



IDC School of Design
अभिकल्प विद्यालय

PROJECT II

Duration : 4 months

DESIGN OF TRUCK INTERIOR AS LIVING SPACES FOR INDIAN TRUCK DRIVERS

CONSIDERING THEIR ACTIVITIES INSIDE THE TRUCK SUCH AS SLEEPING, COOKING, LEISURE & STORAGE SPACE

Rajat Prakash Kushwaha
186390007

Mobility & Vehicle Design
2018-20

Guided by
Prof.Nishant Sharma
PhD



**“DESIGN OF TRUCK INTERIOR AS LIVING SPACE FOR
INDIAN TRUCK DRIVERS”**

Rajat Prakash Kushwaha
186390007
Mobility & Vehicle Design 2018-20

Guided by
Prof.Nishant Sharma
PhD

ACKNOWLEDGEMENT

My Project II has been a great learning experience. I was exposed to different areas of research and truck interior design. I wish to express my gratitude to my guide Prof. Nishant Sharma for guiding me throughout this project. I'm thankful to him for giving his valuable time and suggestions. I would like to thank Prof. Sugandh Malhotra for his valuable feedback during stage presentations. To all my friends who helped me directly or indirectly, I'm very thankful for their valuable feedback during the design process.

ABSTRACT

Indian truck industry shares a mixture of products from conventional TATA 407 to Volvo FM 460 and heavily decorated trucks. With the major global player coming into the market, it is required to study this emerging market for people, culture and business opportunities. The men who drive these trucks spend long hours on the road and are away from their families for weeks at a time, so their trucks act as a second home and they take great pride in them. The interior and exterior of the trucks are colorfully decorated with paintings, stickers, garlands, tassels, and shrines, which are not only a unique form of folk art but also an expression of individualism.

This project is an attempt to study the life of truck drivers, their needs and aspirations, problems they face and hence to design an interior for the Indian trucks. For a better understanding of this project, a Gantt Chart was made for project

management and designing the timeline for the process. To identify the needs of the driver, well-planned user research was performed which involves user interviews, photo documentation of trucks at selected locations, observational study and a board game. To perform the user study, the Vashi APMC market was selected.

The data was analyzed and insights were drawn with the help of mapping and based on the research insights a design brief was drafted. Many concepts were proposed and then evaluated based on the parameters of configuration, storage, aesthetics and leisure activity. After conceptualizing, user testing was conducted to get the review of drivers and their opinion on the proposed concepts and layout. This was a crucial stage as the drivers are the one who drives these trucks and to know whether my design is solving their needs and aspirations and whether

it excites them. After completion of user testing, one concept was taken ahead and then further developed. An inspiration was made to render the desired aesthetics and capture the feeling and emotions of the truck drivers. In the end, a CAD model is made to visualize the concept in 3D.

CONTENTS

1.BACKGROUND STUDY

15-31

- 1.1 History of Trucks in India 15
- 1.2 Structure of Trucking Industry 16
- 1.3 Typology of trucks 17-18
 - 1.3.1 Truck type and usage
- 1.4 Overview of Indian truck 19-22
 - 1.4.1 Indian Trucks
 - 1.4.2 Indian truck scenario
 - 1.4.3 Sales Statistics of Truck in India
- 1.5 Overview of Global truck 23-25
 - 1.5.1 Market leaders
 - 1.5.2 VOLVO FM 460 blueprint
- 1.6 Materials 26-29
- 1.7 Defining the user 30
- 1.8 Need & Motivation for this project 31

2.USER RESEARCH

33-37

- 2.1 Pilot user interview 34-35
- 2.2 16 Truck Drivers study 36-37
 - 2.2.1 Observational study
 - 2.2.2 Questionnaire based
 - 2.2.3 Board game

3..ANALYSIS

38-62

- 3.1 Ingres & egress 38-39
- 3.2 Decoration 40-41
- 3.3 Dashboard 42-43
- 3.4 Entertainment inside 44-45
- 3.5 Cooking & utensils 46-47
- 3.6 Platform for cooking 48
- 3.7 Sleeping 49-50
- 3.8 Clothes 51
- 3.9 Storage space inside 52
- 3.10 Current design 53
- 3.11 Outcome of Board game 54-57
 - 3.11.1 User interactions
 - 3.11.2 What constitute truck Interior
- 3.12 Insights 59-61
 - 3.12.1 Statistics
 - 3.12.2 Problems identified
- 3.13 The need triangle 62

DESIGN BRIEF

63

4. CONCEPTS

66-97

- Layout 1 66-67
- Layout 2 68-69
- Layout 3 70-71
- 4.1 Concept 1 72-75
- 4.2 Concept 2 76-77
- 4.3 Concept 3 78-81
- 4.4 Concept 4 82-87
- 4.5 Concept 5 86-89
- 4.6 Concept 6 90-91
- 4.7 User Testing 92-95
- 4.8 Concept Evaluation 96-97

5. DESIGNBOARD

98-101

- 5.1 Mood-board 99
- 5.2 Inspiration Board 100
- 5.3 Color Material Textures (CMF) 101

6.FINAL CONCEPT

102-121

- 6.1 Storyboard 102-104
- 6.2 Sketches 105-113
- 6.3 Packaging & layout 114
- 6.4 Different configurations 115 1
- 6.5 Renders 116-119
- 6.6 CAD 120-121
- 6.7 CAD Renders 122-127

7.APPENDIX

128-135

- 7.1 Questionnaire 128-129
- 7.2 Board-game 130
- 7.3 Cards 131-132
- 7.4 Truck size chart 133
- 7.5 Links 134-136

1. BACKGROUND STUDY

1.1 INDIAN TRUCKS

One unmistakable feature of the Indian highway is the presence of the brightly decorated trucks that ply the country's roads. The men who drive these trucks spend long hours on the road and can be away from their families for weeks at a time, so their trucks act as a second home and they take great pride in them. The interior and exterior of the trucks are colorfully decorated with paintings, stickers, garlands, tassels, and shrines, which are not only a unique form of folk art but also an expression of individualism^{[5],[7]}.

HOME ON WHEELS

In a nation spanning almost four million square kilometers, truck drivers are the ones quite literally keeping the Indian economy moving -- delivering goods to rural parts of the country inaccessible by railway.

It's a job which entails long months on the road, and these hefty vehicles transformed into mobile homes away from home, kitted out with bunk beds and photos of loved ones far away. "Since they're missing their kids and wives, they like to decorate their trucks with ornaments to remind them of home. They might adorn the cabin with bangles -- things that remind them of their wives."

SPECTACULAR SYMBOLISM

The symbolism continues on the richly painted exterior, with images of gods and goddesses, Bollywood stars, and political logos that say much about the person behind the wheel.

"Depending on which region they're from, you'll see Hindi, Muslim, Sikh, and Christian iconography," said photographer Dan Eckstein. "There's also a lot of decoration that has to do with luck on the road and warning away bad omens. There's a little demon face they put on the front of the truck, or they might tie shoes to the bottom which is meant to keep away the evil eye."^[8]



Fig 1. Long haulage truck interior from Punjab



Fig 2. Driver from Punjab driving Tata LPT 3718

1.2 Structure on Trucking Industry

Customers move their goods almost entirely through third party players, rather than through their own fleet. This makes the trucking industry commercially very dynamic. The trucking industry has multiple actors. The core actors directly serving the customers are the trucking company and the brokers/agents. They are supported by the pure truck owners. This core set of actors is supported by four entities providing the tangible elements for trucking: manufacturers, truck body builders, drivers and fuel suppliers. The core set of actors has an ecosystem constituting support services, and government and regulatory bodies. [10]

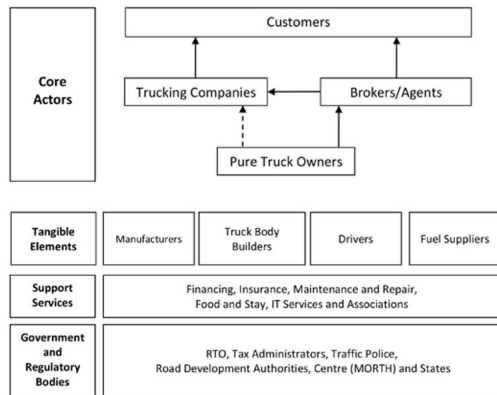
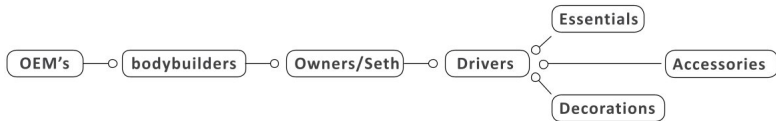


Fig 3. Structure of trucking industry in India



1.3 TYPOLOGY OF TRUCKS

Trucks are categorized on many factors such as price, segment, usage, body type, distance etc. The following is a typological chart which categorizes the trucks based on the previous mentioned factors. [2],[3],[4]

FACTORS	TIPPERS	DISTRIBUTION	HAULAGE	TRACTOR
Type			 	
GVW	9.6 ton-37 ton	11.9 ton	37 ton	49 ton
Cabin type	Sleeper/ non-sleeper	non sleeper	Sleeper	Ac sleeper
Body type	Built Deck	Built Deck	Naked/ built deck	Built deck
Price	26,50,000/-	12,00,000/-	26,50,000 - 40,00,000/-	35 lakh onwards
Distance	Long, short	moderate	long distances	long distances
Axle	3-5	2-3	3-5	3+ trailer
Usage	Mining, construction Garbage, agricultural	Delivery, agricultural produce Industry good and materials, logistics, FMCG, last mile connectivity.	agricultural produce Industry good and materials, Machines, construction materials, Shipments, railway tracks , engines, Cars and motorcycles	Heavy machinery, agricultural produce Industry good and materials, Machines, construction materials, Shipments, Cars and motorcycles
Trailers	No	No	Yes	Yes
FEATURES				
Customizability	Yes	No	Yes	Partial
Tilt steering	No	No	No	Yes
AC	No	No	No	Yes

1.3.1 TRUCK TYPE AND THEIR USAGE

The nomenclature of trucks are based on their load capacity and power. For example TATA 1613 means 16 ton (permitted) capacity with a 130 hp engine. Similarly Tata Prima 4938 means 49 ton capacity with a power of 380 hp. In India, the most common type of truck of used are long haulage truck because of their load capacity, low maintenance, and customizability. These

come in two variants, one is naked body one is build deck. Body builders build the cabin on the naked chassis according to the regional cultures and traditions. These trucks interior and exterior are heavily decorated by the drivers or fleet owners as these decorations brings charm and remind them of their home and family. ^{[11],[13]}



TIPPER

With heavy duty aggregates & laborious applications like shallow mining, quarry and river sand, this Tipper is built to manoeuvre across the country for multiple purposes. Mostly these are used for mining, construction and garbage dumping purposes. Load capacity varies from 9 - 40 tons.



DISTRIBUTION

Perfectly suited for market load, express cargo and parcel loads. For high volumetric loads, these truck variants are equipped with specially designed load bodies that can accommodate 7% more volumetric capacity. These trucks are used in cities for distribution of goods carried by long haulage trucks.



LONG HAULAGE

Designed for those who look for the maneuverability of 6X2 trucks and the revised payload of 8X2 trucks, these trucks efficiently handles today's tough operating terrains and loads. Ideally suited for operations like POL tankers, sand, construction material, etc.



TRACTOR

These trucks carry very heavy load up-to 45 ton in one trip. It is a vehicle that a business owner would be happy to have in their fleet, a tractor that saves money and offers high performance. These comes with a world of comfort with sophisticated cabins to make the driving experience much easier.

1.4 INDIAN TRUCK OVERVIEW

In India, Trucks are not just a heavy load carrying vehicle but it is like a home for thousands of drivers supplying goods in the country. These trucks vary from size, power and moreover how they look. Drivers and fleet owners decorate their trucks, hire artists to paint them, make them look more alive and beautiful. In India trucks vary from minimum comfort level to maximum luxury. Bodybuilders play a crucial role in building the cabin on naked long haulage trucks. Companies provide both the options, naked body and build deck. In India, apart from Indian companies many foreign companies also sell trucks which are more premium and with very heavy load capacity such as Volvo, Scania, DAF etc. Key Indian market players are TATA, Ashok Leyland, Eicher, BharatBenz, Force, Mahindra, Volvo, Scania.



Fig 4. A 19 year old truck from Uttar Pradesh



Fig 5. Drivers cooking inside truck.



Fig 6. Loaded truck at APMC market, Vashi



Fig 7. Deocrated Tata truck from Punjab



Fig 8. Tata truck at APMC market.

1.4.1 INDIAN BRANDS

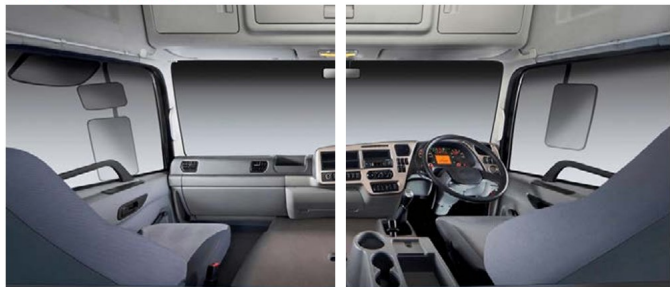


Fig 9. Eicher truck interior

Image showing Eisher Captain interior
3-way adjustable seats for continuous operation
4-point suspended cabin, lower NVH and higher productivity on all terrains
Wider glass for better visibility in extreme challenging terrains

PRIMA DIMENSIONS

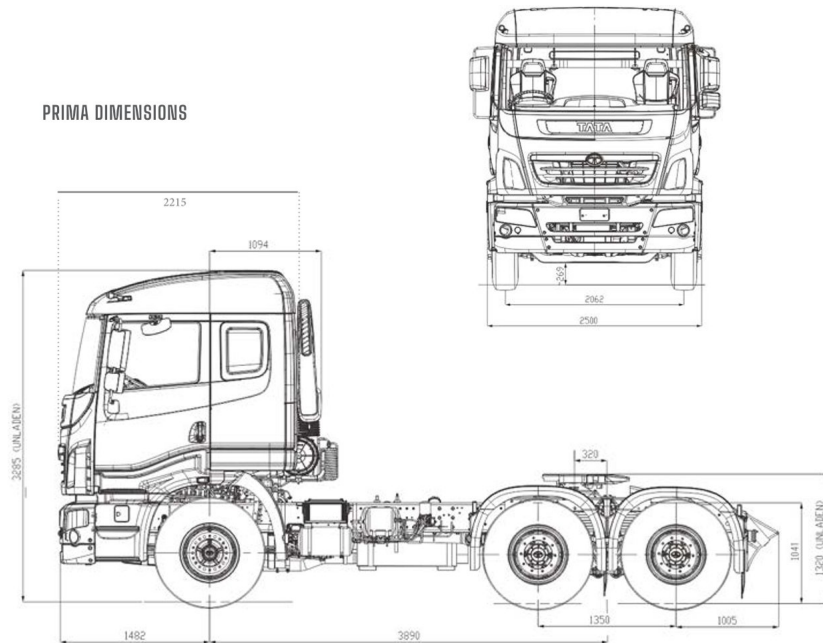


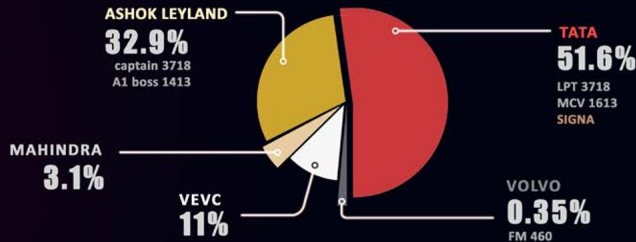
Fig 10. Tata Prima blueprint

SALES STATS

M&HCV (GOODS CARRIER)

MANUFACTURERS	DOMESTIC SALES APRIL- MARCH			MARKET SHARE APRIL- MARCH	
	FY19	FY18	DIFFERENCE	FY19	FY18
TATA MOTOR	181,265	154,676	26,589	51.62%	50.77%
ASHOK LEYLAND	115,613	102,826	12,787	32.93%	33.75%
MAHINDRA	11,014	9,484	1,530	3.14%	3.11%
SML ISUZU	2,780	2,307	473	0.79%	0.76%
VEVC EICHER	39,230	34,316	4,914	11.17%	11.26%
VECV VOLVO	1,226	1,055	171	0.35%	0.35%
	351,128	351,128	46,464	100%	100%

Tata being the market leader with a share of more than 50% and Ashok Leyland continues to the 2nd largest M&HCV brand in India. The Axle norm 2018 has majorly affected the sales of the trucks which aimed at increasing the GVW of each segment so that more goods can be delivered from one place to another.



VOLVO FM 460 DIMENSIONS'

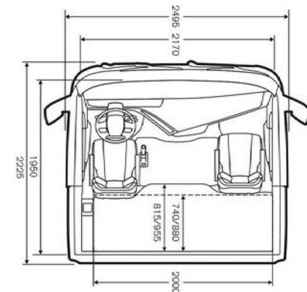
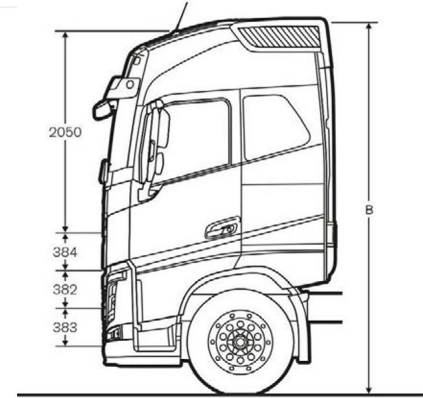
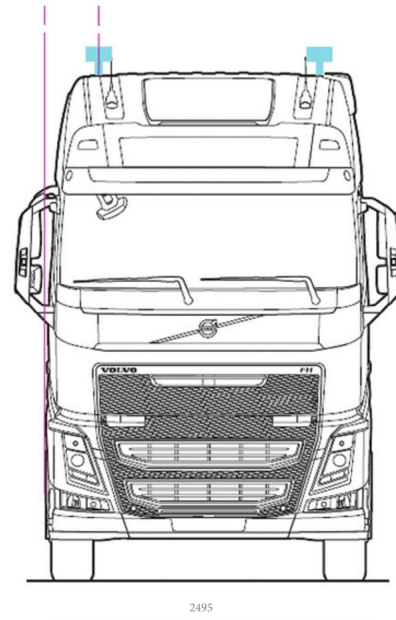


Fig 11. Volvo FM 460 blueprint

1.5 OVERVIEW OF GLOBAL MARKET

VOLVO



Fig 12. Volvo FM 460 interior as benchmark

SCANIA AND RENAULT (16), (17)



Fig 13. Scania and Renault interior

1.6 MATERIALS

DASHBOARDS

Dashboards keep us aware of the condition and performance of a particular piece of equipment necessary to the functionality of the vehicle. Additionally, dashboards protect the mechanics of the vehicle against moisture, impact, abrasion, excessive heat, and harmful UV rays. For several decades, plastics have been playing an increasingly vital role in the performance and design of these panels. Acrylonitrile-Butadiene-Styrene (ABS), polycarbonate alloys, polycarbonate, polyester, and polypropylene are the most common materials associated with these important applications.



