

A SPORTSBIKE CONCEPT

MOTORCYCLE STYLING

*Motorcycle Design is not a question of line.
It is primarily about proportion.
-Glynn Kerr*

Approval Sheet

Project II

A Concept 'Sportsbike'
(Styling of a Sportsbike)

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02613002

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Acknowledgement

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I wish to thank all the Department Faculty and Workshop Staff for their help and support during the project. I thank all my colleagues at IDC for their self wholehearted support and encouragement.

A special thanks to Pankaj Dhamane for helping me improve my rendering skills, to Aditya Dhavale for helping me experience those imported machines and vintage bikes which helped me understand them better.

Last, but not the least, I wish to thank Mr. Glynn Kerr, arguably the world's best motorcycle designer whose work, articles and emails have been a constant source of guidance for me.

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The idea for the project emerged as a result of an initial study of the trends prevalent in the motorcycling arena in the country. Motorcycles are a fast growing sector and have gained an ever increasing market share in the two-wheeler market, as against scooters, scooterettes and mopeds. Success of bikes like the Bajaj Pulsars and the Hero Honda CBZ surely point to the near future being that of '*Sportsbikes*', which is what people in the country generally term them as.

This project attempts to conceptualize a 'Sportsbike' for the youth in this scenario, in the process *breaking my own preconceived notions* about the mental image of a 'Sportbike' in the minds of the Indian user.

The methodology relies on an innovative approach, user inputs for design and last but not the least the past eight years spent in riding, studying and experiencing almost all the types of motorcycles, for they are... my passion.

Aim and Objectives

1.1 Aim Of The Project

Styling of a Sportsbike' for the Indian Youth

1.2 Project Objectives

- To do an initial survey to determine the market relevance and feasibility of the project idea
- To identify the need for such a product, i.e. the market
- To design a motorcycle, the extent of which depends upon the time frame of the project
- To attempt to improve the motorcycling experience by innovative features and styling
- To deliver a truly contemporary Indian product, which has international appeal
- To develop various concepts and a final concept, which reflects and addresses the user needs and desires

1.3 Personal Objectives

- To understand the design process in depth
- To understand the finer aspects of motorcycle design/styling
- To improve and develop sketching, rendering and model making skills, which are paramount in automotive design
- To improve presentation skills by experimenting with various media, verbal and written skills

2. The World of Sportsbikes

This section explores the meaning of the word 'sportsbikes'; it brings to light the various forms of such motorcycles that exist internationally and try and understand several perceptions

2.1 Introduction

What does “Sportsbike” mean?

The mention of the word ‘Sportsbike’ immediately brings to mind visions of aggressive looking , really fast bikes, riders in full attire and races. It also almost instantaneously brings the word ‘imported’ bikes into the picture. It is rightly so because the word ‘sportsbike’ is common knowledge in the West and Europe to denote such machines. As foreign MNCs such as Honda, Kawasaki, Suzuki, Yamaha, etc set up shop in India, Indians have adopted the term ‘Sportsbike’ to denote fast and racy machines in our context.

It is interesting to note that many a user wants to personalise his motorcycle to make it more ‘sporty’.The meaning of the word ‘Sportsbike’ thus can be more easily understood by reading about their history and present avatars.However a word of caution that I too bear in mind is that it is easy to have a rigid notion of what constitutes a sportsbike which is undesirable for design.

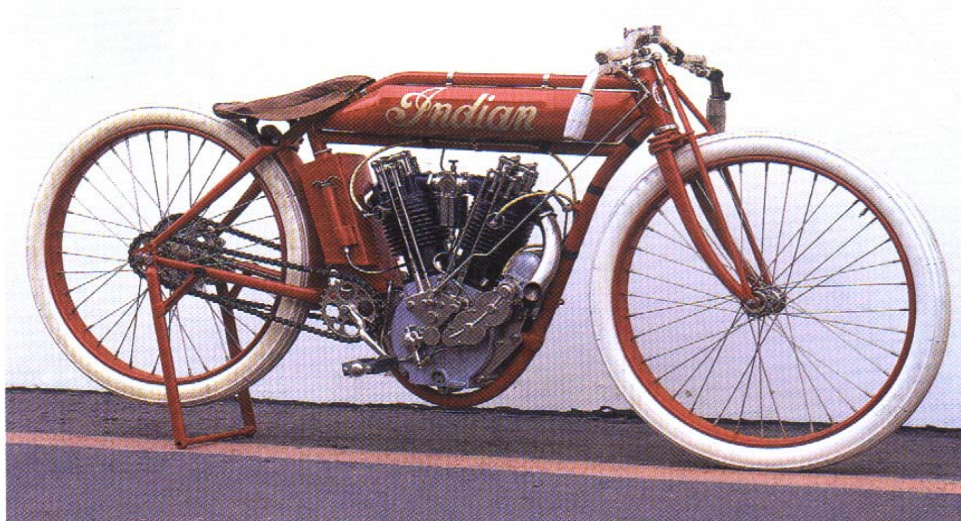
A detailed explanation of motorcycles in general has not been dealt with in this report, for that is a vast topic and easily available in books about automotive engineering and websites.I have assumed that the reader would have a visual image and basic understanding of motorcycle form. However, a diagram of basic components of a motorcycle has been provided.

2.2 Motorcycle Nomenclature

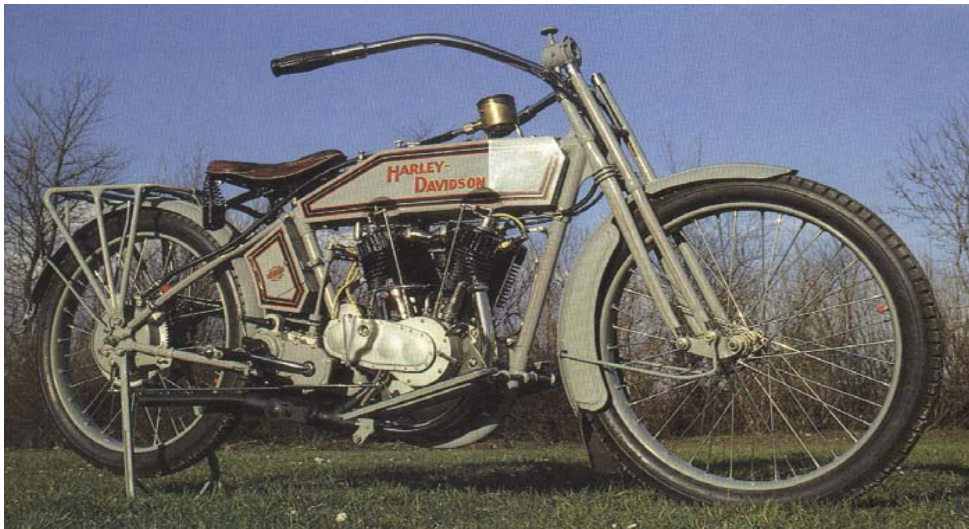


Shown above is a contemporary motorcycle (a Honda CB1300/ 2003 model). It shows the various features and components associated with motorcycles

2.3 Evolution of the Sport Machine



Indian board race bike 1911



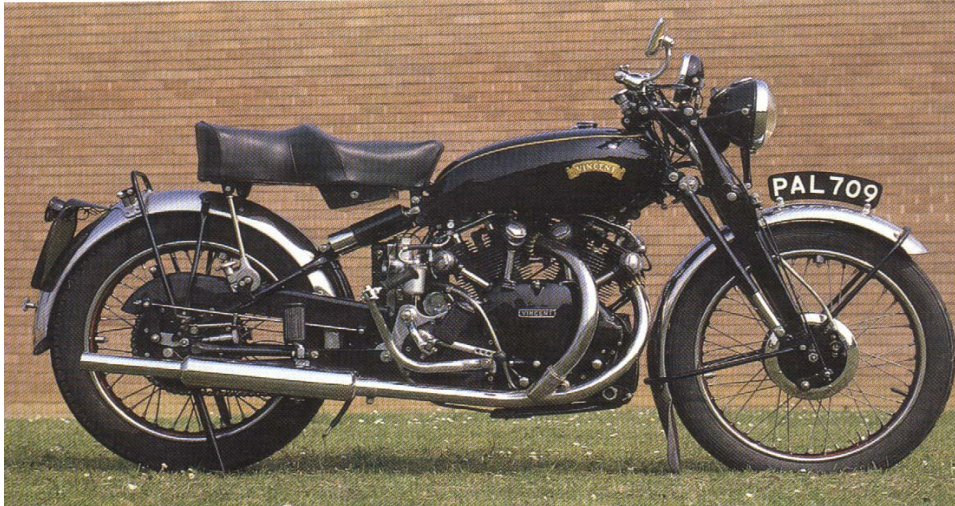
Harley Davidson Model 11F 1915

- ◀ The Indian was Harley Davidson's rival and the biggest American manufacturer during pre world war I years. This model, a board race bike of 1911 had a eight valve V-twin engine with open exhausts, low handlebars and a curvy streamlined frame to give a race like riding posture.*

- ◀ The Harley Davidson Model 11F of 1915 was a good looking, efficient and powerful machine for its time. Its 989cc V-twin engine, 97km/h top speed and sturdy frame made it a good racing machine.*

*Refer Reference no. 4

2.3 Evolution of the Sport Machine



Harley Davidson XL Sportster 1957



Vincent Black Shadow Series C 1949

- ◀ The Harley Davidson XL Sportster of 1957 had a lean and simple profile that was enhanced by two tone paint schemes telescopic forks, a sprung saddle and chrome shocks. It established yet another trend in 'sportbikes'.*

- ◀ This bike, a Vincent Black Shadow Series C of 1949, with its superb 998cc V-twin engine and 193km/h top speed, was an exotic, superbly crafted and rapid machine. Black and chrome elements imparted it that special no nonsense racing look. The above attributes fully justified the advertising line, 'The World's Fastest Standard Motorcycle'.*

*Refer Reference no. 4

2.3 Evolution of the Sport Machine



MV Agusta 750 Sport 1973



Honda CB1100R 1981

- ◀ The Italian firm, MV Agusta introduced the 750 Sport in 1973. It was designed for racing. Its race style fairing with a Perspex fly screen and red, white and blue colour scheme screamed 'racy'. So did its twin shocks on each side.*

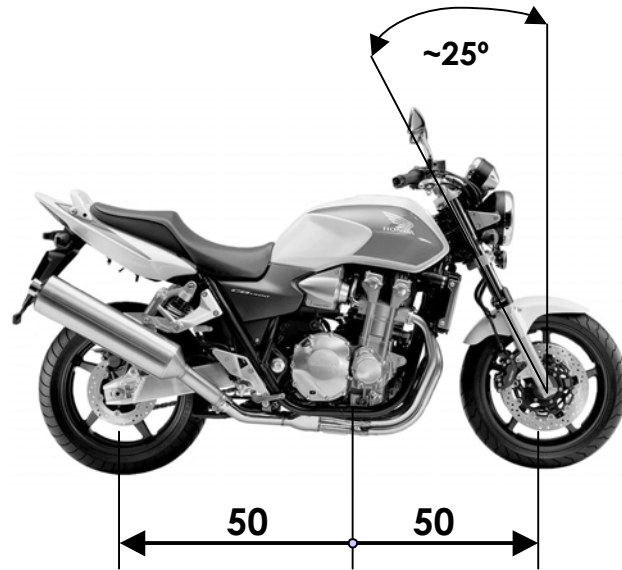
- ◀ The Honda CB1100R of 1981 had a half fairing, single seat, brightly painted body and black painted mechanicals. It was designed for long distance production racing, and yet was a sensational road bike with an attitude.*

*Refer Reference no. 4

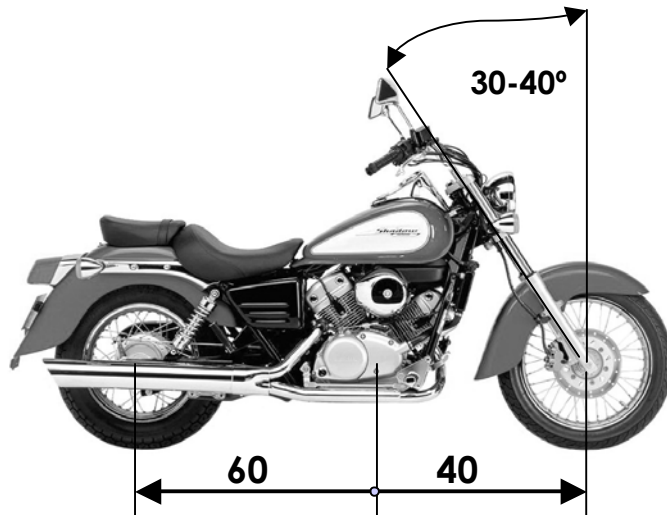
2.4 Differentiation Based On Motorcycle Weight Bias

After the Honda CB1100R in 1971, motorcycle styling began to emerge as three broad categories based on weight bias at the front and rear and rake angle

Rake is measured as an angle that the steering stem is from a vertical angle. The steeper the rake angle, the sharper a bike will steer (all other things being equal).

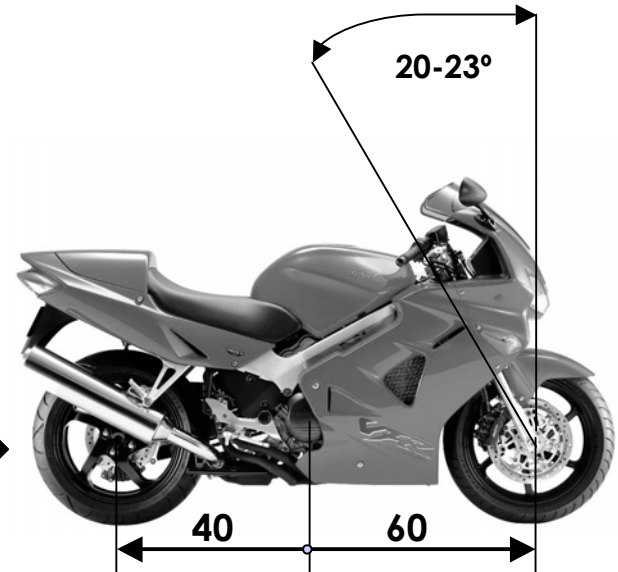


◀ 50:50 weight bias F/R –
Road machines
including naked,
roadsters⁵



60:40 weight bias F/R –
Race bikes, Sport tourers, Supersports⁵ ▶

◀ 40:60 weight bias F/R –
Cruisers, Choppers, Soft
tails, etc⁶



2.5 Sportbike Derivatives

Sportstourer



Supersports



Racing



Naked/Roadster



Dual Purpose



Motocross



2.6 Colours Typical To Reputed Brands

Honda



Kawasaki



Triumph



Yamaha



MV Agusta



Ducati



Suzuki



Benelli



3. Motorcycles in India

This section gives an idea of the motorcycle scenario in India which is has the greatest relevance to the project. It also includes some illustrations and samples of some interesting findings while trying to understand Indian motorcycles.

3.1 The Indian Scenario

The motorcycling revolution in India really began with the advent of the Japanese motorcycle majors. Suzuki introduced a 100cc 2 stroke motorcycle known as the 'Ind-Suzuki' in the 1980s, which later became TVS-Suzuki. This was followed by Honda's advent in India in collaboration with Hero Motors. They introduced the Hero Honda CD100, a 4 stroke motorcycle with a phenomenal fuel efficiency. This motorcycle really captured the hearts of millions of Indians and became the best seller.

The entry of mass manufactured bikes may have been due to the above, but motorcycle enthusiasts and racing fans were active long before. The Royal Enfield Bullet, the Jawas and the Yezdis were the diet of motorcycle lovers. A few extremely lucky ones owned expensive imported and vintage motorcycles.

Today Indian manufacturers like Hero Honda, Bajaj Auto, TVS, etc manufacture motorcycles in the sub 250cc category. They term their most powerful, stylish and most selling bikes as '**Sportsbikes**'. But one cannot assume that it is always so in the minds of the users also. People have varied notions of the term 'Sportsbikes'. To add to this, the diversity of culture, traditions and customs within our country has led to varied but vibrant lifestyles which makes designing a 'Sportsbike' for our users a real challenge....

.....or is itan opportunity.

3.2 Some Relevant Indian Motorcycles



Hero Honda CBZ



Bajaj Wind 125



Enfield Bullet Machismo



LML Daelim Adreno



Kinetic GF125



Bajaj Pulsar 180

3.3 Study of Existing Products

Sample Photos



Bike with original fairing



Bike with retrofit fairing

V/S



Safe

V/S



Bizarre

??????????????

USER STUDY

3.3 Study of Existing Products

Sample Photos



Note use of false air scoops to add sporty flavour. Not a fine detail as it is fake. Meaning in form is missing.



USER STUDY

3.4 Existing Trends in Instrument Consoles on Indian Motorcycles



List of commonly provided instrumentation

- Speedometer
- Tachometer
- Odometer
- Tripmeter
- Fuel gauge
- Neutral indicator
- High beam
- Turn signals
- Ignition/Handlelock key

Note

- common use of twin dials and placement of indicating lights in between or behind
- Also note use of black as colour for most instrument consoles

4. User Study

4.1 Reaching out to the users

The objective of the project was styling of a 'sportbike' for young people, possibly in their early twenties.

The user studies were therefore conducted at places frequented by them. User Studies were done in two cities, **Pune** and **Mumbai**. Pune was chosen because of its status as the city with the largest numbers of two wheelers in India.

Places included

Colleges - Fergusson college (Pune), MIT (Pune), Symbiosis (Pune), IIT Bombay

Restaurants & Cafes

Hangouts, shopping streets and parking places

Garages which modify bikes for customers, auto accessories shops

Apart from all these, opinions about the project were obtained from designers, automotive journalists and users of exclusive imported bikes, in short those with working knowledge of sport bikes .

