Cambridge International AS & A Level Design & Technology 9705

Component 4: Project 2

General comments

This A level project follows on from the AS project produced earlier. There is clear evidence of the design process being followed, but much of the input is somewhat shallow in approach and outcome.

Criterion	Comments	Mark
Product Development [10]	The model from the AS level project is tested and evaluated before the start of development. Improvements are made as a result of this testing and aspects of form and construction methods are added to this. There is some evidence of material choice, but with little reasoning.	6
Product Planning [4]	A dimensioned working drawing is provided with outline stages of production given. This tends to be generic in nature with tenuous links to the product in question.	2
Product Realisation [20]	There are ongoing and final photographs of the product, giving the impression of a standard of production appropriate to the lower end of the top range of marks. The finish is not of the highest standard.	15
Testing and Evaluation [6]	There is clear evidence of the product being tested in use, although it shows only the items being stored with no user interaction. The evaluation against the Specification is quite shallow with no recommendations for improvement.	3
Total [40]		26

Name :

School :

Index No :

Subject : Design And Technology

Paper No : 9705 /04

Title : To design and construct a cuttlery holder

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Testing and Evaluation Of Model

TESTING OF MODEL

It is the process of testing the model on which the final design will be based and to analyse the requirements that should be made before realising the final product.

THE ITEMS THAT WILL BE USE RI TEST THE MODEL.

White plastic spoons

Black plastic spoon and purple plastic fork

Red plastic spoons

Straws

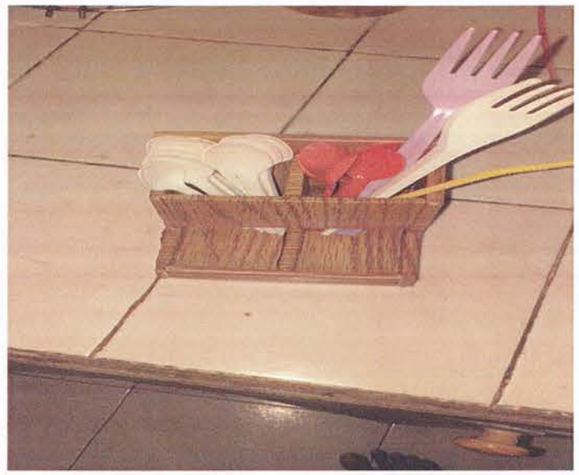
These items are used specially to eat yogurt or other things

WEIGHT : 12 - 18 grams

HEIGHT : 10 - 15 cm

They are very light

FUNCTION



- It holds the cutleries items pretty well
- It is being held in an orderly manner
- The cutlery helps to separate different types of items as shown in the diagram.

STABILITY TEST

- The cutlery is very stable as it has a large surface area in the base.
  The greater the surface area, more stable it will be.
- The model is tilted to the left of about 25° and is release.
  In this experiment, the model returned to its original position and did not topple over.
  Therefore the product is very stable.

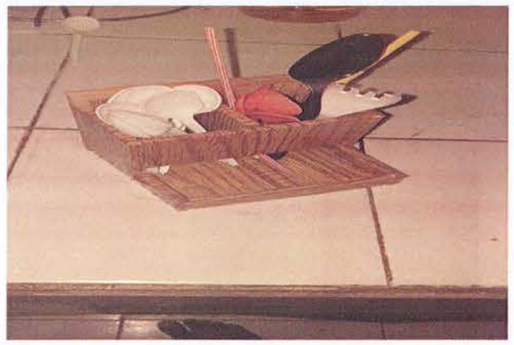
AESTHETIC

The model has been finished using a mahogany like wallpaper texture.

The model is beautiful and attractive but it could be more aesthetic and the features are simple.

Strength test

- This test is done to verify if the model can support weights.



As we can see in the diagram above, the model is strong enough to support more items on it.

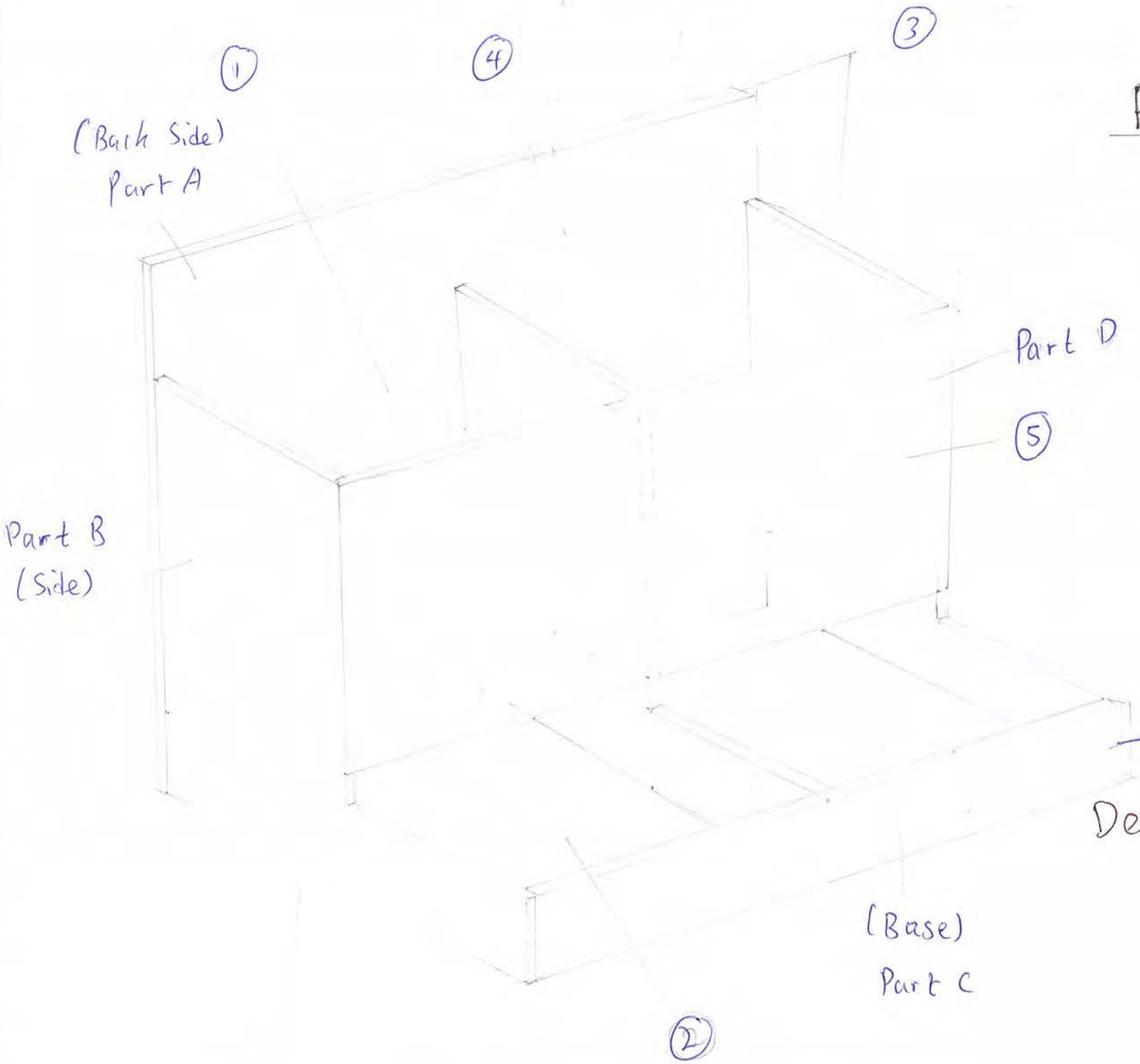
But the model can support only 10 items per storage.
As there is no more space.

