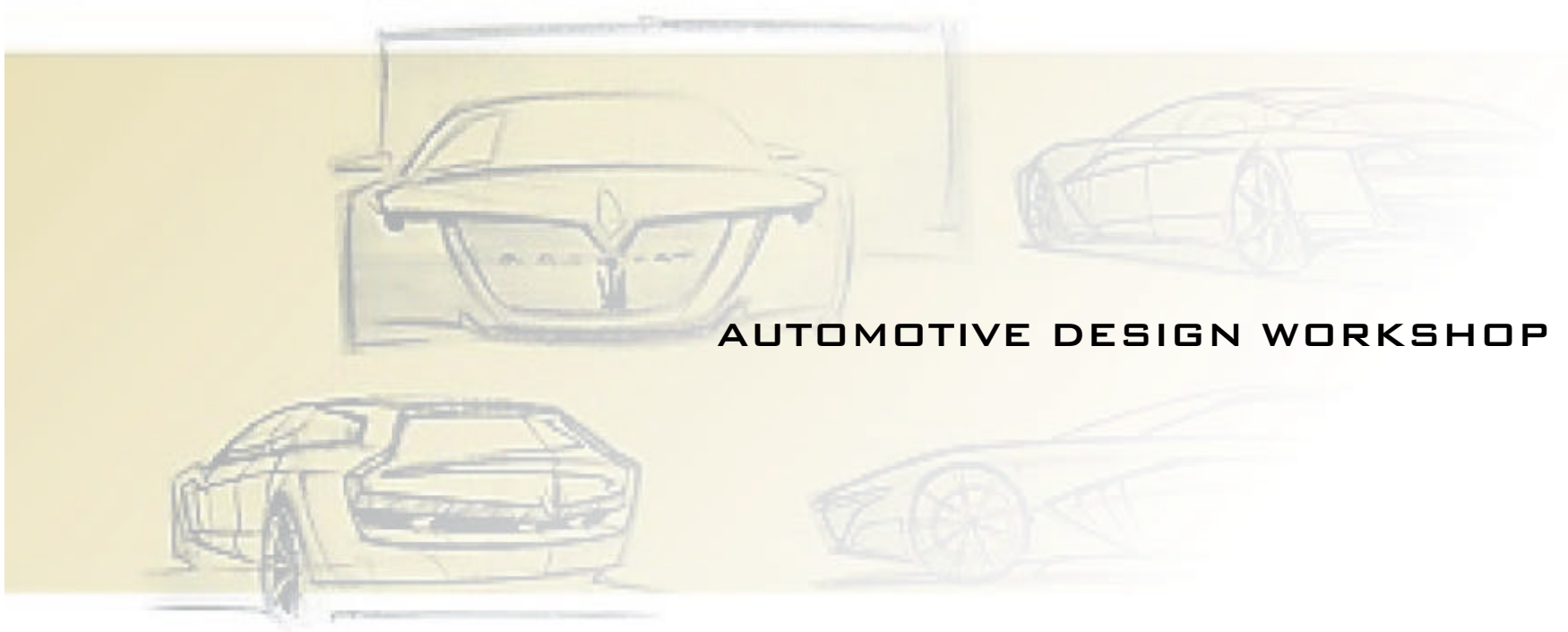
SUMMER TRAINING REPORT

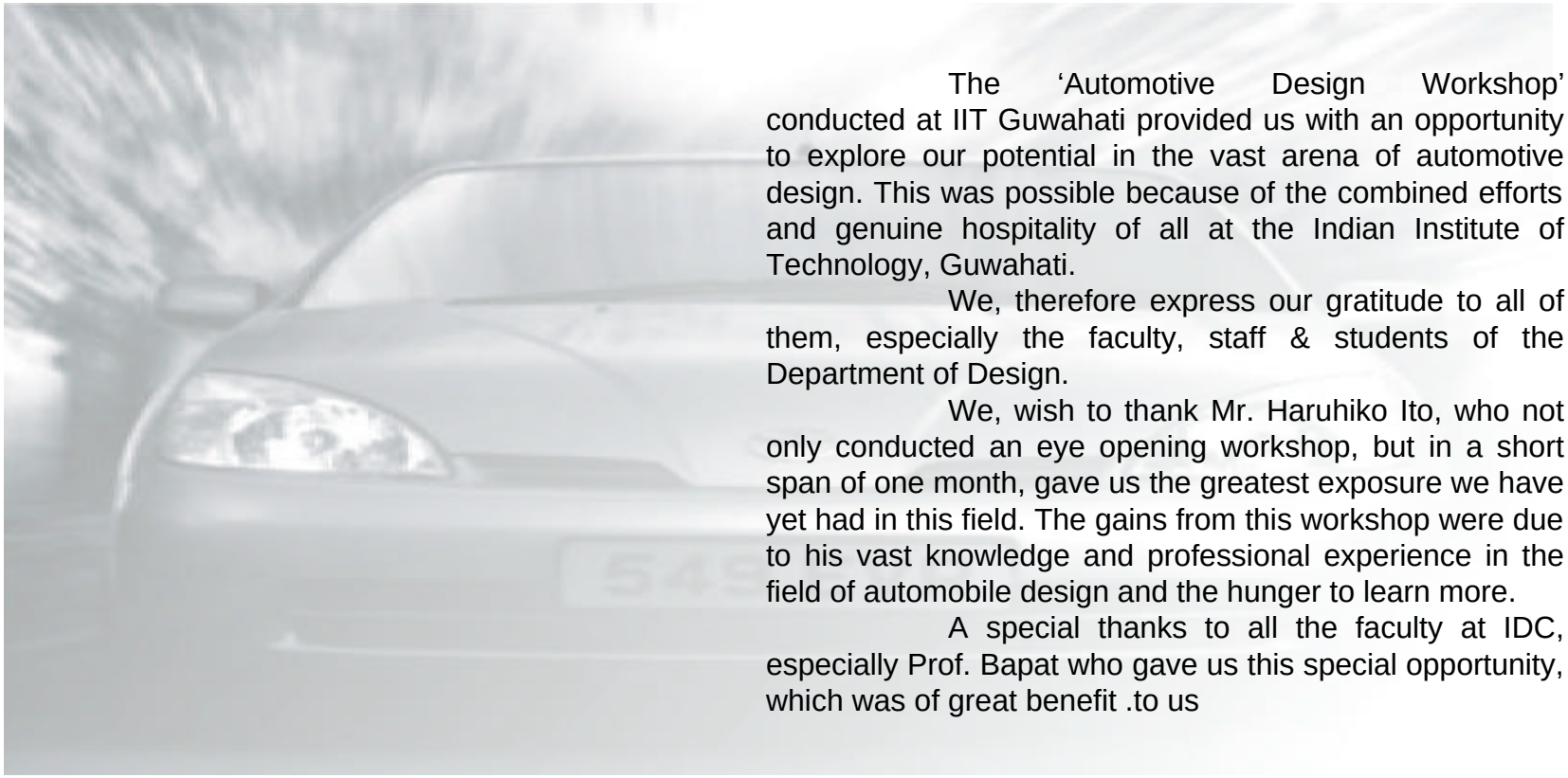


AUTOMOTIVE DESIGN WORKSHOP

Conducted at IIT-Guwahati
by
Mr. Haruhiko Ito [Industrial designer, Japan]

Nikhil Rane
02613002

Acknowledgement



The ‘Automotive Design Workshop’ conducted at IIT Guwahati provided us with an opportunity to explore our potential in the vast arena of automotive design. This was possible because of the combined efforts and genuine hospitality of all at the Indian Institute of Technology, Guwahati.

We, therefore express our gratitude to all of them, especially the faculty, staff & students of the Department of Design.

We, wish to thank Mr. Haruhiko Ito, who not only conducted an eye opening workshop, but in a short span of one month, gave us the greatest exposure we have yet had in this field. The gains from this workshop were due to his vast knowledge and professional experience in the field of automobile design and the hunger to learn more.

A special thanks to all the faculty at IDC, especially Prof. Bapat who gave us this special opportunity, which was of great benefit .to us

Sequence of Activities

Sketching

- Exterior styling – Concept (Form) generation
- Learning the use and importance of anthropometric data
- Conversion of final concept into dimensional drawing

