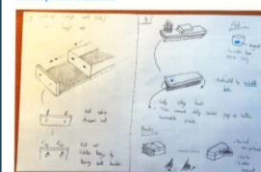


Prototype 2 - Side and over intake. The card was first ruled out and measured precisely using a protractor to 60 degrees - the angle of the PS4. The card was then cut and scored using a box cutter before using a pair of pliers to create a hole in the PS4 frame model. This was a small hole holder on the face and can be used to create the same amount of airflow. This design however could not cut off the PS4's intake to have the fan spinning and this may create more noise in a less graphically intense game than the PS4 could handle.



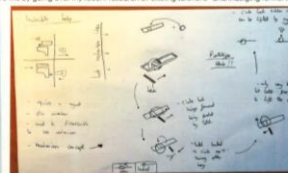
**Summary Of Phase 2:** I have made and shown my card prototypes for my PS4 cooling system, as well as explained the pros and cons of each as to which to use as a basis for my final design. I concluded that a hybrid between prototype 2 and 3 will create a more superior cooling system and that a better final design.

## Development sketches

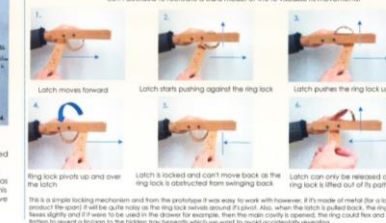


Idea 1 was the most favoured concept from my focus group due to the ease of the locking system and the increased capacity for hiding items. However, few did prefer the floating shelf concept. I displayed a more hidden concept that was a bit harder to accidentally discover and get into due to the magnetic lock. From this, I can't tell further design 3 and improve design 1 but try to increase its safety but making it simply harder to get into. I will try to achieve this by going over my recent research on existing solutions, and including further into locking mechanisms.

I was trying to compare up some new ideas to develop concept 1 but I was struggling in one spot welding my thumb. I kept clicking my pen in and out and then got interested in the mechanism it uses to actually push out and retract the tip of the pen holder. I did some research and came across a concept called the push-push mechanism. I decided to draw it out to get a better idea of how it works.



This latch concept here I discovered on my uncle's farm in Pakistan. It was a locking mechanism he used to lock the fence gates. It was simple enough for him and anyone to enter but just hard enough for the animals not to figure out how to get out. I decided to recreate a card model of this to visualise its movements.

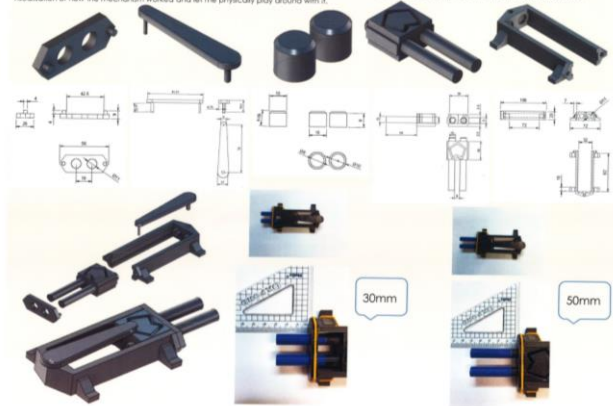


After drawing it and getting a better idea of its functionality, it came up with an idea of incorporating into my concept 1. It had both the ideas of the mechanism that locks the compartment and the hidden cavity only accessed by sliding points similar to that of Japanese puzzle boxes. I wanted to recreate this almost as a final product but needed to get my hands on a 3D version of this mechanism, so I decided a 3D printer was the best way to achieve this.

This is a simple locking mechanism and from the prototype it was easy to work with however, if it made of metal the ring lock is a larger problem the ring lock will be able to hold the ring lock around it. Also, when the latch is pulled back, the ring lock leaves slightly and it will be too hard to use in the future for example, when the main cavity is opened, the ring lock will be too hard to use to get into the hidden compartment which we want to avoid accidentally revealing.

## Push-Push Mechanism

I recreated the push-push mechanism in Fusion 360 but had to adapt the design and break it up for 3D printing and assembly purposes. The mechanism worked but some pieces came out slightly distorted due to their orientations upon the 3D printer's base. However, the overall result was impressive. I gave me a better visualisation of how the mechanism worked and let me physically play around with it.



## Final Product W/ PS4



## Manufacturing Techniques- Fastening a Screw

### 1- Using a vice



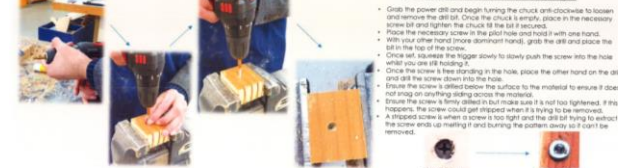
- Before infusing this workshop task, ensure an open spirit and goggles are worn at all times.
- To open up the vice, swing the arm anti-clockwise, remember left loosey, right tighty close you finger the direction for the vice.
- Place the working material between the 2 arms metal holders of the vice and begin moving the inner arm clockwise to close the holder around the material.
- When the holder grip the material, tug on the swivel arm to ensure the working material is secured tightly and won't move when being worked on.
- The material is ready to be drilled into.

### 2- Setting up a power drill for pilot holes



- Grab the power drill and ensure a charged battery is inserted in the base of it. If not placed, press the button to unlock the current dead battery. Place the battery on charge in the holder and install a charged one by simply clipping it back onto the battery.
- Once locked, place the side end of the drill bit into the hole and begin turning the chuck clockwise till it is secure.
- Ensure the drill will function in forward motion by pushing in the button right next to the trigger.
- Hold the drill with 2 hands (one over the other on the handle), place the drill tip on the marked area to drill and slowly begin lowering your grip on the trigger.
- Push down on the drill to cut a deeper hole.
- Once complete, pull the drill up and release the trigger.
- The pilot hole is ready for a screw to be installed.

### 3- Setting up a power drill for screwing in



- Grab the power drill and begin turning the chuck anti-clockwise to loosen and remove the drill bit. Once the chuck is turned, press in the necessary screw bit and tighten the chuck till the bit is secured.
- Place the necessary screw in the pilot hole and ensure it is in the correct position.
- With your other hand (more dominant hand), grab the drill and place the bit on the hole.
- Once set, squeeze the trigger slowly to slowly push the screw into the hole until you are satisfied.
- Once the screw is free standing in the hole, place the other hand on the drill and pull the screw down into the hole.
- Ensure the screw is drilled below the surface to the material to ensure it does not snag on anything during assembly of the material.
- Ensure the screw is firmly seated in but make sure it is not too tightened. If this happens, the screw will get stripped when it is trying to be removed.
- A missed screw is when a screw is too tight and the drill bit trying to extract the screw ends up heating it and burning the plastic away so it can't be removed.



# Where can this subject take you?



Design and Technology gives pupils an enviable set of skills as well as an excellent understanding of the world we live in.

As well as intelligent, our students are problem solvers, critical thinkers and team players.

Our students go on to study design and engineering courses at University in pursuit of careers within the STEM sector.

If you have any questions or would like some more information about A-level Design and Technology at KEVI Aston please feel free to email Mr Hodgkinson (Subject Leader) directly:

[m.hodgkinson@keaston.bham.sch.uk](mailto:m.hodgkinson@keaston.bham.sch.uk)