RESTYLING OF TATA SE TRUCK CAB (EXTERIOR)

MOBILITY & VEHICLE DESIGN PROJECT III

MVD II-29

BY

ARJUN BAVALIA

146390006

GUIDE

PROF. NISHANT SHARMA

INDUSTRIAL DESIGN CENTRE

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Approval Sheet

The project titled "Restyling of TATA SE truck cab (Exterior)

By Arjun Bavalia is approved for the partial fulfillment of the requirement of degree of Master in Design in Mobility & vehicle design.

Guide 

Chairperson 

Internal Examiner 

External Examiner 

Date 08/01/2016

Declaration

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

Arjun Bavalia

146390006

2014-2016 Batch

2nd year M.Des, Mobility & vehicle design

IDC, IIT Bombay

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I would like to thank my guide Prof. Nishant Sharma for his support and valuable inputs that he has provided during the course of this project. I also thank Prof. Ramachandran for his inputs on the project. I would also like to thank the various truck drivers, fleet owners and dealers who cooperated with the user interview for this project.

Last but not least, I would like to thank my family and all my friends at IDC and outside, for being constant source of support and inspiration throughout the project.

Abstract

Commercial vehicle is the lifeline of Indian economy. About two-third of goods transportation is handled by commercial vehicle with in the country and across the neighboring country. Commercial vehicle has remarkable contribution in the GDP of country. Commercial vehicle is classified into three major class i.e. light commercial vehicle, medium commercial vehicle and heavy commercial vehicle. Due to reforms by Government, Infrastructure development, mining sector, improvement in roads, hub& spoke model due to urbanization, and golden quadrilateral are main driving factor booming commercial vehicle in India. Especially M& HCV is the most important segment in the range (16 to 25ton) in Indian market.

India has become a good market for commercial vehicles among emerging markets (BRIC) compared to triad markets. Most of the company has entered into the Indian market and competing with domestic leading manufacturer. Due to new entrants leading manufacturer’ s like TATA, Ashok Leyland market share are decreasing. In Indian most of the domestic manufacturers have continued to sell their trucks in the cowl with chassis only. They have not given importance to the full body importance, aesthetic, essential features, safety, and ergonomics. And now the domestic players are also have started to enter into the international market either by adopting new technology, adding new features, or making JV with foreign players.

This project is hypothetical which deals with the restyling of TATA SE truck. The product is chosen for restyling because the product has much potential in the market. The TATA SE is most popular truck still now in every sector like cargo, tipper, defense vehicle, rescue vehicle etc. compared to other models by different manufacturers. But still it requires some change by addition of new essential features, technology, and aesthetic. Which do not only make it sustainable for Indian market but also can increase it demand at International level. This project deals with creating new design language in truck segment for TATA which is exclusively based on styling of exterior cab.

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1. Introduction

1.1 Overview of Indian Automotive Industries

Indian automobile industry is one of the largest automotive industry in the world. In FY 2014-15 it has shown an annual production of 23.37 million vehicle with positive growth of 8.68 %. Indian automotive industry account for 7.1 % of GDP of the country. Indian auto industry includes Passenger vehicle, Commercial vehicle, three wheeler, two wheeler. The overall CV has shown positive growth rate of 8.02 % in current FY 2014-15 as compared to previous year. M& HCV has shown Strong positive growth by 32.3 % compared to LCV which is reduced by 5.24 % during April-October 2015 year on year.

1.2 Overview of Commercial vehicle

India is 7th largest country in the area wise ranking. India has road network of around 4,689,842 kilometers spreading from north to south and west to east across the country. About two third of daily goods transportation is done by commercial vehicle in India. Commercial vehicle plays a major role in Indian economy. Commercial vehicle contributes around 12-14% in GDP of India.

A commercial vehicle is a vehicle is used for transportation of either goods or passenger. The commercial vehicle plays an important role in remote areas, inaccessible area where rail transportation is not possible. The commercial are generally classified as light commercial vehicle, medium and heavy commercial vehicle (M&HCV). For short distance, small good which is not and for quick and easy mode of transportation commercial vehicle are used. In India commercial vehicle M&HCV segment, the 16-25 ton capacity is most important segment.

1.3 Classification of Commercial vehicle

Commercial vehicles are classified into eight class from 1 to 8 on the basis of Gross vehicle weight rating (GVWR). Although in more generic term it is classified as Light duty commercial vehicle, Medium duty commercial vehicle, and Heavy duty commercial vehicle.

GVWR

GVWR is Gross Vehicle Weight Rating of the vehicle is the maximum weight a vehicle is designed to carry the net weight of the vehicle, fuel, accessories, plus passengers, or cargo. GVWR is a safety standard is used in Central vehicle regulation act generally to prevent overloading of the vehicle.

The vehicle manufacturers determines the maximum weight capacity of the vehicle by considering the combined weight of the strongest component like axle and weaker component like tires.

Light duty commercial vehicle- The light commercial vehicle (LCV) as those vehicle having GVWR up to 7.5 metric tonnes.

Medium duty commercial vehicle- The medium duty commercial vehicle (MCV) classified as those vehicle whose GVWR comes under between 7.5 -16.2 metric tonnes.

Heavy duty commercial vehicle- The vehicle whose GVWR is equal to 16.2 metric tonnes and above.

IR-01, 02, 03

1.4 Truck scenario In India

Trucks plays vital role in the easier, faster, and smooth movement of freight across the country. In India trucks are owned by fleet owners and driver are employed for its handling. The driver generally drive at an average of 12 hours to a month also. The trucks are the second home of driver. But the truck in India is not much evolved like triad (Western Europe, Japan, US) countries. Generally the domestic manufacturers like TATA, Ashok Leyland have continued selling the trucks in the form of cowl with chassis. The truck cab and load bed are constructed at local body building workshop without following any standard norms. And as the India is very diverse country in terms of tradition and culture, languages, religion, caste which has much influence on the truck. The fleet owner always give importance to the commercial aspects only like capital cost of truck, running cost includes it fuel, maintenance, neglecting the needs of driver.

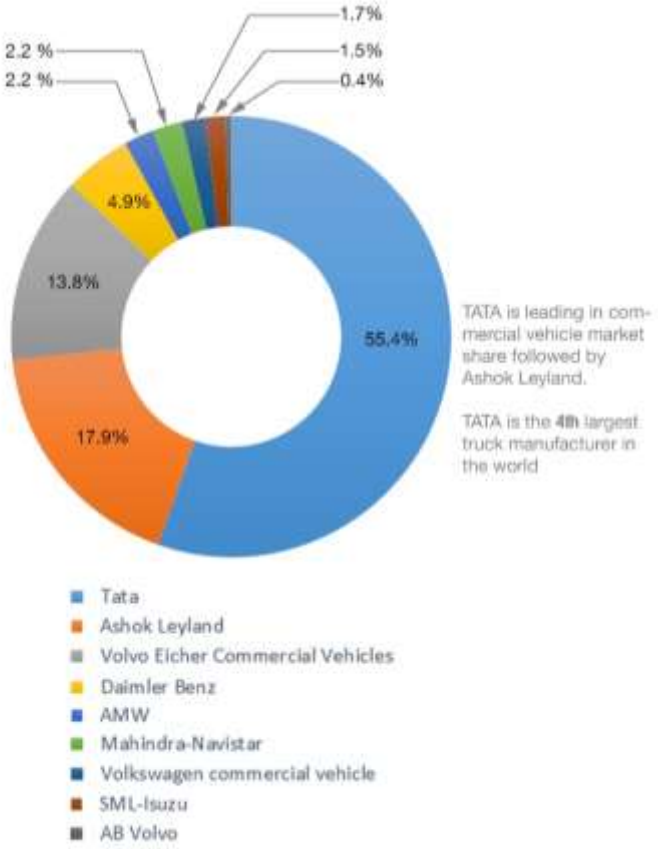
The truck industry in India is much lagging behind the triad countries industries. In the triad countries rising fuel prices, stricter environmental regulation and saturated market forced these manufacturers into the emerging market of BRIC (Brazil, Russia, India, and China). India has become the most attractive market for triad countries manufacturer. In India due to new entrants in the market, it has become essential for the domestic players to enter in the competition to sustain. Domestic company has started to adopt technology by establishing JV with various new foreign players, started new segment, moving from cowl to full body cabin, incorporating aesthetic into design. Truck industries in India are more turned towards globalization.

But as the scenario is changing, most fleet owners are giving importance to performance, total cost of ownership, advance trucking platform, and needs of drivers. They do not want only a simple truck but a truck with solution, an ecofriendly truck.

The driving factors behind the rising demand for fleet owners are firm freight rates, replacement of ageing fleets due to government environmental norms, fuel price declination, firm freight rate, road infrastructure development, mining sector, urbanization and hub & spoke model.

1.5 Montage of Indian Trucks

India is the country of diversity in terms of religion, caste, color and creed. We can observe from the above collages that, every trucks are decorated with motifs and graphics with different colors. Each trucks shows the significance of the region from where it belongs. Generally when the cowl with chassis are taken to the local body building workshop where the more focus is given on the decoration part where owner tries to show the identity through the decoration. The decoration is given more importance rather than safety part.



1.6 Major players in Truck industry in India

India is 6th largest commercial vehicle manufacturers country in the world. Leading commercial vehicle manufacturers in India are:

TATA
Ashok Leyland
Volvo Eicher commercial Vehicle (Joint venture between Volvo and Eicher group)
Daimler Benz
Asia Motor Works
Mahindra-Navistar (Joint venture between Mahindra & Navistar)
Volkswagen commercial vehicle
SML-Isuzu (Joint venture between Swaraj Motors Ltd. & Isuzu)
AB Volvo

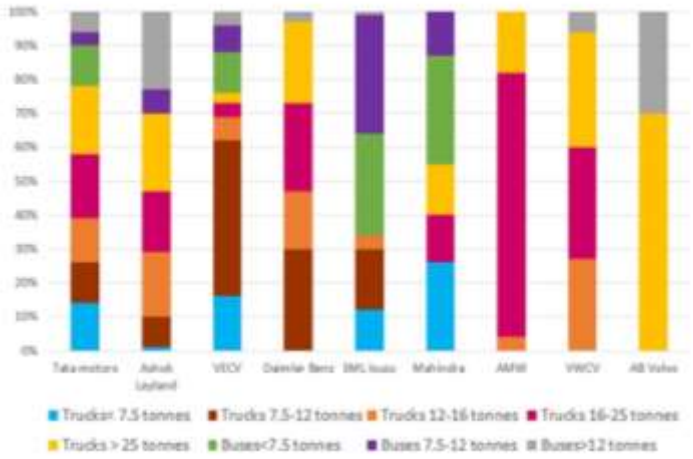
Among the above manufacturer TATA motors and Ashok Leyland are the major domestic player in the market. Ashok Leyland is having one third share of TATA in the market. Ashok Leyland controls one fifth of the market.

After 2005 due to the new players and new JV in the market the TATA motors has faced 4.5 % declination.

TATA is the 4th largest commercial vehicle manufacturer in the world.

After 2000 many new players like AMW, Volkswagen commercial vehicle, AB Volvo has entered in the market. And some domestic player like Mahindra has entered into partnership by making JV with Navistar, Eicher group has started JV with Volvo group, SML has started with Isuzu.

Daimler has started Joint venture with Hero MotoCorp but Hero MotoCorp has withdrawn later and nevertheless Daimler Benz decided to move ahead.

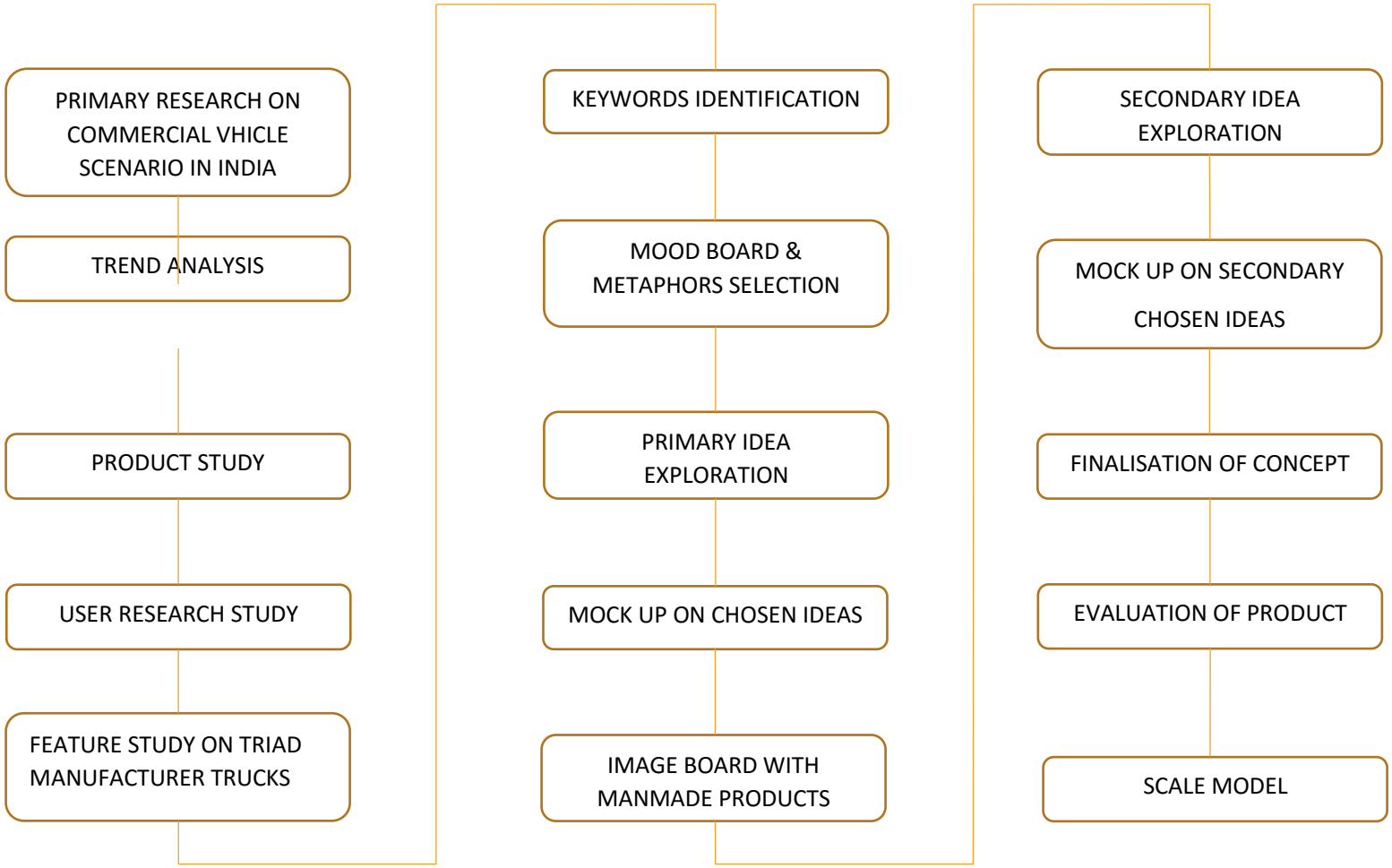


IR-05

1.7 Manufacturer breakdown of Sales by segment and GVWR

The figure shows each vehicle manufacturer sales portfolio by vehicle type and GVWR. TATA and VECV have the most diversity in their sales. All the six highest selling vehicle manufacturer offer vehicles in atleast five classes, while the three lowest volume manufactures have sales limited to 2-3 classes in which AMW, Volkswagen Commercial vehicle, and AB Volvo comes.

