

DESIGN PROJECT 3

DESIGN OF NEXT GENERATION TRACTOR FOR YOUNG FARMERS IN INDIA



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Mobility and vehicle design

(2017 -2019)

Guide: Prof. **Sugandh Malhotra**

DECLARATION

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

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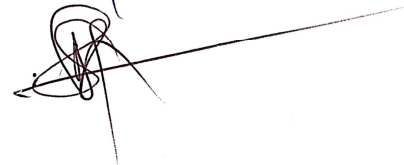
APPROVAL SHEET

This Mobility and Vehicle Design project entitled “Design of Next Generation Tractor for Young Farmers in India” by R.S.Mahesh is approved in partial fulfilment of the requirement for Master of Design degree in Mobility and Vehicle Design.

Project Guide :



Internal Examiner :



External Examiner :

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Date :

19/6/2019

CONTENTS

1. Introduction Phase	1
1.1 Introduction	2
1.2 Farmers and land size in India	3
1.3 Farm Mechanisation	4
1.4 Target Users	5
2. Research Phase	6
2.1 Tractors in India	7
2.2 Application of tractors	9
2.3 Tractor driver safety options	13
2.4 Extreme use of tractors in India	14
2.5 Tractor Silhouette study	15
2.6 User Research and kit	16
2.7 Agriculture in Tamilnadu	17
2.8 User feedback	18
2.9 Insights Through research	19
3. Design Phase	20
3.1 Design brief	21
3.2 Mood Board	22
3.3 Initial Sketches	23
3.4 Concepts and Ideations	26
3.5 Final concept	30
3.6 Renders	32
3.7 Drive line and driver packaging	35
3.8 Scale down model	36
4. Project time plan vs actual	39
5. Annexure – Individual user feedback	40
6. References	48

1. INTRODUCTION PHASE

1.1 INTRODUCTION

Agriculture in India is one of the major sector of Indian Economy having 18% of India's GDP. Farm mechanisation in India has reached 40 to 45% in which tractors form an integral part of farm mechanization and have a crucial role to play in increasing agricultural productivity. India is the largest in producing tractors. The technology and the aesthetics in the tractors are getting modern these days. Young farmers in India wanted to perform multiple applications with comfort using tractor and would like to see the tractor as a symbol of their life style. Hence this project is to design a next generation tractor for young farmers satisfying their aesthetic aspirations based on the user research with sample of young farmers in India.

1.2 Farmers and land size in India

Farmers distribution in India

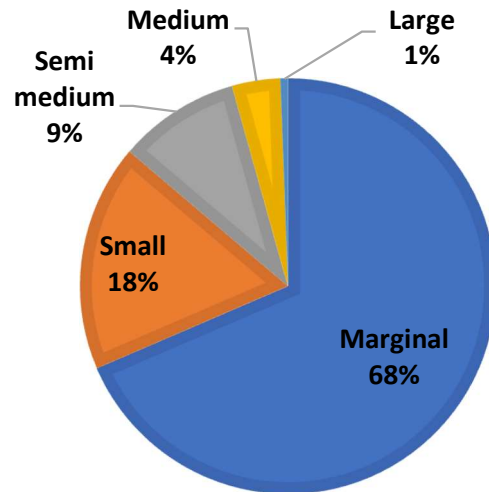


Fig1

India is the second largest country in farm output which has around 160 million hectare arable area. In India, average farm size is just 1.15 ha when compare to developed countries like US, Europe whose average farm size are over 200 ha. Farmers are classified based on farm holding size. Refer (Fig1).

Marginal farmer	– (Land holding size less than 1 ha)
Small farmer	– (Land holding size between 1 to 2 ha)
Semi medium farmer	– (Land holding size between 2 to 4 ha)
Medium farmer	– (Land holding size between 4 to 10 ha)
Large farmer	– (Land holding size more than 10 ha)

Tractors are mostly owned by Large, Medium and Semi-medium farmers. Marginal and semi- marginal farmers rent tractors whenever required for some specific operations. Though the population of Large, medium and semi medium farmers are just 15%, they produce more than 50% percentage of total farm output as they use tractors which increases the productivity. The ratio of farmers and farm output is shown in (Fig2) Average land size across India is shown below. Refer (Fig3).

Total crop producers

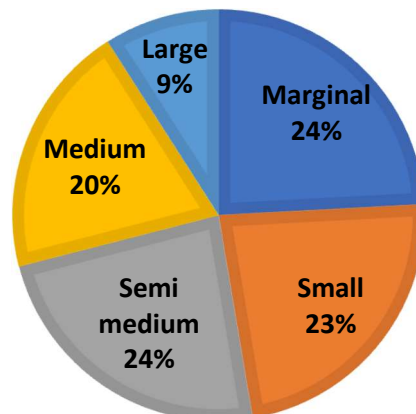


Fig2

Average farm size across India (1.15 ha)

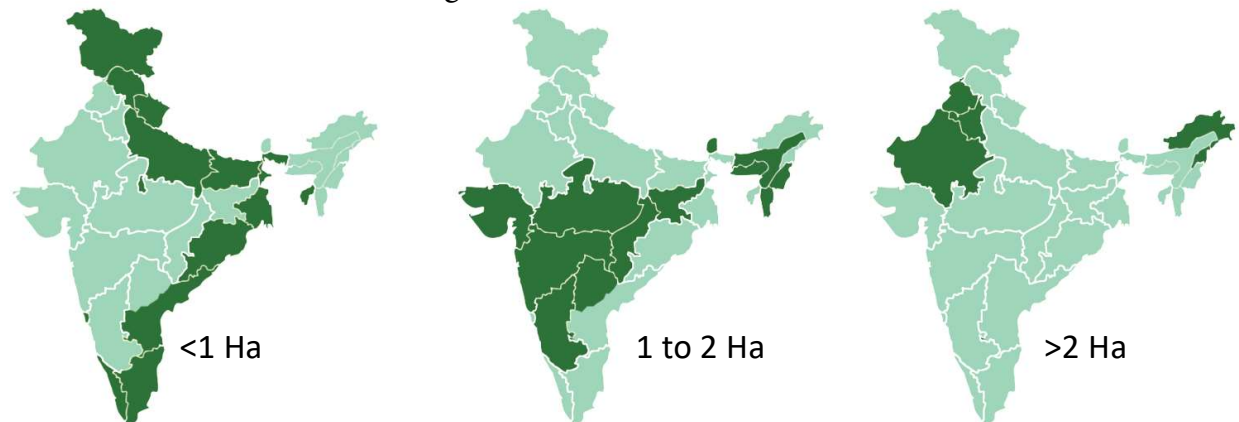


Fig3

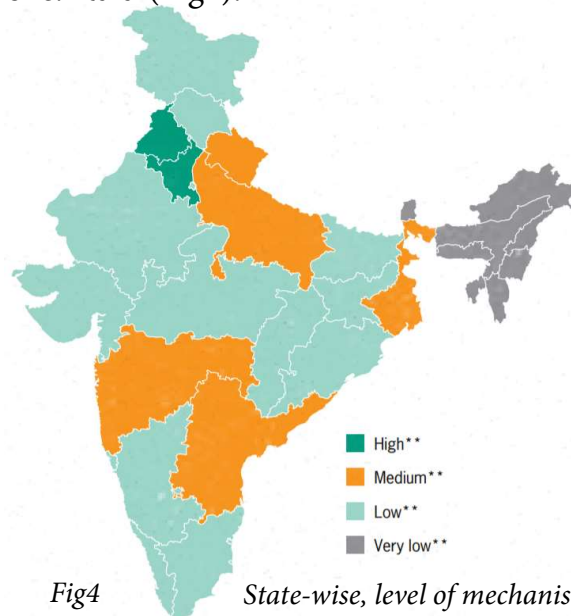
1.3 Farm Mechanisation in India

Farm mechanisation in India stands at about **40-45 percent**. This is low when compared to countries such as the US (95 percent), Brazil (75 percent) and China (57percent). [2]

North (Punjab, Haryana and Uttar Pradesh) have high level of mechanisation due to the highly productive land in the region as well as a declining labour force. The state governments in these states have also provided timely support in promoting mechanisation of farms.

Western and southern states in the country have a lower level of mechanisation due to the smaller land holdings prevalent in these regions as well as the land holding being more scattered. As a result, in many cases, mechanisation has been uneconomical leading to the lower development.

North-eastern states, the level of mechanisation is extremely low. The reasons are hilly topography, high transportation cost, lack of state financing and other financial constraints due to socio-economic conditions. Refer(Fig4).



Operation-wise, the level of mechanisation

- Soil bed preparation – 42% mechanised
- Seeding and planting, - 29% mechanised
- Plant protection – 34% mechanised
- Irrigation – 37% mechanised
- Harvesting – 65% mechanised

Crop wise, the level of mechanisation

Crop	Seedbed preparation	Sowing/ planting/ transplanting	Weed and pest control	Harvesting and threshing
Paddy	85-90	5-10	80-90	70-80
Wheat	90-95	80-90	70-80	80-90
Potato	90-95	80-90	80-90	70-80
Cotton	90-95	50-60	50-60	0
Maize	90-95	80-90	70-80	50-60
Gram	90-95	50-60	60-70	30-40
Sorghum	80-90	30-50	60-70	20-30
Millets	80-90	30-40	60-70	20-30
Oilseeds	80-90	30-40	60-80	20-30
Sunflower	80-90	40-50	80-90	60-70
Fodder Crop	80-90	20-40	80-90	10-20
Vegetable Crop	70-80	5-10	80-90	< 1
Horticulture Crop	60-70	30-40	40-50	< 1

Source: Country presentation paper, Agricultural Machinery Manufacturers Association (AMMA) India, October 2014

1.4 Target Users

Next generation young farmers look forward for more sophisticated tractors with greater aesthetics, reliability, manoeuvrability, comfort, and safety to suit their modern life style.

Old Farmer



- Most of the old farmer are not enough educated.
- They give less importance for tractor styling and focus only on the functionality of the machine
- Not updated with technologies. They do farming by traditional method and take less risk in selecting newer machines, breeds, pesticides, new methods, etc,.
- Most of the old farmers does only farming
- Life style is very traditional and old

Young Farmer (Target users)

