

Product Design Three

Project Report

DESIGN OF TWO WHEELER FOR TRAFFIC POLICE

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APPROVAL SHEET

The Industrial Design project titled

“Design of two wheeler for traffic police”

by Edwin Mendes (0 5 6 1 3 8 0 3)

is approved for the partial fulfilment of the requirement for the post graduate degree in Industrial Design.

PROJECT GUIDE:

EXTERNAL EXAMINER:

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CHAIRPERSON:

INDEX

Acknowledgments	01
1. Abstract	02
2. Scope of project	03
3. Project Objective	03
4. Introduction	04
5. Understanding the organisation	
5.1 Organisation structure of Mumbai Police	05
5.2 Organisation structure of Traffic Police	06
5.3 Duties of Traffic police	07
5.4 Departments	08
6. Vehicular requirement	10
6.1 Vehicles Used	10
6.2 Types of Two wheelers used	11
6.3 Modification of Two wheelers	15
6.4 Bikes used by Beat Marshal	20
7. User study and Analysis	21

INDEX

8. Identity requirements	32
8.1 Characteristics of Traffic Policemen	32
8.2 Characteristics of two wheelers	33
9. Fabrication Method	35
10. Product Brief	36
11. Bike selection	37
12. Idea Sketching	42
13. Concept Rendering	62
14. Concept Selection	68
15. Mock Up study	71
16. CAD Modelling	74
17. Final Product	75
18. Final Scaled Prototype	78
 Reference	 80
Drawings	

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1.ABSTRACT

The project aims at designing a two wheeler which addresses the duty requirements of traffic police and also enhances an identity of the department and the person using it. During my visit to Southern region of Mumbai as a causal observation I noted that the two wheelers used by the traffic police department lacked the functional and identity requirements. This observation and my interest in two wheelers led me to take up this as final design project.

Mumbai metropolitan region is one of the largest and fastest growing region in India. The vehicular traffic in this city has been constantly rising. This leads to the need of better traffic control system. Mumbai's concern regarding traffic control dates back to 1924 when the traffic department was created by the administration. From then on the department has been in constant effort to improve the efficiency by use of better electronic equipments and vehicles.

In this project my major challenge is to understand the patrolling requirements of the traffic police and transform the two wheeler as functional extension for performing the duty. Along with satisfying the functional issues, the two wheeler is designed to carry a visible identity of the user in the congested city traffic.

2. SCOPE OF PROJECT

The scope of this design project covers the possibility of using the two wheeler as an extension to achieve the duty need more efficiently. The scope also includes creating an identity to the Mumbai Traffic Police when using the vehicle for Patrolling.

This would involve studying organisational structure, existing vehicles used, the kind of changes done on these vehicles, tasks involved during patrolling, and the characteristics carried by a two wheeler. Further this study would help in exploring the possibilities of using an existing vehicle structure and transforming it into one that would have specific functional features and creating a identity through change in form.

3. PROJECT OBJECTIVE

The prime objective of this project is to design a two wheeler for Mumbai Traffic Police which would not only be just a transportation vehicle but would extend itself to the duty needs of patrolling. This vehicle would carry a distinct identity to the Traffic Police rider.

4. INTRODUCTION

Mumbai's concern regarding traffic control dates back to 1924 when the traffic department was created by the administration. This traffic police branch was carved out of the mounted police force and comprised of 1 Police Inspector, 3 Sergeants (Sub-Inspectors), 1 Jamadar (Asst. Sub-Inspector), and 154 constables and head constables, with a complement of 1 jeep and 3 motor cycles, and an annual budget of Rs. 22,524.

It was smooth sailing till the early 1960's (with suitable additions to the branch from time to time). The 1960's, however demanded special attention and the post of Deputy Commissioner of Police, in charge of the traffic department was created. As problems multiplied, there was an increasing need to curb them. The Traffic Control Branch has now grown to a strength of over 2,000. The modest beginnings of 1924 have given way to the technological brilliance of electronic cells, computers, wireless systems and motor transport. The department has been in constant effort to improve the efficiency by use of better electronic equipments and vehicles.

Mumbai traffic police has been using a number of vehicles to perform their daily duties. The two wheelers are very important part of this fleet. After a brief study on the existing system of the vehicles used, it was realised that the present two wheelers used could not satisfy the functional and identity needs of this department. Hence, need was felt to design a two wheeler which addresses the duty requirements of traffic police and also enhances an distinctiveness of the department and the person using it.

Facts & Figures

Area Km	437.71 Sq.
Policemen per Km	0.5 per/Km.
Population	1.20 Crore
Vehicle Population	11.23 Lac
Road Length	1900 Km

[Http://www.trafficpolicemumbai.org/facts.html](http://www.trafficpolicemumbai.org/facts.html)

5. UNDERSTANDING THE ORGANISATION

5.1 ORGANIZATION STRUCTURE OF MUMBAI POLICE

The Mumbai Police have the task of policing the vast metropolitan area of Mumbai, one of the largest metropolitan areas in the world. The Mumbai Police is divided into the following units:

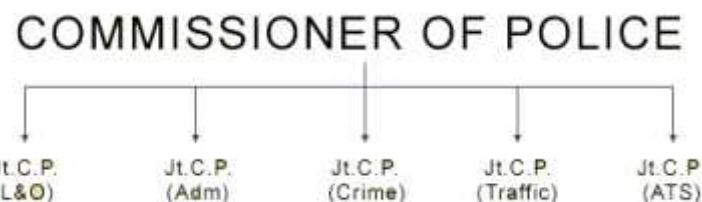
- The Crime Branch
- The Anti Terrorism squad
- The Law and Order
- The Traffic Police [1]
- The Administration

Each of these units have a commander who officially holds the rank of Joint Commissioner of Police.

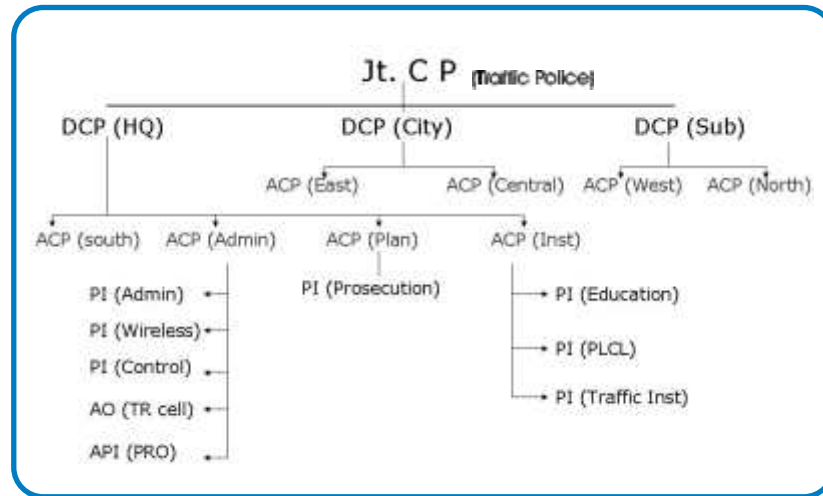
RANK STRUCTURE

The rank structure of the Mumbai Police is as follows:

- Commissioner of Police (CP)
- Joint Commissioner of Police (Jt. C. P)
- Additional Commissioner of Police (Addl. C.P.)
- Selection Grade Deputy Commissioner of Police (D.C.P.)
- Deputy Commissioner of Police (D.C.P.)
- Deputy Commissioner of Police (D.C.P.) (Less than 10 years of service)
- Assistant Commissioner of Police (A.C.P.)
- Police Inspector (P.I.)
- Assistant Police Inspector (A.P.I.)
- Sub Inspector (S.I.)
- Assistant Sub Inspector (A.S.I.)
- Head Constable (H.C.)
- Police Naik (P.N.)
- Police Constable (P.C.)



5. UNDERSTANDING THE ORGANISATION



Organisation Structure



Mission Statement of Traffic Police

5.2 ORGANIZATION STRUCTURE OF TRAFFIC POLICE

The Traffic Police Department is divided into five zone, they are, North, South, East, West and Central. Each zone is headed by an ACP.

Along with this five ACP's there are three ACPs each heading the Administration, Planning and Instruction. The overall organisational structure is as shown in the organisation chart.

The rank structure within the traffic police department is as follows:

- Joint Commissioner of Police (Jt. CP)
- Deputy Commissioner of police (DCP, 3 nos)
- Assistant Commissioner of Police (ACP, 8 nos)
- Senior Police Inspector (Sr. PI)
- Police Inspector (PI)
- Asst. Police Inspector
- Head Constable
- Police Naik
- Constable

5.3 DUTIES OF TRAFFIC POLICE

Overall duties of traffic police include the following:

Traffic enforcement: enforcing laws and regulations intended to improve traffic safety, such as speed limits.

Emergency response: securing the scene of a traffic accident by using cones and flares as well as providing first aid to the injured

Accident investigation: gathering evidence to determine the cause of a roadway accident

Commercial vehicle enforcement: enforcing laws related to commercial transport, including weight limits and hazardous materials rules

General law enforcement: assisting local police, especially at traffic signals.

Education: providing public information, handouts and displays to encourage safe driving and usage of the roads

Monitoring the road conditions, diverting the traffic during repair.

In order to perform the assigned duties efficiently the department is provided with a fleet of vehicle, which include 4 wheelers and 2 wheelers. These vehicles carry the Mumbai Police logo and graphics of yellow and blue strips. The vehicles are allotted to various Chowkies based on the area that they cover.

5. UNDERSTANDING THE ORGANISATION



5.4 DEPARTMENTS

In order to understand how the vehicles are purchased and used, visits were made to the various department and the officials were interviewed. The understanding of the departmental functions are collated below.

Traffic Police Headquarter

In this department all the administrative functions are carried out. This department has the offices of ACPs and other top officials. Most of the administrative operations happen in this headquarter.

Motor Transport Section(MT) - Nagpada

This department is in charge of the entire vehicular fleet of Mumbai Police responsible for keeping all vehicles in roadworthy conditions. It also provides the pilot, escort and other vehicles during the visit of VIP's in Mumbai.

All the vehicles required for Mumbai Police are purchased under Rate Contract, by the Director General of Supply and Disposal. Vehicles are purchased at special government prices, directly from the manufacturing company. Proposals regarding a particular model are made by the Motor Transport section. Final decision on the purchase of a particular model is made by senior officers, like Jt. CP and DCP.

When the officer in charge of the two wheeler section was questioned on the choice criteria of vehicles some facts surfaced. He informed that initially Royal Enfield were more commonly used since there was not much choice in the bike section of that power category. With entry of new bike models in market there is a variety to choose from. Since the bikes are used for city patrolling 100cc to 200cc is sufficient. Also the new bikes such as Bajaj Pulsar,



5. UNDERSTANDING THE ORGANISATION



Bajaj Caliber, Fiero and Hero Honda had other advantages over the bullet, such as better fuel efficiency, lower cost, Lighter and easy to move in city traffic, easy of service and maintenance etc. Modification in terms of accessories and graphics is done by the Motor transport Section. After the purchase of vehicle, a prototype vehicle is made with the graphics and accessories changes. This is then shown to the Jt. CP (Traffic Police) for approval. Fairing for TVS Fiero was done by external agency. these have been discontinued or modified cause of the hindrance it causes while riding through the traffic. Bajaj Caliber and Pulsar has factory fitted fairing which can carry the Traffic Police Logo.

Area Chowki

Further the department is divided into smaller area chowkies which takes care of the traffic flow and enforce traffic law and order in their designated areas. Offenders penalised for minor law break have to deposit the fine amount and collect their documents.



Traffic Junction Cell

These are small units at major traffic junctions from where the officials control the traffic flow at the junctions.

Learning from the visits:

The vehicles are purchased under rate contract directly from the manufacture. The type of vehicles to be purchased is decided by Jt. CP and DCP. Modification in terms of accessories and graphics is done by the Motor transport Section. A prototype vehicle with modifications are made and approved for changes from the DCP

6. VEHICULAR REQUIREMENT

6.1 VEHICLES USED

Below is a chart which gives the relationship between the types of vehicles used and the position the user hold in the department.



Jt. C P		
DCP (3)		
ACP (8)		
Sr. PI		
PI		
Asst. PI		
Sub Inspector		
Asst. Sub		
Inspector		
Head Constable		

Use Four wheeler such as Ambassador, Maruti Gypsy,

Use Two wheeler such as Suzuki Fiero, Yamaha, Bajaj Pulsar, Bajaj

As seen above, two wheelers are used by Asst. PI, SI, ASI, Head constable and police Naik. Of these Asst. Pi, SI and Asst. Si are compulsorily provided with two wheeler. In city patrolling the officials using the two wheeler for patrolling are also called as riders.

Number of two wheelers used:

Enfield	204
Bajaj Caliber and Pulsar	800
Fiero	100
Yamaha	80
Hero Honda	75

Total number of two wheeler in use : 1259

6. VEHICULAR REQUIREMENT



6.2 TYPES OF TWO WHEELERS USED

Model: Enfield Bullet 350.

Engine type: 346 cc, air cooled, single cylinder, 4-stroke, 18 hp.

Royal Enfields had been sold in India from 1949. In 1955, the Indian government looked for a suitable motorcycle for its police and army, for use patrolling the country's border. The Bullet was chosen as the most suitable bike for the job. The Indian government ordered 800, 350 cc model Bullets, an enormous order for the time. These bikes do not carry much modifications on them.

Users:

This bike is mostly used by higher rank police officer such as

- Police Inspector
- Assistant Police Inspector
- Police Sub-Inspector
- Head Constable

Purpose:

These two wheelers are used mainly as transportation vehicle for the officers. The officer uses this vehicle to move to an important traffic junction from where he monitors the vehicular traffic. It is also used for patrolling purpose



6. VEHICULAR REQUIREMENT



6.2 TYPES OF TWO WHEELERS USED

Model: Bajaj Pulsar 180, 2006.

Engine type: 180 cc, air cooled, single cylinder, 4-stroke, 16.5 hp.

This is one of the most popular premium segment bike in the country. With its 180 cc capacity and Digital Twin Spark Ignition technology delivers a good power and decent mileage. The styling of this vehicle with its large tank size is very favorites among the youth.

Users:

This bike is mostly used by:

- Assistant Police Inspector
- Police Sub-Inspector
- Head Constable
- Police Naik
- Constable

Purpose:

These two wheelers used for road patrolling, also used as transportation vehicles by senior official to move at a junction and monitor traffic.



6. VEHICULAR REQUIREMENT



6.2 TYPES OF TWO WHEELERS USED

Model: Bajaj Caliber 115.

Engine type: 111.6 cc, air cooled, single cylinder, 4-stroke, 9.5 hp.

This bike delivered a very good mileage and had a decent capacity for city riding. The riding posture was upright and was comfortable. These bikes did not carry any modification except for the Mumbai police graphic on the head light fairing.

Users:

This bike is mostly used by:

- Head Constable
- Police Naik
- Constable

Purpose:

These two wheelers used as transportation vehicles by the traffic police personals. Mostly used by head constable and police naik as transportation vehicle. These are rarely used for patrolling.



6. VEHICULAR REQUIREMENT



6.2 TYPES OF TWO WHEELERS USED

Model: SUZUKI Fiero.

Engine type: 147.5 cc, air cooled, single cylinder, 4-stroke, 12 hp.

Launched in 2000, presently traffic police use 100 bikes with customized front panel and body paint. These also has a attached side trunk to carry the equipments needed during patrolling. This was one of the best selling bike from TVS Suzuki.

Users:

This bike is mostly used by:

- Head Constable
- Police naik
- Constable

Purpose:

These two wheelers are used specifically for patrolling.



6. VEHICULAR REQUIREMENT



6.3 MODIFICATION ON THE TWO WHEELERS

Model: TVS Suzuki Fiero

Front fairing with Visor

The standard fairing has been replaced by a wider one with body matching paint work of blue and yellow strips. This fairing initially carried a front visor with Mumbai Police Logo on it. The fairing gives a identity to this fleet of bikes belonging to traffic police, and is clearly visible from a long distance.

Problem with this fairing:

1. During turning the fairing hits the legs of rider and thus increased the turning Radius.
2. The fairing is too large and does not go well with the overall bike proportions.
3. The assembly of the fairing is with MS strips bent and welded.
4. While moving through congested traffic the fairing causes added difficulty in maneuver.
5. Visor fitment with the carrying logo tends to create a problem with the visibility.

Inference:

1. The front fairing should not hinder the maneuverability of the vehicle.
2. It should carry an identity of the departments to which it belongs.
3. The visor fitment should be stable.

6. VEHICULAR REQUIREMENT

6.3 MODIFICATION ON THE TWO WHEELERS



Metal bracket to carry walkie talkie



walkie talkie is carried in the upper pocket



Metal bracket to carry walkie talkie and LTM book.



LTM book is carried in a

Metal bracket on steering handle.

A metal bracket is mounted on the steering handle to carry the walkie talkie and LTM book. This is made of MS sheet.

Problem with this bracket:

1. The bracket is not used for the intended purpose. The walkie talkie is carried in the upper pocket of the uniform and the LTM book is carried in a pouch attached to the belt.
2. The metal bracket does not have any locking system to securely hold the walkie talkie, hence on speed breakers and rough roads the walkie talkie falls off from it.
3. The MS sheet tends to vibrate when riding.
4. The sheet metal tends to rust

Inference:

1. The LTM book holder and Walkie Talkie holder should be within reach.
2. The holders should hold the walkie talkie securely and should give the rider a sense of safety.

6. VEHICULAR REQUIREMENT

6.3 MODIFICATION ON THE TWO WHEELERS



Helmet

Every rider has to compulsorily wear a helmet while patrolling. The helmet currently used are open face helmets. A number of these helmets are sponsored by Zee News TV channel company.

It is observed that there is no proper place to secure the helmet on the two wheeler. The rider places these helmets on the Walkie Talkie Bracket, the side trunk or on the rear view mirror.

Inference:

1. Helmet holder needs to be provided.

Trunk

Each Bike carries a side trunk that is used to carry various items items such as the LTM book, licences collected of law violaters, raincoat etc.

This trunk causes a hindrance to the pillion rider. The shape and paint work on these trunk do not gel with that of the bike.

Inference:

1. Space for carrying the equipment needed during patrolling to be provided.
2. The form and colour of the side trunk should match with that of the bike.



6. VEHICULAR REQUIREMENT

6.3 MODIFICATION ON THE TWO WHEELERS



Graphic on Bajaj Pulsar 180 DTSI



Mumbai police Logo on the rear wheel mud guard

Model: Bajaj Pulsar 180 DTSi.

These are the latest bikes bought and being used by the Mumbai police. There are no modifications done on these bikes except for the graphic work on its body.

Inference:

1. The graphics should carry the necessary information eg. Helpline number.
2. The graphics should be distinct.



Mumbai Traffic police Logo on the fairing



Blue and yellow stripes on Tail.



Blue and yellow stripes on the side trunk



Blue and yellow stripes on the tank with Helpline number

6. VEHICULAR REQUIREMENT

6.3 MODIFICATION ON THE TWO WHEELERS



Model: Royal Enfield Bullet 350

These bikes were brought during the early sixties. They carry the strong look and are seen as standard bikes for police force. These bikes do not carry any visible modifications. Few of the vehicles carry the siren and flag stand. These are now mostly used for piloting of VIPs and in parade shows. These bikes deliver good amount of torque and power. Have a very prominent sound which is also called as thumps. Because of the high capacity engine, the fuel efficiency is low. Also these bike are costly as compared to other bikes available in the market. Bullets are very stable on highways at high speeds. The weight of these bikes makes it difficult for a new user to maneuver in city traffic.



