



STYLING OF A 'SPORTBIKE'

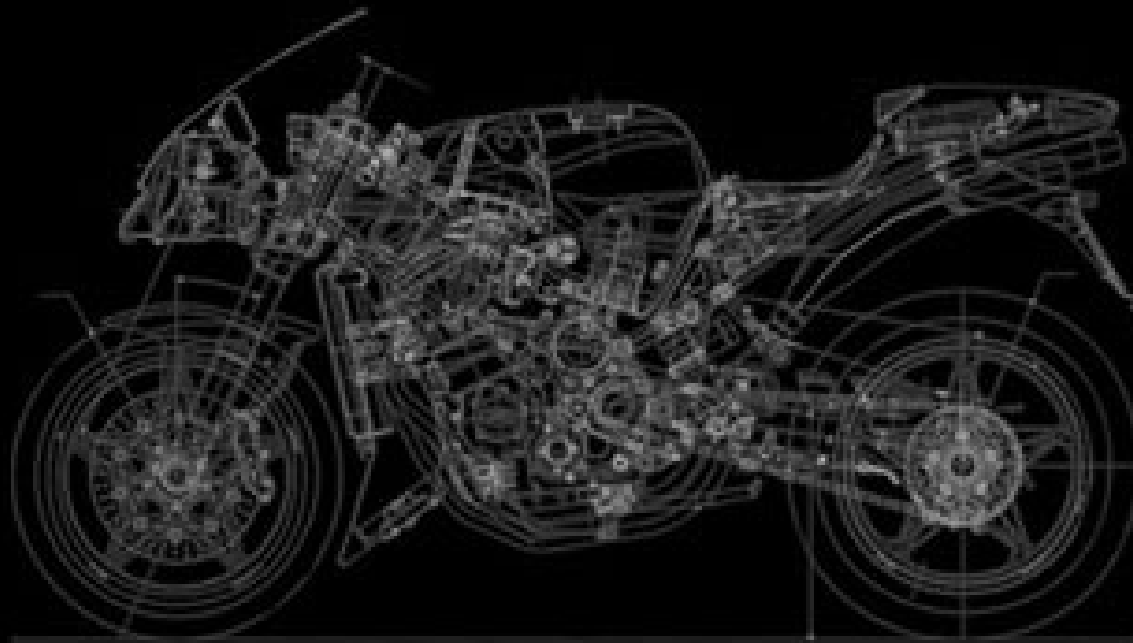
Nikhil Rane

02613002

Guide : Prof. Ravi Hazra

Presentation

Existing Product Data



Bike Catalog

Exit



Motorcycle Design is not a question of line.
It is primarily about proportion

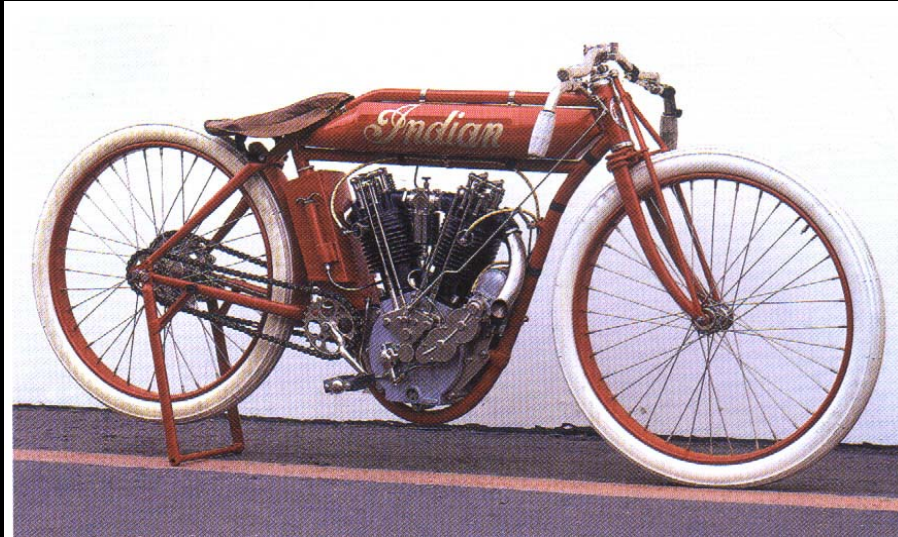
..... Glynn Kerr

Motorcycle Nomenclature

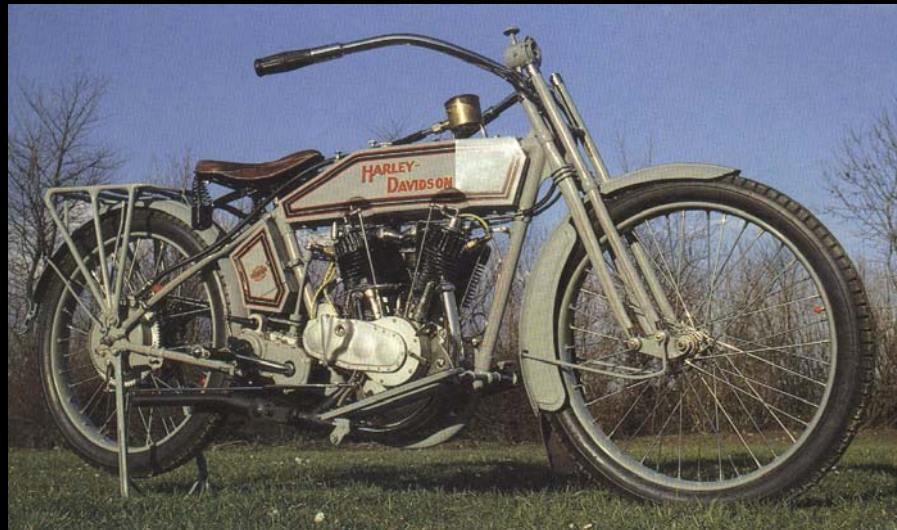


Shown above is a contemporary motorcycle (a Honda CB1300/ 2003 model). It shows the various features and components associated with motorcycles

Evolution of the Sport Machine



Indian board race bike 1911



Harley Davidson Model 11F 1915

Evolution of the Sport Machine



Harley Davidson XL Sportster 1957



Vincent Black Shadow Series C 1949

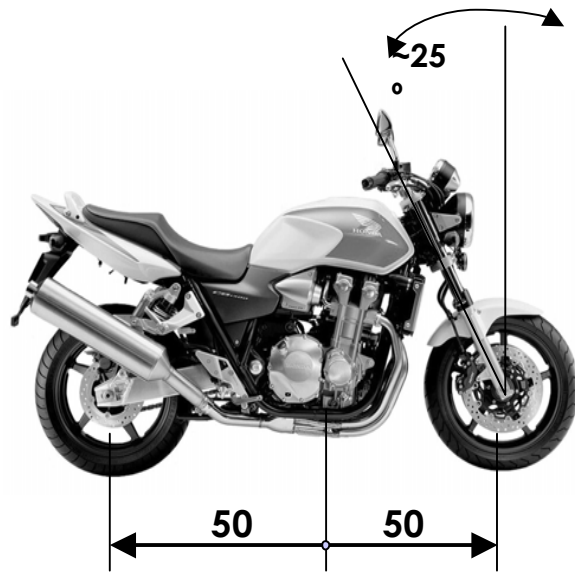


MV Agusta 750 Sport 1973

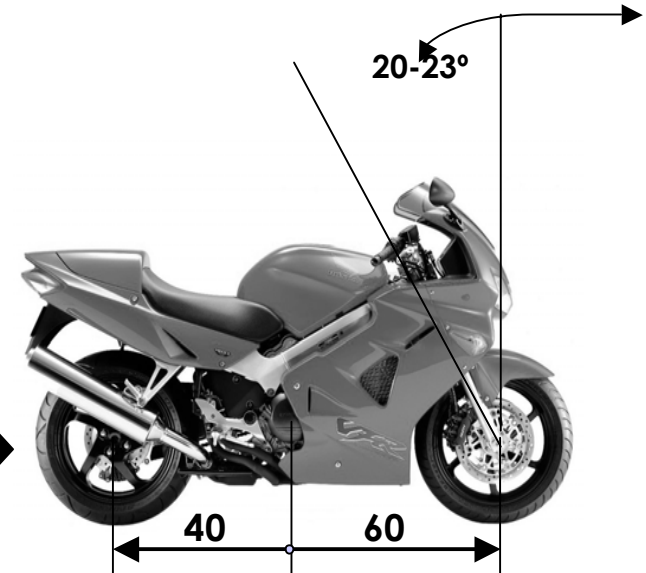


Honda CB1100R 1981

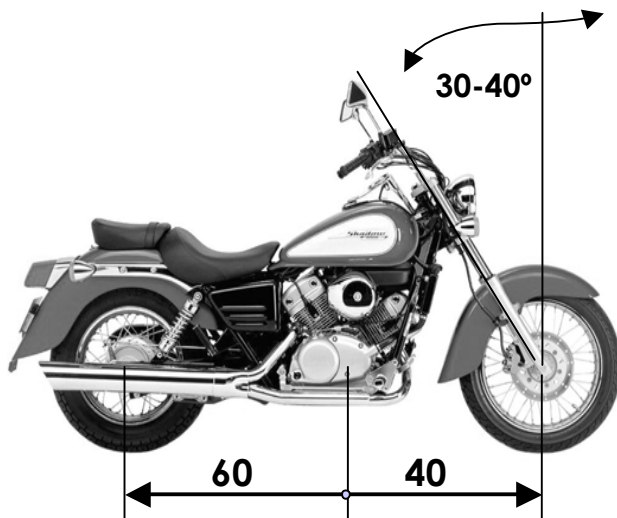
Differentiation Based On Motorcycle Weight Bias



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

Sportbike Derivatives

Sportstourer



Supersports



Racing



Naked/Roadster



Dual Purpose



Motocross



Colours Typical To Reputed Brands

Honda



Kawasaki



Triumph



Yamaha



MV
Agusta



Ducati



Suzuki



Benelli



Reaching out to the users

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

User Studies were done in **Pune** and **Mumbai**.

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

1. **Observing** users and noting interesting happenings
2. **Interviewing** users informally and trying to get them to speak out their heart on the issue

Questions & queries asked to the user

- 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 sportbike 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?

A word cloud centered around the word "User". The word "User" is the largest and is colored red. Surrounding it are several other words in different colors and sizes: "Society" (yellow, top center), "Behavior" (orange, top left), "Attitude" (teal, middle left), "Passion" (maroon, bottom left), "Lifestyle" (green, bottom center), "Gender" (blue, bottom right), "Income" (black, middle right), and "Cultural traits" (purple, top right).

User

Society

Behavior

Attitude

Passion

Lifestyle

Gender

Income

Cultural traits

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

Interpreting the user comments



"A bike should go as fast as it looks"

styling & performance as related entities.



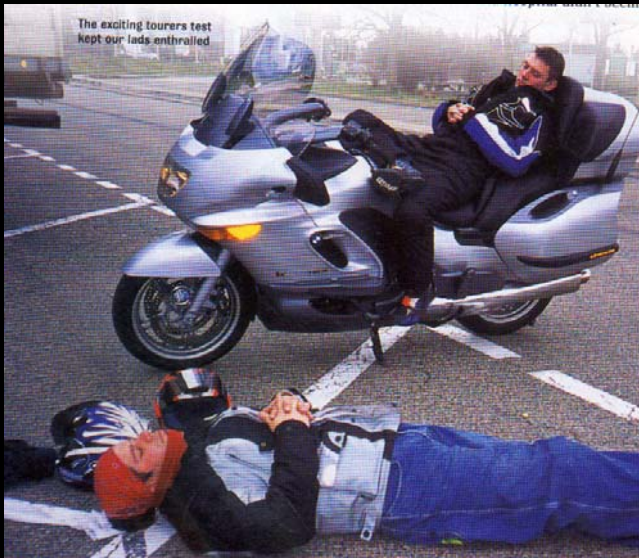
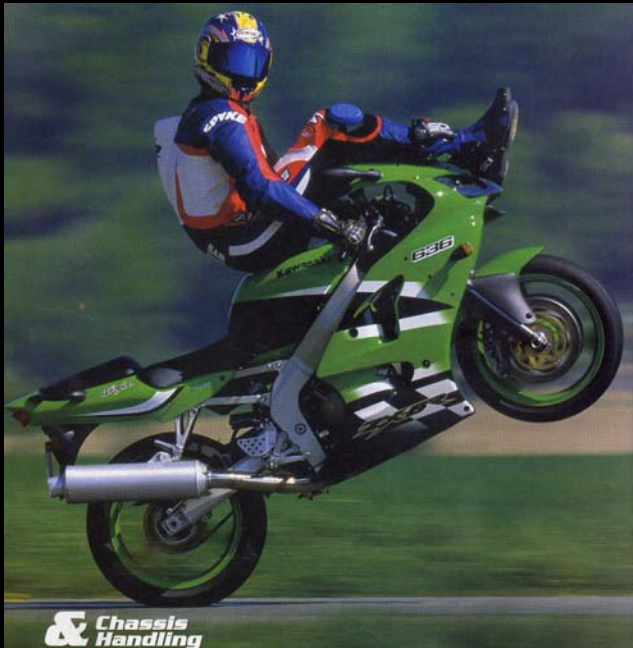
"Styling trends...edge style and curve.....what trends?"