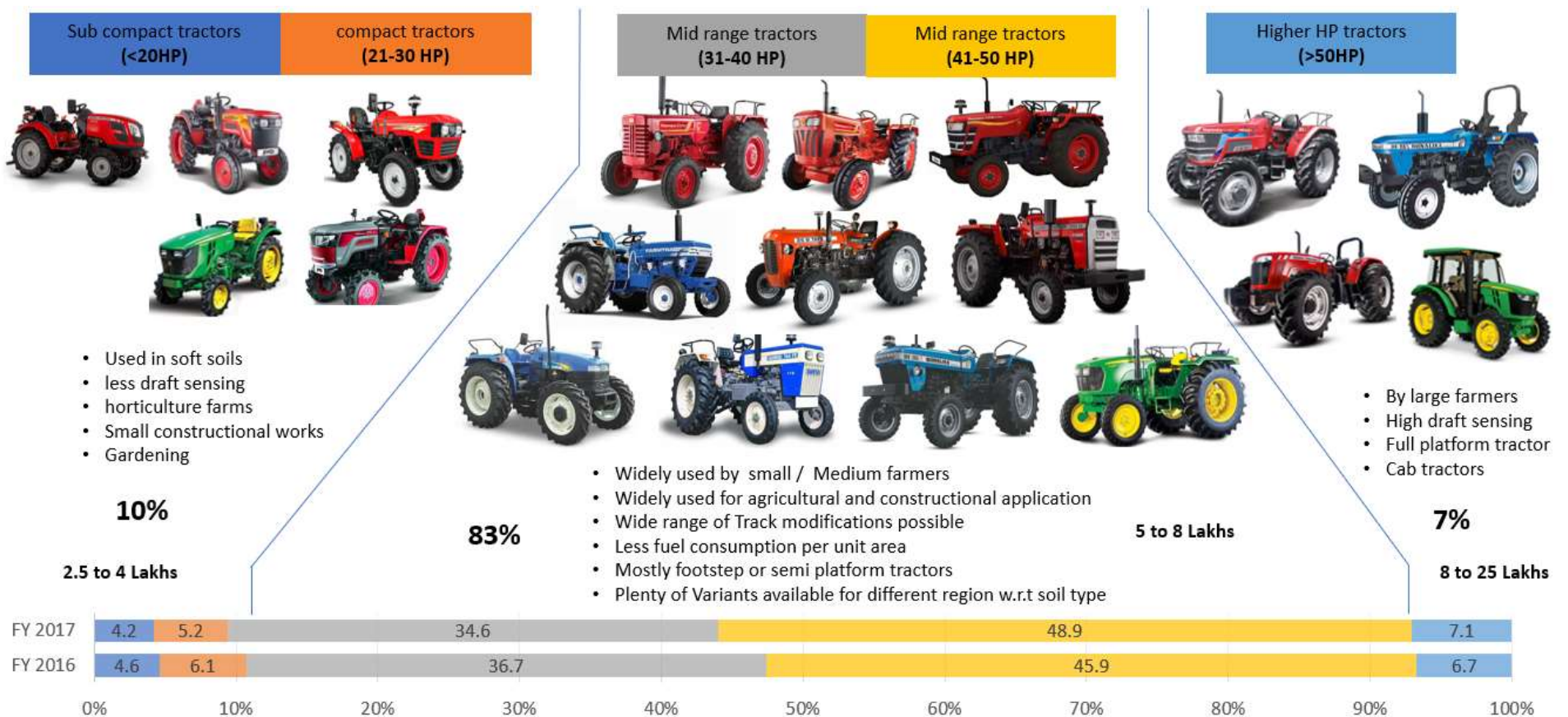


- Most of the young farmers are educated.
- They give importance for both functionality and also styling of tractor
- They learn farming from previous generation and also through technologies, tries traditional and new methods, They explore new breeds, pesticides, new methods, etc,.
- Most of the young farmer does multiple profession
- Life style is modern

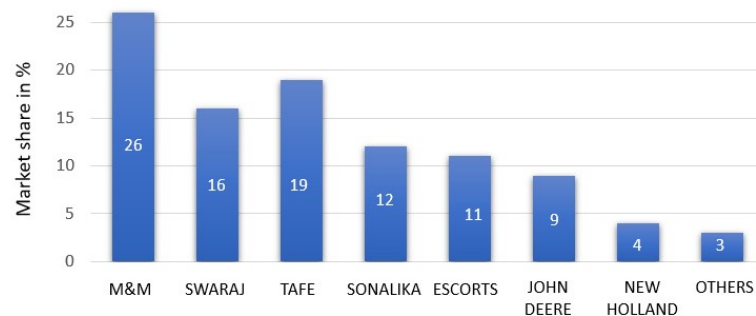
2. RESEARCH PHASE

2.1 Tractors in India

In India high selling tractors are between 30 to 50HP as it can perform various application with economical cost investment. The below chart shows the different HP segment and tractors in India.



Manufacturers in India



Current tractor population in India has reached 5.3million tractors. Approximately 7 lakhs tractors produced in . FY 2017- 2018. Forecast says tractor production will further increase as there is good scope of increase in farm mechanisation. As of now the power penetration rate through tractor across India is 1.3hp / ha.

Tractor Design before and after 2000

Couple of decades before most of the tractors were with semi tooled up hoods and fenders as the importance for styling was less, But now the young farmers wants their tractor to look good as similar as their personal passenger vehicles. Hence tractor manufactures started designing the hoods and fenders with good styling intent . The below images shows the difference between tractors designed before and after 2000.

Designed before 2000



- Semi tooled up hoods and fenders
- flat hoods and Common fascia for many variants
- still in production as these are proven models in terms of performance and cheaper in price
- Rectangular or round head lights are used
- Less tooling cost

Designed after 2000



- Fully tooled up designed hoods and fenders
- Mostly Trooping hoods
- Specific design for specific projects
- Free formed /Square /round head lights are used
- High tooling cost

2.2 Applications of tractors

Mostly tractor are used for agricultural applications. Also used for constructional and commercial purposes. Front or rear mounted implements will be attached with tractor to perform any kind of applications. Different implements are used for different application. Powered implements are operated through PTO or hydraulic pumps. Most commonly used operation and implements in India are given below.

Agricultural application

1. Soil bed preparation

Tractors are mostly used for soil bed preparations. Different implement are used based on the soil type. Basically the soil is prepared under dry or wet condition which depend on the soil hardness and the crop which is planed to grow. For hard soil – MB plough, tiller and rotavator are used. For soft soils disc harrow and rotavators are used. In recent days Rotovator are used for all types of soil as it is a power implement and it pulverize the soil. There are trailed implements and powered implements. Half cage and full cage wheels are used for puddling operations. Different soil preparation implements are listed below.

MB (mouldboard) plough
Reversible MB plough (Pic3)
Leveller
Laser Leveller
Tiller
Duck foot shovel

Disc plough
Disc harrow
Power rotovator (Pic4)
Power harrow
Full cage wheel (puddling) (Pic5)
Half cage wheel (puddling)



Reversible MB plough



Rotavator to pulverise the soil



Puddling operation

2. Seeding / Planting

Seeder(different sizes)

Trans planter (paddy)

A Seeder / planter is a farm implement, usually towed behind a tractor, that sows (plants) seeds in rows throughout a field. It is connected to the tractor with a drawbar or a three-point hitch. Planters lay the seeds down in precise manner along rows. Planters vary in size depending crop and tractor size.



Seed drill implement used to sow grains

3. Crop maintenance

Water pump for irrigation

Sprayer (Irrigation / Pesticides)

A centrifugal water pump made as an implement which can be mounted at 3 point linkage to irrigate water from pond, canal, river, etc,. A sprayer is an Implement attached to the rear to spray a liquid, where sprayers are commonly used for projection of water, pesticides, and fertilizers on crops.



Tractor with spray irrigation

4. Harvesting

Reaper

Crop based combined harvester

Potato harvester

Sugarcane harvester

Sugarcane infielder

A reaper is a farm implement that reaps crops at harvest when they are ripe. Usually the crop involved is a cereal grass. Combined harvester is huge machine where the reaping and thrashing happens in sequence the moving machine . Harvester varies based on crop and its size.



Combine harvester harvesting paddy

5. Post harvesting

Thrasher
Shrub cutter
Mulcher
Shredder
Shredder blower
Baler

Thrasher is static implement where the harvested crops are thrashed to separate the seeds from the plant.



Thrasher

Mulchers – pulverise the harvested plant into the soil which improves the fertility of the soil,

Shredders – cuts the remaining portion of harvested plants or grown weeds

Balers – bundle the straw in cuboid or cylindrical form. and trailers - toed container.



Banana mulching operation

Trailer is toed container which comes with single axle, multi axle , and tipper depending on the load capacity



trailer loading harvested crops

Constructional / commercial application

Trailer (single / multi axle)
Trailer tipper
Back Hoe
Front end loader
Dozer
Concrete mixer
Trench digger
Compressor
Post hole digger

Trailers are also used for commercial purpose. Dozer, front end loader, back hoe, compressor are widely used for constructional purposes. Tractor manufacturers design specific tractors specially for haulage uses which gives better fuel consumption when compare to farming operations. The below chart show the commonly used the post harvesting implements and constructional implements.



Post hole digger



Front end loader



Air compressor



Back hoe

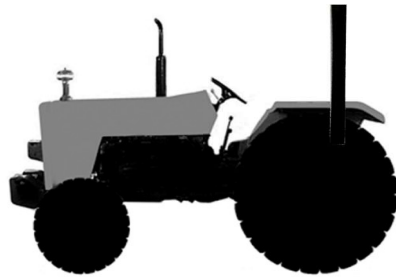


Trench digger



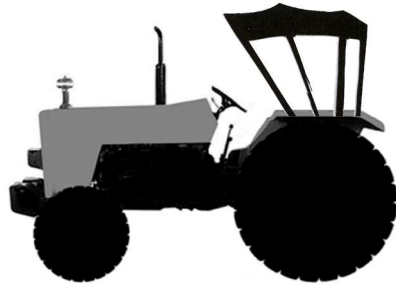
Trailer

2.3 Tractor driver safety options



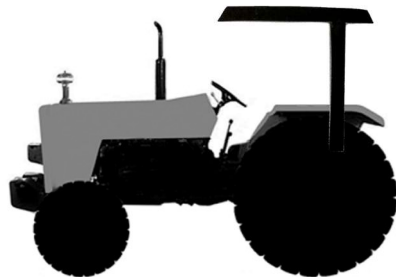
Tractor with ROPS (Role Over Protection Structure)

In India ROPS are slowly getting basic mandatory safety requirement. When the tractor topples the driver zone is protected by ROPS. Seat belt can be used only when ROPS is fixed in the tractor, else it is very difficult for the driver to escape.



Tractor with Canvas Canopy

Canvas Canopy is used mainly for sun shade. OEM stopped producing these canopies as it become old style. But still canvas canopies are fixed as accessories at dealer end and workshops as per customer choice. The structure is not strong enough as ROPS.



Tractor with Hard Canopy

Hard canopy is made of steel which can protect from heavy stones during constructional work, also for sun shade. It is basically a bolt on roof over ROPS. This is an optional accessories. There are customer who fix FRP or Plastic canopies from local dealers just for sun shade.



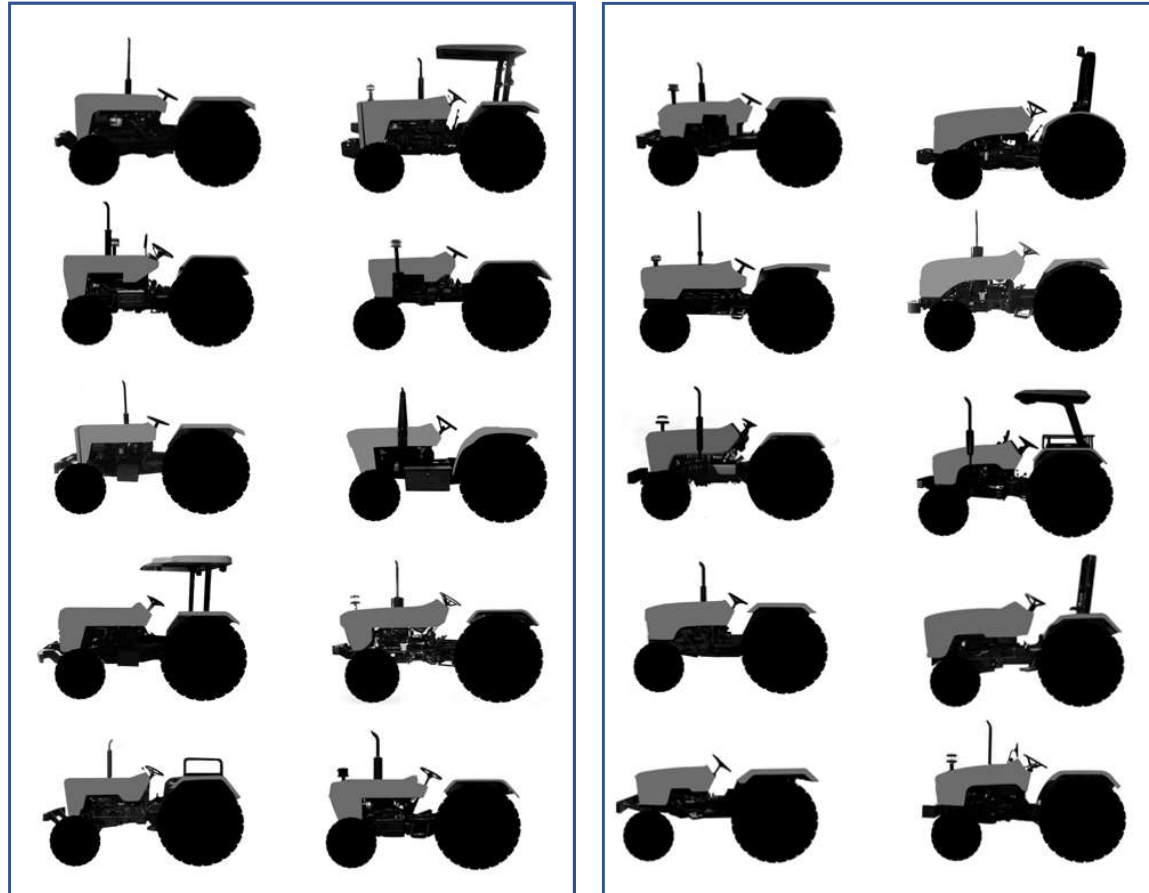
Tractor with Cabin

Cabin tractors are highly comfortable as it can have air conditioning system. In India its very rare to see a cabin tractor as it is very costly. In future farmer may prefer cab tractors to get protected from hot weather.

