DEP 301
Collaborative Design Project

Week 4 Report

MAGANS

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Problem statement

To find creative solutions to make eating in cars a better experience and enjoyable to the users

Back to the drawing board

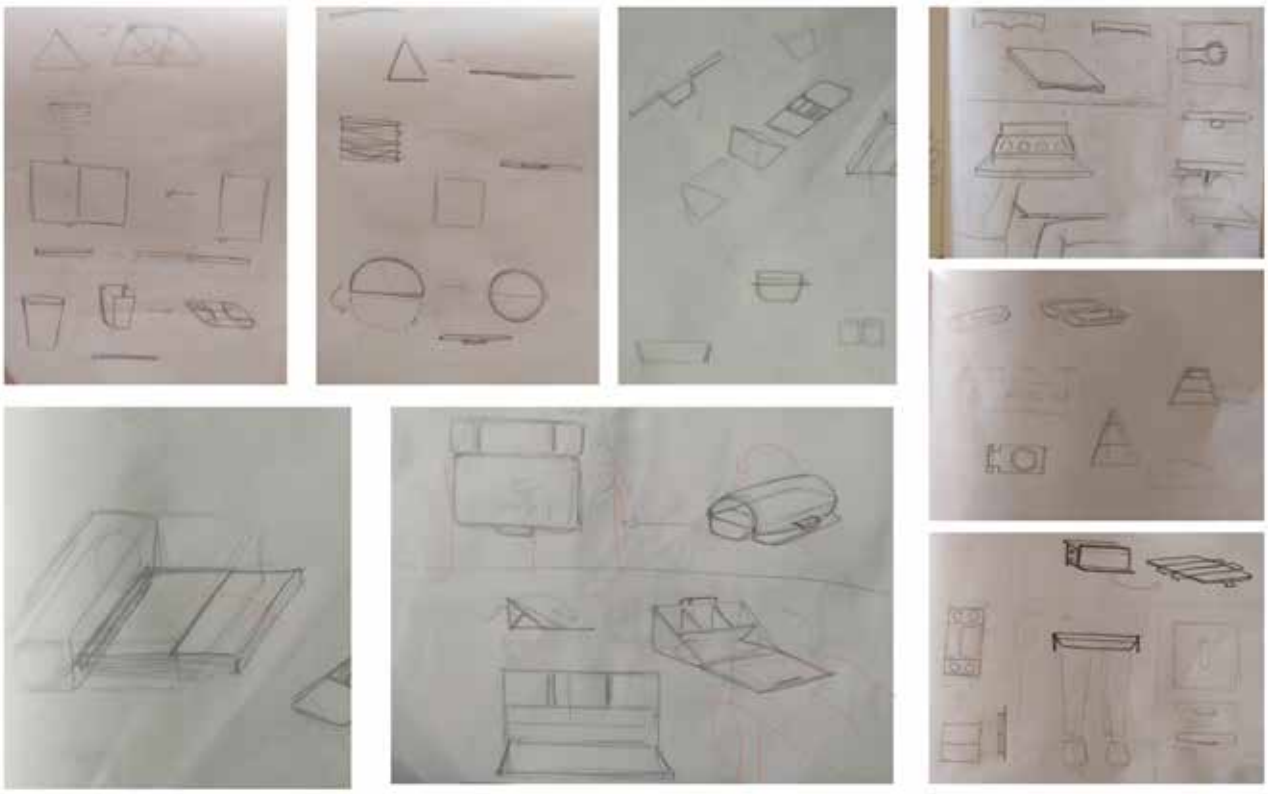
After our previous presentation, we got valuable feedback from professors and colleagues and with that, we went back to the drawing board. We decided to focus on two types of food groups instead of making it universal and also decided to make it part of the takeout packaging. For this, we studied cardboard boxes and takeout trays that existed for these food groups and also looked at Japanese food packaging techniques and origami.

