TECH_306

ASSESSMENT TASK 3

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Contents

2. Design Brief & Marketing:

Identification of a specific design need for a user:

The product I am designing derives from the Ikea Arkelstorp, which is described as a coffee table with the option to expand and withdraw to suit smaller home environments (Ikea, 2023). The success behind the Arkelstorp is given in its ability to function within small living room environments, while also providing a modular design to expand the surface area of the tabletop. In relation to my design, the primary need for both target markets I intend to identify and capitalise towards is the longevity and appropriate utilisation of a coffee table that will timelessly exist. The reason why the need I am aiming towards is geared with a focus on longevity and genuine purpose, is because I strongly believe that coffee tables are not explicitly defined for their intended role, and serve primarily as an arbitrary piece of furniture in a household.

Who will use the product:
The primary intended target market for this product will be aimed towards households in both apartment and domestic household settings. Although there is no specific age range behind this target market, it is designed to suit the contemporary design of modern houses, with a census from Ikea Climate Report, (2022) claiming most household owners are between the ages of 19 and 55, making it ideal for a design to exist timelessly within a home setting. With the original design this product derives from being the Arkelstorp (Ikea, 2023), my design intends to extend the setting of the Arkelstorp by expanding it from small, enclosed apartment spaces, into slightly larger and more inviting living room areas while retaining its initial purpose. With Ikeas sheer focus on mass manufacturing and producibility (Ikea Climate Report, 2022), I found an opportunity to expand their market base with my design by creating a sustainable piece of furniture that will have a longer life span and fit effortlessly in any environment. Although coffee tables have existed since the 17th century, creating coffee table that not only suits 21st century design but remains practical, is why I chose the homeowners demographic. With the average of most standard coffee tables costing between $150 - $1200, the atypical material choice consists of a veneered particleboard, artificial board, or engineered wood (Index Box, 2022). Although there is a degree of environmental sustainability and consistent producibility, it does not retain longevity within how long the product lasts for, and does not establish a sense of premium quality. With the product I am designing, the utilisation of a natural hardwood that can explicitly be identified, makes it more ideal as a key piece of furniture that can be empathised with.

The secondary market my design aims to target are schools within the education sector. The reason why it targets this demographic, is because of how coffee tables can be utilised as a multipurpose piece of furniture that expands marketability by allowing younger audiences to interact with the design. My design achieves this by integrating simple geometry, shape and colour schemes to appeal to classroom settings by offering a unique and diverse piece of furniture which students can empathise with due to the natural wooden elements of the design piece. From personal primary research, schools typically incorporate modes of furniture made of particleboard that s laminated, as it is a cheaper and more manageable solution to classrooms. However, with a growing trend of open-learning environments in school ever since Covid-19, students particularly in primary education would benefit from being able to work on, and interact with a piece of furniture that serves significance as a timeless piece within the classroom, and can serve as an item to treat well and show respect to.

When and how often might they use the product?

For the primary target market, the product would be used on a consistent daily basis, as coffee tables are often considered the key centre piece of furniture in a living room that ties the lounges, entertainment units, and together (Icons, 2023). As coffee tables mainly serve the purpose of holding drinks and storing items, this design will be able to be utilised consistently, acting as the main conduit for the end-user to interact with (Icons, 2023). In comparison to the secondary market being the education sector, this table would be used regularly during weekdays for students to engage their work with, while on weekends it would remain inactive due to a lack of students present. Despite the tables inactivity on weekends, it's existence during the weekdays suffices for its absence, as countless students will be interacting with it on an hourly basis, opposed to the circumstantial interactions the primary market may have with the coffee table.

Description of specific design context.

This design focuses on the context of 21st century modern Swedish furniture design by redesigning the Arkelstorp product (Ikea, 2021), and expanding upon the niche established in the original Arkelstorp design. By assessing small living environments as the key component that proved to be successful for the Arkelstorp, my design intends to not only retain the comfortability and sleekness of the design, but to also expand it into modern households with larger living rooms, as well as classrooms for students to engage in. By diversifying the context this design will suit, it will be able to extend its planned obsolescence, while also serving more functional and symbolic value aside from existing as a household placeholder item.

Demonstrate an ability to analyse a design opportunity based on an existing design problem/s informed by research.

Opportunity came for this design after realising the vast majority of coffee tables that exist for coffee tables are constructed of less premium and cheaper cost material. With a design opportunity such as this, emphasising the use of local natural hardwoods accentuates the value in timber design within furniture, making it ideal to redesign a common household item such as the Arkelstorp. With a hyper-functional focus attached to the Arkelstorp, my design capitalises on lost areas such as ergonomic function and aesthetic appearance by integrating key desirable aspects such as space and contemporary two-tone design into the table. As Berry, (2017) notes, coffee tables are notorious for pets and children to interact with, where the Arkelstorp particularly would have had issues addressing this as it incorporated many sharp edges, hinge folding mechanisms, and had a very easy-to-scratch top due to the pine softwood (Pine Timber Products, 2023). For my design, the rounded edges prevent any potential injury from sharp corners, while the American oak sealed in polyurethane is scratch resistant, and the table does not use any hinge locking mechanism, making it safe for all ages. With the ability to improve upon a design weakness such as this, the opportunity presented itself as a chance to design a product that could redesign the Arkelstorp to another level.

Demonstrate an ability to write a concise set of specific design constraints (which become evaluation criteria)

Design Constraints	Explanation	Evaluation Criteria
The design must retain a degree of minimal form factor	- The main reason why this design must retain a degree of minimal form factor, is so that its longevity and planned obsolescence can extend for a greater duration of time, as the end-user is able to better interact with a product that they feel are invested in since they have had to construct it. - With the original design being the Arkelstorp being a key featured product of Ikea, it is evident according to Ikea, (2021), that their items are flat-	- Did the design retain a degree of form factor that allows it to be shipped and distributed, while also having the ability to be taken apart if necessary. - Is the design augmented in a manner that allows for the size of it to suit in any specified environment?

	packed and assembled by the end-user. With an end-user option setup like this, mirroring my own design to retain these traits is important in extending my product.	
The design must focus on curvature as a design theme	- Curvature is a key design feature of my design as it provides a new perspective on how my product needs to be aware of the spatial form it takes. - The reason why I want this table to follow a degree of curvature as the main theme, is because a report by Article, (2023) states that contemporary 21st century design is become more geared towards the exploration of curved geometry to progress from 20th century blocky shapes. - With a greater trend towards curved shapes, opting for a simple circular geometry allows for construction to be more streamlined and manageable, while the circular shape helps to offset typical square enclosed living rooms (Article, 2023). - Curvature for the design also means that there are no sharp edges or corners, making it ideal for younger children, mitigating any risks of injury.	- Does the design showcase curvature as a primary feature of the design? - Does this curvature contribute in showcasing and establishing the product as a unique recognisable design? - Is the focus on curvature explicitly shown and evident to see for the end-user? - Does the curvature contribute to other aspects of the design?
The design must show modes of mass-manufacturability	- Modes of mass-producibility is a key underlying constraint that the design needs to achieve, as it aims to draw from the Arkelstorp and maintain the ideal of being a product that can be manufactured in large quantities, but with the addition of feeling premium and lasting several generations. - The design will need to utilise forms of jigs, moulds, and simple geometric shape construction to achieve a sustainable mode of mass-manufacturability.	- If the opportunity presented itself, is the design capable of mass-production? - How does the design achieve mass-production? - Are the materials being used capable of allowing mass-production to be achieved from a sustainability basis?
The design must adhere to safe workplace and product standards.	- Specifically pertaining to AS 2070:1999, which is the Australian standard relating to plastic surfaces for food contact use, it is important that for my design, the finish used is food-grade safe, especially if it is covered in a type of	- Does the table adhere to Australian Standards? - What considerations have had to of been made to ensure safe work standards were met? - Who are the man audiences of concern with these safe work standards?

	thermoplastic. There should also be awareness for the type of gluing substances being used, as they can protrude through the surface and be a potential cause of harm, especially if the surface has not been finished or sealed. - Although there is no specific guide for height within the design of coffee tables, AS442-2018 can associate with my design as a guide, since it provides a general idea of how the table should relate and be considerate of other items it may be interacting with such as lounges, beanbags, and TV units. - AS1428.2 is another Australian standards that my design needs to achieve, especially with the education sector being the secondary target market, as the standard focuses on having rounded edges with no protruding sharp corners. This is especially important within my design, as compared to the Arkelstorp, it takes one of its key weaknesses being sharp edges on the hinges, and improves it to be more user-friendly.	
The design must be environmentally sustainable locally, and reduce future carbon footprints immensely.	- To be more environmentally sustainable, my design will focus on the safe sourcing of timbers from local areas, while ensuring that they are FSC approved. - Although my design will not be using artificially constructed timbers, it will incorporate an equivalent amount of sustainability in comparison to the Arkelstorp, and will follow and integrated Lifecycle analysis plan over its duration.	- Where are you sourcing the FSC approved timbers? - What measures are being put into place to decrease the environmental carbon footprint of this table? - How does your lifecycle analysis allow for sustainable production and planned obsolescence of this design?
The design must empathise with an individual.	- This constraint is important for the design, as it provides unique value to the product and establishes the coffee table as a more meaningful piece of furniture that can better be taken care of. - By allowing users to better empathise with the design, it contributes to the sustainability and lifecycle analysis plan, as it extends the longevity of the products use, and provides the end-user with a design that can last several generations	- How is the end-user expected to empathise with the design? - Why would the end-user empathise with a coffee table? - Is empathy relevant to the end-user with a product such as this?

	due to the types of hardwood timber the design will be made of.	