2.4 Extreme use of tractors in India

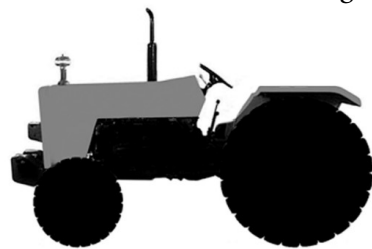


2.5 Existing tractors silhouettes in India (30 to 50 HP)

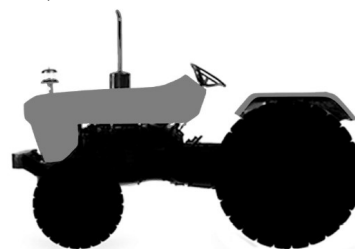


Old design (before 2000)

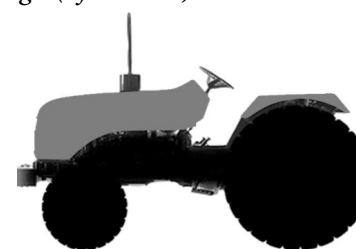
New design (after 2000)



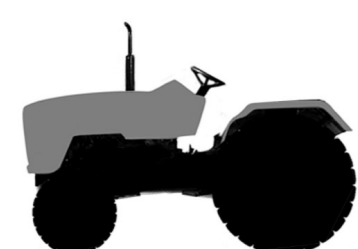
Boxy and horizontal
hood



Boxy with slight
inclined hood



Curvy with bigger
rounds



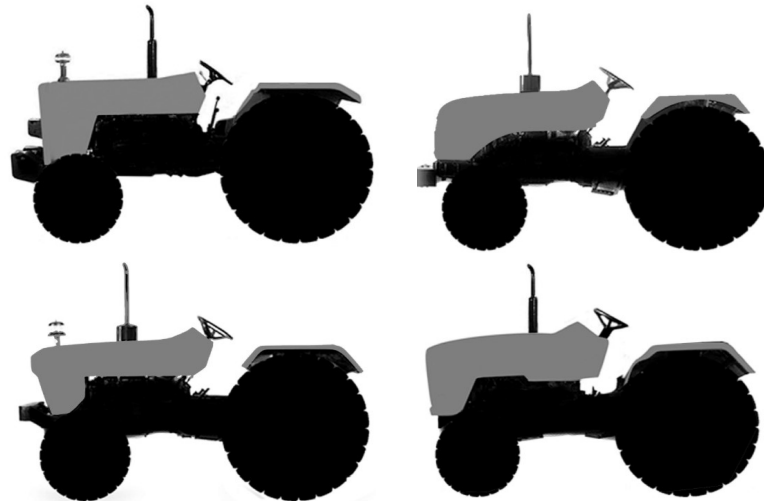
Curvy with sharper
rounds

Different tractor silhouettes of 30 to 50 HP segment is shown here. Most of the old tractors are edgy and almost all are straight hoods gives a nose up stance. The main functional reason to have straight hoods are to have effective packing under hood with simple cuboid sub components like fuel tank, battery, etc... New tractors are with curvy trooping hoods as modern cars and hence the under hood components also follow the styling. From all these tractors four particular silhouette picked which stands different from each other. 1. boxy, straight edges with horizontal hood. 2 boxy with slight trooping hood 3. curvy with bigger rounds. 4. curvy with sharper rounds. In tractor Hood and the fender are the A surface skin panels. In India, 99% Fender top surface are flat, as the farmers use to sit over fender.

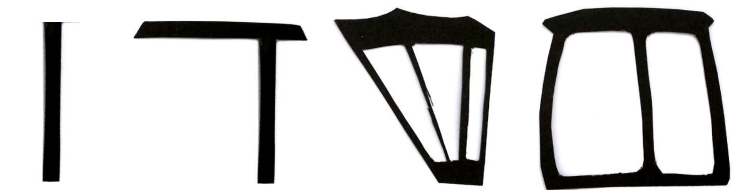
The main reasons for change in silhouette is because change in manufacturing technology and the user aesthetic aspiration

2.6 User research and kit

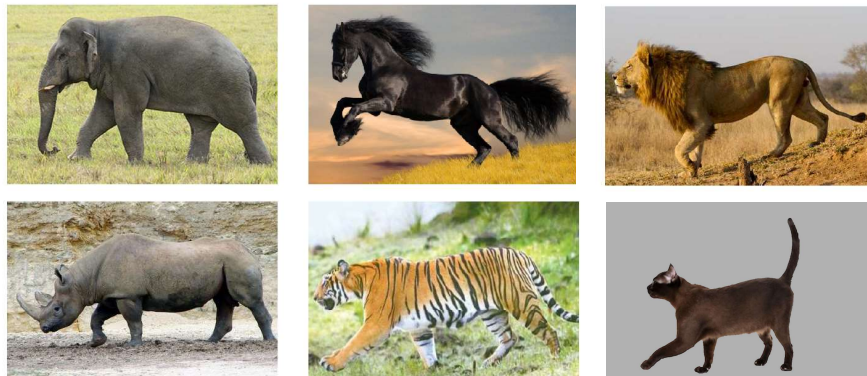
User research was conducted in Tamilnadu. Along with semiformal questionnaire below shown kit were shown to farmers and asked to select their preferences in terms of styling aspirations and in term of safety and comfort. Targeted users are within the age limit between 25 to 45. Educational background, personal vehicle, reason for doing farming were collected. And their life style were observed.



existing tractor silhouettes



ROPS Hard canopy Canvas canopy Cabin
Choice of Driver safety and weather protection

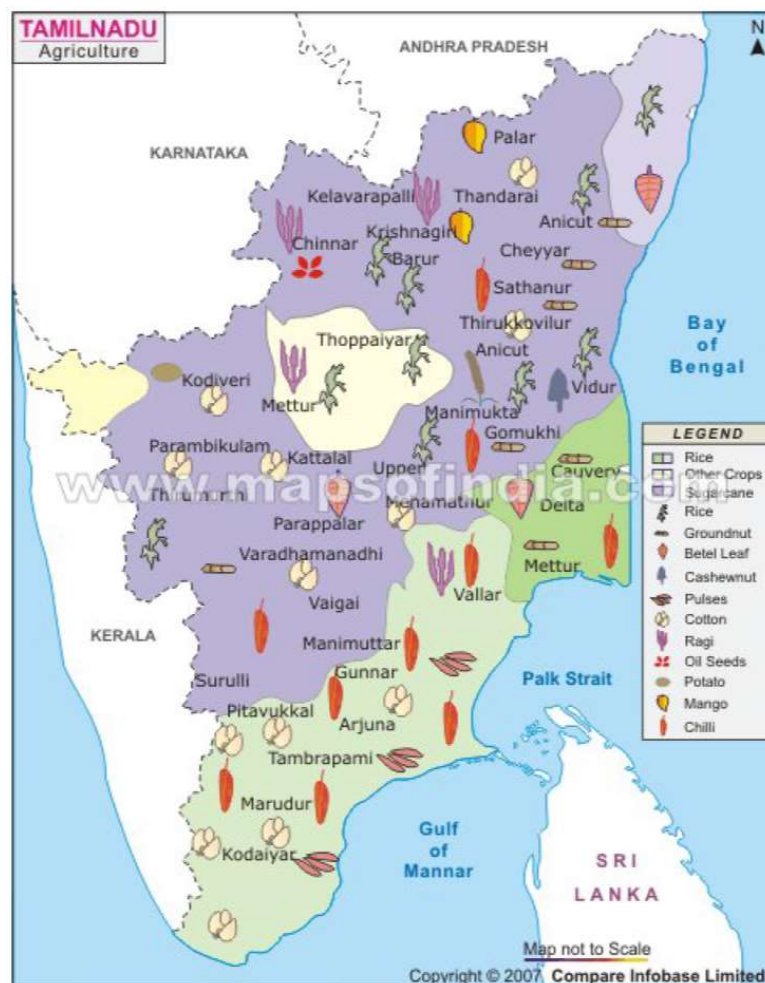


Choice of animal stance resemblance in the tractor



Choice of colours for tractor exterior

2.7 Agriculture in Tamilnadu



In Tamilnadu, the Important food crops that are cultivated likely rice, maize, jowar (cholam), bajra (cumbu), Red gram, Green gram, ragi and pulses. The cash crops like sugarcane, oilseeds, cotton, coffee, tea, gingelly, rubber, coconut and chillies. Mostly produced horticultural products are bananas and mangoes only. The state which is the largest producer and cultivator of flowers, bananas, tapioca, the second largest producer and cultivator of mangoes, coconut, natural rubber, groundnut and the third largest producer and cultivator of tea, sapota, coffee and sugarcane. Tamil Nadu's cultivation yield of sugarcane per hectare is the highest yield in comparing to the other states of India. Paddy is the most leading crop in Tamil Nadu and is found in 3 kinds namely Kuruvai, Thaladi, and Samba that varies from season to season. River tanks and wells are the main source of irrigation. The major soil groups of Tamil Nadu are : Red soils, (62 per cent), Black soils (12 per cent), Laterite soils (3 per cent) and Coastal soils (7 per cent)

Kharif Crops (June - September)

Rabi Crops (October – March)

Zaid Crops (October – March)

All time Crops

Largest grown crops in Tamilnadu



2.8 User feedback (sample)

A sample user feedback is shown below. Rest of the feedback attached in the **Annexure** (Refer Page. No. xxx)



Mahesh , 30

Place – Periya mullaivoyil, Tamilnadu

Farm area – 10 acres

Crops - Paddy and water melon

Farming – Fulltime Farming and Travels with brother

Current Tractor – MM 275 di

Personal vehicles – Innova / Thunderbird / Unicorn

Annual income – 8 to 10 Lakhs

Education – Diploma



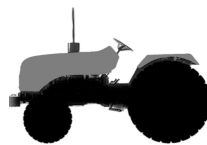
Purpose of Tractor – 80% agriculture, 20% haulage

Preferred HP range –45 to 50HP suitable for all application

Budget limit for new tractor - up to 6 lakhs

Problems faced in tractor – Front lifting , need front bumper with weight. Fender front guard is less . stones thrown on the legs from rear tyres

Preferred silhouette in terms of styling -



Stylish and modern (looks like a car styling)

Which animal should resemble the tractor exterior styling -



Very aggressive

Driver should be Protected with -



Looks More stable , Protects from accidents

Feel of using tractor - Proud, (want to drive modern and aggressive tractor)

Most celebrated - Harvest season and temple festivals

Luggage space –fenders and on the implements

Accessories preferred - Hard canopy with ROPS, Front weight,

Semiformal Questionnaire

6

Name/Age Mahesh/30
Place Periya mullaivoyil. 10 ac.
Education Diploma
Profession Farming / Travels.
Crops Paddy / W.M.
Purposes / applications of tractor 80% Agri - 20% haulage 8-10 lakhs
Which tractor you own now? Mahindra 275 di.
Which tractor you would buy next? Why? Mahindra 275 35.
What is your budget limit/HP range? 45 HP to 50 HP (up to 6 lakhs)
What kind of tractor you will buy if you don't have any budget limit? Why? ROPS tractor.
What are all the ergonomical discomfort you face in your tractor? front lifting, Move Vibet, stones, fender.
What are all the safety concerns you face in the tractor? ROPS, front bumper, front guard.
Which type of styling, you prefer from these silhouettes? Why? Stylish and modern, latest style, stones thrown on legs.
Do you prefer canvas canopy / ROPS with hard canopy / Cabin? Reason? More stable / Protects from accident requirement.
Which animal should closely resemble your tractor from outside? Reason? Other styling? Tiger - Aggressive.
How do you feel when you drive / own the tractor? Proud - Young farmers will look.
Most celebrated season / applications which gives a different feel? Modern looking tractors.
Prioritise the colour choice available in the pallet. Temple festival, harvest season.
How much importance you give for styling (1 to 10 scale).
Why Styling is important for you? Proud/Green.
Space for luggage On the implement and fender.
List of accessories fitted and like to fit. Hard canopy with ROPS/front weight.
Personal vehicles Innova / Thunder / Unicorn.