2. Design Process

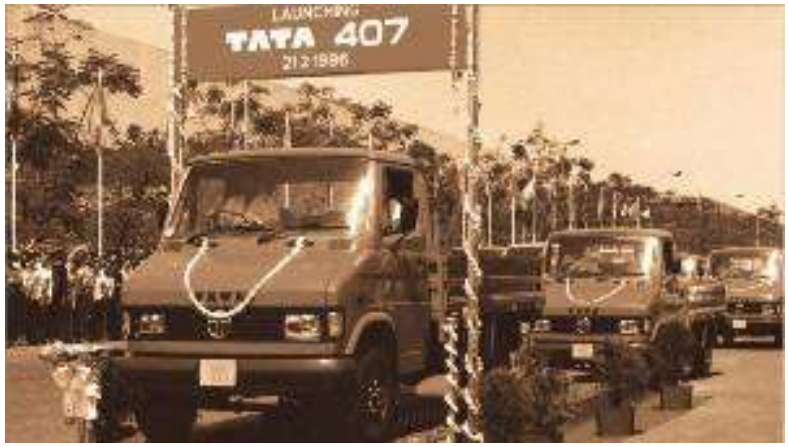


3. Glimpse of TATA Motors

IR-06, 07

Tata Motors Ltd. is one part of the business conglomerate, Tata Group, and was formerly known as TELCO (Tata Engineering and Locomotive Company). The other ventures of Tata Group include Tata Steel, Tata Consultancy Services, Tata Technologies, Tata Tea, Titan Industries, Tata Power, Taj Hotels, and so on. Headquartered in Mumbai, India, Tata Motors is a multinational corporation accounting for 70% cumulative market share in the domestic commercial vehicle segment. Today, the company is the world's second largest manufacturer of commercial vehicles, world's fourth largest truck manufacturer and world's second largest bus manufacturer. It is a dual-listed company, which is traded on both the Bombay Stock exchange as well as the New York Stock Exchange.

Tata Motors was first established in 1935 as a locomotive manufacturing unit. The first commercial vehicle was manufactured in 1954, in collaboration with Daimler-Benz AG of Germany. In 1960, the first truck, quite similar to a Daimler truck, rolled out from the Tata factory in Pune. Ever since its launch, the truck became highly successful. However, the success of the commercial vehicles was just the beginning of the flourishing and booming future of Tata Motors. The company went ahead diversifying itself and took up other products as well. Apart from exporting heavy-duty trucks, the company decided to come up with lighter versions for the local market. Thus, began the production of the first LCV (Light Commercial Vehicle) model, Tata 407 in 1986. In the early 1990s, the company began its expansion into the car market. Its first passenger vehicle was Tata Sierra, a multi utility vehicle that was launched in 1991. Tata came up with three other automobiles, namely, Tata Estate in 1992 (a station wagon based on the earlier 'Tata Mobile' in 1989), Tata Sumo in 1994 (LCV) and Tata Safari in 1998 (India's first SUV). After thoroughly analyzing the demand of the consumers, Ratan Tata, the current chairman of Tata Group, decided to build a small car, which was practically a new venture. Thus, in 1998, India's first fully indigenous passenger car, Tata

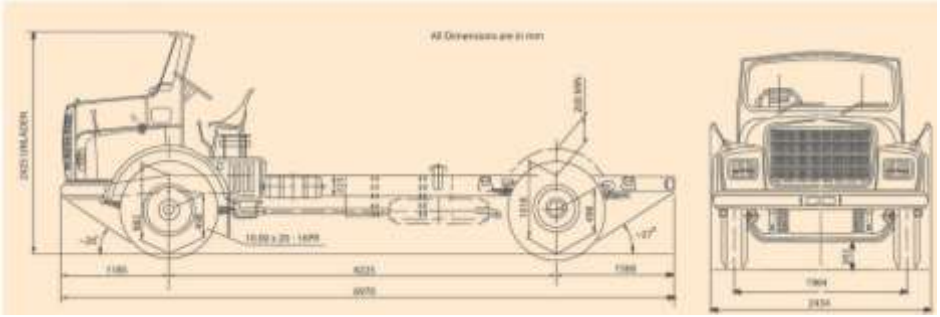


IR-08, 09

Indica was launched. It received an immediate success, since it was inexpensive and relatively easy to build maintain. The car was exported to Europe, to UK and Italy. The second generation of Indica, V2 was even more successful. Indica's high success gave Tata Motors the financial power to take over Daewoo Motors in 2004. This gave the company an opportunity to give their brand international exposure. Today, Daewoo's trucks are sold as Tata Daewoo Commercial Vehicle in South Korea. In 2005, the company acquired 21% share in Hispano Carrocera SA, earning the controlling rights of the company. In January 2008, the global automobile sector showcased the world's cheapest car in the form of Tata Nano. Launched by Tata Motors, the car cost only Rs.1, 00,000 (US $2,500). In the March of that year, Tata Motors also acquired the Jaguar Land Rover (JLR) business from the Ford Motor Company, which included the Daimler and Lanchester brands. Tata Motors formed 51:49 joint venture with Marcopolo of Brazil and came up with manufacturing and assembling fully-built buses and coaches targeting the developing mass rapid transportation systems. Tata and Marcopolo jointly have launched low-floor city buses that are widely used by Delhi, Mumbai, Lucknow and Bangalore transport corporations. Tata Motors has been continuously acquiring foreign brands to increase its global presence. The company operates in the UK, South Korea, Thailand and Spain. Today, Tata Motors has its auto manufacturing and assembly plants in Jamshedpur, Pantnagar, Lucknow, Ahmedabad and Pune in India, and in Argentina, South Africa, South Korea and Thailand. It is further planning to set up more plants in Turkey, Indonesia and Eastern Europe.

4. Product Study

4.1 Technical drawing



IR-10

4.2 Technical Specification

Engine	:	Cummins 6BT – 5.9
Type	:	Water cooled direct injection Turbo charged, Intercooled diesel engine
Bore x stroke	:	102 mm x 120 mm
Max. engine output	:	101.5 kW(136 HP) @ 2500 rpm
Max. Torque	:	490 Nm @ 1500 rpm
Displacement	:	5900 cc
Air filter	:	Dry type remote mounted
Fuel pump	:	Rotary
Clutch	:	352 mm, single plate dry friction, Spicer pull type
Gear box	:	TATA GBS-600
Type	:	Synchromesh on all forward Constant mesh on reverse gear
No. of gears	:	6 forward, 1 reverse

1st gear ratio	:	6.58
Front axle	:	Heavy duty forged I beam Reverse Elliot type
Rear axle	:	RA-109 RR single reduction Heavy duty, Hypoid gears, fully floating Axle shafts
Rear axle ratio	:	6.83 (41/6)
Steering	:	Hydraulic assisted power steering
Frame	:	Ladder type heavy duty frame with riveted/ bolted cross members, side members are of channel section Depth-223 mm, Width-60 mm, thickness-7mm
Suspension	:	Semi elliptical leaf spring at front and rear
Shock absorbers	:	Hydraulic double acting telescopic type at front only
Brakes		
Service Brakes	:	Fully duplicated, Full air S-cam brakes
Parking Brakes	:	Hand operated, spring actuated parking brake acting on rear wheels
Engine exhaust brake	:	Coupled with service brake
Wheels & tires	:	10.00 x 20-16 PR
Wheel rims	:	7.5 x 20
Number of tires	:	Front-2, Rear-4, Spare-1
Fuel tank	:	225 liters
Cowl/ Cab	:	All steel Semi forward control cowl/cab
Electrical system	:	Battery-24V, 150 Ah capacity

Alternator capacity	:	45 Amps

Performance

Max. climbing ability	:	22.0 %
Max. geared speed in Top gear (with std. rear axle)	:	92 kmph
Turning circle diameter in mm	:	17000
Clearance circle diameter in mm	:	18500

Dimension (MM)

Wheelbase in mm	:	4225

Weights (Kg)

Bare chassis kerb Weight as per IS 9211	:	4590
Max. Permissible GVW	:	16200
Max. Permissible FAW	:	6000
Max. Permissible RAW	:	10200

4.3 Montages of TATA SE truck

TATA SE is the single axle truck in semi-forward cab model. Only this is the semi forward truck existing in the Indian market in the 16 ton category. This truck is most significantly used in cargo for small fleets, on seasonable business, hilly terrain, even in urban areas and city, defense and rescue departments, mines and construction sites. We can see the various forms of TATA SE in terms of different application in above collage. It shows as cargo vehicle, defense vehicle, oil tanker, towing vehicle, tipper truck.

4.4 Reviews from Auto Blog

TATA SE 1613 it is a rugged and capable workhorse which does exactly what it was engineered to do. It's able to carry massive loads from point A to point B with minimum costs. The truck doesn't have the pretention to offer a comfortable driving experience and it doesn't even wants to hide it.

The Tata SE 163 offers a fair business and would appeal to those that seek a rugged and affordable truck that it's able to get the job done without all those bells and whistles found at its more upscale rivals.

http://www.topspeed.com/trucks/truck-reviews/tata/2000-tata-se-1613-ar130814.html

After a very long time i had my hands on a Semi Forward, the new one that is. 1613 is the work horse. You will never go wrong. Porn for Truck Lovers! What a beauty.

http://www.team-bhp.com/forum/commercial-vehicles-india/67389-day-lpt1613-tc- tata-1210e-semi-forward-1613tc-5.html

As an owner, I do not want. But that is not the case with drivers.

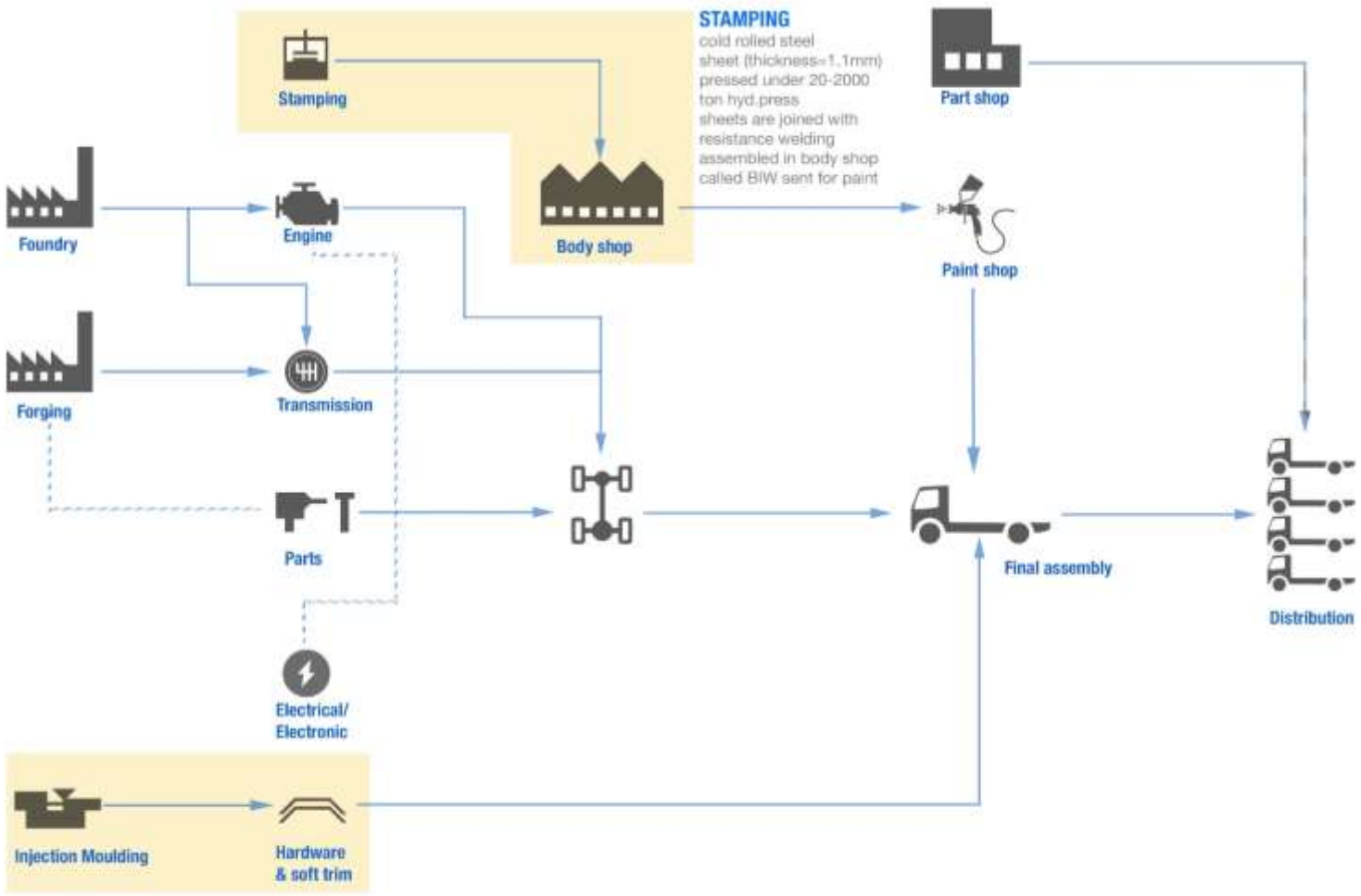
Http: //www.team-bhp.com/forum/commercial-vehicles-india/67389-day-lpt1613-tc-tata-1210e-semi-forward-1613tc-5.html

4.5 Sale statistic for Two years

Statistic data for two consecutive year shows positive growth by 57 % in sale

1. The driving factor responsible are:
2. Infrastructure projects
3. Opening of mining activities
4. Government new reforms for new projects
5. Road development
6. Single axle truck in M&HCV segment
7. Hub & Spoke model due to urbanization

