2D AND 3D

WOOD PUZZLES

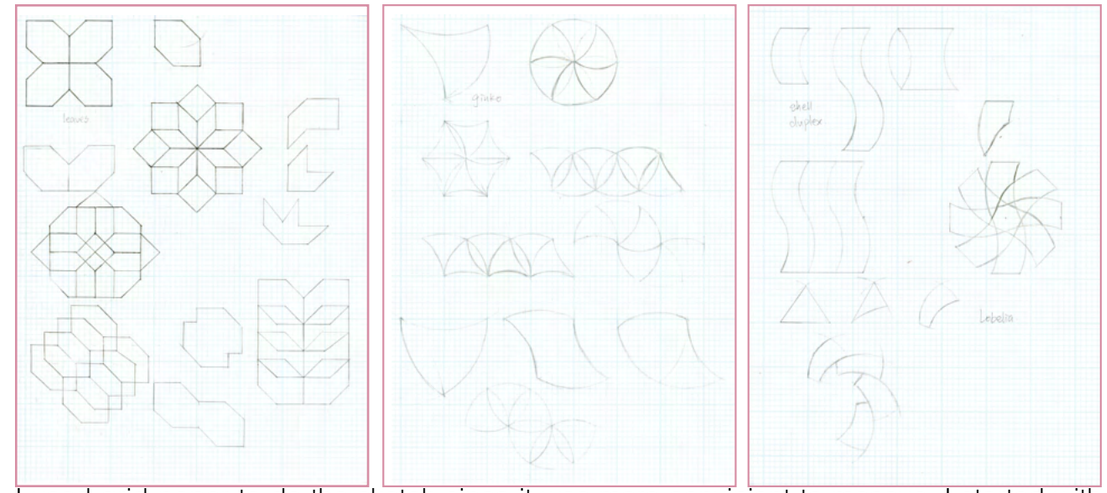
INTRO |

The purpose of this project is to investigate form and transformations from two-dimensional media to three-dimensional media. This project will also provide an opportunity to practice using the shop's basic tools.

1. Bring examples of geometrical man-made patterns from posters, tiles, architecture etc. You can also bring examples of geometrical nature patterns from Design 252 exercises if applicable.
2. Develop a low complex 2D pattern. Create a set of modules from an arrangement of two-dimensional geometric shapes. These two- dimensional modules must fit together in two or more ways both x and y axis.
3. "Extrude" the shapes within the 2D modules to produce a three- dimensional module. The degree and manner of this extrusion should generate new correspondences between the units (z axis). Create at minimum four of these modules to demonstrate how they fit together.

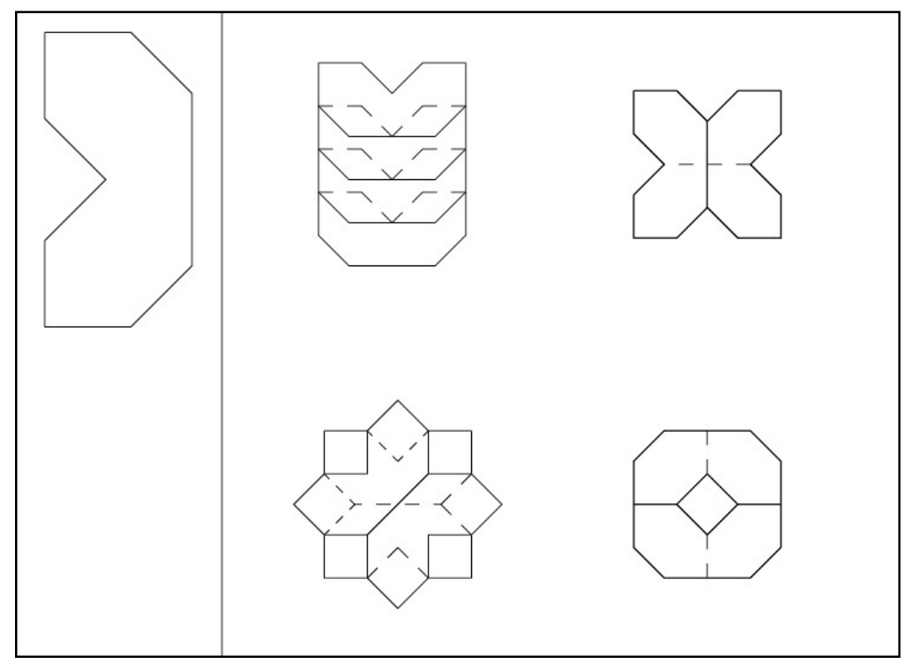
RESEARCH |

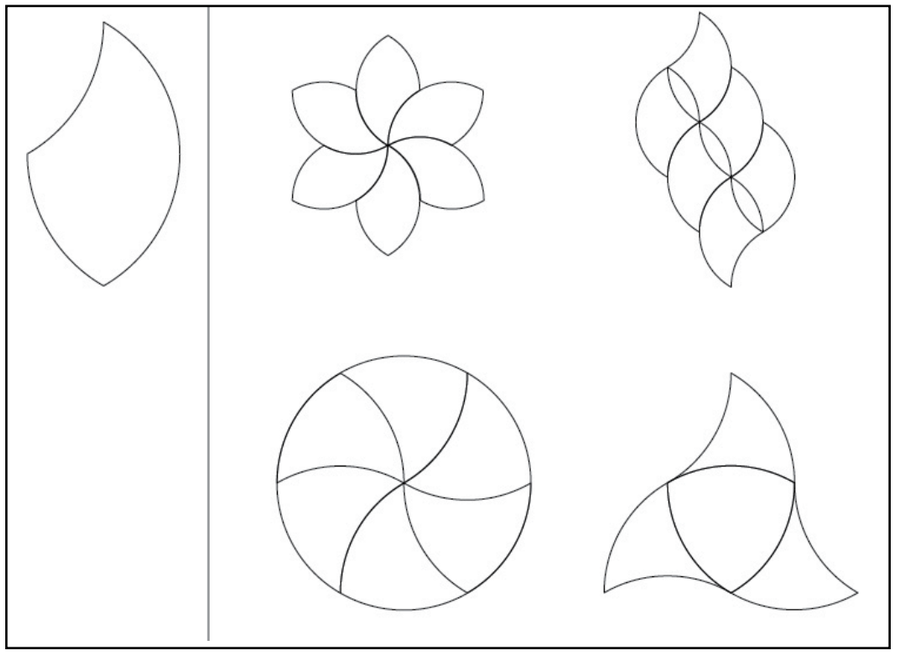
I gathered some geometrical nature patterns like sun flower, green spider mum, ginco, bee comb, peakock feather, shell, parrot feather, snow and so on. I always believe Nature is the best designer and I got a lot of inspiration from it.