Experiment with user



2.9 Insights from User research

- Most of the young farmers are educated and interested in full time farming as the farming profession makes them **Independent, Proud, Dignified, Empowered and United** with their farming community
- Preferred HP range is between **40 to 50HP** suitable for all agricultural application and non agricultural applications
- All farmers want their tractor with **aggressive, powerful, rugged**, looks
- Young farmers want **modern** features **and aggressive** forms in the tractor
- Most preferred animal to resemble its stance on tractor exterior are tiger 50% , lion 20%, horse 20%, elephant 10%
- All young farmers need a **cabin** for their comfort which should be detachable during puddling operation
- Most preferred colour choice for tractor are **bright red** and sky blue
- Most celebrated season of farming are during **Harvest, Pongal, Ayudhapooja, Temple festival** (January / October)
- **Most common problems** farmers face with tractors are 1. Less safety without ROPS, 2. Front lifting, 3. Hot air in foot zone, 4.uncomfortable seats, 5.Mud throw from rear tyre on foot zone

3. DESIGN PHASE

3.1 Design Brief

To design a versatile tractor for young farmers in India with addressing the following needs, which was captured in user research.

Styling aspiration

Tractor with new form representing Aggressive, Powerful, and Modern.

Comfort

Young farmers aspire tractor with cabin for better ergonomics and convenience

Functionality

User prefers 40 to 50 HP Versatile tractor which can be effectively used for all kind of applications

Dimensions :

Length approx. 3800mm

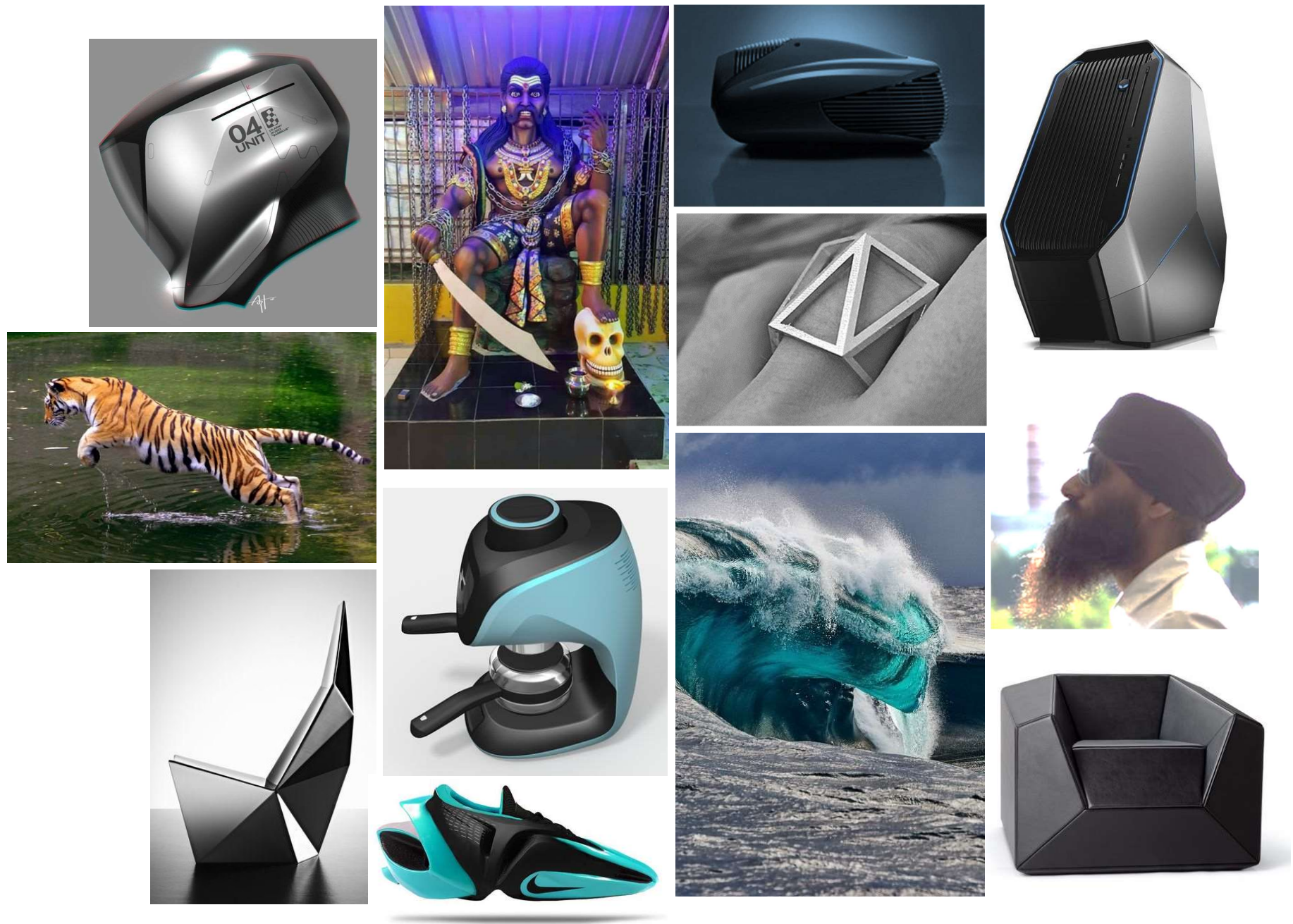
Width approx. 1800mm

Wheel base approx. 2200mm

Standard Track 56”to 60” (extracted from average dimensions of existing 50 HP range tractors)
(subjected to marginal change based on final concept)

3.2 Mood Board

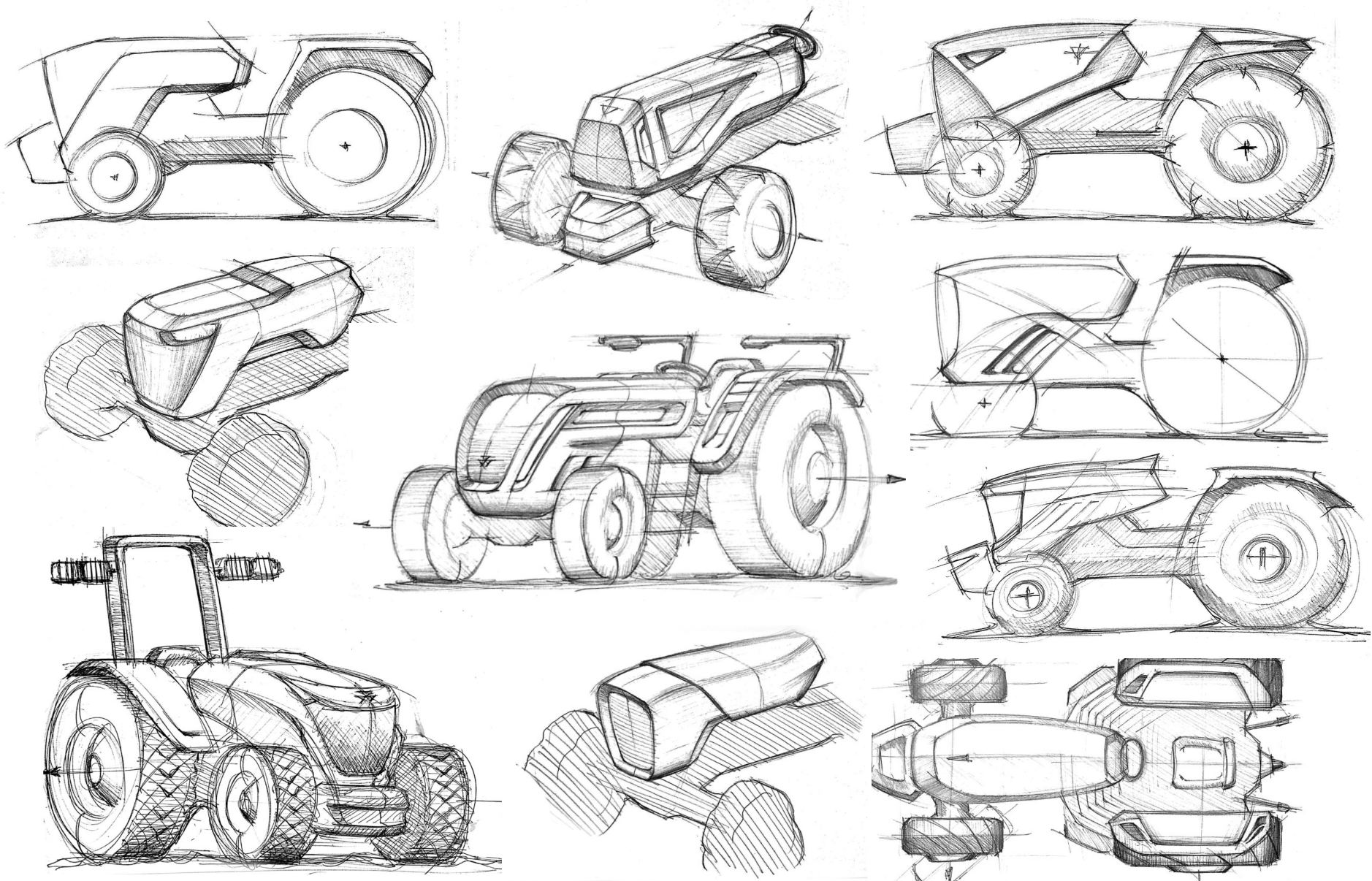
AGGRESSIVE POWERFUL MODERN



3.3 Initial sketches

(Direction 1 – open tractor - Horizontal hood with slight trooping)

