A2 DESIGN PROJECT

OLA BOWTELL

Candidate: 6020 Centre: 62451

W E E K 1a - The Idea

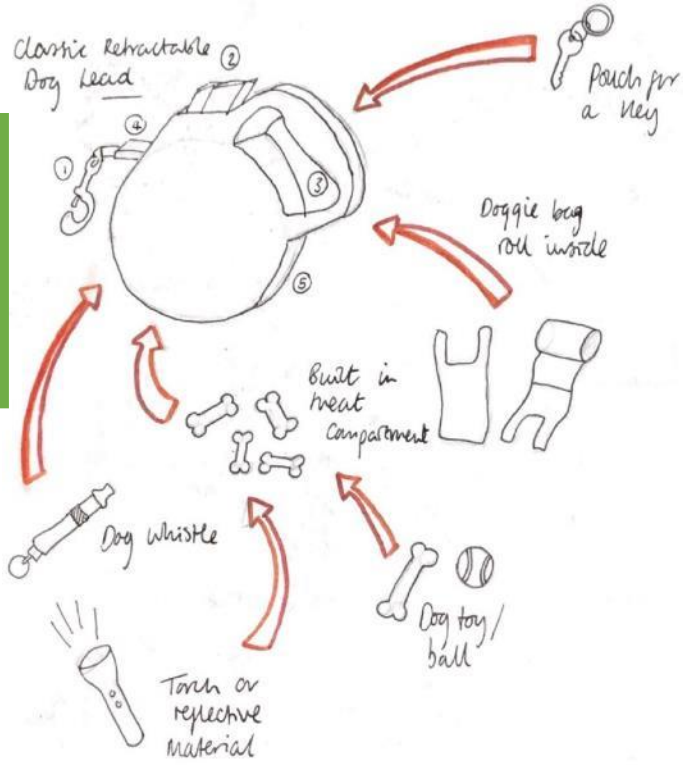
Initial idea came in being on a dog walk and forgetting treats, bags, a lead and a full doggie bag

My first thought was to involve a poo bag reel into the plastic of the retractable lead and soon after decided I didnt have to stop there, there could be a built in treat box too!

I started thinking and decided if I were to only take one thing with me on a walk it would be the lead

CONTEXT

Many dog walkers carry multiple accessories with them on a walk . An issue people face is having dog treats in their coat pocket which can be an issue as they cause their pocket and hands to smell of treats. Equally occasionally people forget poo bags which is a big issue for the environment and for other walkers as dog mess may end up not being cleaned up.



I now have a task with a goal, I aim to anaylse it and come up with a plan and soon after that the next stage will be to meet the clients in order to set a brief.

Next Week: I will continue to analyse the task so I'm prepared when I meet my clients

DOG LEADS

Existing Products:
- poo bag rolls, quite bulky.
- dog leads without treat pouches or doggie bag rolls.

Materials:
- final product made from durable plastic

Ergonomics:
- must fit comfortably in the users hand
- Must not be too heavy

Components:
- Must hold:
- treats · poo bags ·
- a whistle · a torch ·
- or a house key.

Safety:
- the lead mechanism must be secure
- ensure there are no sharp edges.

Client:
- Businesses selling pet accessories.
- Dog walkers/owners

Function:
- hold treats and doggie bags inside the dog lead.

Key Components:

①	CLIP	- Easy to use - quick to clip and unclip.
②	BUTTONS	- easy to use - not difficult to press
③	HANDLE	- Ergonomics - Comfort - Anthropometrics
④	LEAD	- Strong but not thick - Coils up into small space - space saving
⑤	SHAPE	- Not bulky - Light weight

WEEK 1b

CURRENT PROBLEMS

Some walkers face forgetting certain things when out for a walk due to needing to remember too many things in the first place. Forgetting certain things can be more serious than others:

- Doggie bags – forgetting these means that if you need one, you cant clean up the dog mess which is bad for the environment as it litters the paths and could cause other walkers distress if they step in it
- Dog treats – forgetting these could mean that your dog won't come back after its been let off the lead or that you won't be able to control your dog in times such as when there's a horse or another dog and you need your dog to come back.
- House key – this may mean that you don't end up locking the door behind you or even that you may get locked out and not be able to get in
- Torch – if it gets dark whilst you're out it may be a little unnerving and also difficult to see where you're going
- Dog whistle – this is a similar scenario to forgetting treats, some dogs respond better to a whistle and if you don't have it, the dog may be less likely to come back when needed.
- Ball – if you forget a ball it just means your dog may have a less enjoyable walk

Another issue is keeping treats in your coat pocket can cause your pocket to smell and consequently your hand would also smell.

Due to the size and weight of the dog bags they are easily lost whilst walking if they are not in or attached to something.

You can buy add on bags and storage devises for accessories however I'd like the storage to be built in to allow dog walkers to only need to take one thing with them.

Most dog leads are made of plastic shells with the lead mechanism inside however the area inside the handle's space is wasted. I could use this space to store a slot in whistle, small torch or use the area as a compartment for a house key.

MY PLAN

I am Intending to design a dog lead with compartments and devices inside it to store accessories needed when walking a dog. It should be **ergonomic and stylish**, however its main function should be to **hold essentials for a walk**. This would make sure the user doesn't forget anything especially as a lot of people walk their dogs in the early mornings when they're half asleep and potentially prone to forgetting things. It **shouldn't be much heavier than an average lead** as this may be uncomfortable and impractical for the user.

TARGET AUDIENCE

My target market would be anyone who owns and walks a dog. My product would be perfect for people who are forgetful and don't always remember treats or more importantly a doggie bag! It's aimed at dog walkers in general however there could be different variations of it such as different colours or storage components for people who need extras for a puppy or people who just need treats and doggie bags.

Throughout this design process, I need to consult various possible end users to ensure my product is fit for their wants and needs. Here are my stakeholders who I aim to seek advice from when it comes to development and refining ideas.

POSSIBLE STAKEHOLDERS

- ➢ - Local Pet Shops:
- Notcutts Garden Centre, Oxford
- Pets at Home, Abingdon
- Didcot Pet Store, Didcot
- ➢ - People aiming to purchase the lead (clients/end users) e.g. people with a dog (I will be looking into my end users in the next few slides to get an idea of what they want)
- ➢ - Pet shop owners
- ➢ - Pet shop workers

Next Week: I plan to meet my clients to understand their wants and needs when it comes to designing a new innovative dog lead

WEEK2 - STAKEHOLDERS

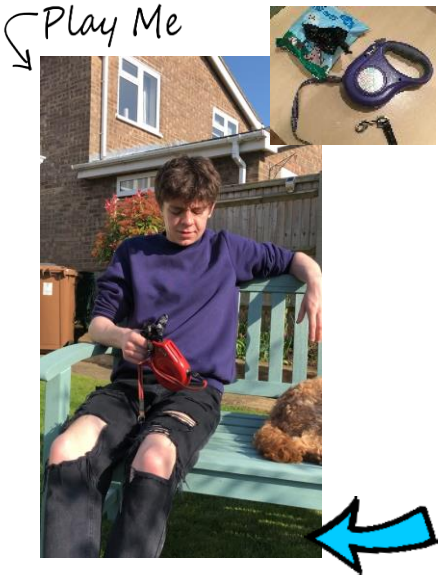
CLIENT ONE

This is one of my clients, Josephine. She is currently a student and loves taking her dog out for walks in her spare time to relax and get some exercise.

Currently, her dog Jonty is a puppy so needs a lot more accessories on a walk such as a whistle, a large portion of treats and a harness for training purposes. At the moment, she carries a bag containing all the things she needs on a walk and feels that this is an effective way of ensuring she remembers everything. In the video she describes what she would want once her puppy is older and doesn't need as many things on a walk.

Josephine currently she uses a rope lead however because she lives in an area where she can't always let her dog off the lead, an extendible lead would be ideal to let her dog have a run around whilst keeping him safe.

Next Week: carry out some further research into the bag Josephine's bag she takes on dog walks, ensuring to look at other peoples opinion of it too



CLIENT THREE

This is my final client Aiden. He is a student who walks his dog in the afternoons. Indie, his dog, is young and lively and therefore has two walks a day. Aiden's mother walks her in the mornings before work.

On a dog walk, Aiden takes his dog lead, poo bags and often a dog ball with a thrower.

From what Aiden has said he would like a lead that has:

- A light for being to see better at night
- A place to store poo bags

CLIENT TWO

This is another client, Prew. She is a mother of three and the allocated morning dog walker due to her teenage children not waking up early enough to walk the dog before they head off to school. She often 'half asleep' during her dog walks as a result of 'staying up late working' and regularly kicks herself for forgetting either a doggie bag or treats.

'We used to have a doggie bag attachment for our lead before but the clip for it broke so we've resorted to tying poo bags around the handle, which is somewhat practical however they occasionally come loose and on a windy day can end up miles away! The only other thing I take with me would be dog treats which I keep in my jacket pocket, this is not ideal as it leads to my pocket and consequently my hands smelling of dog all day!'

'An ideal product for me would be one that carries doggie bags and dog treats as these are the two essentials that I cant do without on a walk. However I will occasionally need a torch on winter mornings or in the evenings. I am not fussed about the aesthetics of the product, as long as its comfortable to hold, not too heavy and carries everything I need, I'm happy.'

WEEK 3

Play Me

Josephine talks about what she currently takes on a dog walk with her, she mentions a whistle, treats and poo bags. As her dog Jonty is a puppy she uses the whistle for training. When he is older she will no longer take this on dog walks. She carries all of these things in a

After listening to my client and reading various reviews for this product I have decided the things I must include in my final dog lead design; a treat pot, a poo bag dispenser and a secure pocket for a house key. I may add some other parts however these three must be present in my final design.

Roll over image to zoom in

Dog Treat Pouch Bag with Poop Bag Holder & Collapsible Travel Food Storage Water Pet Bowl - FREE Doggie Clicker - Puppy Training Walking Bag with Built-In Poo Waste Bags Dispenser - Adjustable Belt

by Sweetie

4.4 out of 5 stars 268 customer reviews | 10 answered questions

Amazon's Choice for "dog accessories"

Price: £25.99

Sale: £13.45 & FREE UK Delivery on orders dispatched by Amazon over £20. Delivery Details

You Save: £12.54 (48%)

This is the bag she uses – it has a treat pouch with a 'built in waste bag dispenser' and comes with a travel dog bowl and a doggie clicker (similar purpose as a whistle). This bag is sold as specifically for puppies however it would be fine for a grown dog too. I believe they have sold it as a puppy training walking bag to make new dog owners more likely to buy it as it makes it more personal to their needs.

The bag is able to be worn over the shoulder or attached to a belt. Either way this seems like a practical product, especially for new dog owners to ensure they don't forget anything on their walk! I believe that the items in the bag could be condensed down into a smaller space.

79% of the Amazon reviews for this product were 5 star – this bag is hard to fault however here are some constructive comments:

Next Week: conduct some 2nd hand research into what is on the market for dog walkers

★★★★☆ **Very good!**

By snw on 31 October 2017

Verified Purchase

This bag is super handy! Not sure what we would have done without it. It holds a lot of treats, the other pockets are very handy and overall it's great!
The downside is that it's hard to clean as the lining isn't detachable. If there was a way for the pouch that holds the treats to be taken out and washed this would be the perfect bag!

This client wanted to be able to clean the inside of the bag, I assume to remove treat debris and make the bag smell better. With the lead I plan to make the treat compartment will be made of plastic rather than fabric which tends to hold smells more easily. The treat compartment in my design would be able to be wiped clean so won't need to be detachable.

★★★★☆ **OK, could do a lot worse.**

By Lee on 11 December 2017

Verified Purchase

Decent product. A good size. Kind of awkward on a belt if you're wearing a coat or anything, but that's to be expected I suppose. The collapsible water bowl is a good idea, though it's more like a thrown-in afterthought than part of the product. The poop-bag dispenser is on the BACK, so very impractical if you're using the belt mounting, so that's not great. Still... far better than the last treat/poop bag thing I bought.

The issue this client found was to do with the placement of the poo bag dispenser. They found that it was inaccessible when using the bag attached to a belt. This would not be an issue with my product as I aim to make a dog lead with a bag dispenser attached rather than an accessory to carry them.

★★★★☆ **Handy bag for any dog walker**

By Sancha Lancaster on 25 February 2018

Verified Purchase

Still going strong after 6 months despite some chewing by our puppy. Great for carrying lots of things. I fit bags, treats and an extendable lead in the main compartment. Only complaint is the poo bag dispenser is too tight and rips bags.

This client found that the poo bag dispenser pocket was too tight with the bag reel they used. The solution to this on my design would be to make the compartment a little bigger than the bag roll to ensure it's able to spin round as the bags are pulled out to avoid it being difficult to take a bag out.

★★★★★ **This is an excellent wee bag for carrying bagged up dog poop with ...**

By Billbo on 5 September 2017

Verified Purchase

This is an excellent wee bag for carrying bagged up dog poop with you. I keep some poop bags, treats and house keys in mine at all times so I never forget to take them with me... which was often the case.

This client found no faults however they did mention how they'd previously forget to take certain things with them on a walk. This made it very clear to me that I needed to include a secure section for a house key as in the reviews I read, it was a common theme that people liked having a space to keep their house keys as well as a space for treats and bags.

STAKEHOLDERS & DESIGN BRIEF

After some careful consideration and my conversations with Josephine, we decided she wouldn't be a very good stakeholder in this design process as she currently has a young puppy who have very different needs on a walk and I'm designing a lead for a dog rather than a puppy. I aim to potentially involve her in decisions about aesthetics and functionality however she doesn't fit the target market of someone who owns a dog and is looking for an all-in-one lead.

Luckily, I have two clients who fit the target audience perfectly, Aiden and Prew. Prew is a middle aged teacher whereas Aiden is a teenager in sixth form, they are both very different but have very similar needs in terms of the dog lead product

I've summarised the needs of my users into this table:

There are some other stakeholders who could be involved in the design process such as pet store employees, other dog walkers, manufacturers and a pet store owner. I could potentially go to a pet shop with one of my final developments of my design or at the end of the design process to see if they think it's a feasible product.

Needs	Comments about the user's needs
Lead	Prew has a medium sized dog and would like a lead that extends to 5m
	Aiden has a smaller dog than Prew however his dog is young and very energetic so would like a strong lead that extends to up to 8m
Poo Bags	Prew only needs one poo bag per walk so would normally take one or two bags (just incase)
	Aiden will normally take one poo bag on a walk with him
Treats	Prew uses treats to entice her dog to come back after she's been off the lead and will normally bring a small pot of treats and use 2-3 per walk. She would usually take between 4 and 10 small treats per walk just so she doesn't have to refill her treat pot as regularly
	Aiden's dog doesn't respond to treats so he wont usually take any, she prefers a tennis ball so Aiden doesn't require any treats on the walk but will usually reward her with one when they get back home
Torch	Prew usually walks her dog in the morning so in the winter she likes to have a torch with her as it can be quite dark! She doesn't want to carry a bulky or heavy thing around with her, especially as she wont need it during the summer months
	Aiden usually walks his dog after school (at around 4pm) so isn't fussed about a torch however his mother usually walks the dog in the morning and he says she'd find it useful to have one
Key	Prew thinks having a key isn't a necessity however it'd be handy just incase she forgets one or gets locked out
	Aiden has a similar opinion to Prew about the key.

DESIGN BRIEF I aim to design an all-in-one dog lead, with all of the items needed on a dog walk all attached to or part of the lead. It will be used on dog walks and possibly during the training of a dog. There is a major gap in the market here as most companies sell add on parts for leads however I'm yet to come across an affordable lead that contains everything needed for a walk. I want the design to be modern and sleek, I will avoid a bulky or heavy looking design. I want to keep the cost as low as possible to make the lead available to the average user, I'd like to keep the buying cost around £30 and the production costs below £10 however, I am willing to compromise with these numbers as they are just estimates.

I aim for the prototype to be as realistic as possible however its unlikely to be a functional lead, I aim to make all of the componets functional apart from the actual mechanism. Therefore the timescale and cost of making will be estimates based on other products that are made in the same way (the real thing would be made by injection moulding polypropylene or high density polyethylene due to their strength-to-density ratio)

W E E K 4 – Second Hand Research

I decided I needed to do some research into what was already available on the market as I felt as if I lacked knowledge on what consumers could already purchase. This will hopefully give me a good idea on where the gap in the market is and how my idea can fit with what people need but at the same time stand out.

I like the concept however I can imagine the pouches either side of the lead getting muddled making it **difficult to find smaller things** such as a whistle or small torch underneath treats or poo bags.
I'd quite **like to have specific compartments** for certain items such as an **area for treats** and a **doggie bag space**. However in doing this I need to ensure that I **don't make the product bulky** and heavier than a regular retractable dog lead.
Although this product is slightly bulky, it is practical as you can **carry everything you need** within one device in **one hand**, which is useful. This is what I'd like to achieve **without taking up as much space**.

This is an attachment for a dog lead to carry a poo bag reel. This mechanism is **practical way to carry the bags.**

I dislike that this product is that the device **hangs and swings** from the lead which **can be irritating**. Equally **the small clip may break causing** the product to detach from the lead and get lost.

I would like to involve a poo bag reel or some form of storage for multiple bags in my design however I would **like it to be built in.**

This seems like a very practical lead however **it doesn't look very attractive**, the torch on top looks out of place and the shape and colour don't appeal to me. In my opinion the shape is quite boring and the poo bag compartment doesn't sit nicely – it sticks out of the device.

To improve this I would integrate the torch and the poo bag holder into the main part of the lead. I would most likely make the torch the same colour.

Overall:
I would like to design a retractable lead as I believe they are more practical for the purpose of carrying other accessories and a lot of dog owners prefer to use retractable leads over rope leads.

I would like to involve a built in poo bag reel or some form of storage for multiple bags in my design. I would want it to be permanent as it's an essential and if it was detachable it would risk getting lost and needing replacing.

I want my device to carry everything you need within itself to enable the user to be able to grab the lead a walk out the door without needing anything else

This carry case for dog treats or dog bags which can be attached to a lead. I think this is a great idea however most dog walkers need bags and treats on their walk and the lead these attach to can only hold one of them.

I think the dog treat pot is good however it **wouldn't be very easy to access the treats quickly** – you'd have to remove the lid then take out one treat without the rest tipping out. To improve this one I would make it so you pressed a button and a single treat came out.

To improve upon the poo bag dispenser I would **make it part of the device by having it built in**. I would want it to be permanent as I believe it's an essential and if it was detachable it would risk being damaged or getting lost and needing replacing.

This is a regular retractable dog lead which is very **commonly used** by dog walkers who wish for their **dog to walk further** from them. This means the dog has the independence as if it's off the lead but the owner has the ability to ensure their dog stays safe and with them.

I would like to design a retractable lead as I believe they are **more practical** for the purpose of carrying other accessories.

Next Week: carry out some first hand research to deepen my knowledge on what's available for people in store as well as online

W E E K 5 – First Hand Research

I visited Notcutts, my local garden centre and found various dog accessories and treats. In this video, I talk about the Flexi dog lead and the attachments for it.

Play Me

Although this set of the light, treat / bag box and lead are overall really great, the total cost of all 3 is £37.97 which is very pricey for a lead

Here I am in the pet shop with various items including the Flexi lead and dog treats.

This is the back of the 'multi-box' for the Flexi lead. It doubles up as a treat box as well as a poo bag dispenser.

This is the 'LED lighting system', it attaches to the side of the lead with adhesive.

The poo bags come out here however when using the box for treats there is a cover for the hole.

It's made from very durable plastic which feels very well made and good quality.

Play Me

I aim to make my product a lot more affordable.

These were the smallest treats I could find because they need to be able to fit into a potentially small space. The smaller the treats, the more treats I can fit.

I decided to weigh the treats to get an idea of how much the lead would weigh with all the add ons as I don't want it to be too heavy.

W E E K 5 – First Hand Research

I visited a local garden centre and pet shop to see their range of accessories for dog owners to take on walks.

Made from plant fibre plastic
↳ Sustainable & biodegradable

Elasticated straps allow it to attach to a normal lead, belt and possibly bag.

£5.99

couldn't work when clipped to a retractable dog lead

Clear so you can easily see how many treats are left

£3.49

Carabiner style clip allows it to be clipped onto anything ↳ a lead, belt, bag etc.

I like the idea of this product however it would **dangle and hit against the lead** and possibly be **annoying to the user.** Also I'm unsure whether it'd fit all dog lead handles as some may be **too wide or chunky** to fit the clip.

£2.99

Slightly weak velcro could cause the bag to fall off

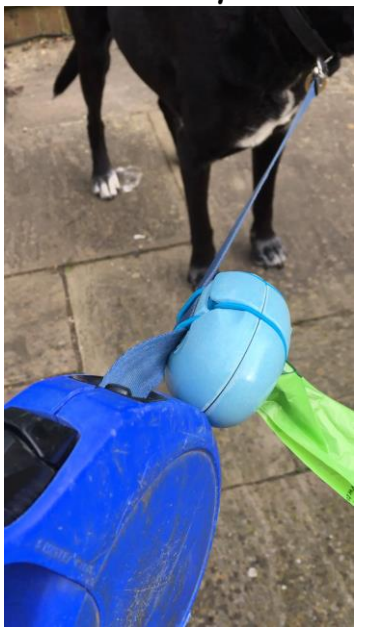
Ideal for a belt or a rope lead

You can feel how many treats are left in the bag

May not be able to attach to such a variety of things

I like this product as it would be easy and convenient to get the treats out the bag. I like how you **can tell how many treats are left** in the bag by the feel of it as the material is flexible. However I felt as if it would be slightly inconvenient to use as you would need two hands to open the bag up and get a treat out.

Play Me



This video shows that this lead accessory designed for a rope lead is not suitable for use on a retractable lead. Because this product attaches to the fabric of the lead, when the dog walks away, the device goes too. It's also much heavier than the lead can take so it weighs down the lead quite a bit.

This design would be ideal to try to incorporate into my dog lead as a built in dog bag dispenser.

Next Week: take all my research and create a design brief and plan

WEEK 6

The torch would be much heavier than a key and would add a considerable amount to the overall weight.

If I were to include a key pouch of some sort it wouldn't be very heavy however it would take up space so I will need to decide if its neccessary.

Non Technical Specification

My Clients all take poo bags on their walk. Josephine also takes treats and a whistle. Aiden takes a ball and Drew takes just treats.

My design must carry:

- doggie bags
- treats

My design may also carry:

- a torch
- a key.

I decided it didn't need to hold a ball as the ball would be in use most of the walk. It also won't have a whistle as most people only use a whistle for training and keep it either on their keys or in a pocket.