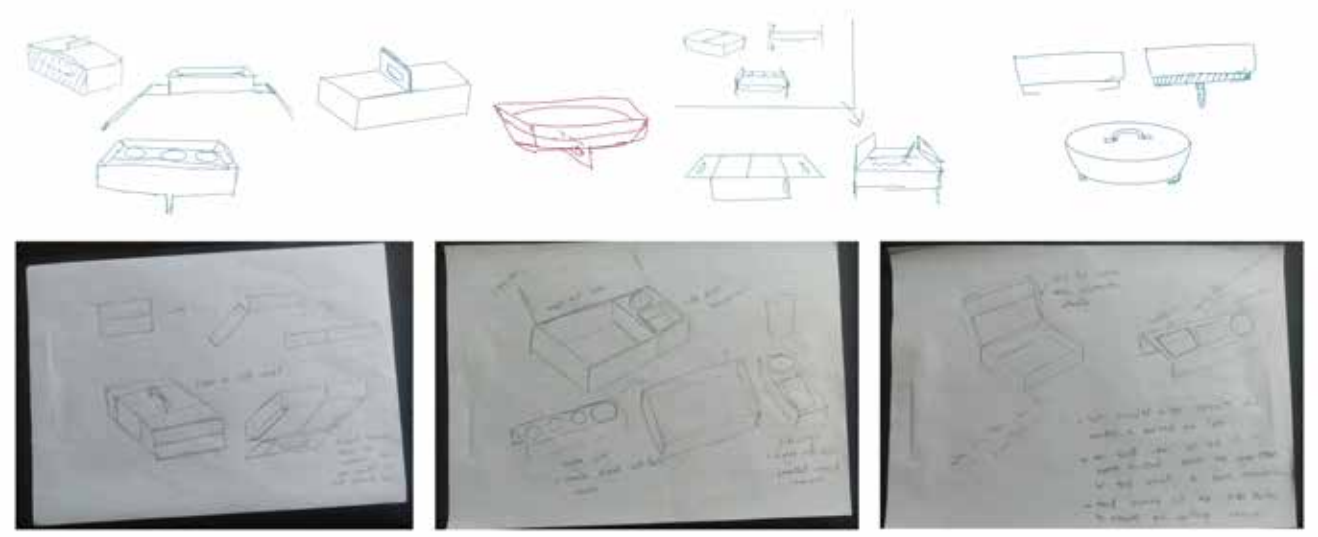
Understanding the food groups

We went forward to group the major food choices into two which are the roll type of foods which includes chapati, dosa, appam, shawarma, etc and rice type including biriyani, mandi, noodles, etc.

Ideation

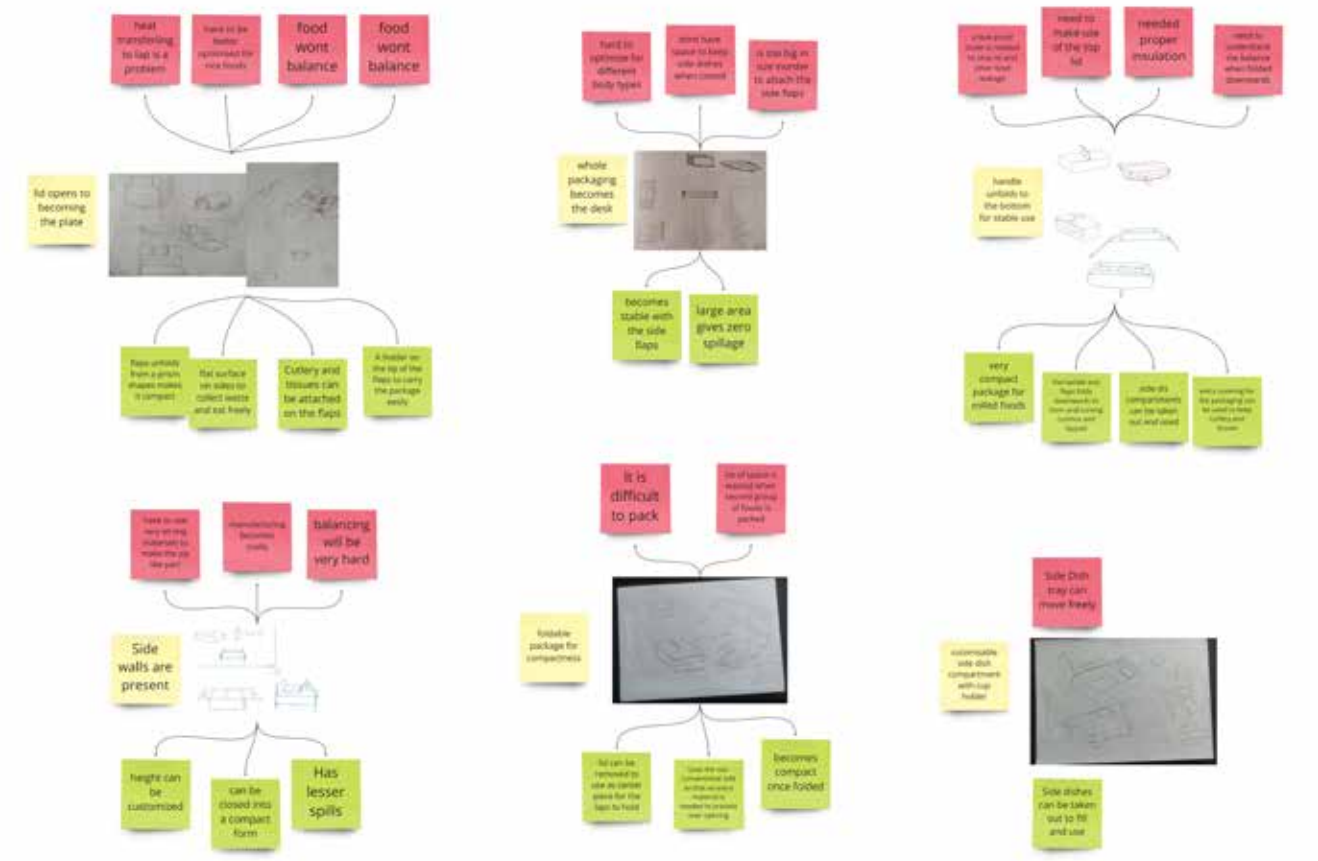
With all this information we did another ser of ideation where we made clusters of ideas for opening techniques and placing the desk of lap and palm for the roll type and rice type food groups.





