



# Electric Motorcycle Styling

Summer internship at Evfutures, Auroville

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A little bit about Auroville..



The MatriMandir





Sri Aurobindo statue at Unity Pavillion



Entrance to town hall



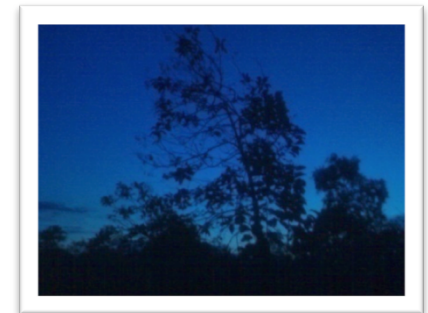
A performance at Adi Shakti



A peculiar sunset



Auroville Charter  
displayed at the Mitra  
Guest house



Glimpses of Auroville



## The Evfuture Unit



## Introducing the HumVee





## People at EVfutures

### **Aurosukrit**

Mechanical Engineer,  
in charge of R&D. He  
runs the EVFuture  
workshop and  
manages production



### **Dhyalan**

The welder/helper  
who helped build  
the model



### **Akash Heimlich**

Software &  
Electronics. He takes  
care of the business  
aspect and designs  
intelligent battery  
monitoring circuits for  
the Humvee.



## Electric Vehicle Technology

An electric vehicle (EV) is a vehicle with one or more electric motors for propulsion.



An electric vehicle consists of the following:

### Batteries

Used as the source of energy, could be lead-acid, Lithium ion based batteries

### Controller

A logic control to control the DC motor by user input i.e. accelerator and transfer the required energy from the battery to the motor

### Electric Motor

A DC motor to propel the vehicle, attached at the wheel or through a drive train

## Product Analysis

The redesign of the HumVee retained most components of the current HumVee.

The frame suited its purpose and so was retained

Position of the footrests was found to be comfortable from testing and so retained

Rear shocks were customizable but there was a need cover the positioning slots

Other components were easily available as bike parts and hence retained.

The styling was restricted to mostly frame and headlight





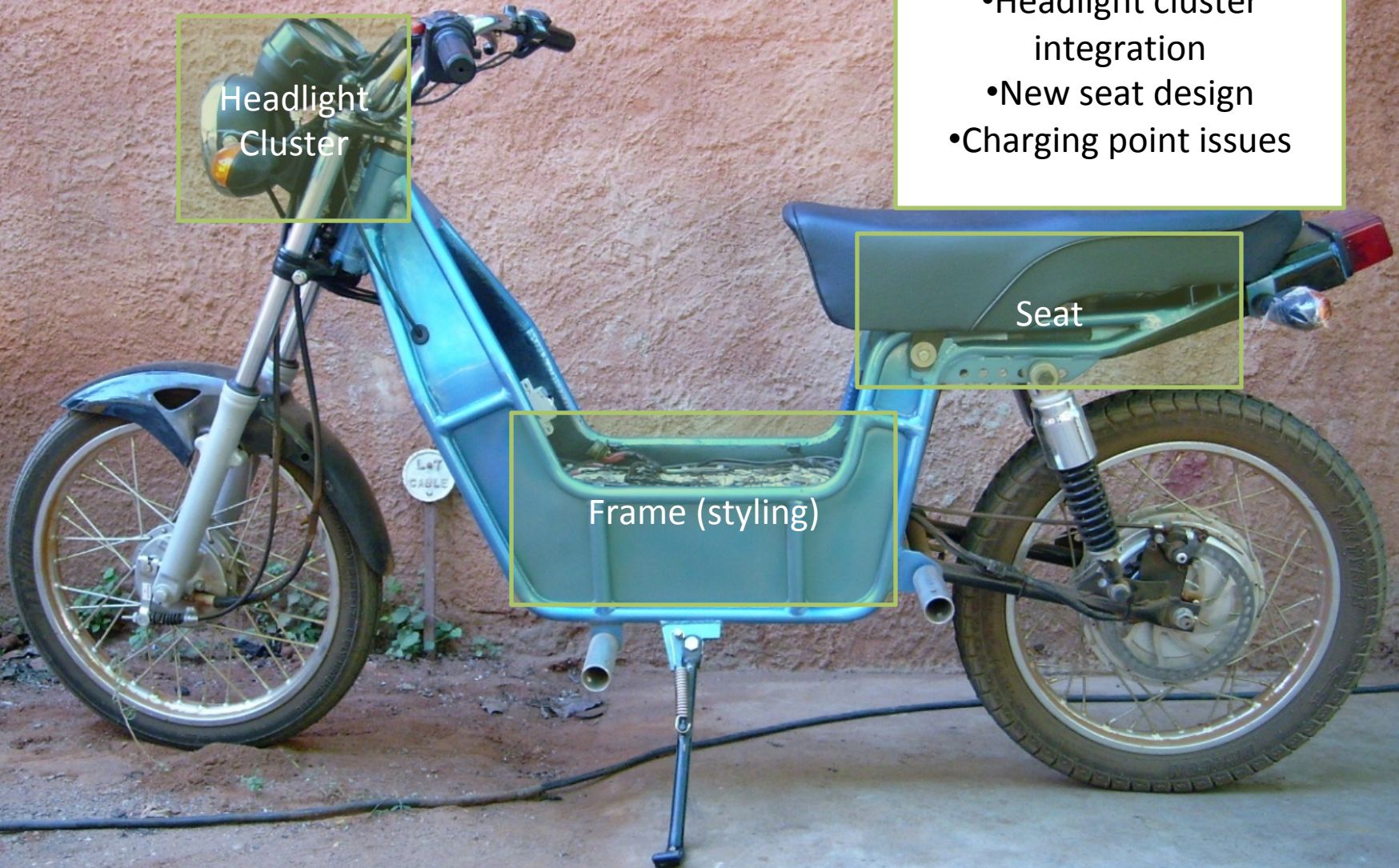
## Design Scope

- Aesthetically better
- Robust look for rural market
- Headlight cluster integration
- New seat design
- Charging point issues

