

# **Microcar for FORD**

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# **Micro-car for FORD**

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IN

TRANSPORTATION DESIGN

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## Declaration

I hereby declare that the project work entitled "Micro-car for Ford" submitted by me in partial fulfilment of the requirements for the award of the degree of Master of Design (Transportation Design) at School of Design Studies, University of Petroleum and Energy Studies was carried out by me during 15 Jan 2015 to 16 April 2015 at "UPES, Dehradun" under the supervision of "RakeshSah, Assistant Design Fellow".

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## **ABSTRACT**

Automobile is a form of transport. Due to the lack of strong public transportation systems, the number of personal vehicles is increasing day by day. This is leading to long traffic jams in cities with a sizeable population. It also causes an acute shortage of parking space. Micro car addresses this problem by reducing the carbon footprint and also solves parking problems. The project deals with the design of a micro car which acts as a transportation solution and also looks like a lifestyle product.

## TABLE OF CONTENTS

<b>S.no</b>	<b>CONTENTS</b>	<b>PAGE</b>
<b>1.0</b>	<b>Introduction</b>	
<b>2.0</b>	<b>Data collection</b>	
2.1	Literature review	
2.2	User research	
2.3	Market search	
<b>3.0</b>	<b>Design Brief</b>	
<b>4.0</b>	<b>Concepts</b>	
<b>5.0</b>	<b>Digital and Physical model</b>	
<b>6.0</b>	<b>Conclusion</b>	
	<b>REFERENCES</b>	

## List of Figures

S.no	Figure name	Page
2.1.1	Ford Model T	9
2.1.2	Mahindra Reva	12
2.1.3	Mahindra E2O	12
2.1.4	Ford Fiesta	13
2.1.5	Ford Eco Sport	14
2.1.6	Ford Fiesta ST	15
2.1.7	Ford Figo	16
2.1.8	Ford Design Language	17
2.1.9	Layers in Design	18
2.1.10	BMW 4 Series Coupe concept headlight	19
2.1.11	Bmw i8 concept spyder black light	19
2.1.12	lexus lf lc GT Version 2015	19
2.1.13	lexus RC	20
2.1.14	lexus lf lc 2015	20
2.1.15	lexus lf lc GT Version 2015	21
2.1.16	BMW i8	21
2.3.1	Mahindra E2O	26
2.3.2	Mahindra E2o VsReva	27
2.3.3	Mahindra Rear 3/4 <sup>th</sup> View	27
4.1	Concept No 1	29
4.2	Concept No 2	29
4.3	Concept No 3	29
4.4	Concept No 4	30

4.5	Concept No 5	30
4.6	Concept No 6	30
4.7	Concept No 7	31
4.8	Concept No 8	31
4.9	Concept No 9	32
4.10	Concept No 10	32
4.11	Concept No 11	33
4.12	Concept No 12	33
4.13	Concept No 13	34
4.14	Concept No 14	34
4.15	Final Rendering	35
5.1	Alias mode top view	36
5.2	Alias Model Front view	36
5.3	Alias Model front 3/4 <sup>th</sup> view	37



## **INTRODUCTION**

Ford motors are the first automaker to introduce a micro car in its portfolio way back in 1912. This vehicle was named the Model T. The Model T is also credited with being the first automobile to be manufactured in an assembly line. Thus revolutionizing the automotive industry. As years passed on the demand for a micro car reduced considerably. However in modern days due to the large number of vehicles plying on roads traffic problems have compounded over the years. This has thrown the transportation systems of major cities out of gear. Ford has expressed its desire to address this problem by designing a micro car which also acts as a lifestyle product to be in sync with modern times.

## **2. DATA COLLECTION**

### **2.1 Literature review**

#### History of Ford

Ford motor company is an American automaker based in Detroit. It was founded by Henry Ford in 1903. Ford Motor Company is one of the largest automotive groups in the world. Ford now encompasses two brands Ford and Lincoln. [1].

Ford was the first automaker to introduce assembly lines in a factory. This increased production fourfold thus bringing in massive profits. Ford model T was the first car in their portfolio. It is also considered to be the first micro car in the world. [1].

The Ford Model T was named the most influential car of the 20th century in the 1999 Car of the Century competition, ahead of the BMC Mini, Citroën DS, and Volkswagen Type 1, and still makes top ten list of most sold cars as of 2012. [1].

Although automobiles had already existed for decades, their adoption had been limited, and they were still mostly scarce and expensive. Automobiles were considered extreme luxury for the common man until the Model T. The Model T set 1908 as the historic year that the automobile became popular for the mass market. The first production Model T was produced on August 12, 1908 and left the factory on September 27, 1908, at the Piquet Plant in Detroit, Michigan. On May 26, 1927, Henry Ford watched the 15 millionth Model T Ford roll off the assembly line at his factory in Highland Park, Michigan. [1].

