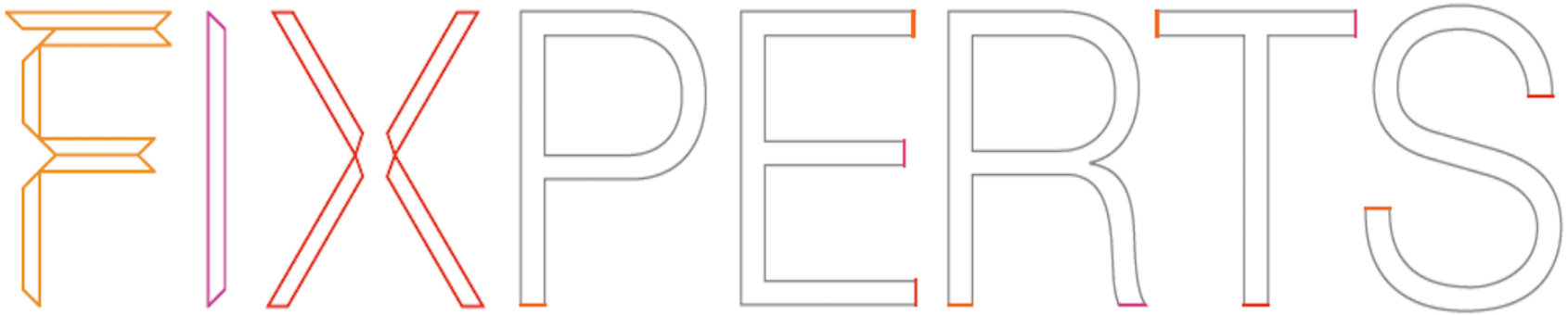
FIX Team 1

PD4115



FIX Team Members

Online Introduction

Adam Finnerty

Student

"Product Design and Technology Student with an interest in Photography and the future."

Anthony Carey

Student

"Product Design & Technology Student with a particular passion for Graphic design, emerging technologies, film and visual storytelling."

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PD4115–Fixperts – Team 1

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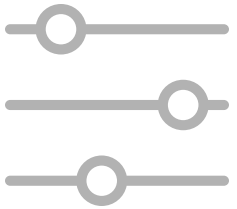

FINAL FIX

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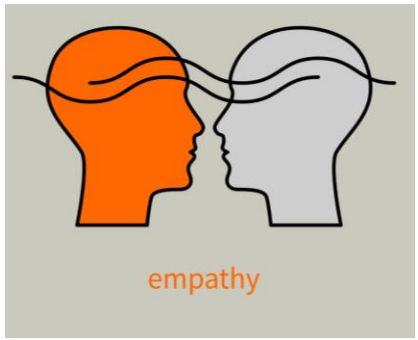
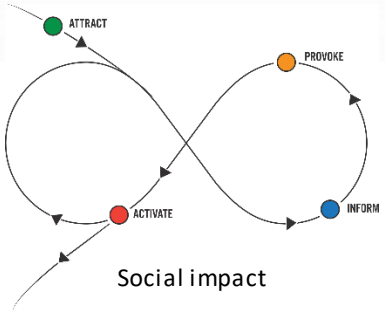
ANALYSIS

ANALYSIS OF BRIEF

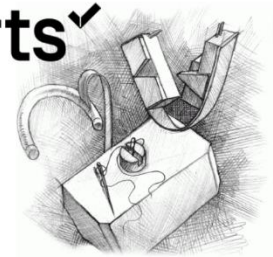




Social impact

PD41115– Fixperts

Fixperts



Project Background & Information

Sometimes as designers we forget to look at the potential in small opportunities to impact big change on people's lives. Fundamentally designers are problem solvers and the Fixperts project challenges you to create ingenious solutions to everyday problems for a real person.

During Week 0 you and your project partner are required to look around you and find a person (The Fix Partner) who has a real problem that impacts on their ability to do their everyday tasks. The problem should be simple; it should make something better; it should repair something that is 'broken'; it should change how we behave.

Your team (or the linking team mate), must spend time with the Fix Partner to understand their needs so this is where your Design Research skills come in. Once the need is identified you will work through a series of build, test, analyse phases to refine the design solution.

When your team have developed a workable fix you will build it using the resources on campus during Wk3.

As well as documenting through traditional design means (sketching, model-making, graphics etc.) your team must document the process through video recording all stages and editing it into a final movie for submission.
DELIVERABLES: Final Process Book & Fixpert Film (max 3 minutes)

Project Objectives / Learning Outcomes

- *Respond to real world problems with a thorough user-driven design process.*
- *To introduce tools, techniques and methods applicable to innovation and effective problem solving.*
- *To advance practical design skills from sketching through to prototyping and functioning product builds.*
- *To explore and implement complex real-world research techniques to gather information, and build user understanding.*
- *To allow students to integrate all stages of the design process in the realisation of a workable solution.*
- *To introduce students to concepts around Universal Design, Design for Social Impact and Design for Inclusion.*
- *To develop new skills in storytelling and videography.*

Assessment Criteria

1. Evidence of expansive research
2. Evidence of exploration & experimentation
3. Evidence of effective collaboration with Fix Partner
4. Effective team work.
5. Final functional Fix output
6. Professional outputs
7. Communication & Documentation of Process

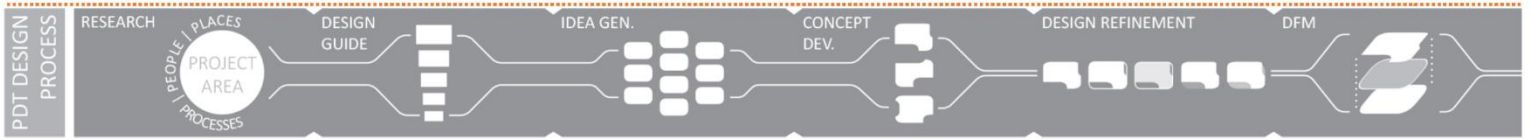
pdt PROJECT DESIGN and TECHNOLOGY

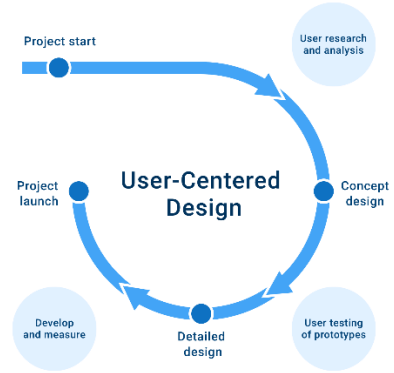
100% of module

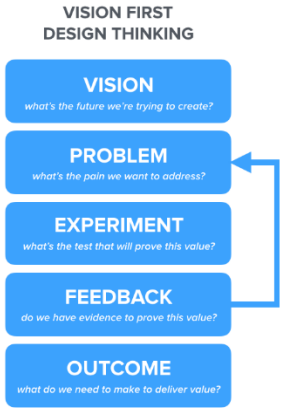
Duration 4 weeks

Project Details

Project Stage	Stage Details	Deadline
Introduction 10%	Identify a number of fix partners and fix opportunities. Narrow down this list to one Fix Partner. Compile a research plan that outlines the research methods you intend to use to build an understanding of your partner. Your plan should include a timeline for carrying out your research. Create a 30 second video introducing your fix partner. **Deliverable** Introduction to your Fix Partner & Research Plan.	**Week 0 & Week 1**
Conversation 25%	Spend time with your Fix Partner to identify true needs. Observe, probe, question, experience. Identify one Fix and explain your choice. Document the research process through video and visual reports. **Deliverable** Research Pack (visual document) containing research methods used, key findings and observations.	
Prototyping 25%	Generate as many solutions to the fix as possible. Use both 2D and 3D sketching to explore these ideas. Remember building early and often is key in this project, use whatever materials you have to hand to prototype. Return to you Fix Partner as regularly as you can to get feedback on your ideas. **Deliverable** A 'wall' of sketches and ideas for review. Choose your final Fix.	**Week 2**
Delivering 25%	You must conduct at least two rounds of 'Build, Test, Tweak' for your Fix. Once you have refined your Fix with feedback from your Fix Partner create a Build Plan outlining how you will create the final prototype during Week 4. Prepare the storyboard for the video, compiling the content to date and finalising the narrative. **Deliverable** Working prototypes, evidence of testing & Build Plan.	**Week 3**
Final Fix ON CAMPUS WEEK 25%	Build your final prototype in the PDT workshop and return to your Fix Partner to deliver your final Fix (if possible). Document the engagement and collate your video into a short engaging story (no longer than 3 minutes). **Deliverable** Fixperts Film (Mon 26th Oct.) & Project Process Book (Fri 23rd Oct.).	**Week 4**





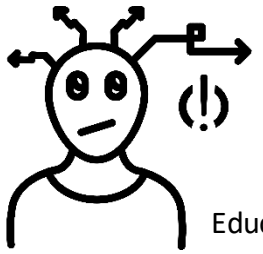


ANALYSIS

POSSIBLE FIX PARTNERS

Fix Partners & Fix Opportunities

Identification of possible people suitable for a FIX partnership and FIX opportunity areas



Opportunities

Education, Elderly home care, Hygiene, Disease prevention, Covid 19

Fix Partner Video

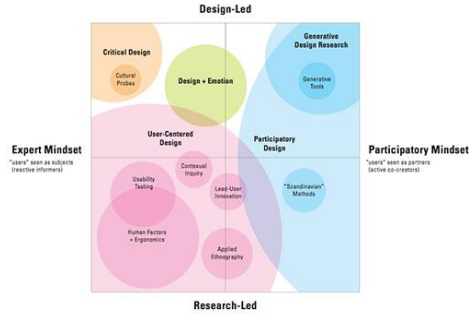
Initial video introduction to chosen FIX partner

Users

Elderly, Older patients, Pediatrics, Relatives, Family Members, Disabled people, Hard of hearing, Blindness

Possible Research Methods

Ethnographic, Fly on the wall, Observation, Behavioral, Negative Brainstorming, Empathic prototyping, Feedback-led prototyping, human centered approach.



Fix Partners & Fix Opportunities

Identification of possible people suitable for a FIX partnership and FIX opportunity areas

Research Topics and Ideas

Home care and Assistance.

- Reaching above head height to grab items from shelves – safety is an issue, grabbing the item can also be problematic
- Tactile grip enhancers – something that makes gripping onto something easier and more stimulating to the nerves in the hand
- Confusion in communication due to multiple caregivers caring for one client

Carpel tunnel/ Ergonomic issues

- Specific mouse design to change the orientation of the hand
- Wrist rests that can be moved from a desktop keyboard to be used with a laptop etc
- Promoting good posture (and proper desk set up) for working from home

Covid -19 related

- Timers for handwashing – An interesting thing, something to gamify handwashing and personal hygiene for younger humans
- Prevent glasses from fogging while wearing a face covering
- What to do with a face covering when you're not wearing it
- Reducing waste from sanitizing things in a gym
- How can things be sanitized more quickly/ effectively
- Things are often wet after sanitizing – can this be helped?

Younger Humans dexterity/ spatial sense

- How can a cup be made to not spill when it is held?
- Not being able to brush teeth properly because toothbrush is an adult one

FIX Partner

Elderly Person – Anthony's Grandfather

ANALYSIS

IDENTIFIED FIX PARTNER – WORKING WITH OUR FIX PARTNER

Research Pack Update: Week 1

Our Fix-partner is Anthony's Grandfather who has vascular dementia.

Our main methods of gathering information will be through conversation/ interviews with his carers and video footage from a face to face meeting. We will also be using the internet to seek out anything that may be relevant to the problem (detailed below) we are trying to solve to make our partner more comfortable.

Just before the feedback session yesterday, Anthony was in contact with our Fix-partner to gain some insight and to arrange a time to meet face to face.

Through the phone call we learned that our partner faces some issues around sitting upright in a chair. In our feedback session this was the idea that we decided we would try to focus on, pending a face to face with our Fix Partner.

Anthony is meeting face to face with our partner today and we will be working from there. It was discussed yesterday that for most of the project we will be empathetically testing our prototypes on ourselves for logistical reasons and to reduce the stress we put on our Fix-partner.

ANALYSIS

SPECIFIED RESEARCH (DEMENTIA)

Research Pack: Dementia findings type-up

Definition of dementia

Dementia is defined as a disease that " affect the parts of the brain which are normally used for learning, memory, decision- making and language" (https://www.hse.ie/eng/services/list/4/olderpeople/dementia/about-dementia/what-is-dementia/)

It is a neurological disease that affects everyone around the world.

"The current global prevalence of dementia is estimated to be 7% in individuals above the age of 65 years" (Liou , Wei- Chin et al 1)

Signs and symptoms of Dementia

According to the HSE dementia symptoms can be hard to recognise on some patients.

"Common symptoms of dementia may include memory loss, difficulties with thinking and carrying out everyday tasks, problem solving or language and changes in mood and behaviour" (https://www.hse.ie/eng/services/list/4/olderpeople/dementia/about-dementia/symptoms-and-signs/#:~:text=Common%20symptoms%20of%20dementia%20may,changes%20in%20mood%20and%20behaviour.)

There is a false misconception that these symptoms are only caused by old age.

An early diagnosis helps the people affected have time to adapt to their new lifestyle of living with dementia.

According to the HSE in Ireland there is an estimate of 55,000 people who have been diagnosed with dementia.

Future projections predict that this number will continuously rise within Ireland

In Ireland women are more prone to this disease than men.

Alzheimer is the most common cause of dementia.

Affects of dementia

Psychological symptoms of the disease are visible with behavioural changes , changes in personality and mood changes which contributes to anxiety and depression.

Dementia affects motor skills

Motor skills becomes impaired when someone is diagnosed with dementia

"The motor symptoms of dementia include slowed movement, decreased body tone, decreased spontaneous activity" (Liou , Wei- Chin et al 2)

" different motor abilities derive from the coordinated activity of varied motor control systems located throughout the brain and spinal cord" (Buchman, Aron and Bennett, David, 2)

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"Motor impairment can include reduced gait speed, loss of muscles strength and bulk, and reduced balance" (Buchman, Aron and Bennett, David, 3)

There is also a decline in cognitive function

Sever cases of dementia causes greater disability in the hand

"Since the 1990s, numerous studies have demonstrated that motor dexterity declines with age, beginning in middle age and deteriorating more rapidly after age of 65 years"(Liou , Wei- Chin et al 4)

Spatial awareness and coordination

Dementia affects the patients visuospatial ability – they loose the ability to fully comprehend what we see around us

A person with dementia are more prone to risks such as the inability to be familiar with environments that were once familiar to them, daily tasks such as dressing one self also becomes an almost impossible task for the individual in question.

A person with dementia looses the ability to recognise faces, incapable of getting behind the wheel as they are more prone to get lost.

The person in question starts to struggle while processing images and general and they are having difficulties determining their spatial relationships

" Seniors who have dementia are at greater risk of falling or receiving head injuries due to misjudging the safety of activities" (https://www.homecareassistancemassachusetts.com/what-are-the-reasons-for-visual-spatial-difficulty-related-to-dementia/)

A person with dementia is in-capable of following instructions

Use of colours

" the use of various colors, particularly in the environment for those living with dementia, can be helpful in providing quality care" (https://www.theadvocate.com/baton_rouge/entertainment_life/health_fitness/article_922b136a-84d5-11e6-8c00-fbc8ac72b472.html#:~:text=Color%20preferences%20for%20individuals%20with,shades%20of%20red%20or%20orange.)

The preferential colours for a patient is red, blue and green

Red increase brain wave activity, seems to decrease the size of a room, and increase the perceived temperature of the room" (https://www.theadvocate.com/baton_rouge/entertainment_life/health_fitness/article_922b136

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ANALYSIS

SPECIFIED RESEARCH (DEMENTIA)

Research Pack: Dementia findings type-up

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Designing with dementia in mind

"Design can offer novel ways of complementing existing care approaches to empower people with dementia in everyday social situation" (https://cordis.europa.eu/project/id/691001)

Mindful design is the best approach

Design will help bring about a new sense of self empowerment and control to the individual suffering with dementia

People with dementia still live in their own homes and this must be taken into account

They are surrounded by familiar territory so this is something that the designer must keep in mind

The design needs to be accessible for all

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"Designing for People with Dementia: designing for mindful self-empowerment and social engagement", https://cordis.europa.eu/project/id/691001 Accessed on

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ANALYSIS

FIRST VISIT – INITIAL OBSERVATIONS

F Our Fix Problem - Initial Visit

Dementia affects his motor control & spatial awareness. He currently uses two trays which allow him to eat meals in bed and on his favourite sofa.

These trays have their flaws and also remind him of the hospital. To make his quality of life better and to help his caregivers, we are going to fix the problems they have identified with the existing tray.

Our tray will need to be bigger, more stable and suitable for his bed and sofa and most importantly add an element of familiarity so it doesn't remind him of a hospital.

ANALYSIS

FIRST VISIT – INITIAL OBSERVATIONS

Caregiver Interviews / Video Analysis -
Initial visit review

Observations

Care-giver had difficulty moving meal trays around. There was not a lot of room on the tray for cups and plates. The 'portable' tray had a slick surface and didn't have a cupholder.

Problems

Care-giver had to strain to move the tray. Cups and plates were often nocked over causing mess and discomfort. Items on the tray would move around on the surface when jostled.

Needs

A more easily moved tray that has a larger surface, which is non-slip to avoid things sliding around on the surface.

Our vision

1. Research, Observations & Findings from first initial visit.

We needed to know what problems we were trying to solve and how we might go about solving them in the best way. We did this through a visit to our fix partner and his carers. During the visit we recorded some video clips and had good conversations.