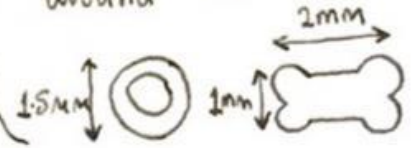
So... the lead must carry at least 2 bags and ideally at least 5 treats.

Each bag weighs 1.8g so weight wise they wouldn't be an issue however I need to ensure I have enough spare.

Each treat weighs between 1.4 and 1.75g.

In terms of the amount of dog bags people use on one walk, most people only need one however usually bring two just in case.

People tend to use around 1-5 treats.



Next Week: take all my research and create a design brief and plan

WEEK 7

Play Me

I started modelling as I drew inspiration from this sports water bottle I found at home, the handle of it intrigued me and gave me the idea of having treats in the handle.

Treats come out here

I formed the shape of a lead around my water bottle model using plasicine to get a feel for what it'd look like.

Whilst making this I could really see the idea coming to life and began to understand how it could work. The handle would be filled with dog treats and there would be a hole with a cover for the treats to come out. Ideally there would be a lid at the top (similar to the water bottle lid) to fill up the lead with more treats when needed.

I carved a small hole into the base of the model to fit a treat into it. This was a little inaccurate as where the hole is is where the handle would be attached to the rest of the lead however it gave me an idea of what it could be like.

After I put together the first model made from the bottle, was inspired to form my own handle from Styrofoam.

I began with a thick piece that I made into a C-shape, to start with I hand cut it with a fret saw. Soon after I started to use hot wire foam cutter which was much quicker and more effective and precise.

I cut bumps into the C shape to make it more comfortable to hold onto. After I cut the foam into shape I sanded it with wet and dry paper. This gave it a really smooth finish to make it more ergonomic and fit for the user.

This model incorporated parts from both of the other two models – it has a similar Styrofoam handle to the second model and has a treat mechanism like the first model.

To make the shape of this I used the hot wire foam cutter. when it came to cutting the hole for the handle, I drilled into the foam using the pillar drill and then threaded the wire on the foam cutter through the hole and cut around to create the shape of the handle. I then sanded everything down using wet and dry paper to ensure it was all neat and smooth.

To finish off the model I carved a rectangular hole into the base (top right image). I then took the lid of a tic tac packet and pressed it into the hole. this mimics a possible mechanism I could use for the lead. in the video below you can see how it could work – the treats would all be stored in the handle of the lead.

Play Me

The foam cutter heats the wire to allow foam to glide through

Here I tested out the pillar drill and the foam cutter to check I could do it before I did it on the real thing

Next Week: look into clip lid mechanisms to use for the treat container

WEEK 8

The main aim for the clip-lid mechanism is to allow one treat to be taken out quickly and easily.

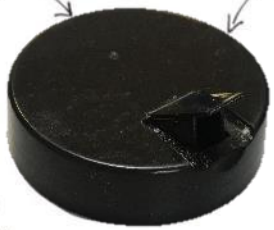
1

I found various lids around my house and took inspiration from them. I looked at each of them and assessed if they would work as the lid for the treat compartment on the lead and then how they would work and be functional and practical.

This lid is great because it is very easy to open due to the clip-lid being obvious by sticking out a little

2

I quickly decided that the bottom two mechanisms would be unsuitable due to the nature of what they were designed for, one being for a liquid such as paint and the other a container for plasters with a fiddly opening.



This one is a little fiddly due to how small it is.

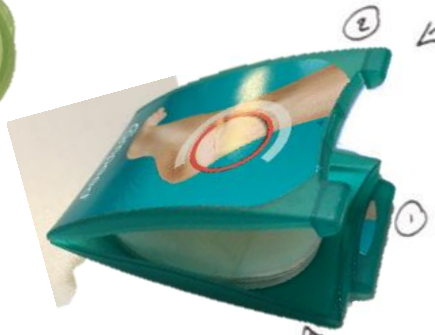
I could scale it up and experiment with a larger version of this style lid.

I like that it's angled, it would make it easier to remove just one treat at a time

This is a very simple and classic design of a lid

It's designed for liquid products to enable a squirt to come out.

I would need a much larger hole than this one.



This mechanism is slightly more complicated - you must push ① down and then lift ②

This would most likely be unsuitable for my design as it's too fiddly and complex.

3

So out of the 4 lids I came to the conclusion that the top two, the salt pot lid and the container lid, were the most fit for purpose. Both of them are very easy to open and would in theory work as lids for the treat section lid.

UF USER FEEDBACK

In this video Prew describes how she would like the treats to be able to be accessible quickly with just one hand so she can hold the lead with one hand and get a treat out with the other.

This is something I will need to take into consideration during the design process.

Next Week: start drawing up ideas and modelling if needed to visualise ideas

WEEK 9

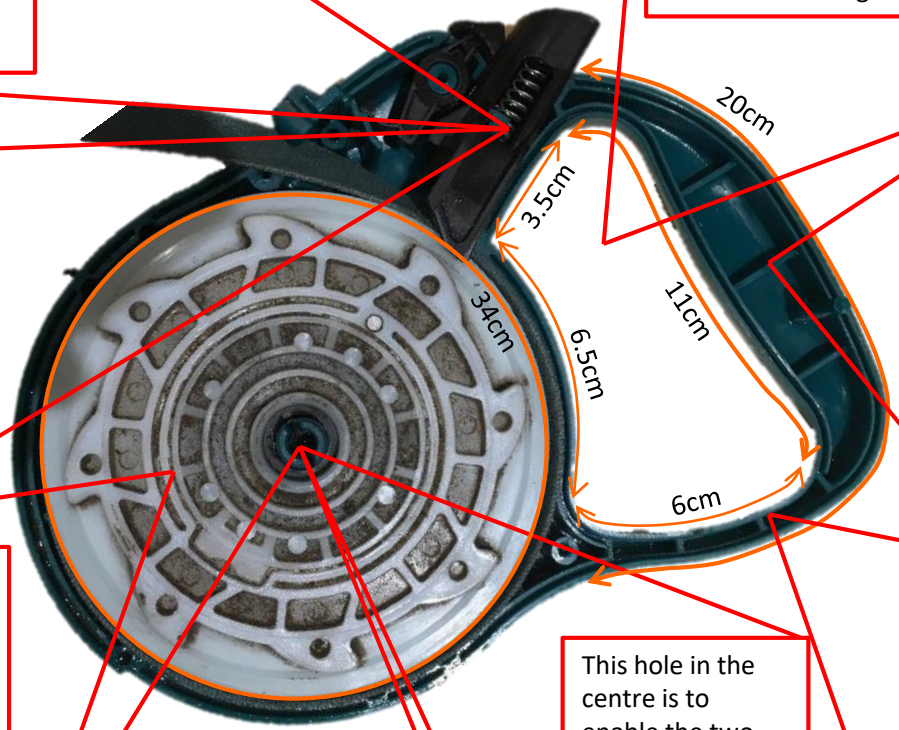
This is the switch that locks the lead, it is an essential part of the retractable lead so I won't be able to use the space. I will have to look elsewhere on the lead for space I can use.

I took apart an old dog lead to understand its inside components and learn where I could add or improve parts

The handle on this lead seems very large when comparing it to the size of the whole lead however it has to be big enough to fit any size of hand comfortably. I aim to roughly follow the handle size of this lead however I will design a new shape which may lead to the handle area being different dimensions.

Play Me

You press down the large button (1) to stop the lead from pulling any more and push the little button (2) to lock the lead length in place.



This handle space is not used at all – it is shaped to be thinner at thinner at the top and bottom to making it ergonomic. I could easily use this space for something however I need to experiment with the shape of the handle to be comfortable and to be as practical as possible to store dog treats or doggie bags. The depth of the handle when both halves are together is 3.5cm.

This is where the lead coils up – this space could only be made smaller by having a shorter length of lead. This lead is 5 metres in length which seems to be a size 'small' online. I probably want to stick to 5m as the longer the lead the less space I have to work with.

This hole in the centre is to enable the two halves of the lead to fit together – this side has a rod with a hole in the centre and the other side has a hole to fit the rod into.

This section is very thin, I could either not use this area or make it thicker to be able to fit a poo bag roll or treats in. Alternatively I could use the section for a house key as it doesn't need to be very large to fit a key in.

Next Week: continue designing and modelling ideas for the lead based on my new knowledge of the lead

RESEARCH INTO MATERIALS

I aim to research different materials that the final product could be made from not what my prototype will be made from as my prototype will be made of other materials to make it look as similar to the final thing as possible. I am unable to produce a fully functioning final product partly due to the mechanism inside being difficult to replicate by hand and partly because if I were to make it as I would the real thing, I would injection mould it which is a very expensive process, especially when I only want to produce one currently (split across the production of a batch of 10,000, injection moulding is much less expensive).

I would need to use a thermoplastic as they're able to be moulded into the intricate shape and it wouldn't need any finishing once its come out of the mould

Materials

Acrylic

- Semi-rigid
- Translucent
- Good chemical resistance
- Tough
- Good fatigue resistance
- Good heat resistance

- It can crack and break
- It could scratch
- The colour can fade

- Excellent weatherability and resistance to sunlight
- Rigid, with good impact strength
- Excellent dimensional stability and low mould shrinkage
- It can be translucent, transparent or opaque.

- Subject to stress cracking
- Flexible grades unavailable

Overall acrylic wouldn't be suitable because its too brittle and inflexible.

Polypropylene

Polypropylene is ideal for injection moulding and is very widely available. This makes it an ideal plastic to use to make my dog lead.

- Ideal to injection mould
- Tough and stong
- Resistant to chemicals and moisture
- Ease of forming and processing

- It is cheap
- Comparatively weak
- Doesn't decay and is polluting

PVC

- Very dense
- Readily available and cheap
- Rigid PVC is very hard and has good tensile strength
- Can be purchased as a hard material or in a flexible form

- It emits toxic fumes when melted which would cause issues when its injection moulded as the plastic needs to be melted

Overall PVC would be suitable to use for my project

HDPE

HDPE would be suitable to use for injection moulding to produce my dog lead.

I would most likely use polypropylene due to the range of colours available, its ability to be moulded into intricate shapes, its strength and how readily available it is.

TECHNICAL SPECIFICATION 1

The first points are the **musts**, second points are ones I **should** consider, and third points I **could** consider.

FUNCTION
- The lead must have the ability to hold and store treats and poo bags
- It should also be able to have a light
- It could have an area to hold a set of keys

AESTHETICS
- It must be quite a neutral design so that it suites the majority age groups styles
- It should bring a slightly new style of lead to the market
- It could have customizable features

MANUFACTURING
- Must be cost effective to produce so that its affordable and matches the cost of existing products
- It should consider time, how long it takes to manufacture and also if the process is costly as these would effect the overall cost

MATERIALS
- The lead must be durable and strong – it must be able to withstand being dropped
- The materials should have a long life span so that the lead has a long life

COST
- From my research I found that dog leads and their accessories can sometimes add up to around £35 sometimes so I aim to keep my cost around that price to ensure my lead is affordable for my target audience

ERGONOMICS
- It must be easy to use and hold
- All the compartments should be easily accessible to the user whilst they're holding the handle (the compartments should be opened with the use of only one hand)

SAFETY
- As the lead is much more interactive than a regular lead, the edges mustn't be sharp and it must have rounded corners
- There shouldn't be any small parts that are potentially choking hazards for young children

MARKETABILITY
- To increase popularity, the lead must appeal to large variety of target audiences, e.g. both genders, a range of ages
- My lead should fill a gap in the market as an all in one lead with multiple functions

SIZE
- The lead must be able to hold around 10 treats and 1 to 2 poo bags comfortably
- The lead shouldn't be too big or bulky for the user to hold

ENVIRONMENTAL IMPLICATIONS
- The materials used must be recyclable so it can be disposed of in the most environmentally friendly way possible.
- It should be made from sustainably sourced materials.

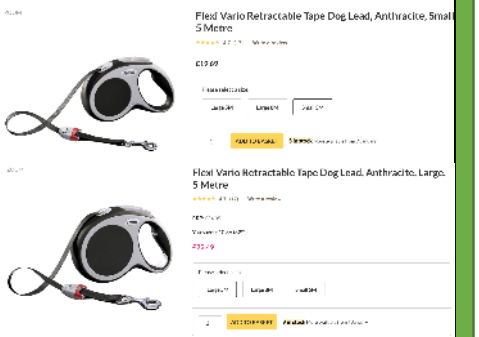
UF

In this video, Aiden talks about the size of the dog lead. He originally says he'd like the lead to be smaller than his current lead however he then goes back on himself after thinking about the practicality of a larger lead with a longer lead and the correct components.

KEY POINTS:
- Must be able to store treats and poo bags
- It must have a neutral design that suites a large target audience
- It must be cost effective to manufacture
- The material must be durable and strong
- It must be affordable so that its not out of the price range of what's already on the market
- The finished edges should be comfortable for the customers.
- All materials must be recyclable so it can be disposed of in the most environmentally friendly way possible.

WEEK 10

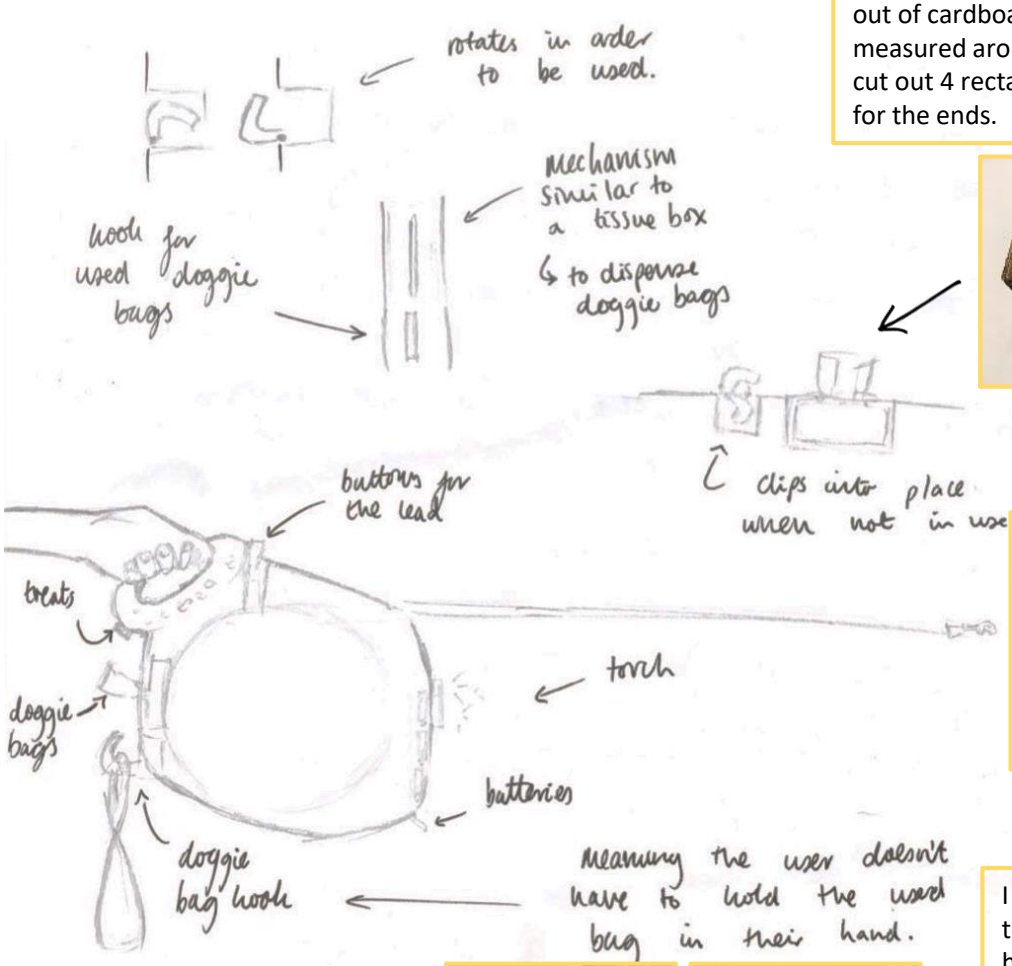
SIZE



I was looking online at dog leads again and discovered this sizing system. Depending on the weight of your dog, you choose a different sized lead. It didn't really occur to me that this was the case until now so I either need to choose a size based what's the best selling size (indicating the popular size of dog) or just create a design that can be adapted to be S, M or L. This could be an issue as the strength of the lead tape may change meaning the size of the coil of tape would most likely change due to needing a thicker one for a larger dog.

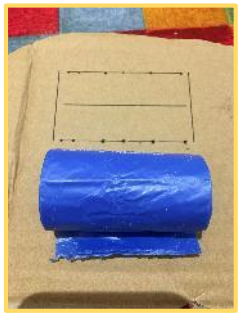
Size Guide

Handle Size	Lead Length	Max. Dog Weight
S	5m	15kg
M	5m	25kg
L	**5m**	**60kg**
L	8m	50kg



Next Week: evaluate where there is available space on a dog lead to fully understand how I need to adapt the design to fit the needs of my clients

I wanted to visualize if and how this idea would work – I made a model out of cardboard and hot glue. I measured around a poo bag roll and cut out 4 rectangles and 2 squares for the ends.

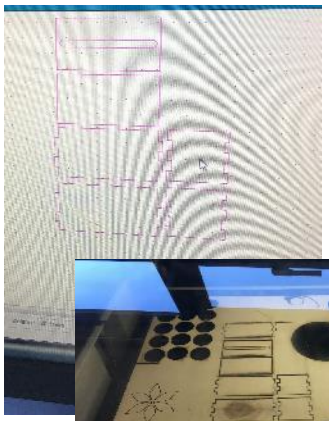


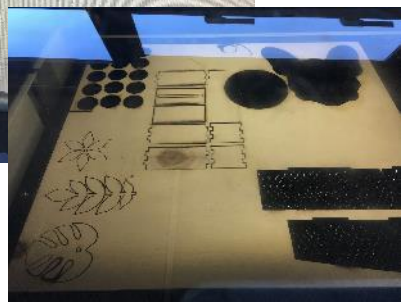
I then cut a thin slit into the top piece before placing the roll inside the box and gluing the lid on.

This was the final outcome – I was really pleased with how it turned out so I decided to add more to it.

I then attached another cardboard model to it, this was a model of the dog bag hook. it worked however I could see it being slightly insecure which could either cause the dog bag to fall off or the hook to break! I will need to re-evaluate this part of the model as I believe it's a really important part to my product

WEEK 10 b





1 I decided to laser cut my previous model of the doggie bag dispenser as the cardboard one didn't work smoothly which made it difficult to get a full understanding of the concept. To create the shape, I simply made a box with box joints and then cut a slit in the top to let the bags out.

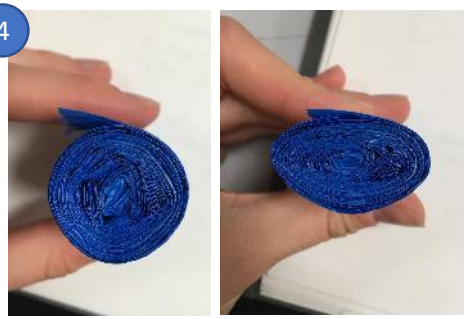
2 I then slotted together the box using a little PVA to create a stronger bond. I then simply taped the lid on as I wanted to be able to remove it the access the roll of bags.

Play Me

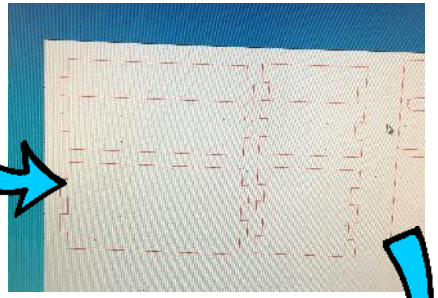
3 This video shows how smoothly the bag dispenser works – my development now would be to see how small I can make the dispenser with it still working smoothly without any faults. The smaller I can make it, the better because it will ensure the lead as a whole isn't bulky.

I need to ensure the holder can hold a whole roll still though because most dog walkers take their dog at least once a day and most likely will need to use a bag per walk therefore each week they will use seven plus bags.

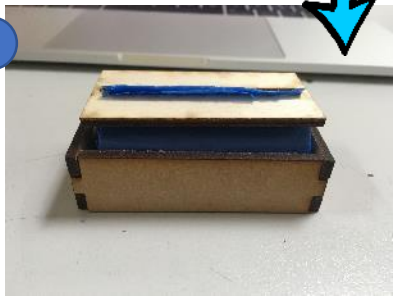
4 To save space, I could compress the poo bag roll down so it takes up less space meaning the dispenser could be smaller – I don't know how this will affect the functionality of the device.



5 I went onto 2D Design to make a new bag dispenser – I halved the height of the box as you can see, the bottom diagram is the original and the top two are the new model.



6 This is the model of my design, as you can see, its too small as the lid doesn't stay down. If I were to force it down and glue it wouldn't smoothly roll out.



USER FEEDBACK

UF PLAY ME

Prew thinks it'd be a bit excessive to carry around a whole roll of bags for one walk where they're only likely to need one or two. She says the idea would work much better if it didn't end up taking up so much space in the design

In conclusion, I have decided that I may have to compromise. Having the whole reel of bags would take up too much space and make the lead rather bulky. I am going to need to look into ways of carrying the bags in another way and considering the clients only need one to two bags per walk, there's no need for all the bags.

Next Week: come up with ideas for the storage of much fewer bags – between 1 and 5

WEEK 11a

USER FEEDBACK

Prew said she really liked the idea of the key fob holder on the side of the lead as long as it doesn't make it bulky or make an annoying noise of keys jingling on the edge of the lead.

She also likes the treat storage idea however she doesn't like how it makes the lead such an odd shape.

Aiden likes the poo bags being stored in the handle however he doesn't want the handle to be really bulky and uncomfortable to hold.

Overall: The handle needs to still be ergonomic, the key fob needs to be thin and not dangle around and the lead shouldn't be an odd shape

UF

This week I properly started designing ideas based on my research. This page contains my initial ideas – I will develop some of these going forward.

This would be a good option for people without good pockets for a key

This area contains the stop-start buttons for the lead. and the actual lead.

The yellow area represents where there is free space

It would keep their key safe and they wouldn't lose it

I could have a smaller length of lead to give space at the bottom for treats.

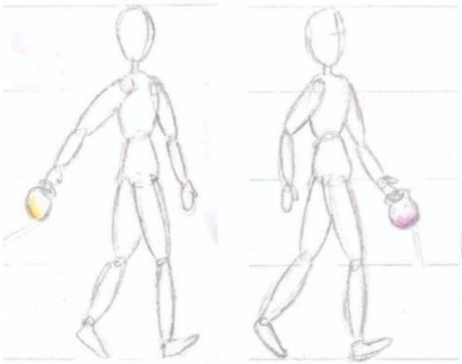
IN

OUT

I could have the poo bags in the handle however I need to look into sizing.

