POSSUNT QUIA POSSE VIDENTUR

Beech Hall School

for pupils aged 6 months to 18 years

The Griffin Extra

Issue 8/3 - March 2023

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Lower V Clock Designs
Inspired by designers, artists or simply the world around us, there have been some outstanding creations

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Autodesk Fusion 360
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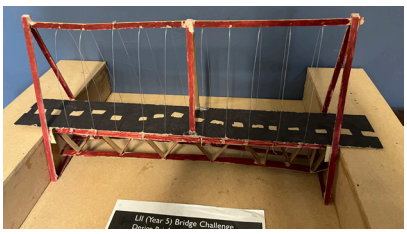

Lower II Bridge-building
Assessed for aesthetic design, strength and structural integrity, some are even tested until they break!

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A slightly maniacal **Henry Robinson** relishes the opportunity to test his bridge to within collapse - and then beyond it. This is the moment it went!

Back cover

I chose DT because before GCSE it was my favourite subject and I find it enjoyable and interesting. It is a mix of written and practical work. I enjoy coming up with ideas to make the projects and prototypes. The practical side of making them using new machines and materials and learning new skills and techniques is great fun.

Nathan Wood, Lower V

I chose D&T because it is just overall a really fun, and pretty hands-on subject. Also Mr Richards is an amazing teacher. I really enjoy the designing process of D&T. I love how you can come with almost anything you can imagine, then present your ideas in drawings or models. It is like seeing your imagination come to life in a way.

When designing a product, try to come up with a few almost completely different designs, as it makes it much easier to pick out what you want or don't want from the product, and helps you to make your final design the best it can be.

Abigail Gibbons, Lower V

Welcome to the end of the spring term, and a very Happy Easter. Now that the weekly Griffin has returned in bumper glory and you see so much of what is happening on a weekly basis, The Griffin Extra is taking a slightly different approach. Still in printed format, it will showcase particular aspects of the school and what the pupils have been doing. In this edition, we are looking at all things Design & Technology and, in particular, a Lower V project on clock design which really has captured their creative imagination.

AUTODESK® FUSION 360™

In the last edition of The Griffin Extra, Mr Richards wrote about a new piece of software called Autodesk Fusion 360 which is an industry leading 3D Computer Aided Design (CAD) package that incorporates 2D and 3D modelling. Following that training day for the pupils in December, they have been getting to grips with this new software to design aspects of their clocks, and it has been great to see it in action and, in some cases, the finished products.

As you no doubt have read in the Griffin, this term has very much focused on pupil voice and engaging our pupils in taking the lead in certain aspects of school life. They have led assemblies on US President Biden's controversial Willow Project, on the ninth anniversary of the disappearance of Malaysian Airlines Flight MH370 and on school plans for a 5km Fun Run in aid of Prevent Breast Cancer as part of the Paint Macc Pink weekend.

Pupils have advised on our planned refurbishment of the senior toilets, and the School Council is working hard to bring to completion their project to build an outdoor classroom. They are currently in the process of match-funding the school's contribution of £5,000 and actively targeting local businesses for sponsorship in exchange for advertising in the weekly online Griffin.

Most recently, I have been extremely impressed with five senior boys who have organised a prayer room in school so that they are able to pray as part of their commitment to Ramadan. In support of these boys, others in their year have joined their fasting on certain days, an opportunity that has taught them the admirable commitment that those who are fasting for thirty days make. This demonstration of respect is an outstanding example of one of our four school values, and what drives us every single day.

The boys knocked on my door one break-time to ask if they could organise this, they printed their own sign for the door, researched in which direction they should pray, and requested permission to leave the lesson at the right time to pray. Through this process, we are all learning more about Ramadan. I didn't know, for example, that fasting also includes water. I didn't know that listening to music or singing is prohibited, and I hadn't realised the implications of fasting until I tried it for just one day. Thanks to Mr Wycherley for his suggestion to put ourselves in our pupils' shoes to better understand their experience.

We have also recently show-cased our senior curriculum in the form of Lower IV Options Evening, a chance for pupils and their parents to fully understand what study options are available and what they entail. It was an impressive evening summed up by one parent who said:

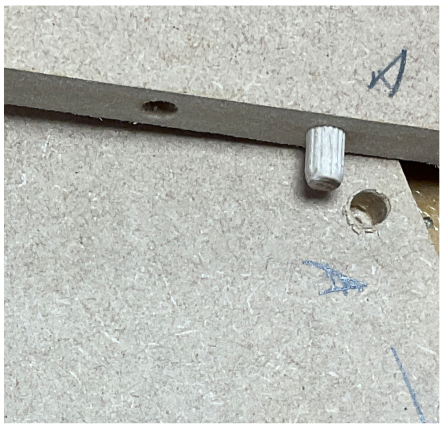
"I just wanted to say thank you to yourself and all the amazing staff that presented their subjects this evening. It was informative, interesting and very enjoyable. One thing that stood out more than anything, was the passion they all had about their subject, giving constructive feedback and advice."

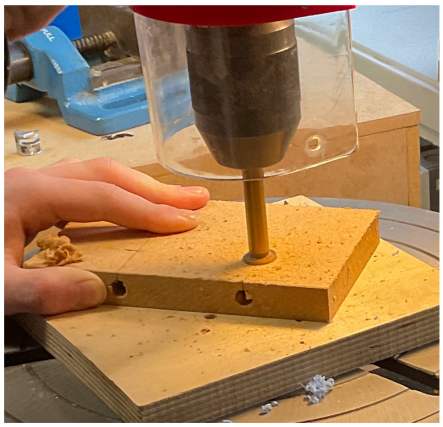
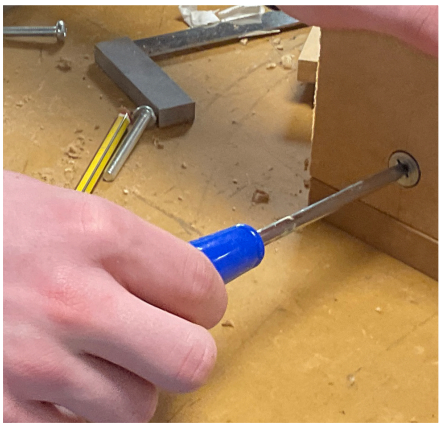
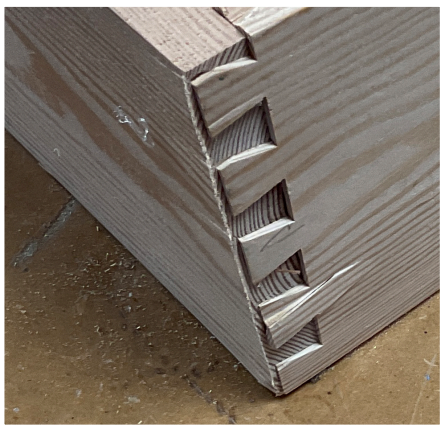
Whilst the school continues to grow in size, many senior year groups are now full with a maximum of 30, comprising two forms of 15. I am excited about the interest in the school, and remain committed to providing a learning environment in which every single pupil is valued, every single pupil is listened to, and every single pupil matters. We can now look forward to the 21st April and our 5km Fun Run, itself instigated by one pupil.