Issues we needed to solve

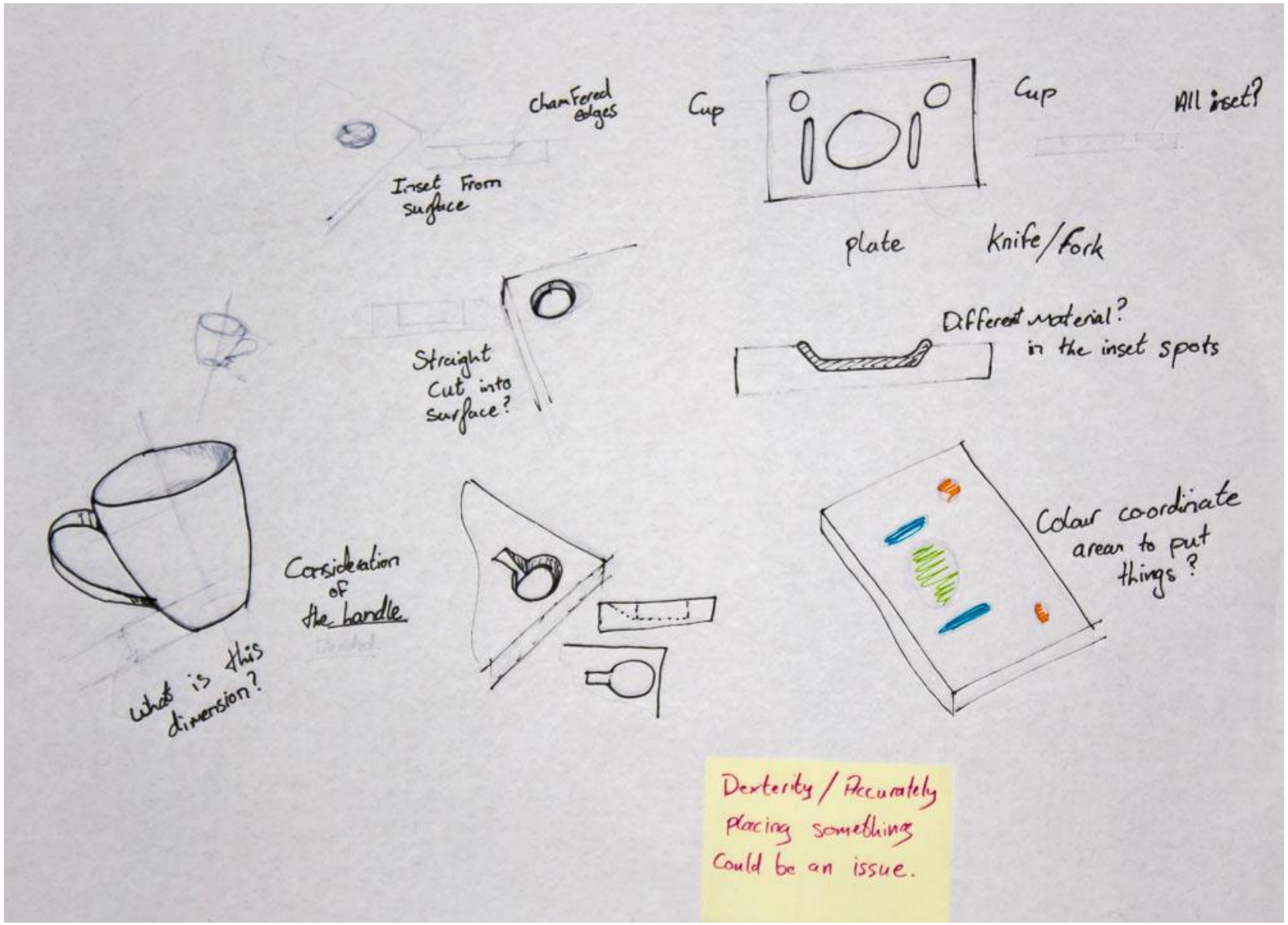
- Stability
- Height Adjustability
- Shear/ Slippery surface
- Places to hold onto the tray (carer)
- Arm support (user)
- Easy to clean (Hygiene)
- Surface size
- Multiple use scenarios : chair/ wheelchair/ bed (Modularity)

Dementia Requirements

- Spatial awareness (particularly colour)
- Personalisation
- Size requirements

IDEA GENERATION & CONCEPT DEVELOPMENT

DESIGN CRITERIA – POSSIBLE TRAY DESIGNS



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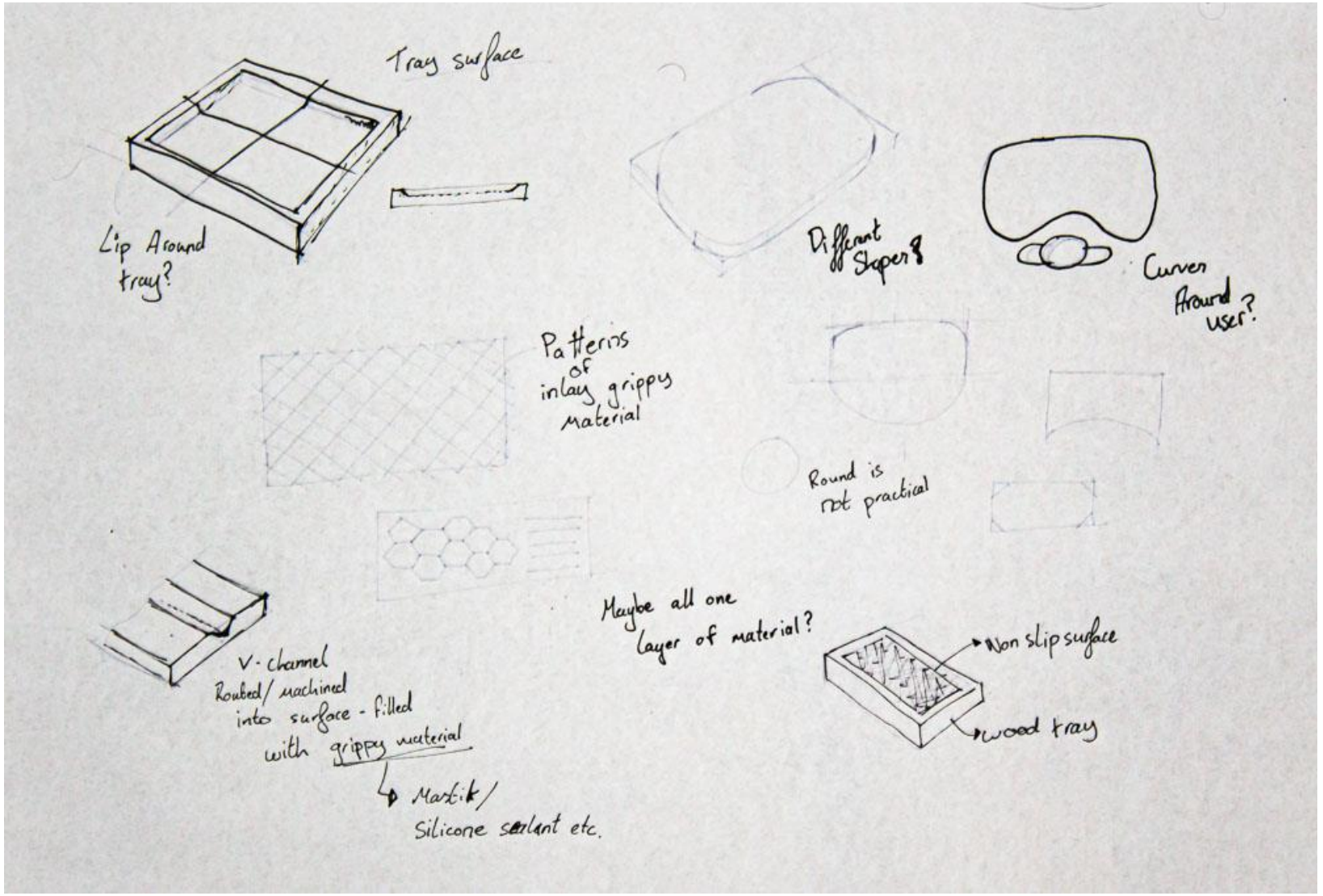

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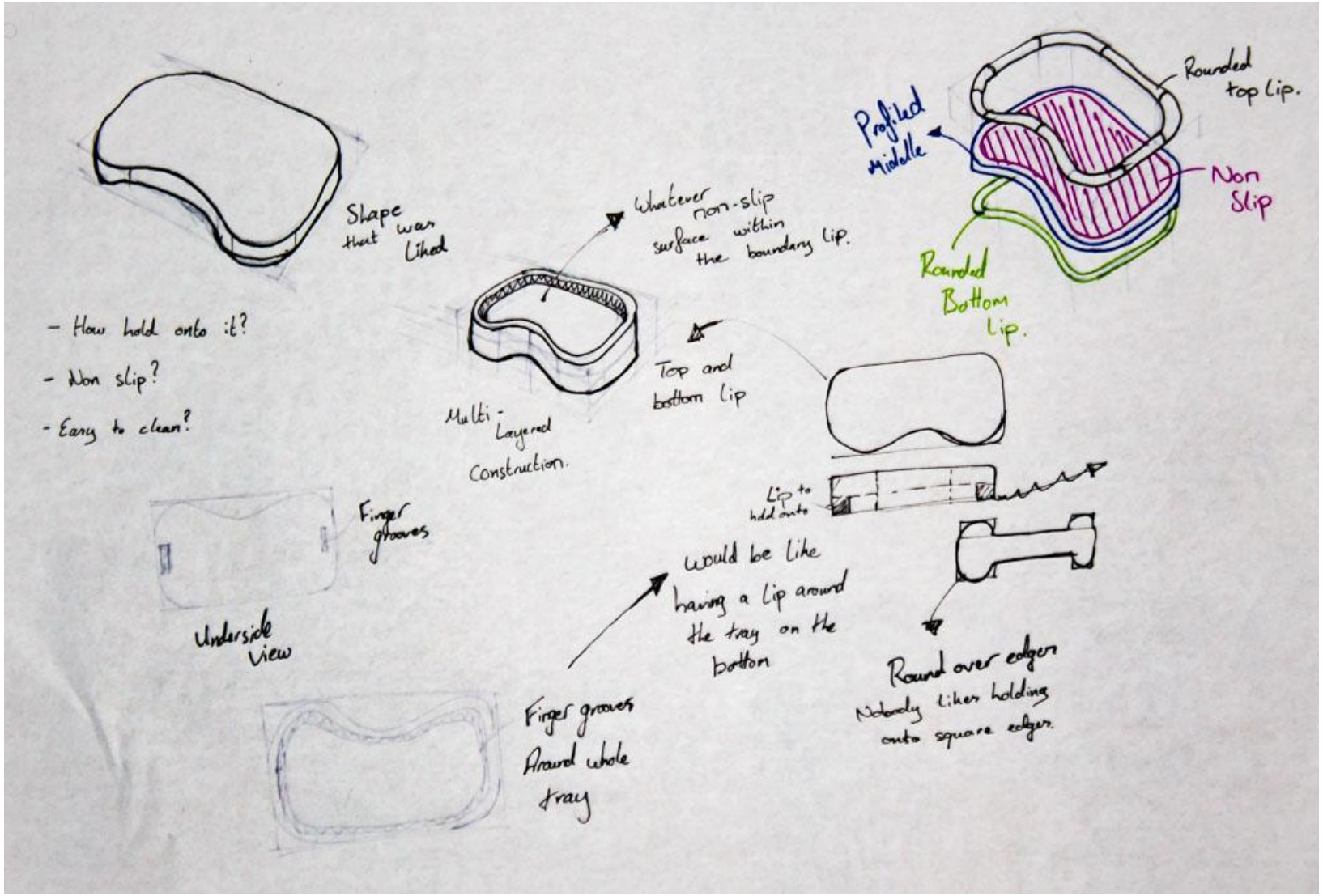

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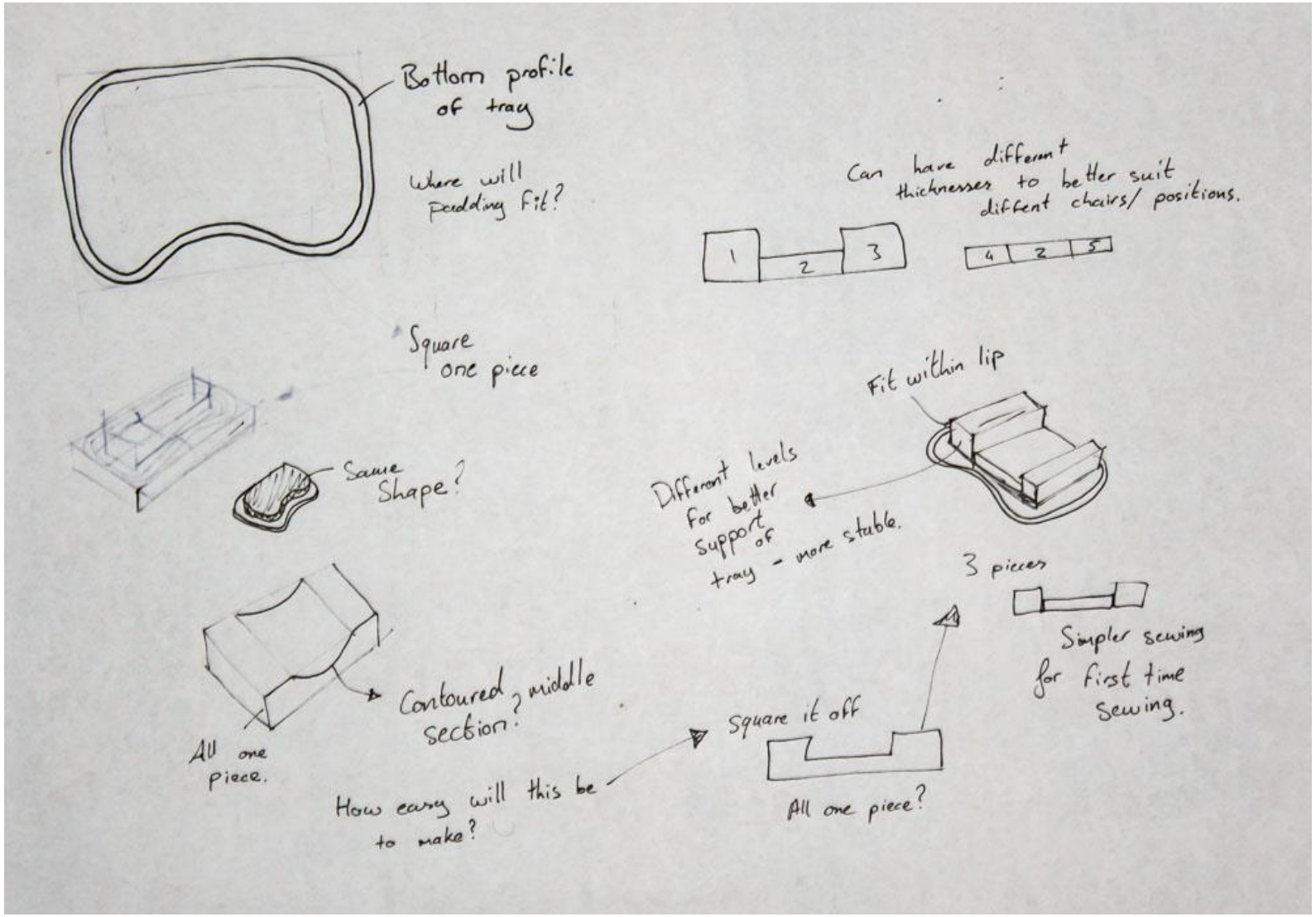

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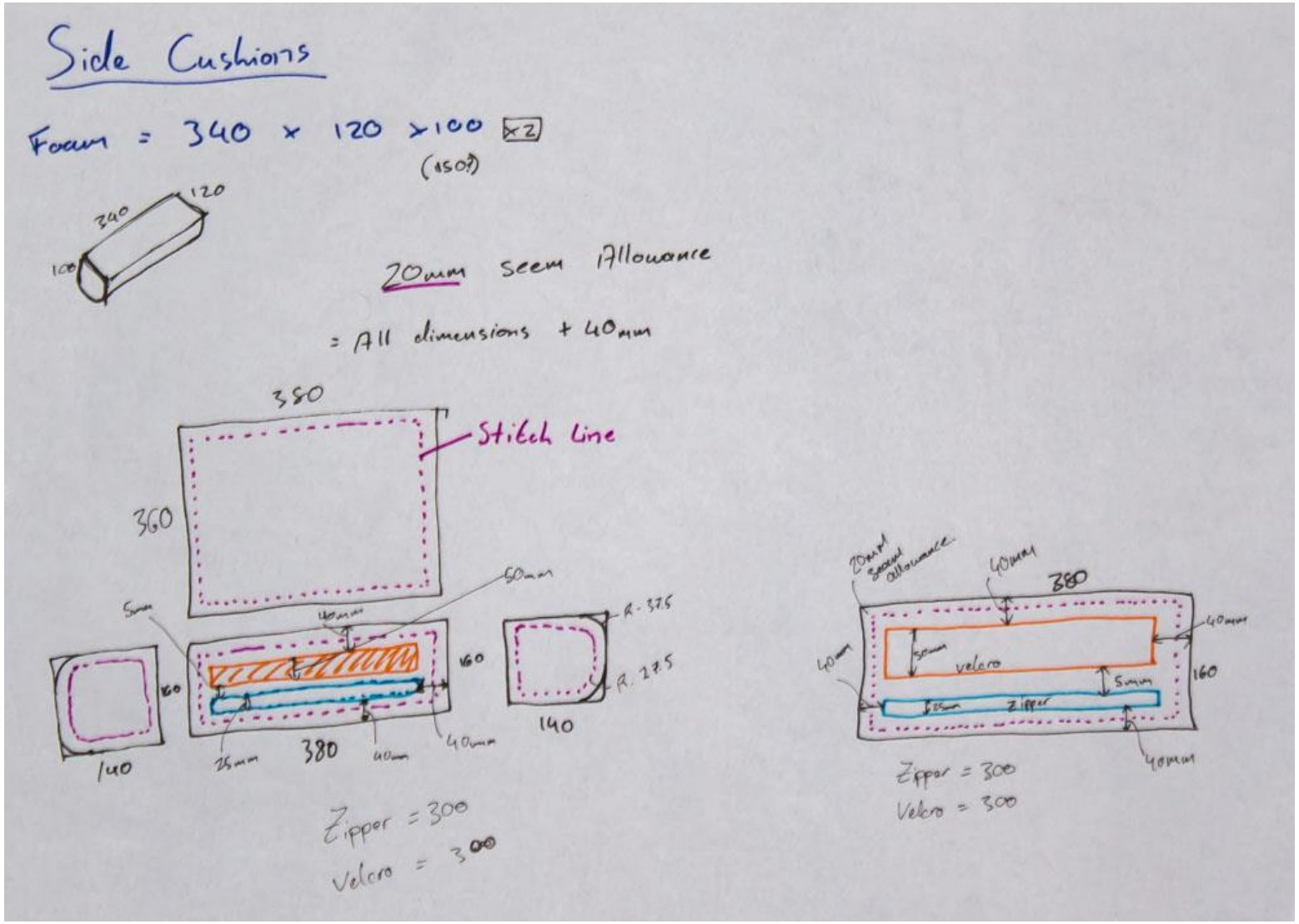