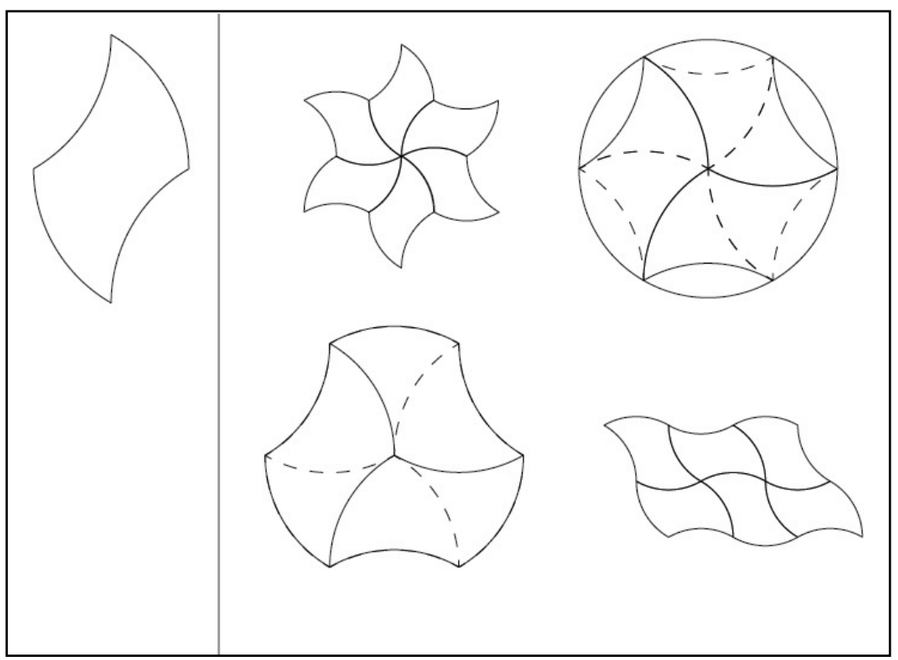
I used grid paper to do the sketch since it was more convinient to measue. I started with some simple shapes extracted from the geometrical nature patterns and did some simple transform and combination to achieve more interesting shapes. I tried to kept my 2D shapes really simple since when move on to 3D the overall design would become comlex easily. Following are the three shapes I chose and their possible configurations.

IDEATION | CONCEPT 1 |

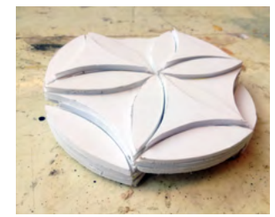


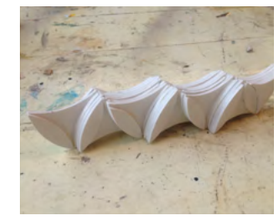


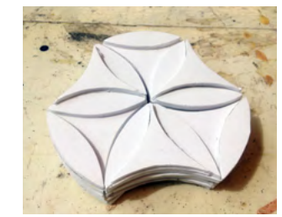
CONCEPT 2 | CONCEPT 3 |



I chose concept3 as my 2D puzzle final and started to explore the 3D puzzle by making some foam core models. Though these are not full size models, they are good enough to help me figure out how these pieces would fit tougether to achieve different configurations

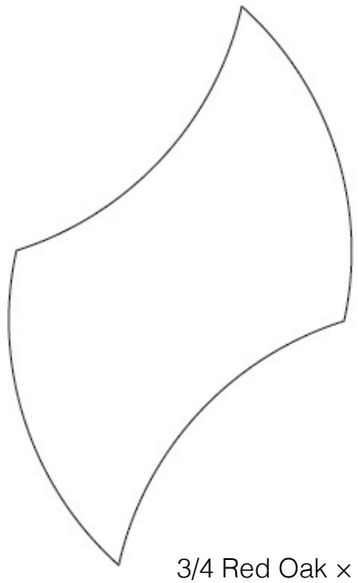






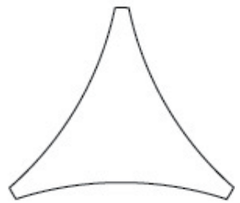
MODEL | FOAM |

Before making the final wood puzzle I made a full size model with yellow foam, which is a media really simiar with wood. This was a good practice run for my final wood version and would help me visualize the true scale and form of my final.



3/4 Red Oak × 9
3/4 Walnut × 6

3/8 Red Oak × 36

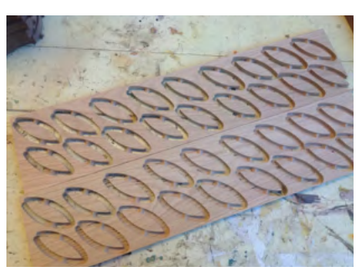


3/4 Walnut × 12

This project requires these wood puzzle pieces to be cut as accurate as possible so it should be a wise choice to use CNC machine. As a result the most important thing to do is to have the Illustrator versions of the shapes I need to cut ready. These shapes were going to be cut on different kinds of wood in different amounts.

SHOP PLAN | CNC CUT |

Once the machine started to cut it only takes a few minutes to finish each piece, which really save a lot of time. However, I also noticed that if there is any unexpected trouble like the wood board was not clamped tightly enough, it could ruin the whole board, which waste too much material. After CNC cut what I need to do was knocking those small pieces off from the frames , sanding the edges and glue some of them together as designed.