Fig 14. Dashboard made of ABS.

SEATCOVERS

There are many seat cover materials used currently in the industry. All of them have some plus points over other. There is a comparison chart in the end to evaluate the best material for seat and bed covers for truck interiors given that it should be not very expensive.

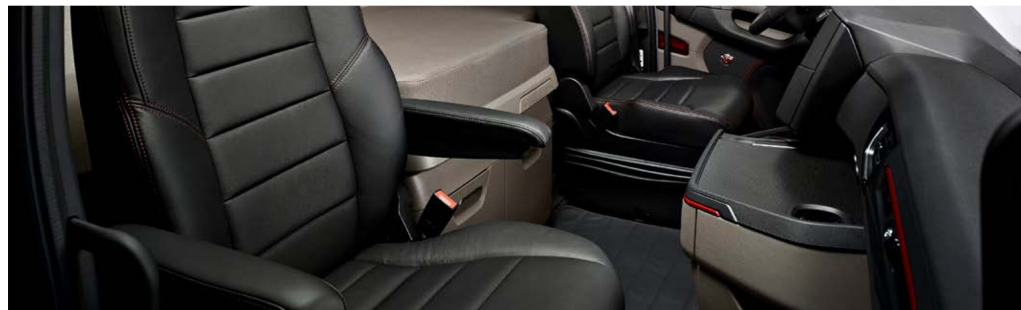


Fig 15. Picture showing PU leather used in making premium truck seat covers

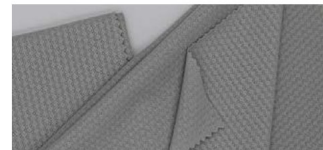
VELOUR

Velour is the basic material choice for seat covers. It is designed to look like the original upholstery in modern vehicles so is ideal for the person who is looking to protect their seats without looking like they have seat covers. The material is soft and comfortable but not the most durable or waterproof. Velour is a good economic, multipurpose option for any vehicle.



JACQUARD

Similar to the velour, the jacquard is not waterproof or super durable. The material is a bit rougher than the velour and features a heavy duty center panel. You could argue that the jacquard is more hardy than the velour, while the velour is more comfortable and modern looking.



CANVAS

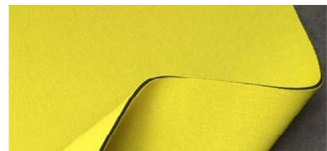
The most durable of all the fabrics, canvas is the favorite for trades vehicles, trucks and agricultural vehicles. It is fully waterproof, rough and designed to take a beating.

Comfort is not its strong suit though and can be a little rough on the skin so is not recommended for family cars. Perfect for those who require ultimate protection for their seats.



NEOPRENE

Neoprene is a great all round fabric for seat covers. Comfortable, highly water resistant and durable, it is the popular choice for those with an active lifestyle. Made from wetsuit material which is 98% rubber, neoprene is really popular amongst surfers and beach goers.



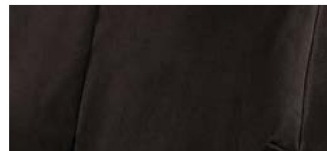
POLYURETHANE (PU)

The easiest to clean of all the material and his most preferred choice for taxi and Uber drivers. The fully waterproof vinyl barrier is perfect for regular spilt drinks, food crumbs and vomit. It can easily be wiped off and will look just like new again. It gets hot in the summer, and cold in the winter so is not the most comfortable seat cover.



4ELEMENT

4Elements is a technical material developed by Black duck to bridge the gap between the hard core canvas material, and the softer denim. It has been specially formulated to be soft and stretchy to touch, but also 100% waterproof and extremely durable. The 4Elements are high end in terms of price but also super high quality.



Different types of materials of seat covers are available, it can certainly be confusing and overwhelming to select the right one for truck interior. The following chart evaluate the seat cover materials based on certain parameters.^[13]

Source Title : Seat Cover Material Comparison Guide

Source:<https://www.motoquipe.com.au/buying/seat-cover-material-comparison-guide/16716>

	Velour/ Jacquard	Canvas	Neoprene	Leather- look	Denim	Mesh	Sheepskin	Acrylic Fur	4Elements
Comfort	★★★★	★★★	★★★★	★★★	★★★★	★★★★	★★★★★	★★★★	★★★★
Water resistance	★★	★★★★★	★★★★	★★★★★	★★★★	★★	★★	★★	★★★★★
Durability	★★★★	★★★★★	★★★★	★★★★	★★★★★	★★★★	★★★★★	★★★	★★★★★
Value	★★★★★	★★★	★★★★	★★★★	★★★	★★★★★	★★★	★★★★	★★★
Brand Options	2 Options	3 Options	2 Options	1 Option	1 Option	1 Option	5 Options	1 Option	1 Option
Quality	★★★	★★★★★	★★★★	★★★	★★★★★	★★★	★★★★★	★★★	★★★★★
Warranty	1 year	5 years	1 year	1 year	1 year	1 year	3-7 years	1 year	1 year
Universal Option	✓	✓	✓	✓	✗	✓	✓	✗	✗
Custom Option	✓	✓	✓	✓	✓	✓	✓	✓	✓
Machine Washable	✓	✓	✓	✓	✗	✓	✗ Dry clean	✓	✓
Colour Options	2	3	3	4	2	1	5	5	2
Applications	Multi purpose	Trades vehicles	Active lifestyle/ Kids	Taxi/Uber	Active lifestyle	Hot climate	Luxury	Match Sheepsk	Trade/Active

Fig 16. Comparison chart of different kinds of seat cover materials.

How to read this chart.

★★★★★	Excellent
★★★★	Good
★★★	Average
★★	Poor
✓	Yes
✗	No

Defining the user

Trucks are used for business to carry goods from one place to another. There are many stakeholders involved in the process. Since trucks are very expensive and the drivers cannot afford it, these trucks are owned by the fleet owners or bigger companies.

The stakeholders are the **driver, fleet owners, manufacturer, bodybuilders.**

Since the driver is the one who uses the truck more than other stakeholders. They live inside the trucks and will provide more authentic information about the problems and issues that they face inside the truck. No one will talk better about their problems than they themselves. I will be interviewing the truck drivers.

Need & Motivation for this

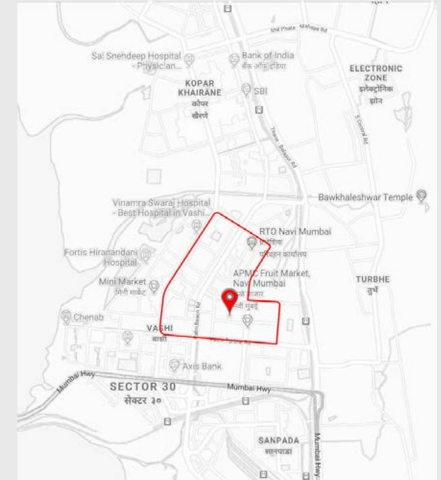
“The truck drivers spent more than months in trucks and thus this small cabin become their home far away from their family. Some visit their family after 2 weeks and some for even more than 5-6 months. They decorate the interior as per their cultural backgrounds with motifs, flowers, deities etc.

Apart from all these, they face a lot of problems which needs to be addressed as a mobility and vehicle design problem. Their cultural, traditional and aspirational values need to be reflected in the design and the current design are failing to offer the feeling of proud, comfort and luxury, hygiene, storage and many other things which will improve the quality of their lives and social status.”

2. USER RESEARCH

The user research was carried out in two ways. The first was an observational approach towards the interior and driver where my aim was to just not get down and click photographs of the interior and understand the what is kept where and why. How certain things vary in different trucks and how different regions affects the interior of trucks. The second approach was to design a questionnaire based on my observational research and pull out answers for the same. This was carried out with discussing issues with truck drivers and spending hours with them knowing what are their aspirations, how they feel about being an Indian truck driver and followed by many other questions. My curiosity to know more about them drove me to many sites in Mumbai where trucks from south, north east and west all come in (The APMC market, dockyard road etc.). So the three ways are listed below:

1. Observational
2. Questionnaire based
3. Game based.



Vashi APMC selected for user research study based on the fact that trucks from different parts of the country come there for delivery.

Pilot interview

Before proceeding to user interviews, I did a pilot user testing. (Fig.17)

Mohd. Rahees is a 40 years old truck driver who lives with his family in Govandi. He has 3 children and 2 brothers Kalam & Yasir aged 28 and 30 years respectively. Both of them are unmarried. Raees drives on Mumbai Pune road and carries construction material. Many times he drives to Satara and Kolhapur as well. He drives for 6-7 hours in a single stretch. He is paid 4000 rupees per 1000 km so as per this he earns 8,000 rupees per month.

He eats wada pav or dal rice on the way at highway dhabas. He does not consume alcohol inside truck. His brothers sleeps in the truck since they are not married and Raees house is too small to accommodate 7 people. The truck interior is like a small home for the two brothers where they sleep, eat and rest. His children do not go to school as he is unable to save money for their education.

He owns a samsung multimedia mobile with buttons. Listen 90's music and had installed a small radio plus music player in the truck. He aspires to own a four wheeler car (fortuner) which he sees very often on the highways. Likes its powerful stance and road presence.

One of the major problem he faced is storage and the feeling of luxury in the truck interior. Followed by organized space, sleeping bed and the feeling of proud. And if they get a chance to change the first thing in truck interior, they will change the look and feel of the interiors and make it look more alive and a living space.



Fig 17. Mohd. Raees in his truck, leaned back on his seat



Fig 18. Mohd. Raees low cushioned truck seat.



Fig 19. small lockable box kept on dashboard for keeping money & invoice



Fig 20. Picture showing sweaty clothes lying on the bed.



Fig 22. Egress in Rahees's truck.



Fig 21. Notebook and invoice kept in the metal box.



Fig 23. Table fan hung on ceiling.



Mohd. Raees
Age 40 yrs
Family - 5 members
Income- 15000/-
T Type - Haulage

Raees is a 40 year old truck driver who lives in Govandi with his family in a small house. He has three children and have 2 brothers mohd. Kalam and Yasir aged 28 & 30 respectively. He drives mostly on Mumbai and Pune road and carries construction materials. He mostly sleeps at home but his 2 brothers they sleep in the truck itself. For them it's their home, they are unmarried and do not have a place to live.



Tanaji Bongh
Age 29 yrs
Family - 6 members
Income- 8-9k/-
T Type - Haulage
Exp. 9 yrs

Tanaji Bongh is a 29 yrs old truck driver from Solapur who mostly drives for 8-10 days in a go. Mostly drives from Solapur to Chheda nagar in Mumbai. Carries mostly construction materials. He mostly sleeps around 4 hours in a day and utilizes his hault hours with other truck drivers by playing cards or by eating and chatting.



Parshuram Yadav
Age 28 yrs
Family - 4 members
Income- 10,000/-
T Type - Haulage
Exp. 8 yrs

Parshuram is a 28 year old unmarried truck driver from Varanasi, mostly driver on Mumbai Gujarat road. Carries spices from Gujarat and masala powders. He mostly sleeps for 3-4 hours and carries a stove for cooking. He visit home once in a year and live in the truck itself. Has his office at APMC where he keep his extra clothes.



Dinesh Patel
Age 22 yrs
Family - 4 members
Income- 8000/-
T Type - Haulage
Exp. 3 yrs

Dinesh Patel is a 22 year old young & unmarried truck driver from Jaunpur, mostly driver on Mumbai Gujarat road. Carries spices from Gujarat and masala powders. He mostly sleeps for 3-4 hours and carries a stove for cooking. He visit home once in a year and live in the truck itself. Has his office at APMC where he keep his extra clothes.



Diljit Singh
age 26 yrs
Family - 6 member
Income 8500/-
T Type Haulage
Exp- 7 years

Diljit is a 26 years old truck driver from Punjab and is married. Carries agricultural produce from Punjab to APMC Mumbai. It takes him 4 days to reach Mumbai. Cook food inside the truck and have heavily decorated his truck.



Amarnath
age 32 yrs
Family - 4 member
Income 8500/-
T Type Haulage
Exp- 13 years

Amarnath is a 32 years old truck driver from Punjab and is married. Carries agricultural produce from Punjab to APMC Mumbai. It takes him 4 days to reach Mumbai. Cook food inside the truck and have heavily decorated his truck.



Sukhvendra
age 29 yrs
Family - 5 member
Income 8500/-
T Type Haulage
Exp- 11 years

Sukhvendra is a 29 years old truck driver from Punjab and is married. Carries agricultural produce from Punjab to APMC Mumbai. It takes him 4 days to reach Mumbai. Cook food inside the truck and have heavily decorated his truck.



Yasir Ansari
age 28 yrs
Family - 6 member
Income 7500/-
T Type Haulage
Exp- 9 years

Yasir Ansari is a 26 years old truck driver from Govandi and is unmarried. Carries construction material on Mumbai Pune road. He does not have a house so his truck interior itself is a small home for him.



Abhijeet Tambe
age 28 yrs
Family - 6 member
Income 8500/-
T Type Haulage Signa
Exp- 7 years
Sholapur



Akshay Bongh
age 22 yrs
Family - 4 member
Income 8500/-
T Type Haulage
Exp- 3 years
Sholapur



Patil
age 29 yrs
Family - 6 member
Income 9000/-
T Type Haulage Signa
Exp- 3 years
Sholapur



Manoj
age 36 yrs
Family - 6 member
Income 9000/-
T Type Haulage Signa
Exp- 18 years
Sholapur

all are friends and drive all together



Mohd. Kalam
age 30 yrs
Family - 6 member
Income 7500/-
T Type Haulage
Exp- 18 years
Govandi



age 24 yrs
Family - 8 member
Income 8000/-
T Type Haulage Ashok L
Exp- 5 years
Karnataka



age 33 yrs
Family - 6 member
Income 7500/-
T Type Haulage
Exp- 15 years
Karnataka



age 41 yrs
Family - 6 member
Income 9000/-
T Type Haulage
Exp- 22 years
Karnataka

3. ANALYSIS

3.1 INGRESS & EGRESS

Ingress and egress. This was one of the interesting feature which I observed, not in every trucks but in few of them yes. Since the height of these doors are around a meter from ground and it is hard to get inside the truck. Truck drivers for their easy in and out have made small slots in the doors to help them get in and out. Adding a bar makes the process even more convenient for them.

First they put one leg on the lower slot and then second on the another and then hold the bar to lift the body and get inside. Similarly is the way out. The drivers age varies from 18 - 65 + years, it is important to provide provisions for the easy in & out of the truck.



Fig 24. Ingress and egress in the truck. A small improvisation made build by the drivers.



Fig 25. 10 kg gas cylinder and wheel spanner kept at co-driver's end.

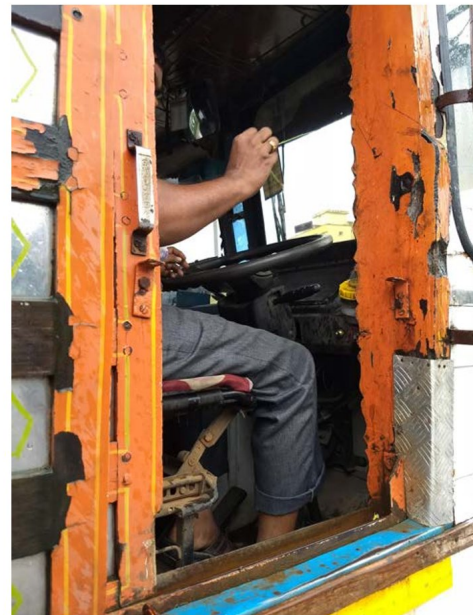


Fig 26. Wooden sliding door on the drivers' end. Many issues with this door during rains.

3.2 DECORATIONS INSIDE



Fig 27. Colorful truck interior from Punjab.

The interior and exterior of the trucks are colorfully decorated with paintings, stickers, garlands, tassels, and shrines, which are not only a unique form of folk art but also an expression of individualism.

They decorate these interiors with the belongings of their loved ones such as with bangles of their wife's, garlands of beads, flowers etc. These are done to keep reminding them of their loved ones. Also it makes the interior look alive. In the center of the upper storage is dedicated to their deity which is again heavily decorated with flowers,



Fig 28. Colorful posters on the wall of interior.

lights, small posters etc. On the rear wall are the very colorful paintings of sceneries framed in a beautifully carved plywood frame. Many female actress photo is also hanged on the door panels or on mobile holders. Many small hangings like I love bebe, vahe guru, Ram, Allah can be seen in the interiors as their belief of their culture and traditions. The deities are kept on a very soft feather like Cushion which is a gesture to their deity of love and belief. There is also a small mounted foldable screen in few trucks which they uses for seeing the back view while reversing which is mounted on the upper storage.



Fig 29. A foldable screen device mounted on the frame.



Fig 30. Floral decoration around the deity.

3.3 THE DASHBOARD



Fig 31. Royal dashboard design of Trucks from Punjab.

The dashboard of the Indian trucks are one of the mostly decorated component and have an art oriented signature. Many of the trucks from Punjab has royal castle like dashboard design with small storage lockers as well as open platforms for keeping things. Trucks from Karnataka and UP had very minimal and simple dashboard with one or two lockable storage. The dashboard is the most accessible component so the drivers keep most of their essential belongings on the dashboard from needle to tool kits. Toothbrushes, pastes, medicines, matchsticks, toll invoices etc are just kept in either a small plastic basket or in a small



Fig 32. Dashboard platform covered with a yellow synthetic fur fabric and many partitions on the dashboard for storage.