Tool and template preparation

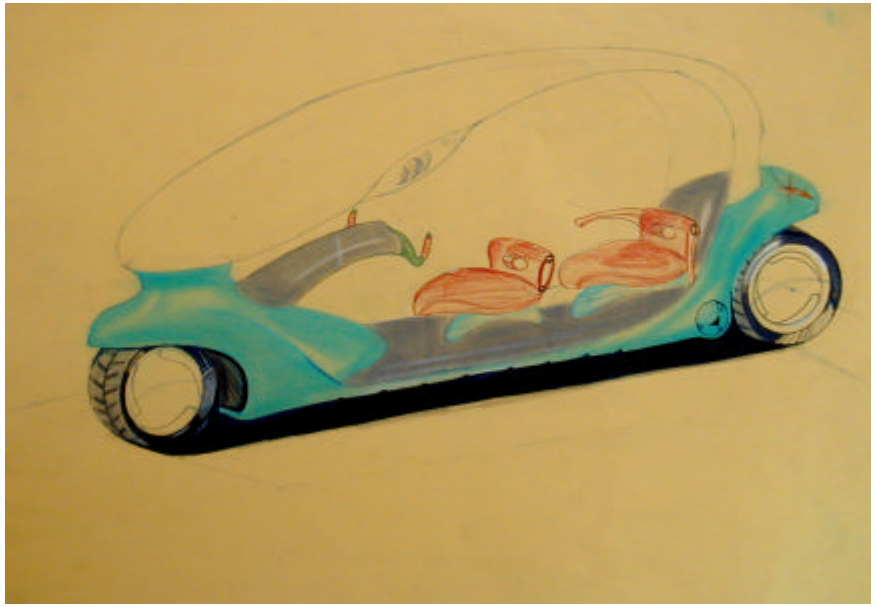
- Scribers, right angles and sweeps
- Front, rear and side profile templates
- Base plate (Wood)

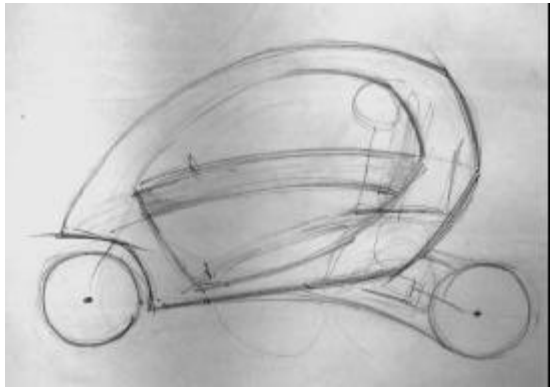
Model Making

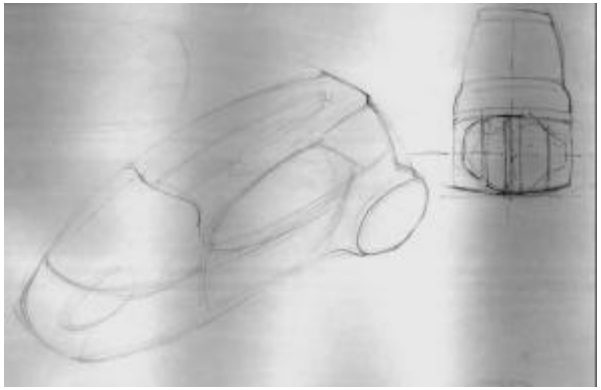
- Preparation of Thermocole core
- Clay modeling
- Plaster mould making
- Final plaster casting
- Finished model preparation (Refining surface, applying putty, painting, graphics and stickers)

Exterior styling – Concept (Form) generation

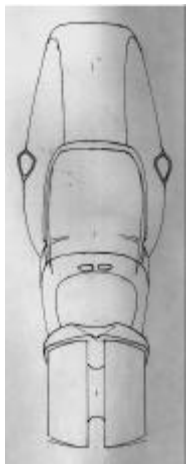
Concept generation for a mega cruiser (large capacity scooter for two people)

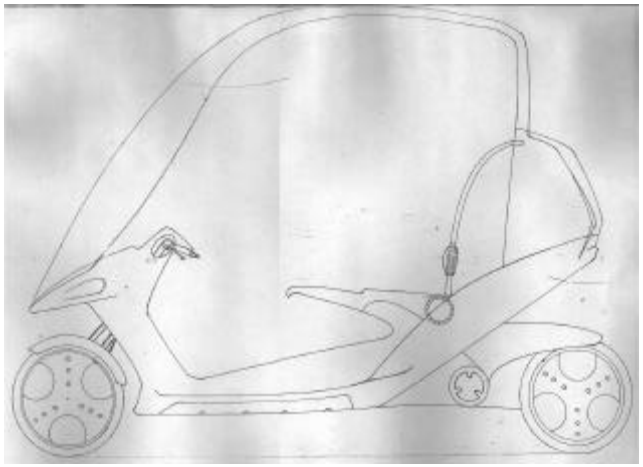


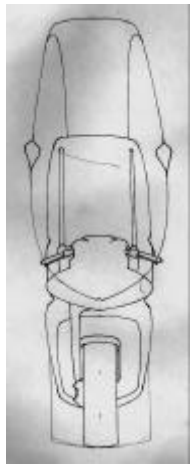




Final Concept (Rendering & Scaled views)