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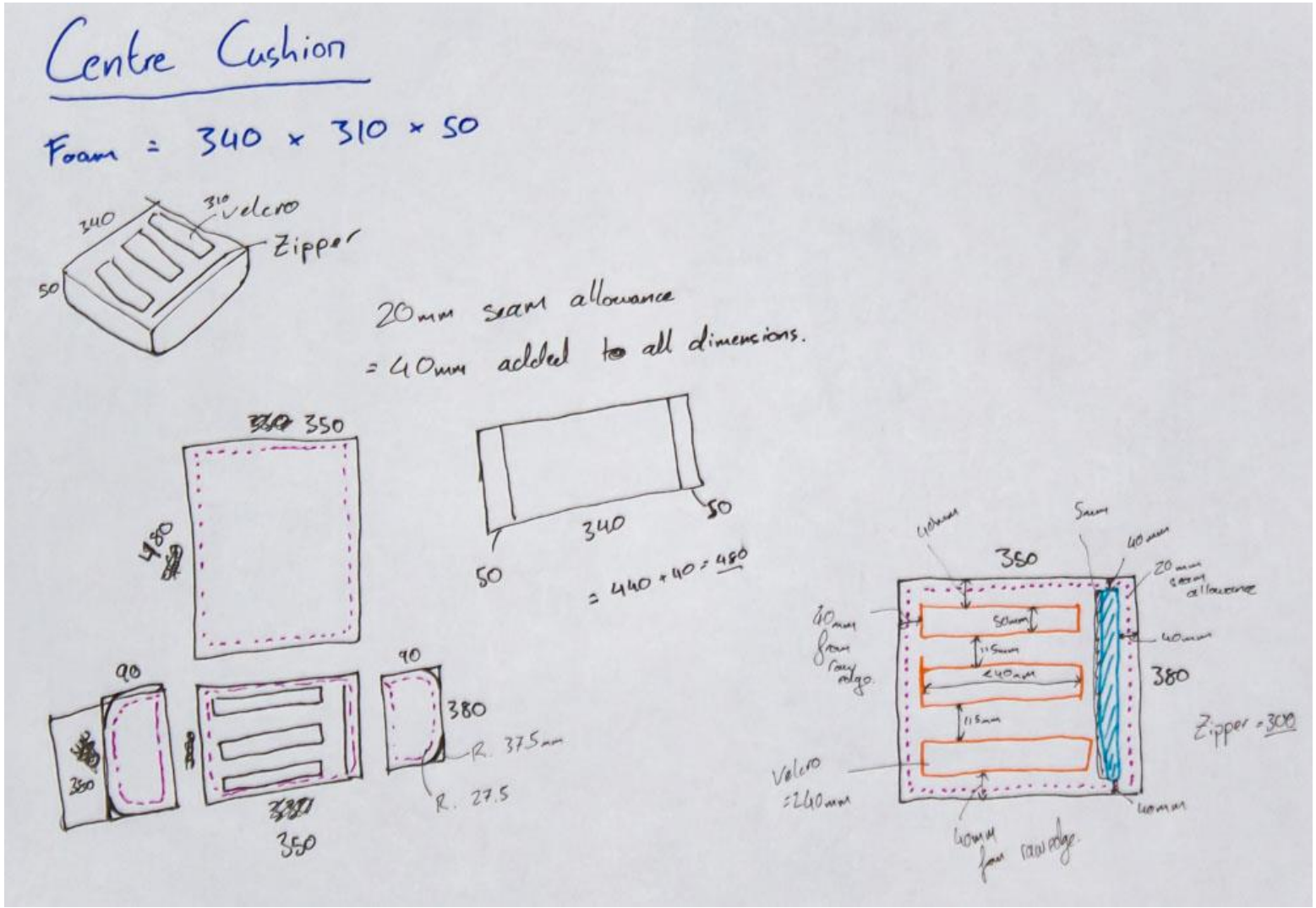
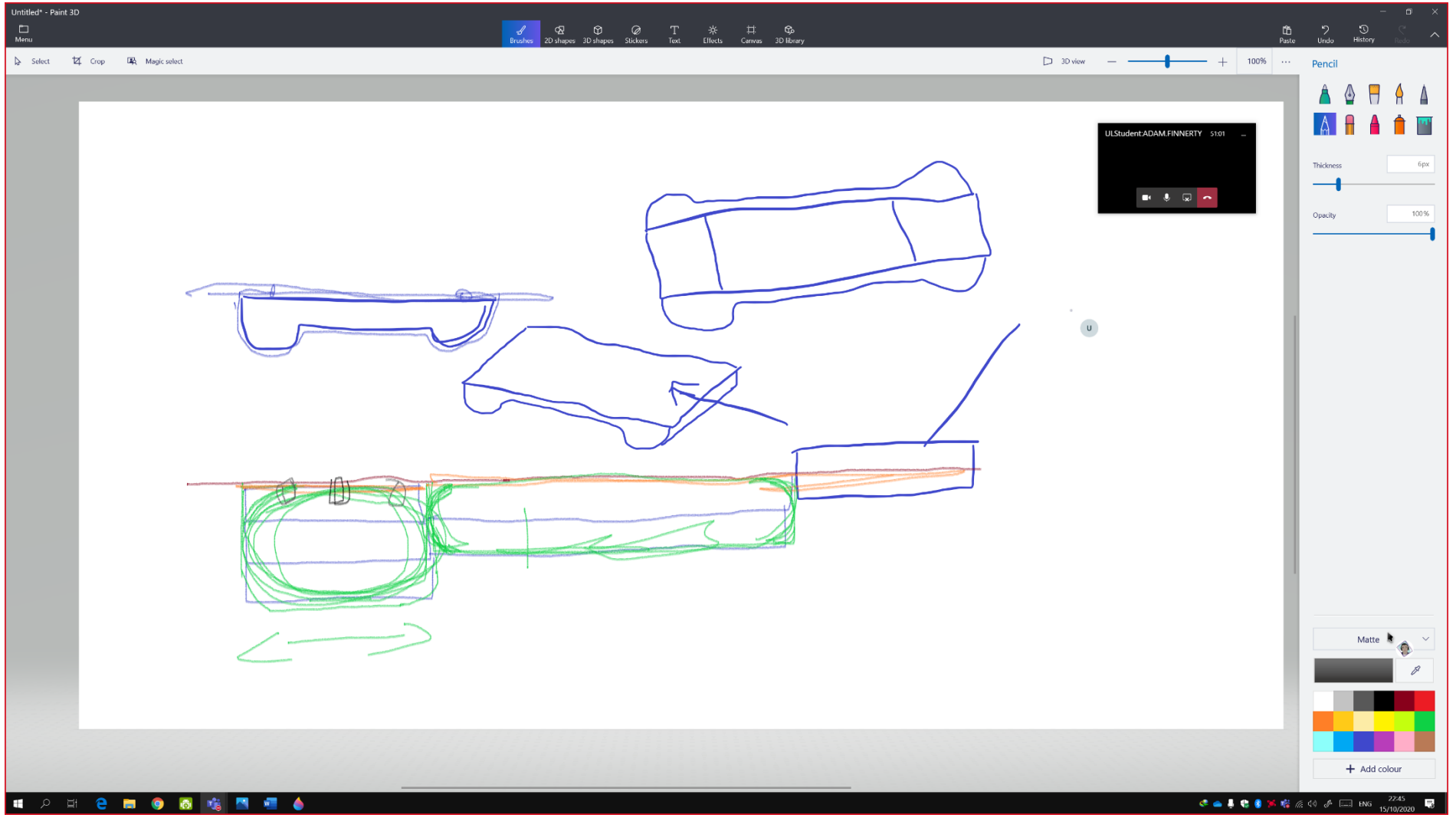


IDEA GENERATION & CONCEPT DEVELOPMENT

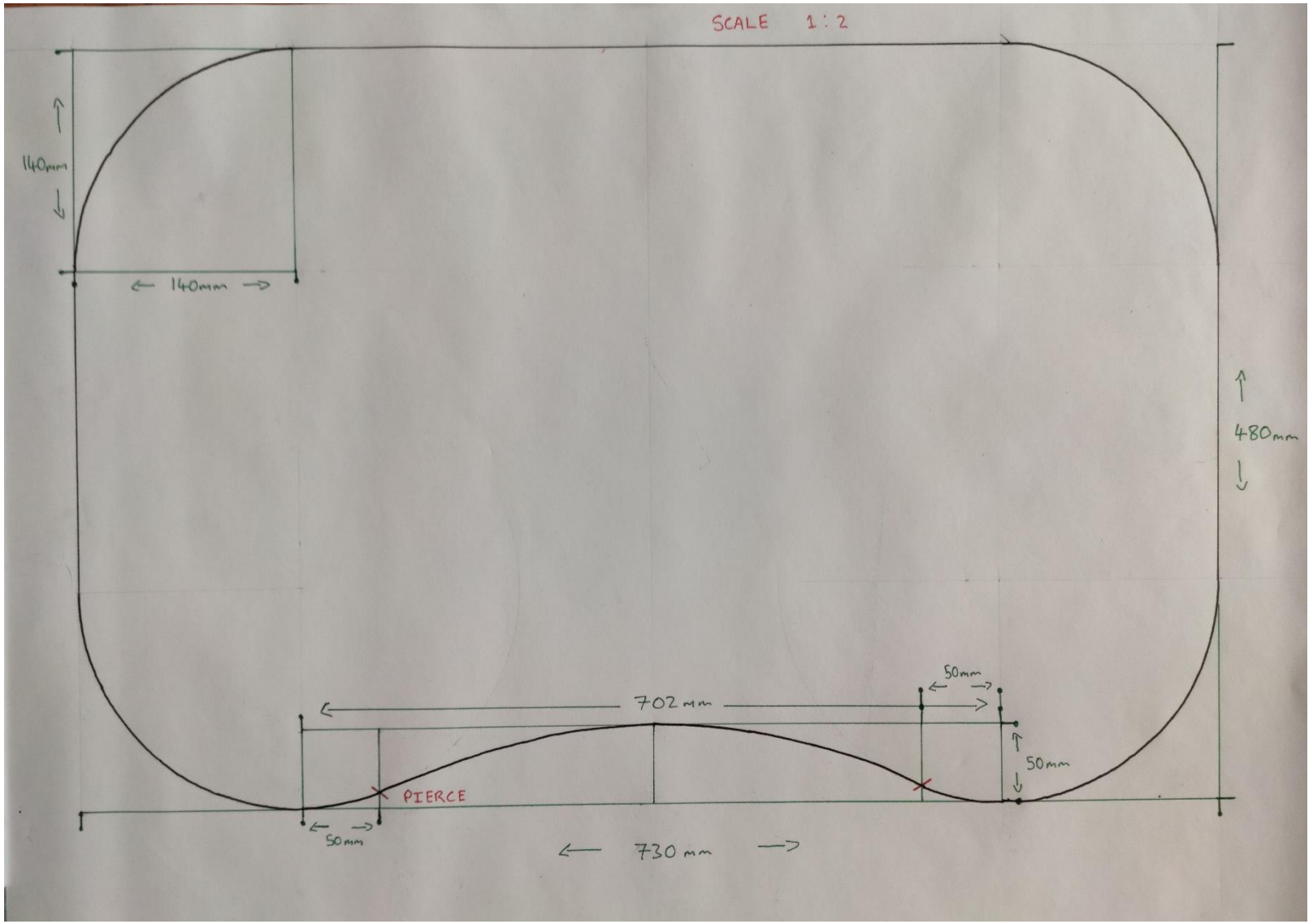
TEAMS COLLABORATIONS

We collaborated together 3 – 4 times per week over Microsoft teams virtually to offer each other feedback and share our content in order to conceptualize our ideas and capture our findings even further.



IDEA GENERATION & CONCEPT DEVELOPMENT

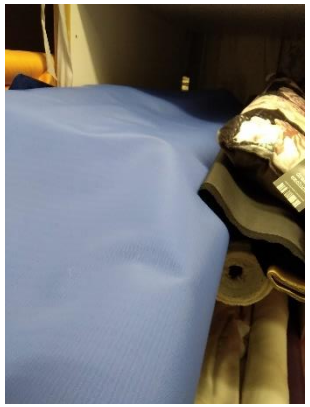
CHOSEN CONCEPT

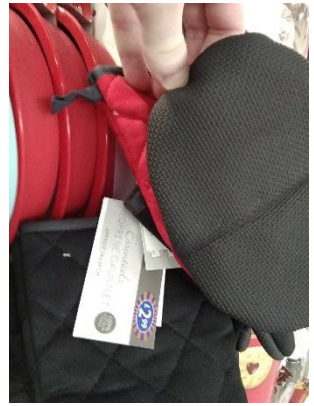


IDEA GENERATION & CONCEPT DEVELOPMENT

PROCESS OF ELIMINATION – RESOURCES & MATERIAL POSSIBILITIES

We visited multiple hardware stores, shops, textile & fabric stores and were on the lookout for materials/ objects that we could obtain second hand – Frances Finishing Touches, Topline Wards, Eurogiant, Homesavers, Deals, Brandmax, Homebase, Dunnes, Aldi, Lidl, Hickeys, The Range and our own homes.





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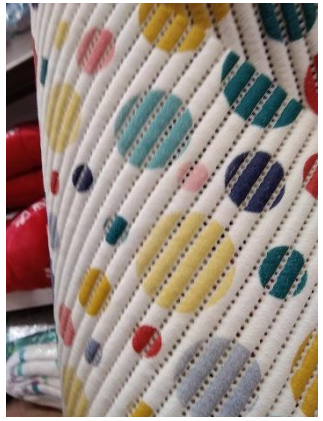

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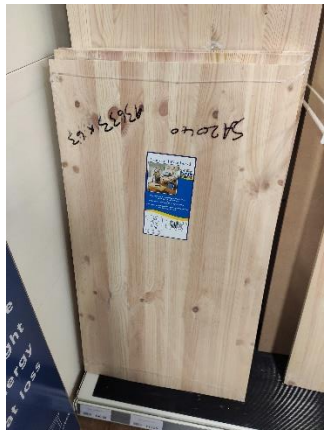

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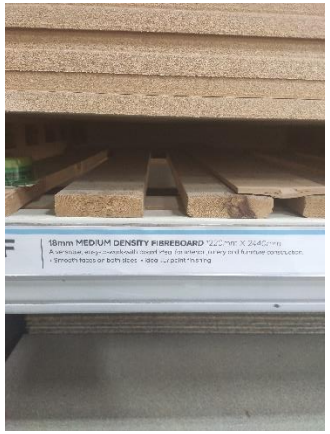
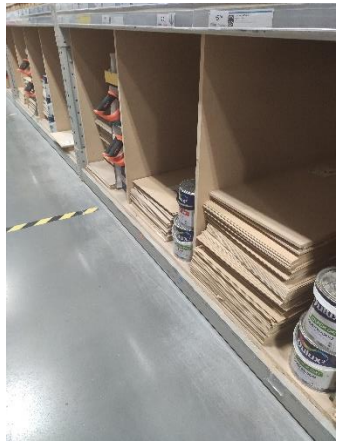


IDEA GENERATION & CONCEPT DEVELOPMENT

PROCESS OF ELIMINATION – RESOURCES & MATERIAL POSSIBILITIES



IDEA GENERATION & CONCEPT DEVELOPMENT

INITIAL MATERIAL SELECTION FOR PROTOTYPING

"Using common products and reclaimed materials for prototyping – a waste reduction effort"

WATER BOARD

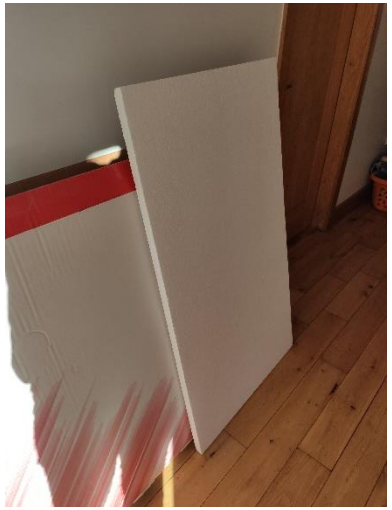
Perfect overall shape and dimension suitable for our task. Affordable to buy and replace. Can be cut to desired dimensions using a hand saw or Stanley knife

CARDBOARD FROM TV BOX

My father (Anthony's dad) had purchased a TV over the pandemic to replace a faulty one. He stumbled upon it when searching for possible materials to use in his garage. This was suitable as it gave us an opportunity to reduce waste and save on material sum cost

RECLAIMED STYRO-FOAM

Styro-Foam is harmful to the environment and still often used to protect electronic equipment in its packaging. We sought fit to find an alternative use for this material for our prototyping phase as it often ends up in land fill sights

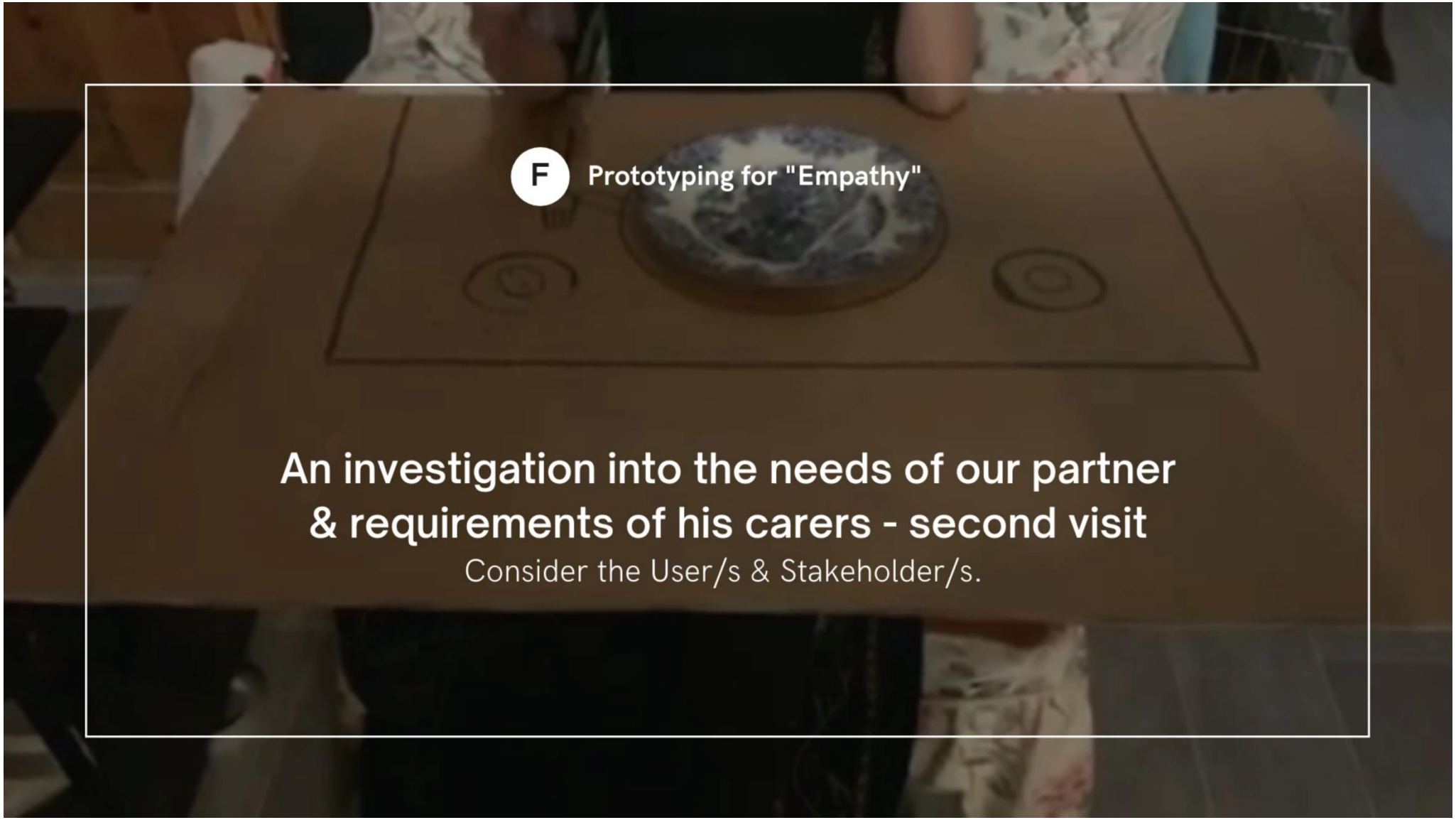


USED YOGA MAT

Yoga mats are almost ubiquitous in the average family home. They are inexpensive and increasingly are manufactured from recycled and/or recyclable materials. We decided this may prove to be an effective material for prototyping as it is easily cut and can be molded to desired shape/s with little effort

DESIGN REFINEMENT

INITIAL PROTOTYPE – Feedback driven approach



DESIGN REFINEMENT

INITIAL PROTOTYPE – Feedback driven approach

DESIGN REFINEMENT

SECOND VISIT – FIX PARTNER FEEDBACK + CARER FEEDBACK

Caregiver Interviews/ Video Analysis
Second visit review

Observations

Tray mockup was not stable. Plenty of room on the tray. Square edges were being leaned on by user.

Problems

Items on tray were upset easily due to in-stability. User leaning on edges of tray caused a lot of movement.

Needs

A method of providing stability to the tray while still being comfortable to use.