User studies involved two activities

1. *Observing* users and noting interesting happenings

2. *Interviewing* users informally and trying to get them to speak out their heart on the issue



4.2 Understanding the Users, their Passions, their Needs.....

Aged 18 – 25 years

Enthusiast

Individualistic

Aggressive

Adventurous

Aware of bike trends

Relishes rides

Attempts to look cool

The opposite sex is important

Wants getaways

Loves accessories

USER PROFILE

4.3 Questions & queries asked to the user

Sample Questions

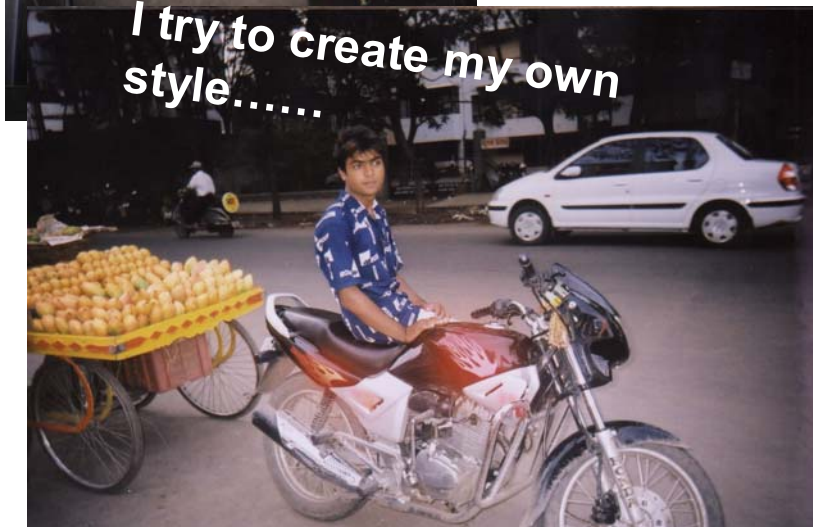
- Does sport mean something to you?
- Do you play any sport? Any favourites?
- Do you like using and experiencing sporty gadgets and accessories?
- Which motorcycle do you consider sporty?
- Would you like to own one, in the way you described?
- Would you like to give your opinion on some sportsbike model photos that I have?
- Does a particular styling appeal to you?
- Do you follow fashion and style trends in your daily life?
- Are you an automobile enthusiast?

USER STUDY



Note- It is difficult to use a fixed format or sometimes , even to ask any of the above questions in a short time. But the discussions were revealing at all times

4.4 Sample Photos Of Motorcycles Personalised By Users



USER STUDY

4.4 Sample Photos Of Motorcycles Personalised By Users



4.4 Sample Photos Of Motorcycles Personalised By Users



USER STUDY

4.5 Which Bike Is Most Sporty?



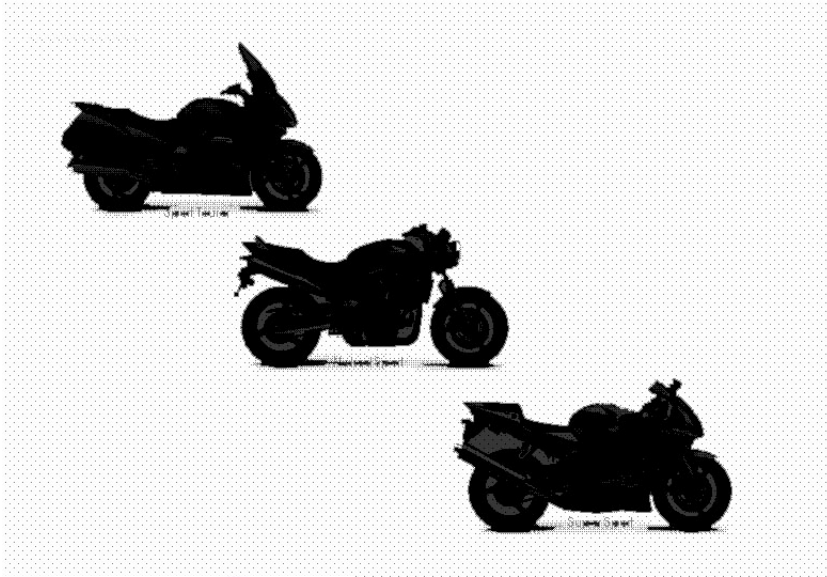
USER STUDY

Boards for user interviews

4.6 Identifying Perceived 'Sportbike' Profiles

Asking the users about their perceived 'sportbike' profile gave good indications about user knowledge likes and dislikes and idea of sportbike

Darkened profiles (shown in picture on top) were used to eliminate form bias



Sport Tourer



Naked Sport



Super Sport

Pictures at bottom show the normal forms and names.

Most users strongly preferred the 'Naked Sport' and 'Supersport' variety

Boards for user interviews

4.7 Interpreting the user comments



"A bike should go as fast as it looks"

It means that users consider styling & performance as related entities.

They are complementary



"Styling trends...edge style and curve.....what trends?"

The best thing about today's trends may be that there are no fixed trends...

Straight lines go alongside curves.



"Sporty means engine.....sporty means Ninja.....sporty means black"

Designing a form with engine as focal point could be a good idea.

Names of bikes often add to the sporty flavour.

Black components tend to make the bike look powerful, but black is often used to hide poorly designed components and adds bulk.



4.7 Interpreting the user comments

- Motorcycle design today involves a lot of detail design as motorcycles have a lot of exposed components as opposed to cars
- The user wishes to have the freedom to make small changes in looks and feel on his own too
- The sportbike should have outstanding visual appeal, when stationary or on the move
- Good styling might be achieved with lesser bodywork in most cases.
- The continuity of form must be maintained in the body form, even on mechanical components
- The styling should provide for a distinct riding posture, which should be fully adjustable for maximum comfort and liking
- Floating parts should be minimized, to add to the solidity of the form
- Body should wrap around the rider, it feels safer.....
- More bodywork in the frontal area also adds to the safety perception

4.7 Interpreting the user comments

- The bike should be tailor made for Indian physique, yet must reflect an international identity and look like a global product
- It should look planted on the surface, like most sport shoes do, especially jogging shoes. It might be a good idea to try and incorporate rubber patterns on the body, which might achieve such a goal.

A very important insight has been the desire to have an expressive bike, an active one.....one which urges the rider to communicate with it and responds.....

.....does this mean that a transition in form is desirable...with technology and materials to aid in achieving this.....an opportunity to explore.

4.8 Quantitative Analysis

A quantitative analysis [NFO – Autocar Total Customer Satisfaction Study (India) 2003]* [Study on next page] was referred for an evaluation of the current trends in the Indian motorcycle market. It helped to understand the customer's buying preference and the degree to which styling affects the purchase of a vehicle with respect to each category of vehicle.

The 'Premium' segment was then chosen as the target segment and it became a basis for reference. Also, the 'Bajaj Pulsar' emerged as the bike which customers preferred over others in the segment, the top purchase reason being **STYLING**.

This quantitative analysis helped me in the concept generation process to work within a framework without neglecting Indian conditions and market trends. The design need not necessarily depend on existing vehicles but a combination of qualitative user study (done by the designer) and reliable quantitative data enable a stronger design approach and confidence in the mind of the designer. It also helped me look at customer preferences objectively and draw inferences.



NFO - Autocar 2003 Motorcycle Total Customer Satisfaction Study [India]

Top five purchase reasons

STANDARD

Good Fuel Economy
Low Price
Good Styling
Good Model / Good Vehicle
Low Maintenance Costs

Top model - Hero Honda CD 100 SS

EXECUTIVE

Good Fuel Economy
Good Styling
Good Model / Good Vehicle
A Model That I Have Wanted / Liked
New Product

Top model - Hero Honda Splendor

PREMIUM

Good Styling
Engine Performance (acceleration / Pickup)
Good Fuel Economy
Good Model / Good Vehicle
A Model That I Have Wanted / Liked

Top model - Bajaj Pulsar

CRUISER

Good Styling
A Model That I Have Wanted / Liked
Good Model / Good Vehicle
Heavy Bike
Engine Performance (acceleration / Pickup)

Top model - Royal Enfield Bullet Electra

QUANTITATIVE ANALYSIS

¹ 5400 owners of 30 major motorcycle models interviewed across 16 cities in India
Reference – Autocar May 2003

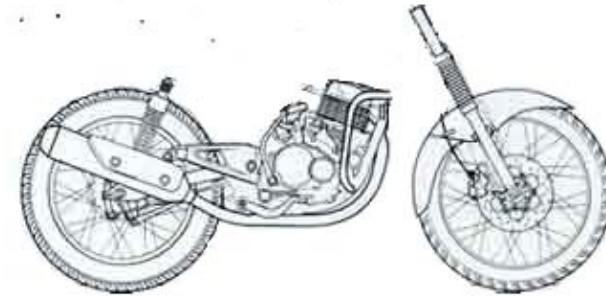
4.9 A Brief Analysis Of The Pulsar

1



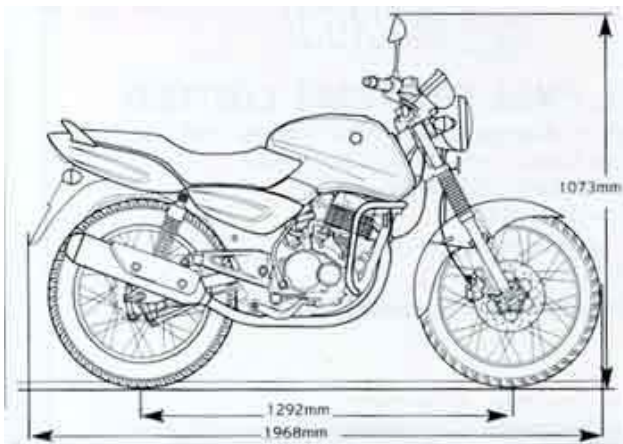
Side Profile of Pulsar 180

2



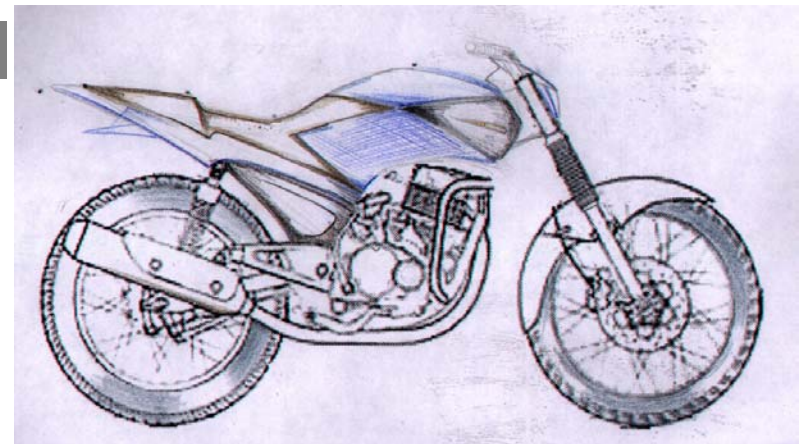
Engine and Transmission Framework

3



Overall dimensions

4



Sample styling exercise

5. Product [Styling] Brief

The user study and study of existing products culminated in a Product Styling Brief which identifies the user profile for the end user and guidelines for form generation and conceptualization of new designs based on it.

Product [Styling] Brief

User Age Group

The target user is 18 – 25 years of age. The 'Sportsbike' design has to meet and more positively, surpass the user's expectations. It might appeal to other user groups also.

Form & Design

- The styling should be based upon the user insights and observations and must reflect his characteristics. (See user profile)
- The form should speak a sporty language. It should not just demonstrate sporty looks but also imbibe the implied meanings behind the use of the word
- The styling should not be a hindrance to functionality and the motorcycle should promote its use as a regular vehicle
- A certain freedom which is part of any styling process must be utilised to demonstrate personal style and design capability. It should add originality to the design.

The form

- Should imbibe speed, elegance and good transition of proportions
- Should be free flowing and a coherent entity, integrating otherwise separate elements
- Should have aggression and a unique identity
- Should integrate technology with Styling elements

Product [Styling] Brief

Ergonomic Aspects

- The riding posture should be nearer to upright seating posture
- The motorcycle should have an ergonomically contoured seat
- Footrests should be at ergonomically correct position
- Ergonomic seating such as Mandel's seating principles , i.e. the saddle seat type should be considered

[For proposed technical specifications see annexure 1]

6. The Design Process

6.1 Methodology

How do I see Metaphors.....

Student projects have used metaphors extensively in design of vehicles. Animals and birds seem to be the favourites as they are strongly associated with speed, power, elegance and the like. I like their use in form generation, but I would like to take a different path here.

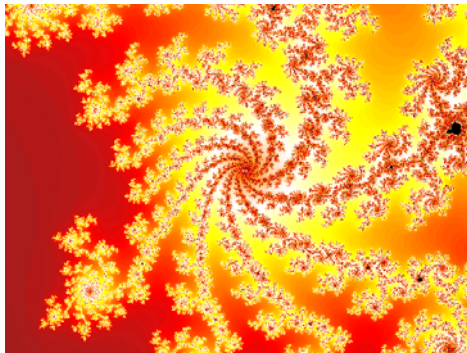
I wish to generate forms using the five elements:

air water fire earth space.

This, I choose to do as it allows me to experience the transition of these entities into desirable forms. I wish to explore these both as individual powers and as integrated ones. But I also realized that it may not be possible to visualize all of them and their interactions simultaneously. Alternatively any one of them can be used as an inspiration or a basis for the styling. Interaction between two elements might help define a form too

The use of these elements can be for...

- form generation, in totality or individual components
- colour schemes
- adding character to engineered components



6.2 Visualizations And Mental Images

'FIRE' conjures up the following images

Energy
Ascending
Warm
Purifying Sacred
Fierce
Rhythm in Movement
Bright
Matter becomes energy
Passion
Creation by Destruction

Agn
i



6.2 Visualizations And Mental Images

Air is interpreted as 'wind'. 'WIND' conjures up the following images

Dynamism

Moulding forms

Ever changing moods

Direction

Speed

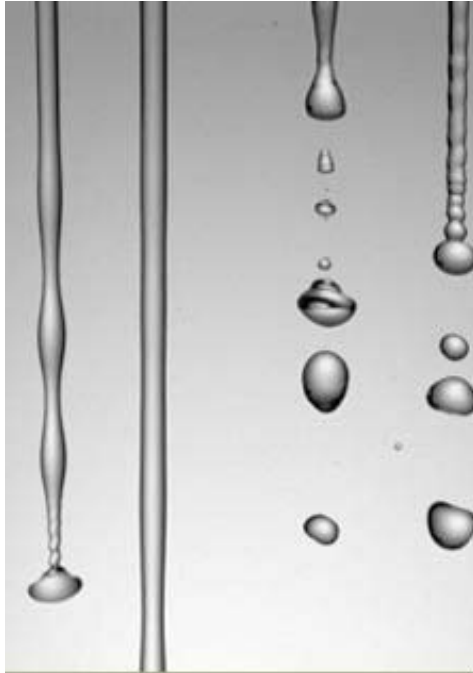
Unpredictability

Cause and effect

Vayu

6.2 Visualizations And Mental Images

From a single droplet to the mighty ocean,
water greets us everywhere



Source of Life

Streams

Cleansing

Refreshing

Spreading Out

Rhythm... a poem flows

Large expanses

Transparent...apparent

Transience.....

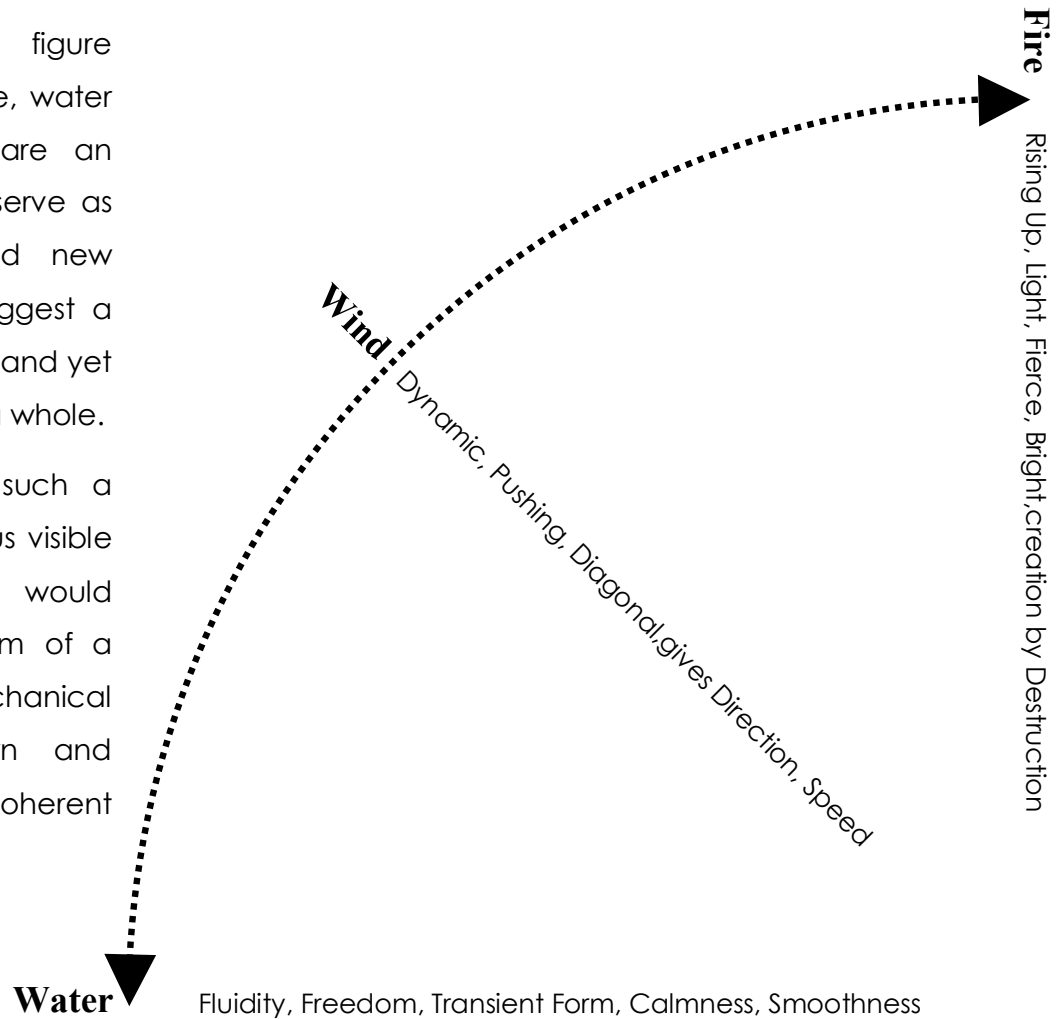


Neer

6.3 Form Generation

The adjacent figure demonstrates the meanings of fire, water and wind as elements which are an inspiration for creating form. They serve as visual aids to design and add new meanings to the design. They suggest a move away from direct metaphors and yet add character to the sportbike as a whole.