Headlight Cluster

Seat

Frame (styling)





## Additions to be incorporated

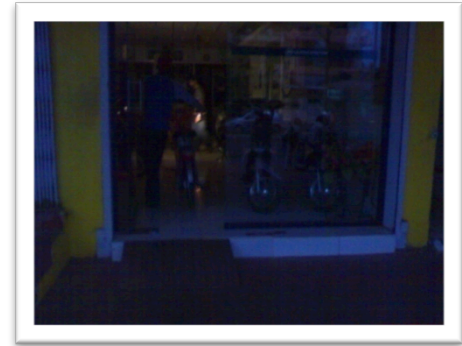
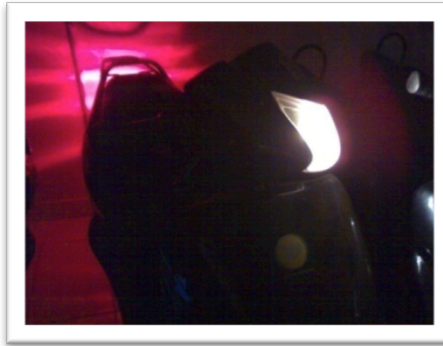
- Additional Storage space
  - Pillion Handle
  - Sari guard
  - Leg guard
- Front Mudguard
- Rear Mudguard
- Foot rests





## Synchronic analysis

### Competition ( Electric bikes )



Yo bikes



Ultra motors



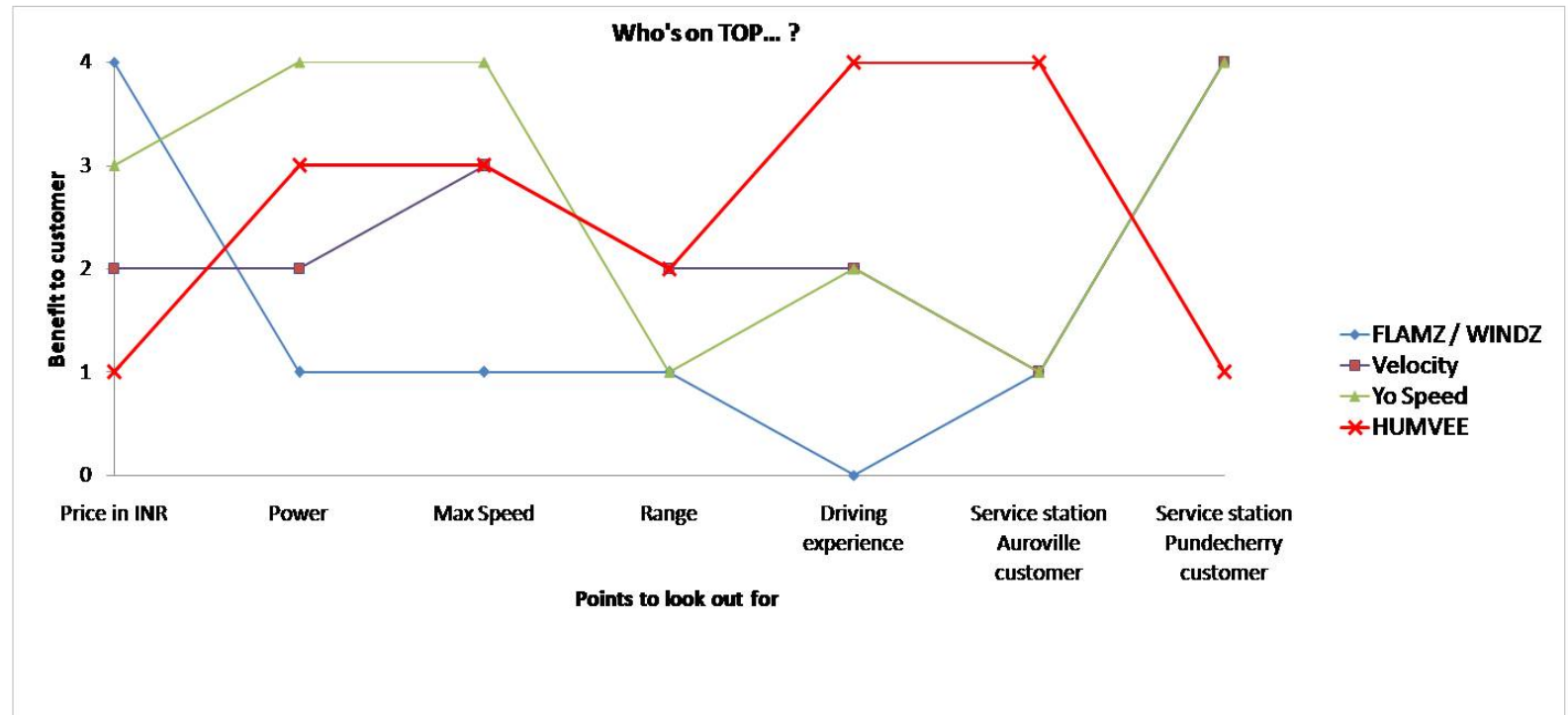
Green Motors

## Competition ( IC bikes )



The HumVee (centre) and TVS XLs

## Comparison Chart (Electrical Competitors)



- Apart from cost Humvee also loses out on ARAI and RTO approval in today's date.