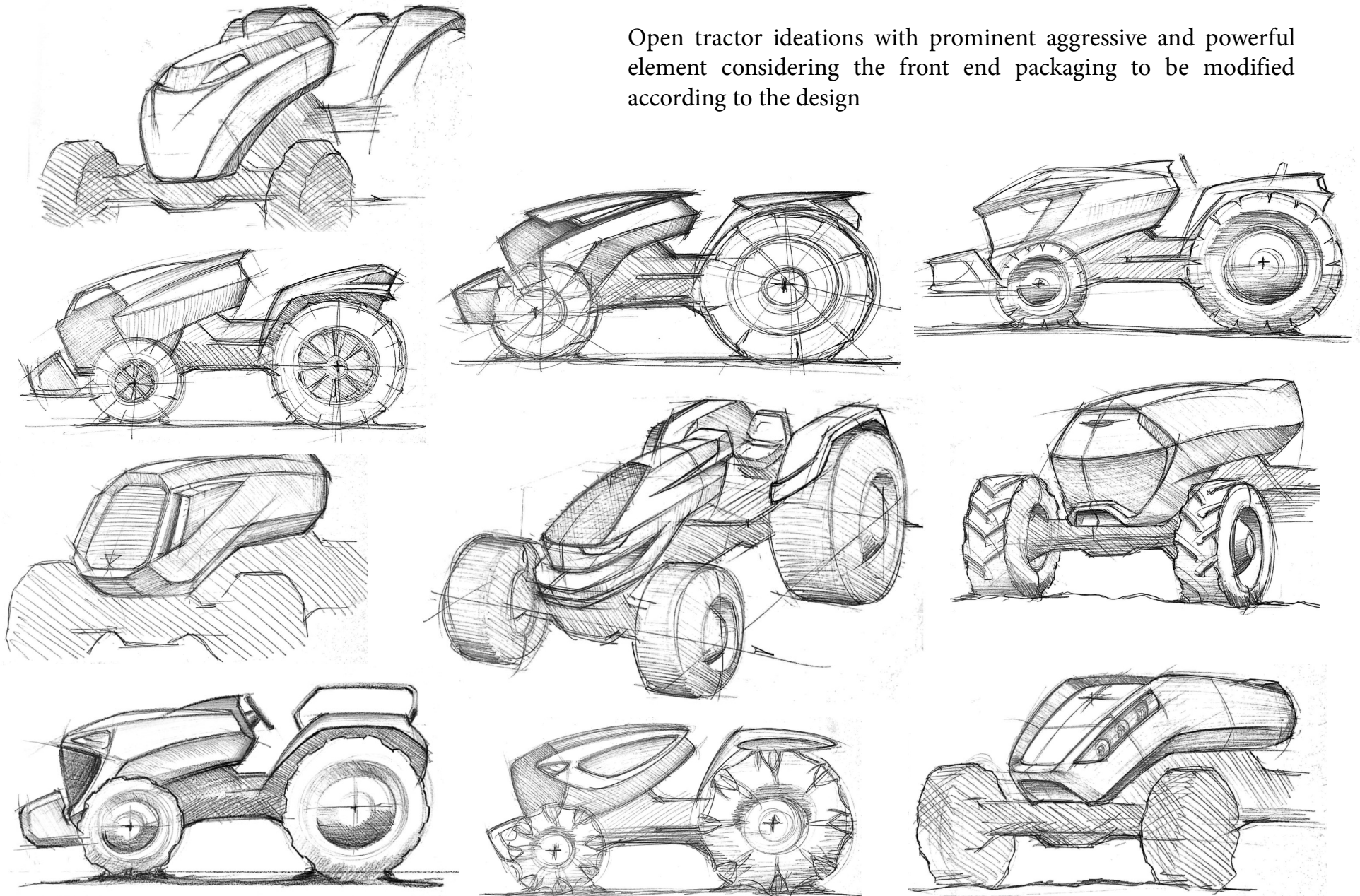
Keeping the existing 40 to 50HP tractor's chassis as the base reference, tried to ideate open tractor concepts with minimum trooping in the front in order not to disturb the front packaging.



Initial sketches

(Direction 2 – open tractor Concepts showing prominent aggressive and powerful elements)

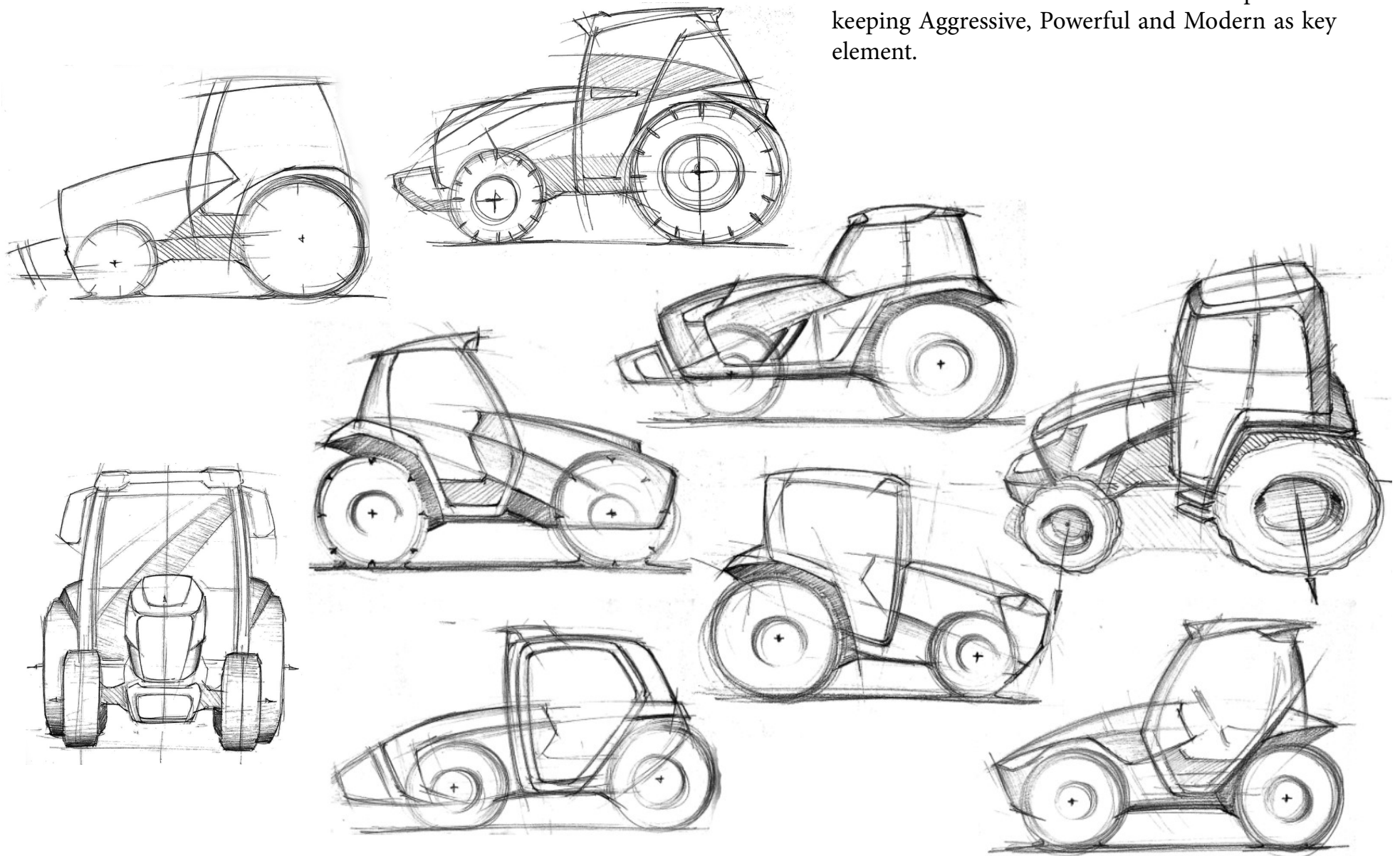
Open tractor ideations with prominent aggressive and powerful element considering the front end packaging to be modified according to the design



Initial sketches

(Direction 3 – Cab tractor form exploration)

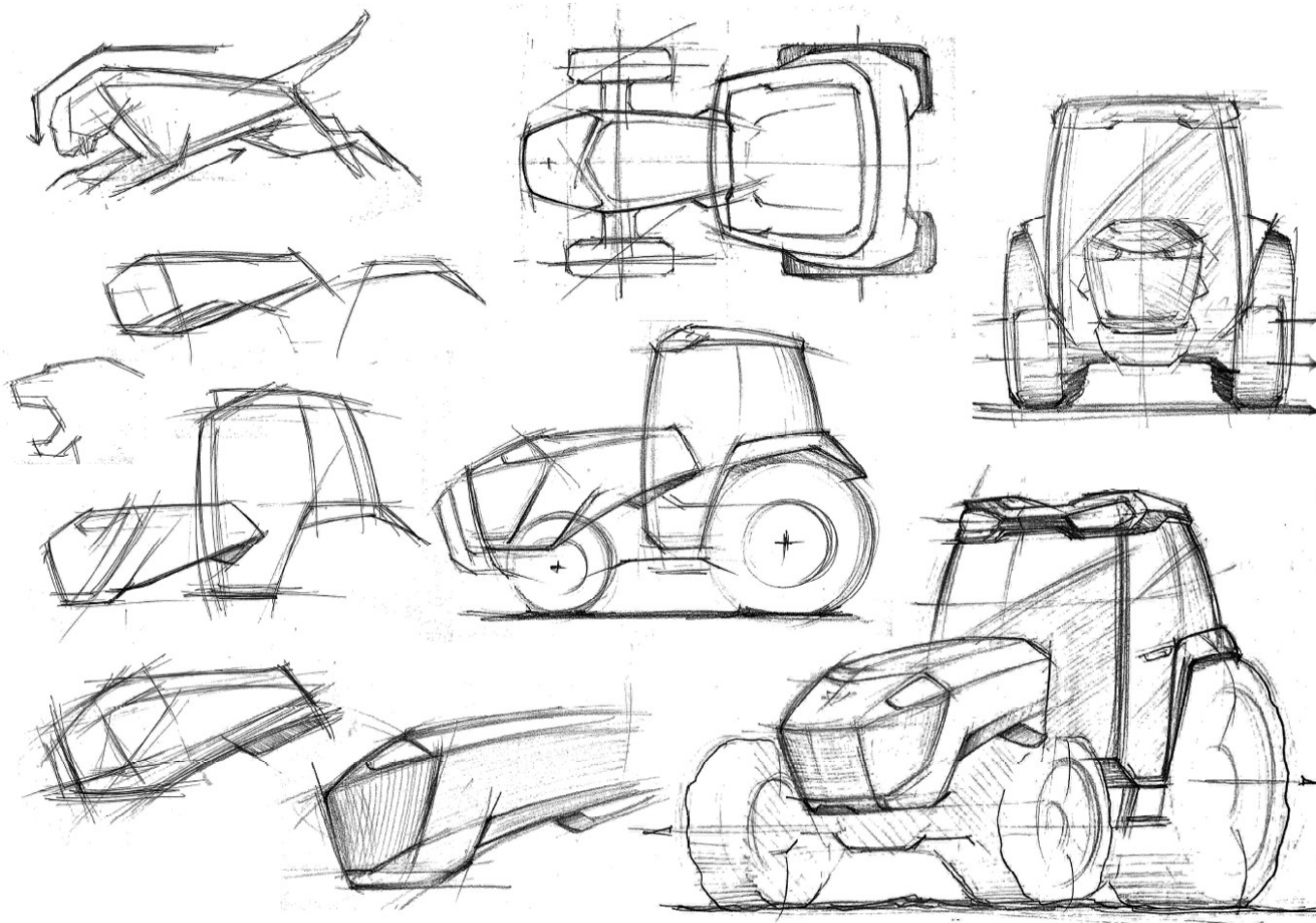
Cabin tractor silhouette and stance exploration keeping Aggressive, Powerful and Modern as key element.