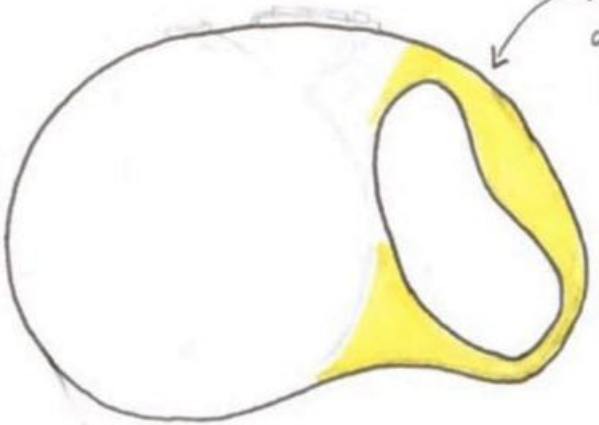
This idea leaves space in the handle for other accessories.

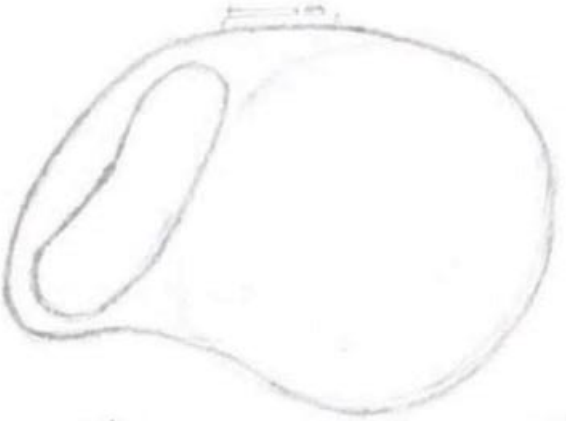
This design has created a lot of free space for the treats however I don't want the lead to be less than 5m so I might need to compromise.

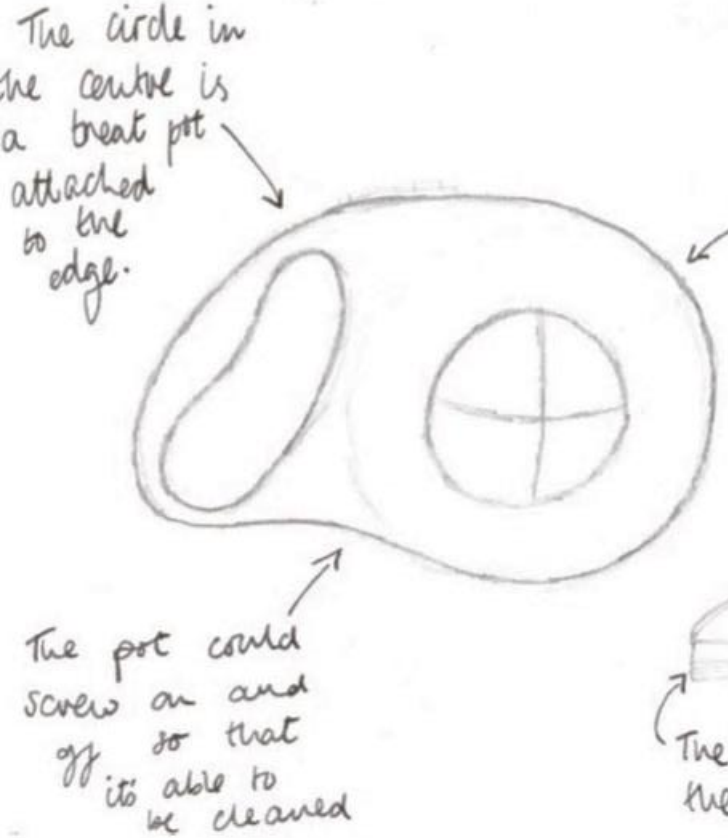


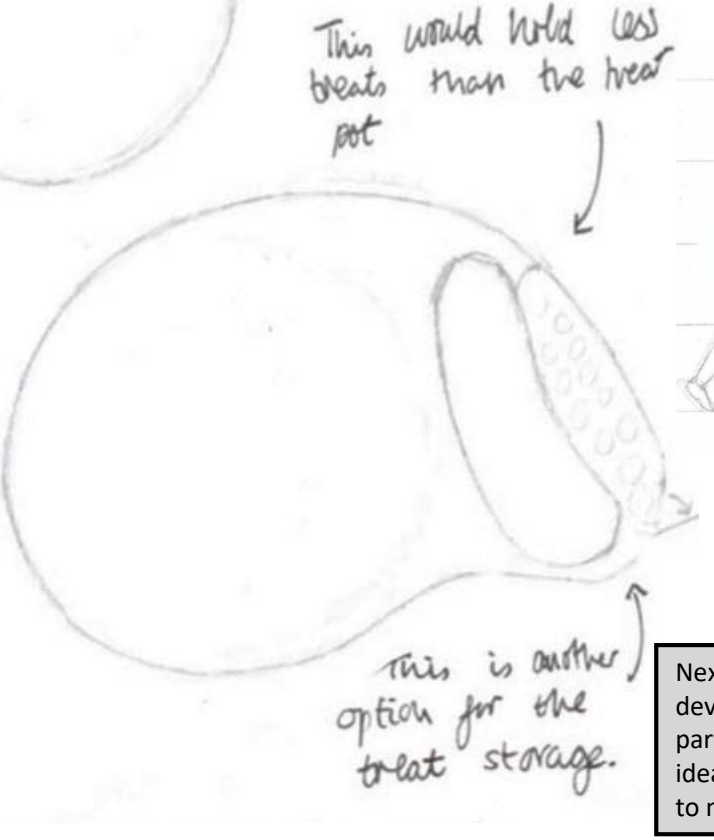
Next Week: carry on drawing ideas and gaining an understanding of which designs would work and how I can eventually incorporate all of my ideas for different components into one lead

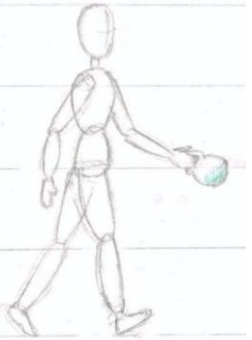
WEEK 11b











USER FEEDBACK

Aiden doesn't like the treat pot attached to the edge of the lead as it would be too fiddly to open with just one hand as the other hand would be occupied holding the lead

UF

Prew likes the idea of having storage in the handle as it would mean the lead wouldn't be made more bulky with a compartment on the side or an adapted shape to add storage space.

Next Week: start developing particular initial ideas to present to my clients

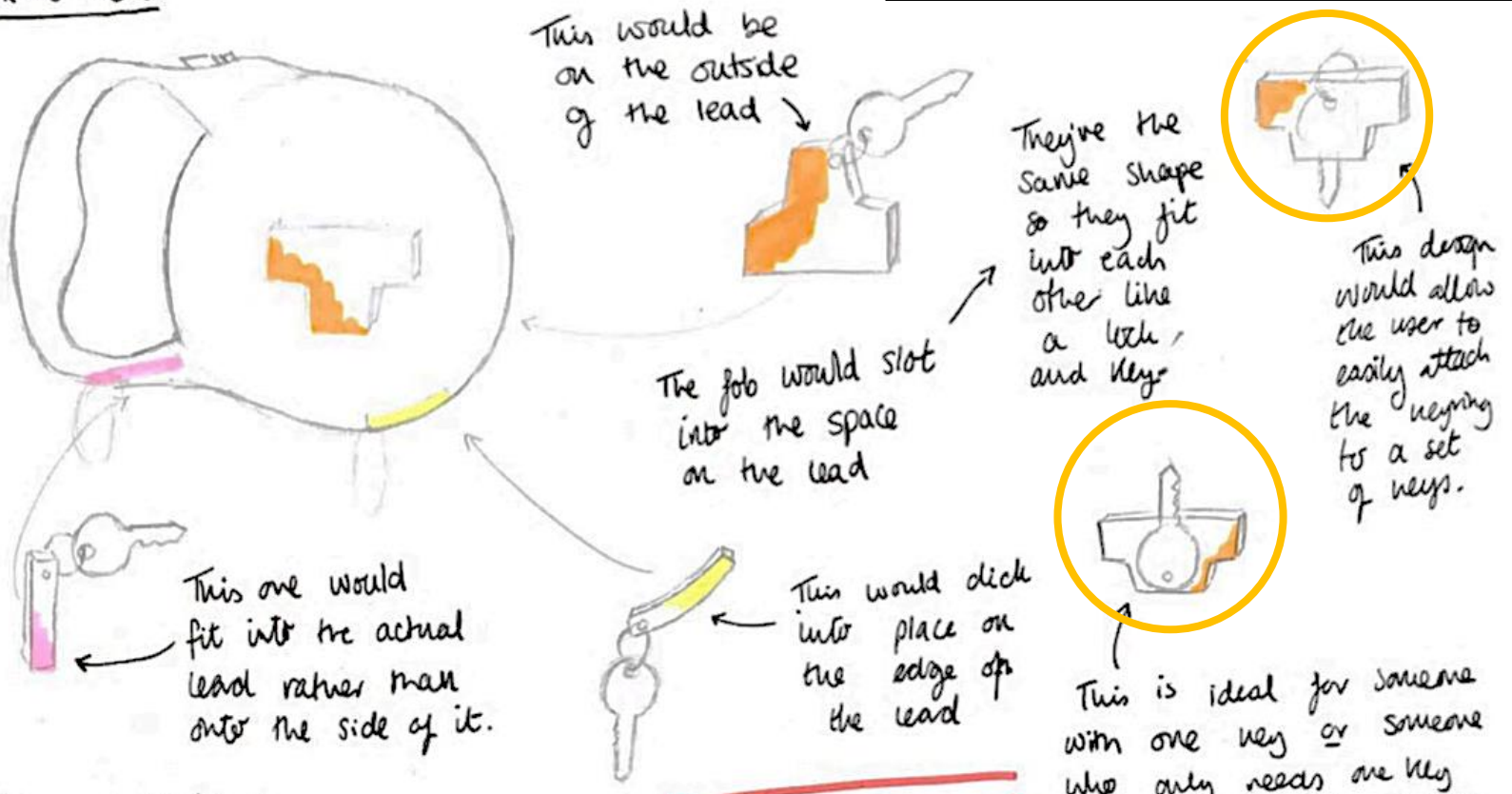
WEEK 12 a

Next Week: develop a different idea such as the dog treat container. Start using 2D Design to create my deigns using CAD

USER FEEDBACK

Aiden likes the rectangular fob idea because its not too large and will fit nicely on his set of keys without being too invasive. He doesn't mind the top right one (circled) as with that key fob, he wouldn't have it attached to all his keys, it would be separate to the rest of his keys so it wouldn't matter that it's a bit bulky as it would probably just live attached to the lead and only get used on or after a walk.

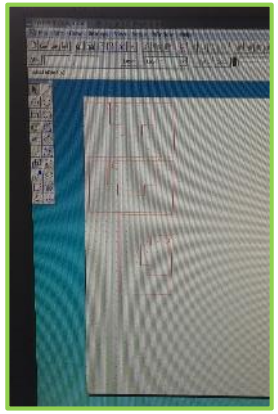
KEYRING IDEAS

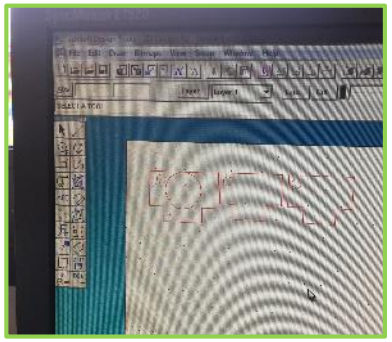


UF

Prew doesn't like the key fobs with the keys that dangle down as there's a high chance they could fall off and get lost and also they will jingle against the lead and make an annoying noise so her favourite ones are the top right two (circled in yellow)

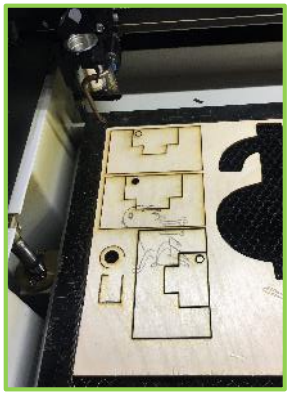
WEEK 12 b

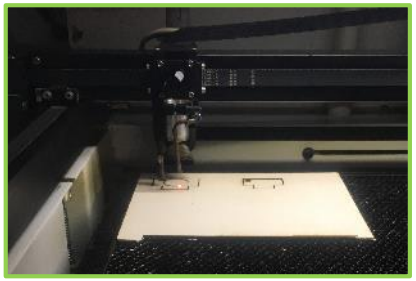




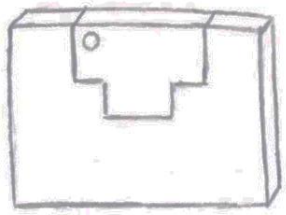
I drew up my ideas on 2D Design for the key fob, I then printed them out onto 3mm plywood on the laser-cutter at school.

I cut out my designs on scrap wood in order to avoid wastage of materials. I then used small dots of hot glue to connect the pieces together.



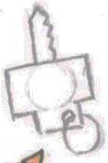


This video shows how the fob slots into the base. The base would be attached to the side of the lead to enable the key to be kept safe.

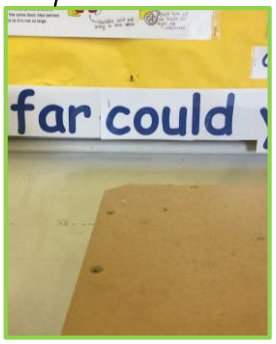


This was my first model of my key fob idea. It worked quite well however the key was dangling and was irritating.

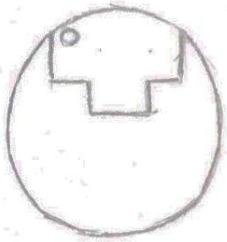
I made another fob for this, it had the key built into it to avoid it annoying the user.

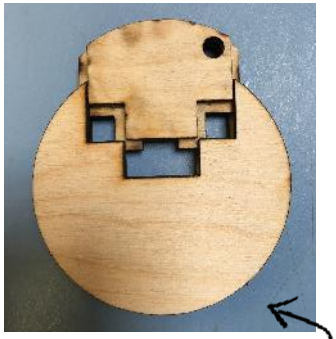


Play Me



After various comments from classmates wondering what it was and why it was the shape it was, I decided to adapt it to look more like I aimed for it to look eventually.





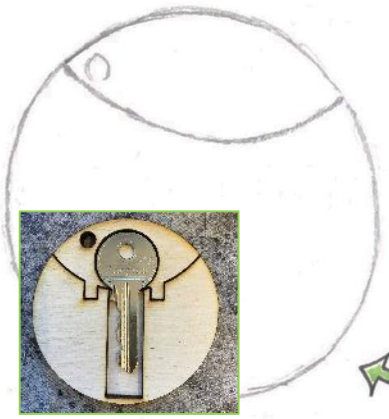
The key would slot into the base to avoid it being exposed to see.

UF

Although Aiden originally preferred the smaller keyfob that could be attached to his keys, he really likes how smoothly the fob slots into the body of the holder. Prew really likes this design however is still conscious if it being too bulky on the edge of the lead.

Next Week: continue to model and adapt these designs and models as they develop

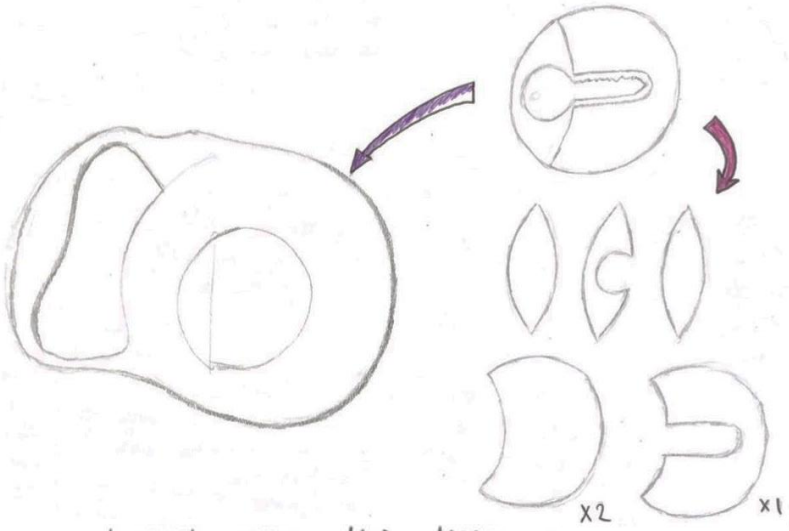
WEEK 12 c



This was my final shape for my key fob design - it's circular shape flows with the round dog lead.

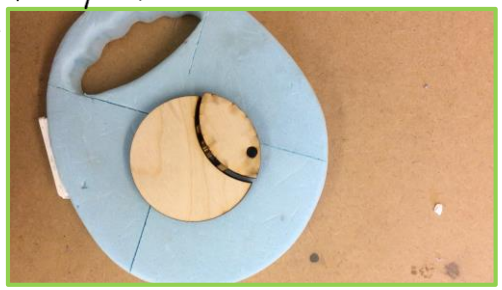
I need to look into the style of the locking system to ensure the key is able to stay connected to the lead to avoid the user losing it.

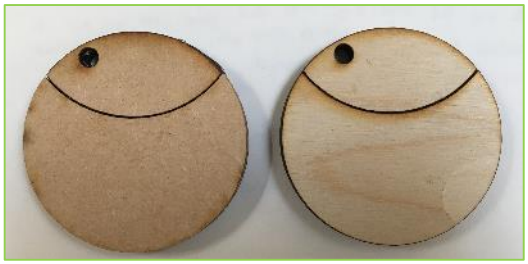
This video shows the model in use on a previous model I made of a lead. It seems to work pretty well – the only thing I would change is that it sticks out of the lead quite a bit so I'd try to integrate it into the design more by having curved edges as shown in the images at the bottom in green

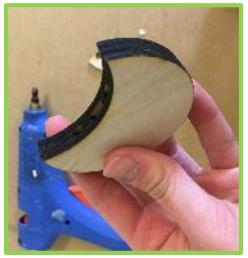


I much prefer this design a oppose to the T shaped as this blends into the lead much better.

Play Me







These are my final models for this design – the plywood one (with the grain) was the first one I did, thinking it'd be my final design however after realising that you wouldn't be able to fit the key into a door with the little notches on either side of the key. I then made the notches come out of the base.

Next Week: look into a different aspect of the lead to develop

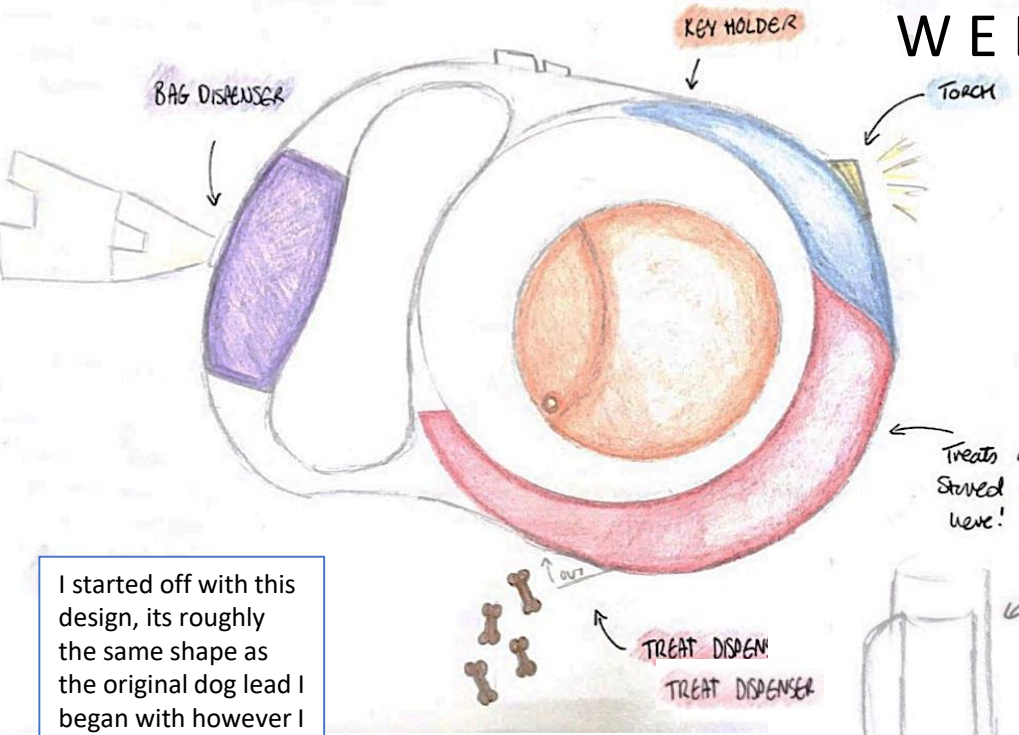
I could alternatively somehow build it into the lead so that the key comes out of the lead itself rather than a thing attached to the edge.

USER FEEDBACK

PLAY ME

UF

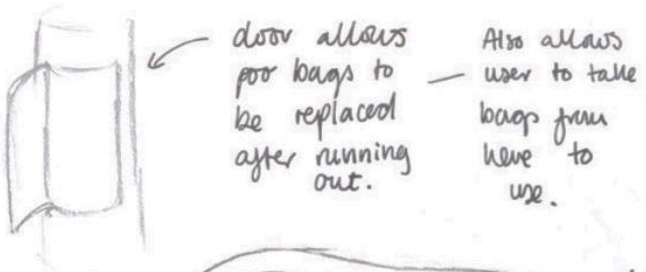
WEEK 13



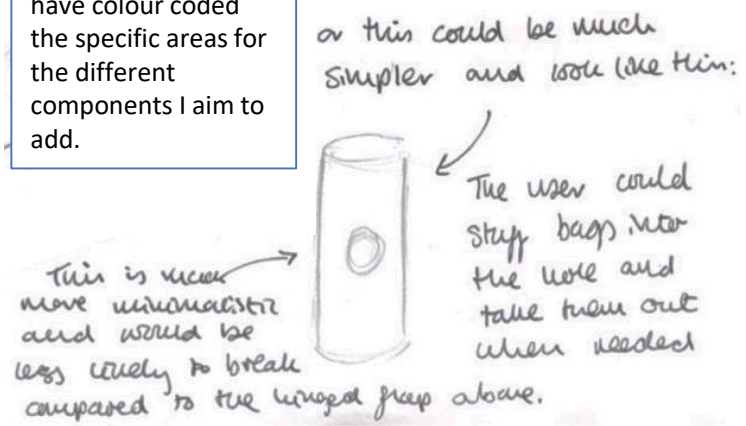
I used this old dog lead as a model for this design, this would hopefully give me a good feel for the dimensions of it before developing the design further.