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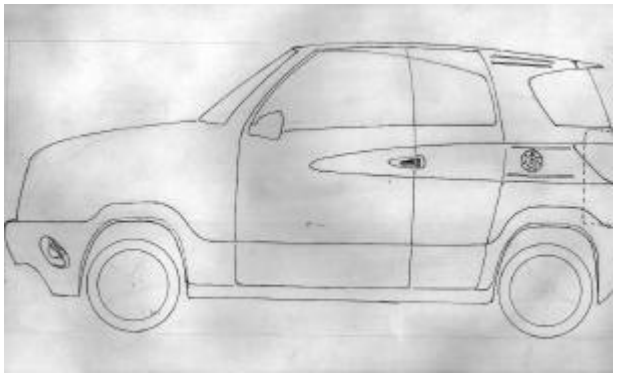

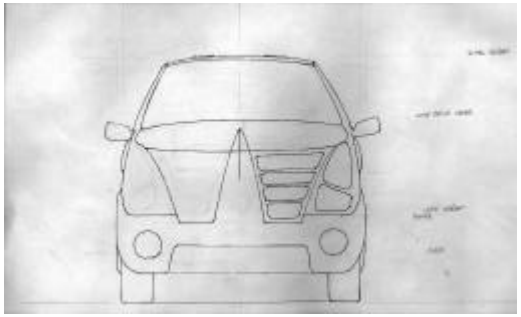

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