Inference:

1. The bike to be used for city patrolling should be easy to maneuver.
2. The bike need to have sufficient power to catch up with the law defaulters.

6. VEHICULAR REQUIREMENT

6.4 BIKES USED BY BEAT MARSHAL OF MUMBAI POLICE



Modified front fairing with graphics



Emergency signal light and Siren



Emergency signal lights



'Mumbai Police' written on number plate



Side trunk with graphics



Switches for Emergency light and Siren

7. USER STUDY AND ANALYSIS

Once the initial study was done and the system understood it was decided that the area of focus will be designing a two wheeler for patrolling. From this study done an initial product brief was drafted.

Initial Product Brief:

Design of a two wheeler for the Traffic Police of Mumbai City focusing on their duty need during patrolling and Creating an identity as patrolling vehicle.

This product brief gave a direction as to what the further study had to focus on. So a detailed study of the patrolling activity was carried out using video protocol. The details of the study has been collated and presented in the following pages.

7. USER STUDY AND ANALYSIS



During turning the broad front fairing hits the knees.



Rider has to move around the vehicles to access the side trunk.



Getting the bike on main stand requires effort.



Have to park the bike in confined spaces.



Pillion rider faces problem due to the large side trunks.

Inferences:

1. The design changes should not interfere with the normal riding usage of the vehicle.
2. Things used frequently during patrolling should be accessible.
3. The vehicle should be easy to handle.

7. USER STUDY AND ANALYSIS

Scenario 1: Getting on the bike



Rider lifts his trouser to cross over the rear seat and the bulky side



Rider lifts his right leg and crosses over the rear seat and trunk.



Puts the key in the ignition and turns over the switch. Gets the kick lever in position by hand. Kick starts the engine.



Rider changes the gear and moves ahead

Inferences:

1. Side trunk to be made smaller or eliminated.
2. Trouser of the uniform to be stitched loose.
3. Electric start to be provided.

7. USER STUDY AND ANALYSIS

Scenario 2: Crossing the junction at Stop signal



Stop signal ON, rider takes the narrow passage on the left side of road



Rider has to take care not to hit the stand still vehicles with the handle and side trunk



Rider needs to attend an emergency and hence jumps the signal



Rider tries to cross the flowing traffic, other road user are not aware of rider intent.



Rider finds it difficult to cross the flowing traffic.



The pedestrians crossing the signal are also unaware of riders emergency.

Inferences:

1. Attachment designed should not be greater than the handle bar dimension.
2. Light and sound signaling system to be provided.

7. USER STUDY AND ANALYSIS

Scenario 3: Taxi parked in 'No Parking' area



Rider spots a taxi parked in no parking area and waiting for passengers.



Rider moves closer to the rear of the taxi. Taxi driver spots the rider in rear view mirror.



Taxi driver starts the vehicle and moves out from that area.

Inferences:

1. The front head light and fairing needs to have a distinctive identity.
2. The vehicle should be recognised even during night or low light condition.

7. USER STUDY AND ANALYSIS

Scenario 4: Moving through 'No Entry' road



Road ahead is congested with traffic. He needs to move ahead and clear the traffic congestion.



To move ahead rider takes a side route which is a no entry road.



The on coming vehicles find it difficult to give way to the unexpected entry in the one way route.

Inferences:

1. Proper sound signaling system should be provided to alert other vehicles on road.

7. USER STUDY AND ANALYSIS

Scenario 5: Chasing law defaulter



Stop Signal ON at a junction.



Rider spots a signal Violater.



Rider jumps the signal and chases the defaulter.



Rider speeds up to catch up with the defaulter.



Rider overtakes the defaulter and uses hand signal to stop him.



He gets off his bike puts it on the stand call the defaulter and remove the LTM Book from the side trunk.



Use the rear seat surface to write the temporary licence form



Collects the license of the defaulter and keeps it in the top pocket.

Inferences:

1. proper indication system in terms of sound should be provided on the bike.
2. Light signal should be provided indicating the defaulters to stop.
3. Bike should have a good pick up and speed to catch with rule defaulter.

7. USER STUDY AND ANALYSIS

Scenario 4: Writing Temporary License for law defaulters.



In one scenario we had seen that the rider uses the rear seat surface to write the LTM book. Another similar scenario was observed when the rider uses the tank surface.

1. The rider keeps sitting on the bike and calls the defaulter to him.
2. He removes the LTM book from the waist pouch and the pen from the top pocket.
3. Keeps the LTM book on the tank surface.
4. writes the temporary license for the defaulter and collects his permanent license.
5. Keeps the license in the top pocket.

7. USER STUDY AND ANALYSIS

Things carried on the bike

From the user study it was found that the rider usually carries the following things along with the on the bike:

1. Temporary Licence Book (LTM Book)
2. Walkie Talkie
3. Tiffin Box, soap, bike spare etc
4. 1 litre water Bottle
5. Civil Shirt in a packet
6. Bike Log Book



1



2



3

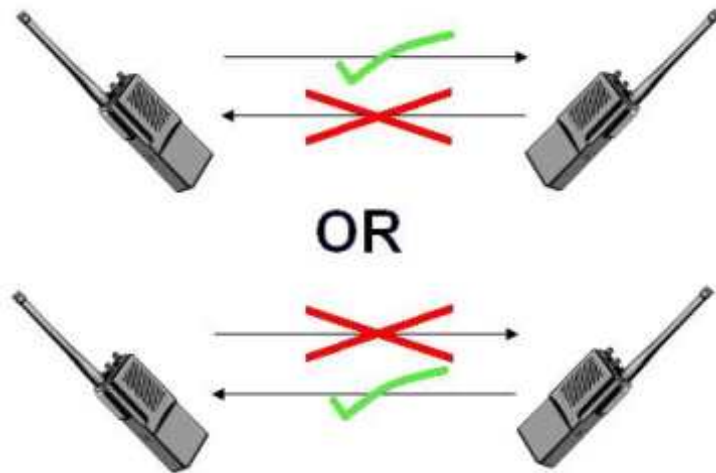


4



5

7. USER STUDY AND ANALYSIS



COMMUNICATION SYSTEM

A walkie-talkie or two-way radio is a hand-held portable, bi-directional radio transceiver. Major characteristics include a half-duplex channel (only one radio transmits at a time, though any number can listen) and a push-to-talk switch that starts transmission. Typical walkie-talkies resemble a telephone handset.

In a situation of traffic congestion at a junction, Officer at that junction or in the adjacent area will give a call over the walkie talkie. This voice message will be transmitted to all the walkie talkies in that area at the set frequency. The calling officer will address the message to a particular rider by calling out the name of the road the rider is patrolling on. That particular rider would receive the message and reply back, if necessary the will move to the problem area on the two wheeler and get it cleared. The rider also recieves call from the control room.

7. USER STUDY AND ANALYSIS

Two Wheeler used for patrolling in other countries

A brief study of two wheelers used in other countries was studied to understand the elements that differentiate it as patrolling vehicles from other bikes.

Following points were noted:

1. Prominent emergency lights.
2. Colour and graphics used on the bikes.
3. Side trunk.
4. Siren mounted near the engine



Harley Davidson (NYPD)



BMW Tourer (Italy)



BMW Tourer (Frankfurt)

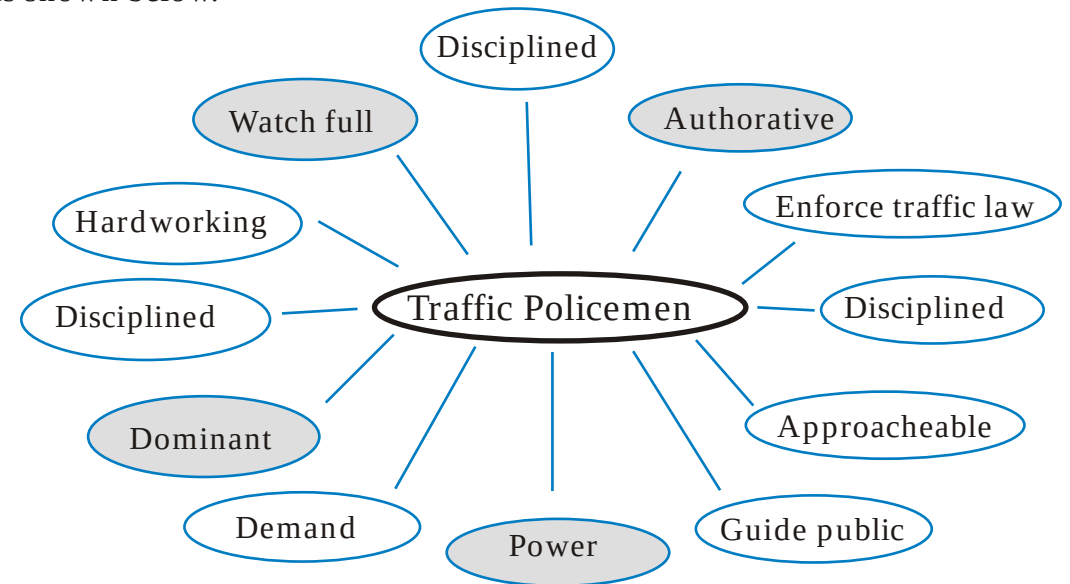


Honda CBR (Japan)

8. IDENTITY REQUIREMENTS

8.1 CHARACTERISTICS OF TRAFFIC POLICEMEN

In an attempt to understand and communicate the characteristics of a traffic police through the vehicle they use a study was done with the general public and the traffic policemen. This was done by putting forth question to them as to what they perceive about a typical traffic police men. The answers were documented and put in form of balloon diagram as shown below.



From the above balloon diagram four characteristics were popular in the perception on the general public and traffic police alike. As per my observation from the interaction in had with the traffic police personnel, it was found that they were very authoritative in their speech and like to display the power they possess. During the user study it was also observed that they were help full in guiding the public for road direction and were dominant towards the law defaulters



8. IDENTITY REQUIREMENTS

8.2 CHARACTERISTICS OF TWO WHEELER

For studying the characteristic elements that would be incorporated in the traffic police vehicle to be designed I selected some bike that display strong visual identity and tried to understand the perception it creates about itself

Harley Davidson

- Exposed engine shows the Power possessed by this vehicle and the owner.
- Upright cruiser sitting posture gives the owner a feel of authority.
- Chrome parts speak about the strength and display a expensive look.
- Round head light cluster gives the feel of dominance.
- This vehicle has got a unique sound.



Harley Davidson (NYPD)



Royal Enfield

Royal Enfield

- Exposed engine shows the Power possessed
- Here too the upright seating posture give a feel of authority and control
- The bigger diameter front shock absorbers give the feel of strength
- Round head light cluster gives the feel of dominance.
- The Thump sound is unique for this vehicle

8. IDENTITY REQUIREMENTS

8.2 CHARACTERISTICS OF TWO WHEELER



Ducati Monster

Ducati Monster

- Broad Tank resembles the shoulder strength of a male
- Chromed front shock absorbers with larger diameter gives the feel of stability.
- Naked exposed engine give the feel of raw power possessed by the engine.
- Round head light cluster gives the feel of dominance and seriousness.
- The Head Light is lower than the tank and in side profile the bike looks like an animal ready to pounce on its prey.



YAMAHA R1

YAMAHA R1

- Covered engine panels with the sharp lines give a speedy look to this vehicle.
- Pointed head light also display the piercing speed of this vehicle.
- the Twin Head light cluster have a very focused and aggressive expression.
- Dual coloured body give a sporty feel to the vehicle

9. FABRICATION METHOD

FABRICATION VENDORS

In order to understand the fabrication process that would execute the design a study of a vendor who does bike modifications was done. These are small scale units that carry out modifications of bikes as per customer requirements. These vendors have got skilled workers that have expertise in fabricating FRP panels, sheet metal work, chassis modification and painting. Since the number of bikes that are used by the traffic police is low this kind of batch fabrication would be suitable.



FRP fairing for a bike modification



Sheet metal tank being worked for painting



Bike modified by the Fabricator.

10. PRODUCT BRIEF

Design of a two wheeler for the Traffic Police of Mumbai City for City Patrolling Duty, and should meet the following requirements.

1. Space created to carry the items required for their duty need during patrolling

- LTM book
- Walkie Talkie
- Confiscated Licenses
- Bike log book
- Reflector jacket
- 1 litre water bottle
- Tiffin box
- Raincoat
- Civil clothing

2. Should have indication systems in terms of sound and light to warn the traffic during emergency.
3. Should carry a strong visual identity of 'dominance' in traffic during day as well as in night.
4. Design changes should not hinder existing maneuverability in congested traffic conditions.
5. The graphic should clearly display the emergency contact number.
6. It could be a single seater or can carry one pillion rider for short distance.
7. These design requirements would be done on a existing motorcycle.

11. BIKE SELECTION

Since the number of bikes used by the traffic police was limited it was necessary to formulate a strategy as to how the design will come to realisation. Design a complete new two wheeler for the sole purpose of patrolling would be expensive in terms of manufacturing. Hence, to move ahead with the design process selection of an existing bike was necessary. For this a study of existing two wheelers available in market was done. From the wide range of two wheelers few matched with the brief requirement. A detail of the short listed vehicles is presented in the following topics.

11. BIKE SELECTION

SHORT LISTED BIKES



Model: Bajaj Pulsar 150 DTSi/180 DTSi

This is one of the most successful bike in the country. It continues to thrill 150cc segment buyers for the last four year. Bajaj has taken the initiative to upgrade the bike almost on a yearly basis. It has a decent handling, sporty look and performance. It DTSi motor of 150cc is known to deliver a fairly good fuel efficiency. The 180 cc version of Pulsar, has more power but it give a lower fuel efficiency.



Model: Honda Unicorn 150 cc

Honda Unicorn from the Honda brand carries a lot of refinements in the engine and handling. The mono-shock at the rear wheel with a sharp tail lamp and tripod instrument cluster are straight from the Honda bloodline. The Unicorn is a very spirited motorcycle and is cheaper then its competitors.

11. BIKE SELECTION



Model: TVS Apache 150

This is the first bike from TVS that can be called as jaw-dropping. It is compact, muscular machine that is very striking in the flash. The fairing looks very classy head-on and the combination of the wide face and fat front tyre gives the bike a taut, big-bike stance in the rear view mirror, which is very attractive. Its motor is from the TVS Fiero refined to the core. The fuel efficiency it delivers is fairly good.



Model: Kinetic Blaze 165 cc

Kinetic calls this as segment make. The Blaze marks a giant leap for India's scooter segment with its a powerful 166cc 4-valve engine, advanced suspension, majestic street presence, glamorous looks and cushy seats for maximum comfort. Along with its power full engine, it is has the advantage of automatic transmission and step through seating. The vehicle has split seats with ample space for storage under it.

11. BIKE SELECTION



Model: Bajaj Avenger 180cc

The Bajaj Avenger is a cruiser style motorcycle conceptualized and produced by Bajaj Auto in India. It draws the styling and other design cues from the Bajaj Eliminator which had an air-cooled, single cylinder Kawasaki engine and was sold at a premium. Bajaj engineers replaced the Kawasaki single with the indigenously conceived, and more successful, 178.6cc DTS-i engine from the Bajaj Pulsar sportbike. However, the engine had to be re-tuned to suit the torque-demanding characteristics of a cruiser. The wheelbase is 1475mm, the longest in any motorcycle in India.



Model: Royal Enfield Bullet 350cc

This Royal Enfield Bullet 350cc has been around for the past 50-odd years. It is used by the armed forces and police around the country. This bike is known for its thump and is a classic model sold as cruiser. There has been up gradation in its engine but the style has been retained.

11. BIKE SELECTION



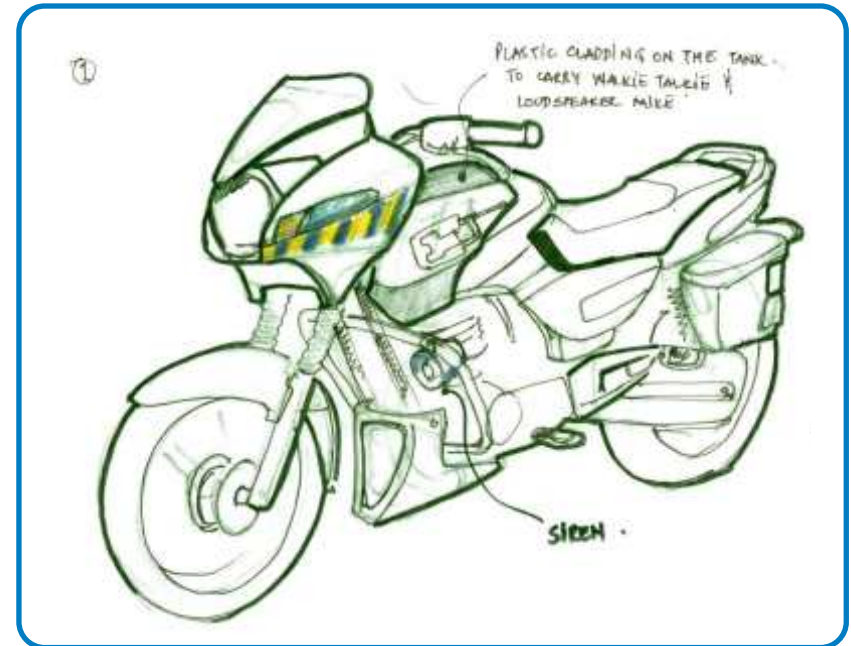
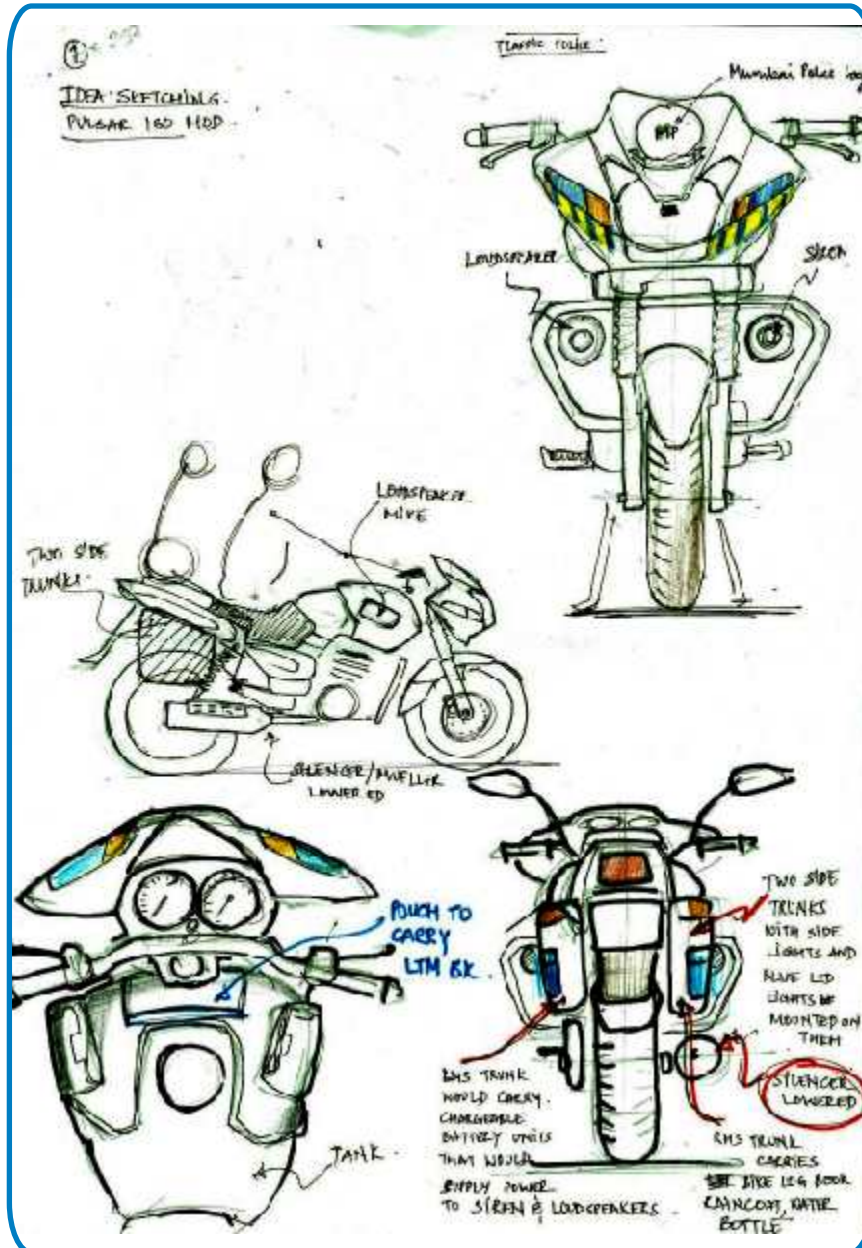
After the bikes were shortlisted, the next task was to select one bike so that idea exploration could happen around this bike. To do so an informal discussion was carried out with riders and staff members of Nagpada MT section. Out of the six bikes, two were more suitable for the purpose:

1. Bajaj Pulsar DTSi 150 and 2. Royal Enfield 350cc

Bajaj Pulsar DTSi 150 had the pros of latest technology, fuel efficiency, sufficient power output, lower price and low maintenance cost. Royal Enfield Bullet had the pros of its image in the general public as police vehicle, its dominant classic look, power output, road presence etc. But, bullet had the major disadvantage in terms of fuel efficiency, maintenance cost and its high price.