Considerations and design context statement.

Design Considerations	Design context statement
The design should show a degree of refinement in how it is presented and finished	- The design will need to consider this key point as an aspect of the final product as it should be presentable from both a finished perspective, and a deconstructed perspective so that the end-user understands the components that are to be connected. - The product should be finished and presented appropriately, so that the end-user is able to feel a degree of luxury and pristineness to the product, making it feel like a quality item.
The design should incorporate a mode of two-tone design themes	- Two tone design is a consideration the design should integrate, as (Article, 2023) notes how 21st century furniture design is about identifying contrast and appearance, making it ideal for a 21st century product design such as this to incorporate a level of commonality to make it more marketable. - The two-tone of the design will help in making key features of the table more prominent such as the tambour door and the surface top, whereas without a distinguishment in colour, it is more difficult and less noticeable to see.
The design should encompass space-saving and functional components of an atypical coffee table.	- As this design is redesigned from the Arkelstorp, it is important that it retains space-saving and functionality from both an internal and external point-of-view. - Internally the table needs to have enough space to place typical household items such as magazines, phones, newspapers, and assorted accessories, while also integrating a type of closing panel/ mechanism to avert the viewing of items to make the table look more homogenous as a single piece of furniture. - Externally, the table needs to not only fit in small living room environments, but it needs to occupy a surface area of space that still allows for an atypical person to place coffee mugs, food platters, or decorations on, and not feel too cramped.

Innovations and properties and/or performance characteristics to hypothetically market the redesigned product prototype.

Context	Plus	Minus	Interesting
Size	- The size of the design still maintaining a small form factor, but having enough surface area to interact with having household items such as coffee mugs, food platters, and decorations present, makes it ideal for the context it is aimed towards. - The size of the design is also good for packaging, as the maximum occupancy size it needs is a 600mm diameter, meaning it can be packaged in a square box easily.	- The size of the table may not be big enough to suit all the needs of an end-user that needs more surface area to work with. - The size of the table may also not fit in with certain living environments that are designed differently from standard households.	- The size of the table being 600mm is interesting, since it occupies enough room to house multiple coffee cups, laptops, and accessories, based off my own research and investigation. - The size is also interesting because of how it can become a smaller form factor and be transported easily as a piece of furniture.
Shape	- The circular shape of the design allows for the coffee table to encompass more of a living room/ environment, and distinguish it as a piece of furniture that can be identified. - The shape also makes the coffee table feel more inviting, and offsets sharper geometry within a living room.	- The shape of the table may not work homogenously with other pieces of furniture in the living environment, due to how imposing the round shape is. - The shape of the table may also make it difficult to place larger items on top of it.	- The shape of the design being circular is interesting, because of how it physically imposes itself in a living room. - The circular shape in contrast with the flat lined wood which transfers to the tambour makes for a unique offset in shape and appearance.
Weight	- Although American Oak is a heavier type of wood, the lightness from the Tasmanian Blackwood helps to offset the weight difference. - The weight of the American Oak is also good for weighing the table down and providing it with structure, whereas the blackwood is also good for connection joints and housing the American Oak surfaces more lightly.	- The weight of the table may prove to be too heavy due to the American Oak, which also poses the potential risk of harm if it were to fall over. - The weight of the table may also place additional unnecessary weight on the legs to begin with.	- It's interesting how although the American Oak is a heavier type of wood, the durability of the material makes it ideal as a tabletop. - The weight of the table will also not be too extreme, making it suitable for homeowner to still interact with, but should still be cautious of how heavy it may be.
Cost of the material	- With the price of American Oak varying between $60 to $110 per linear metre, it is considered to be a relatively expensive material, making this design pricier. However, since the	- The American Oak costing more, will raise the total cost of the oak materials to approximately $220, while the blackwood will cost approximately $140. With an approximate $360	- The cost of the material is interesting, because despite how expensive it may be on the surface, it reflects in its quality for when the item is sold.

	American oak is only used on the tabletop surface, it only requires a small amount. - The Tasmanian Blackwood is the primary material for this design, and is approximately $26 per linear metre, making it more affordable and cheaper to use, as Australia has an abundance in Blackwood (Tasmanian Blackwood Growers, 2016).	material cost, excluding the gluing, domino pieces, knock-down fittings and polyurethane finish, this product will cost approximately $430 to create for each product piece. - With a $430 manufacturing price tag, this product will retail for a higher price in comparison to the Arkelstorp.	
Manufacturability	- This design is good from a manufacturing perspective, as it utilises jigs to create the main construction of the exterior, while the remaining parts such as the legs, tabletop, and half-crossed halving joint are made with simple joinery techniques. - Manufacturability is also a benefit of this design as it uses knock-down fittings to make it easier to construct and deconstruct, while also allowing the end-user to better interact with this product. It is also very easy and intuitive to assemble, however, to accompany Australian Standards, there will be both a visual and written instruction manual for assembling.	- Since this design primarily utilises raw materials being the hardwoods, it is dependent on a consistent supply of American Oak and Blackwood. - Although the jigs are useful, components such as the legs require skill-use in lathe work, making it dependent on an individual to make every leg.	- The manufacturability of the design is interesting too since it utilises jigs, simple cut shapes, and basic geometry to form a design that show's a degree of complexity when forming it together. - Although there are less complex methods of joinery, it's also interesting how this can be viewed as beneficial, as it makes it easier for the end-user to interact with, and does not require an expert woodworker to understand how the table is joined together.

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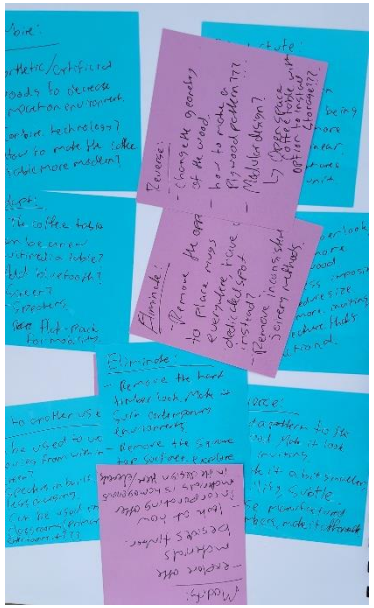
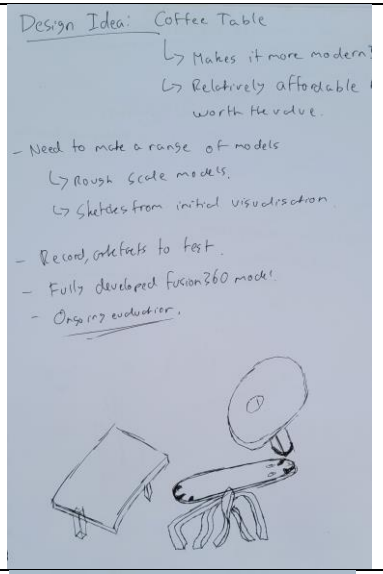
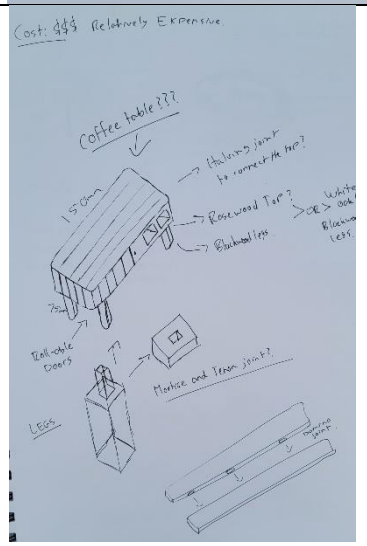
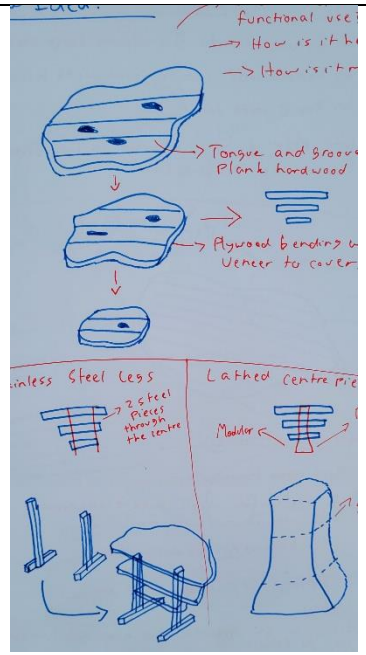
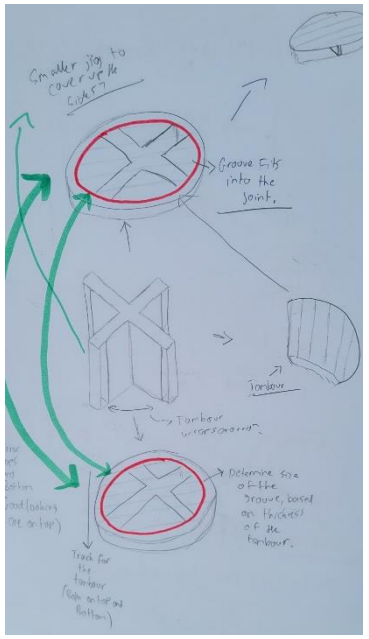
3. Conceptual design development:

Design Thought	Evidence	Explanation
Creating a scamper to establish the initial concept development idea, and to then conceptualise an idea based on formulated ideas.		- At this stage of the design process, I was contemplating what design I should redesign, especially since I desired to redesign a product that would have an impact towards me. - I ultimately chose to do a coffee table since I did not have one in my living room, and if I were to choose a coffee table, I would expect one that was high quality and felt premium, as it would be the focal point of my living room every day. I also felt drawn to the fact that most coffee tables are constructed out of poor materials despite appearances, and are very expensive. - By creating a scamper, I was able to determine what I wanted to create, design, and think about aspects of the coffee table to design differently from a standard coffee table. - The scamper aided in analysing the purpose of a coffee table, and provided an expanded outlook on how I could improve the design.

Initial concept design sketching based off the information idealised in the scamper prior		- This is an initial concept sketch I made based off the information from my scamper. - Within this sketch, I was conceiving thoughts and ideas for a table that I believed to be unique and different. - However, without a key focus point to guide my ideas off, or any pre-existing research, it was very difficult for me to communicate my thoughts into images.
Realising a concept idea from thought to actuality and determining whether a more real-world and practical project can be constructed based off the initial idea.		- At this stage, I had already begun researching a few products on the market, especially the Arkelstorp product. - I decided to think of functionality and the ability to manufacture the product as key factors of consideration while drawing this sketch. - Aspects of the design I considered included the option of Tambour sliding doors, mortise and tenon joints, and domino joint connecting tabletops. - I felt that this design was very simplistic and did not offer anything unique compared to other coffee table I found online. - I also did not resonate with this design too well, as it did not have any defining properties that made it unique.

Revisiting concept design sketching with practicality in mind to determine whether a constructive product can be made with key conceptual ideas at the core.		- This stage of concept design development was when I decided to be more explorative with design themes such as biomimicry and bio-morphism, as I was interested in the different forms and modes of timber I could potentially create. - Within these design sketches, I looked at creating jigs and moulds for thin pieces of timber to wrap around, in the hopes that it would form together and remain as a fixed structure. - After communicating with peers, I realised that this project was extremely ambitious, and was not viable from a consistent producibility perspective. - I also realised that although this design was conceptually rich, the execution was not viable for a project within this timeframe, nor would it be a project that a typical end-user could interact with regularly.

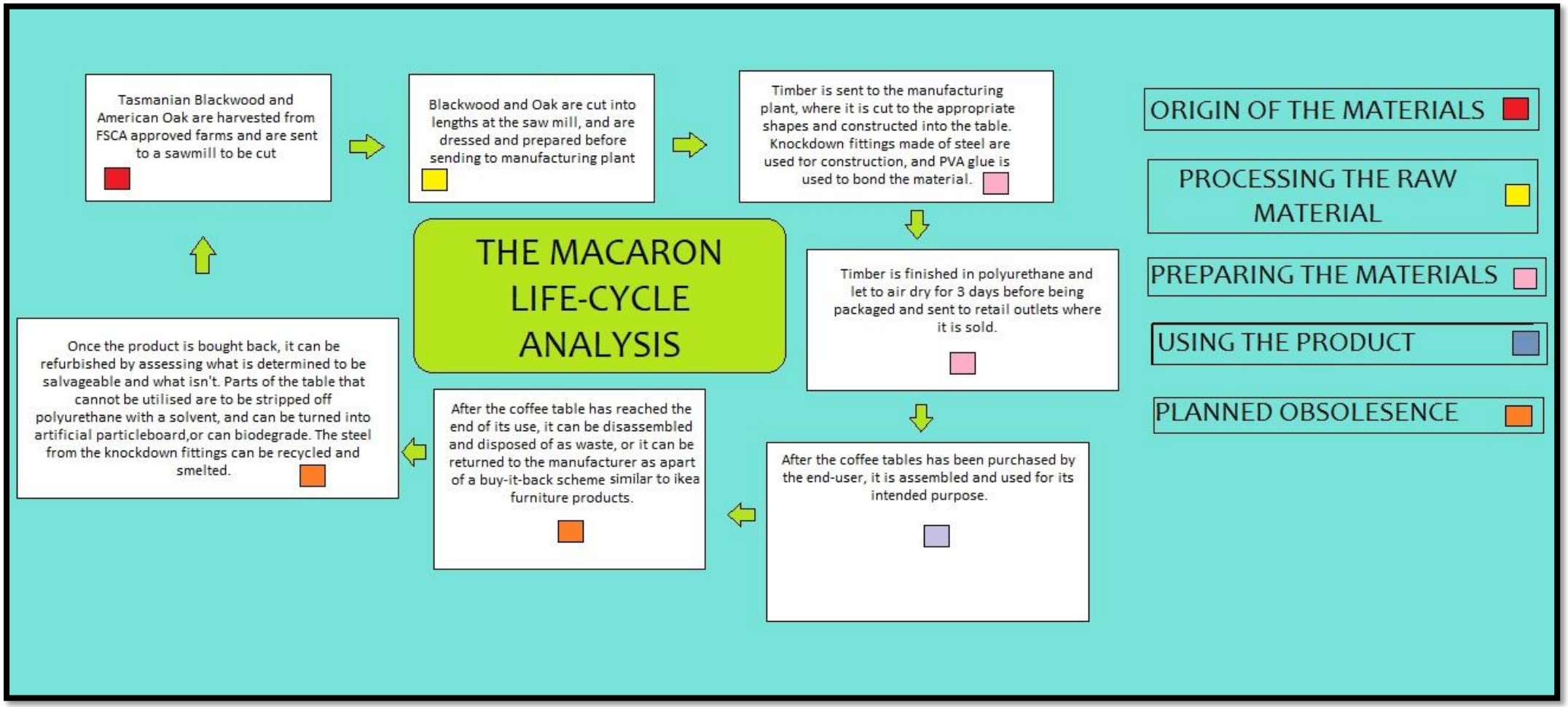
Considering the nine product design factors and focusing on a design after real-world practical scaling, and then determining methods and modes of construction.		- This was the final concept design development I did, which encompasses the prior concept ideas, but with a sense of realism and actuality, since this product had a 12-week timeframe to be constructed in. - I decided to take aspects of potential manufacturing on board for this design concept, as I wanted to design a product that was unique but viable. - I ultimately decided upon this design idea since it incorporates a variety of geometric shapes, and takes into consideration how everything will be assembled. - I also chose this design, as the concept would be easy for the end-user to recognise and interact with, while also feeling premium, since every aspect of the product is visible for the end-user.
The following examples are renders of how the final product turned out.		- The design renders featured here are examples of what I intend for the final product to look like. - From the initial concept sketches to a working model in this render, it is evident to see how the process is ideation has conceptualised an idea into a project.

