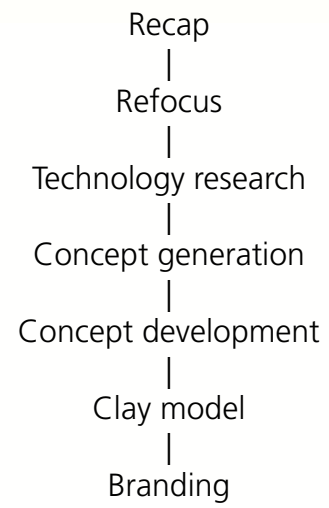


Exploring Futuristic Automotive Forms

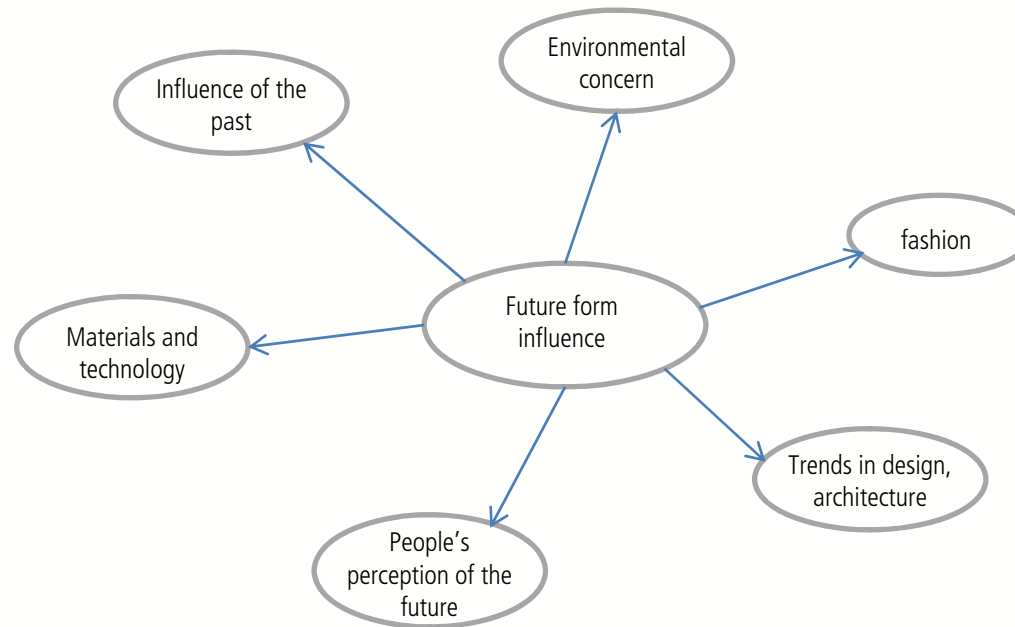
By: Karthik Narayan
Guide: Prof B.K. Chakravarthy
22nd May '09

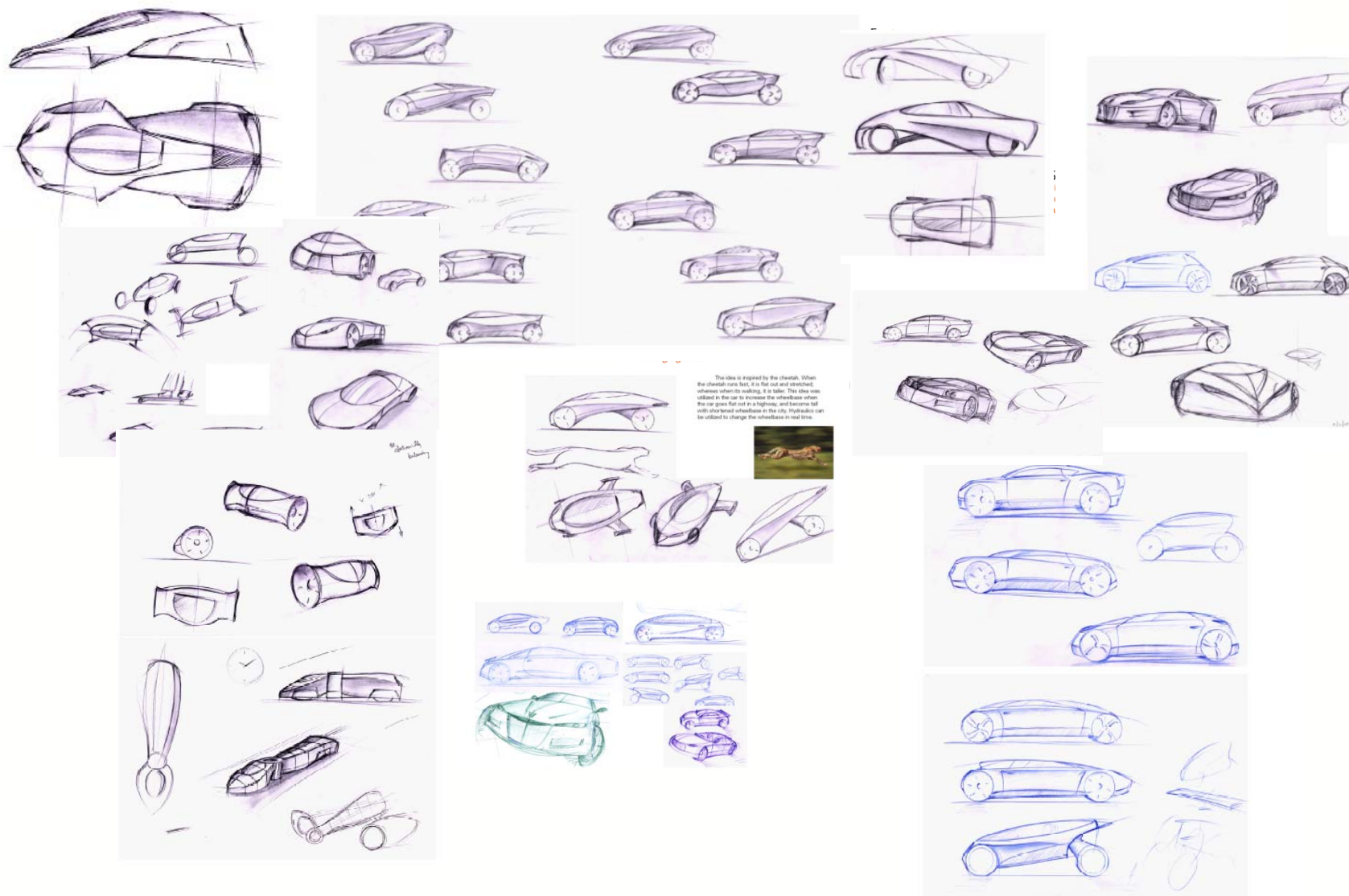
The plan



Inference:

- Underlying Form Influence - **Technology**





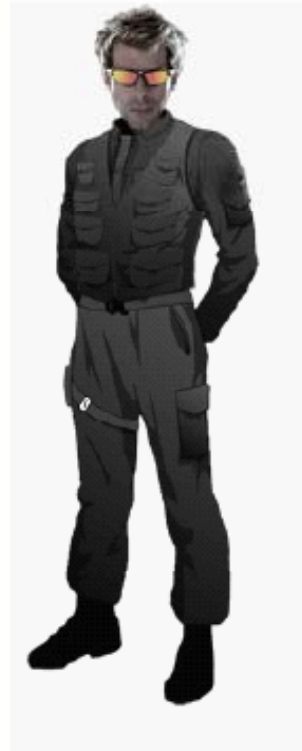
Name: Vishrut
Age: 31

Occupation:
Financial Analyst

Passions:
Motorsports, real-time gaming, 3d photography, music

Sports :
Cycling

Activities:
e-book writing, voluntary work at enviro school, weekend getaways



Realization:

- Car idle for long – should use up time fruitfully
- Separate visual language



"Innovative technology...Alternative powertrain...
efficient... ..environmentally friendly"

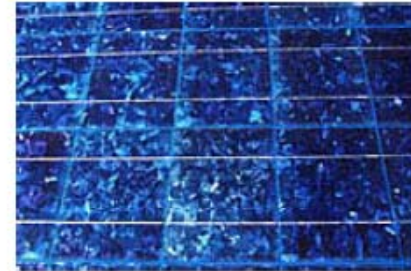
Michelin challenge Design 2010

Tech for using idle time usefully

- Algae
- Solar nano-coat

Solar nano-coat

- Absorbs IR range also
- Can be coated on flexible surfaces
- produces brown pattern when applied



Technology for using idle time usefully:

- Algae
- Solar nano-coat

Algae Hydrogen Production

- produces H₂ in the presence of light.
- Oxygen is the by product
- Hydrogen replenishes the fuel, whereas O₂ is released into the air
- The car would essentially be a hydrogen car.

Major elements

- Algae tanks
- Algae tubes

Numbers

Sunlight to H₂ efficiency - 0.1%

Efficiency for economic feasibility - 7-10%

Genetically altered algae - 2-2.5%

H₂ efficiency of the process - 10%

Scientists predict that it could be as high as 85-90% as photosynthesis is a perfect process.



algae reactor MIT.mp4

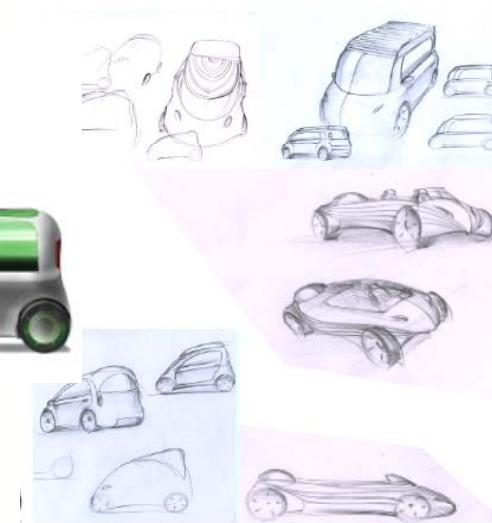
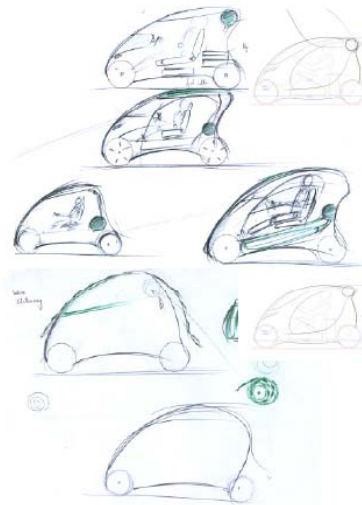
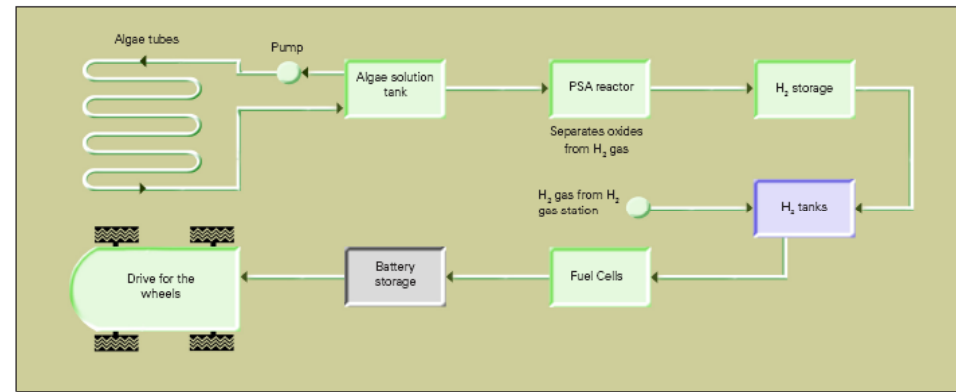
Manifestation of technology:

- P2 processor
- env for fuel cell exhibit
- water



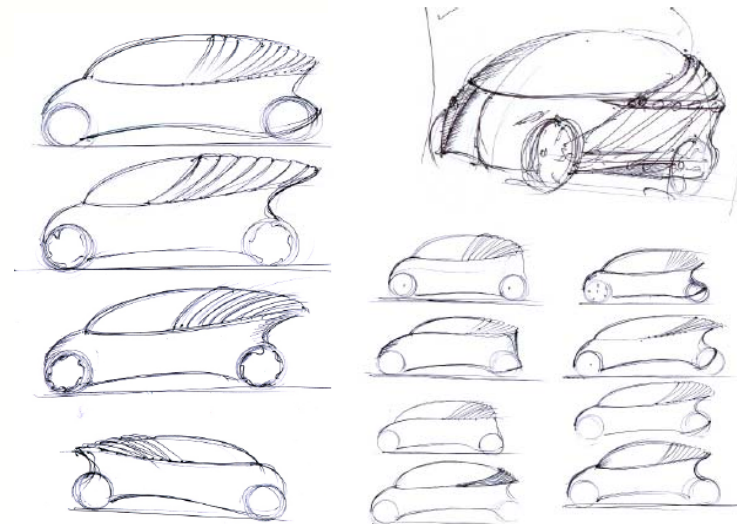
Concept Generation: Algae

- Speculative drivetrain
- Placement of algae tanks:
 - To make a visual element
 - On top, rolling out, Spherical tank.