There were several cars produced or prototyped by Henry Ford from the founding of the company in 1903 until the Model T was introduced. Although he started with the Model A, there were not 19 production models some were only prototypes. The production model immediately before the Model T was the Model S, an upgraded version of the company's largest success to that point, the Model N. The follow-up was the Ford Model A. The company publicity said this was because the new car was such a departure from the old that Henry wanted to start all over again with the letter A. [1].

The Model T was Ford's first automobile mass-produced on moving assembly lines with completely interchangeable parts, marketed to the middle class. Henry Ford said of the vehicle: [1].

*“I will build a car for the great multitude. It will be large enough for the family, but small enough for the individual to run and care for. It will be constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise. But it will be so low in price that no man making a good salary will be unable to own one – and enjoy with his family the blessing of hours of pleasure in God's great open spaces.” [2].*

Although credit for the development of the assembly line belongs to Ransom E. Olds with the first mass-produced automobile, the Oldsmobile Curved Dash, beginning in 1901, the tremendous advancements in the efficiency of the system over the life of the Model T can be credited almost entirely to the vision of Ford and his engineers. [1].



Fig 2.1.1 Ford Model T [2].

## Microcar

A microcar is the smallest automobile classification, usually applied to very small cars (smaller than city cars). Such small cars were generally referred to as cyclecars until the 1940s. More recent models are also called bubble cars due to their bubble-shaped appearance. [3].

## Definition

Economy vehicles with either three or four wheels, powered by petrol engines of no more than 700cc or battery electric propulsion and manufactured since 1945.

*-By the register of unusual microcars in the UK.[3].*

Engine size of 700cc and less and 2door or less.

*-By The Bruce Weiner Microcar Museum (the world's largest collection of microcar)*

1000cc or less.

*-By US based vintage microcar club. [3]*

Micro Cars are designed for only two occupants and with a minimum amount of cargo space.

*-By H Point.[4].*

Typical microcars usually have some of the following features:

- seats only the driver and a single passenger
- a 1 cylinder 49 – 500cc engine
- 1 wheel drive
- cable operated brakes on 2,3,or 4 wheels (no longer permissible in countries such as the UK)
- simple suspensions
- 6" - 8" roadwheels

Many, but not all, microcars are also:

- Not fitted with a reverse gear (the weight of the car was light enough for parking to be achieved by lifting one end of the vehicle).
- May have all gears operable in reverse as well as in forward gear such as the Messerschmitt KR200.
- Fitted with lifting bodywork instead of doors.
- Less than 3m in length (sometimes less than 8', 2.440m).
- Less than 85 cubic feet/2400 litres interior volume.

### Legal Position [3]

Places like Austria, France, Germany, Spain, Italy microcars with a certain max weight are considered motorcycles and therefore no car driving license is needed.

## Team BHP Review (Reva)



Fig 2.1.2 Mahindra Reva[5].

Effort less car in city

*-Mike Boxwell from UK.[5]*

Around town, the performance of the car is responsive enough to be fun and it's small enough to rip through the traffic extremely well. It's also good to know that where ever you are going to there will always be a space to park in the reva is so small it can squeeze into the tiniest parking space where other cars cannot fit.

*-Mike Boxwell from UK.[5]*

Car park in small parking areas and can take turns easily in streets and for 'U' turns.

*-Mike Boxwell from UK[5].*

Designed for city dwellers fed up of the daily traffic problems.

*-AbhinaveKumbhat from Banglore City.[5]*



Fig 2.1.3 Mahindra E2O [5]

Tata has discovered that a large majority of owners aren't first time car buyers, as originally predicted, but owners who are using it as a second car.

*-Auto car (Feb 2015).[6]*

## FORD Design Language

### 2014 Ford Fiesta



Fig 2.1.4 Ford Fiesta[7]

The Ford Fiesta is a supermini car manufactured by the Ford Motor Company since 1976, now in its seventh generation. The Fiesta has been manufactured in Europe, Brazil, Argentina, Mexico, Venezuela, China, India, Taiwan, Thailand, and South Africa. In 2010, the sixth generation Fiesta was introduced worldwide. [8].

## 2014 Ford Eco Sport



Fig 2.1.5 Ford Model Eco Sport [9].

The Ford EcoSport is a mini sport utility vehicle (SUV), originally built in Brazil by Ford Brazil since 2003, at the Camaçari plant. A second generation concept model was launched in 2012 and is intended to be also assembled in a new factory in Chennai, India and Vietnam.

The second generation of EcoSport has been developed under Ford's Global product development process. It was launched globally. The second generation EcoSport was first showcased as a concept at the 2012 New Delhi Auto Expo, in India on 4 January 2012. The car was launched in Brazil on 14 July 2012 at a starting price of 53,490 Brazilian real.[10].



## 2015 Ford Fiesta ST



Fig 2.1.6 Ford Fiesta ST [11].

