Industrial Design Project- 3

designing a letter sorting device

for mirakle couriers

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Approval Sheet

The Industrial design project 2 entitled “designing a sorting device” by Vinish Janardhanan (08613003) is approved, in partial fulfillment of the requirements for Master of Design Degree in Industrial Design.

Guide:

Chairperson:

Internal Examiner:

External Examiner:

index

Introduction

A courier is a person or company employed to deliver messages, packages and mail. Couriers are distinguished from ordinary mail services by features such as speed, security, tracking, signature, specialization and individualization of services, and committed delivery times, which are optional for most everyday mail services.

A courier company's main aim is to provide highest customer service possible by a fast and efficient delivery system. There is an increasing need for accurate & fast sorting work to compete with other similar service providers.

It all starts with the mailing system. No matter the size of the organization, a well-engineered system can increase productivity, maximize efficiency and streamline the workflow. Large chunks of mail has to be delivered everyday from magazines, bills, personal mails, etc of various sizes. By providing an organized method of handling the mail ensures a fast and efficient work.

Mirakle couriers is a newly established courier company located in south Mumbai. The speciality being that they employ only deaf adults. Since they are deaf the scenario of the working condition changes. My objective in this project is to provide a compact furniture for sorting, ideally designed for limited spaces and easy adaptability to ensure an efficient processing of mails. And customizing it for the special needs of Mirakle Couriers.

About the company

fig.1 mirakle logo

Mirakle Couriers is a courier company with a difference as they employ only deaf adults. Deafness is an invisible disability, and has been largely ignored in India. All the staff members including delivery personnel are deaf.

Their business model is based on creating a service driven profitable enterprise that uses the deaf. It is not a charity but a social business, where the social element is embedded in the commercial operations. Corporate clients have shown their trust in their business and their cause by availing their services. While their services are currently available only in Mumbai, they plan to extend their operations to other cities soon.

Dhruv Lakra, an MBA graduate from Oxford University, is the founder and CEO of Mirakle Couriers. Dhruv started the company in November 2008 with one delivery boy and now has a total strength of 40. With a tag line 'Delivering possibilities', the has been growing quickly. The company's mission is to take the lead in employing deaf adults.

why deaf

"While you can help a visually impaired person to catch a train or help someone on crutches to cross a road, deaf people are overlooked. They are 'invisible' in India!" It's one of the most underfunded disabilities in our country, despite it being home to an estimated 60 million of them. India has one of the highest deaf populations in the world. Coupled with their disability, skewed education and low-income status has resulted in a deaf youth population that is not part of a productive labor force but suffers from seclusion and constant discrimination. Mirakle Couriers tries to change this grim scenario. It wants to economically empower this community and make them more visible in the Indian society.

The aim of the company is to create meaningful and sustainable employment opportunities for low-income deaf adults in India, thereby increasing their standard of living and making them economically independent.

Mirakle Couriers is a full-service courier company that offers delivery and tracking services to clients in Mumbai. All delivery and back office functions are performed by deaf employees. In addition to providing job Mirakle Couriers provides life skills training for their employees including personal financial management.

Other organizations working for the deaf have isolated this population by developing vocations that do not do justice to their abilities. These organizations also have done a poor job in spreading the use of sign language and have not sensitized the society about their culture. Deaf adults do not study after tenth grade and have been taught very basic English. Lack of English and computer skills today puts one in a very precarious situation hence the irregular employment avenues such as tailoring have been developed. Mirakle Courier's approach is innovative as it engages the deaf adult population in a manner which uses their existing skill sets and gives them a white collar job. Constant traveling and interaction with a wide range of people improves their confidence and has a domino affect on awareness about deafness in the society.

Mirakle Couriers has an aim to take the lead in employing deaf adults and employ roughly 1 to 2 percent of deaf/hearing impaired adults in every major capital of the Indian states. It seeks to become the number one employer for low income deaf adults, generating employment for over 10,000 members of India's deaf community.

fig.2 mirakle delivery boys

working the mirakle

fig.3 mirakle team

• Mirakle Courier is a newly started firm in November 2008

• Mirakle has office space opposite Churchgate, in the heart of town. A new branch is to open at Andheri East

• The area space at the main office is around 12sq.mt.

• Mirakle Couriers started with one delivery boy and has a total strength of 45 boys and girls.

• Modes of travelling are local buses and trains for long distances and by foot for shorter distances. They have the permit to use the handicapped compartments in trains.

• Service Areas

Western Suburbs - From Churchgate to Borivali
Central Suburbs - From Victoria Terminus to Mulund
Harbor Line - From Victoria Terminus to Mankurd

• They have a one day delivery system, where the mail would be delivered the next day of pick-up. The confirmation of the mail would be e-mailed to the company address.

• Their list of clients includes Mahindra & Mahindra, The Aditya Birla Group Victory Art Foundation, JSW Group, Indian Hotels Company, etc.

There is a major trust issue, but he clients have been convinced about the efficiency of the service. The companies are approached personally by Dhruv. The number of clients has been gradually increasing with the gaining confidence of the Mirakle couriers.

• Their major competitor is Vichare Courier Service, who has an added advantage in the number of employees and providing services at a cheaper rate.

mirakle workers

fig.4 mirakle workers

• Mirakle Couriers has a total strength of 45; 20 girls and 25 boys

• Working Hours:
Girls: 8:30 am to 5:00 pm
Boys: 10:00 am to 7:00 pm

• Employees are underprivileged deaf boys and girls, 20-30 years of age.

• Boys go out to pick-up and deliver mail.

• Girls remain at the office for sorting, documentation and accounting.

• They are not all equally educated; some are class three pass outs and some graduates. During their daily shifts hey face many problems such as of reading cursive handwriting and simple multiplication (2x3=?)

• All of them communicate by Indian sign language (ISL) and read lips.

• A person has been employed to receive calls.

• The deaf love SMS as a communication tool. It becomes their life line in emergencies during their deliveries.

• The deaf lack in confidence. Since the deaf boys and girls come from underprivileged backgrounds, they have never been given a task or responsibility of work. Constant traveling and interaction with a wide range of people gradually help to improve their confidence.

• Computers are used for accounting, documentation and updating mail status.

data collection and analysis

Project was started with studying the History of sorting and how it has evolved with technology. Other similar systems where sorting was used were also studied , with an aim to understand their working and how it could influence the design. Various related projects done in IDC were also studied, aim was to know the kind of Design process and the methodologies that they followed.

diachronic analysis

• Earlier sorting of mail was done by hand using what is called a "pigeon-hole message box" method. Addresses were read and manually slotted into specific compartments (fig.5).

• To handle rapidly growing mail volumes, the first semiautomatic sorting machine was installed by the United States Postal Service in 1957. The Transorma Letter Sorting Machine consisting of an upper and lower section, a conveyor belt transport and a series of five sorting keyboards. Operators read the destination and keyed a sorting code. The letter was then automatically transferred to a letter tray and deposited into one of 300 chutes. The Transorma could sort 15,000 letters per hour (fig.6).

• In 1965, the Postal Service put the first high-speed optical character reader (OCR) into operation that could handle a preliminary sort automatically. In 1982, the first computer-driven single-line optical character reader was employed – which reads the mail piece destination address then prints a barcode on the envelope that could be used to automate mail sorting from start to finish (fig.7).

• With the U.S. Postal Service introduction of postal work sharing, ZIP + 4 and the POSTNET barcode in 1980, companies were given an incentive to sort their mail prior to inducting it at the Post Office.

fig.5 pigeon-hole message box ret.1

fig.7 optical character reader ref.3

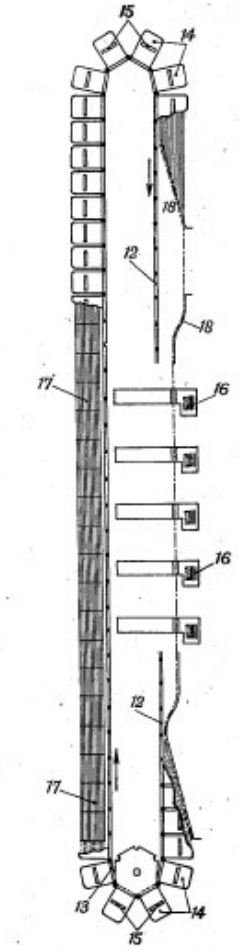


fig.6 Transorma Letter Sorting Machine, ref.2

synchronic analysis

• Pigeon-hole sorting system is still used for small scale sorting like in offices. (fig.8)

• Large scale sorting requires sorting bins (fig.9) or collapsible bins (fig.11).

• Postal sorting bags are used for sorting which can be carried away by the delivery boys (fig.10)

• Voice sorting is a new technology for high-speed sorting and processing of postal mail. Speech recognition software enables its operators to quickly communicate commands and functions within mail processing departments (ref.8)

• Bar-coding is a widely used technology where the packages are given a barcode. All details of the mail can be read of it (sender, receiver, status, date, etc.) The barcode is read by a handheld scanner (fig.12).

• UPS partnered with Hewlett-Packard on the new sp400 All-in-One wireless handheld laser barcode scanner combo that can print directly onto packages, which saves paper and streamlines UPS's shipping processes (fig.13).

• Computerized sorting systems are used worldwide where all the sorting is done automatically (fig.7). It processes the mails through a Multi Line Optical Character Readers (MLOCR) which affixes a Postal Barcode to the mail and sorts them automatically. Major companies producing such sorting systems are Siemens, distri-sort, pitney bowes, etc. (fig.14)

fig.8 pigeon- hole system, ref.1

fig.9sorting bins, ref.4

fig.10 postal sorting bags, ref.4

fig.11 collaapsible bins, ref.4

fig.12 barcode scanner, ref.5

fig.13 sp400, ref.6

fig.14 computerised sorting system, ref.7

other courier systems

india post/pafex

Understanding involving systems where a large number of mails are sorted on a daily basis was studied at India post and Pafex.

India post is a government operated postal system which is spread across the country. It is the most widely distributed post office system in the world. It has been around for years old and has been modernizing to providing cheap and quality service for the masses.

Prakash Air Freight Pvt. Ltd. (PAFEX) is one of the largest domestic express companies operating all over India. It is the FedEx service provider in India.

India post has numerous services for their customers. For a fast (24hrs service) and safe service, Speed post/ Registered mails is the preferred. By this facility the customer can get a confirmation of a safe delivery. This service is similar to that of Pafex.

working

When the mail is accepted at the local post office it is given a barcode, which has all the details of the mail like destination, client details, date of mailing, etc. The client is given a corresponding tracking number, with which he can check the status of his mail.

At the local office, mails go through a primary sorting are then clubbed, tagged and taken to the respective hubs, where the major sorting is done. At each stage the barcode is scanned by a barcode reader, to keep account of the mails.

After sorting the mails head back to the local offices where it is accounted for and sorted beat wise. Beats are fixed areas covered by a delivery boy. A proof of delivery is attained from the receivers end to confirm the delivery.

Understanding

• By the use of technology of bar-coding, illiteracy has been eliminated. The mails don't have to be read every time. The process becomes faster and more efficient. It also makes accounting easier.

• Sorting at different level reduces cluster

• Batch wise sorting, it reduces unnecessary movement of mails between local office and hub.