Concept Generation - Algae

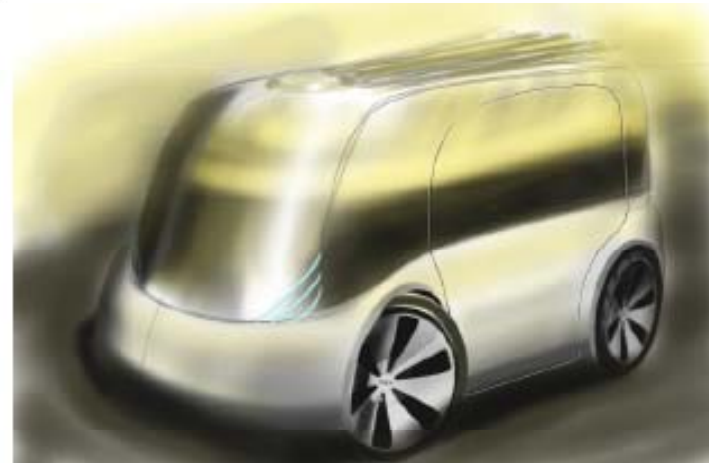
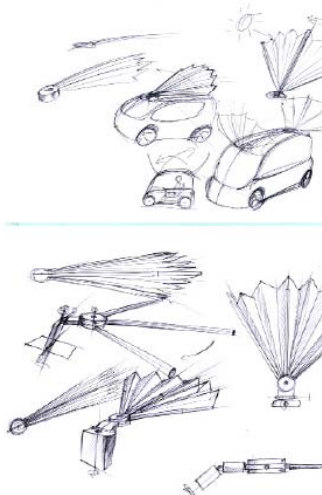
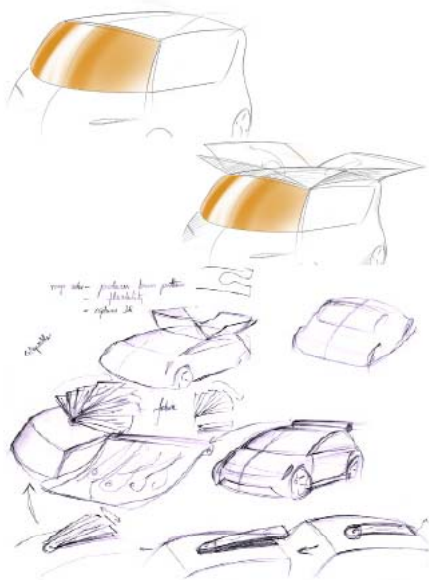
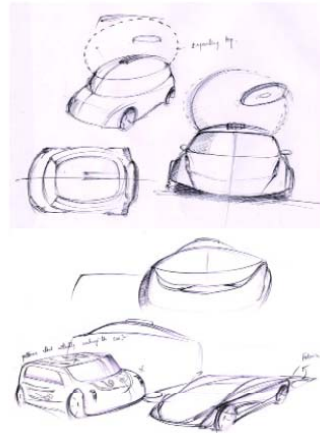
- The idea combines functional and visual requirements
 - The canopy retracts becoming a visual element as well as to provide ingress and outgress.
- Attempt to emphasize the canopy was made
- Tried covering the real wheel with a skirt.



Concept Generation – Solar Nanocoat

Increasing surface area

- Opening surfaces
- Balloon type
- Opens up like a fan.



Product brief :

To design a 2-seater concept car using innovative powertrain for city use in the future.

User:

- Pride of owning a clean car
- For regular office goers
- Travel less than 150Km/day
- Ease of use

Technology:

Should be an answer to green energy needs of the future

May not be feasible today, but with time would be practical and economical.

Scenario:

- Society conscious about individual carbon footprint
- Welcome green technology as they have disposable incomes
- Stringent Laws governing emission and environmental impact.

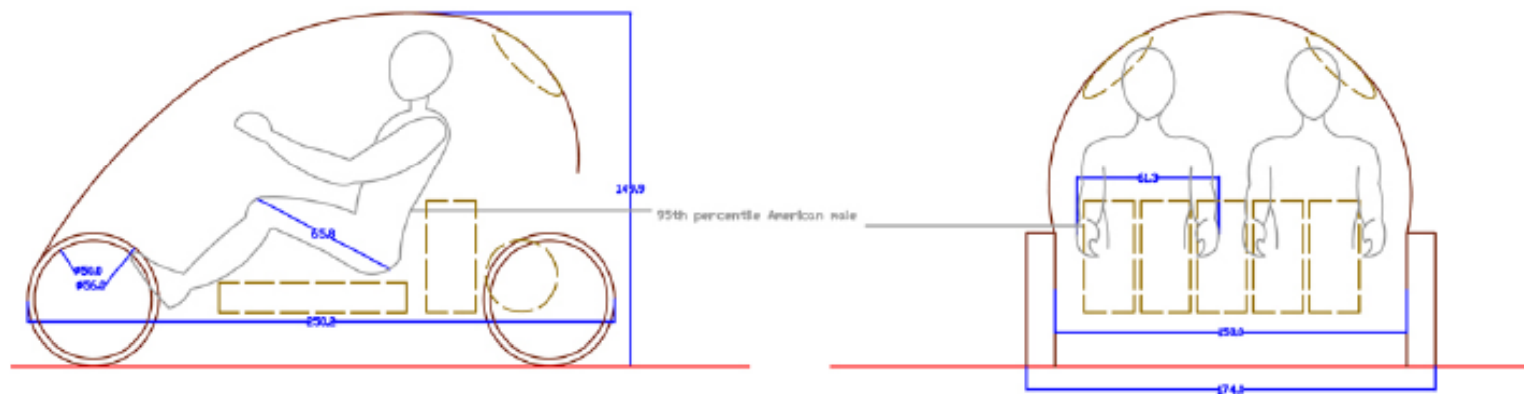
Evaluation and Selection

| Concept Selection | 01 : Nano coat | 02 : Algae |
|---|----------------|------------|
| <i>User</i> | | |
| Aesthetic appeal | 3 | 4 |
| Ownership pride (3x) | 4 | 5 |
| Distance travelled (hypthesis) | 3 | 4 |
| Ease of use in city (parking etc) | 2 | 5 |
| | | |
| <i>Technology</i> | | |
| Addressing technology (3x) | 4 | 4 |
| Concept evolution | 3 | 3 |
| Feasibility | 2 | 1 |
| | | |
| <i>Scenario</i> | | |
| Impact on environment (lesser the better) | 3 | 5 |
| Whether system level | 3 | 5 |
| | 45 | 59 |

Concept Development

First, basic packaging needs to be done to accommodate a 95 percentile American male. The package needs to contain space for