Evaluation Against Design Specifications

Specification	Evaluation
1. The product must be used indoor	The product is being used in the kitchen only
2. The product must resemble a cutlery holder	The product does resemble like a cutlery holder
3. The product must be able to hold cutleries in an orderly manner	The cutleries are held in an orderly manner
4. The product must be safe to use	The product have sharp corners which is not to safe
5. The product should provide adequate storage for different types of cutleries	There is adequate storage but not enough for different types of cutleries
6. The product must not be too big to cover space in the kitchen	The product is small
7. The unit should be joined using strong wood joints for the construction	Butt joints were used for the product
8. The product must be able to keep on a bench top or can be fixed on a wall	The product can be placed on the benchtop only

Product Development

DEVELOPMENT



Chosen IDEA

Areas to develop.

PROBLEMS:

① There are not enough space to Separate folks, spoons and knives

② There are not enough storage to keep Small items like yoghurt spoons, toothpicks...

③ There are pointy edges which may Cause injuries.

④ Product uses more areas on top of a table when not using.

⑤ It is difficult to see properly which item is in the storage.

Developments:

① Make 3 cuttlery areas to Separate folks, spoons, and knives

② Make 3 areas on the bottom to provide more storage.

③ Make most of the corners round shape/curve shape.

④ Make 2 holes on the product to allow it hangin on 2 nails which are fixed on the wall.

⑤ Instead of plain wood, make barrels to make the items visible through it.

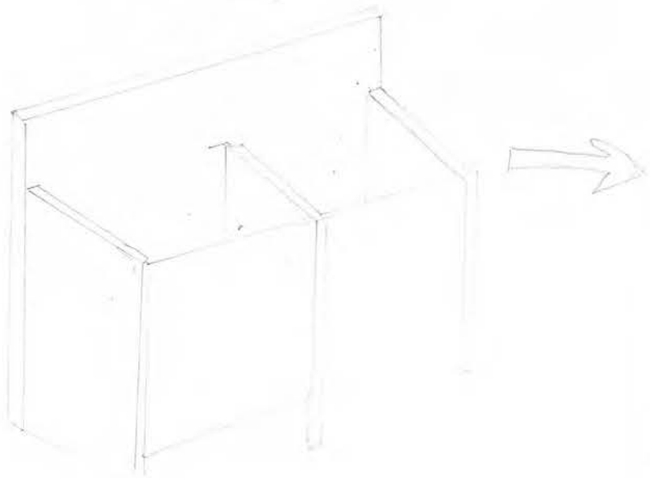
Development ①

└ Make 3 cutlery areas for spoons, folks and knives

Before

Top view

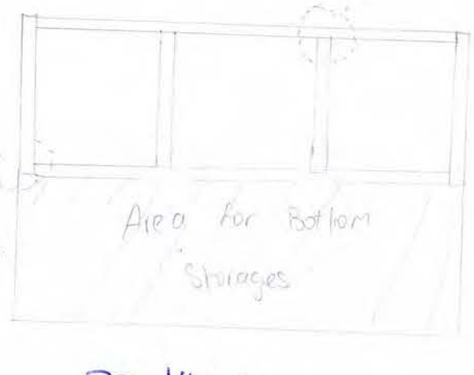
3D View



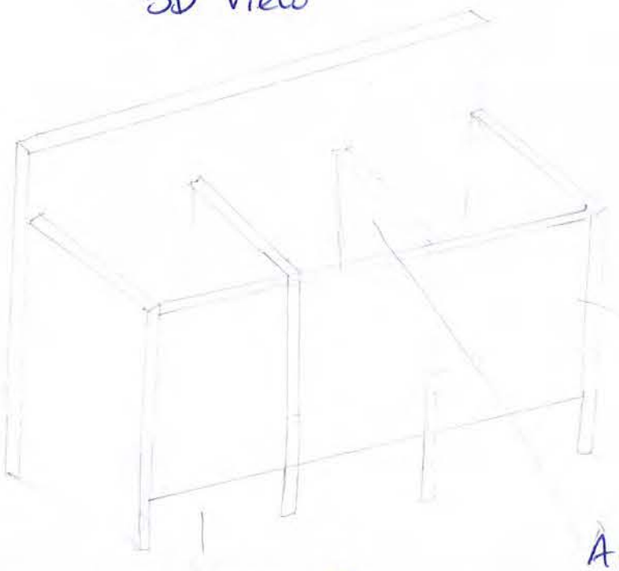
2 Storages in previous model

After.

Top view.



3D View



3 storages in developed model.

Butt joint is used.

The 2 pieces are joined by glueing.

Instead of 2 storages, It is developped to 3 storages therefore there is place for each type of cuttlery such as spoon, forks and knives

In the previous model, The Spaces of the Storages were too big and wide and may Cause the cuttleries to fall inside and may not be seen.

Therefore in the developped idea, the storages are now smaller and allows the cuttleries to lean and incline on the wood to avoid falling down.

All the storages are of same areas and dimensions.

Another part of pine wood is added to act as separation.

Materials: Pine wood.

↳ it is strong enough and durable.

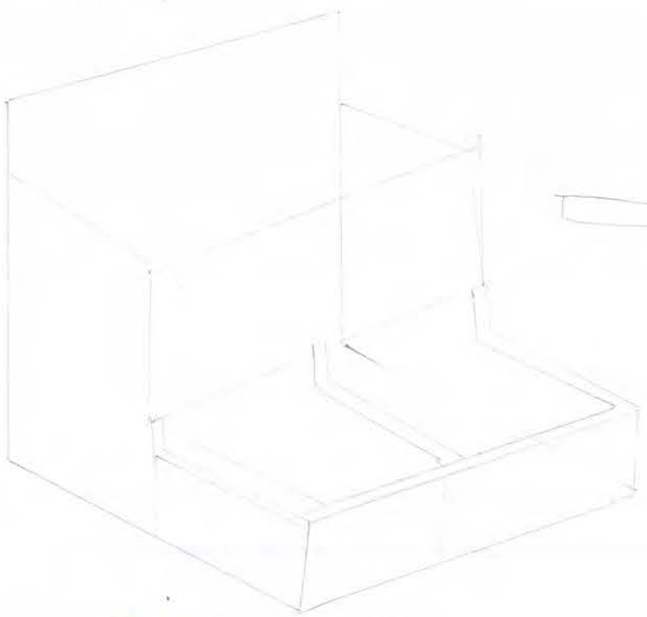
Development (2)

↳ Make 3 areas in the base

Before

Top view:

3D View

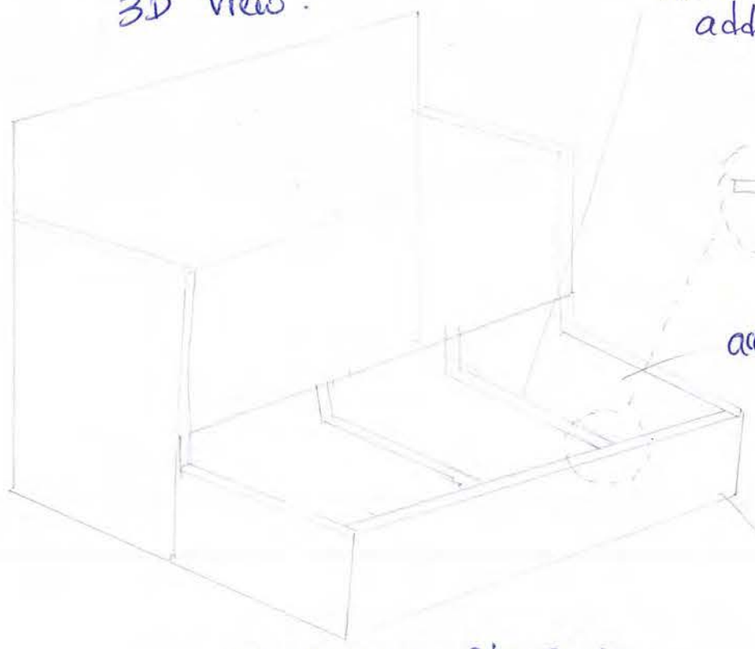


2 Bottom Storages

After

Top View

3D View.