4. Sustainability:

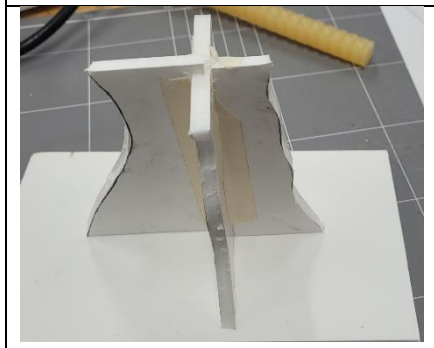
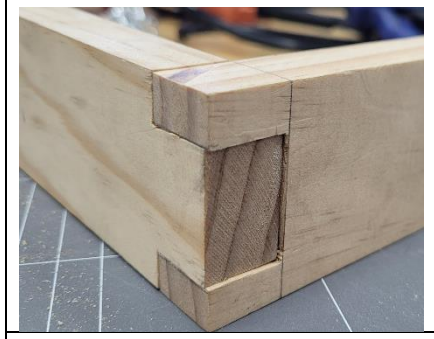
Sustainable related design factors	Original Design	Redesign
The product is manufactured out of environmentally sustainable materials that are low impact during and after production.	- The Arkelstorp is made from particleboard, pine wood, and coated in a lacquer, making it a product that is easy to construct from. - Since it utilises pine wood as the main structure, preparing and cutting it is very manageable (Cameroon, 2021). - The particleboard is also good for the project, as it reuses excess wood trimmings and wood waste in a more efficient waste. - Unfortunately, the particleboard is dangerous during the manufacturing process, as it is bonded with formaldehyde and resins, while after it is also dangerous to the environment if the external lacquer coating is not removed.	- Since the design will only be made from whole raw materials being the Blackwood and Oak, there are not environmental concerns during the production process, aside from ensuring the polyurethane finish dries properly. - Although polyurethane is an environmentally sustainable material, it can be argued that extracting it utilises a significant amount of energy and resources, however, it yields a substantial amount.
The product utilises materials that can be derived from a steady source for consistent manufacturing.	- Since the Arkelstorp derives their pine wood specifically from FSC approved forests located in Eastern Europe, they have a large abundance of materials to work with (Ikea Climate Report, 2022) - Ikea is also known to have their pine woods come from any FSC environment that they have access too, especially if it is closer to their manufacturing facilities in different countries (FSC, 2023).	- For this design, the Tasmanian Blackwood is in sheer abundance, making it an ideal choice of material for the project. - Unfortunately, American Oak may not be as heavily prominent, however, it is able to be sourced ethically enough for this project to engage in the potential for mass-manufacturing.
The impact the product has on the environment is minimal.	- The Arkelstorp is inherently not dangerous for the environment as it is a timber constructed project. - The only areas of concern the Arkelstorp may have, lies in the acrylic lacquer that coats it, which is not biodegradable, and the particleboard which has resins bonded to it.	- This design will have a low impact on the environment from two main perspectives. - The first perspective is that the design utilises strictly wooden material in their natural form, meaning that they are biodegradable and do not have a detrimental impact on the environment. The steel associated with the design can also be smelted and reused for other purposes.

		- The second perspective is the push for this product to last for a lifetime. Although this design may pride itself on using timber for sustainability, there are still concerns that the lumbering of countless trees can affect the environment negatively, which is why providing the end-user with a product that is featured to last several decades will assist in reducing the constant need to log down new trees. - This design will also incorporate a buy-it-back scheme, which is aimed at retrieving the table from customers that no longer want it, and refurbishing it so that it can be sold again.
The product is not only sustainably sourced, but complies with regulatory standards.	- The Arkelstorp cooperates with the FSC standards of forest stewardship in maintaining the environment (FSC, 2023). - The Arkelstorp also considers a lifecycle analysis which Ikea details heavily as apart of their reduced environmental emissions scheme (Ikea Climate Report, 2022)	- This design will adhere to the FSC approved source for materials specifically for the blackwood and oak. - This design will also ensure that any excess timber cuttings and trimmings are disposed of effectively, by having them recycled and used to create mulch or particleboard through external companies.

LIFECYCLE ANALYSIS:



5. Experimentation and Testing:

Evidence/ Artefact	Explanation
	- To begin the design of my project from my scamper, I decided to model my ideas in my head to see whether I could take something physical and then draw it. - In this design, the ideas was to determine whether I could create a tree shape that utilises bio-morphism and can wrap veneers around it. - I found that during this test, the project was very ambitious, and that researching pre-existing product designs would be a more optimal way of determining how I should shape my product. - I made two more test models after this foam prototype to gauge what a final product may look like.
	- This is a test experiment I did to determine whether a comb joint such as this would be worthwhile for connecting the tabletop together. - I also used this joint to inform me whether it would be useful from a mass manufacturing point-of-view, in which it informed me that it would take too long to do on a consistent basis.
	- After I had ironed out my concept drawing, I began testing aspects of the design that I had researched prior, such as laser cutting a tambour door, which is what this photograph demonstrates. - The idea of laser cutting the tambour door was so that manufacturing would be faster on an industrial scale, and so there would be a degree of uniqueness associated with the design compared to a typical tambour. - Although this design pattern was not the strongest, it still allowed the material to flex and work for a brief moment in time. This test helped to inform me of pattern shapes and lines to follow, which I later experimented using 3-D printing.

 	- This lathe experiment was used as an example to indicate how skill in the safe-operation of a wood turning lathe is important for creating this design. - Although the pieces from this image does not reflect what the product looks like, it informed by decision to use a lathe for this design, and provided a good basis and background into what I need to keep improving on so I can create a quality product.
	- This 1:4 scale 3-D printed model is emblematic of the final physical test and experimented I attempted, as it showcased a working tambour door, and visualised how the final product would look like. - Despite being a 1:4 scaled model, it incorporated all of methods of joinery intended from the concept idea, and connected homogeneously with each other. - Although the legs are not tapered in this model, it represents an initial concept design as the legs are still an aspect of consideration within the production of this coffee table.

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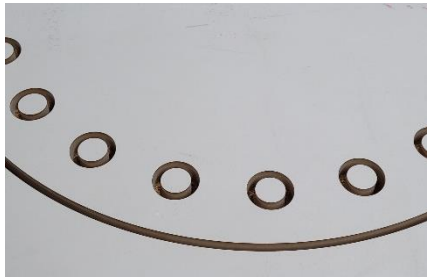
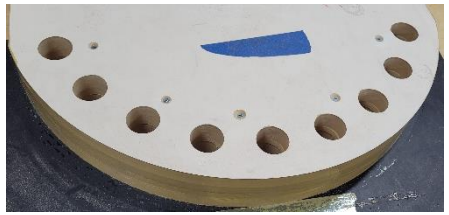
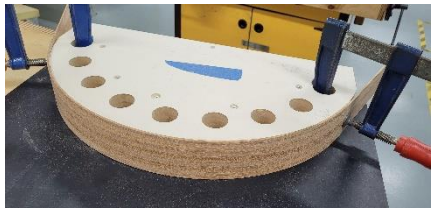
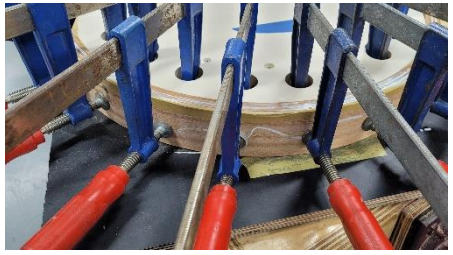
<td> 
 
 
  </td>
<td>- This wooden jig made out of MDF timber was constructed to act as a construct for creating the bent wooden shape.
- This jig incorporated small holes which were CNC laser cut out to help clamp the project to the timber.
- The jig was set to make a 90-degree angular curve, however, overhang to 180 degrees was factored in to ensure any spring back from the timber would be accounted for.
- The curved timber being tested was a spotted gum, which was cut into thin strips, and wrapped around the jig until it reached a thickness of 20mm.</td>
</tr>
<tr>
<td>  </td>
<td>- This test helped to inform what thickness I should be cutting the thin strips to.
- The initial thickness I tested for the material was set to a 7mm thickness, which gradually reduced to 4mm in thickness after stress testing the material for bending.
- The material being tested was also very straight grained, which made it easier to bend, making it a consideration for when it is produced more consistently</td>
</tr>
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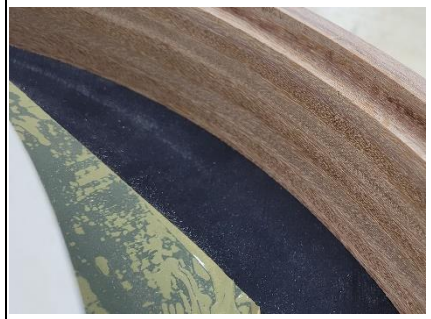
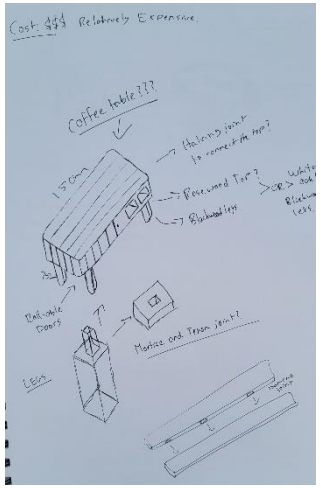
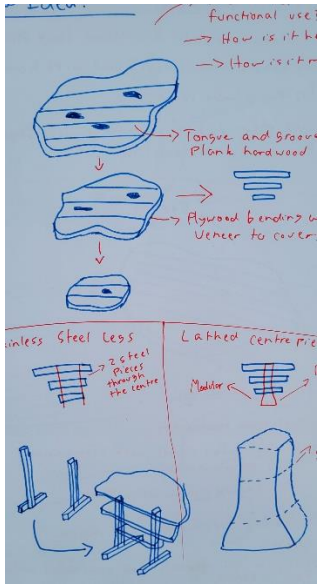
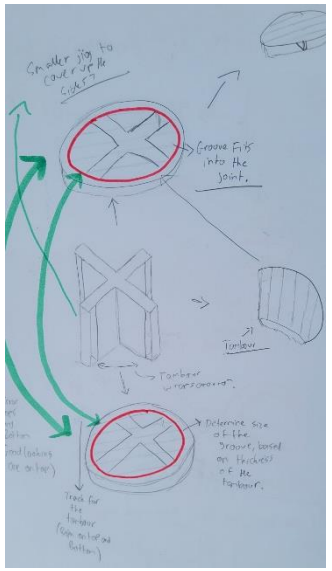
	- This test was made with the curved form timber, where I attempted to make a rebate joint on the table router. - This test was to determine whether a rebate joint could be made on the curve, and whether the glued strips of timber would hold together. - Ultimately I found that for areas of the timber that were glued less cohesively, the layers flaked apart and chipped away, whereas the more connected areas had no issues passing through the router.