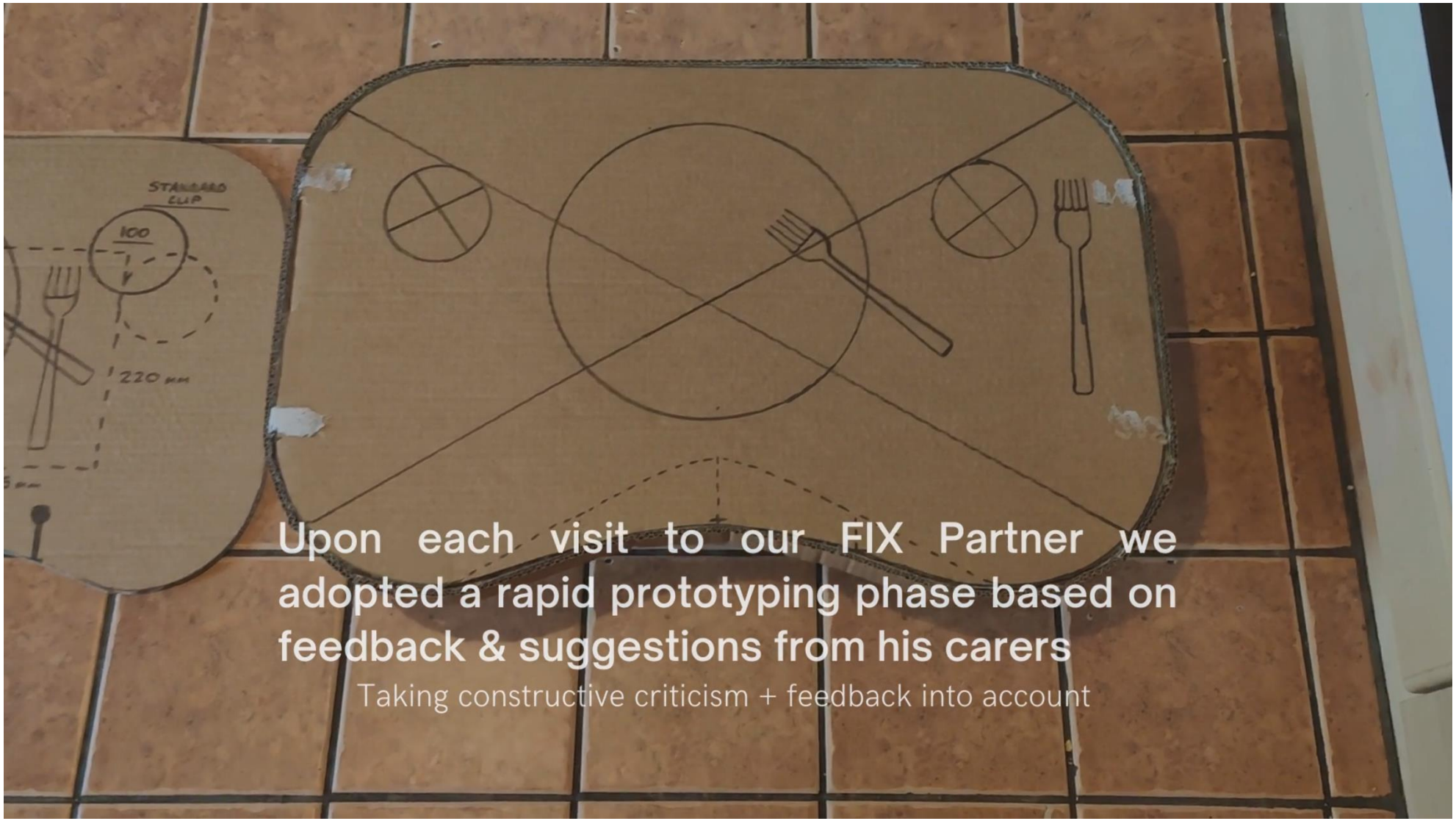
DESIGN REFINEMENT

ITERATIVE PROTOTYPING - Padding + Weight Investigation

Adam used an existing tray that he had available to carry out this investigation. The aim and objective was to discover which areas of the surface of the tray would be most felt on a persons lap/ knees by simulating weight in various areas. His findings highlighted the issue of edge stability and horizontal weight distribution. We now knew that our tray would have to be a larger size than many existing solutions for a more even spread of weight.

DESIGN REFINEMENT

ITERATIVE PROTOTYPING - Empathic Prototyping

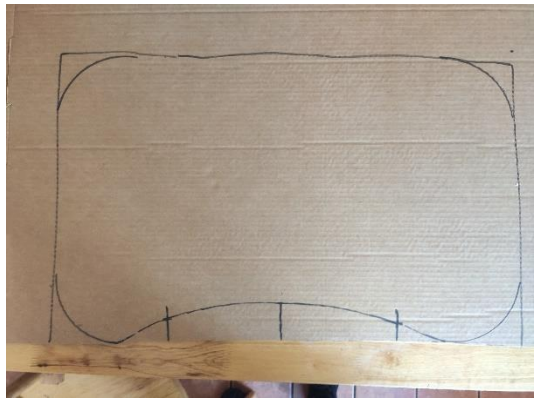
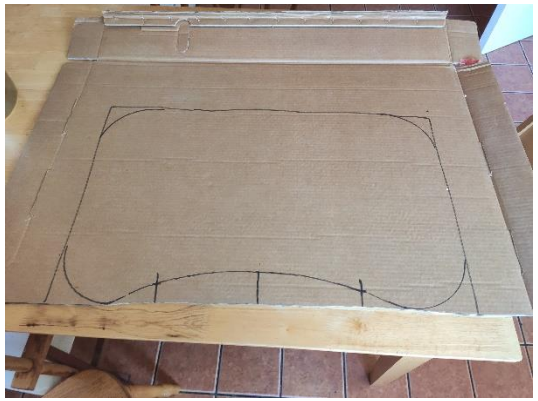
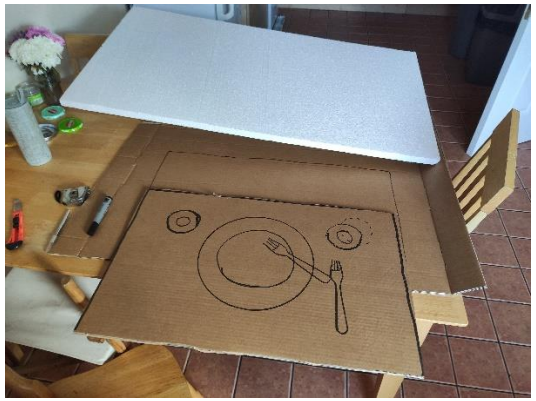
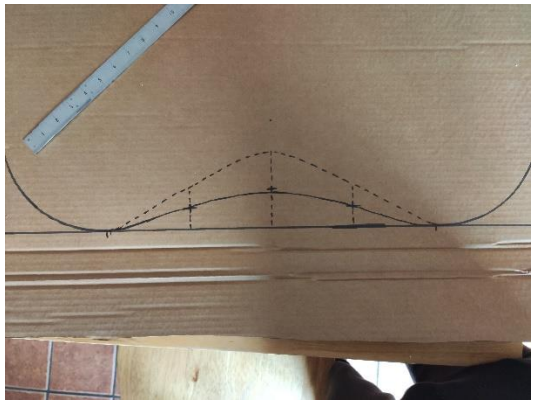
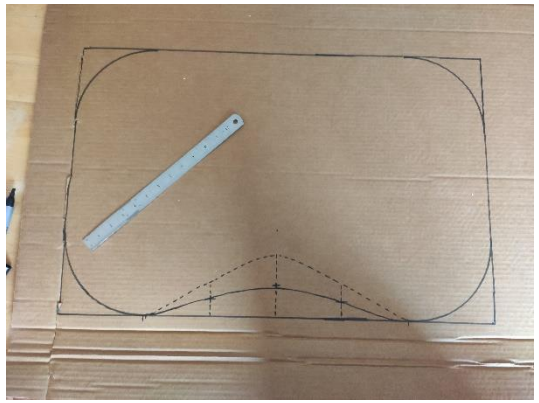


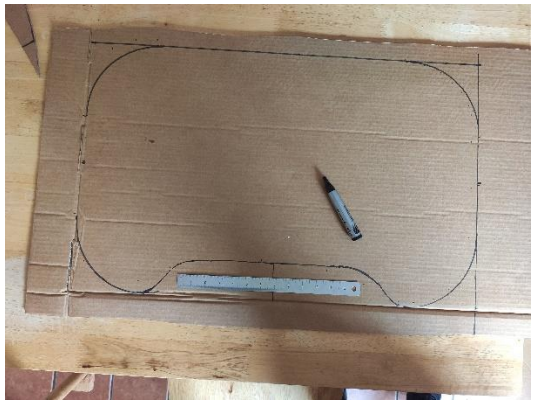
DESIGN REFINEMENT

ITERATIVE PROTOTYPING - Empathic Prototyping

DESIGN REFINEMENT

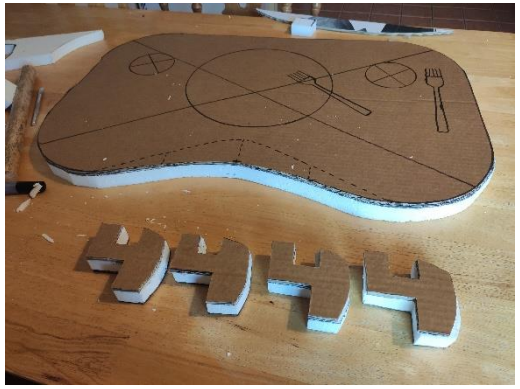
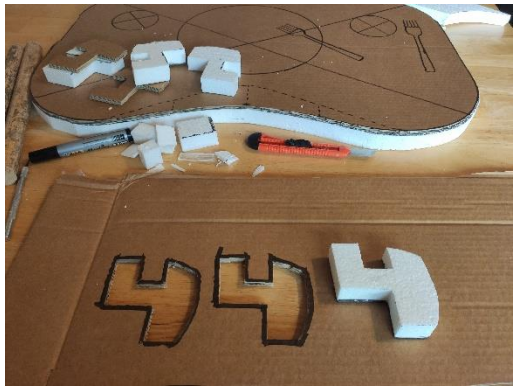
ITERATIVE PROTOTYPING - Empathic Prototyping

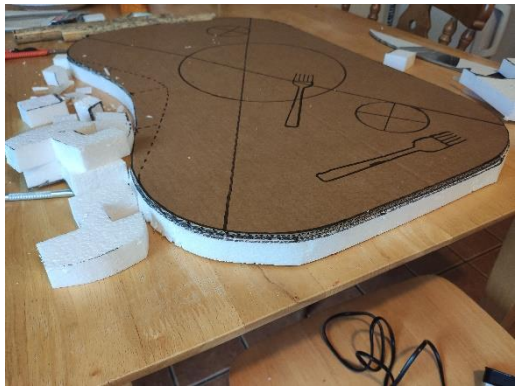
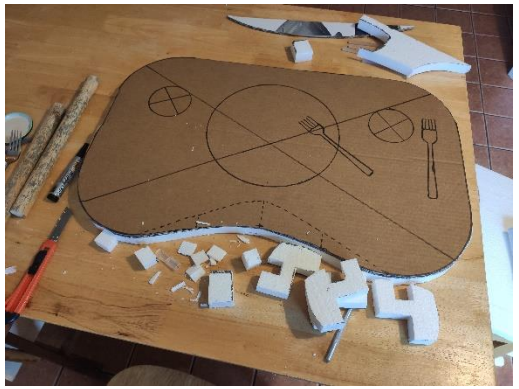








DESIGN REFINEMENT

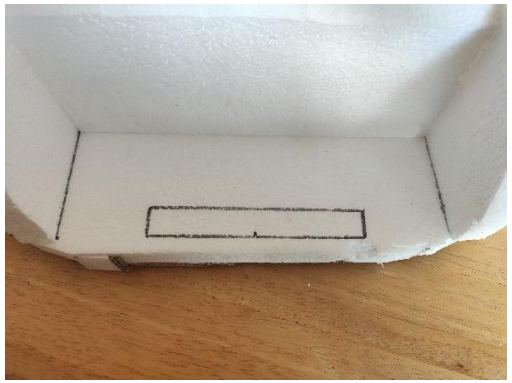
ITERATIVE PROTOTYPING - Empathic Prototyping

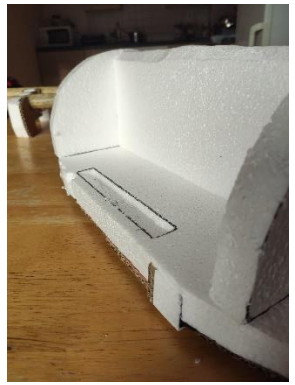



DESIGN REFINEMENT

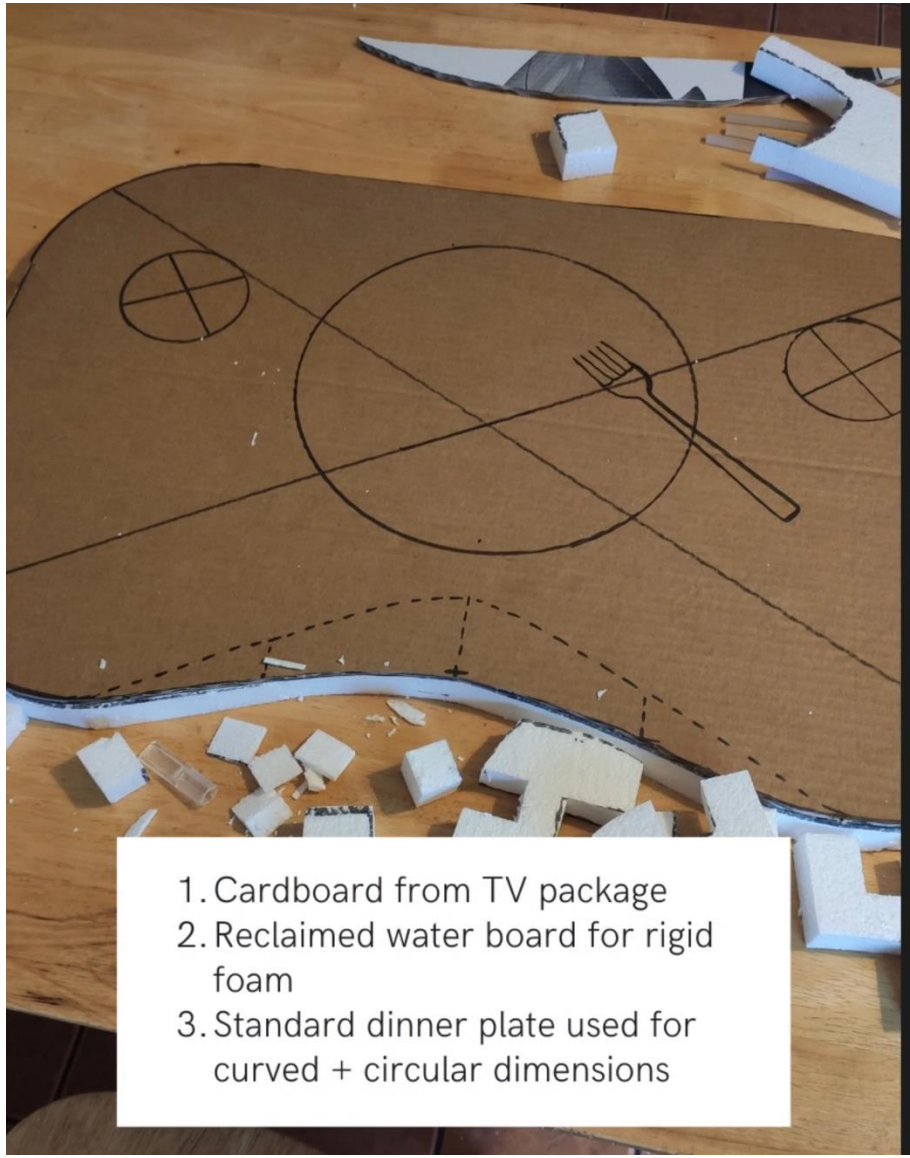
ITERATIVE PROTOTYPING - Empathic Prototyping



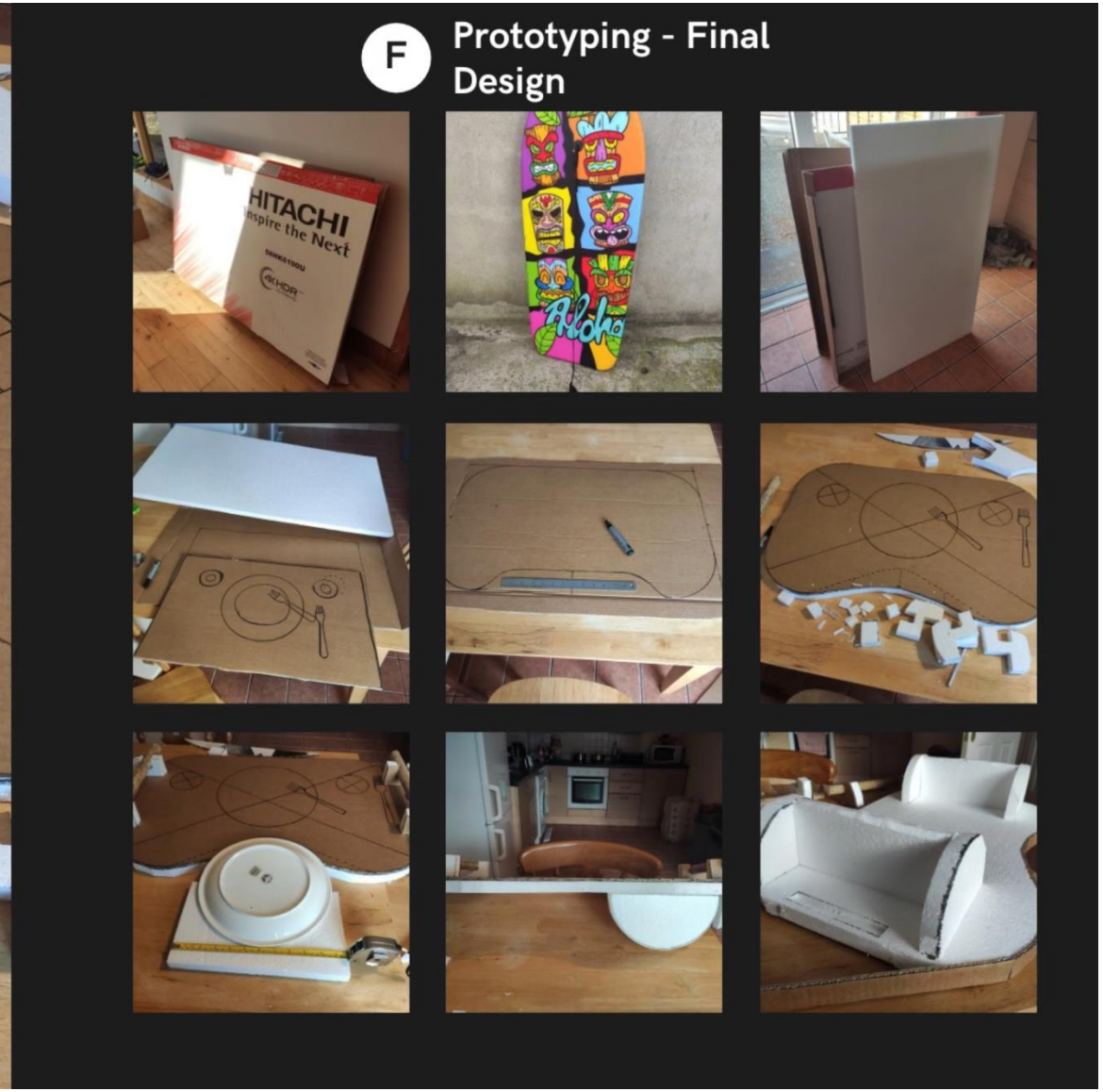


DESIGN REFINEMENT

ITERATIVE PROTOTYPING - Empathic Prototyping



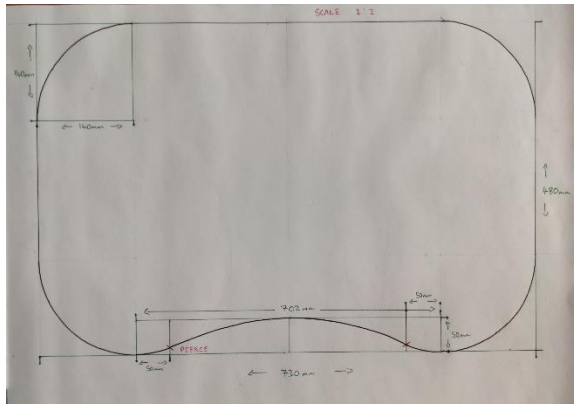
1. Cardboard from TV package
2. Reclaimed water board for rigid foam
3. Standard dinner plate used for curved + circular dimensions

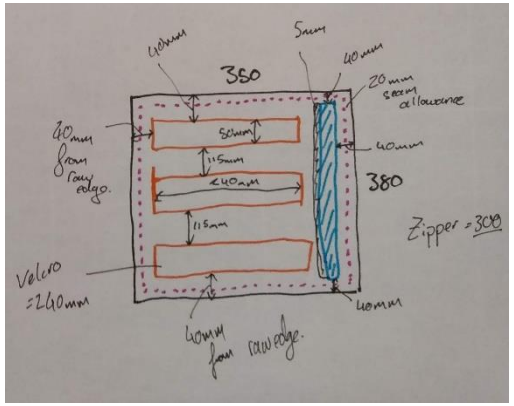


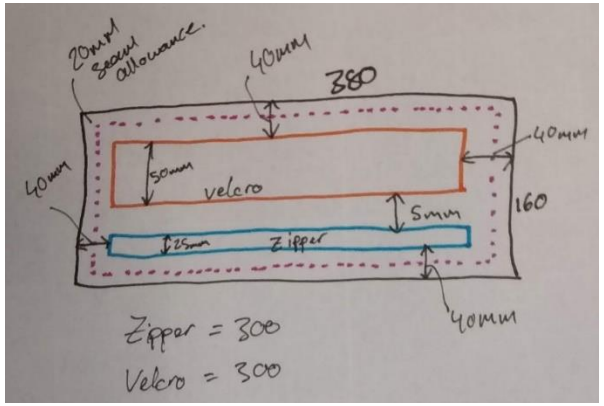
DESIGN REFINEMENT

SCHEMATICS & TECHNICAL DRAWINGS

BASE FILES – FOR MEASUREMENTS







Method and Madness

For this project we were working with our Fix Partner testing prototypes to solve the issues that were present with the existing Lap Tray. From our prototypes and measurements we created a Solidworks file, this allows us to use CNC tools and have accurately scaled technical drawings.