3 Bottom storages.

Instead of 2 storages, it is now developped to 3 storages therefore it will be parallel to the above storages shown in development ①.

All the Storages are of same Areas and dimensions.

Another part of pine wood is added to act as Separation.

Butt Joint is used — the 2 pieces are joined by glueing.

accomodation for items like toothpicks

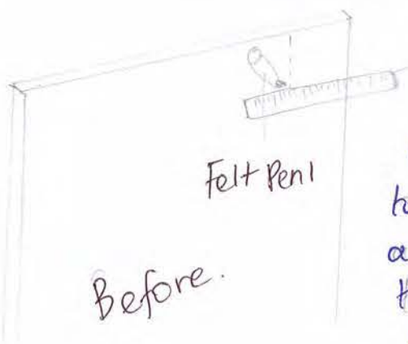
material used as Pine wood.

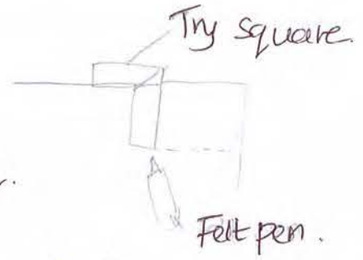
Development (3)

→ Make most of the corners round shape

Part A (Back side)

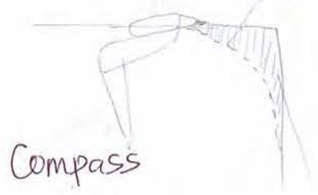
Step ①





Ruler and trysquare is used to measure with perpendicular lines and to locate the centre to make the curve.
A felt pen is used to mark the Centre on the wood.

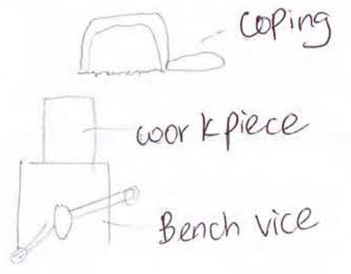
Step ②



A Compass with felt pen is used to draw the curve shape on the pine wood.

Step ③.

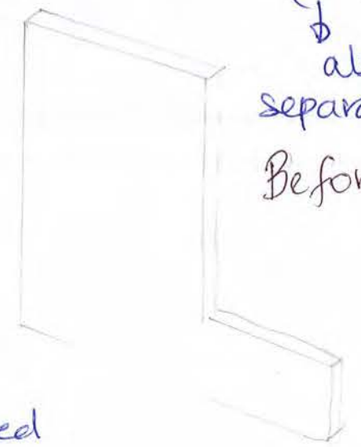
Shaded part to be cut.



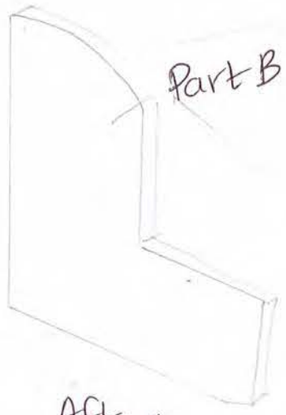
Coping saw is used to cut the workpiece as it perform Curve cuts more easily.

④ Part A is now developed

Same applies for part B (side) → also for separation

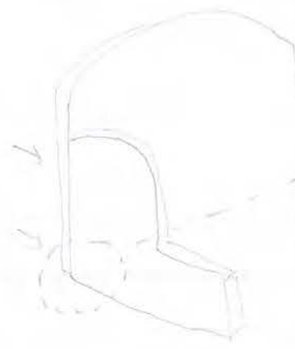


Step ①, ②, and ③ is repeated therefore Part B is developed.



The curved edges have now reduced the risk of injury and it is much safer.

- The curved edges have become more interesting shape and aesthetic than before.

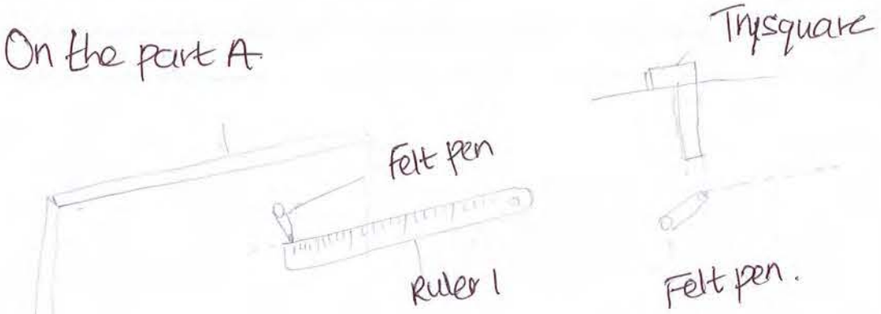


Butt joint is used and the 2 parts are glued together using Potter glue.

Development ④.

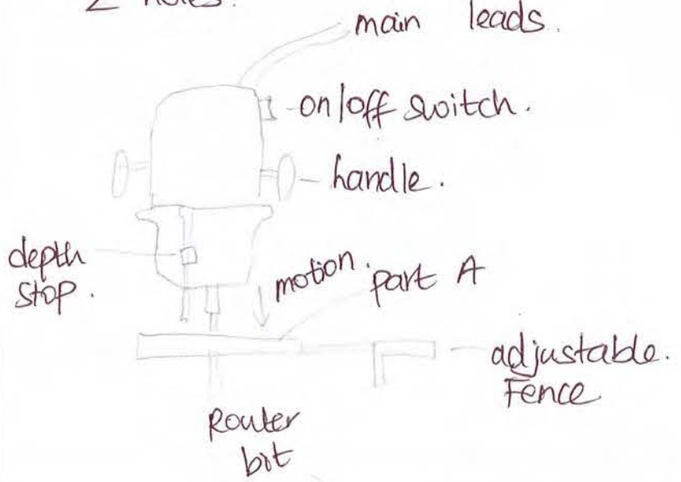
↳ Make 2 holes on the part A.

On the part A



Ruler and Trysquare is used to measure the appropriate distance for the hole and perpendicular to edge and a felt pen is used to mark the point.

Then a portable router is used to drill the 2 holes.



