

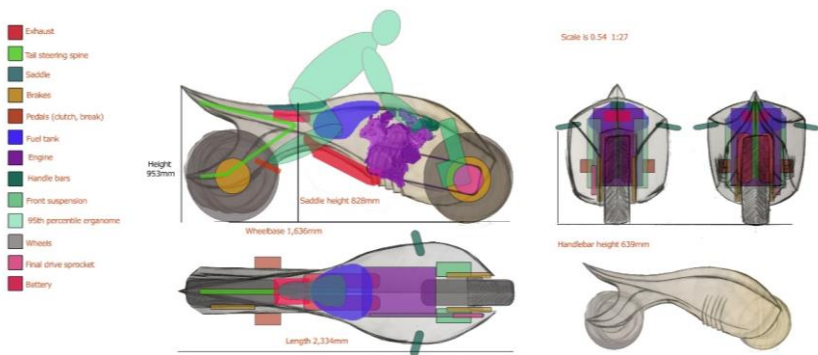
Executive summary.

This project reflects my process in developing a shark-like motorbike sculpture. This sculpture is not meant to be driven, but is somewhat driveable, the goal is to raise awareness and funds for ocean and sea life conservation, by exhibiting in art galleries and car shows internationally. This bike is a unique hand-built sculpture with moving fins, streamlined forms and will be one of a series of sea life inspired vehicles that will follow. The primary inspiration has been taken from the Thresher Shark and the Great White Shark. The Thresher shark is such a dynamic creature, and the Great White is the epitome of shark. The bike will be constructed from recycled parts and hand-created bodywork.

Week 1

To start my FMP, I revisited my ideas from the previous module where research into sea life and automotive sculptures were carried out.

From this and the feedback given, I started developing and designing the components for the bike, foot-pegs and handlebars. I acquired modelling clay and began to start modelling the bike itself. The first model was to see if the proportions were correct and to see if it looked good. This was also an exercise to become familiar with working with clay and modelling (see image 2 and 3). After developing the components to a satisfactory level, I felt that the package drawing was useful to set out and make everything fit, and to see whether any further adjustments were needed (see image 1). In doing this, I have learnt that further modifications were needed to accommodate the driver of the bike. My lecturer pointed out that modifications were needed such as changing the drive train and the steering. This led to further research into these areas.



(image 1)



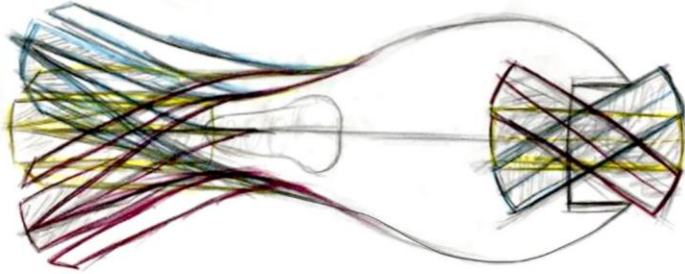
(image 2)

(image 3)

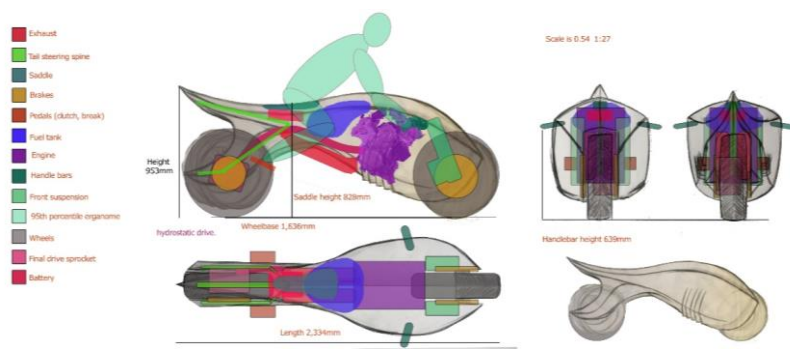
Research revealed that that a rear wheel steering motorbike has never been produced and many scientists and inventors have tried to develop a working mechanism for this to no avail, so I needed to make the front wheel steer. I learnt that I could build a bike with front and rear wheel steering, this is a solution for design. I found front wheel drive was possible. Further adjustments were needed in this area, the drive train needed changing with an engine an electric motor in the front wheel. However, I liked the engine originally selected for the general qualities that reflect the assets of a shark, powerful.