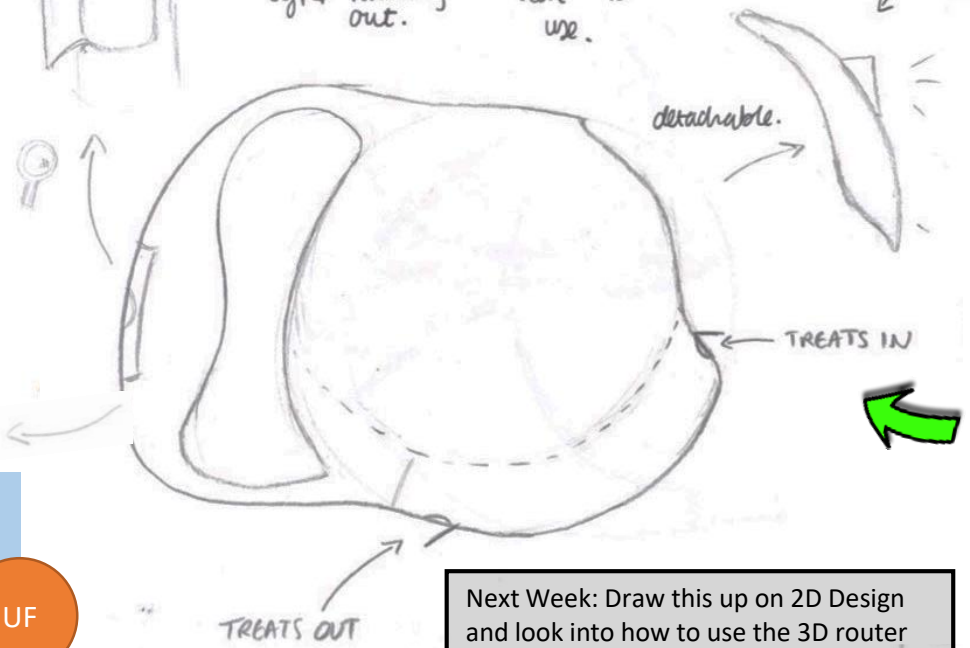
I used plasticine to divide the space as it would be in my design. I put treats in the space to see how many would fit and I also placed a AAA battery in the area where the torch will be.

I started off with this design, its roughly the same shape as the original dog lead I began with however I have colour coded the specific areas for the different components I aim to add.



removable light:
- allows treat dispenser to be refilled.
- allows the light's batterys to be replaced.





As you can see the dog bag reel is rather large in the model of the old dog lead above and wouldn't fit in the space I originally intended it to however I have developed this section to the left with a couple of bags in a small compartment

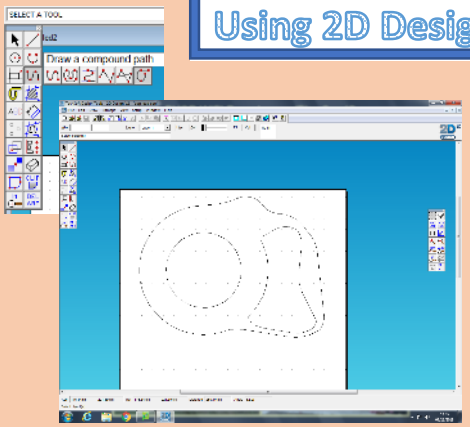
This design takes into account the UF throughout the design process:
- Poo bags are in the handle and don't make the lead bulky as it only stores 1-2 bags
- The shape being rounded and not odd
- The keys not dangling
- The treats are easy access with one hand

UF

Next Week: Draw this up on 2D Design and look into how to use the 3D router to cut it out

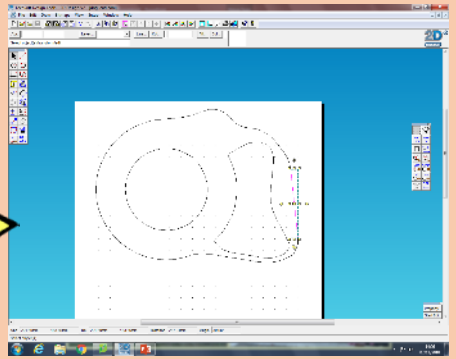
WEEK 14

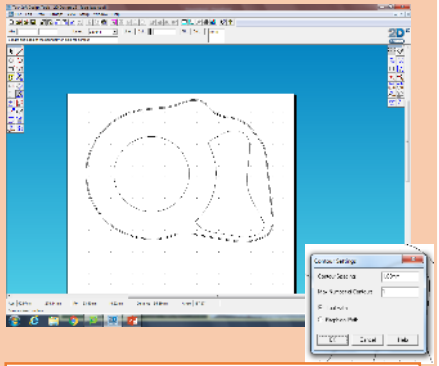
Using 2D Design



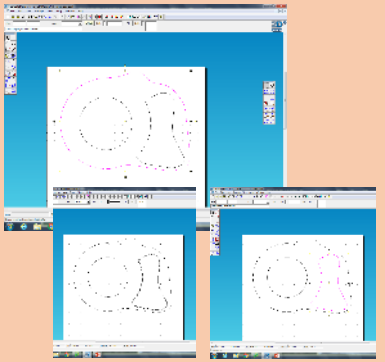
Initially I drew out my dog lead design using the 'draw a compound path' tool and the circle tool for the central ring and the curve around it.

Although this method allowed me to create the exact shape I wanted, it left me with a design that was made up of lots of lines that weren't connected – if I left it like this, the laser-cutter would take ages as it wouldn't cut it out in one motion, it'd go over each little line individually.



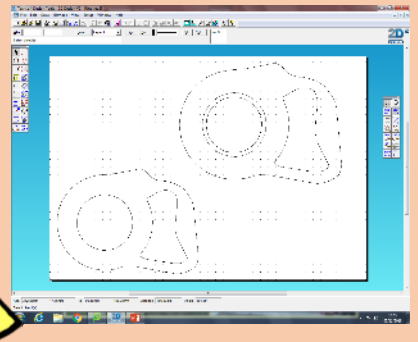


To fix this, I used the 'contour' tool which allowed me to create a line 1mm away from my original design and then delete the original line to then contour the new line so the size of the design hadn't changed



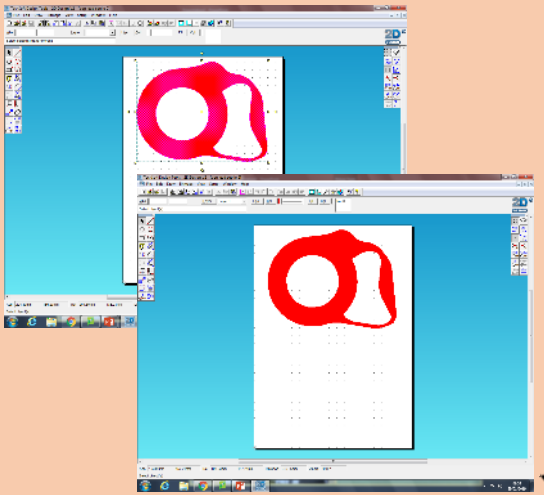
I did this with the inside hole of the handle which left me with a design comprised of just two lines which would allow me to then fill the shape in with colour to be cut out on the 3D router

After printing it out on the laser-cutter, I decided to scale up my design as it was a little small and the handle was a bit tight and I thought it'd be good to have more space in the hollow of the design for the components I aim to add.



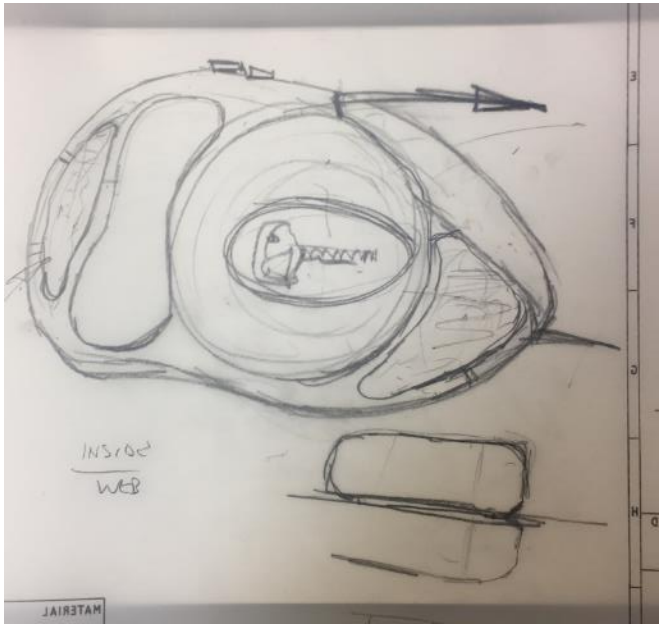
Finally I practiced using the 3D-router for this design, I only engraved it into the MDF rather than cutting it out fully as at this stage, I wanted to double check the dimensions of the design. The bottom right corner is a little too thin would cause it to be very weak and most likely break.

I then filled the shape in red and removed the outline. This meant that when I program this shape into the 3D router software, it will cut around the outline of the red shape



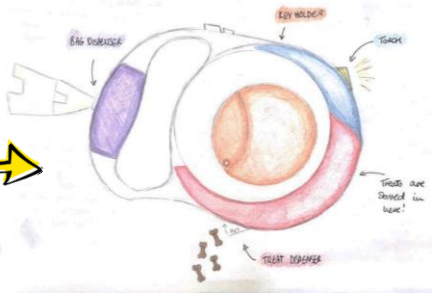
Next Week: adapt my design slightly to avoid the thin area on the handle

WEEK 15



1

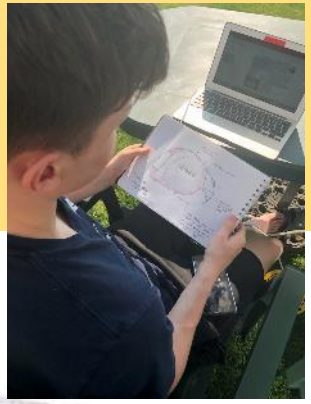
I used this tracing paper and placed it over my original drawing (a few pages back). This allowed me to keep the same shape of the handle and main body of the design but I made the bottom of the handle thicker and the front of it longer, into more of an oval shape.

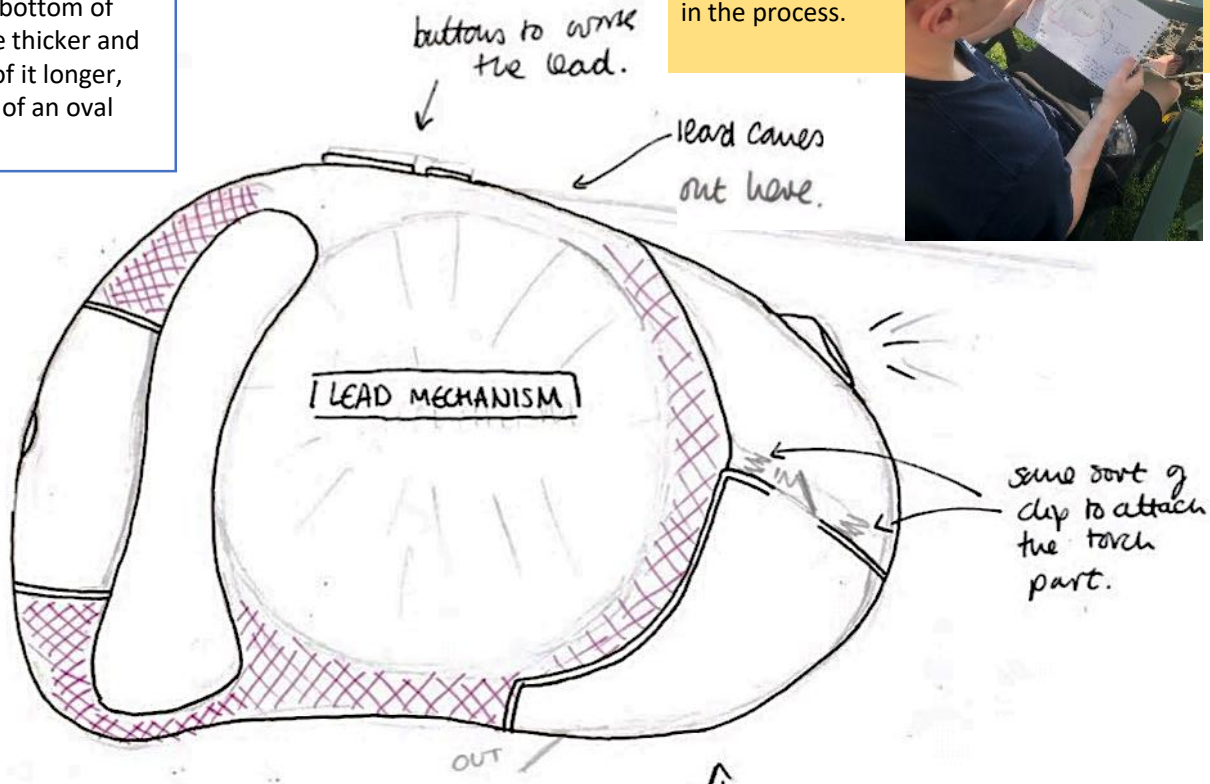


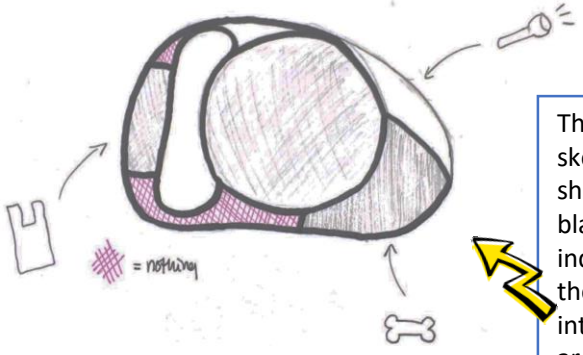
USER FEEDBACK

UF

I showed Aiden the final drawing he described to me how although he thought the previous 'final development' was his original favourite, after seeing this one he much prefers the oval shape and is very keen to see where this goes as we move forward in the process.







3

This is a little sketch of the shape, the thick black lines indicate where the exterior and interior walls are.

Overall, this development in the design has added extra space for the treats and more room for the torch (space for batteries and the electricals to work the torch)

Next Week: Draw this design on 2D Design and continue work with the 3D router

// = interior walls.

= space for webbing in the hollow areas.

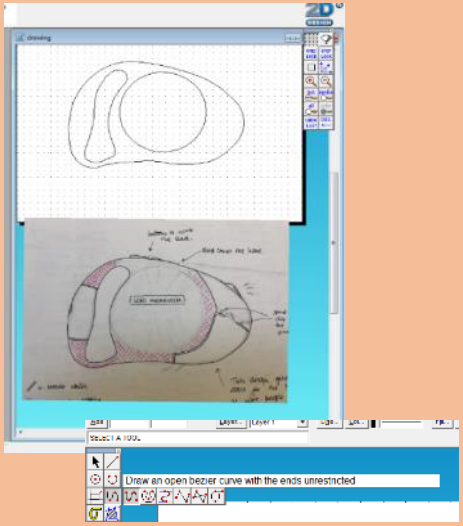
I then re-drew this shape to see how it looked in a less scruffy form. I shaded areas that'd be empty in pink – this gave me an idea of where supportive webbing could go to make the hollow areas much stronger

2

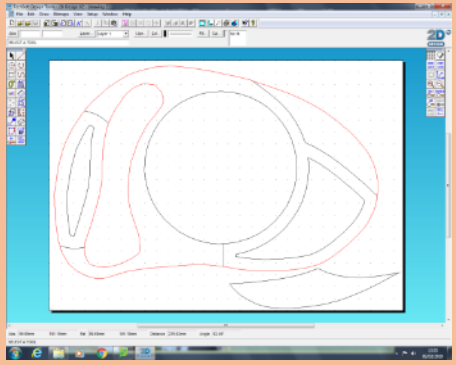
This design gives more room for the treats - as most people use a few treats per walk, this is ideal.

WEEK 16

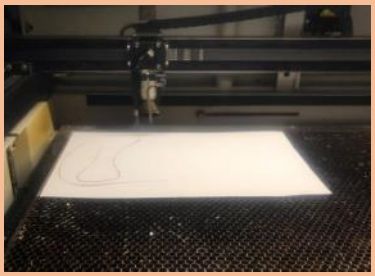
UF



I traced around the design I drew on 2D Design, initially I was going to do it free hand on the software however I really struggled to make it look how I wanted it to so I ended up scanning my drawing in and tracing around it with the 'path' tool



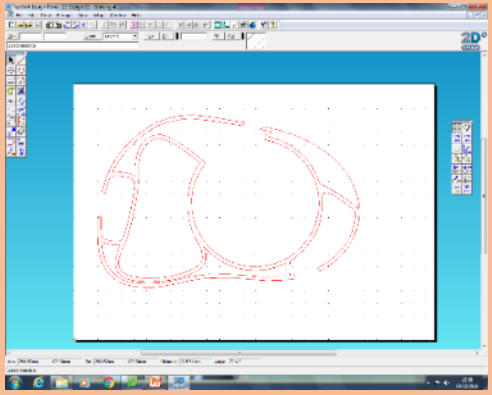
I then contoured various sections to indicate where the different compartments would be for treats, bags and the lead mechanism



I laser cut out the shape on white card to check the scale of it however I very quickly realised the design flaws – the handle was too skinny and was difficult to hold and the overall design was too large

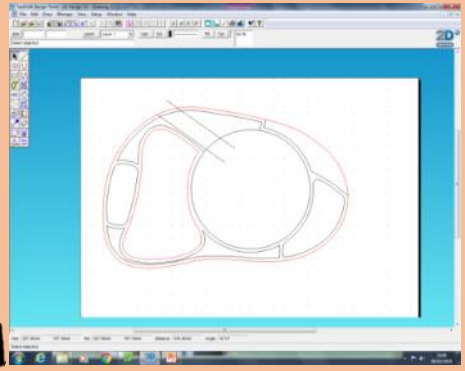
As you can see here, this design is very large in comparison to the old lead

Here's one of my clients, Aiden, assessing the size of the lasercut model, he agrees that it is rather large and the handle is very thin



I adapted the design by having paths where the exterior and interior walls of the lead would be. This will help when I eventually cut out the design on the 3D router

Inspired by my sketch, I took to 2D Design and adapted my old shape by replacing the handle with a traced sketch of the old dog lead handle

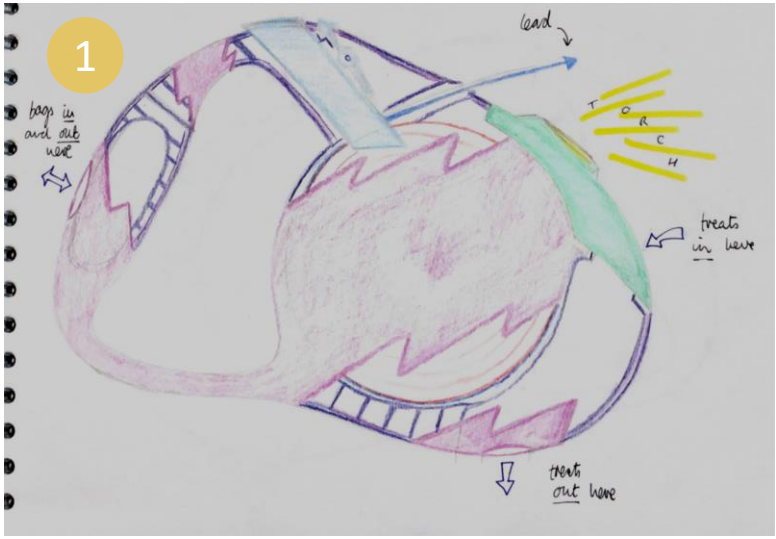


I traced around a picture of the old dog lead handle (the same technique I used previously with the tracing around the original drawing)

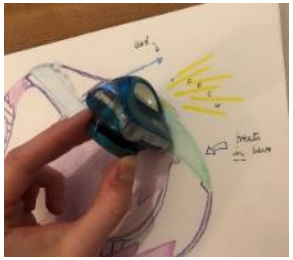
I sketched around a picture of the old lead and made the front more pointed to allow room for the treat compartment and torch at the front

Next Week:

WEEK 17

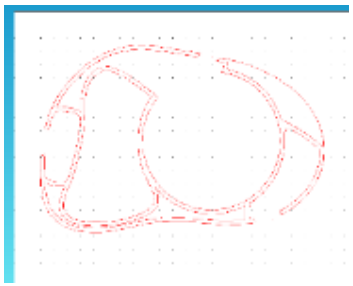


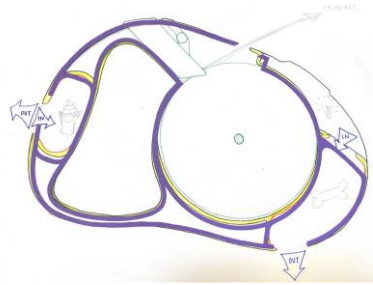
I then redrew it with the new handle design. This sketch is somewhat difficult to understand; the light purple is the lead on the outside and the zigzags show what the inside of the lead – it shows the buttons, mechanism, webbing and the interior walls.



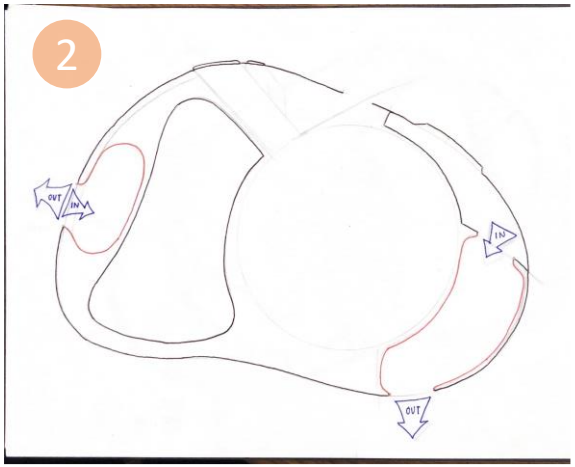
This is a small headtorch I found at home, it would be perfect to integrate this into the shape, it is a little large so I aim to look out for a smaller torch or light in the near future

3 I printed out my design on the laser cutter from 2D Design and ended up with a very thin purple outline of the skeleton of the lead. This was very useful as it helped me understand that I needed to make various parts thicker to allow the 3D router to cut it out and ensure thin areas aren't too weak





These images (right) show three different people holding the lead, they all have very different hand sizes however they all found the handle comfortable:



This drawing (above) was what I came up with however I soon added the yellow to it (right) to highlight where the interior and exterior walls will be

I wanted to simplify my drawing as after I stood back and looked at it I reaslied how colourful and hectic it was. I wanted to make this version of it as simple and easy to understand as possible.