6. Perseverance:

Design Changes	Explanation
	- The areas of this design project initially began coming to fruition once I had a suitable concept constructed in the form of a visual drawing. The idea I was initially considering followed on from the Arkelstorp design, which was hyper-focused on functionality. - With functionality being a key focus point of the Arkelstorp, I designed my product at this stage to incorporate a tambour door with open-close space, a large surface top area, and regular open-storage areas. - I had conceived the idea of using a mortise and tenon joint to act as a key indicator of pristine within the product as it would highlight woodworking joinery, while the domino tabletop joint would be convenient for making the surface. - The reason I did not opt for this design was because it was very ambitious and large, and did not reflect the ideas I intended to expand upon from the Arkelstorp. - I also felt as if the design did not have a key defining aspect that made it unique from other coffee tables due to the geometry of the concept.

	- For this design I decided to explore modes of biomimicry and bio-morphism in an attempt to conceptualise a different and more unique approach to the design. - By using trees as the key inspiration for this design, I had idealised that the furniture design would incorporate layers of different shapes to imitate a tree and highlight the shape and form factor of the concept. - After foam modelling this design, I soon found that it would be extremely difficult to make, especially with the timber bends required being extremely harsh and sharp. - I also found that this design was not modular and did not demonstrate space-saving capabilities well, making it not ideal for construction, or for the end-user. - The construction of this design would also be heavily glue-based and requiring several cuts of timber, causing a significant loss in materials , thus making this entire project both unsustainable and uneconomical.
	- This concept design idea was the final constructive one I came up with, which attempts to incorporate more features associated with the Arkelstorp such as the space-saving and modularity of the design, with explorative shapes and design themes such as the circular table look and the two-tone colour design. - This design concept attempts to apply real-world joinery techniques such as the halving joint to reinforce the centre portion of the table with circular tambour designs, and rebate joints to connect the entire project together. - Although the legs are not illustrated in this design, it is intended to incorporate knockdown fittings to make it more modular, while the simple joinery also makes it easier for the end-user to assemble and interact with.

7. Evaluation:

EVALUATION CRITERIA	PRODUCT DESIGN FACTOR	JUSTIFICATION	WAYS TO ACHIEVE THIS	CHECKING METHOD ON FINISHED PRODUCT
Relevant Evaluation criterion (as a question)	Which product design factor does the criteria relate to?	Justification (why it is important to the design situation, etc.)	Actions to achieve in the product design process (e.g., research, measure, trial, test, practise)	How to check if achieved, and to what degree, on finished product
1. **Did the design retain a degree of form factor that allows it to be shipped and distributed, while also having the ability to be taken apart if necessary.**	Economics	As this design was catered towards improving upon the Arkelstorp (Ikea, 2023), maintaining a level of form factor is important in ensuring that this design extends from an existing key strength of the original design product. With a greater focus on modularity within the design, not only does making a modular design benefit the manufacturers since they do not need to construct the entire project every time, but it also reduces the amount of space the	To determine the viability in testing this theory, a 1:4 scaled 3-D model was manufactured, which was assembled in the same manner, using the same joint as if it were the final product. With the largest occupancy space being a 600mm diameter, the entire design can be compacted into a square box, and requires very little to assemble.	With the final product, success in achieving this evaluation criteria can be done by self-assembling and disassembling the product. The main components of this project that will require assembling includes the table top, base, legs, and cross-halving piece to tie it together. These aspects are demonstrated in the 3-D printed model, and is very straightforward in achieving.

		design occupies, which ultimately reduced the price of the item for the end user.		
2. **Does this curvature contribute in showcasing and establishing the product as a unique recognisable design?**	Visual, tactile, aesthetic	One of the major weaknesses of the Arkelstorp was its appearance from my perspective, as it felt very cheap with the fold out hinges, and did not establish a very prominent appearance. Using this as a factor for consideration within my final design, I decided that emphasing the visual aspect of my design would benefit the overall appearance and identity of the product. By incorporating a unique appearance to the design, I believe that it highlights the coffee table as a pristine and premium product that can last several years and suit a variety of environments.	To achieve this, testing a curved piece of timber alongside with a scaled 1:4 model would allow a better visualisation of what the design could integrate with. By creating this design in an environment that justifies its shape in comparison to other pre-existing products that are marketed, it will determine whether this evaluation criteria can be achieved or not.	To determine whether this is achieved, conducting a public survey with the 1:4 scale model and the test curved piece of timber would allow for a general consensus on what the public visualise in comparison to the evaluation criteria. For the finished product, placing the product in a typical living room environment will assist in allowing people to recognise whether they think the table is unique in design and establishes it differently from other products.
3. **What considerations have had to of been made to ensure safe work standards were met?**	Legal	Legality is a key focal point of this design as it ensures the end-user and manufacturers are kept safe within all respects. By ensuring certain Australian regulatory standards are met, not only are the end-users assured that they are not interacting with a potentially	To achieve whether the Australian Standards outlined in this document have been achieved, retrieving the information from finishes, material safety documents, and bonding agents will be important in collating this data into an informative sheet that the end-user can read.	To check whether the Australian standards on the final product have been met, asking a representative of the Australian Standards organisation to investigate the product is recommended, however, conducting your own personal assessment of the product will assist in gauging whether it has

		hazardous or dangerous piece of furniture, but the manufacturers of the product are not engaging in harmful work practices, whether it may include working with a dangerous piece of timber, or finishing the product in a dangerous substance.	Having an external party such as a timber reseller examine the furniture for any potential harmful issues is a way of testing whether the product meets legality and standards, or by using an external entity such as a retailer, they are able to identify whether all standards have concurrently been met.	achieved the criteria set out to achieve.
4. **What measures are being put into place to decrease the environmental carbon footprint of this table?**	Sustainability	- With a company such as Ikea priding their furniture products on sustainability, it is difficult to expand and enhance on their environmental friendliness, however, the approach I have taken alongside Ikea, is to decrease the overall carbon footprint by altering the advertising of the product. As my product still retains a level of sustainability with the all-timber design, I further enhanced sustainability input by integrating a buy-it-back scheme that allows the end-user to return the product once they are done with it. Since the product is also made out of hardwoods, it will typically last a longer period of	To achieve sustainable practices in reducing carbon footprint for this project, advertising this table in a manner that promotes the end-user to hold onto their product instead of disposing of it will be beneficial. Encouraging the end-user to also consider the buy-it-back scheme and renew parts if they get damaged will incentivise holding onto the item for a greater period of time.	Conducting a survey with the final product and determining whether it is viable to sustainably uphold buying back tables and replacing parts will aid in guiding how sustainability is achieved. With open-ended questions such as “Would you keep this table and replace the tabletop with a new one if it were to be damaged?” will allow the end-user to consider opportunities with holding onto a piece of furniture instead of disposing of it immediately.

		time compared to softwoods featured in the Arkelstorp, meaning that this design which is advertised for longevity can remain that way without needing to dispose of it once finished with it.		
5. **How is the end-user expected to empathise with the design?**	User-centred	Empathy with the end-user of this design is instrumental in the success of the product, as it provides a level of respect the end-user must have in understanding the coffee table as a unique furniture piece aside from strictly functional purposes. By creating a product that allows the user to feel more in tune with it, I am able to create a product that is appreciated more thoroughly and will be taken care of, reducing the impact of sustainability on the environment, and instilling a level of care for the furniture piece.	Researching how people determine what coffee table they choose when purchasing one will inform this evaluation criteria. A general consensus questioning what people look for in a coffee table, and whether appearance is a consideration will aid in understanding how well people associate themselves to a coffee table.	Comparing and contrasting results from the conducted survey with the prior researched data from online sources will inform how well users empathise with the coffee table design. By creating an informed decision with the creation of the product based on researching consumer bases, and by then attesting this with surveys to the public, identifying whether the end-user empathises with this product can be determined.