2D PUZZLE

and different configurations

3D PUZZLE

and different configurations

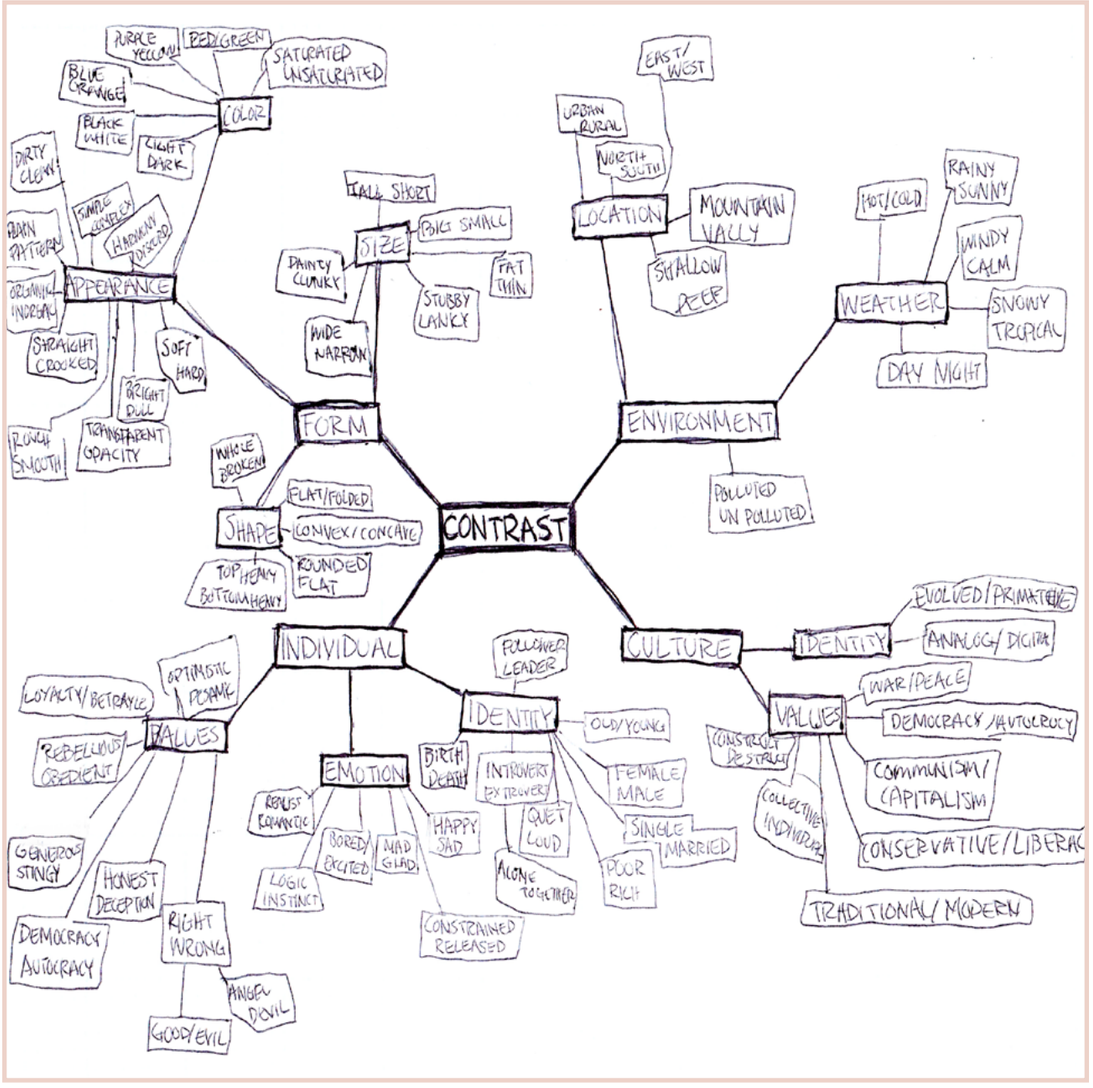
SALT SHAKER AND PEPPERGRINDERSET

INTRO

- Creative problem solving given material and fabrication limitations
- Learn safe shop practice
- Application of previously learned concepts of visual communication, technical drawings, layout, model making
-To manipulate relationships between aesthetics and function

Design a wooden pepper grinder and salt shaker set. The design is to be fabricated utilizing the capabilities of the major woodworking power equipment in the shop. An existing pepper grinder mechanism is to be used. The final model should be a working prototype that is ergonomic. Models materials: your choice of wood. The design is to be primarily of wood and is to work using an existing pepper grinding mechanism. Mechanisms can be purchased at Woodcraft or Woodwerks.

The design has to respond to functional criteria as well as formal and have to consider the following: How is it going to be used? How does it work? Where is it going to be used? How is it going to be cleaned? How is the set going to be packed? Who is the user? In which environment does it fit? Is it comfortable to use? In addition to meeting functional requirements, the forms have to illustrate visual contrast. The set is to create emphasis and interest through the use of opposing qualities among figures and forms. One of the two items is to reflect the opposing quality of the other. Think about different possibilities.



BRAINSTORM |

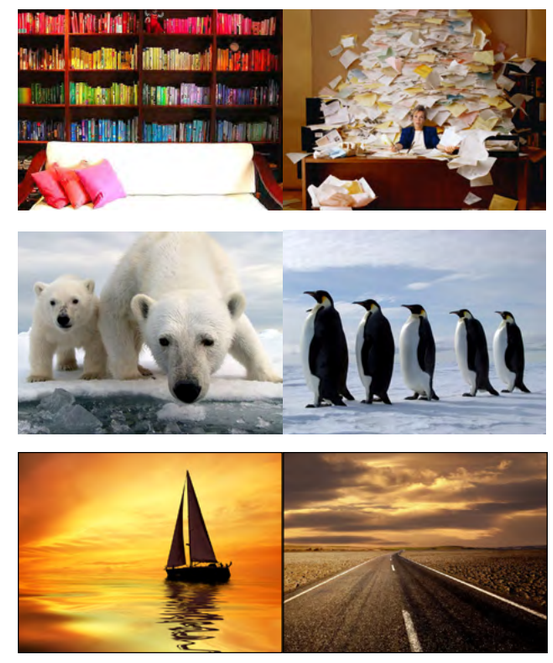
To achieve different possibilities the step was to brainstorm a whole bunch of contrast word pairs. This is the mind map made to document the brainstorm process, beginning with the key word contrast we have environment, form, individual and culture and then come out with more and more possible word pairs.

RESEARCH |

I chose some word pairs, which I thought are potential and worth to explore further and researched the visual element of them.

Heaven and Hell
Poor and Rich
Sunny and Rainy

Christian and Islam
Fire and Ice
Generous and Stingy
Order and Messy
North and South
Flow and Firm



IDEATION |

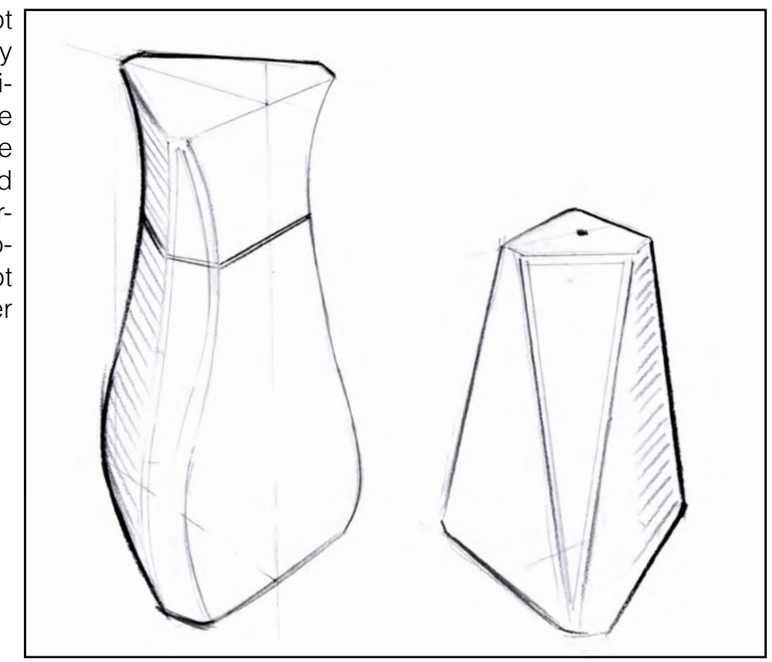
Christian and Islam
North and South
Order and Messy
Generous and Stingy
Flow and Firm
Pride and Modest

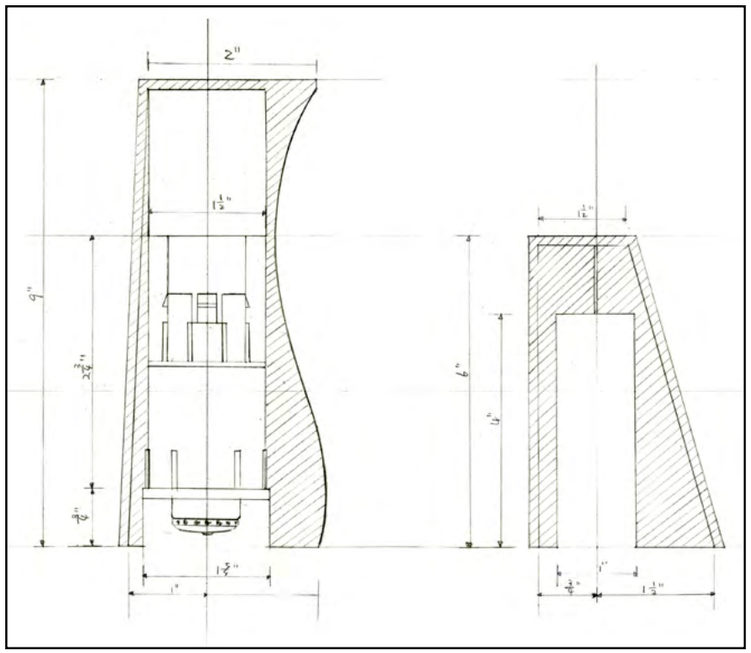
I made some foam models with the pepper grinding mechanism installed. It took me almost a whole week to do this and finally had my final design settle down. I think the time I spent was worthwhile since the more details I work out in foam the easier it will be when it comes to my wooden set. It is a lot more forgiving to make mistakes with foam but much costlier and time consuming with wood.