Analysis

We selected unique champion ideas from the list and did a pro and con analysis to understand the problems we have to solve for each of them and to try and merge the ideas to come up with a champion idea.



Understanding users and food dimensions

Before finalizing on one concept we met with Avinash sir to discuss our ideas,
he gave us really helpful feedback on each idea and helped us to narrow down, but more importantly, he advised us to extensively research anthropometry and insulating the heat transfer from the food to the lap since takeout food will be very hot from the restaurant.

Since most of our ideas were based on eating with the food on the lap, we figured that we need to use anthropometric data to decide the dimensions of the box, along with that we also had to take the size required by food into consideration, for making a mockup we decided to take dosa as the example since it would require the largest size. These are the values that we needed to do it.

Anthropometric data

Body dimensions	Mean	5th %	50th %	95th %
Thigh - thigh length	28.9	22.9	28.7	34.1
Thigh clearance height	12.4	9.7	12.3	15.0
Femoral width	9.6	7.8	9.7	11.2
Upper leg length male	40.8	35.6	40.8	45.9
Upper leg length female	36.7	31.2	36.9	41.8

Food dimensions

Dosa diameter - 305mm
dosa rolled diameter - 60mm

Measurments are in ?

we used the 50th percentile of all values to accommodate the largest user group, thigh to thigh length and the diameter of dosa gave us the required length and the upper leg length gave us the breadth. we chose to use the female data for upper leg length since it is shorter than in males because it's harder to balance a wider box on a short leg than the other way around. We needed the thigh clearance to figure out how much space we could use in between the thighs.

For the dosa dimensions, we used the standard diameter of dosa tawas.