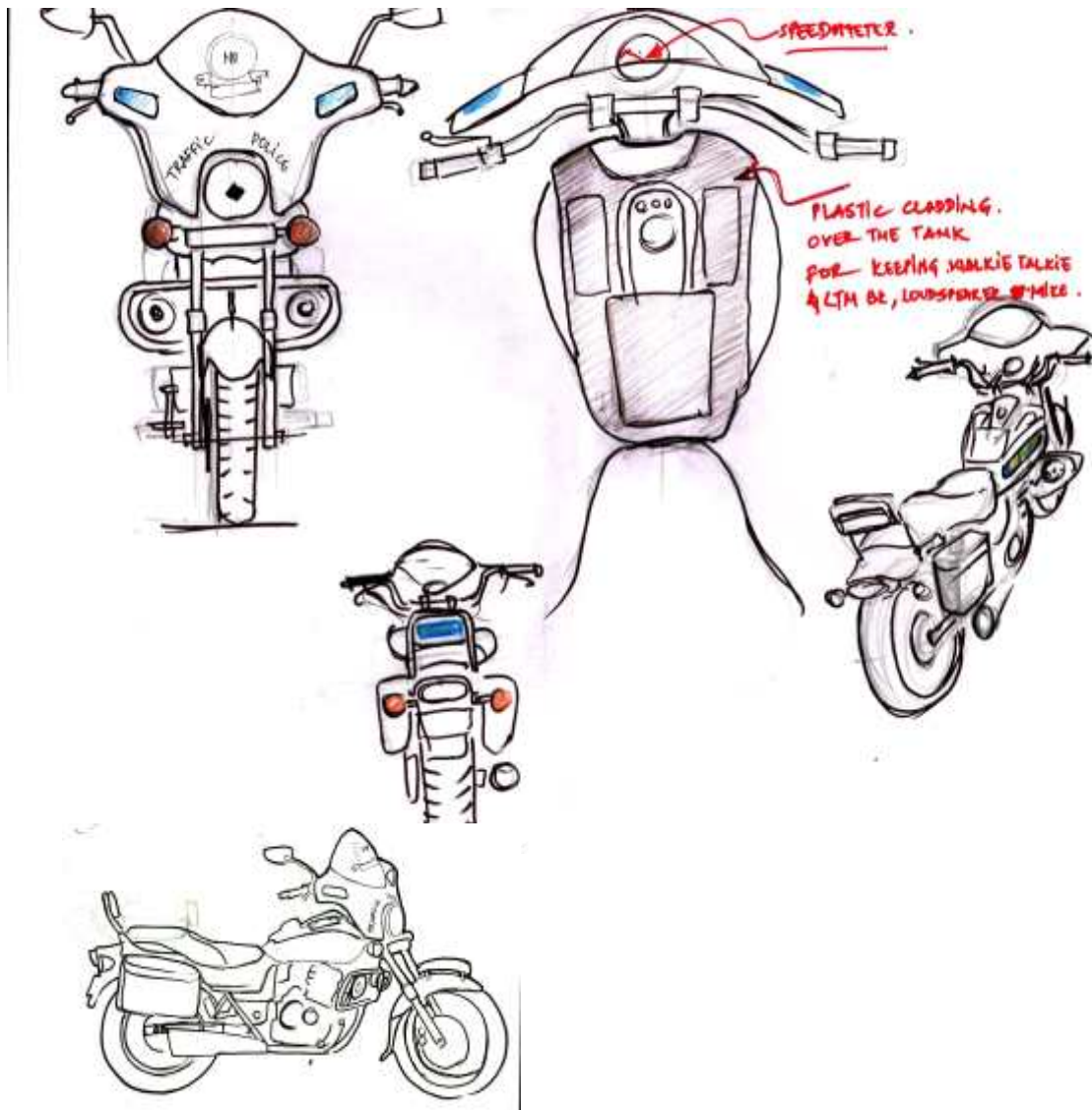
Due to above mentioned reasons, Bajaj Pulsar was the final choice on which the design exploration would be carried out.

12. IDEA SKETCHING

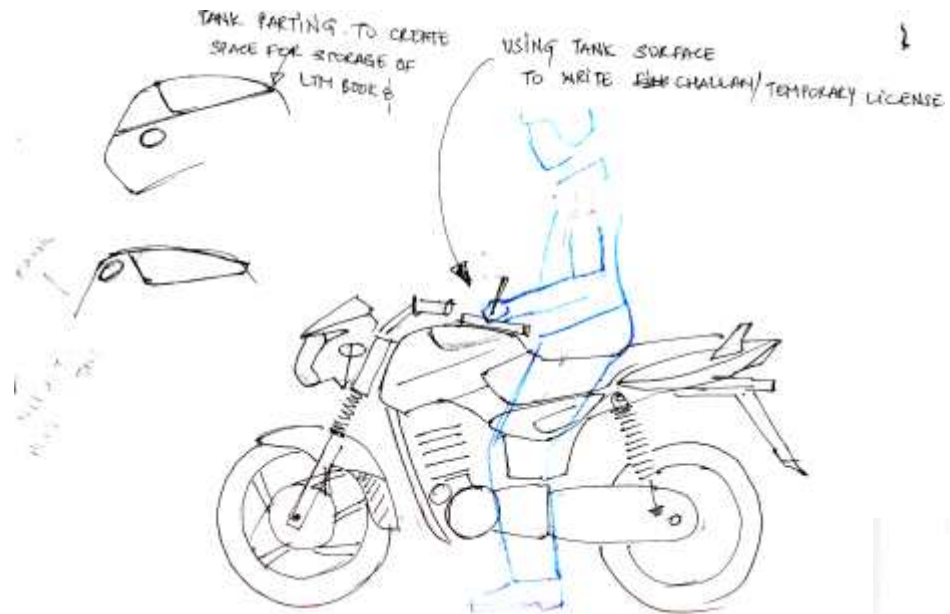


Here various possibilities that would meet the design brief were tried in sketching. After some initial study on this bike. It was understood that the basic structure as in the chassis, would not be modified.

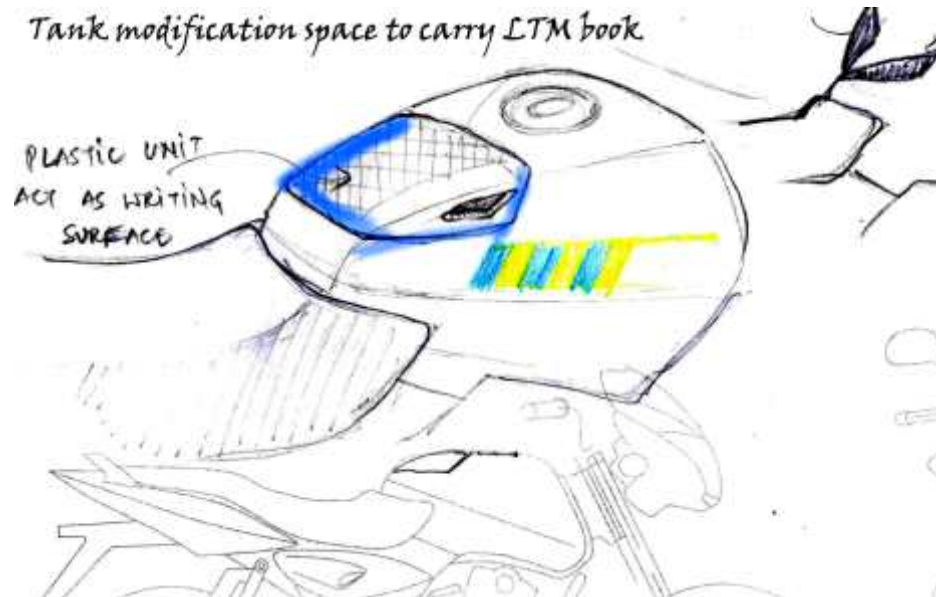
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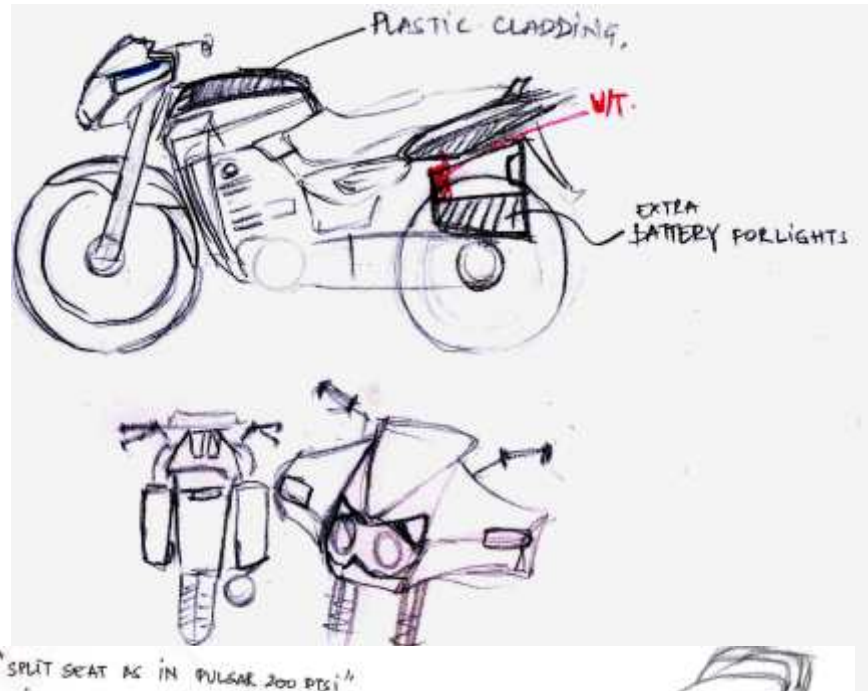
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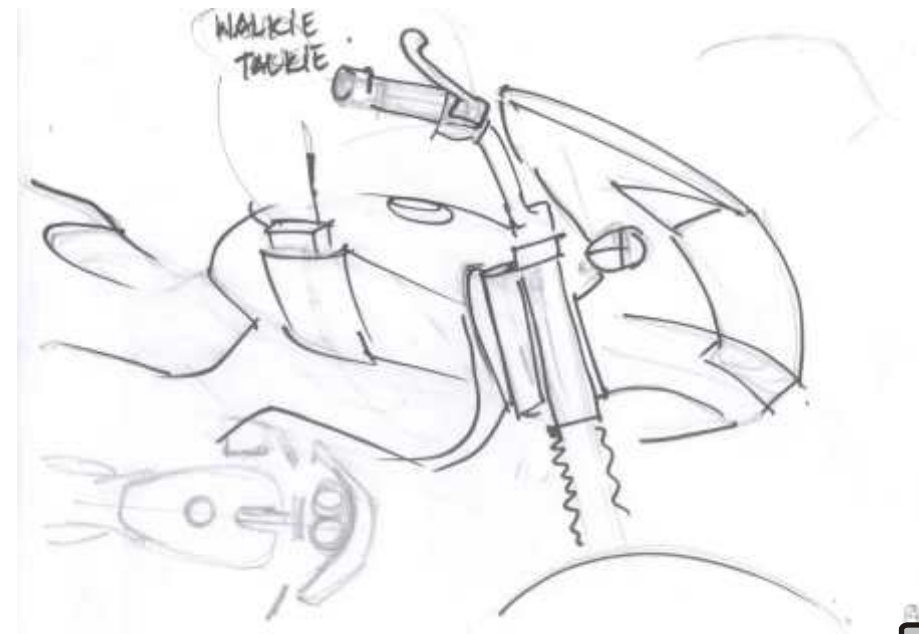
Tank modification space to carry LTM book



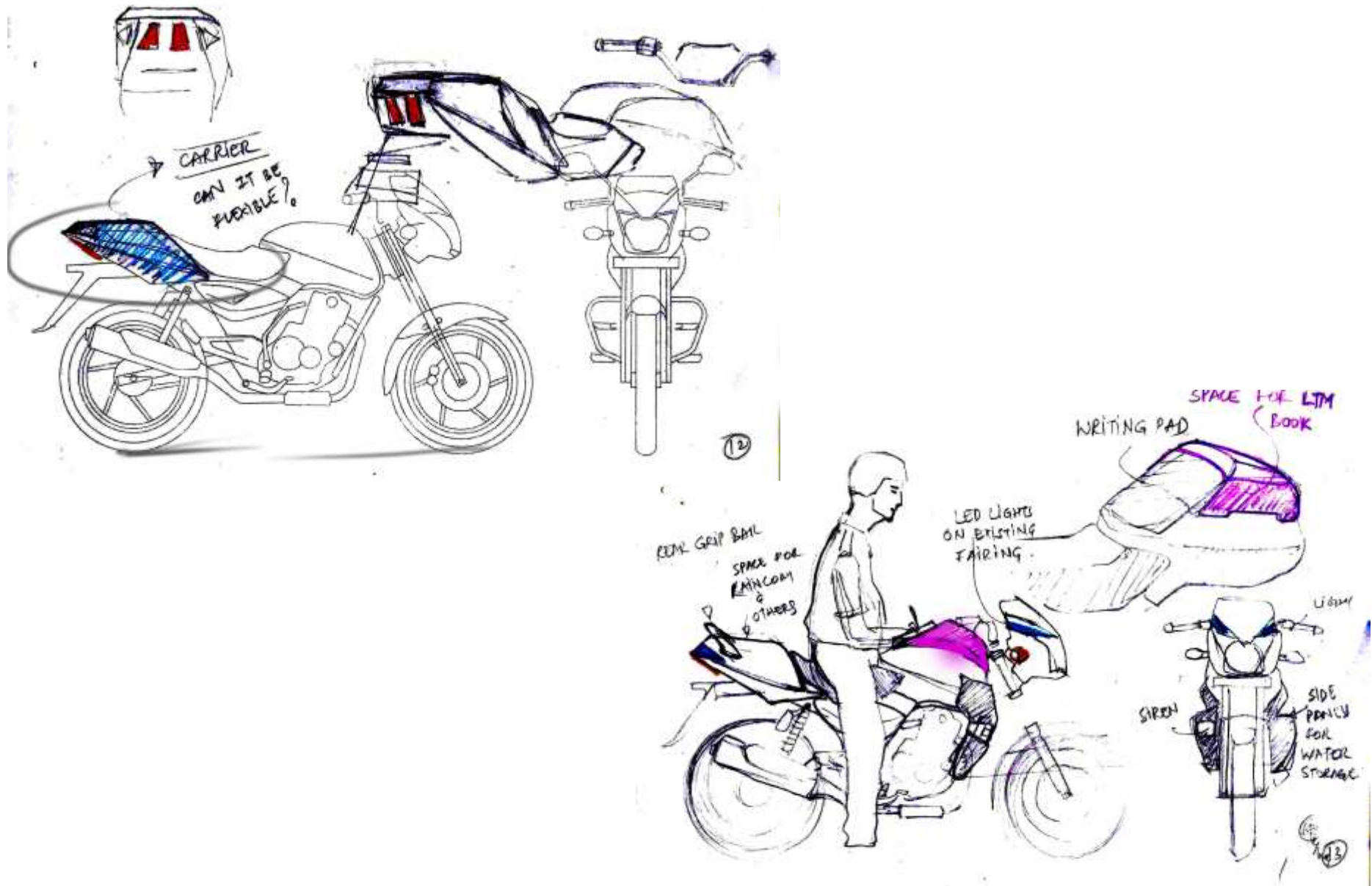
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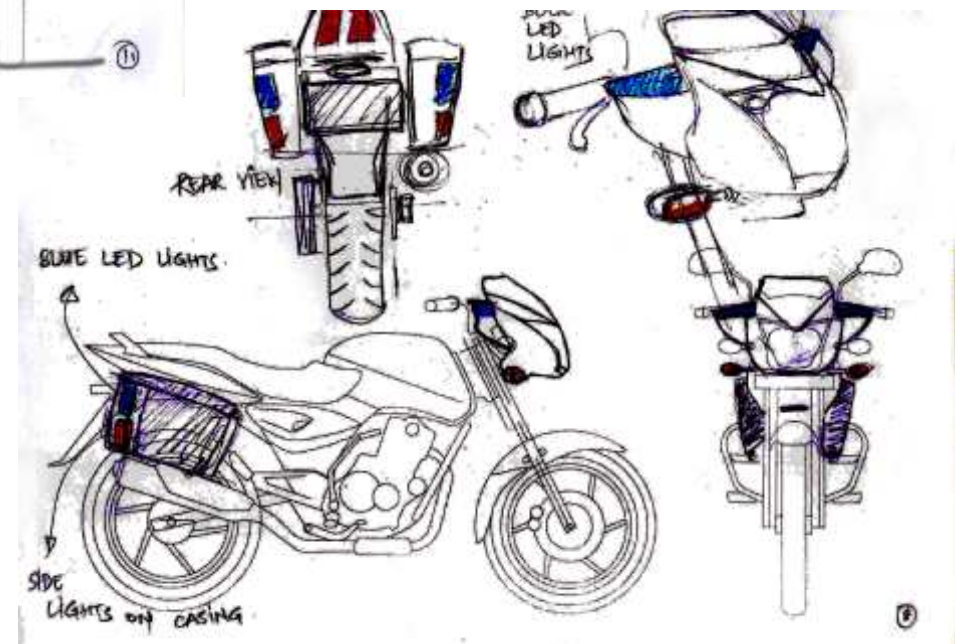
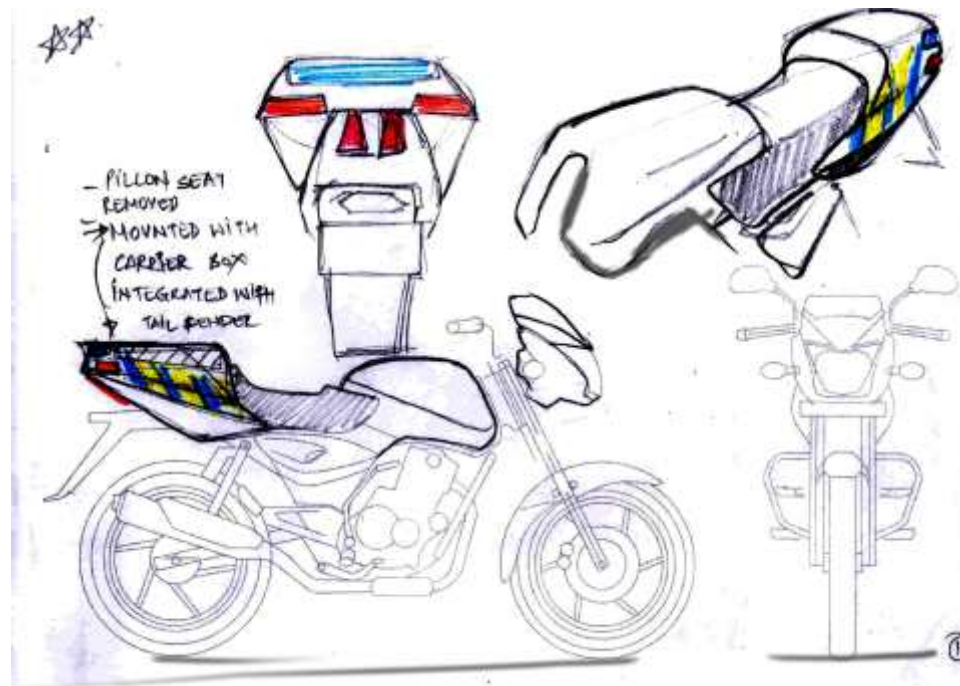
"SPLIT SEAT AS IN PULSAR 200 PXS"
WITH STORAGE SPACE