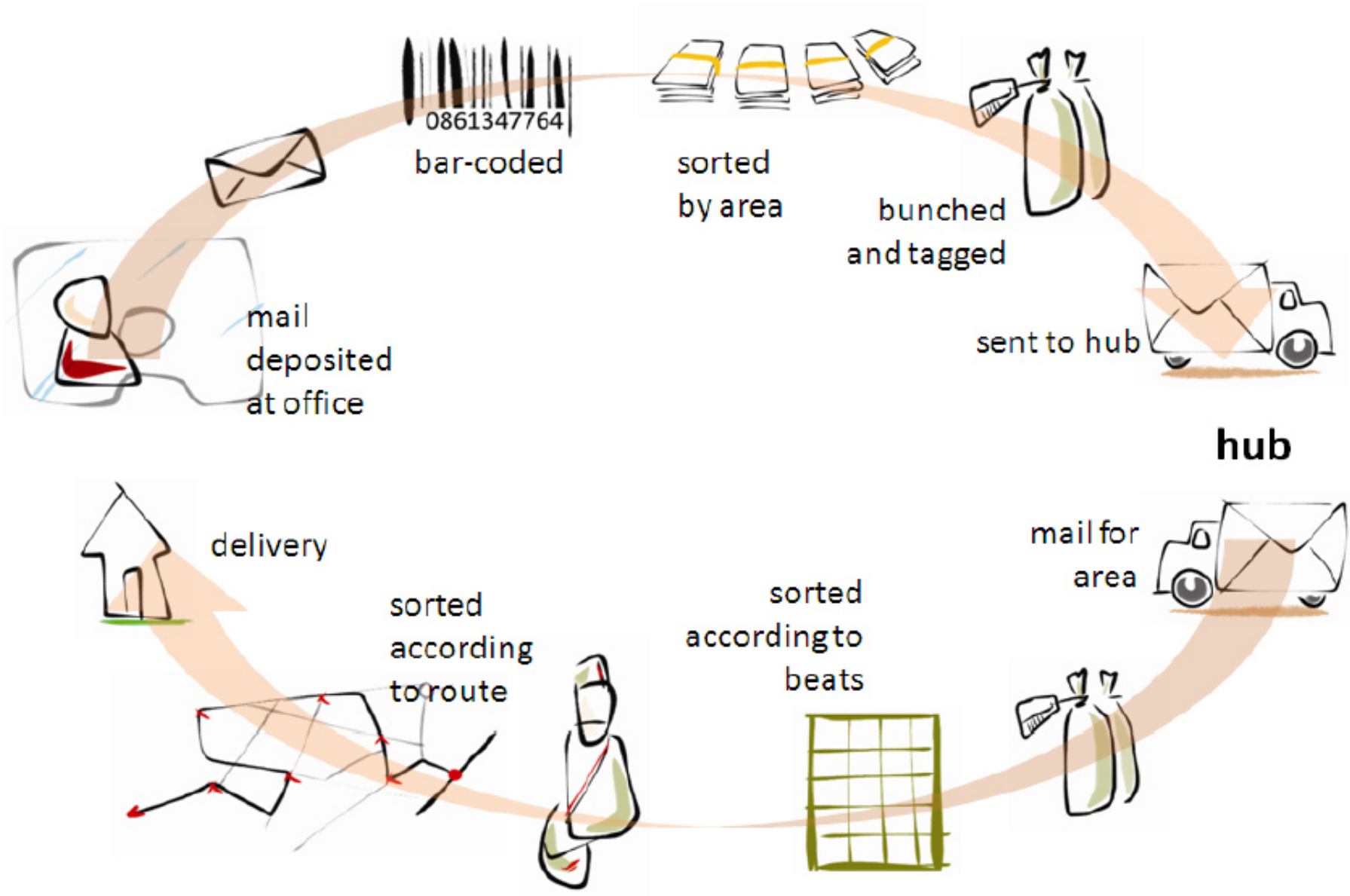


fig.15 work cycle of india post/ pafex

dabbawala system

A unique service industry whose primary business is collecting the freshly cooked food in lunch boxes from the residences of the office workers (mostly in the suburbs), delivering it to their respective workplaces and returning back the empty boxes by using various modes of transport.

• Daily more than 200,000 lunch boxes get delivered everyday

• The dabbawala system have been given six sigma ranking by Forbes group and also ISO 9001:2000 for their accuracy and customer satisfaction

• It is a delivery system where large number of parcels has to be delivered all around mumbai within a time span of 3hours.

• The system involves no documentation nor any advanced technologies

• The average literacy rate is that of 8th grade

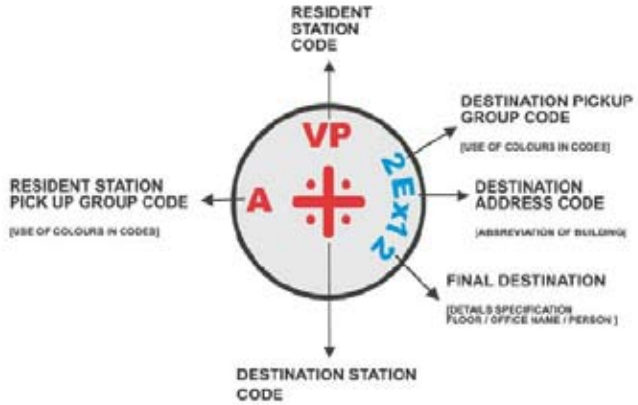


fig.16 decoding the colour code, ref. 8

Understanding

It was noticed that the dabbawala system worked more or less on the conditions similar to that of the Mirakle. Where at Mirakle, the system had to be designed for people with a low literacy rate and lack of technology funds. The dabbawala system uses a fast and efficient sorting technique.

• The dabbawala system works on a simple colour coding system which is an identification system for the destination and recipient

The use of icons, numbers, colours and position on the lid helps to identify the delivery points. It also contain codes that help the different groups of dabbawallas to identify their set of dabbas at each leg of the journey

• Many of the dabbawallas are illiterate and cannot follow written names and addresses, but the icon system - of symbols and colour codes - works for all.

• Since each set of dabbawallas transport the dabbas for only a part of the journey, only a part of the information has to be studied by each dabbawalla

• The visibilty of the coloured codes on the lid help them in easy identification

• The dabbas stacked side by side on the carts, which provides easy placing and removing of dabbas

• The codes are painted on the dabbas which indicates fixed roots and destinations. This helps to speed up delivery

iit internal mailing system

fig.17 work cycle of iit internal mailing system

In any large company or organization lot of mails have to be sorted and distributed daily. With the number of departments each receiving and sending mails there is a need to have an additional internal mailing system which takes care of the mailing issues within the premises for the smooth running of the normal day activities. The Internal mailing departments are connected with each other and with the outside mailing services.

IIT internal mailing

• All handles 3 types of mails
Mails from one department to another department
Mails from a department to be sent outside the campus
Mails from outside the campus to a particular department

• The Hub is mostly situated in the central administrative building.

• There is a common pigeon-hole system with slots for each department.

• Office boys from each department come to deposit their mail in the respective slots and next day morning the sorted mails for the department are collected. In this system the need for delivery boys is not required.

• All the mails are stamped and accounted in a common data base. Since there are a finite number of members in the organization, all member details are known. Cases of wrong addresses can be verified.

• IIT mailing services uses India post services for all the mails which have to be sent out of the campus.

mirakle couriers

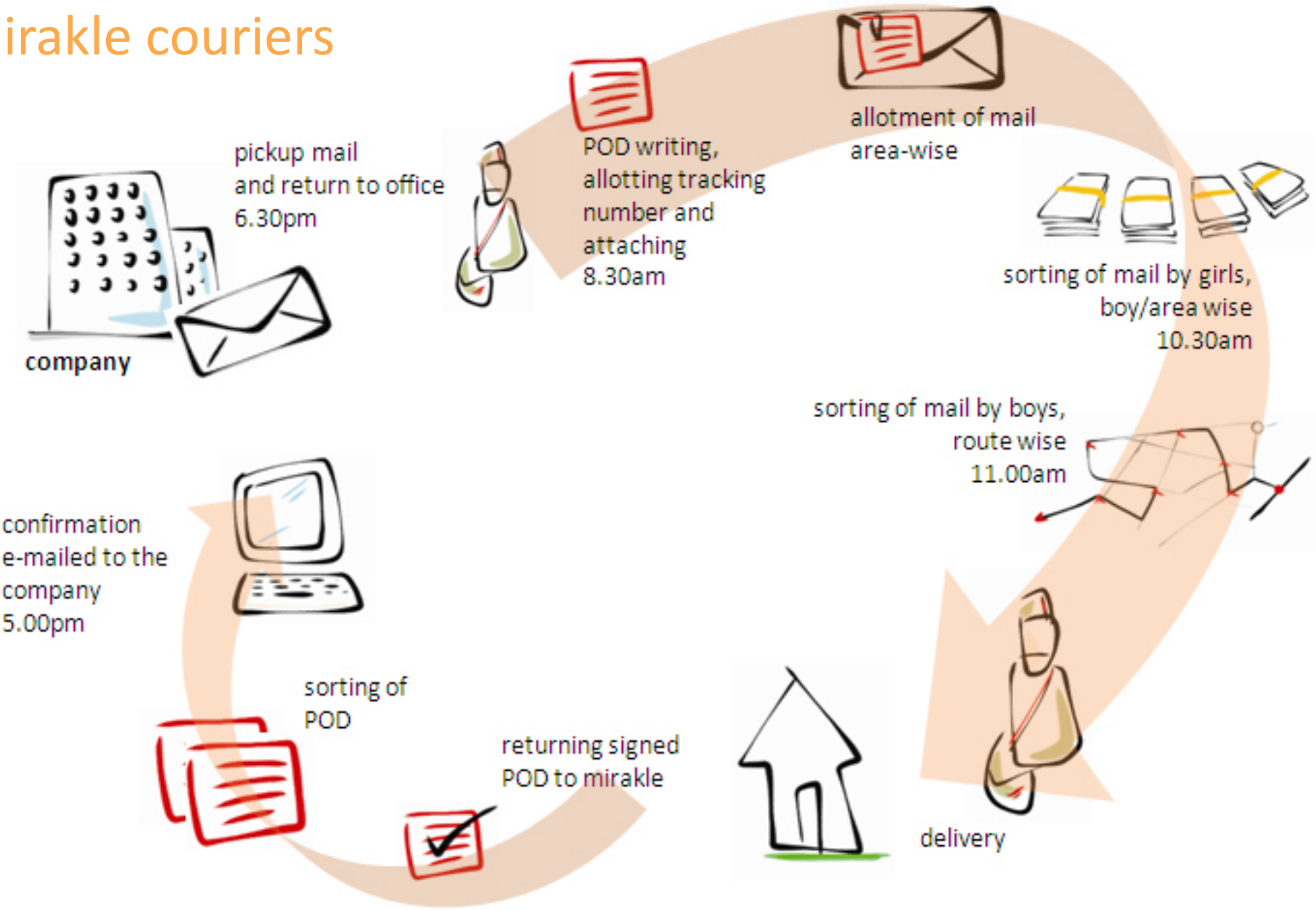


fig.18 work cycle of mirakle couriers

work cycle

fig.19

fig.20

fig.21

The day starts with the sorting of mails which are to be delivered that day. The mails collected by the boys from the companies are locked up overnight.

First step is counting of the consignments of each company and noted.

This is followed by filling up of PODs and sign language sheets and attaching them with the respective mails (fig.19).
A tracking number is stamped on each mail and POD. Later in the day the tracking number along with the details are sent to the client. The clients can anytime check the status of their mails online by inserting the tracking number. It provides a quick confirmation to the client.

Proof Of Delivery (POD) is a small slip where the address, company name and pick-up date is written. The PODs are stamped by the companies, acknowledging that the mail has been delivered safely (fig.20).