Mr James D Allen
Headmaster

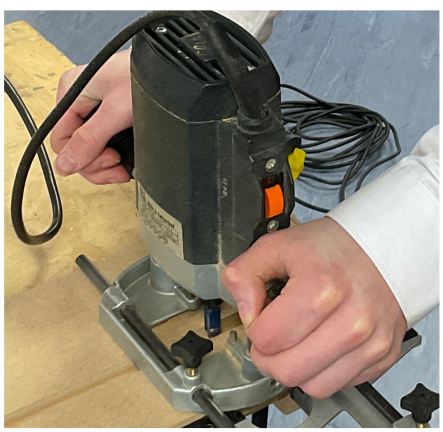
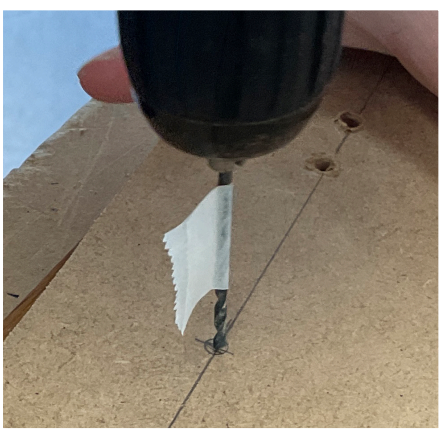
UPPER V NEA

Harvey (Upper V) is currently working on his NEA (Non-Exam Assessment) which counts towards 50% of his GCSE in Design & Technology. Whilst we are not allowed to share his drawings or designs, we can share how Harvey's work is progressing as he works towards completing his design for a fully-functioning desk.

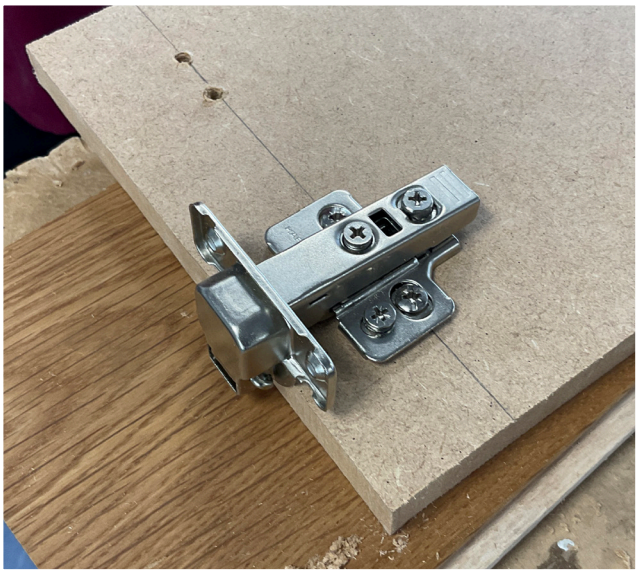



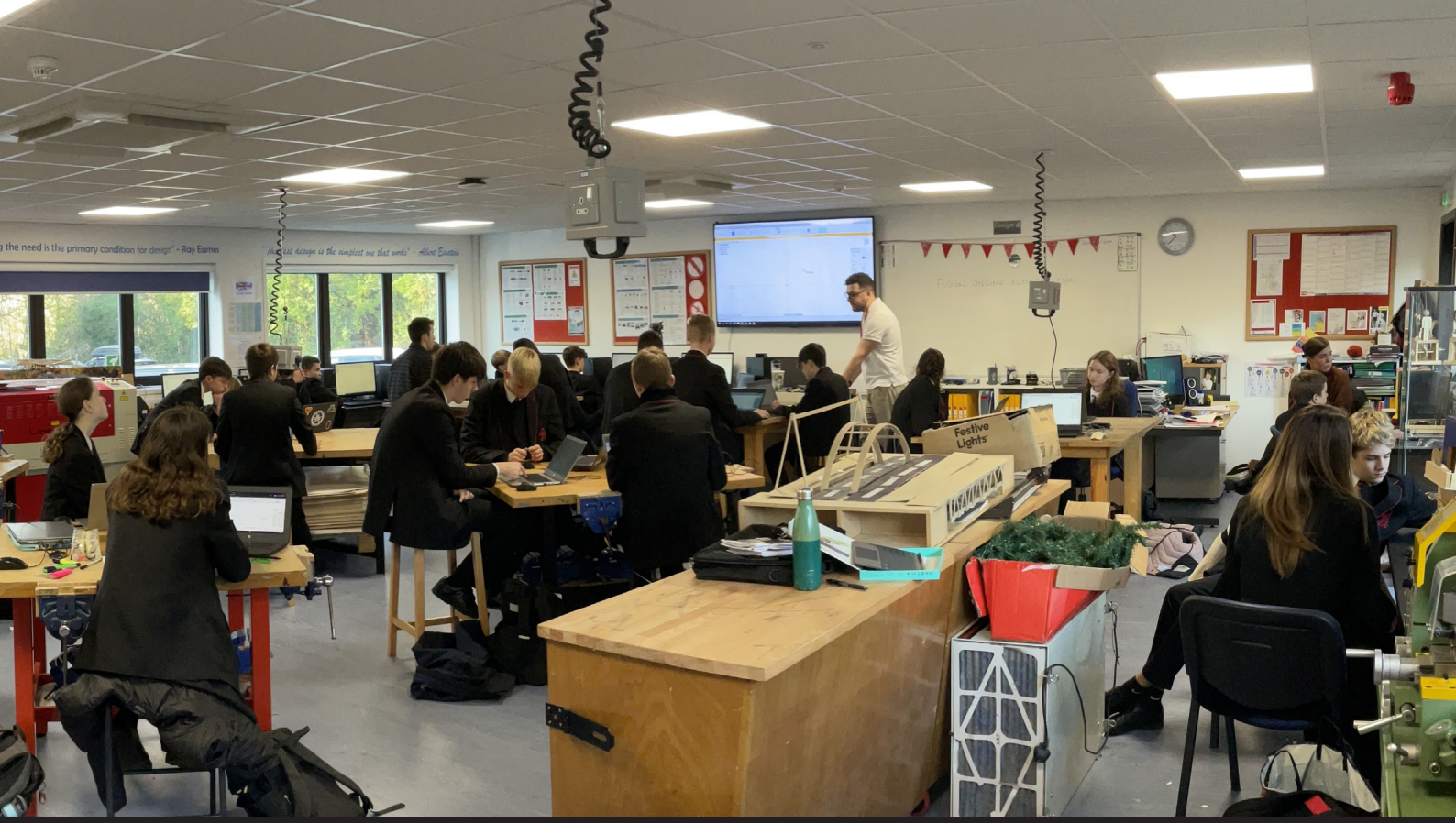








WOOD GLUE





D&T AUTODESK FUSION 360

We introduced Autodesk Fusion 360 into the Design & Technology curriculum this year. Fusion is an industry leading 3D Computer Aided Design (CAD) package that incorporates 2D and 3D modelling, ISO-compliant draughting, full rendering of photo-realistic images, stress analysis, fluid dynamics simulations, Printed Circuit Board design and manufacture, 3D printing and Computer Aided Manufacture support and sheet material net design.

To give the pupils a jump start with their journey through learning to use this advanced software, we arranged for an Autodesk funded full-day training session from Fabrio Design for all our current GCSE D&T pupils.

On Wednesday 7th December 25 pupils and 4 staff gathered in the workshop, armed with PCs and Chromebooks, eager to get to grips creating 3D CAD models. Within the first session they had created a fidget spinner using the software, before moving on to a more independent learning task of fully modelling the intricacies of a Lego brick using Fabrio's unique training platform before being challenged to use their new-found skills to come up with a creative design for a money box. The competition kept interest and engagement high as we worked late into the afternoon. Pupils voted for their favourite design after seeing each other's efforts. Congratulations to Dmytro Vasylevskyi who won with his donut inspired design.

Feedback from pupils who took part has been very enthusiastic and we look forward to seeing this new tool being integrated into pupils' future design work. I would like to thank James Miller of Fabrio Design for his time and expertise in delivering the workshop, Autodesk for funding the training, and to our colleagues and pupils in school who supported the day by adapting their day, changing rooms and covering lessons without complaint.