*"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.





Interpreting the user comments

- detail design
- outstanding visual appeal
- lesser bodywork
- continuity of form
- distinct riding posture
- add to the solidity
- wrap around the rider
- More bodywork in the frontal area adds to the safety perception

Interpreting the user comments

- tailor made for Indian physique, yet must reflect an international identity
- It should look planted on the surface, like most sport shoes

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.

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

5400 owners of 30 major motorcycle models interviewed across 16 cities in India

Reference – Autocar May 2003

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.
- The form should speak a **sporty language**.
- 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

Please Note : Given the project duration and scope of the project, priority will be given to form generation. It may not be possible to evaluate seating ergonomics thoroughly.

[For proposed technical specifications see annexure 1]

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

Methodology

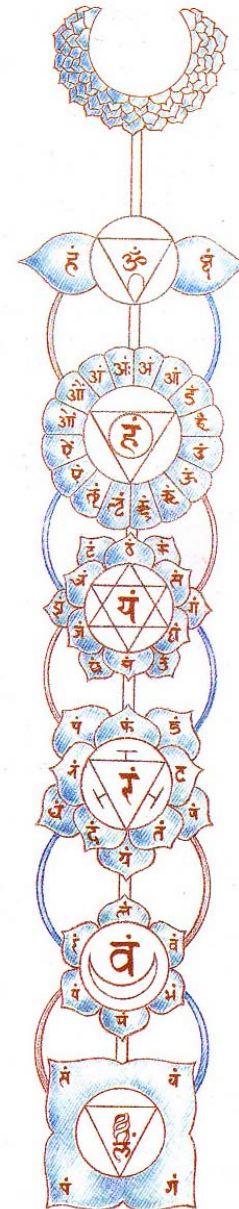
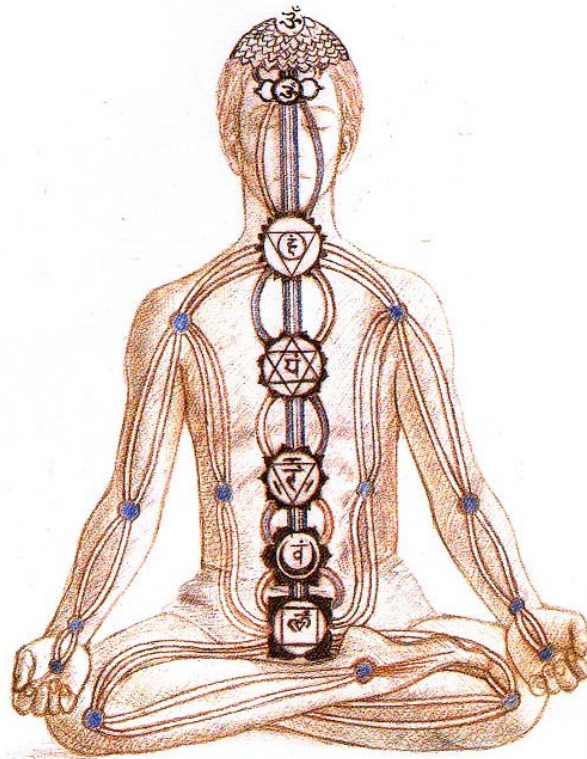
I wish to generate forms using the elements:
air water fire earth space.

The use of these elements can be for...

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

The Path of Cosmic Energy

Ida and Pingala spiral around Sushumna, the principal nadi in the astral body. When the dormant Kundalini is awakened it starts to move up the Sushumna through the seven chakras.



Sahasrara Chakra

The thousand-petalled crown chakra corresponds to the Absolute. When Kundalini reaches this point, the yogi attains samadhi or superconsciousness.

Ajna Chakra

This snow-white chakra has two petals. Seat of the mind, its mantra is OM.

Vishuddha Chakra

This sea-blue chakra has sixteen petals. Its element is ether and its mantra, Ham.

Anahata Chakra

This smoke-coloured chakra has twelve petals. Its element is air and its mantra, Yam.

Manipura Chakra

This red chakra has ten petals. Its element is fire and its mantra, Ram.

Swadhisthana Chakra

This white chakra has six petals. Its element is water and its mantra, Vam.

Muladhara Chakra

This yellow chakra has four petals. Its element is earth and its mantra, Lam.

Visualizations And Mental Images



Energy

Ascending

Warm

Purifying Sacred

Fierce

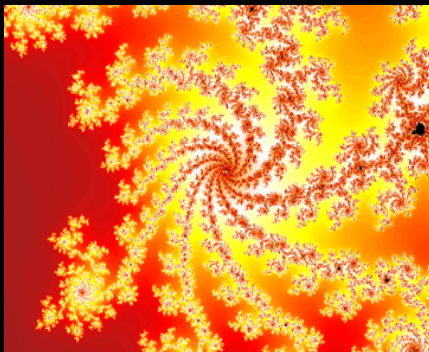
Rhythm in Movement

Bright

Matter becomes energy

Passion

Creation by Destruction



Ag
ni



Dynamism

Moulding forms

Ever changing moods

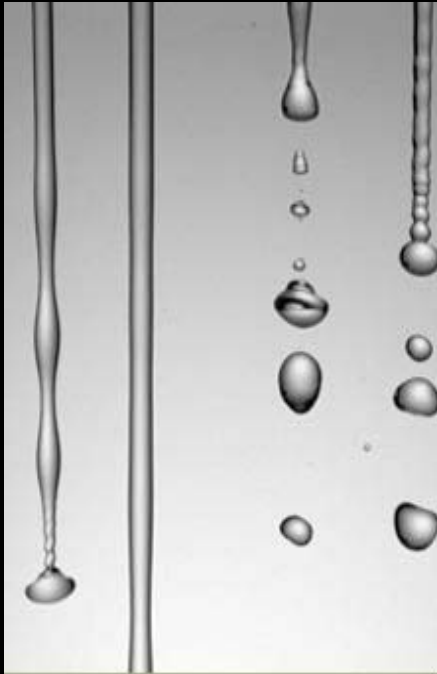
Direction

Speed

Unpredictability

Cause and effect

Vay
u



Source of Life

Streams

Cleansing

Refreshing

Spreading Out

Rhythm... a poem

flows

Large expanses

Transparent...apparent

Transience.....



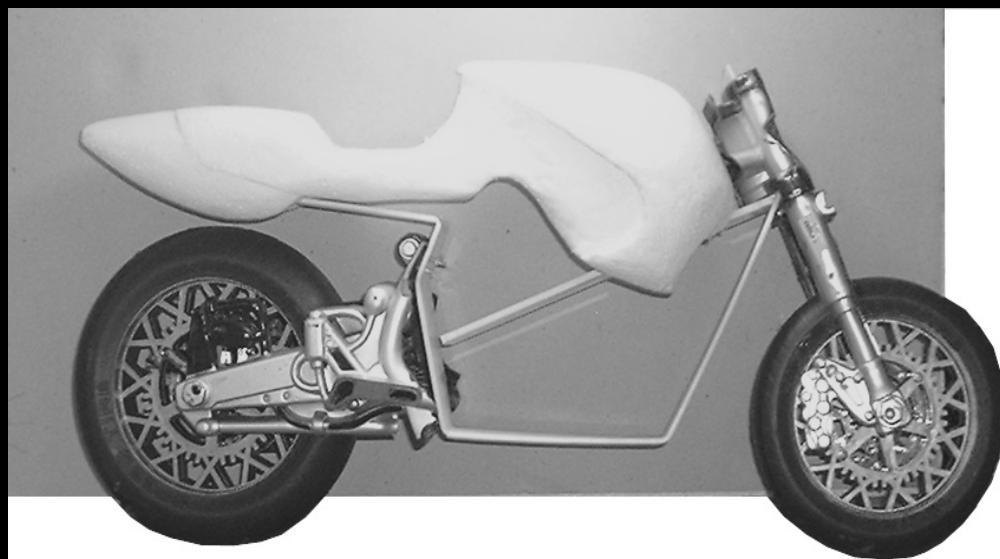
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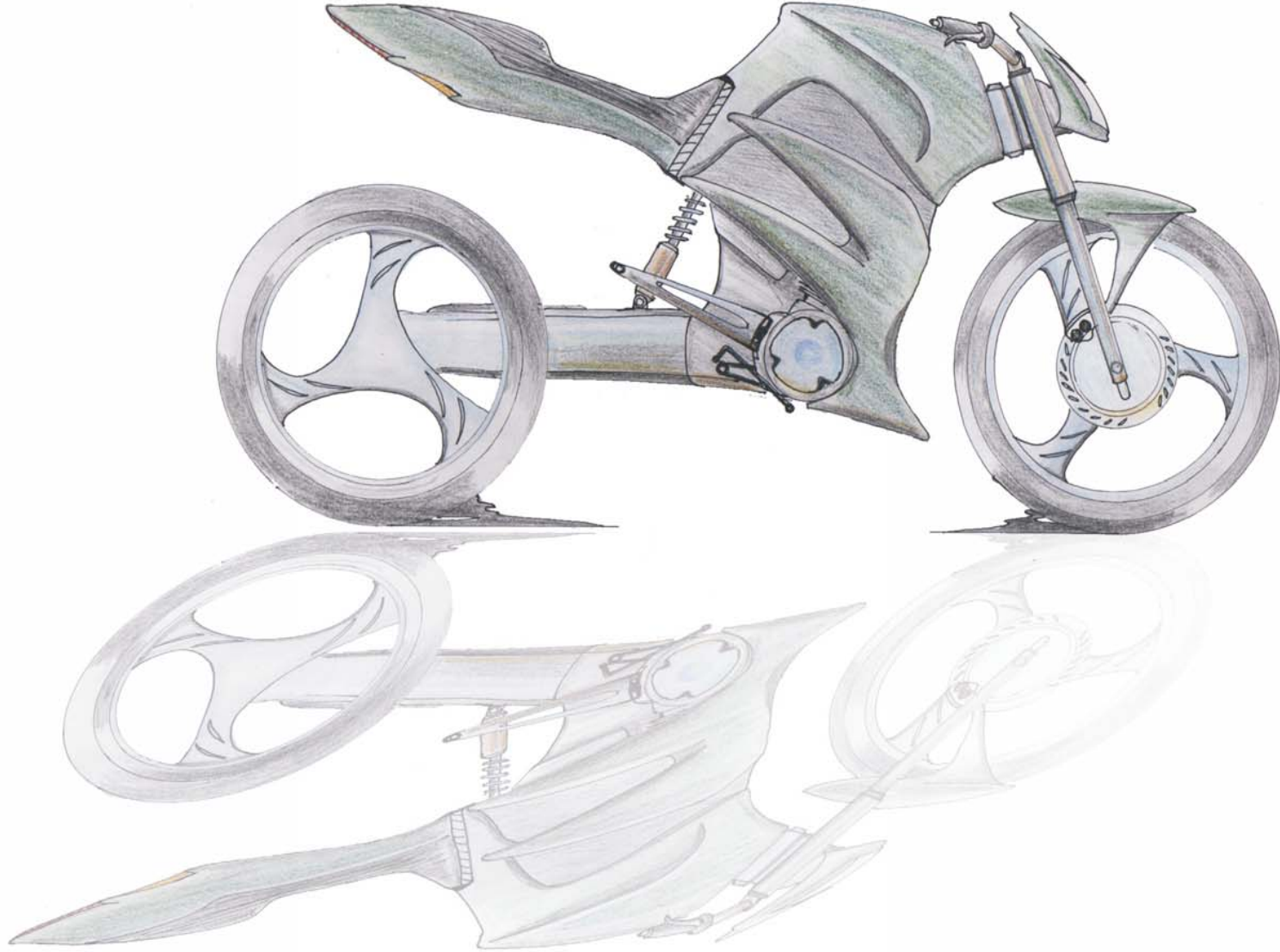
Use of Natural Elements in Form Generation