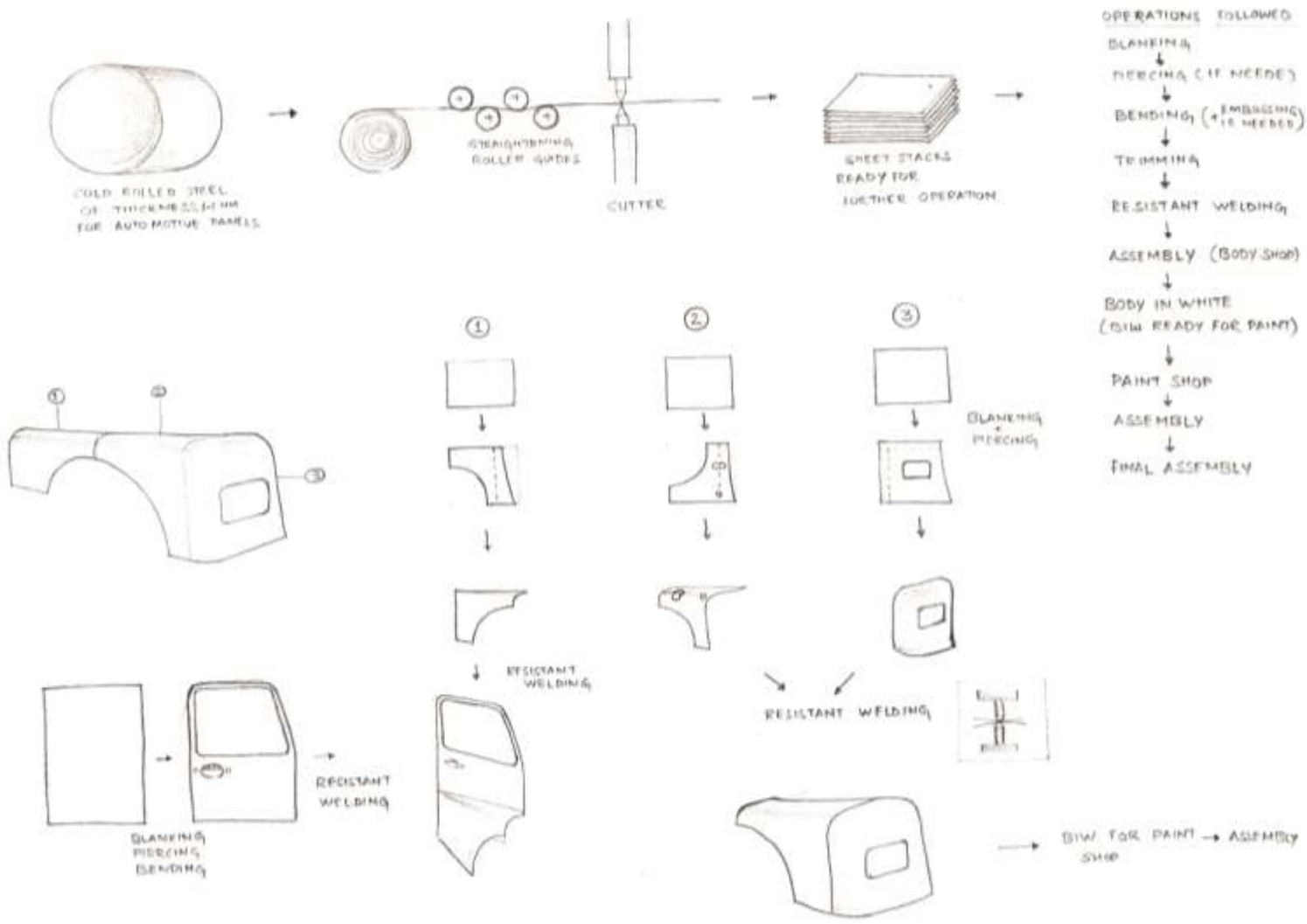
4.6 Manufacturing process

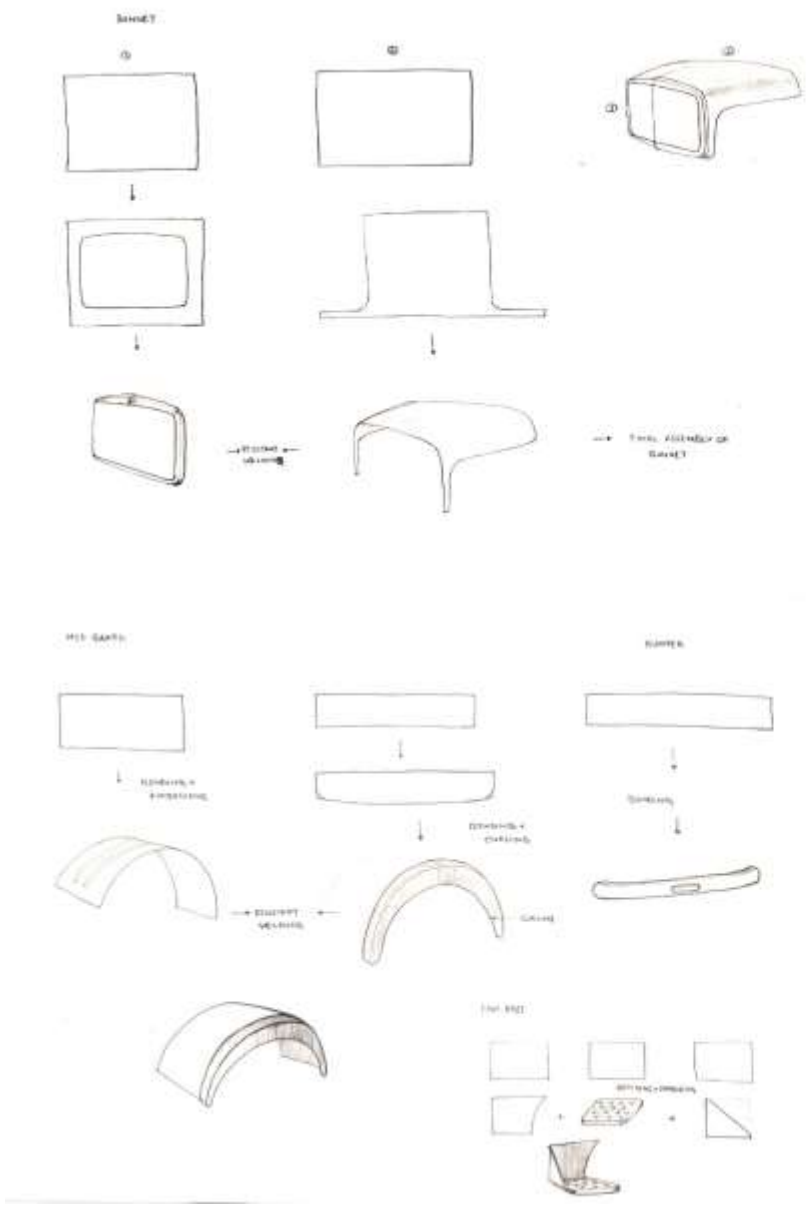


The above figure shows the schematic diagram of manufacturing process of Truck. For various types of exterior metal panel cold rolled steel sheet of thickness – 1.1 mm is used which are formed under the hydraulic press of capacity 20-2000 tonnes.

The entire manufacturing process is divided into five section:

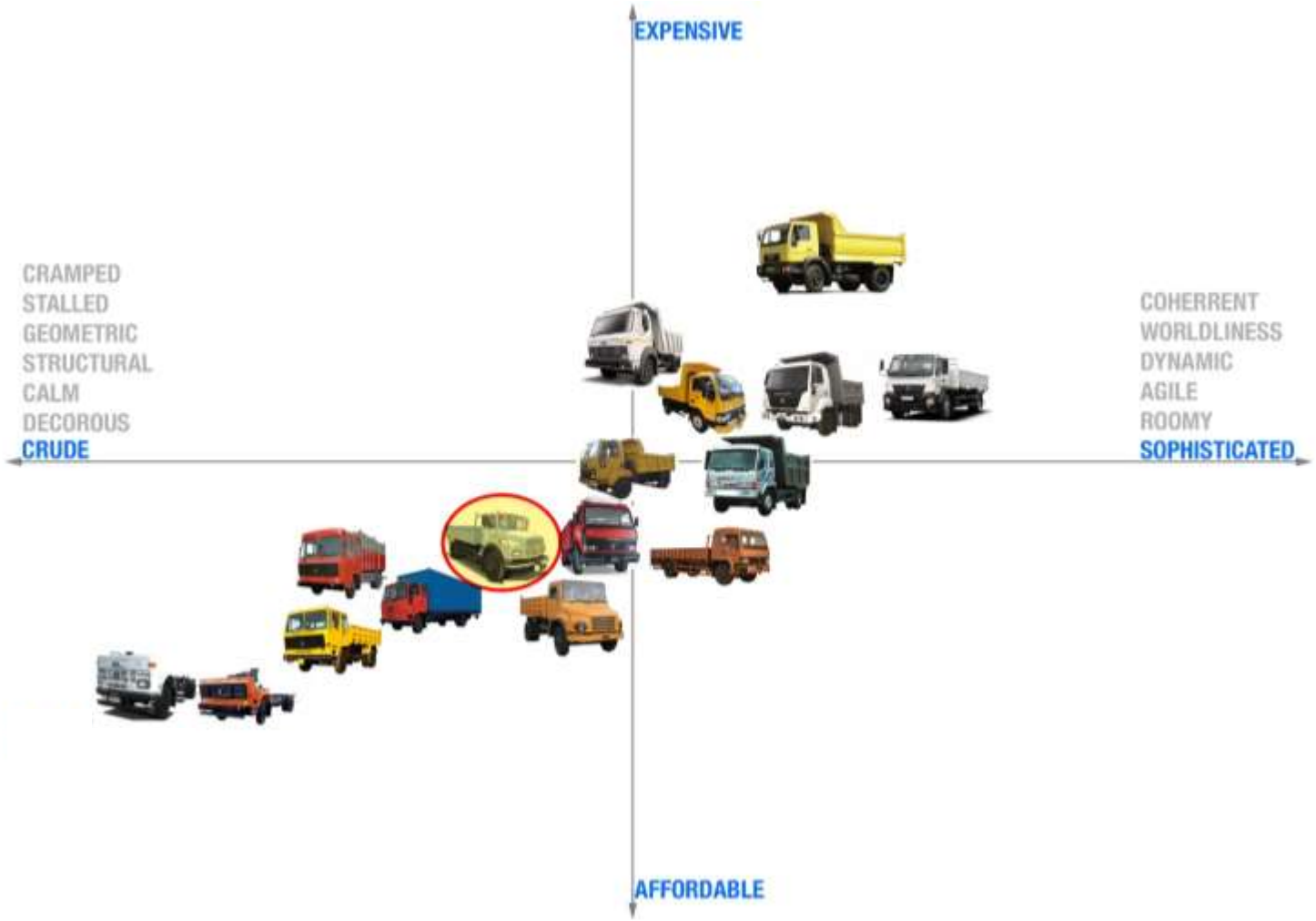
1. Body stamping section: Forming of sheet and Resistant welding process
2. Paint shop: Paint of BIW
3. Injection molding section
4. Assembly line
5. Distribution
   Figure below shows the stepwise process of each external body panel of TATA SE


COLD ROLLED STEEL OF THICKNESS IN MM FOR AUTOMOTIVE PANELS
STRAIGHTENING ROLLER GUIDES
CUTTER
SHEET STACKS READY FOR FURTHER OPERATION
OPERATIONS FOLLOWED
BLANKING
PIERCING (IF NEEDED)
BENDING (+EMBOSSING IF NEEDED)
TRIMMING
RESISTANT WELDING
ASSEMBLY (BODY SHOP)
BODY IN WHITE (BIW READY FOR PAINT)
PAINT SHOP
ASSEMBLY
FINAL ASSEMBLY
1
2
3
BLANKING + PIERCING
RESISTANT WELDING
RESISTANT WELDING
RESISTANT WELDING
BLANKING PIERCING BENDING
BIW FOR PAINT → ASSEMBLY SHOP



5 Trend Analysis

5.1 Trend analysis in 16 tonnes trucks in Indian market



All trucks available in 16 tonnes GVWR are placed in X-Y chart. Abscissa and ordinates were denoted by opposite adjectives correspondingly. The position of the product to be restyled is found in the X-Y chart with the trend analysis. Following observation noticed while carrying out trend analysis:

1. The product distribution is scattered in the chart from 3rd quadrant to 1st quadrant.
2. All the trucks lies in the extreme left side are crude and very geometrical. Lacks essential features and technology which is required in the today's truck.
3. All domestic player' s product lies in the extreme left of the 3rd quadrant.
4. As we move towards right the manufacturers have been started in JV with manufacturers from international market to manufacture products with essential features with adding sophistication in the product.
5. All extreme right products are by international manufacturers.
6. TATA SE lies in the 3rd quadrant of the chart.

5.2 Evolution of Trucks in India in last 20 years

For last twenty years the truck there is vast difference has been notices in truck industries. Before 2000 only domestic manufacturers were active in the country. Following insights have been noticed:

1. Tata & Ashok Leyland has major share in the domestic market.
2. The models were sold in the cowl with chassis form.
3. The form were very crude and geometric
4. As the trends has move towards more sophistication in terms of design like elegance with minimalistic and cleaner form.
5. Ashok Leyland has started production of 1616S on experimental basis.
6. Ashok Leyland has launched Stallion based model in commercial vehicle segment.
7. After 2000, India has become fastest growing market for automotive sector especially in commercial vehicle segment. Reforms in policies by government has attracted many foreign players and which arouse competitive situation in commercial vehicle.
8. Due to the new entrants, share of domestic players such as TATA motors, Ashok Leyland, Eicher started decreasing
9. In 2002, AMW started production of trucks with full cab body.
10. In 2005, JV between Mahindra and Navistar entered into heavy duty commercial vehicle segment.
11. JV between Eicher and Volvo started in 2008 and give rise to new design language.
12. In 2011 Daimler Benz has in JV with Hero MotoCorp started production but unfortunately Hero MotoCorp withdrawn. Daimler has to move ahead alone and launched Bharat Benz trucks in competition with existing leading manufacturers in the market like TATA, Ashok Leyland, VECV etc.

6. User Research

The user research is conducted for TATA SE along with various types of 16 ton trucks by approaching around 15 user and discussing about the functionality of truck along with their primary biodata like name, age, experience, and profession.

Vishal Gaekwad
Age: 27 years
Exp: 8 years
MAN CLA 16.200

Due to low ground bumper and provision of step in bumper is easier for cleaning

Extra angle bumper fabricated locally to protect bottom of engine

Bappi Chauhan
Age: 46 years
Exp: 27 years
Eicher 1110pro

Play with number plate

LASER light for decoration

Compact headlamp with side indicator and parking light

Wooden cabin

Contact numbers and decorative graphics are on windscreen.

Not enough ventilation in the cabin

Grill mounted over bumper

Extra bumper mounted to prevent engine for hitting hard material

Anand Apte
Age: 48 years
Exp: 30 years
TATA 1613 LPT

Ashok Leyland
1616

Extra angle bumper fabricated locally to protect bottom of engine

Proper ingress or egress

Grabrail for ingress or egress

K Raj
Age: 35 years
Exp: 10 years

Rubber bellow is between Footrest and bumper

Sapcious

Easy ingress and egress

Santosh Mukund
Age: 35 years
Exp: 18 years
LPT 1210

Gaurd provided o-ver side indicator

Black paint strip to avoid high beam glare on oncoming vehicle's driver

TATA 2416 LPK

Proper footrest is given

TATA 1613 LPT

Extra lights for visibility during fog

Opening for ventilation inside cabin

Handle

Foot rest is given on place of number plate provision

For ingress or egress extra ring welded over wheel rim

D. Lokhande (Right)
Age: 38 years
Exp: 15 years
(Driver cum Mechanic)

Shambhu Singh
Age: 35 years
Exp: 10 years

Ashok Leyland 2516 il

Ventilation issue
Troubleshooting issue

Kedar
Age: 55 years
Exp: 34 years
MAN Fire tender

Footrest is given
for crew cabin also

Spacious cabin

Mirror to provide
front bottom visi-
bility

Mohammad Ishal
Age: 34 years
Exp: 11 years
TATA SE 1210

Extra rearview mirror on fender

Vent gate for air induction inside cabin

Religious motiff on body panel

Vent for air duct to cabin for ventilation

Foot rest step on bumper

Amalgappa
Age: 38 years
Exp: 8 years
TATA SE 1613

Stalled & Bulky

Extra grill for headlamp
Compact space

Ashok Bind
Age: 37 years
Exp: 7 years

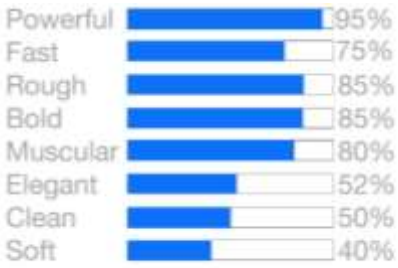
Rugged in form
Visibilty issue due to front nose hieght

Raghuram Singh
Age: 49 years
Exp: 20 years

Extra guard is provided for safety

Insight:

1. Cabin space is not ample, a tall driver cannot accommodate inside the cabin comfortably.
2. No proper approach for cleaning.
3. Color of body are generally white, red, orange are seen.
4. No parking lamp
5. No step for load bed check
6. No storage cabinet
7. Motifs over body shows religious belief
8. Warning triangle is maximum used as decorative element
9. Playing with number plate
10. Visibility issue while taking reverse due to wide spread load bed.
11. Extra bumper and guard are mounted locally for extra safety of bottom of engine.
12. Ventilation in cabin is not effective.
13. Graphics and motifs over windscreen are notice which creates visibility issue
14. No grab handle for easier approach.



Statistic showing user wise form expectation:

Based on the discussion with various user a statistic obtained which shows the various keywords weightage in future product.
Among various keywords, Powerful, Fast, Rough, Bold and muscular got maximum weightage.

Opportunities for improvement:

1. Cabin space.
2. Front nose and fender.
3. Footrest provision.
4. Headlamps and other lights.
5. Grill provision for headlamps.
6. Provisional space for motifs to represent user identity or belief.
7. Integrated storage space.
8. Air vent for proper ventilation inside cabin.
9. Bumper for safety of engine with footrest provision.
10. Grab handle provision
11. Dedicated space for number plate
12. Rear view mirrors

7. Understanding of Essential features in Western trucks

Various truck from triad manufacturers like Volvo, Renault, Iveco, Daimler Benz, and Scania studied to find essential feature, functionality and comparison made in existing truck. Among various company Renault truck is considered as suitable example for the comparison.