Mr C Richards, Design & Technology Teacher

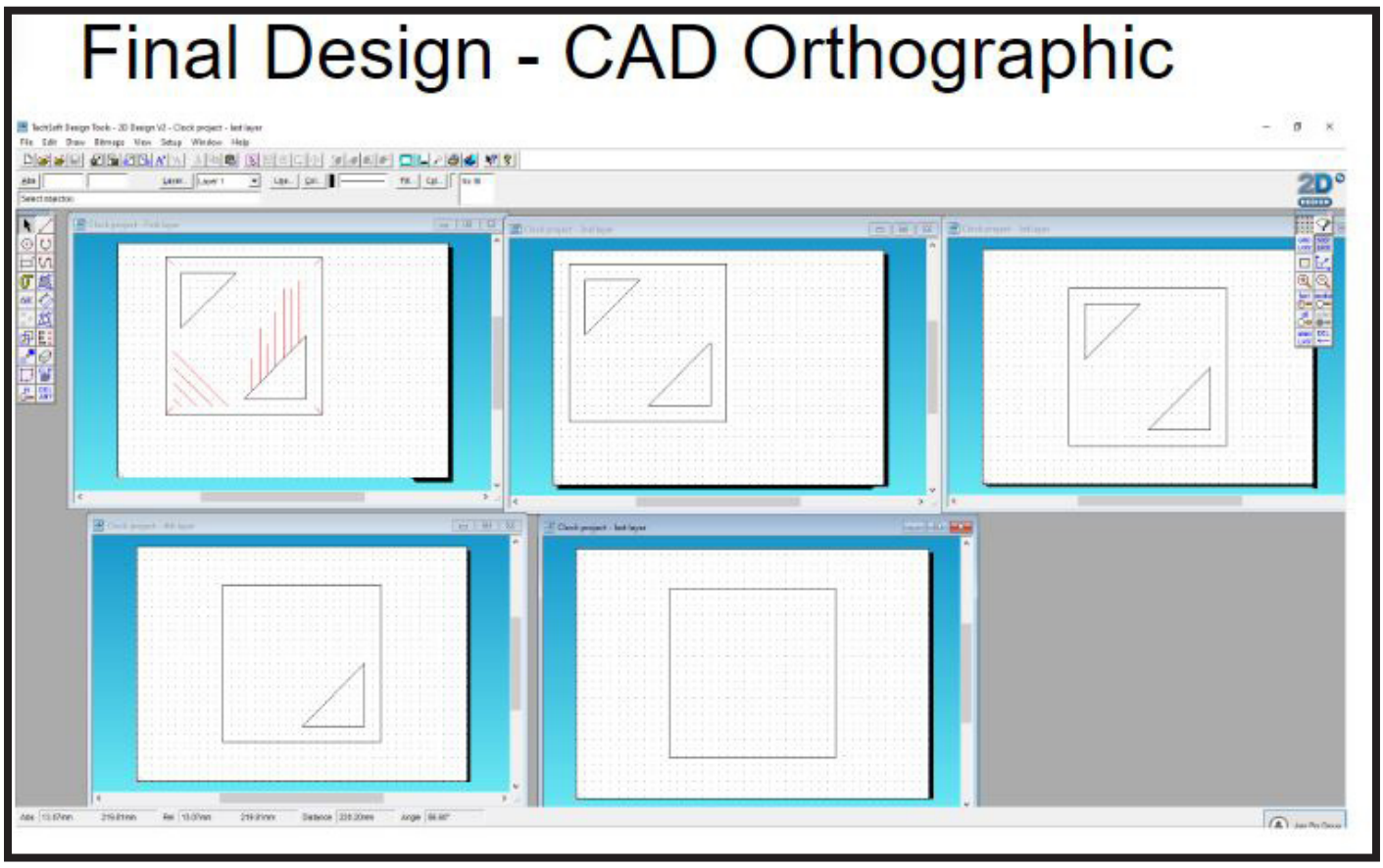
D&T AUTODES

To begin my clock project, I first researched designers and movements to see which one I liked the most. I decided to choose the Bauhaus movement as an inspiration for the project, because I love how the designs are simplistic, yet effective at the same time. Once I had made my choice, I began to create an inspiration sheet of other products, and ideas based on the movement. Afterwards, I started to create a questionnaire, to send to people who fit my target buyers - teenagers and young adults. It took a while to create all the questions and plan out the form, then even longer to get a good amount of replies, therefore I did my analysis of existing products while I waited. However, before I started drawing my ideas, I did a design specification to easily see what I needed the product to do to fit the questionnaire results, and have an aesthetically pleasing and functioning product.

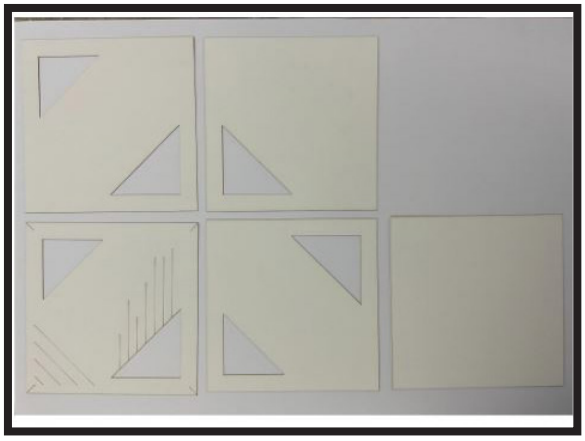
I started by drawing three completely different designs inspired by the Bauhaus, then began refining the designs and developing them. Eventually, I chose my final design based on a final evaluation of the three, so that I could begin designing using CAD, then later making a model of the clock.

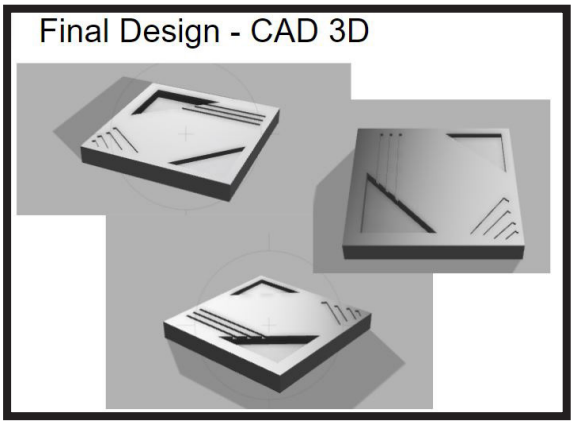
Once I had two cardboard models, a CAD 3D drawing of my clock, and the laser cutter ready, I cut out my design from the different coloured acrylics. I then lined up all of the layers of the clock, glued them together, and I had created my final product.

Abigail Gibbons [Lower V]



SK FUSION 360





First, I laser cut the different layers of the clock out of acrylic, on cutting speed 18 and power 60. I also engraved the front layer at speed 400 and power 25. We also had windows open on both sides of the room for safety.

Then I took the plastic protective layer off all the layers except the top one, and glued them together using Tensol glue and a paintbrush.