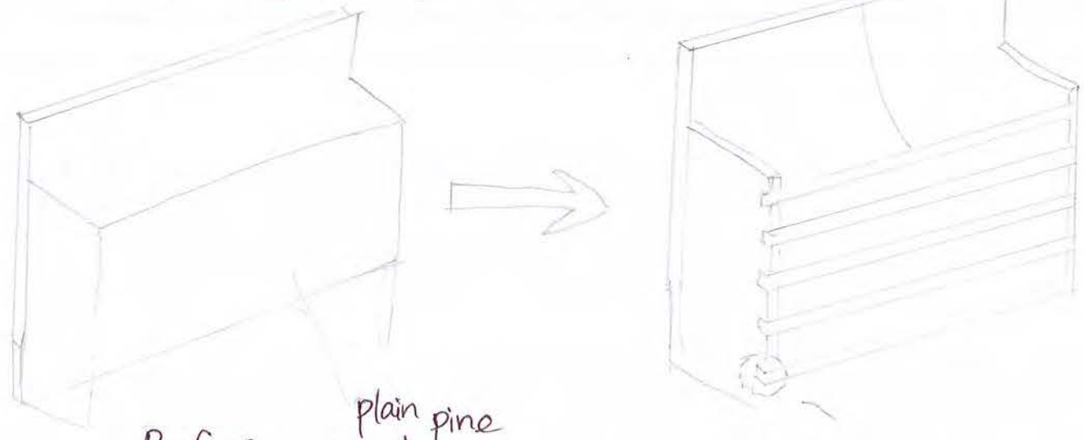
a router bit of 6mm is used for holes.

Safety Precautions:

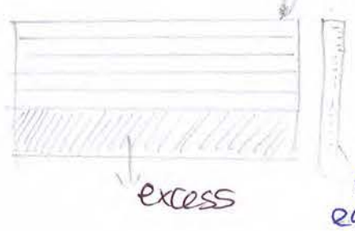
- wear safety goggles to avoid dust.
- wear safety gloves to protect hands from any bits of woods.

Development ⑤

↳ Make barrels to make it visible to see through the product.



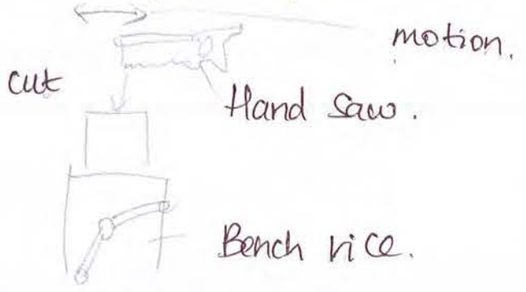
Barrels made up of pine wood.



A ruler is used to measure equal dimension for the 5 barrels and Felt pen is used to mark Straight line.

Finger Joint used.

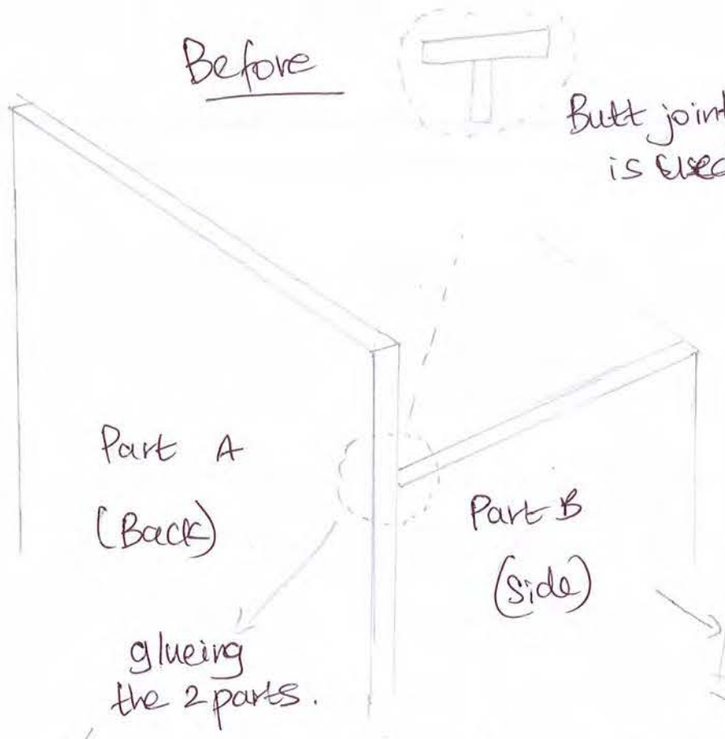
The excess is removed by cutting with Hand saw. and the remaining pine wood is cut into equal 5 parts



The barrel occupies minimum space to see and perform really well as it avoid the spoons, forks to fall ahead.

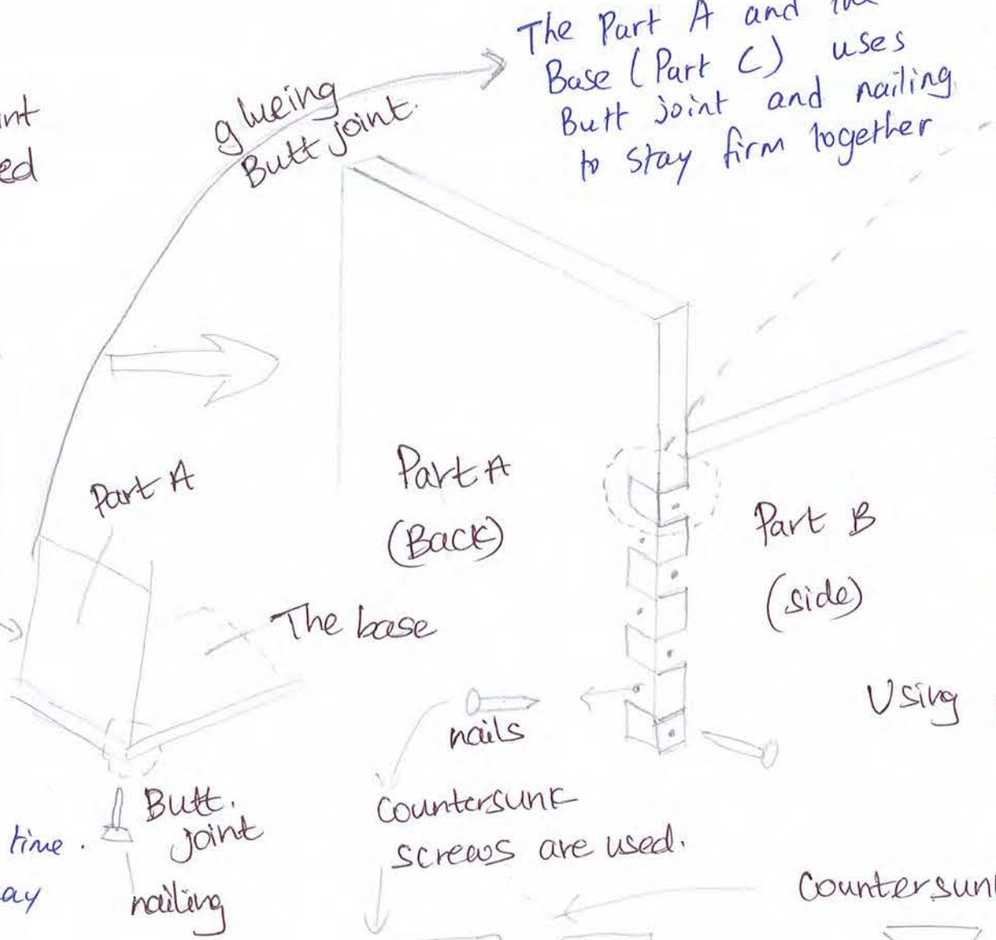
Further development & Construction details.