TRAPEZOIDAL SHAPED CAB
Better Air Penetration & Better Handling

COEFFICIENT OF DRAG REDUCES
Aerodynamic design reduces fuel consumption

DOUBLE STEP FOOTREST
Non slippery suface
with ergonomic level for
easy ingress or egress

HEADLAMP
integrated with side
indicateors and
dipped beam lamp

HEAD LAMP GRILL

ANTENNA
For connectivity

FORWARD VIEW MIRROR
For better visibility

TWO PART REAR VIEW MIRROR
integrated defogging system

WINDSCREEN WIPER

BONNET COVER
For primary check up

HEADLAMP WITH DEFLECTOR
As functional element

CORNERING LAMP
For better maneovuring

DIPPED BEAM LAMP

FOLDABLE GRILL FOOT REST
Easy access for cleaning
windscreen

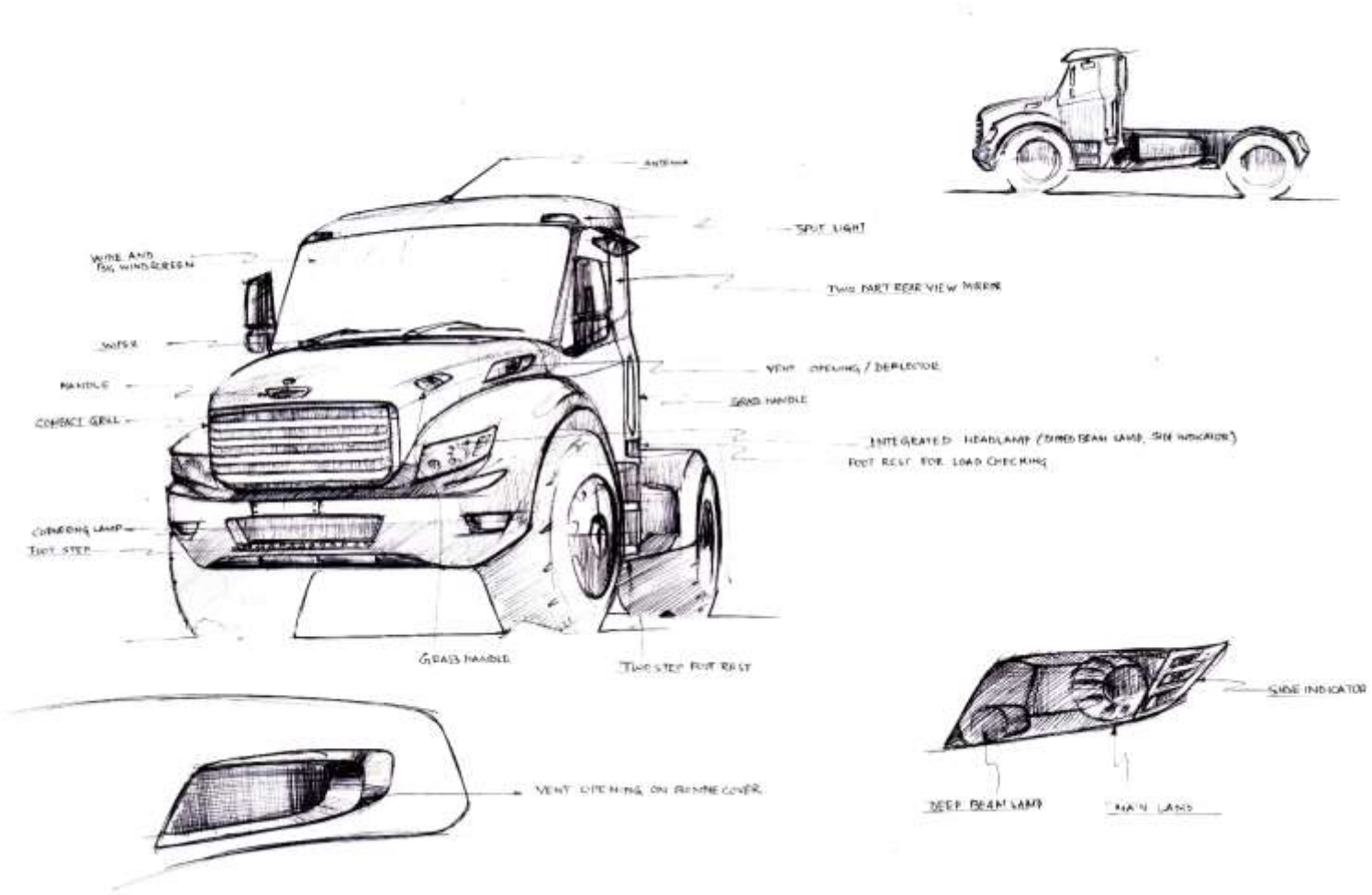
7.2 Comparison of essential feature in Renault truck & TATA SE truck

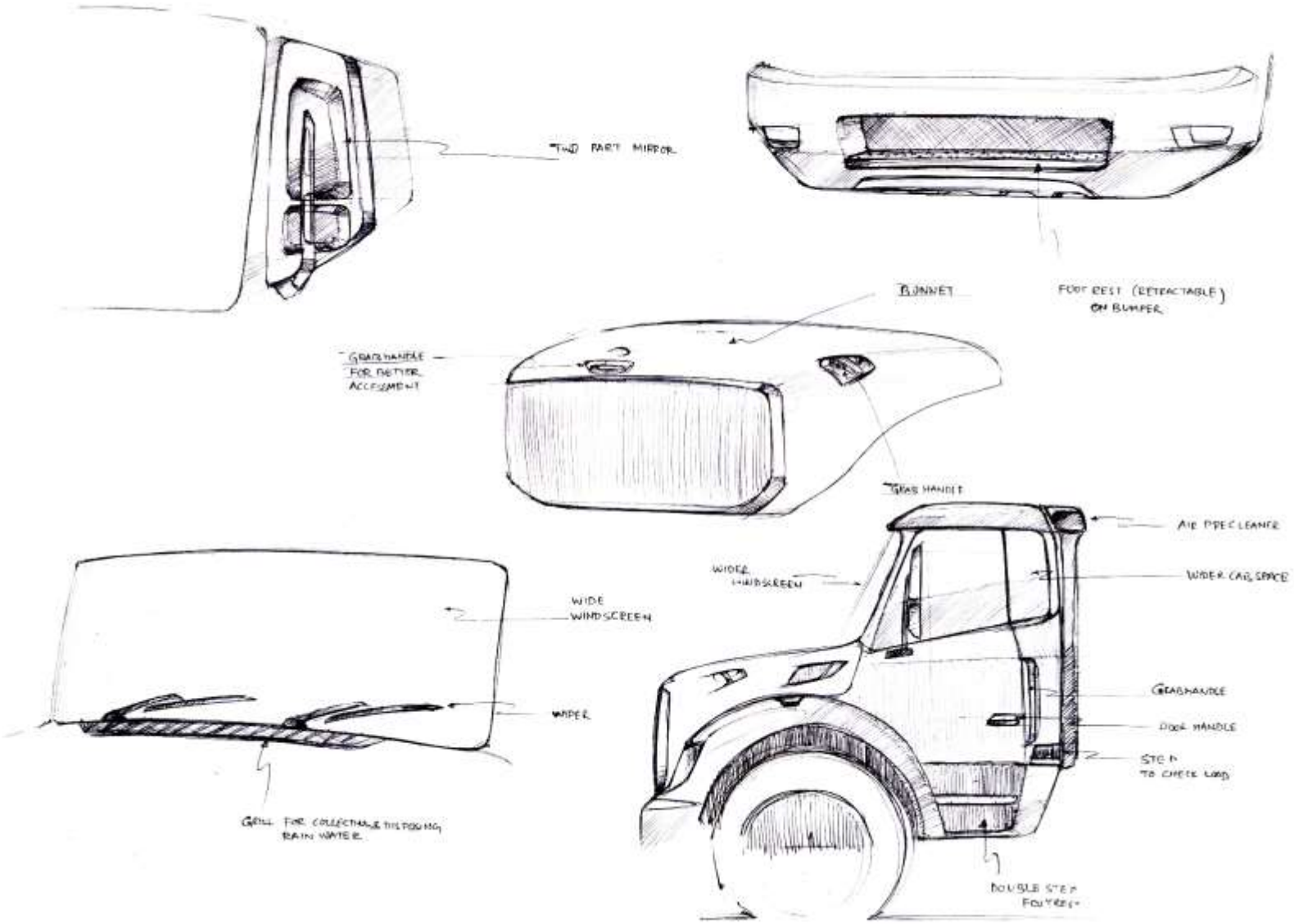
IR-11, 12

Essential Features	Renault Truck	TATA SE truck
Sun visor	✓	x
Grab Handle	✓	x
Step for checking load bed	✓	x
Foot rest (double step)	✓	x
Communication antenna	✓	x
Two part mirror	✓	✓
Integrated headlamp	✓	x
Cornering lamp	✓	x
Headlamp grill	✓	x
Foot rest to approach wind screen	✓	x

7.3 Features conceptualization on Front Facia

After studying various features provided on western trucks. A concept is made to marry those features on the Front Facia of TATA SE truck.




THIRD PART MIRROR
BONNET
FOOT REST (RETRACTABLE) ON BUMPER
GRAB HANDLE FOR BETTER ACCESSMENT
GRAB HANDLE
AIR PRE CLEANER
WIDER WINDSCREEN
WIDER CAB SPACE
WIDE WINDSCREEN
WIPER
GRAB HANDLE
DOOR HANDLE
STEP TO CHECK LAMP
GRILL FOR COLLECTABLE DISPOSING RAIN WATER
DOUBLE STEP

8. Design Brief

Restyling of TATA SE truck cab (Exterior)

From the research study it can be concluded that to place TATA SE in fourth quadrant of trend analysis chart, restyling becomes essential. Driving factors which emphasize restyling of TATA SE are:

1. Trend study which shows TATA Se lies in the 3rd quadrant of x-y chart.
2. Evolution study which shows it has not changed for 38 years.
3. User research who demands new features and change.
4. Packaging demand among users because it is single axle truck in M&HCV segments which makes it more demanding for useful in city, mining, defense, narrow passage on hilly terrain.

User profile

It is owned by small fleet owners and contractors for construction purposes as well as mining in few numbers ranges from 2 to 20 on average.

From user side it should restyle with essential features and form, which can sustain its popularity for another 20 years because this is the only semi forward cab truck in this segment in Indian CV market.

Price segment

TATA SE is always affordable in the segment to its users and which should be maintained. The price shall be in the range 15-25 lacs which should make it affordable in this competitive market.

Keywords

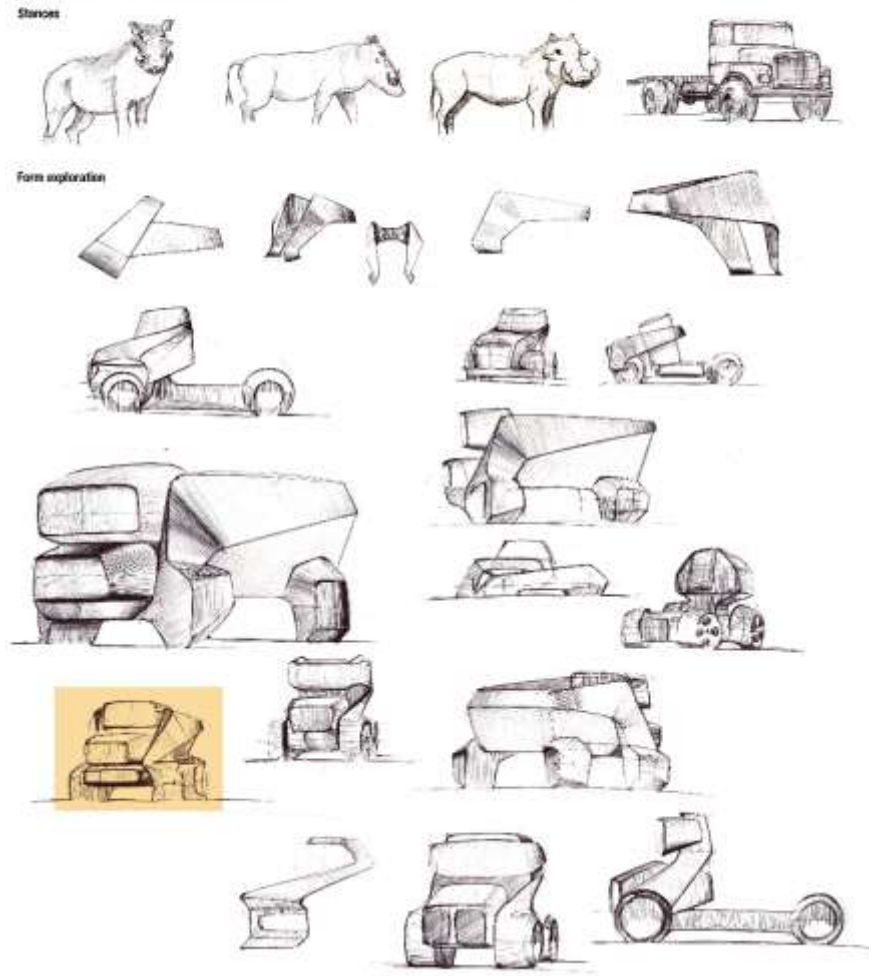
Rugged, masculine and dynamic significantly identified through user research study.