In 2008, Ford offered Mountune Performance options for Fiesta ST vehicles, available at specialist British Ford dealers beginning in March 2008. These were developed by Roush Technologies Ltd, which owns the Mountune Racing motorsport brand. [12].

## 2015 Ford Figo



Fig 2.1.7 Ford Figo

The Ford Figo is a subcompact Hatchback Manufactured by Ford India in Chennai,India. European Ford Fiesta hatchback, theFigo has been sold in developing countries since March 2010

## Design language of Ford



2014 ford fiesta



2014 ford Ecosport

Character lines are prominent  
Front grill-- same pattern



2015 ford fiesta ST



2015 ford figo



2015 ford figo sedan



Fig 2.1.8 Ford Design Language

## Ford Kinetic Design

In 2004, Martin Smith, the Executive Design Director for Ford of Europe, was challenged with the task of forming a new design language for Ford. This was a defining moment in Ford's recent history, which resulted in a new design philosophy for the company.

*"The form language is communicated through bold, dynamic lines and full surfaces. When you look at kinetic Design, you can see that it visualises energy in motion."*

*- Martin Smith, Executive Design Director for Ford.[14].*

'Energy in Motion' that expresses the design language. That's why the cars look like they're moving even when they're standing still. [14].

## Upcoming Design Language

### Baking Up a New Look, in Layers

The BMW i8 may be the most futuristic looking car on the road. But elements of its sliced-and-angled appearance, which might be called the layered look, are starting to show up on other vehicles and hint at an emerging trend in auto design.

Layering is key to the “stream flow” design language of BMW’s “i” subbrand for electrified cars, its designer, Richard Kim, said in 2011 when he came to New York with prototypes of what would become the i3 and i8.– Car Body Design Added on 23 October 2014[15].



Fig 2.1.9 Layers in design [16].

## High Efficiency, Aggressive, Robotic Headlights and Taillights

An aggressive headlight design is the mark of a well-designed sports car. Some brands like Audi have connected this trend with an emphasis on efficient, high-output lighting technology.[16].



Fig 2.1.10 BMW 4 Series Coupe concept headlight [17]



Fig 2.1.11 2015 Bmw i8 concept spyder black light[18].



Fig 2.1.12lexus lf lc GT Version 2015 [19].



Fig 2.1.13lexus RC [20].



Fig 2.1.14lexus lf lc2015 [21].

The images shown above are the upcoming future trends of head lights which displayed on 2015 Geneva Auto Expo. Fig 2.1.10 shows aggressiveness in the headlight rest all of the headlight shows the character of aggressiveness and robotic feeling to the hadlight.



Fig 2.1.15lexus lf lcGT Version 2015 [22]



Fig 2.1.16BMW i8[23].

Fig 2.1.15 and 16 shows the future trends in taillights. In which Fig 2.1.15 shows the stepped trend of tail light and in Fig 2.1.16 layered trend of taillight is shown and both of the taillight gives the aggressive and robotic feeling.

## Panoramic Roof

A common element in recent concept car designs has been panoramic roofs, roofs with expanded sunroof panels or windows that expand onto the roofline.



Kia No 3 concept[24]



Element c hybrid suv[25]



Lincoln sedan[26]





## **2.2 User research**

### **Questionnaire**

1. How many cars are selling?
2. What type of experience, feeling you are getting?
3. How connected with the car you are?
4. What type of emotions you have with your car?
5. What colour of car are most selling?
6. What type of age group are using micro car?
7. How is car in traffic and parking?
8. What about the storage space?
9. Is it owner first car or second car?
10. Why microcar?

## User No:1



Owner: Sujay Singh Gupta

Driver: Manoj

- Owners second car.
- Easy to park.
- Comfort is nice.



## User No: 2



Owner: J B Len

Assist Director HRD division,

CEA SevaBhanan, Delhi.

- Parking is very easy.
- Handling of car is very easy.
- Turning is very comfort.
- Easy to drive in traffic.

## 2.3 Market Search

### Mahindra E2O



Fig 2.3.1 Mahindra E2O

The Mahindra e2o, previously REVA NXR, is an urban electric car hatchback manufactured by Mahindra Reva Electric Vehicles. The e2o is the successor of REVAi or G-Wiz as it was known in the UK and was developed using REVA's technology, and has a range of 120 km.

In 2006, the G-Wiz became the world's best-selling Electric Vehicle and by 2008, the company managed to sell over 950 G-Wiz electric cars, making it the UK's best-selling electric car of all time.

The e2o, a two-door, four-seater hatchback, is equipped with features like automatic transmission and allows the buyer to lock the car and operate the A/C using a mobile application. According to Forbes, the car "will inoculate its buyers from rising gas prices, provide relief from tailpipe exhaust on India's polluted streets, and provide a much more convenient and cost effective alternative for the urban city driving."