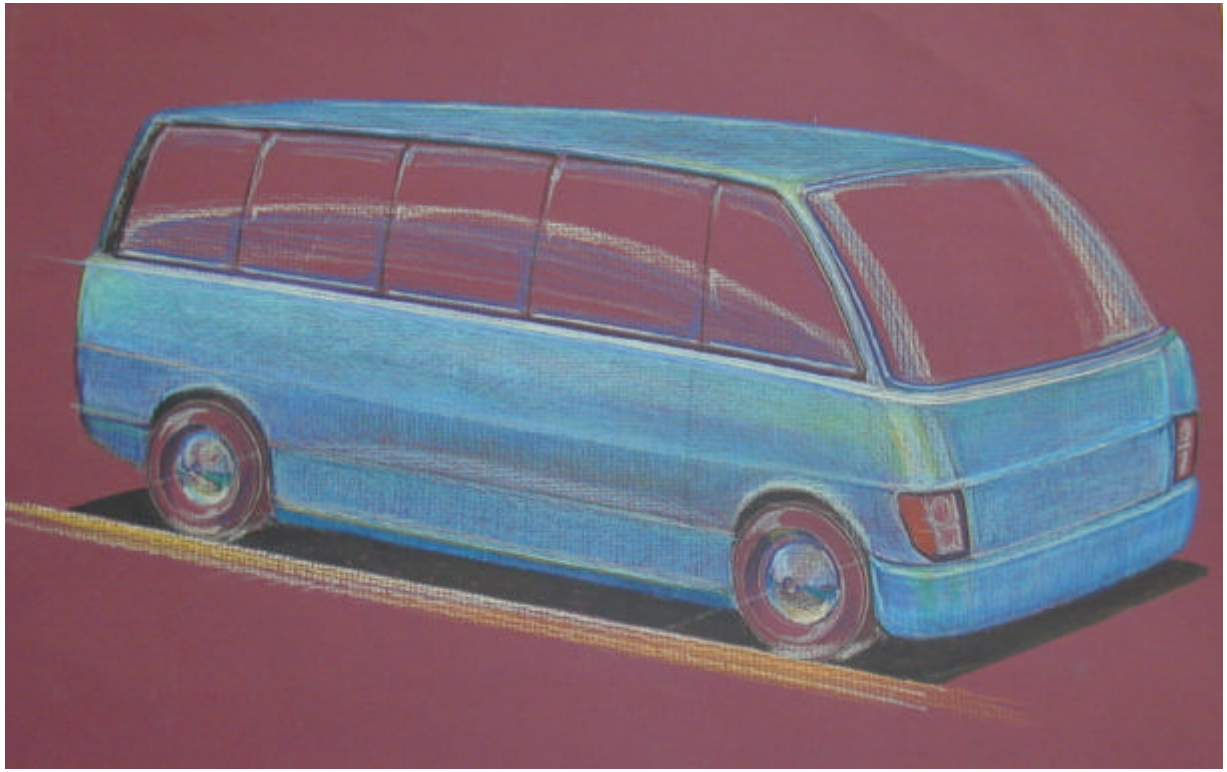
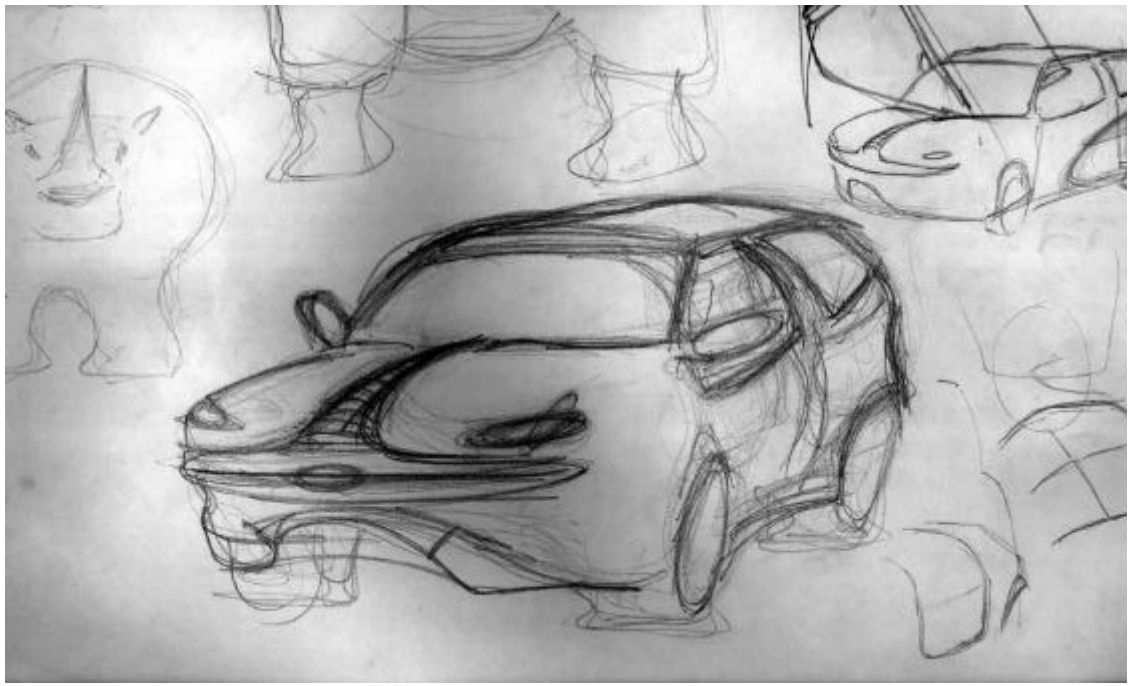


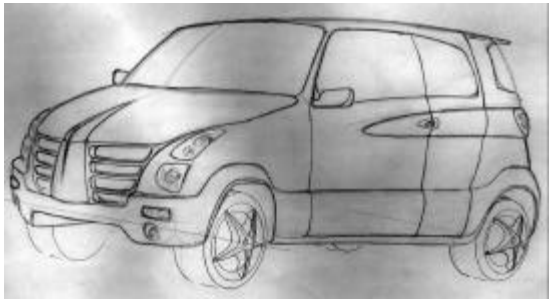
Exterior styling – Concept (Form) generation