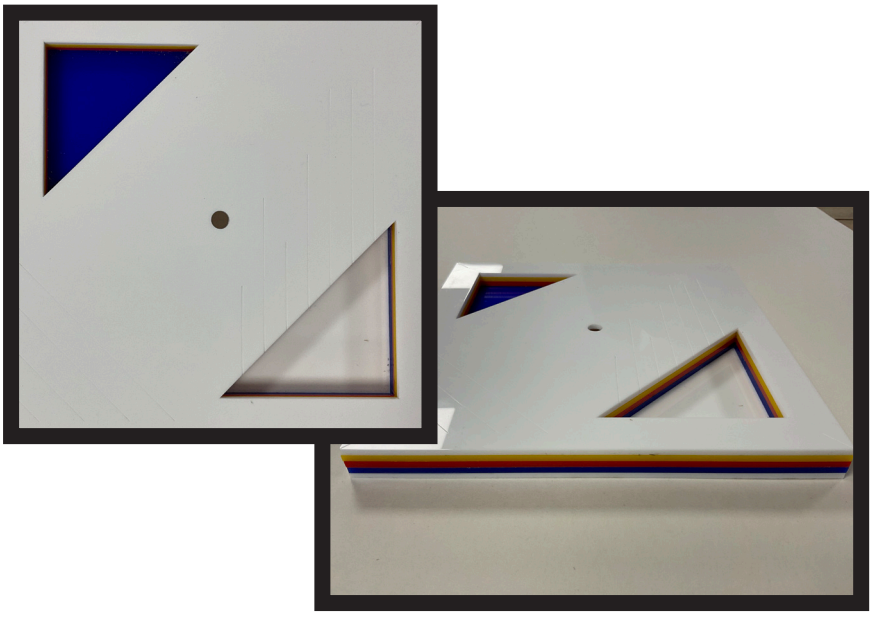
I then let it dry for around 20 minutes, before trying out the clock mechanism and different hands.

Development of the chosen design - modelling & testing

I laser cut this cardboard model, to check the size of the clock, and check the placement of the triangles.
The cardboard was cut at speed 20, and power 40.

Here I made my chosen design on Fusion 360, so I could test to see if it would work well once it was actually made.

The final design ready to laser cut. From 2D design.
This shows all of the layers of the clock without the circles in the back, however I did add them afterwards.



Development - experiments

This prototype is individual shapes laser cut out of cardboard, and each piece is layered one on top of the other. After making this prototype, I have decided to make the top left curve slightly wider and the bottom right curve further away from the centre to make it seem slightly distorted. I think the clock would look best if the layers were alternating with plywood and white acrylic.

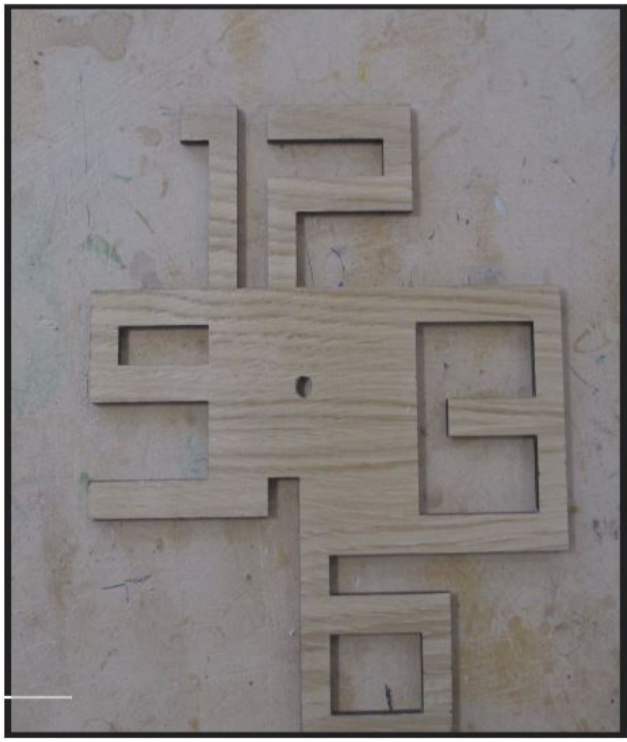
Nathan Wood [Lower V]

Conclusion & photos of final prototype

After making this final prototype, I think that all the curves on each of the layers seem similar to the designs by Zaha Hadid shown on my inspiration page. I'm happy with how the shape and colours of each material look altogether. Maybe I could have improved the shape by sanding down the sides to make a smoother curve.

Conclusion/chosen idea

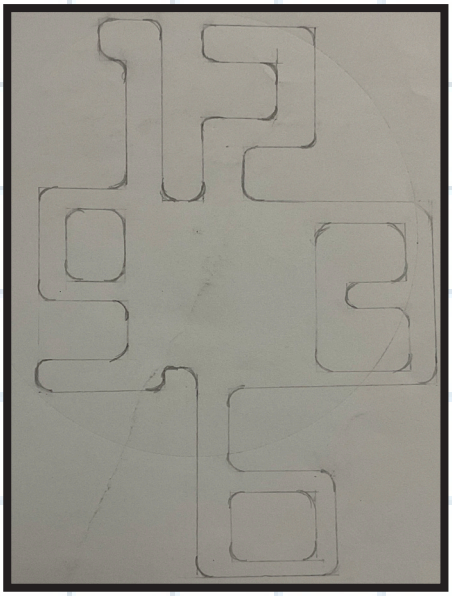
I have chosen an idea which has a body which resembles the numbers, which doesn't need engraving.