The styling of this car is done by DilipChhabria. But still the exterior of the car is not that pleasing, it is better than the previous model Reva but still it has a boxy structure.



Fig 2.3.2 MahandraRevaVs E2O



Fig 2.3.3 Mahindra E2o Rear 3/4<sup>th</sup> View

### 3. Design Brief

Design a Micro car for Ford India to be used primarily by the youth and working professionals.

- The main focus is on the exterior of the car.
- By keeping bench mark Mahindra Reva e2o.
- To be designed for the Indian market.



Mahindra Reva e2o

## 4. Concept

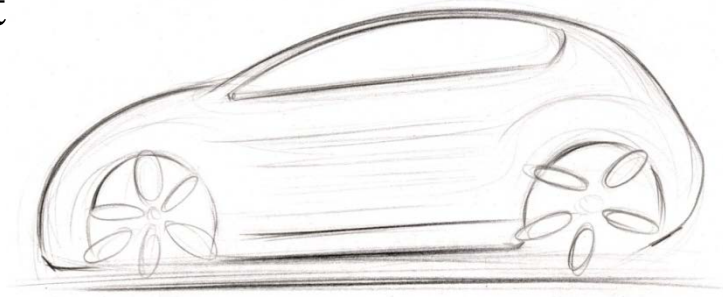


Fig 4.1 Concept No 1

Fig 4.1 shows the basic form of the microcar. In which there is no character of Ford.

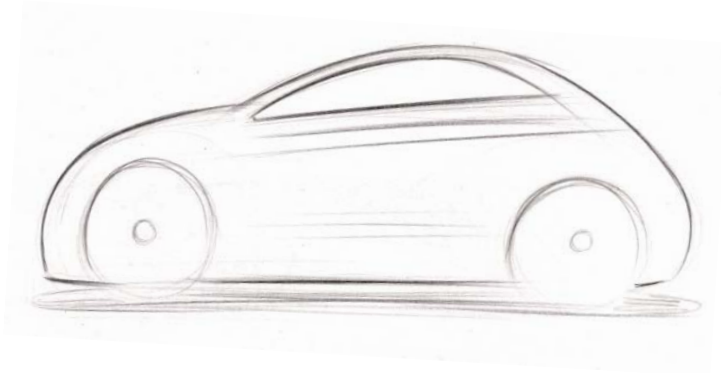


Fig 4.2 Concept No 2

Fig 4.2 is the refined form of Fig 4.1. Where the bonnet has been in little up and rear made straight.

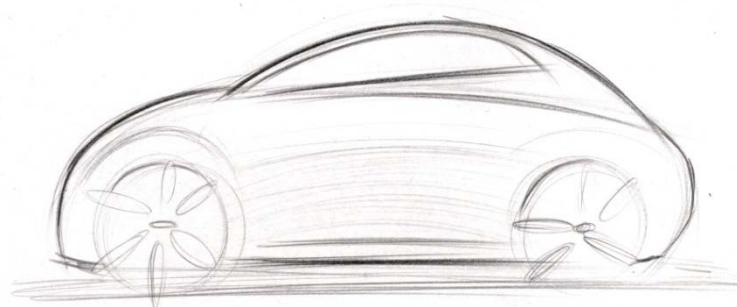


Fig 4.3 Concept No 3

In Fig 4.3 the concept is showing the character of Ford like shoulder line.

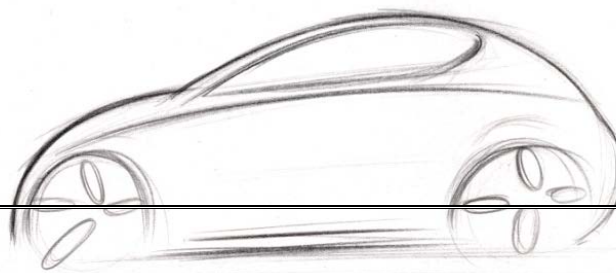


Fig 4.4 Concept No 4

In Concept no 4 the character line is extended till starting to ending of the concept.