Fig 32. A small metal box kept on the dashboard which is used for keeping money and bills.

storage space. The small metal box Fig.32 is their small pitara in which they keep coins, notes and invoices and is lockable. There are many plastic baskets which they attach on the dashboard and keep their products as per need and frequency of usage. Water bottles, Glasses, jugs, Colin soaps are kept on co-drivers side. Because of its royal designs it's very difficult to clean it regularly. Also the in board storage spaces are very small and cannot be used even for small products. A tray is kept on the dashboard in which they keep coins and notebook, pen.



Fig 33. A small plastic basket attached on the dashboard.



Fig 34. Plastic bottles kept on the dashboard.

3.4 ENTERTAINMENT SPACE



Fig 35. Truck drivers hanging out together in a truck.



Fig 36. Picture showing a small platform on engine cover used as dining table.

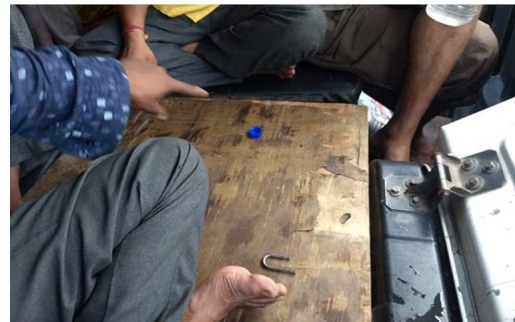


Fig.37 2x3" plywood platform

These truck drivers drive with their friends in general or at least know them from their hometown. Whenever they halt on their way, they all come together in and eat and drink together. They also carry cards with them and play while drinking. They have build a small platform on top of engine cover which serve dual purpose of sleeping as well as a platform for eating and drinking. This 2x3 " ply board cost them 700 and the mattress cost them 600 rupees.

At this time around 5-6 drivers gathers around in a truck and gossips everything from family, life to seth. At this time the small truck interior becomes a small dining room where drivers talk, relax and drink together and once they are done drinking they put up the mattress and 4 of them rest for sometime before

3.5 COOKING AND UTENSILS



Fig 38. Drivers cooking inside the truck.



Fig 39. Picture showing gas stove packed & kept on bed.



Fig 40. Picture showing kerosene stove under co-driver seat.

Mostly truck drivers cook inside the truck and eat self made food because it is cheap and healthy. Though they have improvised the interior in such a way that they can carry stove and utensils with them and can cook as well. They either carry kerosene stoves or small gas stoves (10kg) which they keep under co-driver's seat or in the leg space. The utensils are lying in a plastic basket kept on the bed on driver's end. They carry frying pan, big bowls, plates and cooker with them. For cleaning they carry dish washer soaps with them which is kept under the seat with stove. Once the food is cooked, they are kept on the dashboard as shown in the Fig.41



Fig 41. Picture showing cooked food kept on the dashboard.



Fig 42. Picture showing a 10 kg gas stove kept near the leg room.

3.6 THE PLATFORM FOR COOKING

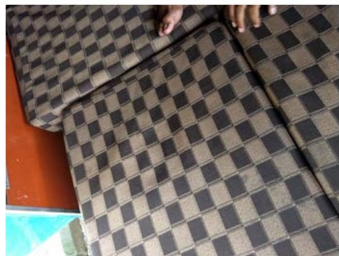


Fig 43. Extended convertible bed.

The masala and other ingredients are kept in a separate carton and covered to avoid getting moistured. There is no given provision to cook so how do they do it? These drivers built convertible beds which can be used as a platform for cooking as well and as a bed. So when they have to cook they remove the mattress and keep the stove on the wooden platform as shown in the Fig.44

All these arrangements are made by them and they design it according to their comfort and accessibility. And once the cooking is done they clean the platform with a cloth kept in dashboard and place the mattress.

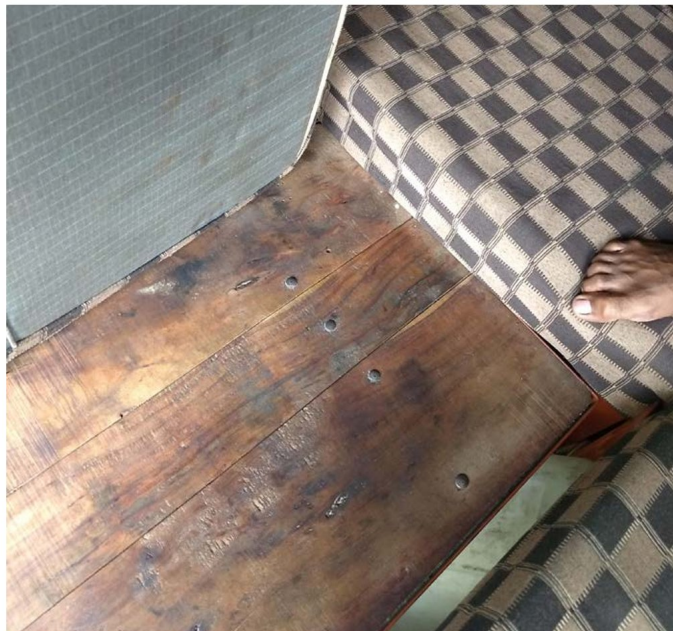


Fig 44. Platform after removal of bed mattress and then used as cooking platform.

3.7 SLEEPING



Fig 45. Driver resting on the bed.

The drivers improvise the interior according to their need. Since there are two people in trucks and there is only bed for sleeping, they build two small beds, one over the engine cover and second the co-driver seat. The driver sleep on the bed, the co-driver sleeps on the build bed and rests his head on the drivers seat. In some trucks, their were bunker beds as well but the upper bed were used for storing not for sleeping. These small square mattress are 2x2 feet and cost around 300 and the wooden table cost around 600. The build bed is very uncomfortable for sleeping because of the difference in levels.



Fig 46. Driver resting on extended bed.



Fig 47. Picture taken during my conversation with truck drivers.



Fig.49 showing bed in Tata LPT 3718



Fig.50 showing the kinner sleeping in TATA Signa

3.8 CLOTHES

Drivers carries clean clothes with them before heading for a delivery. From shirts, pants, towels to lungi, boxers, hand, gamcha, blankets (Fig.51). Clean clothes are kept in a duffle bags and the dirty or wet clothes are hanged on a rope tied on the back wall in the interior or kept in a corner of the bed. Even after washing their clothes they hang them on the rope for drying. Their sweaty clothes are also hanged along with the clean clothes because of which the whole interior stinks.



Fig.51 Clothes hanged on a bar for drying.



Fig.52 Backpack kept on the upper head storage.



Fig.53 Clothes hanged for drying on a rope tied across the width.

3.9 STORAGE SPACES



Fig.54 Small toolbox kept on the dashboard



Fig.55 Small shelf mounted on driver's door panel.

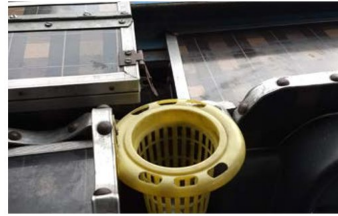


Fig.56 Small bucket attached on dashboard for keeping oil, toothbrush etc.



Fig.57 Basket kept on the dashboard for keeping papers, toothbrush, matchsticks, mobile, combs etc.

3.10 CURRENT DESIGN

Image shows the Interior of Tata Signa. Though this is designed keeping in mind the drivers but it does not deliver the purpose of storage, sleeping and cooking inside the truck. As we can see in the picture that the products are just thrown on the dashboard which creates clutter and find it hard to access which and when required. Because of this, the interior looks very cluttered, less spacious and unorganized. It does not bring out the joy in drivers.



Fig.58 Tata Signa dashboard with products scattered.

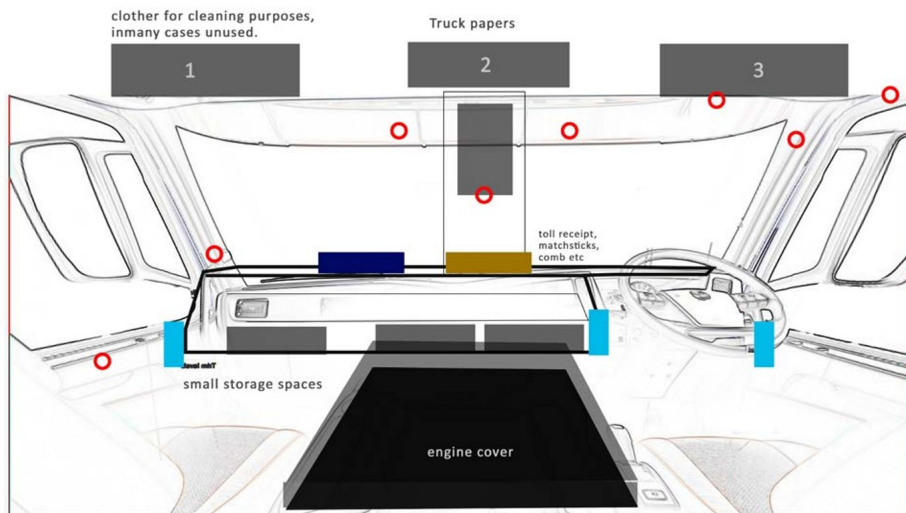


Fig.59 Leg space storage.



Fig.60 Tata Signa dashboard storage

BOARD GAME



- mounted baskets, hooks etc.
- small boxes kept on the dashboard
- points of interest
- tray
- storage spaces



Fig.61 picture taken during my interaction with truck drivers while they were placing cards on the board

On the basis of the my observational research I found out that there are a lot of commodities that they carry with them and they keep them at certain place in the interior. I had identified all the storage spaces in the interior where they keep their essentials (Fig.61).

Based on this data, I designed a board game to get a more clearer picture of what they keep where and why. The above images (Fig.61) shows their union interaction with the cards and where to keep what.

https://drive.google.com/open?id=1hc6LQXQM-Qq3ZBaLAg7Nt7oJR2H_LIAP



This board game was designed to know and understand what all they carry with them and why they keep them at certain place in the truck. And how regional differences affects the location and choice of products that they carry along with themselves.

3.11 THE OUTCOME OF BOARD GAME

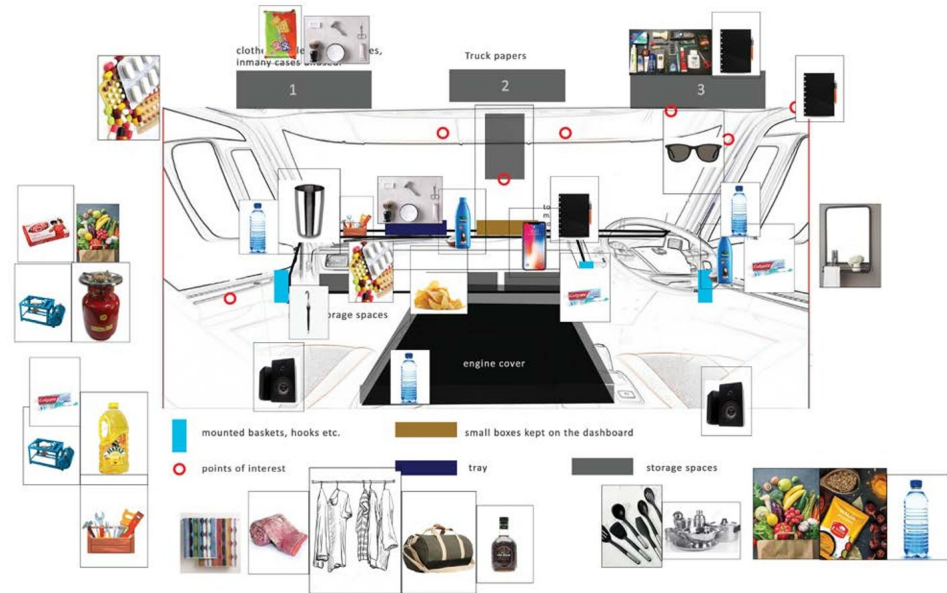
The image below shows the outcome of the game design. They placed the cards at their usual locations. The factors which affected their decision were ease in accessibility, visibility, size of the product, frequency of usage. More a product is used it is kept in front. Though they do not have any dedicated storage for most of their products, they keep things on the dashboard. Water bottles, Jug glasses are kept on the ends of dashboard. They very efficiently uses the under seat spaces as storage space for kerosene stove, utensils, soaps, shoes, etc.



Fig.62 The cards placed at specific points on the board



Fig.63 Cards placed at specific points on the board.

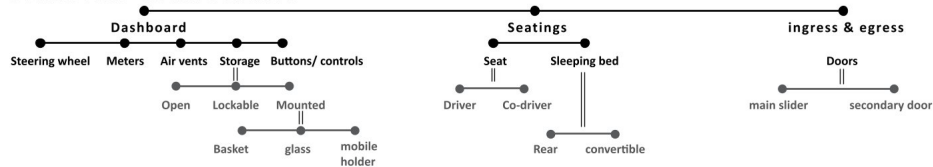


A pattern can be traced out after going through the process. Drivers keep similar kind of products at a particular space in the truck despite of their regional differences. The above image is a compiled mapping of all the user testing outcomes. This mapping helped me to understand the different types of product they use and their location in the truck interior.

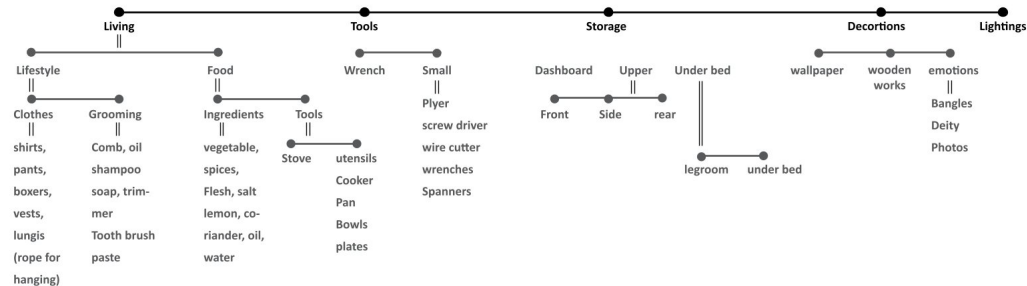
What Constitutes Truck Interior ?

It's not just the seat, dashboard, sleeper bed but there are many other components which add up to what we call as Indian Truck interiors. Though few things vary from place to place but in general we can trace a pattern of object and their positions in the truck.

STANDARD COMPONENTS



ESSENTIALS



3.12 INSIGHTS

1. Which one of the following truck you prefer the most?



Factors which affected there decisions are power, safety, comfort, look, customizability, maintenance, space and the proud of owning.

2. Which one of the following interior you prefer the most?



First two were liked by them because of Premium look, Comfortable seatings, Subtle color, Spacious, Feels like living space, lightings, organised.

.STATISTICS.

Avg Income

8-9 K

4000/km

Avg sleep hours

3-4 hours

6 hours during halt

6 out of 8 drivers

cook inside the truck

Most preferred dal rice, chicken

Spends 6-10 days

in the truck.

2 drivers spends almost 9 months in the truck.

Avg driving hrs

6-7 hrs

single stretch

carries veg, spices

8 out of 10

for cooking

9 out of 10 drivers

decorate interiors

printed laminations, flowers
leds, bangles.

Drivers prefers

premium interior

and feels it make them proud
about being a truck driver.

They get more connected when I talked about truck interiors as a small home.

They drive for more than 7 hours in a stretch.

They will change the seat, bed and the interior treatment if they get a chance to renovate.

These drivers are very attached to their trucks and decorate them extensively to make it look alive.

The storage spaces are not build in respect to the belongings that they carry.

They re-build things as per their needs like extra sleeping space, bench for cooking and decorative walls.

Hygeine issues, flies, rain water leaks if door kept open and too hot in summers.

They wish to buy a fortuner because it's bold strong and has a unique stance. (they see on highways)

NEEDS

A better LIVING SPACE.

Ease of accessibility form driver's seat.

A design they should be proud of.

Proper lightings and air cooling.

an organised space for keeping essentials

A design which enhances their quality of life.

Safety

dryer for clothes, built in water heater, low maintenance.

Problems

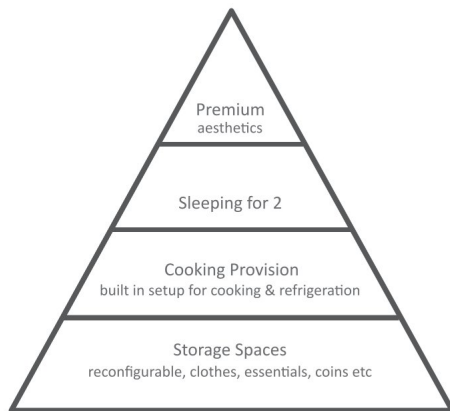
Their products are lying here and there. Cooking inside truck is very difficult.2 people cannot sleep comfortably at a time. Many times theft is likely to happen during halt hours. The available storage spaces are incapable of keeping all their essentials. No co-driver seat in long haulage trucks.

Very hard to clean. Drying of clothes and keeping clean clothes. The side door storages are not useful as the way they are.

3.13

The need triangle

Based on my user research and the insights, their basic needs and requirements of the drivers were storage for everything (clothes, soaps, coins, toothpaste, oil, vegetables etc.), provision for cooking inside the truck, sleeping for two people and premium aesthetics. The need triangle shows the hierarchy of their needs.



DESIGN BRIEF

Design of an Indian Truck Interior

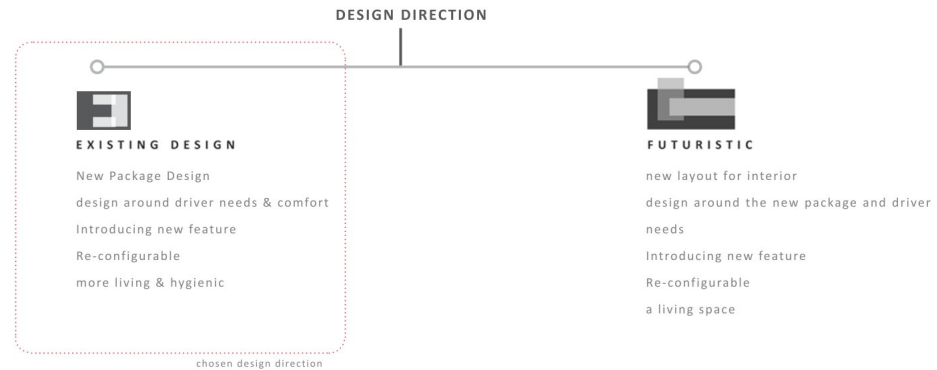
Truck interiors as small living spaces for the drivers considering their activities inside such as -

- Different configurability
- Cooking provision inside
- Sleeping for 2 people
- Storage (space for everything, everything at its place)
- Religious beliefs
- Leisure activities

New package design for addressing the needs.

