

Project 1- Design of saddle box for Royal Enfield Himalayan



IDC School of Design
अभिकल्प विद्यालय

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Mobility and Vehicle Design

DECLARATION

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited of from whom proper permission has not been taken when needed.

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05.07.2018

To whomsoever it may concern

This is to certify that Mr. Srinag K. A., first year Master's student in Mobility and Vehicle Design studying in IDC,IIT Bombay has done his internship project with us titled 'Design of a saddle box for Royal Enfield Himalayan'.

He did his internship with us from 14th May, 2018 to 27th June, 2018 at Ergodesign Private Limited, Bangalore.

For Ergodesign Private Limited,

A handwritten signature in blue ink that reads "Deepthi V. Shet".

Deepthi V.Shet
Studio Manager



APPROVAL SHEET

This Mobility and Vehicle Design project report entitled "Design of saddle box for Royal Enfield Himalayan.", by Srinag K A is approved in partial fulfilment of the requirement for Master of Degree in Mobility and Vehicle Design.

Course Co-ordinator:

ACKNOWLEDGEMENT

I would like to express my sincere thanks to Mr. Vijay Kumar, Principal Designer, Ergodesign and Ms. Deepthi Seth, Manager, ErgoDesign for granting me to inter with ErgoDesign, Bangalore. Without the guidance of Mr. Vijay, this project would not be what it is. I would also like to thank the members of the firm for their constant support and guidance and involvement during internship period.

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INTRODUCTION

Saddlebags

These bags are usually attached to the saddle and are hence called as saddlebags.

A brief history

Saddlebags were usually used for horse riding. In horse riding, saddlebags sit in various positions, on the back, side, or front of the saddle. Most attach to the saddle by straps and ties. They can be made from various materials. Although leather was the traditional material, it is heavier and requires more maintenance than many modern versions. There are several types: Pommel bags (which sit in front of the saddle), traditional paired saddlebags (which lie on the hips of the horse, on either side of the cantle), and assorted smaller bags such as a cantle bag (a small tube-like bag that sits just behind the saddle), or a single small saddle bag that may be carried on the off-side (right hand side) of an English saddle.

Pannier-style bags are sometimes fitted over a pack saddle used for packing gear on a horse or other pack animal (often, a mule or donkey) rather than for carrying a rider.^[1] In Turkish Anatolia, Iran and Baluchistan, saddlebags are traditionally woven in wool, with a front face decorated with Soumak and a plainer flatwoven back. Slits are left along the opening for a rope to close and secure the bag to the pack animal.



Saddlebags on a horse saddle



Traditional Blackfoot women's saddlebag

Bicycle panniers

In bicycling, a saddlebag or seat bag is a bag attached under the saddle or seat. Smaller bags are typically used to hold a few items such as spare inner tubes, puncture repair kit, tools, rain gear, food, first-aid kit, etc. Seat bags are common on touring bicycles, racing bicycles, and cross-country mountain bikes.

Bags range from tiny to large (over 25 liters). Smaller bags, known as seat bags, wedge packs, or seat packs fit completely under the saddle. Larger bags which project behind and sideways are usually called saddlebags.



Bicycle Panniers

Motorcycle Panniers

On a motorcycle, modern panniers are normally hard-shell cases mounted behind the seat and on either-side of the rear wheel, attached to a framework (which bolts to the motorcycle frame) known as a *carrier*. Modern panniers are made to be quickly-detachable.

Historically, the origins were in military use for dispatch riders, where soft, often canvas-type woven material bags were fitted to the motorcycle by rudimentary frames enabling the rider to carry documents securely. After hostilities ended, any left-over items including the motorcycles could be obtained from army-surplus depots, particularly after World War II during the 1950s when there was an increase in motorcycle use as a cheap form of transport.



World War I pannier-style saddlebags containing a first aid kit



Metal Saddle boxes/panniers are preferred in motorcycles.

MATERIALS USED IN MAKING PANNIERS

Soft materials

Ballistic Nylon is a thick nylon synthetic fabric. Ballistic nylon is very durable and easy to clean. It's ability to resist abrasion and tearing makes ballistic nylon a popular material for luggage that has to be able to withstand considerable beating.

Corduroy is known for its durability and resistance to abrasion, tears and scuffs.

Polyester is cheapest, soft material option. Most luggage in the lowest price ranges are made with polyester fabric.



Nylon Panniers



Corduroy Panniers



Polyester Panniers

Hard Materials

Aluminum panniers have been around for a while and is a classic choice for making panniers. Since they are less expensive, they are being replaced by other less expensive hard materials.

Polycarbonate is a molded type of thermoplastic polymers and is very popular material for hard luggage.

Polypropylene is a thermoplastic polymer and the lightest of all the thermoplastic products, making it ideal for any lightweight luggage range.

ABS (Acrylonitrile Butadiene Styrene) is a common thermoplastic which is lighter than polycarbonate but isn't durable. It is the cheapest hard material which can be used to make hard panniers.



Aluminium Panniers



Polycarbonate Panniers



Polypropylene Panniers

BENCHMARKING THE PANNIERS

Givi, Touratech and Trax are major players for the metal saddle boxes in the market. Since the panniers are to be made exclusively for Royal Enfield Himalayan, the quality of the box in terms of form and functionality must be in par with to Royal Enfield's standards.



Dirtsack and Royal Motorcycles are a few third-party brands that makes panniers for Royal Enfield Himalayan. Each pannier has a capacity of 26L.



DESIGN BRIEF

Design of saddle box for Royal Enfield Himalayan.

The material used is aluminum sheet (thickness=2 mm). Nylon strips may be used to protect the edges.

The focus must be on the utilitarian value of the panniers.

FIXING THE DIMENSIONS OF THE BOX

A list of various items carried by the riders in a saddle box was noted down and their volume is calculated.

| Sl. No | Product | Length (mm) | Breadth (mm) | Height (mm) | Volume (l) |
|--------|---------------|-------------|--------------|-------------|------------|
| 1 | Cutlery | 60 | 20 | 170 | 0.204 |
| 2 | Swiss Knife | 35 | 20 | 90 | 0.063 |
| 3 | First aid kit | 200 | 80 | 25 | 0.4 |

| Sl. No | Product | Length (mm) | Breadth (mm) | Height (mm) | Volume (l) |
|--------|----------------------|-------------|--------------|-------------|------------|
| 4 | Personal Hygiene Kit | 250 | 60 | 150 | 2.25 |
| 5 | Tire pressure gauge | 80 | 50 | 150 | 0.6 |
| 7 | Short bike pump | 120 | 80 | 150 | 1.44 |
| 8 | Socket Adaptor | 80 | 50 | 100 | 0.4 |
| 9 | Allen Keys | 80 | 50 | 50 | 0.2 |
| 10 | 2 L Oil Can | 140 | 10 | 250 | 0.35 |
| 11 | Chain Links | 100 | 40 | 100 | 0.4 |

| Sl. No | Product | Length (mm) | Breadth (mm) | Height (mm) | Volume (l) |
|--------|---------------------|-------------|--------------|-------------|------------|
| 12 | Spark Plug | 50 | 50 | 80 | 0.2 |
| 13 | Oil Filter | 70 | 70 | 80 | 0.392 |
| 14 | Puncture Repair kit | 200 | 130 | 40 | 1.04 |
| 15 | Brake pads | 130 | 100 | 90 | 1.17 |
| 16 | Gaffer tape | 5 | 5 | 12 | 0.3 |
| 17 | Sleeping bag | 220 | 220 | 360 | 17.424 |
| 18 | Tent | 150 | 150 | 450 | 10.125 |

| Sl. No | Product | Length (mm) | Breadth (mm) | Height (mm) | Volume (l) |
|--------|----------------------------|-------------|--------------|-------------|------------|
| 19 | Spanner Set | 44 | 110 | 306 | 1.48104 |
| 20 | Bolts, nuts, washers | 100 | 100 | 50 | .5 |
| 21 | Tire tube (front and rear) | 120 | 120 | 120 | 1.728 |
| 22 | Document Files | 150 | 70 | 250 | 1.575 |
| 23 | Clothes | 220 | 100 | 200 | 4.85 |