Sign Language sheet shows the basic sign language of alphabet. This is to bring awareness of deaf to the people (fig.21).

work cycle

The mails are passed on to the girls next in line who do the sorting of mails. Mumbai has been divided into 25 zones, each boy delivering and picking up mails in the respective areas. There are no separate boys to pick up the mails from the companies. The girls sort the mails for each boy (fig.22)
The systems of pin codes are avoided as there are frequent errors from the sender in writing the correct pin numbers.

The sorting is done on the table (fig.23)

After all the mails are sorted, the number of mails for each boy is counted for and recorded. The boys are paid extra for the more number of mails delivered by them (fig.24)

After the boys are handed over their lot for the day, the mails require further sorting by the boys according to the route which the take starting from the railway station (fig.25,26)
The delivery boys use Eicher Mumbai Maps to clarify their routes or delivery points, which is kept on the main table. Then the boys leave for delivery (fig.27)

fig.22

fig.23

fig.24

fig.25

fig.26

fig.27

work cycle

The boys do the delivery till 6.30pm then return to the company. During the delivery the boys get a stamp from the recipient on the PODs which are brought back to the company. If the mails could not be delivered the reasons are stated (shifted/ closed/ wrong address) and brought back to head office. If the recipient address is closed a form with the details of date and time is slipped in (fig.28). After three attempts to deliver the mail, it is sent back to the company.

The boys have the duty to pick up mails from respective companies at respective timings. They stop their delivery to pick up the mails for the next day.

The boys return back to the company with the stamped PODs and the mails for the next day.

The girls engage themselves in data entry of details and accounting of each mail. The confirmation is e-mailed to the company addresses on receiving the PODs after delivery (fig.29)


MIRAKLE COURIERS
SORRY WE MISSED YOU

Name of Customer :

Date :

Time :

Signature of Delivery Boy :

Kindly contact us :

Phone No. : 982097 5600
SMS :
Time : 10 to 6 p.m.
Days : Monday to Saturday

DELIVERED AND SORTED BY DEAF ADULTS
CALL US FOR ORDERS

fig.28

fig.29

activity analysis

Gathering the mail
Pile of Mail on table
Counting the number of mails received from each company
Communicating with Writer (BOOK1 + BOARD)
Writing workload for the day on board
(Date,company, number)
Pilng up of mail

Filling POD
Writing addresses on POD
(Name, Address, Date, Sign)
Stamping number code on POD and mail
Difficulty in recognizing handwritings
(Clarification from someone who can understand better)
Placing the bunches of POD and Sign language sheet at an easy reach
Stapling POD and Sign language sheet on mail
Piling up finished mails

Assigning Delivery boys (2 girls)
Picking up pile (repeated action for each pile)
Transferring to respective table
Writing names of boys, according to the zone to deliver, on each POD (known)
Clarified if wrong address is written

Accounting no. of mails for each boy(BOOK2) – total count
Handling the book around the company when required

Sorting
Tables cleared for sorting
Mails clubbed together according to delivery boy
Mails arranged in an array (no sequence) overlapping piles when less space
Check on previous days pending mail in book
Taking out and sorting the pending mails
Accounting for pending mails(BOOK2)

Delivery boys
Delivery boys assigned their respective piles
Boys find place to sit
Boys sit to sort their mails according to their route
Route decided by the boys
Clarification of route with the help of Eicher
Map kept on main table.
Mails not in their route are returned to the Girls to be reassigned
Sorted mails are arranged together by rubber band
Placed in bag
Check on sufficient 'Sorry we missed you' sheets

At Office
Accounting for the day
Previous days POD Sorting company wise
Checking with data in BOOK2
Bundled and placed in Box (Tiffin)

Uploading data on Computer
Wait for boys to return

Boys Delivery
Known areas
Travel by public transport Train/Bus
Delivery to destinations
Finding unknown destinations from strangers
If no one is home 'sorry we missed you' filled and left on door
Missed mails kept in separate compartment
At Appointed Time delivery is left and run to company for pickup
Entry to office/mail rooms
Asking for the mails
Collecting mails(and Address)
Counting number of mails and bound(rubber band)
Placing the mails (in the separate bag DEPT2)
Returning PODs (kept in DEPT3)
5.30 Delivery stopped Returned to Mirakle

Back to Office
Emptying the bags one by one (pagewise)
Undelivered mail returned(DEPT1)
Fresh mail (DEPT2)
Piling of Fresh mailPODs returned(DEPT3)
Accounting of undelivered mail (BOOK2)
Conveying to Writer
Handling bag(picking up, No. of bags, Emptying bag, Checking, Folding aside)
Updating mail data online according to number code on POD.
Status of the mail sent to companies through e-mail

motion analysis

Motion analysis to understand the movement of objects and people in the workspace.

The office space is 12sq.mt. It is a pre-furnished rented office, where the furniture is permanent and built in. It is open to the passage. The office has a small first floor which is used for personal activities.

Movement of mail
The mails which are brought in are emptied (2) the evening is stored overnight (3). The next morning the mails are accounted for and PODs are filled (4). The mails are passed on to the girls for assigning boys according to the area (5). Then the mails are sorted boy wise (6, 7). The sorted mails are given to the boys for delivery. The boys do a second sorting according to his route (8). The boys then leave for delivery.

Movement of people
Although most of the activities are specified for each worker, the space required for movement is less. When the total strength is present in the office i.e. when the boys come to take their mails, the office becomes crowded.

CPUs (4 numbers) are place d on the table tops.
The maps are kept on the main table, for the boys to clarify the roads or routes
The delivery bags are placed on the first floor
Mails are stored in in-built cupboards.
White boards are put up on the wall.

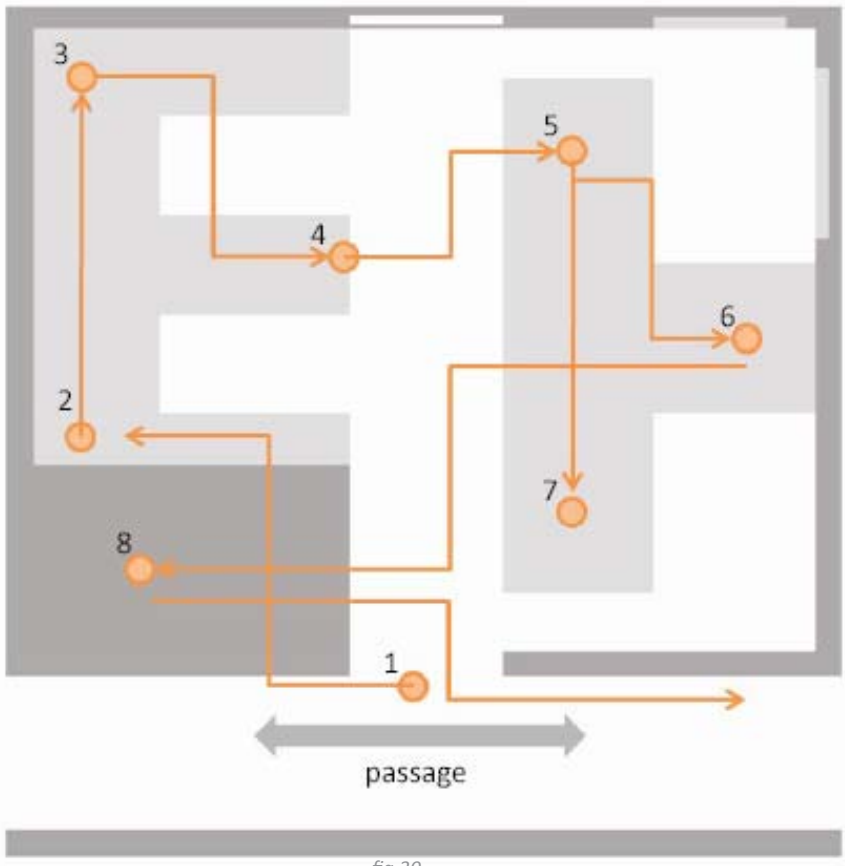


fig.30

time analysis

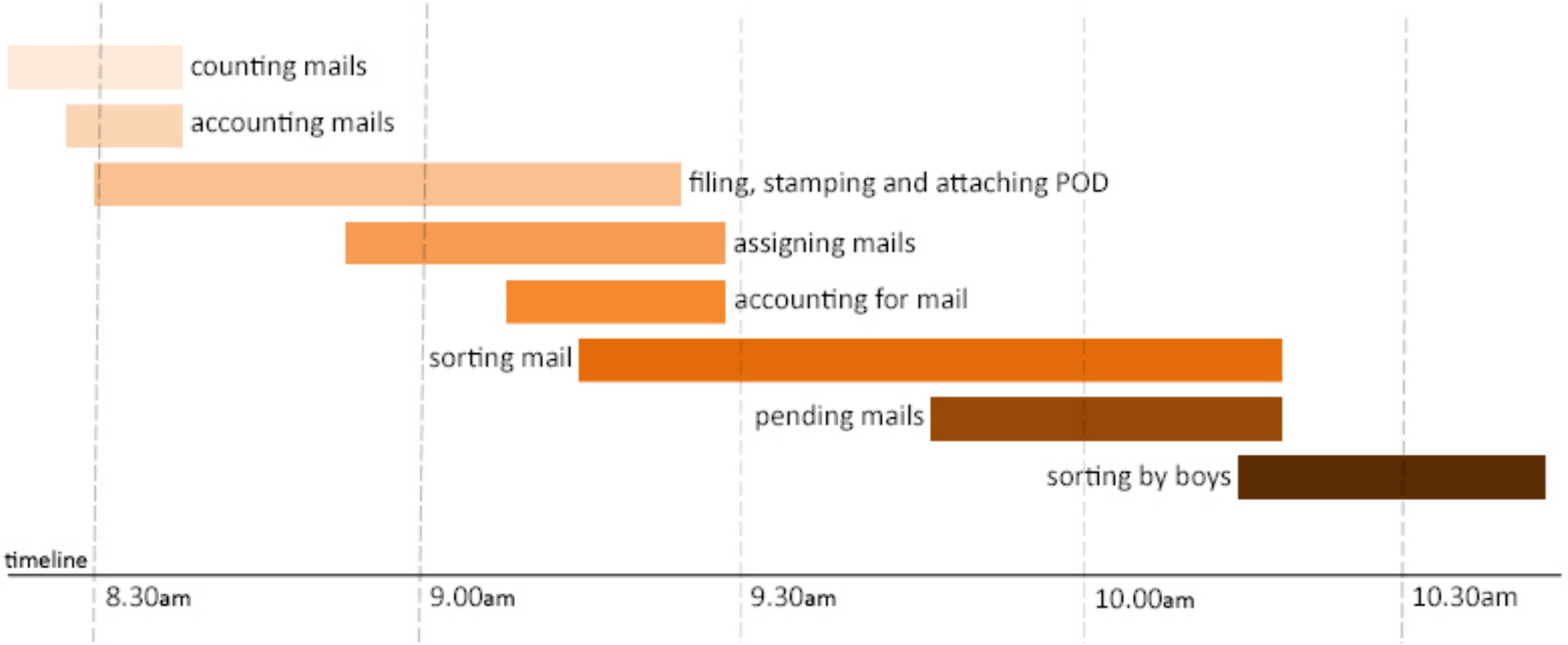


fig.29

A time analysis to understand the time required for the various internal activities during the maximum work load hours.
The diagram indicates from when the activity started to when it gets over. Activities overlap i.e., it is a continuous process.
It is seen that the maximum time goes on manual filling of the PODs and sorting of mails.
The boys enter the company around 10 am; this is the only time during the day the girls and the boys get to interact.

general problems faced in the current system

• Sorting done on table or any other available surfaces (fig.30, 31, 32,33)
• piling and overlapping of mails

fig.30

fig.31

fig.32

fig.33

• 2 different sorting required
• Girls are unknown of places
• Wrong address

• POD not properly handled (fig.34)
• No proper storage for PODs (fig.35)

fig.34

fig.35

• space constrains (fig.36)
• updating and handling accounting books (fog.37)

fig.36

fig.37

• Time required for sorting
• improper time utilization of girls
• no flow in system – movement of mails and workers
• repeated accounting
• verification of route

problems faced by deafness

fig.38

fig.39

fig.40

The boys and girls find a difficulty in building confidence in thier work.
But with time, interacation and experience their performance increases

education level is low. Most of the They find it difficult to read the addresses written in cursive hand writing. Mathematics is poor, few boys find it difficult to perform small calculations such as 2x3

communication becomes difficult due to deafness. The system slows down (fig. 38,39) boys during their delivery face major problem were they have to interact with people in finding directions. As the boys pertain to a fixed area, the areas and routes become familiar and delivery becomes faster (fig.40)

personal problems from the parents of the boys and gurls as they feel its unsafe

design brief

For a system to function efficiently and smoothly there is a need to bring order in the system. A courier company, where loads of mails pass through everyday and where every mail is of utmost importance, the system has to function quick and with great efficiency.
Sorting of the mails is the most time taking process where the mails are distributed and have to be regrouped without flaws. By designing furniture that aids the sorting process, mails can be handled in a more organized way.
Some basic requirements were kept in mind during designing a sorting system customized for Mirakle Couriers.