Initial Sketches For Ideation

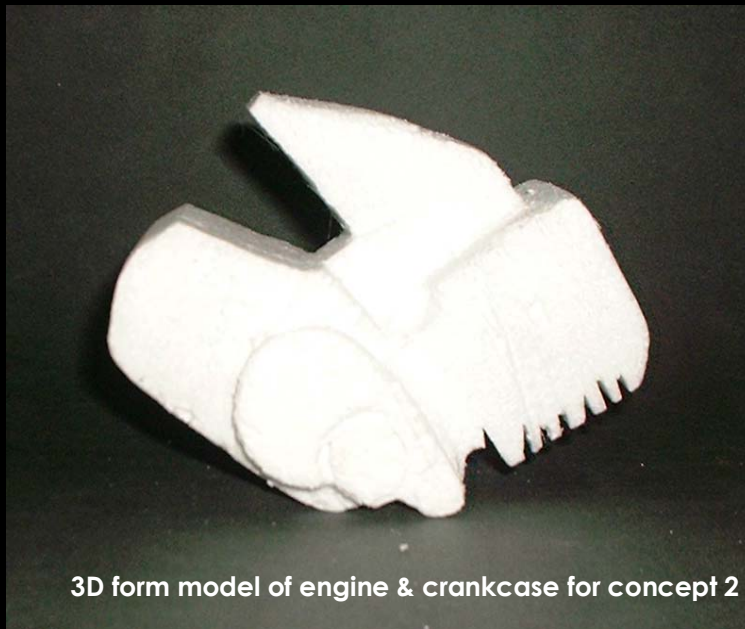
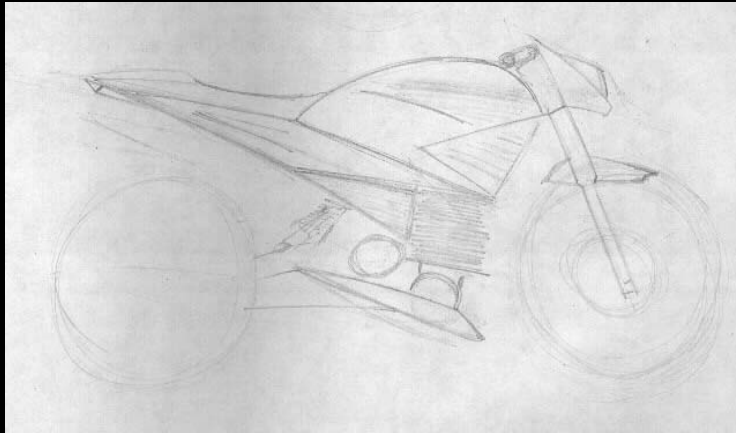