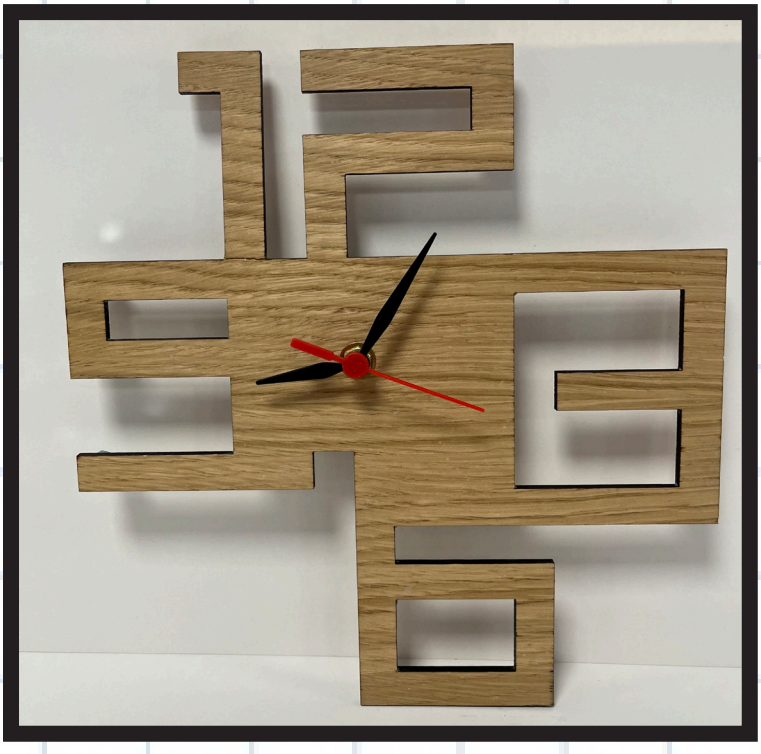


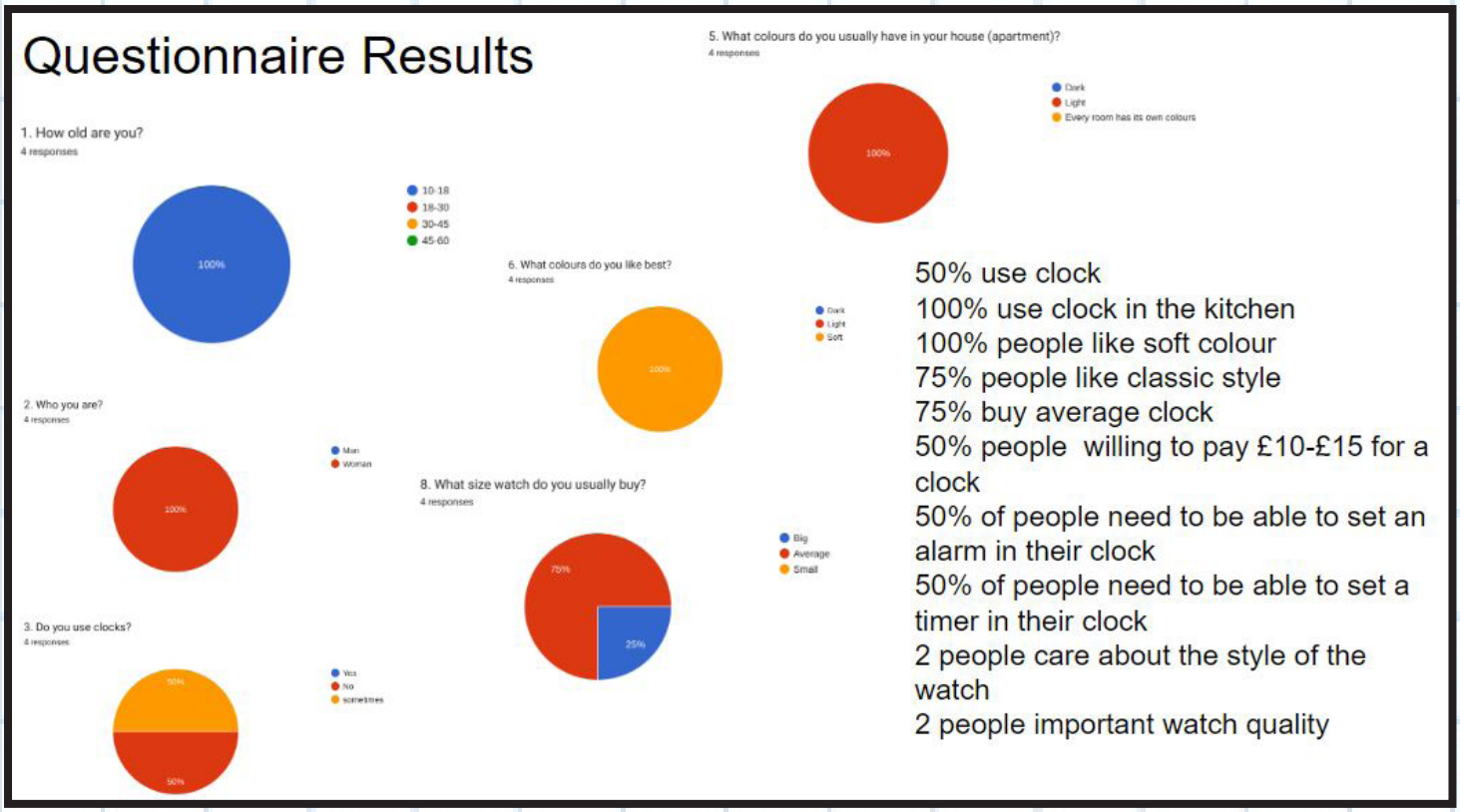
Testing of final prototype

The clock performs as wanted, it shows the time clearly. The arms continuously keep on moving without getting stuck.

Alex Stanley [Lower V]



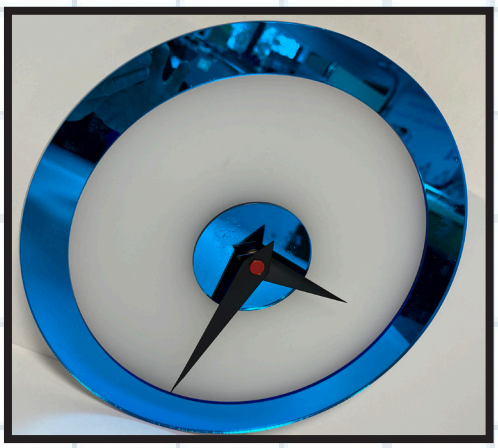




Part of the design process is to research your chosen market; here Dmytro presents the data from his questionnaire.

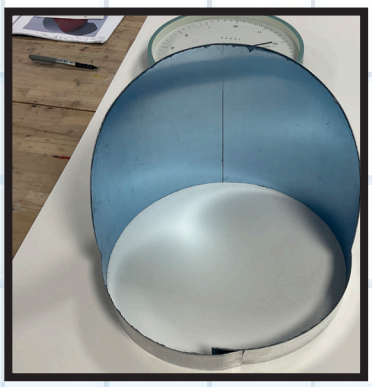
Dmytro Vasylevskyi [Lower V]

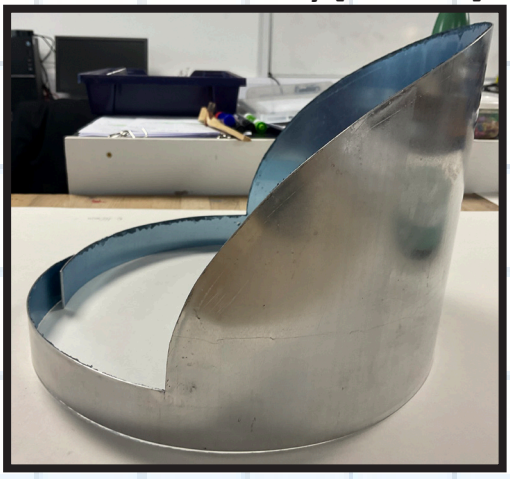
Henry Barnes [Lower V]

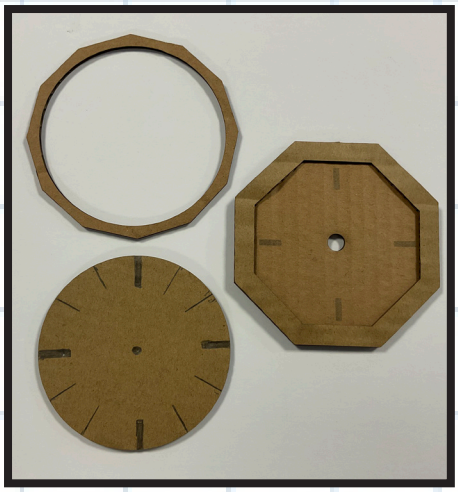


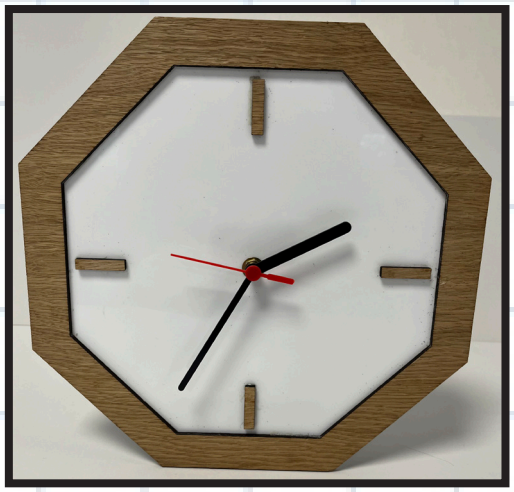
Isaac Platt-Wells [Lower V]

Andrew Kelly [Lower V]