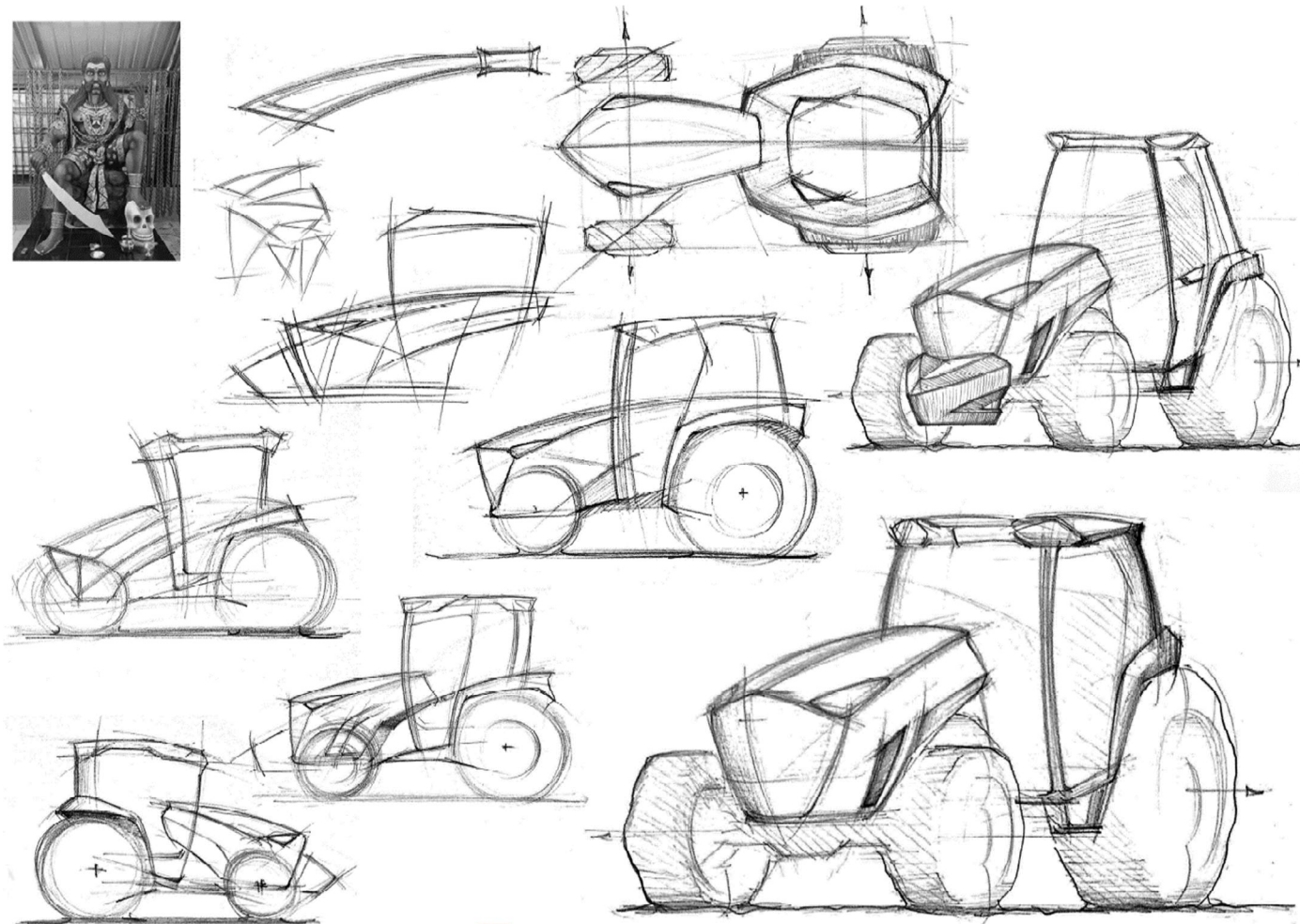
3.4 Concept 1



Design inspired form Stance of tiger. Tiger is the most preferred animal by young farmers to resemble its characters like aggressive and powerful on the exterior. The top vertebral line, wider shoulder and the trailing rear legs are taken as the key element to design this concept. The edges are with sharp rounds to maintain muscularity. The front face leaning forward makes the composition more aggressive stance.



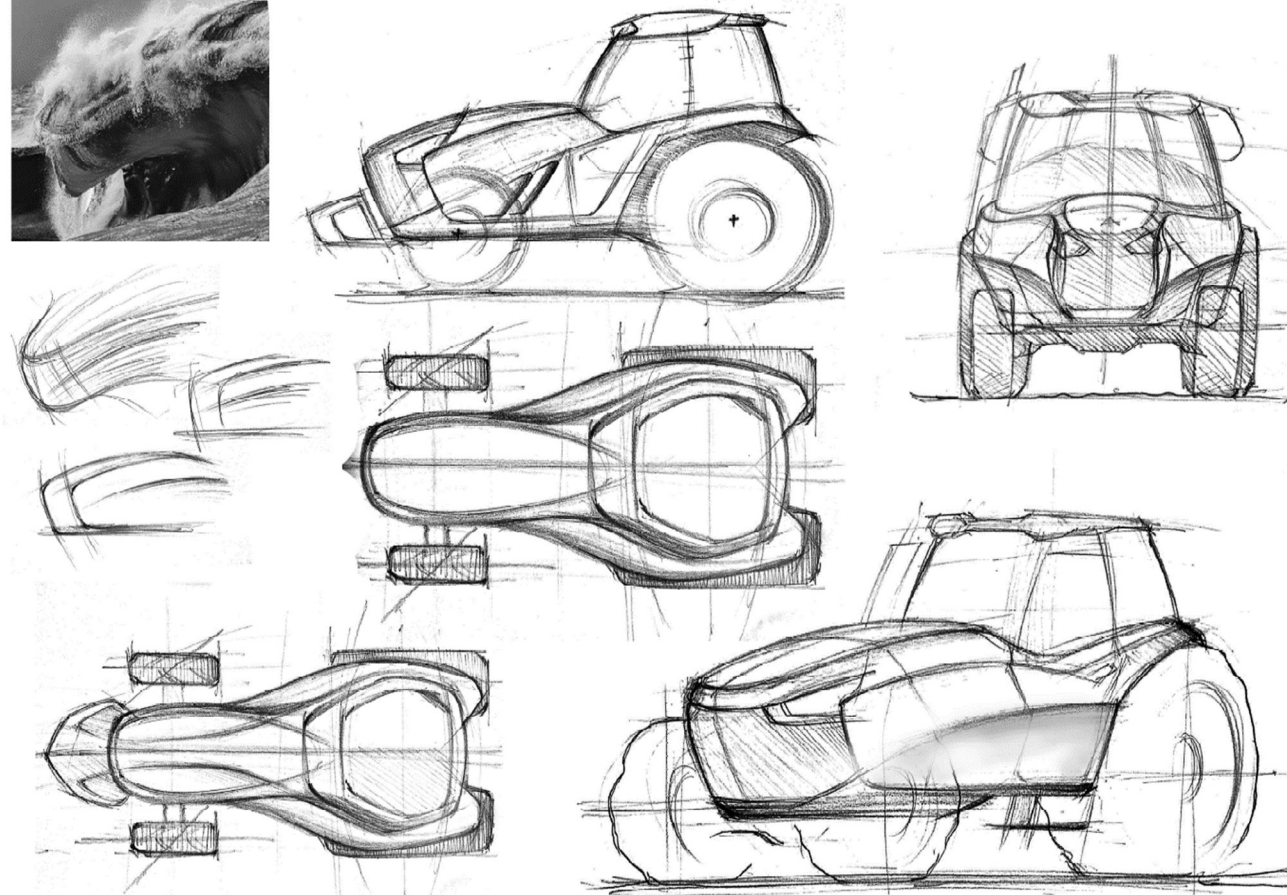
Concept 2



In Tamilnadu, most of the village has this Ayyanaar (God) statue. This God is known for securing the whole village from all kind of disaster. All farmers use to worship this god and the statue looks very aggressive posture holding a long sword. Keeping the sword as key element made this concept.



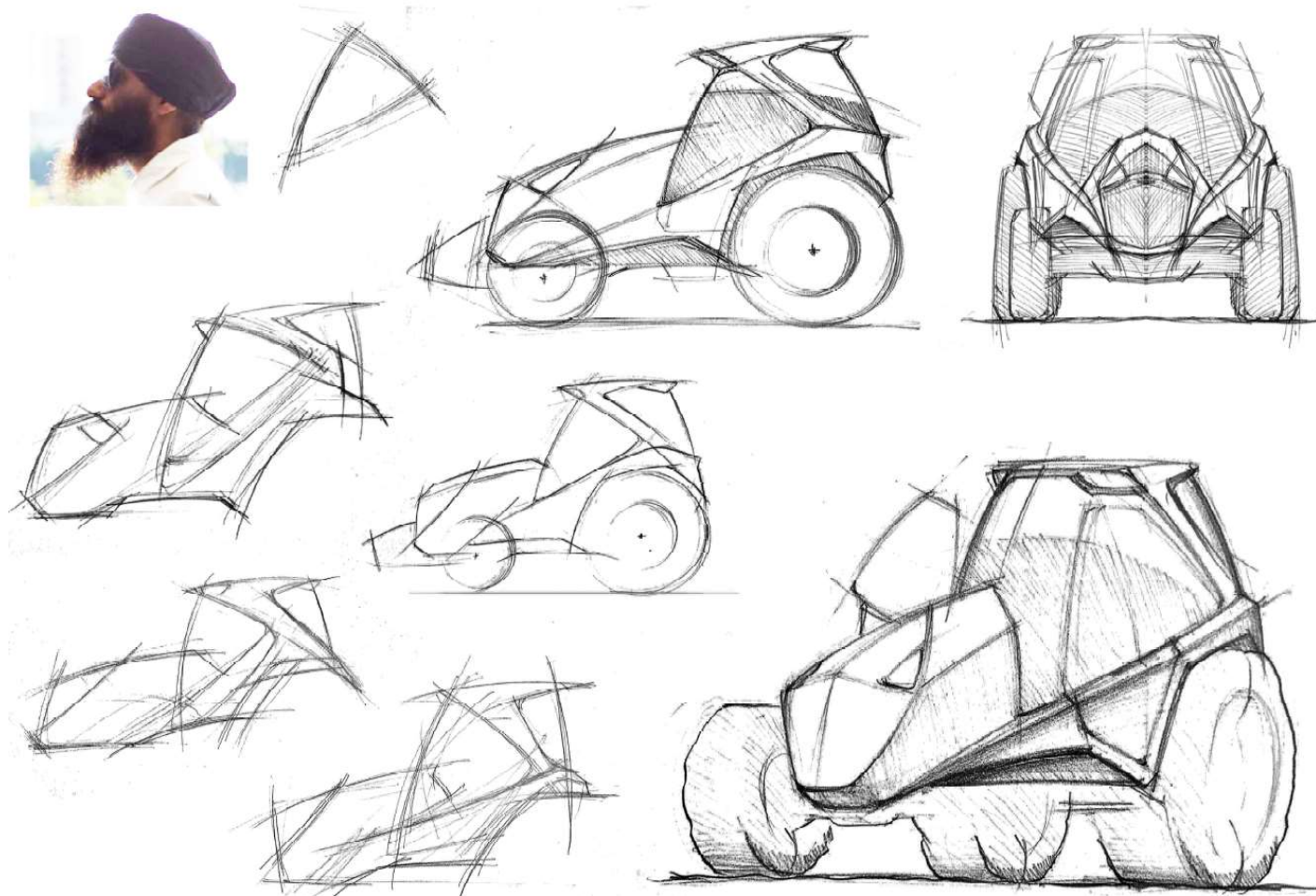
Concept 3



Taking an inspiration from nature, a tidal wave which is powerful and with an aggressive form a cab tractor concept is designed.. In the side view the flow of aggressive wave is prominent. This design is new to market as it has an exclusive seamless connection from fender to hood.