We will also use the file to help us in purchasing the correct amount of materials. The dimensions and some quick calculations will allow us to go into the shop knowing the size of the material we need to buy. Also using the website to see what the shop has to offer helps. For example;

We went to B&Q to see what materials they had and we picked one we liked. While in the shop we also discovered that they can cut sheet material down for us. After this we went online to get the exact measurements that are available and to compare prices of other sizes. The full sheet is the best value, especially with the cutting service available to us.

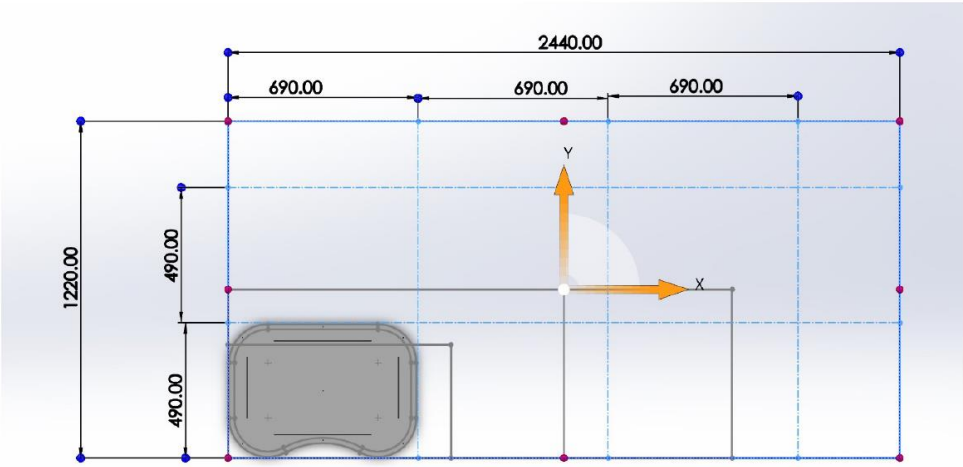
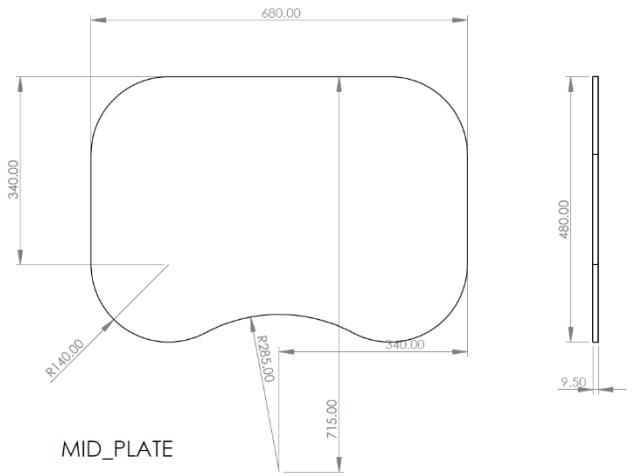


Figure 1: Our template with sheet material sizes sketched. Includes cut lines

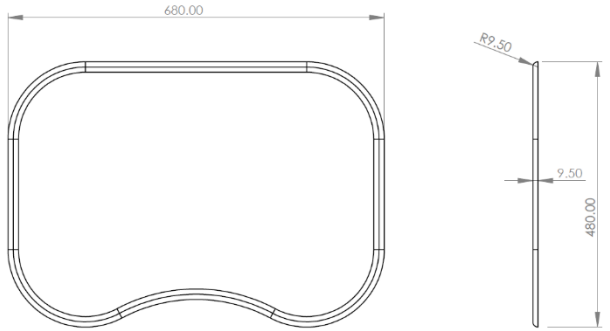
DESIGN REFINEMENT

SCHEMATICS & TECHNICAL DRAWINGS

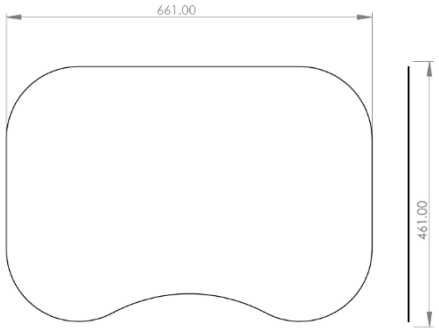
MEASUREMENTS FOR ALL PARTS



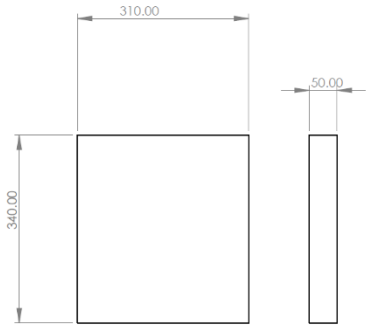
MID_PLATE



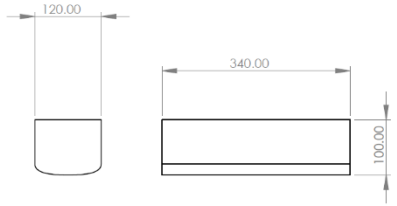
TOP_PLATE AND BOTTOM_PLATE



NON SLIP TABLECLOTH



MIDDLE CUSHION



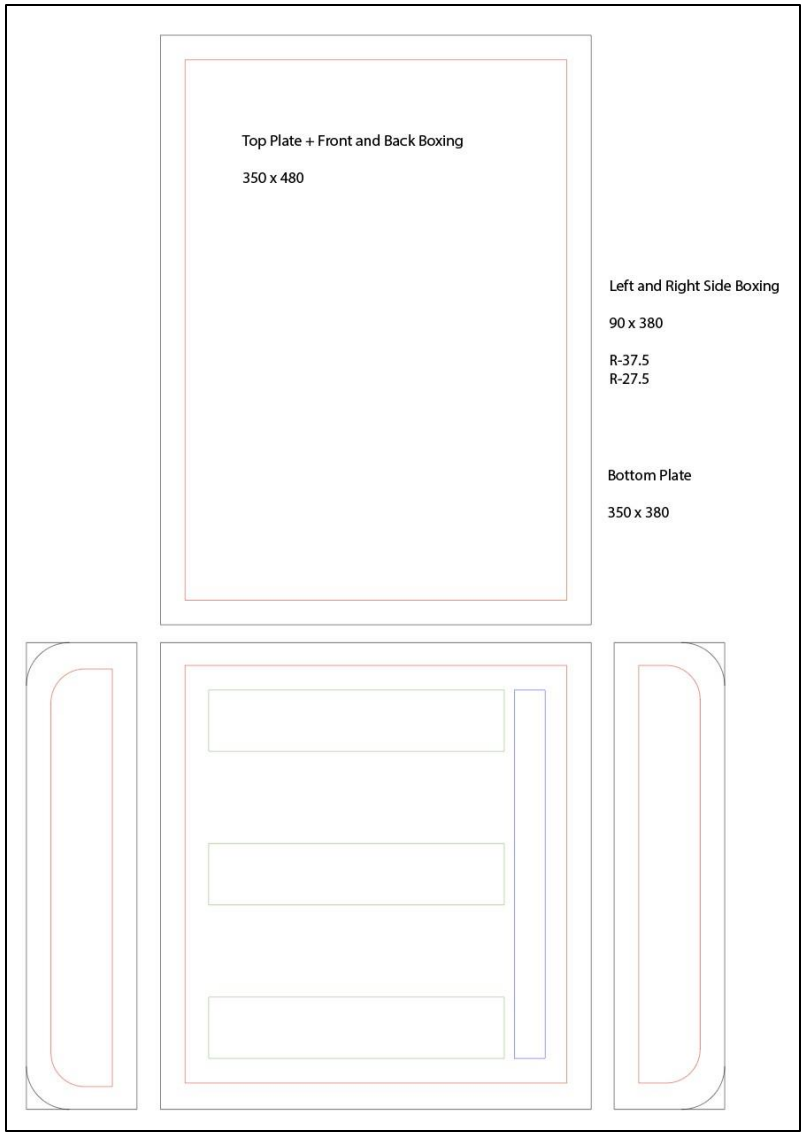
SIDE CUSHIONS

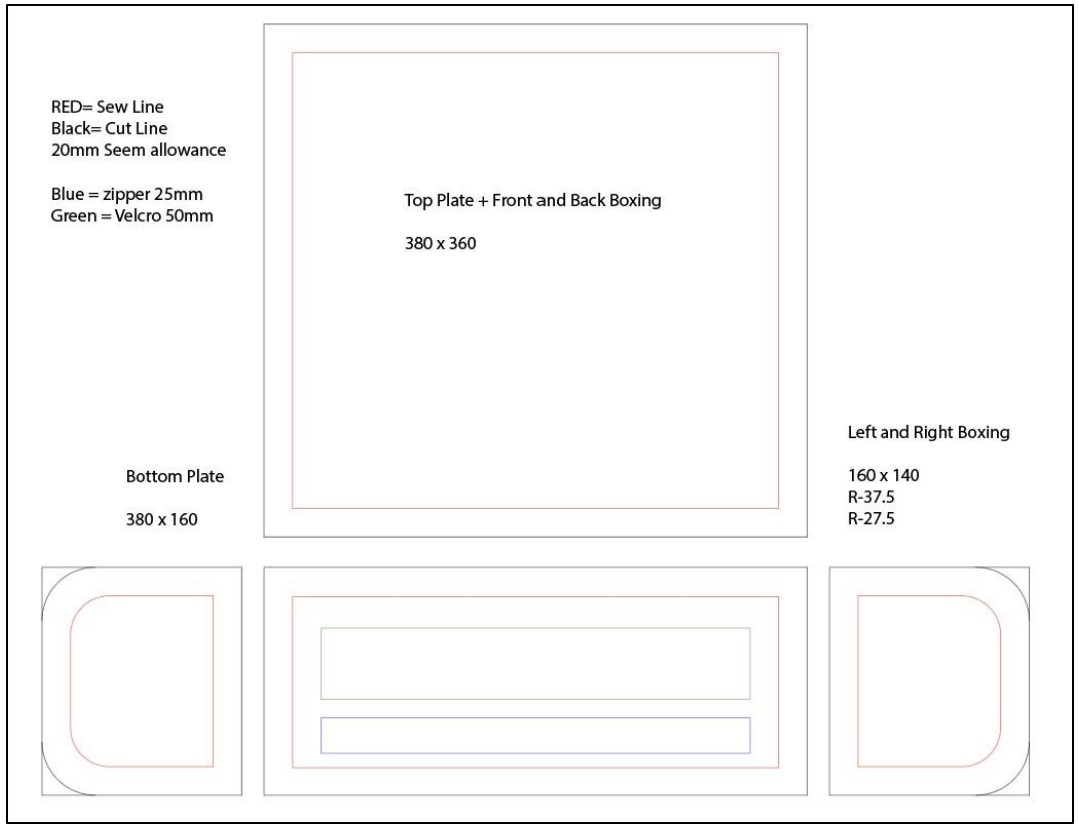
The rounded croners seen here will be achieved with the sewn covers. the foam itself will be square