Week 2

Further research was conducted into drive train options, I came across a hydro-static drive train. This works by an engine powering hydraulics, which powers a hydraulic pump. This is housed inside the rear wheel (see image 5). This drive train was selected, due to being flexible and allows me to have the tail move like a shark's tail. If I were to use a conventional drive train, a drive chain and a drive sprocket, it would not allow for this movement as the drive chain would jump off the sprockets. Also, I widened the front end around the front wheel for practical steering purposes (see image 4).



(image 4)



(image 5)

Week 3+4

Following on from a tutorial with my lecturer and the feedback provided, I have revised certain key features with a view to making it more roadworthy. The biggest alteration is how the front wheel is integrated into the bike. I studied land speed record bikes to see how they integrate the front wheel into the design making sure there is enough room for turning (see image 7). This has caused the front wheel to be more exposed and has taken away the aggressive sharp front from earlier development (see image 8). After making these adjustments to the design, I compared it to earlier developments, and I believe the previous design would work with some alterations. During this development I changed the rear swingarm from being much like a large shark fin, to appearing like the tail of another shark swimming in the same direction. This is inspired by images of vast schools of hundreds of sharks (see image 6).

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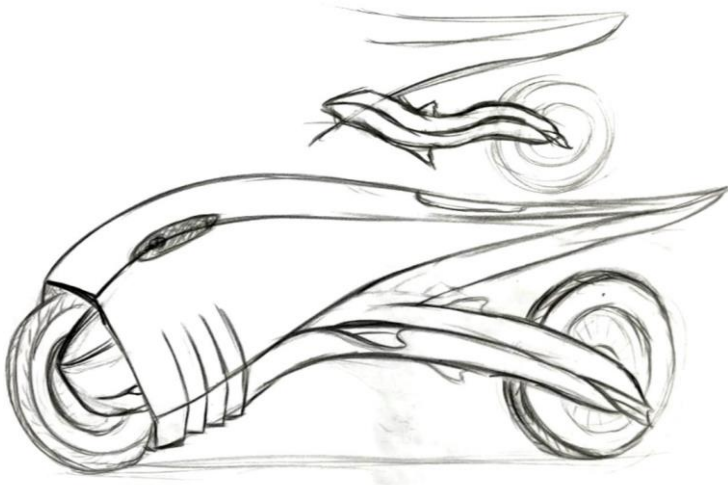
William Fawcett transport
1802236



(Galapagos Conservation Trust, 2019)(image 6)



(Marker, 2018) (image 7)



(image 8)

Week 5

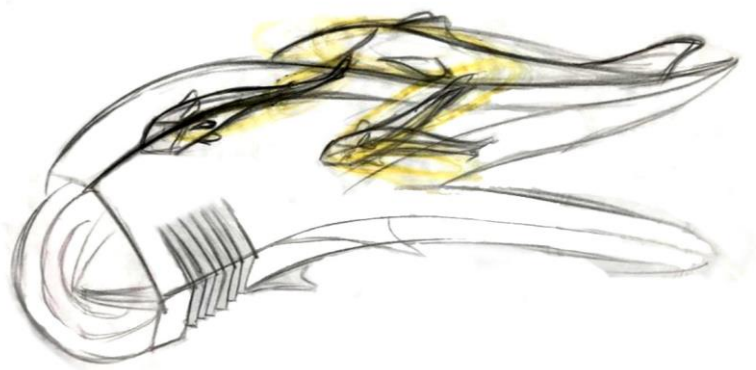
This week, I wanted to visualise it more from a 3D perspective, to gain a better idea of how the bike is working as a form (see image 9). This has made me realise how narrow bikes are

and previously when I have been drawing the bikes, I envisaged them being broader. However, with this narrower, sleeker form it is more sharklike.