FLAMZ/WINDZ – 250 watts – Shri Cauvery Green Electric Vehicles

Yo Speed – 750 watts – Yo Bikes

Velocity – 500 watts – Ultra Motors

Humvee – 600 watts – EV Future

Driving experience rated on 0 to 4 scale

Price data as on 23<sup>rd</sup> May, 2009

## Data Collection and research

### Field Survey

Location: Village near Reve and on the way to ECR road

Date : May 26, 2009

Time : 10:00 AM to 12:00 Noon

The vehicle used: Brown colored Humvee.

### Questionnaire

- Would you buy this bike? Why?
- Which bike would u prefer? TVS xl or HumVee? Why
- Your Opinions and Views of the HumVee?
- What do you think about its cost?



## Inference

### **Cost :**

Humvee cost too high as compared to the expected 20 to 30k price tag

### **Looks :**

More “stylish”, “fancy” required  
It should look like company made bike

### **Recharging issue:**

to reduce recharging time, complete battery pack replacement facility required

### **Preference:**

Petrol bikes are preferred because of easy refill facilities and need ‘more’ out of vehicle for which they will spend 20 to 30k.



# HumVee Current User Survey

## Questionnaire

### Questionnaire

Why did u buy the Humv?

What other two-wheeler is the humv most similar to?

Do you prefer the electric bike to IC bikes?

What kind of music do you listen to?

Do you prefer the hum Vee to other electric bikes? Have you ridden other electric bikes? Which movie do you think the humV could be used in?

Where else in the world (outside auroville) could the humV be suited for? Name some products that have the humV's character? (apart from the hummer)

### Changes

If the humV were to look different, what visual qualities would you like it to have? Choose from the following

Soft, strong, light, delicate, sporty, classic, cute, rugged, curvy, streamlined, funky

If there is any other quality that the HumV has, please type below  
Is the humv comfortable for u? If no, What would you like changed for comfort

What extra additions on the bike would be useful to u?

### Associations

What vehicles ( two wheeler/ four wheeler ) have you owned so far?

## **Current opinions:**

Current owners liked the HumVee because of customizable suspension and noiseless way of driving. Not bothered on looks for purchase.

## **Changes wanted:**

Liked the sturdy and rugged character of the HumVee and would like to retain that character.

Quality issues like peeling rubber rims, charging cords etc

More charging stations

Waterproofing

Easy to clean

## **Additions needed:**

Need additions like crash bar, hook for clothes, Sari guard, clear cut battery indication and distance covered with available battery charge.