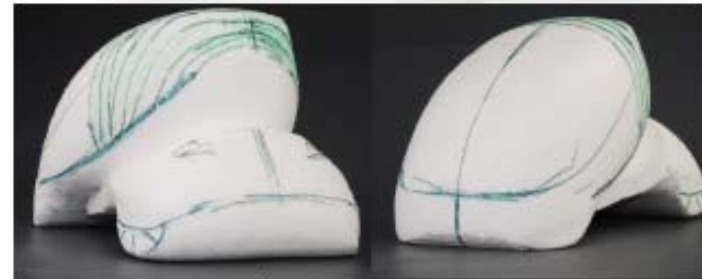
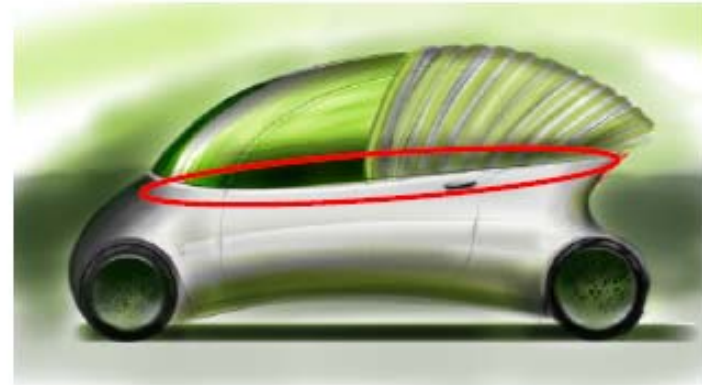
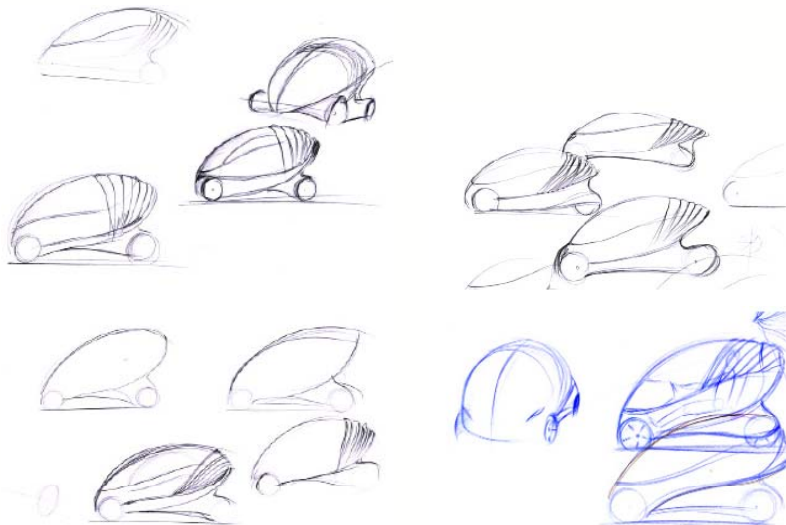
- 2x95 percentile American males
- Hydrogen fuel cells
- Hydrogen tanks
- Algae tanks
- Different layouts were tried out



Concept Development

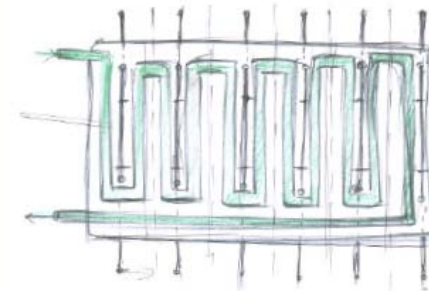
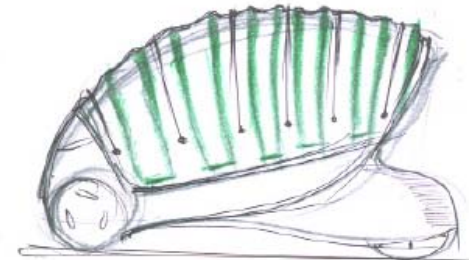
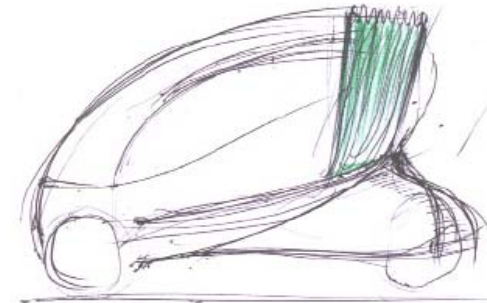
Disadvantage with this model

- Shoulderline, strong visual element, break it
- Separate Algae component from the rest



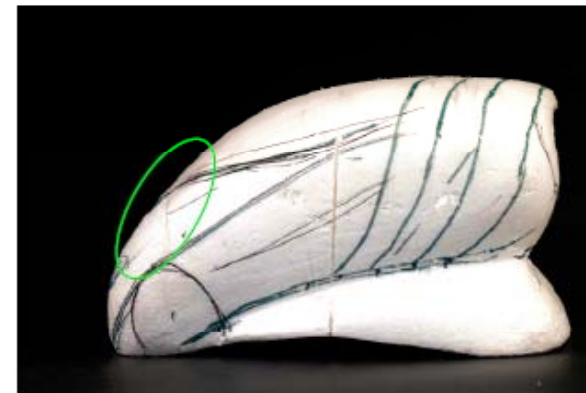
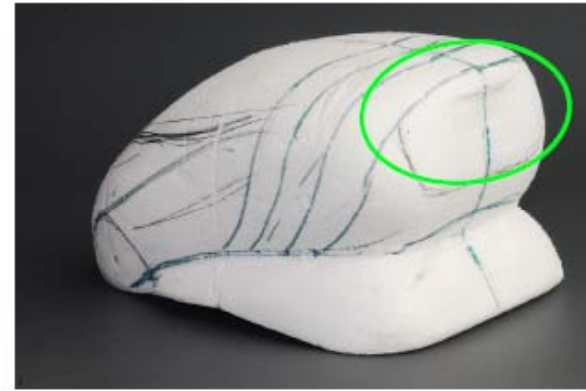
Canopy mechanism

- The algae fluid is carried in flexible pouches welded together
- There are frames that run through the pouches.
- These frames are joined to the rails along the skirt of the car and along the pillars.



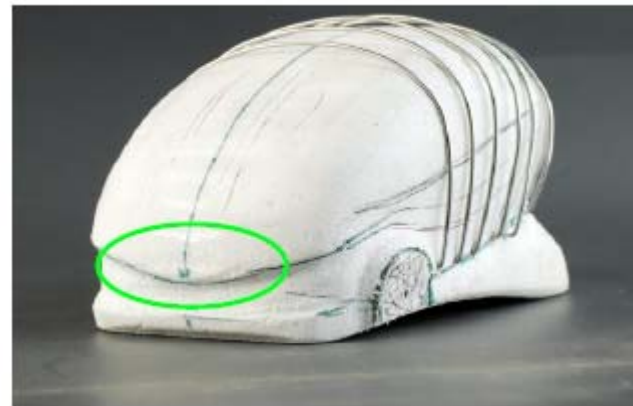
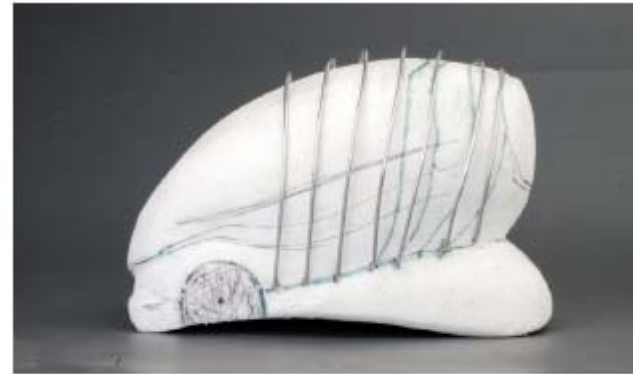
Concept Development

Characteristic front, abrupt back



Concept Development

To explore canopy frames
Front goes in to indicate absence of mechanism
there.