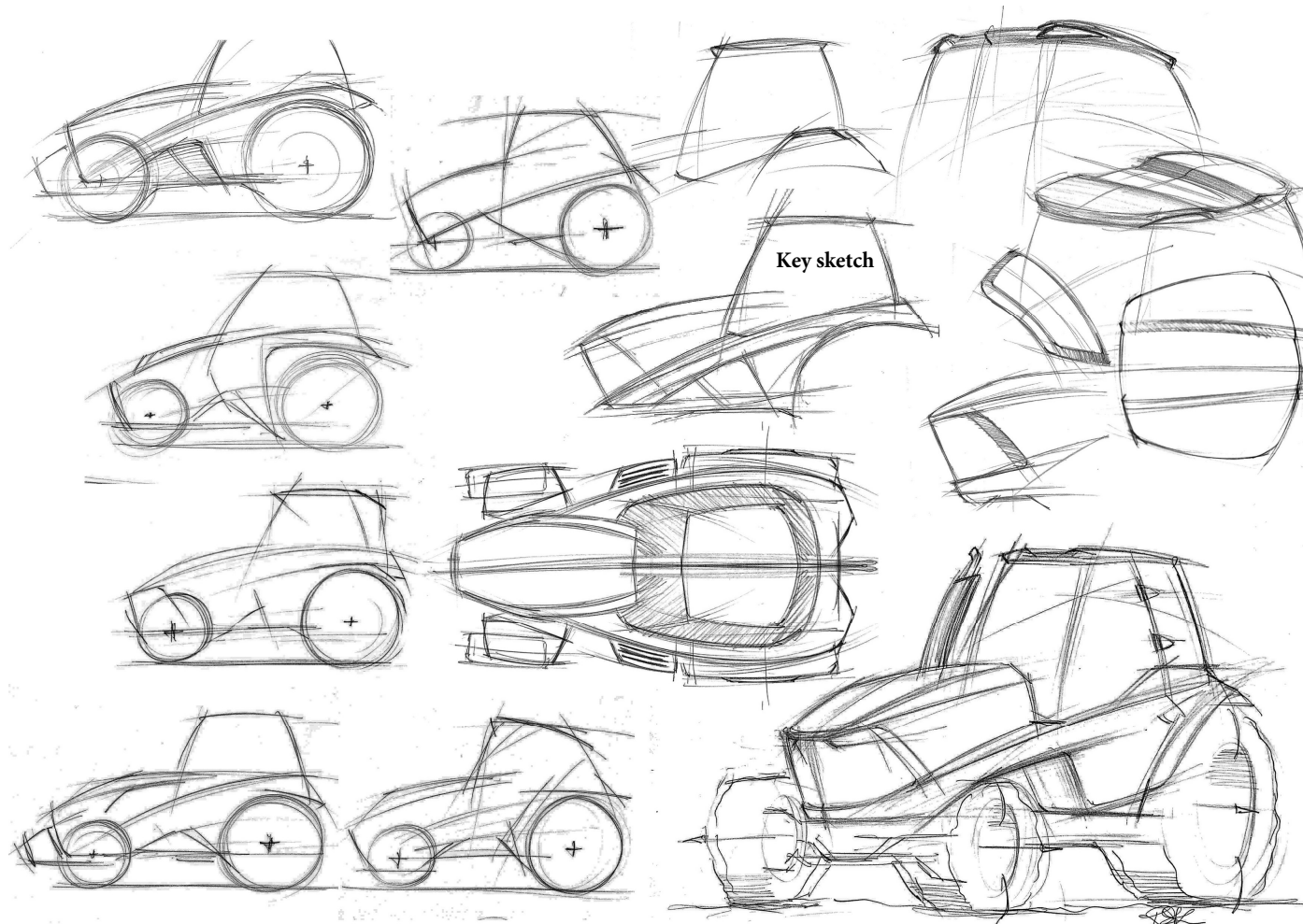
Concept 4



Punjab is the state where the tractor density is high. A Sikh with turban (dastaar) and beard looks highly gigantic and powerful. Among the Sikhs, the dastaar is an article of faith that represents honour, self-respect, courage, spirituality, and piety. The combination of turban and beard with tractor is highly prideful and powerful. Keeping this exalted combo as an inspiration a cab tractor concept is designed. The concept came out with completely new form in tractor.



3.5 Final Concept

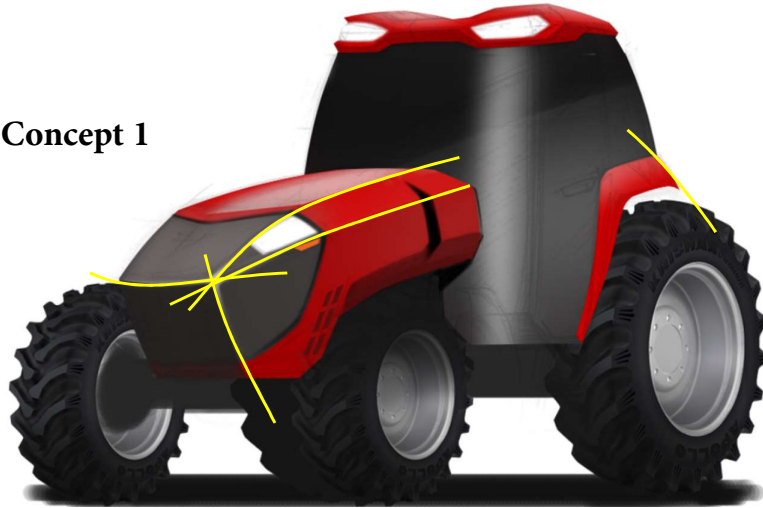


This concept is an outcome of concept 1 (inspired from tiger) and concept 4 (inspired from a Sikh who has a powerful stance with a combination of turban and beard). The main inspiration is from tiger. The connecting element from the rear fender to the front hood is taken from Concept 4. The new element in this design is the seamless shoulder line of the tractor. In general, the tractor cabin is not connected with the hood as the cabin is mounted over the isolators to reduce the tractor vibrations. So this particular concept should be engineered in such a way that engine vibration is not transferred to the superstructure.



Final Concept key elements and stance

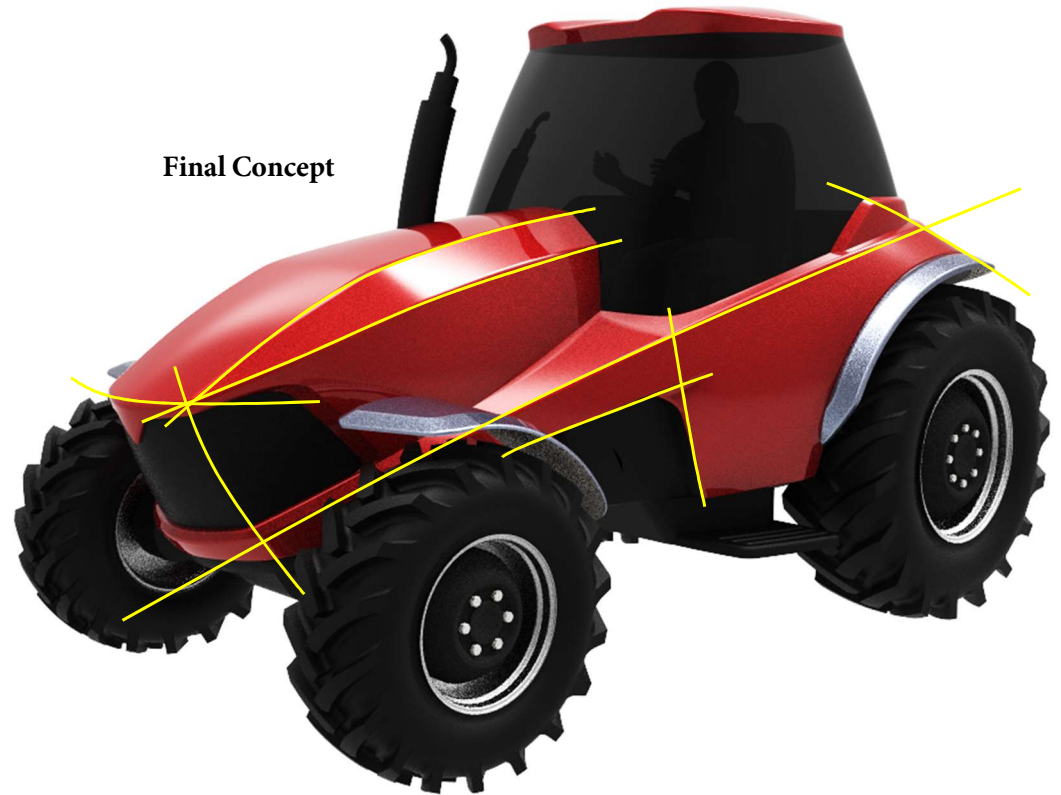
Concept 1



Concept 4



Final Concept



3.6 Final Concept Render



Tractor with tiller



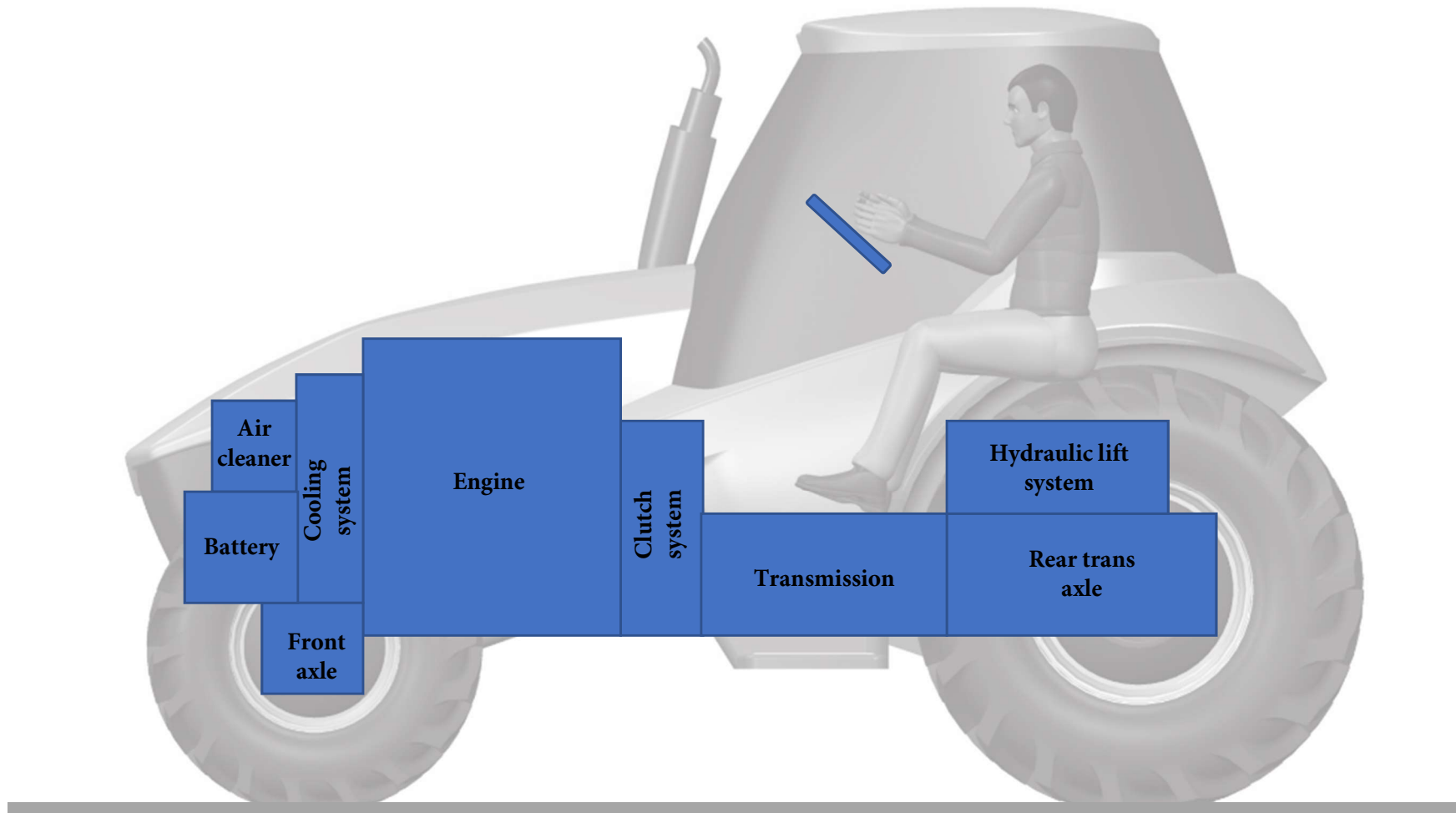
Tractor with MB plough



Tractor with Front end loader and back hoe

3.7 Drive line and driver packaging

ISO 4253 (standard for Agricultural operator ergonomics) is referred



3.8 Scale down model (1:10 scale)



CAD Modelled and 3Dprinted

Scale down model (1:10 scale)



Painted and graphics pasted

Scale down model (1:10 scale)



4. Project time Plan vs. Actual

P3 project stages		2019	February				March				April				May				June	
			Wk1	Wk2	Wk3	Wk4	Wk1	Wk2	Wk3	Wk4	Wk1	Wk2	Wk3	Wk4	Wk1	Wk2	Wk3	Wk4	Wk1	Wk2
S1	Preliminary research	Plan																		
		Action																		
	User research	Plan																		
		Action																		
S2	Design brief	Plan																		
		Action																		
	Mood board creation	Plan																		
		Action																		
	Concept generation	Plan																		
		Action																		
S3	Concept finalisation	Plan																		
		Action																		
	Detailing / Rendering	Plan																		
		Action																		
	CAD modelling	Plan																		
		Action																		
S4	Scaled down Model making	Plan																		
		Action																		
	Final presentation	Plan																		
		Action																		
Stage - 1 presentation																				
Stage - 2 presentation																				
Stage - 3 presentation																				
Stage - 4 presentation																				