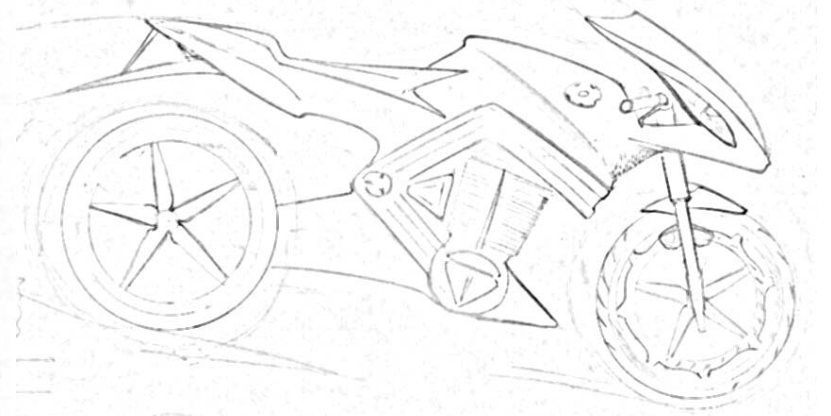
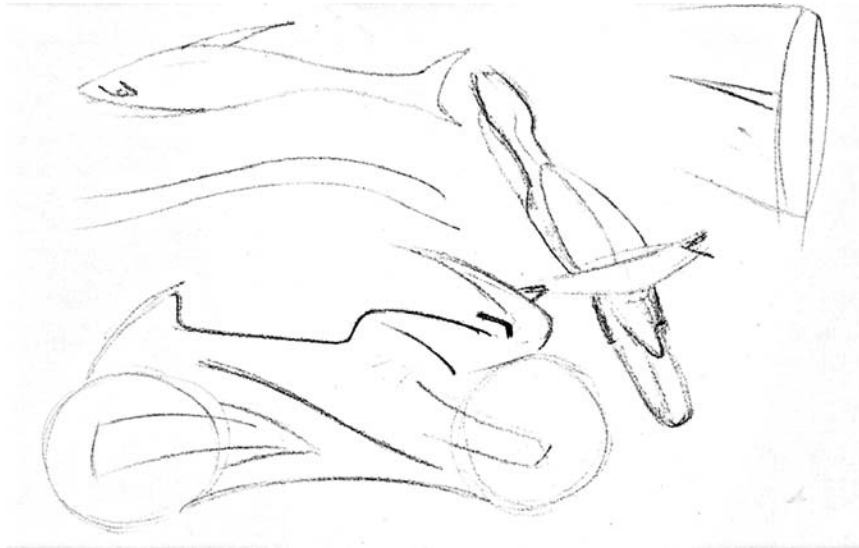
They are ideal for such a product which consists of numerous visible components, many of which would otherwise not be within the realm of a product designer. They act on mechanical components as colour, pattern and textural elements to create a coherent form



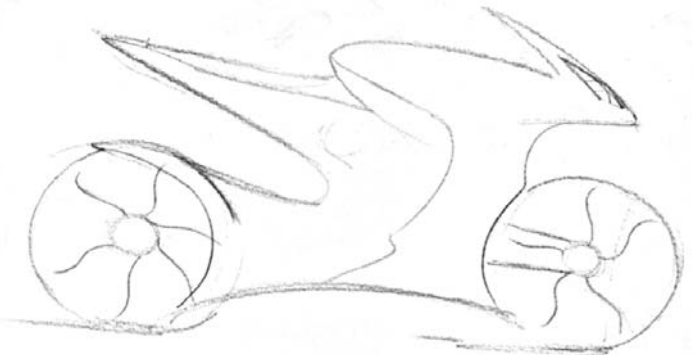
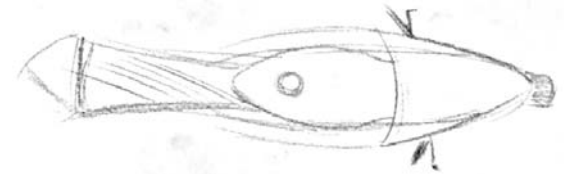
6.3 Form Generation

Use of Natural Elements in Form Generation

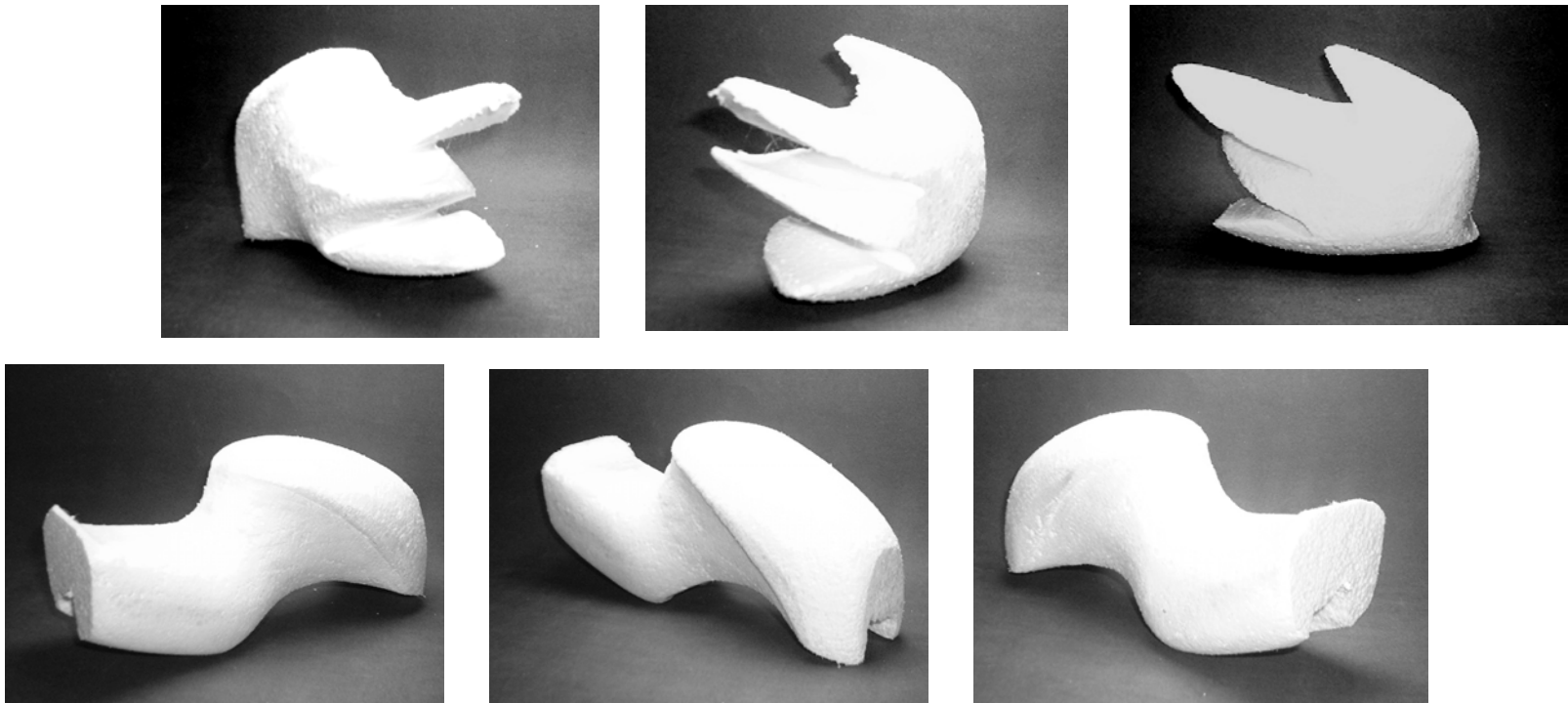
6.4 Initial Sketches For Ideation



Sharp ,focused, wedged



6.5 3D Exploration

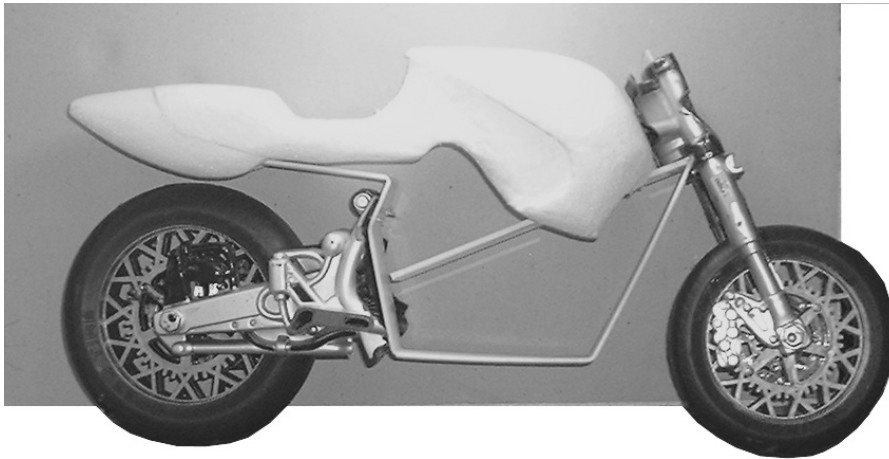


CONCEPT GENERATION

At this stage it was necessary to explore form in 3 dimensions. This helped me to impart clarity to my thought process and visualize 'Agni' and 'Vayu' in space. At this stage form generation was open ended without serious thought to product outcome.

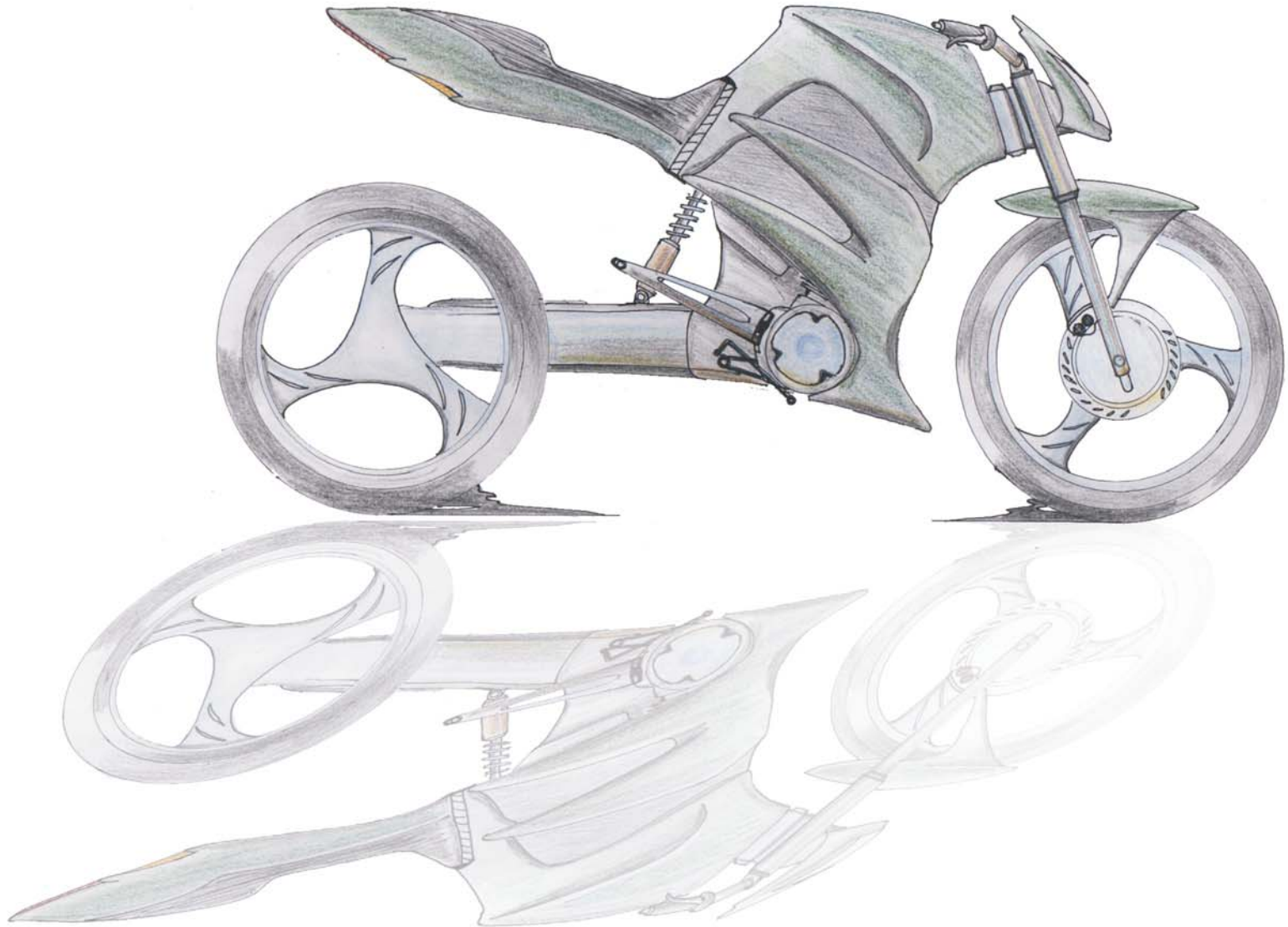
The thought behind the form depicted here was the form of 'Agni' (fire) when it interacts with 'Vayu' (Wind).

6.6 Concept Generation



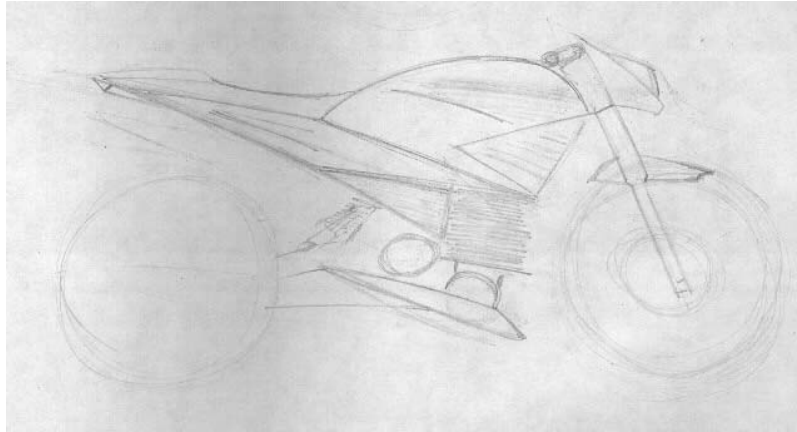
Concept generation for the first concept attempted to generate a motorcycle form which meant 'Agni'. This was a follow up of the previous visualizations. 3D form exploration on a 1:5 scale helped tighten the proportions.