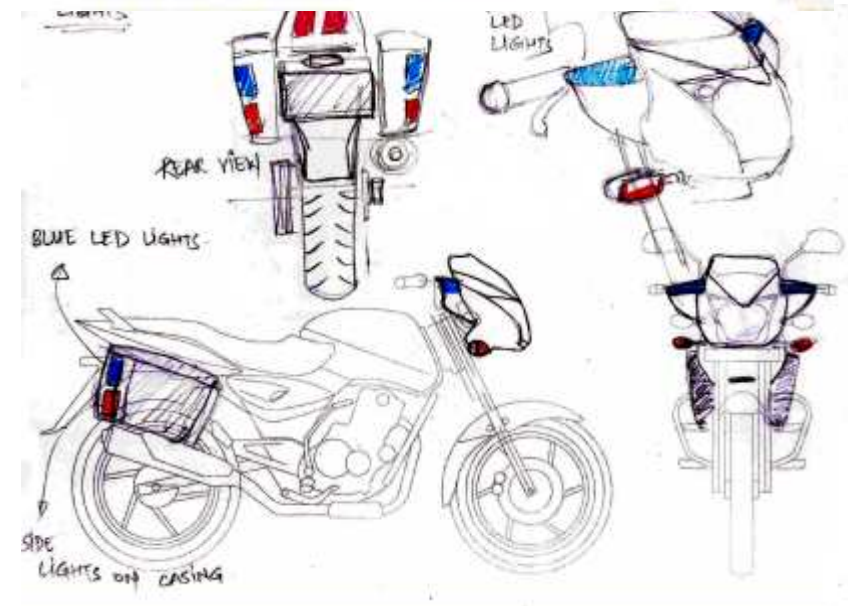
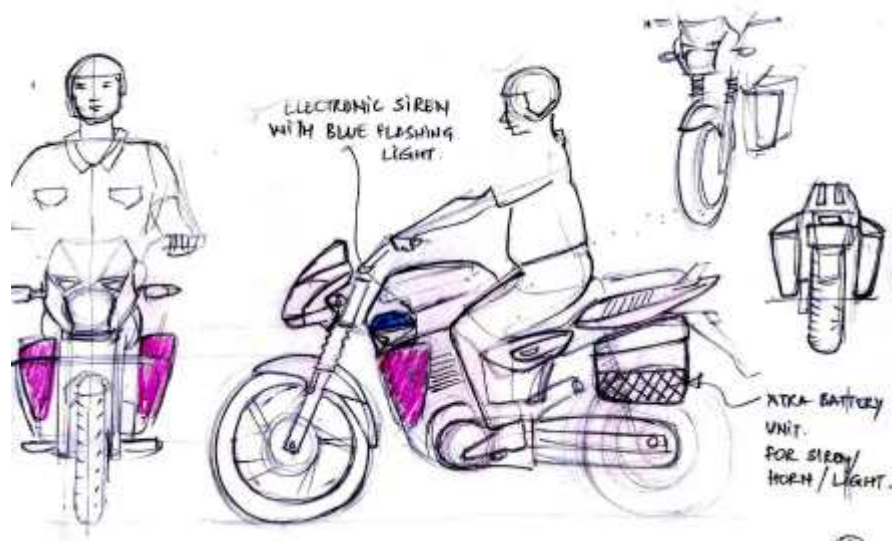
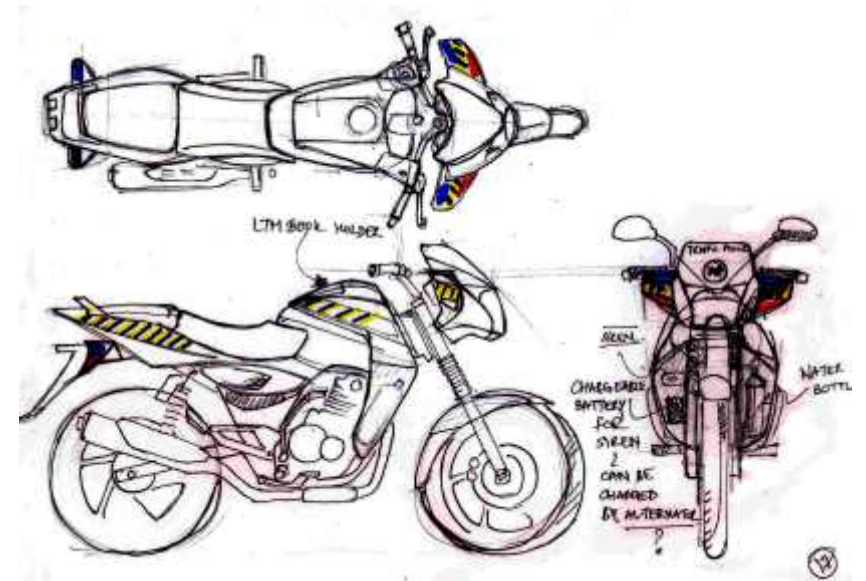
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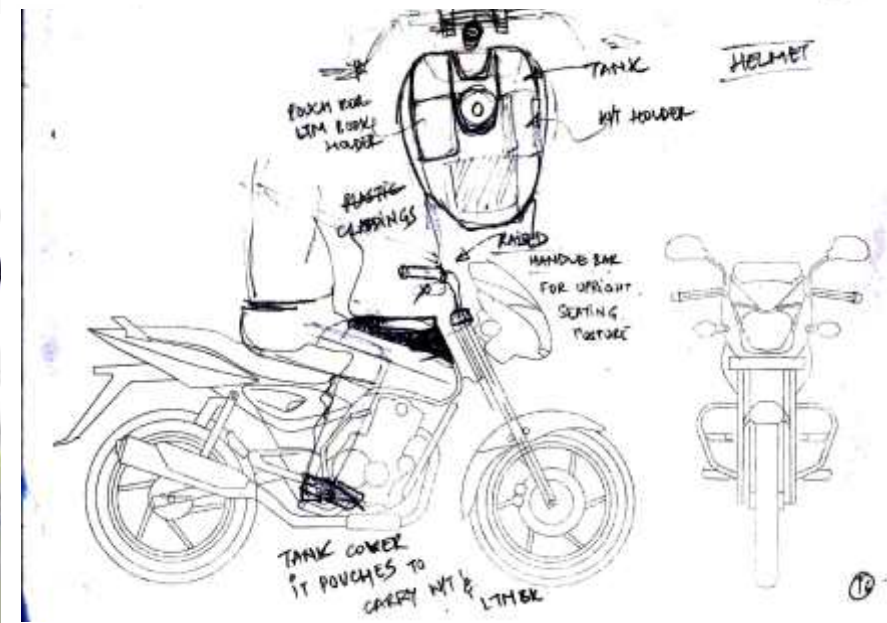
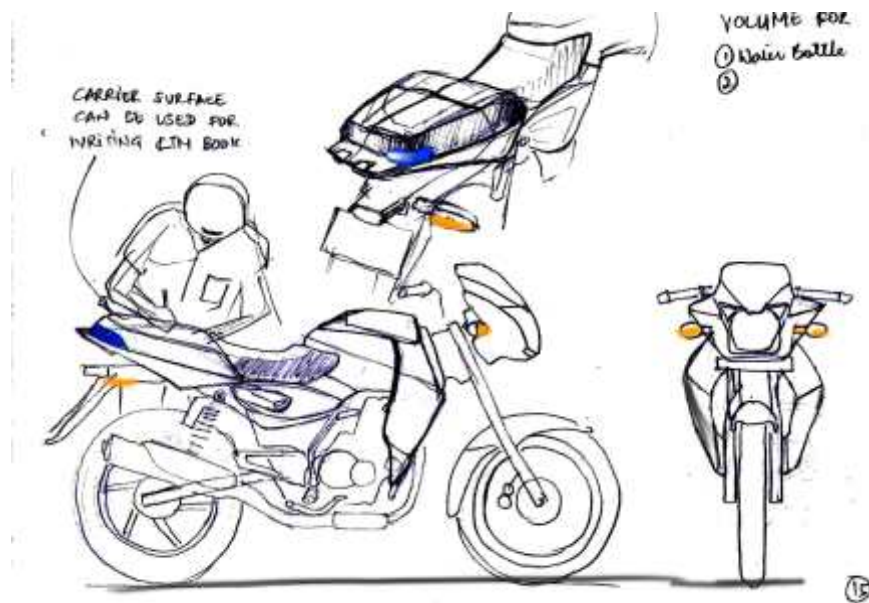
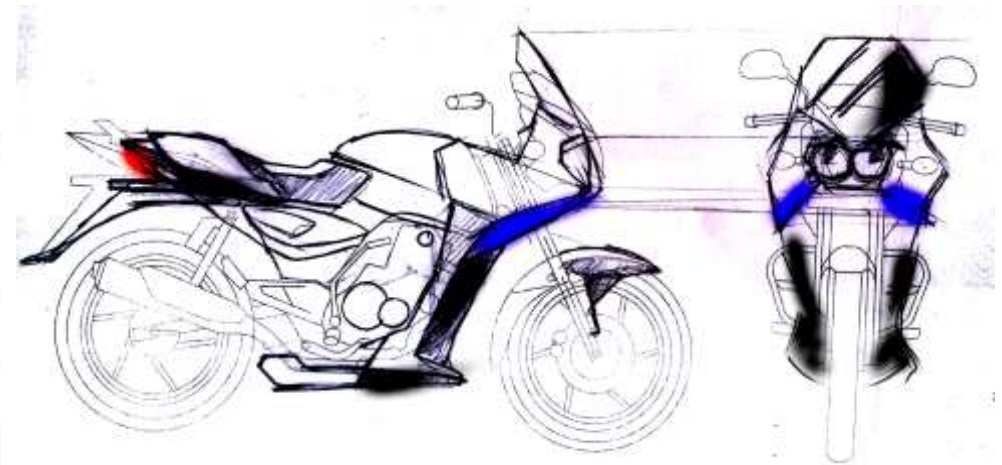
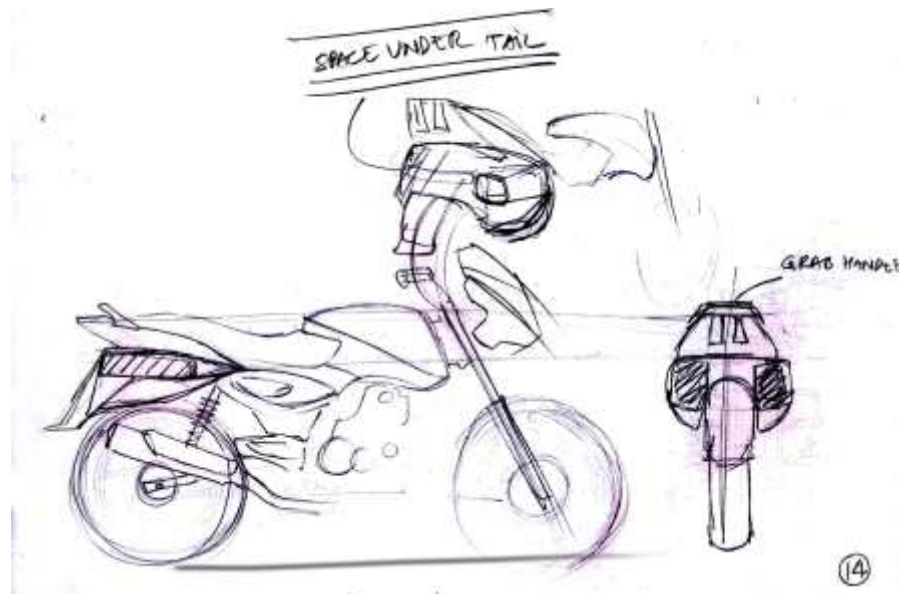
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12. IDEA SKETCHING

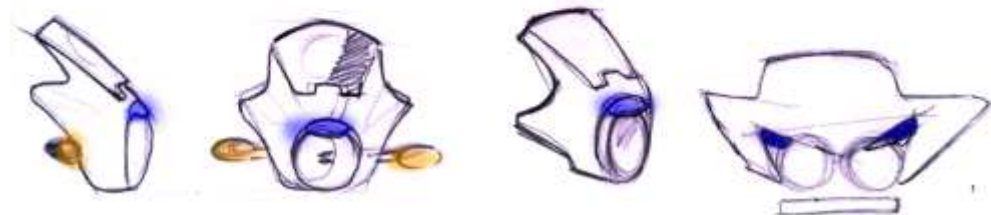
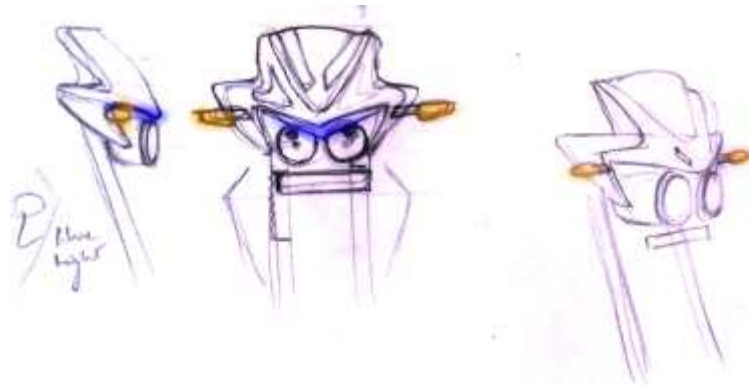
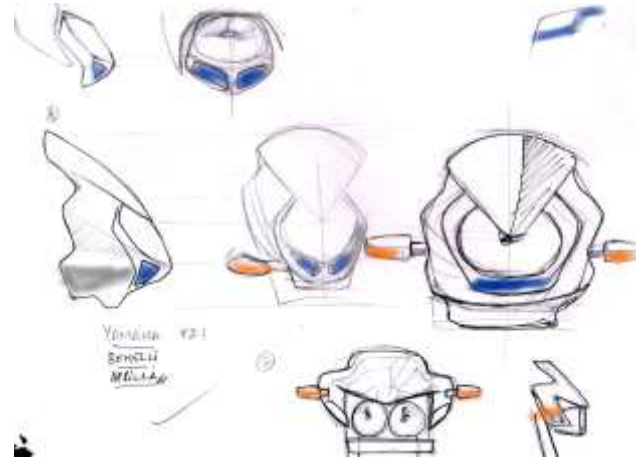
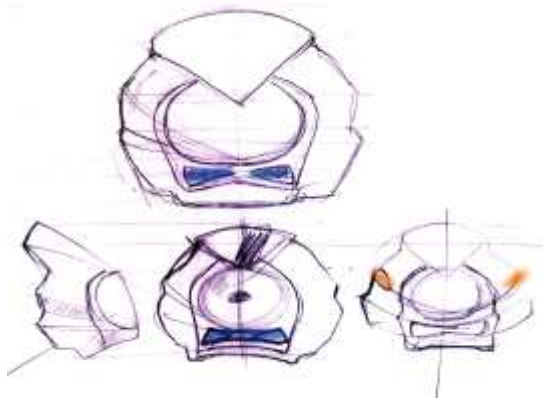
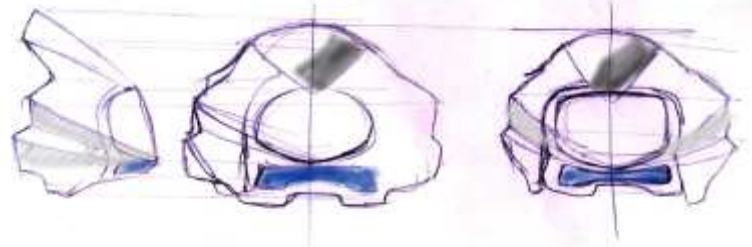
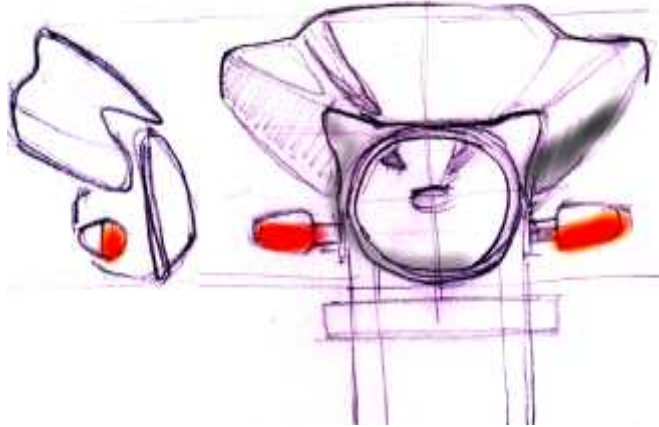