The total volume of the items (excluding tent which is rolled and tied to the top of the box with bungee cords) is around 40 liters. Since no product fits perfectly with other product, it can be assumed that an extra volume of 5-6 liters may be required. Hence the total volume occupied by products in a saddle bag may be assumed to be 60 liters. Hence the volume contained in each saddle box/ capacity of each saddle box is around 30 liters.

Object having the maximum length- 250 mm

Object having the maximum breadth- 220 mm

Object having the maximum height- 360 mm

If the objects are arranged such that it fits inside the box, then the dimensions of the box are:

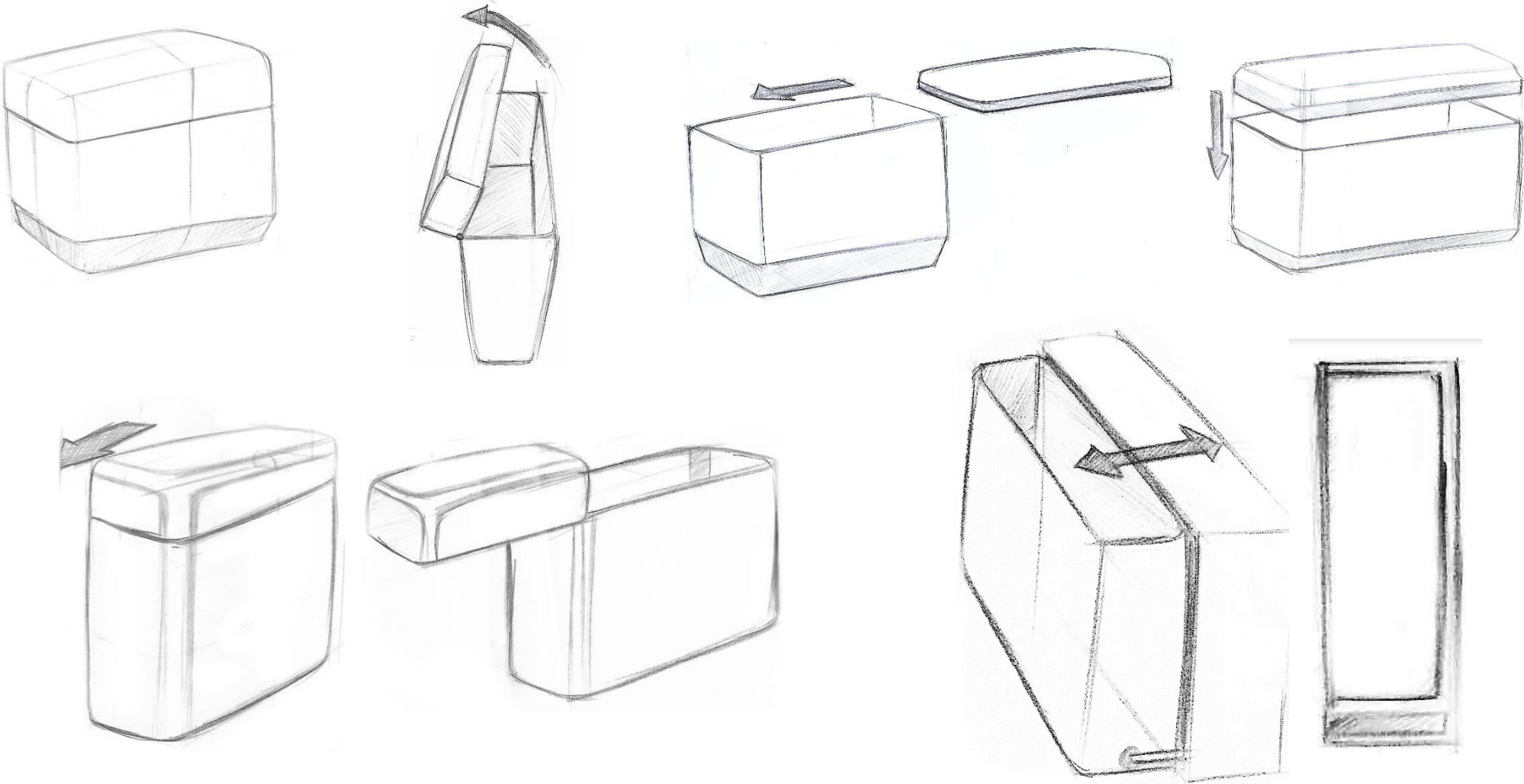
Length- 440 mm

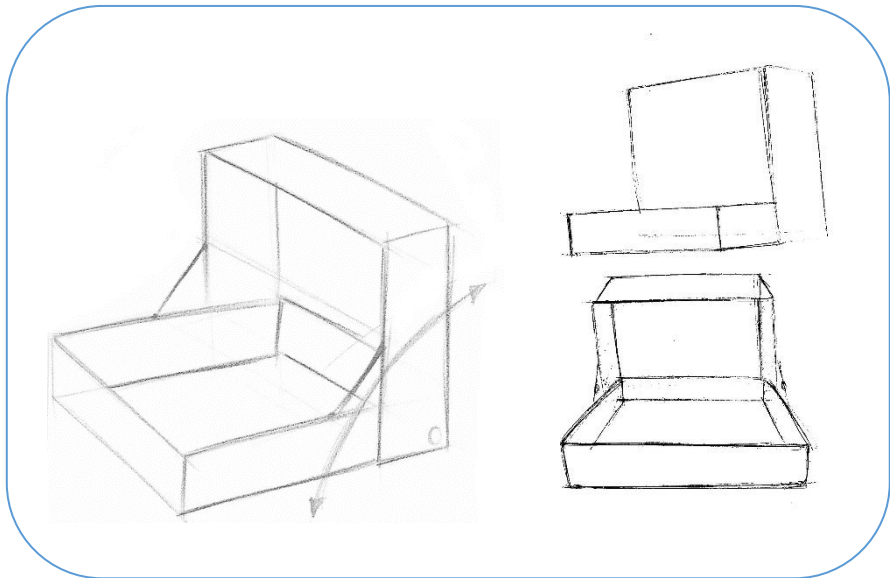
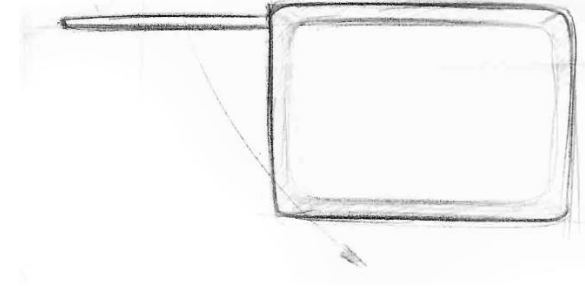
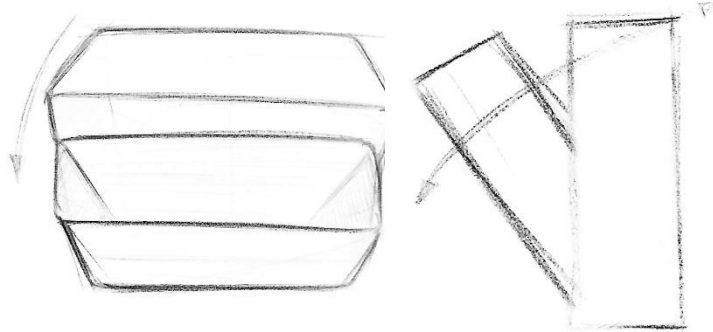
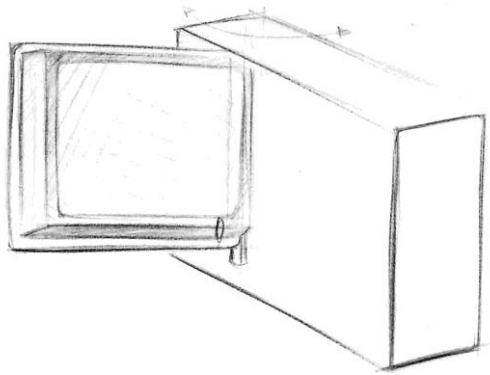
Breadth- 220 mm