6.6 Concept Generation

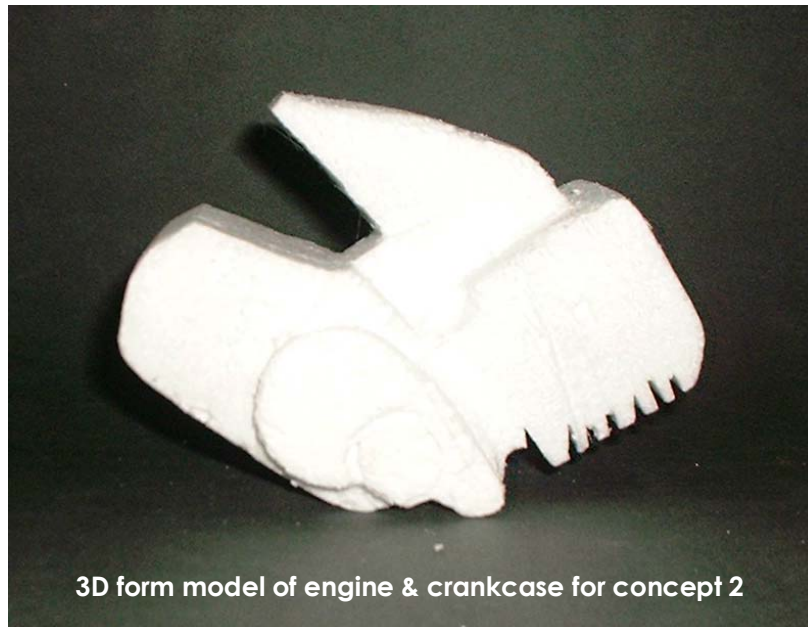
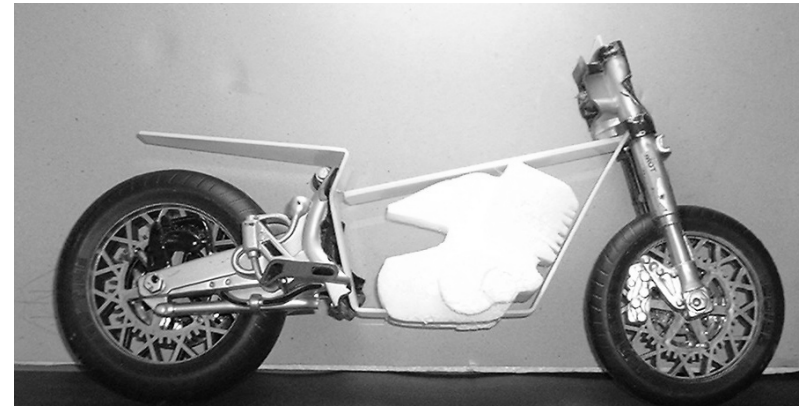


Concept 1

6.6 Concept Generation

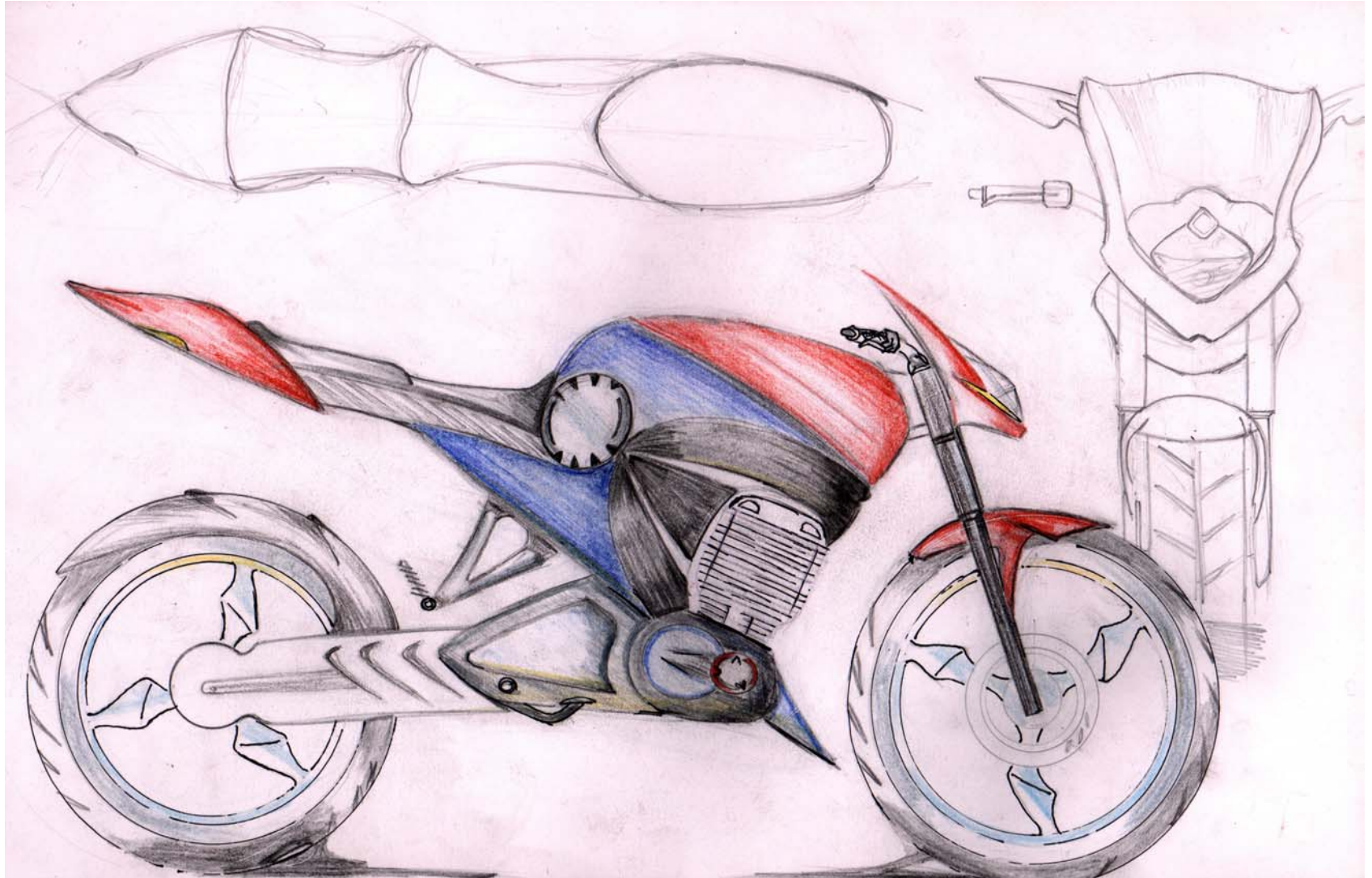


Concept 2 was visualized as a 'mischievous' bike. It depicts wind as a force which emerges from the power plant. It suggests an aggressive, almost prankster of a being. The engine and bone like alloy wheel members emphasize this. It is shown next.



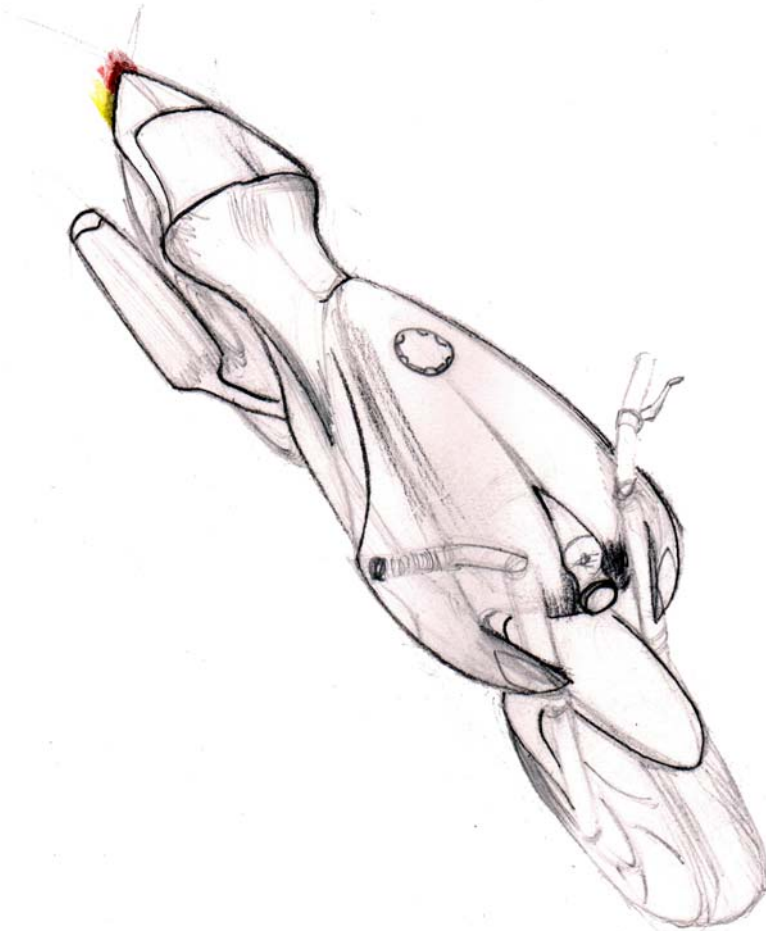
CONCEPT GENERATION

6.6 Concept Generation

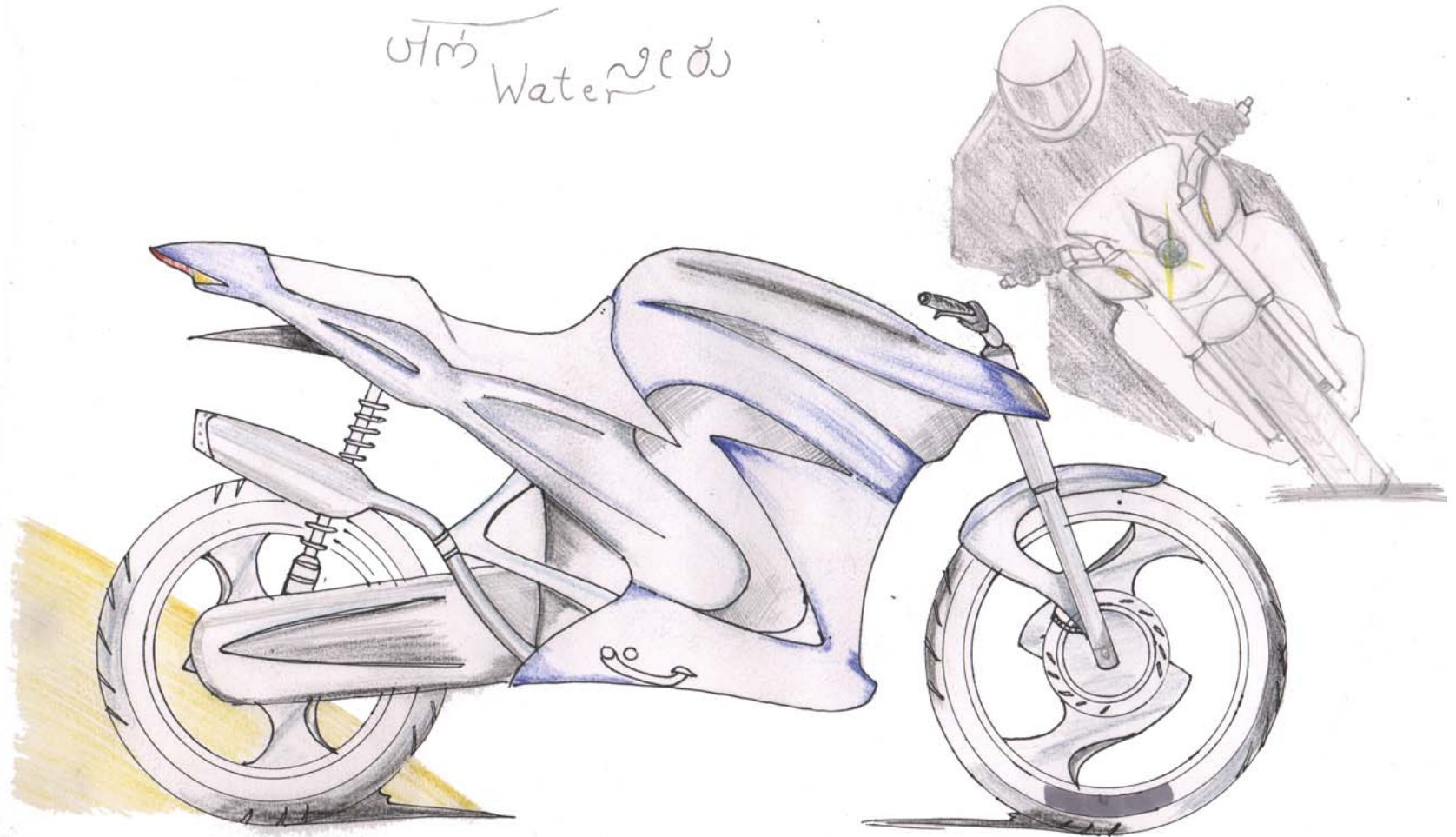


Concept 2

6.6 Concept Generation

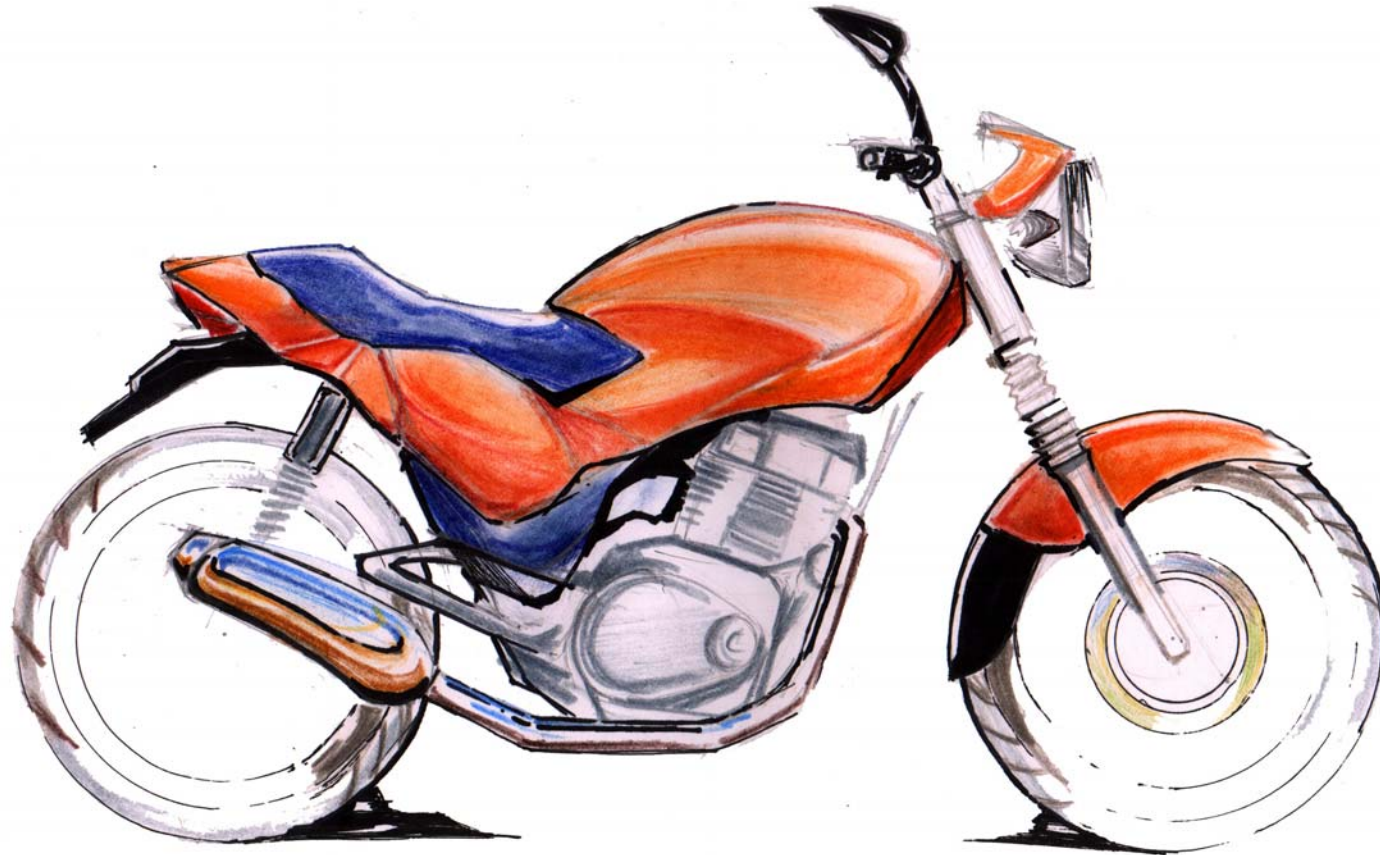


The next concept emphasizes flow, intermingling of fluid lines to give a new meaning to enthusiastic behaviour and rebellion.....shown here and next