Concept generation

For

Sports UTILITY VEHICLE





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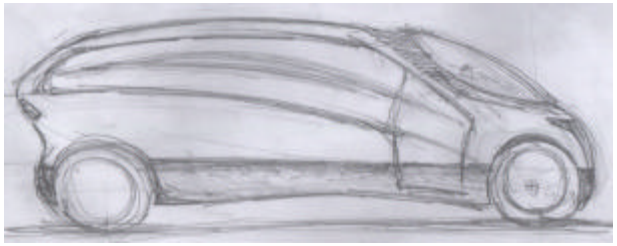
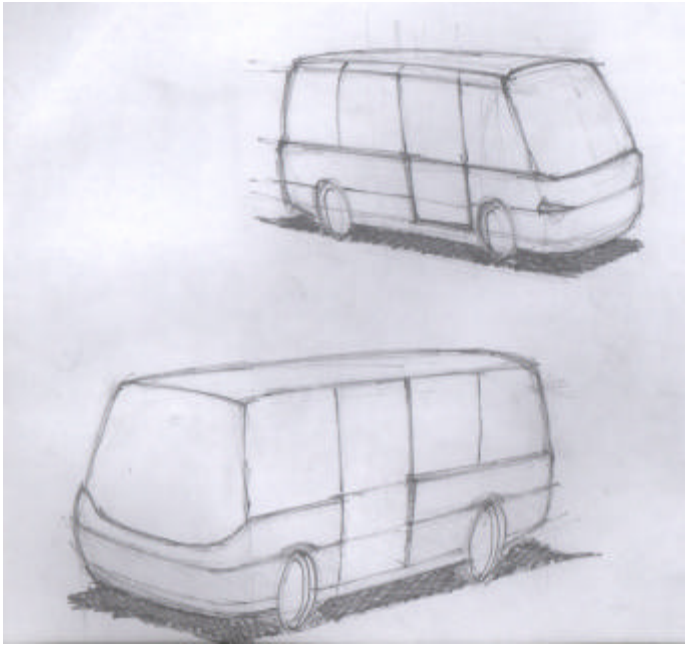
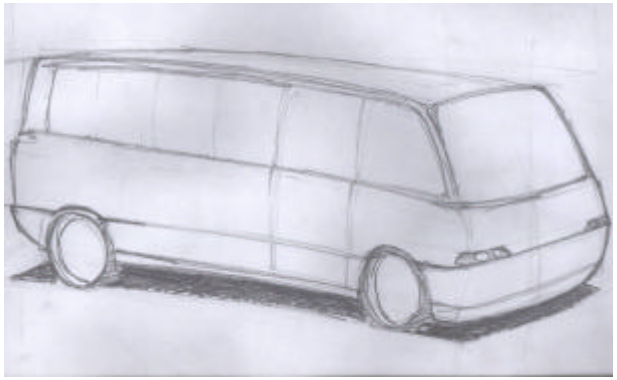


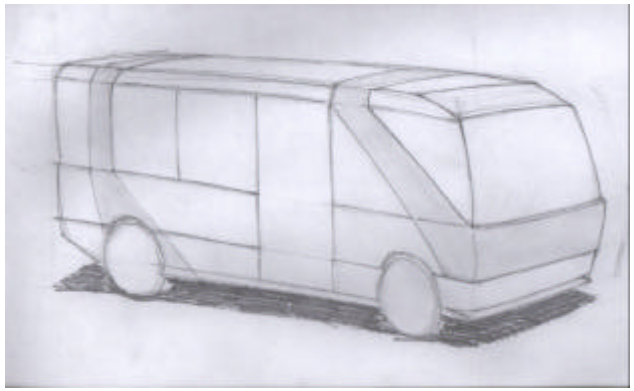


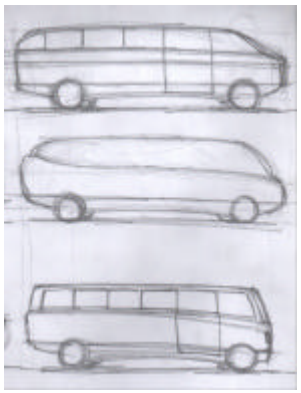


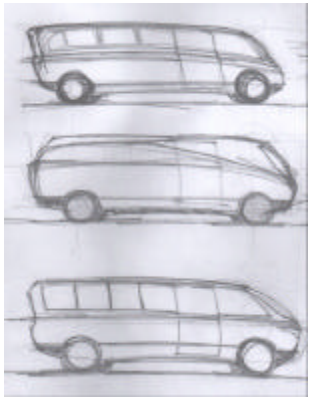
Concept generation

For

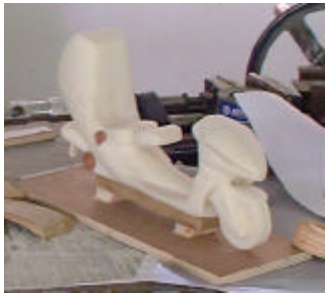
microbus

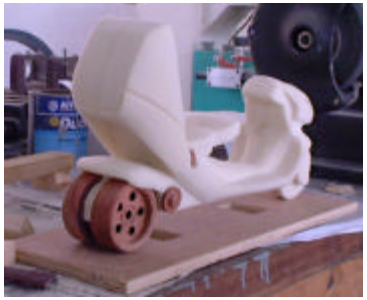






Evolving the Final Model (in PU Foam)