Height- 320 mm

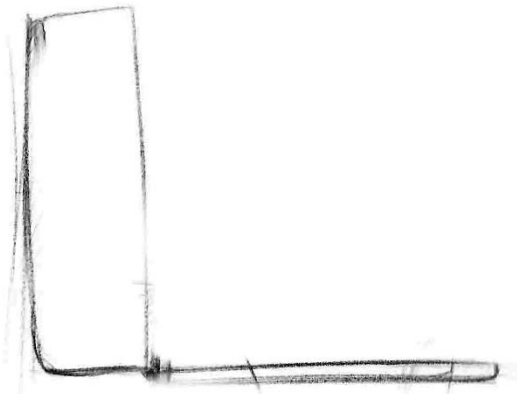
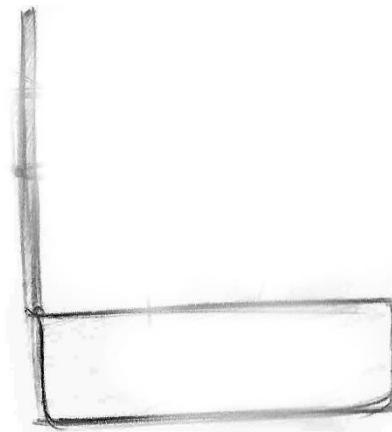
The approximate volume would be 34 liters. But due to presence of chamfers and fillets, the volume would be reduced to approximately around 32 liters

IDEATION- The ideation started with the exploration of the different ways the lid of the box would open

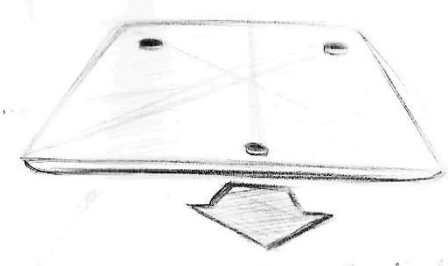




This particular method of opening was chosen due to the easiness in accessing the items in the box.



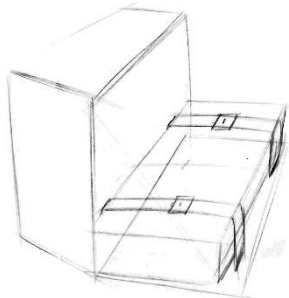
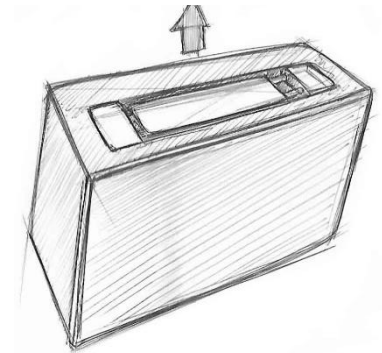
Further explorations were done on which portion of the box is opened



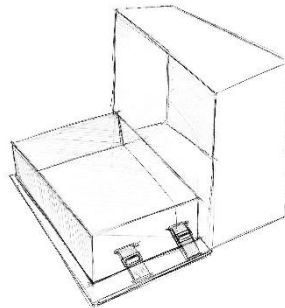
Using magnets to hold the handbag to the base



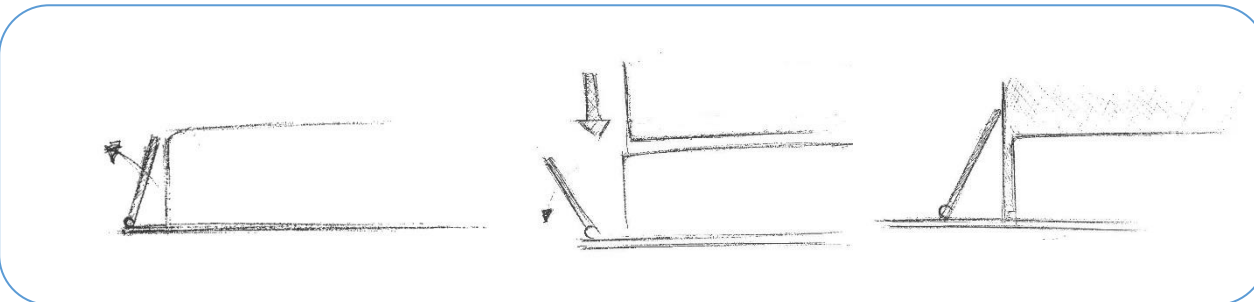
Velcro was proposed as other option to hold the base



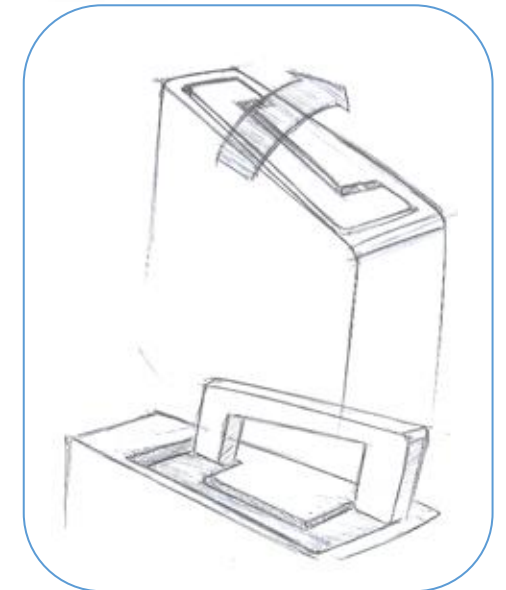
Belt straps can also be used as an option