The interior should be premium and make them feel proud and can keep their family souvenirs as well.

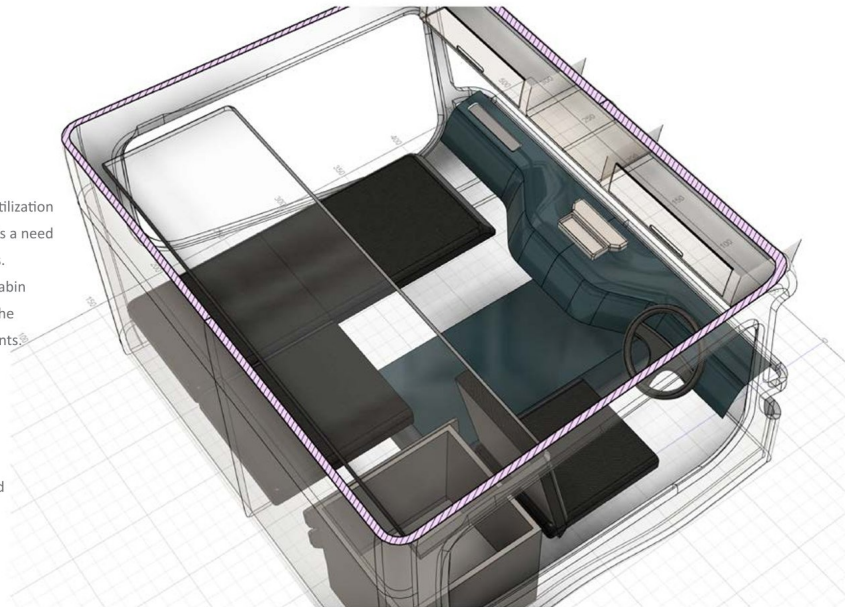
DESIGN DIRECTION



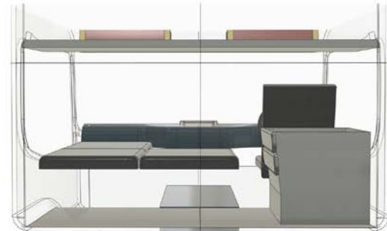
LAYOUT ONE

In order to achieve maximum utilization of space inside the truck, there is a need of new layout for truck interiors. Which involves increasing the cabin length by 20 cm and changing the configuration of the arrangements.

A new re-configurable layout which offers more space and a dedicated space for cooking and storing essentials, vegetables also good for entertainment as well.



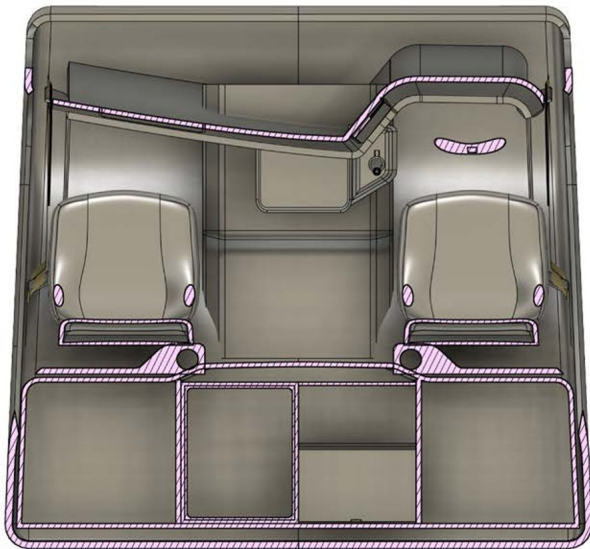
Block model of the proposed layout and orientation.



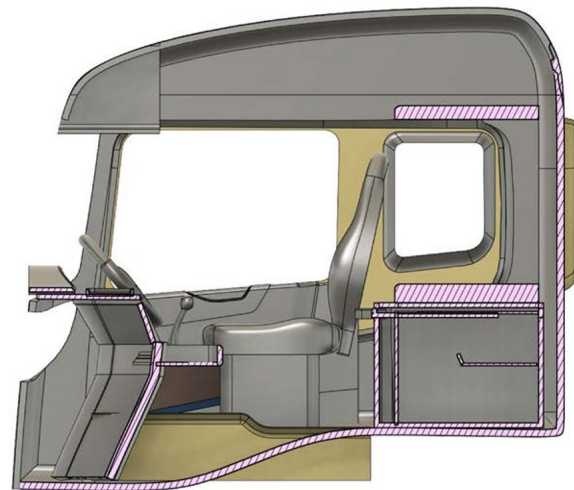
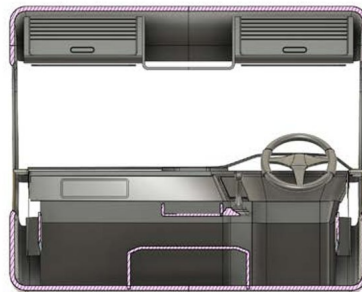
LAYOUT THREE

In order to optimize the interior space, this layout aims to maximise the space utilization of the current package and making it a living space to fulfill their needs.

A new design based on the current configuration with a big under seat storage. There are two bed at 2 levels. The cabin is separated in two parts by a net curtain. The dashboard has got a new form and is easily accessible for both, driver and co-driver.



Cross-section showing the storage spaces both lockable and open and undereat storage .

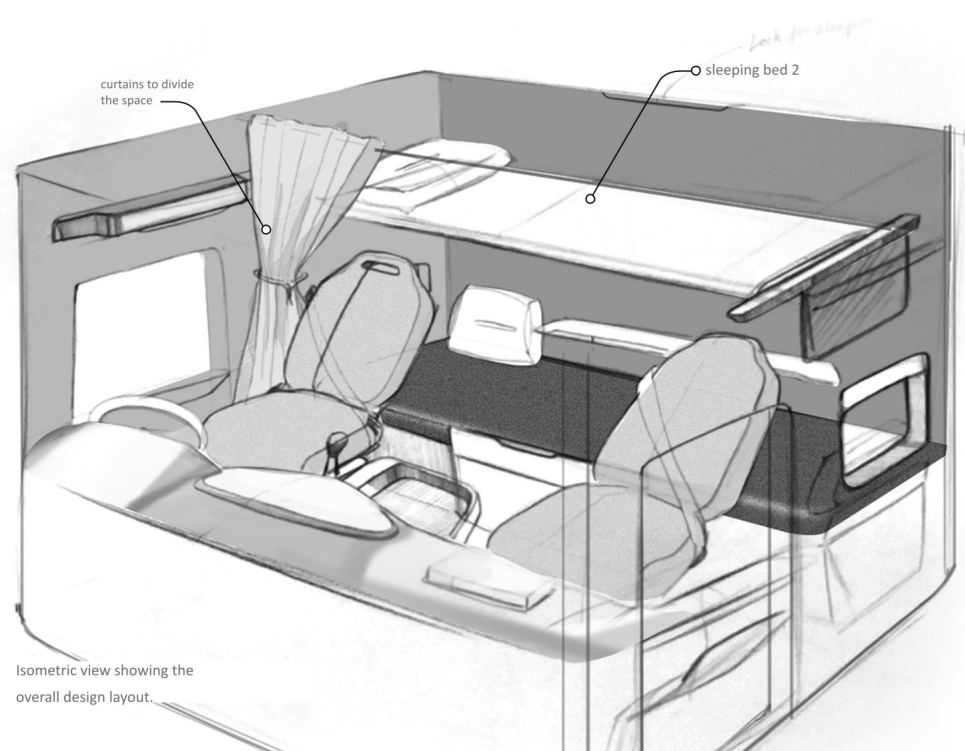
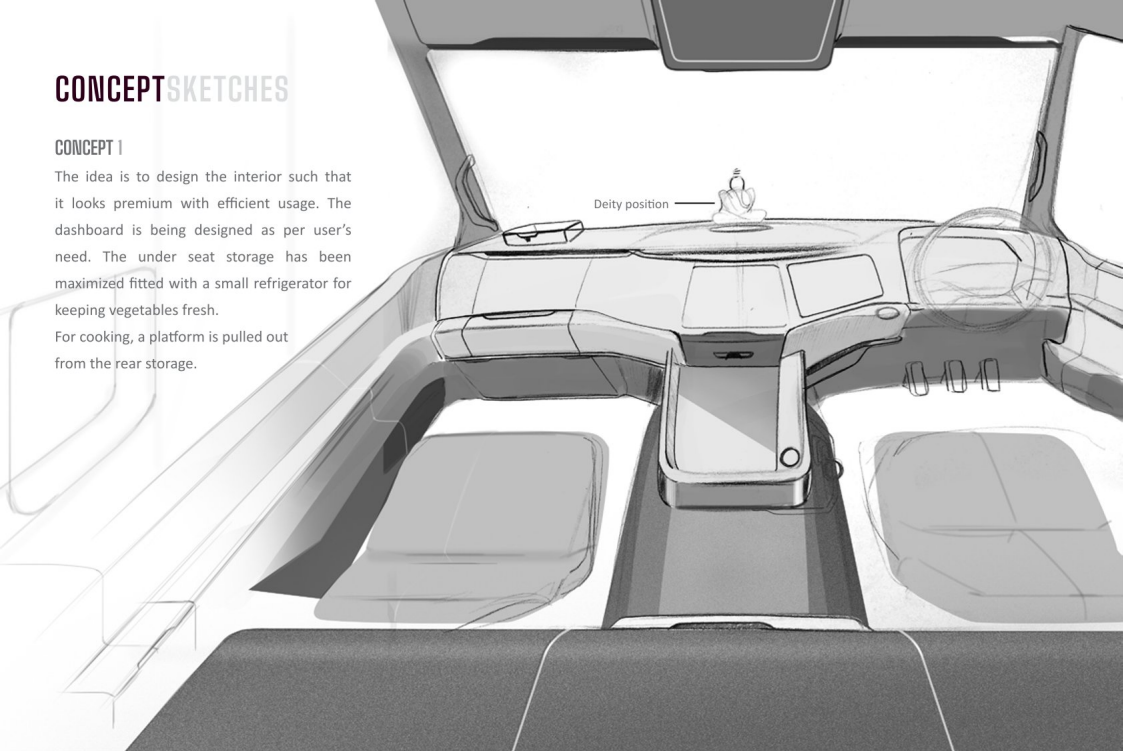


CONCEPT SKETCHES

CONCEPT 1

The idea is to design the interior such that it looks premium with efficient usage. The dashboard is being designed as per user's need. The under seat storage has been maximized fitted with a small refrigerator for keeping vegetables fresh.

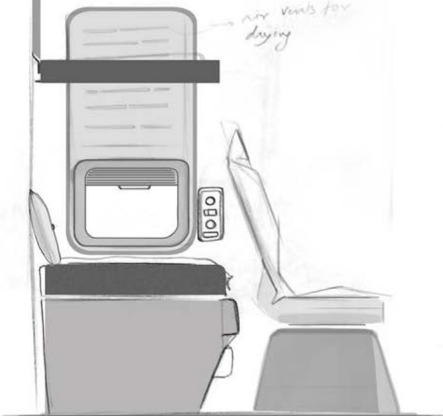
For cooking, a platform is pulled out from the rear storage.



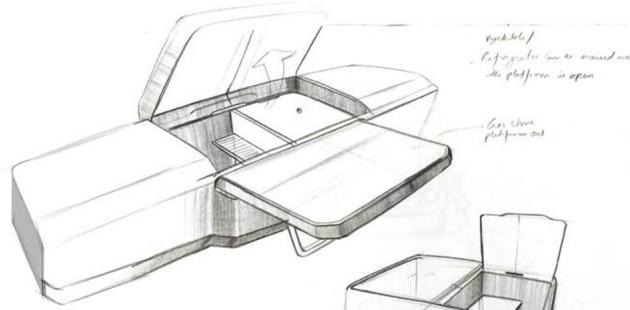
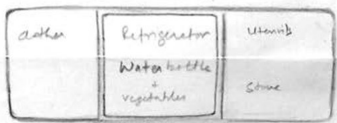
Isometric view showing the overall design layout.

rear side layout showing two bed and window

air vents for drying

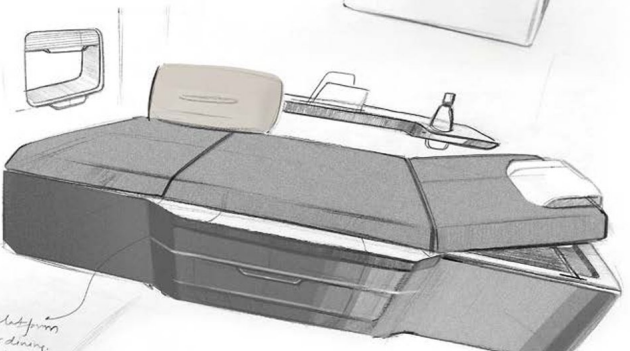


small Refrigerator



Hydratable / Refrigerator can be mounted on the platform is open

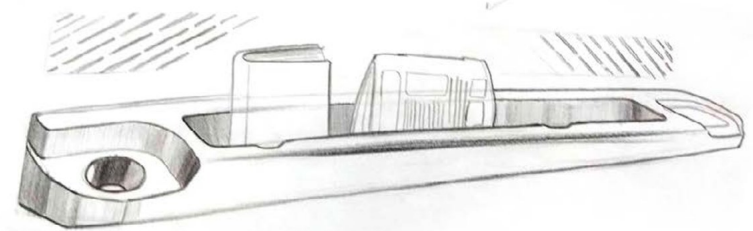
Gas stove platform out



• Stove platform
• table for dining

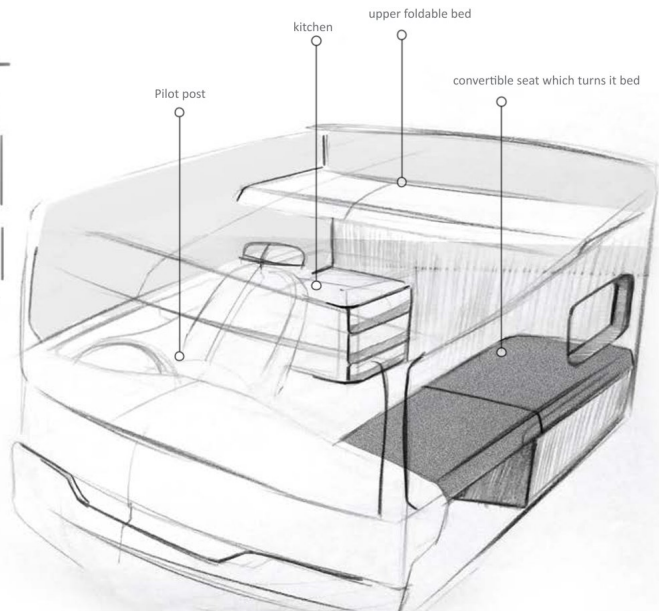
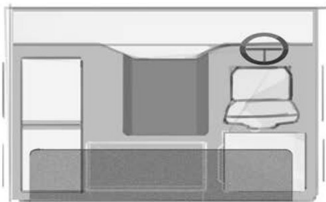
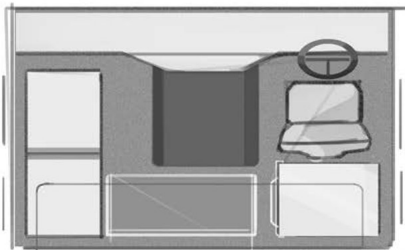


• hanging rack for clothes



CONCEPT 2

This idea is based on a new interior configuration. It solves the problem of storage, cooking and sleeping for two people but also the space is reconfigurable as per the driver's need.