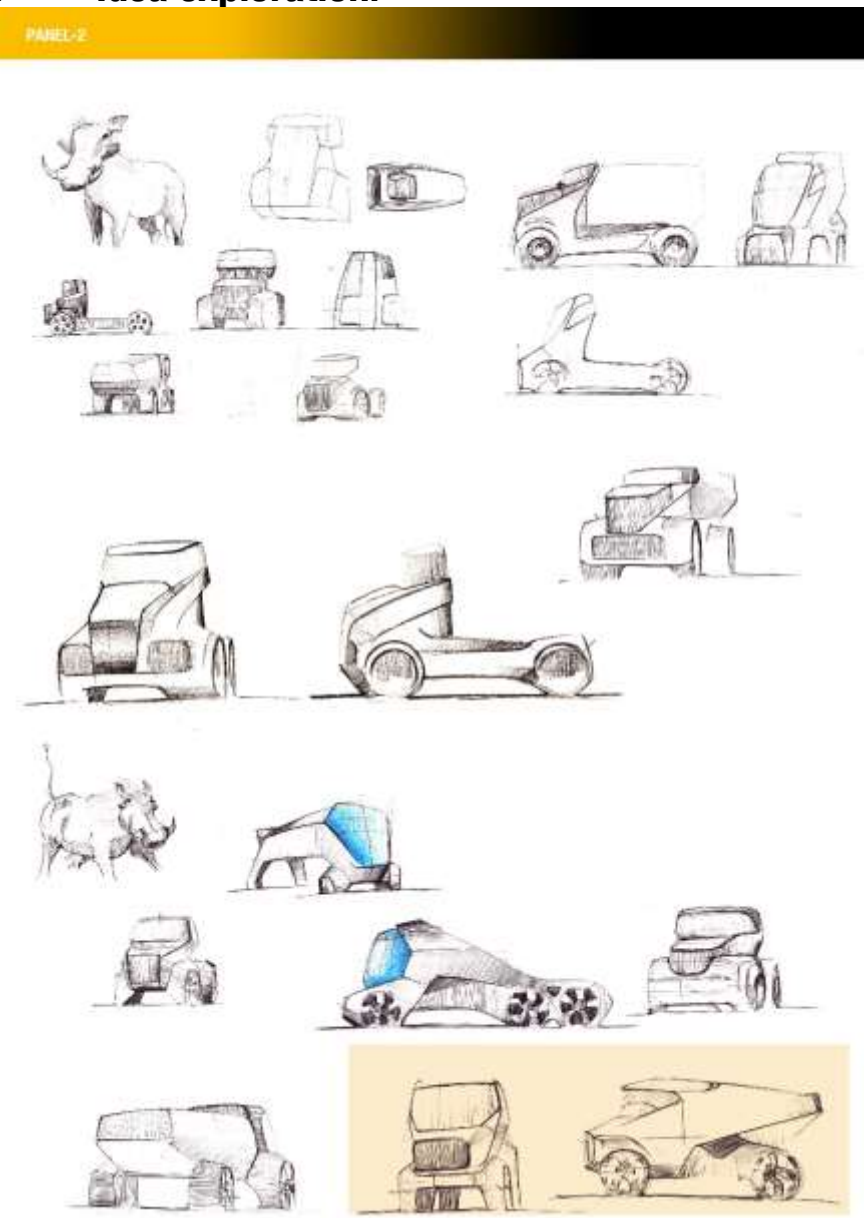
9. Mood Board

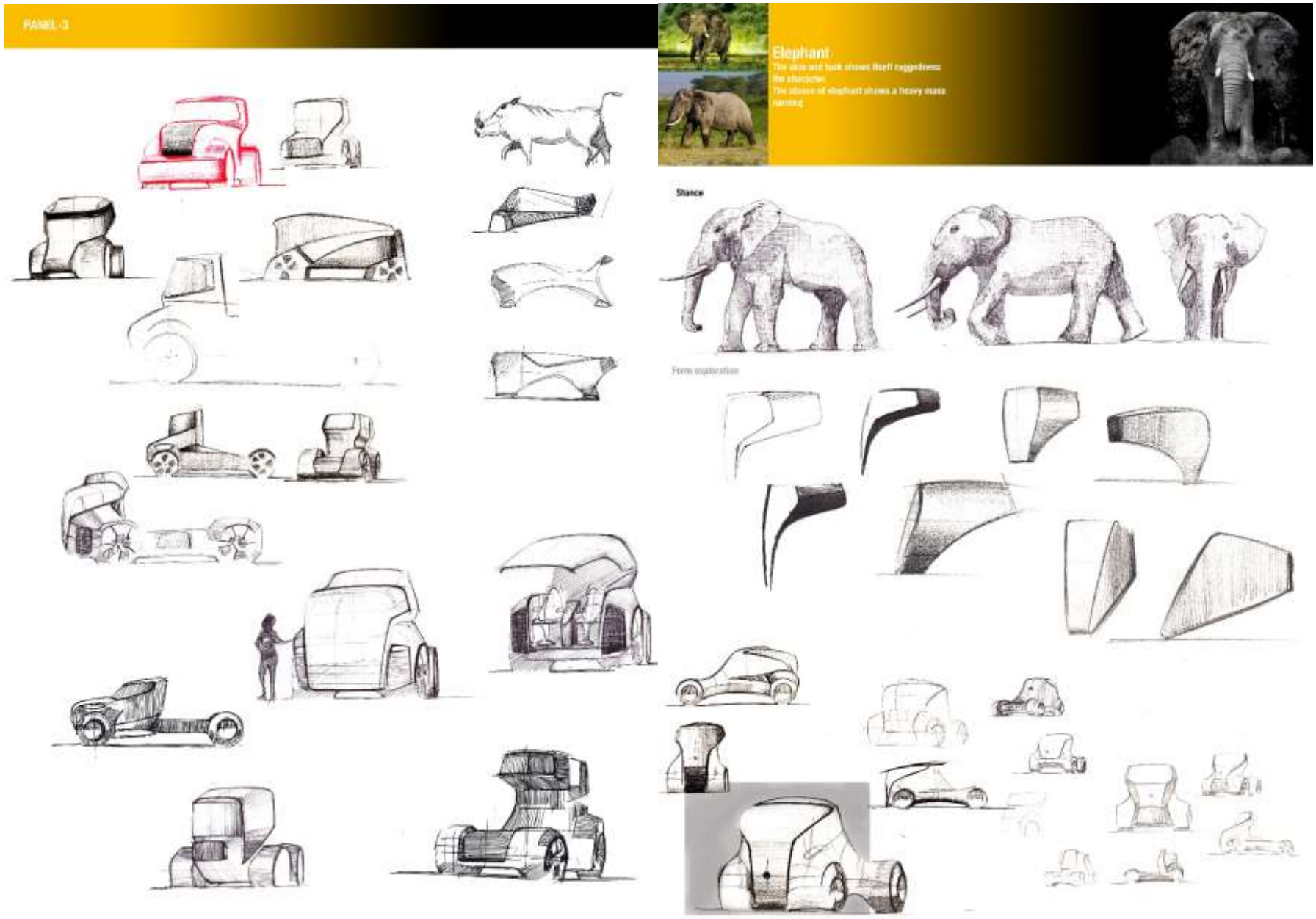
MASCULINE
POWER
TENSION
AGRESSION
RUGGED
ROUGH
TOUGH
DYNAMIC
FLOW & SPEED

Mood boards shows natural as well as manmade product which give rise to a theme of power, aggression, strong and dynamism. While choosing the images of mood board consideration is given to the stance of metaphor and form and which is being taken as inspiration for idea exploration.

10. Idea exploration:



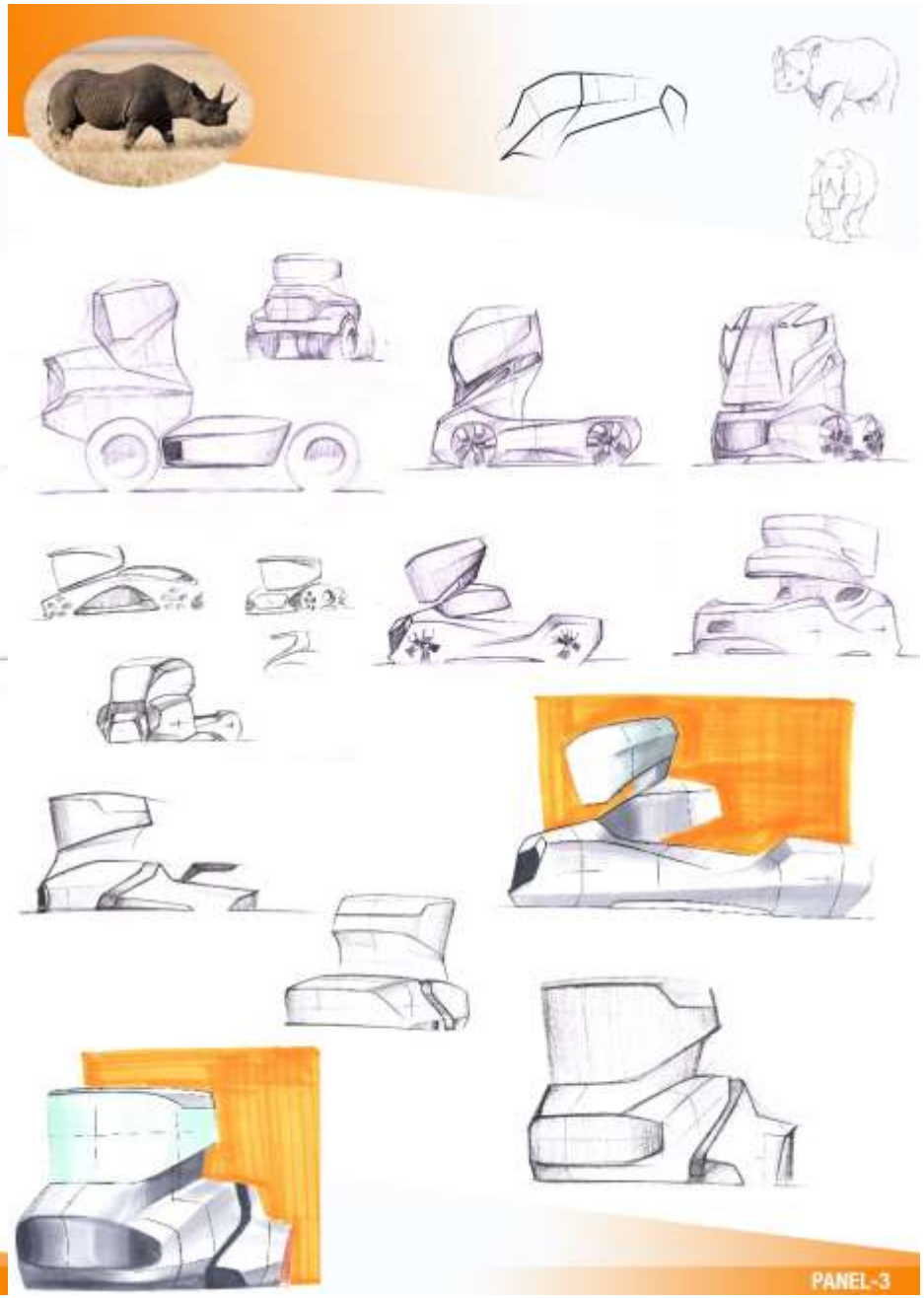



PANEL-3
Elephant
Stance

PANEL-5

PANEL-1


PANEL-2


PANEL-3

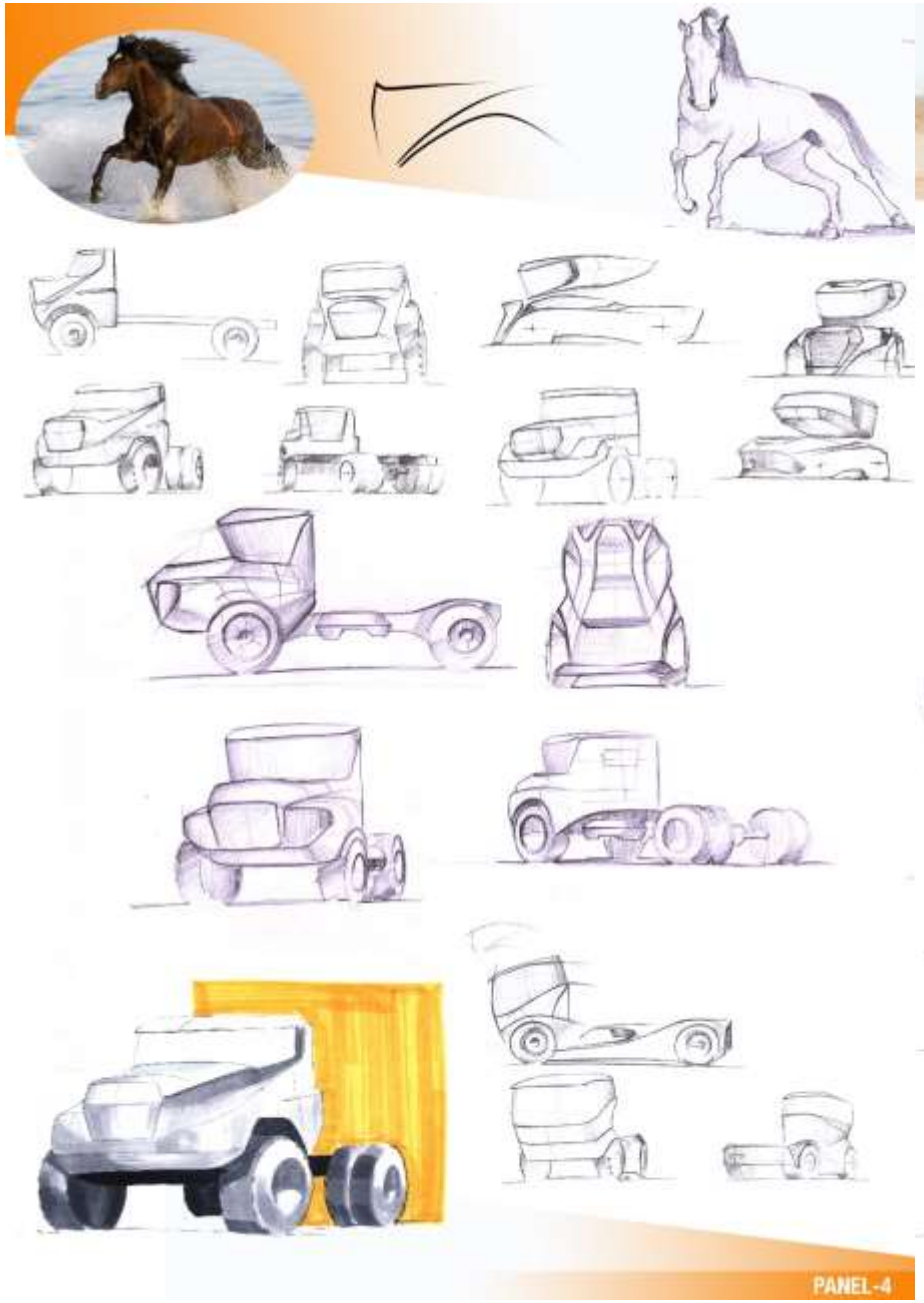
The above exploration is done in rugged metaphor where stances of most rugged animal were chosen as inspiration. While exploration, the stances were abstracted into the form and upon which ideas were derived and also on the basis of sketches few of them were made into thermocol mock to visualize basic volume and proportions.