DESIGN REFINEMENT

SCHEMATICS & TECHNICAL DRAWINGS

ILLUSTRATOR FILES – MIDDLE CUSHION + SIDE CUSHION

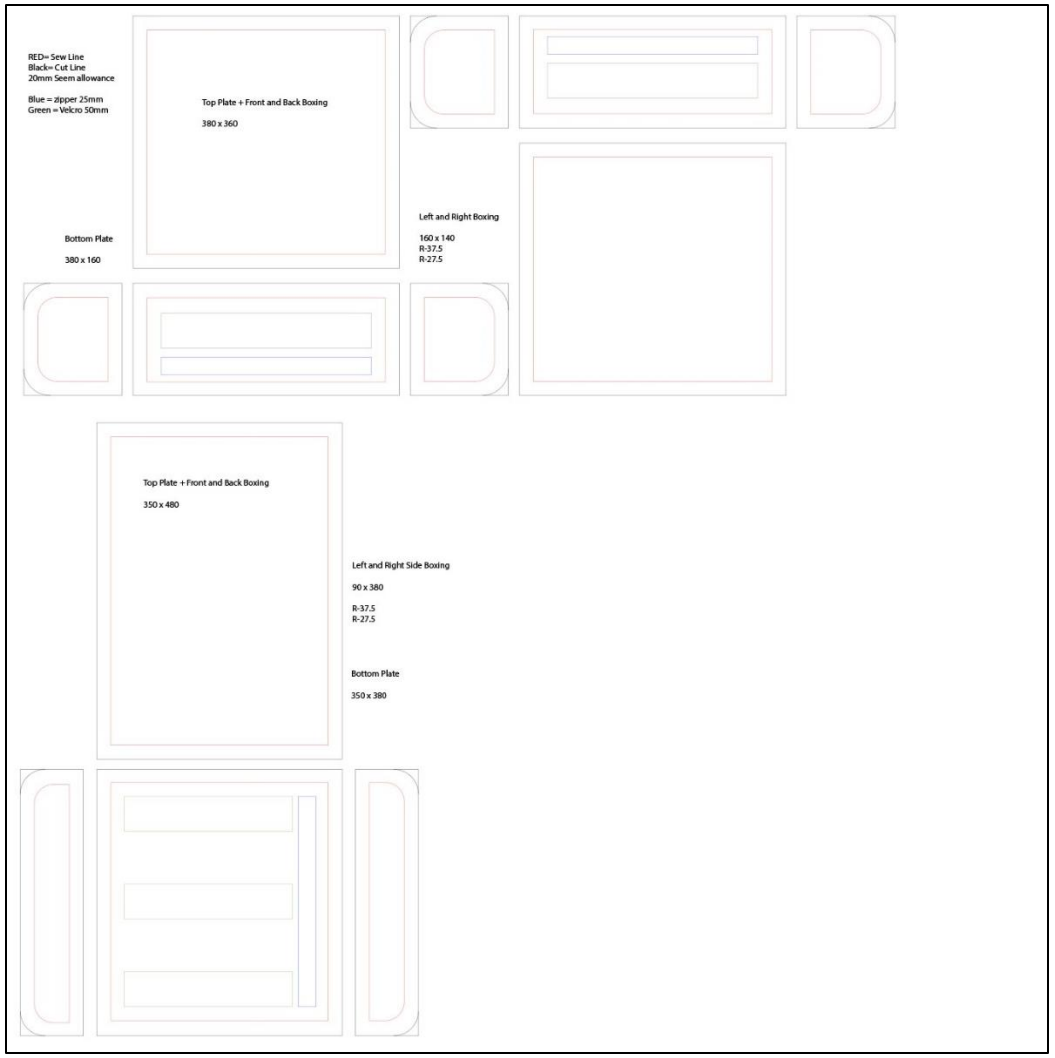


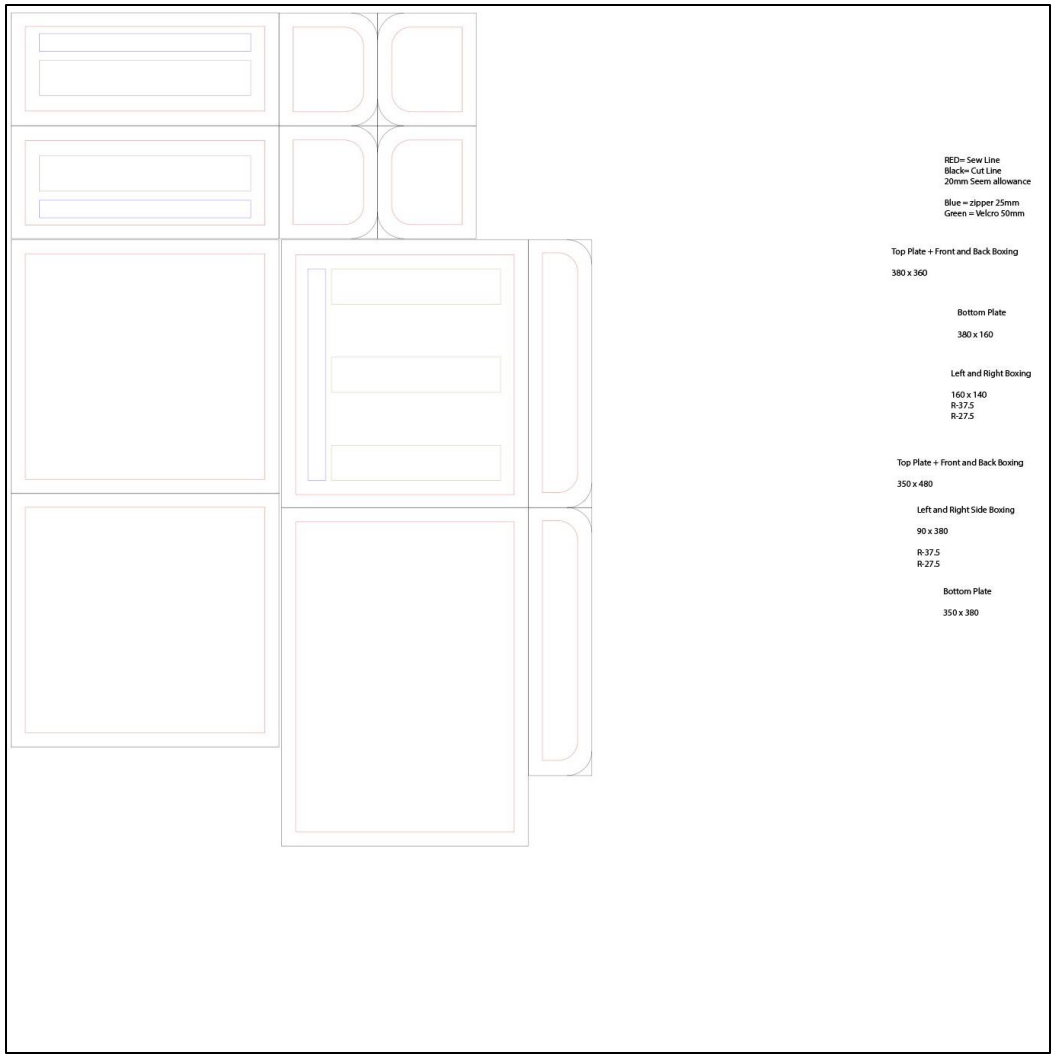


DESIGN REFINEMENT

SCHEMATICS & TECHNICAL DRAWINGS

ILLUSTRATOR FILES – CUSHION ASSEMBLY PRINT OUT FILES

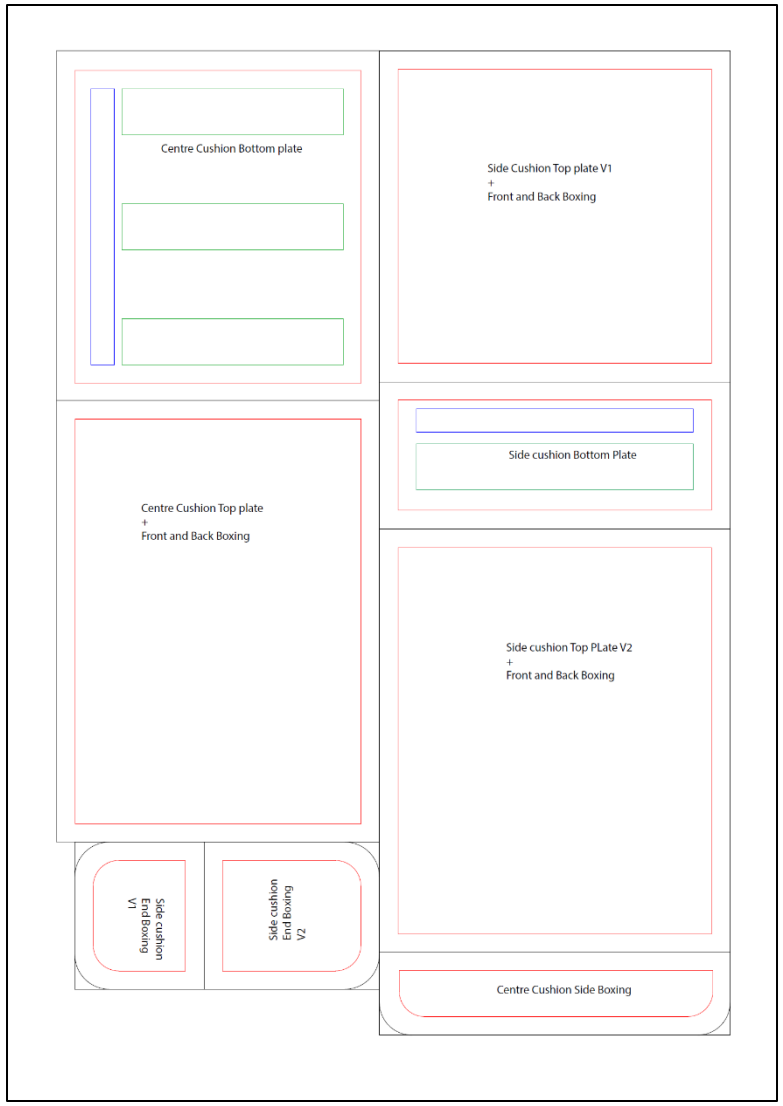




DESIGN REFINEMENT

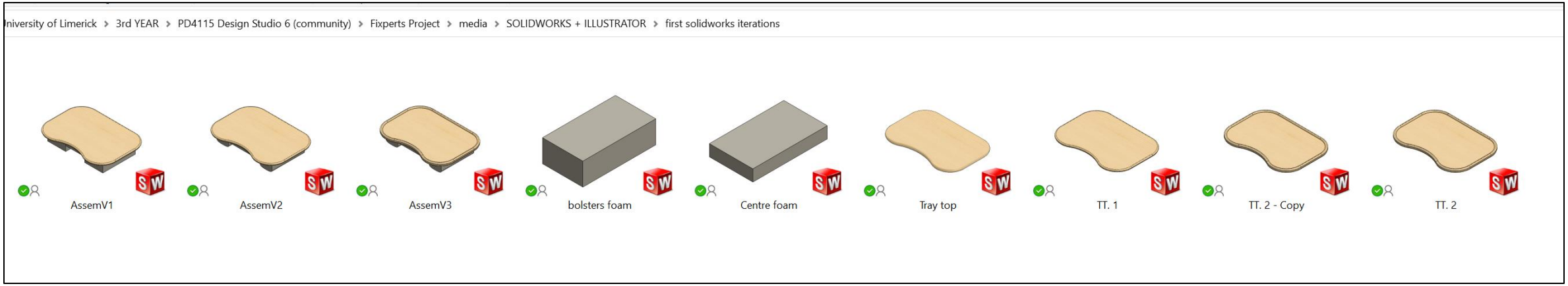
SCHEMATICS & TECHNICAL DRAWINGS

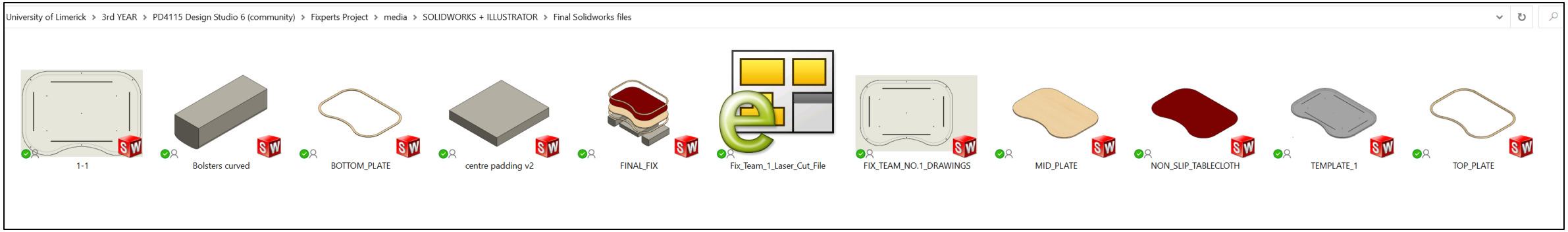
ILLUSTRATOR FILES – CUSHION ASSEMBLY FINAL PRINT OUT FILE – Troy Printing



DESIGN REFINEMENT

SOLIDWORKS ITERATION

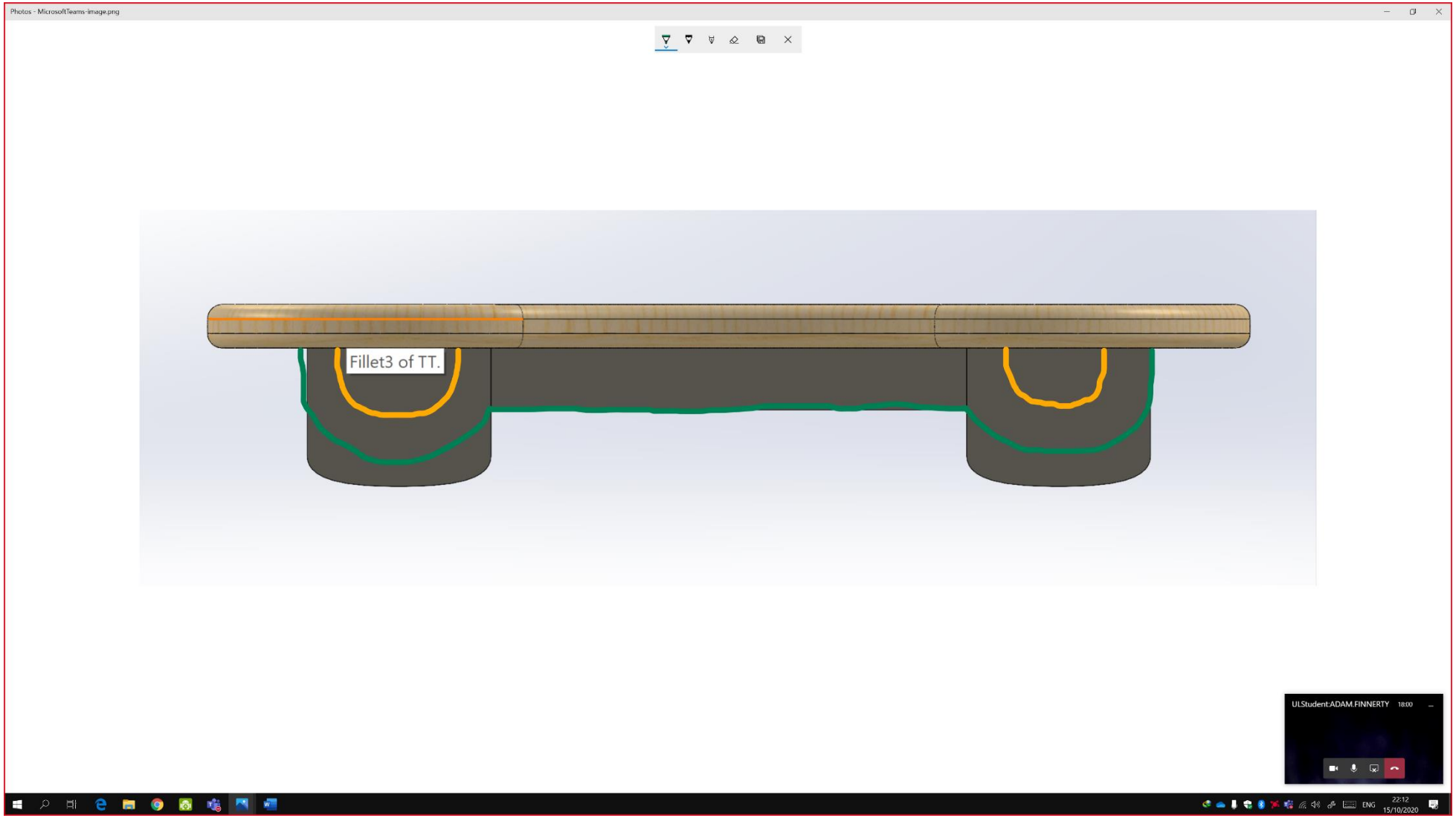




DESIGN REFINEMENT

SOLIDWORKS ITERATION - TEAMS COLLABORATIONS

Refining our design further via virtual collaboration and digital sketching tools via screensharing



DESIGN REFINEMENT

SOLIDWORKS ITERATION - TEAMS COLLABORATIONS

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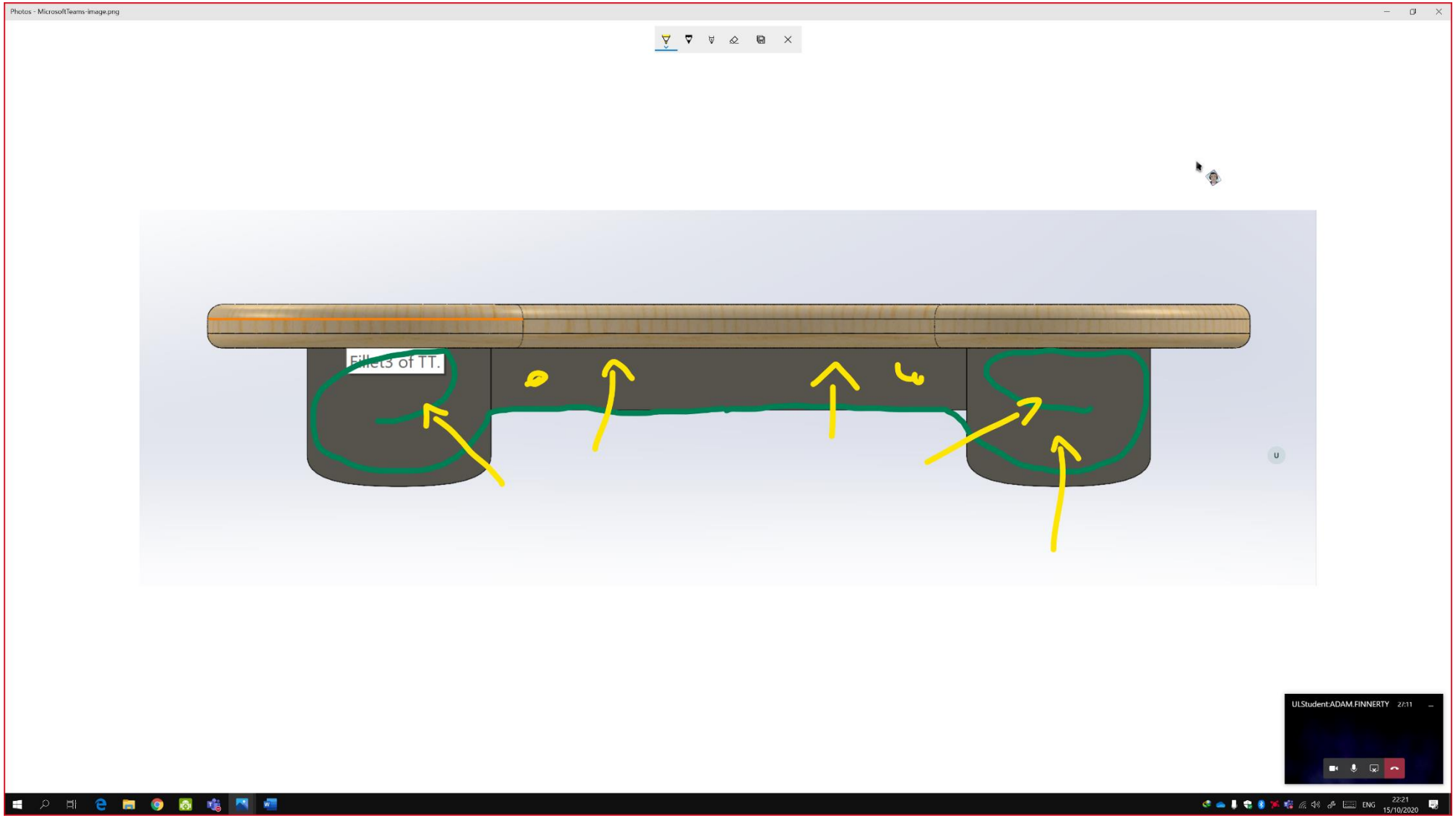

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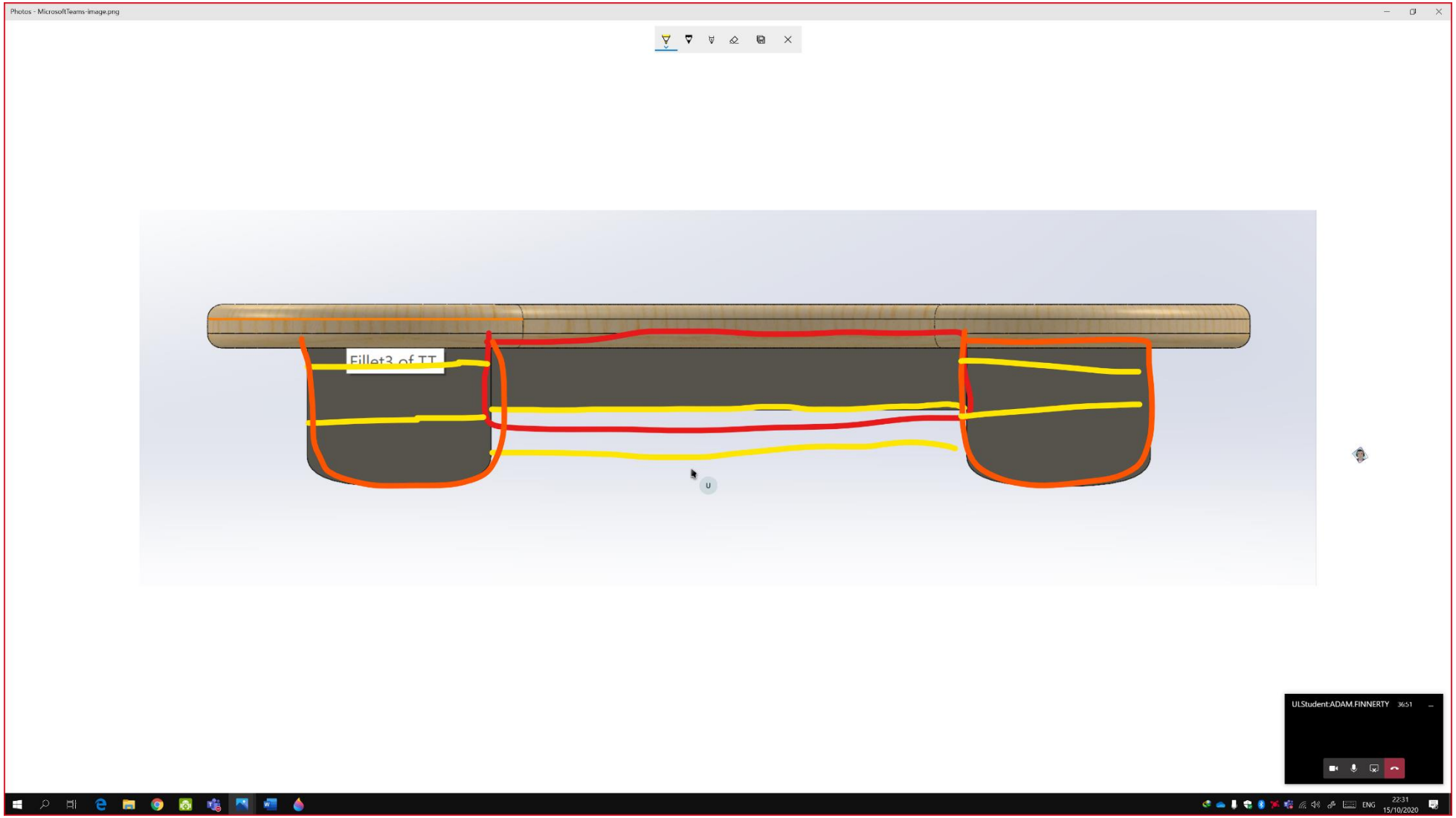
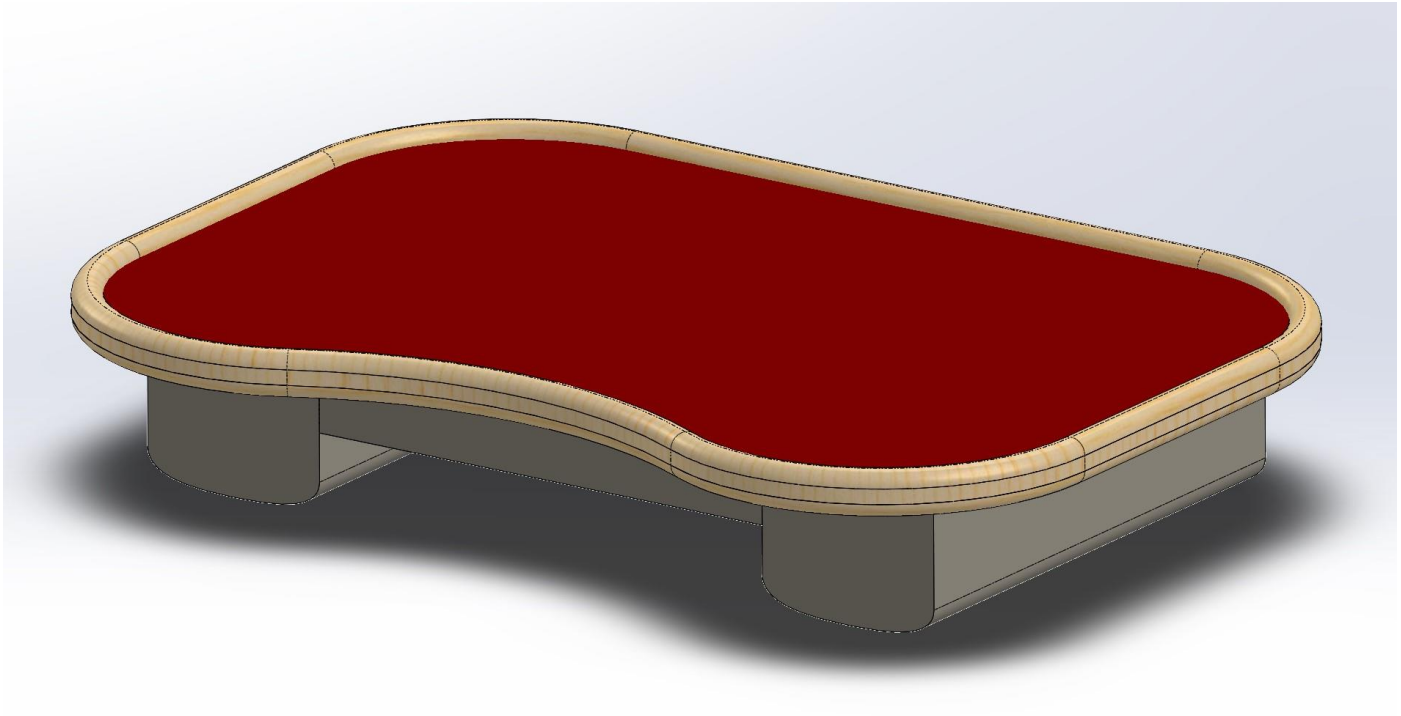
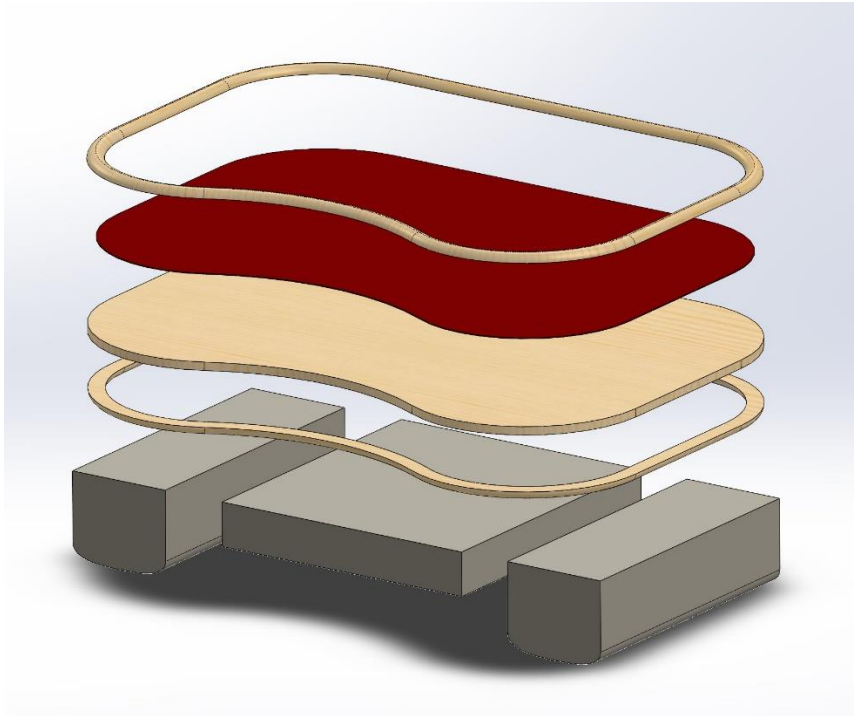