EVALUATE YOUR REDESIGNED PRODUCT IN RESPONSE TO A SPECIFIC SET OF EVALUATION CRITERIA (BASED ON AN EDITED VERSION OF THE DESIGN CONSTRAINTS)

EVALUATING THE DESIGN, PLANNING AND PRODUCTION PROCESSES

EVALUATING THE DESIGN, PLANNING AND PRODUCTION PROCESSES	
Design activities	• How could you have 'stretched' your design ideas? *I could have stretched my design ideas further by conceiving ideas that were more expansive and imaginative, with a degree of realism so I could actualise them better, thus potentially producing a more refined and better product. I could have also conducted more prior research into other forms of coffee table designs, and looked at greater themes to draw upon to better diversify how I interpreted my initial concept ideas.* • What methods could you have used to make your design more innovative or interesting? *Integrating modern 21st century technology could have made the design more interesting and innovative, since it would add a layer of practicality and establish the design as an explicit 21st century coffee table design. I could have also used other modes of materials in different respects of the design such as a lightweight particleboard, since it would highlight innovation in new forms of materiality while also decreasing the overall weight of the project in areas that does not need it being weighed down.* • What activities might have improved your design aesthetically? *Exploring more random and less refined aspects of curves would have contributed to making the design look more aesthetically pleasing and unique, however, working with timber and creating standard curved arcs was already difficult to begin with. I did conceive some ideas of bending timber to create a tree design, however, after realizing bending wood became more fragile as it became rigid during testing, I soon altered by design idea.*

	• What activities might have improved the functional aspects of the solution in your design? *Incorporating a more seamless tambour joint would aid in allowing the tambour sliding door to move more effortlessly. Having a type of roller or more evident guide on the timber pieces would assist in achieving this. Establishing key areas for the knockdown fittings to be attached would also be beneficial, however, without understanding the full size and weight of the object I am working with, it is difficult to determine whether there needs to be a precise location for the legs.* • Did your working drawings provide enough accuracy and detail? *The working drawings I utilised derived from a book, which is then tested with cardboard to gauge the size, and then adjust accordingly before placing into fusion360. Using this, I was able to create a working model which did provide sufficient detail and accuracy in the design, demonstrating how the tambour would work, and how the entire design would come together.*
Planning activities	• Did you follow your sequenced work plan? *I followed my sequenced work plan to a degree before having to experiment and test with different aspects of the design. For manufacturing purposes, everything is sequenced in a manner that allows a production plant to execute without any issue.* • Was your scheduled work plan adequate? If not, where did you need more detail? *My scheduled work plan was initially adequate, and did not need too much detail to follow once I realized a proper concept idea. I spent approximately 6 weeks determining my idea, as there were many aspects and avenues to be considerate about, but once I was settled on an idea, I rigorously tested and experimented to determine the best solutions to this design.* • Were your sequenced work plan and timeline realistic? *The plan and sequence of work I established were realistic and did follow good pacing in determining how this product would be made. By first ironing out the idea I wished to pursue, I was able to conceptualise aspects of joinery, forming, and creation which I tested and experimented with. These tests and experiments were provided with enough time, as it ultimately led me to concluding the design should be augmented in a manner that allows the end-user to recognise how it is being created.* • Did you accurately calculate the time needed for each step? What steps required more/less time than anticipated? *I did not accurately calculate the time needed for each step, as there were new aspect such as the jig and laser*

	cut tambour being experimented with despite being new additions. The area of planning I did not expect to occupy the most time was the jig creation, as that required a CNC router and table router to appropriately create. • What changes did you make to your original (designs or plans) and why were those changes made? *The main changes I made to the original design and plans relates to reining in a larger concept idea and turning it into a more realistic and attainable design which can be physically constructed and made.* • In your plan, did you choose the most appropriate and effective processes and equipment for production? Were these choices changed during production? If so, why? *Initially, I chose more complex and difficult ways of producing this product, however, after taking the considerations of the end-user, I decided that the coffee table needs to be accessible for them to interact with. Some aspect of the design can appear to look more difficult in achieving such as making the tambour and rounded circular edge on the jig, however, it is a realistic expectation of the design, and can be achieved.*
Production activities	• Was your product modified during production? If so, why? *During construction of the design, the product was not modified. I allowed the product to maintain the concept idea I had imported into fusion360, however, as a future reference, certain aspects of the design, specifically the 1:4 scale mode could be altered such as the positioning of the legs to make it feel more natural instead of linear.* • Did you work safely? *During the testing, experimentation, and construction of this project, all safety measures imposed were adhered to without any harm conducted.* • Did you manage your time effectively? *Within every opportunity of production, I utilised the time to effectively create tests and pieces whether it related or did not relate specifically to the project so that I could determine whether it would attribute to the design of my project. Tests that were unplanned such as the laser cut tambour and table router joint aided in the creation of the final product.* • Did the quality measures you put in place assist you? *The quality measures being a product that demonstrates a premium and quality feel contributed in producing quality pieces to be showcased. By establishing a quality criteria, it ensures that the design is maintaining a standard to be adhered towards.*

	• Did you have an adequate knowledge of and experience in using the equipment and processes needed for making your product? Could skill trials and practice have assisted you? *I did not have adequate experience in a variety of machines and tools such as the table saw and jigsaw. I also did not have any experience with a wood-turning lathe, making it difficult to design legs around since it was an option I had never considered investigating. With ore skill and trials into using these tools, I believe it would have aided not only the product, but also my design process, as it would have provided more insight into what I can and cannot do with these tools.* • In what areas did you seek further information and experience? *Primarily for the tambour and curving timber. These two aspects were the areas I did not know anything about, and considered asking an expert with adequate resources to aid me in testing some curves and determining whether a tambour would work. Ultimately, the tests I conducted worked well, and produced artefacts of the design which informed the final product.*

SUGGESTIONS FOR FURTHER IMPROVEMENT

SUGGESTIONS FOR FURTHER IMPROVEMENT (Livett & O'Leary, 2011, p. 47)	
a. Aesthetics	○ How could the visual, tactile, and aesthetic factors of the product be improved? *From a visual, tactile, and aesthetic point of view, expanding the outlook of shape and form for this design would greatly improve the way this product looks. As I kept the design to very simple geometric shapes, it can be argued that it is simplistic in nature, thus providing an opportunity to expand on the curvature of the design and create something more personalized and bespoke.* ○ Look at your use of line, colour, texture, visual proportions, etc. *From a line point of view, the tambour in comparison to the tabletop wooden planks creates a consistent vertical upwards line throughout the table which is then offset by the curvature of the table itself. The colour of the table*

	follows a two tone between dark and light, immediately drawing attention from the end-user. The visual proportions are also adequately achieved between the main body and legs, however, I did consider that the tambour itself was quite high and could be useful in reducing size.
b. Functional aspects	○ Could the safety, ergonomics, performance, and sizing be improved? *The sizing of the product could be improved if there were a safe and more viable way of expanding the tabletop surface. I attempted to incorporate a hinge mechanism while ideating, however, I believe it would have caused a safety concern, especially since the secondary audience I am targeting is the education sector.* ○ Do the secondary functions enhance the design? *Secondary functions of the table include storage primarily, in which the four dedicated areas to draw from greatly assist in enhancing the functional aspect of the design. By enhancing the amount of storage within the product, it build from the Arkelstorp and solves a weakness which that design had.*
c. Suitability of materials	○ Are the materials flexible or rigid, strong, or light as needed? *The materials are both strong and light typically, with American Oak being the stronger material, as it is good for impact and scratch resistance. The Tasmanian Blackwood is light making it ideal for packaging and distribution, yet it is also very strong and durable as a material.* ○ Does the combination of materials work well? *The colour contrast of the Tasmanian Blackwood with the American Oak works well as the stark difference in colour makes both aspects of the design more prominent. It also makes both materials recognisable with the wood patterns, and establishes the coffee table as a unique furniture item.*
d. Quality	○ Is it durable, reliable with strong joins and ease of maintenance and repair? *The design is durable and incorporates both strong and simple methods of joinery. With the tabletop and base being domino jointed and glued together, the two other primary joinery modes is the cross-lap halving joint, since that keeps the table top up and separates the top and base, while the knockdown fittings connects the legs to the table top, meaning that they are adjustable and can be swapped out in the circumstance they need to be shipped or renewed if they break.* ○ How could the quality be improved? ***Quality of this product can be achieved by better understanding the client demographic I am targeting for both primary and secondary contexts. By understanding if it does actually suit a context appropriately, or if there is an aspect of home living or the education sector I have missed, I can rectify that error to better improve the product.***

	For this product, there is a lack of primary research into my target markets, making it more difficult to realise what I should be looking for in a coffee table, which is why it is important to ensure the end-user have had their opinions and thoughts communicated thoroughly.
e. Sustainability	*From a sustainability perspective, ensuring there is a stable supply of the materials is important, however, the American Oak would be one contentious aspect of the design which may not incorporate a thoroughly consistent supply. From a long-term and mass-manufacturing perspective, allowing production to occur locally would be the most sustainable mode of production, while considering how workers interact with the product from both a sustainable and work, health, and safety perspective will be paramount in how the product upholds sustainability practices.*

References:

Article. (2023). Timpani Charme tan ottoman. Contemporary, Mid Century & Modern Furniture | Article. https://www.article.com/product/15364/timpani-charme-tan-ottoman

Australian Government. (1997). Environment Protection Act. https://www.legislation.act.gov.au/a/1997-92/current/pdf/1997-92.pdf

Baker, T. (2020). Mild steel properties & uses | Structural steel fabrication. https://www.bakersteeltrading.co.uk/what-can-mild-steel-be-used-for/

Berry, C. (2017, April 6). What design can do. Medium. https://craigberry93.medium.com/what design-can-do-288e5f6ab363