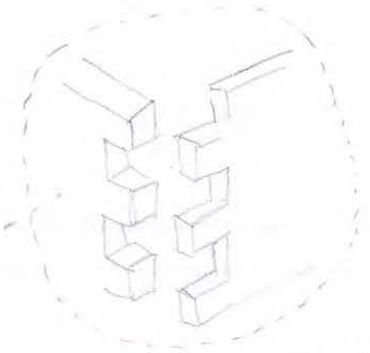
Before



With just glueing, it is very difficult for the 2 parts to stay together for a longer time.

- And glueing the 2 parts with pattex glue may damages the product later on.

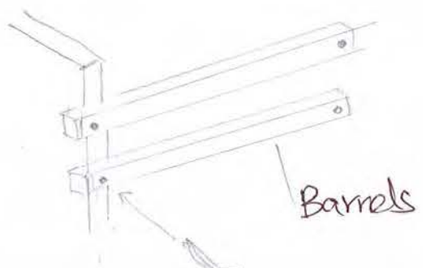




Finger Joint

Finger Joint is used to hold the 2 parts very firmly together and does not required to glue

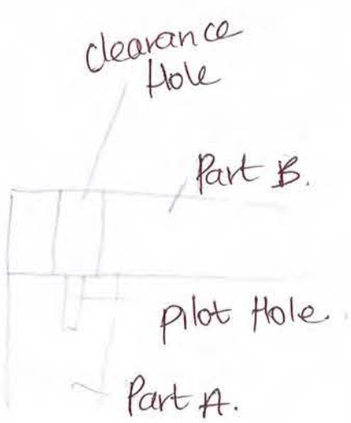
Using of glue must be avoided.



Nailing is more efficient than glueing as the nail are strong and it is difficult to detach if their is an external force on it.

For the Barrels also nailing is used to join the Part B (side)

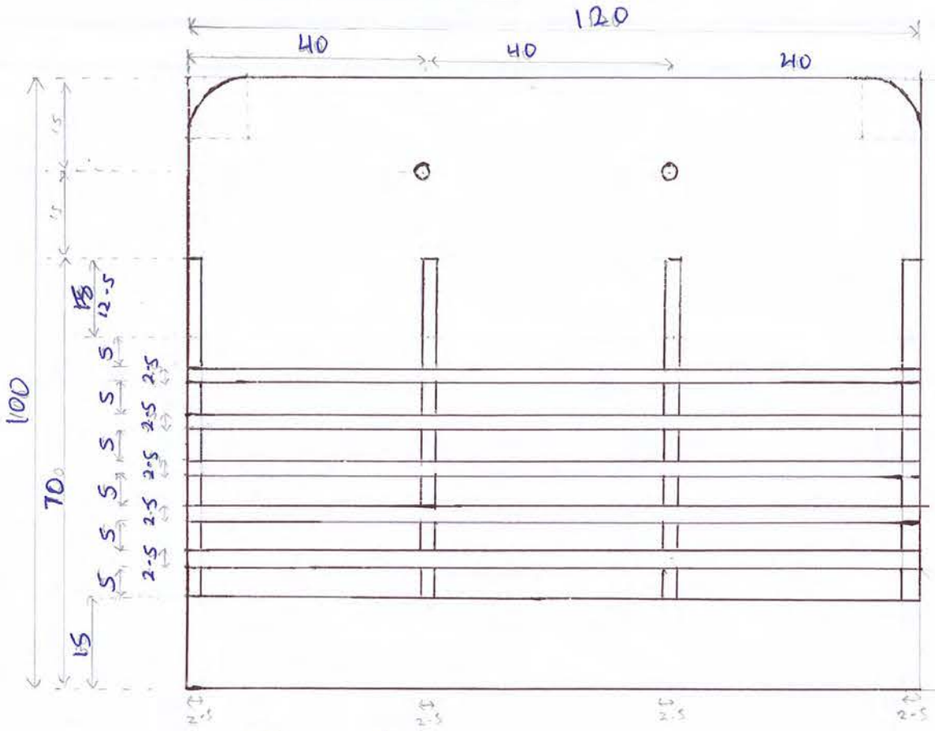
Advantages of using Headscrew is the Head does not appear on the surface of the material



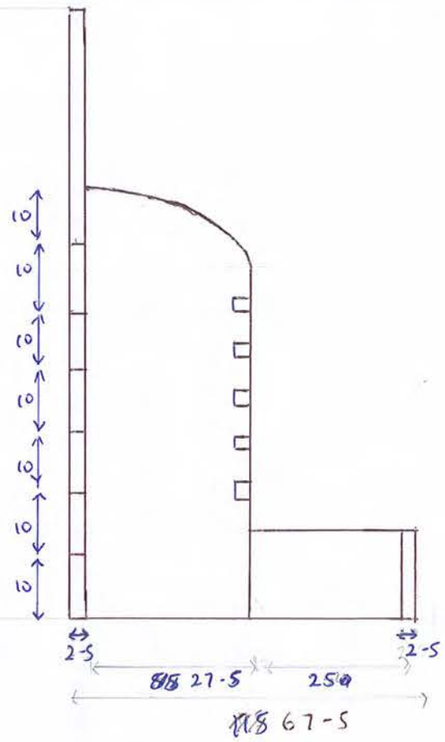
Product Planning.