Straps can be used in the sides



Spring loaded frame can be used in order to prevent the bag from toppling when closed



The handle bag can be designed such that it easily fits inside the pannier

FORM IDEATION

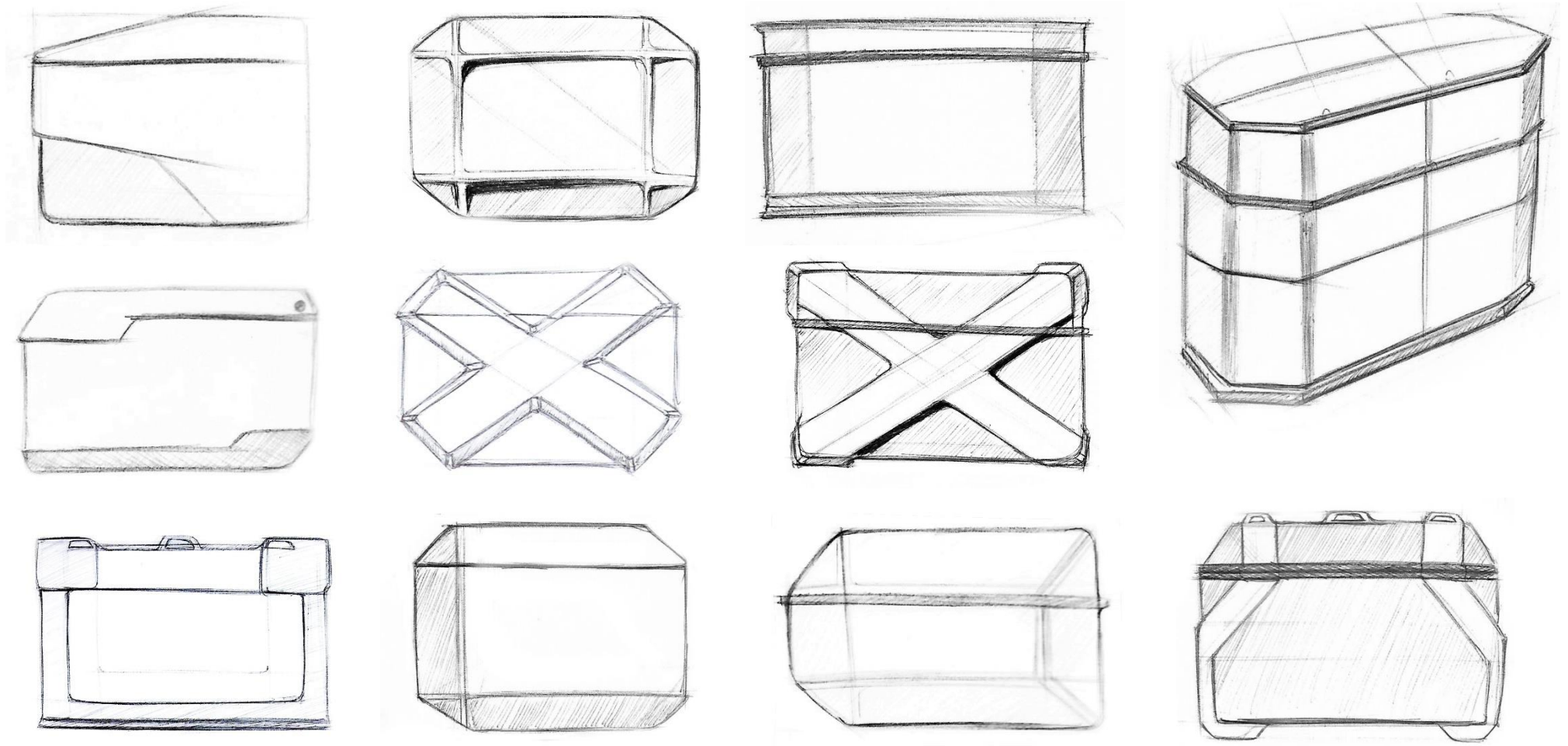
Moodboard

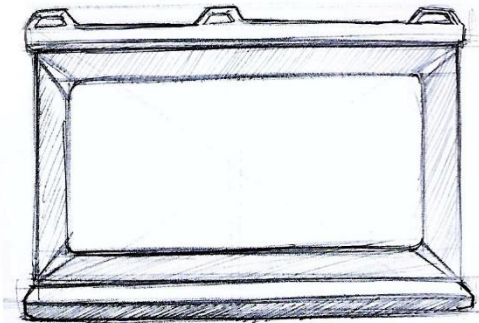
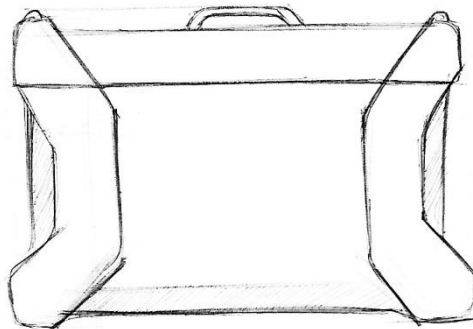
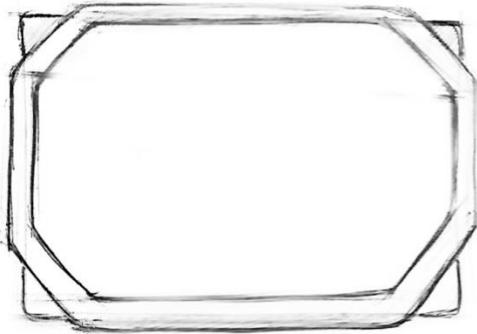
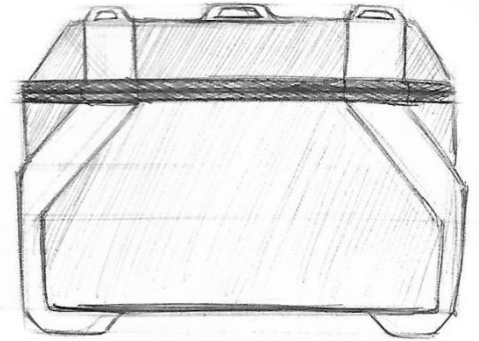
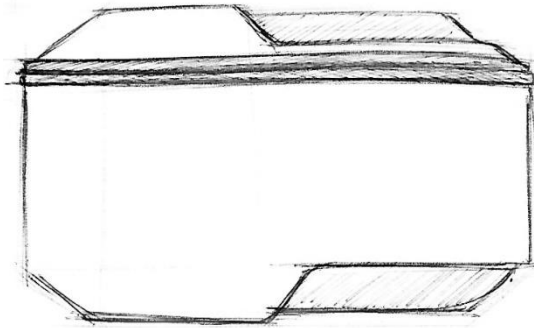
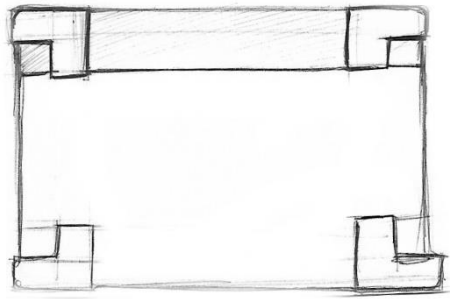
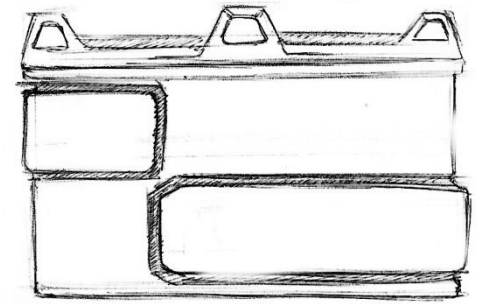
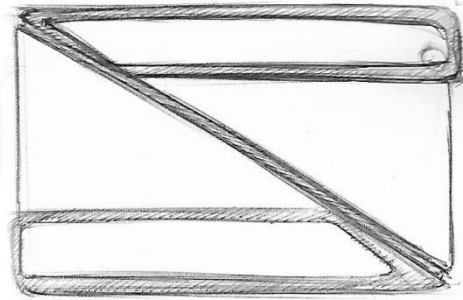
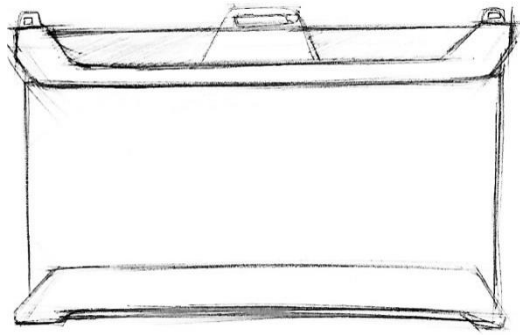