Concept Development

Made to quickly check the flow of surfaces

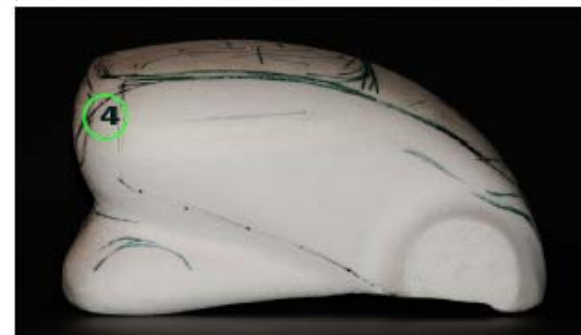
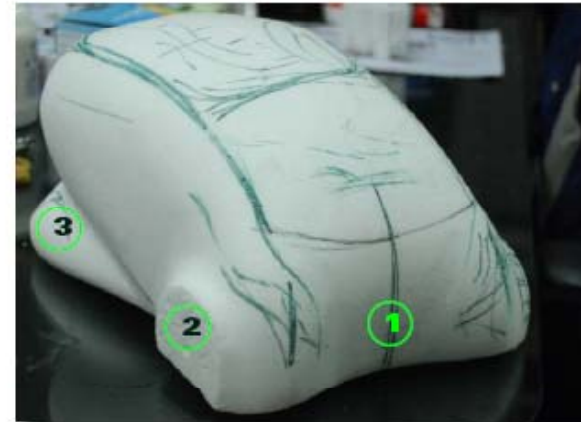


Amalgamation

- The concave surface
- Flaring wheel arches
- Bulging skirt
- Flat back

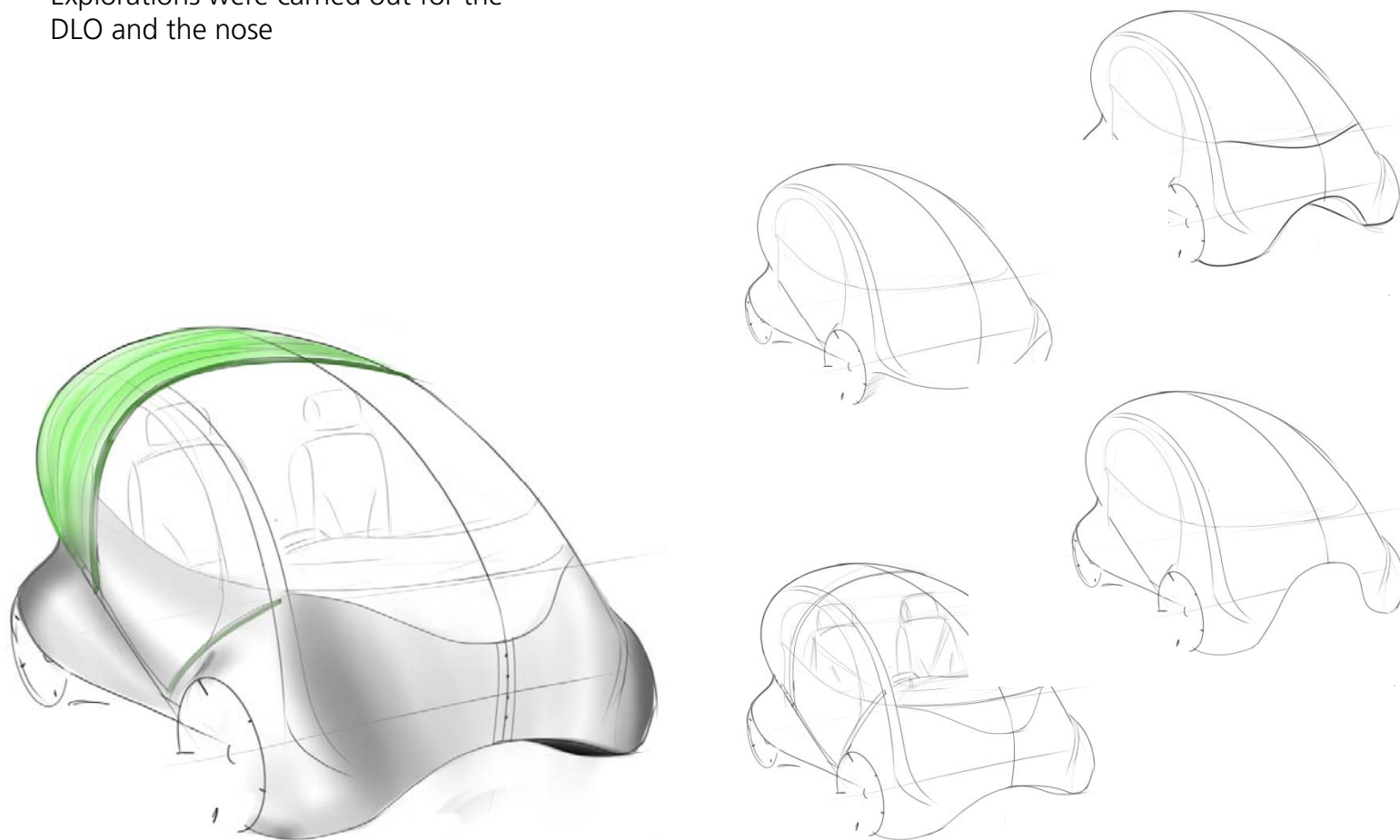
Negatives

- Nose comes way down to touch the ground
- DLO is flat

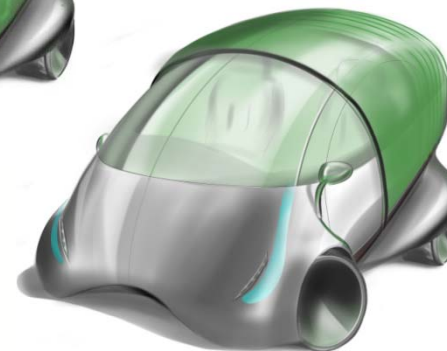
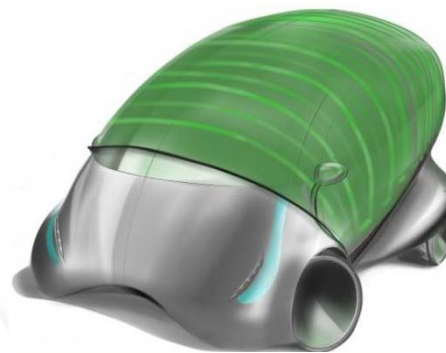
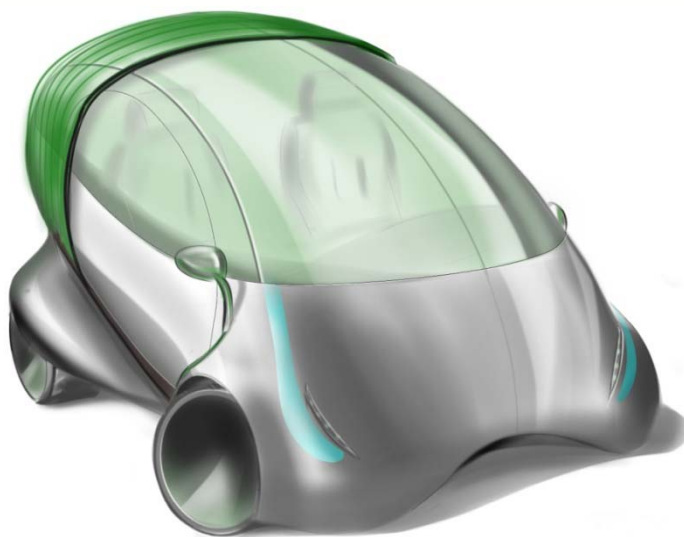
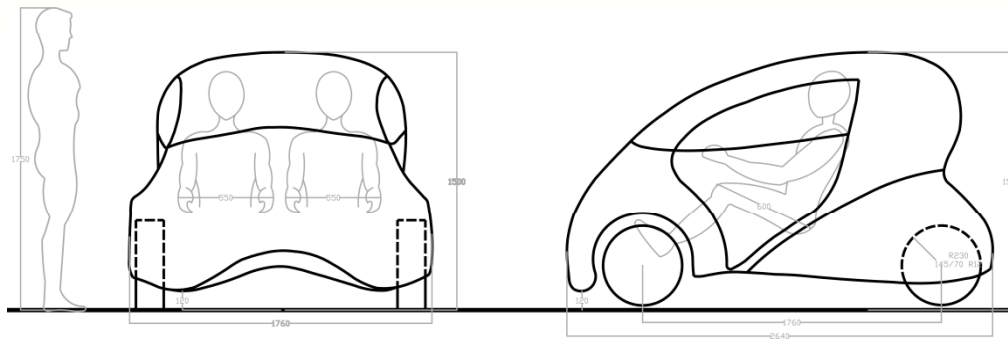
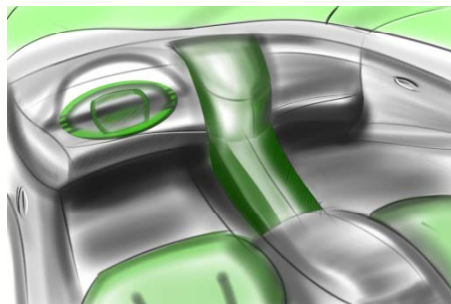