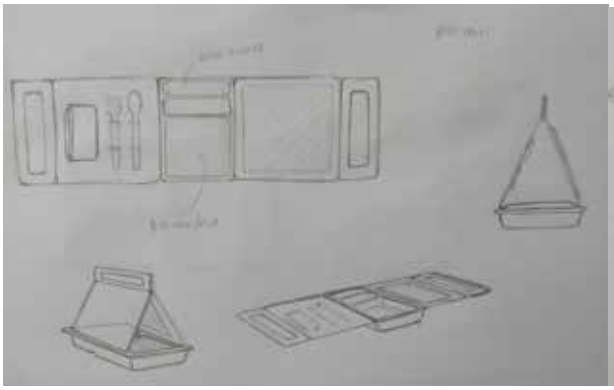
Insulation solutions

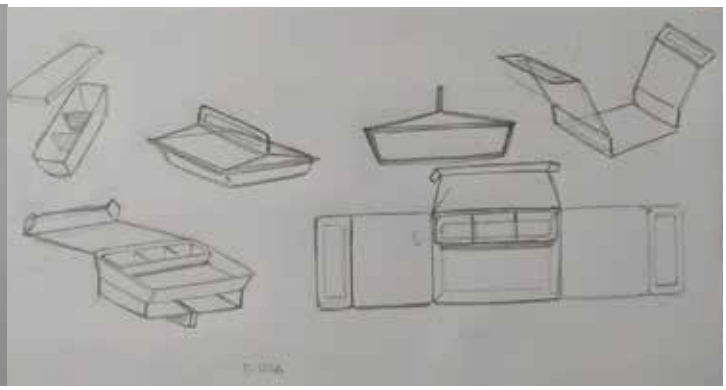
The next problem we needed to address was the heat transfer. Since the box is meant to be placed on the lap, there is a need to consider how we insulate the heat from the food and the lap. we came up with a few different ways to try and solve this issue, like using an aluminum foil inside to shield the heat or trying to introduce an air gap between the food and thigh.

We decided to use corrugated sheets as the outermost layer to solve this issue since the corrugated sheet has a gap in it, it restricts heat transfer through it, so along with the material of the box, introducing an extra layer of the corrugated sheet will help in reducing the heat.

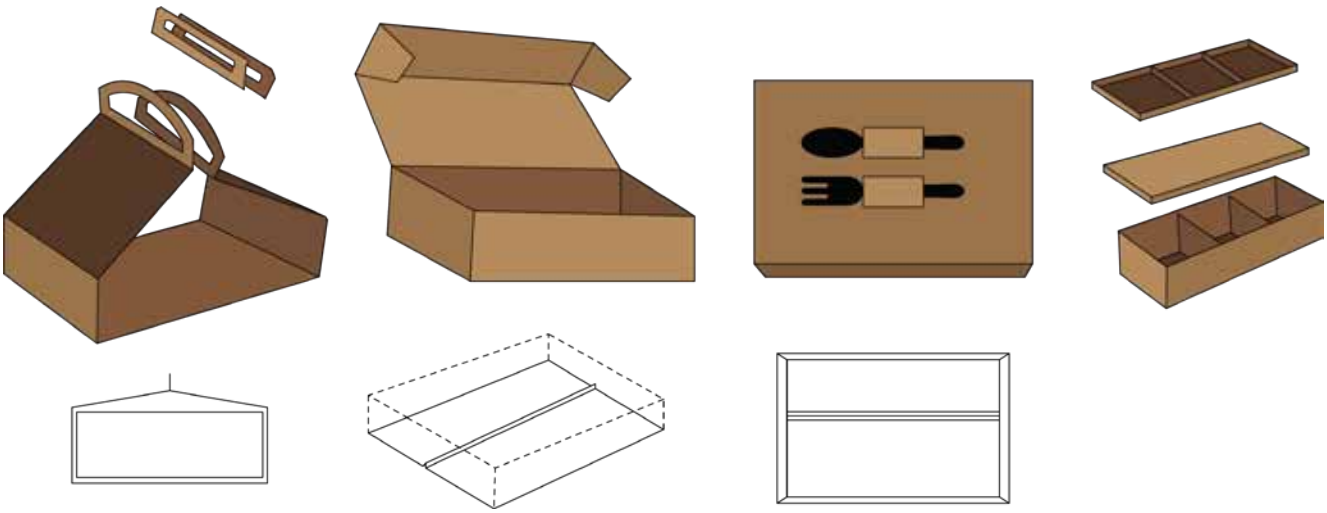
Champion ideas

From the list of ideas, we selected two based on ease of use and functionality. We tried to detail these a bit to help fix on one idea.
The first one is a concept where the food is packed in a prism-shaped cardboard container that has flaps that can be used as an eating surface. This idea involves tightly packing the food in a central compartment which will stay in between the legs when in use. But the problem with this idea was that we were not able to maintain its balance and open state since most of the weight is in the center which makes it bend downward.
so we chose to focus on the other concept





The next concept involved a container with a lot of space to eat in to reduce spilling of food into the car, it also had a side dish tray which can be customized to suit the food that is being served. we also left an empty slot in the side dish tray to be used as a waste compartment to help eat comfortably. the side dish tray could also come with a compartment that can be used as a cup holder to hold a cup of chai or a can of soda. The concept also has two flaps which are folded down while eating to form a handle on the bottom. this serves two functions, it works as a handle to facilitate eating with the tray on one hand for people who find eating from the lap uncomfortable or if the user wants to eat standing up out of the car. it also enables the user to hold it with their thighs in the car in case of an emergency braking situation.