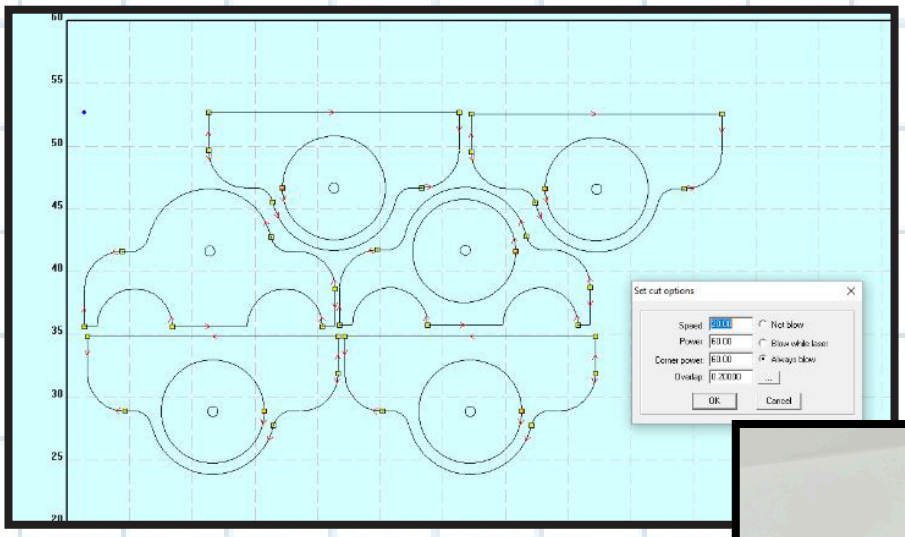






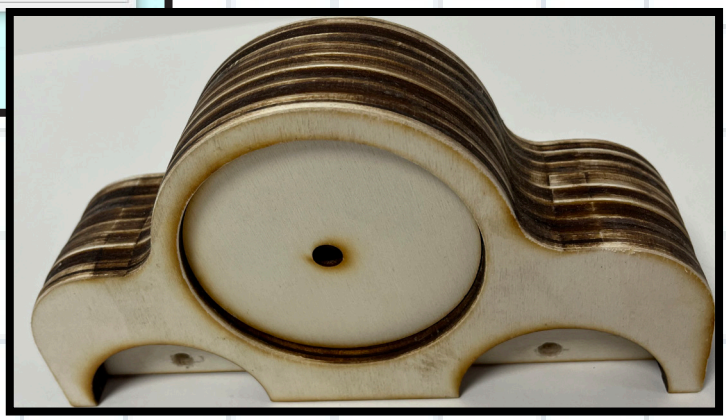
From cardboard prototype to completed design.

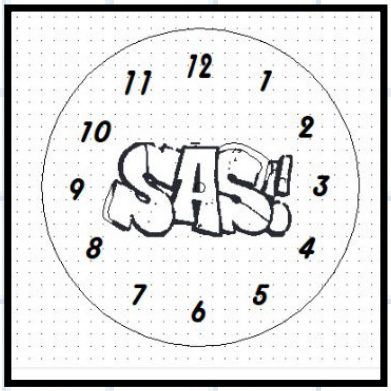
Cameron McGhee [Lower V]



Inspired by vehicles and aimed at children and car enthusiasts; Alex wants his clock to be fun.

Alex Molloy [Lower V]



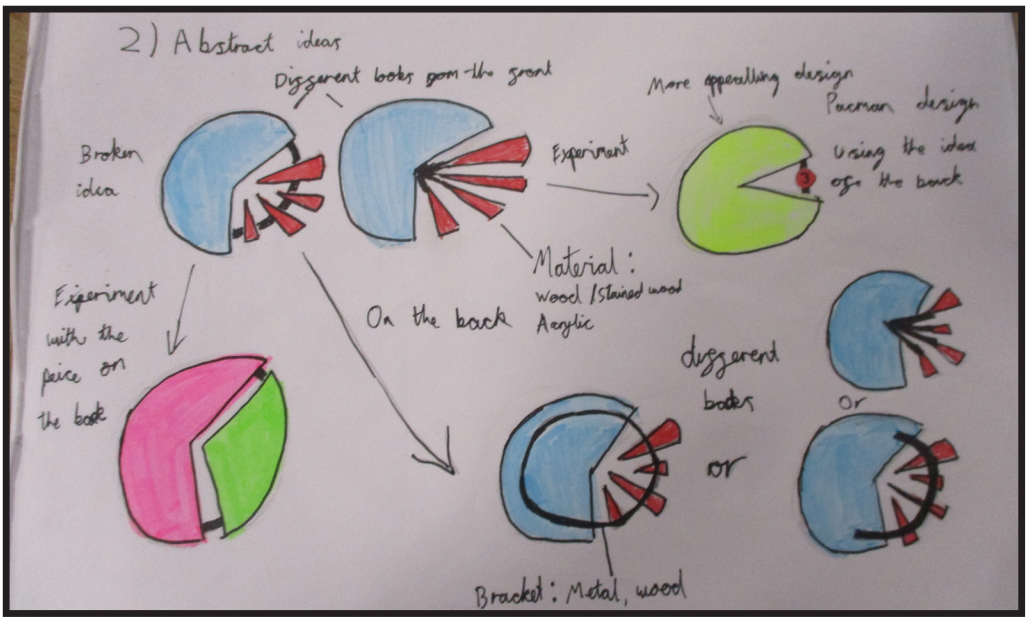


Sam Allmand-Smith [Lower V]

Lucas McCulloch [Lower V]

The first step of the clock project was finding inspiration, both from the internet and a design company of choice; I chose Heatherwick Studios whose ideas are architectural and abstract. I researched some creations from Heatherwick Studios and the internet.

I then created a questionnaire to base my project on and asked members of the class and my family. Using the answers from the questionnaire, I created a design specification to base my project around. After that I started my design ideas, this part of my project was the most imaginative, and I ended up with 3 ideas. With each idea I had to develop the shape, the style until I found something that really stood out to me.

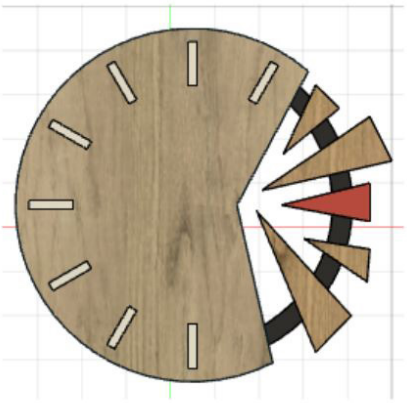


I ended up being conflicted between two, and I ended up picking the more abstract one which I usually do, but mainly because I evaluated all my designs based on the design specification I made and chose which one fit the most.

Then to the 3D CAD (computer assisted design) development. I had already had practice using the software when we had a day dedicated to learning it, so it was reasonably easy creating my design and testing the different variations I made in 2D.

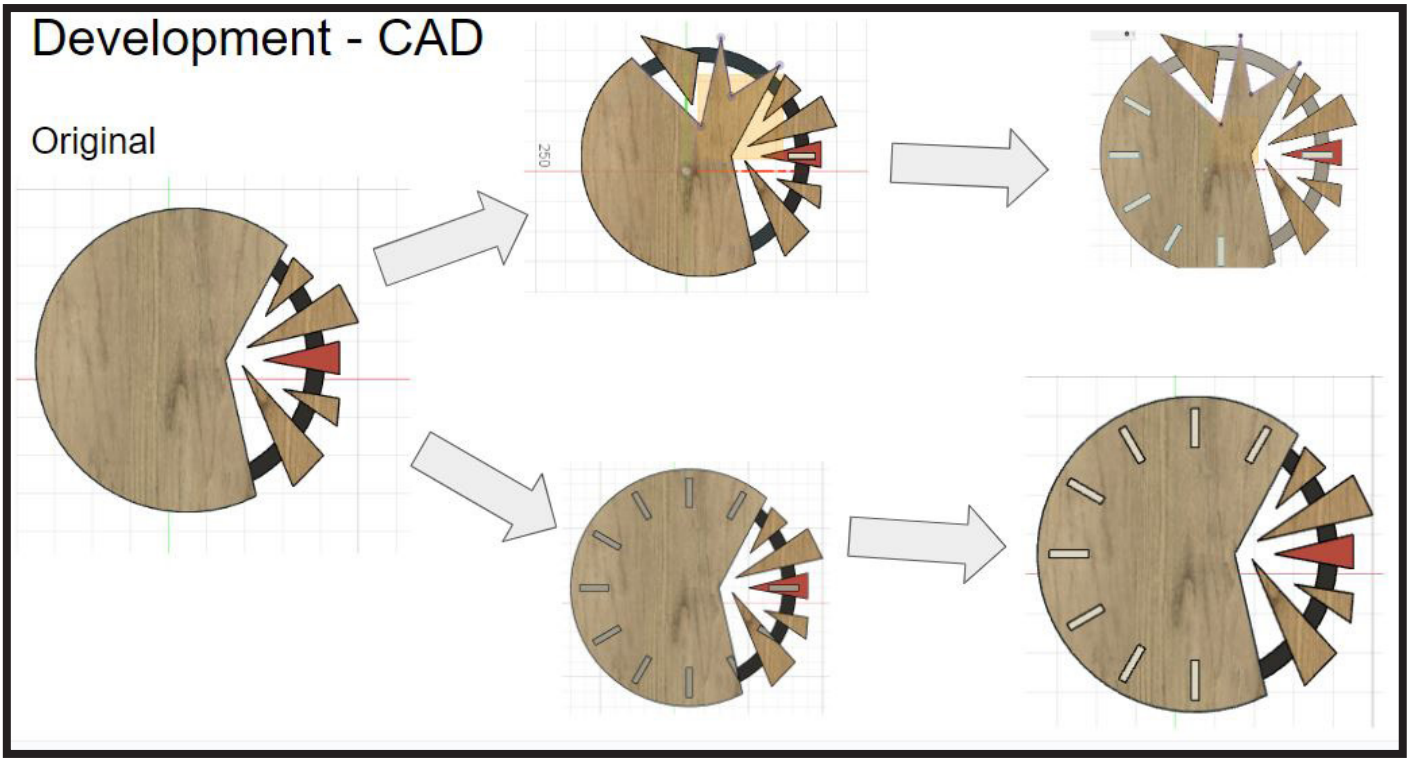
After rendering the ideas and colouring them how I like, I started the modelling and testing. I Laser cut the bases for the designs in cardboard. I wanted to see if I would change my mind.