(image 9)

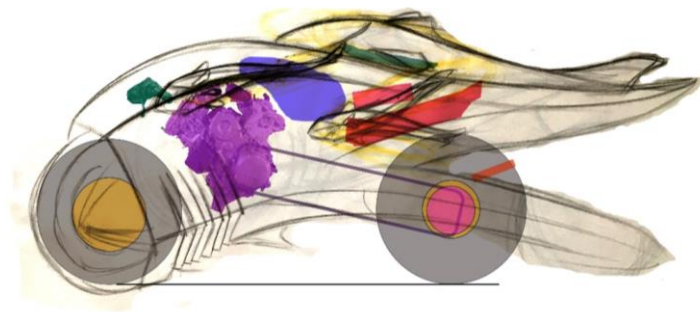
This week, I have been focusing on my piece as a sculpture, as I have been concentrating on motorbike aspects of my design recently, which was not the prime motive. One way that I have done this is thinking of how the rider interacts with the bike. During my research project, I investigated experience and interaction and I want to bring this to my design more, as this has been neglected. To do this, I positioned the remora forms across the bodywork to see how the rider could interact in the most aerodynamic way with the bike (see image 10). This is what remora's do in the sea when they catch the shark. In my design, it is important to remember how much the rider has an impact on the visual quality of the design as it is a motorbike not a car where the driver is less visible. I would like to tie in the rider in as naturally as possible, blending them in with the sculpture.



(image 10)

Week 6

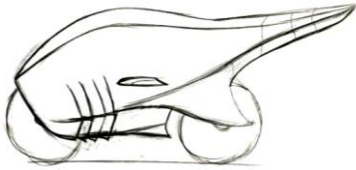
Following on from integrating rider with the bike more cohesively, this changed the scale and size of the bike, forcing me to make another package with this new scale (see image 11). From this new package the development I have made to the wheelbase of the bike is more conventional and more practical for driving compared to earlier developments. This also means that when it comes to constructing the sculpture, less adjustments will be needed to the bike chassis. This makes the motorbike easier to produce as well as ride, I am happy with this development.



(image 11)

Week 7+8

After developing a new package, I wanted to finalise my design, the perfect balance between bike and sculpture. In recent developments, I have been overly focused on functionality and conventional bike design and I have drifted from my original intention. Therefore, I revisited the key sketches from various points in the project so I could take all the aspects from each drawing and merge them into a final design. This meant a lot of back and forth between different developments and finding the best combination of elements, I did this by completing a series of rough quick sketches with many variations and alterations, taking inspiration from different points in the project (see image 12 and 13).

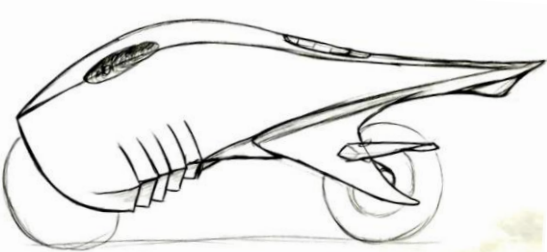


(image 12)

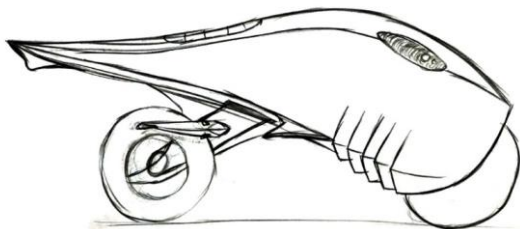


(image 13)