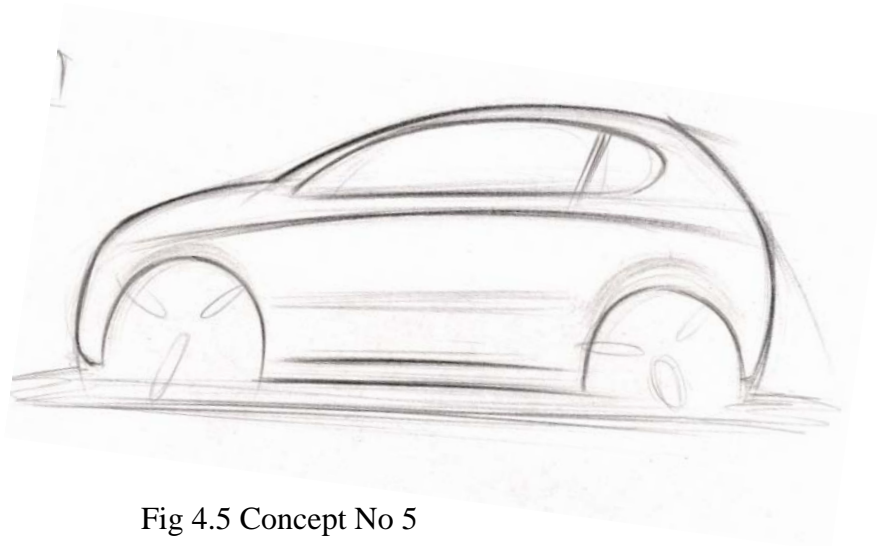


Fig 4.5 Concept No 5

In Fig 4.5 tried to show the limitation of character line.

Fig 4.6 Concept No 6

Fig 4.6 is the final side view in this the Ford character is fully applied in the concept.





Fig 4. 7 Concept No 7

In fig 4.7 the front grill pattern of Ford has been implemented.

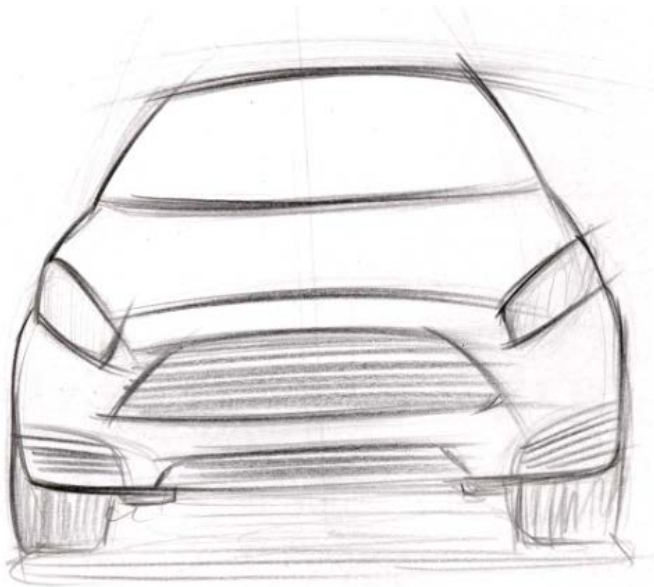


Fig 4.8 Concept No 8

In Fig 4.8 the refinement of front view is done.

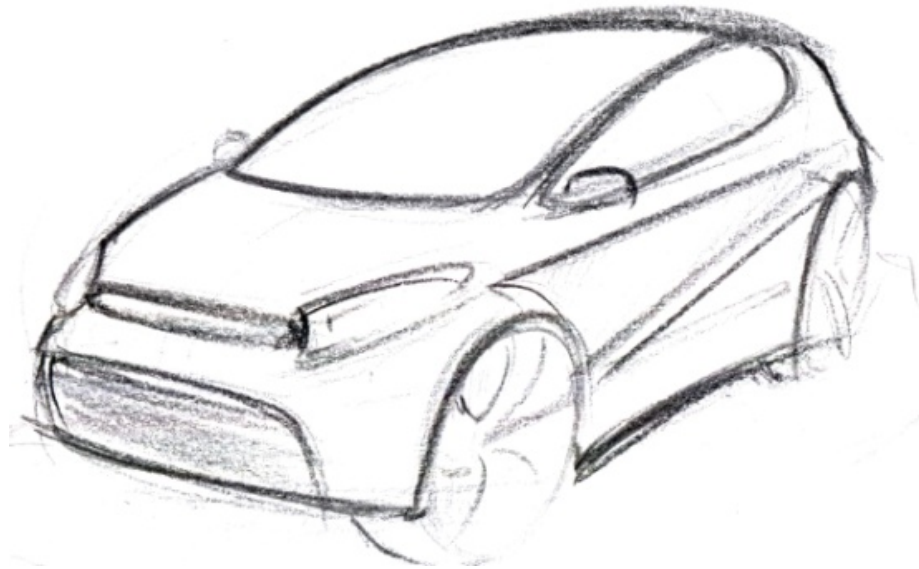


Fig 4.9 Concept No 9

Fig 4.9 shows the front 3/4<sup>th</sup> view of the concept where the characters of Ford is implemented. The shoulder lines are straight.