USER FEEDBACK

Here, Aiden is looking at my (hopefully) final development of the idea. He explained to me how much he likes this one and how well it involves all the aspects he felt were needed

UF

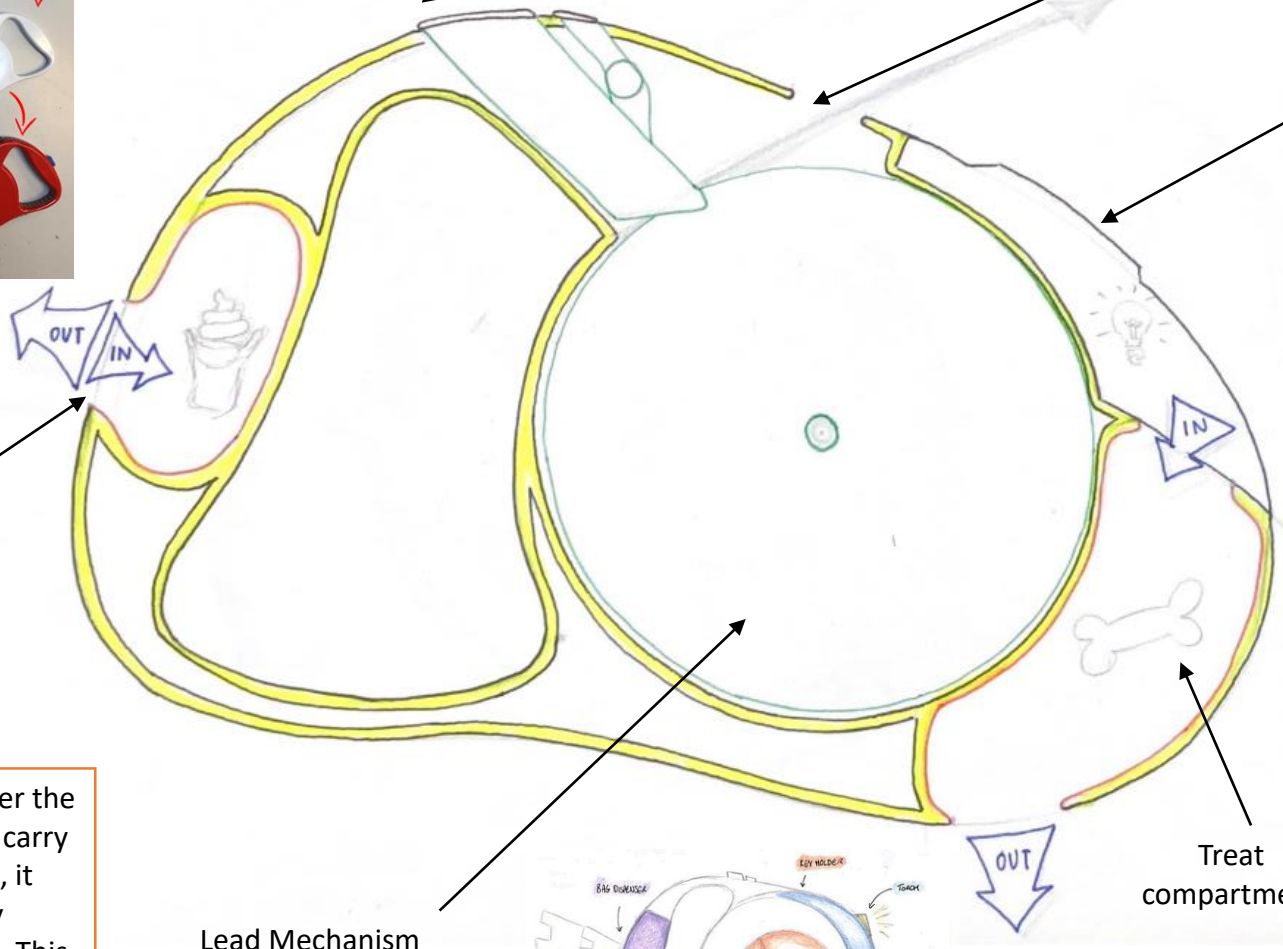
Next Week: start planning the making process

FINAL DESIGN SOLUTION

Buttons to control the lead

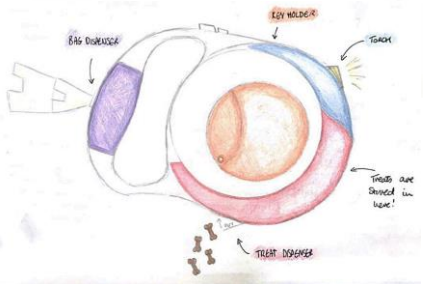
Lead comes out here

Torch can be taken on or off to allow access to put more treats in or to shine the light somewhere without having to hold the lead too

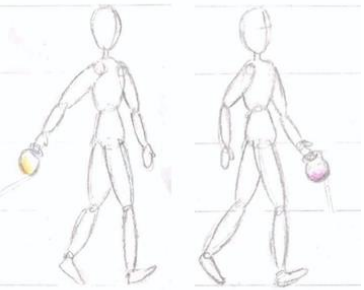


Poo bag storage

Lead Mechanism



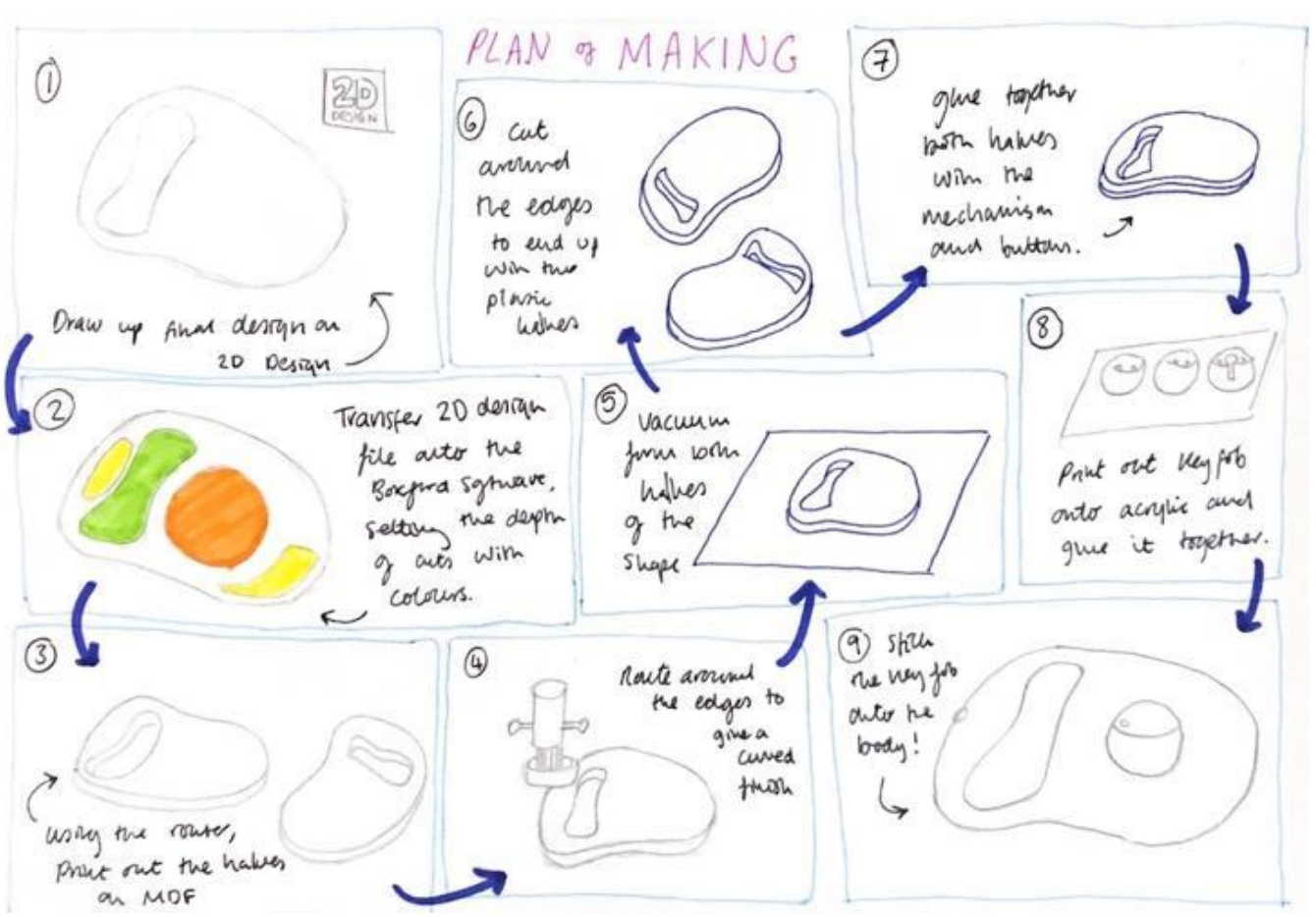
Treat compartment



This lead gives the user the ability to not need to carry anything but the lead, it holds everything they made need on a walk. This means they won't end up in a situation where they forget anything crucial such as poo bags

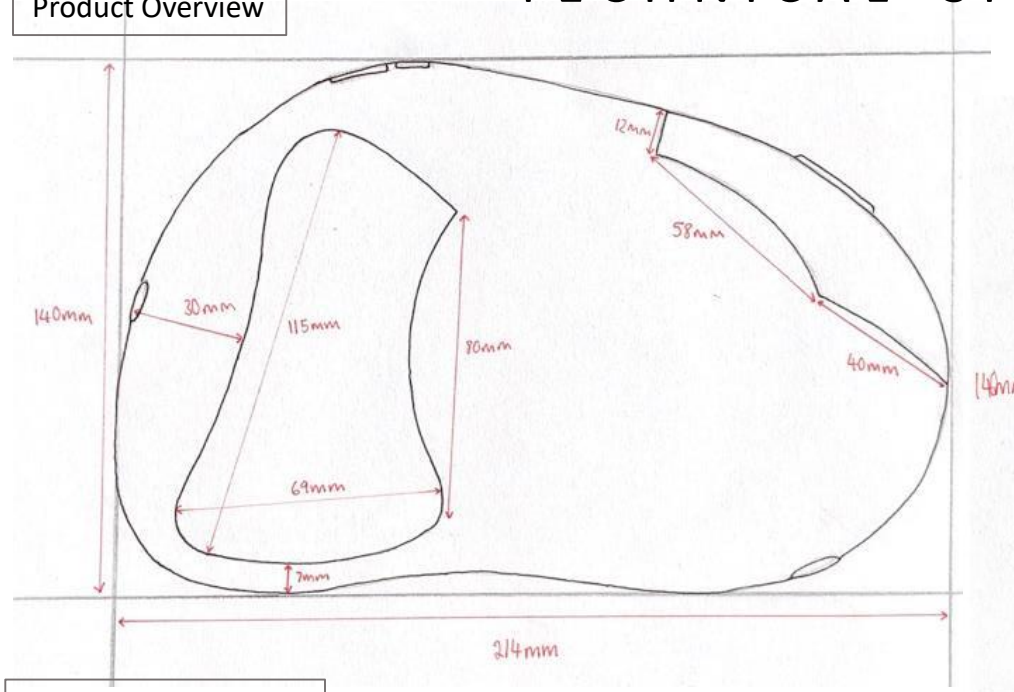
PLAN OF MAKING

1. Draw up final idea onto 2D Design (could laser cut it onto card to confirm the size is right before committing to cutting on the 3D router)
2. Transfer 2D Design drawing into the Boxford software, ready to cut (setting the depths and colours for cutting, e.g. green = cut inside shaded area)
3. Place MDF into the router on top of the sacrificial bed and fix it in place with the screws.
   - Start the router, ensuring to also have the vacuum going too to ensure there isn't a build up of dust in the machine.
   - Once the router has finished, remove the sacrificial bed and pry the MDF off of it to remove the cut pieces.
   - Sand the edges of the routed pieces to ensure they're not splintered
4. Using the hand router and the curved bit, route around all the front edges of the halves to create a smooth curve.
   - Sand around the bottom edges to create a tiny curve so that the plastic in the vacuum former will create a tighter closer seal around the bottom
5. Then using a craft knife and a cutting board, cut around the excess plastic around the halves.
   - Then cut out the holes for the torch, treats, poo bags area and the lead mechanism using the same craft knife.
   - Using the band saw, cut out the part for the torch (through the MDF and plastic coating)
6. Place the halves, one at a time, into the vacuum former and place the plastic into the machine and heat it up
   - Vacuum form both halves ensuring there is a tight fit between the wood and plastic.
7. Then place the mechanism inside and glue together both halves.
   - Cut out a circle for the torch to fit onto the segment that was cut from the main body of the lead. Do this using the pillar drill and a circle cutter.
8. Print out the key fob onto acrylic on the laser cutter.
   - Glue the fob together
9. Stick the fob onto the lead.

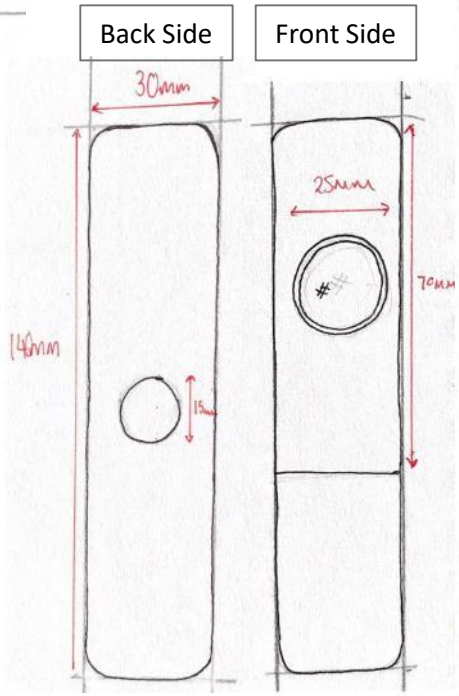


TECHNICAL SPECIFICATION 2

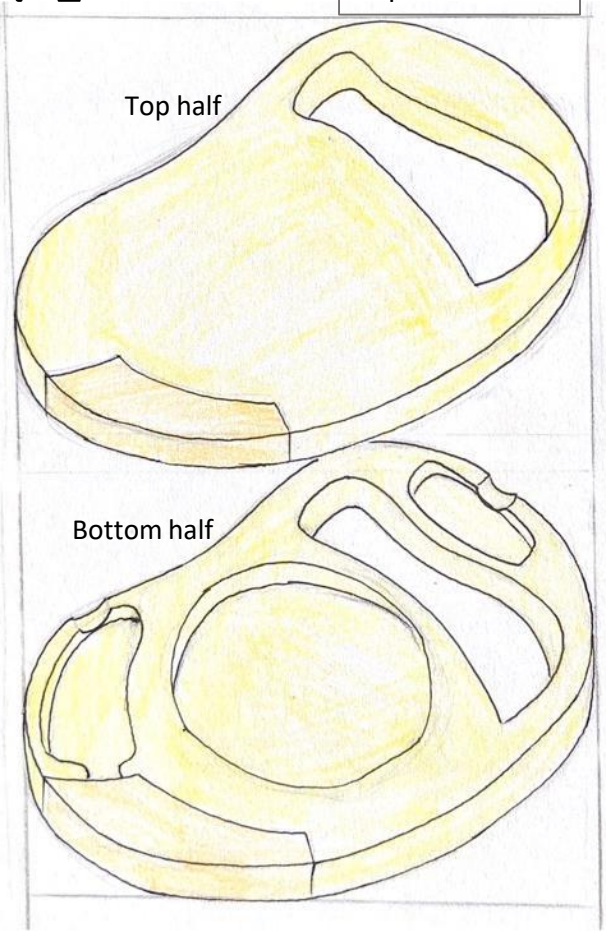
Product Overview



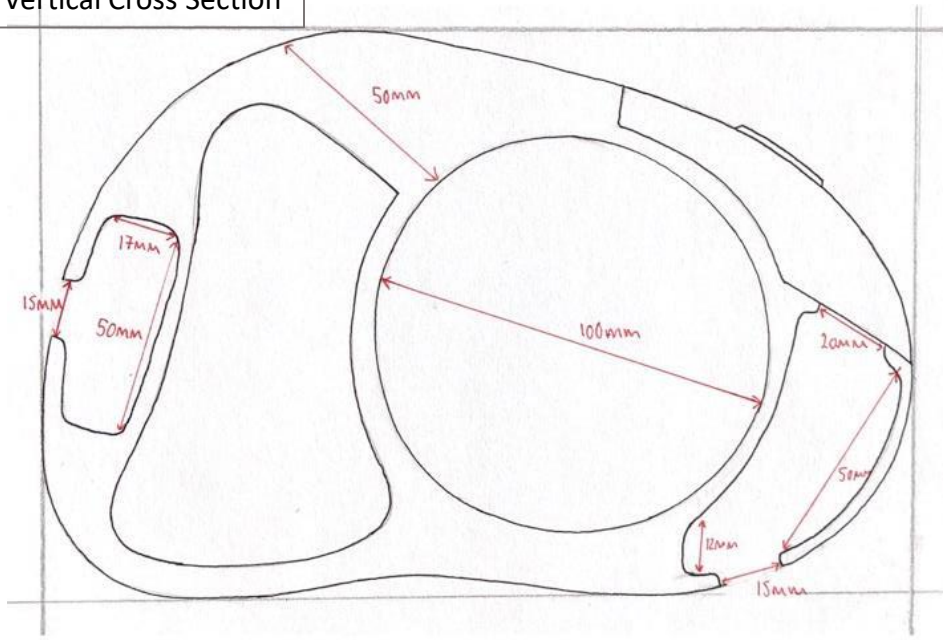
Back Side / Front Side



Exploded View



Vertical Cross Section



Although in the diagram the halves are labelled 'top' and bottom' both halves are identical mirrors of the other

Part	Material	Finish	Notes
Top Half	MDF	Outside edge coated in ABS plastic	
Bottom Half	MDF	Outside edge coated in ABS plastic	
Mechanism and Buttons	Various	n/a	Bought in (from a dismantled lead)
Lead Rope	Various	n/a	Bought in
Torch	Various	n/a	Bought in
Treat Stopper	Silicon	n/a	Molded to shape

Equipment

RISK ASSESSMENT

This symbol indicates where the risk assessment has been used during the process of making

RA

Hazard	Risk	Risk controls in place	Level of Risk	Further action required to control risk
Laser Cutter	The invisible high energy laser beam can cause severe eye damage, including blindness and serious skin burns	The doors are interlocked such that the laser beam will be disabled when the doors are opened.	High	DO NOT modify or disable any safety features of the laser system. DO NOT operate the laser unless all covers are in place and interlocks are working properly. DO NOT look directly into the laser beam.
	Some materials and dirt or debris can catch fire during cutting creating fumes and smoke inside the device	Keep a fire extinguisher close by and clean up clutter, debris and flammable materials from the laser cutter after use.	Moderate	DO NOT use materials that are highly flammable, explosive or produce toxic by-products. DO NOT remove material from the cutting bed before it has cooled. DO NOT leave a laser cutter operating unattended.
	Laser cutters will generate fumes and vapours which can be highly toxic and harm your health.	All laser cutters are equipped with a fume exhaust system and filtration system.	Moderate	DO NOT cut a material that has not been approved by the manufacturer. DO NOT use the laser cutter with a malfunctioning exhaust system or clogged air filter
3D Router	Air pollution due to dust. Potential slips, trips and falls. Fire or Electric Shocks	Vacuum attached to the machine to remove the majority of the sawdust in the machine. Machinery is to be checked for defects before use	Low	Wear PPE, apron and goggles for when opening the door of the machine incase a cloud of dust is caused. Cables and obstructions are to be kept clear of the machine to avoid hazard.
Chisel & Mallet	Slipping and slicing hand with chisel. Hitting hand with the mallet	Hold the mallet and chisel steadily to avoid jogging it and slipping	Moderate	Wear PPE to protect clothing.
Hand Router	Contacting the blade during rotation, potential flying fragments/ dust particles.	The workpiece is securely clamped in place and a guard is fitted.	High	Avoid blade during rotation, tie up hair and wear suitable PPE (goggles and an apron) to ensure fragments don't get in eyes. Wear ear defenders to avoid hearing damage.
Craft Knife	Being cut by the blade.	Blades kept sharp to avoid excess pressure being applied.	Moderate	Use of a cutting board or mat to avoid damage to the surface.