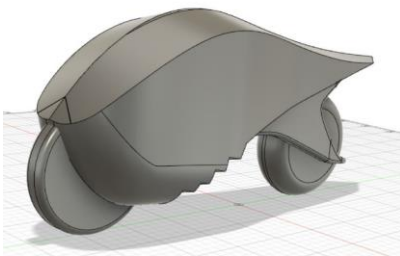
After arriving at a design that I am proud of and fits all my intentions, the balance between sculpture and motorbike (see image 14 and 15), I began development of a CAD fusion 360 model so I could use it to execute some precise and dynamic perspective drawings. Whilst constructing this model I realised that the limitations of the software were affecting the design fundamentally in a negative way (see image 16 and 17). I then realised I needed to develop it instead on alias as this has a lot more tools and allows the designer to construct much more complex surfaces, meaning the model can be more accurate. I did not use alias initially, as it is a complex program that takes time to develop a complete model in comparison to fusion 360, which is a solid modeller and allows me to develop CAD models faster. However, there are limits when it comes to surfacing and this proved to be too much of an issue for this model.



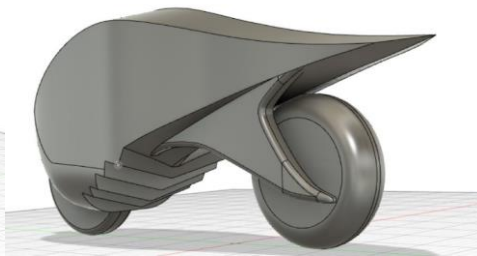
(image 14)



(image 15)



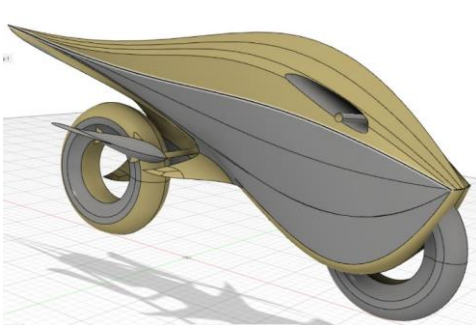
(image 16)



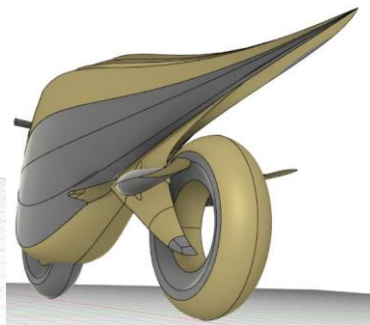
(image 17)

Week 9

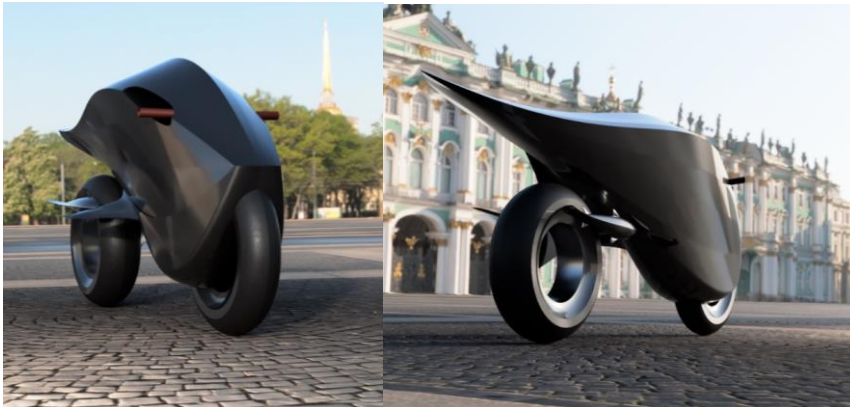
This week I focused on making the bike in alias. It took more time than planned but I am really pleased with how it turned out (see images 18 to 21). It has meant I now have a CAD model that is surfaced to a lot higher standard than I had planned which supports my project a lot more than a fusion model would have, so it has been worth the extra time I put into it. I have had trouble with alias in the past as it is such a complex program, but I have been able to teach myself the tools needed for this model. I now have a model that I can use as template for my 3D model as well as my package drawing.