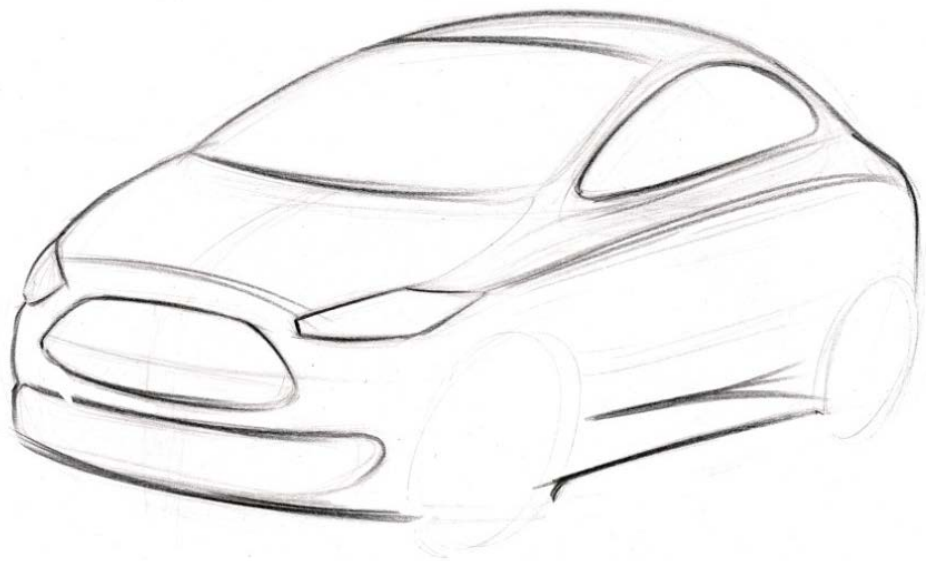


Fig 4.10 Concept No 10

In Fig 4.10 the shoulder line drawn little curvy instead of straight prominent line. The front grill and headlight gives an expression of Ford Figo sedan.



Fig 4.11 Concept No 11

In Fig 4.11 tried to show the detailing of microcar

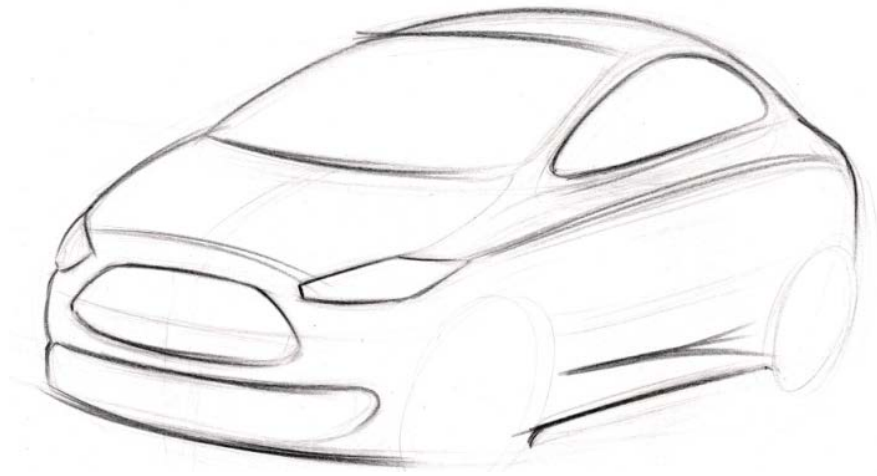


Fig 4.12 Concept No 12

Fig 4.12 shows the character line falling down.



Fig 4.13 Concept No 13

In Fig 4.13 the future design trends are implemented like panoramic roof, robotic, aggressive headlight, layered front. The detailing of micro car is also in concept 13.



Fig 4.14 Concept No 14

Fig 4.14 is the final concept of microcar, where the robotic headlight is there and the character line is also giving the character of Ford where the prominent curved lines and the front grill.