Cameroon. (2021). Pine wood: Properties, characteristics & uses in detail. https://cameroontimberexport.com/pine-wood-properties-characteristics-uses/

Core77. (2015). How IKEA is managing their natural wood push. https://www.core77.com/posts/31232/How-Ikea-is-Managing-Their-Natural Wood-Push

FSC. (2023). Wood | Forest stewardship council. fsc.org. https://fsc.org/en/businesses/wood

Icons. (2023). Magnus coffee table. Icon By Design. https://www.iconbydesign.com.au/Magnus Coffee-Table-Solid-Walnut 120x70x43cm~19892?wickedsource=google&wickedid=EAIaIQobChMI-o-e D76i6_gIV1aCWCh3a8AoGEAQYAiABEgI3zPD_BwE&wickedid=&wcid=17811846687&wv =4&&&gclid=EAIaIQobChMI-o-D76i6_gIV1aCWCh3a8AoGEAQYAiABEgI3zPD_BwE

Ikea Climate Report. (2022). IKEA Climate Report FY21. IKEA. https://gbl-sc9u2-prd cdn.azureedge.net/-/media/aboutikea/newsroom/publications/documents/ikea-climate report-fy21.pdf

Ikea. (2018). Creating a sustainable IKEA value chain with IWAY. https://about.ikea.com/en/sustainability/building-a-better-business-with-iway
IKEA. (2021). Hej and welcome to IKEA Industry. YouTube. https://www.youtube.com/watch?v=tKN0AVIaYuw

IKEA. (2023). Wood - IKEA. https://www.ikea.com/au/en/people-and-planet/were-big-fans-of wood-pub7d894da1

Ikea. (2023). Arkelstorp coffee table. IKEA. https://www.ikea.com/au/en/p/arkelstorp-coffee-table black-90353016/

Index Box. (2022, September 12). U.S. particle board prices. IndexBox. https://www.indexbox.io/blog/particle-board-price-july 2022/#:~:text=In%20July%202022%2C%20the%20products,411%20per%20cubic%20 meter)%20were

Kustom Paints. (2023). Acrylic lacquer. https://kustompaints.com.au/product-category/automotive paint/automotive-coatings/acrylic-lacquer/

Mistry, K. (2017). Particle board properties. https://gharpedia.com/blog/particle-board-properties/

Monnappa, C. (2020, February 27). IKEA won't raise prices. https://www.reuters.com/article/us ikea-india-idUKKCN20L1OJ

Mukpo, A. (2020, June 29). IKEA using illegally sourced wood from Ukraine. Mongabay Environmental News. https://news.mongabay.com/2020/06/ikea-using-illegally-sourced-wood-from ukraine-campaigners-say/

The Pennsylvania State University. (2023). Why does lumber need to be dried? https://extension.psu.edu/why-does-lumber-need-to-be-dried

Pine Timber Products. (2023). Pine Timber The Complete Guide. https://www.pinetimberproducts.com.au/articles/pine-timber-the-complete guide/

Scott Metals. (2023). Products. https://www.scottmetals.com.au/bars Swedish Wood. (2023). The forest and sustainable forestry. https://www.swedishwood.com/wood facts/about-wood/wood-and-sustainability/the-forest-and-sustainable forestry/#:~:text=As%20much%20as%2083%20percent,other%20broadleaf%20trees%2 0(see%20fig

Tasmanian Blackwood Growers. (2016). Timber Price Lists. https://blackwoodgrowers.com.au/2016/07/01/bunnings-timber-price lists/#:~:text=Prices%20for%20the%20Standard%20Grade,a%20limited%20range%20o f%20sizes

U.S EPA. (1996). COMPETITIVE IMPLICATIONS OF ENVIRONMENTAL REGULATION. https://www.epa.gov/sites/default/files/2017-12/documents/ee-0214h 01.pdf

WoodSolutions. (2020). *Blackwood | WoodSolutions*. https://www.woodsolutions.com.au/wood-species/hardwood/blackwood#:%7E:text=Blackwood%20has%20a%20good%20overall,also%20good%20for%20steam%20bending.

Worksafe WA. (2001). *Safe use of chemicals in the woodworking industry*. https://www.commerce.wa.gov.au/sites/default/files/atoms/files/guide_chemicals_wood.pdf

MACARON - COFFEE TABLE

WHAT IS THE MACARON?

The Macaron is a coffee table inspired by the shape of a Macaron cookie!

The Macaron coffee table focuses on being contemporary, functional, and easily manufactured amongst all other things it can do!

The Macaron coffee table is made out of both Tasmanian Blackwood and American White Oak, providing a nice contrast for the homeowner in their living room!

AESTHETICS AND APPEARANCE

The Macaron follows rounded curvature to sit softly in any home environment. Although the primary shape of the table follows the theme of a Macaron biscuit, it also incorporates straight edges and 45-degree cut angular legs to allow it to distinguish itself more clearly. The colour contrast provided by the oak and blackwood provides a two-tone contemporary theme to the design, exenuating the natural materials being utilised.

USES AND FUNCTIONALITY

The Macaron incorporates a substantial amount of space with four dedicated storage sections in the main body of the product. The four sections are separated by a cross halving joint, while a tambour laser-cut door is used to open and close half of the coffee table at once. The surface of the coffee table also makes it suitable for surface top work such as using laptops and drawing, while the height keeps it at the same level as a typical couch.

PRICE: $799

This coffee table just isn't some cheap run of the mill budget table!

This coffee table is made out of premium American Oak Timber and Tasmanian blackwood, providing a premium to the design, and encompassing the rich natural materials local to Australia.

For $799, it accounts for the majority of the materials costs, while also factoring in labour and production fees.

QUALITY AND USER-FRIENDLINESS

With both American Oak and Tasmanian blackwood acting as the only hardwood materials for the design, the Macaron is made of natural materials and is refined to a stage that allows the end-user to assemble it by themselves. As the product incorporates a variety of forms and jigs, it is made with the intention of it being simple for anyone to setup, while also ensuring that each product is made with a high quality.

SAFETY, ERGONOMICS, SOCIETY AND THE ENVIRONMENT

This design is safe for users to interact with as the project will be sealed in a polyurethane that will be air-dried in an open environment. The surface will all be sanded down before adding a finish to ensure there are no potential risks of splintering.

Ergonomically, the Macaron occupies a 600mm diameter, making it small and compact, yet it retains a large amount of storage. From a societal point-of-view, this project reinforces contemporary appearance, and uses locally sourced sustainable timbers, while also incorporating plywood to make the tambour.

From an environmental perspective, the timber components can be recycled and decomposed of, while the knock-down fittings attached to the table, can be re-used or recycled as they will be made of steel.

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Product Marketing

This product is set out and marketed in this manner to promote colour and vibrancy to people reading this. Although it does not go into heavy detail about each aspect heading, it provides a general detail about what the product is, and how it is relevant to them.

TECH306_RISK ASSESSMENT TABLE SAW

A. Production
B. Work Environment
C. Product

RISK ASSESSMENT TABLE

[A] RISK ASSESSMENT: PRODUCTION

Step, process, material or equipment	Hazard	Possible injuries	Level of risk		Safety precautions or controls needed to minimise risk
			Likely? (H/M/L)	Serious? (H/M/L)	
Retrieving the material and having it setup for preparation to be cut on the table saw.	- Quality type of blade being used for the operation of the table saw. - Height and thickness of the table saw blade. - Unnecessary objects protruding on the tabletop. - Potential splintering of the material during preparation of cutting. - Uneven work surface and/or work material.	- Damage caused to the user if the blade being operated for the material is not appropriate. For example, using a chipped table saw blade to cut through Rock maple timber is extremely dangerous, especially at a lower speed. - If the table saw's height is not set appropriately, it may protrude through the timber too far, causing unnecessary risk for objects to accidentally fall into it, or for and individuals body parts to accidentally touch the blade. The thickness of the blade is also important for the type of wood being cut, as most are typically 3mm thick, however, it is still important to ensure you have the appropriate amount of teeth on the blade, and there are no damages with it. - Having unnecessary object in the vicinity of the table saw may cause items to flick away if it enters contact with a moving blade, or it may prevent the table saw from running the material, especially if an external object	M L M L M	M L H M M	- To minimise the risk of using the appropriate table saw blade, it is recommended to inspect the equipment in accordance with the engineering controls within the hierarchy of controls. - To minimise the potential of this risk, it is recommended to adjust the table saw blade to only protrude through the timber if ripping/ cutting it entirely, or to have marking guidelines setup within the timber to ensure the user is guiding the wood appropriately. By doing this, there is less risk of having an unexpected blade protrude through, and will not stress the blade itself. - Removing all objects within the vicinity of the table will ensure that any associated risks are also removed. Without any unnecessary objects present, there will be less potential for the table saw to be interfered with. - Although wearing gloves is not recommended while operating the table saw, moving the materials with a pair of