(image 18)



(image 19)



(image 20)

(image 21)

Week 10+11

After completing my CAD model, and whilst I was home for easter break, I wanted to make sure my portfolio is in order, so I spent the week documenting and editing my drawings ready for the poster and portfolio. This means when I am back in Swansea, in my creative environment, I can put all my effort and attention into building my 3D model for my final piece. I also have made a rough version of the poster to give me an idea how it will look and what I want on it. I have added quotes and statistics to raise awareness about the challenges ocean life and sharks are facing, such as pollution and over-fishing. I also added my sketches of sharks and other sea creatures to the poster to create an ocean environment with my drawings.

Week 12

After organising my portfolio, I have been able to continue with the element of the project that I have been looking forward to, sculpting a yellow foam model. When I arrived back in Swansea, I immediately went into the university to print out the documents needed to sketch out the components, to the right scale, onto the foam block. The prints went wrong and re-formatted the size, the scale of the drawing was off but luckily it was $\frac{2}{3}$ scale of what I needed. Therefore, I was able to multiply every measurement by 1.5, to correct this

issue (see image 22). I then went ahead with carving out the rough outline with a knife, then I worked into it with 60 grit coarse sandpaper (see image 23).



(image 22)



(image 23)

Week 13

I continued to work on the main body until I was happy with how it looked. At this stage I had not made any refinements with a finer grade of sandpaper, as this would have made it very fragile. I wanted to avoid damage before I completed the other components that I wanted to attach to the main structure. After arriving at the stage when the main body was well sculpted, I started work on other components, starting with the largest part- being the swingarm. I drew it out onto a large piece of offcut yellow foam and continued to carve the rough shape using a knife, like I had previously, then sculpted it with sandpaper. To attach the components to the main body I used wooden dowels and drilled small pilot holes into components, as the friction from the foam is enough to keep them in place (see images 24 to 26).



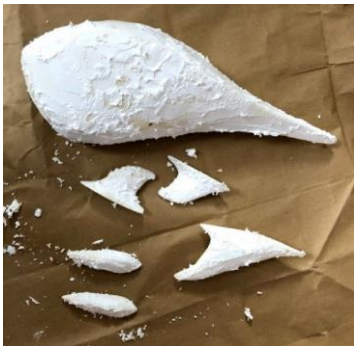
(image 24)

(image 25)

(image 26)

Week 14

This week, I finished sanding the components to the desired form, followed by abrading them with 240 grit to make them nice and smooth. This meant that I could continue with the finishing process. This starts with covering the foam model and components in wood filler. After doing three layers of wood filler, making sure it is thick enough and entirely covered for re-sanding (see image 27), I then sanded it down until it is smooth and ready for the coat of primer paint (see image 28). The filler was needed as an additional layer because it has a much smoother finish when sanded down, compared to the modelling foam, because the paint will look much better on the smoother surface.



(image 27)



(image 28)

When I was satisfied with how smooth the model was, I made sure all the components were of the same standard and proceeded to prime them with white spray paint. After priming the components, I began gluing them together with rapid epoxy adhesive (see images 29 and 30). I primed all the parts before gluing so I could get even coverage of primer; it would be a harder application and a more uneven finish if I had constructed it first.