DESIGN REFINEMENT

SOLIDWORKS ITERATION – Final Design Solution

3D rendered mockup & Exploded view





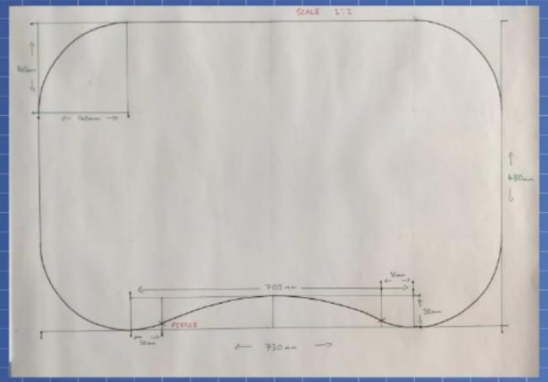
DESIGN REFINEMENT

BUILD PLAN MOCKUPS

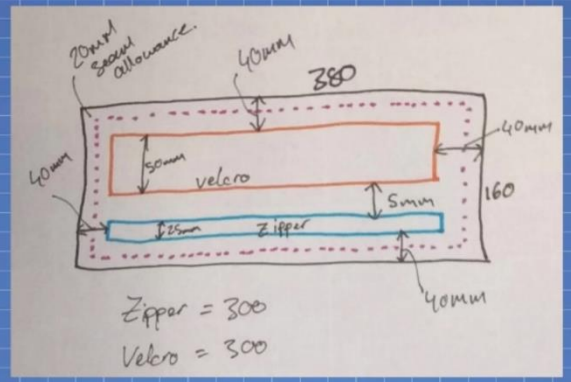
F

Creating the "Build Plan"

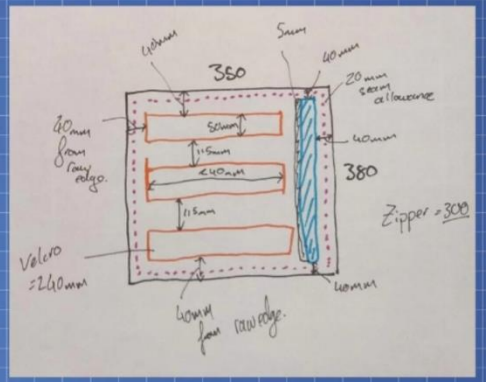
solidworks extracted dimensions



side cushions



middle cushion



Dimensions gathered from our final prototype allowed us to generate schematic sketches & drawings to transfer to CAD

DESIGN REFINEMENT

BUILD PLAN MOCKUPS

Sewing research – Figuring out how to manufacture the cushions

Videos that helped understand sewing and how to make cushions;

Knee rise cushion – the idea was that we might make the bottom cushion all one piece that was scrapped in favour of the modular system we used for ease of construction and the benefits that the modular design provides. Even though we didn't make the cushion all one piece, this in-depth video shows methods we used to sew curved corners and how we installed the zippers into the cushion covers.

https://www.youtube.com/watch?v=f1VKw2Ecrn4&list=WL&index=2&t=1577s

We did get a tutorial from a member of staff on how to use the machine but a video tutorial is always a good thing to fall back on when you need it.

This video is about how to thread the machine that was available to us in the studio. While the voice is difficult to listen to the information is useful.

https://www.youtube.com/watch?v=k17gdg1lMNA&list=WL&index=1

We had an issue with the thread fraying. We thought this was because we hadn't set the machine up correctly. We referenced the video and we re-threaded the machine. This didn't entirely fix our issues. We then laid the blame on sewing through Velcro, however this wasn't an issue the following day.

We decided to try re-positioning the needle in its holder and discovered that in a front to back orientation that the machine would not sew a stitch. We moved the needle back to roughly the way it was before and it seemingly solved all of the issues we were having with thread fraying.

The video below shows how a needle should be placed in the machine, and backs up what we figured out by trial and error.

https://www.youtube.com/watch?v=LgCRN4O4udU

While there is no specific video or forum that can be referenced as to pointing us in the direction of getting templates or 'patterns' printed out, we did that to make the best use of our fabric and also our time. We drew the outlines of the cushion panels in illustrator and had them printed in 1:1 scale so we could trace around them directly.

You will see it mentioned in the Build log that we needed to re-sew the first cushion covers that was made because it was not as good quality as the subsequent covers. This was due to the fact that we had never sewn before and we were working out what order to sew the panels together in. Safe to say we got the order wrong for the first cushion.

Another issue we had that wasn't clear is why sometimes there would be multiple threads on the bottom side of the fabric when we went to remove it from the machine. This video explains why that is.

https://www.youtube.com/watch?v=cPxU4-cGbUM

DESIGN REFINEMENT

BUILD PLAN MOCKUPS

Figuring out the parts list – Assembly parts critical breakdown

1. Template

Save solid works file as a .DXF file. This is suitable for laser cutting and needs to be done first to guide the rest of the pieces. Acrylic approx. 6mm thick would be ideal

2. Mid plate

A solid piece of whatever thickness plywood we purchase. Marked out by using the template. Rough cut out with a bandsaw/ Jigsaw. Template re-attached and use flush trim bit on the router to get perfect dimensions

3. Top/ Bottom plate

Outer ring of template. Solid Piece of ply with the middle cut out. Mark it out with the template. Drill a hole in the waste area big enough for jigsaw blade. Cute close to line. Re-attach template. Using flush trim bit in the router in the router table bring to near perfect dimensions.

Switch the router bit to appropriate size round over bit and round over two edges on the same face.

4. PVC/PVB Tablecloth

A suitable colour selected. Marked out using the inner template and cut slightly oversize to fit underneath the top plate when assembled. Glued down to mid plate?

5. Assembly

Glue tablecloth to mid plate, glue top plate to the mid plate, concealing the edge of the table cloth.

Clue the bottom plate on. Mask off the table cloth with paper and tape. Apply waterproof/ hardwearing finish to the exposed wood.

6. Foam

Cut foam layers to required dimensions, glue/ double stick tape together to form block.

7. Cushion covers

Construct covers from material using dimensions of the foam blocks. Sewing the covers together.

8. Attaching the cushions to the tray

Heavy duty Velcro will be used. Stitched to the covers and stapled to the tray.

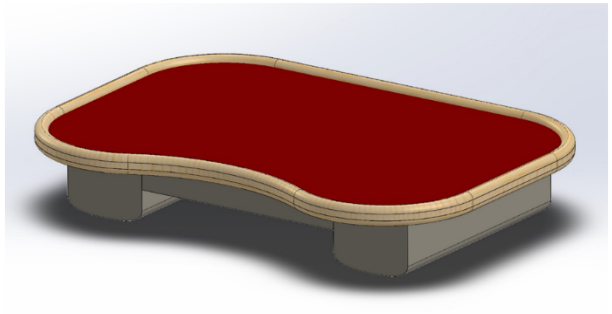
DESIGN REFINEMENT

FINAL BUILD PLAN

Fixperts

Fix Team 1- Build Plan

Anthony Carey and Adam Finnerty



Page 1

What we are going to need:

Tools:

- Router
- Router table
- Flush trim bit
- Round-over bit
- Laser cutter
- Jigsaw with a fine cut blade
- Drill
- Countersink bit
- Drill bit (Bigger than the Jigsaw blade)
- Screw driver
- Hammer
- Pliers
- Small hand saw
- Sewing machine with zipper foot
- Fabric scissors
- Seam ripper
- Ruler
- Pencil
- Staple gun
- Serrated bread knife

Consumables:

- Acrylic sheet
- Small screws
- Plywood sheet
- Tablecloth
- Small diameter wood dowel
- Wood glue
- Sandpaper (various grits)
- Soft wire wool
- Beeswax finish
- Cotton cloth
- Polyester Fabric
- High Density Polyurethane foam (soft)
- Thread
- Double stick tape
- Velcro
- Zippers
- Staples
- Time

Other things we might need:

- Extension Cables
- Help from tutors

Personal Protective Equipment (PPE):

- Safety gloves
- Safety glasses
- Hearing protection
- Face shield
- Facemasks
- Disinfectant
- Dust masks
- Lab coats
- Well ventilated areas
- Knowledge of equipment
- A healthy dose of fear
- Common sense

Page 2

DESIGN REFINEMENT

FINAL BUILD PLAN

Method and Madness

For this project we were working with our Fix Partner testing prototypes to solve the issues that were present with the existing Lap Tray. From our prototypes and measurements, we created a Solidworks file, this allows us to use CNC tools and have accurately scaled technical drawings.

We will also use the file to help us in purchasing the correct amount of materials. The dimensions and some quick calculations will allow us to go into the shop knowing the size of the material we need to buy. Also using the website to see what the shop has to offer helps. For example;

We went to B&Q to see what materials they had and we picked one we liked. While in the shop we also discovered that they can cut sheet material down for us. After this we went online to get the exact measurements that are available and to compare prices of other sizes. The full sheet is the best value, especially with the cutting service available to us.

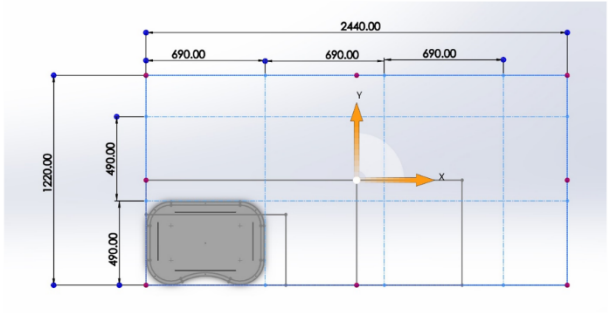


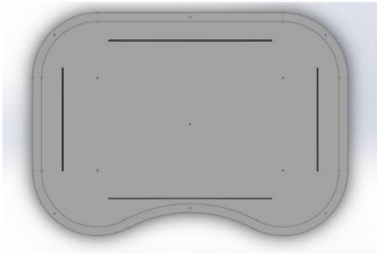
Figure 1: Our template with sheet material sizes sketched. Includes cut lines

1. Template

Material: 6mm Acrylic

Processes: Laser Cutting, Drilling

This part will be laser cut from a sheet of 6mm thick acrylic. To do this a drawing must be created. We did this using Solidworks. After it is created, it will be saved as a ".DXF" file in 1:1 scale so that it can be laser cut correctly.



The part itself will be the exact dimensions of our finished tray. It will consist of an 'Outer ring' and the 'inner part'. Both will be cut at the same time. It will have holes for mounting the template to our workpiece. These holes will be countersunk. The inner section also has small slots removed to allow the position of the foam cushioning to be marked.

2. Mid-Plate

Material: 9mm Hardwood Plywood

Processes: In-Store Cutting, marking out, Shape Cutting, Flush trimming

As mentioned above the raw material will be cut into more manageable 'blanks' in store for us to work with. One of these blanks will be marked out with the full template. The template will be screwed down to the material to keep it from moving while marking it out. The screw holes will not be visible once the tray is assembled. The template will then be removed so as not to damage it. We will then cut close to the line with a Jigsaw. The template will then be re-attached so that a 'Flush trim' bit can be used in the router to get the dimensions exact.

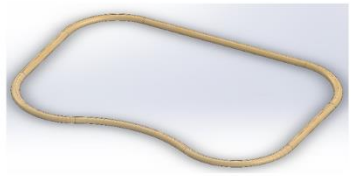
DESIGN REFINEMENT

FINAL BUILD PLAN

3. Top/ Bottom Plate

Material: 9mm Hardwood Plywood

Processes: In-Store Cutting, marking out, Drilling, Shape Cutting, Flush trimming, Rounding-over

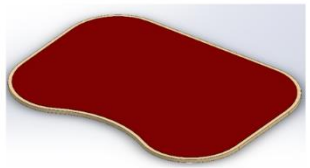


The top and bottom plates are the same profile and the process of producing them is the same. We will take a 'blank' and mark it out using the 'Outer' template only, as the inside portion will be removed. Once the piece is marked out the template is removed. A hole that is bigger than the Jigsaw blade is drilled into the waste area close to the line. This allows the jigsaw to be used to cut out the waste area without cutting through the piece that we want. Similar to before we cut close to the line with the Jigsaw. We will do this to remove the inner portion and shape the outside. Once the shaping cuts are made, we will re-attach the template and use the flush trim bit to bring it to the pieces to their final sizes. With the Template still attached we can use a Round-over bit in the router to add the radii to the inner edge. The Template can then be removed.

4. Non-Slip Table Cloth

Material: (PVC/ PVB) Wipe clean Table Cloth

Processes: Marking out, Cutting, gluing

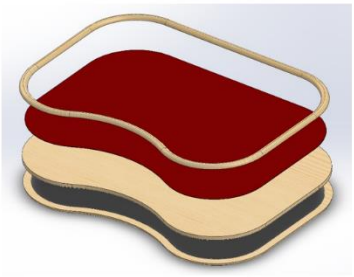


This part will be marked out using the inner portion of the template. Laying the template on top of the material will be enough. Only the outer edge needs to be marked. When cutting out the shape we will cut it slightly oversized so the edge is concealed between the top plate and the mid-plate. It will then be centred on the mid-plate and glued down.

5. Assembly of Tray

Materials: All parts made in 1-4, Glue, Small wood dowel, Damp Cloth, Newspaper, Masking tape

Processes: Drilling, Gluing, Clamping

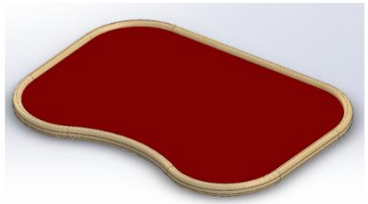


To assemble the tray the pieces will need to be gathered. Layout the pieces in the order that want to glue them. To help with alignment of the pieces we will use small wooden dowels in the screw holes left after using the template. We may need to drill these out to be slightly bigger. Spread some glue on the surfaces and align the dowels and press together, use small spring clamps around the perimeter to hold it all together. If we don't have clamps exercise weights may be used to apply pressure to the joints. Watch for glue squeeze out and wipe up with a damp cloth. To protect the tablecloth surface, it is a good idea to mask off the area that will not be in between the top-plate and the mid-plate. This is easy to do with some masking tape and newspaper, just be sure to follow the inside profile of the template or the inside edge of the top-plate. Now we wait for the glue to dry. Overnight is probably best for this.

6. Finishing the Tray

Materials: Assembled tray, Beeswax finish

Process: Routing, Sanding, Waxing



We want to leave the masking we put in place in the last step, it will keep tablecloth surface clean. To start off with we will need to round-over the outside edges of the top and bottom plate. We didn't do this in step 3, because a flat surface is easiest to clamp to, and provides a little stability if we needed to use the weights as a clamp. Once the edges are rounded over, we can sand the wood up through a few grits to make it smooth. We can then clean the wood surfaces of any dust and apply the wax using a bit of soft cloth. With this you will want to follow the instructions on the pot of wax you are using, ours says to buff/ polish it out immediately. At this point you can remove the masking on the table cloth if you want.

DESIGN REFINEMENT

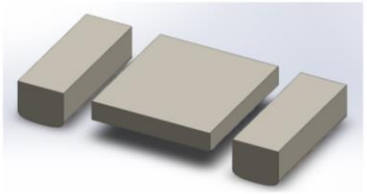
FINAL BUILD PLAN

7. The Foam Blocks

Materials: Foam, Double stick tape or Foam glue

Processes: Cutting, gluing the layers together

The foam we will be using is a soft mattress topper that we had laying around at home. When I was in the fabric shop, I was advised to use a bread knife or serrated blade to cut out whatever shape we need. Our shape is a rectangle of the dimensions in the drawings. The depth of our foam is 50mm so we will be layering it to get the thickness we want. To stick the layers together we will be using double stick tape or Foam glue. The two side cushions will be the same.



8. Cushion Covers

Materials: Outdoor Fabric, Thread, Velcro, Zippers, Double stick tape

Processes: Marking out, Cutting Fabric, prepping to stitch, Sewing

The Covers are like a soft box that we will be packing the foam into. So, the way we make one would be like laying out the net of a cardboard box, and instead of gluing the pieces together we will sew them. The dimensions will be almost the same as the foam block going into them. The difference is that we will need to have a seam allowance. We will work out the dimensions that we need and then mark our fabric. The foam blocks will be square, so the curves seen in the picture above will be created with the cover shape. To get the curves we will mark out a couple of the sides with the curve we want. When the fabric is marked, we can cut it out. Before we start sewing, we want to make sure that our colour thread is in the sewing machine. Once we have checked that we can prep the seams we are going to sew. We do this by putting outside faces together and using the double stick tape along the edges we are going to sew. We won't be sewing through the double stick tape because that will be within our seam allowance. The zipper and Velcro will be added to the pieces before they are all sewn together. See the pattern drawings for the placement of those. Once all sewn together, they can be turned the right side out and the foam can be put it. It may take a few minutes to get the foam into the covers and sitting the way you want.

9. Attaching the cushions to the Tray

Materials: Velcro, Staples

Processes: Marking out, Removing carefully, Stapling

Using the inner piece of the template, Mark the position of the padding on the underside of the tray. Attach the 'Loop' side of the Velcro to the 'Hook' side that you stitched to the covers. Remove the backing from the sticky back of the 'loop' side. Press the cushion into position where you marked on the underside of the tray. Carefully remove the Cushion so the 'loop' side Velcro stays on the tray. Now that the Velcro is in place, we can staple it to the tray to make sure it doesn't accidentally come off. It is important that we don't use staples that are too big here, so that they don't poke through to the top side of the tray. Repeat for the other cushions. Attach the cushions to the tray for the final time and it is complete!! Congratulations.