Concept Development

- Explorations were carried out for the DLO and the nose



Final Concept



Dimensions

| | |
|-----------------------|------|
| Overall Length (mm) | 2640 |
| Overall Width (mm) | 1760 |
| Overall Height (mm) | 1600 |
| Wheelbase (mm) | 1760 |
| Ground Clearance (mm) | 120 |
| No. of Doors | 2 |

Powertrain

Hydrogen fuel cell based

Motors

In-wheel

Hydrogen tank

Ti-Mg-Li alloy

Algae subsystem to regenerate the hydrogen fuel.

Steering

In-wheel

Suspension

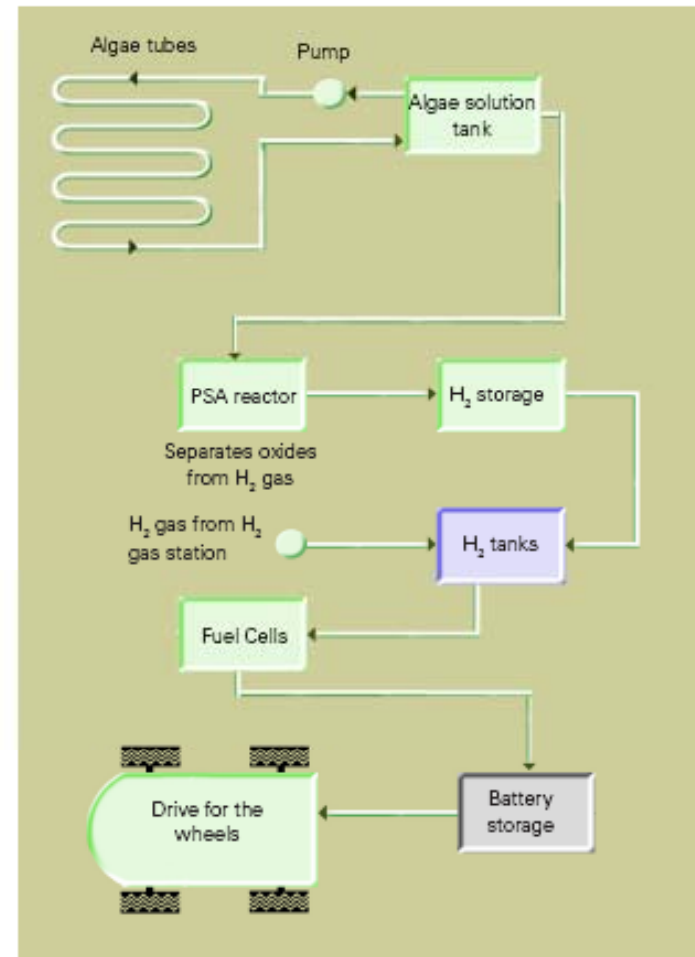
In-wheel with electronic damping

Wheels

145/70 R12

Michelin Active wheel

With in wheel motors, suspension and steering mechanism



Clay model

Making of the clay model was one of the important creative processes followed in the styling process. 1:8 scale model was decided to be made. The base armature was made out of wood and thermocole was used to make the skeleton. The surface of the thermocole was heated to harden it, so that it forms a stable base for the clay to hold onto. The clay was applied and shaped using the clay modelling tools. Base was used to sculpt the wheel arches. The clay was applied and reapplied until the desired surface quality and surface continuity was achieved. More of finishing was done to perfect the surfaces.



Clay model



After refinement from the previous stage, surfaces were checked once again by applying dinoc film on the surface. The reflectivity of the film magnifies any surface imperfections that may exist. With specific lighting, the flow of reflections can also be checked using the application of the film. Then, DLOs were decided by applying masking tape strips on the surface as shown in the figure. Multiple options were tried out for the lines to go with the overall form and to ensure line continuity. Once the DLOs were fixed, it was carved on the surface as shown below. The shut lines were also carved out in a similar, but with more weight.



Clay model

Once the shut lines and DLOs were sculpted on the surface of the clay, the wheels were made. Three 6 inch pieces were cut in CNC and joined together to make the wheels. The disc for the wheels were formed by filling clay in the cavity. After that, the clay model was cleaned with water to remove any clay particles. A layer of DuPont primer was applied directly on the surface of the clay to harden it. This followed by two thick coats of gray putty. Surface was sanded with a P600 grade sand paper. A thin coat was applied on top of that. The surface was further sanded with 1000 grade sandpaper, after which the model was ready for painting.