(image 29)



(image 30)

Week 15

Now that the model had been constructed and primed, I added fillets to the seams of where the components attach to the main body. I used filler to do this and sanded it smooth. To follow, I reprimed these fillets (see image 31). Now that the bike had been built it was ready for finishing. The first step was to abrade with wet and dry sandpaper, to ensure an even finish for painting. However, I had no access to wet dry sandpaper, so I went ahead slowly applying light coats of the blue acrylic spray paint. I applied these coats in brief intervals to allow the paint to cure, before applying more coats, carefully achieving the desired gradient (a Great White's camouflage). To achieve this gradient, I sprayed the paint from extreme angles, almost directly above. This created a deeper blue on top, where many coats were applied to that surface. when I was satisfied with the application of the blue, I had over sprayed and the gradient was gradual. However, I wanted a more a sudden fade, this led me to spray white primer from directly beneath to create the white underbelly, and make the fade on either side optimal. I had to do a few overlapping layers on the blue and the white until I was pleased with how the gradient looked. Now that the gradient was complete, I hand painted the exhaust tips with silver acrylic paint. Finally, the model was ready for

finishing. The final coat had been applied to create a metallic effect and protect the overall finish. I encountered problems with glossing the model, as it sticks to surfaces before the gloss is cured, pulling paint off, so I had to fill a gap on the right fin with bluetac, as this was the best material at hand to fix with, then re-prime and re-spray. After this issue I secured the model to a stand with a dowel and re-glossed, achieving a smoother result. After glossing, I was able to add the final layer of paint by hand with a fine paint brush, applying matte black for the gill-vents and exhaust holes to create the illusion of shadow (see images 32 and 33).



(image 31)



(image 32)

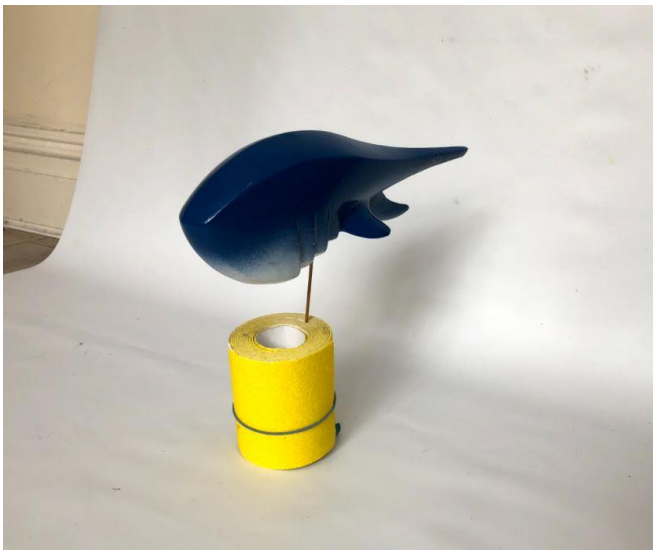


(image 33)

Week 16

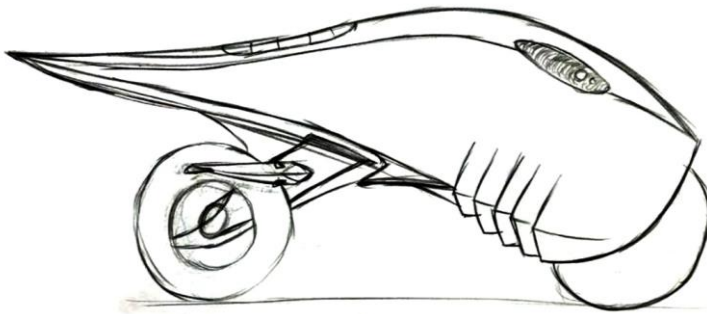
This week I set up a photobooth in the best lit room, using homemade props (see image 34). I then used a Nikon D 3300 to capture images of my model. In the first photo-shoot, my images were dark and parts of the model were blurry, so I went and discussed solutions

with a photographer and made adjustments to the focal range, so the entire model was in focus, by tightening the aperture. Tightening the aperture makes the images darker, so I used speed flash to illuminate the model. I had to make sure that I took the images from a particular distance away for flash and yet not so close as to capture the model out of focus. The stand I was using was also bright yellow, so caused an undesired glow effect on the white underbelly of the model, this was solved by covering the stand with a white towel. After these adjustments, I achieved the desired outcome. I selected my final images and edited them on Photoshop for my silent salesmen.