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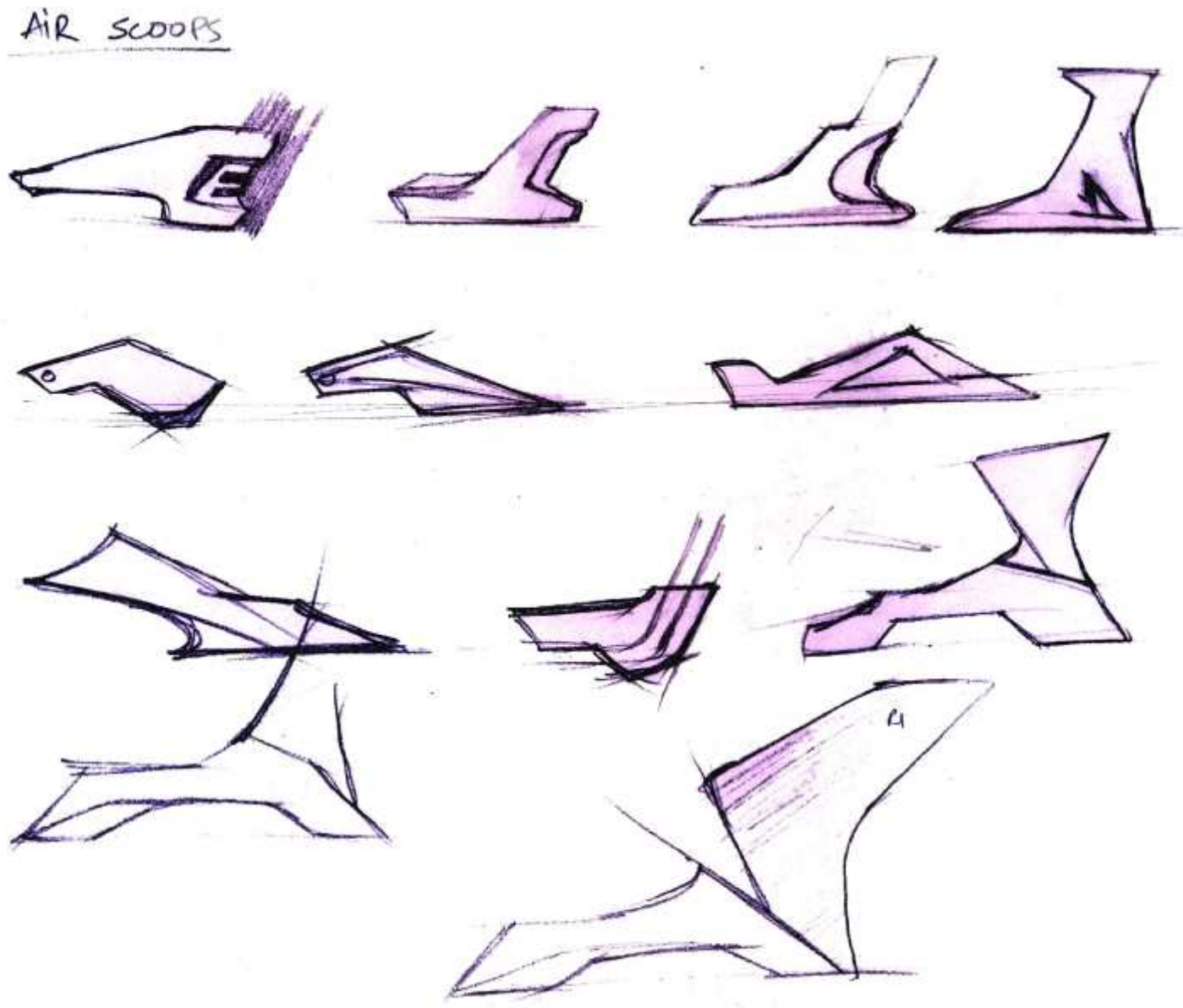
12. IDEA SKETCHING

Exploration in Head light form

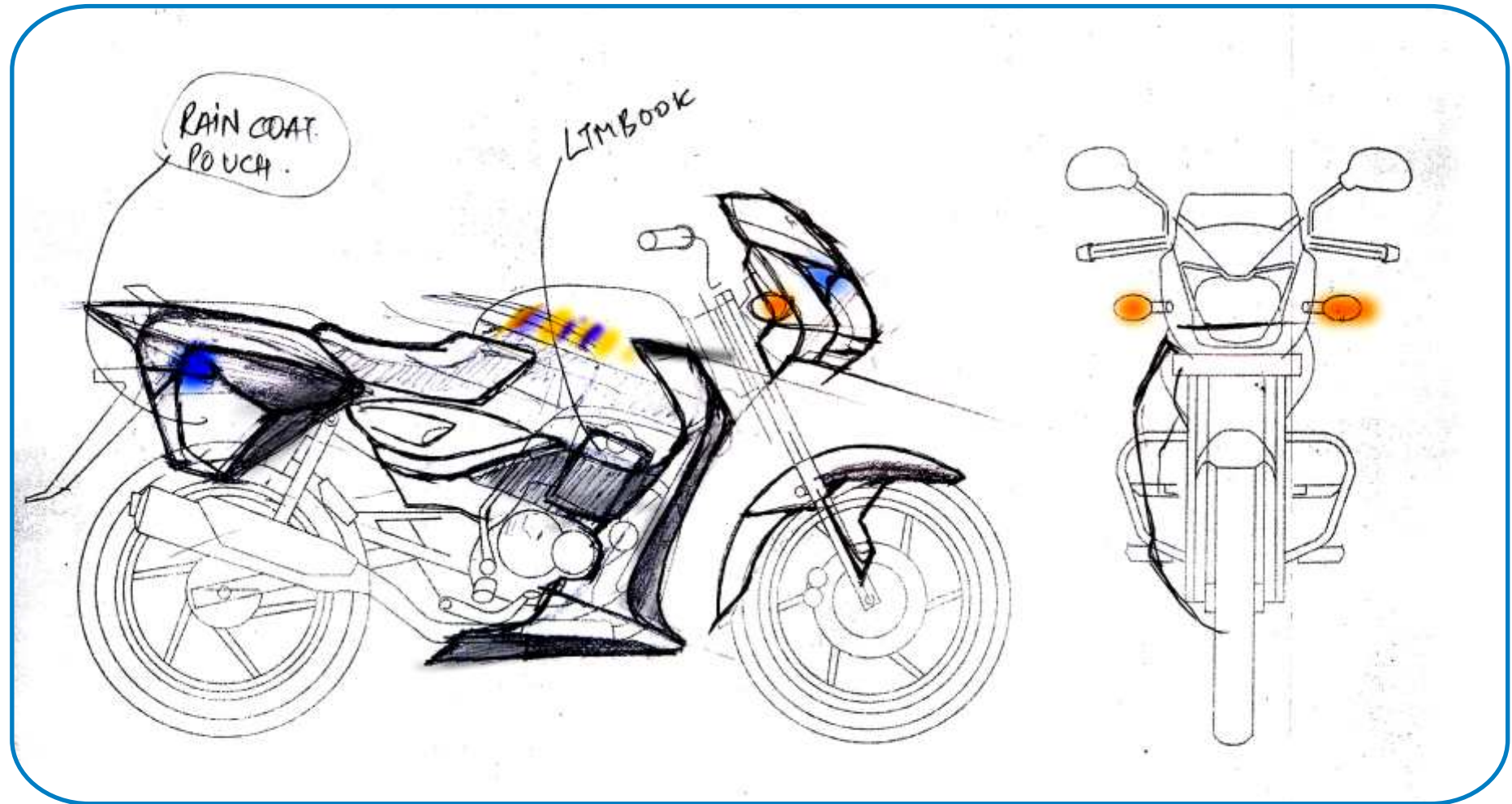


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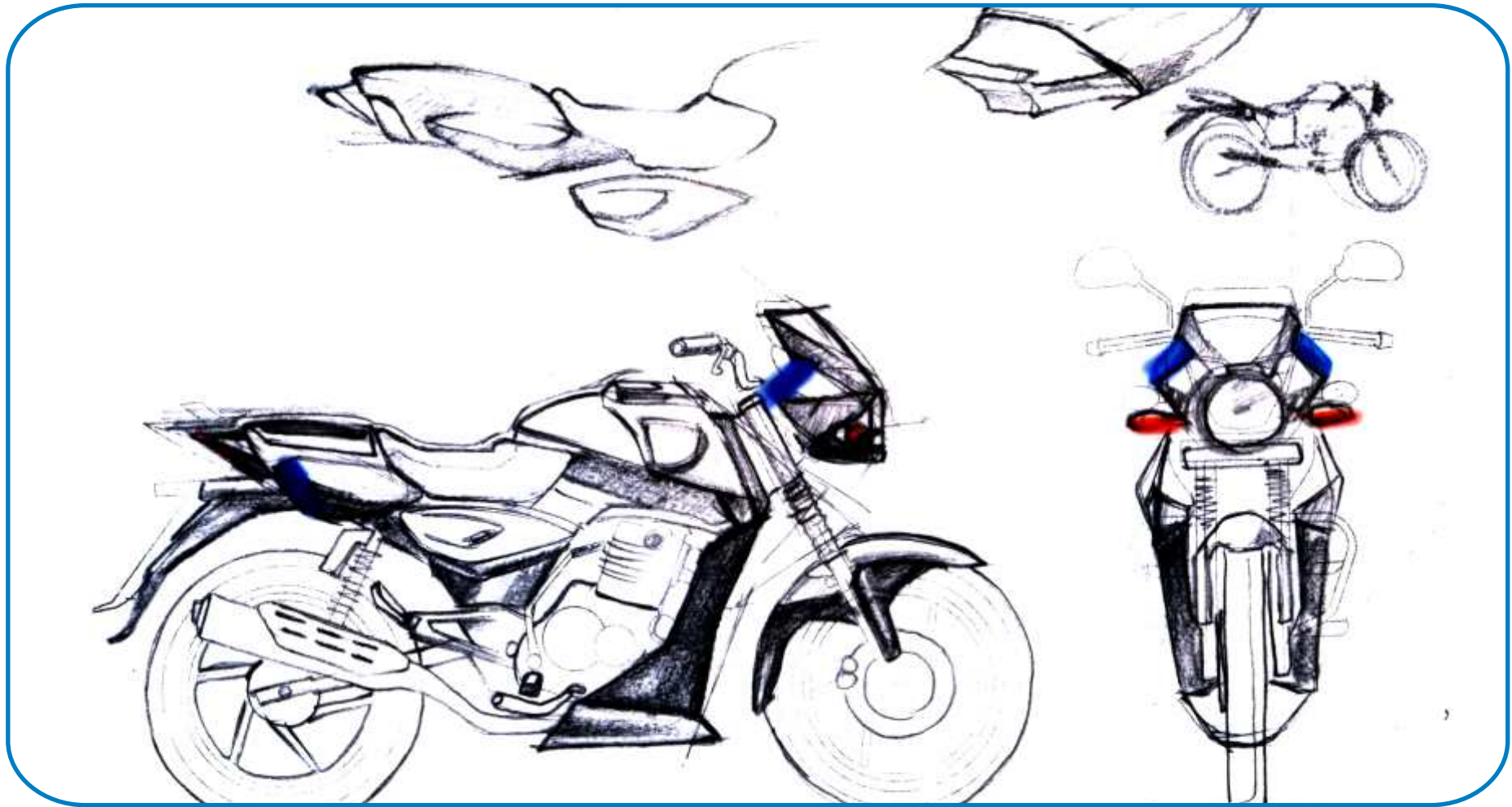
Exploration in Air Scoop form.



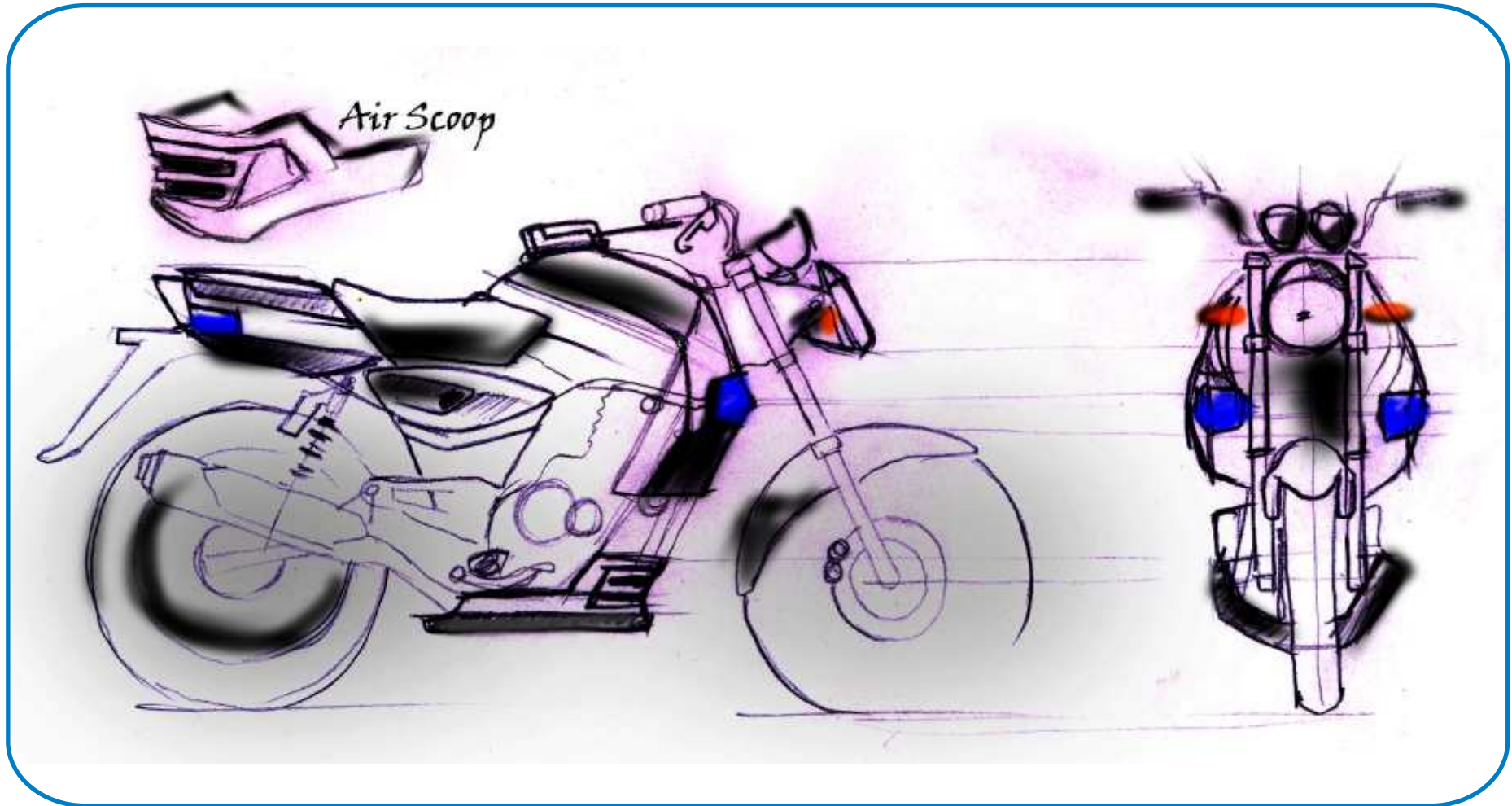
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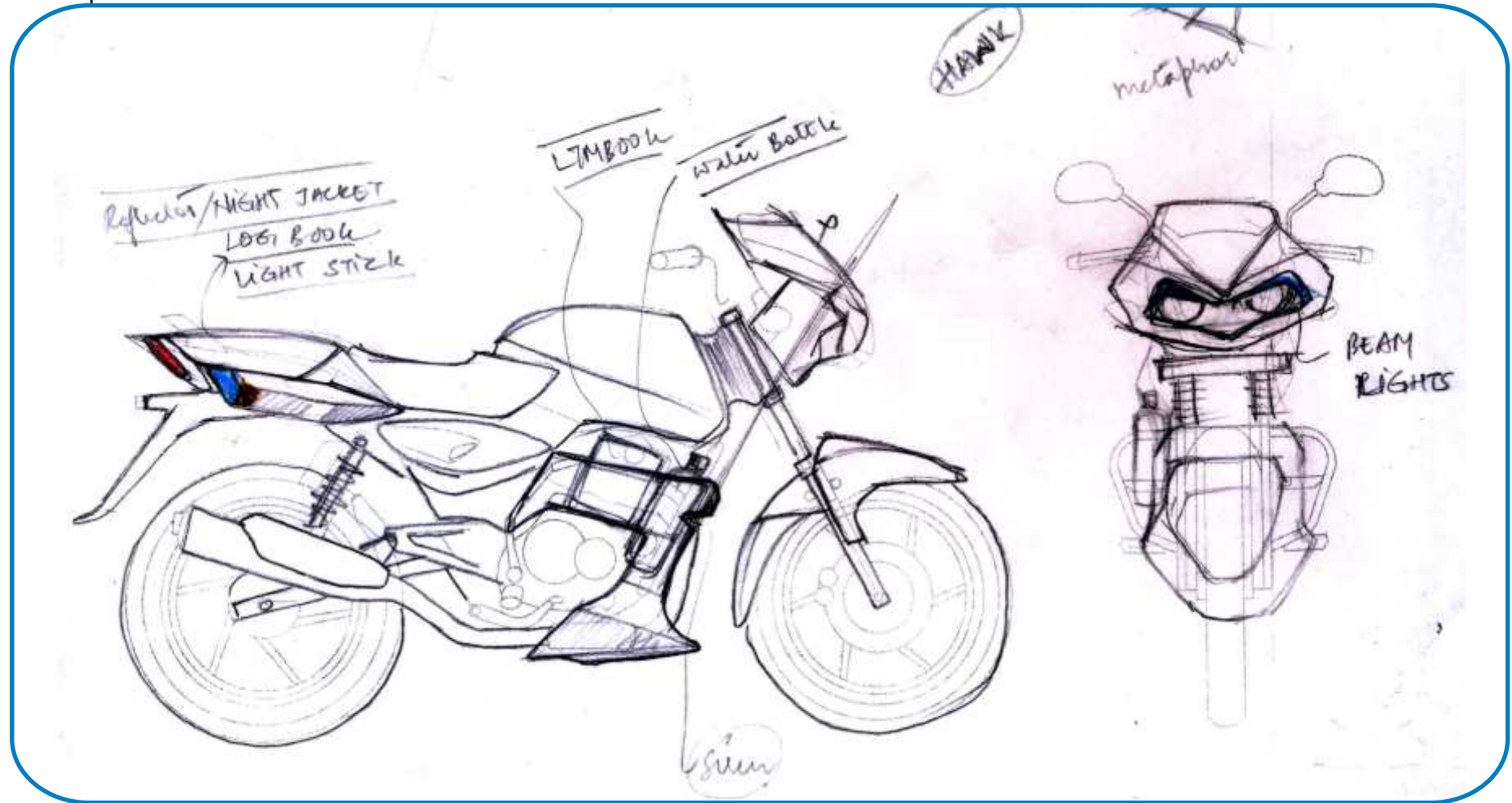