CUPBOARD

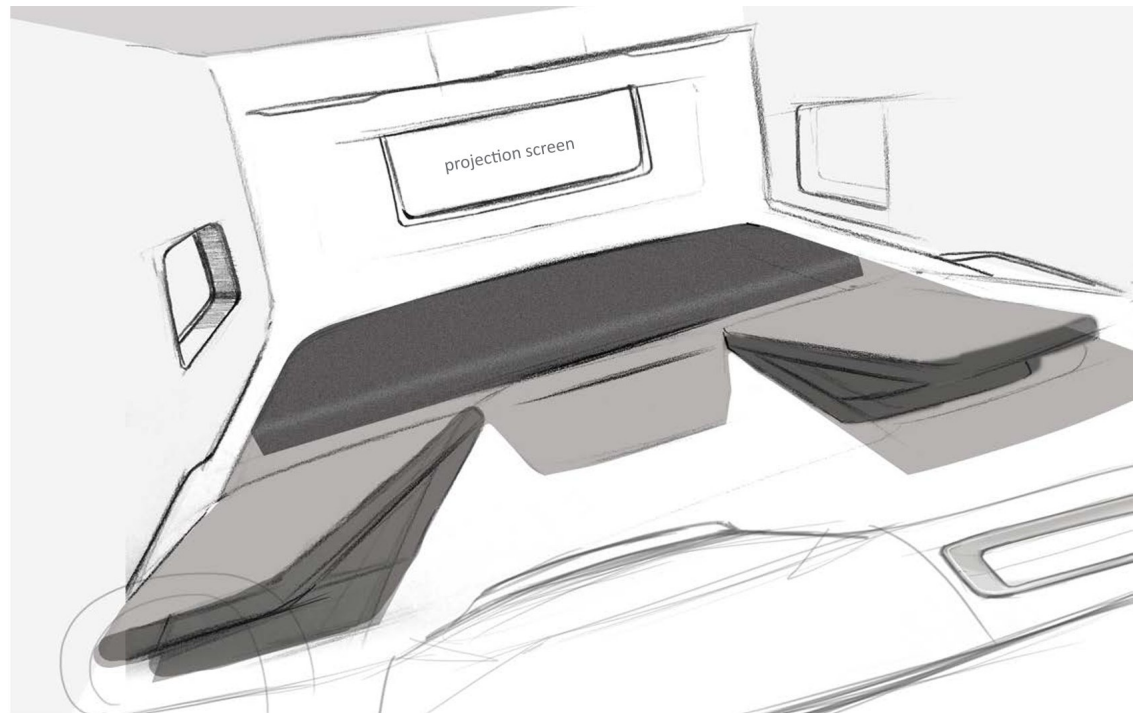
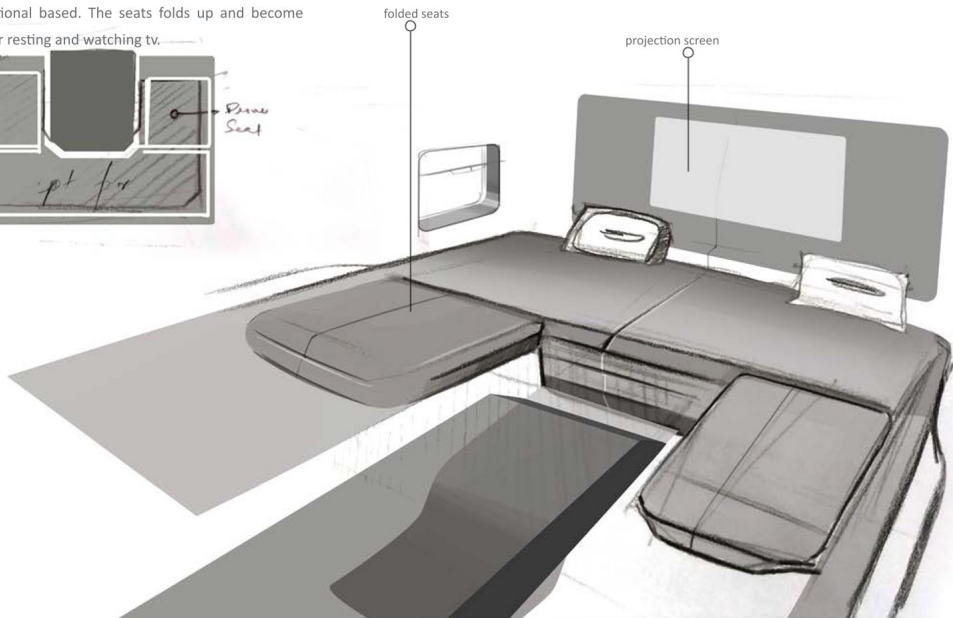
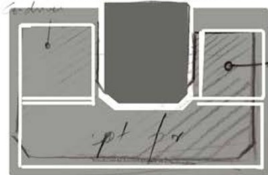
The concept is this that the co-driver seat is convertible and becomes a bed for sleeping. Also it has a further extension for expanding resting area.

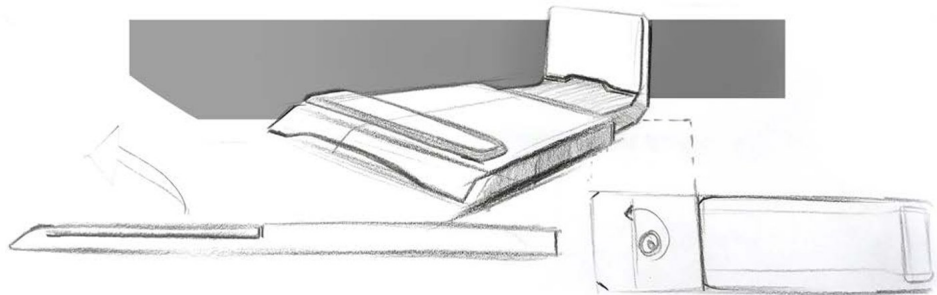
Under it is the storage space for clothes and other amenities.



CONCEPT 3

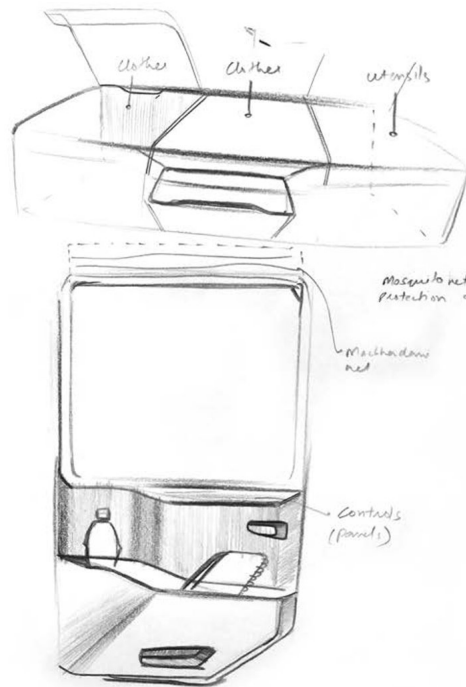
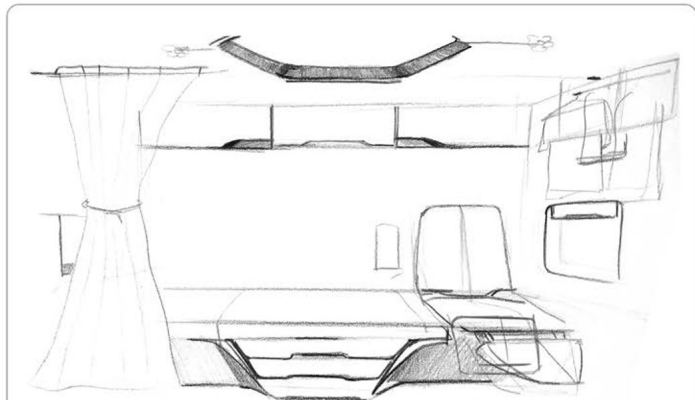
The idea behind the concept is to make the interior more social and spacious & more towards the driver's aspirational based. The seats folds up and become bed for resting and watching tv.





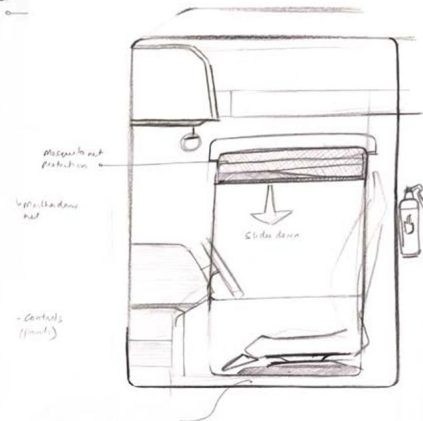
Sketch showing the folding of the seat and the sketch (i) shows the bed side view of the interior with the seat headed back and becomes the bed.

At the ceiling, there is decoration based on their culture and traditions. And a curtain with separate the spaces into two where the drivers can have their personal space.



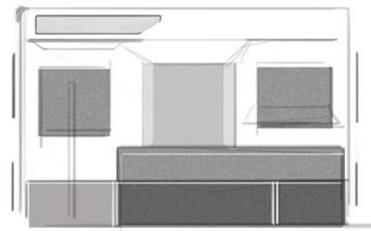
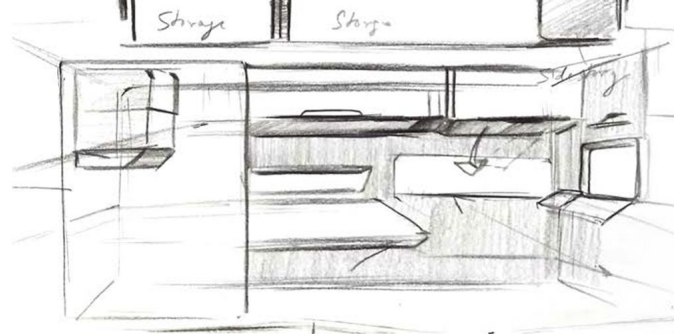
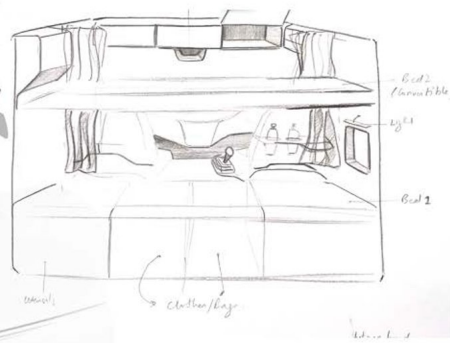
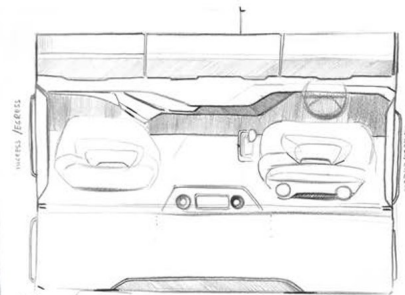
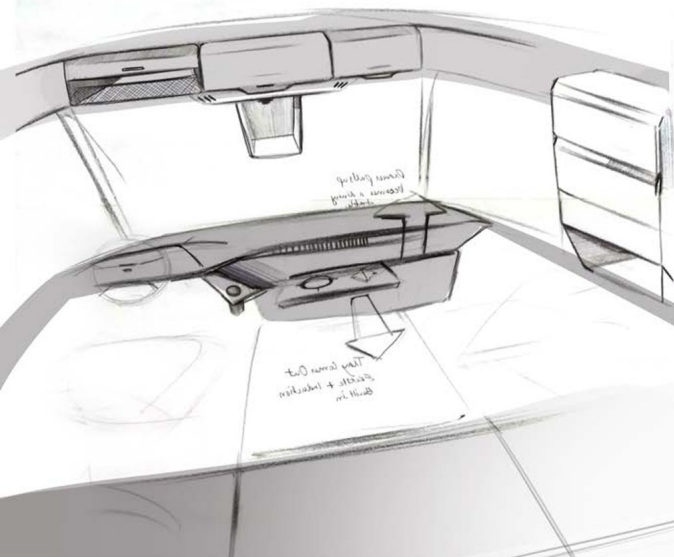
Sketch showing the under seat storage which has three partitions for clothes, refrigeration & utensils, stove respectively.

The need of mosquito net cannot be ignored. It can be pulled by drawing it from the window. The sketch below illustrates the idea.



CONCEPT 4

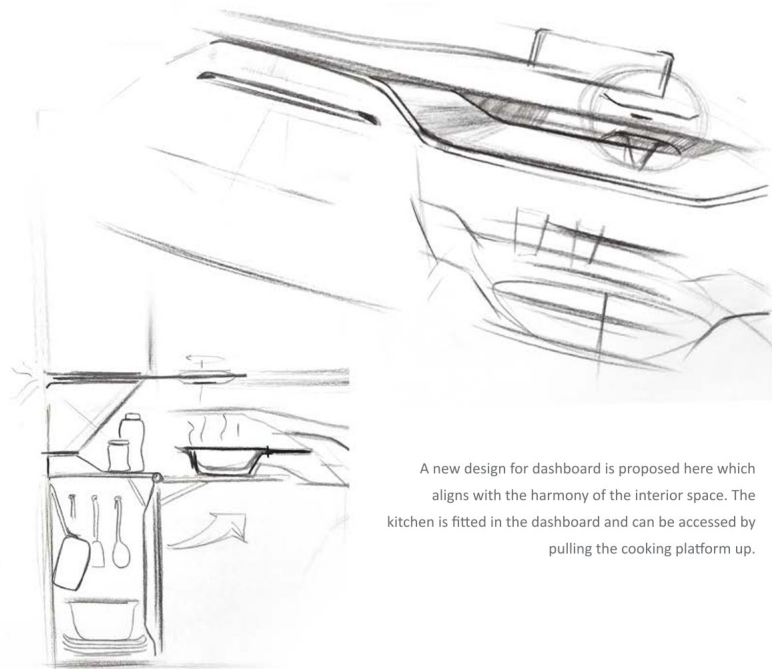
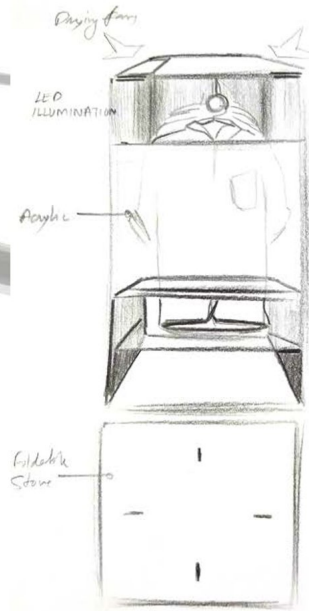
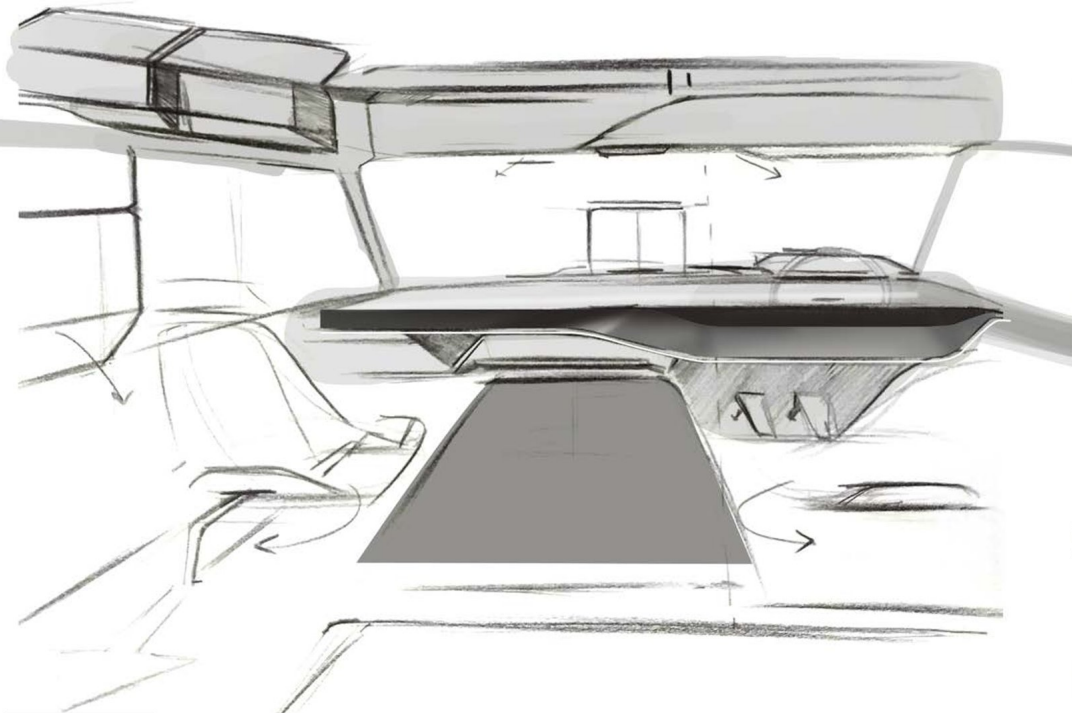
The idea behind this concept is to design space for cooking inside the truck and dedicated storage spaces for their essential products (both lockable and open).



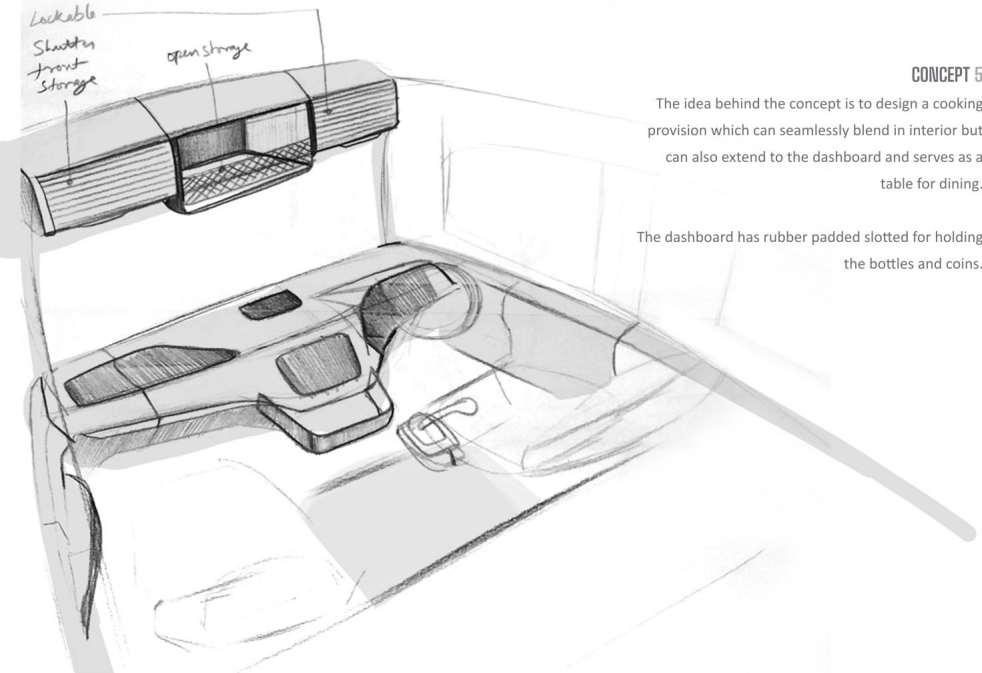
An electric induction is fitted in the dashboard and can be drawn out by sliding and the induction is placed over the engine cover.

The co-driver seat moves back and becomes a part of the bed. This provides more space in the front for the co-driver to relax and rest.