## Design brief

Design a Electric bike's exteriors with the existing frame for

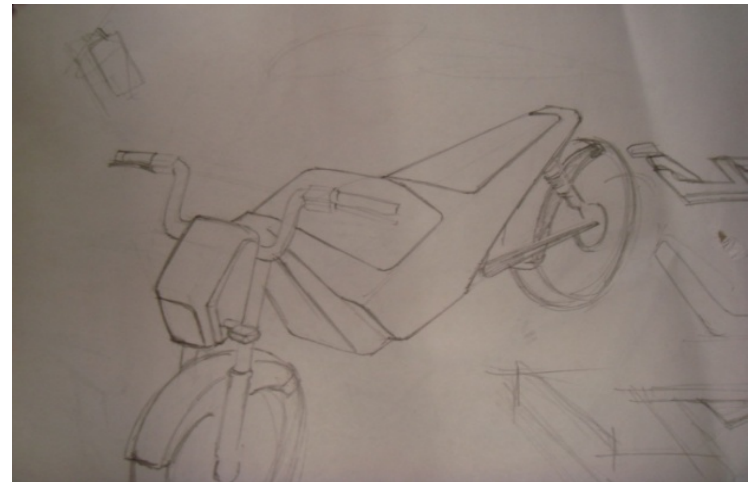
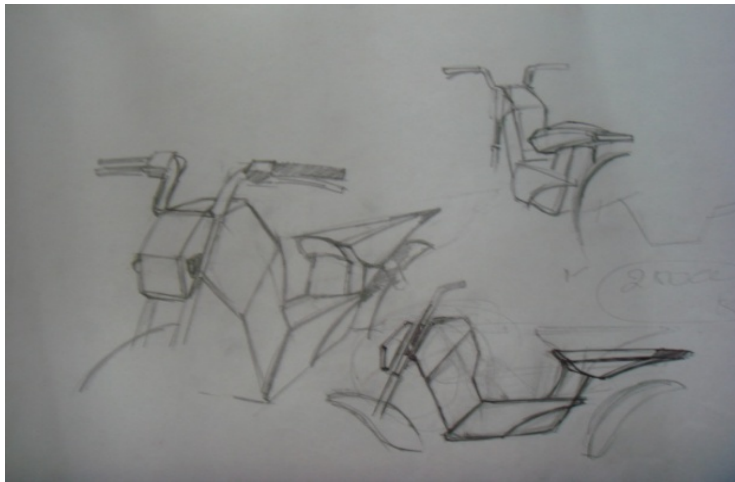
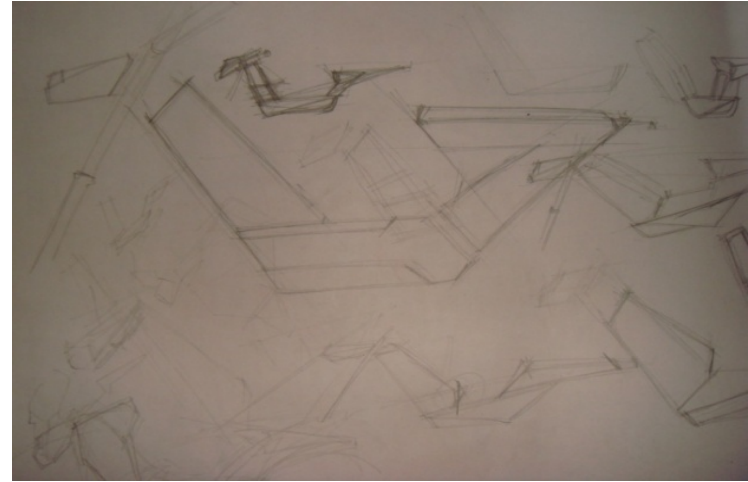
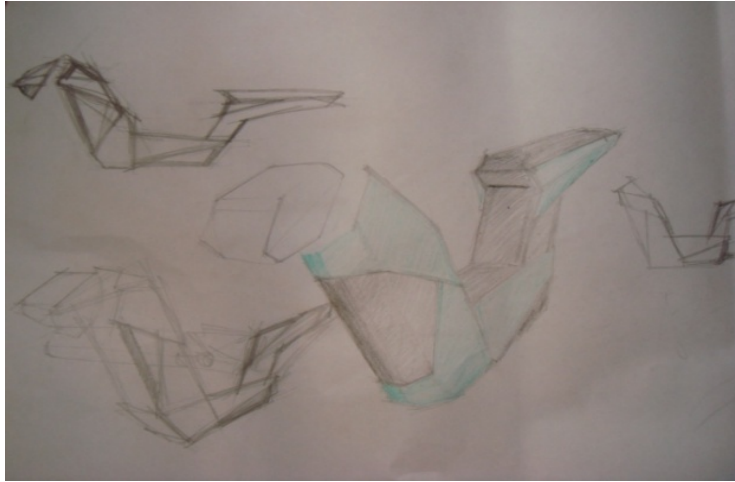
- 60 bikes as production target
- Half of them targeted for Auroville users and rest as to be sold as **Demo bikes** in different parts of India
- Targeted for environmental concerned users
- Price tag of around Rs. 50k to 55k
- Functionality should also be considered (carrying luggage, cooling for controller, etc.)

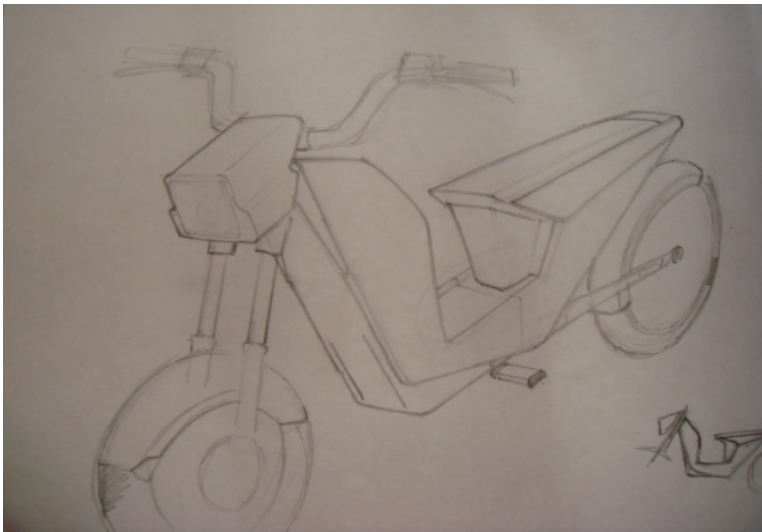
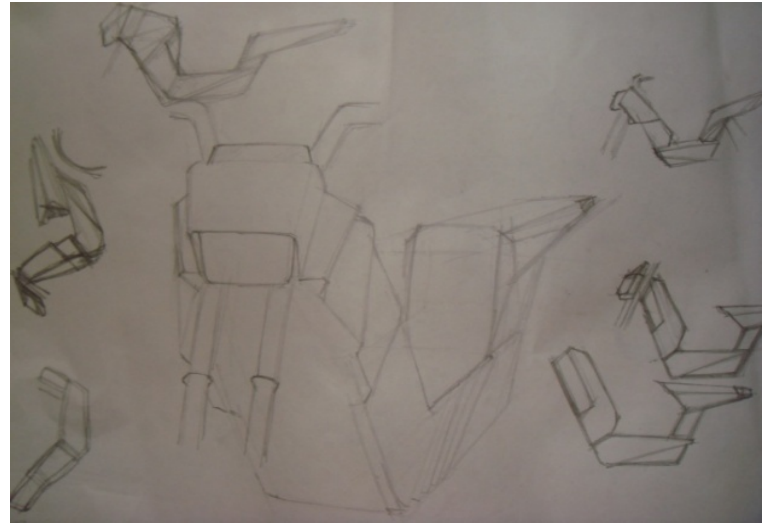
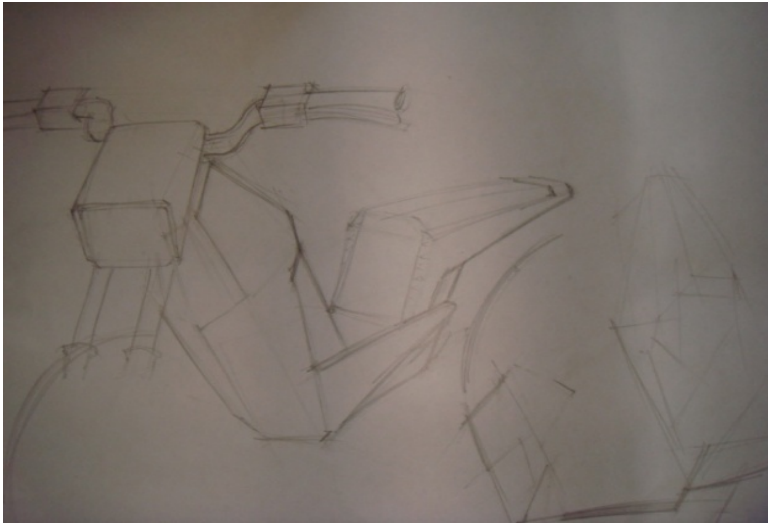
### Other conditions