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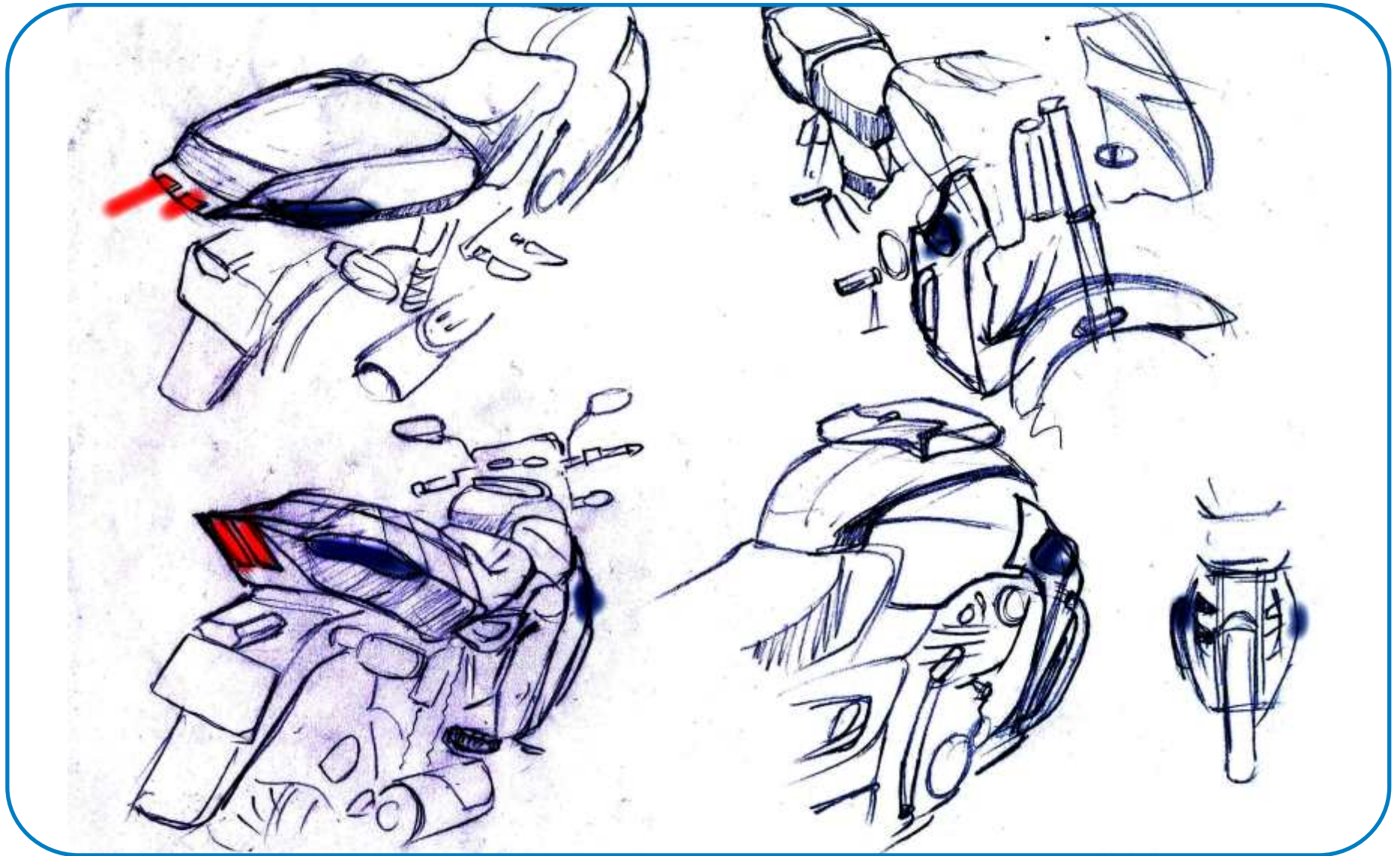


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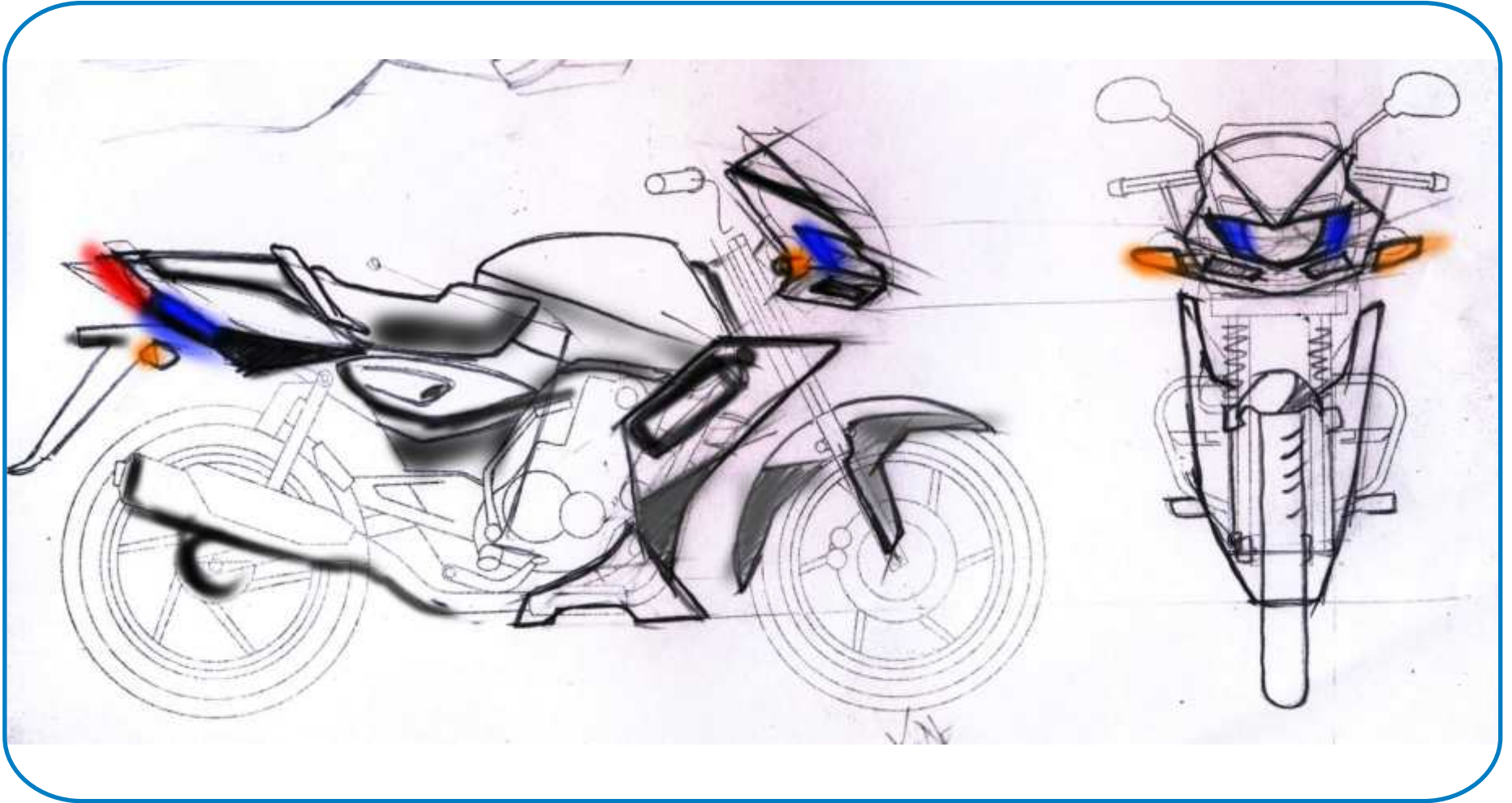
Concept Sketches



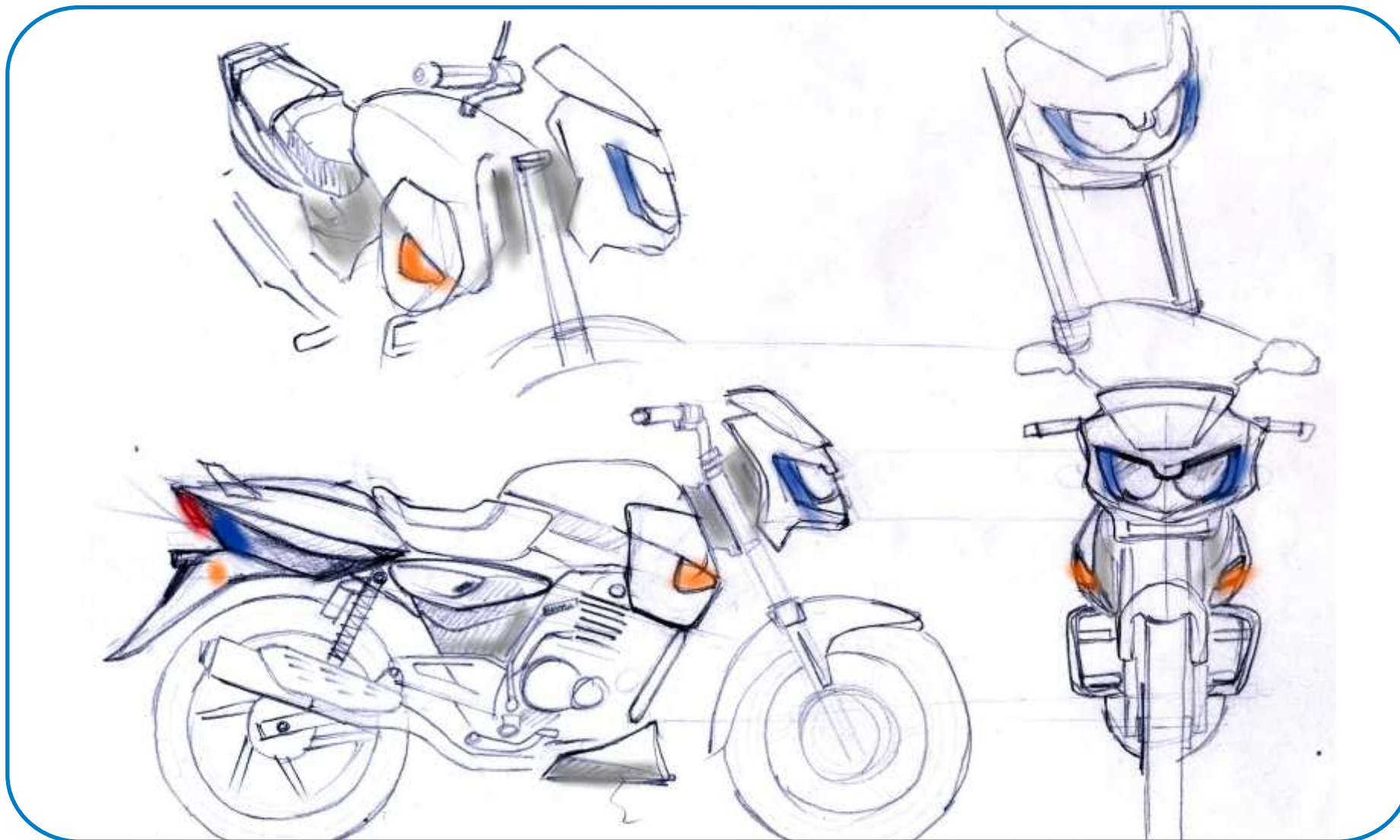
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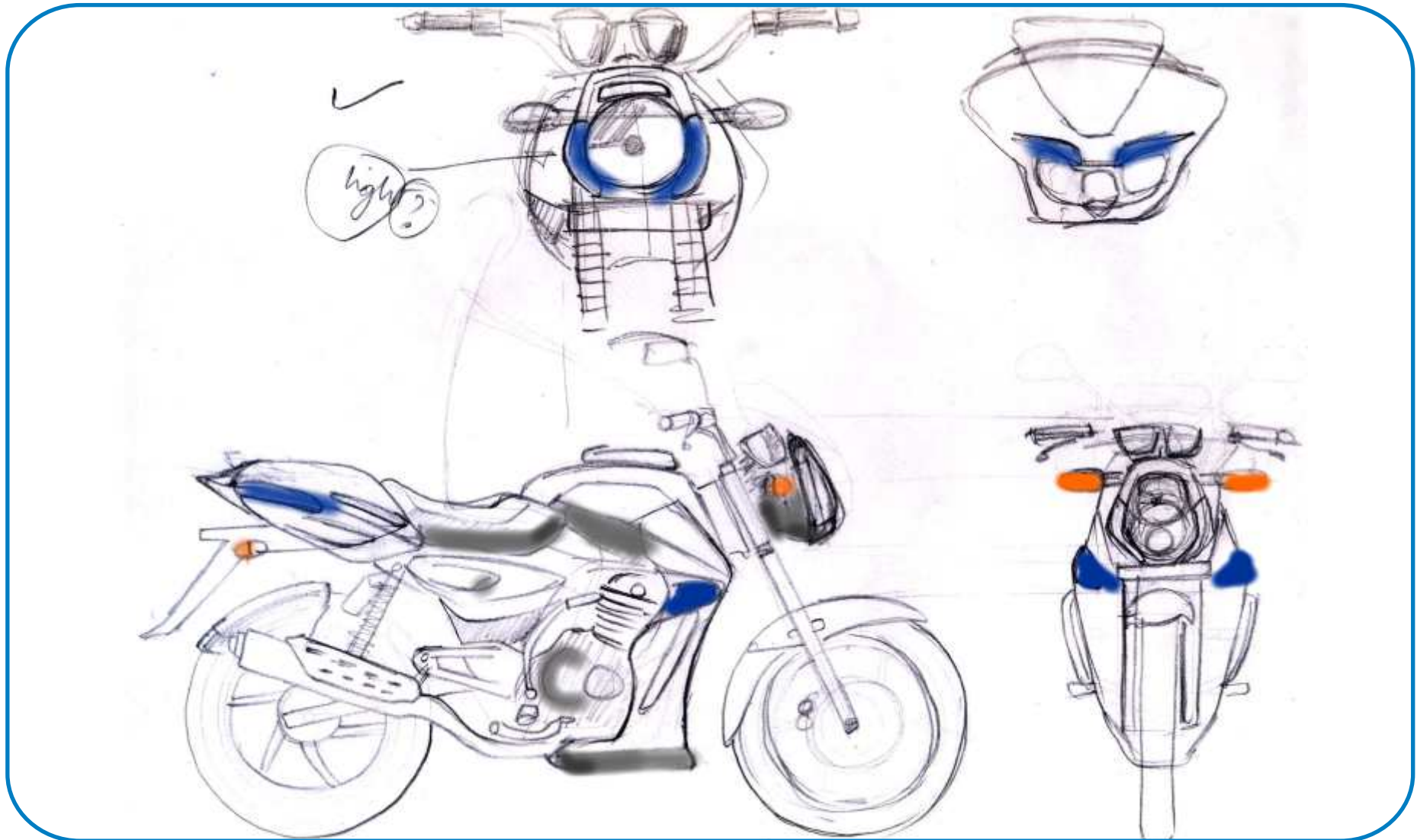
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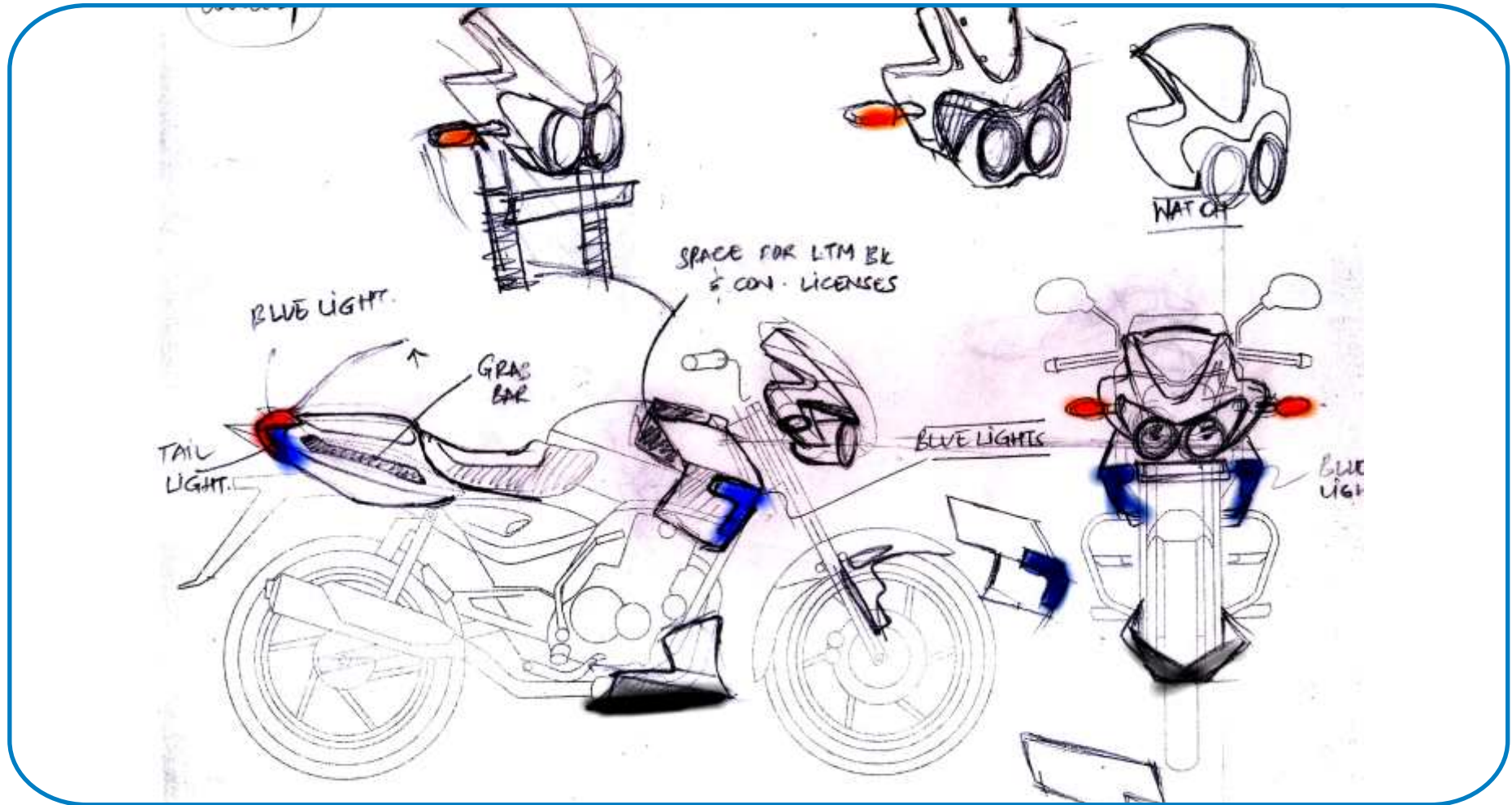
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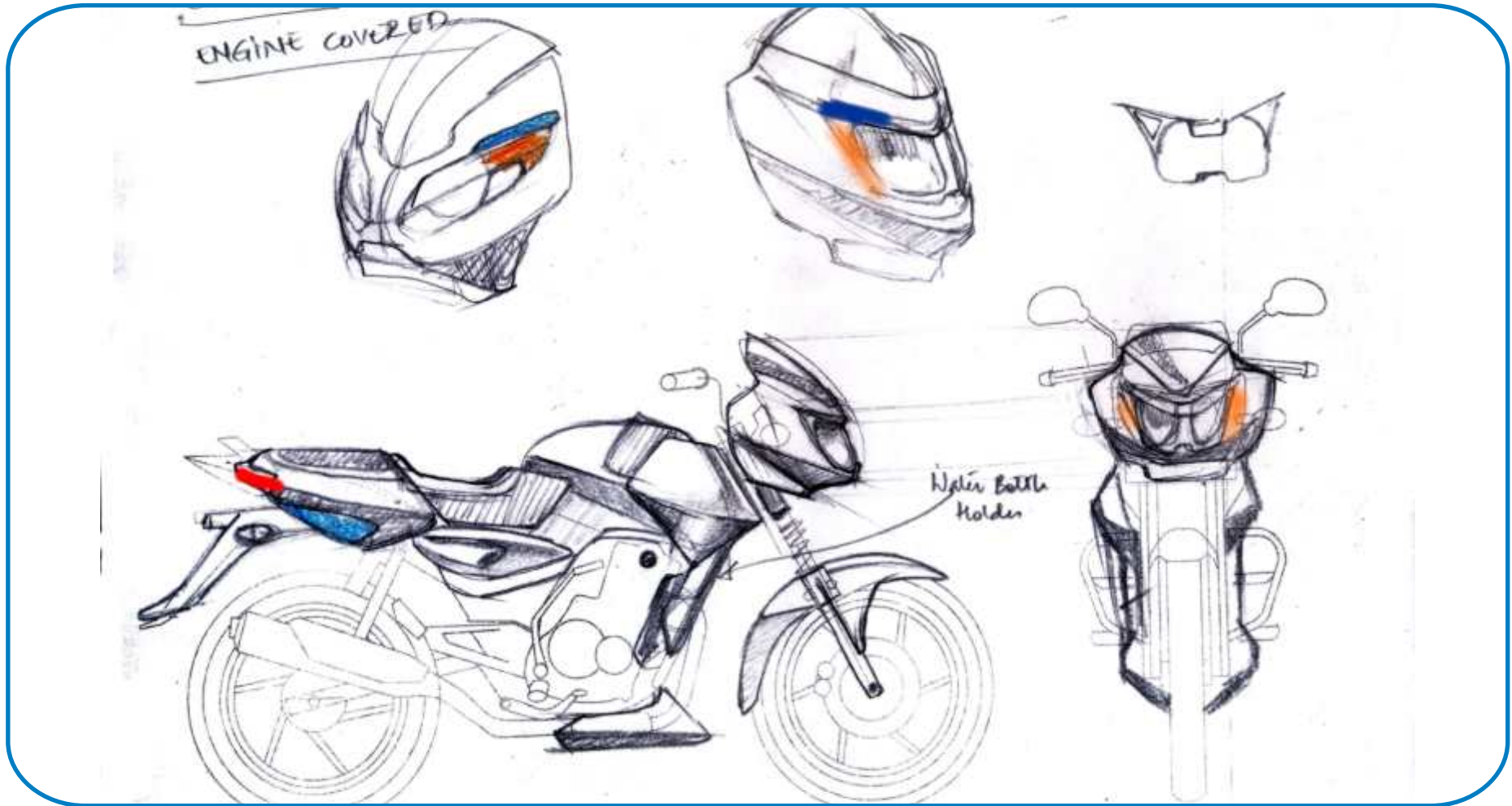
12. IDEA SKETCHING



12. IDEA SKETCHING



12. IDEA SKETCHING



13.CONCEPT RENDERINGS

After the idea sketching the different suitable ideas were cross checked with the product brief and assimilated into final concept sketch. These sketches were then rendered to generate the concepts. The concept renderings with features provided are explained in this following section.