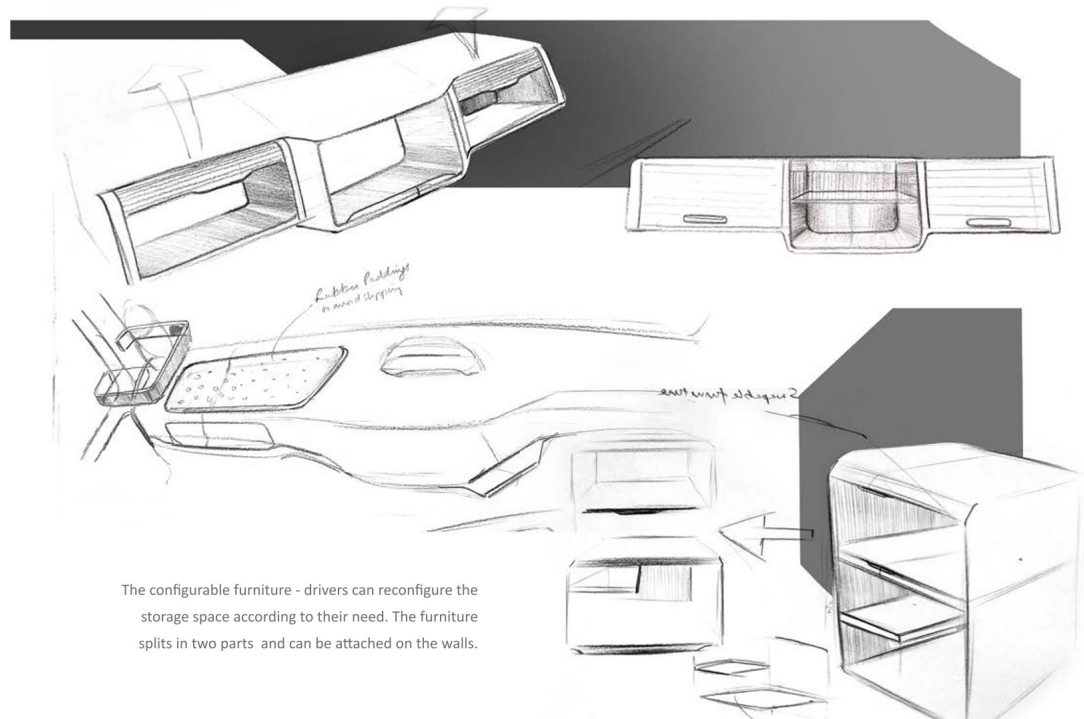
A new design for dashboard is proposed here which aligns with the harmony of the interior space. The kitchen is fitted in the dashboard and can be accessed by pulling the cooking platform up.



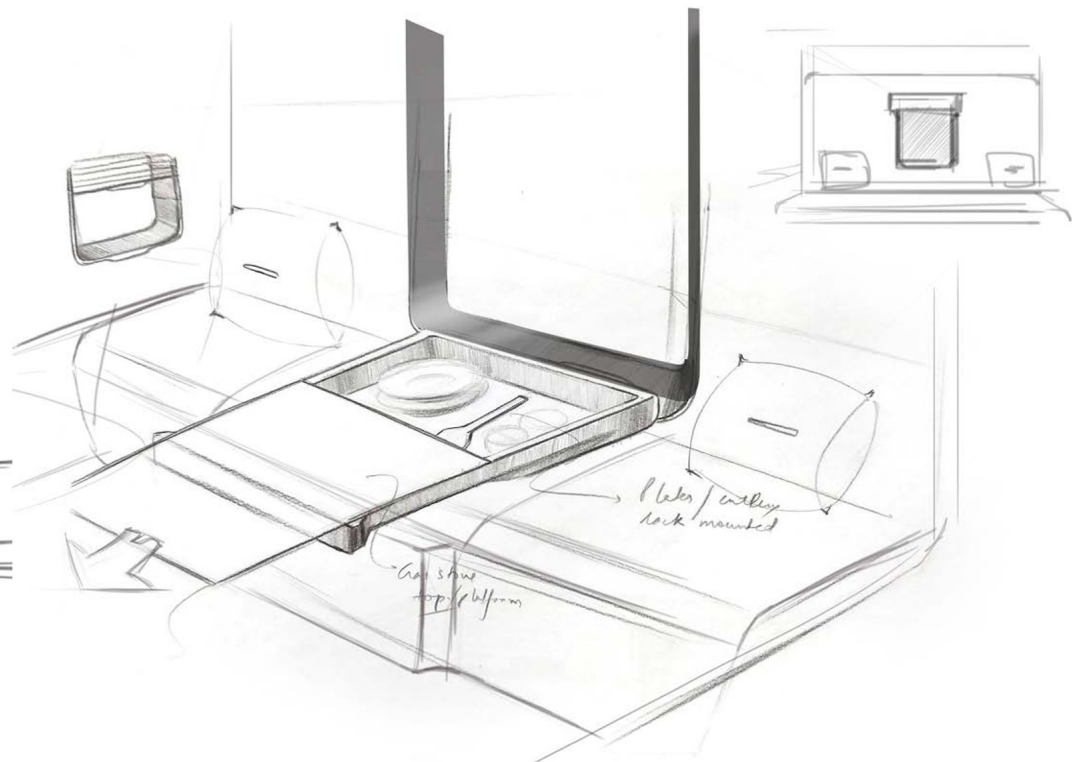
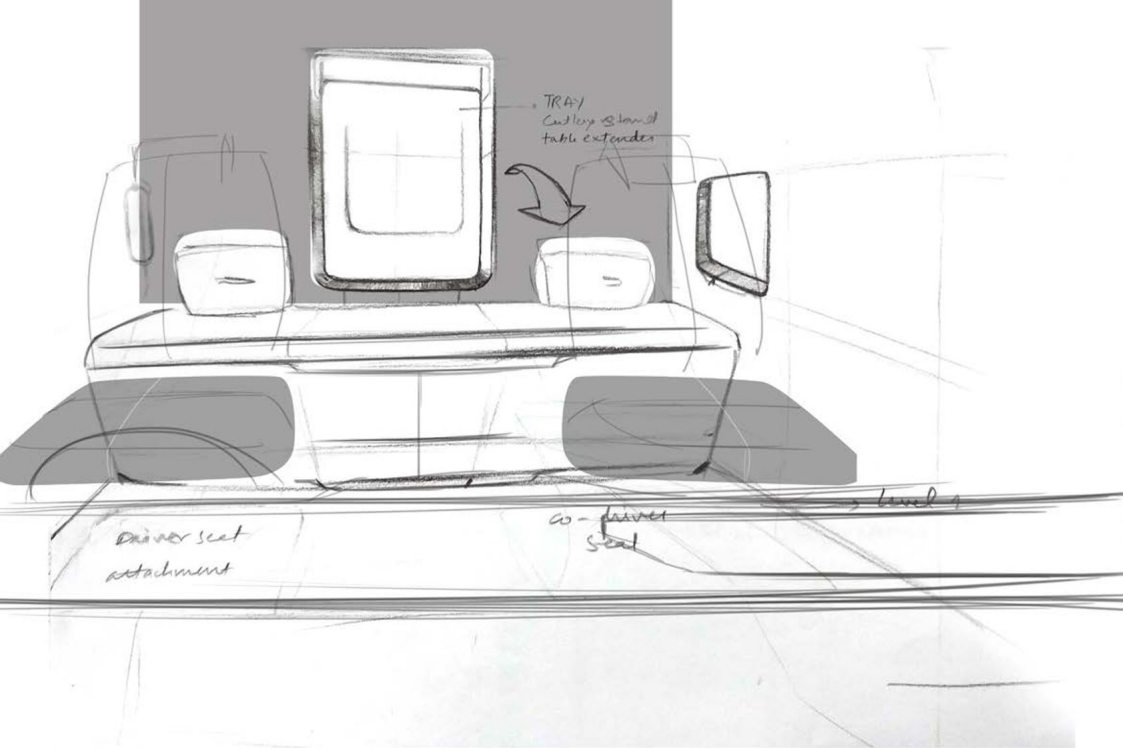
CONCEPT 5

The idea behind the concept is to design a cooking provision which can seamlessly blend in interior but can also extend to the dashboard and serves as a table for dining.

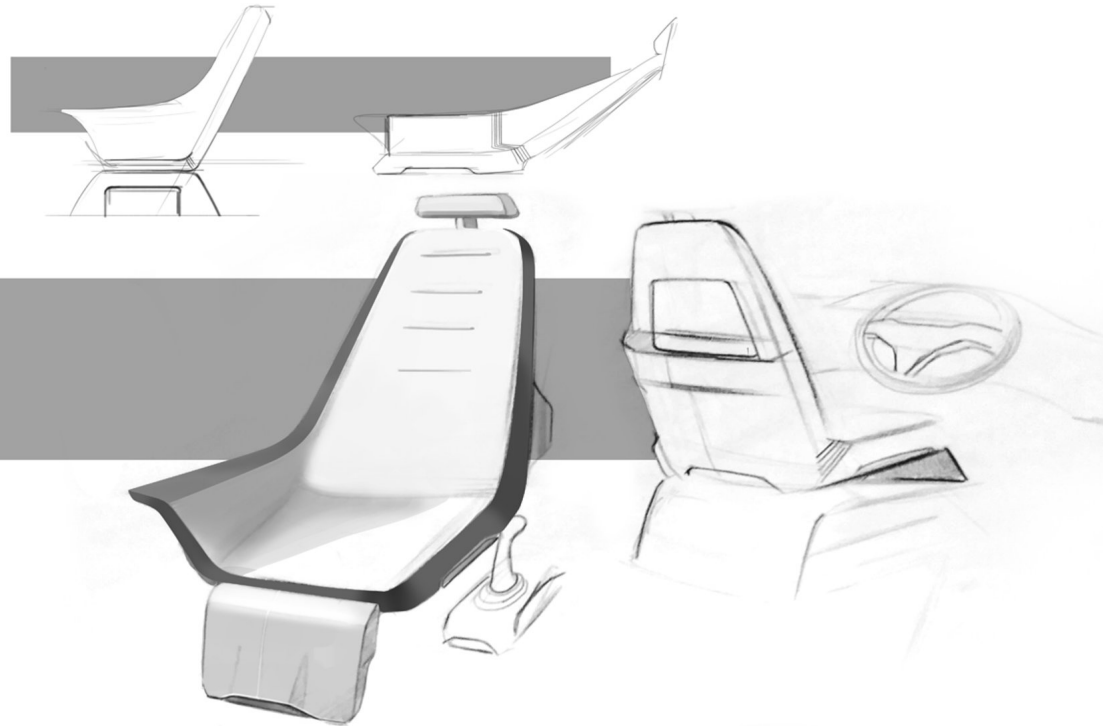
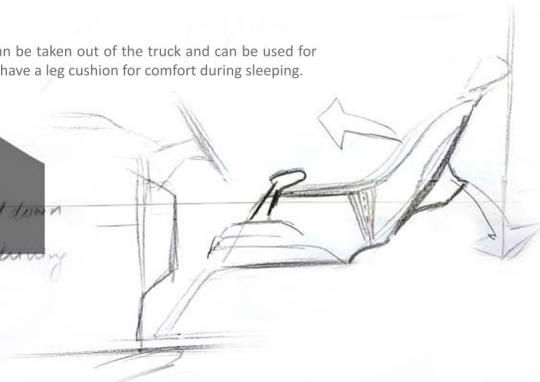
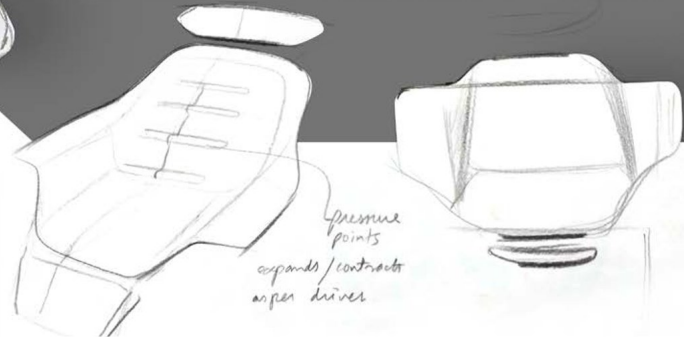
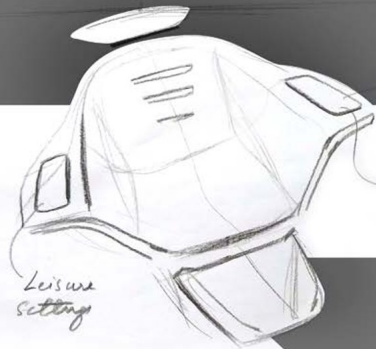
The dashboard has rubber padded slotted for holding the bottles and coins.



The configurable furniture - drivers can reconfigure the storage space according to their need. The furniture splits in two parts and can be attached on the walls.



CONCEPT 6 The idea behind this concept is to design a seat which can be taken out of the truck and can be used for seating as well. The seat can be tilted to 160 degrees and have a leg cushion for comfort during sleeping.



USER TESTING

After designing a layout and conceptualizing, a user testing was conducted to get the review of drivers and their opinion on the proposed concepts and layout. This was really crucial stage

as the drivers are the one who drives these trucks and to know whether my design is solving their needs and aspirations and whether it excites them. Below are the pictures showing my interaction

with drivers. I showed them all the three layouts to them and observed them discussing among themselves about it and then I explained them about the concepts.



<https://drive.google.com/open?id=1r1MLSxHh0yow2ds9NP-s-yfjbPTih5b>



https://drive.google.com/open?id=1Vio_QqViCsvUQgDchiimO7X337y3ol3W

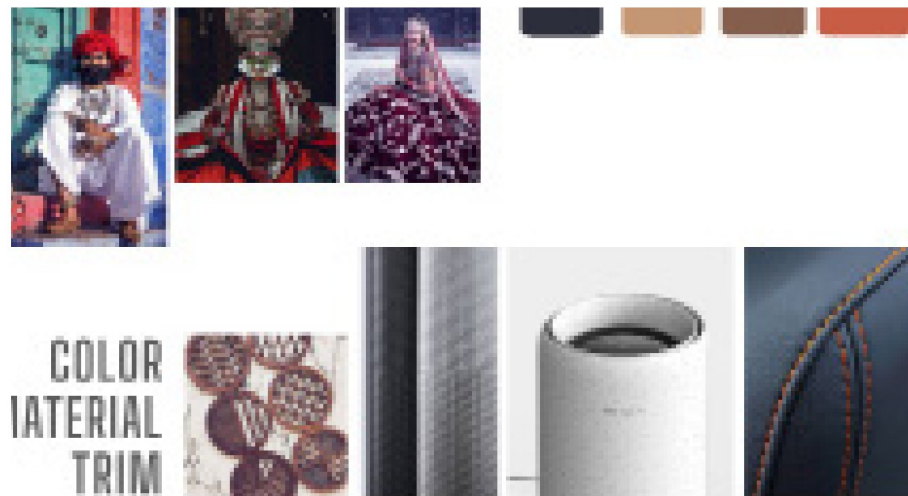
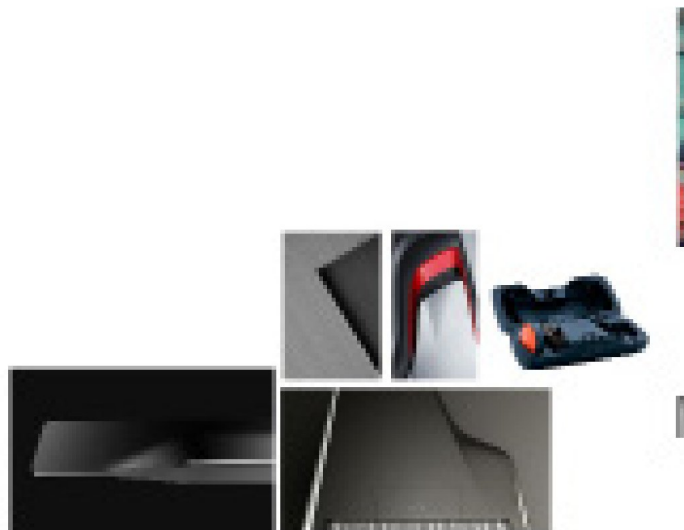