Orthographic Projection

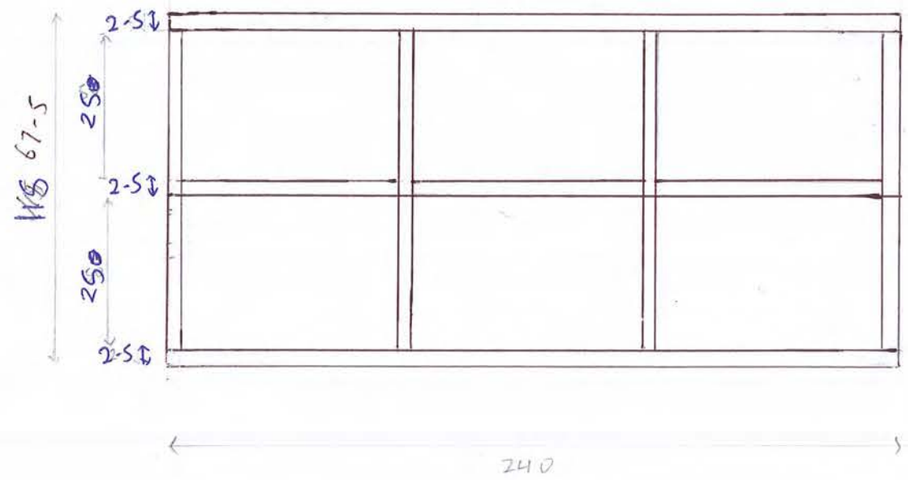
Front View



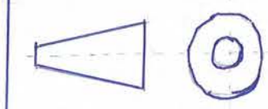
Side View



Top View

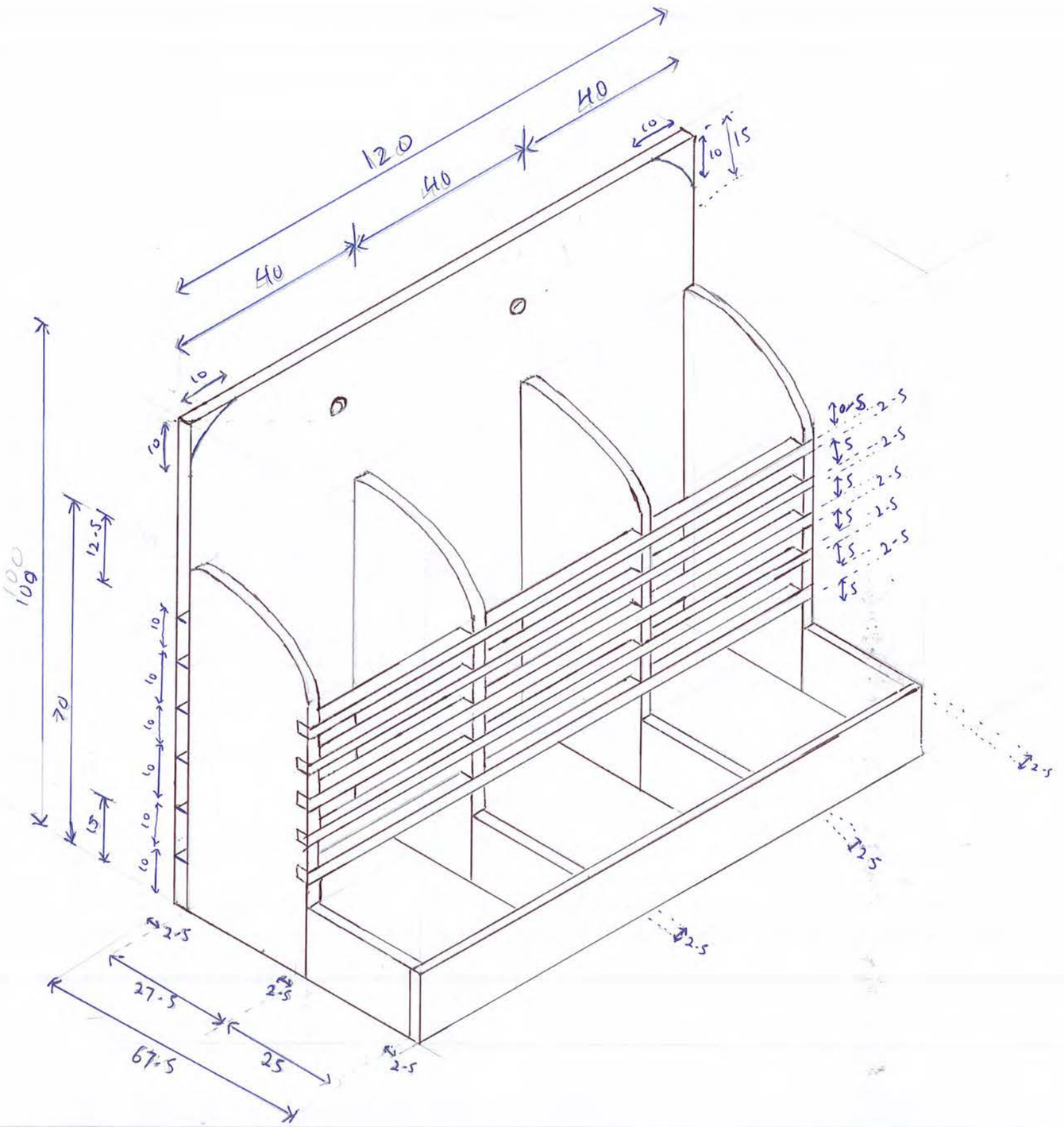


1st Angle



Scale 1:2

Isometric Projection.



in mm

Scale 1:2

Angle = 30°

Selection of materials for artefact

Part list

ITEM N0:	ITEM NAME	POSSIBLE MATERIALS THAT CAN BE USED	SELECTED MATERIAL	REASONS FOR SELECTION
1	Back panel	Plywood, pine wood, fir wood, bamboo wood	Pine wood	Easy to make with, rigid, good texture, finishes well
2	Side panel	Pine wood, bamboo wood, fir wood, plywood	Pine wood	Rigid, good texture representation, can easily make curves cuts
3	Front piece	Plywood, pine wood, fir wood, bamboo	Pine wood	Rigid, easy to work with
4	Base	Pine wood, fir wood, bamboo, plywood	Pine wood	Strong enough, rigid, good texture representations
5	Barrels	Pine wood, plywood	Pine wood	Can easily be made, strong

Cutting tools

Table saw : It is used to cut all the large pieces on it.

2. **Hand saw :**It is used to make the joints and curve cuts

3. **Scissors :** To cut additional bits of wood.

Drilling tool

- **Makita drilling machine :** It is used to drill the two holes to aloww the product to hang on the wall

Finishing list

1. **Sandpaper :** To polish and make smooth curve edges

2. **Meta bled sander:** To polish the product and the edges of the joints

Glueing

- **Pekay glue:** It is used to glue all the parts together as it is very efficient and works well

Planning sheet

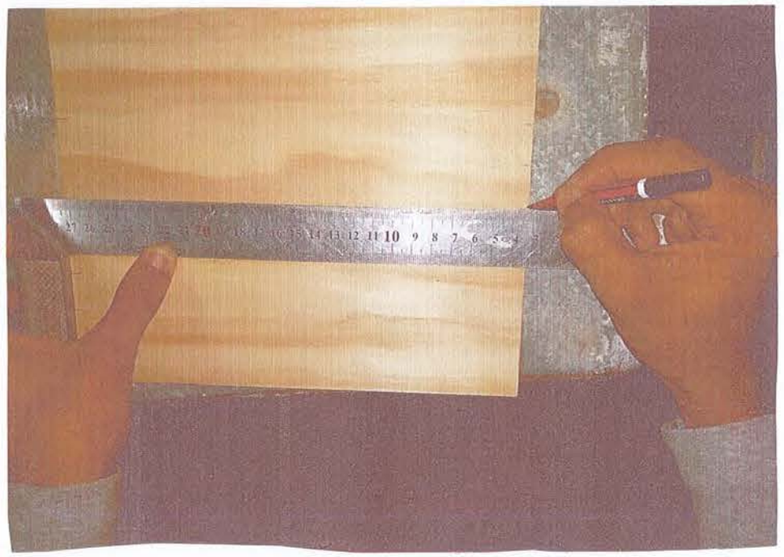
NO.	PROCEDURE	TOOOLS/EQUIPMENTS	TIME (hrs)
1	Mark out each piece of the design onto the pine wood	Pencil, compass, try square, steel rule	1
2	Cut out all the parts	Table saw	2
3	Measure accurately and draw all the Joints for the barels and side panels	Handsaw	1 (½)
4	Apply glue on the edges and stick all Pieces together	Pekay glue	2
5	Join the barrels onto the joints	pekay glue	1
6	Clean the product to remove excess Of glue	Clean cloth	(½)
7	Drill 2 holes on the back panel	Makita drilling machine	(¼)
8	polish the edges of the product	Makita bled sander, Sandpaper	1

Product Realisation

Realisation of Artefact.