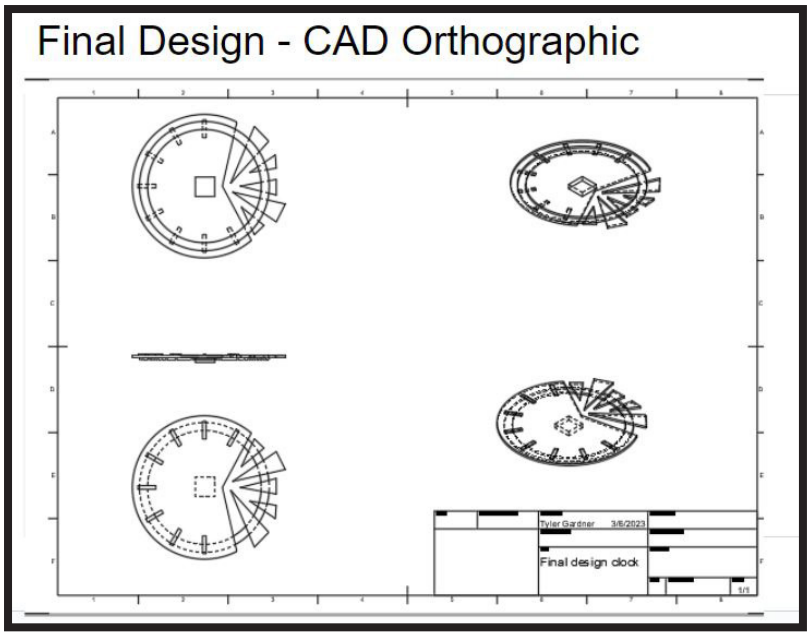
Final Design - CAD 3D



Development - CAD

Original

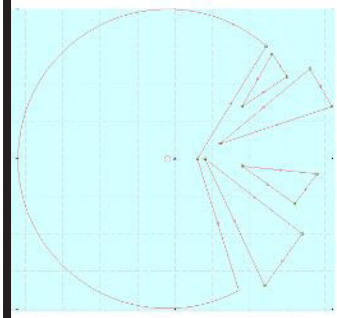




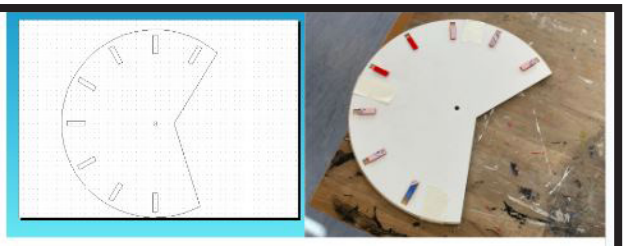
Using 2D design tool (a website for using the laser cutter) I cut the main part of the clock and the shards out of oak veneered MDF (other than the red one). With 4mm red acrylic I cut the dials and the 3 o'clock shard. And finally with some black acrylic, I made the ring that goes around the back and holds the pieces together.

Sticking together wasn't with a normal glue stick but a glue that uses a chemical reaction to make sure the pieces stay together. Annoyingly though, I had no way of knowing where to put the dials, so I had to create a template and use that to make sure everything was in the right place.

Diary of making

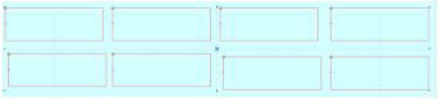


The base and the shards were made from oak veneered MDF which I think has the best colour and grain pattern.

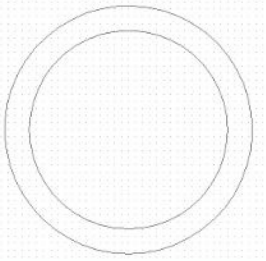


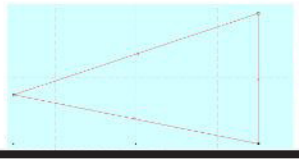
I created a template, so I could glue the pieces on in the right place. It only needed to be made of card.

Firstly I stuck this to the base of the clock but had to approximate where it had to go, then stick the shards on it.

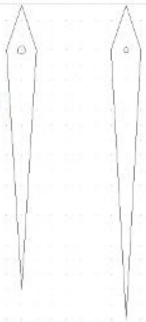


The blocks used for the units. Made of acrylic.





I had to measure the diameter of the quartz movement to find how big the hole in the hands needed to be. This was made from



I also had to approximate where the 3 o'clock was on the clock when I stuck it to the frame on the back. As well, I had to use a different glue because I wasn't sticking wood to acrylic, this was red acrylic.

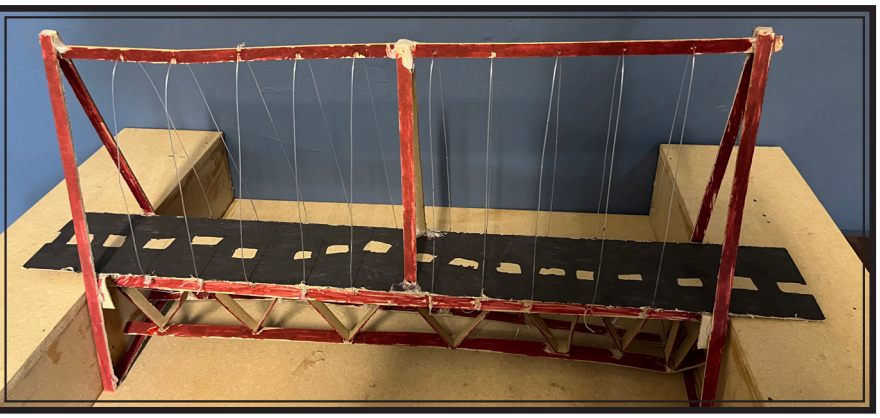
All that was left was to attach the motor on the back and put the hands on, which took no time. This was the only DT project I've fully completed because every other project we've done I used to pick the most ambitious design possible and never complete it.