CONCEPT EVALUATION



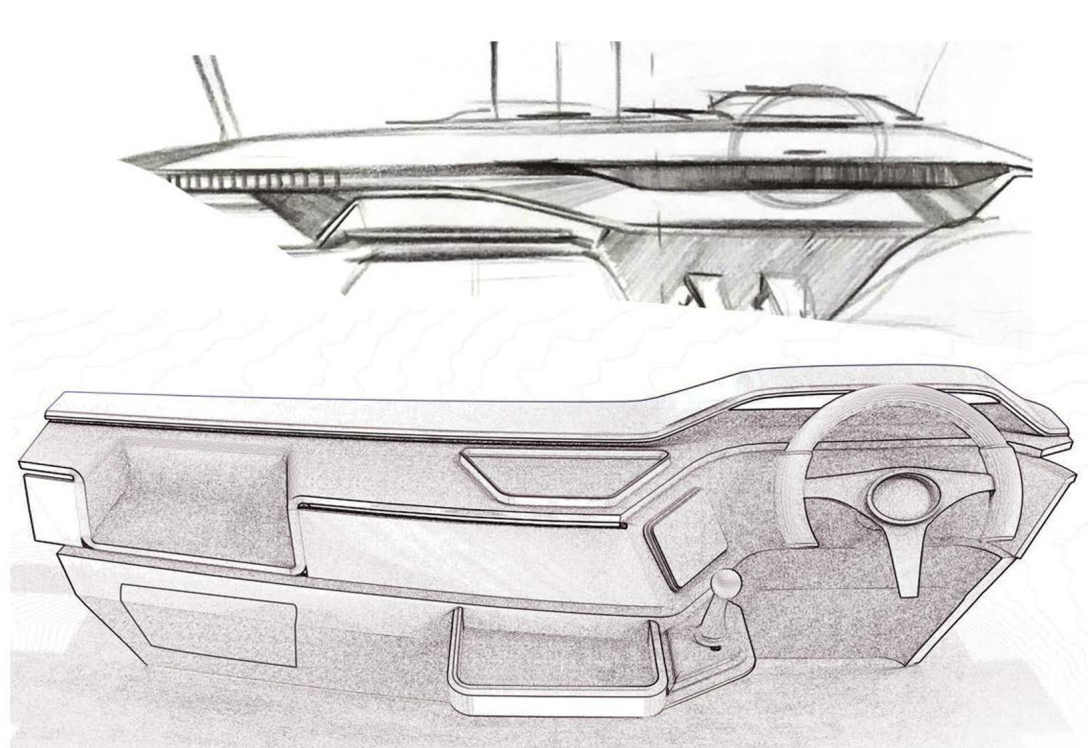
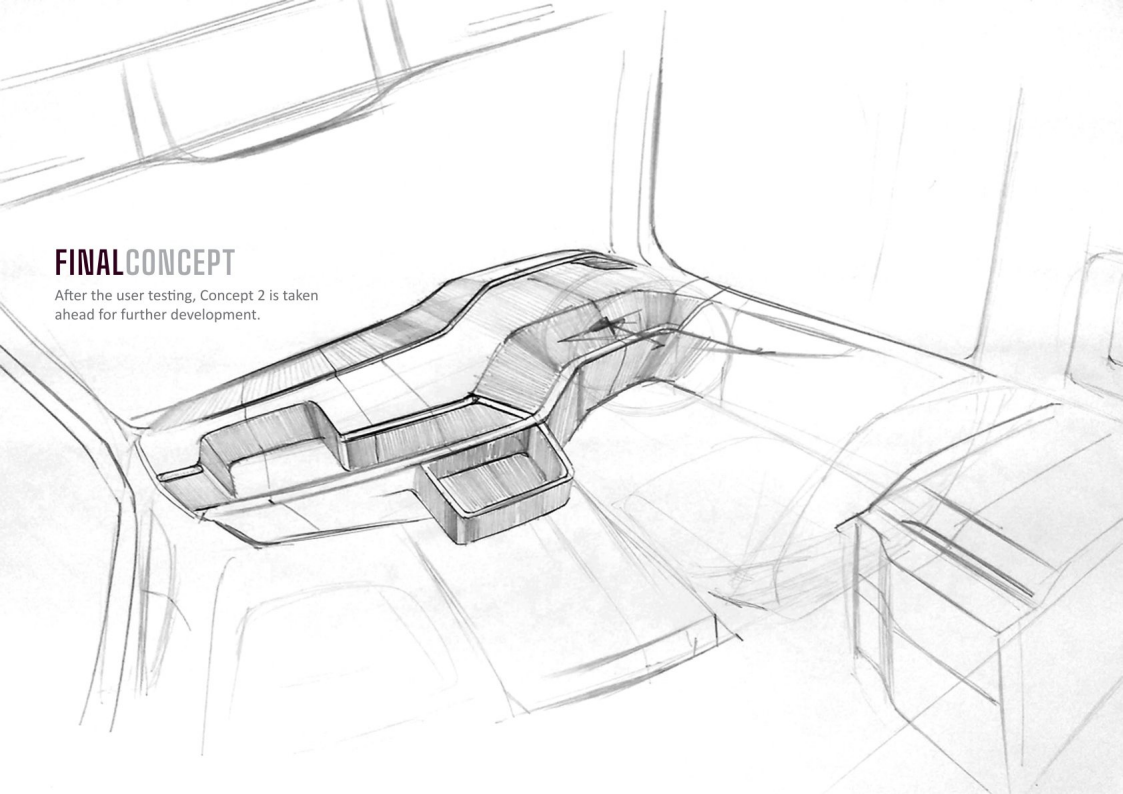
PARAMETERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5	CONCEPT 6
Configurability	storage and bed are reconfigurable. Based on existing dimensions.	Reconfigurable and different orientation can be made.	reconfigurable seat and bed	Reconfigurable and different orientation of seat.	Yes	Reconfigurable, seat can be taken out and can be used as a chair.
Space	optimum utilization of space. easy to clean	optimum + extra space. easy to clean, easily accessible.	optimum + extra space. easy to clean	optimum + extra space.	optimum	optimum easy to clean.
Cooking	Dedicated slidable platform for cooking, and dedicated space for vegetables & utensils.	special area for cooking + loaded with an integrated cupboard.	special sliding platform for cooking	cooking platform on engine cover and utensils kept under bed.	Cooking on a foldable platform	
Sleeping	bed for two. One foldable at top.	bed for two in L layout with one convertible bed.	extendable bed for 2.	bunk bed for 2	bed for two	bed for 1 and one sleep on tiltable seat.
Storage	storage for their every essentials they carry with both lockable & open slots.	Storage space organized such that it provides space inside cabin + optimum utilization of dashboard.	storage for their every essentials they carry with both lockable & open slots.	more utilization of dashboard + storage for everything	most of the products are kept under bed storage.	more utilization of dashboard + storage for everything
Entertainment	more than existing designs.	Very interactive space, good for 6+ people.	interactive space, good for 5 people, designed for extra fun inside.	limited not for more than 4 people.	limited not for more than 4 people.	more personalized
Features (same in all)	Ac at necessary points, Foldable seats, special vents for drying, mosquito net at window, digital screen, chotakul etc.	Ac at necessary points, Foldable seats, special vents for drying, mosquito net at window, digital screen, chotakool etc.	Ac at necessary points, Foldable seats, special vents for drying, mosquito net at window, digital screen, chotakul etc.	Ac at necessary points, Foldable seats, special vents for drying, mosquito net at window, digital screen, chotakul etc.	Ac at necessary points, Foldable seats, special vents for drying, mosquito net at window, digital screen, chotakul etc.	Ac at necessary points, Foldable seats, special vents for drying, mosquito net at window, digital screen, chotakul etc.
Aesthetics (same in all)	Premium	Premium	Premium	Premium	Premium	Premium
User testing	like the concept of cooking, storage, tilted beds, kitchen, dashboard and the privacy, more feel like home.	liked the entertainment concept + cooking cabinet + the idea of convertible seat into bed and utilization of bed.	loved the concept of convertible seat into bed and projector, and the idea of cooking and gathering.	liked the idea of seat and bed as one component but issue with seat height w.r.t. bed	liked the concept of foldable tray but issue with size and production cost.	not fully convinced with the concept but liked the idea of seat. maintenance cost will be high.

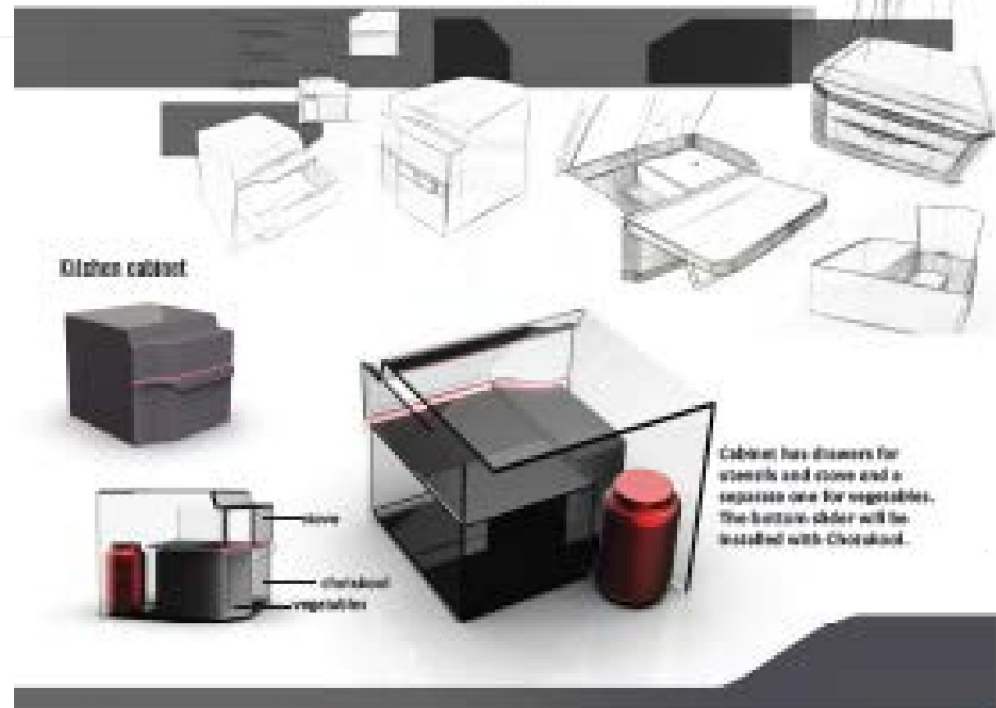
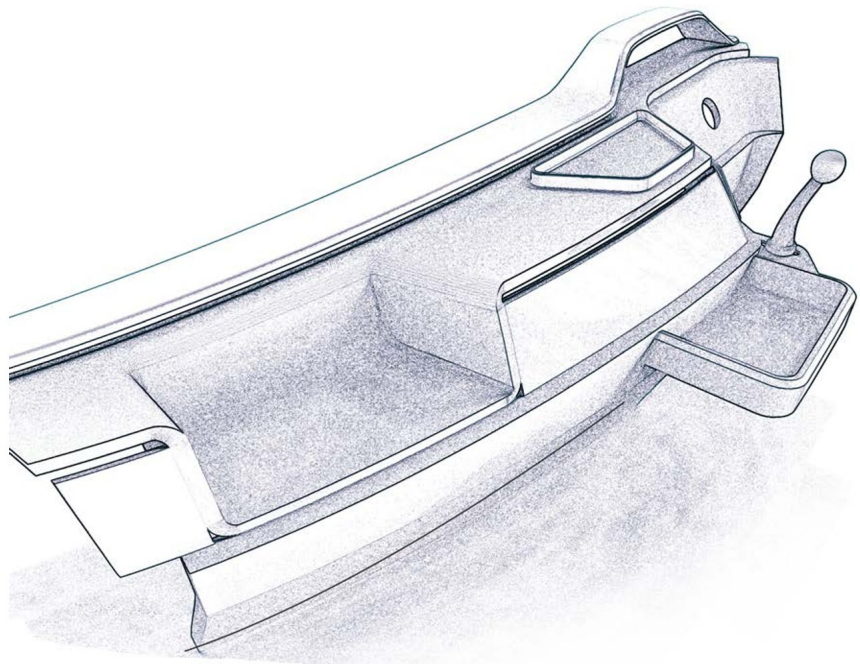
MOODBOARD

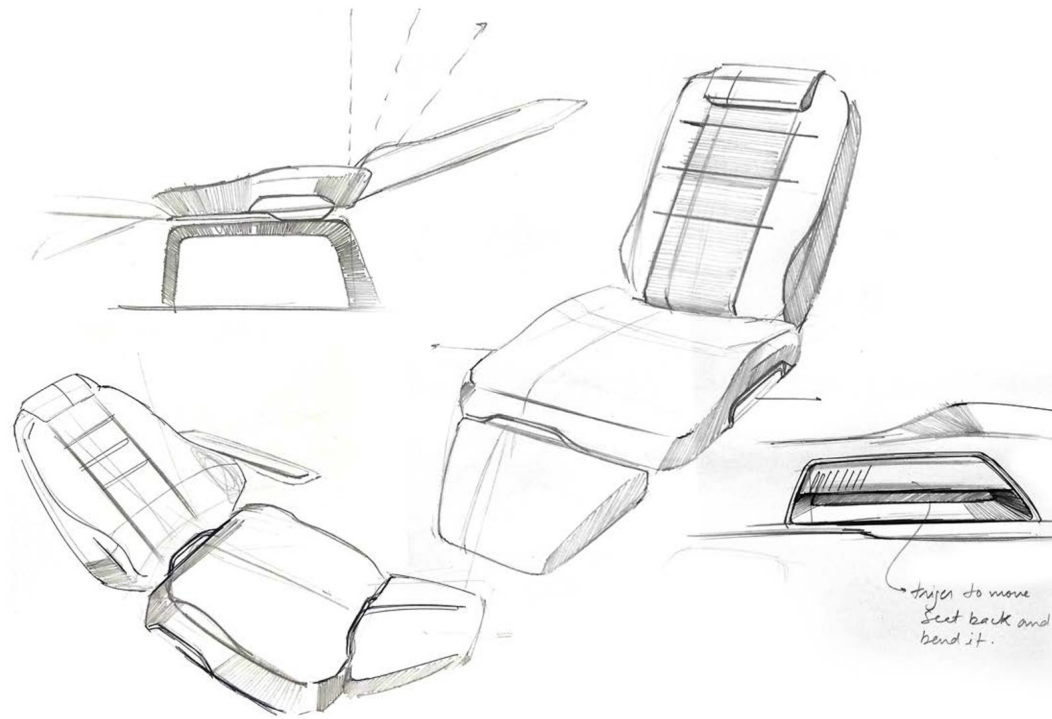
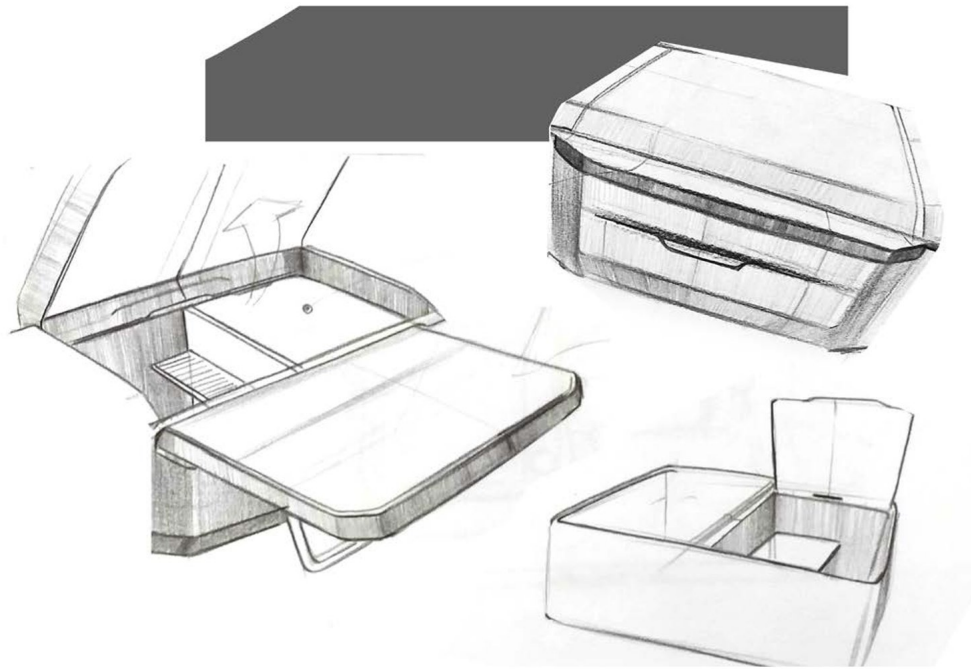


FINAL CONCEPT

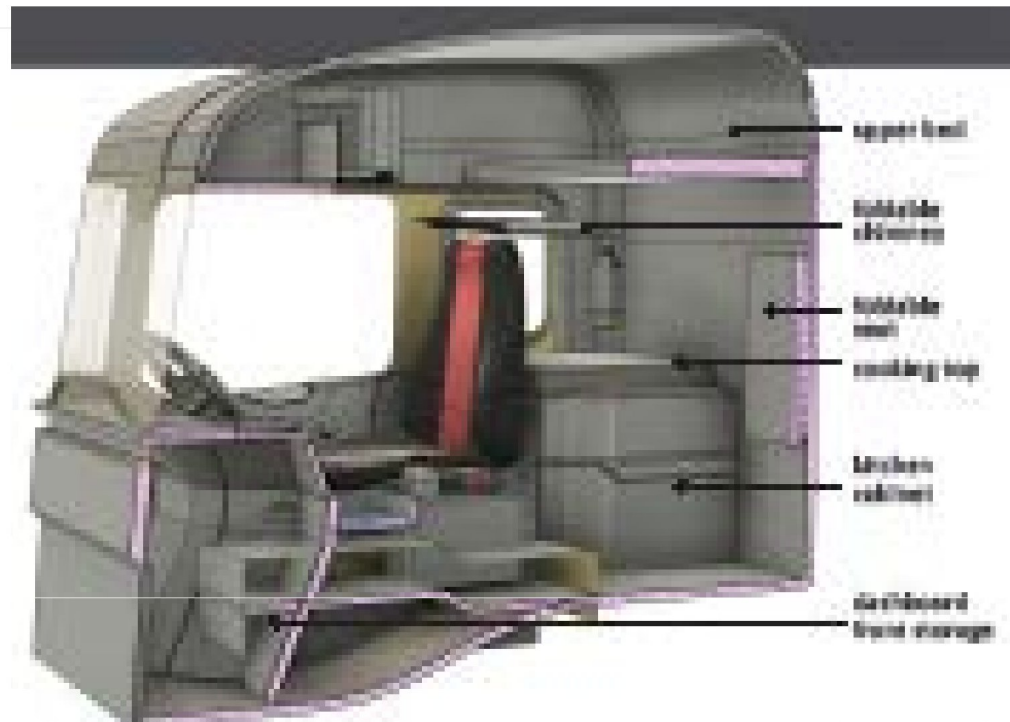
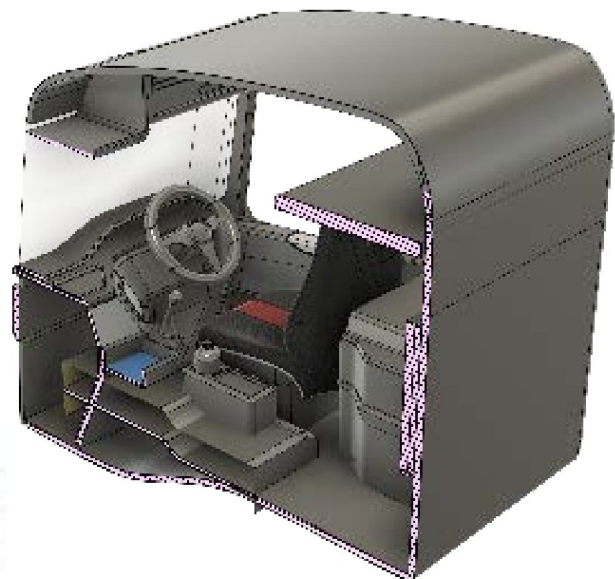
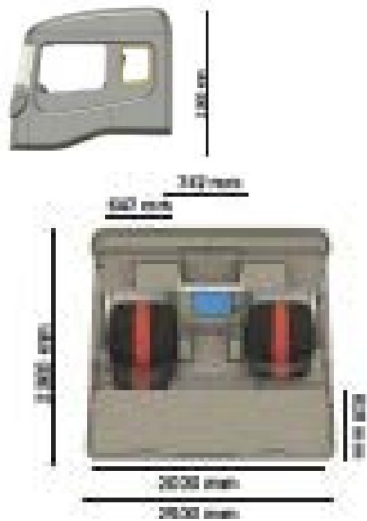
After the user testing, Concept 2 is taken ahead for further development.