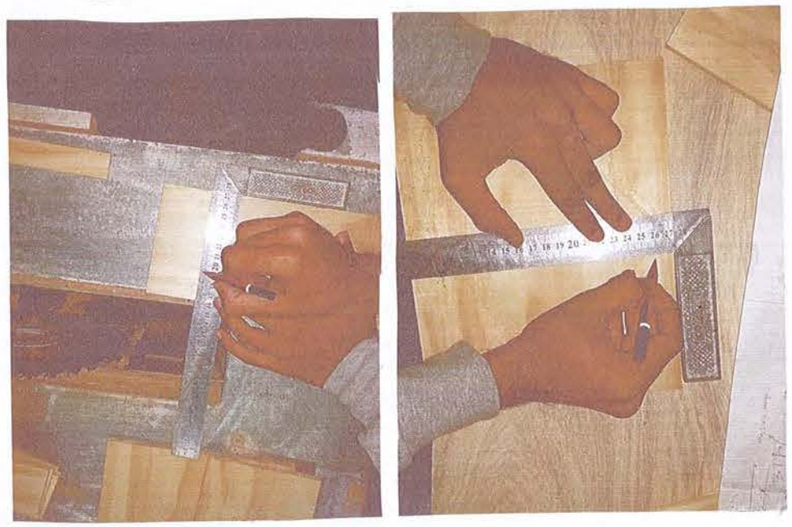
Marking

Step (1) - A steel rule and a pencil is being used to mark lines to form parts.



Precautions : Make sure to mark straight lines using the steel rule.

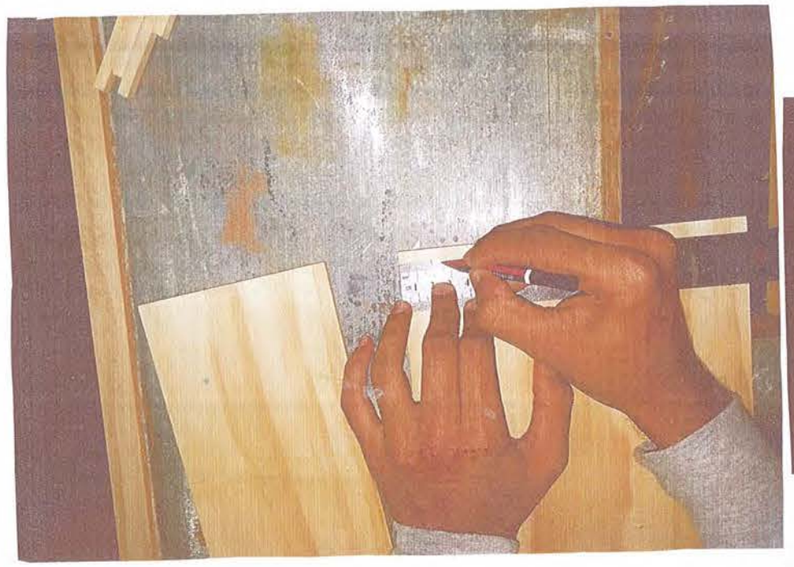
Step (2)



A steel try square is being used to mark perpendicular lines using a pencil

- All the parts are being marked as shown in step (1).

Step (3)



- The joints are being measured and marked by using a steel rule and a pencil.

- lots of concentration is needed so that there is no faults in measurement.

Step (4)

- The joints are being drawn and a cross sign is being added on the waste wood that should be cut.

Step (5)

A compass is being used to draw curved lines on the side panel and the top or back panel.

Cutting.

Step ① The pine wood is being cut according to the marked lines

Precautions: Wear safety goggles as the
① wood dust may enter in our eyes.

All the large pieces are being cut as shown in step ①

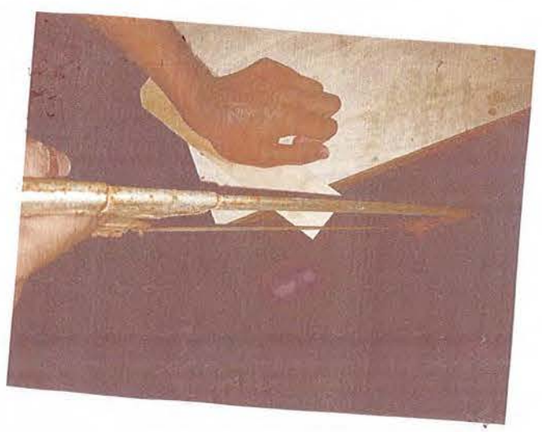
Step ②

- The side panel is being cut with handsaw to make carves cut.

Precautions: ② Be careful as it may cause deep cuts in our hands.

Step (3) The Joints are being made and cut using a handsaw

Here also cutting is done as shown in Step (2) to cut curves cut ~~as~~ for the top of the back panel



Step (4)

Drilling -

- A Drilling machine is being used to drilled 2 holes on the top of the back panel.

Glueing and Joining.

Step (1) Applying Pekay glue on the side panels to be joined in the back

Step (2) The side panel is being joined to the back panel by glueing pekay glue forming finger joints

The process is repeated for the other side.

Pre Cautions : Make sure to clean the excess of glue on the wood to prevent the product being dirty.

: Apply moderate supply of glue for it to be not too sticky or less sticky.

Step (3) Again apply glue on the edges and join the 2 middle parts by using butt joints.

Step (4) Applying pekay glue to the edges of the base.

After all 4 panels are joined to the back panel.

Step (5) Joining the base with the other parts by Using butt joints.

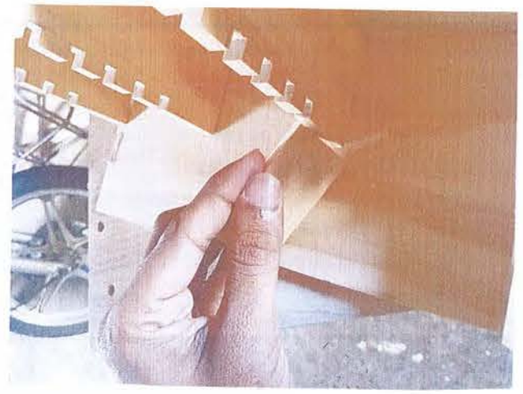
- Pressing and holding it to help the parts to stick well.

Then wait for around 20 mins to let the glue dry. It is then strength.

Step (5) Applying glue on the small piece being part of the side panels.

Same step is repeated to the other parts

Step (6) Joining it to the base and the side panel by glueing and using butt joints.

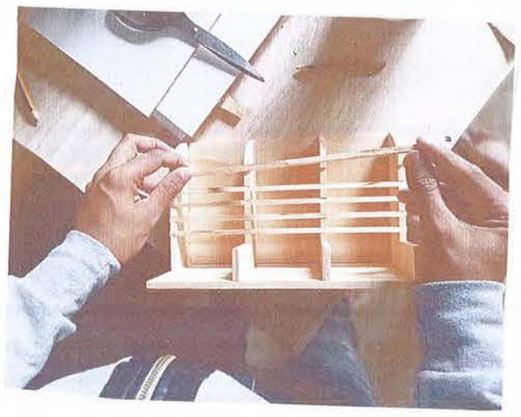


Step (7) Glue is being taken from the bowl.

It is then put on the edges of the barels to stick well in the joints.

Gluing the joints

- The process is repeated for the other barels



Step (8) The barels is being inserted in the spaces forming finger joints.

Step (9) Pekay glue is being applied on the front piece of the product

Step (10) Cleaning the product

Precautions : Make sure to clean the product and remove excess of glue using a clean cloth.

Step (11) The front piece is sticked and pressed to the other parts forming butt joints

Step (12) The cuttery holder is pressed to stick well by using f-clamps and g-clamp.

Wait for another 20 mins to let the glue dry and it will be very strongly joined.

step 11 (i) The front piece being joined as shown below.