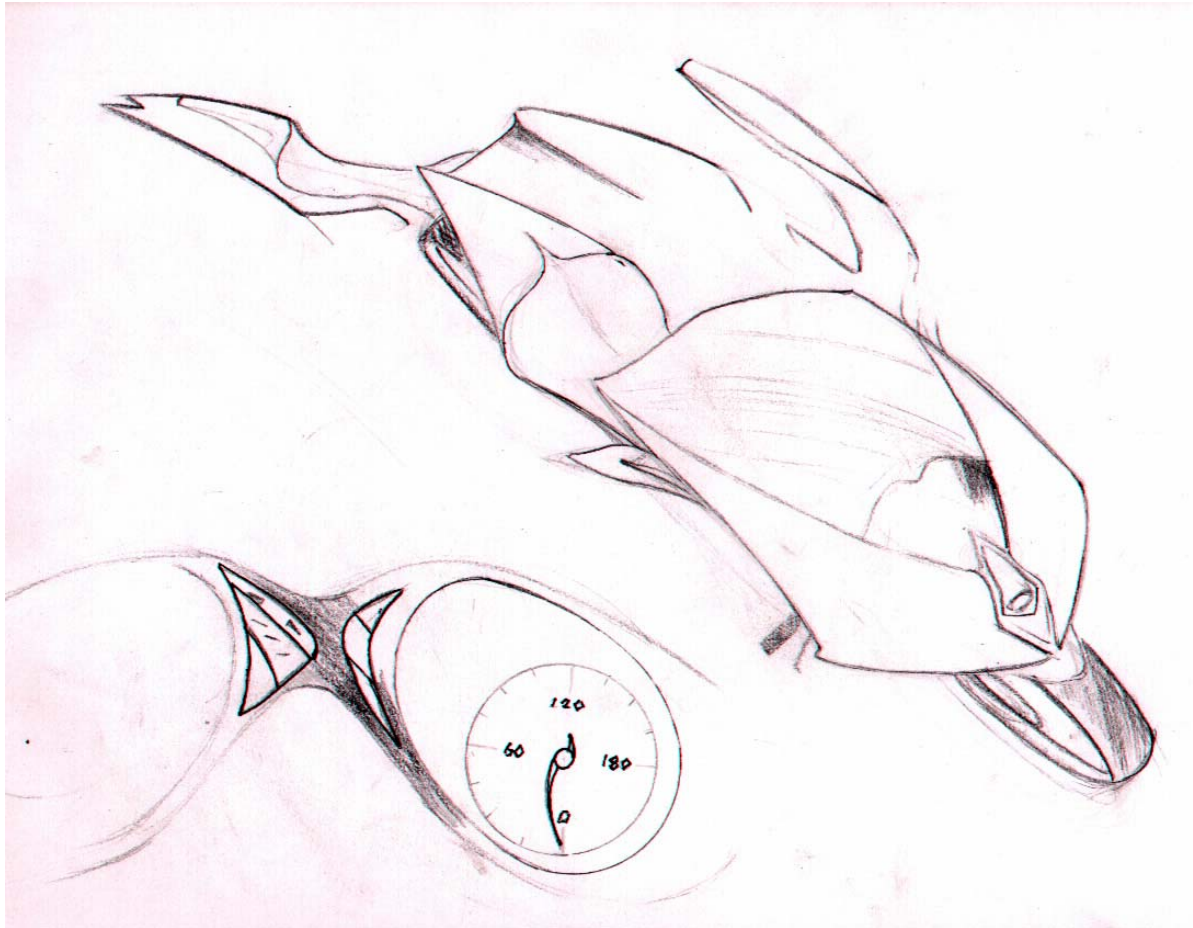
Concept 3

Fire as colours



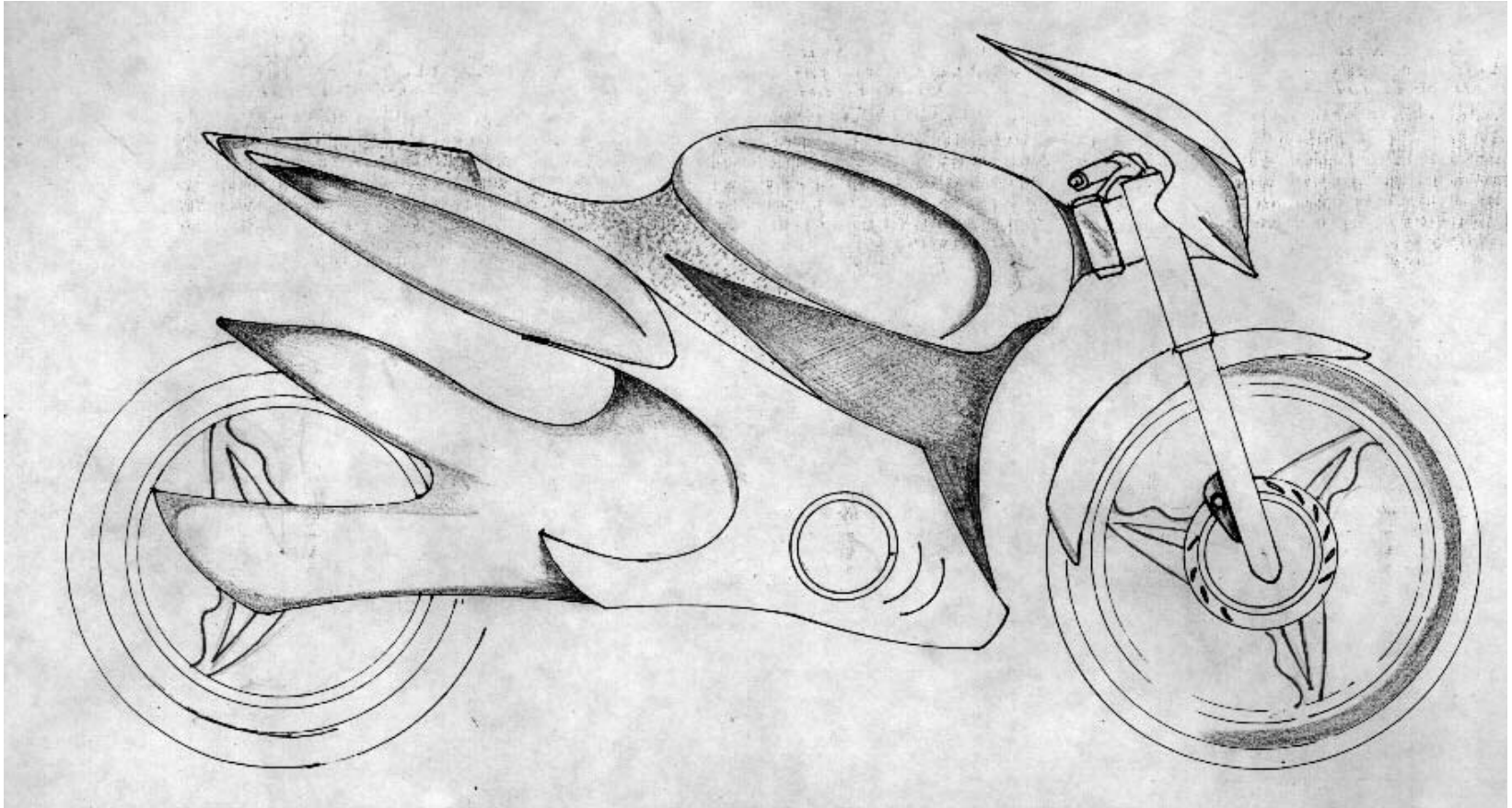
Concept 4

6.6 Concept Generation



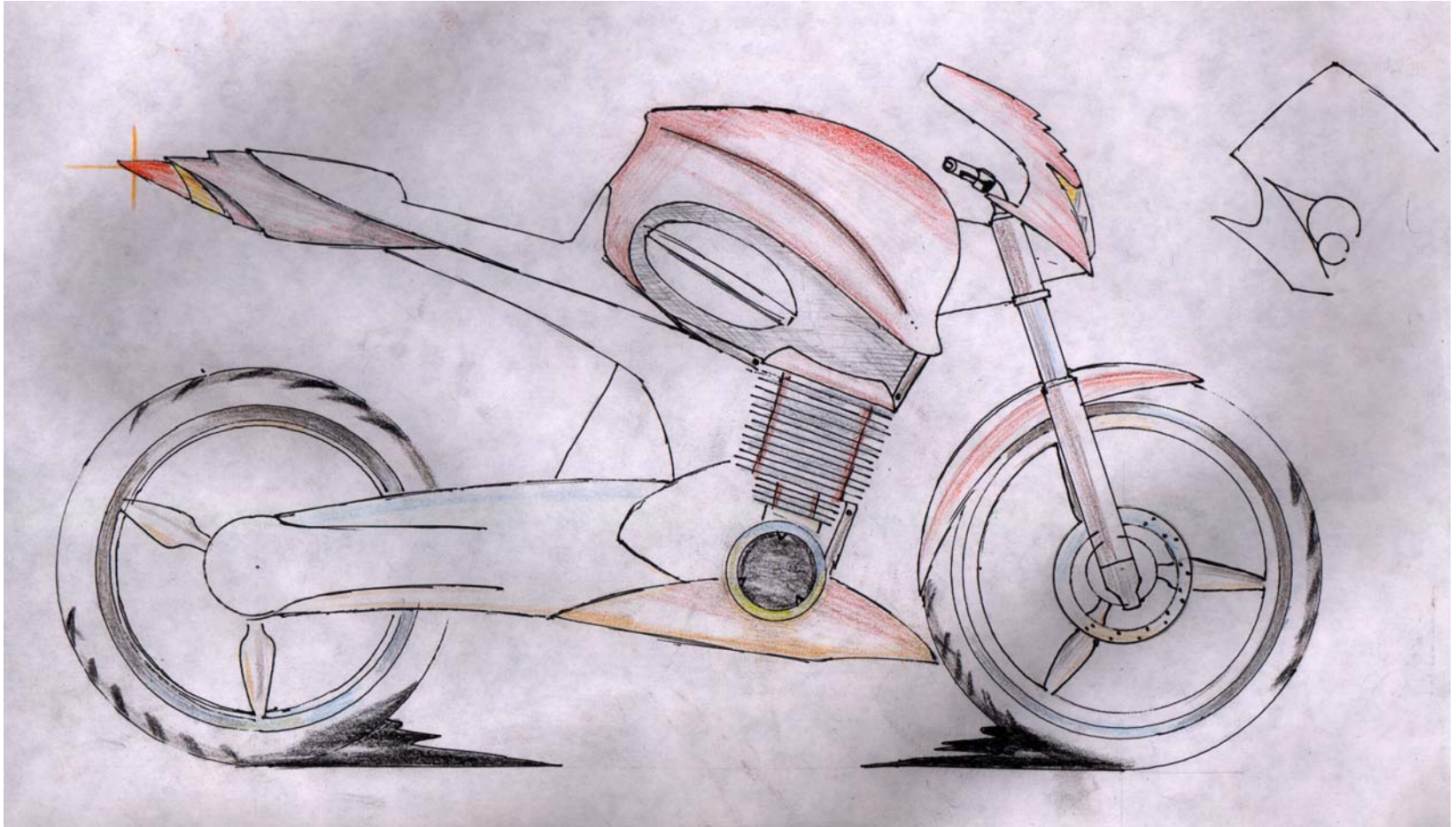
CONCEPT GENERATION

The 5th concept is an attempt to imbibe 'speed''grace'and.....'activeness'
.....in a motorcycle to suggest a different flavour of sport.



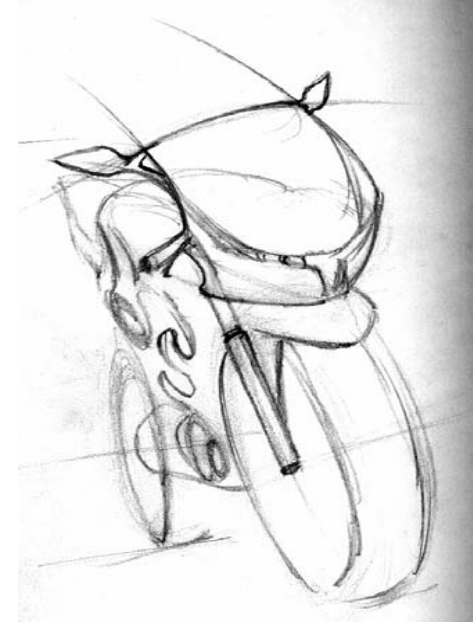
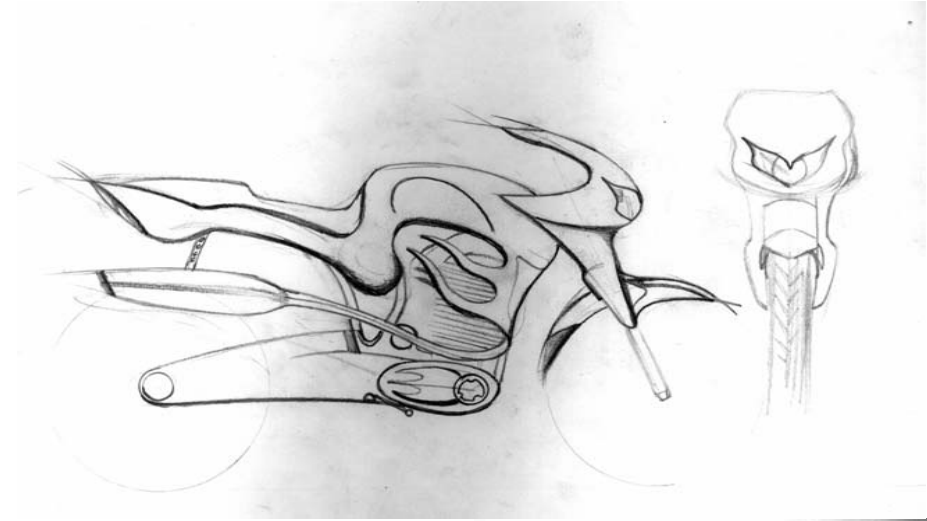
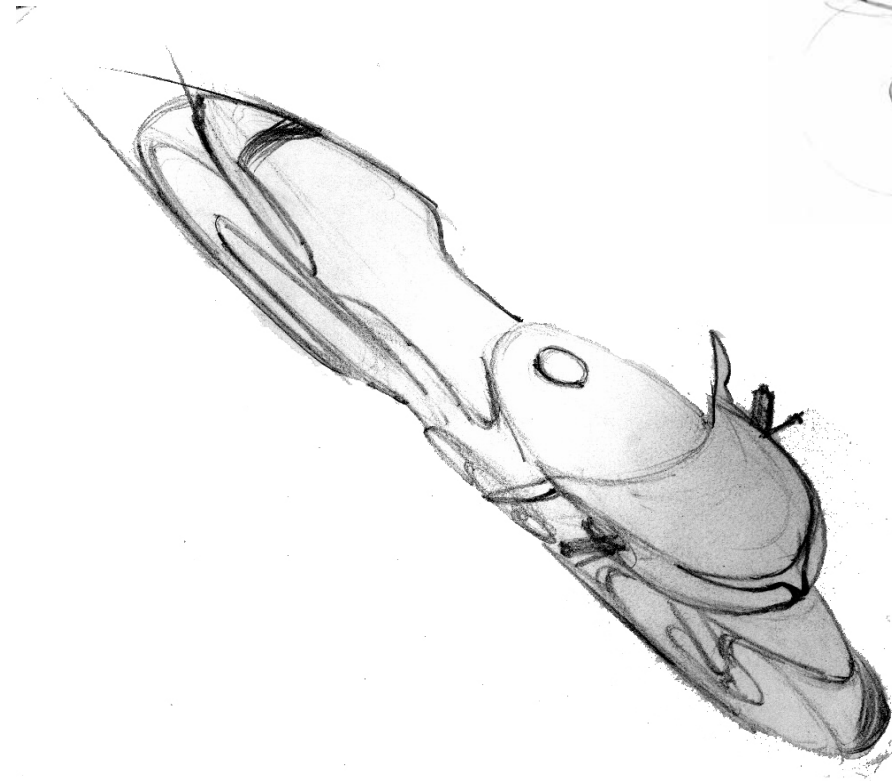
Concept 5

6.6 Concept Generation



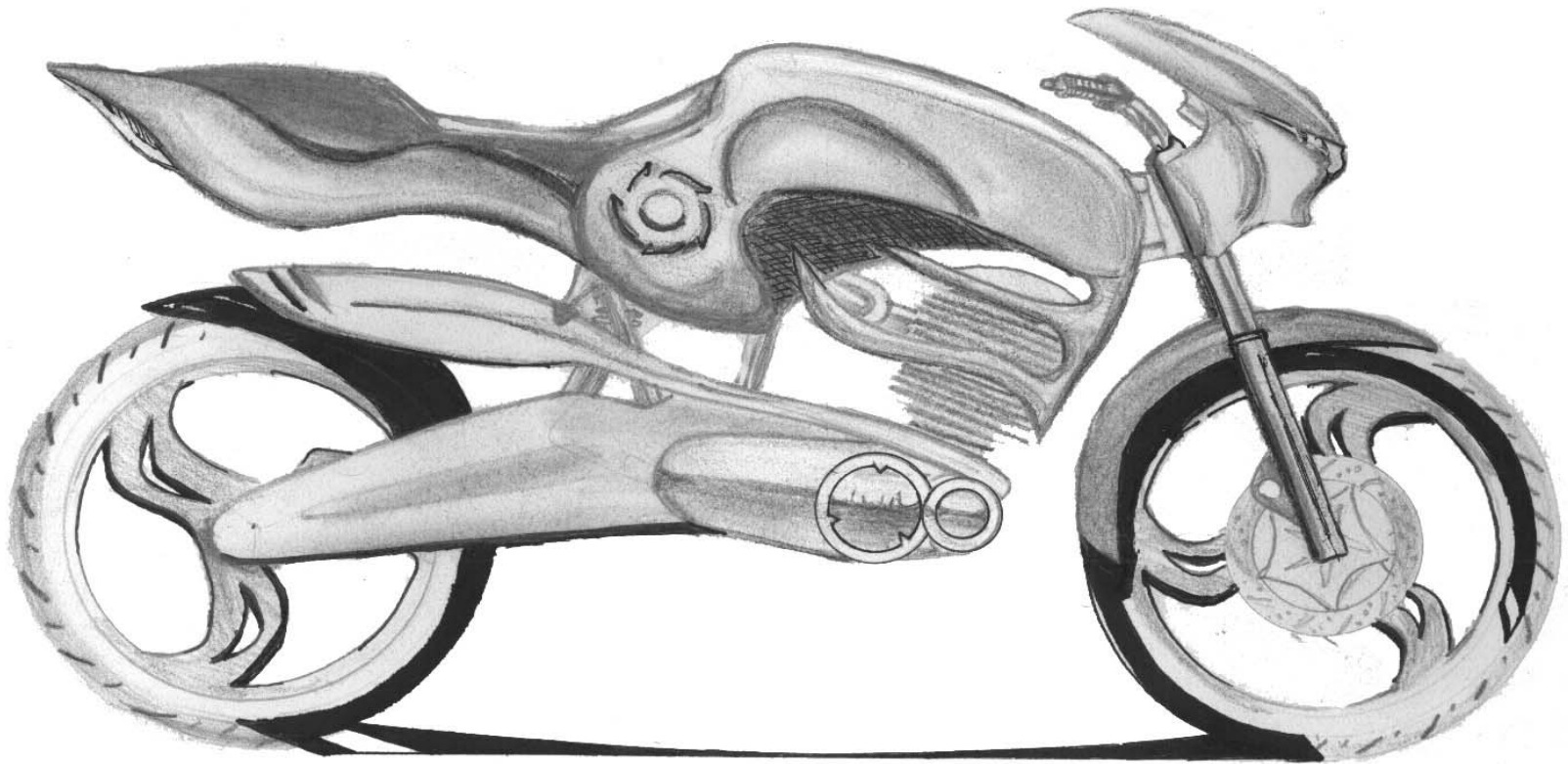
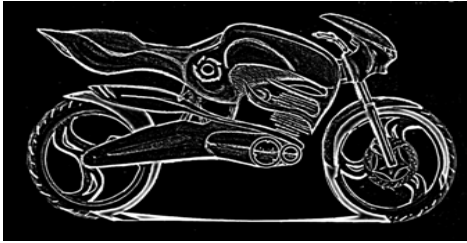
Concept 6