- To be designed for functionality of rural Indian market
- Body work to be designed for handmade production for this lot with sheet metal
- It should not be Moped or scooter nor motorcycle.

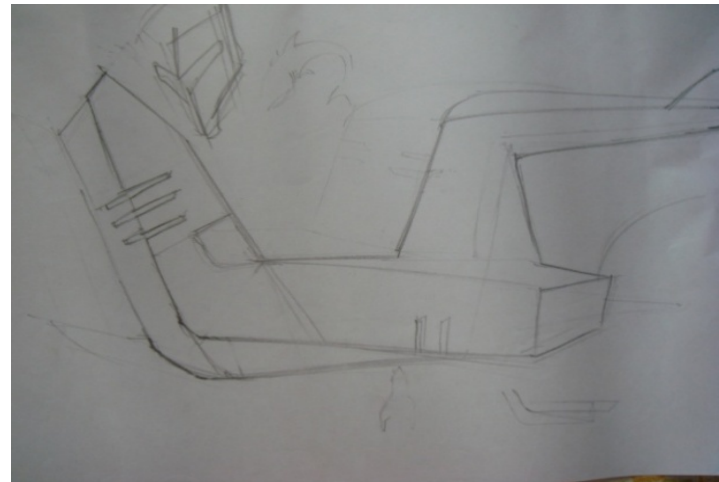
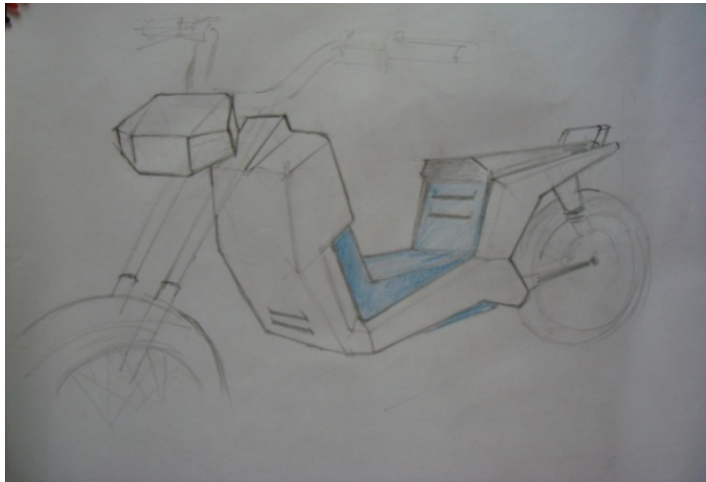
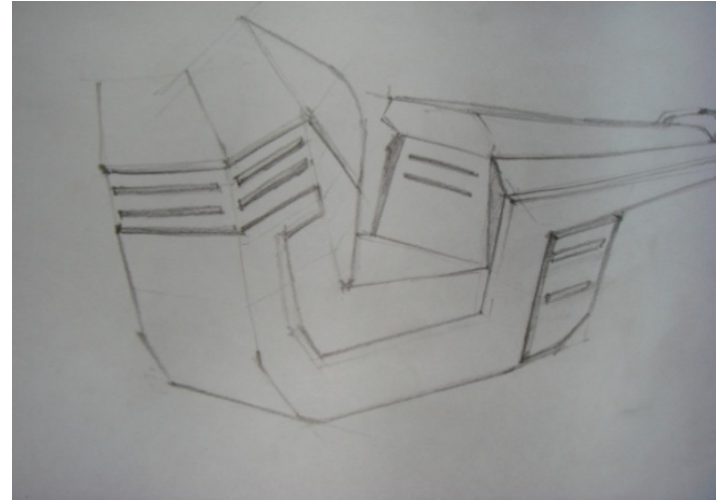
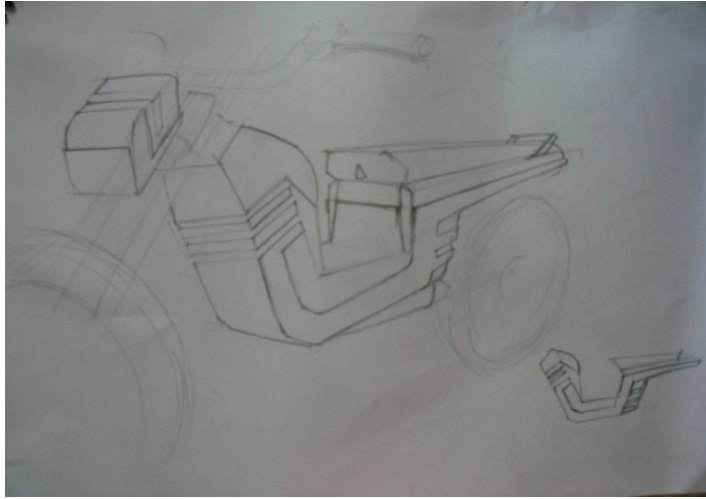
# Concepts