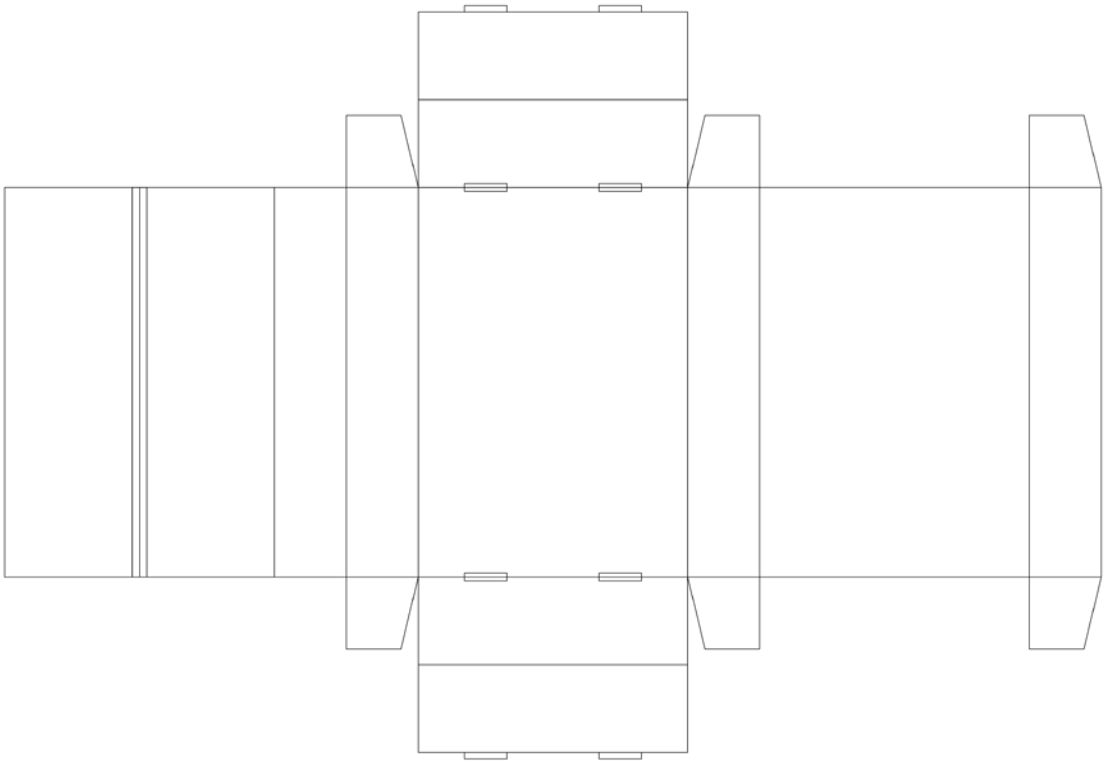
Prototypes

We made a prototype from cardboard using the dimensions from the anthropometric srudy. We learned a lot of things while doing it. One of the major things we learned was that the actual product was too big when t. We did it based on anthropometric measurements and we realized while doing the final thing that it was way bigger than what was necessary. Another thing we learned was that the flap for the handle needs to be as big as a box as we are using that for heat insulation. The next thing was that the side dish lid can be stored on the box's lid when in use. We didn't intend it to be so but we realized that it was and it turned ou to be the solution for its storage.







References

Anthropometry for furniture design - https://www.sciencedirect.com/science/article/pii/S2215098616304578

GG Ray - Indian women anthropometry - https://www.jstage.jst.go.jp/article/jhe1972/19/1/19_1_31/_pdf

Children and adults of us anthropometry- https://www.cdc.gov/nchs/data/series/sr_11/sr11_252.pdf

Indian males anthropometry - https://www.researchgate.net/publication/267337032_Anthropometric_dimensions_among_Indian_males_-_A_principal_component_analysis

Folding - https://www.johnsbyrne.com/blog/printing-packaging-terms-part-3-tucks-folds/

https://cdn.discordapp.com/attachments/767756245440004109/777459531952685086/CCL_Healthcare_Digital_Folding_Carton_catalog.pdf

https://www.gwp.co.uk/coatings/waterproof-cardboard/