Keywords

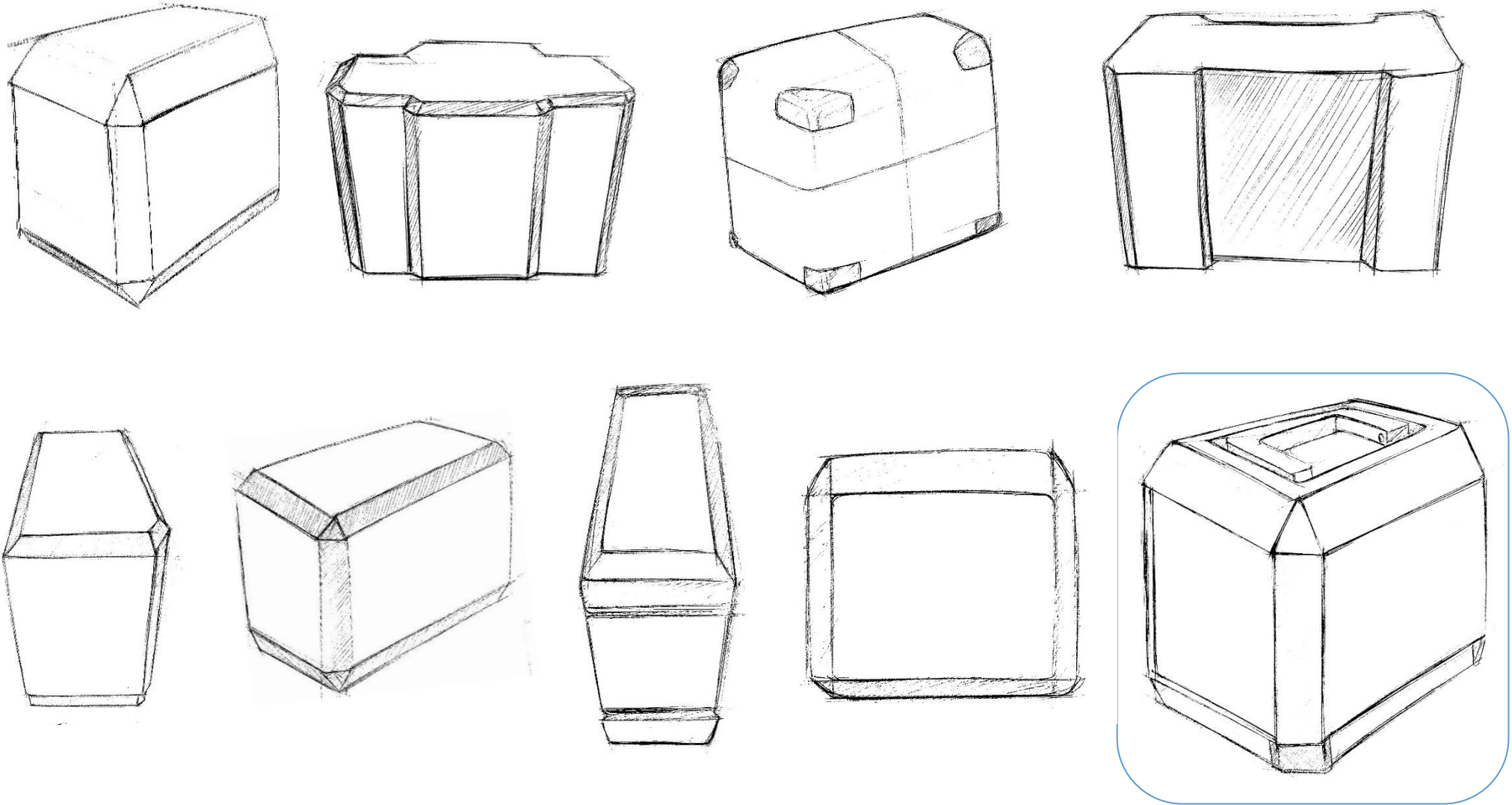
Rugged Adventurous Secure Robust

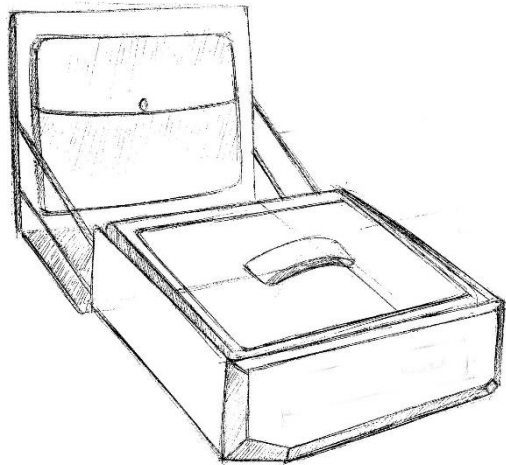
FORM IDEATION- In this phase, the ideation was based on the form of the panniers. The form was generated with the influence of the moodboard



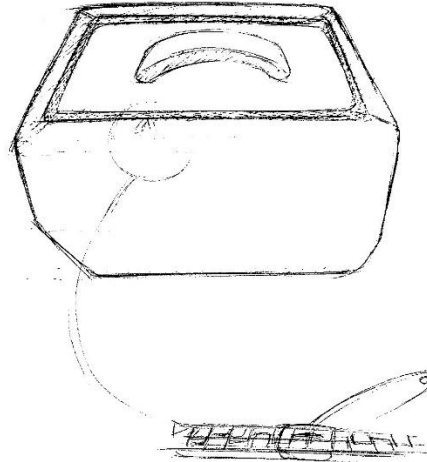


Since the option of tooling was unavailable, the form of the box was restricted as only chamfers and fillets were allowed