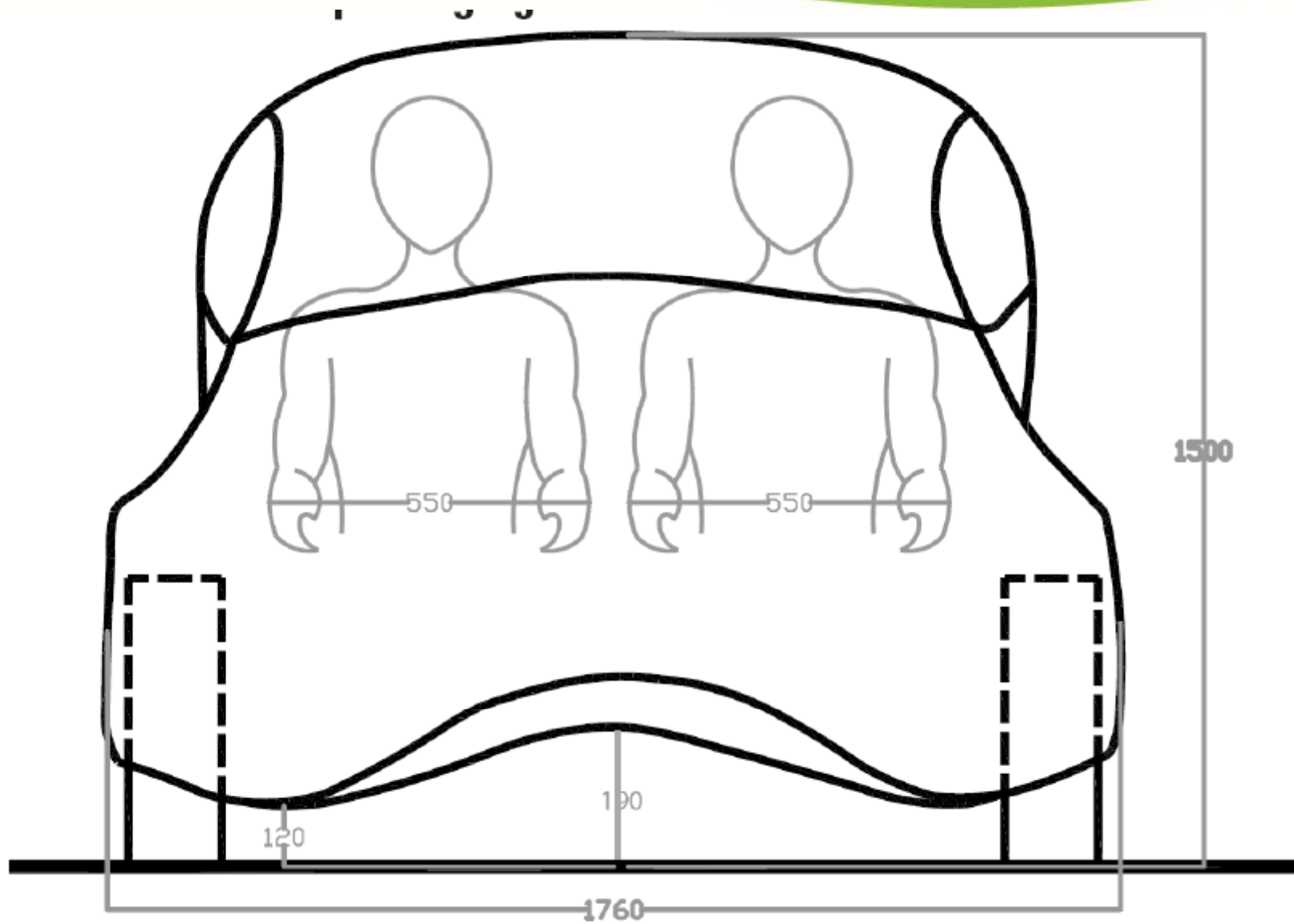
The car essentially photosynthesizes and gives out oxygen. Hence the name "Jeevan". The letter 'G' is present in oxyGen, hydroGen, alGae, Green, nextGen. This car is the first of its kind that actually releases oxygen as a by-product. Hence the car is called "G1". The name completely captures what the car stands for. The presence of the leaf was important in the logo.

The paint was bluish silver and green which represents the hydrogen and algae component of the car.