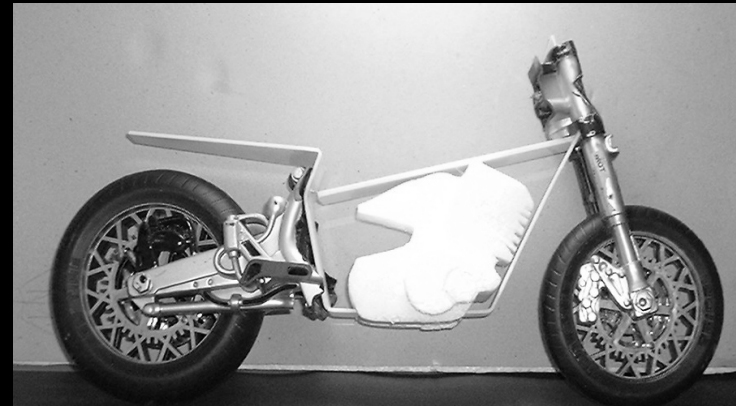


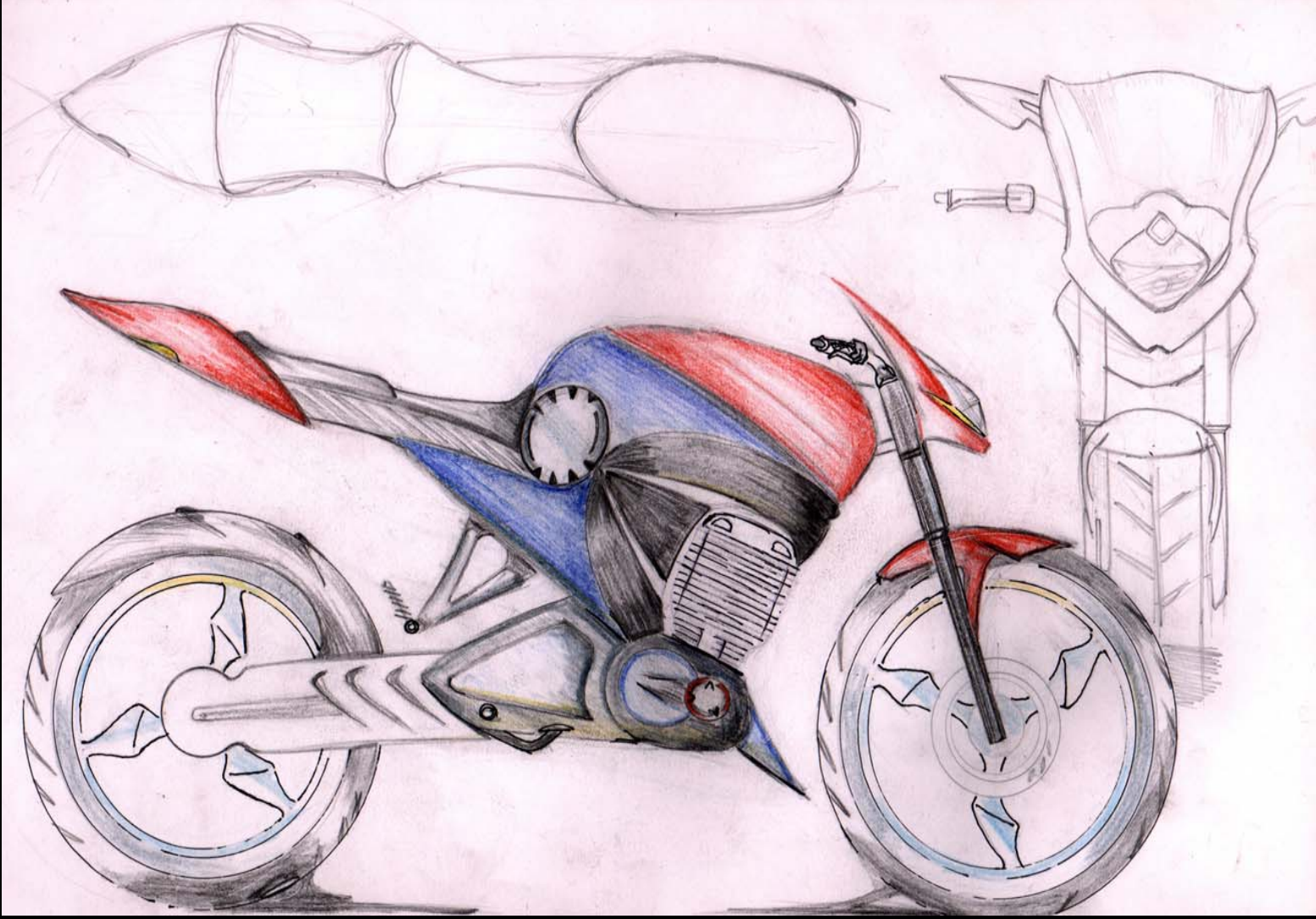


Concept 1

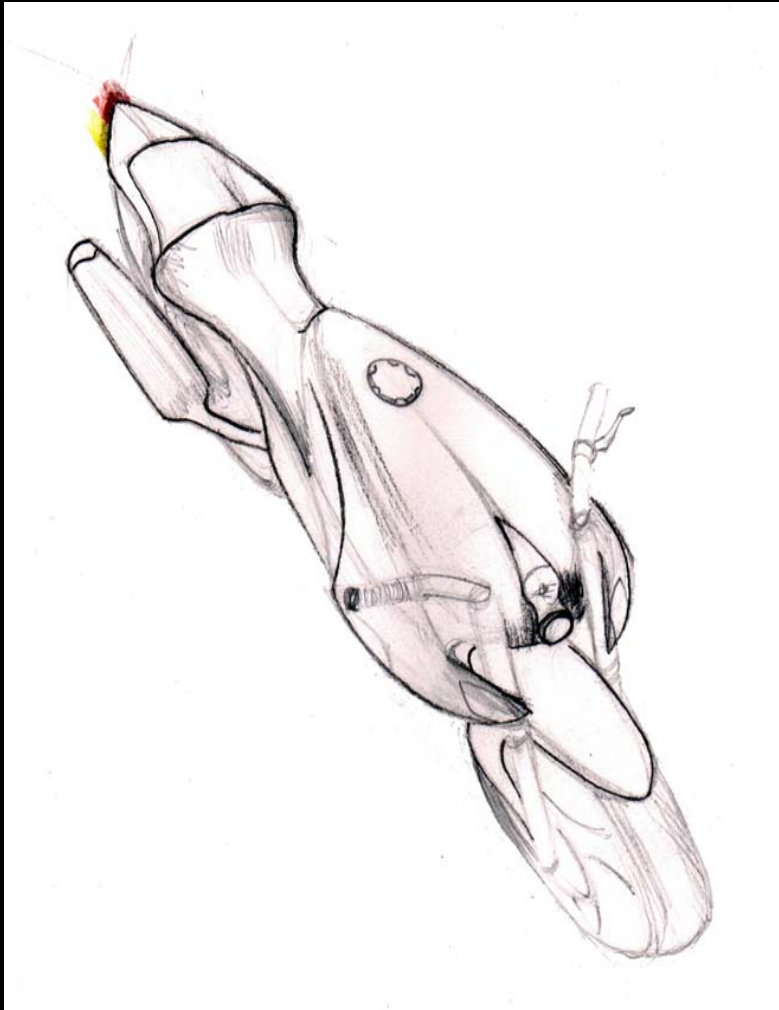


3D form model of engine & crankcase for concept 2

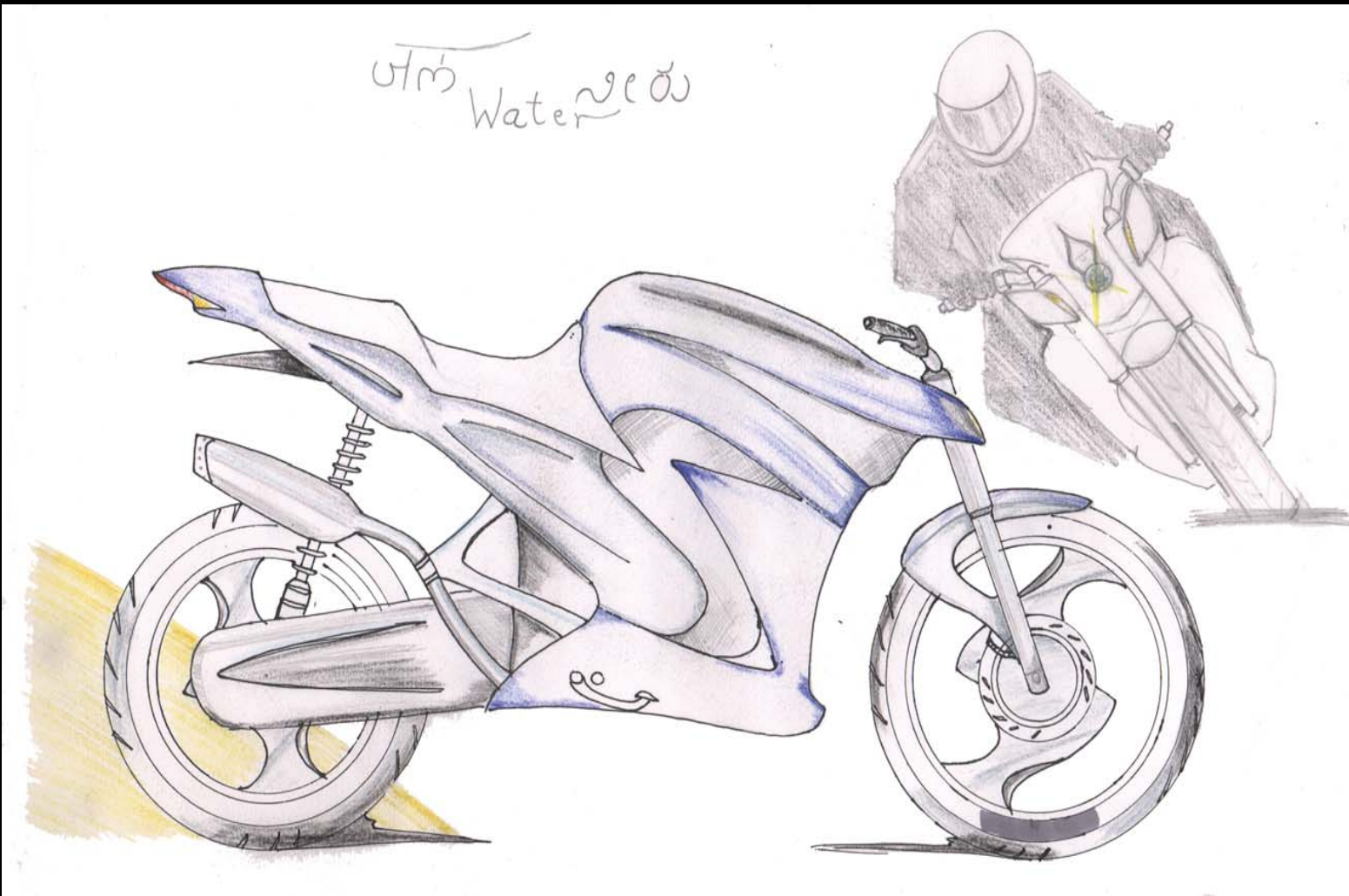




Concept 2



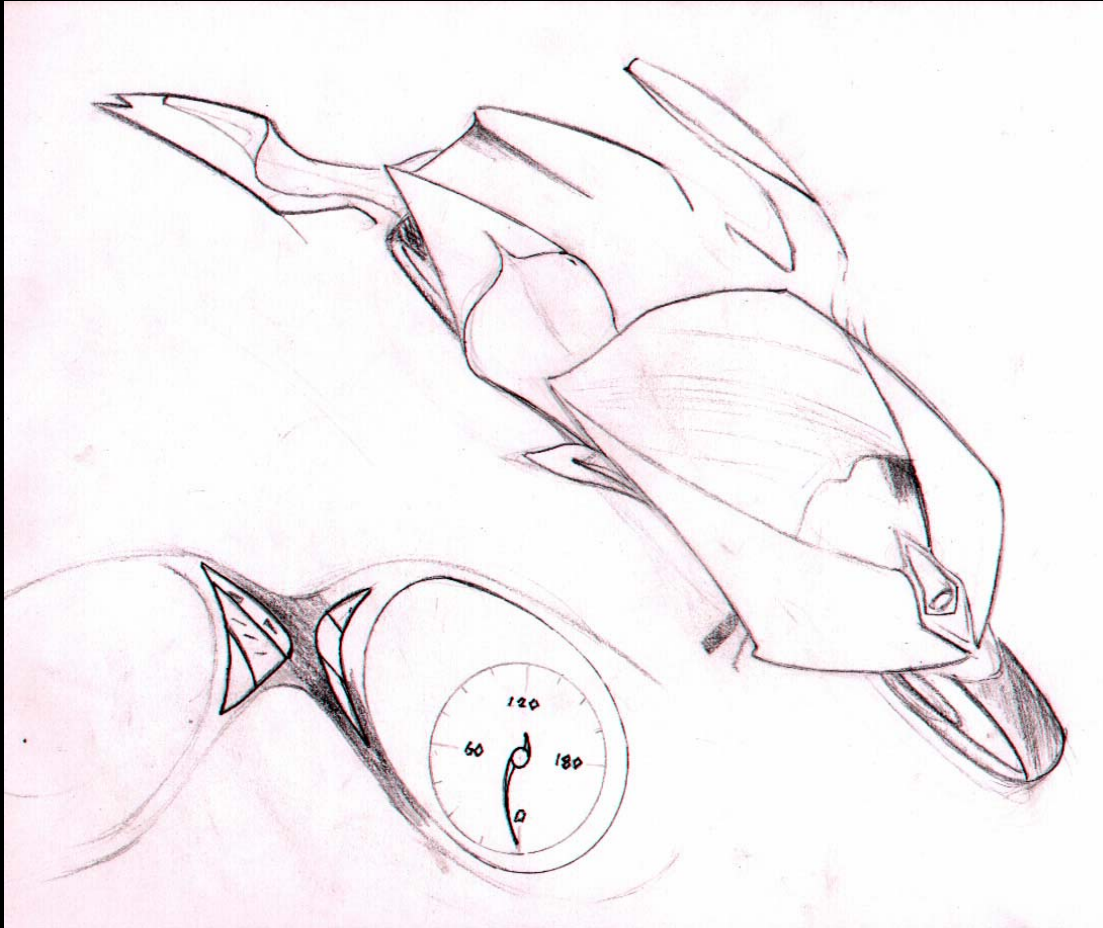
The next concept emphasizes flow, intermingling of fluid lines to give a new meaning to enthusiastic behaviour and rebellion.....shown here and next