MODEL |

This is my final concept sketch, which is extremely distinctive from my original idea. Though I have been through a tough time to make foam models and kept changing the plan forever I still enjoyed the process to refine my concept and make it become better and better.

FINAL SKETCH |



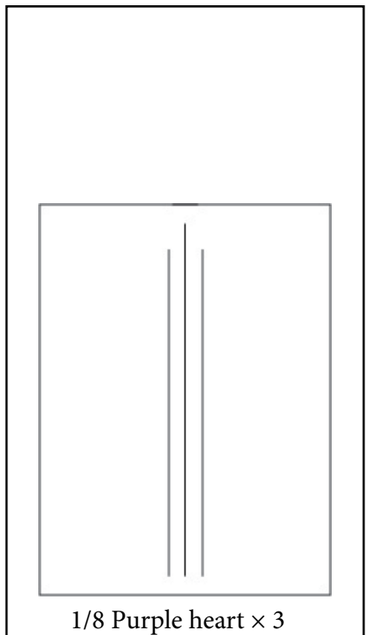


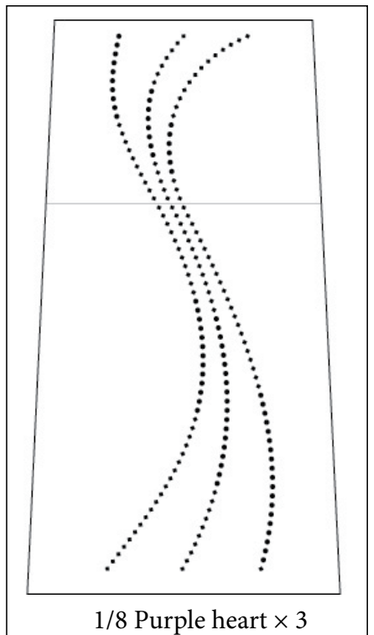
This is the Dimensioned orthographic layout drawing for my final concept, which was necessary to be completed in order to construct the salt and pepper set precisely. The accuracy of this drawing will translate into the final salt andpepper set.

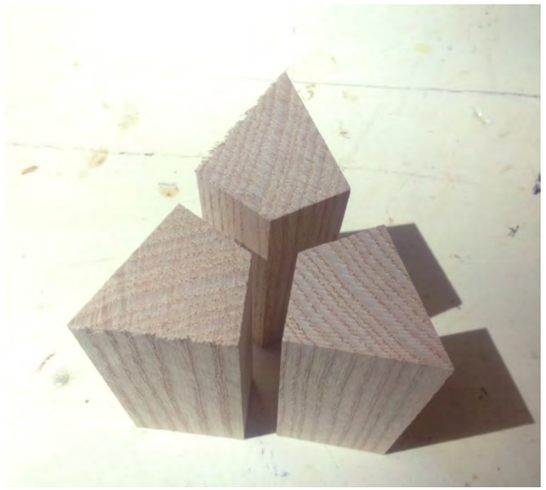
LAYOUT |

ILLUSTRATOR |

The laser cut pattern is designed to help illustrate the visual contrast of flow and firm. The straight lines for firm were really easy to achieve with Adobe Illustrator. Instead of using curve lines to represent flow I chose dots because they looks more flexible. Though it took me a lot time to trace those dots alone the curve lines, I am really satisfied with the result I achieved.







Another detail I designed to emphasis the contrast is the nature pattern of wood. I got ash with really straight pattern for firm and the burl with crazy curly pattern for flow.In order to make sure the pattern I need would show on the surface rather than simply cut triangular prism from a wood block I cut three pieces according to the wood pattern and than glued them together.After the glue got dry I drilled the holes for the mechanism.

CORE |

LASER CUT |

After laser cut the skin , I glue those pieces on the cores and cut the overall shape as I designed until the glue totally got dry. The rest works were making everything fuctional.

My final word pair is FLOW and FIRM and the basic idea is both of the salt and pepper are start with a triangular prism and be cut differently with curve and straight line. The visual constrast is emphasized by the laser cut partern and the nature wood pattern.

The poster is considered as an advertisement for the salt and pepper set. The rough idea is either use the pictures of flow and firm to give audiences a visual reference or make some transformation of the words themselve to make a really clean look poster.

POSTER |

BOTTLE OR CONTAINER OPENER

INTRO

Improve experience for the user Issues involved: Human factors, usability, form. To expose the student to the following phases of the design process: Problem definition, systematic approach to concept generation, application of 2D and 3D communication systems.
By following the three design phases presented in class, design a new bottle/container opener based on the user's experience. The following are examples of possible directions, but your individual problem statement has to be based on your own conclusions from observation and user's study.
1. Design a bottle/container opener to increase usability and comfort for a diverse user/context. Emphasis should be placed on ergonomics, the bottle/container opener should adapt to either hand, and to a range of hand sizes. The final form should imply how it is to be used.
2. Design a bottle/container that performs two functions related to a specific scenario/activity.
3. Design a bottle/container that is to be operated using one hand only. Depart from conventional openers- User is performing additional function with other hand, has limited use of one hand or is disabled.

RESEARCH |

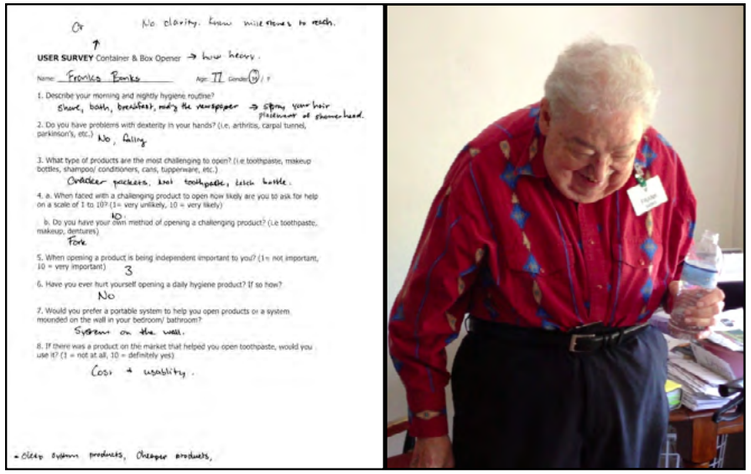
To have a initial understaing what kind of opener is exciting in current market I did a brief research and collected some images of different opener designed for jars, cans, bottle caps, boxes, wine bottles, letters and so on.
The SURVEY and INTERVIEW were group work. Our group wanted to develop a device for the elderly that will help open small capped products to increase their independence. Focusing on this direction we visisted the elderly people living in the nuring home and received some useful feedback.