## Initial form concepts

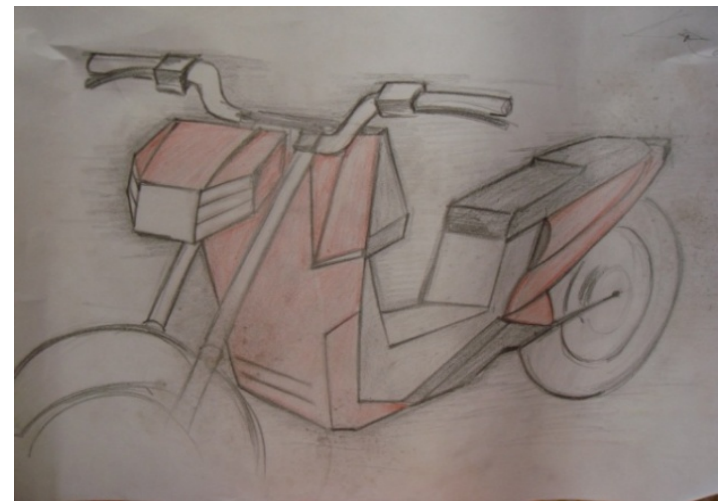
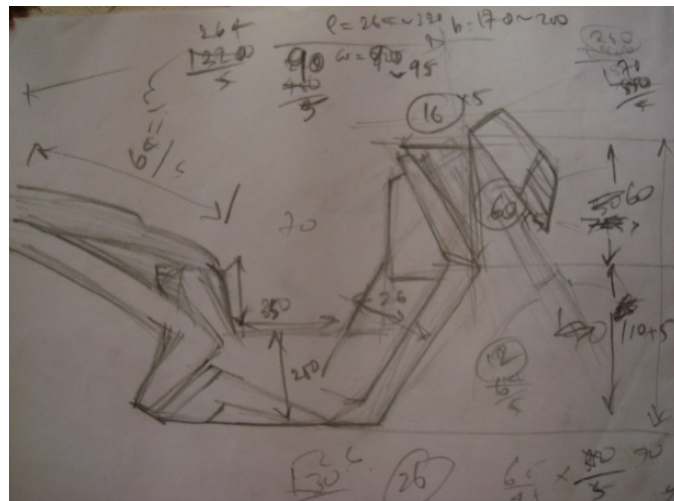