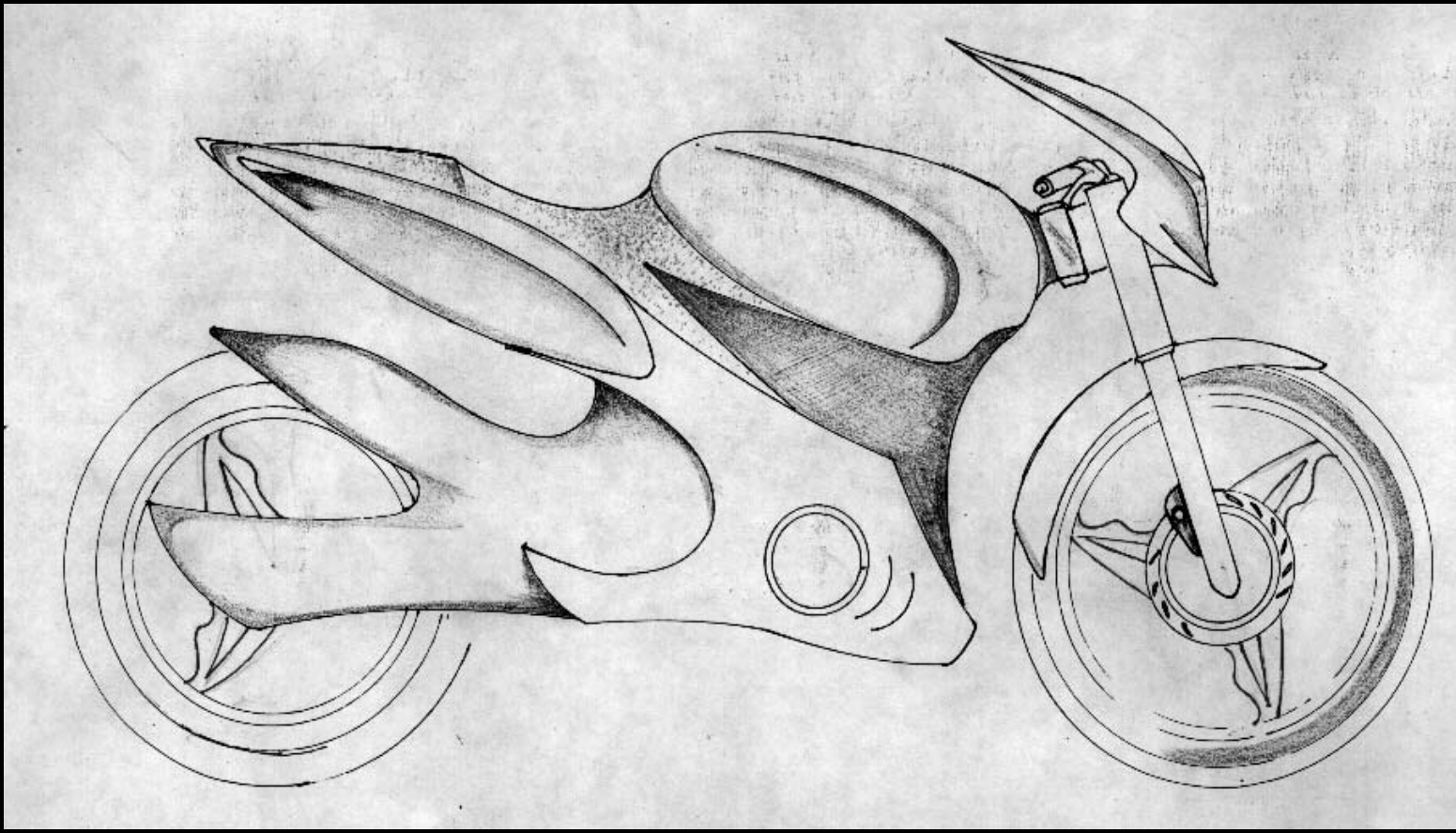
Concept 3



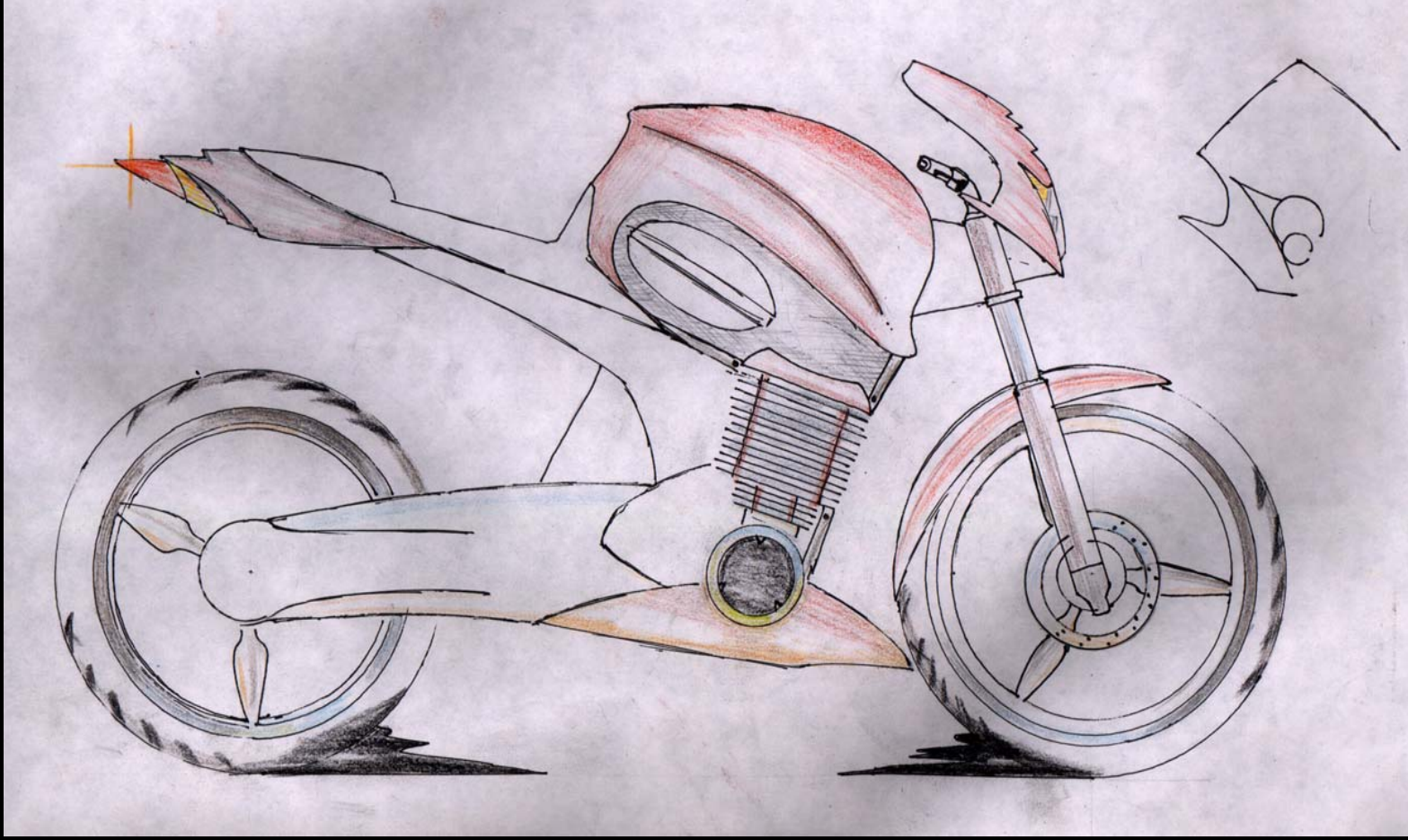
Concept 4



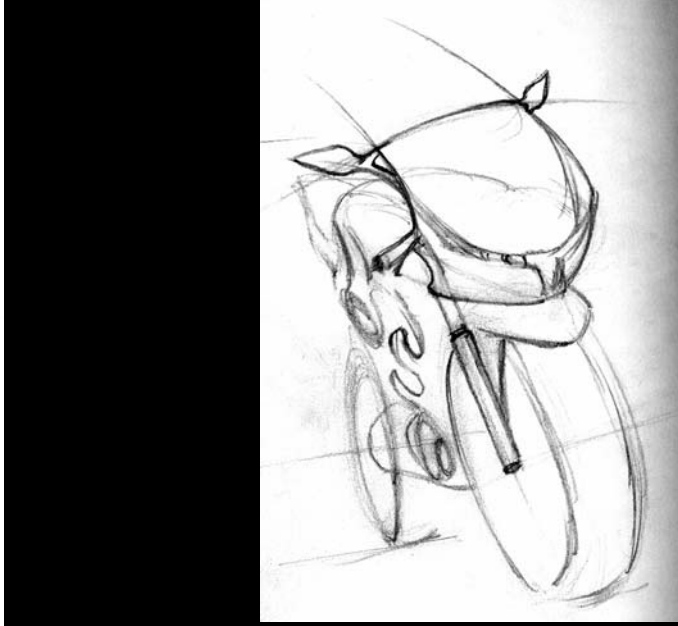
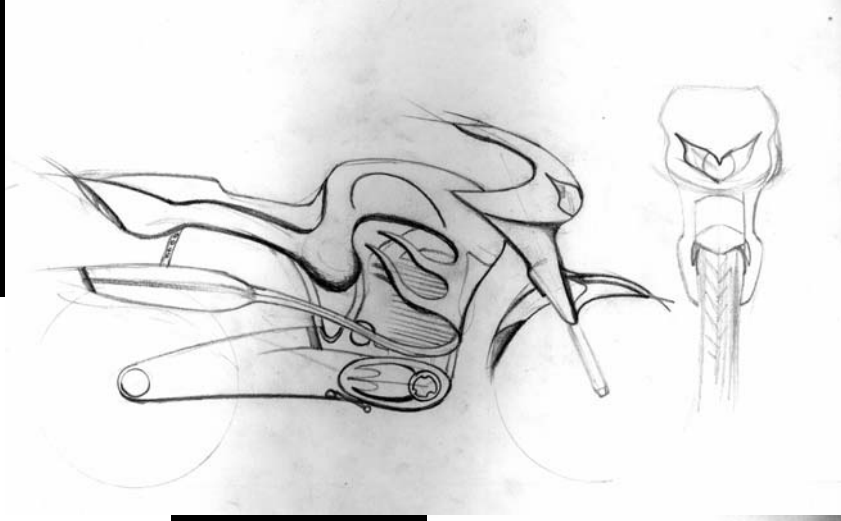
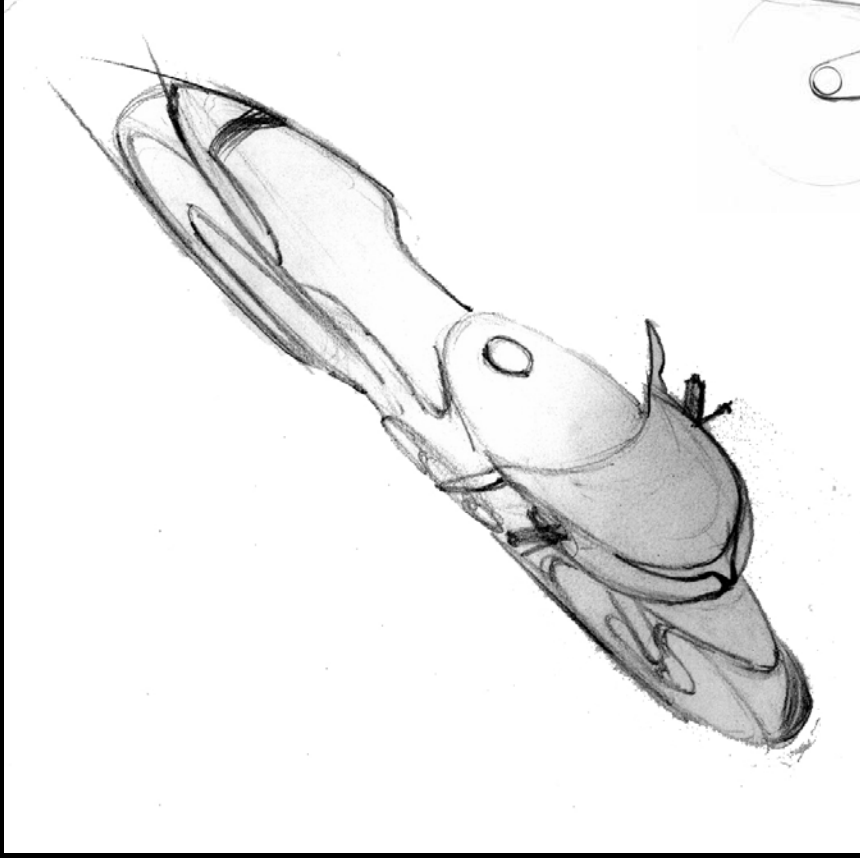
The 5th concept is an attempt to imbibe 'speed'
....'grace'.....and.....'activeness'
.....in a motorcycle to suggest a different flavour of sport.



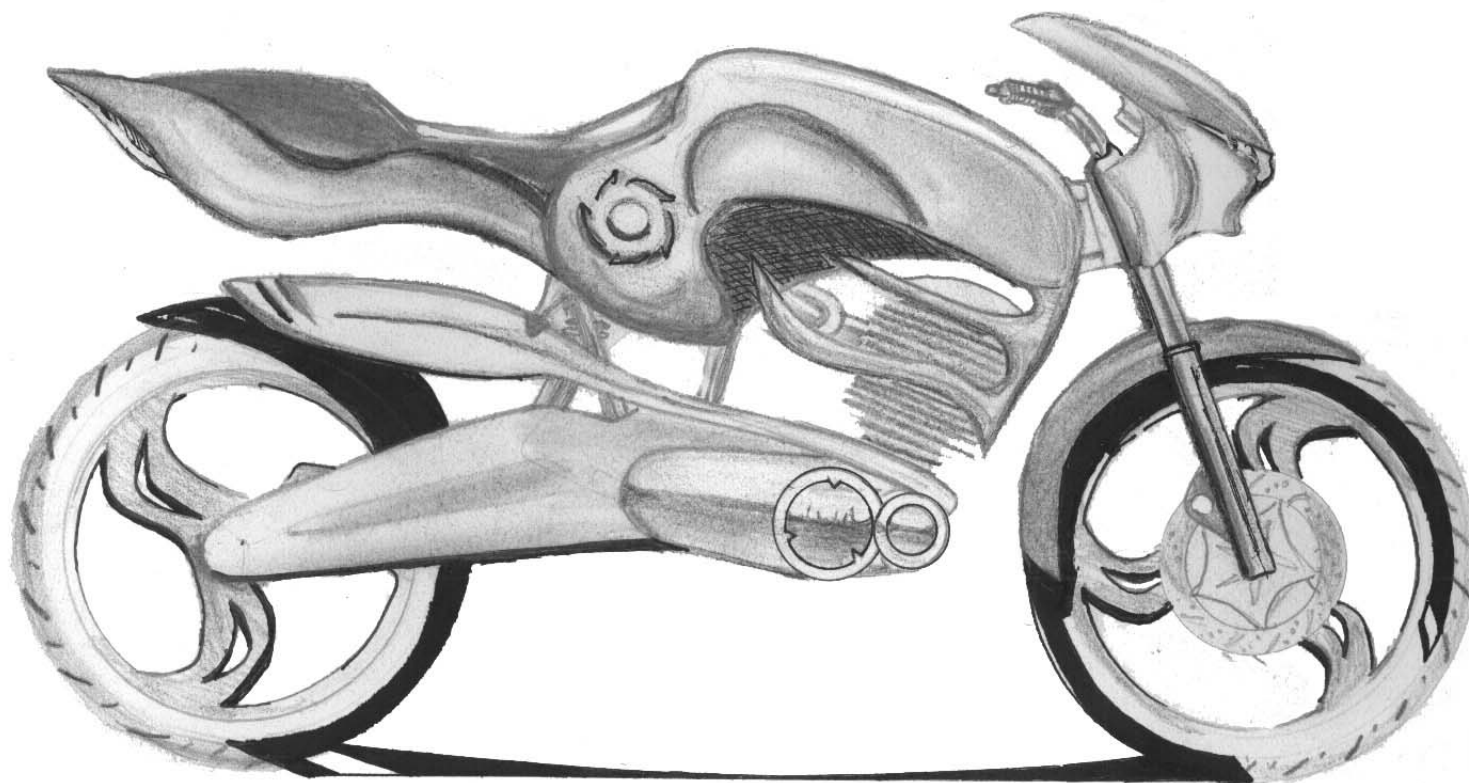
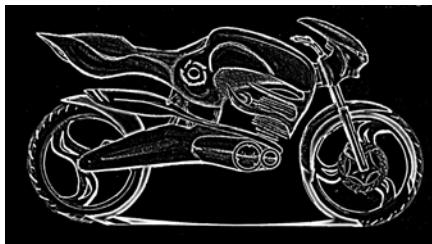
Concept 5



Concept 6

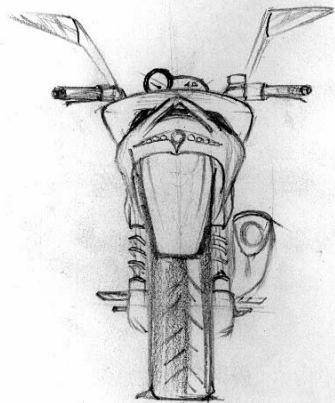
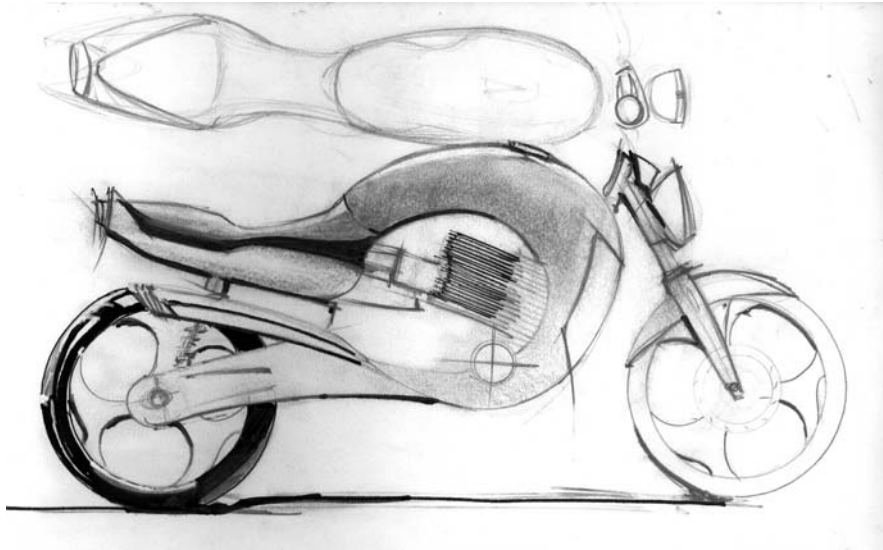