SURVEY |

Age: 66-99 Gender: 4 M / 14F

1. Describe your morning and nightly hygiene routine?
   Brush teeth ,wash face, take shower
2. Do you have problems with dexterity in your hands? (i.e. arthritis, carpal tunnel, parkinson's, etc.)
   Majority said no, few with arthritis, one had had a stroke
3. What type of products are the most challenging to open? (i.e toothpaste, makeup bottles, shampoo/ conditioners, cans, tupperware, etc.)
   Small things, tooth paste, Tupperware, creamers, sugar
4. a. When faced with a challenging product to open how likely are you to ask for help on a scale of 1 to 10? (1= very unlikely, 10 = very likely)
   Eight people said 10, three people said 7, one said 4, and one said 2
   b. Do you have your own method of opening a challenging product? (i.e toothpaste, makeup, dentures)
   Most say no and several used other tools or more force
5. When opening a product is being independent important to you? (1= not important, 10 = very important)
   6 tens; 3nines; 3fives; 1three
6. Have you ever hurt yourself opening a daily hygiene product? If so how?
   no
7. Would you prefer a portable system to help you open products or a system mounded on the wall in your bedroom/ bathroom?
   13 said portable(majority), some said on the wall so they wouldn't loose it
8. If there was a product on the market that helped you open toothpaste, would you use it? (1 = not at all, 10 = definitely yes)
   Issue of price, seeing it first

Other things we discovered:
   Issue of squeezing the right amount out



Or No clarity. Know milestones to reach.

USER SURVEY Container & Box Opener → hair heavy.

Name: Francisco Banks Age: 71 Gender: M / F

1. Describe your morning and nightly hygiene routine?
Shave, bath, breakfast, read the newspaper → shave your hair
Flashlight of shaved head.

2. Do you have problems with dexterity in your hands? (i.e. arthritis, carpal tunnel, parkinson's, etc.) No, fitting

3. What type of products are the most challenging to open? (i.e toothpaste, makeup bottles, shampoo/ conditioners, cans, tupperware, etc.)
Cracker packers, knot toothpaste, catch bottle.

4. a. When faced with a challenging product to open how likely are you to ask for help on a scale of 1 to 10? (1= very unlikely, 10 = very likely)
10

b. Do you have your own method of opening a challenging product? (i.e toothpaste, makeup, dentures)
Fork

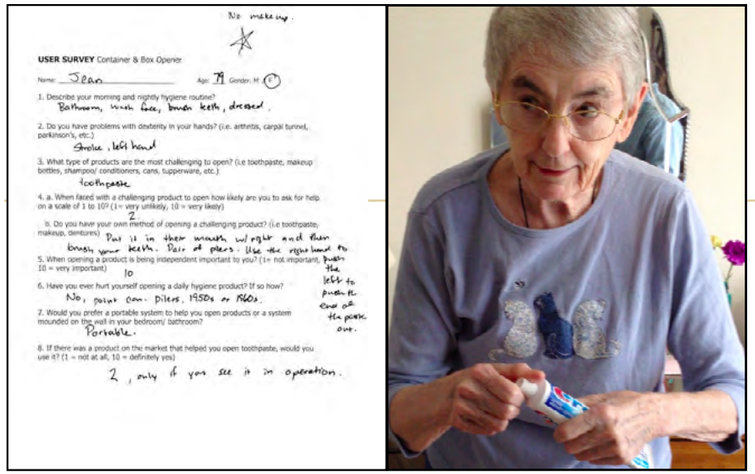
5. When opening a product is being independent important to you? (1= not important, 10 = very important)
3

6. Have you ever hurt yourself opening a daily hygiene product? If so how?
No

7. Would you prefer a portable system to help you open products or a system mounded on the wall in your bedroom/ bathroom?
System on the wall.

8. If there was a product on the market that helped you open toothpaste, would you use it? (1 = not at all, 10 = definitely yes)
Cost + usability.

- Cheap system products, Cheaper products,



No makeup.

USER SURVEY Container & Box Opener

Name: Jean Age: 71 Gender: M / F

1. Describe your morning and nightly hygiene routine?
Bathroom, wash face, brush teeth, dressed.

2. Do you have problems with dexterity in your hands? (i.e. arthritis, carpal tunnel, parkinson's, etc.)
Stroke, left hand

3. What type of products are the most challenging to open? (i.e toothpaste, makeup bottles, shampoo/ conditioners, cans, tupperware, etc.)
toothpaste

4. a. When faced with a challengng product to open how likely are you to ask for help on a scale of 1 to 10? (1= very unlikely, 10 = very likely)
2

b. Do you have your own method of opening a challenging product? (i.e toothpaste, makeup, dentures) Put it in their mouth, wet right and then brush your teeth. Pair of pliers. Like the regular hand to

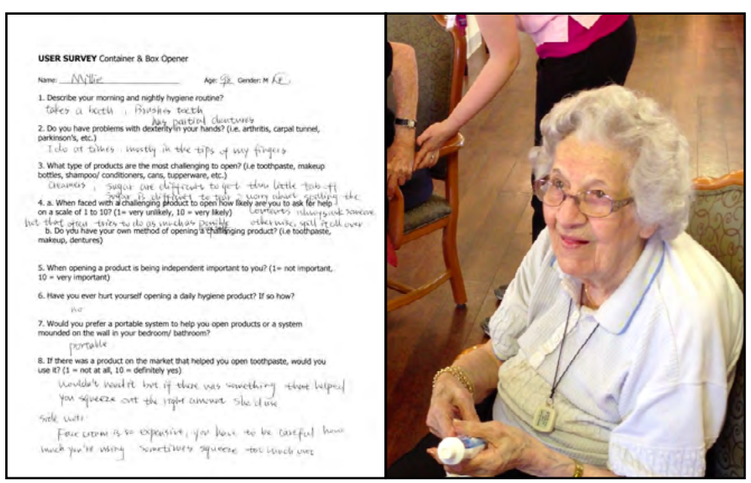
5. When opening a product is being independent important to you? (1= not important, 10 = very important) 10

6. Have you ever hurt yourself opening a daily hygiene product? If so how?
No, paint can. Pliers, 1950s or 1960s.

7. Would you prefer a portable system to help you open products or a system mounded on the wall in your bedroom/ bathroom?
Portable.

8. If there was a product on the market that helped you open toothpaste, would you use it? (1 = not at all, 10 = definitely yes)
2, only if you see it in operation.

Push the tube to push it out of the pump out.