6.6 Concept Generation



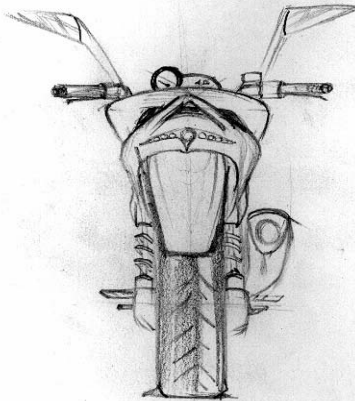
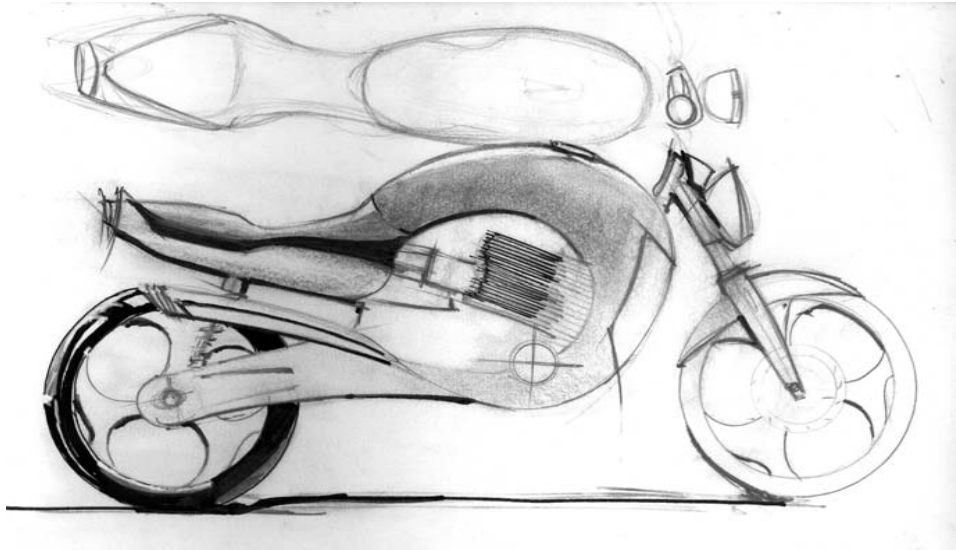
CONCEPT GENERATION

6.6 Concept Generation

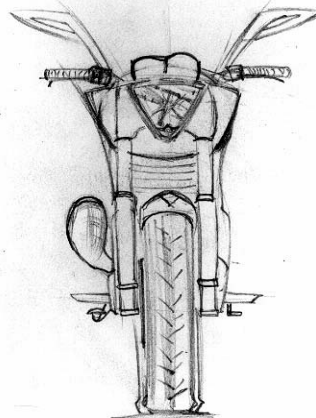


Concept 7

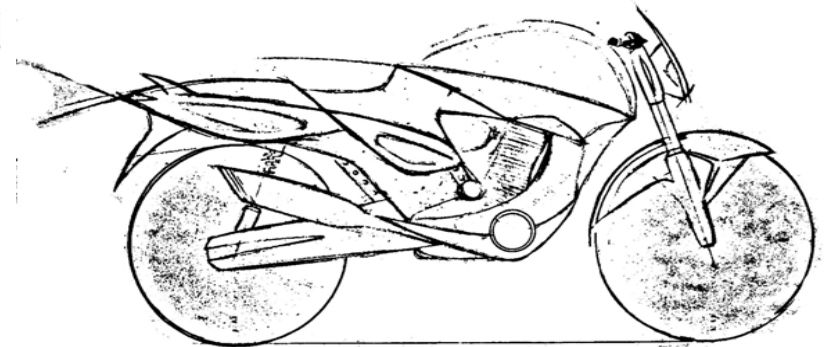
6.6 Concept Generation



REAR

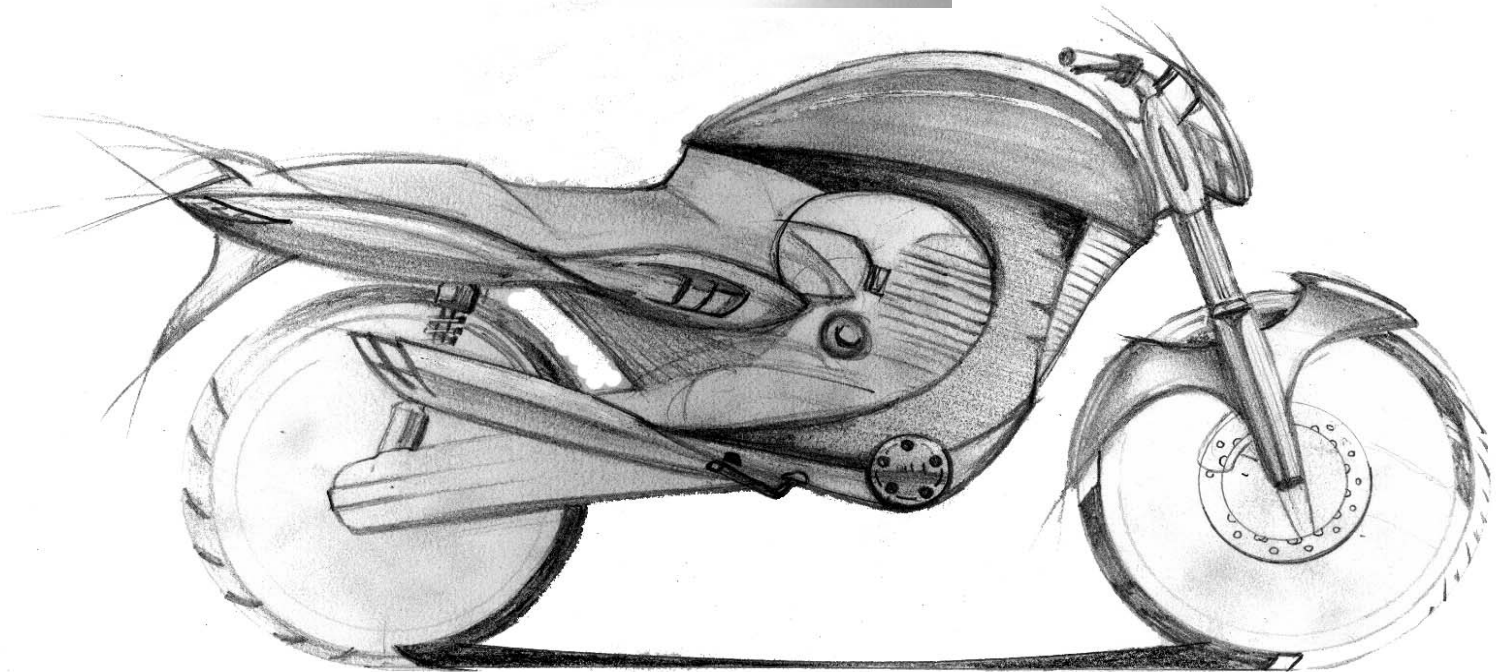
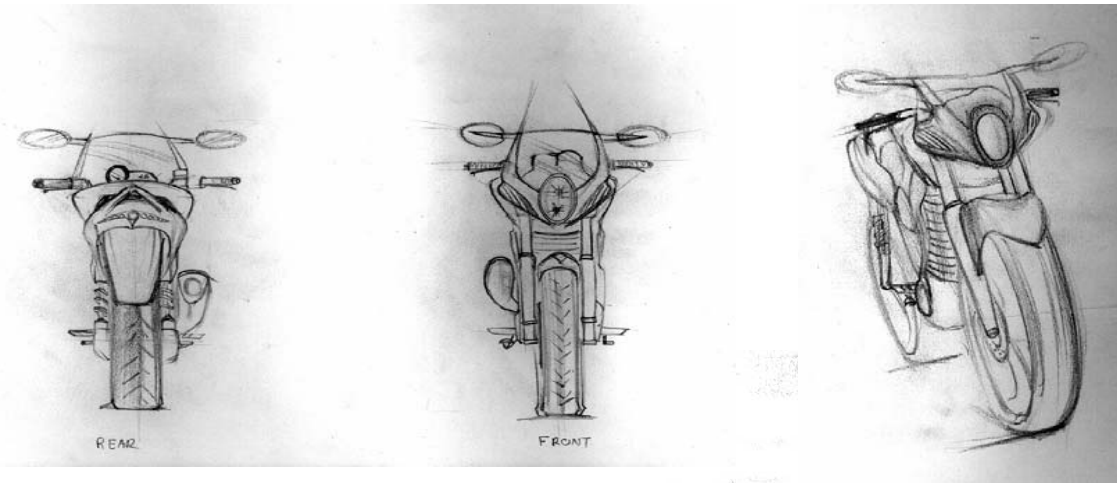


FRONT



CONCEPT GENERATION

6.6 Concept Generation



Concept 8

7. The Final Concept

7.1 Concept Evaluation

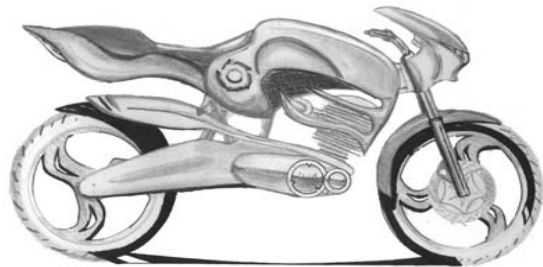
Phase 1 All the eight concepts generated were evaluated against seven parameters. These were selected from design insights based on user preferences and my understanding of 'Styling'.

Evaluation Parameters ▼	Concepts ►	1	2	3	4	5	6	7	8
Activeness and Expressiveness in form		✓	✗	✓	✗	✓	✗	✓	✓
Innovative look		✗	✗	✓	✗	✓	✗	✓	✗
Semantics(form explains its function)		✗	✗	✗	✗	✓	✗	✓	✗
Potential for use of mechanicals components as design elements		✗	✓	✗	✗	✗	✗	✗	✓
Contemporary yet future oriented styling		✓	✗	✗	✗	✗	✗	✓	✓
Proportionate features		✓	✓	✓	✓	✓	✗	✓	✓
Practicality and feasibility		✓	✓	✗	✓	✓	✓	✓	✓
Result (Ranking)		4	5	5	6	3	7	1	2

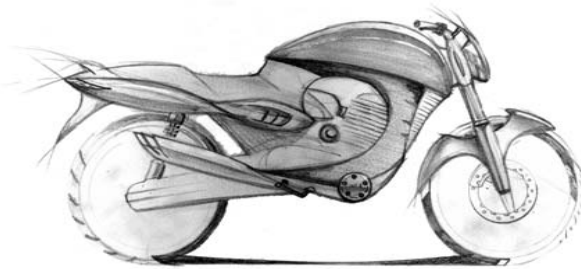
✓ = Yes ✗ = No

7.1 Concept Evaluation

Phase 2



Concept 7



Concept 8

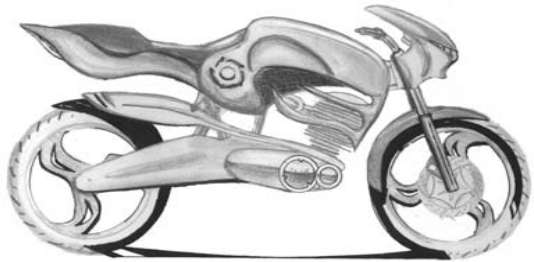
Concept 7 and concept 8 were further evaluated through discussions with user feedback as an important aid to help in selecting one among them to refine it further.

Concept 7 was selected over Concept 8 for the following reasons

- Visually more appealing
- Has more meaning than only functional meaning
....form speaks a sporty language
- does not closely resemble any existing bike
- Has a more sportier stance and flavour
- More aggressive and raw

The selected concept, i.e. Concept 7 was further refined by rendering on a 1:1 scale and adding details and fixing final dimensions.