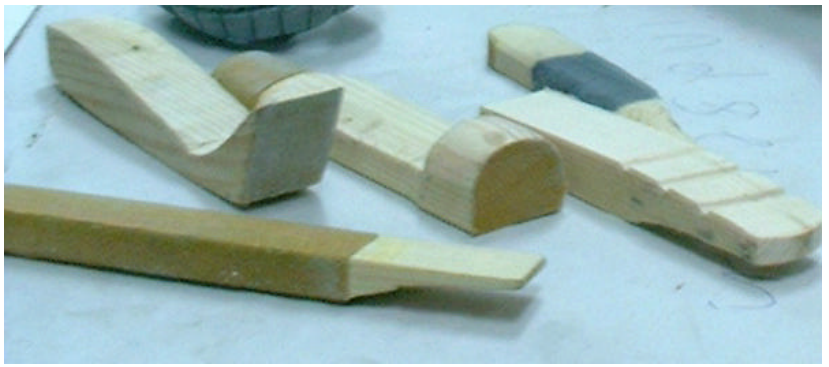




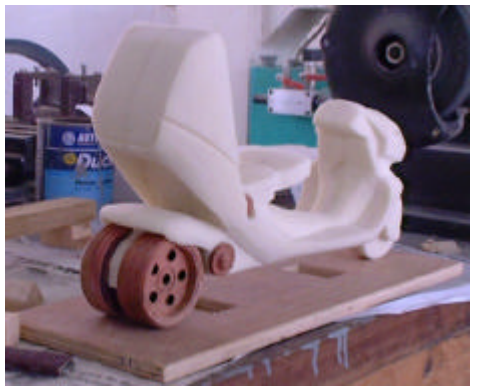
Evolving the Final Model (in PU Foam)

Tool and template preparation

Working with PU foam was a good experience in model making as it is very easy to carve with blades, knives and also to abrade with sand paper. However the making of simple tools enabled me to produce a model with greater speed and with more accuracy.



The easiest way to make my own tools was by using sandpaper and wood, especially soft wood. This allowed me to work on flat surfaces, contours, etc with equal ease. By using different grades of sandpaper, one can achieve better results than by using the sandpaper by hand.



Templates are needed for the front and side profiles to check the maximum dimensions. These are made in either wood or styrene sheets with drawings on graph paper.

A base plate made of wood is necessary to work with the model. The size of this is based on the size of the model and clearances on all sides. Its sides must be perfectly flat and perpendicular to each other to enable use of templates with it.

Wheels, tyres, lights and other details

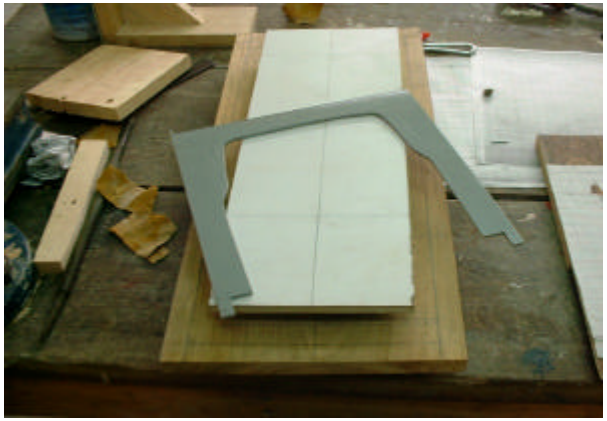
Wheels and tyres, I realized, were often neglected in model making and could result in an otherwise good model looking mediocre. After trying out plaster, PUfoam and wood , I selected wood as the main wheel component . This was made on a lathe to dimensions and rubber treads and foam alloy wheel components were added on.

The steering components are added on separately and other details such as mock crankcase cover , an acrylic front glass and wooden mock canopy are addred.

Preparation of Base Plate and Templates

The base plate is made of wood keeping in mind the overall dimensions of the vehicle. Two slots are cut into the plate which are the same distance apart as the wheelbase of the vehicle. It is important to make sure that the plate is uniformly flat and the edges are true as these will act as the guides for the templates.

The front, rear and side profile templates are made using the dimensional drawings. These are essential to check and ensure that the vehicle dimensions remain constant.