13. CONCEPT RENDERINGS

CONCEPT ONE



1. Carriage created on tail to carry LTM Book and other equipments.
2. Blue and yellow radium graphics.
3. Carries Blue Flashing LED light.

13. CONCEPT RENDERINGS

CONCEPT TWO

Split seat with space under the pillion seat
Pillion seat can be opened without disturbing the rider seat.

1. White body paint with graphic carrying helpline number
2. Tank carries plastic cladding with pouch for LTM book and walkie talkie

Front fairing carries Traffic Police Logo and blue lights.



1. Carriage created on tail to carry LTM Book and other equipments.
2. Blue and yellow radium graphics.
3. Carries Blue Flashing LED light.

13. CONCEPT RENDERINGS

CONCEPT THREE



13. CONCEPT RENDERINGS

CONCEPT FOUR



13. CONCEPT RENDERINGS

CONCEPT FIVE



14. CONCEPT SELECTION

User: Tea Stall owner at Traffic Chowkie

	Concept 1	Concept 4	Concept 5
Dominating	4	5	8
Power	4	4	8
Different	1	8	5
Graphics	6	6	4
	15	23	28

Comments: Should have sound like bullet.

From the five rendered concepts, three concepts were selected for further user study. This include three general public and four traffic police officers. Concept coloured print outs along with the feature explanation were show to the users and their ratings were recorded on a scale of 1 to 9.

This user study helped to finalise the concept for further development.

User: Restaurant owner

	Concept 1	Concept 4	Concept 5
Dominating	4	9	4
Power	3	9	5
Different	5	8	4
Graphics	6	5	7
	18	31	20

Comments: Stickers should be different

User: Tea Stall owner at Traffic Chowkie

	Concept 1	Concept 4	Concept 5
Dominating	2	7	2
Power	3	6	3
Different	3	6	4
Graphics	4	4	3
	12	23	12

Comments: Could be like a cruiser.

14. CONCEPT SELECTION

User: Head Constable

	Concept 1	Concept 4	Concept 5
LTM Book	2	8	5
Walkie Talkie	2	2	7
Others	6	7	9
Dominating	4	8	7
Power	5	7	7
Different	4	8	5
Graphics	6	6	4
	29	46	44

Comments: Need side trunk

User: Rider 1

	Concept 1	Concept 4	Concept 5
LTM Book	1	9	3
Walkie Talkie	2	2	9
Others	6	8	8
Dominating	4	9	3
Power	3	9	6
Different	3	7	5
Graphics	2	7	6
	20	51	40

Comments: Need side trunk, Helmet Lock, Safety Lock.

User: Police Inspector

	Concept 1	Concept 4	Concept 5
LTM Book	3	9	2
Walkie Talkie	3	3	6
Others	2	7	9
Dominating	5	9	6
Power	5	6	4
Different	2	8	4
Graphics	2	6	5
	22	48	36

Comments: Need side trunk for more equipment storage
Need pillion seat

User: Rider 2

	Concept 1	Concept 4	Concept 5
LTM Book	3	7	1
Walkie Talkie	4	4	8
Others	5	8	8
Dominating	3	8	6
Power	4	7	6
Different	6	9	4
Graphics	6	6	6
	31	49	39

Comments: need pillion seat, secure walkie talkie lock



After the user feedback and selection process Concept 4 is selected for final detailing.

15. MOCK UP STUDY

To get an understanding of the volume required to carry the equipments and to fine tune the proportionality of the vehicle a full scale mock up study was done.



VOLUME REQUIREMENTS:

In order to allot space for the for various equipments carried during during patrolling volumetric calculation was done. LTM book, defaulter License area and walkie talkie area would be within the easy reach of the rider. Bike Log book, reflector jacket, water jacket, tiffin box, rain coat and civil clothing would be placed within the space created in tail. The volumetric calculations are give below.

1. LTM Book	(22 x 15.5 x 2.5)cms	853 cubic cm
2. Walkie Talkie	(5.6 x 5.6 x 130)cms	408 cubic cm
3. Bike Log Bk.	(30 X 21 X 1.5)cms	950 cubic cm
4. Reflector jacket		4250 cubic cm
5. Water bottle	(1 ltr)	1200 cubic cm
6. Tiffin Box	(dia 14 x 6) cms	30 cubic cm
7. Rain Coat	(25 x 17 x 10) cms	4250 cubic cms

(A)	Volume required	11941 cubic cm
(B)	Volume required for packing(20% of A)	2388 cubic cm
	Total (A+B)	14329 cubic cm

Volume available in rear tail (40 X 25 X 15) cms	15000 cubic cm
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As seen from the above calculation total volume actually required is less then the volume available.

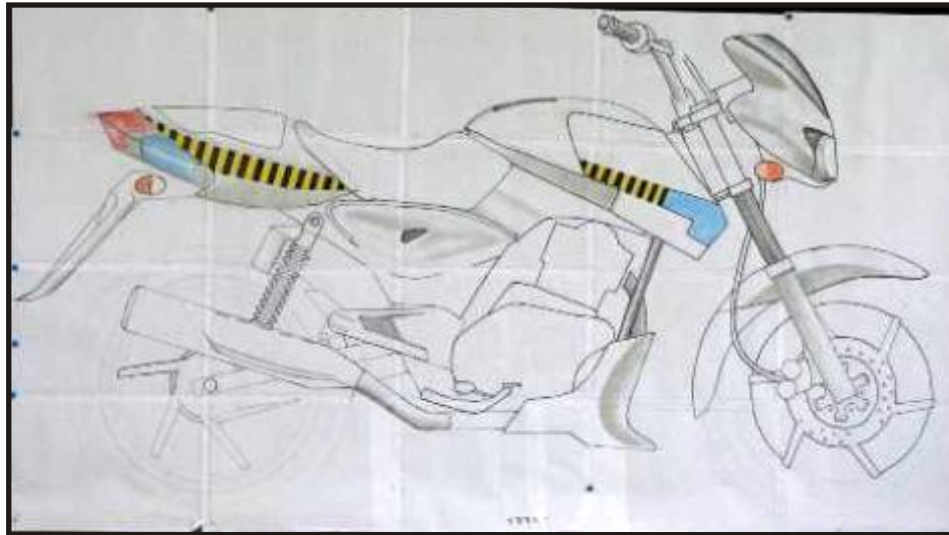
15. MOCK UP STUDY



2D Mock up panels of thermocole were made and attached on an existing vehicle to study the form proportions. This study helped to vary the size of each panels and get the proportion of the units right.



15. MOCK UP STUDY



At this stage a 1:1 scale rendering was made after the refinements in the lines and form. Number of changes happened at this stage in the lines of the front fairing and the tank cowl.



16. CAD MODELLING

CAD Modelling in Rhino.

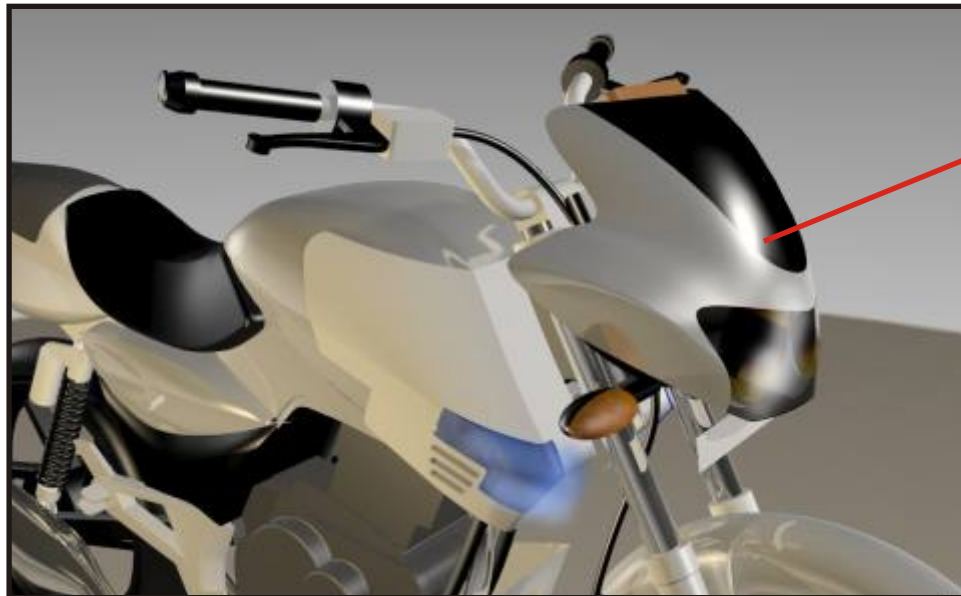
Inputs such as the changes in front fairing and the side cowl, from the mock up model and 1:1 rendering were then incorporated in the final model. This was then modeled and rendered in CAD. Here a number of dimensional issues corrected.



17. FINAL PRODUCT



The CAD Model carried all the features to be incorporated on the final Bike. The features has been explained in the following section.



HEADLIGHT FAIRING

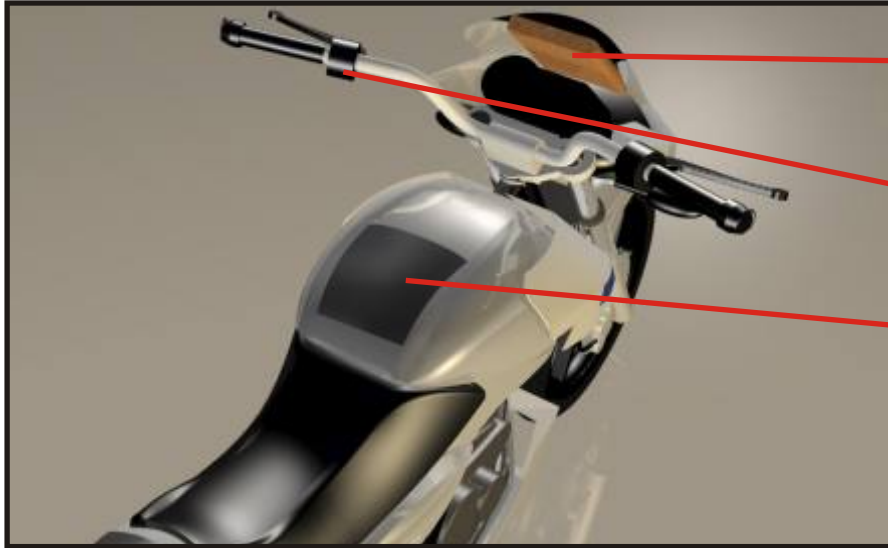
Head fairing with double head light to give a dominant and focused look.

Wider fairing helps to create a dominating feel and has a road presence among the single head light vehicles.

Visor carries Mumbai Police Logo.

17. FINAL PRODUCT

LTM BOOK AND SWITCHES

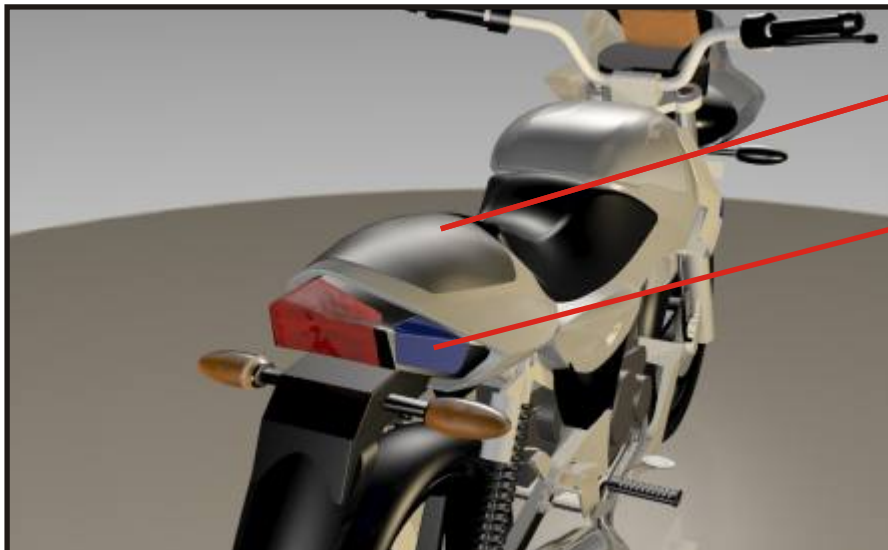


Space for LTM Book in the fairing. This will enable the user to reach the Book without having to get off the vehicle.

3 way switch (OFF, Emergency light ON, Emergency light and Siren ON)

Rubber cladding on the tank surface which will be used as writing surface for the LTM Book.

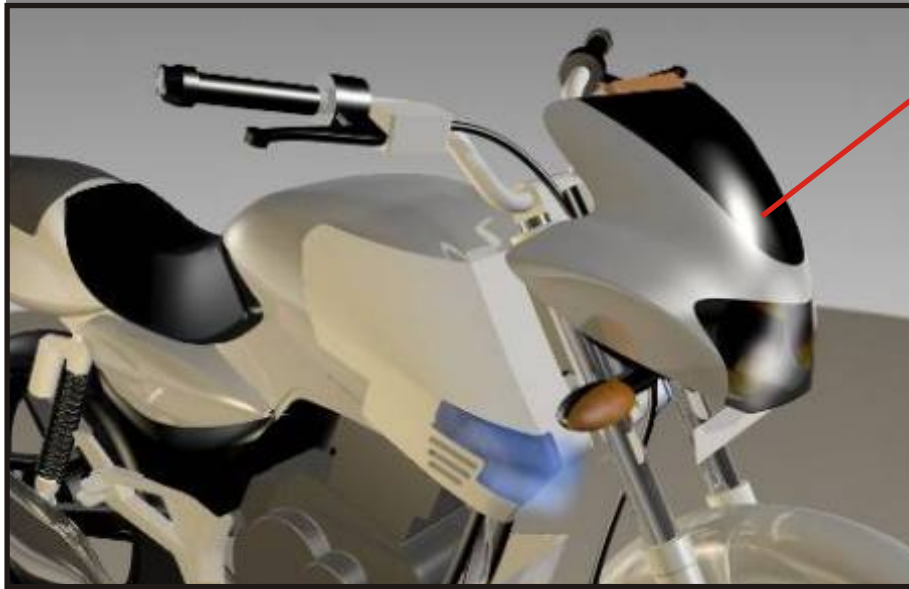
CARRIAGE AND TAIL LIGHT



Single seater with Tail carriage unit at the rear for carrying water bottle, civil shirt, raincoat etc.

The tail light unit carries Blue LED lights that will be used in emergency.

17. FINAL PRODUCT



EMERGENCY LIGHTS AND SIREN

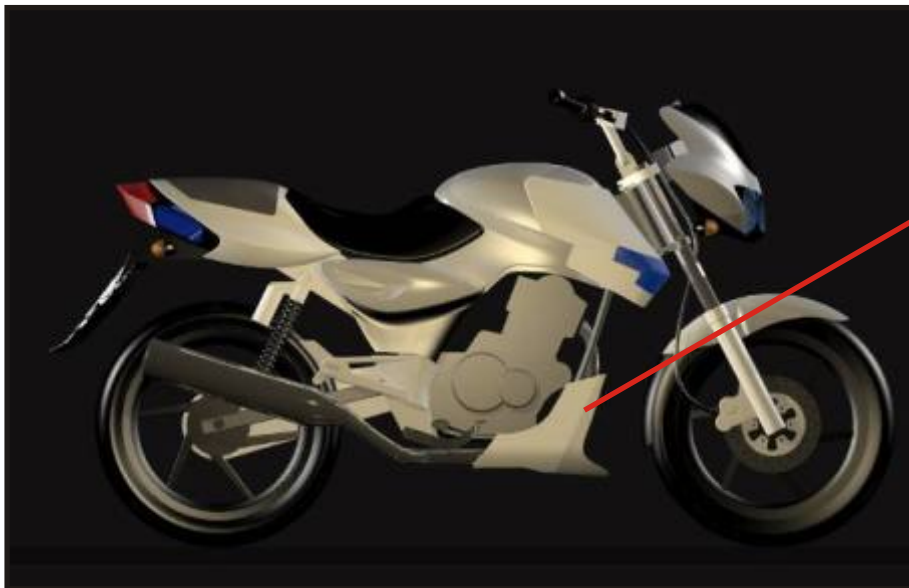
Side tank cowls increases the dominating feel of the user.

Space for carrying graphics and emergency contact number.

Blue LED lights provided on the tank side cowl.

Emergency indicator.

Siren Slots on the tank cowl



AIR SCOOP

Air Scoop.

Gives a sense of movement and power.

✍18. FINAL SCALED MODEL



A scaled prototype of the design proposal is made. The scale of the prototype was 1 : 5. The graphics that would come on the final product were also included on this prototype.