USER SURVEY Container & Box Opener

Name: Millie Age: 92 Gender: M / F

1. Describe your morning and nightly hygiene routine?
takes a bath, Brushes teeth
My partner dressed

2. Do you have problems with dexterity in your hands? (i.e. arthritis, carpal tunnel, parkinson's, etc.)
I do at times - mostly in the tips of my fingers

3. What type of products are the most challenging to open? (i.e toothpaste, makeup bottles, shampoo/ conditioners, cans, tupperware, etc.)
Creams, Sometimes are difficult to get the bottle top off
Now it's difficult, so they wore short sighting the
4. a. When faced with a challenging product to open how likely are you to ask for help on a scale of 1 to 10? (1= very unlikely, 10 = very likely) Someone always ask someone
but that often - tries to do as much possible other wise, spill it all over

b. Do you have your own method of opening a challenging product? (i.e toothpaste, makeup, dentures)

5. When opening a product is being independent important to you? (1= not important, 10 = very important)

6. Have you ever hurt yourself opening a daily hygiene product? If so how?
no

7. Would you prefer a portable system to help you open products or a system mounded on the wall in your bedroom/ bathroom?
portable

8. If there was a product on the market that helped you open toothpaste, would you use it? (1 = not at all, 10 = definitely yes)
Wouldn't would it be if there was something that helped you squeeze out the right amount. Sometimes side with
Face cream is so expensive, you have to be careful how much you're using. Sometimes squeeze too much out

INTERVIEW |

Among the 18 sureys we chose 3 people who are representative to do further inerviews

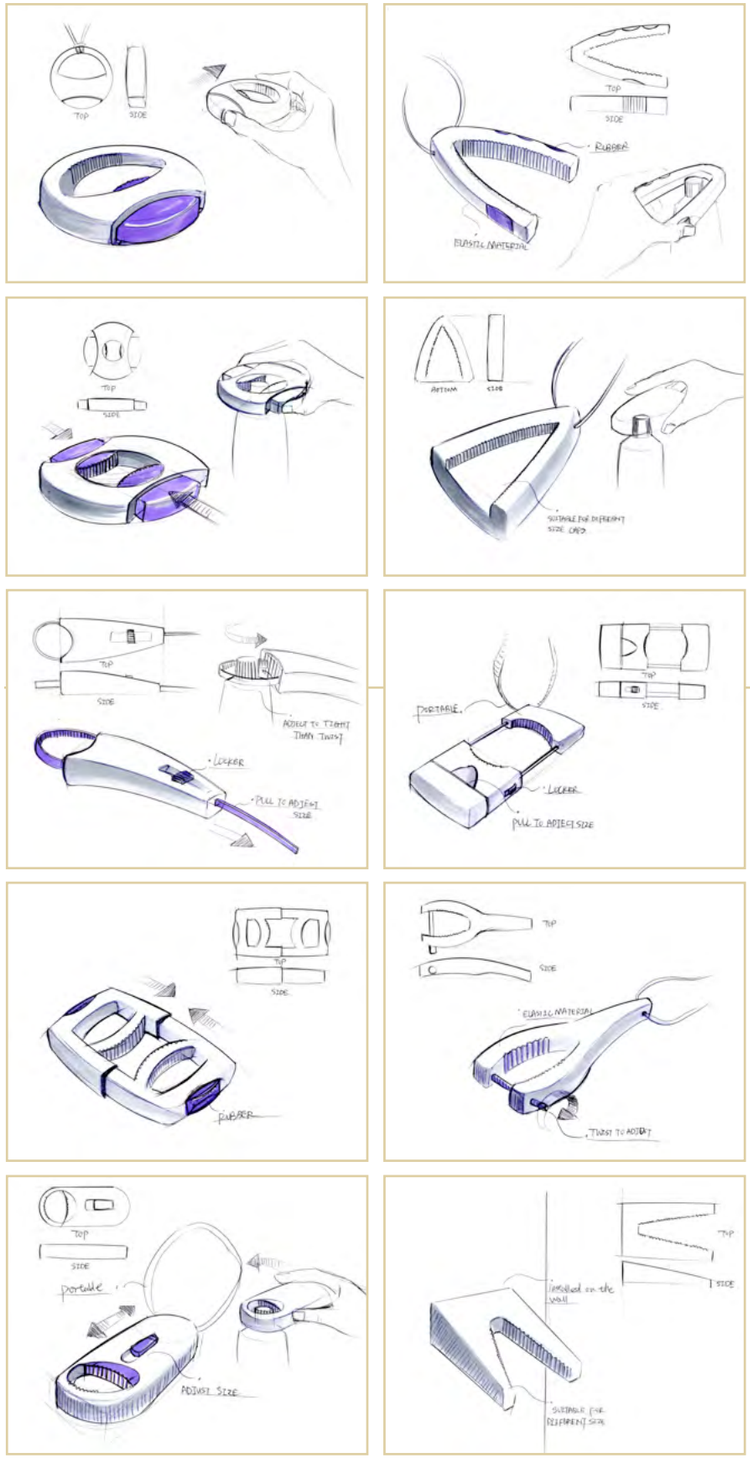
Jean – cannot handle the toothpaste and toothbrush at the same time. Has to use them separately.

Frank – typical example of an elderly individual who wants to live independently.

Millie – has trouble squeezing the right amount of toothpaste or face cream out of the bottle.

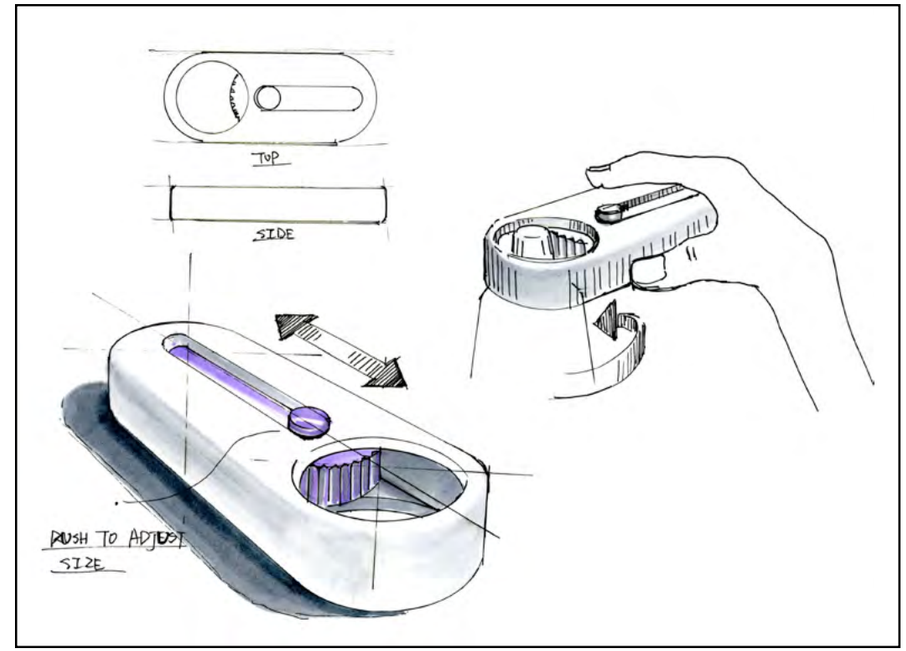
BRAINSTORM |

Our design focus is to develop a device for the elderly that will help open products with small caps to increase their independence. We brainstormed more possibilities like making the opener suitable for caps in variable size or making the opener also help to control the amount of product squeezed out.