- Since the company is small, the sorting device should not occupy large area.
It should not interrupt but enhance the sorting process
- Since the sorting operation happens 2 hours during the day, it should be designed to be kept away or serve other purposes
- Working with the device should be easy to understand and interact with
- It should be flexible to accommodate the daily load of mails
- With the growth of the company, it should be equipped for future expansion

Inferences

The mails have to be sorted boy/ area wise.
The mails that are handled are of various sizes weights
Considering the maximum size of the mails handled, the dimension of the slot are taken as 230mm X 300mm
The activity is done by one girl
It can be a standing or sittin activity. Considering the spacefactor and the span of the operatiion (2hrs) the device is designed for a standing operation.

Height of slot

Considering the system of mails processed at Mirakle Couriers, the number of mails for each boy cannot be predetermined, until the last mail is sorted by the girl. While designing the height of the slots has to be decided as it effects the space consumed by the whole sorting system.
Statistics of average number of mails delivered by a boy in a day is calculated as 40 (12cm)
The device should also take care of instances where a certain area receives a unexpectedly high amount of mail for the day.

• To economize on space occupied by the sorting device, the slot heights can be varied according to the frequency of daily number of mails delivered in that area. Certain areas such as Dadar and Andheri always have a high frequency of mails (fig.41)

• Using packet system where an optimum height of the slot is considered. Each boy is allotted one packet (slot). In the case of extra mails, additional packets are added on (fig.42)

• A slot become redundant when it gets filled up. By using a system where the filled up slots can be replaced by another free slot, the extra mails can be accommodated.

• The slot heights can be a varied by sliding dividers, which separate the mails (fig.43)

• The slots can be designed to increase the height by the use of some mechanism

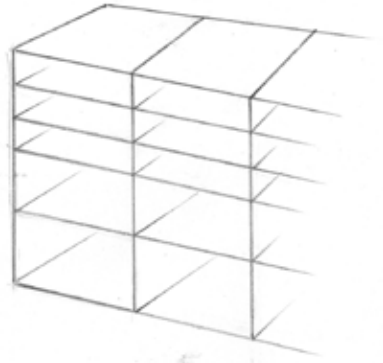


fig.41

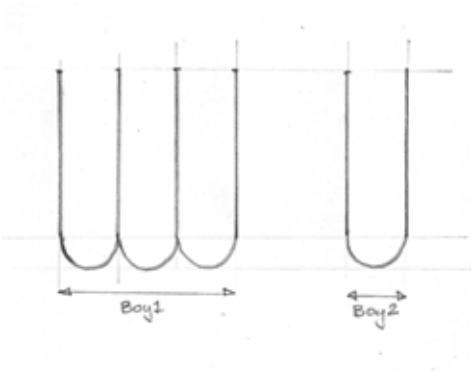
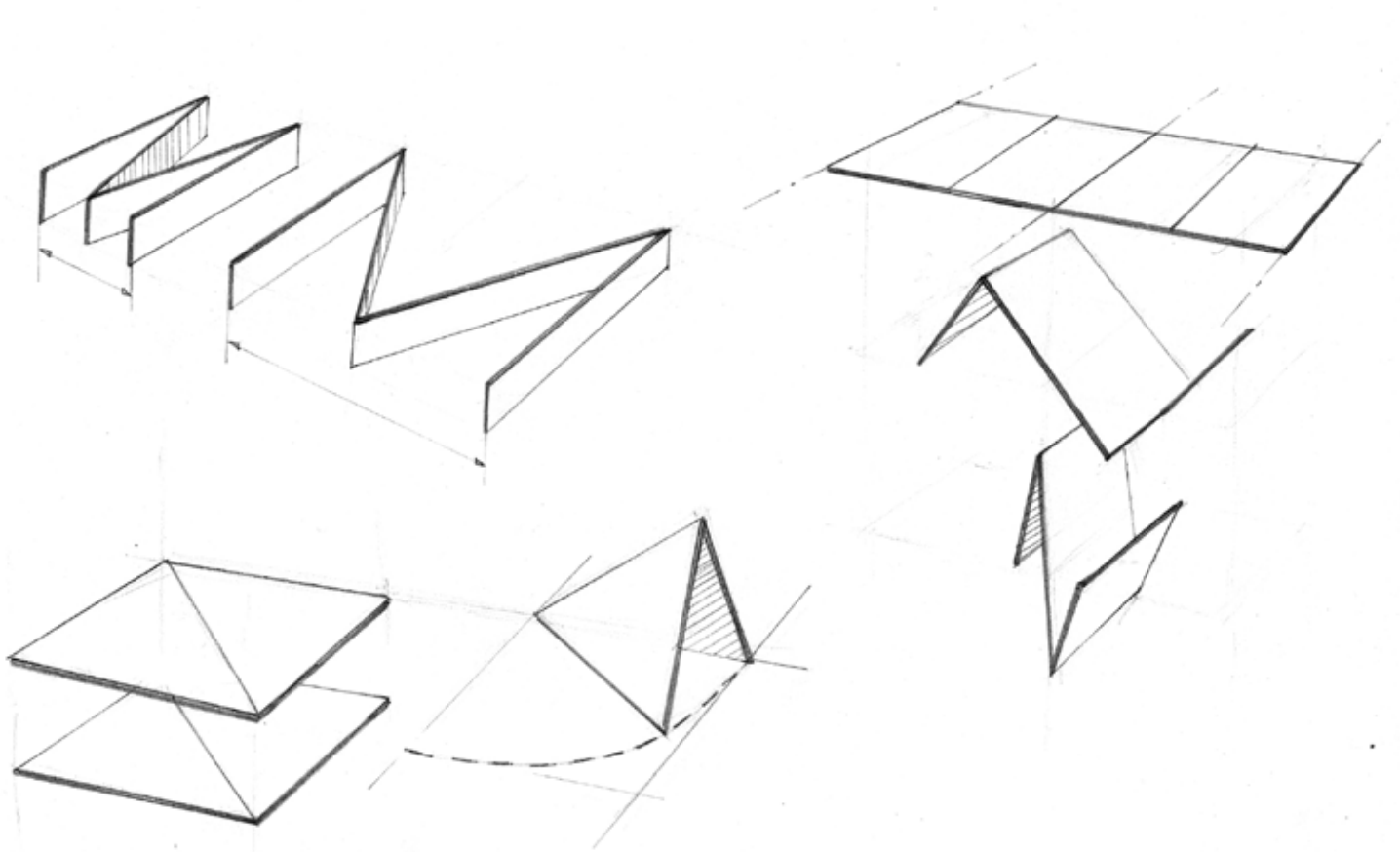