# Rendering



Fig 4.15 Final Rendering

## 5. Digital Model and Physical Model

### Alias Model

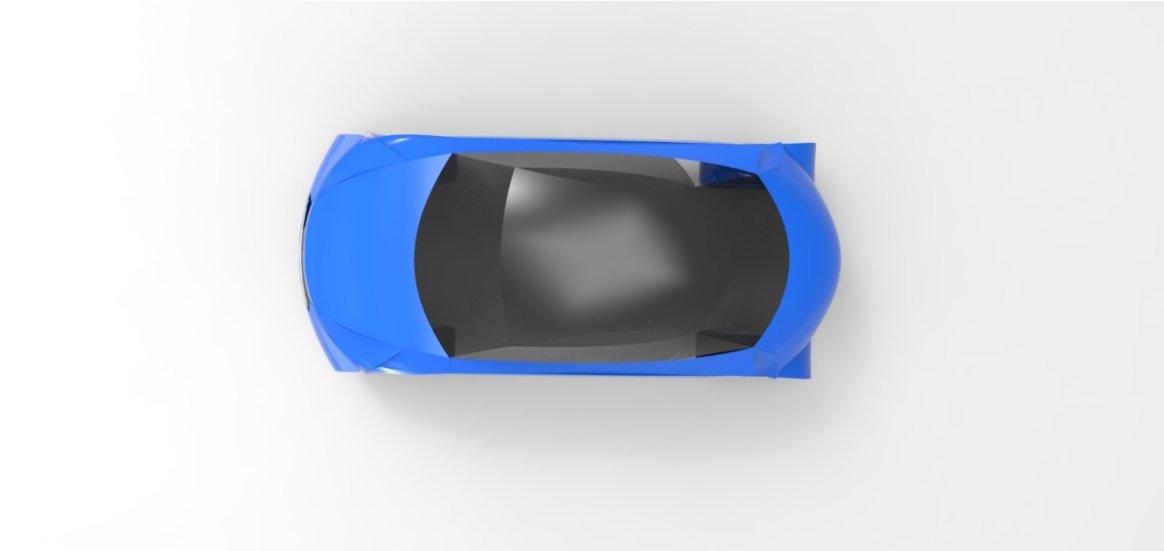


Fig 5.1 Alias top view

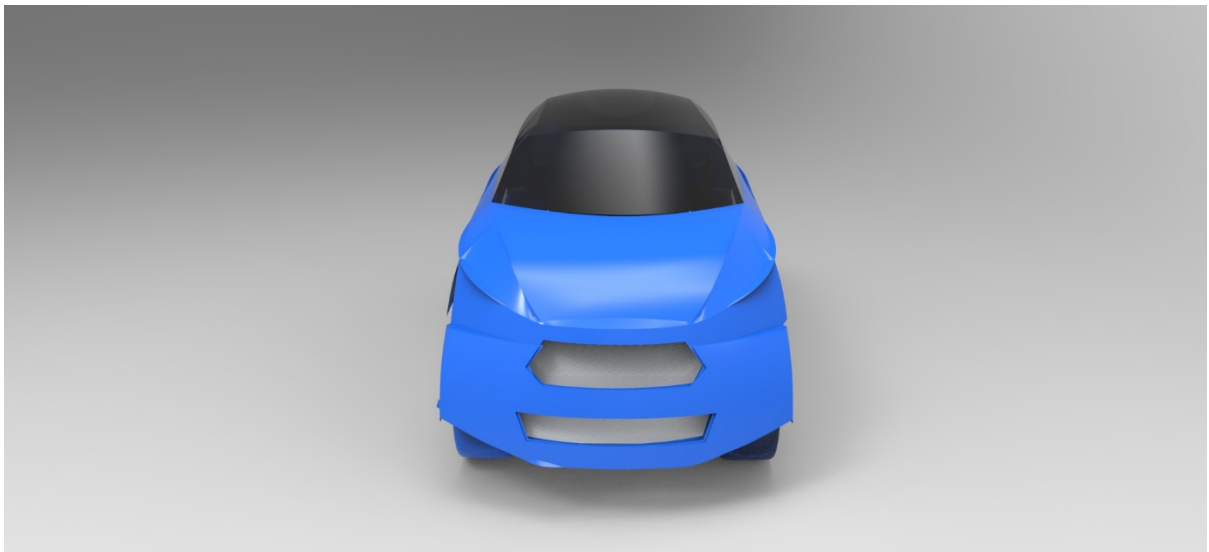


Fig 5.2 Alias front view

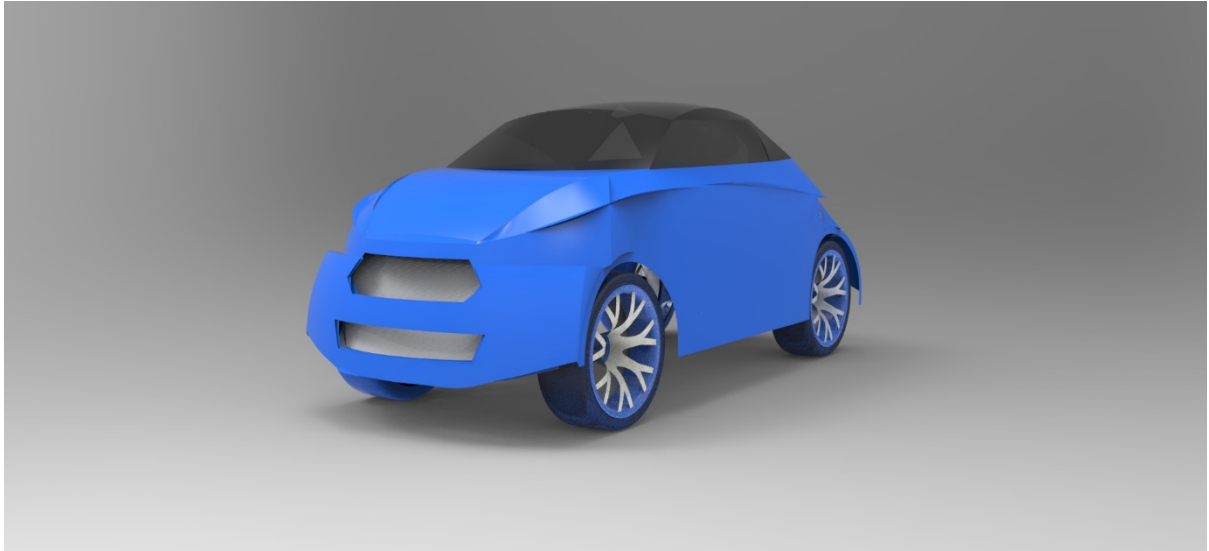


Fig 5.3 Alias front 3/4<sup>th</sup> view

## Clay Model







# Conclusion

## Reference

1. Ford Motor Company, [http://en.wikipedia.org/wiki/Ford\\_Motor\\_Company](http://en.wikipedia.org/wiki/Ford_Motor_Company), Date- 15.04.2015
2. Johns Hopkins University Press, <https://jhupbooks.press.jhu.edu/content/model-t>, Date- 15.04.2015
3. Microcar, <http://en.wikipedia.org/wiki/Microcar> Date- 20.01.2015
4. H-Point by Stuart Macey with Geoff Wardle/ Design studio press/ Page no: 19.
5. Ownership Review, <http://www.team-bhp.com/forum/long-term-ownership-reviews/53561-2006-maini-reva-g-wiz-ownership-review.html>, 21.01.2015
6. Auto car, Feb edition, Page no:10.
7. Jersey auto lease, <http://jerseyautolease.com/car-listing/ford-fieta-sedan-2015/> Date- 20.03.2015.
8. Ford Fiesta, [http://en.wikipedia.org/wiki/Ford\\_Fiesta](http://en.wikipedia.org/wiki/Ford_Fiesta) Date-22.04.2015
9. Ford Eco Sport,<http://www.shifting-gears.com/2014/12/17/20752-ford-ecosport-units-recalled-in-india/>Date-22.04.2015
10. Ford Eco Sport, [http://en.wikipedia.org/wiki/Ford\\_EcoSport](http://en.wikipedia.org/wiki/Ford_EcoSport), Date- 22.04.2015
11. Ford Fiesta ST, [http://www.caricos.com/cars/f/ford/2014\\_ford\\_fiesta\\_st/1600x1200/76.html](http://www.caricos.com/cars/f/ford/2014_ford_fiesta_st/1600x1200/76.html) Date- 22.04.2015.
12. Ford Fiesta ST, [http://en.wikipedia.org/wiki/Ford\\_Fiesta](http://en.wikipedia.org/wiki/Ford_Fiesta), Date- 22.04.2015.