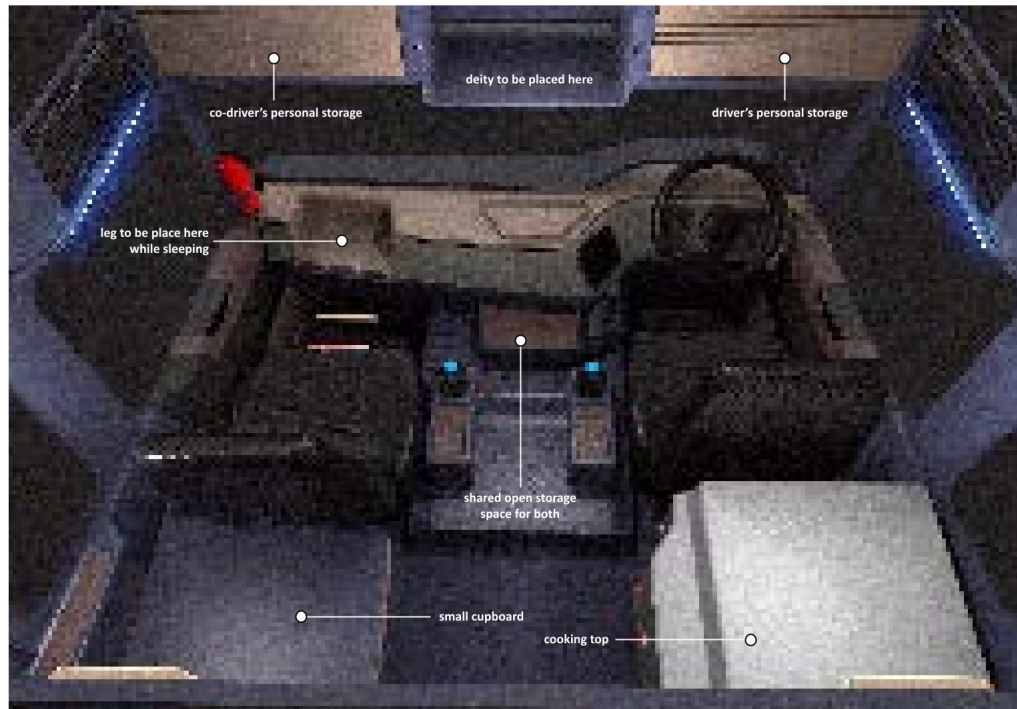


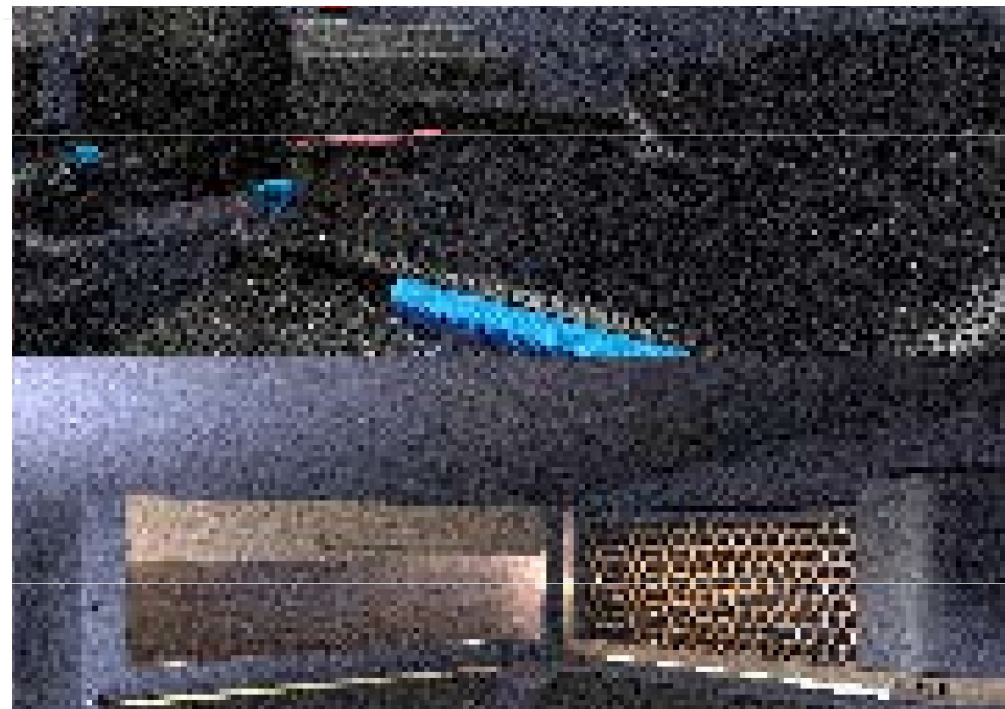
LAYOUT & DIMENSIONS



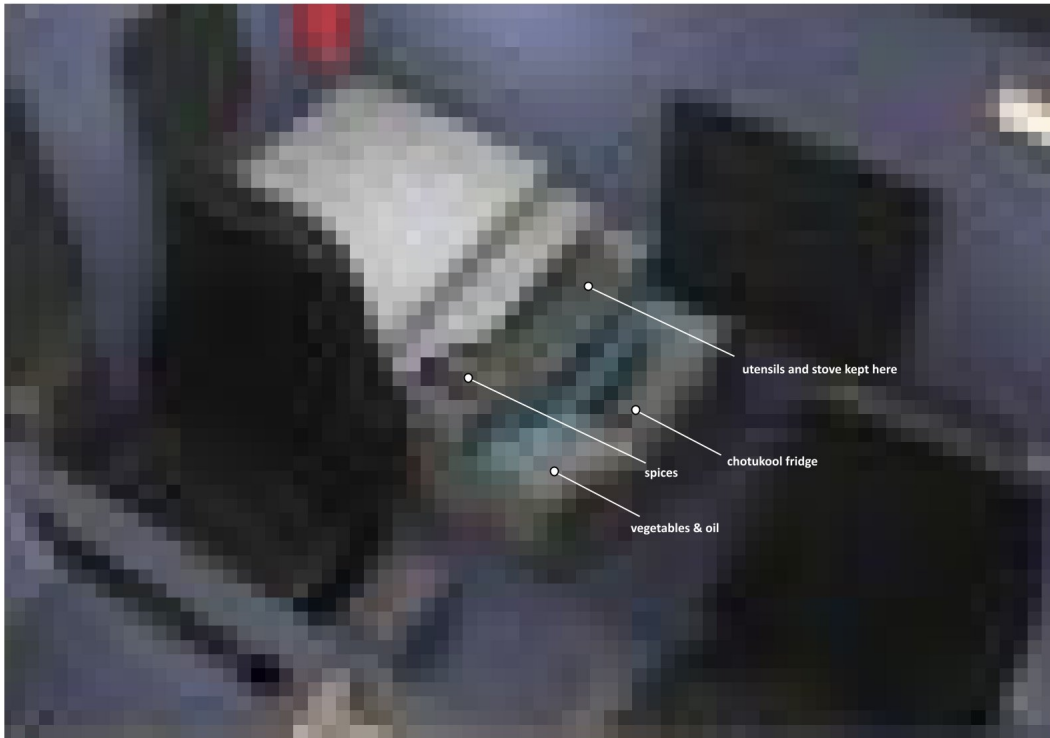


rear seat down, this new configuration will be good for dining and gossip









PROTOTYPING



APPENDIX

1. QUESTIONNAIRE

Questionnaire design: Truck drivers

Name _____; Age: _____

Income: _____ Experience: _____ yrs Truck type: _____

State: _____

Quantitative data:

1. How long do you drive in a single stretch? _____
2. How much distance you cover while driving? _____
3. After how many days you pay a visit to your home? _____
4. How long do you stay in home? _____
5. Where do you sleep in your working day? _____
6. How long do you sleep? _____
7. Where do you eat and what all do you eat?

8. How many halts do you take while driving? _____
9. What essentials do you carry on the go?

10. Do you cook in the truck? _____
11. What are the dishes do you cook? _____
12. What are your driving hours-
 - a. In city
 - b. On highways
13. How much are you paid on completion of one delivery? _____
14. What are the kind of activities you do for your entertainment?

15. Do you own any bike? If yes then which bike? _____
16. What problems do you face in the interior of the truck?

17. If you are ask to change few things in the interior what will you change?

OBSERVATIONAL:

- Observe the ingress & egress.
- Observing and understanding their small mobile home
- Their lifestyle – clothing, essentials they carry with them, tools, position of the objects kept, Position of the deity, ease in accessing the dashboard from driver's seat, what he keeps close to him, where he keep clean clothes and wet or dirty clothes, what all he carries to eat, where he keeps the stove and vegetables, cooking oil etc., hygiene, air and light, fans, sleeping area, bed size, jugads, social status.
- What all things they keep on dashboard, where do they keep utensils, stove, toothbrush, oil, trimmer, toolbox, drinking water, medipack, toll invoice, what constitutes an Indian truck interior.
- Activities they carry during in their halt hours, entertainment, safety and security, double door ,

Which one of the following interior you prefer the most?



What you like about them ?

Which one of the following seat you prefer the most?



Which one of the following truck you prefer the most?



What you like about them ?

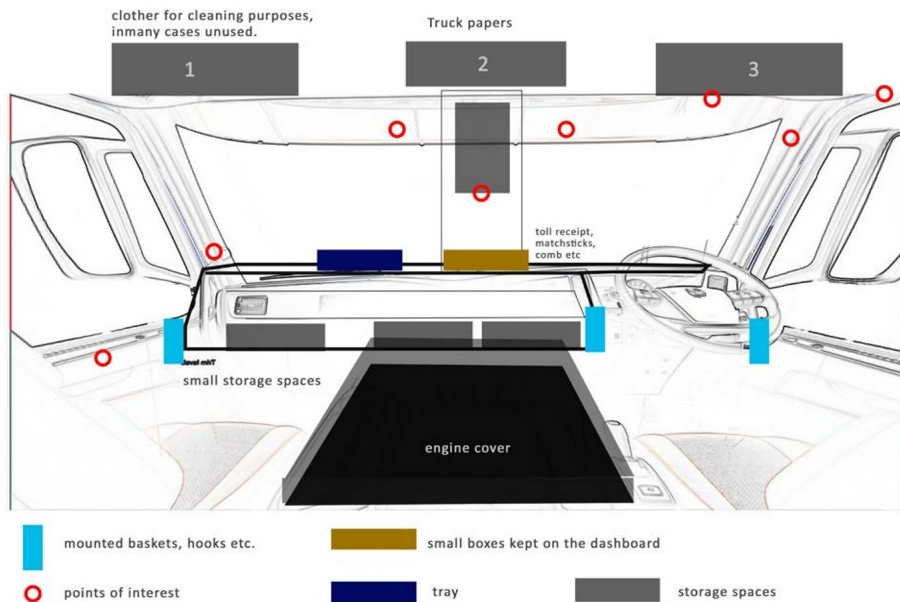
Which one of the following you prefer to have tea served in?



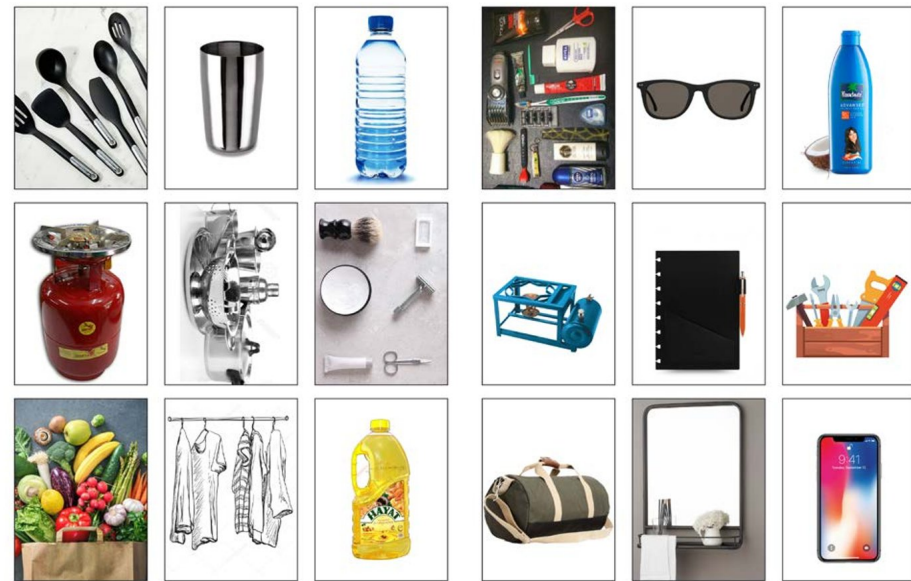
Would you prefer exercise inside the truck?

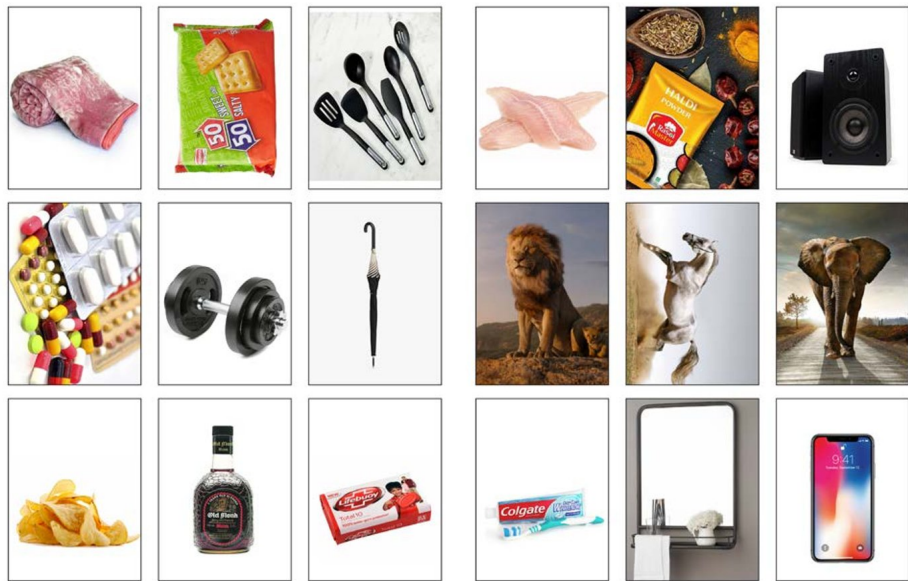


2. BOARDGAME



3. CARDS





4. Vehicle type and load capacity & size ^[14]

Vehicle Type	Capacity	Vehicle Size
Tata 407	Capacity 2.5 MT	Size 10X5X5
Canter	Capacity 3.5 MT	Size 14X6X6
LPT 709	Capacity 4.5 MT	Size 16X6X6
Full Truck Load	Capacity 9 MT	Size 18X7X7
LPT		Size 19X7X7
Taurus	Capacity 15 MT	Size 20X7X7
Open Truck	Capacity 9 MT	Size 20X8X8
JCB		Size 28X8X8
Trailer Double Axle	Capacity 20 MT	Size 40X8X8
Trailer Triple Axle	Capacity 28 MT	Size 40X8X8
Trailer Triple Axle	Capacity 28 MT	Size 50X8X8
Trailer Triple Axle	Capacity 28 MT	Size 60X8X8
Low Bed Trailer for ODC sizes & Various Capacities.		
Hippo/ Beaver	Capacity 40 MT	
Volvo	Capacity 50 MT	
with Hydraulic Axles to Increase the Capacities.		

4. REFERENCES

1. https://www.google.com/search?q=volvo+fm+460+dimensions&sxsrf=ACYBGNTJxVe_VQpLHmUCF-wINlcOhjrm9vQ:1573414906101&source=lnms&tbm=isch&sa=X&ved=0ahUKEwikyr-ks-DIAhV-ILcAH-aNkBeAQ_AUIEigB&biw=1536&bih=754#imgrc=_
2. <https://www.ashokleyland.com/en/trucks1>
3. <https://www.volvotrucks.in/en-in/trucks/volvo-fm.html>
4. <https://tatatrucks.tatamotors.com/tata-trucks/tractors/heavy-medium-commercial-tractors.aspx>
5. <https://edition.cnn.com/travel/article/india-truck-art-travel-design/index.html>
6. https://www.bafnamotors.in/upload/product_catalogs/prima-cargo-brochure1.pdf
7. <https://www.projecthornplease.com/portfolio-post/horn-please-documentary/>
8. <https://www.thebetterindia.com/44371/truck-art-india/>
9. <https://www.team-bhp.com/forum/vintage-cars-classics-india/31848-classic-commercial-vehicles-bus-trucks-etc-thread-60.html>
10. <https://web.iima.ac.in/assets/snippets/workingpaperpdf/12319057932015-12-02.pdf>
11. <http://www.yourarticlelibrary.com/transport/transport-system-in-india-meaning-advantages-and-types/65100>
12. <http://www.motorindiaonline.in/commercial-vehicles/commercial-trucking-in-india-ready-for-a-revolution/>
13. <https://economictimes.indiatimes.com/news/economy/policy/government-raises-load-capacity-for-heavy-vehicles-by-20-25/articleshow/65017330.cms?from=mdr>

14. <https://www.atol.co.in/vehicle.html>

15. https://en.wikipedia.org/wiki/Truck_classification

16. <https://www.oemoffhighway.com/trends/equipment-launches/on-highway/press-release/21036853/renault-trucks-renault-trucks-launching-2019-t-and-t-high-models-with-3-reduction-in-fuel-savings>

17. <https://www.scania.com/nl/nl/home/experience-scania/news-and-events/News/archive/2016/08/een-mooie-combinatie-van-ergonomisch-design-en-comfort.html>

Materials

18. <https://www.piedmontplastics.com/applications/cluster-panels-dashboards>

19. <https://www.motoquipe.com.au/buying/seat-cover-material-comparison-guide/16716>

20. <https://www.piedmontplastics.com/products/polyester-film>

Youtube links :

<https://www.youtube.com/watch?v=iZLSby0efio> - INDIAN TRUCKS PMP DVD 1587 FILMED 2007

<https://www.youtube.com/watch?v=ZBOiXtnLORQ> - Why Indian Truck Drivers Get Their Trucks Painted

<https://www.youtube.com/watch?v=RZDZgNy2LSM> - Top Best 3 Trucks Working in India

<https://www.youtube.com/watch?v=IXTsXVTUkeE> - Volvo FH 460 LNG Tractor Truck (2019) Exterior and Interior

<https://youtu.be/6R4sZLGyvBk> - Renault Trucks T High 520 Maxispace Tractor Truck (2019) Exterior and Interior

<https://youtu.be/lpvkzhsTYs> - All You Want to Know About this Fabulous PRIMA TRUCK