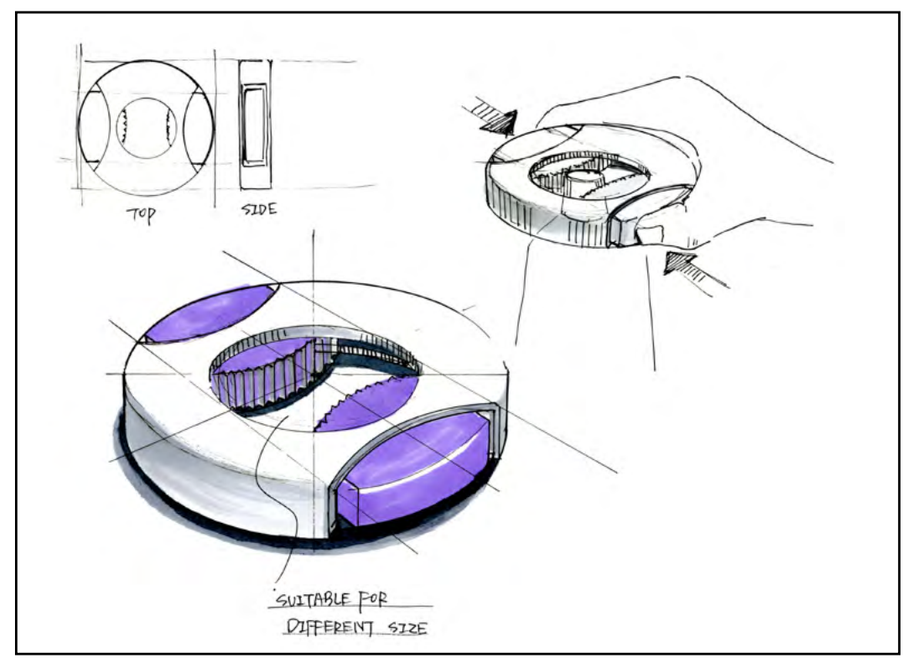
IDEATION |

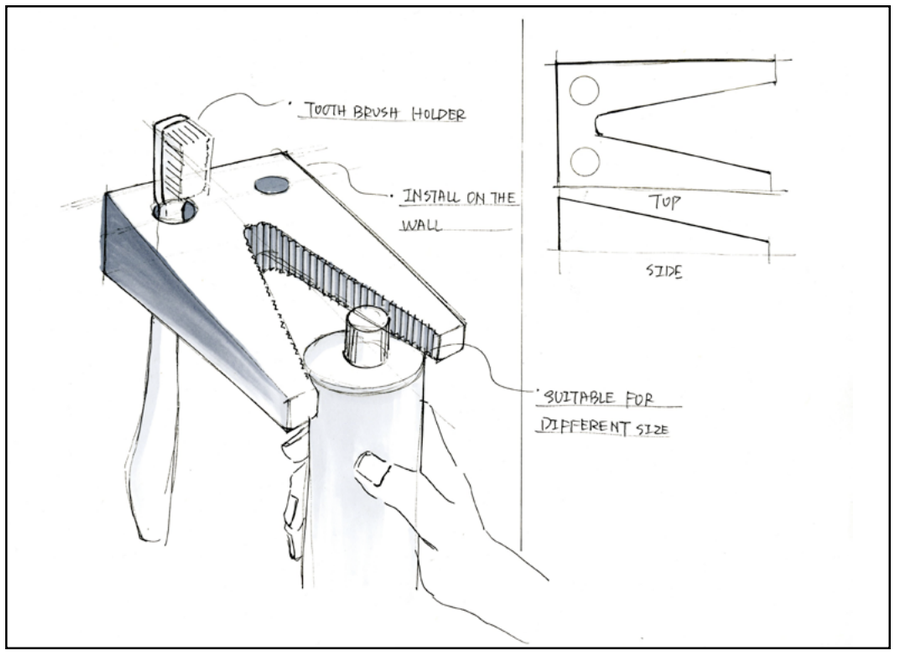
My sketch focused more on the opener could deal with caps different in size ranging from toothpaste caps to water bottle caps.