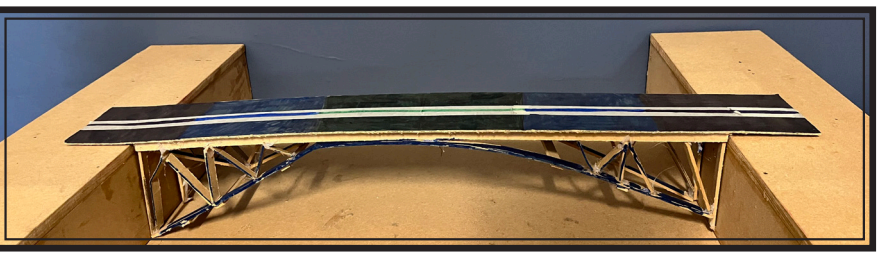
Tyler Gardner [Lower V]

LOWER II BRIDGE-BUILDING

The Lower II bridge-building competition is always fiercely-contested and Mr Richards had to bring in some heavier weights this year as the bridges maxed out on 15kg last year. The winner of the competition is not just the team or individual with the bridge that stands the most cargo. They are also judged on aesthetic design and cost of materials, each of the three categories scored out of 5 for a maximum total out of 15. According to the rules, the truck must be able to pass from one end of the 60cm bridge to the other, and they must balance the cost of materials with strength and appearance to produce a winning bridge.

The winning design - produced by Edith Parkes - took a total weight of 29kg. Although other bridges were able to sustain 30kg, Edith simply ran out of space for the weights, and won overall because of her economical design.





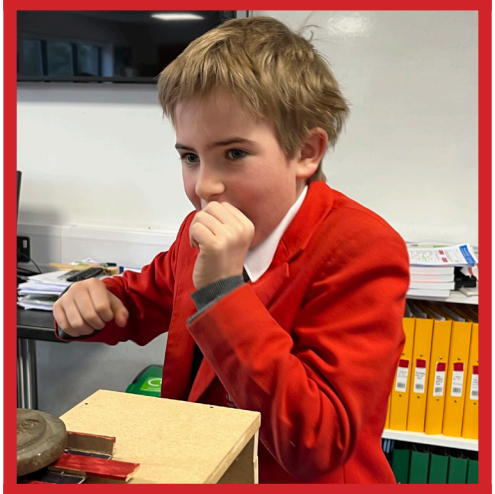
All four bridges were very different, and some took more of a battering than others, as you can see. It is up to the pupils whether they test their bridge to the point of collapse, or whether they quit at a safe weight. Inevitably, some really do crack under the pressure!

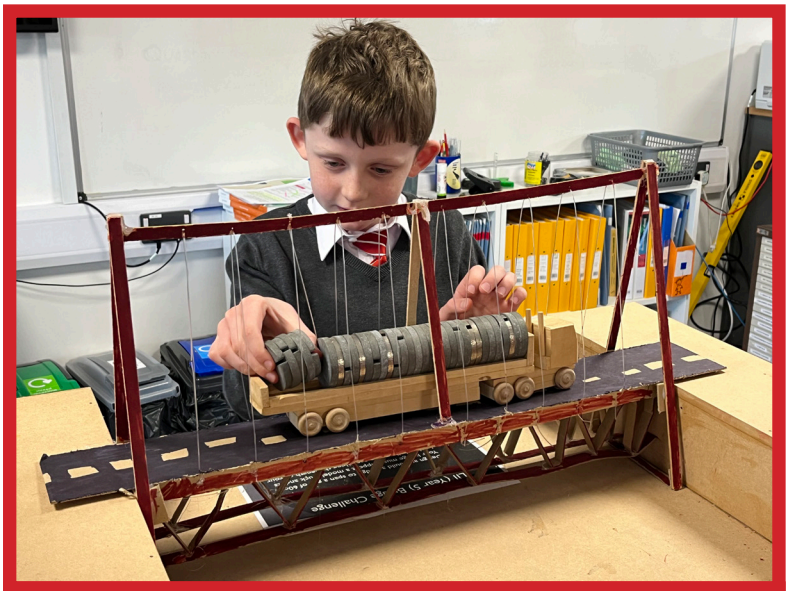
Leo and Henry Robinson were very clear that they were going to test to the point of collapse, hence the bridge at the bottom of the page.

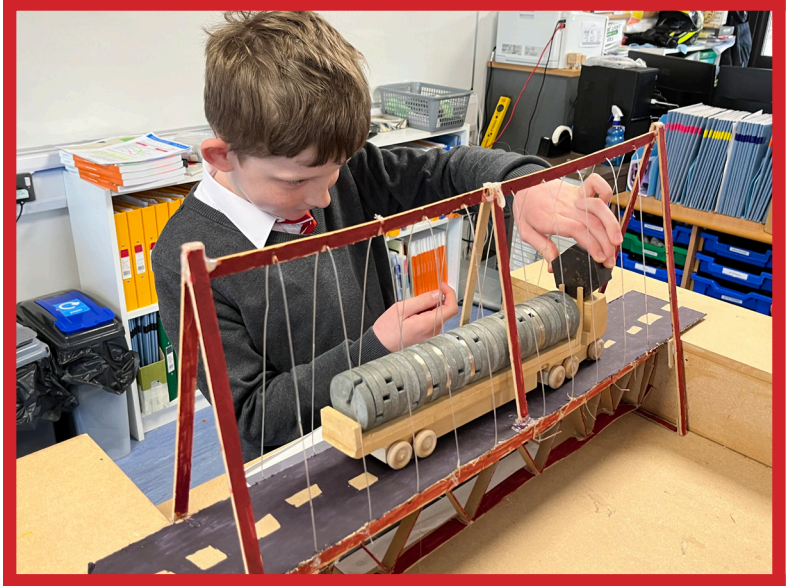
Luca and James's bridge, second from top, remained sturdy before undergoing some significant structural impact on both sides.

Henry Allen's beautifully-designed bridge (top) withstood the maximum 30kg but was expensive to produce.

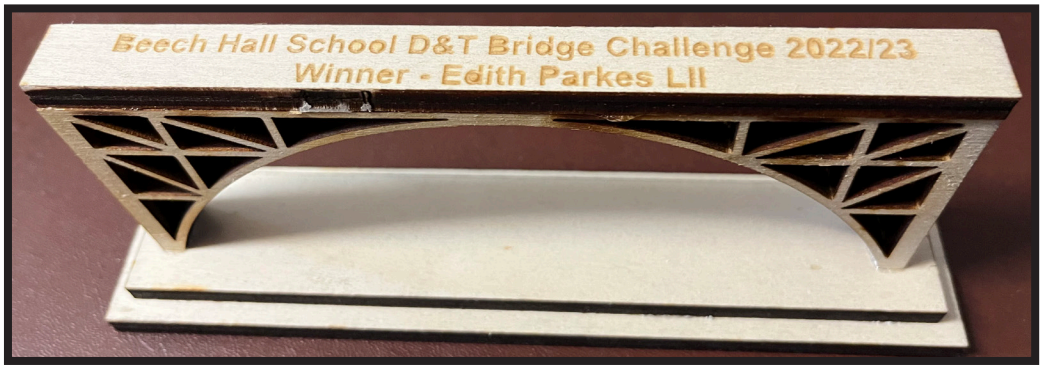
Whilst Edith's did not reach the maximum weight, falling short by just 1kg, this was largely due to running out of space to put the weights. Structurally sound, if leaning a little to one side (not as much as the Tower of Pisa).







Tension builds as bridge designers choose whether to increase the weight by 100g weights or trust in their design and increase by 1 kilo at a time!


Beech Hall School D&T Bridge Challenge 2022/23
Winner - Edith Parkes LII

Brimming with confidence, this team was first up to test their bridge, a simple design with good structural integrity. They were determined to test it to the max, and all filmed in slow motion.

Clockwise from above:
One kilogram at a time, it was clear this bridge could withstand anything; reducing the weight to 500g and then 100g weights - definitely approach with caution; did you hear a crack? Oh no!!