Concept-1

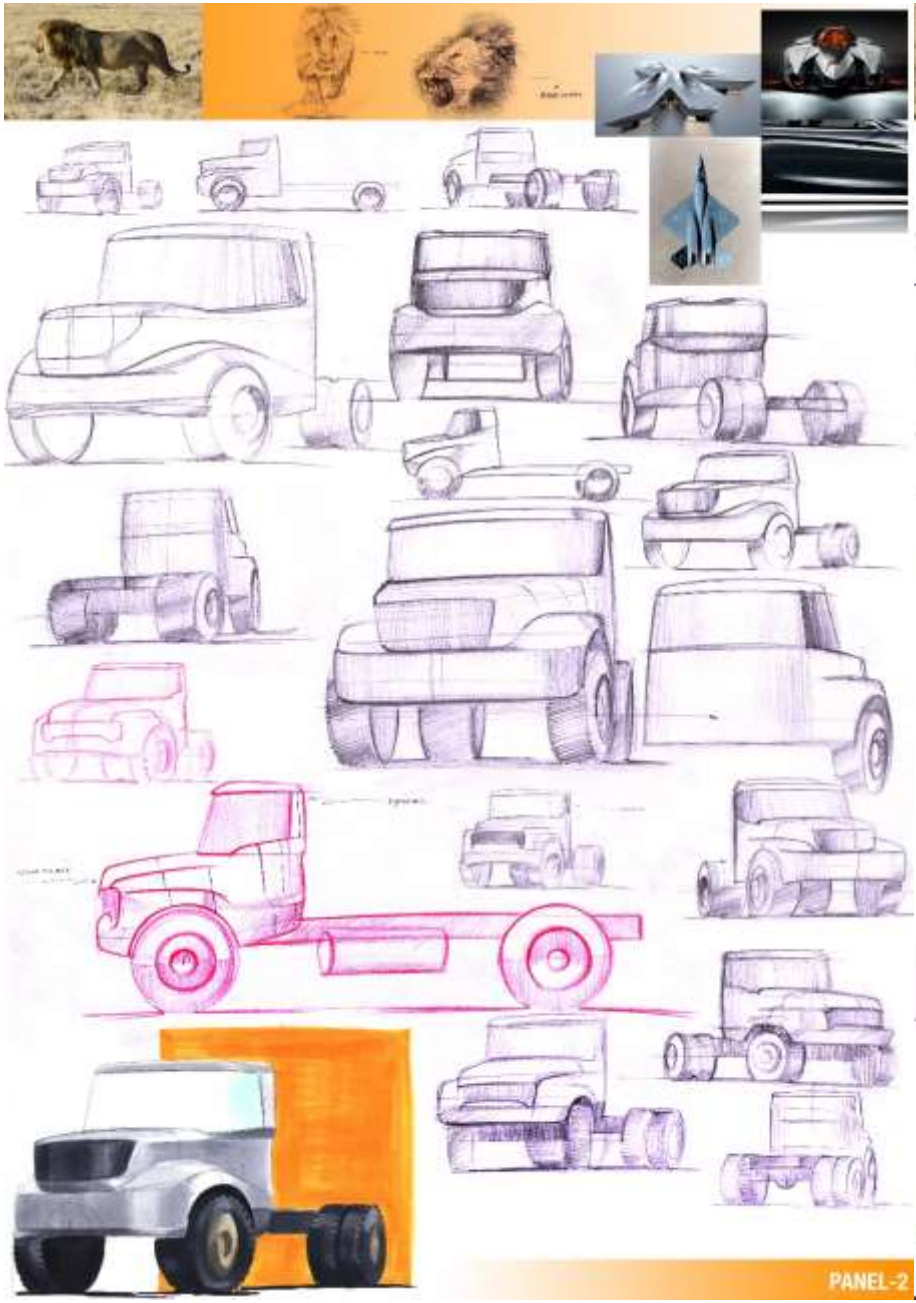
Concept-2

Concept-3

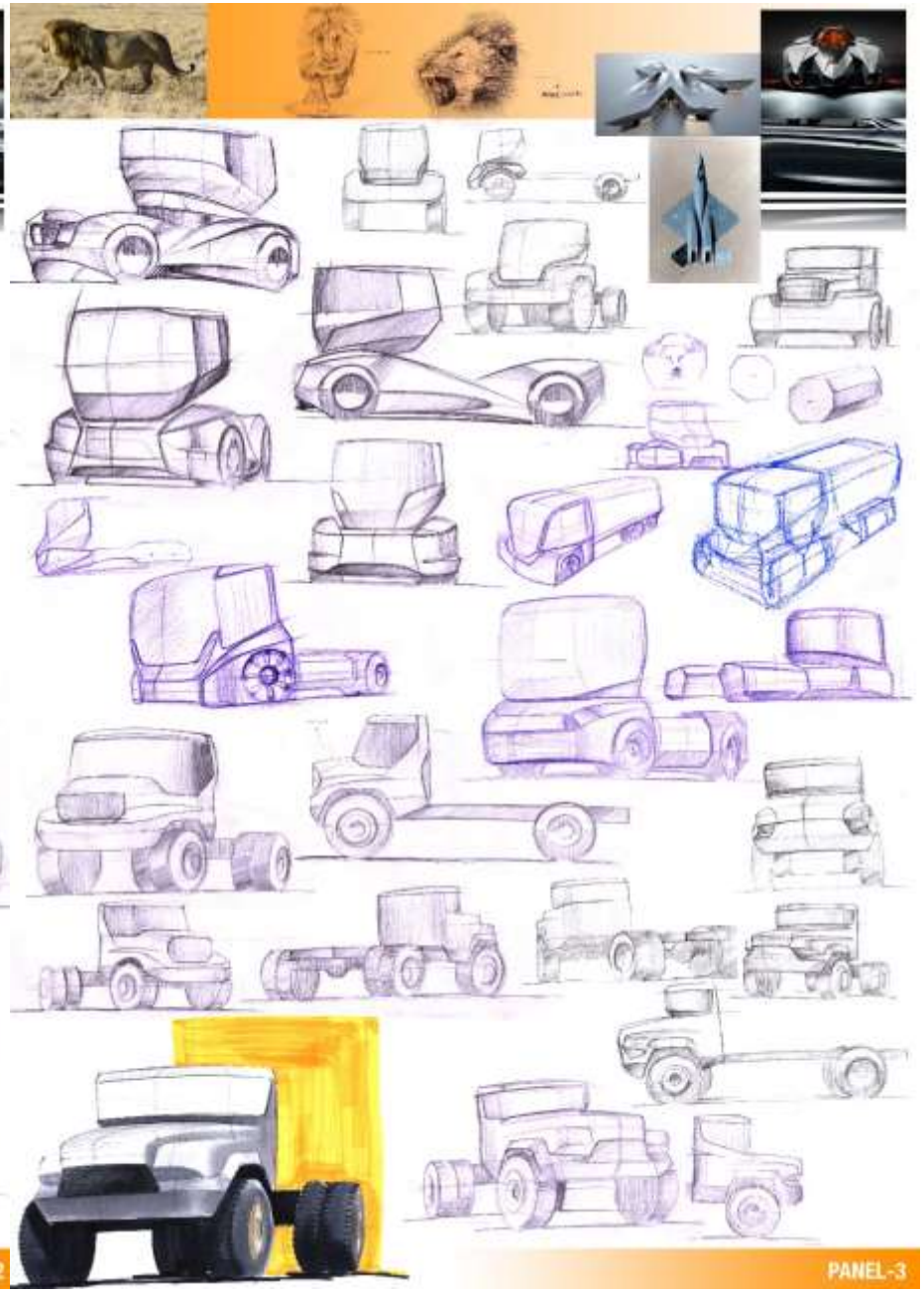
Among the three concepts, concept -1 taken forward for further exploration. Because its front element shows the stance of metaphor and also the cladding running over the dominant volume.


PANEL-4

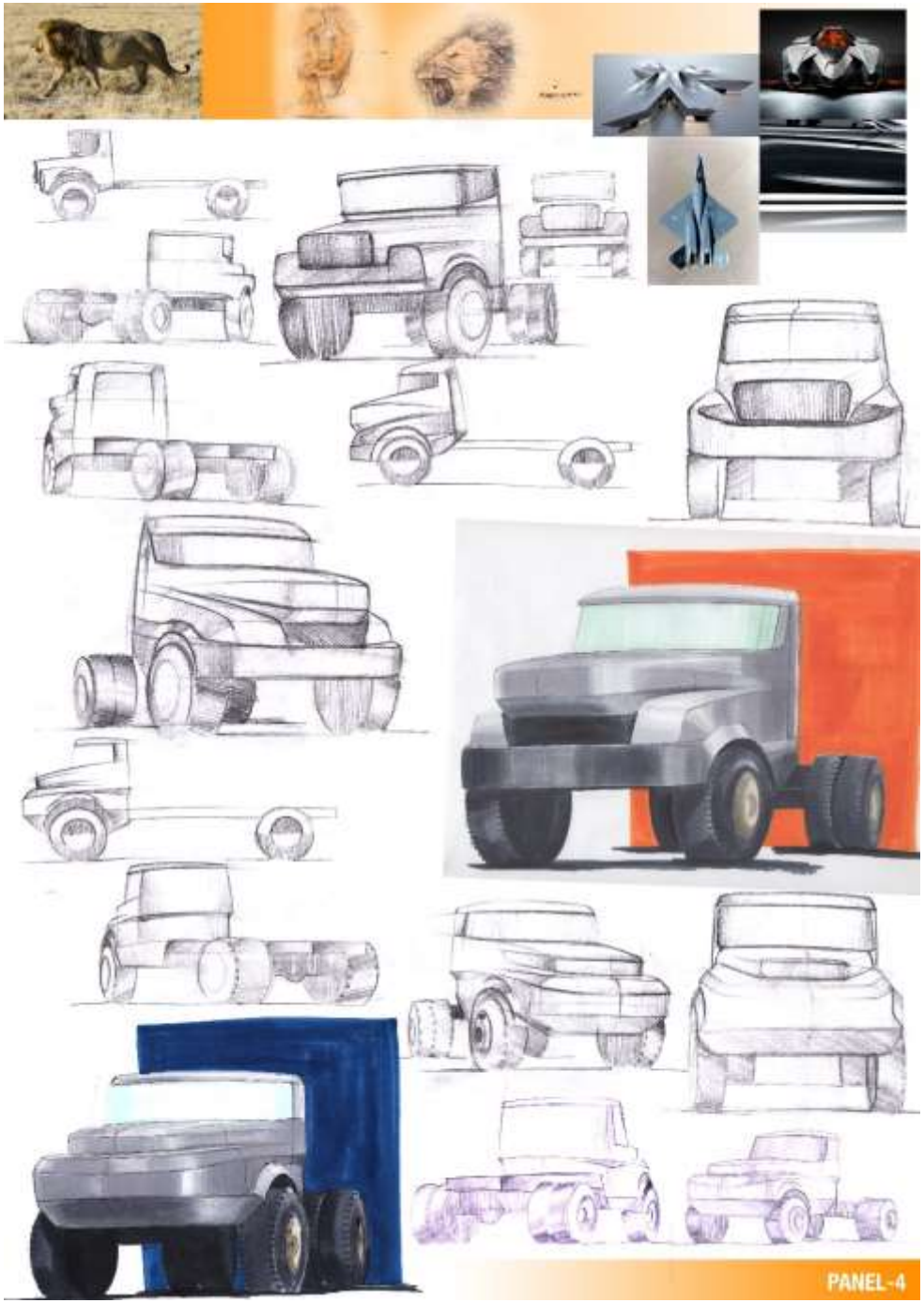

PANEL-1



PANEL-2



PANEL-3



Masculine stands for power, aggression, and tension in expression. Here the expression as well as stance is taken as inspiration and converted their stance into a line curve abstraction. Further exploration is done in this metaphor.

While exploration in Masculine form, further some chosen concepts were made into mock up to study volume and proportion.

Concept-4

Concept-5

Concept -5 was chosen for further exploration as it depicts power imbibe in its subtleness and also front and windshield part looks different.


PANEL-5

Dynamic refers to the motion, speed, flow. Exploration is done taken as light and fast moving metaphors and their activeness is taken as part of expression in the form. The exploration has more move towards un-conventional direction. Here are the concept which is chosen for further exploration.

Concept -6

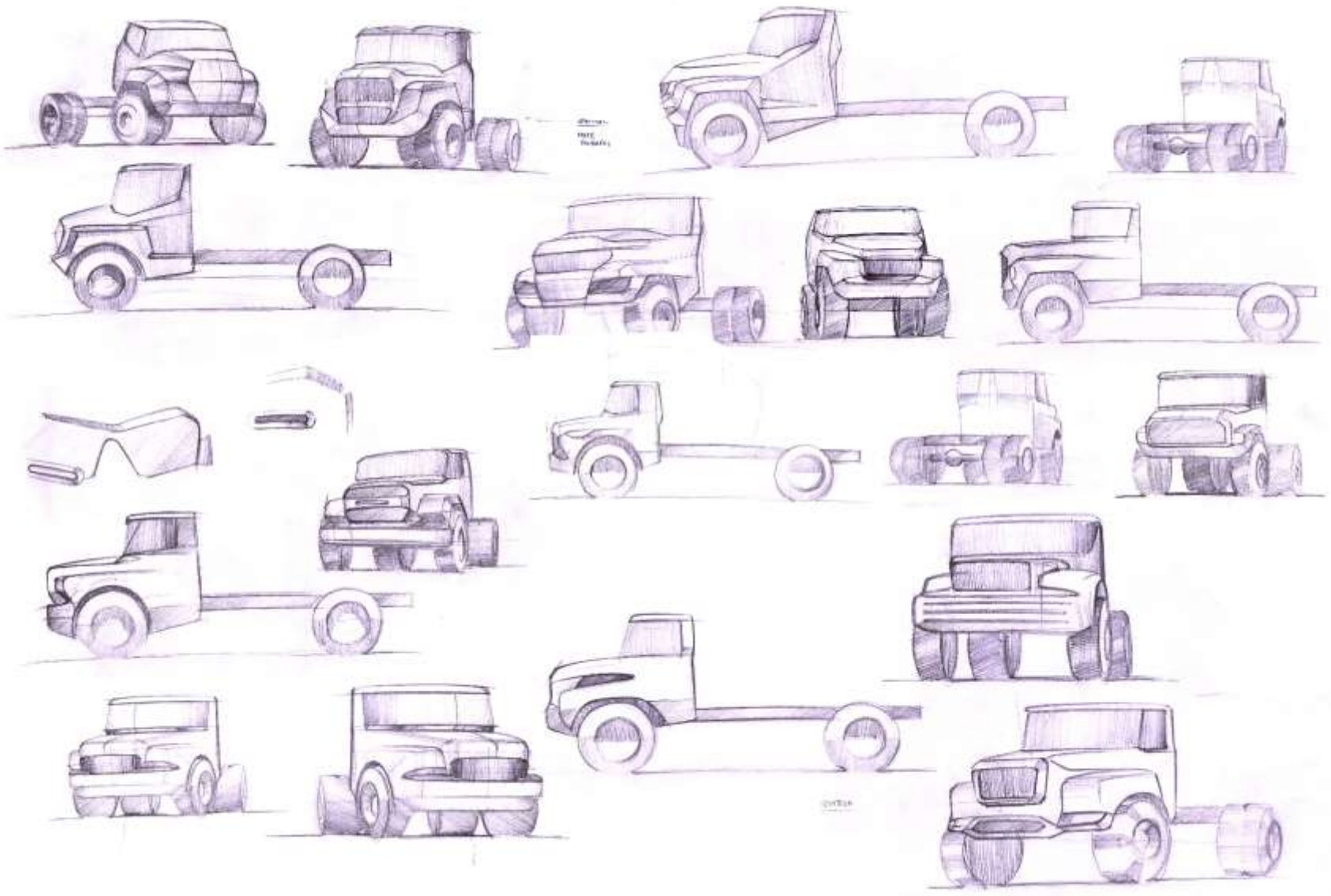
Concept-7

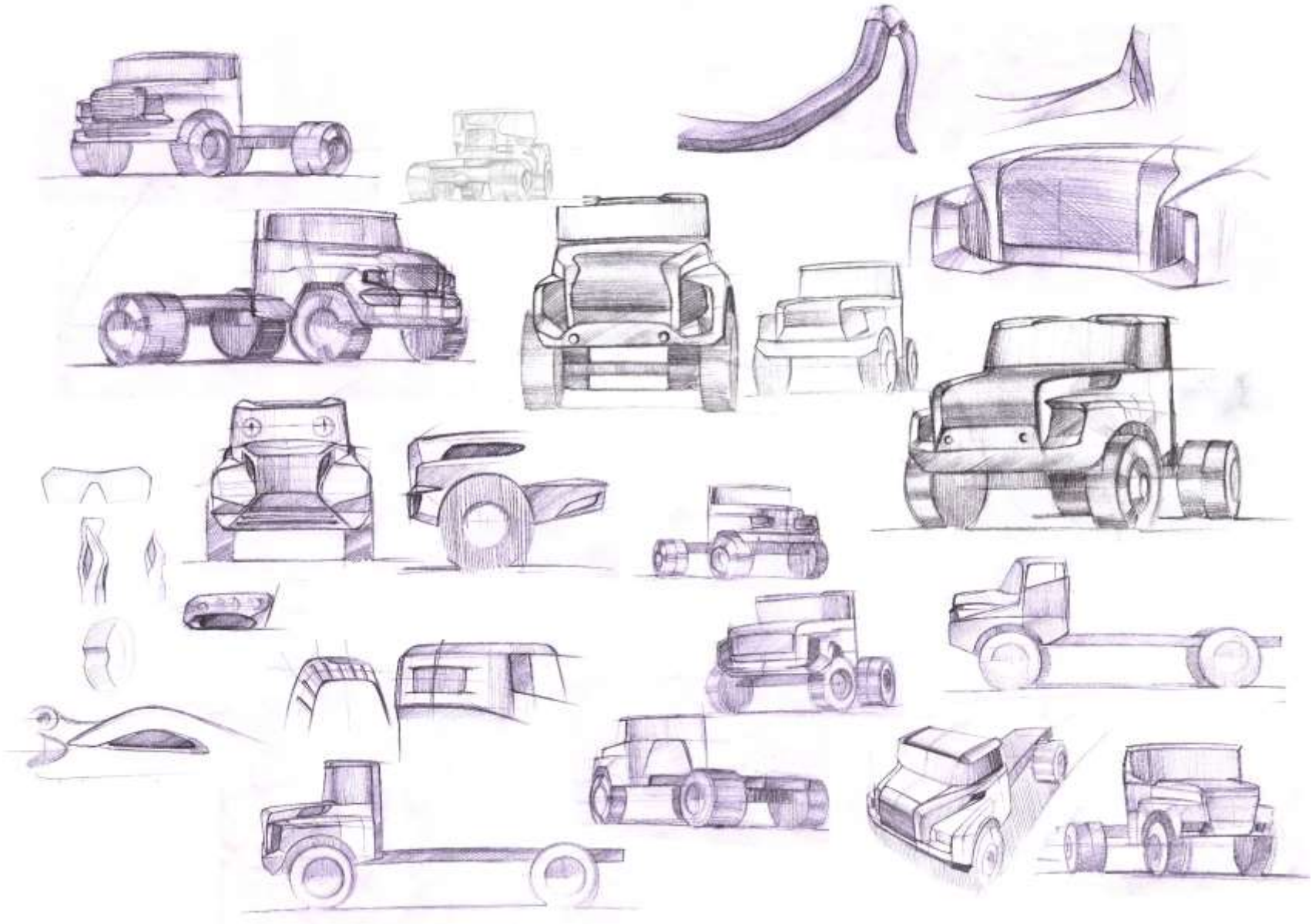
The few lines of concept 6 & 7 were taken in further exploration. The concept -6 has very sharp lines and also it expresses more aggression than concept 7 whereas concept -7 is more volume in the lower and flowier.