RISK ASSESSMENT

This symbol indicates where the risk assessment has been used during the process of making

RA

Equipment

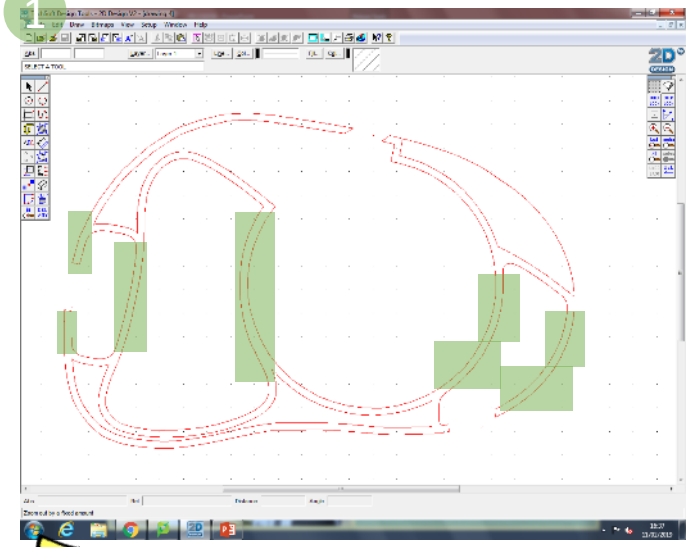
Hazard	Risk	Risk controls in place	Level of Risk	Further action required to control risk
Band Saw	Hair or clothing caught in machinery, chips in eyes, fingers cut or trapped by blade. Dust inhalation	Have the blade set up properly with a clean work area	High	Tie hair up and wear PPE, goggles, ear defenders and an apron. Wear a mask to prevent inhalation. Keep fingers clear of the machine.
Buffer	Clothing could be caught in the machine. Small pieces of mop and polish may fly out of the machine	The foot-stop is there to stop the machine in an emergency.	Moderate	Wear PPE, goggles and an apron.
Vacuum Former	Fire, burns or electric shock.	The device is fitted with a timer signaling when the plastic is heated enough.	High	Don't leave machine unattended (avoids overheating the plastic). Always use the handles and wait a few minutes before touching the plastic. Never put your hand between the plastic and the heater elements.
Pillar Drill	Clothes or fingers getting caught in machinery	Have the guard down, have foot over the emergency stop	Moderate	Wear goggles and an apron. Tie hair up to keep it out the way. Make sure pieces are fitted tightly

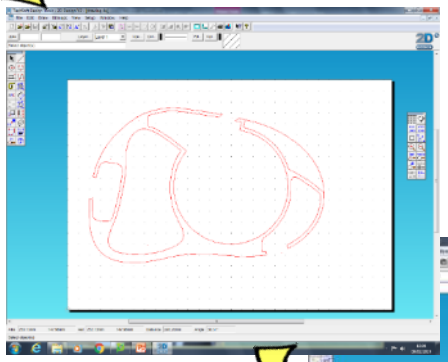
Adhesives

Hazard	Risk	Risk controls in place	Level of Risk	Further action required to control risk
Tensol 12	Adhesive is by nature messy to apply, high risk that the adhesive will at some stage come into contact with the skin and may well be transferred to the mouth. Vapour is heavy, and there is a high risk of irritation to eyes, skin and respiratory system.	Use in a well-ventilated place, for a short time only, and not for areas exceeding 100cm^2. Do not breathe vapour. Wear eye protection. Wear gloves. Do not use near flames	Moderate	Wear gloves, goggles and a mask (PPE)
PVA	Prolonged skin contact may cause irritation, eye contact can cause temporary eye irritation, ingestion may cause nausea	Avoid contact with eyes, skin and mouth	Low	Remove contaminated clothing and wash thoroughly. Irrigate eye with water for 15 mins holding eyelid open. Seek medical attention if symptoms persists
Hot Glue Gun	Burning yourself	Have a tidy area so if glue drips it doesn't go unnoticed	Low	Avoid touching the glue before it's cooled (a few minutes)

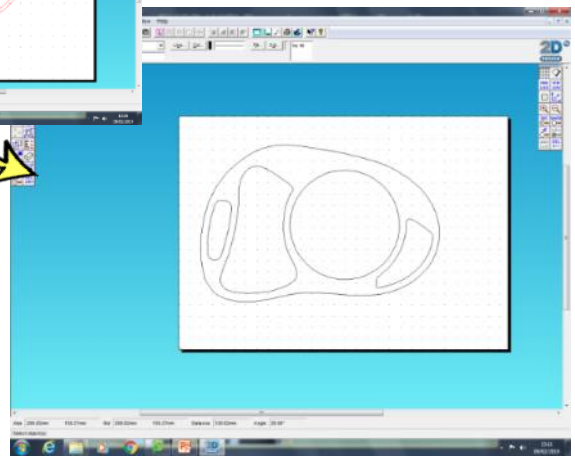
WEEK M1

1



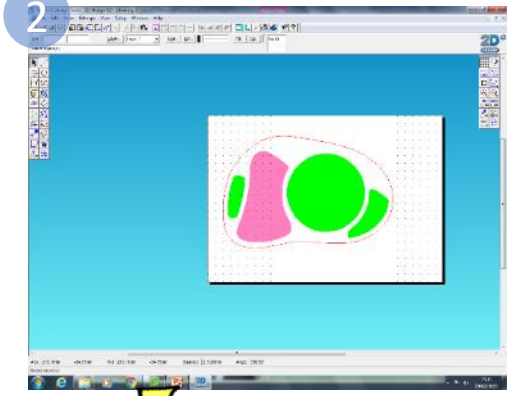


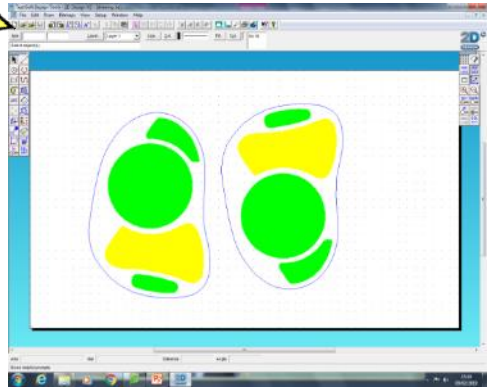
The green highlighted areas indicate where the walls need to be thicker – I went back onto 2D Design and contoured various parts to make all of the parts at least 6mm thick ready for the 3D router!



Next Week: finish off routing out the design

2





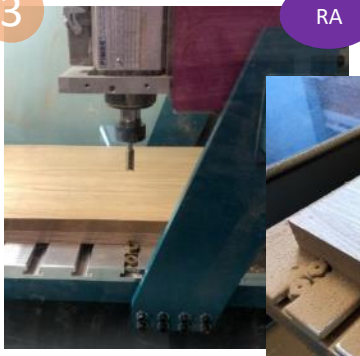
I then filled in areas I wanted to be cut using the 'bound fill' tool. I did this as this is how the 3D router knows where to cut. I copied the design so I had two of them and flipped one so I had two shapes mirrors of each other

I had my fair share of issues with the 'Boxford' (3D router) software, mostly because I've never used it before!

3

RA

See risk assessment for safety advice here

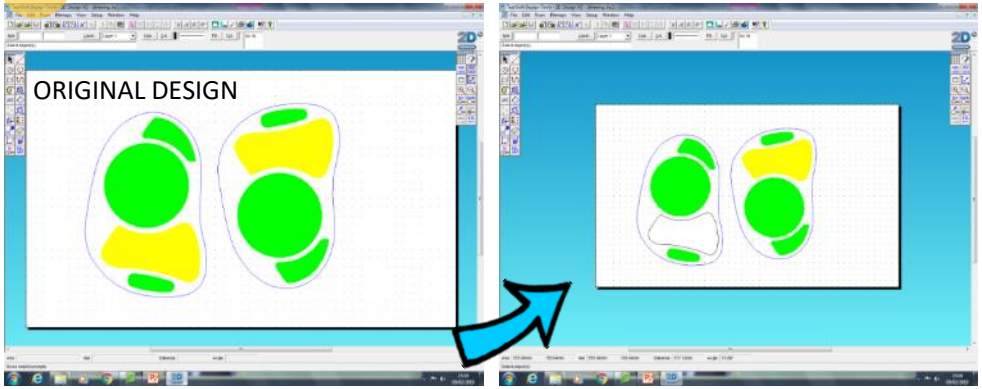


I started routing out the design. I nailed the MDF to the base of the router (I used veneered MDF as this is what we had in the workshop). The first issue I came across was that I didn't nail in the middle of the handle which almost caused it to fly out once it had been cut out – if it had, it could've really damaged the router blade.

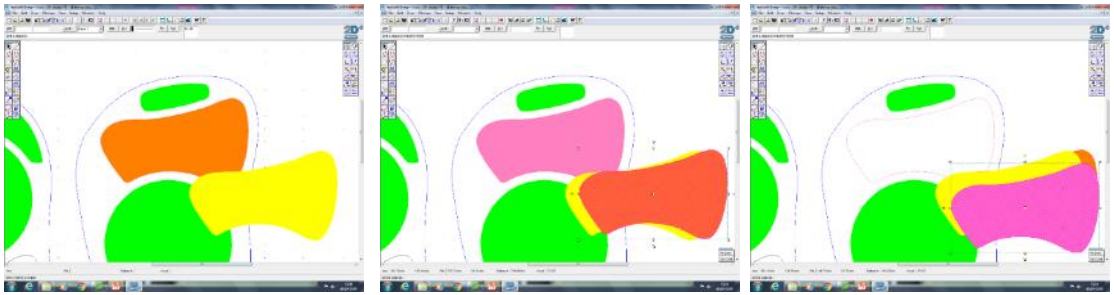
I stopped the router and decided to nail around the parts that would come loose and then go back to 2D Design and the Boxford software before starting it up again

WEEK M2

1

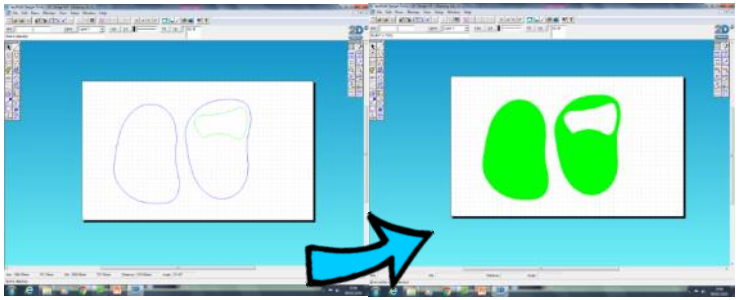


Initially I thought that I could just stick with my original file and just make it cut the inside edge of the yellow and then around the outside edge of the black however as I was editing the drawing I found something:



There were lots of layers of colours from where I'd used the 'bound fill' tool, I didn't realise that it created layers of colour, I assumed it just filled it in in the new colour and delete the old one. This caused quite a lot of confusion for the machine as when I selected a colour to cut in a certain way, there were lots of layers of other colours behind it.

I decided to make a new file with just the outer edge and the handle shape, this meant it was a lot cleaner and easier to work with. Luckily the machine seemed to like it like this – I filled in the shape with green and opened the file in the Boxford software



2

The machine started cutting out the design, after I had put pins through sections to make sure the shape wouldn't come loose once it'd been cut (the image below shows where I put the nails)

I then used a mallet and a chisel to lift the lead shape off of the board. I also then knocked out the previous pins from each side to end up with this:

RA

See risk assessment for safety advice here

Next Week: continue making the model and developing it when necessary

WEEK M3

1

I clamped each half to the table with a G-clamp and used a small hand router to curve the edges of the lead slightly, I then used sandpaper to soften the edges a little further

See risk assessment for safety advice here RA

2

After making my prototype, I knew I wanted to find a smaller mechanism for the inside of the lead to allow more room for the dog treats.

I went to B&M and found two different leads, they had a small blue one and a medium sized red one. I bought the red one as it was still a lot smaller than the original green one I had.

Next Week:
I aim to design and make a new wooden prototype with a smaller mechanism area to fit the new dog lead mechanism I bought and a larger dog treat area

3

I visited Halfords, a local DIY and bike shop, to find a light for the front of the lead, initially I aimed to find a small head torch however they were all too big but luckily I found these bike torches that clip onto the front or back of a bike. I decided the ORB Cat Eye torch was the most suitable as the circular shape will be easiest to incorporate into the lead design through drilling a hole and slotting it in

The light was originally attached to a rubber strap which would allow the light to be connected onto a bike. I removed this strap as I will not need it because I will connect the light directly to the lead.

These are the specs of the torch on the website:

Dimension :	26 x 2 x 51.8 mm
Weight :	26 grams (light unit and battery)
Light source :	Red LED x1
Battery :	CR2032 x2
Runtime :	Rapid flashing : approx 100 hrs Slow flashing : approx 100 hrs Constant : approx 50 hrs

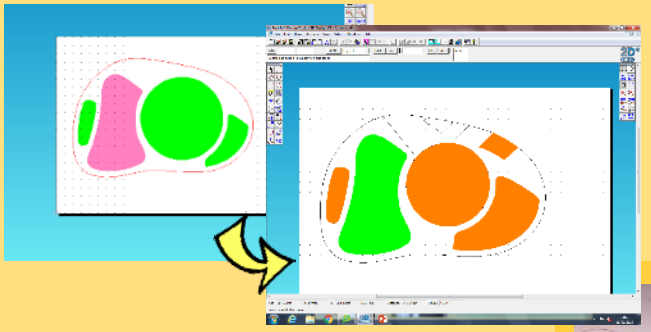
4

I took apart the lead to get the mechanism from the inside – I then placed this, along with the buttons into my wooden prototype:

WEEK M4

Next Week: use the vacuum former with the new MDF model to give it a more professional finish.

1



I decided to go back to 2D Design to edit the layout of the compartments after realizing I could make the circle for the mechanism smaller so I made the treat compartment larger.

I also changed the depths as I was using 15mm MDF rather than 18mm (the previous model was from 18mm). I then measured the depth of the lead mechanism using a digital caliper (24.64mm) to ensure the gap was a perfect size for the mechanism to fit snugly into.

2

I printed out the design onto card on the laser cutter to check that the sizing of it was right before I printed it on the 3D Router.

3

I then used the hand router to curve the outside edges.

1

At this point I was ready to use the vacuum former however another student was quite busy on it so I decided to start working on the keyring key holder for the lead.

I drew up the design onto 2D Design and printed it out on card to see if the sizing and shape was right

2

I then printed this out onto scrap orange 3mm acrylic. I glued it together using a thin layer of tensol 12 and G clamping it to add pressure, gluing two parts together first and then gluing the third on once the first had bonded. This would ensure they are all flush.

I printed out a mock key from some plywood to show where the key would sit and how it'd work.

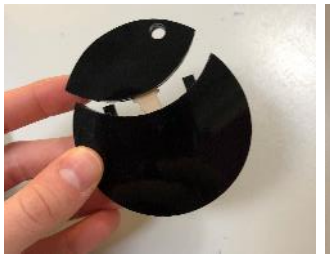
RA

See risk assessment for safety advice here

RA

3

The model worked so well that I decided to re do this process but on black acrylic (to be the final thing). After gluing it together I used the buffer to smooth the edges and make them shiny again. I kept the protective layer on until I'd finished buffing it.



WEEK M5

See risk assessment for safety advice here

RA

1

a To practice using the vacuum former, I used my original wooden prototype. As you can see from these images, it worked well however I'd quite like the plastic to come down further over the wood (this will make more sense in the second images)

b I then cut around the edge of it, as I would do this in my final thing. This shows what I meant a lot better – you can see that the plastic curves up a little at the edges however I need it to be flush

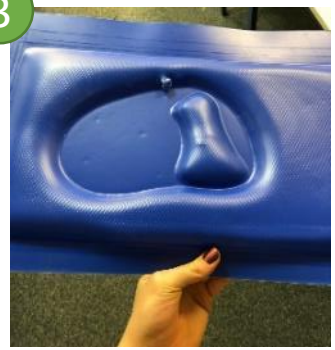
c To try and fix this issue I placed some washers underneath the wooden prototype to raise it slightly which will hopefully make the plastic edge straighter as the plastic will curve under the wood slightly

2

This was the second attempt, I used my new wooden prototype however I encountered a new issue which was that the plastic tried to form around the hole for the lead causing it to pop and create a little hole

3

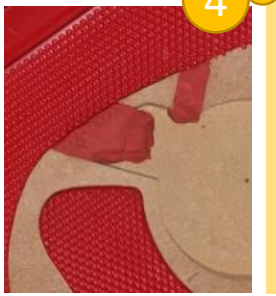
a Initially I blamed the formation of the hole on the plastic being too hot when I vacuum formed it. I realised this was not the case when I tried again with a different material, the plastic popped again which caused the whole thing to quite loosely form around it rather than tight, how I wanted it.



b This is a video of the blue plastic popping due to the plastic being sucked into the hole for the lead buttons

4

a This was my final attempt (which thankfully was a success!) I plugged the hole for the buttons with plasticine and used the washers to slightly raise the wooden model which gave me the perfect shape for my model



b This video shows the vacuum forming of my final plastic form of the lead

Play Me

Play Me

Next Week: continue making the final model

WEEK M6

1

This is how the vacuum form of the MDF form turned out – its exactly how I'd hoped, with enough room to cut around the edge

See risk assessment for safety advice here

RA

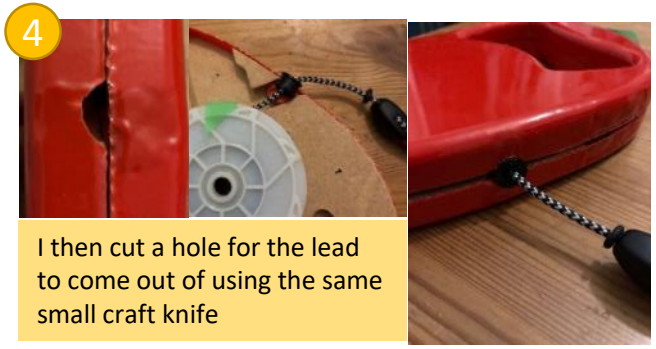
2

I cut around the edge using a Stanley knife and a little craft knife for the more difficult sections to access such as the inside edge of the handle

3

I then used tape to connect the two halves to double check they would it together but also to get an idea of what the finished thing could look like!

4

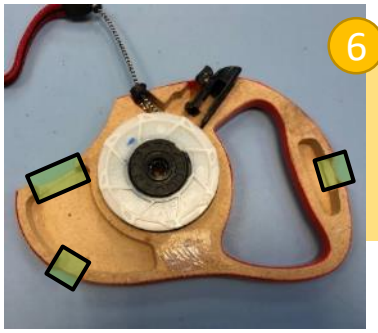


I then cut a hole for the lead to come out of using the same small craft knife

I temporarily taped together the two pieces using cello tape and using the band saw I cut off a section for the light and for access to the treats

5

RA



6

Using a chisel and a mallet I chiseled out gaps through the wood for the treats and poo bags to go in and out (the highlighted areas)

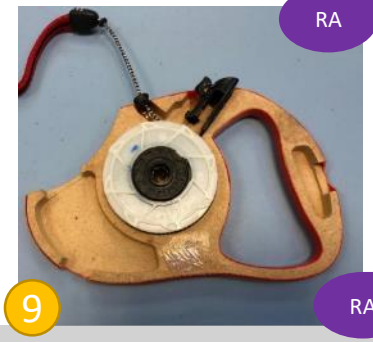
7

I then also created holes through the plastic for the lead buttons, treats and bags using the craft knife and various shaped files however I soon realised that the files caused the plastic to crack due to the friction and movement

I used white spirt on a little cloth to remove the tape marks on the plastic which worked excellently

8

RA



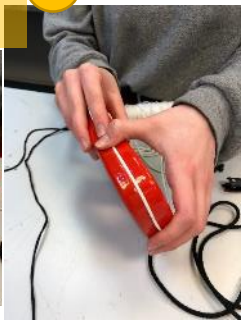
RA

9

Using a hot glue gun, I glued down the buttons into place (as this is a prototype and due to the mechanism being fiddly and complex to replicate in the wooden body, the mechanism isn't functioning). I then put PVA glue on the wooden edges that would be touching put MDF over the joining edges and clamed the body together

I found this cord which I planned to seal the join with however I didn't like the look of it as it stuck out too much and drew the wrong attention to the join

10



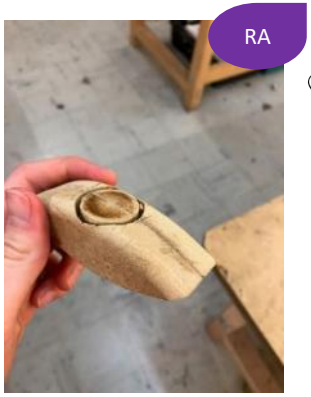
Because I really quite liked the look of the tape I'd previously used to join the lead together temporarily, I rapped the outside edges in the tape to conceal the join where the halves meet

11

Next Week: continue making the final model

RA

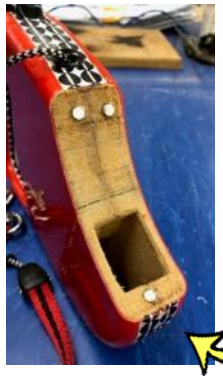
WEEK M7



Using the pillar drill with a hole saw bit to cut a space for the little torch, I then used a flat wood drill bit to remove the inside of the hole.

I then cut a hole the shape of the light through the plastic shell with a craft knife and a file. I glued the plastic onto the wood

I drilled three little holes in the lead for some little magnets to be glued into, this would hopefully allow the torch to stay connected to the body



To ensure I drilled holes in the same places on the torch segment as well as the body, I attached the magnets to the body and then blobbed a little white paint onto them and pressed the torch segment onto it and then drilled holes for the magnets where the white dots on the torch part were.

Originally I was going to have the torch on some sort of hinges or flap however after finding these very strong magnets I thought I'd try this out and it turned out much better than a hinge would have. This is due to being able to completely remove the torch, allowing the user to shine the torch without having to always move the lead around.

Play Me

Here are the different flashing settings of the torch

Play Me

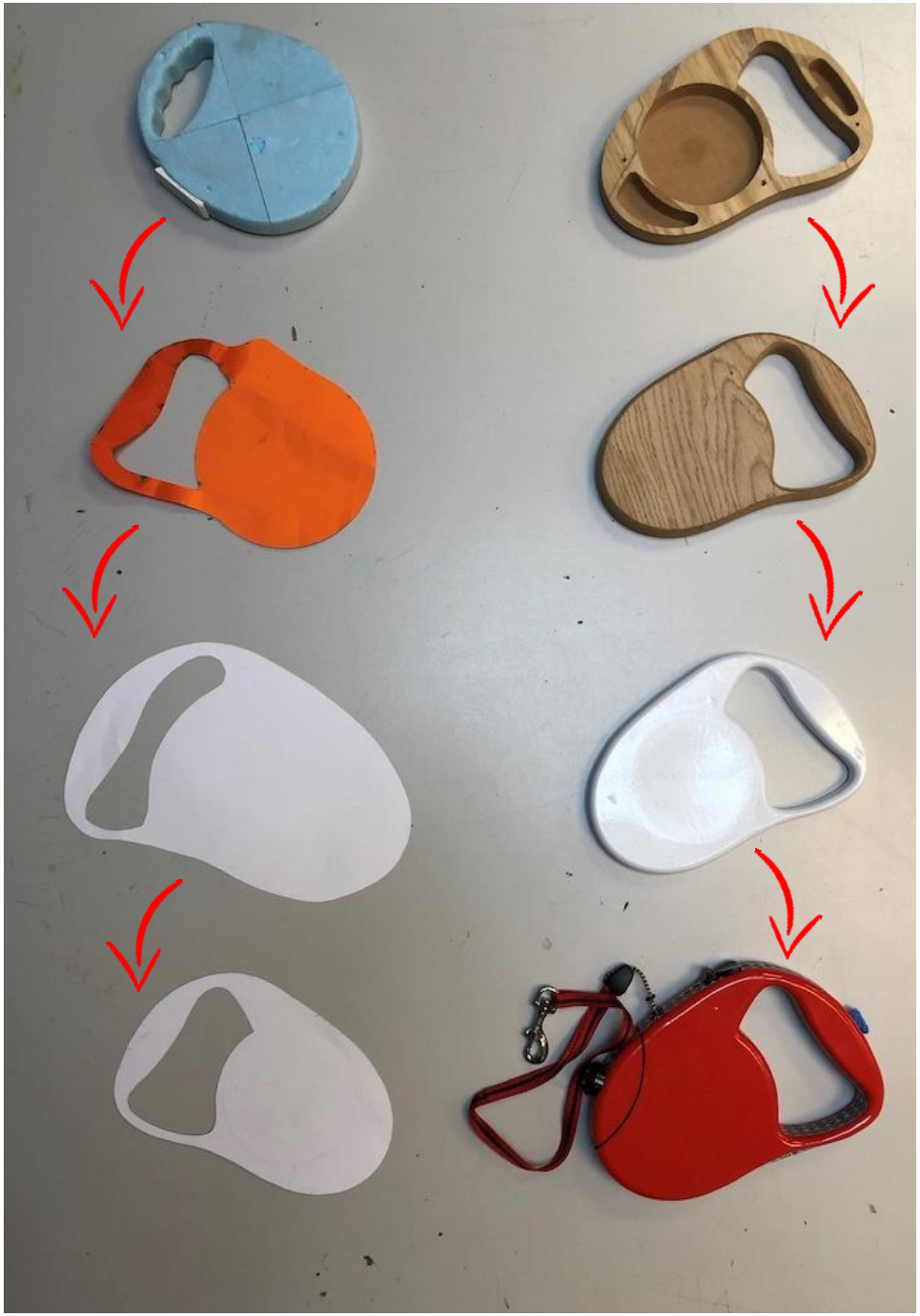
This is the final product of the torch – it turned out much better and more professional than I expected! The magnets I used are very strong and quite perfect for their purpose.