CONCEPT GENERATION

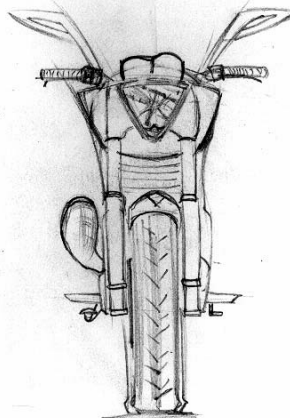


Concept 7

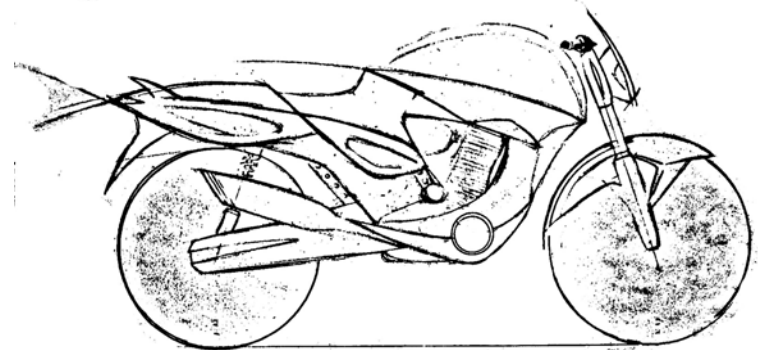
6.6 Concept Generation



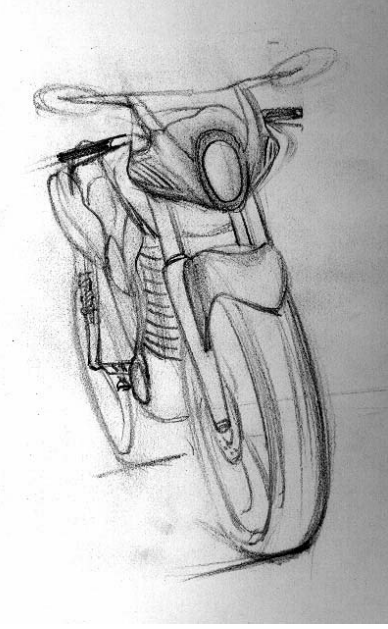
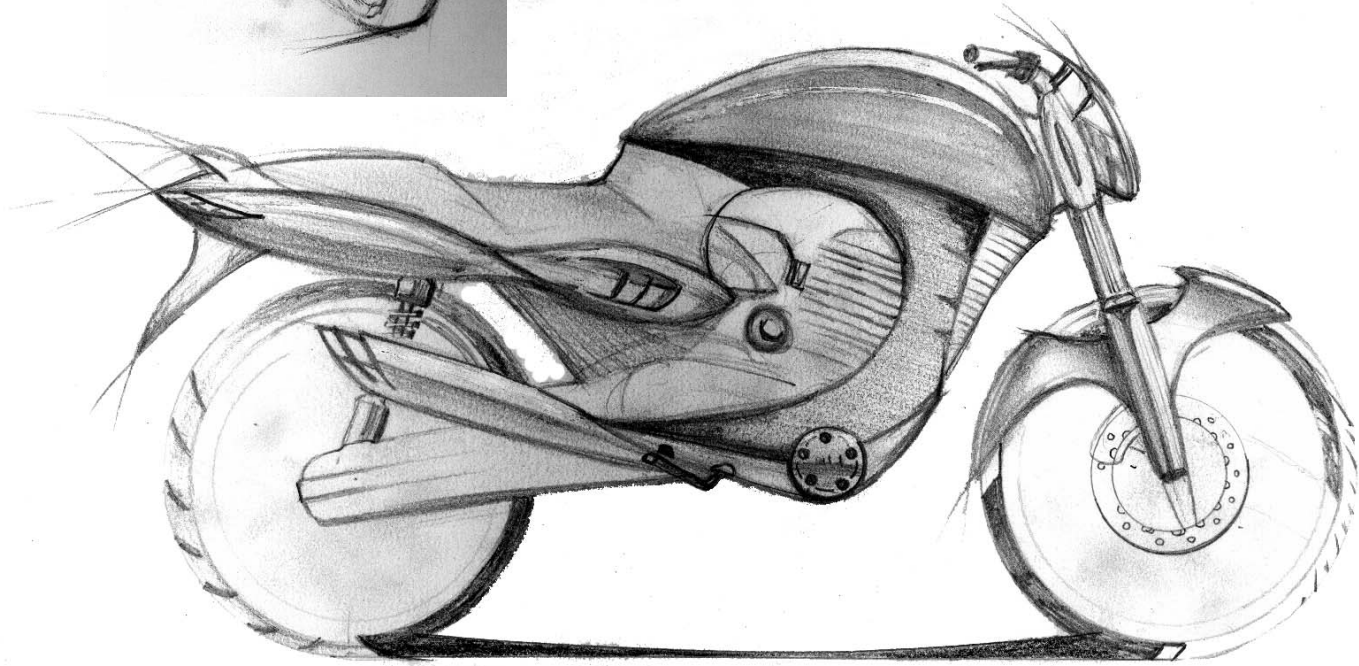
REAR



FRONT



CONCEPT GENERATION



Concept 8

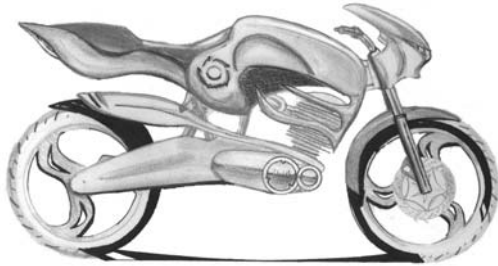
The Final Concept

Phase 1

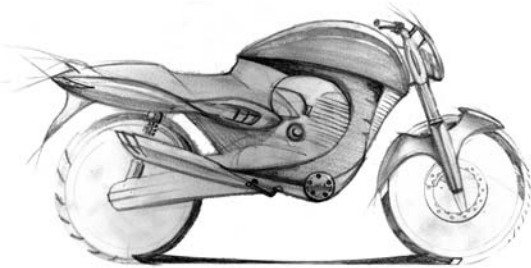
Evaluation Parameters ▼	Concepts ►	1	2	3	4	5	6	7	8
Activeness and Expressiveness in form		✓	✗	✓	✗	✓	✗	✓	✓
Innovative look		✗	✗	✓	✗	✓	✗	✓	✗
Semantics(form explains its function)		✗	✗	✗	✗	✓	✗	✓	✗
Potential for use of mechanicals components as design elements		✗	✓	✗	✗	✗	✗	✗	✓
Contemporary yet future oriented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

✓ = Yes ✗ = No

Phase 2



Concept 7



Concept 8

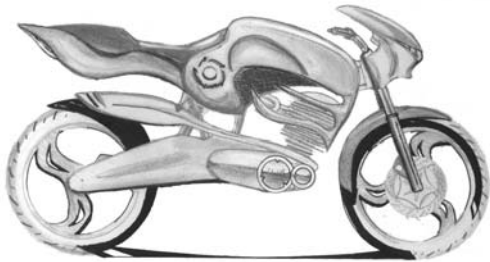
Concept Evaluation

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 meaningform speaks a sporty language
- does not closely resemble any existing bike
- Has a more sportier stance and flavour
- More aggressive and raw

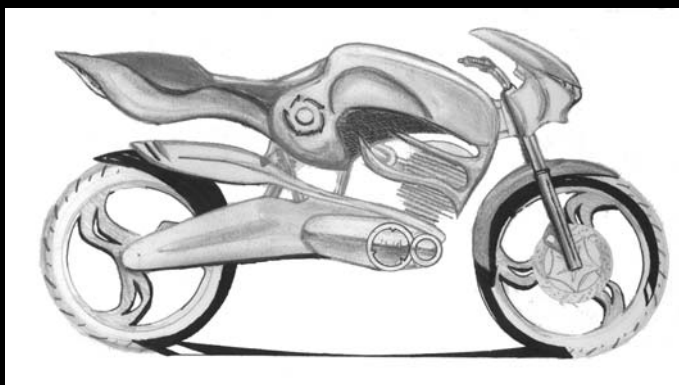
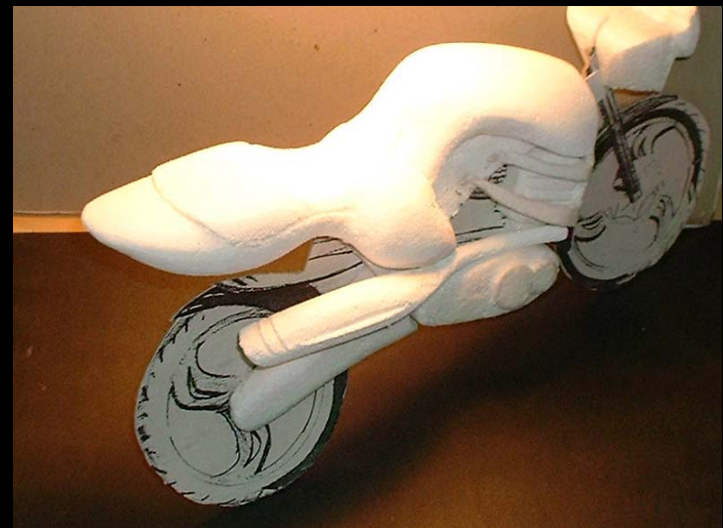
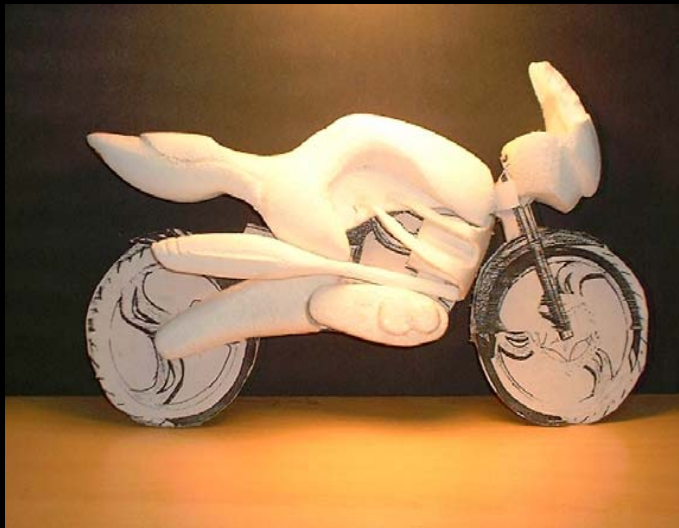
The selected concept, i.e. Concept 7 was further refined by rendering on a 1:1 scale and adding details and fixing final dimensions.