	Plan
	Actual as per plan
	Delayed start
	Delayed completion

5. Annexure - Individual User feedback



Jeganathan, 32

Place – Gnayaru, Tamilnadu

Farm area – 10 acres

Crops - Paddy and water melon

Farming – Full time farming and travels

Tractor – MM 475 Bhomiputra

Personal vehicles – Unicorn / passion pro / Indica

Annual income – 7 Lakhs

Education – 10th std

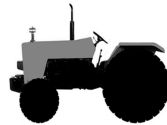
Purpose of Tractor – 100 % agriculture

Preferred HP range – 45 to 50HP suitable for paddy farming

Budget limit for new tractor - 6lakhs (inclusive of all fitment)

Problems faced in tractor – seat not comfortable hand elbow hits fender. Front lifting front weight and bumper required

Preferred silhouette in terms of styling -



Solid and rigid feel

Which animal should resemble the tractor exterior styling -



Aggressive, strong, powerful

Driver should be Protected with -



For better comfort cabin is required with AC.
During puddling cabin should be detachable

Feel of using tractor - Gambeeram, Thimuru, Empowered - Great feeling pride

Most celebrated - During Harvest and festival

Luggage space – Over the implements and fenders (tools, rope, water bottle, bags)

Accessories preferred - support between fenders, front weight. Detachable cabin

User tractor



Experiment with user



Individual User feedback

Annexure



Parthasarathy, 44

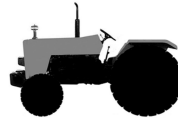
Place – Gnayaru, Tamilnadu
Farm area – 35 acres
Crops - Paddy, Groundnut, Chilli
Farming – Full time farming
Tractor – MF 241, MF 1035 (42HP, 35HP)
Personal vehicles – Hero passion pro, Sumo
Annual income – 12 to 15 Lakhs
Education – 10th std

User tractor



Purpose of Tractor – 70% agriculture 30% haulage
Preferred HP range – 35 to 45 HP sufficient for all kind of agriculture
Budget limit for new tractor - 5 to 6 lakhs
Problems faced in tractor - Seat is uncomfortable, Less clearance between seat and steering wheel, floor is very low. Difficult to ingress and egress

Preferred silhouette
in terms of styling -



Straight edges looks strong, powerful

Which animal should
resemble the tractor
exterior styling -



The styling should represent the
speed, pulling power

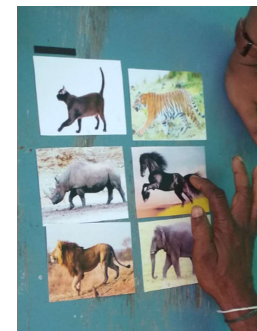
Driver should be
Protected with -



It looks classic, easy maintenance

Feel of using tractor - “Gethu” Empowered, Proud,
Most celebrated - During Harvest and Pongal
Luggage space – Mostly over the implement (200 to 300kg sack of seeds / fertilizers. Rarely over the fender.
Accessories preferred - front weight, bar between fender, ropes or canopy.
No of people – 1+2 on fender
Colour choice – Bright red

Experiment with user



Individual User feedback

Annexure

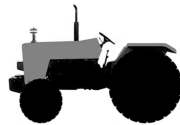


Balaji, 47

Place – Gnayaru, Tamilnadu
Farm area – 25 acres
Crops - Only Paddy
Farming – Full time farming
Tractor – MM 475Di sarpanch
Personal vehicles – Splendor / Unicon / Dezire
Annual income – 10 Lakhs
Education – 8th std, son (Diploma)

Purpose of Tractor – 75% agriculture 25% haulage
Preferred HP range –45 HP good enough for all application / fuel economy
Budget limit for new tractor - 5.5 lakhs
Problems faced in tractor - Seat is bad quality, weather proof seat is required.
Front lifting – front weight required

Preferred silhouette
in terms of styling -



Feels stronger than others. Tractor
should look stronger

Which animal should
resemble the tractor
exterior styling -



Strong, powerful

Driver should be
Protected with -



Hard canopy looks more stable than canvas canopy
also fan, music system, space for documents can be
provided

Feel of using tractor - Proud, feel united when rent the tractor to their friends and
neighbours

Most celebrated - During Pongal and Ayudhapooja and festival at temple

Luggage space – Over the implements and fenders - seeds / fertilizers.

Accessories preferred - Hard canopy, front weight, bar between fender, No of
people – 2 + 1 on fender

User tractor



Experiment with user



Individual User feedback

Annexure

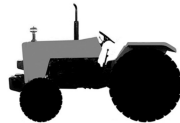


Rajendran, 47

Place – Gnayaru, Tamilnadu
Farm area – 28 acres (13 acres own + 15 acres lease)
Crops - Paddy and water melon in season
Farming – Full time farming and Travels
Tractor – Swaraj 744
Personal vehicles – Pulsar / Swift / Innova / Fortuner
Annual income – 10 Lakhs
Education – 10th std

Purpose of Tractor – 90 % agriculture 10 % haulage
Preferred HP range – 45 HP especially good for puddling
Budget limit for new tractor - 5 to 6 lakhs
Problems faced in tractor - rear tyre throw mud on foot, fender coverage to be increased

Preferred silhouette
in terms of styling -



Looks Powerful, strong feel, rugged feel

Which animal should
resemble the tractor
exterior styling -



Strong , dominating (king of all animal)

Driver should be
Protected with -



Stronger, rigid look than canvas canopy.

Feel of using tractor - Proud to drive tractor than driving a car (comfortable and proud in dhoti in tractor)
Most celebrated - festival at temple, and Pongal , January , October (harvest season)
Luggage space – Over the implements and fenders
Accessories preferred - space for mobile charger and documents . Canopy, No of people – 4+ 1 on fender

User tractor



Experiment with user



Individual User feedback

Annexure

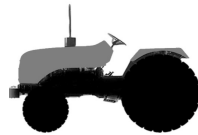


Gopi, 34

Place – Mullaivoyil, Tamilnadu
Farm area – 7 acres + rent to neighbours
Crops - Paddy, groundnut and water melon
Farming – Full time farming
Tractor – Swaraj 843
Personal vehicles – Splendor, Passion
Annual income – 6 Lakhs
Education – 8th std

Purpose of Tractor – 90% agriculture, 10% haulage
Preferred HP range – 45 to 50HP suitable for all application
Budget limit for new tractor - 5 t o 5.5 lakhs
Problems faced in tractor – More hot air near foot and front of platform from engine and transmission. Heat stopper or heat deflector required

Preferred silhouette
in terms of styling -



Curvy and stylish – looks modern

Which animal should
resemble the tractor
exterior styling -



“ Verithanam” - Aggressive, powerful

Driver should be
Protected with -



Fully protected from all weather condition, more comfortable

Feel of using tractor - Proud, Gethu, sema, Great feeling

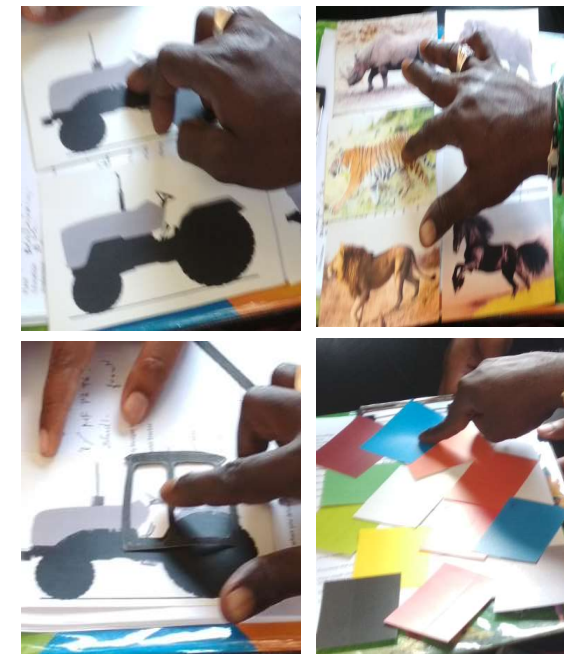
Most celebrated - Pongal and Ayudhapooja

Luggage space – Over the implements and fenders some time one the foot step, sides of seats

Accessories preferred - front bumper, fender support, front weight



Experiment with user



Individual User feedback

Annexure

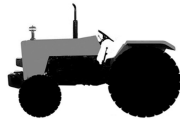


Jayapal , 50

Place – Periya mullaivoyil, Tamilnadu
Farm area – 10 acres
Crops - Paddy, chilly and water melon
Farming – Fulltime Farming
Tractor – MF 1035 Di
Personal vehicles – Royal Enfield
Annual income – 7 to 8 Lakhs
Education – 12th std

Purpose of Tractor – 80% agriculture, 20% haulage
Preferred HP range –40HP sufficient for paddy application
Budget limit for new tractor - upto 5lakhs
Problems faced in tractor – Back pain because of uncomfortable seat. Foot step not reachable, need raised platform, ROPS required for safety

Preferred silhouette
in terms of styling -



Strong and aggressive

Which animal should
resemble the tractor
exterior styling -



Aggressive and powerful

Driver should be
Protected with -



Canvas canopy is cheap and look
beautiful to the tractor

Feel of using tractor - Empowered, proud when rent the tractor to neighbours
Most celebrated - Pongal and harvest season
Luggage space –fenders and on the implements
Accessories preferred - canvas canopy, front weight

User tractor



Experiment with user



Individual User feedback

Annexure

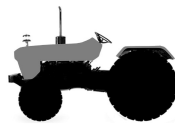


Jagadeesh , 25

Place – Periya mullaivoyil, Tamilnadu
Farm area – 15 acres
Crops - Paddy, Urad dhal, Water melon
Farming – Fulltime Farming helping his father
Tractor – swaraj 735
Personal vehicles – Bajaj Pulsar
Annual income – 6 to 8 lakhs
Education – BE

Purpose of Tractor – 80% agriculture, 20% haulage
Preferred HP range –35 to 40HP good for paddy operations
Budget limit for new tractor - upto 5lakhs
Problems faced in tractor – Back pain because of uncomfortable seat. Foot step not reachable, need raised platform, ROPS required for safety

Preferred silhouette in terms of styling -



Looks solid and rugged and powerful

Which animal should resemble the tractor exterior styling -



Tractor should look Powerful and Gigantic

Driver should be Protected with -



More comfortable and removable during puddling

Feel of using tractor - Proud, Gambeeram, Dignified
Most celebrated - Harvest and festival season
Luggage space –fenders and on the implements
Accessories preferred - front bumper and front weight

User tractor



Experiment with user





Ramaraj , 37

Place – Coimbatore, Tamilnadu
 Farm area – 11 acres
 Crops - Tomato, Chilli, Banana, Coconut, Beans
 Farming – Fulltime Farming with brother
 Tractor – MF 241
 Personal vehicles – Hero Passion , Maruti alto
 Annual income – 7 to 8 lakhs
 Education – BE



Purpose of Tractor – 75% agriculture, 25% haulage
 Preferred HP range –40to 45HP good for all operations
 Budget limit for new tractor - upto 5lakhs
 Problems faced in tractor – Seat is not comfortable, back pain problem when tractor is driven for more hours. Clutch pedal effort is hard. Floor not reachable from the seat

Preferred silhouette
 in terms of styling -



Looks very stylish modern and aggressive

Which animal should
 resemble the tractor
 exterior styling -



Horse powerful, pulling power, speed

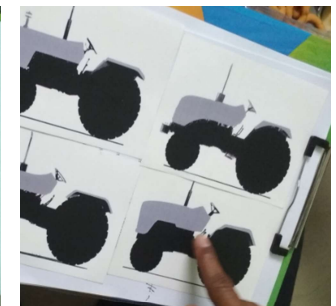
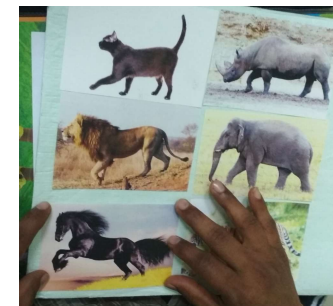
Driver should be
 Protected with -



Cabin is required for haulage application,
 especially during summer and rainy season

Feel of using tractor - Feeling proud ,dignified to own a tractor, and rent his tractor to other farmers
 Most celebrated - Harvest and temple festival season
 Luggage space –fertilizers, tools, rope on the implement it self.
 Accessories preferred - front bumper and front weight and ROPS if there is no cabin

Experiment with user



6. References

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