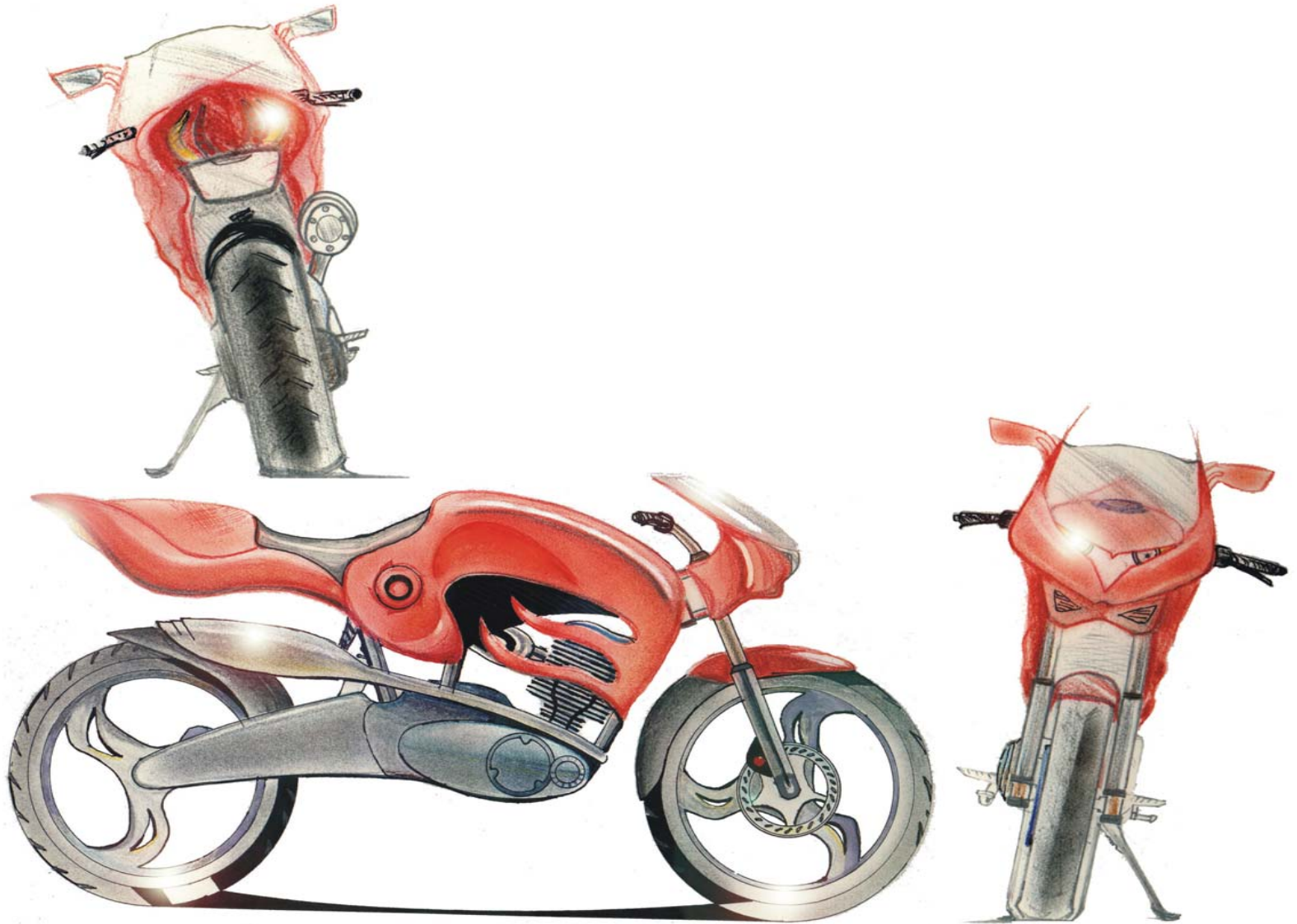
7.2 Chosen Concept



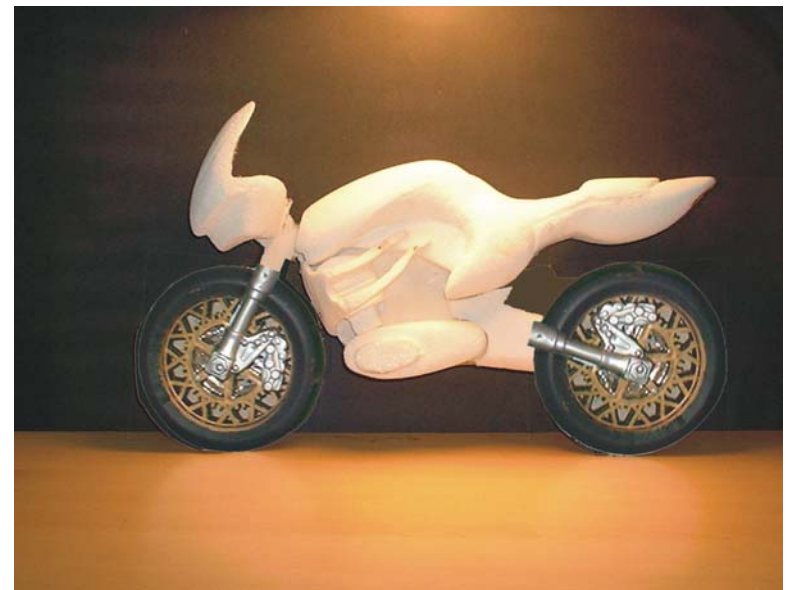
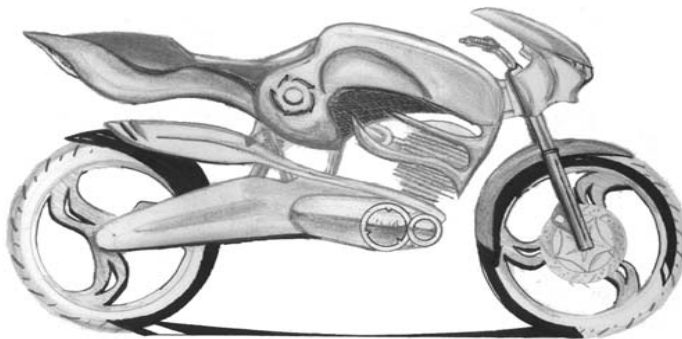
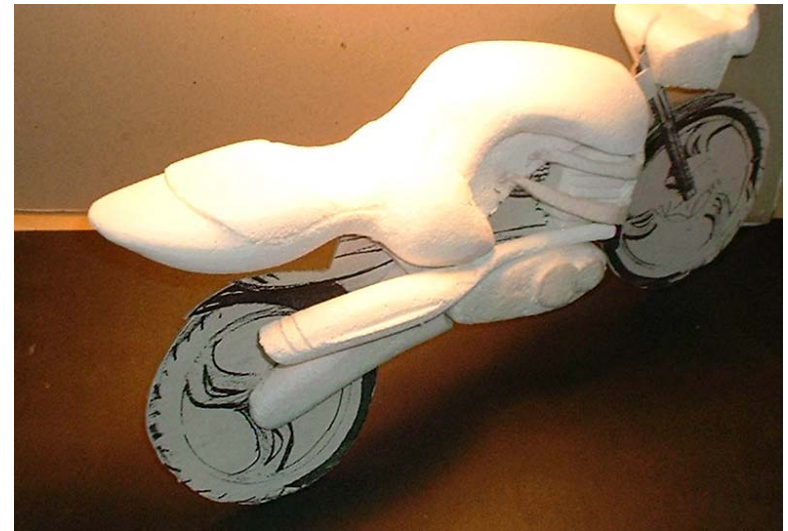
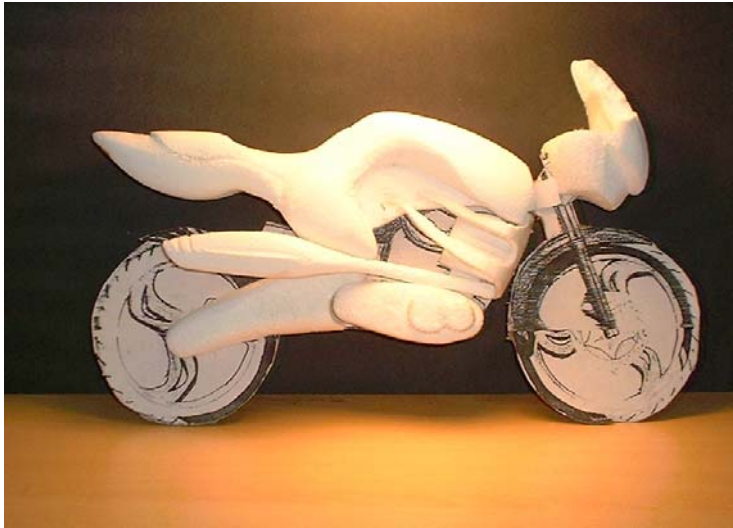
The Chosen Concept : Concept 7



7.3 Chosen Concept Renderings



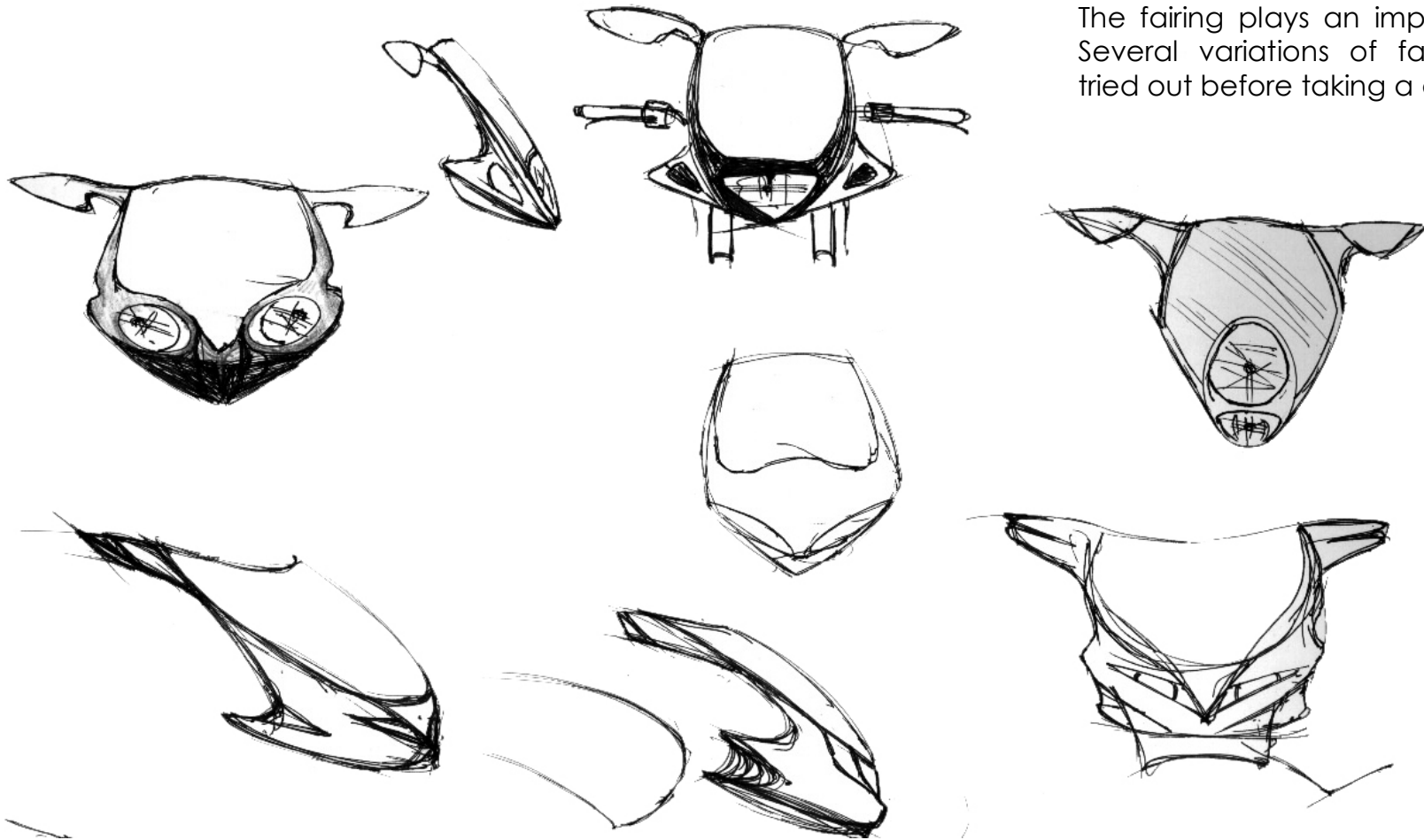
7.4 3D Form Exploration on Chosen Concept



[For proposed technical specifications see annexure 1]

7.5 Tightening the Styled Form

The fairing plays an important role. Several variations of fairings were tried out before taking a decision

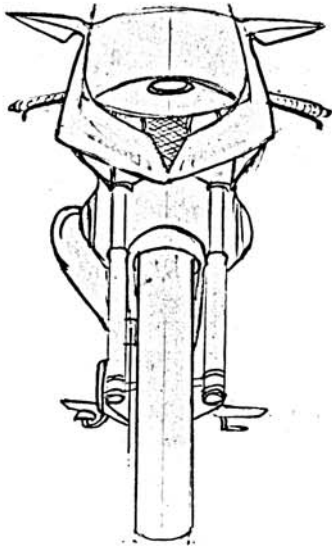


7.5 Tightening the Styled Form

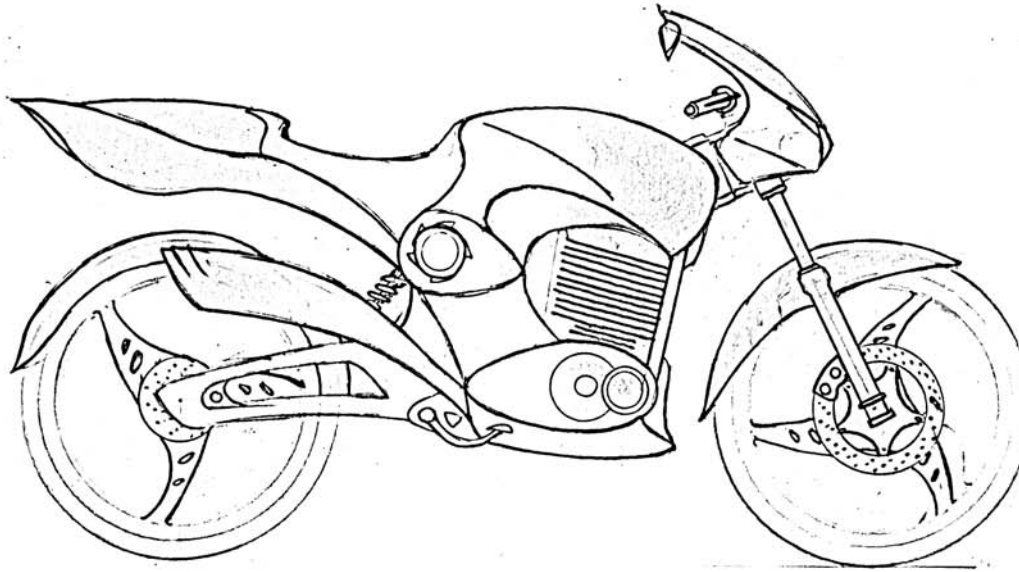
The overall design was refined by first working on the fuel tank profile, loose ends were tightened



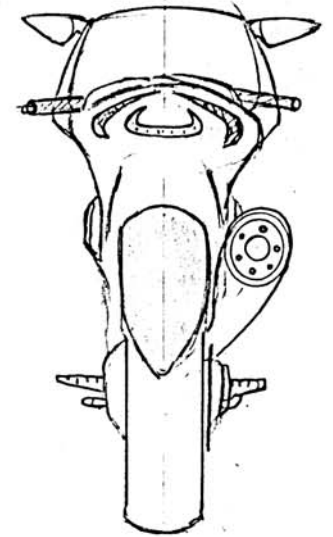
7.6 Refined Form



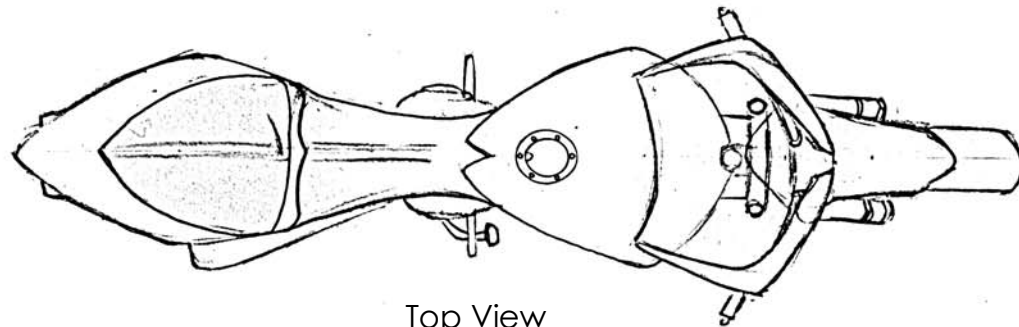
Front View



Side Profile



Rear View



Top View

7.7 Final Concept Rendering

References

1. Autocar (India) May 2003
2. Pages 9,11,27,31,43, 59 Dream Machines – Motorcycles (Compiled by Roland Brown, 2002, ISBN 0 75257 458 2)
3. <http://home.planet.nl/~motors-20th-century/motors.html>
4. Easyriders- Ultimate Custom Motorcycles (By K. R. Ball, 1997, ISBN 1 56025 151 4)

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3. Superbikes A – Z
4. Easyriders- Ultimate Custom Motorcycles By K. R. Bal , [ISBN 1 56025 151 4]
5. Styling of a Sports Motorcycle [Amit Rajwade Transportation Design Project II, M Des PD (1998-00) IDC, IIT Bombay]
6. Redesign of Hero Puch
Vinayak K Raje
Transportation Design , Project II, M Des PD (1999-01)
IDC, IIT Bombay

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www.ccardesignnews.com
www.conceptcar.co.uk

Annexures

Proposed Motorcycle Specifications

Technical

Engine – 4 stroke, air cooled, twin spark ignition, SOHC, single cylinder

Displacement – 200 cc(cm³)

Power Output – 20 bhp @ 8000 rpm

Torque – 1.8 kgm @ 6500 rpm

Transmission

Type – 5 speed constant mesh

Suspension

Front – Telescopic Fork, 130mm travel

Rear – 5 way adjustable gas filled monoshock

Wheels and Tyres

Front Rim – 1.6 X 18 inch

Rear Rim – 1.85 X 18 inch

Front Tyre Size – 3.00 X 18 inch

Rear Tyre Size 100/90 X 18 inch

Brakes

Front – 240 mm hydraulic disc

Rear – 160 mm hydraulic disc

Model Photos

Model Photos



Discs brakes f/r
Twin headlamps
Monoshock rear
Ergonomic seating
Alloy wheels
Colour coded seat
Upswept exhaust
Personalized utility space
Mirror mounted indicators



Model Photos



CLUB



Model Photos



?

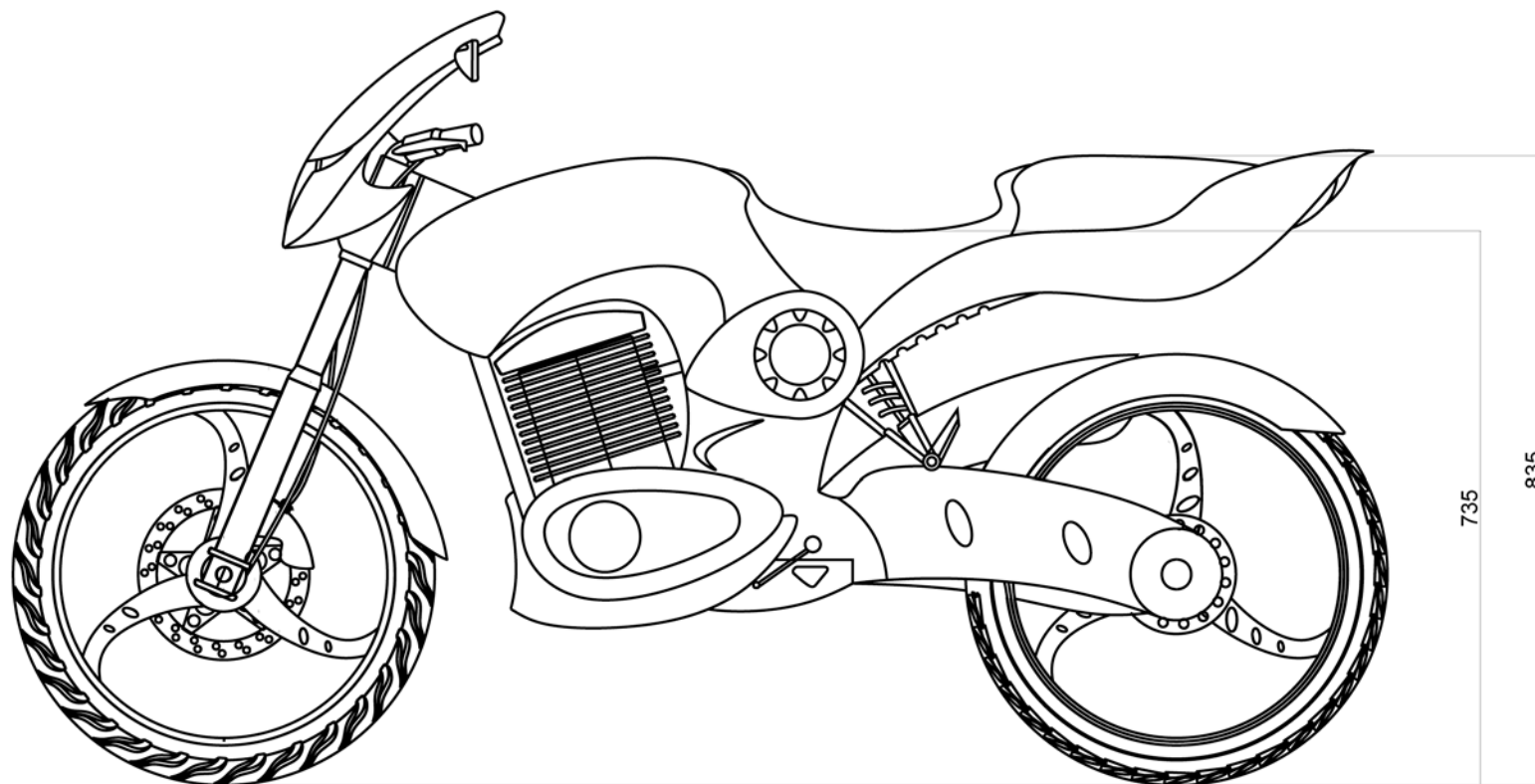
Naked Sports?

Sportser?



Roadster?