The Chosen Concept : Concept 7

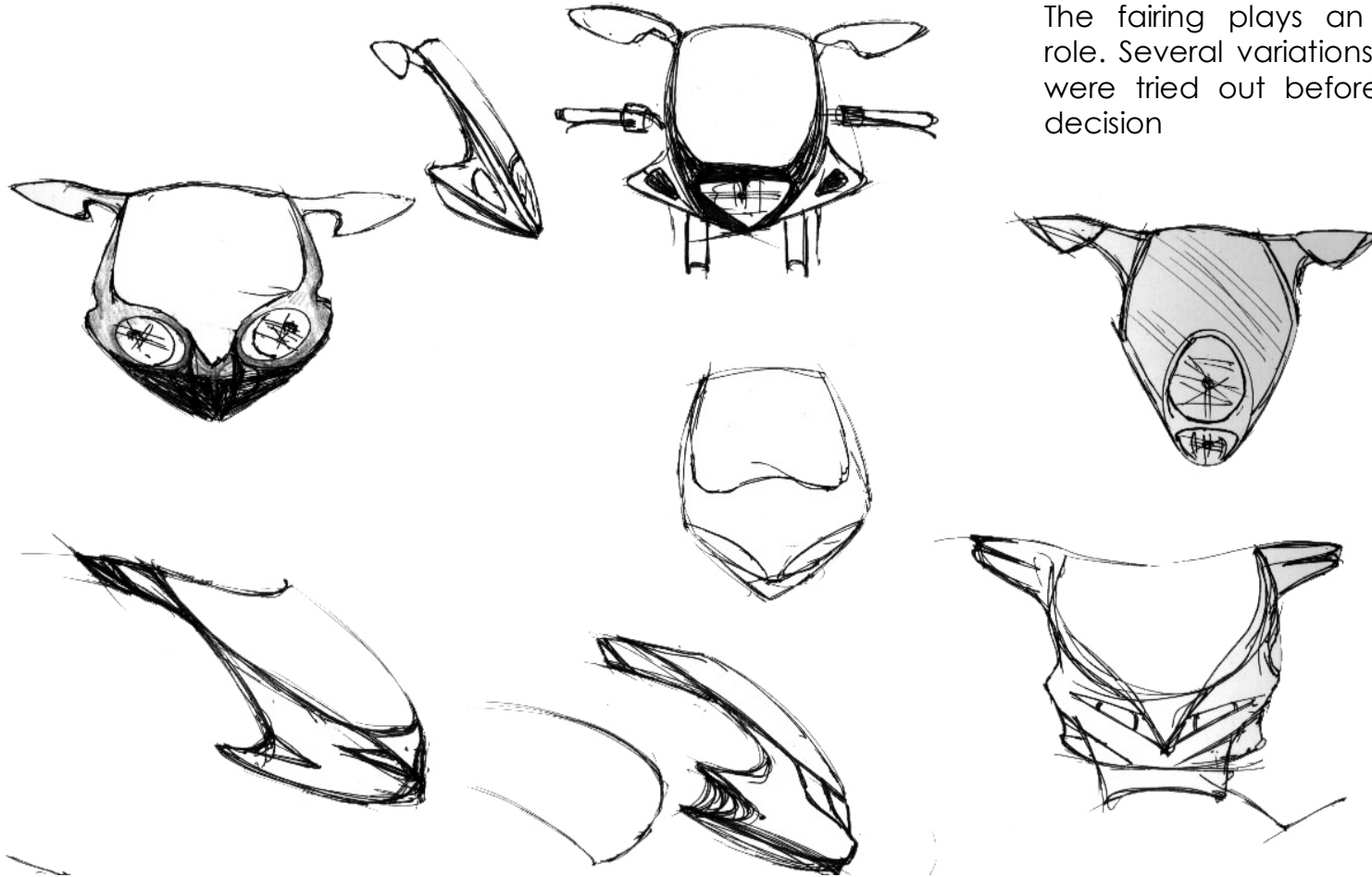






Tightening the Styled Form

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

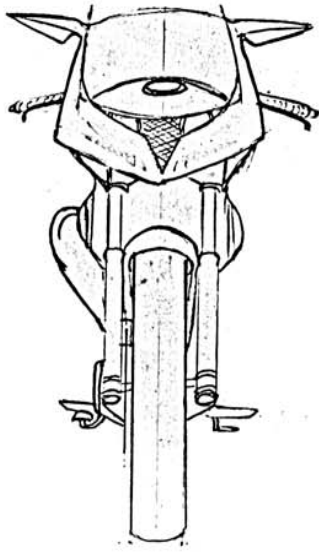


Tightening the Styled Form

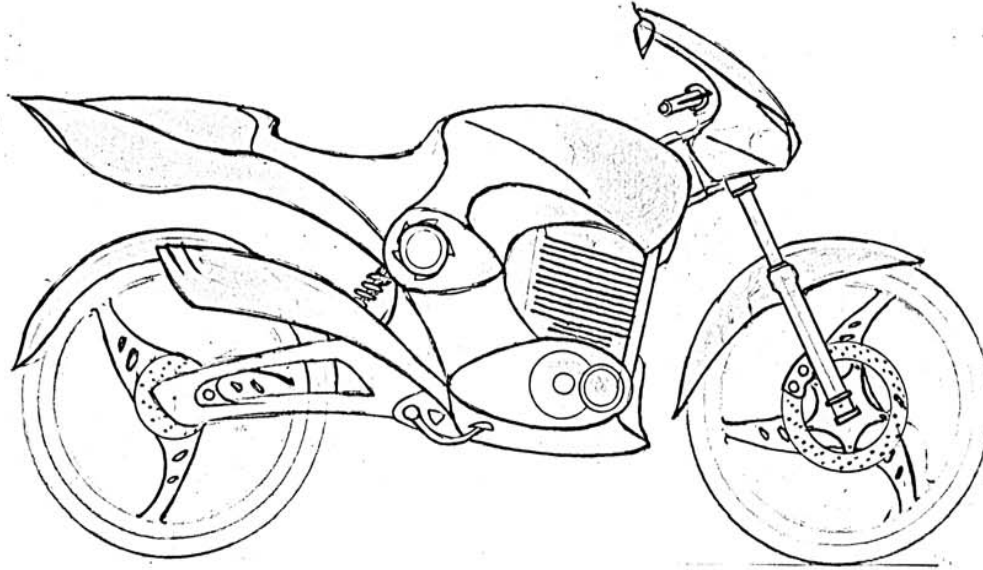
The overall design was refined by first working on the fuel tank profile, loose ends were tightened



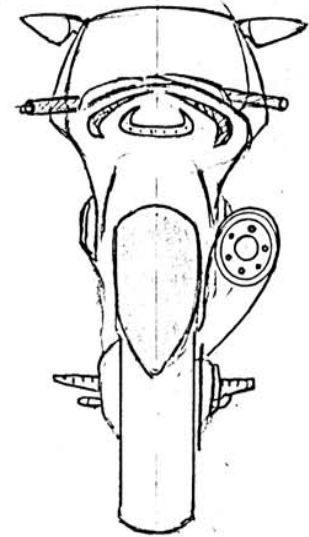
Refined Form



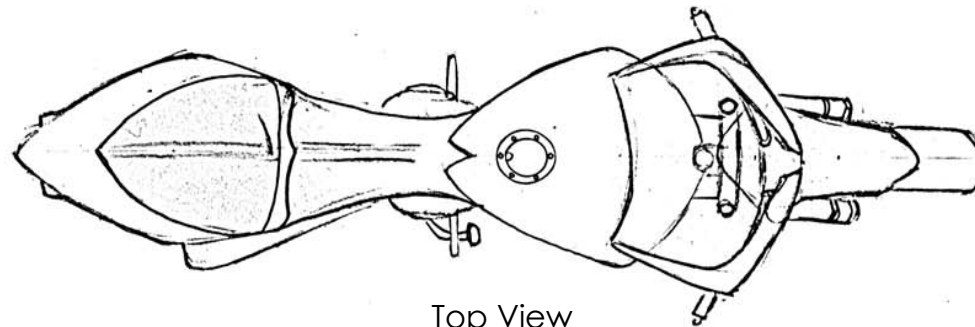
Front
View



Side
Profile



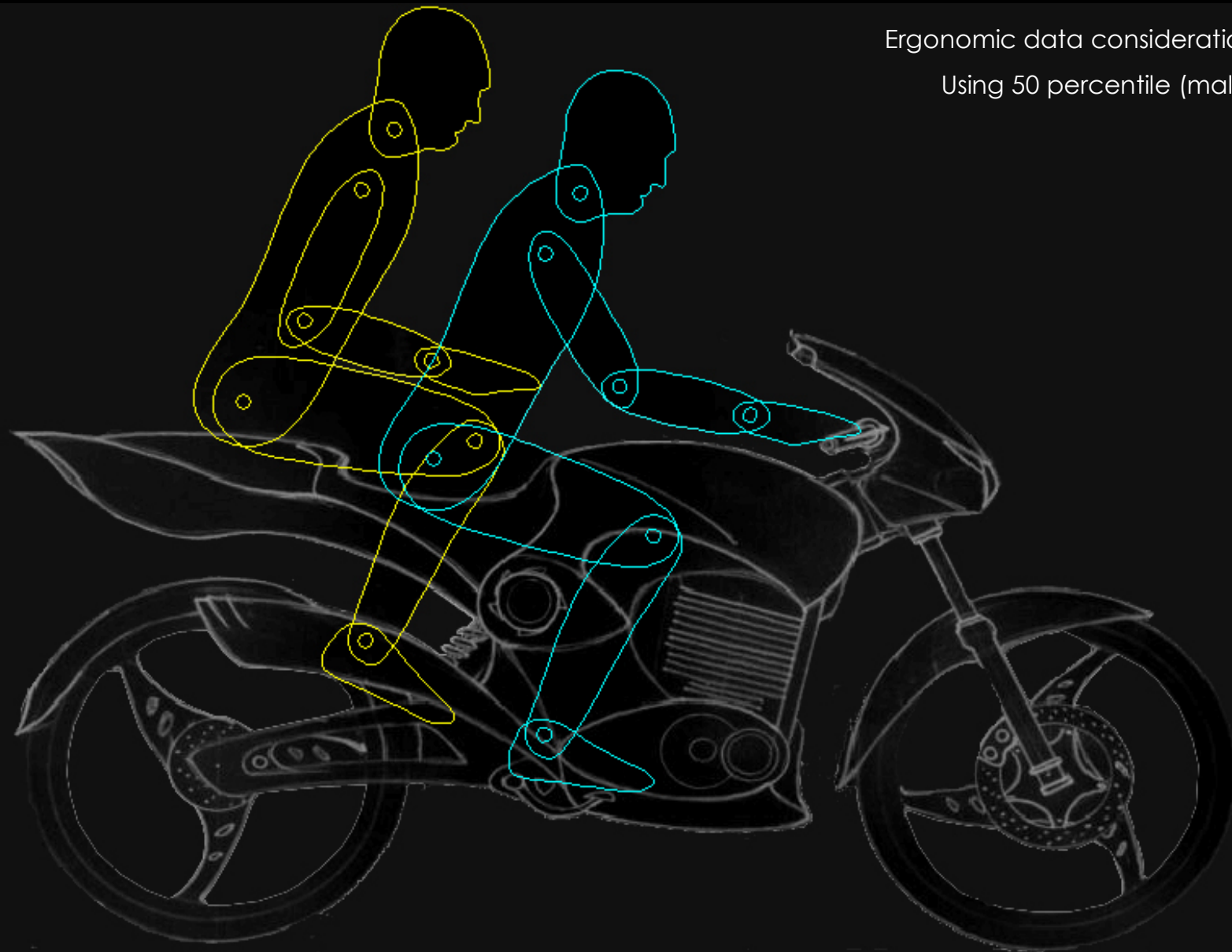
Rear
View

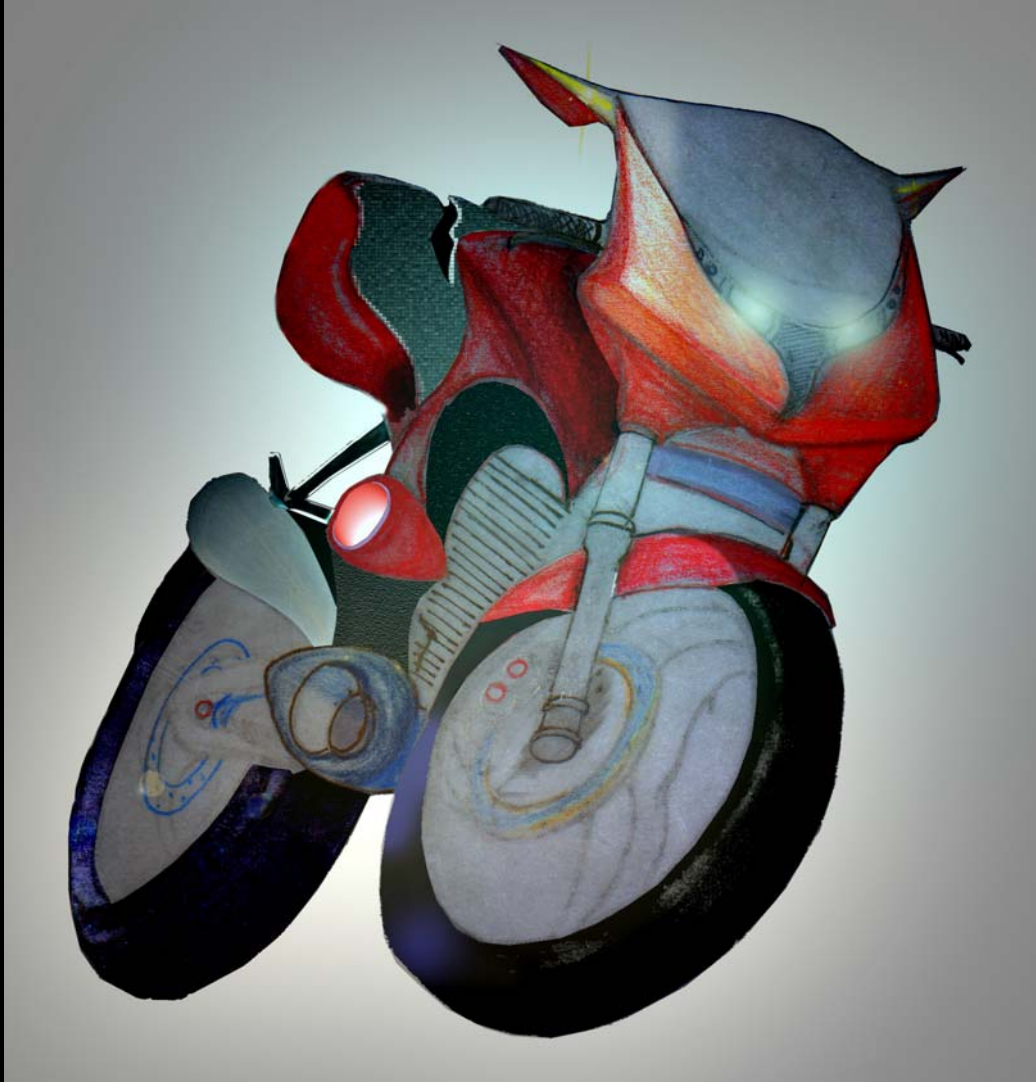


Top View

The refinement of the form included the basic ergonomics of rider and pillion seating postures.