fig.42

fig.43

ideations of collapsible shelves

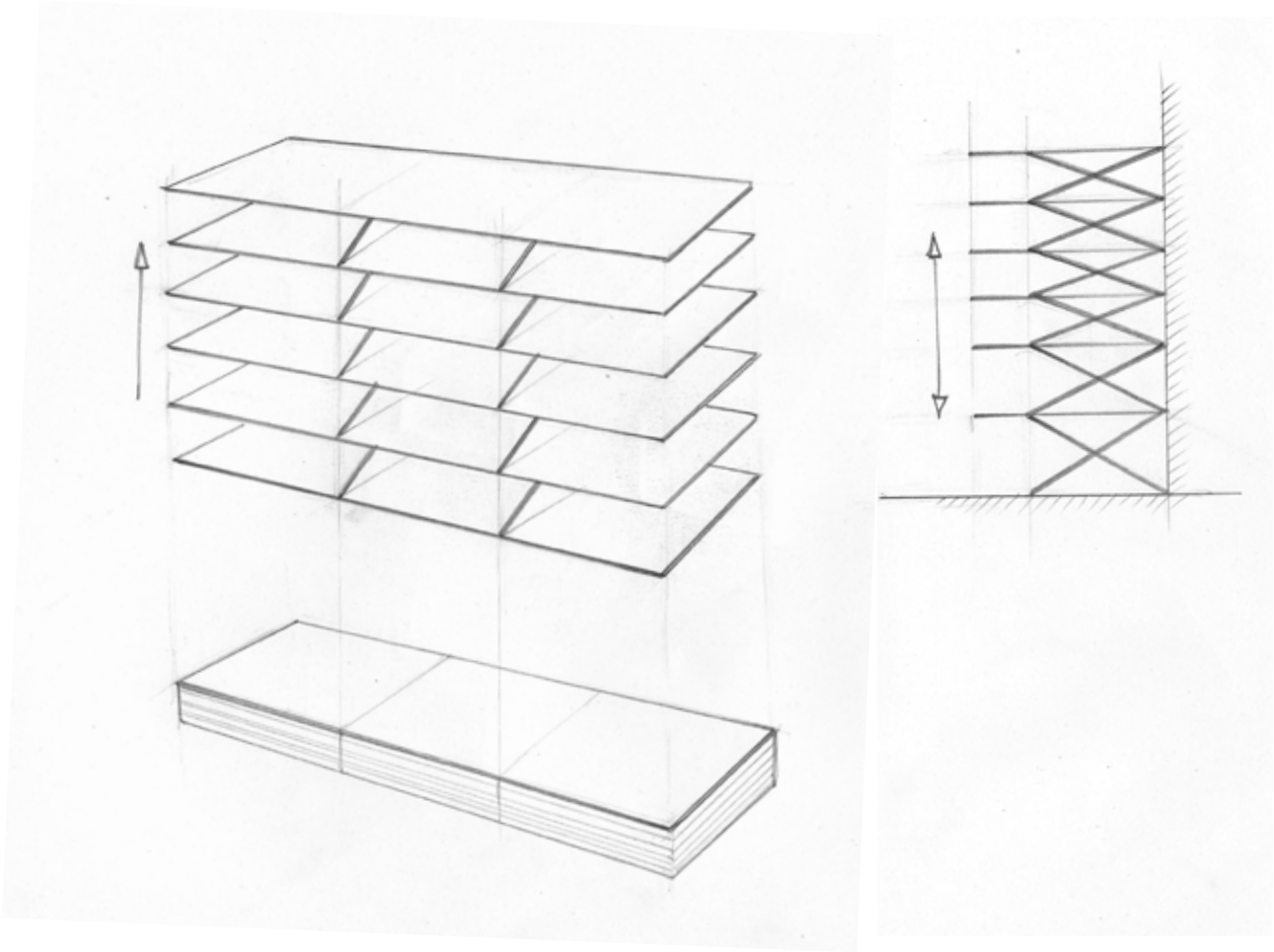


Ideations

ideation 1

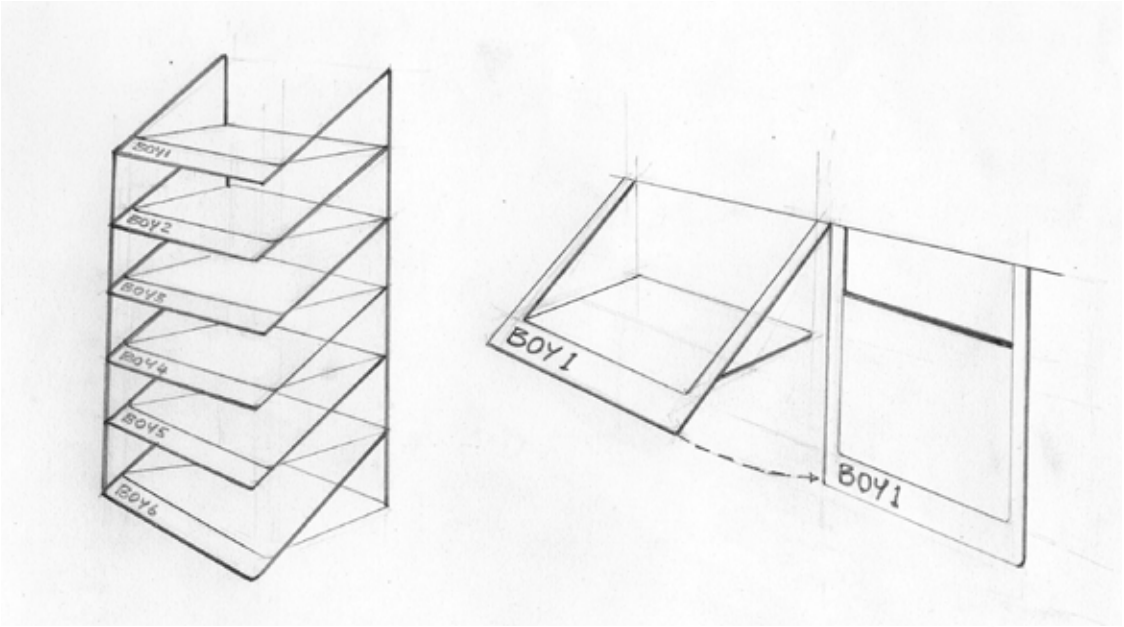
It uses a sicissor collapsible mechanism.
When not in use it is pushed down to form a table top.
It has an advantage of increasing the slot heights by locking it at various levels.
Material is reduced as it takes support from the wall
It can be ceiling mounted

It has an disadvantage of stability.
The device has to have a wall support.



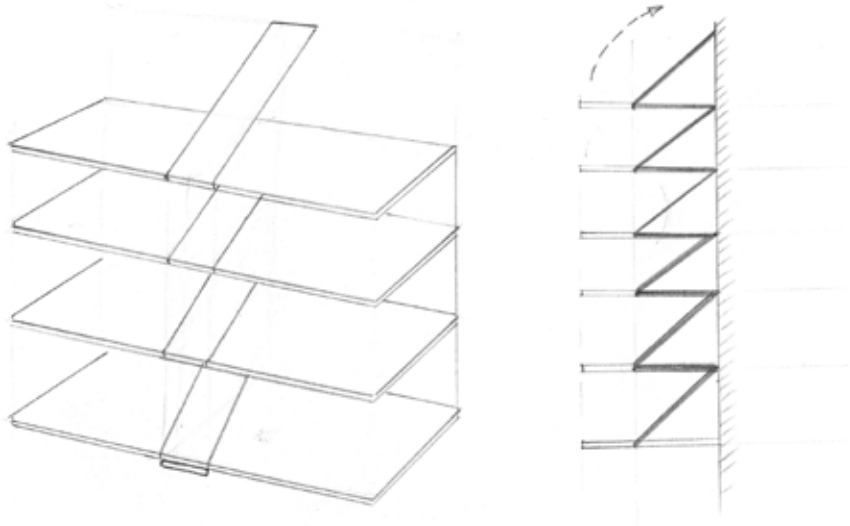
Ideation 2

It is a wall mounted sorting device
It uses modular elements
It can be easily opened up



ideation 3

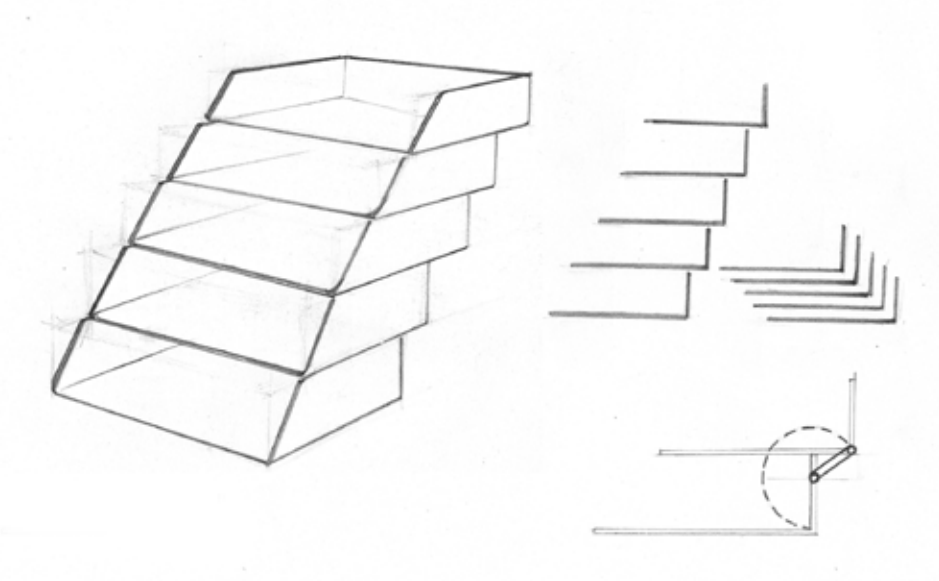
It is a wall mounted sorting device
It can be quickly opened up.
It uses a central element to support the shelves, it also functions as the partition
The central element can be of cloth



ideation 4

It is a table top sorting device
Here the shelves are individual elements which are interconnected
In open position the weight of the shelf is supported by the lower shelf

It can be collapsed when not required

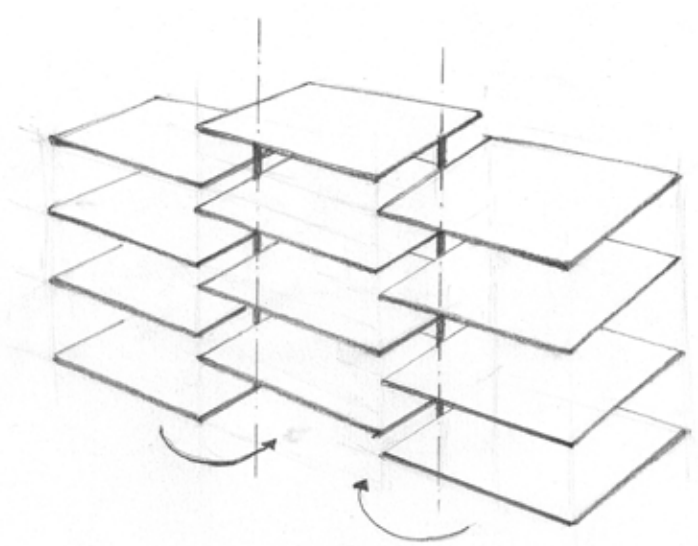


ideation 5

It uses a swivel mechanism

When not can close into each other and thus reducing space.

It can be customized to be wall mounted or table top mounted.



ideation 6

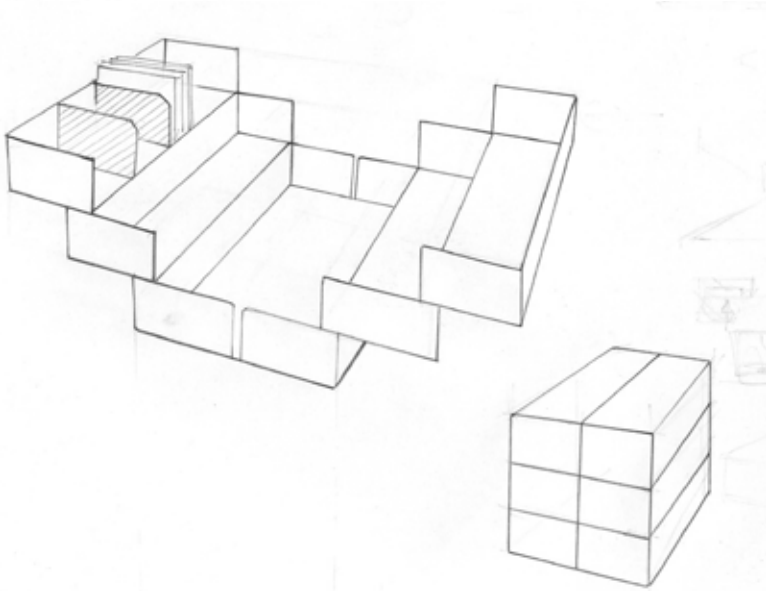
It uses the mechanism similar to a tool box

It closes into a box

It can have a slider mechanism to customize the height of the slots

It opens in a concave manner, which provides easy reach to the user

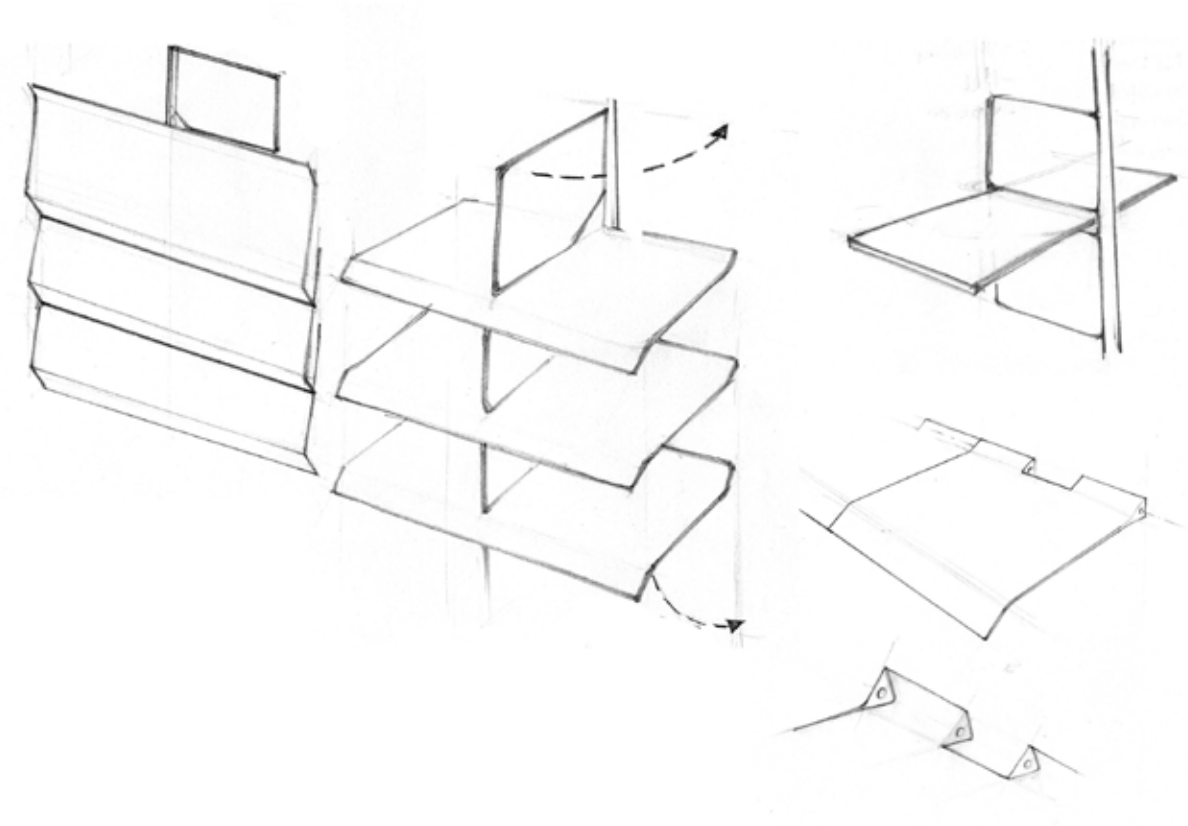
When the sorting is completed the device can functions as storage. for eg. to store the mails which were not been able to deliver.