		interrupts the guide on a jig mounted to the table saw. - Materials that cause the potential to splinter before and during the cutting process are harmful for when the user operates the table saw. Splintering of the material during operation of the table saw may cause the user to accidentally harm his/herself spontaneously if undetected. - An uneven work surface or material can be extremely dangerous if the timber catches on the blade. In circumstances such as this, the injuries that can be incurred mainly relate to kick back from the material which may hit the user directly, or push the timber towards the user and injure them.			gloves to set it up appropriately, and then allowing it to pass through the machine without gloves, and instead using a push stick, will be a safer process. - If a material is being cut on the table saw and it has not been appropriately made square on all sides and shows signs of unevenness, the best way to mitigate this is to place the timber on a jointer to have the sides jointed, and to run it through a thicknesser on the face edge, so that the material does not lift off the table saw. By doing this, you are able to provide the table saw with more grounded working area before operating.
Cutting a large or oversized piece of material	- Material is too large for the table saw and may catch the saw blade. - Due to material size, it may cause the blade to be hidden from sight and can cause potential injury. - Due to how unbalanced the material is, there may be potential kickback if not supported appropriately.	- If a material is too large for the table saw, it may catch the blade, and cause the piece of timber to shake and hit the user. Although the injury potential here is low, it will damage the material. - If the material is too thick and the blade cannot be appropriately seen, it may cause injury if the blade runs through a shorter side of the material and forcibly protrudes upwards. - Due to how unbalanced the material is, potential kickback can cause harm to the individuals' frontal area and may cause the user to fall in the direction of the timber if it catches and the user is still holding onto the materials.	L M M	M M M	- Using a separate tool to reduce the size of the piece of timber is recommended. This could include using a jigsaw, circular saw, or reciprocating saw. Only cut on the table saw if there is enough surface area to do so. - Understanding the thickness and dimensions of the material in relation to the blade is important before cutting. Always ensure the material being cut adheres to the blade and can actually be cut. Ensure the table saw has clear viewing angles before cutting. - If the material is unbalanced due to the size of it and the potential for kickback is present, initially reducing the size of the material is the best preventative measure, however, substituting

					the table saw for another tool such as the jigsaw, drop saw, or reciprocating saw may be more appropriate, as substitution one of the higher categories within the hierarchy of controls.

[B] RISK ASSESSMENT: WORK ENVIRONMENT

Aspect of the work environment (e.g. lifting materials, moving equipment, storage, space, ventilation, ergonomics of work areas)	Hazard	Possible injuries	Level of risk		Safety precautions or controls needed to minimise risk
			Likely? (H/M/L)	Serious? (H/M/L)	
Ventilation of materials being cut.	- Inhalation of sawdust and micro-particles that may damage the lungs, nasal passages, or eyes. - May contribute to unclear eyesight while operating the machine. - Build up of sawdust may impact the guidance of the table saw.	- The inhalation of micro-particles is dangerous for the lung, with artificial materials such as MDF and particleboard exerting formaldehyde during the cutting process. Red cedar and oak timbers are also known to have micro particles that are dangerous to breathe in, and can cause a shortness of breath if too much is inhaled. (Monash University, 2023). - The build-up of dust in an environment especially a small closed-off one is dangerous to the operation of the material, as cutting timber without a clear sight of the blade may cause potential injury. Furthermore, the build up of dust in the room can harm the eyes even with safety goggles on, and can be inflammatory to them too (Monash University, 2023). - If there is too much sawdust built on top of the table saw, there is the potential for materials to veer off the intended marker, and can cause injury to hands or body parts. Build-up of sawdust can also clog the guide rails	H M L	H M M	- The best way to prevent dust inhalation is to have an extraction/ exhaust machine setup to filter the dust out. The exhaust should primarily be linked directly to the table saw, however, having an overall exhaust in a room is also recommended. - Working in an open-space environment is recommended to avoid a concentrated build-up of sawdust, as the particles are less confined to a specific area, and will help to see where the operator is cutting timber. Incorporating ventilation into the working area in addition to an extraction machine will also help in the removal of the sawdust. - Alongside an extraction machine, using a manual brush will help in clearing the table saw, or an air-pressure powered blaster will aid in it too.

		for the table saw in the circumstance a jig is being used.			
Setting up materials in an open working environment	- Having people within the vicinity of the material. - Exposed sharp edges of the material. - Size and weight of the material posing a risk.	- If there are people in the area of the materials while the table saw is being used, it can be harmful to both the user and external parties if they accidentally nudge the material as it is being passed through. Too many people around the materials in general can also be harmful when it needs to be moved as it can hit people. - The exposed sharp edges of materials can be dangerous, as it can cut, scratch, and poke people that accidentally come into contact with it. Sharp edges of materials can also have splinters attached to it, which is why it is important to safely place the material in a secure area. - The size and weight of the material can cause damage to the back during the lifting phase, and can also be a risk if it is placed down on a human body part. Larger objects can cause strain to the body while moving it around, while the weight of a material may require more than one individual to move an object .	M M M	M M M	- Ensuring people are aware of the large material in the area will help prevent anyone from accidentally passing by it. Establishing cones or a perimeter around the material will also inform people to steer clear of the larger material. - Sharp edges on materials should be placed in an area that has less traffic and is isolated from people. If the material is out and has sharp edges, using a piece of tape or a foam covering will assist in ensuring people are not injured if they accidentally encounter it. - The most optimal way to account for moving heavy objects that are awkward in size is to ask for assistance from a peer, and to ensure that the material being moved is manageable. Using a lifting belt is also an item that is effective in extremely large and heavy objects, as back, leg, and grip strain are common injuries when moving larger and heavier objects.

[C] RISK ASSESSMENT: PRODUCT

Product feature	Hazard	Possible injuries	Level of risk		Safety precautions or controls needed to minimise risk
			Likely? (H/M/L)	Serious? (H/M/L)	
Potential for splintering from table saw cut	- Splintered corners and edges made by the table saw if not properly cut and refined for a finish. - Exposed grain for certain woods could	- Splintered corners made by the table saw is a rare occurrence, however, as a safety risk, it is still present due to how edges may be cut. The most	L L	M M	- Using sandpaper to remove any flaking splintered edges is recommended after a material has been finished on the table saw, or even finishing

	leak dust particles such as formaldehyde if MDF if being cut, or natural wood particles that may cause nasal inflammation.	typical injuries for this derive from finger and hand damage cause by exposed splinters. - Exposed grain that is not sealed or enclosed can gradually emit particles over time in an environment, contributing to the build-up of dangerous particles in a household. Exposed end grains also absorb moisture more quickly compared to the face and sides, making the material bode over time, and with some materials such as particleboard, it can flake (EWPPA, 2018)			the material in a thicknesser or jointer will also ensure the potential for splintered edges are mitigated. - Enclosing exposed grain in another piece of timber, or applying a sealant will ensure that no microparticles are exposed. Allowing the end-user to know what material the table is constructed of will also assist in reducing risk factors, in the circumstance the end-user is reactive to the timber itself.
Finish on the product	- The finish of the product may be a toxic chemical, especially for food-safe purposes. - The finish on the product may impose reactive allergens to an individual and should be disclosed. - The finish is slippery and has not set appropriately, making it a physical hazard.	- Finishes on timber products can be harmful primarily those belonging to oil-based variants. Linseed oil and lacquer are the most common oil-based finishes that are toxic, and can cause shortness of breath, inflammation, and the potential for death if too much has been consumed (Worksafe WA, 2001). - Reactive allergens can occur from wood finishes such as tree oil scented timbers, which can create nasal problems and sneezing for a typical person. For younger people, it may cause more intense sneezing and breathing difficulties depending on how exposed the timber is, and the type of timber in addition to the tree-scented oil (Worksafe WA, 2001). - If the product has not been allowed sufficient time to dry, wet finishes can pose a risk to the end-user, as polyurethane wet is harmful and incurs strong fumes which are toxic to the lungs. Products that are	L L L	H M M	- Establishing the appropriate finish for a product is important before marketing the product. For furniture items that require a food-safe finish, it should be explicitly stated on the product, however, for other products that may not be associated with food use, it should still be stated as a disclosure to the end-user. - Ensuring any scented timber oils are explicitly stated in a product is important in notifying the end-user of any distinct allergic reactions they may have. Transparency from the manufacturer is important in making sure the end-user can utilise the product. - Establishing designated timeframes for how long a product takes to dry, and the protocols involved before packaging it is important in ensuring any potential risks chemical injury is reduced. For more potent and stronger finishes such as lacquer and polyurethane, ensuring the product

		thicker in viscosity and are more sticky such as lacquer can also pose potential skin irritations if the end-user encounters a wet surface when engaging with the final product.			has dried in an open environment that doesn't leave a strong resonating smell is important before it meets the end-user.

References:

EWPPA. (2018). *Facts about particleboard and MDF*. https://www.australiantimbers.com.au/wp-content/uploads/2018/04/ewpaa_facts_about_pb_and_mdf.pdf.pdf

Monash University. (2023). *Wood dust exposure*. https://www.monash.edu/ohs?a=592378#:~:text=Allergic%20respiratory%20effects&text=The%20most%20common%20timbers%20causing,years%20after%20exposure%20first%20started.