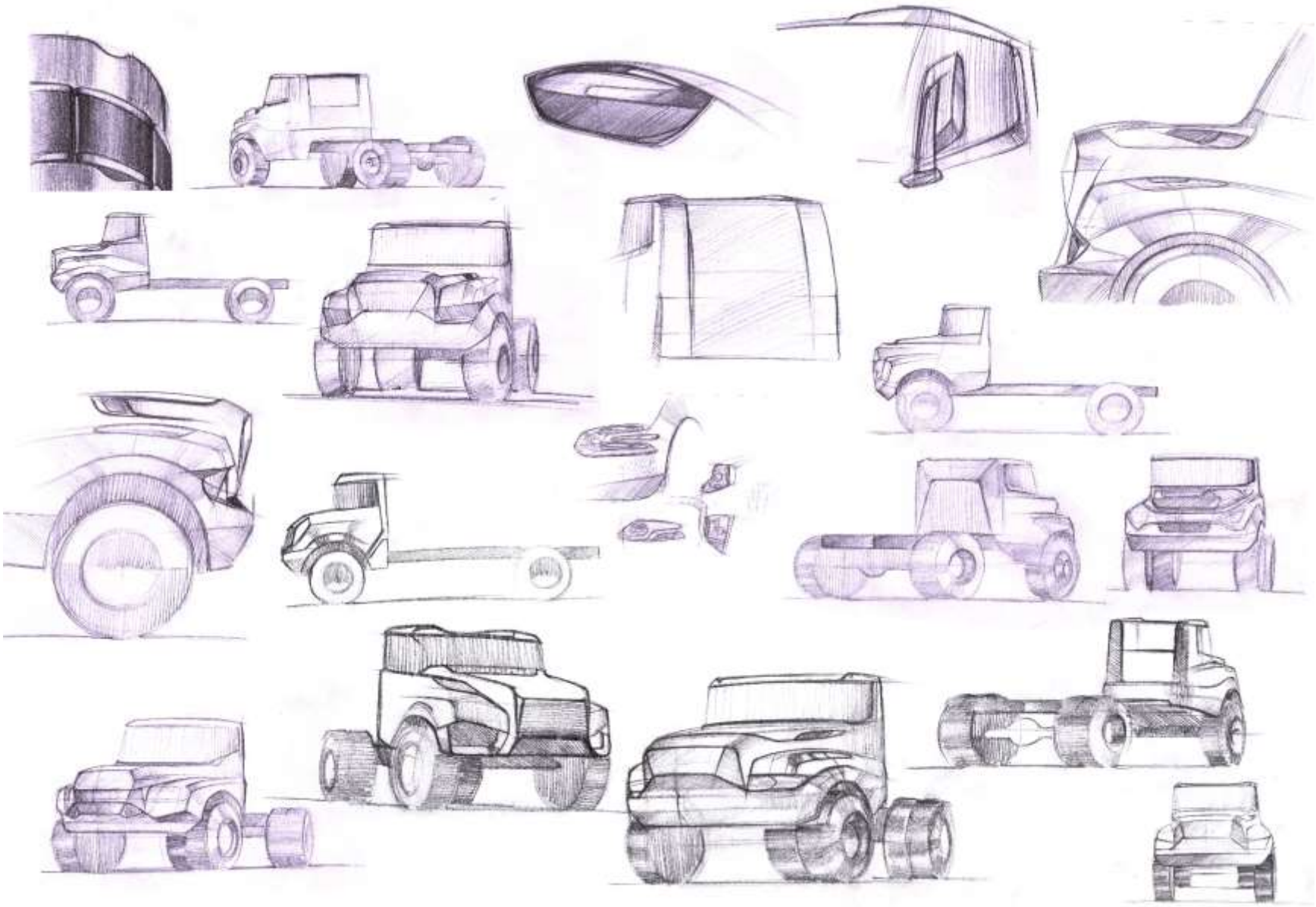
11. Image board

After exploration through metaphor exercise, further selected volume where explored through inspiration from image board. Three image board on Masculine, Dynamic and Rugged were done and on the basis of further exploration and refinement in the form were carried out in terms of detailing.