I then painted the inside of the torch to give it a more professional finish. It made the magnets slightly weaker as there was more material between them however they were still very strong

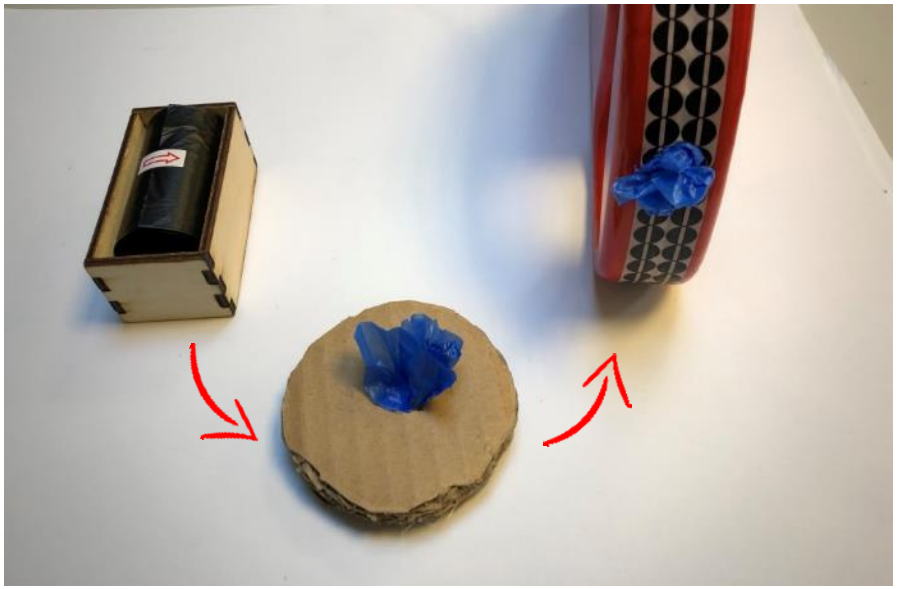
Here is the final prototype

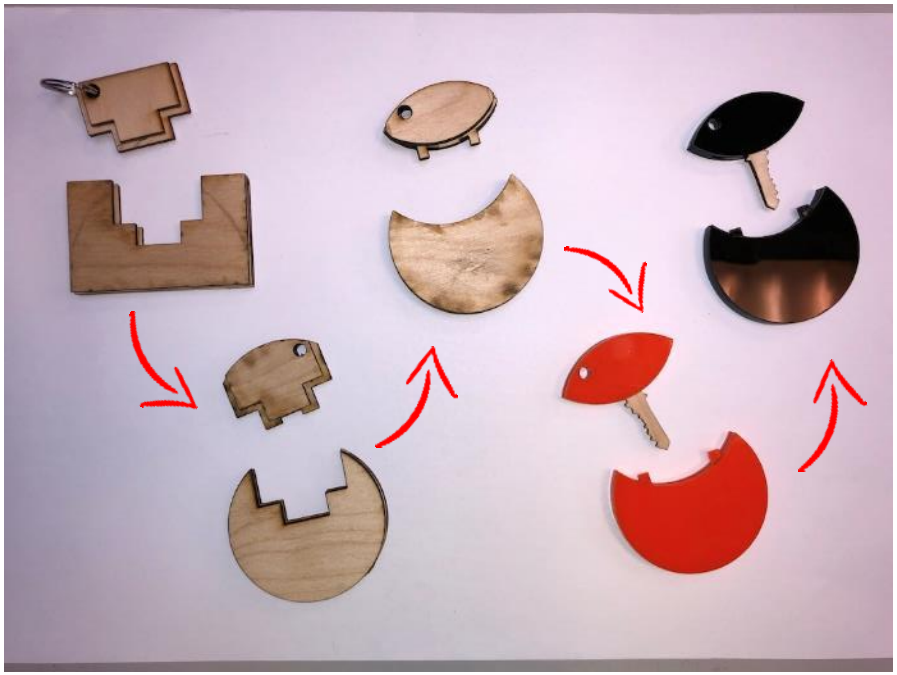
Next Week: Start evaluating the finished prototype

DEVELOPMENT THROUGH THE DESIGN PROCESS



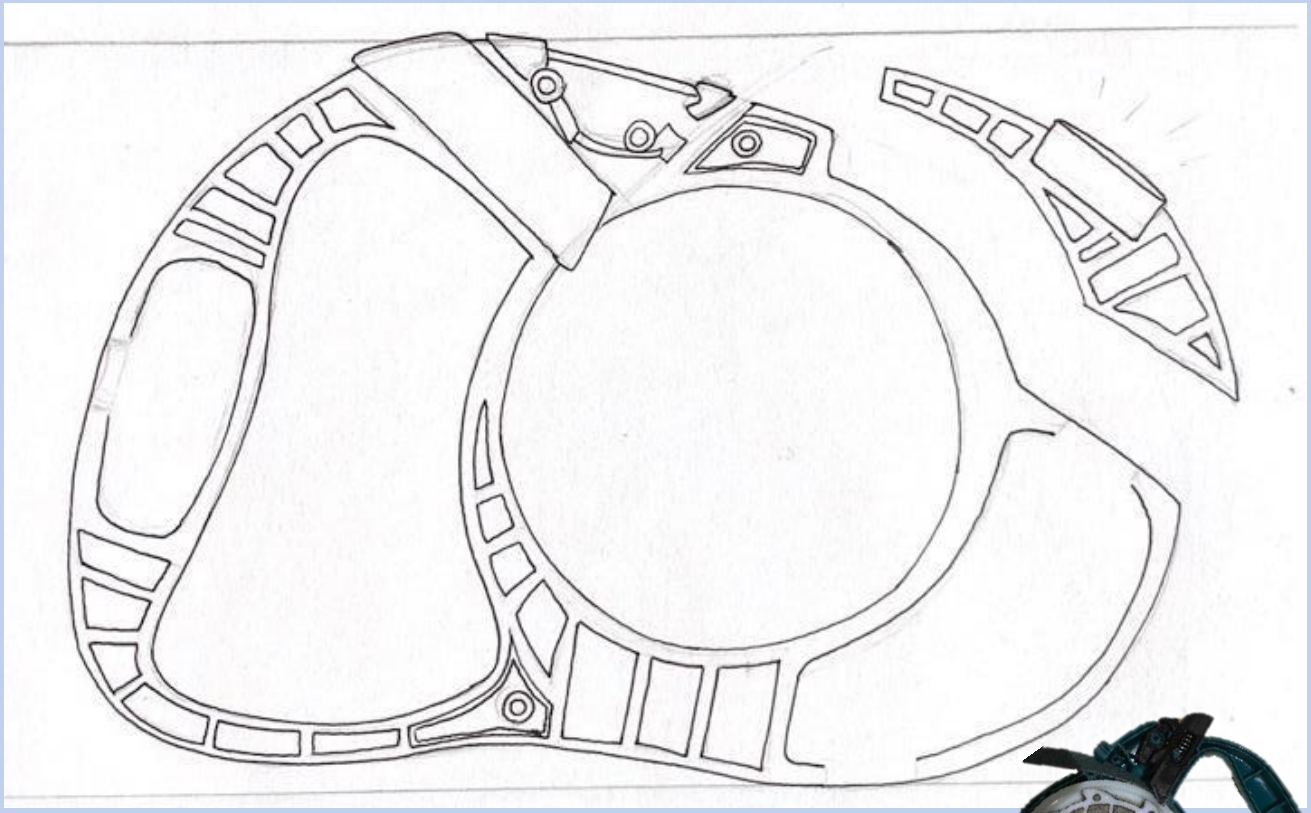
I thought I'd be interesting to create a slide showing various areas of the development of the original ideas.





THE FINAL PRODUCT

INDUSTRIAL/COMMERCIAL PRACTICE

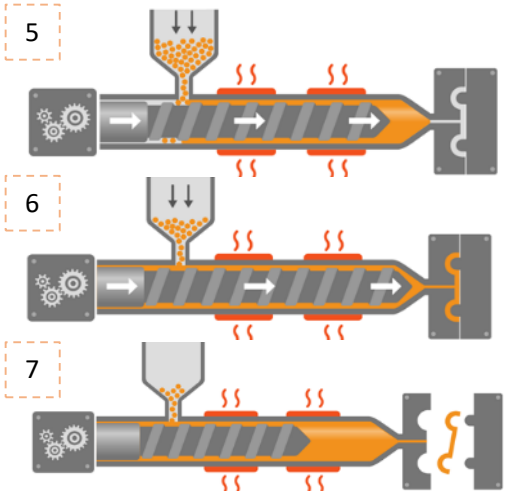


I drew up this sketch of the cross section of the lead as it would be if it were to be commercially made. When drawing it, I kept looking back the the lead that I dismantled to get a better idea of where the webbing could be and how it'd work.

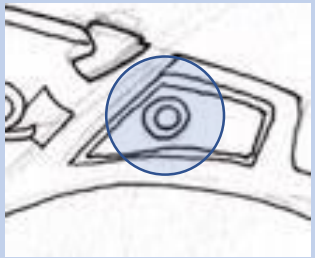
To produce this industrially, you would injection mould the design:

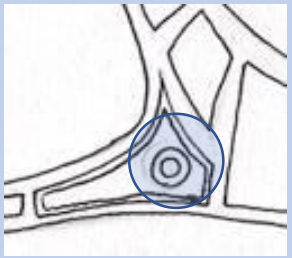
1. The first stage would be to make the mould from chromium steel (a high durability metal that can withstand repeated high pressure injection of plastic)
2. A CNC machine would carve out the details onto two halves of a mould
3. The mould would then be fitted into the machine
4. Plastic granules are heated in the machine to a molten state
5. The molten plastic fills the barrel and a motorised screw pushes the plastic to the mould
6. The screw injects the plastic at pressure into the mould cavity via gates and hot runners
7. The plastic product is allowed to cool before being ejected from the opened mould

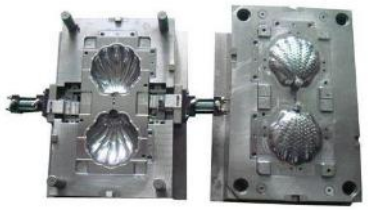
This process would be repeated but for the body of the torch.



As you can see in my sketch there are two points where I've drawn little rings, these are where hidden screws would connect the two halves

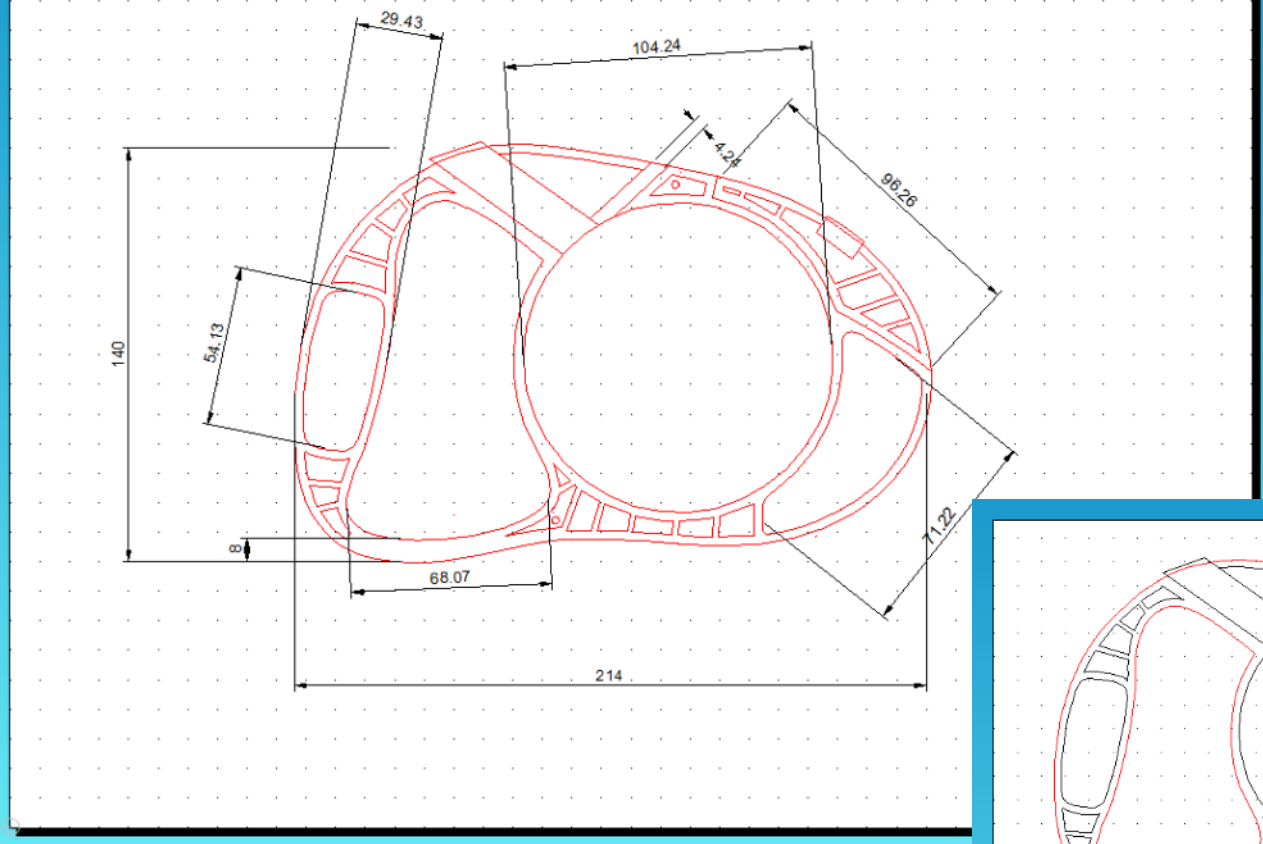


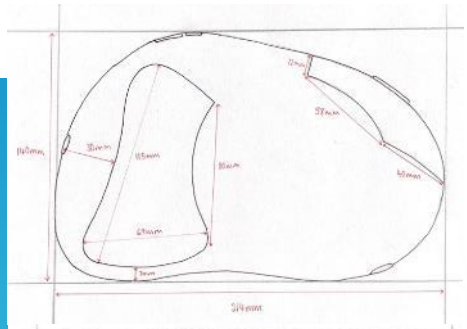


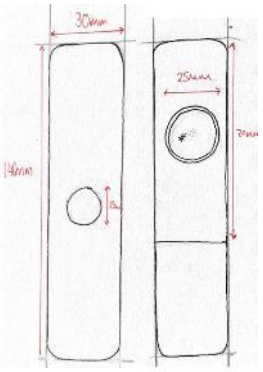


An example of a steel mould

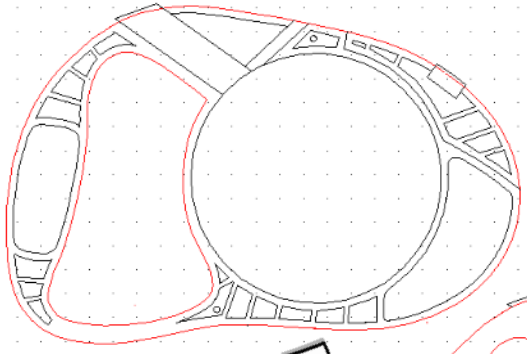
CAD WORK



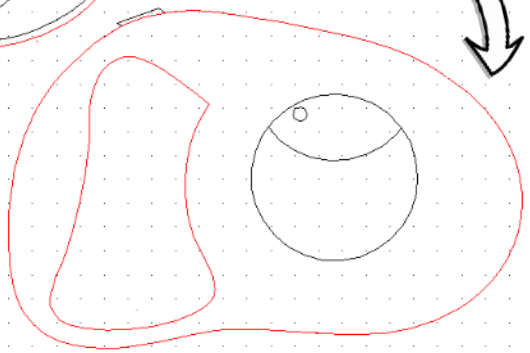




Here are my drawings from my technical spec. I made CAD versions of them on 2D Design

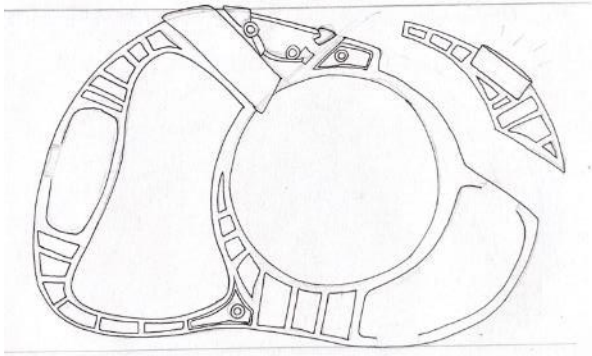


Vertical Cross Section



Product Overview

- Here are my CAD drawings that I would send off to a company to get injection molded
- I just took my previous drawing (right) and used it to create this CAD version (above)

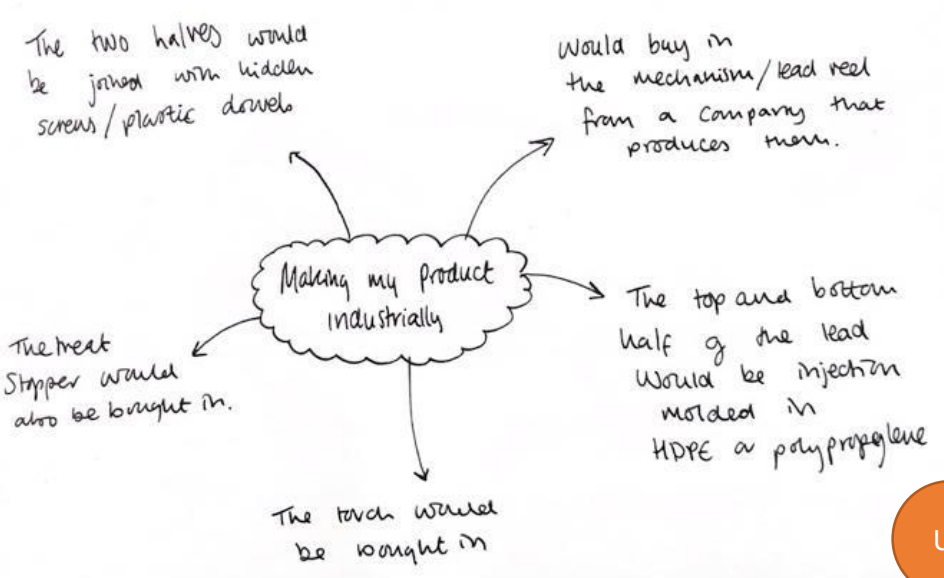


INDUSTRIAL/COMMERCIAL PRACTICE

MATERIAL

Thermosetting Plastic	Thermoplastics
Pros	Pros
More resistant to high temperatures	Highly recyclable
Highly flexible design	Aesthetically-superior finishes
Thick to thin wall capabilities	High-impact resistance
Excellent aesthetic appearance	Remolding/reshaping capabilities
High levels of dimensional stability	Chemical resistant
Cost-effective	Hard crystalline or rubbery surface options
Cons	Eco-friendly manufacturing
Cannot be recycled	Cons
More difficult to surface finish	Generally more expensive than thermosetting plastic
Cannot be remolded or reshaped	Can melt if heated

I would use a thermoplastic like polypropylene or high density polyethylene due to their strength-to-density ratio they would both be very strong and durable whilst still keeping the products weight low.



UF

In this video, Aiden describes how he would spend more on the lead than a regular one due to it having the properties it has

COST

Due to the quality of this product, I aim to have this as a one time purchase dog lead to last a dog's lifetime. This will help to justify the price point in comparison to what's already on the market. Leads online range from £5 (for a very basic small retractable dog lead) to £40 for a large lead for a big strong dog.

I would batch produce the leads and make 10,000 units with the selling cost of £45. This price isn't unreasonable considering the flexi dog lead set (for the lead, treat pot and light) comes to around £38. The initial cost of making the mold for the process will be quite expensive however as I aim to make 10,000 units, and when you split that cost between 10,000 its doesn't dent the profit very much.

Each lead will cost maximum £10 in total to produce (including cost of use of machinery and cost of employees working the machines and cost of certain parts that will be bulk (to lower the overall cost) bought it) so there's a potential profit of £35 per lead and if I sell 10,000 leads there will be a profit of £350,000 leaving the company with enough money to make the leads customisable to different sizes and lengths of lead causing them to be appealing to a larger target audience, increasing the profit even further.