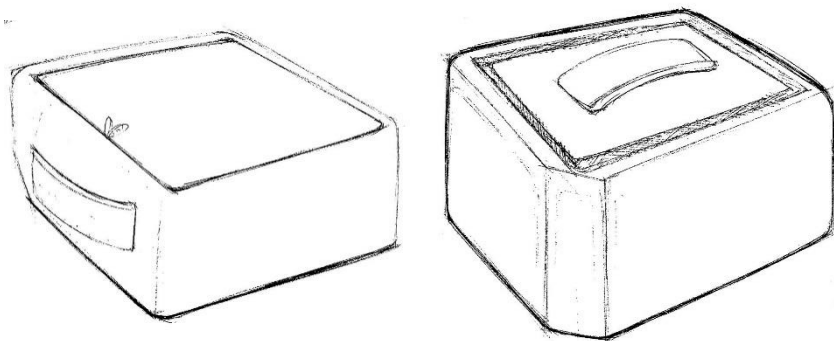
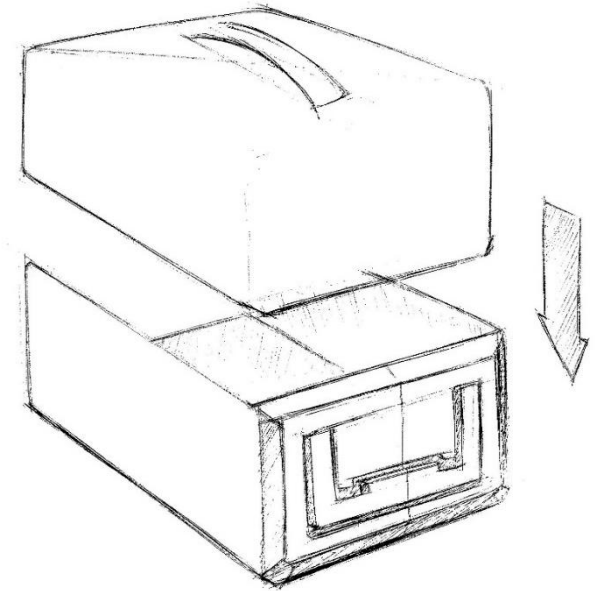




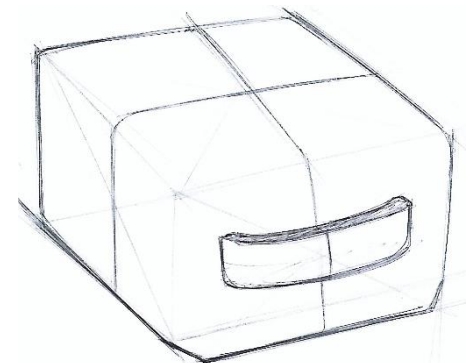
Type of opening



A zipper is present on the top surface of the bag thus acting as a lid

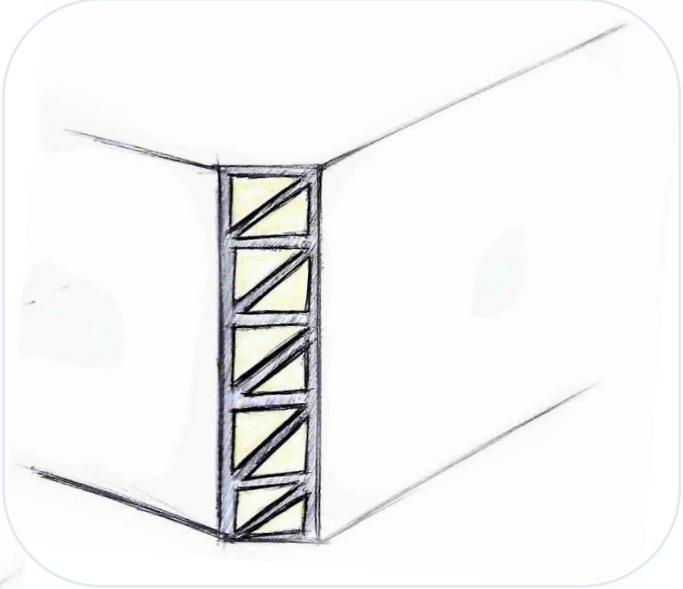
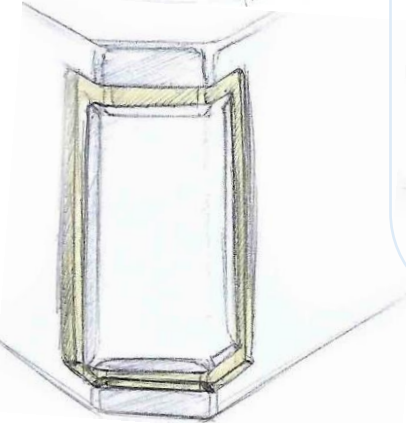
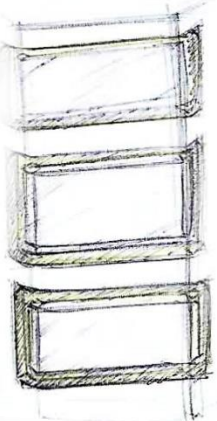
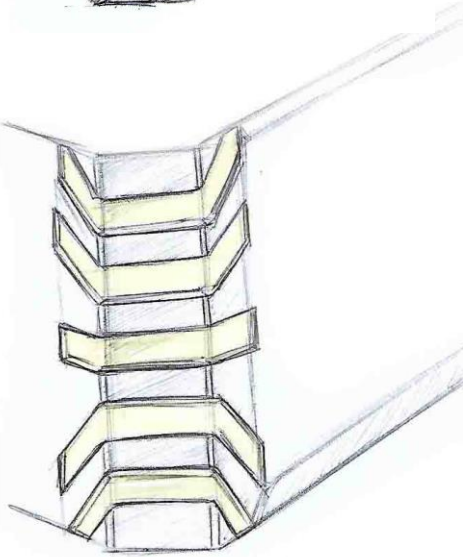
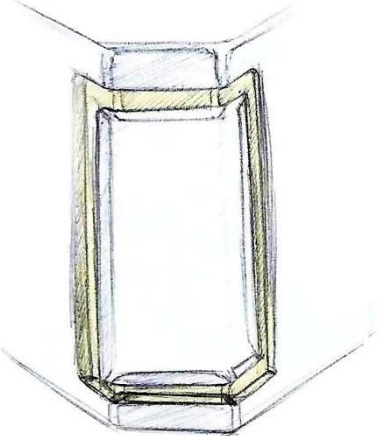
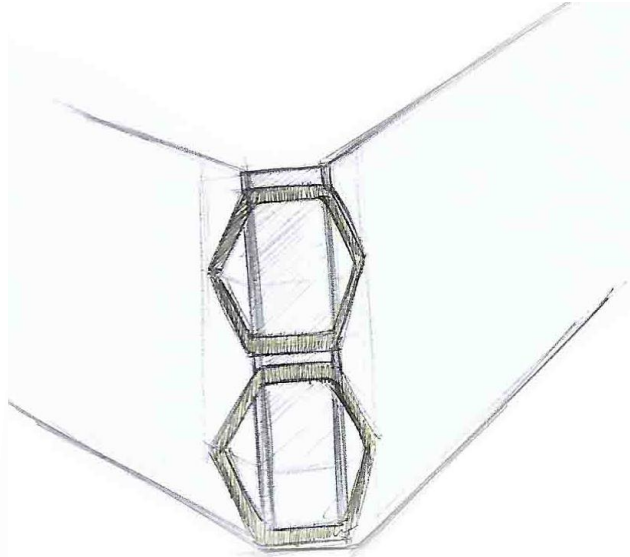
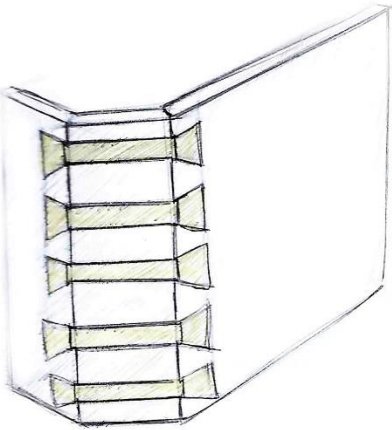
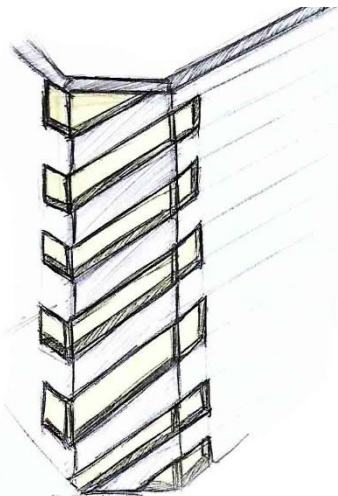
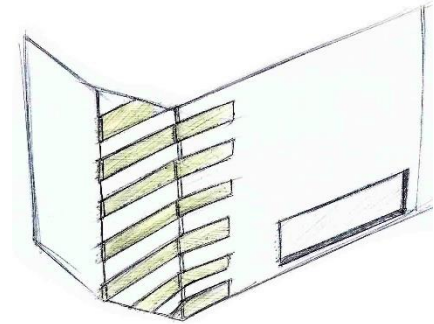