Ergonomic data consideration
Using 50 percentile (male)







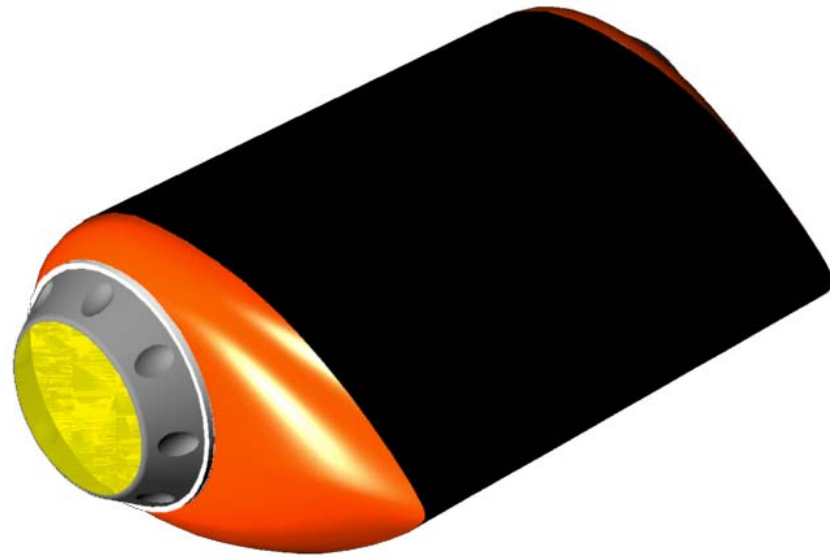


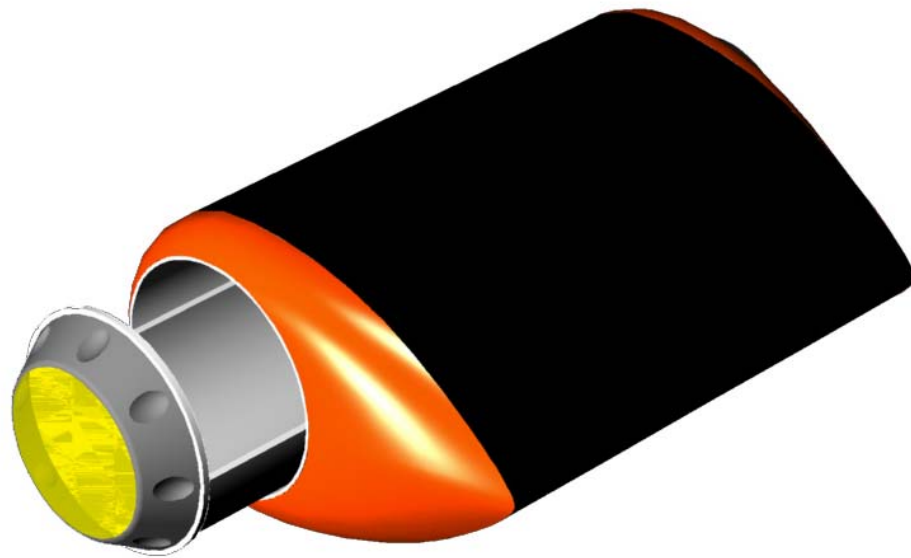
Rendering at full scale.....a need rather than an option

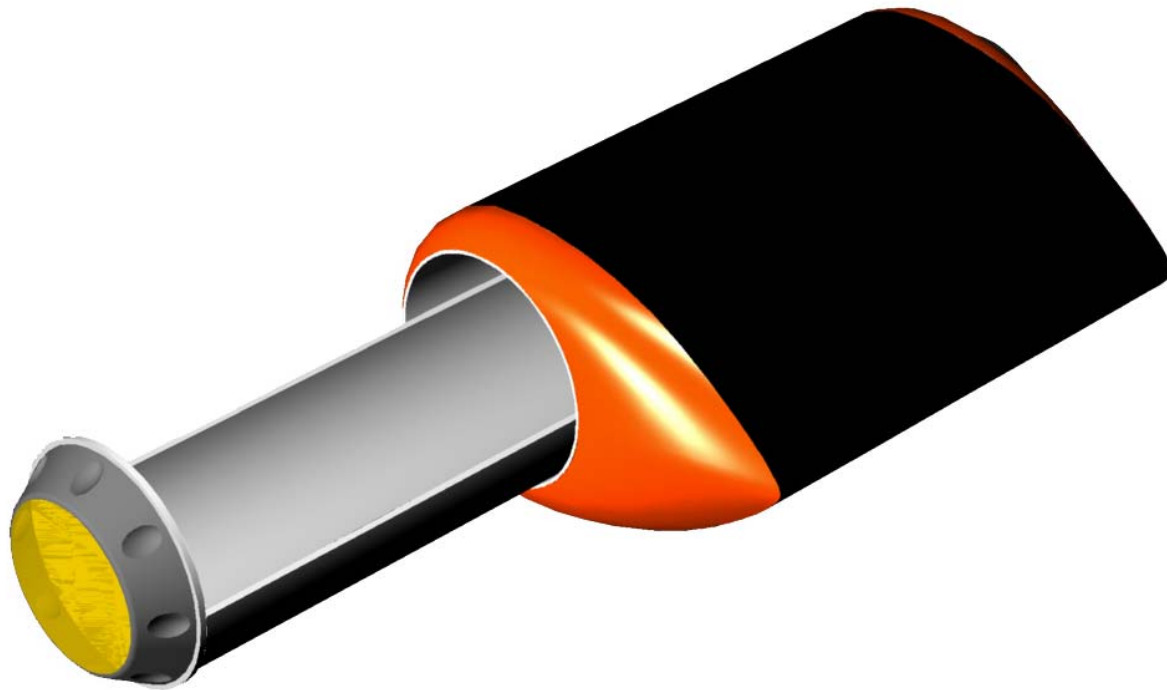
.....and seriously enjoyable











Mock up Model at scale 1:5

Thank You

Existing Product Data

Existing Indian Motorcycles Of
Interest
Headlamp & Fairings

Instrument Consoles

Interesting Photos

User Study Photos

The background of the slide is a faded, light blue image of the front of a motorcycle. It shows the headlight, the front fairing, and the handlebars. The text is overlaid on this image.

Bike Catalog

Existing International Motorcycles

Sportsbike Categories

Monoshock Rear Suspension

Chassis Frame Designs

Front & Rear Disc Brakes

Buell Lightning X1 2001



Naked Sports

Aprilia Tuono 1000 2003



Naked Sports

Ducati Monster 1000DS 2003



BMW R850R 2003



Kawasaki Z1000 2003



Naked Sports

Yamaha BT1100 Bulldog 2002



Sports Cruiser

Harley-Davidson VRSCA V-ROD 2002



Honda CBR1100XX Super Blackbird 2002



Kawasaki ZZ-R1200 2002



Suzuki GSX1300R Hayabusa 2000



Hyper Sports

Yamaha YZF-R1 2002



Sport Touring

Honda ST1300 Pan-European 2002



Sport Touring

BMW K1200GT 2003



BMW R1200CL 2003

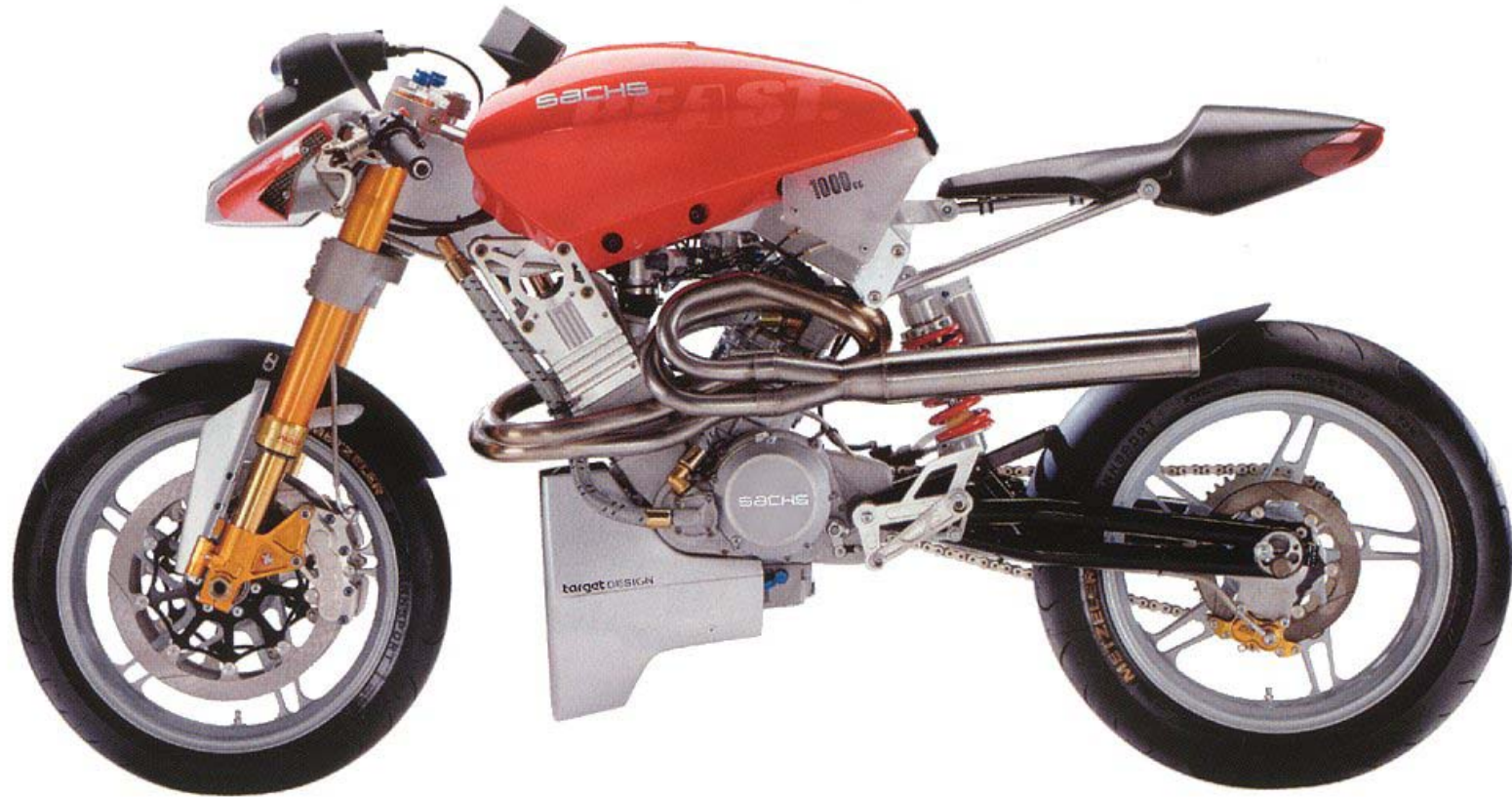


Harley-Davidson FLTRI Road Glide 2003



Monoshock rear suspension

Sachs 1000 Beast 2002



Monoshock rear suspension

Cagiva 125 Planet 2001



Monoshock rear suspension

Ducati Monster 1000DS 2003



Monoshock rear suspension

Honda CB900F Hornet 2002



Hyosung GT125 Naked 2003



Square or box section frame





Single & Double cradle
tube frames
[Circular section]



Aluminum Alloy / Alloy Steel
Cast alloy Welded Frames

Suzuki SV1000S 2003



Front & Rear Disc Brakes

Cagiva 125 Planet 2001



Front & Rear Disc Brakes

Honda CB500 2001