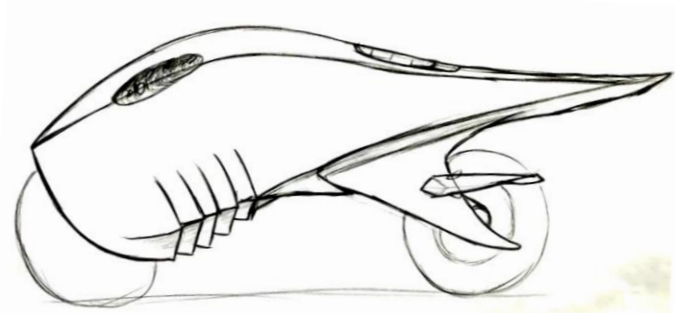


(image 34)

Design outcome.



(image 35)



(image 36)

The structure and mechanisms will be from a recycled motor bike. It will be modified so the exhaust manifold is in the “tail” section, instead of below the engine. I will handcraft the body work, then wrap it in a blue carbon fibre wrap to achieve the desired effect. This is a cost-effective way of creating the carbon fibre effect without using carbon fibre. There is a “pectoral fin” on both sides, these will have small pistons within them to raise the top surface of the fin, creating air brakes. This is to aid in steering the bike. The elongated tail is inspired by the Thresher-shark, with the singular swing-arm completing the shark tail. The foot-pegs are Remora like forms and when used for clutch or brake, would pivot around the head area, imitating the swimming motion of a Remora fish. When a driver rides the bike, the handles are far forward and the foot-pegs are quite high and back, stretching riders' body out and forcing them to hug the bike, much like a Remora fish would be when riding larger sea creatures, and to be as streamlined as possible. The handlebars are also set into

the body work, this is so that the appearance stays as streamlined and shark like as possible, even with a rider.

Evaluation.

I am pleased with the overall design outcome and how I have been able to anthropomorphise a shark into a motorbike: the shark tail swing-arm propelling the bike (rear-drive sprocket), the pectoral fin/airbrakes used for steering and manoeuvring, the gill-like vents for airflow, the main body work containing all the vital components, the handlebars where eyes would be to control and plan and finally, the remora foot-pegs moving as if they are swimming when used. The elongated tail looks great on the bike giving it a dynamic quality whilst strongly resembling the Thresher shark.

The silent salesman is successful, as it creates an environment with my drawings, the model and sea background. This makes the images appear as if they were swimming. There are hard hitting facts and quotes related to sharks around the poster that are smoothly integrated, but are shocking when read, in contrast to the peaceful ocean environment of the poster. The poster highlights the beauty in sharks and their powerful elegance, helping people to forget their fears of these creatures, one of the aims of this project.

The model has turned out fantastic, I am very proud to have achieved this with the resources available to me. It has forced me to do more problem solving and be more organised than I would have been had I been able to use the workshop studios in the university. It truly taught me that I can pursue projects and achieve outcomes independently. The model is not as accurate to the final design as I would have wanted. However, I think this would have been achieved with a larger model, meaning the surfacing can be more complex. Had access to the workshops been available, I would have cut the foam more accurately, so the original form would have been exact before I started sanding. The paint job went spectacularly and the fade came out excellent, strongly resembling a Great White Shark. The hand painted exhaust and vents also came out clean. I also did not have the time to complete the remora-footpegs, handle bars, as well as 3D print a set of wheels, making the final model more of a sculpture than the balance between sculpture and vehicle as I had intended.

However, this is just an early prototype for my sculptures and I have learnt a lot whilst making it. This summer I will go on to produce many similar shark themed bikes to create a series that can be exhibited in galleries.

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