The handle for the bag is considered at top due to its ease for access

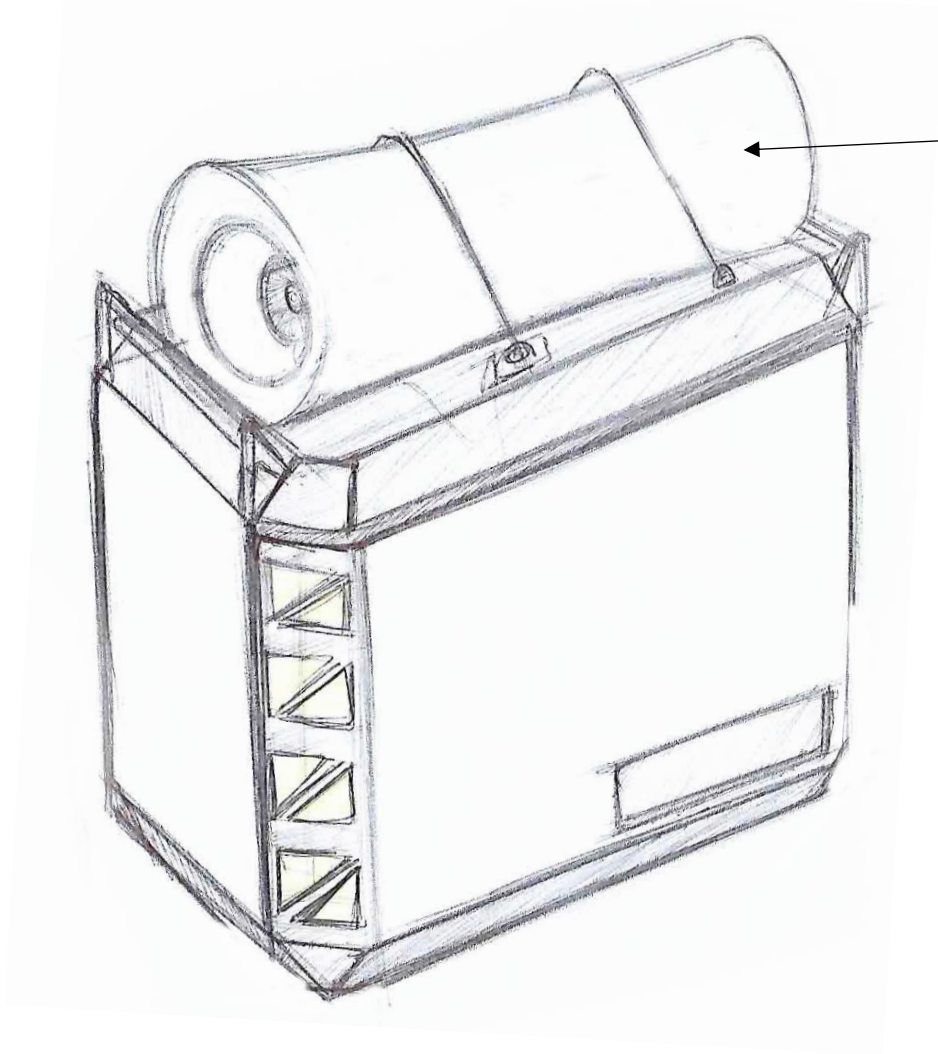
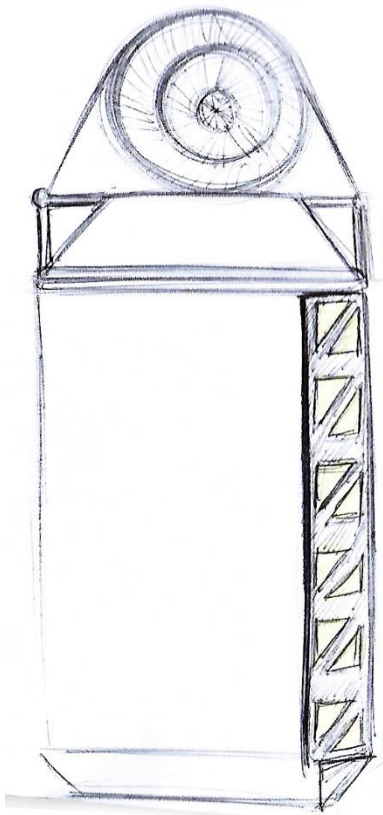


The lower surface of the bag takes the same shape as the lid surface.