Concepts

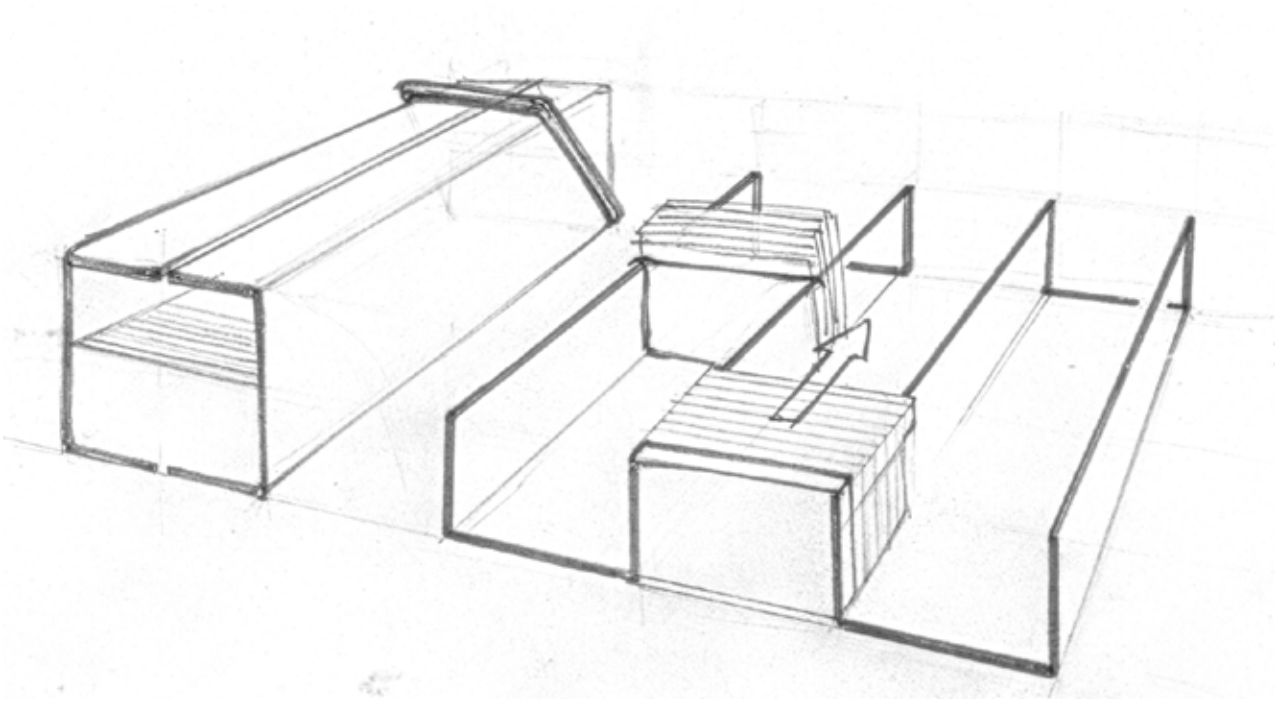
Concept1

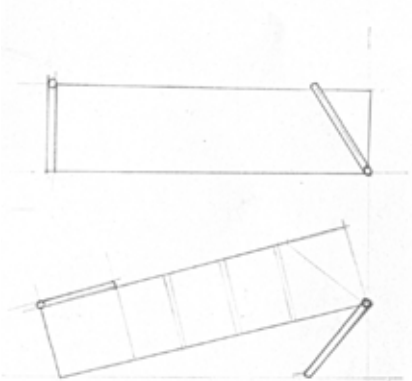
It is a wall mounted sorting system
When not in use it collapses into a flat surfaces
It can be easily opened up
The opening up of the flap pops up the shelf
It is simple in construction



concept 2

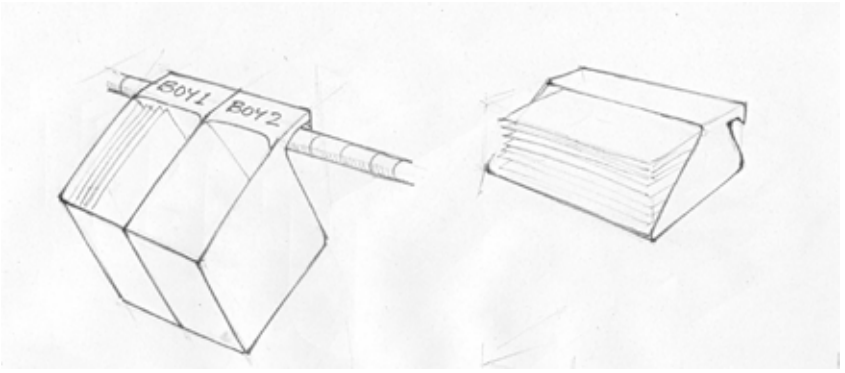
It is a 3 fold sorting system.
It forms a closed box when not required.
It can be easily opened up.
The mails are divided with the help of adjustable sliders
The locking device turns into a stand which provides inclination for better visibility
The device provides an extra table space at a height.

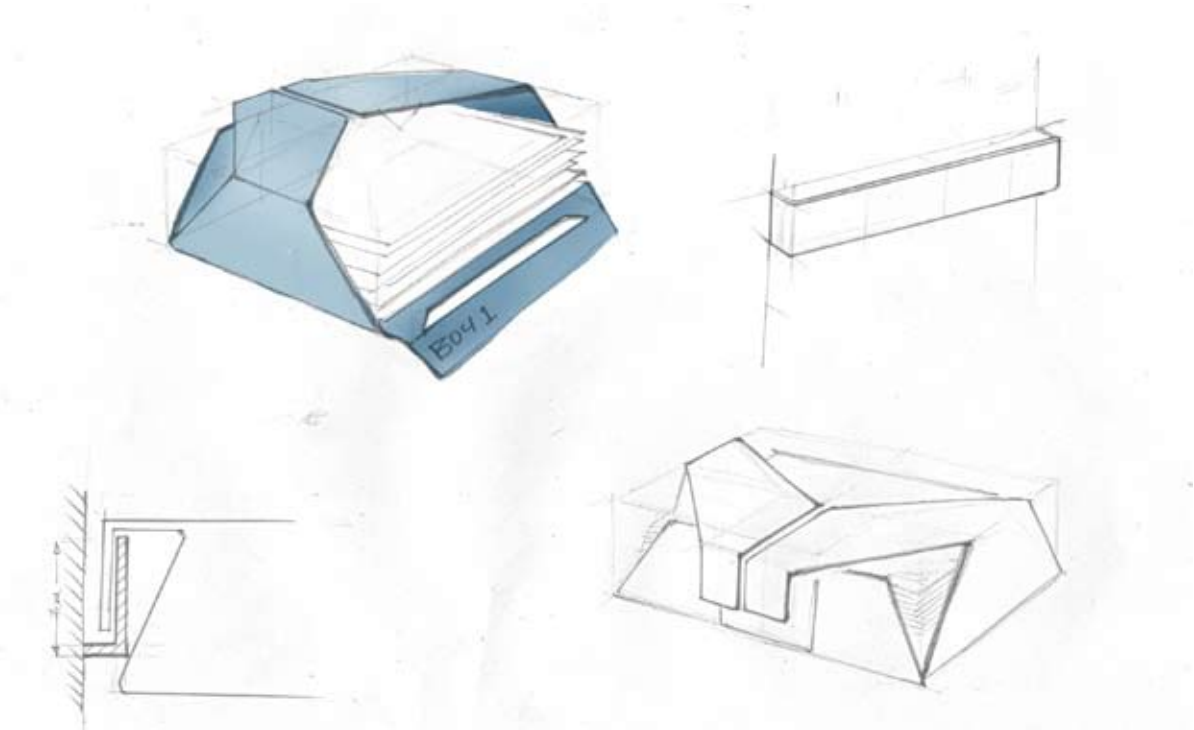




Concept 3

Mails are sorted in bins, each bin for a particular area.
It is mounted on a rail fixed to the wall.
When sorting is not done the bins can be stacked.
In the case of excess mail, the bins can be removed and replaced .
The bins have good visibility and reach of the mails.
The bins are provided with a handle
The railings on the wall can be used for sorting the PODs later in the day.





evaluation

Evaluation of the concepts were done on the basis of the initial requirements of

- the sorting device should not occupy large area.
- it should be designed to be kept away or serve other purposes
- working with the device should be easy to understand and interact with
- It should be flexible to accommodate the daily load of mails
- With the growth of the company, it should be equipped for future expansion

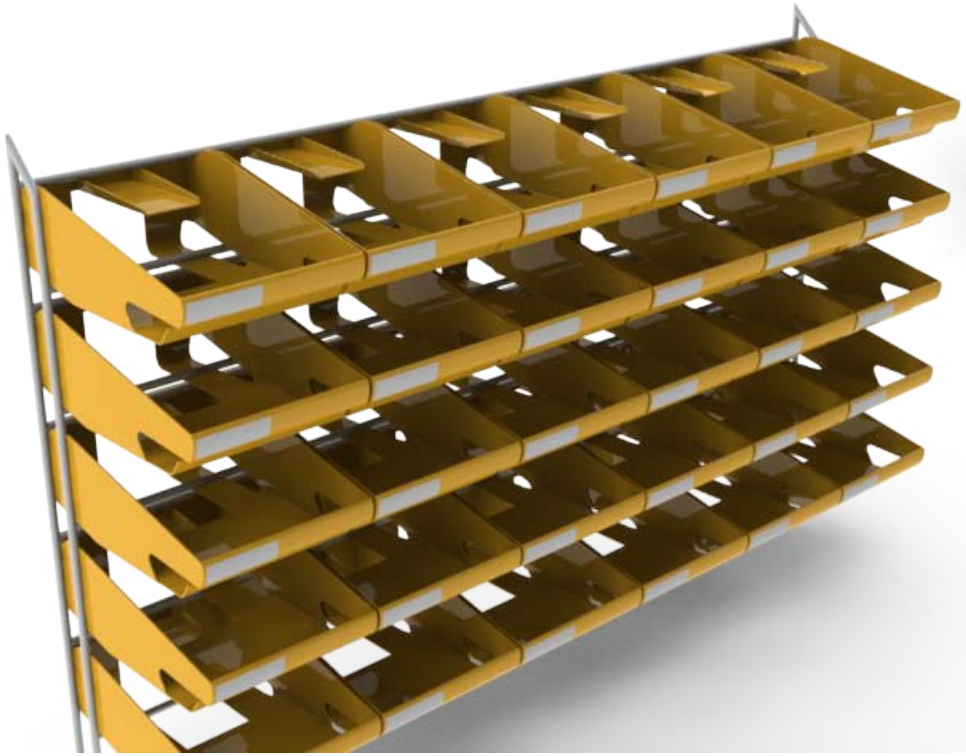
Main disadvantage of concept A that it occupies a large space, irrespective of the number of number of mails in an area on a day. Concept B has a flexibility in accommodating frequency of mail, but to a limit. The total number of mails it a rack can hold in concept B is finite. Concept C has a tray system where the trays can be replaced when they are full giving full flexibility.