RISK ASSESSMENT OF THE LEAD

Hazard	Risk	Risk controls in place	Level of Risk	Potential adaptations to the design to reduce the risk
Lead Burn	The friction of the lead can cause a rope burn on hands if the lead rope is directly held	Don't hold the bare lead, always hold the handle	Low	Caution the user about the hazard of rope burn if the bare lead is held
Getting tangled in the lead	The lead could be a tripping or tangling hazard	The final lead will have an automatic retractable mechanism to pull the lead back in when the lock is off	Low	Ensure the final product has a fully functioning lead mechanism
Lead Breaking	The lead may snap due to pressure from a dog pulling too hard	The lead in the prototype is one from another lead so should be very suitable	Low	Test different ropes to test the tensile strength an durability of the leads and use the best one appropriate
Small Parts	Choking hazard to young children (0-6)	The lead has three removable parts; the key fob, the bung for the treats and the torch part however, both the key fob and torch are too large to be chocking hazards	Moderate	Make the bung for the treat compartment attached to the lead on some sort of string or hinge so its not removable.
Sharp Edges	Someone may hurt themselves on sharp parts of the lead	The main body of the lead has completely curved edges and covered with plastic so hasn't got sharp edges	Low	The key fob shape could be seen as a little too pointy however from really feeling the edges I don't believe it'd be a hazard to anyone
Heavy Body	If the lead is dropped it and falls on someone or something it may hurt	The prototype has a MDF inside which isn't a heavy wood however its heavier than plastic	Low	The final product will have a hollow inside made completely from plastic with webbing to give it strength
Non toxic coatings	A child/baby may find the lead and put in their mouth (as this is what babies tend to do)	The coating on the prototype is ABS plastic which contains no toxic chemicals	Low	Ensure the final product is also made from non-toxic materials and coatings

F E A S A B I L I T Y S T U D Y – COMPARISION TO EXISTING PRODUCTS

Here I aim to compare my product to existing products which I researched at the beginning of the project

I was unable to find a lead that had a key holder or a key area so I am unable to compare this aspect of my design – this shows it's an innovative idea

My lead doesn't really compare to these bags because the bags can hold anything really however my lead is designed to hold specific things. This doesn't really matter though because most people take the same things on a walk and my lead holds all those things.

The main comparison that can be made between treat boxes and my treat compartment in the lead is that most treat boxes are stand alone from the lead or attached onto the edge. My treat compartment is hidden within the body of the lead. The benefit of having the treat section built in is that you cant forget or lose the treat pot because its part of the whole lead.

Probably all the poo bag holders I've seen on the market are designed to hold a whole reel of bags. My original idea was to stick with this and incorporate a whole reel however during the design process I decided there wasn't enough room to work with if I wanted to keep the lead slim. The clients agreed that having just a few poo bags was a good compromise.

There's little difference between the torch attachment for the flexi lead and the torch on my lead apart from that the flexi torch is stuck on my the user using adhesive whereas mine is built in. my torch Is removable allowing the user to shine the light without having to hold onto the lead, the flexi one cant do this.

F E A S A B I L I T Y S T U D Y – COMPARISION TO EXISTING PRODUCTS

Overall, I've not seen anything for sale on the internet or in pet shops that does everything this lead does. The closest thing I saw was the flexi lead with an attachable pot for bags or treats and a torch that sticks on the side however you have to buy these add-ons separately to the lead whereas my lead is all-in-one.

The lead being all-in-one will have its strengths and weaknesses on the market such as:

- It has everything needed for a walk on it without having to spend more on extras and add-ons.
- The cost may be slightly higher than the average lead but overall it costs less than the average lead with add-ons of a poo bag holder, treat box and a torch.
- People may be put off buying it because of the higher price margin and because they don't need all the compartments.
- Because the add-ons are built in, there's no customisability for example one of my client's dog doesn't like treats on walks but the treat compartment is there and wont serve much purpose.
- If part of the lead breaks, the whole thing would need replacing whereas on another lead if the poo bag holder broke you'd just replace that
- The lead is built with the aim of lasting a lifetime for the dog, meaning it will be good quality, durable and strong so parts won't break or need replacing
- If the user wants to take anything with them that's not treats, bags, a key or a torch then they'd have to carry a bag with it in as the lead doesn't cater for carrying other items

A

B

C

D

E

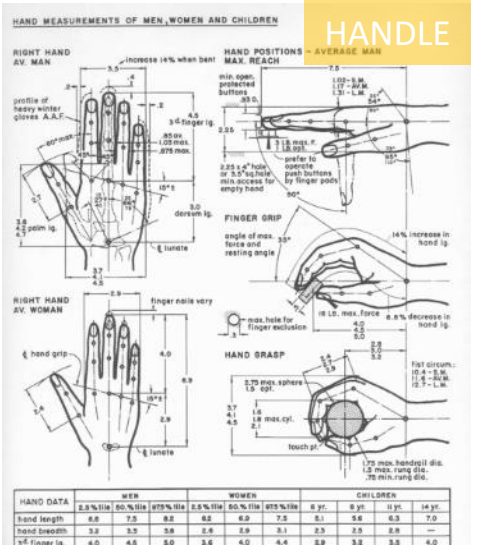
Test	A	B	C	D	E (my lead)
More than one function	✓	✗	✗	✓	✓
Holds treats	✓	✓	✗	✓	✓
Holds poo bags	✓	✗	✗	✓	✓
Has a light	✗	✗	✓	✗	✓
Stores any item	✗	✗	✗	✓	✗
Easy to carry/hold	✓	✗	✓	✓	✓
Affordable	✗	✓	✗	✗	✗
Waterproof	✓	✗	✓	✗	✓
Functions as a lead	✗	✗	✗	✗	✓

The table above shows a few tests a potential client would go through before purchasing a dog lead or walk accessories. Overall E (my lead) got the most ticks however this was to be expected as I couldn't find anything like it on the market. A close contender was the bag that one of my original clients has. It fits almost all of the criteria however its main downfall was that it doesn't function as a lead. The product I made does almost everything (it cant store any item) that the bag whilst also being a functioning dog lead.

F E A S A B I L I T Y S T U D Y – TESTING BY PRIMARY USERS

I met with Aiden for the final time to show him the prototype, he was very impressed and shocked to see the idea we'd come up with together brought to life. Aiden really liked the final product, however he had a few adaptations that she believed would make this prototype ready to go on the market.

HANDLE



Aiden commented on the handle and how it is slightly uncomfortable to hold. I think this is because I focused on the ergonomics of the handle from the front but didn't curve the edge enough with the router causing the handle to be quite thick and slightly uncomfortable to hold.

Going forward I aim to look into hand ergonomics and really look into making the handle more comfortable as this is a crucial part of the lead.

In the second video, Aiden mentions the shape of the handle and how its impractical as you cant hold the middle of the handle and reach the buttons.

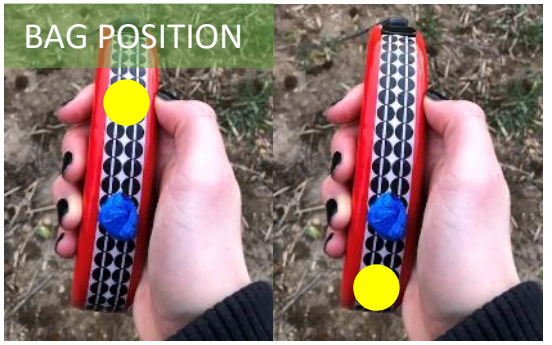
Going forward I will ensure the buttons are closer to the handle.

SIZE

Here is my lead compared to both the leads I took apart in the design process. As you can see my lead is much bigger than the red one and slightly bigger than the green one.

Going forward I will definitely adapt the design to make it smaller.

BAG POSITION



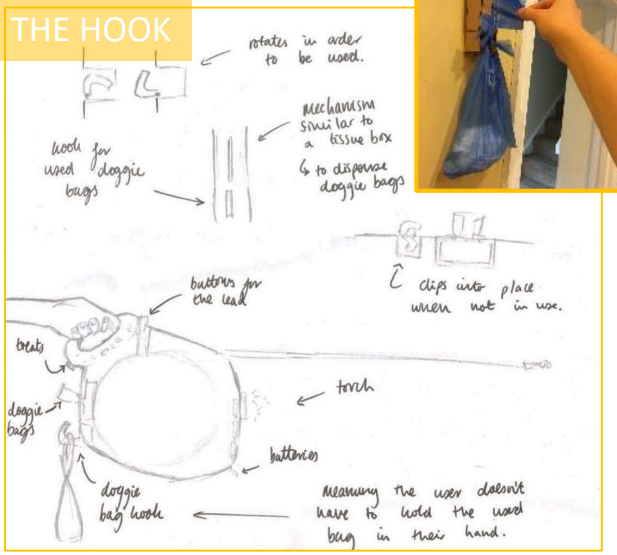
Aiden said he doesn't really like the poo bags coming out of the middle of the handle area as you have to move your hand out the way to grab them which makes sense.

Going forward, in the next development I will move the poo bag area lower or higher (most likely lower otherwise it'll be in the way of the buttons and mechanism)

F E A S A B I L I T Y S T U D Y – TESTING BY PRIMARY USERS

I also met with Prew again to show her the final prototype and get her opinion and ideas of any adaptations needed to finalise this product so its ready to be on the market.

THE HOOK



Prew commented on the potential of a hook for used bags to go on. I actually did come up with an idea for a hook however I took it no further than this as I focused on other aspects of the design

Going forward I will definitely look into the hook idea again and incorporate it into the final design

SIZE

Prew, like Aiden, mentioned the size of the lead, it is rather large in comparison to the length of the lead and the size of the lead mechanism inside.

Going forward I will look into making the lead much smaller

CUSTOMISABILITY

Prew also mentioned the idea of customiSability which I totally agree with, I believe it will not only make the product more appropriate for the user however it can also mean that the selling cost of the product can be higher as people are buying a much more personal product

She also described the potential for having different colours which is something I'd definitely look into. I would do some market research to get a feel for what a larger group of people's opinion is on certain designs with different patterns and colours before hand though.

FEASABILITY STUDY

UF

DOES IT MEET USER NEEDS

I simplified the original user needs table from the beginning of the design process. The 'P' stands for Prew, one of my major clients and the 'A' stands for Aiden, my other main client.

Needs	Comments about the user's needs	Does it meet the user's needs	Comparison to the final prototype
Lead	P: The lead extends to 5m	n/a	Because my prototype isn't a fully functioning lead (the mechanism doesn't work so the lead only extends to a few metres) its difficult to answer whether it meets this requirement. My prototype doesn't meet it however the finished product definitely would.
	A: The lead extends to up to 8m	n/a	
Poo Bags	P: Holds one or two bags (just incase)	✓	My lead holds one poo bag comfortably and two poo bags if you squeeze them in.
	A: Holds one poo bag	✓	
Treats	P: Holds 2-3 for one walk or 4-10 (a couple walks worth)	✓	The lead holds around 10 of the small treats I tested it with
	A: Holds one for when they get back home	✓	
Torch	P: Ideal to have a torch that's not bulky or heavy	✓	The lead has a torch built into the front of it, it adds a slight weight to the front however it doesn't make the lead bulky or large at all.
	A: Isn't fussed about a torch	n/a	
Key	P: A key isn't a necessity but it'd be handy	✓	There's a key fob holder on the edge of the lead, it holds just the one key. It does stick out of the side of the lead quite a bit however the final product would have a thinner key fob design that'd be more subtle on the edge of the body.
	A: Similar opinion to Prew about the key	✓	

USER FEEDBACK

Overall this is what my clients had to say about the final prototype

Aiden really liked the design and if the handle was made more comfortable and the body was made smaller, he would purchase this product

Prew also loved the product, she really wanted a little hook for a used bag to be included in the design however this would be a quick fix and simple to add into my design. She also agreed with Aiden about the size. She also wanted more customizability.

FEASABILITY STUDY

Here I test the feasabilty of each section of the lead with physical tests

Feasibility of the treat compartment

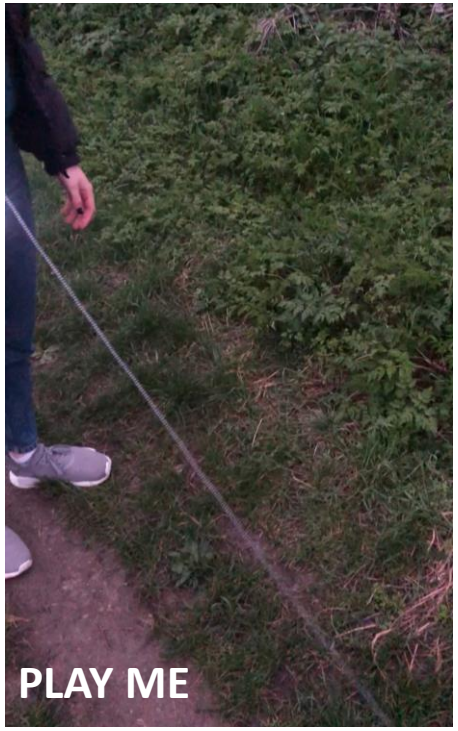
PHYSICAL TESTING

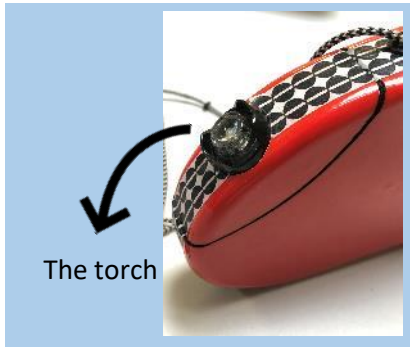
Here I demonstrate the treat compartment in use, to get treats out you have to take out the plug and then shake the lead to make the treats to fall out

Feasibility of the torch

PHYSICAL TESTING

This video shows the torch in action – its surprisingly bright and serves its purpose very well





Feasibility of the poo bag compartment

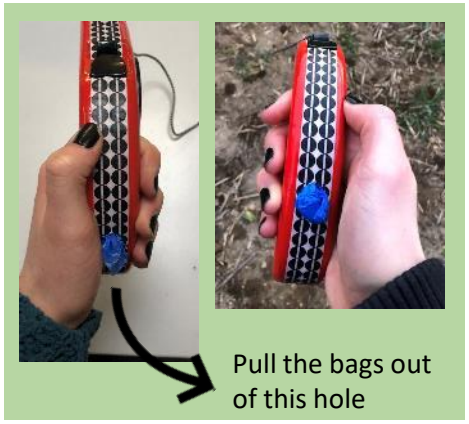
PHYSICAL TESTING

The poo bag section holds one or two bags. To remove them, you simply pull the end of it until it comes all the way out – here is a video of it in use

Feasibility of the key holder

PHYSICAL TESTING

This video shows the key fob in use, it is a little tricky to pull out sometimes however the final product won't be made of laser cut 3mm acrylic, it will be made from a thinner plastic that's easier to remove.



THE FINAL PRODUCT IN USE

This video shows the lead in use, is it a little fragile as the mechanism inside doesn't properly work as the buttons don’t function so the lead can only come out a certain amount and wont go back in smoothly

Conclusions from Analysis of Feasibility

Overall, my clients had a lot to say about my design, both good and bad. The main thing was that they were very impressed with the final prototype as it met all of their individual needs for an all-in-one dog lead. However there were a few things they wanted to be adapted before the lead was ready to be sent off to be manufactured and sold. Going forward, I will ensure I meet all these points before going to a manufacturer.

These needs include:

- Changing the handle shape to make the buttons more easily accessible and to make the handle more ergonomic and comfortable to hold
- Coming up with a way to have different sizes and different lengths of lead for different size dogs
- Potentially moving the hole for the poo bags as it directly behind where the user will hold the handle meaning they'd have to move their hand to access the bags
- Possibly adding a little hook to place used bags on so the user doesn't have to hold onto it
- Think about different colours or designs
- Think about customisablity such as only having a poo bag area or just having a torch to make it more personalized and suitable for the user so theyre not carrying something around with components they don't need.

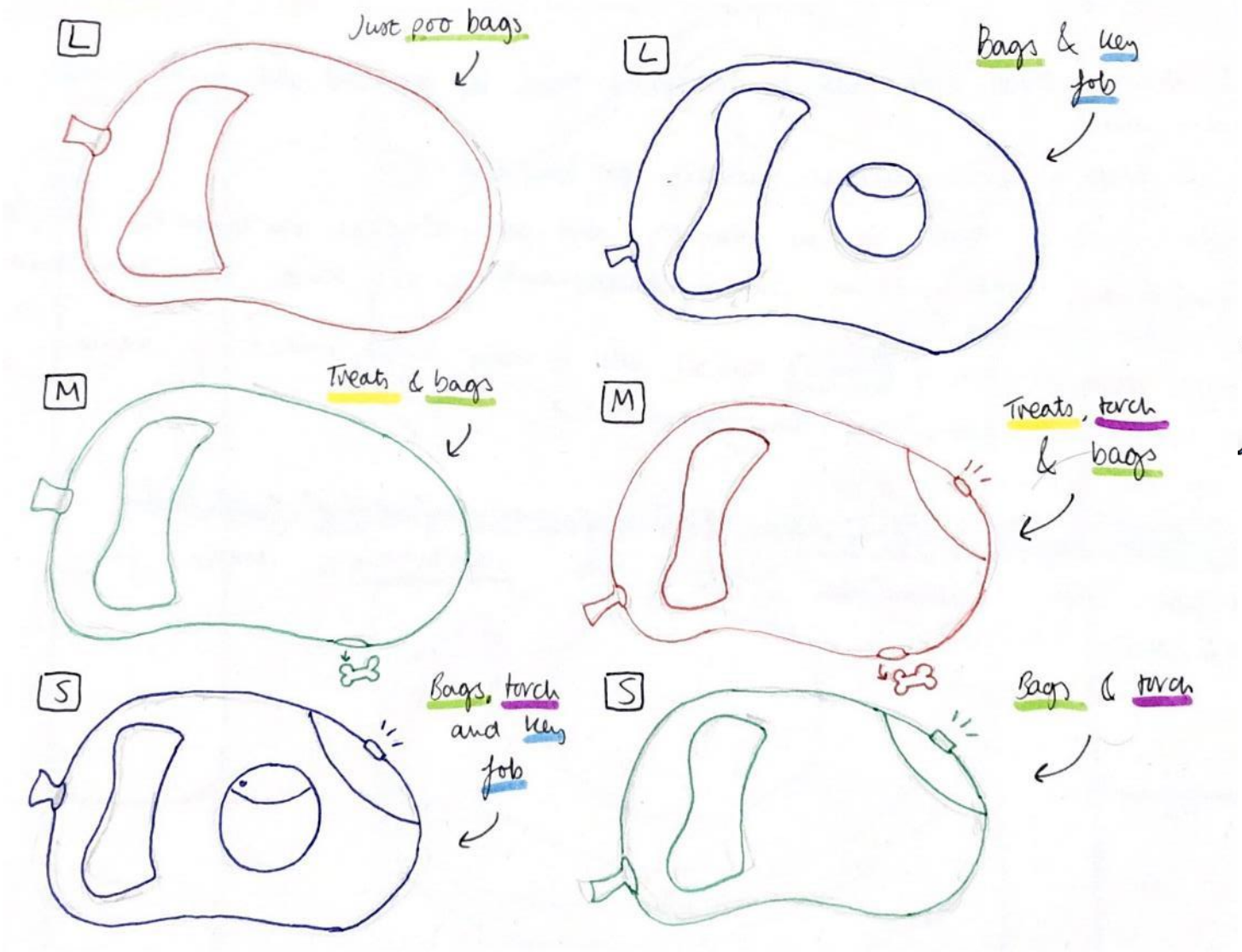
CRITICAL EVALUATION

I gathered together all the information I got from the feasibility study into this table of strengths and weaknesses of the prototype from all angles including from a business and marketing aspect, from a design and practicality aspect and also from a the stakeholders point of view.

STRENGTHS	WEEKNESSES
The lead includes all of the compartments and ideas that my clients and stakeholders wanted. I believe the lead holds everything the average dog walker may need on a walk which was the aim.	The current prototype is very large compared to the size of the actual lead mechanism inside it and the length of the lead. It's the same size as a large lead but with a small lead's mechanism inside. I will look into using a mechanism that has a long lead inside a small reel or just adapt the design slightly to make it fit a large lead reel inside.
The lead is very bright and eye catching. It stands out from other leads due to the funky tape around the edge, due to this it is likely to do better on the market than a more plain design.	Some components may be unnecessary for certain people which would be irritating as they'd have to carry around a lead with things they don't need. To solve this issue I could make it customizable and have a couple different designs to pick from e.g. a lead with just bags and a torch or one with just treats and a key.
The position of the light on the lead is ideal as when the lead it held, the torch points directly forward making the path ahead very visible	The prototype's lead rope isn't very strong however this is due to it just being glued on rather than having a functioning mechanism inside so the final thing wont have this issue as the mechanism will work and the rope will be strong and safe.
The treat compartment is able to hold multiple treats meaning the user wont have to refill the treat compartment as much	The lead doesn't include an area to hold a poo bag, this was an initial idea I had but didn't carry it forward. My client, Prew, really liked this idea and would like to see it in the final design. In the future I will incorporate this idea into my design.
The final lead will be very strong due to the way it'll be injection molded with webs in the hollow areas for strength.	The lead also could have a place to hold a tennis ball or to hold a water bottle or bowl for the dog on a long walk. This would give further customisable features to the design and would make it more appealing to customers.
The final production cost will be quite low while the cost to the customer can be high (3/4 times the cost of production) causing the profit to be high.	The shape of the lead is quite basic and common in dog leads. By looking into different variations of the shape I would make the lead look as innovative as it is.
The final product wont be heavier much than a regular lead due to the materials used and the way it will be made	The magnets on the torch aren't very strong, for the final design I will most likely use stronger magnets or have a clip design as previously mentioned in on of my early design pages

CRITICAL EVALUATION – THE FUTURE

I drew up some ideas of customizability and sizes for my design. I believe if I sell my product as a customisable lead it will do much better on the market. In the designs I also made the poo bag compartment opening lower as Aiden mentioned. To make this easily available to the user, I would have a website in which they could pick the size of their dog and their requirements and their perfect lead would be shown to them. I would also include a little hook for a used bag.



I could start looking to customisability of the lead with different sizes and lead lengths to make it more suited to a larger target audience as in the design process I only looked at one size.

To keep the design the same throughout I would look into stronger thinner ropes for the lead to ensure the lead mechanism doesn't take up loads of room in the smaller leads.

BRANDING AND MARKETING

I came up with the name ‘Dwalk’ which is a play on dog and walk. I then wanted to come up with a tag line, my initial idea was ‘dog walking mastered’ which I quite liked as it made ‘dwalk’ make more sense however during the process of making the logo I came up with ‘dwalk the walk’ which is much more catchy and although it doesn’t explain what dwalk means as well as my first idea, I believe a catching tagline is an essential for a brand.

DWALK

Dwalk
Dog Walking Mastered

DWALK
Dog Walking Mastered

Dwalk

dwalk

DWALK

Here are a few of the logo ideas I came up with, I really liked the dog image in the 2nd, 3rd and 4th idea so I decided to stick with it. I like it because its quite a simple and a good representation of what I’d like my brand to be. I also like this dog image as it can form the ’A’ of ‘dwalk’. I thought the packaging of the lead could have the whole logo on with the tagline and then the actual lead could just have the dog logo on the key fob, for example, or the side of the lead.

DWALK
Dwalk the Walk

The final logo