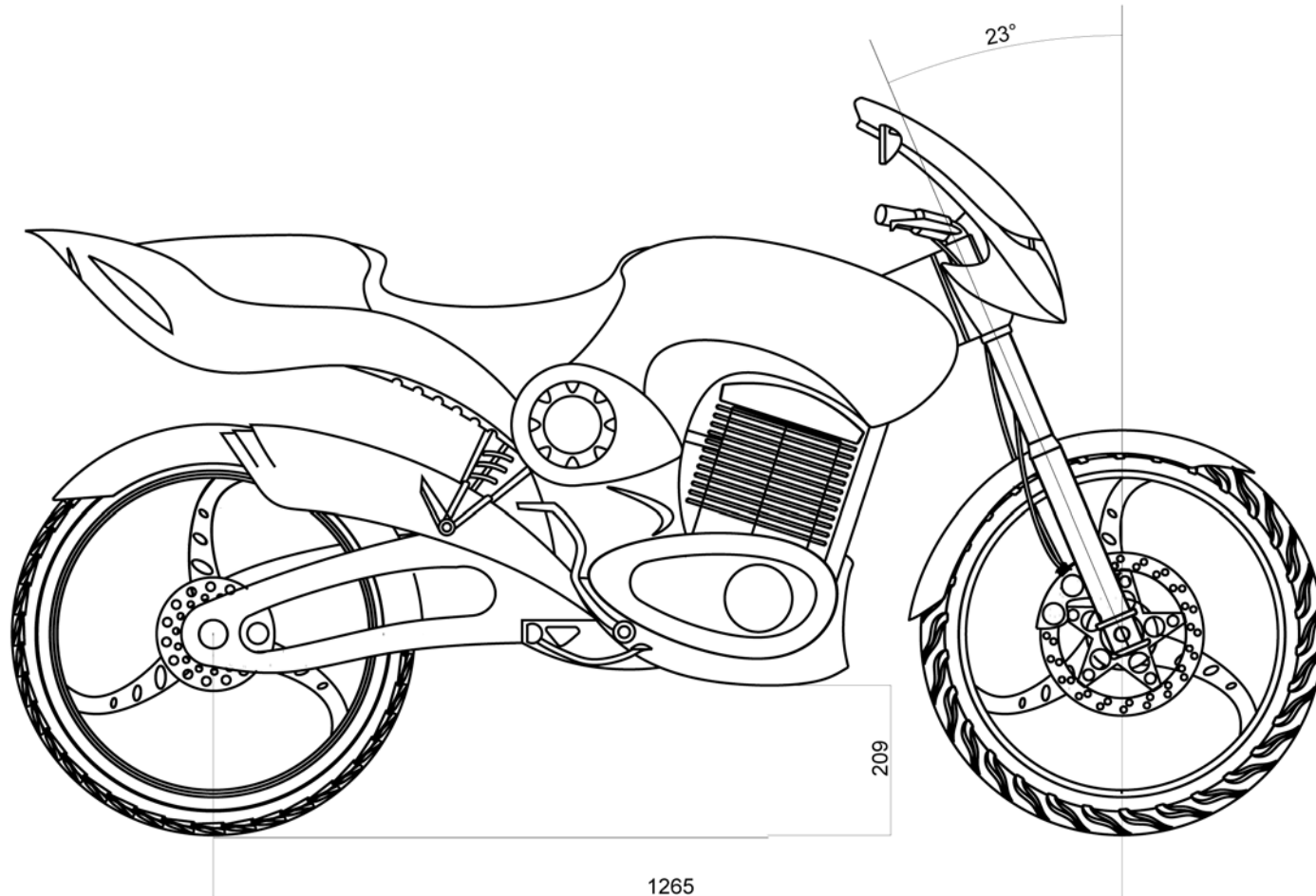
Racer



Left Profile View

All dimensions are in mm

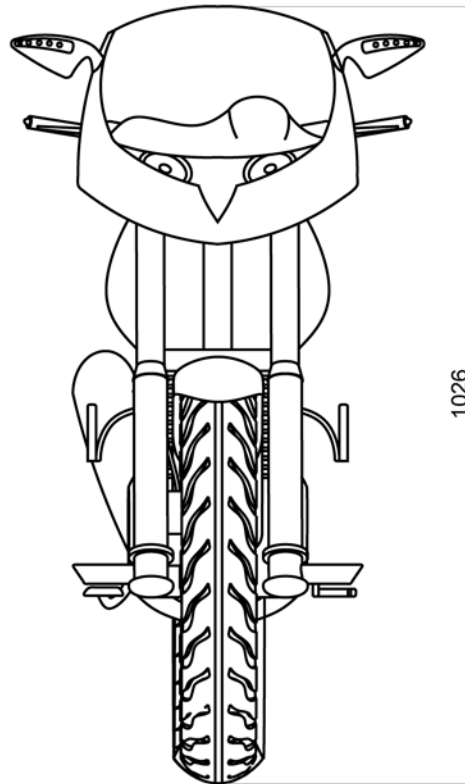
Student Nikhil Rane	Date June 2004	Scale 1:10	Sheet 2/7
IDC		Styling Of A 'Sportsbike' (Motorcycle Design)	



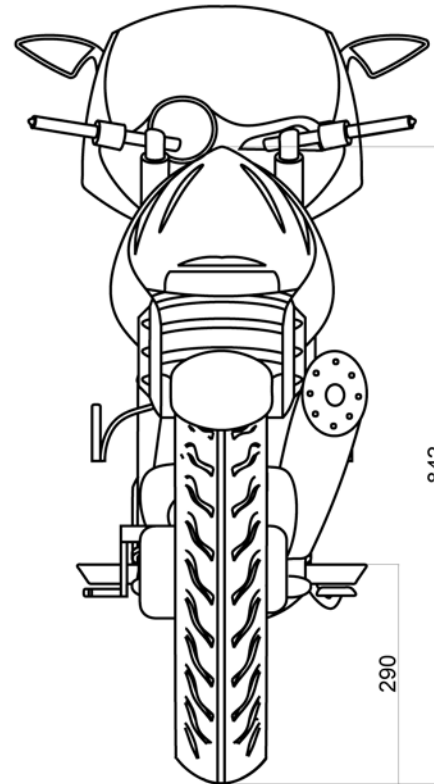
Right Profile View

All dimensions are in mm

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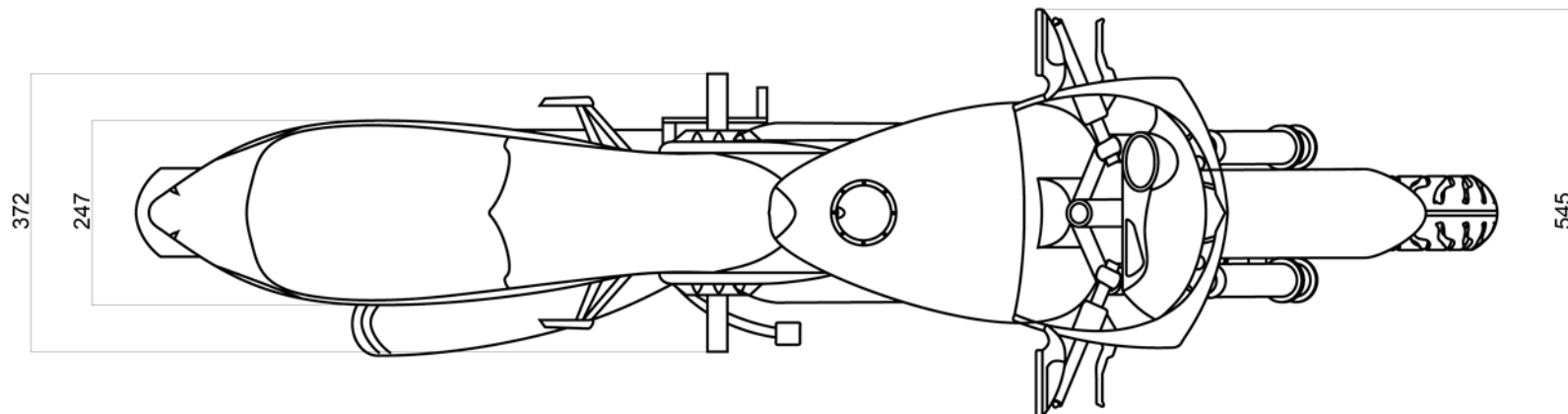
Front View



Rear View

All dimensions are in mm

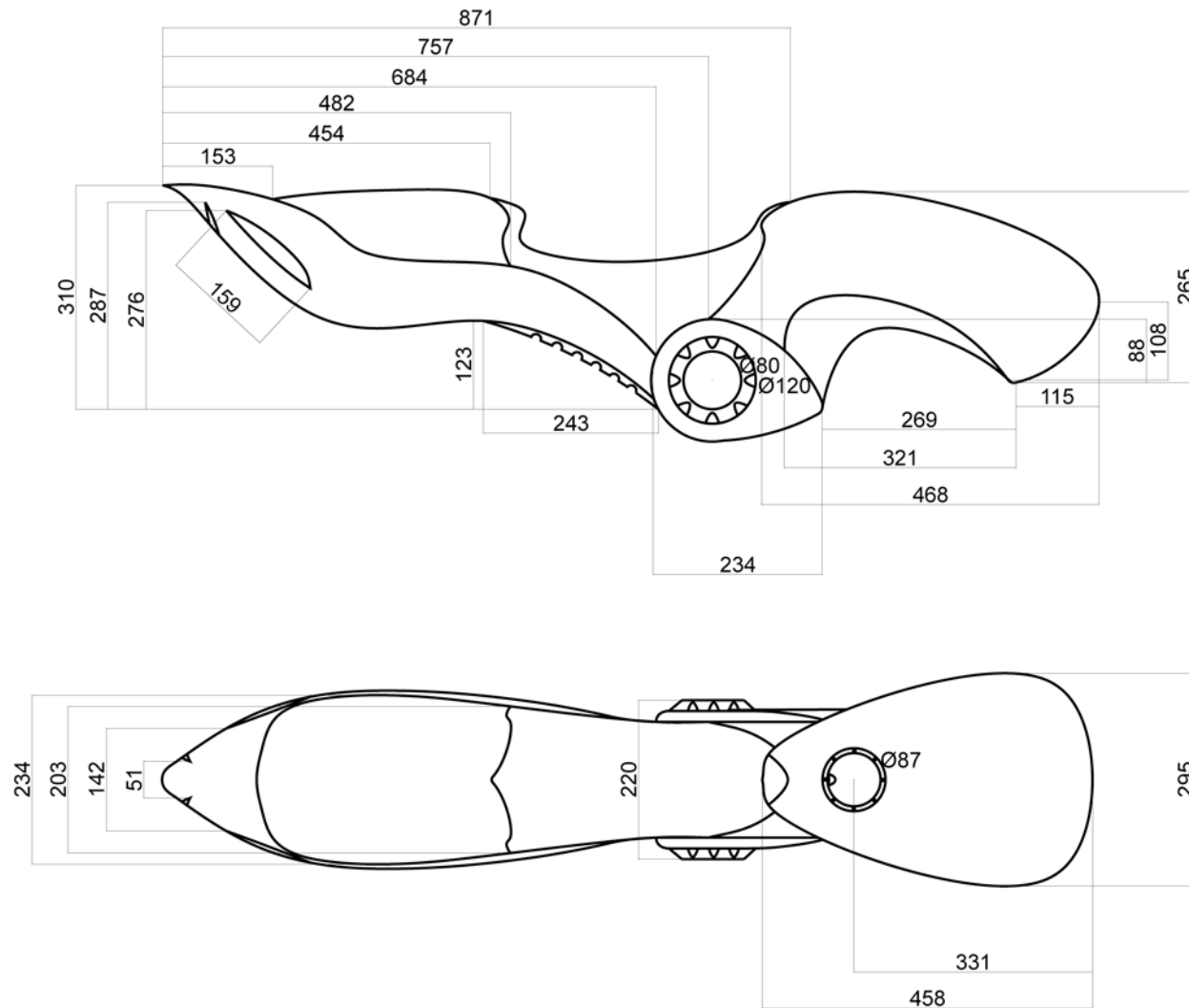
Student Nikhil Rane	Date June 2004	Scale 1:10	Sheet 3/7
IDC		Styling Of A 'Sportsbike' (Motorcycle Design)	



Top View

All dimensions are in mm

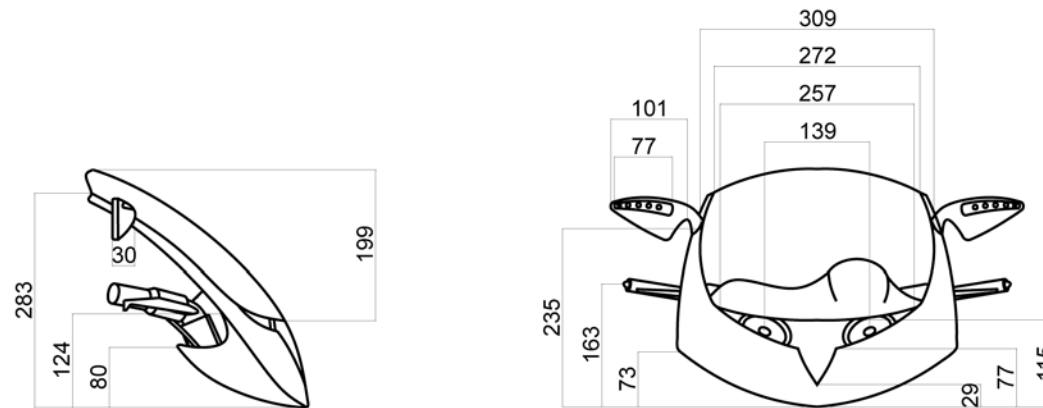
Student Nikhil Rane	Date June 2004	Scale 1:10	Sheet 4/7
IDC		Styling Of A 'Sportsbike' (Motorcycle Design)	



Body Panel Dimensions

All dimensions are in mm

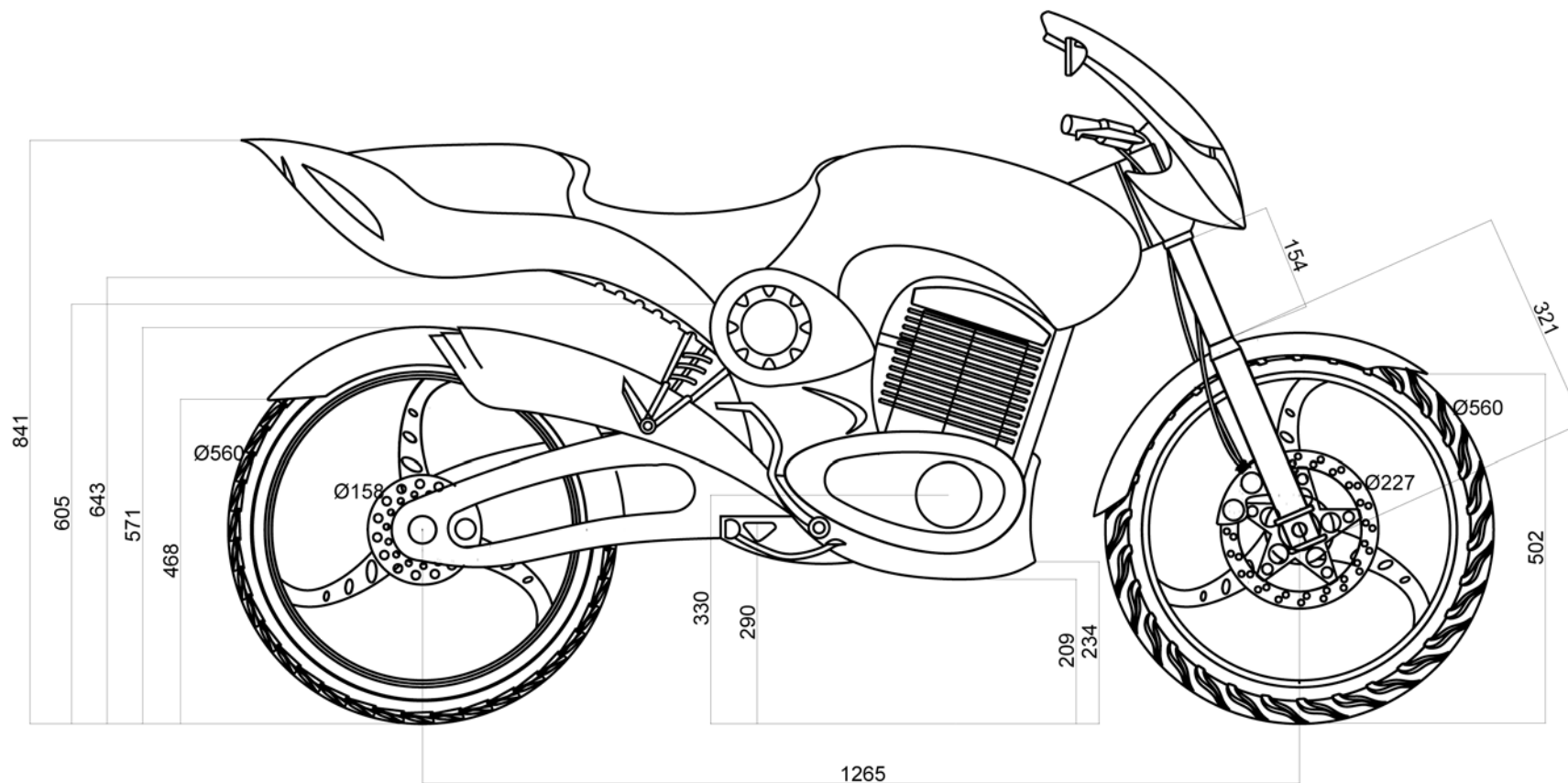
Student Nikhil Rane	Date Nov 2003	Scale 1:10	Sheet 5/7
IDC		Styling Of A 'Sportsbike' (Motorcycle Design)	



Front Fairing Dimensions

All dimensions are in mm

Student Nikhil Rane	Date Nov 2003	Scale 1:10	Sheet 6/7
IDC		Styling Of A 'Sportsbike' (Motorcycle Design)	



Lower Body Feature Dimensions

All dimensions are in mm

Student Nikhil Rane	Date Nov 2003	Scale 1:10	Sheet 7/7
IDC		Styling Of A 'Sportsbike' (Motorcycle Design)	