11.1 Masculine Image board

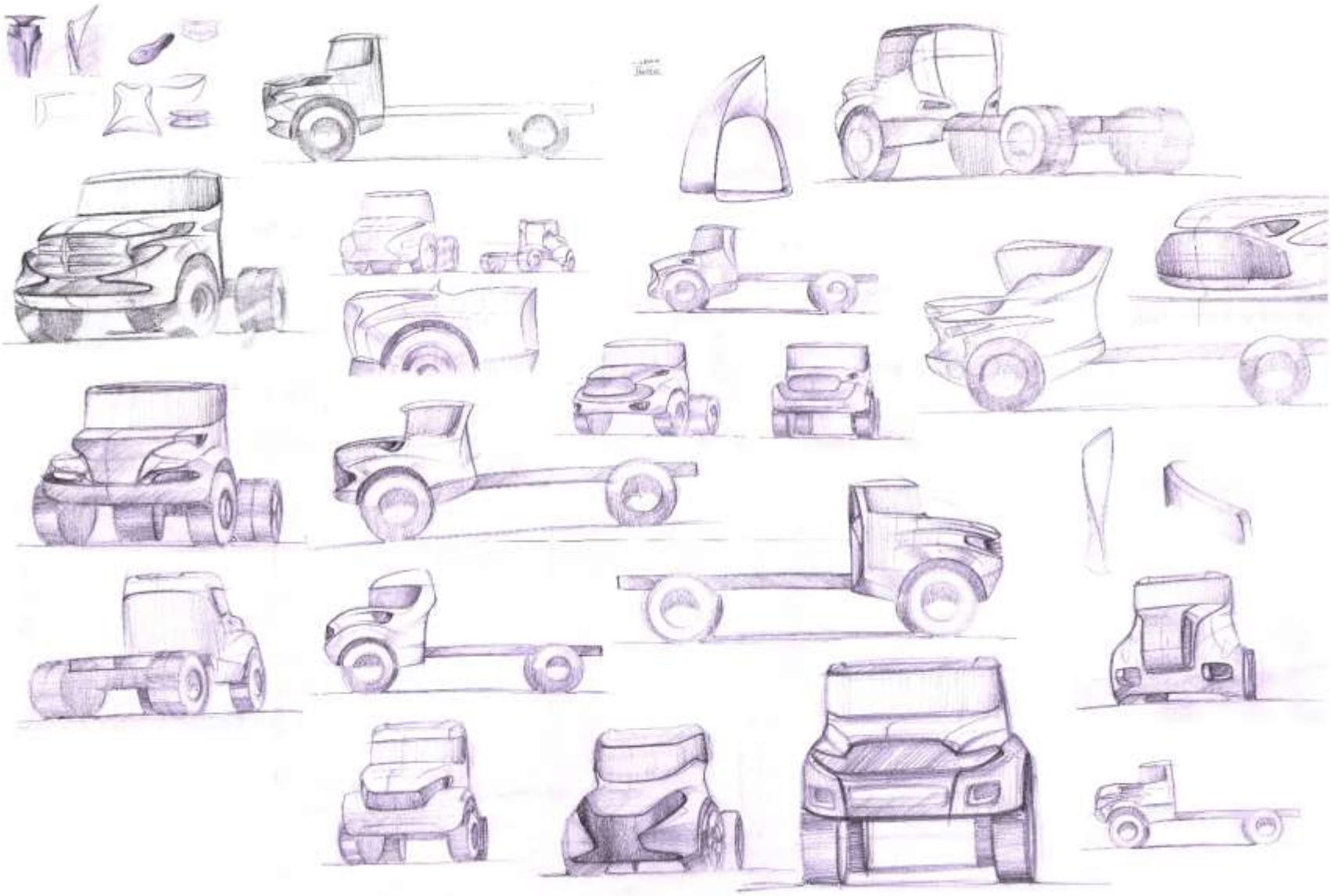


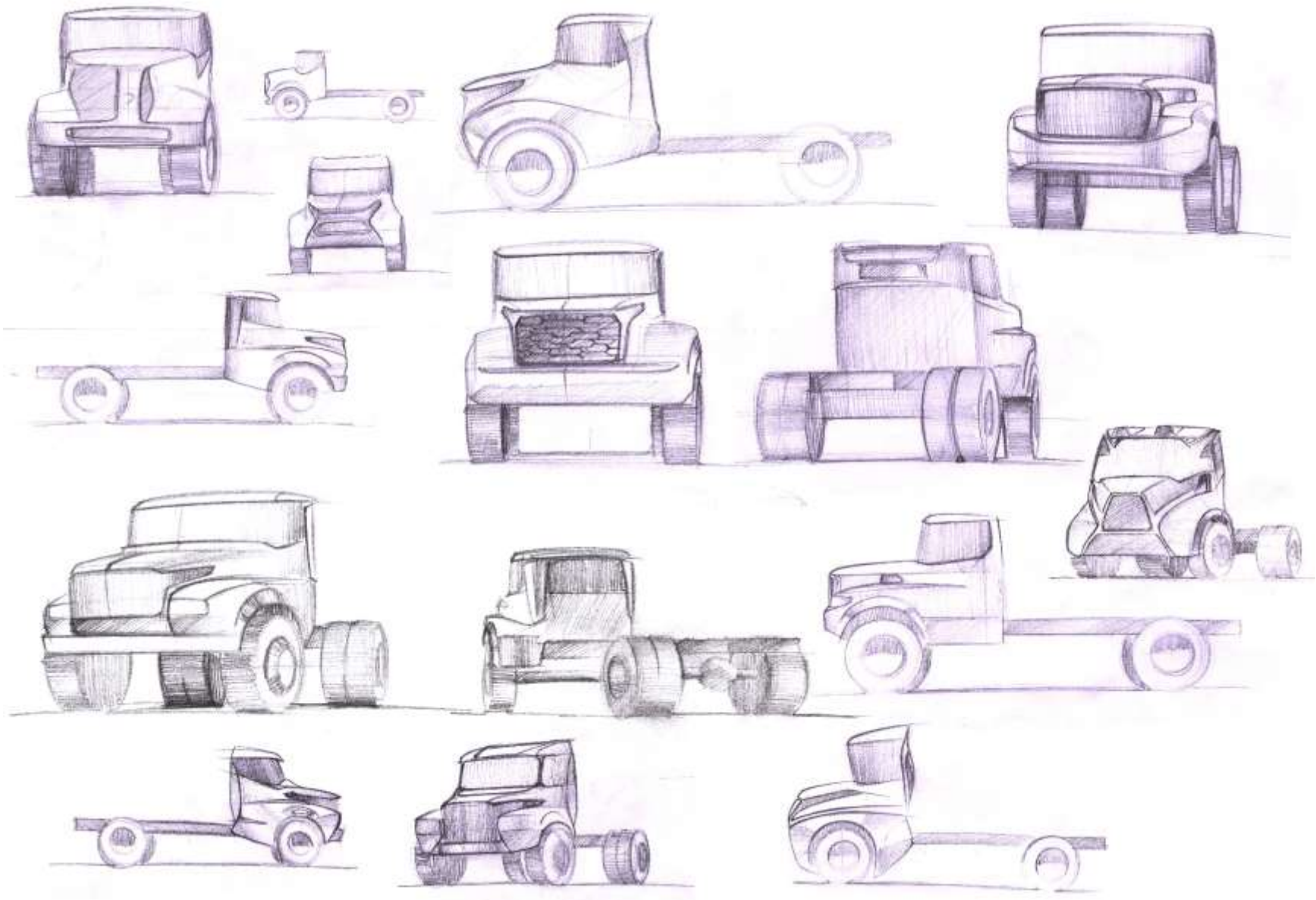




11.3 Concept-1

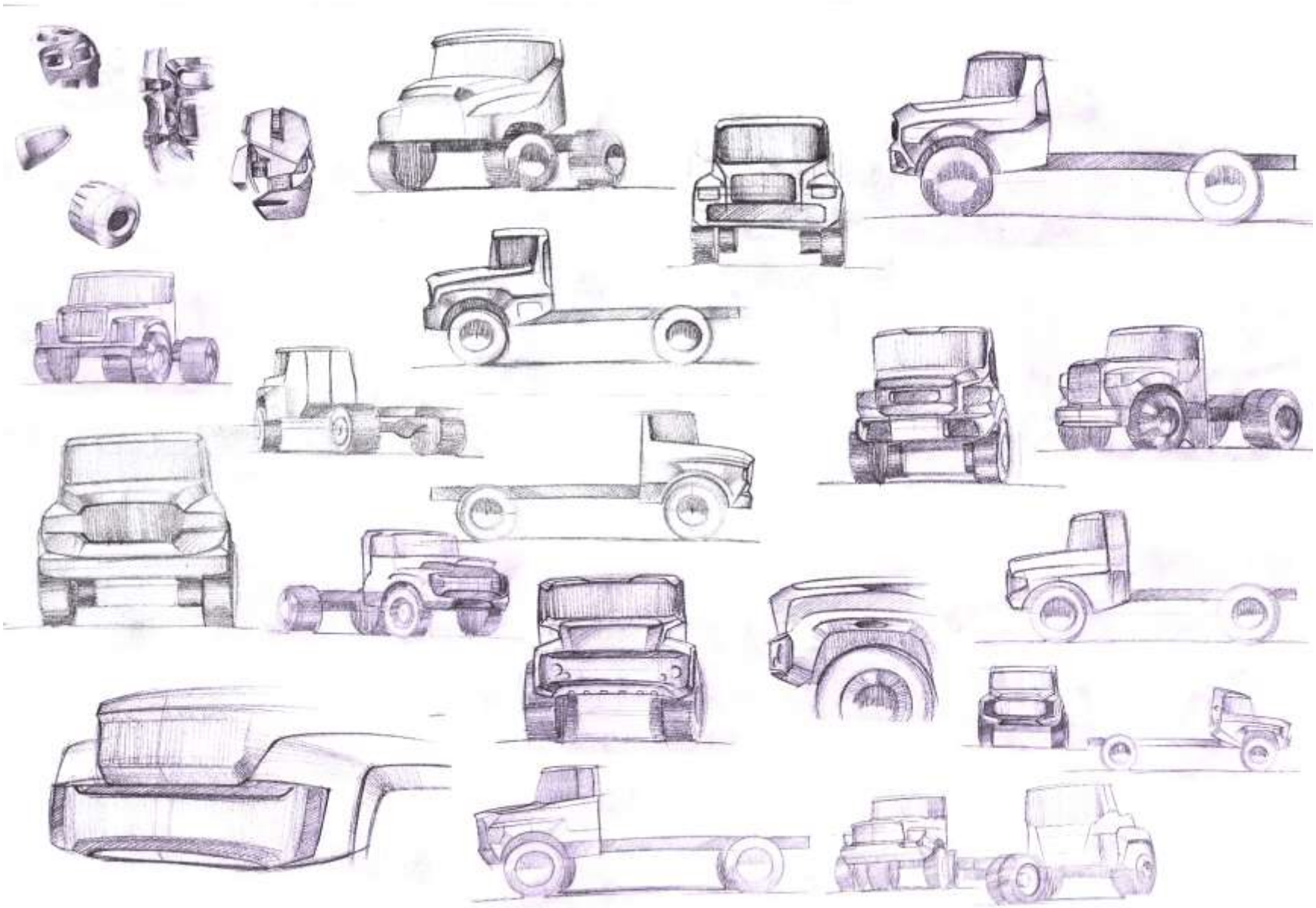
11.4 Dynamic Image board

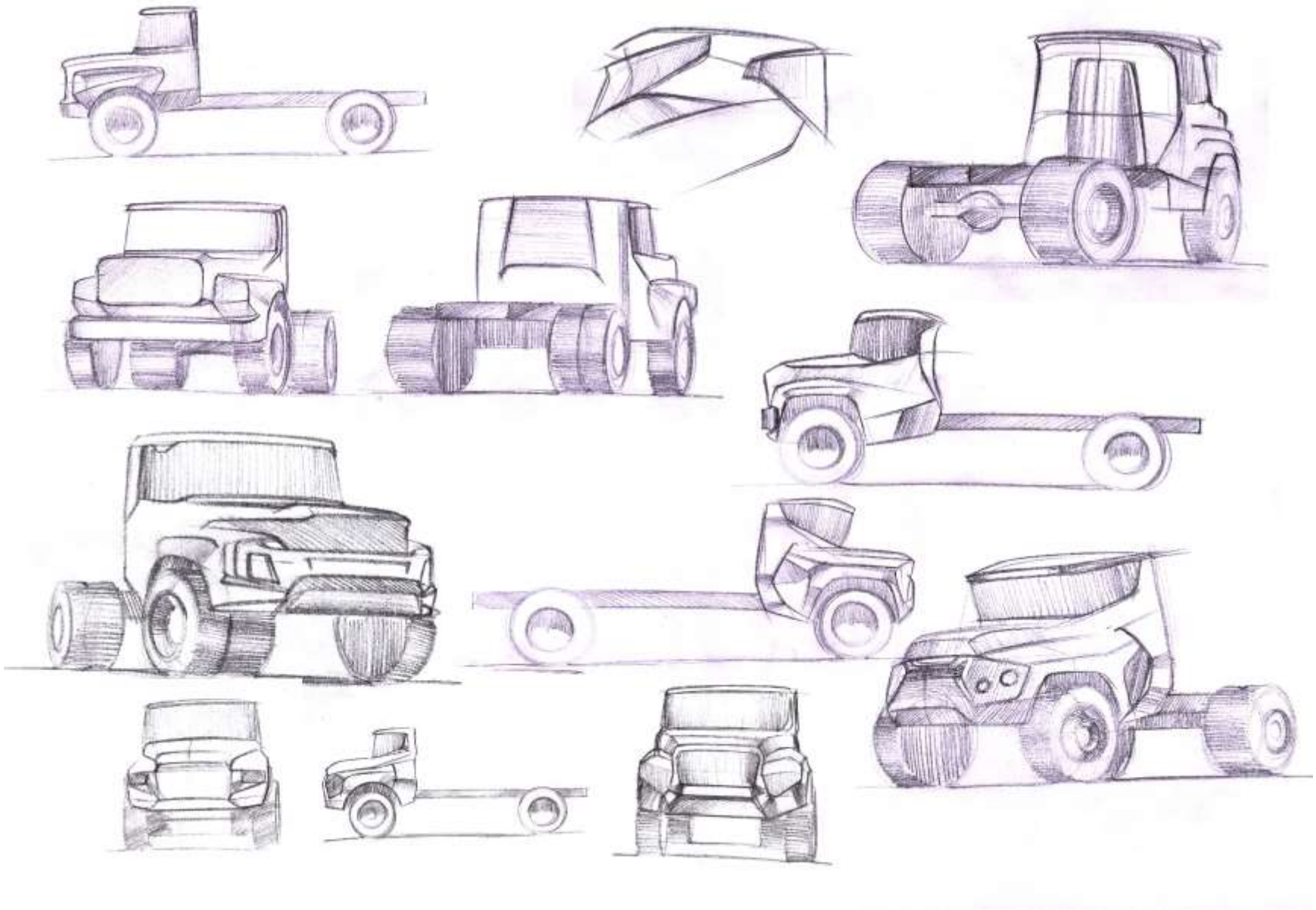




11.6 Concept-2

11.7 Rugged Image Board





11.9 Concept-3

12. Evaluation of Concepts

The concepts made on the inspiration taken from the image boards were shown to the user as well as design people. The evaluation is more of organic type. In which they were asked about their perception about TATA and which concepts among the three can become the brand identity of TATA. After evaluation the selected concept can be taken further for final refinement with adding details with packaging and functionality.

Concept-1

Concept-2

Concept-3

1. Patrick John

Product design

Concept-2:

Less complex form, more order, sophisticated, harmony of features.

Nikhil Kunnath

Mobility & vehicle design

Concept-1:

Volumes and proportion are good but rugged (concept-3) have better detailing

Amol Bhangre

Mobility & vehicle design

Concept-1:

Proportions are good and it has design form of existing truck. Stance conveys power.

Mr. Rajan

Design Innovation Centre

Concept-2:

It fits into the urban scape.

The truck is more dynamic.

Sridhar Geddala

Product design

Concept-3:

It is more like truck and heavy and

Paul

Product design

Concept-1:

Masculine is playing safe, since the existing design has been playing safe for the last 40 years.

Ajithlal

Mobility & vehicle design

Concept-3:

The front facia suits the TATA identity. It resembles the truck it is replacing.

Abhijit Chari

Product design

Concept-1:

Volume, form are relevant but it need some borrow from rugged.

Pankaj Kulie

Mobility & vehicle design

Concept-2:

Unconventional yet goes with TATA language.

Shreyas Barve

Mobility & vehicle design

Concept-3:

Simple front can Work

Md. Abdul Patel

Truck driver

Concept-2:

It looks new compared to other

Suresh

Truck driver

Concept-3:

Rugged looks more powerful truck

Ramesh Patil

Truck driver

Concpet-3:

It is new and details are good.

Mr. Sudeep

Project manager in Volvo

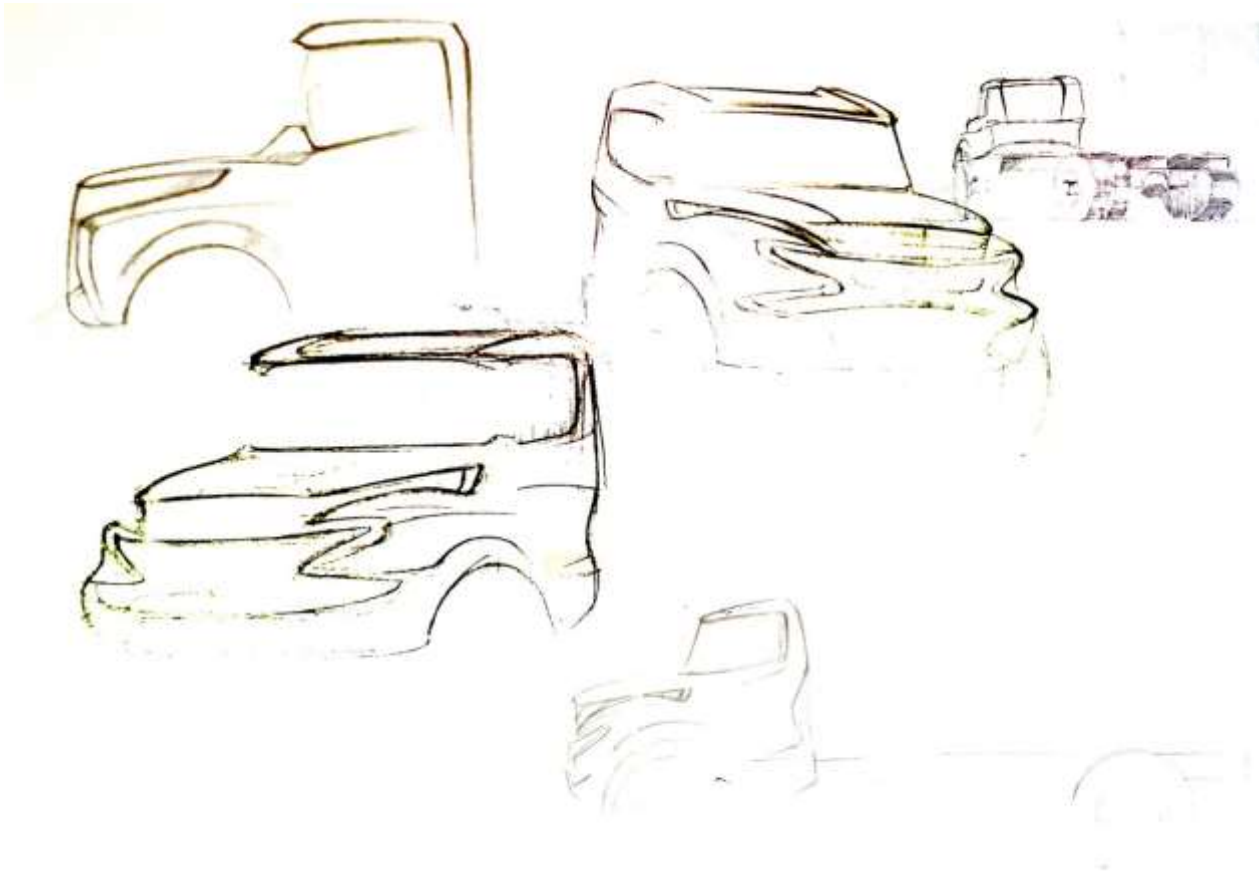
Concept-2:

13. Conclusion:

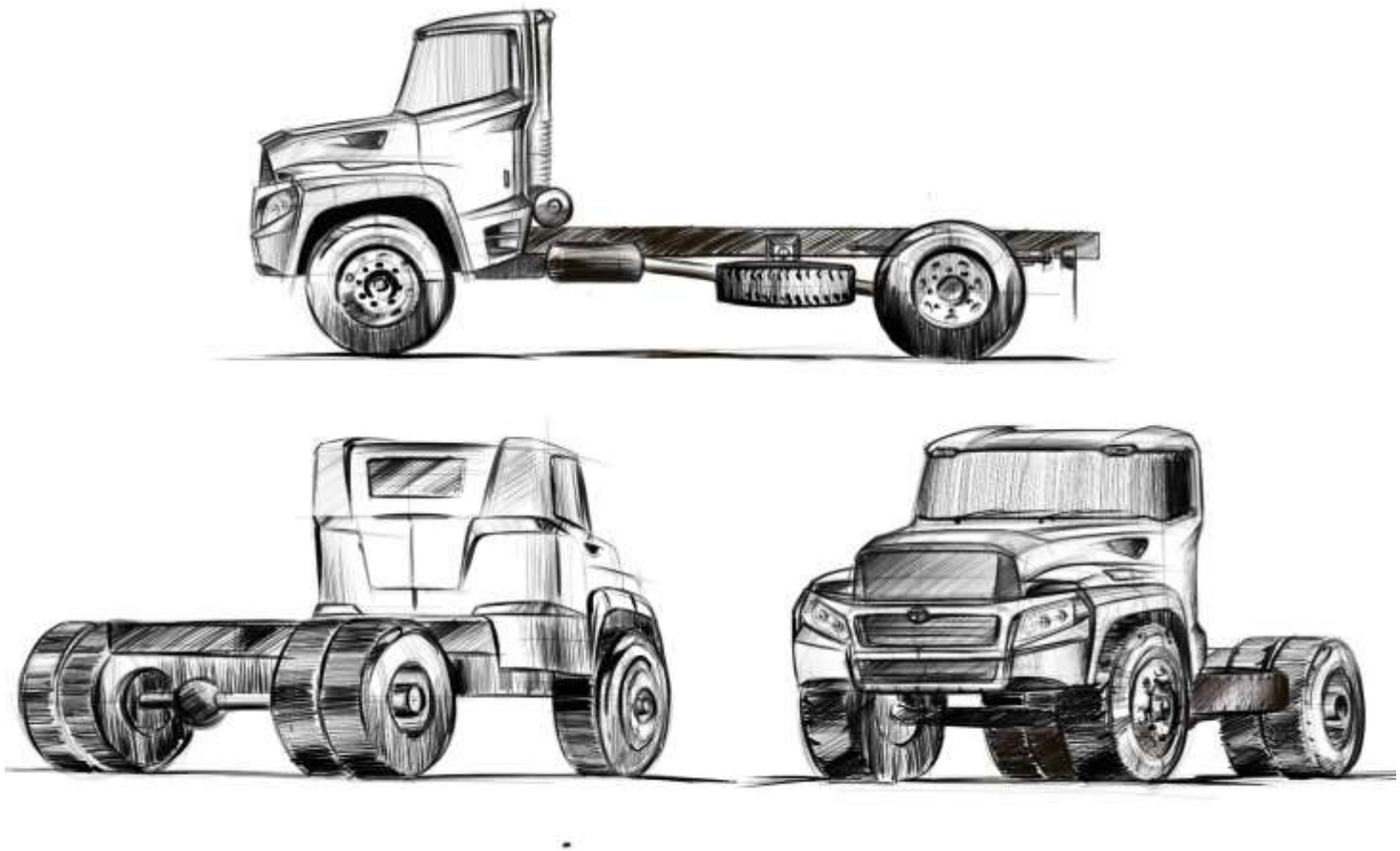
It can be concluded that after evaluation among all design concept 2 and 3 has maximum poll because of new stance in the concept-2 and detailing and rugged elements of concept-3. Both can be taken forward and combined into one form.

14. Final Concept exploration

According the conclusion and feedback, final concept exploration is carried out.

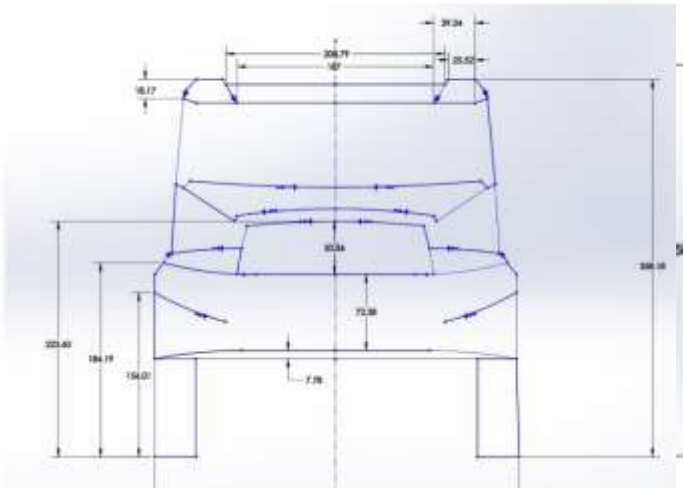


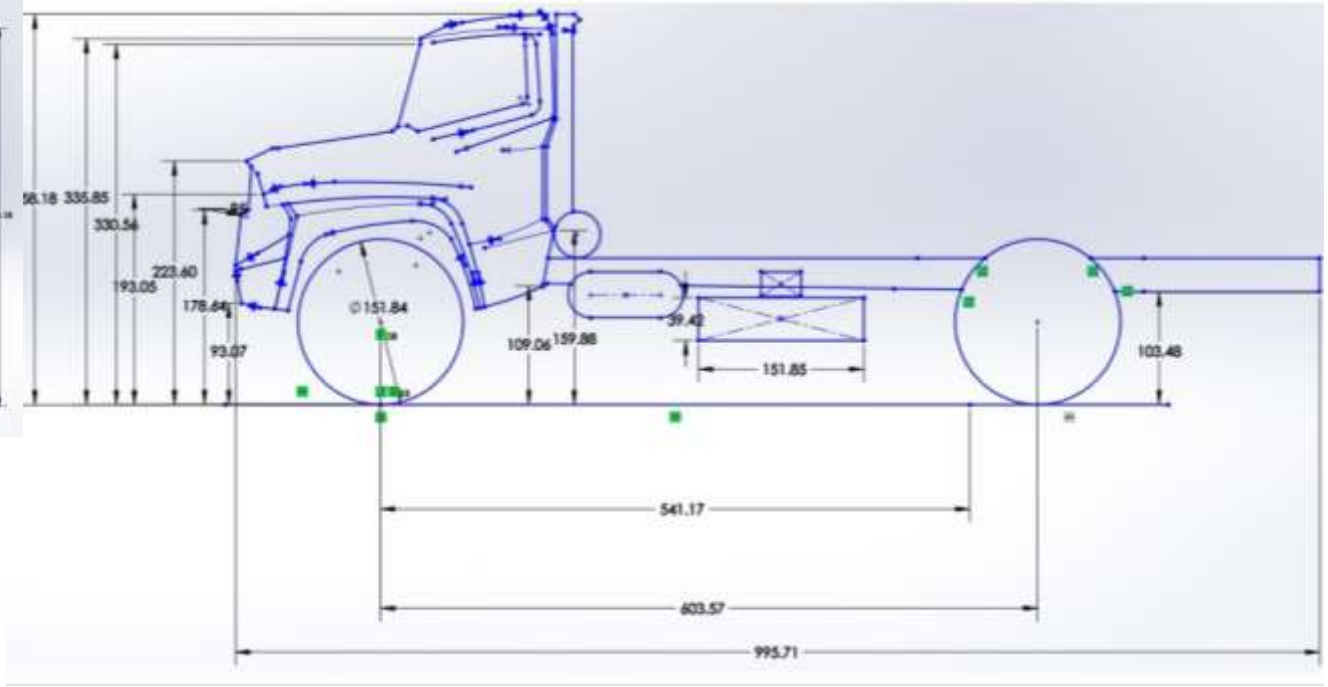
14.1 Final concept sketches



14.2 Final concept Rendering

14.3 CAD drawing of final concept





15. Clay modeling

Final Model (Scale – 1:7)

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