Figure 2 - Side Cushion Template. Required 2 of

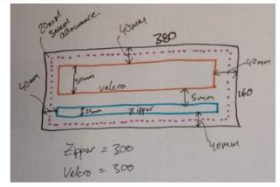


Figure 3 - Side cushions bottom plate dimensions

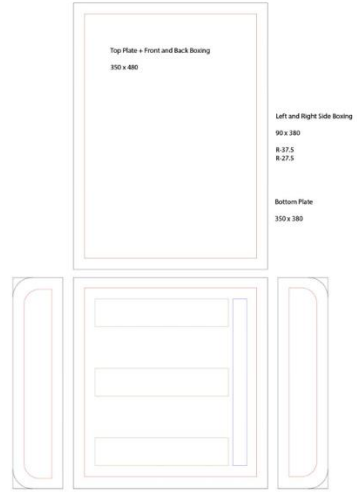


Figure 5 - Centre Cushion Template

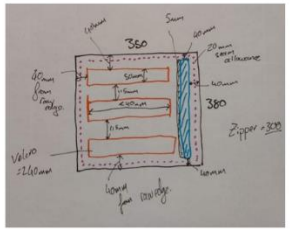


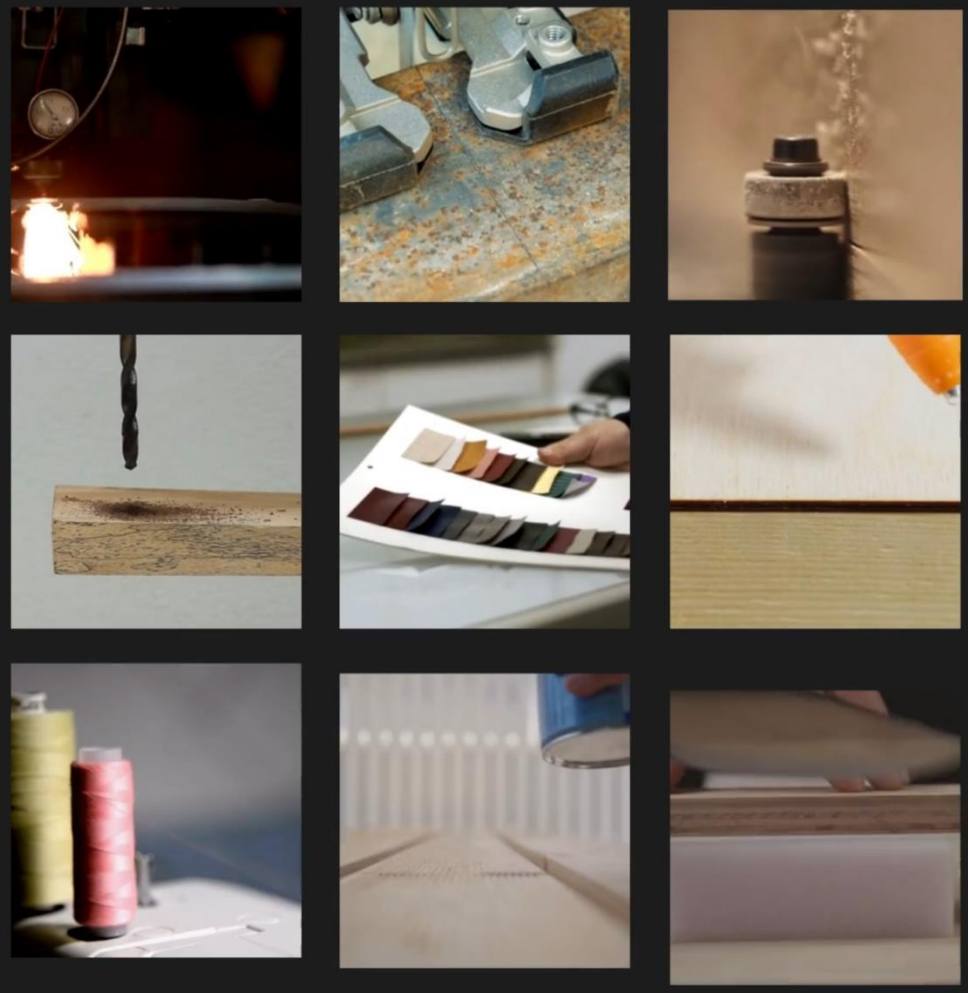
Figure 4 - Centre cushion bottom plate dimensions

FINAL FIX

DFM BUILD PROCESS

F Phase 3 - "The Build"

1. Laser cutting the template
2. Using the jigsaw to cut out tray sections follow template
3. Routing the inner and outer edges of the sections to obtain a curve
4. drilling dowel holes in preparation for gluing
5. cutting out the non-slip material
6. Gluing the tray together
7. Sewing and stuffing the 5 modular cushions
8. Sanding and Finishing the tray
9. Final Assembly



FINAL FIX

TRAY TOP FABRICATION

F The Build - Process

Drilling dowel holes in preparation for gluing

Cutting out top material to desired shape, prepping surface

Gluing the top surface material on

FINAL FIX

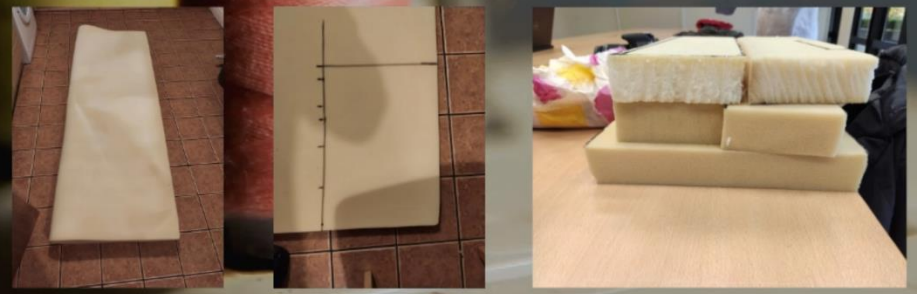
CUSHION MANUFACTURE & ASSEMBLY

F The Build - Process

Sewing the 5 "modular" cushions together

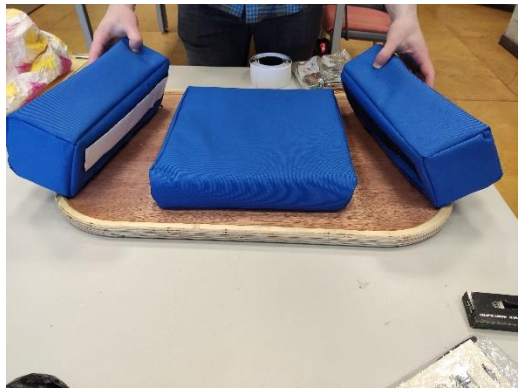
Sanding & finishing surface of wood for waterproofing + stronger grip

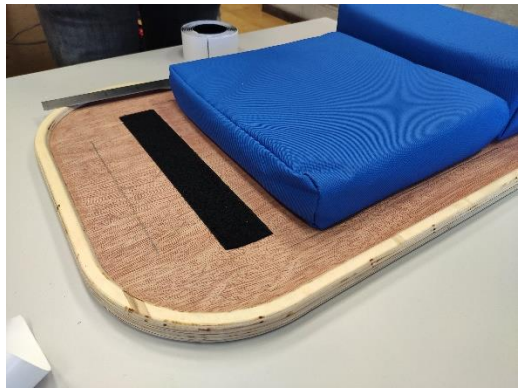
Cutting the mattress foam to exact dimensions for each cushion



FINAL FIX

FINAL ASSEMBLY





FINAL FIX

FINAL ASSEMBLY

Build LOG – Chronological step by step process of each phase of the build

BUILD LOG

1. Research

We needed to know what problems we were trying to solve and how we might go about solving them in the best way. We did this through a visit to our fix partner and his carers. During the visit we recorded some video clips and had good conversations.

Issues we needed to solve

- Stability
- Height Adjustability
- Shear/ Slippery surface
- Places to hold onto the tray (carer)
- Arm support (user)
- Easy to clean (Hygiene)
- Surface size
- Multiple use scenarios: chair/ wheelchair/ bed (Modularity)

Dementia Requirements

- Spatial awareness (particularly colour)
- Personalisation
- Size requirements

2. Prototyping

Knowing the issues, we were trying to solve we used cardboard and foam prototypes to find the best shapes and sizes to use for our final fix. During this stage we had regular video calls with teammates to bounce ideas and talk through what we were thinking.

3. Planning

Once we had figured out solutions to most of the issues, we needed to solve we started planning how we might build this item. What materials we would use, what we had on hand and what methods we had available/ knew how to do already.

This involved a few iterations of solid works models and plenty of discussion around dimensions and such. We emailed our lab technicians seeking information about certain processes and materials and what might be possible for us to get done during our allotted week of construction.

4. Monday

Monday was the day where a lot needed to happen. We needed to purchase the majority of the materials we were going to need. We also needed to get a lot built. On top of that we had a class in the morning.

We had from our cad files the dimensions of the cushions and fabric needed so we had 1:1 template printed out by a print shop on campus.

Page 1

BUILD LOG

4.1 – Materials

We already had purchased the materials for the cushions or had it on hand so that left the materials for the wooden tray.

We went to B&Q to get the material we wanted in the dimensions that we needed, at the best value price we could. We had to do this first because certain dimensions would need to be adjusted based on the thickness of the material.

At this time, we were also looking for, and found, a suitable colour vinyl tablecloth material to use as a non-slip surface for the tray.

4.2 – Laser cutting

After purchasing the material dimensions were confirmed on the drawing file for our template that was being laser cut. We wanted to get a template laser cut so it would have accurate dimensions and it would also ensure that the layers of material would be very close in size after machining.

4.3 – Marking out the material

We used the laser cut template to mark out the 'blanks' that we had gotten cut from the material in B&Q. Having the blanks cut at B&Q kept waste to a minimum and made transporting the material easier.

4.4 – Jigsaw Cutting

After we had the blanks marked out using our template, we used a jigsaw to rough out the shape of our tray. The template was removed for this process so as to not to damage it accidentally. This was an easy process for the outside profile of the layers, however to cut the inside profile of the top and bottom layers we needed to drill holes into the waste area so that we could cut it out without cutting through the piece we wanted to use.

4.5 – Routing to template

After the rough cuts were made with the jigsaw, the template was reattached to the workpiece so that a flush trim bit on a router could be used to bring the middle plate piece to its final dimensions. On a flush trim bit, the cutter is in line with a guide bearing. The guide bearing follows the Perspex template and cuts the material below it to the exact dimensions it follows.

For the top and bottom plate layers the template was also attached. A different router bit was used however. We used a Round-over bit to achieve rounded edges so it would be more pleasant to hold and grip onto. Similarly, there is a bearing that follows the template and the cutter removes the material below it. While routing it was important to feed the material into the bit from one side only. This is because of the direction the blade/ bit spins and it is safer this way.

4.6 – Drilling out holes

Small screws were used to secure the template to the workpieces. After removing the template from the workpieces small holes remained. These holes were in the exact same place on all three work pieces. We drilled them out to accept a small diameter wood dowel. The small wood dowels when in place would serve as locating pins to line up the three layers as closely as possible.

4.7 – Vinyl Non-slip surface

We used the inner template to mark the back of the vinyl material so we could cut it out. We cut it slightly oversize so that the edge would be pinched between the mid plate and the top plate

Page 2

FINAL FIX

FINAL ASSEMBLY

Build LOG – Chronological step by step process of each phase of the build

when the tray was assembled. This would keep a clean edge around the tray and look neater when finished.

4.8 – Rough Sanding

We gave every piece a rough sanding to limit the amount of work we would have to do the next day.

4.9 – Gluing

At this stage we had the top and bottom and mid - plates cut out and machined. We also had the vinyl surface cut out. It was time to assemble the tray.

Using the wooden dowels to line up the bottom and mid layers we glued those first. We then applied double stick tape to the wood surface which allowed us to secure the vinyl sheet to the tray. We needed to make cuts in the vinyl to fit around the dowels. We then glued the top plate and did the best we could to make sure it all lined up and was even.

We didn't have any clamps so instead we used exercise weight plates to clamp it all together. To avoid dinging the pieces we used spare material we had to spread the load from the weights evenly. We then allowed this to sit overnight.

5. Tuesday

Tuesday was an important day. We had hoped to get as far as we could (maybe even finish the project build) on this day. However, plans rarely survive their impact with reality. We also had other scheduled classes...

5.1 – Sewing machine Tutorial

After the class on Tuesday morning we needed to be shown how to use the sewing machine. In this tutorial it was pointed out that we needed to have our own materials to sew with, including thread. We had asked about this in emails the week prior but our question had been overlooked and went unanswered.

5.2 – More Shopping

While gluing the tray together we noticed some small gaps that may need filling once the glue had set. We bought some fillers (that we didn't end up needing). We also needed to purchase the same colour thread as the fabric we wanted to sew. This was so it wouldn't stand out when the cushions were made. It was also because we didn't have any thread to sew with.

5.3 – Cushion Fabric Layout

After returning from the shops the sewing machine was in use so we laid out our fabric with the 1:1 template we had printed off the day before. We traced out the templates using white polychrome on the back of our blue fabric and then cut it out using fabric scissors. We cut out all of the material we would need to make the cushions for the project at once.

5.4 – Learning the sewing machine

After the fabric was cut out there was still an hour of workshop time available, we used this time to try and gain some familiarity with the sewing machine. This allowed us to go home after and 'debug' any issues we were having using the internet.

5.5 – Sanding The tray

We took all the weights off the tray to inspect our handwork. All was well and most of the gaps we had seen the day before were no longer an issue. We brought the tray outside and smoothed out all the edges with sandpaper so it was more pleasant to hold in the hand.

5.6 – Finishing the tray

After sanding we cleaned up the tray by hoovering off the dust and wiping it down with a damp cloth. Once the tray had dried out, we applied some beeswax finish and buffed it out. We let this sit for a while before applying a second coat and buffing again. We allowed it to 'gas off' overnight.

5.7 – Cutting the foam for the cushions

While we were letting the finish 'gas off' in between coats we cut our foam to the required dimensions. The foam we used was from a mattress topper that one of us had laying around unused at home. We marked out the dimensions with a measuring tape and marker. We cut it out using a serrated bread knife.

6. Wednesday

Wednesday was a very long day spent in the studio.

6.1 – Sewing machine and all its troubles

We were in at 8:30am and endeavouring to remedy the issues we had with the sewing machine the day before. The thread kept fraying and we did not know the cause so we continued re-threading the needle in an effort to continue working. In the later part of the day we decided to trying adjusting the needle to a different orientation and the machine stopped working altogether. We moved the needle back to where it was before and it started working again.

Even with all of the issues with threads fraying and breaking we managed to get 3/5 cushions sewn and looking somewhat okay.

7. Thursday

Thursday, at this stage we hoped to be done with building and move onto other things...

7.1 – Re-sewing the first cushion

We decided the day before that we would need to re-sew the first cushion that was made, because it was lesser quality than the following two cushions.

7.2 – The next two cushions

We had not bought enough zips in the shop to have zippers for the 4th and 5th cushions so we had to devise a patter that would not use a zip. Then we needed to sew the cushion covers together. These covers still used Velcro and while stitching this we discovered that the machine was not fraying the thread anymore. (we thought it might have been because of the Velcro).

7.3 – Assembling the whole tray

Now that all of the cushions were sewn and stuffed, we needed to assemble the tray. This involved attaching sticky backed Velcro to the sewn-on Velcro and placing the cushion in the position we wanted on the back of the tray. We removed the cushion and then stapled the Velcro to ensure it would not come off after some use. It was during the cushion removal we discovered that the stitching for the Velcro was failing and that it would need to be re- sewn.

7.4 – Re-sewing Velcro

This involved ripping the panel with the Velcro from the rest of the cushion and re-sewing the Velcro, and the re-sewing the panel to the rest of the cushion. Once all the Velcro was securely fastened to the cushions, we could put the foam back in and re-assemble the tray in its entirety.

BUILD COMPLETE

FINAL FIX

FINAL VISIT – FIX SOLUTION

STABILITY HEIGHT ADJUSTIBILITY NON-SLIP SURFACE APPROPRIATE HAND GRIPS SUFFICIENT SURFACE SIZE MULTIPURPOSE USE MODULARITY

DEMENTIA REQUIREMENTS – SPATIAL AWARENESS COLOUR PERSONALISATION SIZE REQUIREMENTS HYGIENE

FINAL FIX

FINAL VISIT – FIX SOLUTION

FINAL FIX

FINAL VISIT – FIX SOLUTION

FINAL FIX

FINAL VISIT – FIX SOLUTION

FINAL FIX

FINAL RESULT - SHOWCASE

In Context Use – Wheel chair Scenario

FINAL FIX

FINAL RESULT - SHOWCASE

In Context Use – Meal in bed Scenario

FINAL FIX

FINAL RESULT - SHOWCASE

In Context Use – Meal on sofa Scenario

FINAL FIX

FINAL RESULT - SHOWCASE

In Context Use – Caregiver Instructional Demo

FINAL FIX

FINAL RESULT - SHOWCASE

In Context Use – Multipurpose Demo Board

F

Final Result & Fix "DEMO"

Fix Partner in context use - bed

Fix Partners favourite meal!

Fix Partner (carer) in context use - wheelchair

Fix Partner (carer) in context use - sofa

Fix Partner (carer) in context use - wheelchair

FINAL FIX

FIXPERTS VIDEO – TEAM 1

Please enjoy our video – Click on either one of the play icons below to view…

REFLECTIVE WRITING

DRISCOLL'S MODEL OF REFLECTIVE WRITING

What, So What, Now What…

What?
The Fixperts project was an interesting project in many ways. The brief was specific but broad. This enabled me to focus on research techniques such as deep immersion in order to gather key findings and carry out observations in a more thorough way, taking empathy into great consideration. The magnitude of existing solutions currently available for Fixperts provided a insightful platform in which to choose appropriate research techniques most suitable for a particular area of interest. I had to take the current covid-19 phenomenon into account when choosing a suitable fix partner and when planning each stage of the project for maximum interaction between my fix partner and my team. The change in circumstances enables you to view a project under a new microscope and adapt as a product designer.

So What?
The biggest challenge for me was attempting to explain my concepts in a clear and concise way in a virtual setting. Initially it proved quite difficult and cumbersome but I learned how to implement existing technologies and adapt them for suitable use in a online environment. This was an invaluable skill to attain for future work further down the road. Empathic prototyping and a feedback driven approach is a powerful way of utilising human centred approaches and a must to truly gain an understanding of your users needs

Now What?
Overall I feel my experience was mostly positive. The learning curve of forcing yourself to step out of your own shoes and into those of your fix partner requires great attention and understanding. In future I would be more open to new design approaches that particularly focus on design for social impact and inclusivity. The physical needs and requirements of users often overshadow the emotional and social implications when implementing solutions. In future I will attempt to learn how to measure this on a deeper level.

Anthony Carey

"The physical needs and requirements of users often overshadow the emotional and social implications when implementing solutions. In future I will attempt to learn how to measure this on a deeper level."

What?
The Fixperts project served as a grounding for us as designers, bringing us back to something that we often overlook or forget about in our quest to become the next best thing worldwide. That things that we overlook, arent in fact things but in fact are people. Designers are problem solvers, and this time we are trying to solve an issue that affects a real person on a day to day basis.
Not only that but it was a challenge to interact soley online until the build week. I think we did extremely well in communicating over the teams platfor which was relatively new to us, and we made that along with onedrive work for us.

So what?
Our good communication in the early stages and throughout the project allowed us to remain on the same page and work through any differnces of opinion we may have had in a fair way. This made planning what we were going to do when we got on campus that much easier and better. The quality of our finished prodict is clear and can be traced back to the amount of detailed planning we did in the weeks leading up to the build.

Now what?
The overall experience of the module was a very positive one. I worked well as part of a team. I learned a new skill in sewing and re-kindled an old interest in woodworking. This project has aslo inspred me to be on the lookout for things that I can do easily that will make a big difference in someones life. Everything does not need to be about us all the time... This is something that I would like to carry forward in my projects, the topic of design for inclusion and doing so in a manner that is sensitive to the needs of the end user(s). This has been my favourite poject to date. - Adam

Adam Finnerty

"The overall experience of the module was a very positive one. I worked well as part of a team. I learned a new skill in sewing and re-kindled an old interest in woodworking."