CONCEPT 1 |

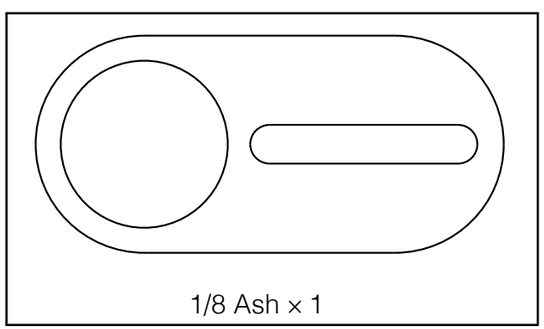
CONCEPT 2 |



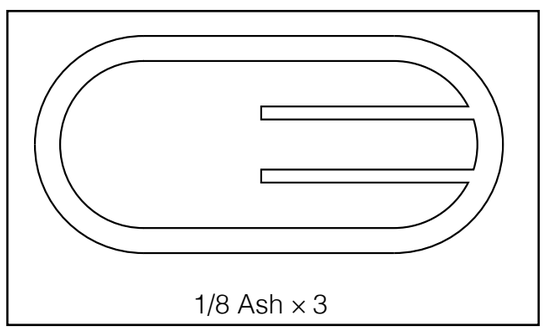


CONCEPT 3 |

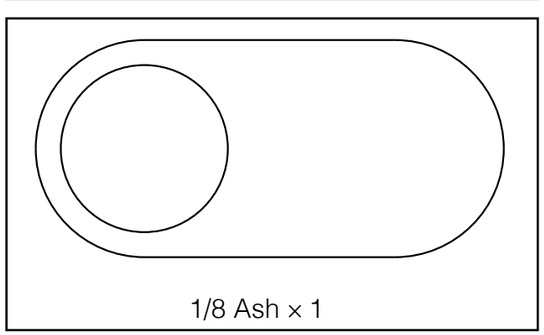
SHOP PLAN 1 |



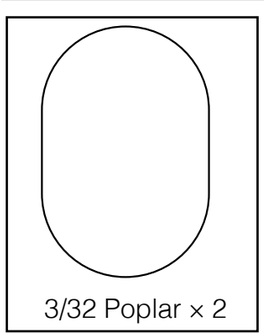
1/8 Ash × 1



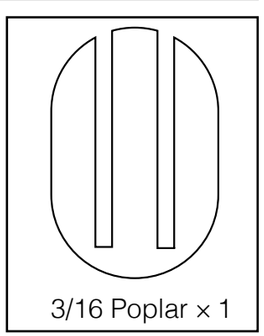
1/8 Ash × 3



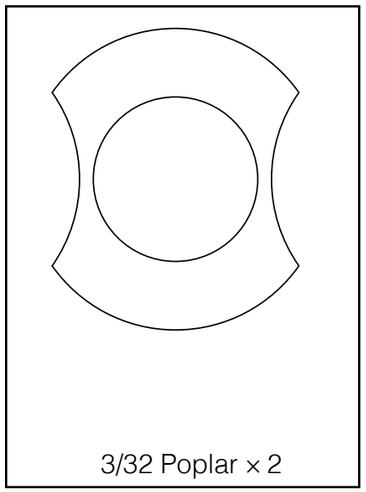
1/8 Ash × 1



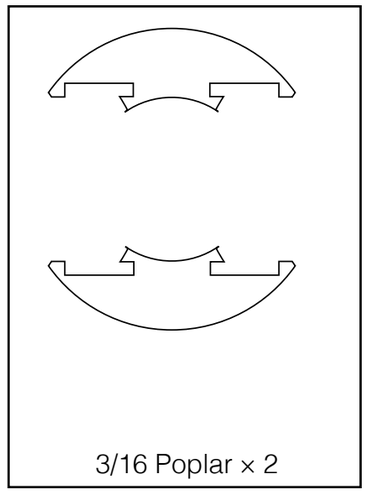
3/32 Poplar × 2



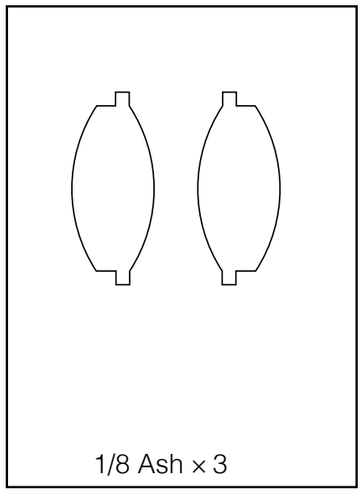
3/16 Poplar × 1



3/32 Poplar × 2



3/16 Poplar × 2

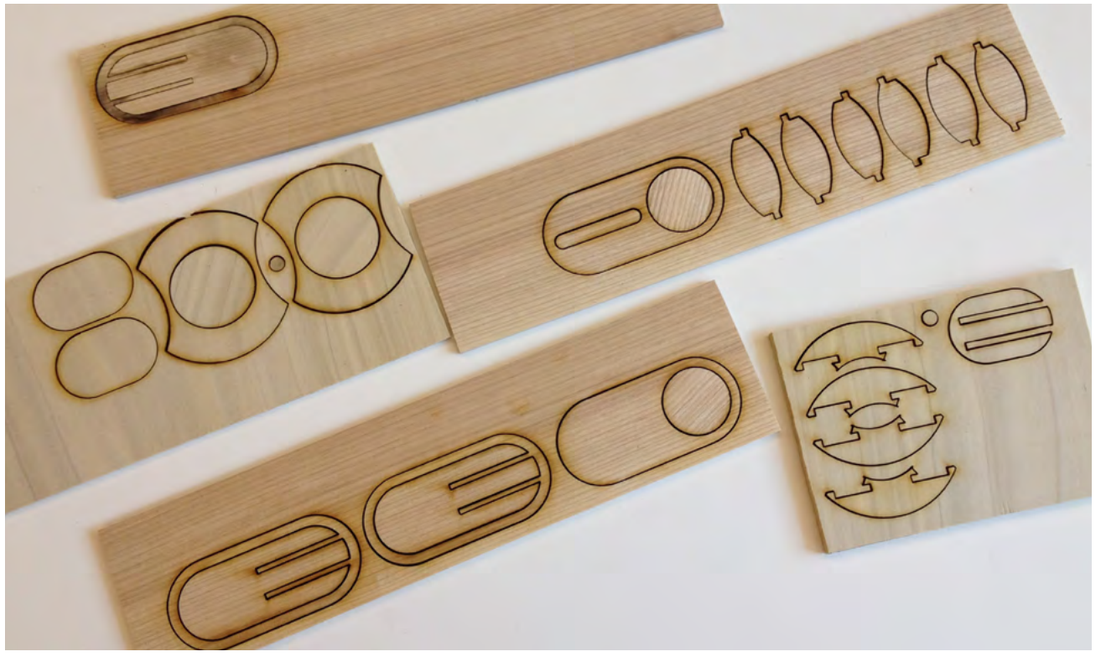


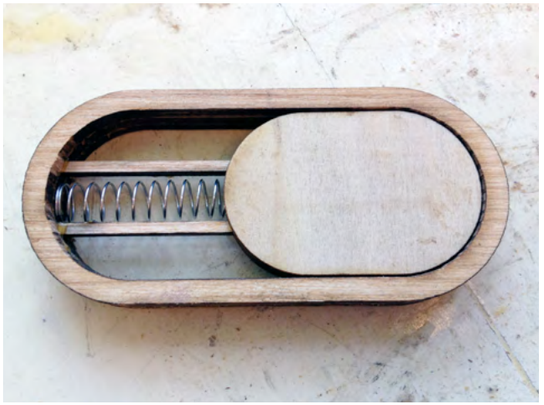
1/8 Ash × 3

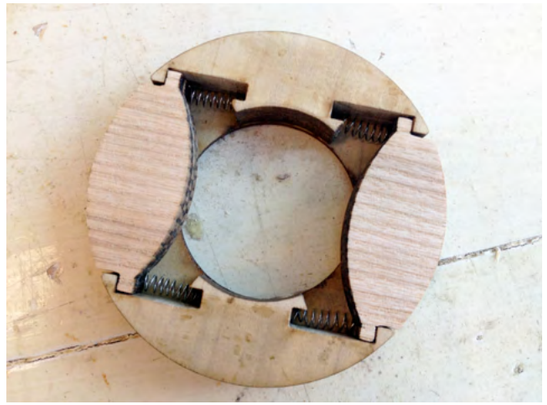
Has the experience of using laser cut in the salt and pepper project, the process was really familiar to me this time. I was able to have my illustrator version well planed and it really saved a lot of time for me.

SHOP PLAN 2 |

LASER CUT |

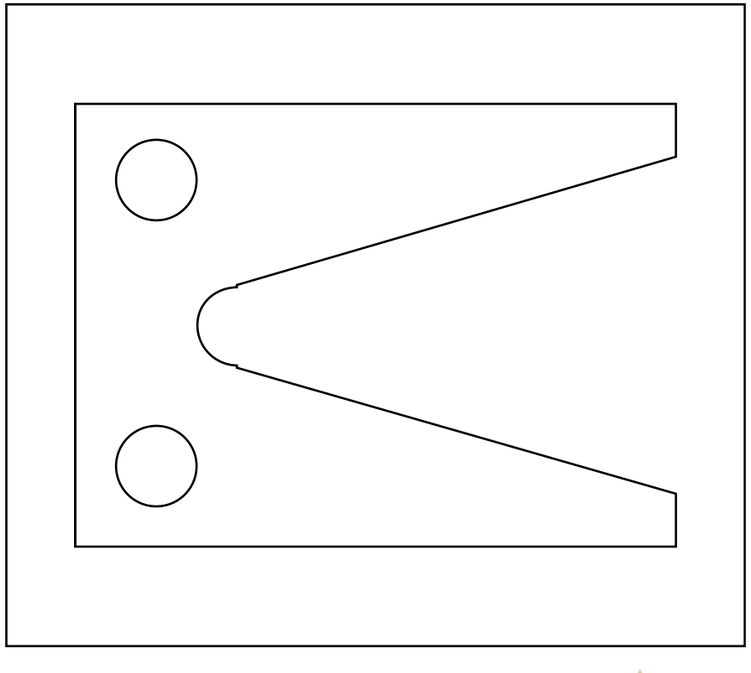






I used springs for the inside machanism as shown in the pictures. The simple machnism only allowed the model to show how the openers should work, which is a liitle bit disappointed for me. Though they are good enough as models I really expexted them could actually work.

MACHANISM | SHOP PLAN 3 |



Though I made this illustrtor version I still dicided to make it by hand becuase this was the most enconimic way and this concept is really easy to make.

OPENERS

and how to use