Its seen that in Concept A, the sorting device can be setup easily by one pull compared to the setting up of the other two concepts. Regardless of this Concept C has a tray system where all the mails which have been sorted can be taken out together and can be passed on to delivery boys for their route wise sorting.

Concept C was taken ahead as the final concept and various variations were tried out.

final concept

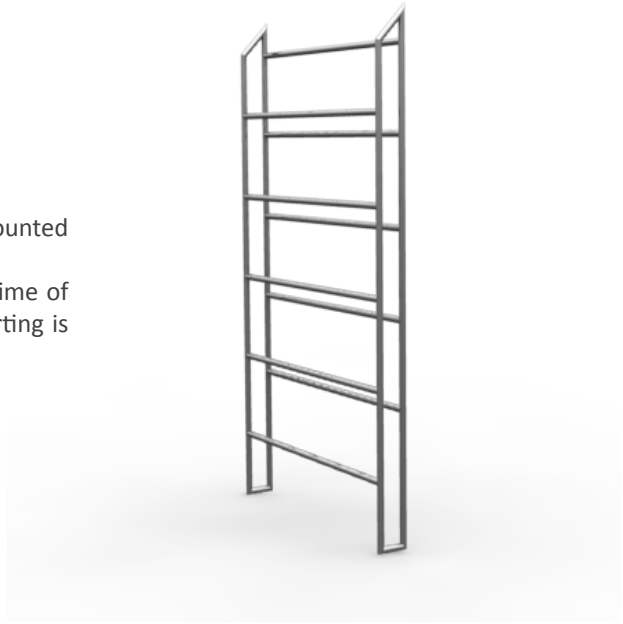
The concept involves a rack and tray arrangement.
The rack is wall mounted and the trays can be attached to the rack at the time of requirement

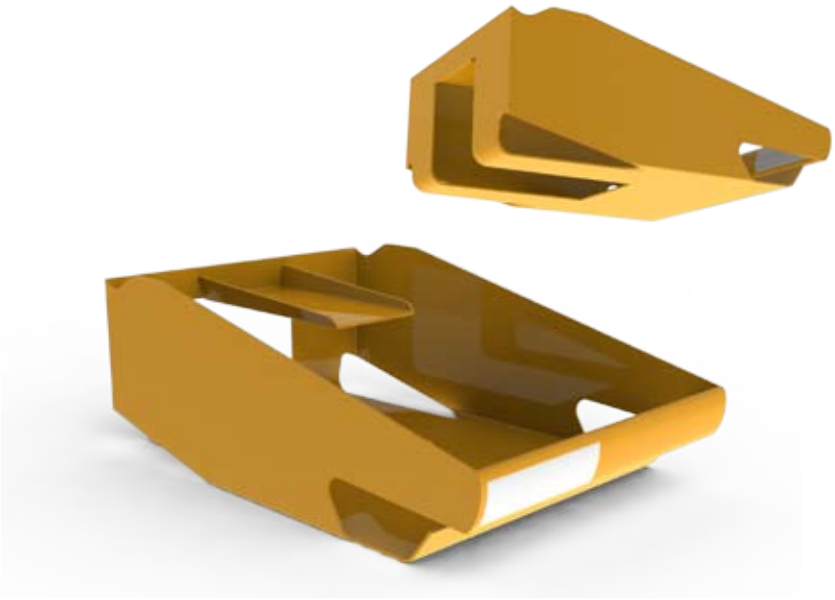


the sorting device consists of two main components

rack

- A rack is a frame on which the trays ca be attached on. The racks are permanently mounted on the wall.
- When not in use the rack is 10cm from the wall, and do not use up space. At the time of sorting the trays can be easily mounted on the racks and taken down when the sorting is done.
- Each rack has a capacity to hold 10 trays



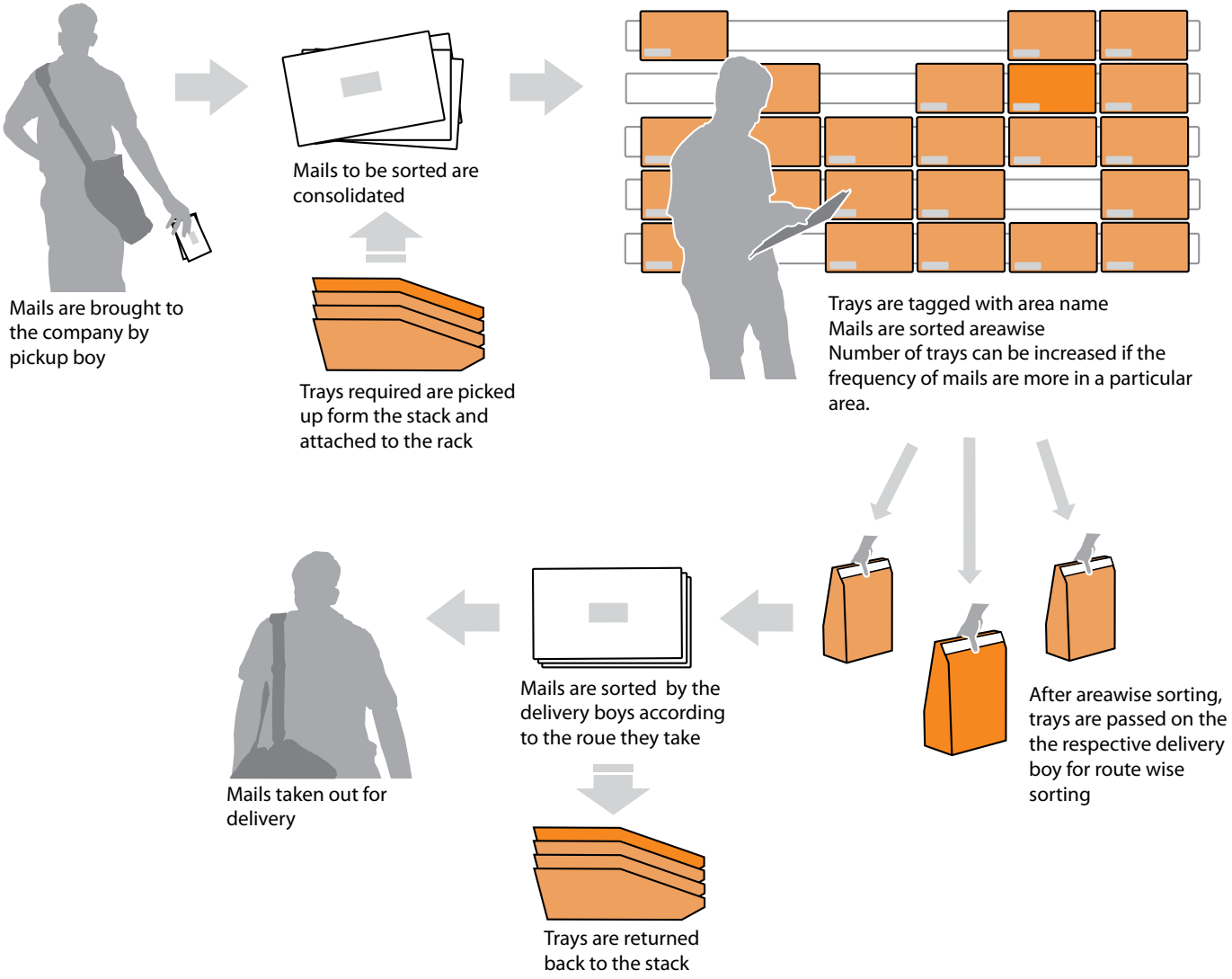


tray

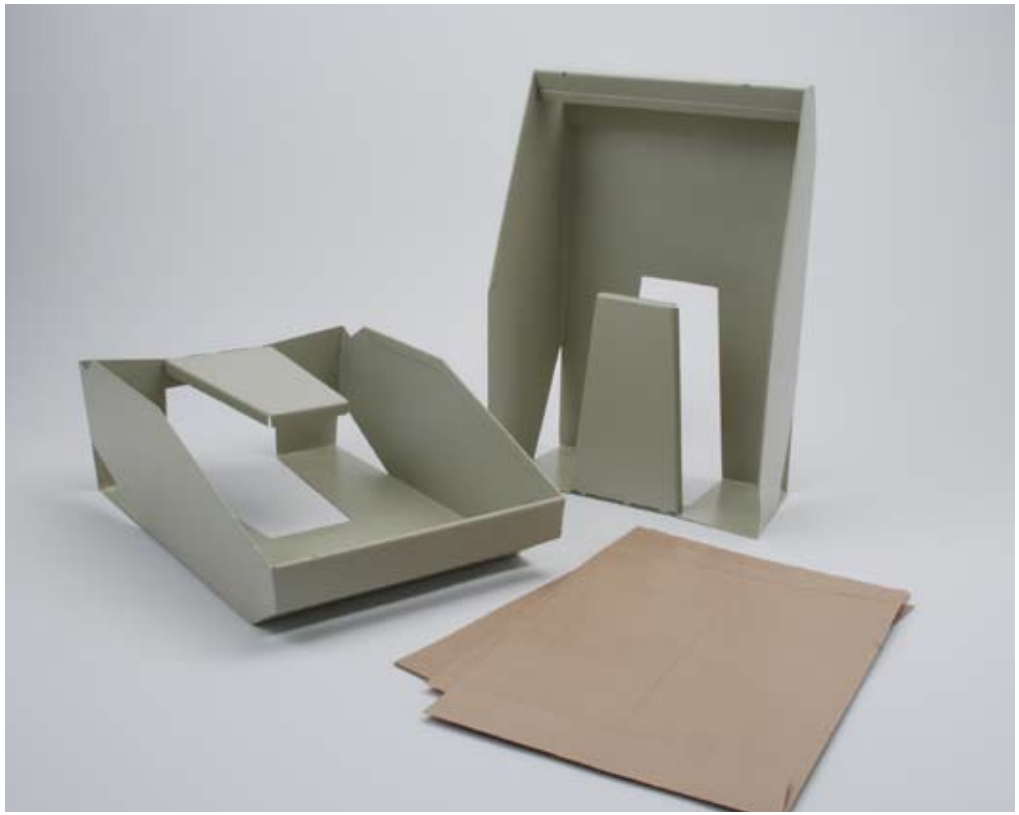
- The trays are used to hold mails of a particular area
- At the time of sorting the trays are mounted on the racks and when not used they can be stacked one over the other
- the trays are designed to accommodate mails to a maximum size of 210mmX291mm (A4 size envelopes). Each tray has capacity to hold around 40 mails

as the trays are to me manufactured in batches, sheet metal is used

usage of the sorting device in the working environment



final product

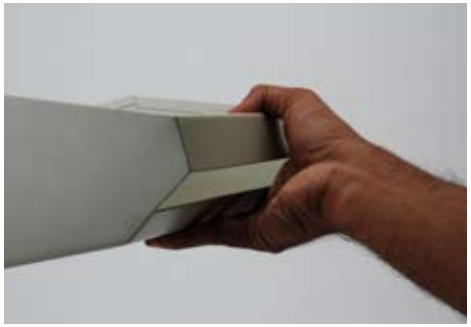


As the requirement for Mirakle couriers is a small amount, the material and manufacturing process has to be done for batch production. The prototype was developed in 1mm sheet metal and powder coated.