# Final concepts





## Mock ups







## Renderings

### Initial rendering







## Final rendering

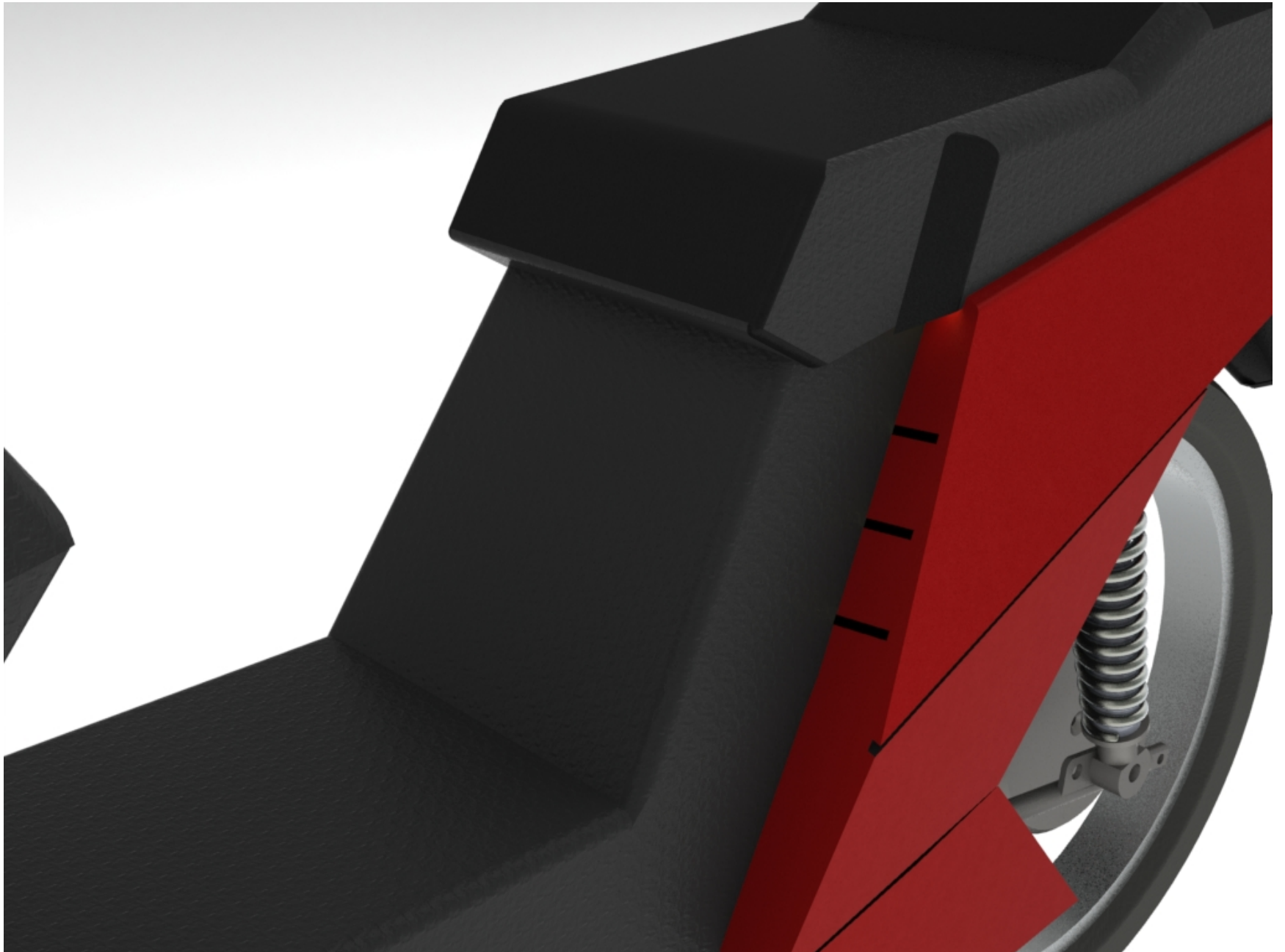


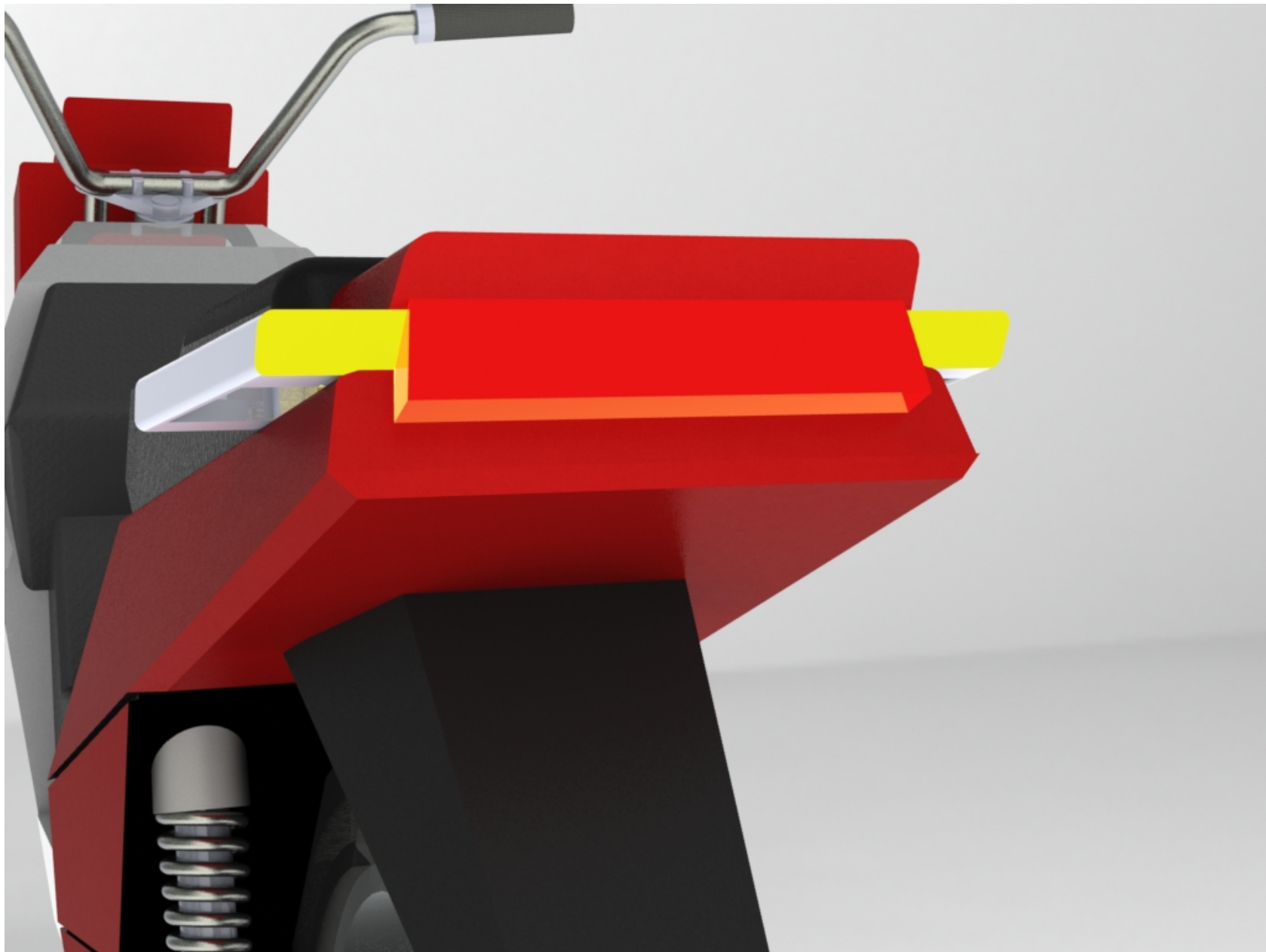




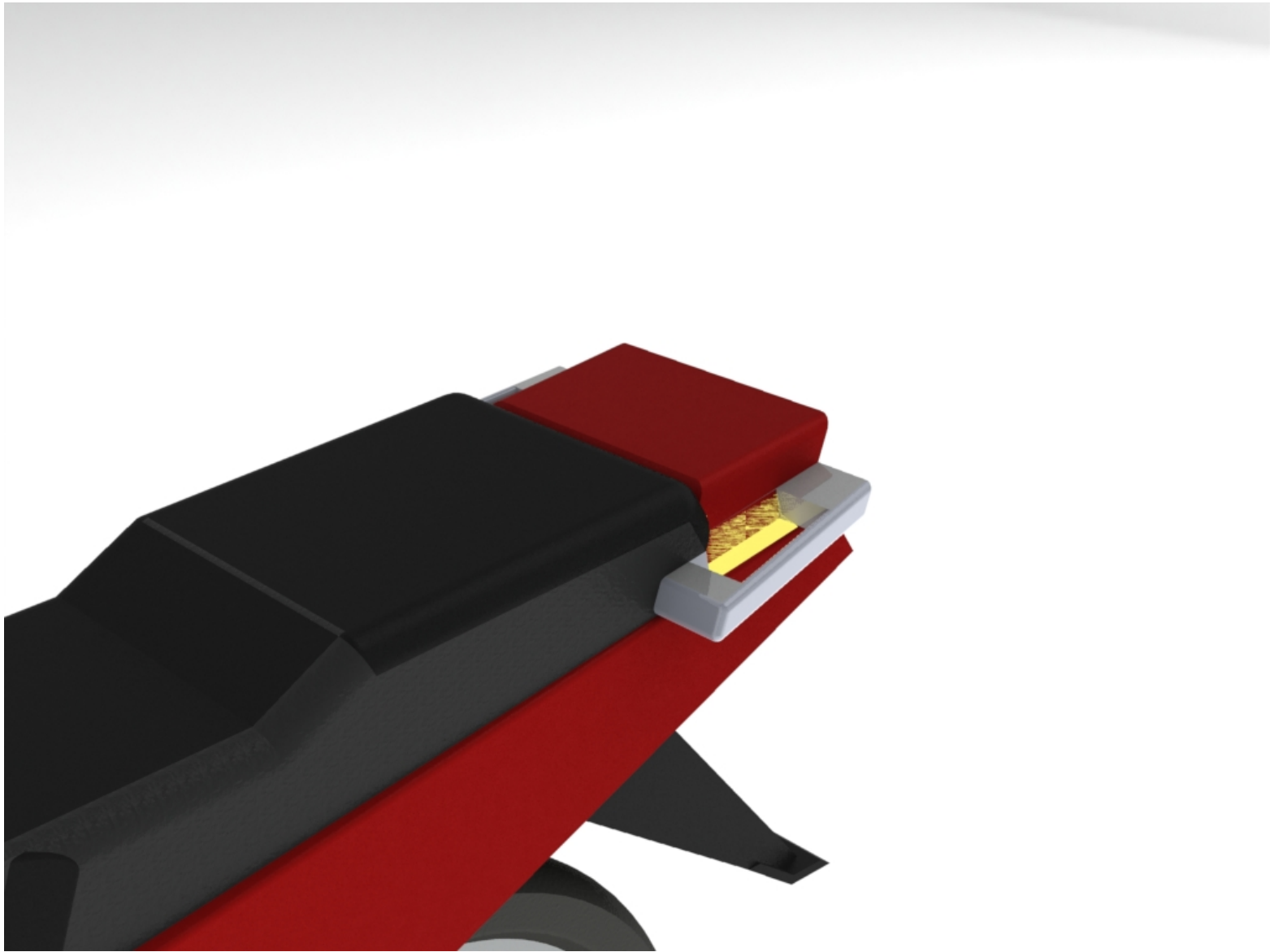












## Prototype (work in progress)



















## Learning from this internship

- Working with sheet metal and various possibilities with it
- Form possibilities given the constraints
- Importance of research and data collection in the design process

**Thankyou**