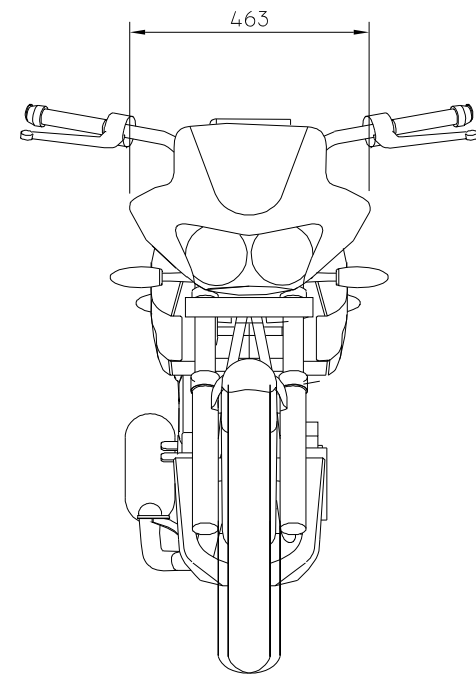
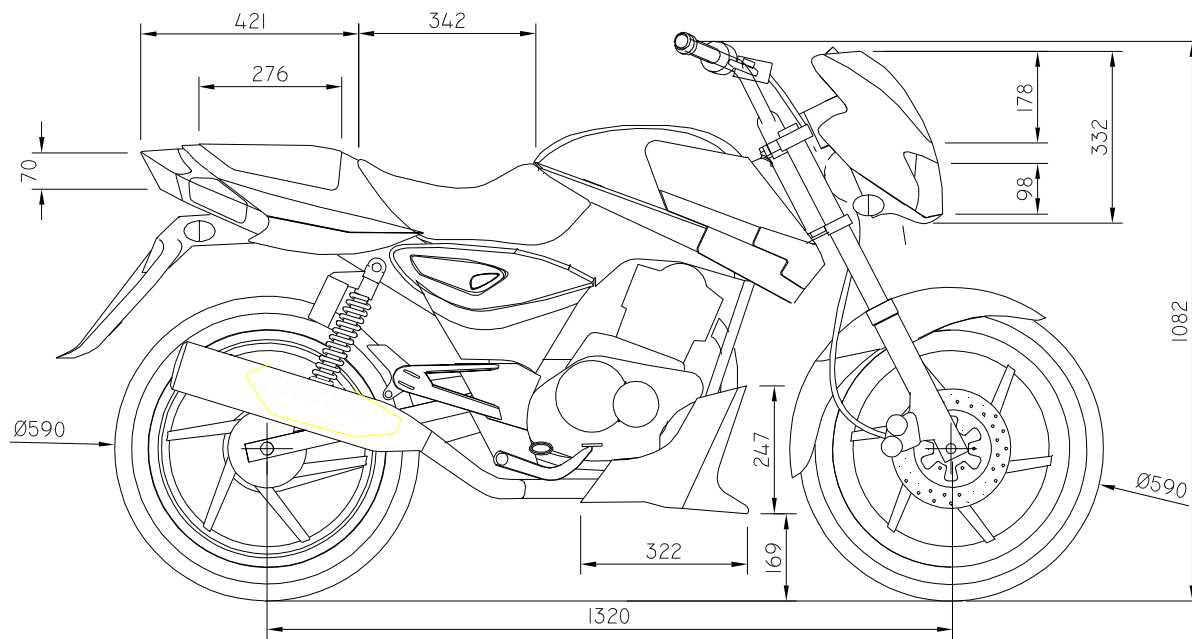
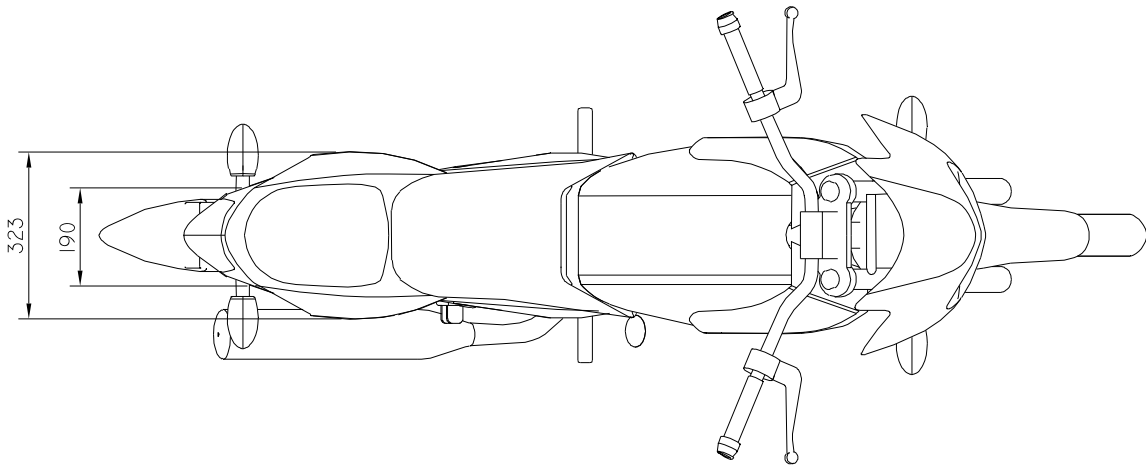


18. FINAL SCALED MODEL



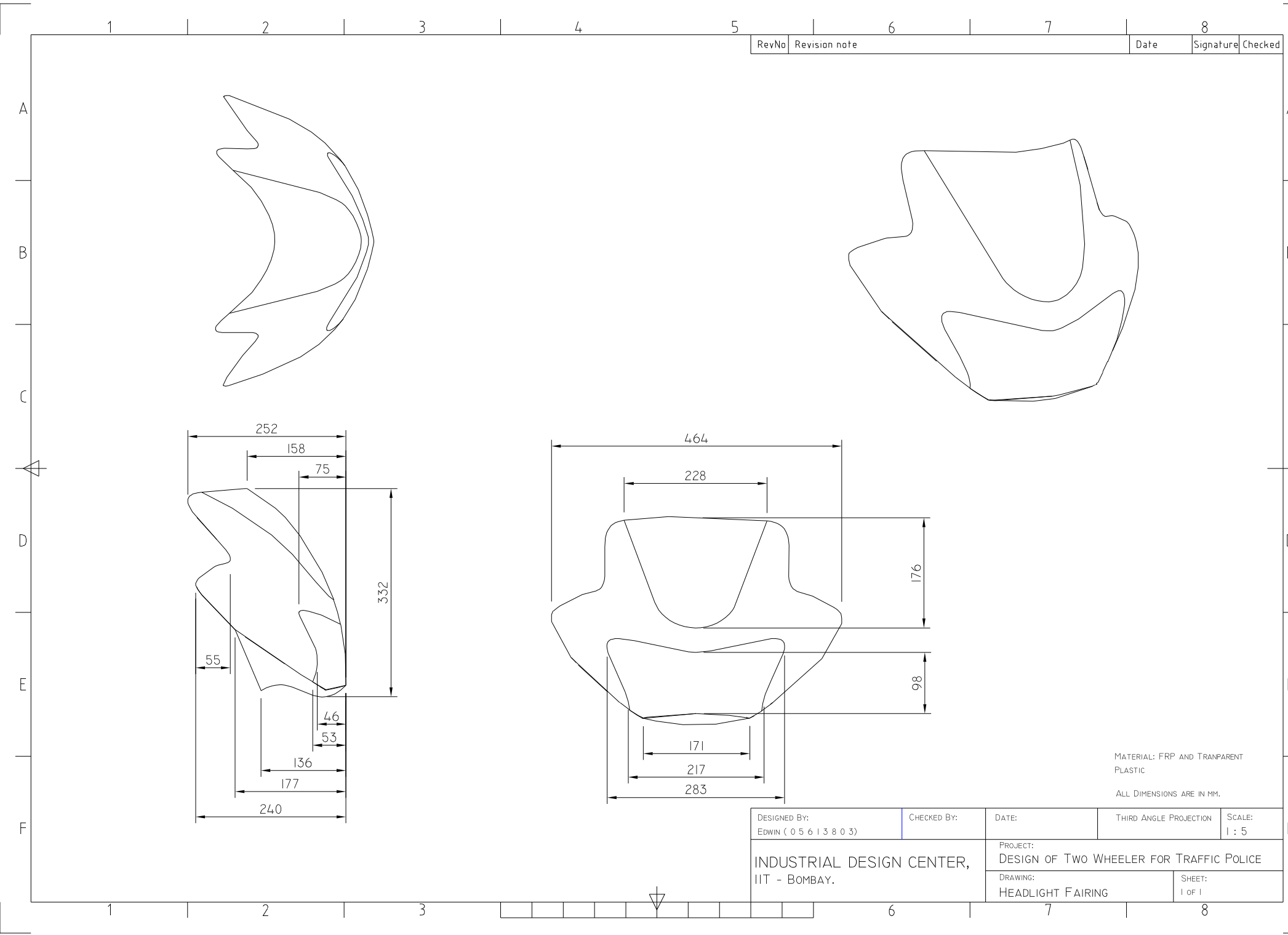
References

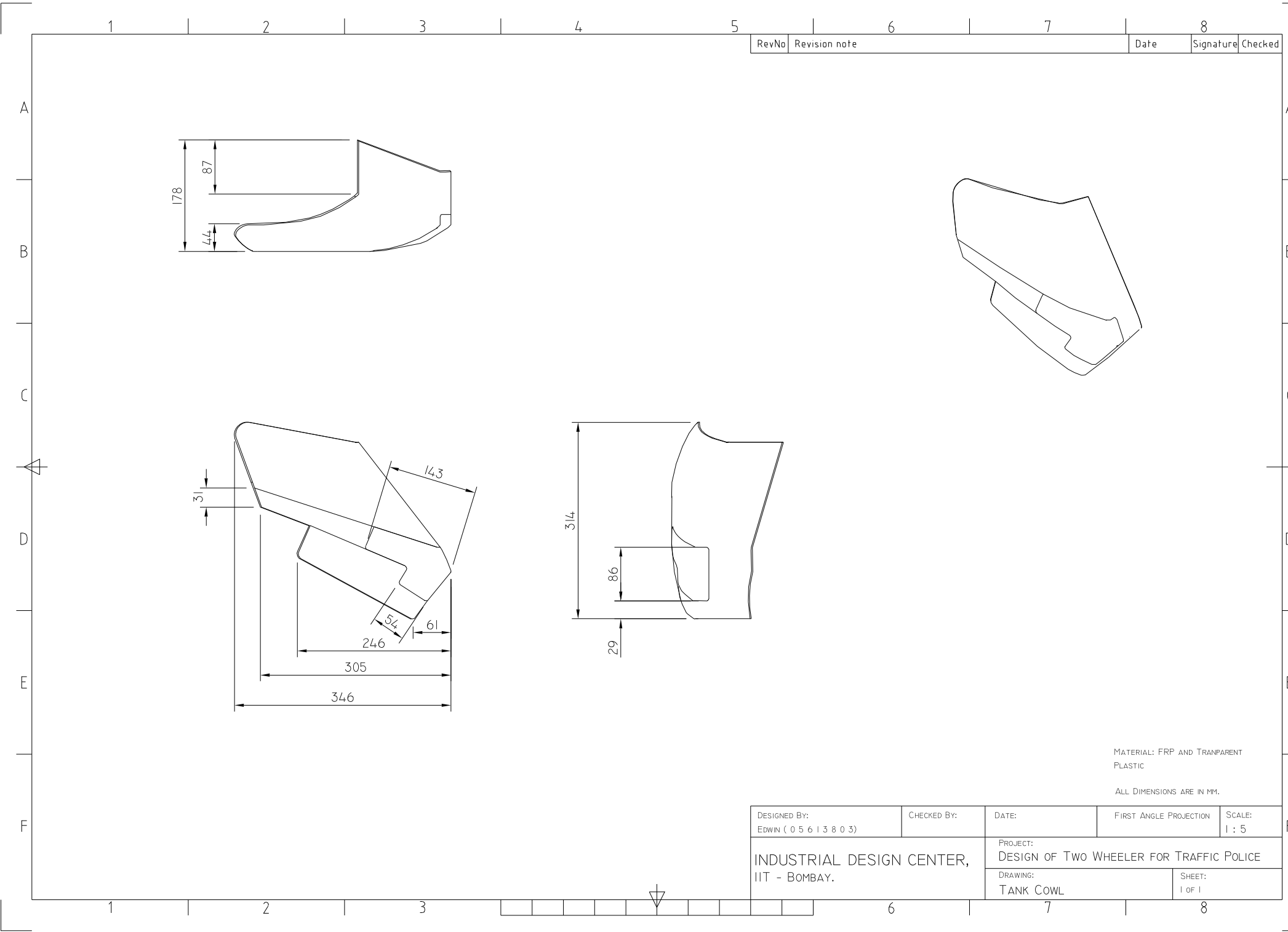
1. Business standard
Motoring Road Teat Digest - July 2006
2. Bikes 07 (bikes magazine)
3. [Http://en.wikipedia.org/wiki/Mumbai_Police](http://en.wikipedia.org/wiki/Mumbai_Police)
4. [Http://www.tech2.com/india/news/websites/mumbai-traffic-police-set-tech-savvy/4344/0](http://www.tech2.com/india/news/websites/mumbai-traffic-police-set-tech-savvy/4344/0)
5. [Http://timesofindia.indiatimes.com/articleshow/msid-1391044,curpg-1.cms](http://timesofindia.indiatimes.com/articleshow/msid-1391044,curpg-1.cms)
6. <http://www.trafficpolicemumbai.org/facts.html>
7. [Http://mumbaipolice.org/](http://mumbaipolice.org/)

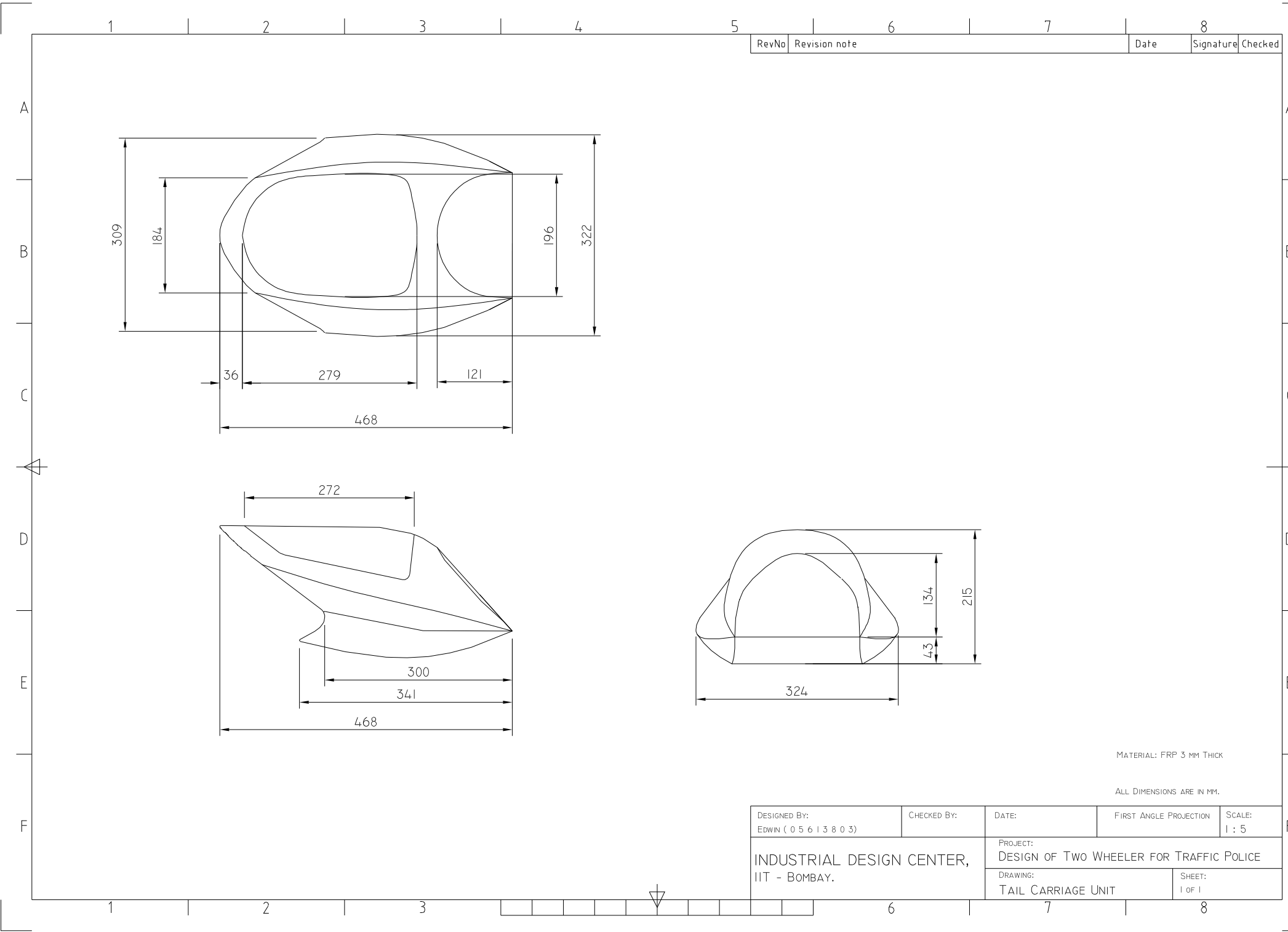


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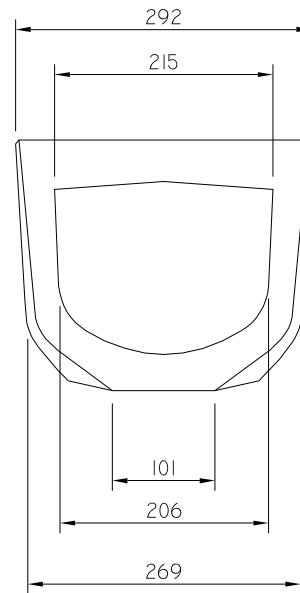
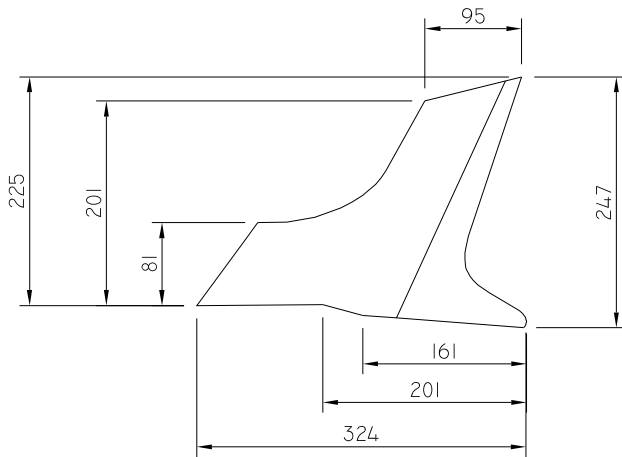
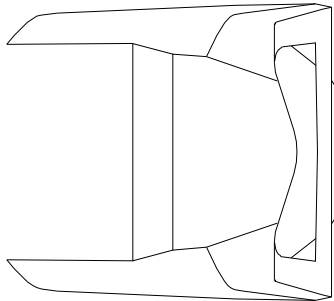
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INDUSTRIAL DESIGN CENTER, IIT - BOMBAY.		PROJECT: DESIGN OF TWO WHEELER FOR TRAFFIC POLICE		
		DRAWING: BIKE ASSEMBLY		SHEET: 1 OF 1







RevNo	Revision note	Date	Signature	Checked
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MATERIAL: FRP 3 MM THICK

ALL DIMENSIONS ARE IN MM.

DESIGNED BY: EDWIN (0 5 6 1 3 8 0 3)	CHECKED BY:	DATE:	FIRST ANGLE PROJECTION	SCALE: 1 : 5
INDUSTRIAL DESIGN CENTER, IIT - BOMBAY.		PROJECT: DESIGN OF TWO WHEELER FOR TRAFFIC POLICE		
		DRAWING: AIR SCOOP		SHEET: 1 OF 1