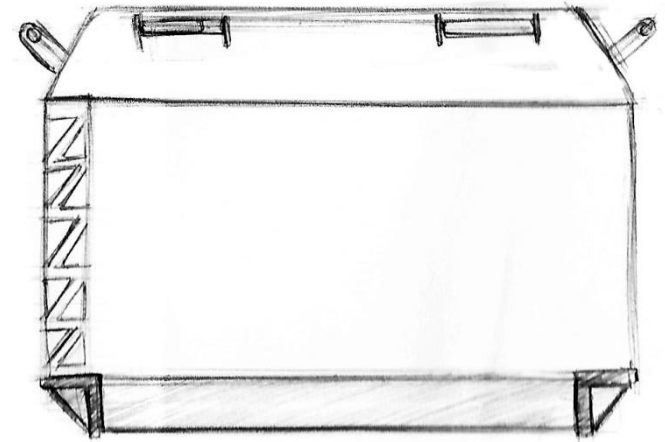
REFLECTOR GRAPHICS IDEATION



Final Product

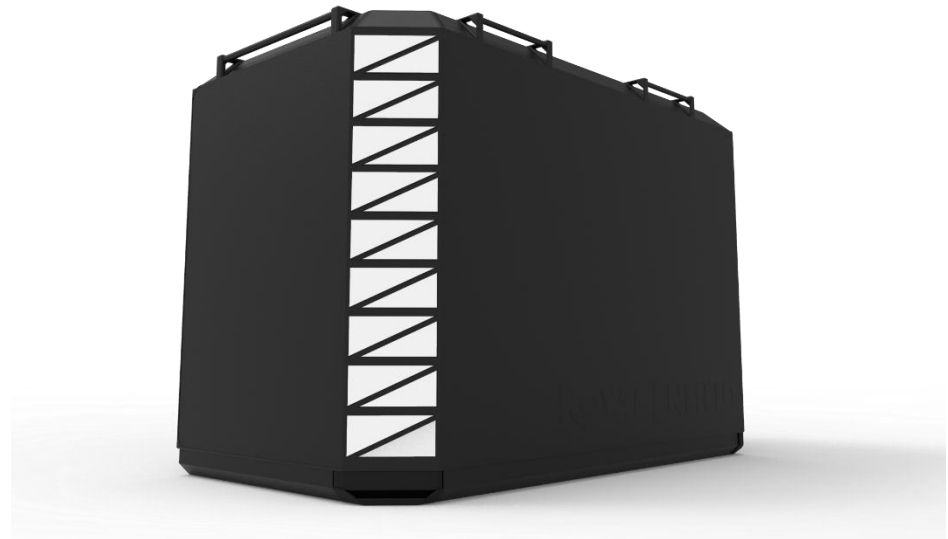
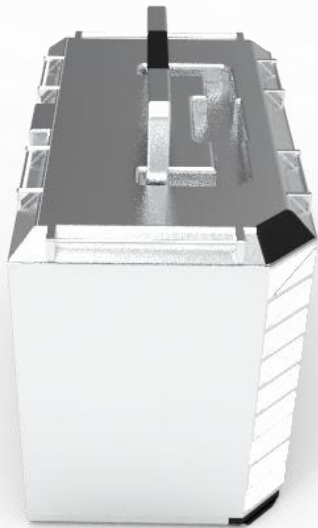


Sleeping bag

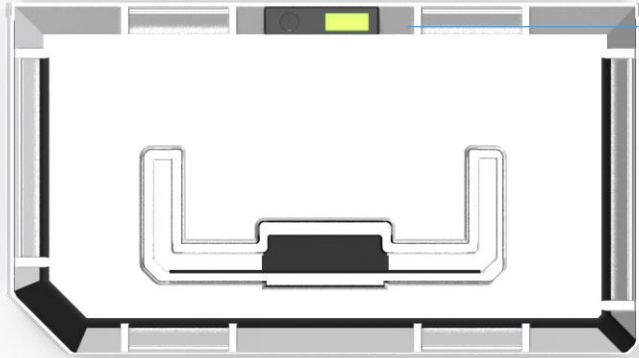


KEYSHOT RENDERS





Powder coated aluminium body



Keyhole



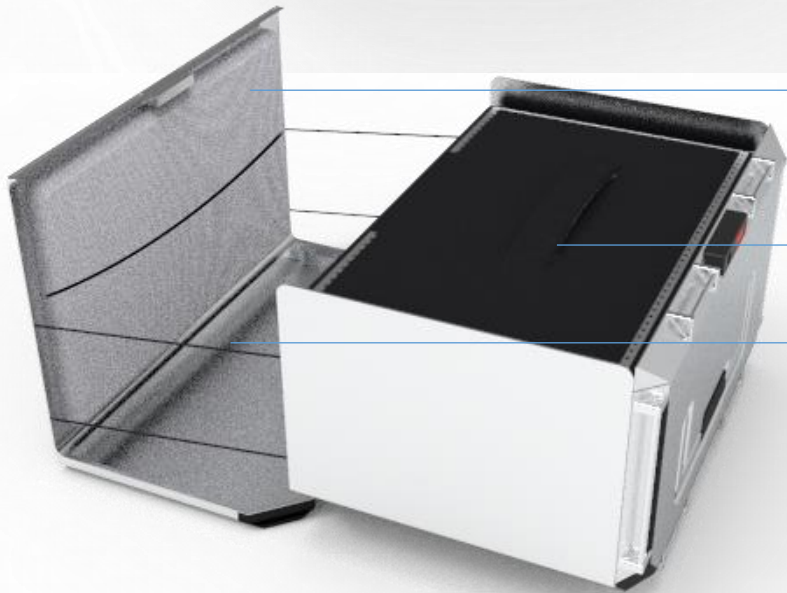
Red colour is indicated when the box is not locked



Yellow colour is indicated when the box is locked by a spring-loaded lock



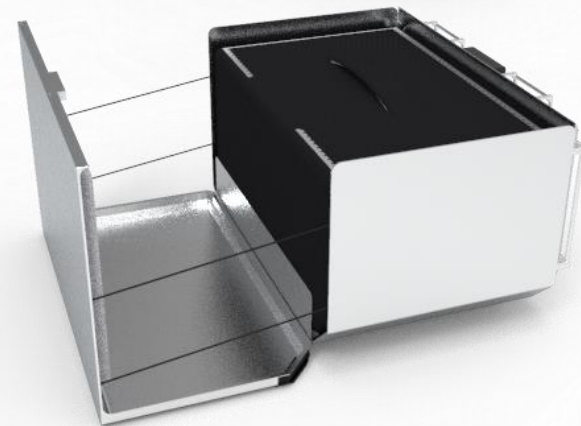
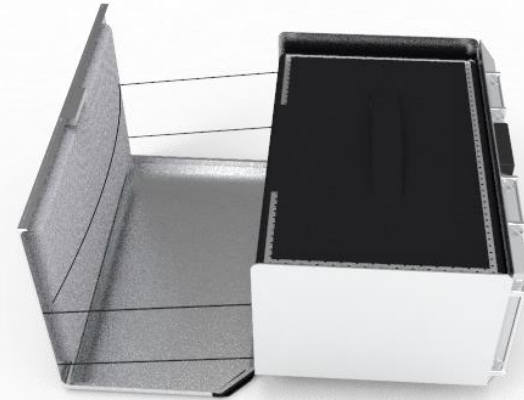
Green colour is indicated when the box is locked by a key.



Document Pouch

Luggage bag

Bungee chords





RETROSPECTION

ErgoDesign provided a good platform for learning and exposure towards the working of the industry. This project still requires feedback on the design and engineering. Corrections will be made and the concept will move forward to the next level. Accordingly.

To sum it up, I would say it has been a good experience interning at ErgoDesign. I got an opportunity to work on an alive project. I also got an exposure on how the design industry works due to which I realised the actual design methods used in actual practice.

Unfortunately, due to small period of time, I could not complete the project satisfactorily but I will be surely working on it. I hope I will be able to use all the learning from this internship and implement it in my academics as well as in my career later. Thank you once again.

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