features

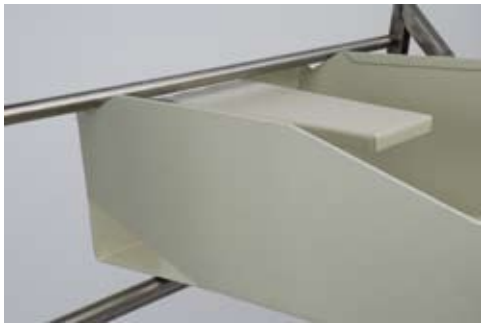
- The trays are designed to accommodate mails to a maximum size of 210mmX291mm (A4 size envelopes)

- A tray can hold a maximum of 40 mails
- the trays can be stacked, when not in use.
- The trays have handles which are designed as for the various usages of the trays
  - when removed form a height,
  - when removed from below,
  - when carried or passed along



features

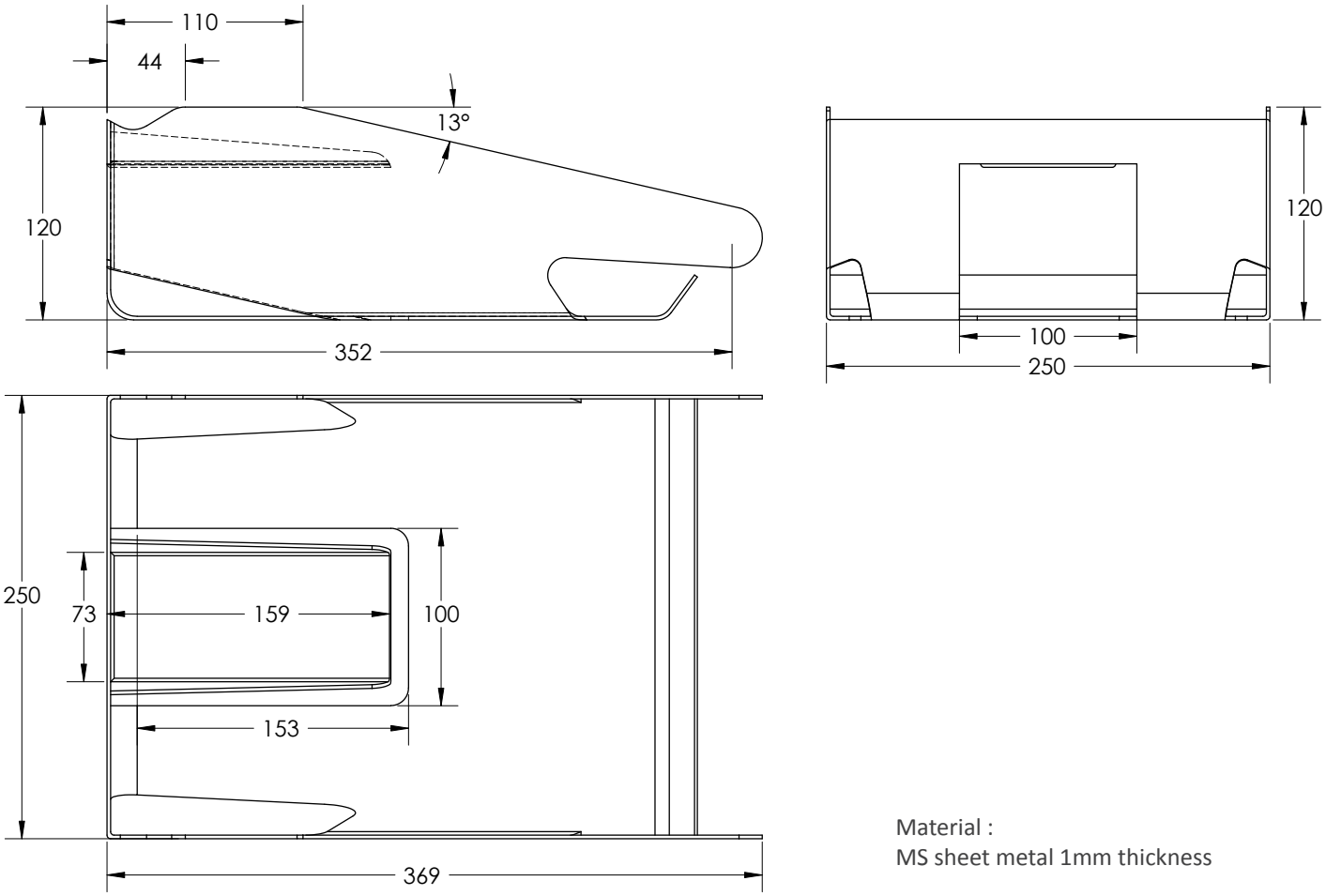
- Trays can be easily attached to the racks at the time of sorting



- A single rack can accommodate 10 trays. The rack is designed as a modular element, by adding racks it can cater to the needs of the growing company.

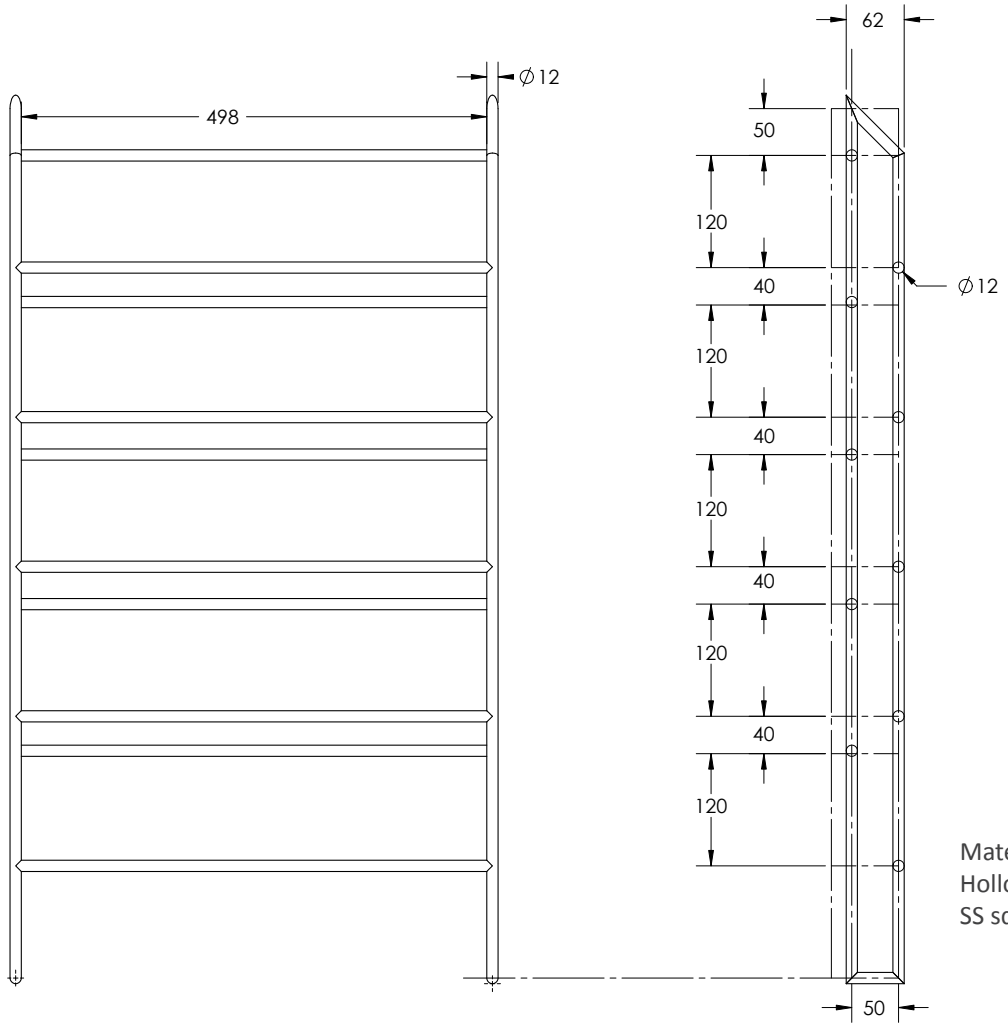
The material used for the tray is 1mm sheet metal and the rack is made from 25mm steel pipes

dimensional drawings of tray



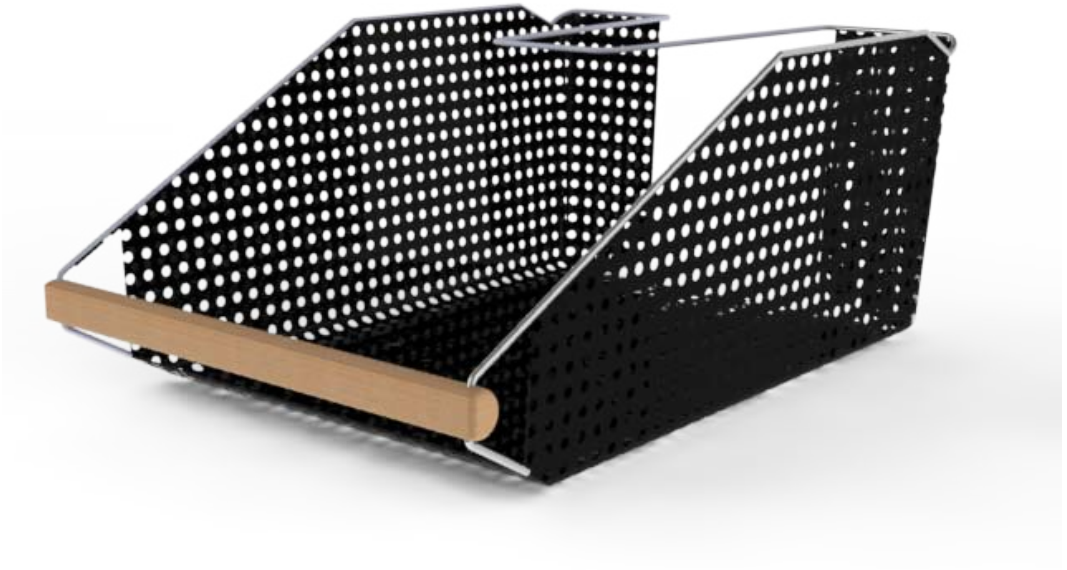
Material :
MS sheet metal 1mm thickness

dimensional drawings of rack



Material :
Hollow SS Rod 12mm
SS square section 15mm

The use of sheet metal as for the trays were found to be heavy to be handled, so a perforated metal sheet tray was used in the final product. The ends are lined with a bend wire for increasing the strength and a wooden handle for comfort grip.



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