Finishing

Step ① The sidepanels are being polished by using sandpaper.

precautions : Make sure to not polish the product by applying to much force as it may damages the product and the material

Step ② The barel is being polished using sand ~~paper~~ paper to make ~~the~~ it narrower

∴ Therefore the barel can easily insert the joints.

Step ③

- The product is being polished by using a piece of wood to facilitate the task and a sandpaper for rubbing.

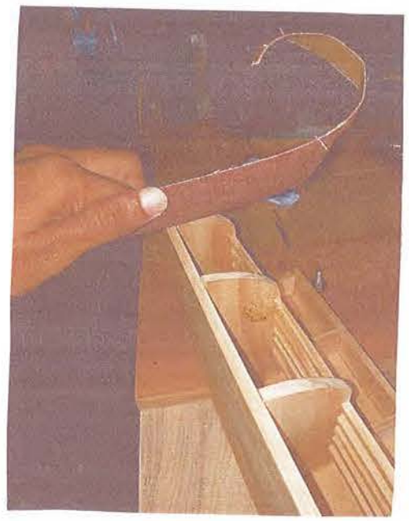
Step (4) A polisher (meta bled Sander) is being used to polish the joints as there were too many faulties.

Advantages : The meta bled Sander polishes the product as quickly as possible instead of doing it with hands.

Precautions : It should not be pressed too hard as it may damages the product.

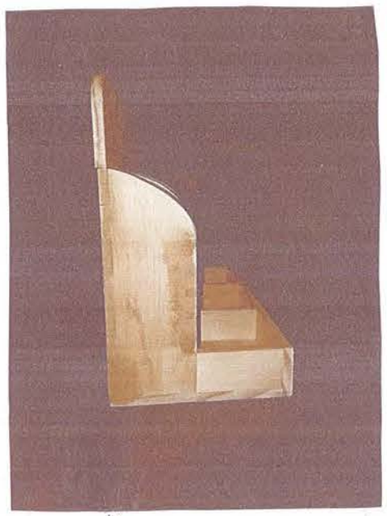
For Step (4) – I took the help of my brother as it was very difficult to polish as it was moving vigourously.

Step (5) A final touch of finishing is being done around the product.



Final Design

Side view



Front View

Top view

3D pictorial view

Testing and Evaluation

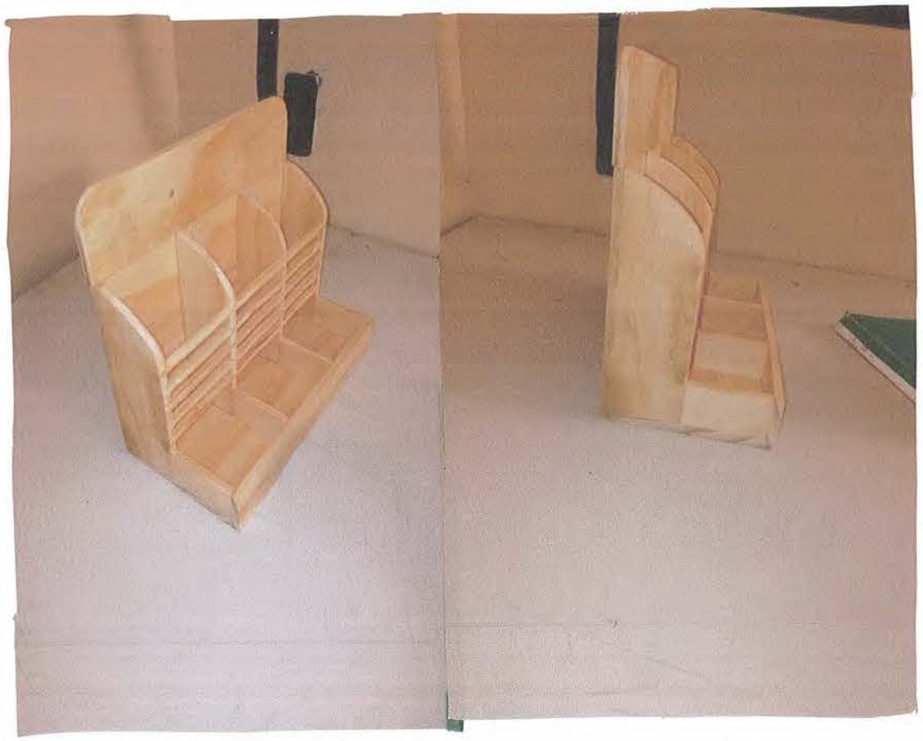
Of Artefact

Function

- It holds the cutleries pretty well.
- It is being held in an orderly manner.
- The cuttlery holder helps to separate different types of cutleries like Forks, spoons and knives in different storages.

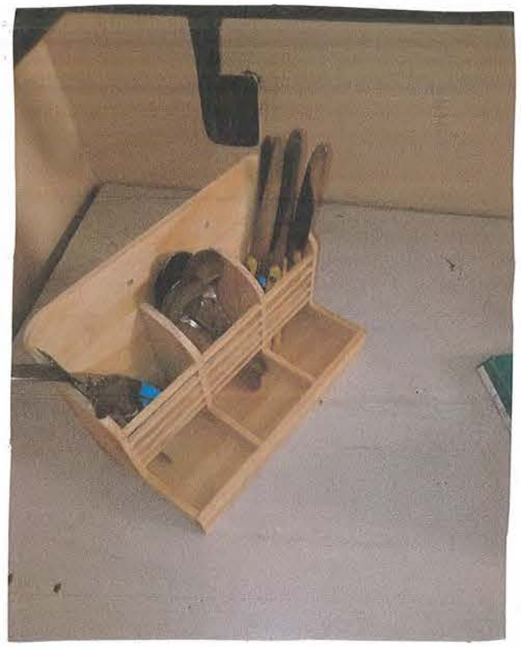
- The product can be hang on a wall by putting it through the 2 holes. Thus 2 nails is inserted to hold the cutlery holder.

Stability test



- The cutlery holder is very stable as it has a large surface area in the base and also at the back panel.
- It is very stable both in Benchtop and the wall.
- The model is tilted to the left about 25° and is realeased, It is seen that the cutlery holder returned to its original position. Therefore the cutlery holder is stable.

Strength test.



- As we can see in the diagram, the cutlery hold is strong and can support more cutlerjes on it.
- The product can easily survive drops from a certain height as it is very strong.

Aesthetic

- The model is beautiful and attractive having beautiful features on the side panels and back panel making the curve and the barels is also a good feature.

Evaluation against Design Specifications

Specifications	Evaluation
1. The product must be used indoor	The product will be used in the kitchen only
2. The product must resemble a cutlery holder	It does look like a cutlery holder
3. The product must be able to hold cutleries in an orderly manner	The cutleries are held in an orderly manner
4. The product must be safe to use	The product is safe to use as the corners of the main parts have been rounded
5. The product should provide adequate storage for different types of cutleries.	There is adequate storages for diferent types of cutleries like spoons, forks, knives and more
6. The product must not be too big to cover space in the kitchen	The product is pretty small and won't occupy space
7. The unit should be joined using strong wood joints for the construction of back and side panels	For the back panels and barels, finger joint were used For other parts, butt joints were used
8. The product must be able to keep on the benchtop or can be fixed in a wall.	The product can be placed on the benchtop and can also be fixed on the wall by using 2 nails through the 2 holes