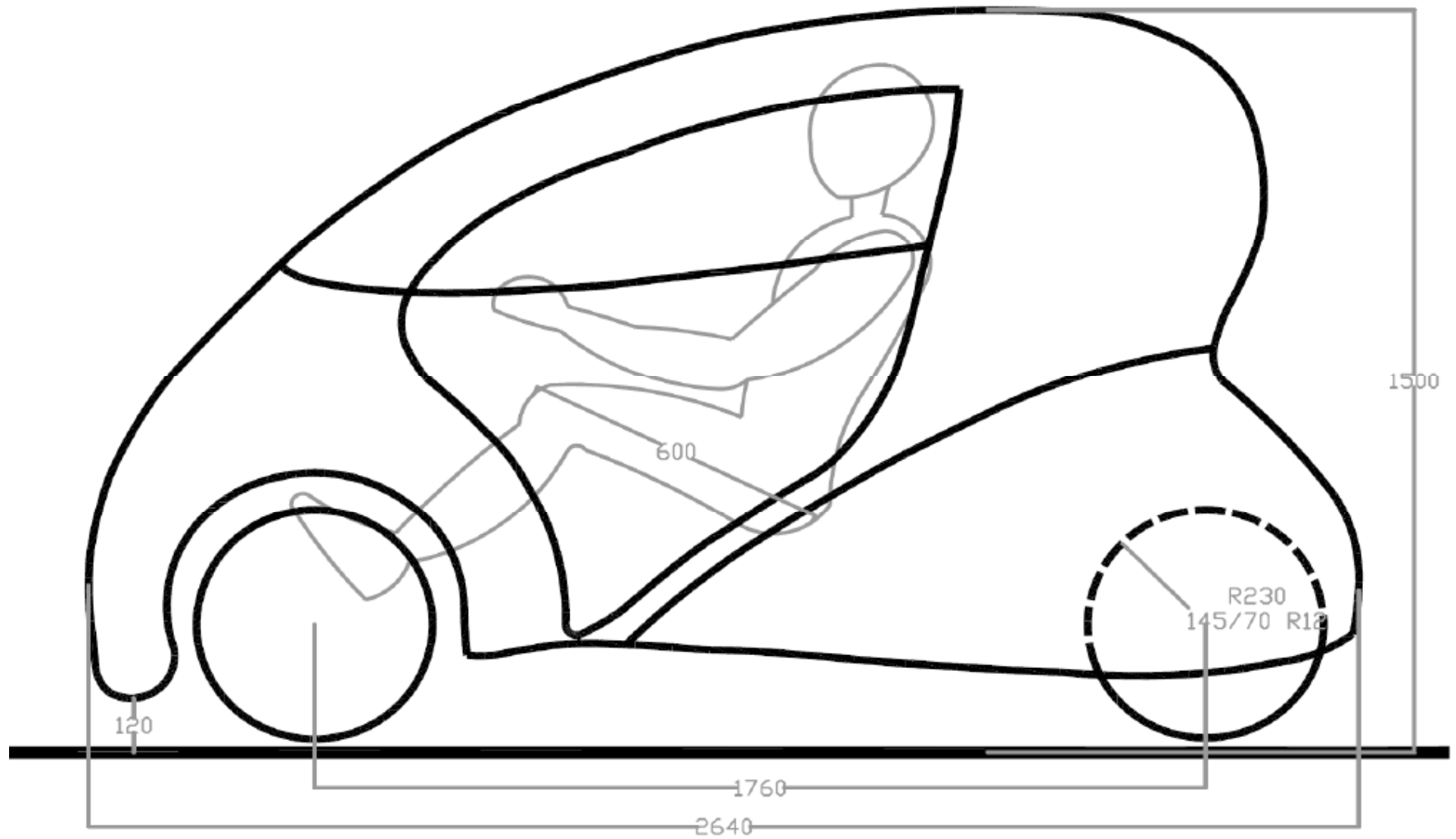


IDC - G1

Dimensions and packaging



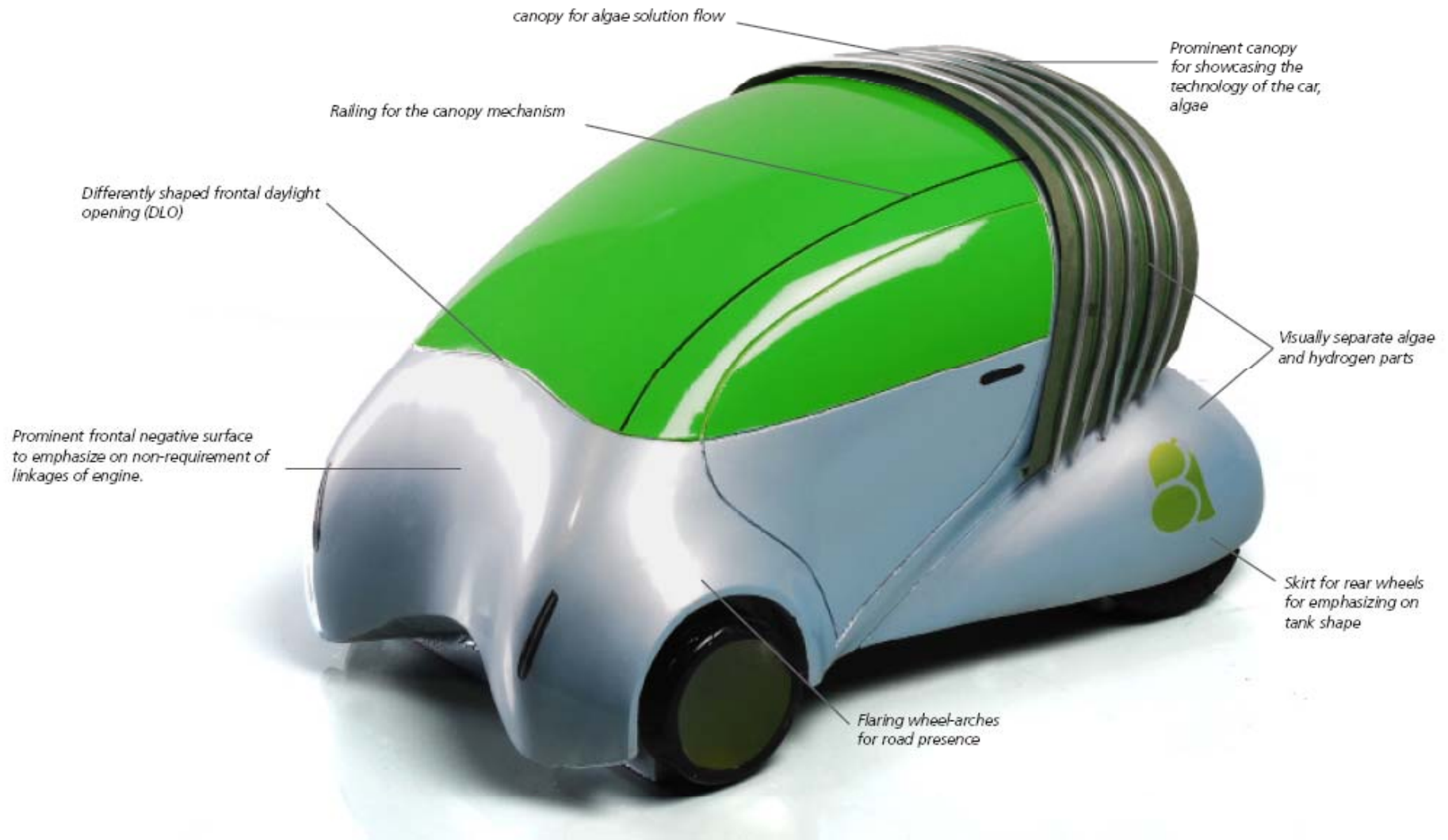
Dimensions and packaging



Final proposal and features



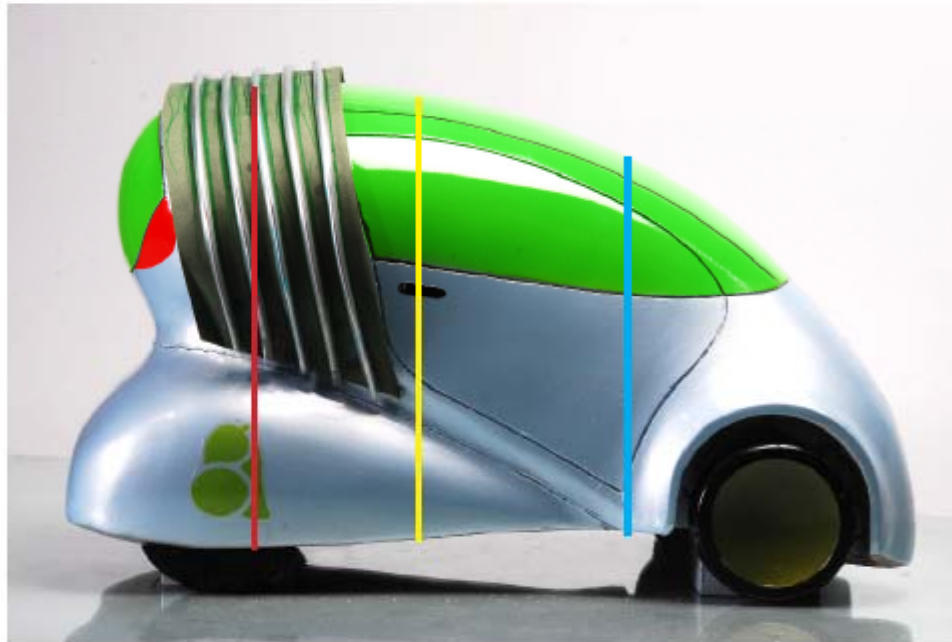
Final proposal and features



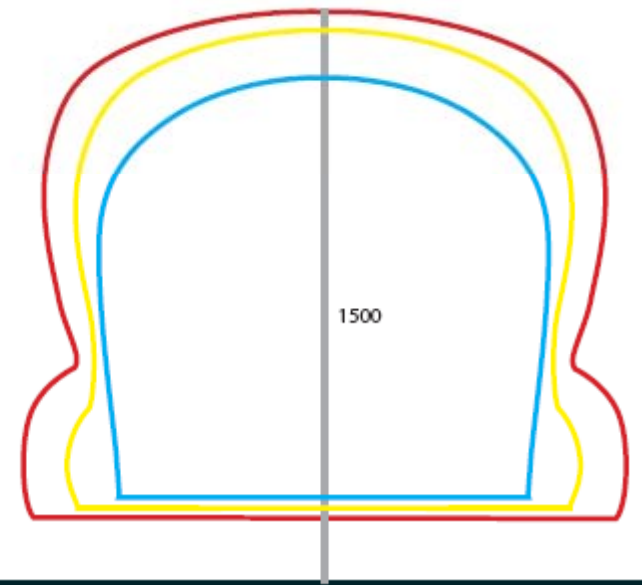
Final proposal and features



Final proposal and features



Three cross sections of vehicle are shown below. The sections are colour coded in the side view and are shown.



Thanks a million!! 😊

Ramdas sir, Milind, Ratika, Juny, Dhuri, Bongo, Tabitha,
Dhanush, Taruja, Pushky, et al.