13. Ford Figo, [http://en.wikipedia.org/wiki/Ford\\_Figo](http://en.wikipedia.org/wiki/Ford_Figo), Date- 22.04.2015
14. Ford Kinetic Design, <http://www.ford.co.uk/experience-ford/KineticDesign>, Date- 27.03.2015
15. Car Body Design, <http://www.carbodydesign.com/pub/53164/baking-up-a-new-look-in-layers/> Date- 27.03.2015
16. Design Trends, <http://smartwater.kinja.com/dreamcar-2020-turning-10-design-trends-into-the-car-of-1616439599> Date- 27.03.2015
17. BMW 4 series coupe, <http://driving.ca/bmw/4-series/reviews/road-test/gallery-2012-bmw-4-series-coupe-concept-2>, Date-27.03.2015
18. BMW i8, <http://n-lux.deviantart.com/art/BMW-i8-concept-car-307579931>, Date- 27.03.2015
19. Lexus <http://www.motoraty.com/cars/blog/2015/02/01/lexus-reveals-lf-lc-gt-vision-gran-turismo-2/>, Date- 27.03.2015

20. Lexus, <http://www.motortrend.ca/en/car-reviews/coupes/1311-2015-lexus-rc/>, Date- 27.03.2015
21. Lexus, <http://www.superstreetonline.com/features/1312-lexus-lf-lc-lfa/>, Date- 2.03.2015
22. Lexus, <http://worldscoop.forumpro.fr/t5786-2015-lexus-lf-lc-gt-vision-gran-turismo>, Date- 27.03.2015
23. Car body design, <http://www.carbodydesign.com/2012/06/bmw-i-design-dna/>, Date- 27.03.2015
24. Motor Authority, <http://www.motorauthority.com/news/kia/page-7>, Date-27.03.2015.
- 25 Enviroment team, <http://www.environmentteam.com/concept/element-c-suv-comes-with-feature-rich-panoramic-roof/>, Date-27.03.215.
26. Car ikos, [http://www.caricos.com/cars/1/lincoln/2012\\_lincoln\\_mkz\\_concept/1024x768/8.html](http://www.caricos.com/cars/1/lincoln/2012_lincoln_mkz_concept/1024x768/8.html), Date-2.3.2015