Thermo Cole Core

On the base, several layers of polystyrene foam are stuck. This forms the core of the vehicle upon which the clay is put to make the rough model.
The thermo cole is cut to a reduced dimension so as to leave about 2 cms to apply clay.
The finished thermo cole core is then spray painted with duco paint to make the surface hard. This prevents sagging.

Clay Modeling

On the finished PS foam core, clay is applied gradually so as to cover the entire surface evenly. Once sufficient clay has been added, the model is placed on a true surface. With the help of a series of templates (which includes front, rear and side profile) the excess clay is removed. A rough clay model is got after this process, which can be further, finished using the various scribers and scraper plates. High degree of surface detailing is possible with minimal skill.

Clay is a forgiving material and is easy to use unlike other modeling materials. Once the final clay model is complete it is ready to plaster. A parting line is made along the central axis of the model. Copper strips are then inserted along the parting line into the clay model up to a depth of 1 cm. The model is now ready for plastering.

Plaster Mould Making

A 1:1 mixture of plaster and water is prepared for plastering purpose. The clay model is then sprinkled with plaster by hand. A thin uniform layer must be put, care should be taken that no gaps are left and any exposed clay is entirely covered with POP. This process is repeated 2/3 times till a uniform layer of plaster covers the entire model.

In the second stage of mould making a layer of thick plaster is added over the existing layer so as to give strength to the mould.

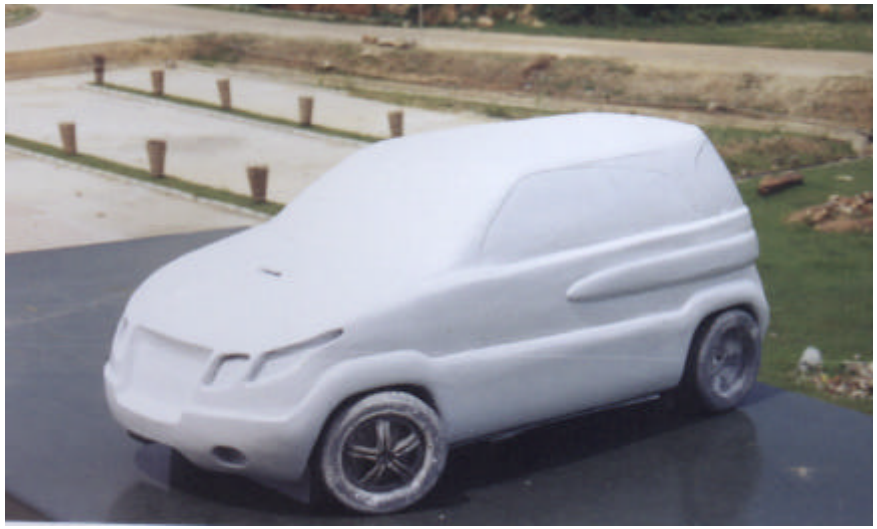
Once plastering is completed the mould is left to dry for 8-12 hours. After drying the copper strips are removed from along the partition line and the 2 halves of the mould are carefully pried apart.
After the inner surfaces of the mould are cleaned they are put together creating a negative cavity in which the final model is cast. Both the halves of the mould are joined by placing a thin cloth dipped in 1:1 POP solution along the partition line. Over which a thick layer of plaster is put to strengthen the joint. This is then left to dry. The mould is now ready for the casting process.

Final Plaster Casting

The mould surface is coated with a surface release agent. Once the surfaces are ready a 1:1 POP solution is made and poured into the cavity. Then it is rotated in such a way that it touches all the surfaces inside and sticks to it exactly in the same fashion how roto-molding is done. Several layers are created to make the shell thick enough (say 2 cms thick). Layer should be created before the previous layer dries up completely. Then the mould is kept for drying. After 12 hours the mould can be opened.

Removal of Mould

First the cloth band is removed carefully and then the mould is separated along the parting line. Finally the cast comes out with the same surfaces that we created in the clay model.



Detailing

Finer details like headlamps, tail lamps, door handles, shut lines etc. can be done before applying putty.
After finishing the plaster model, putty is applied and sanded off to get a better finish. Three coats ensures a very high quality surface.
White duco paint which is softer then other paints is sprayed on the top of it which can be further finished.

Painting

Spray paint it under favorable condition for best results.(2-3 coats)
Fix head lamps, tail lamps, shut lines, rear view mirror, spoiler etc and attach finished wheels and the model is ready for photography.