Redesign of the superstructure of speedboat 'Freedom'

(Internship at Samudra Shipyard, Cochin)

Project 1

By

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146390005

Guide

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Industrial design Centre
Indian Institute of Science and Technology
2016

Declaration

I declare that this written submission represents my own ideas in my own words and where others ideas and words have been included,
I have adequately cited and referenced the original sources. I also declare that I have adhered to all the principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission

I understand that any violation of the above will be cause for disciplinary action by the institute and can evoke penal action from the sources which have thus not been properly cited or from whom proper permission has
not been taken when needed.

Signature:

Name of the student : Ajithlal CM
Roll No. : 146390005
Date: :

Approval form

The project titled 'Redesign of the superstructure of speedboat Freedom' by Ajithlal C M is approved for the partial fulfilment of the requirement for the degree of Master of Design in Mobility and Vehicle Design

Guide :

Date: :

Acknowledgement

The Freedom redesign project materialised to this extent as a cumulative effort and guidance of Mr. Jeevan and Mr Arun at Samudra Shipyard. For without your time, patience and prompt action in providing the men and material required by us to make this project a reality.

To Industrial Design Centre for giving me this opportunity.

Completion certificate

Samudra

Ref: No SSPL|P15|2015|242R
Date: 3rd June 2015

To whomsoever it may concern

This is to certify that Mr. Ajithlal CM , student from Industrial Design center, IIT Bombay has completed his internship with us from 12th May to 29th June 2015. Mr. Ajithlal has redesigned the superstructure for our speed boat "Freedom".

The yard is happy with the way Ajith has undertaken his responsibility.

For Samudra Shipyard Pvt. Ltd

Dr. S. Jeevan
Chairman & Managing Director

the art & science of BOATBUILDING

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ISO 9001-2008 Company

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Content

1. Company profile

Samudra Shipyard (P) Ltd., is primarily an ISO certified boat builder in India, which designs, manufactures, supplies and services FRP boats up to 27 M length, for fishing, tourism and patrol. They make water sports equipments, marker buoys and other marine related products. Over 55 different models are available ranging from 3.82M single man canoes to 27.5M 2 & 3 bed room houseboats.

2. Company products

Samudra is the only company in india which makes houseboat hull in FRP.

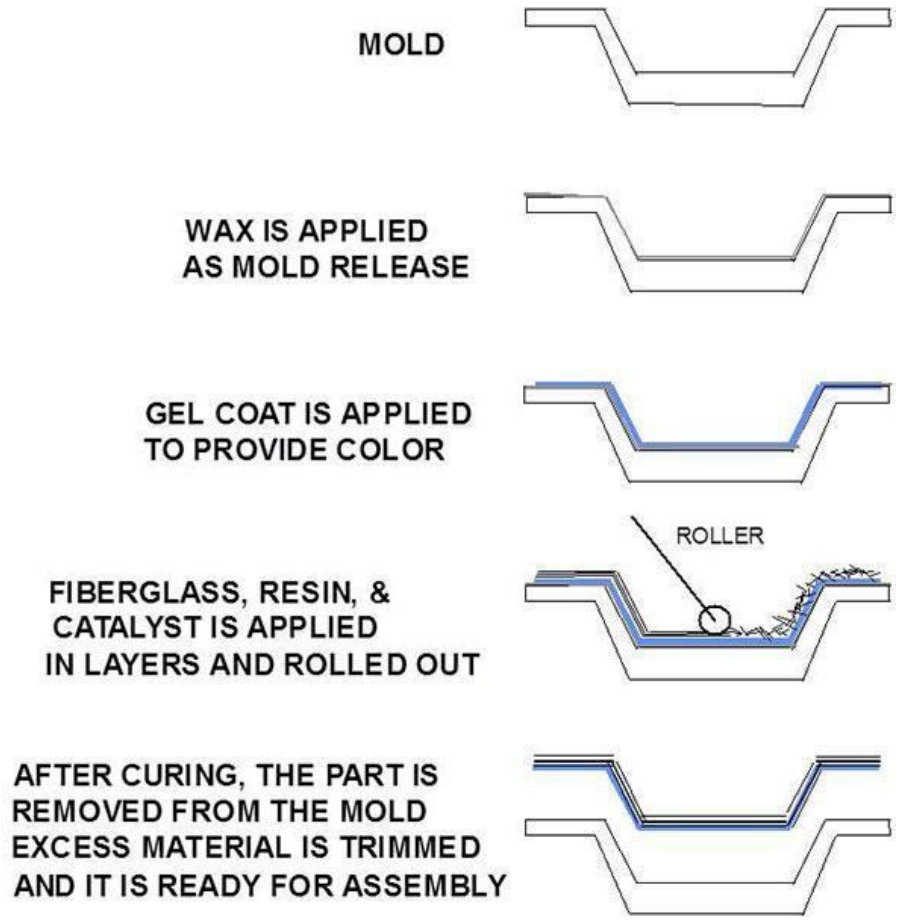
Apart from house boats , they also make

- Canoes
- Speed boats
- Leisure fishing boat
- pedal boats
- Water taxi
- Fishing boats

3. Product Brief

The speedboat Freedom is the most selling product of Samudra. This product is now 12 years old. It has not received any upgrades. It is losing its market share. Due to the old manufacturing method, it takes 11 days to make one of these. It can be reduced to 5 days if the seats could be integrated to the deck mould.

4. Understanding process



In Samudra, hulls are designed according to naval architect standards. Deck is designed and made in house according to user needs. For large boats, FRP ribs are used as stiffner.

They have hull moulds in various sizes and uses them as per customer requirements. For example they make water taxi with their 7 meter hull, and a force traveler body as a deck mould. So it is possible to use traveler windshield and glasses for the taxi, which is economical.

5. Mould preparation at Samudra

Samudra has a lot of skilled traditional labour. Mould preparation is done using traditional methods.

They either copy a model using it as a pattern or build it from scratch. They use the same process for copying a shape also.

Here moulds are made with wooden cross sections and plywood. GI pipes are attached as frame and stiffner.

The carpenters prefer physical mockup models to understand the surface transition rather than CAD models.

6. User study insights

User study was done at Cochin marine drive and Thekkady lake. These are the opinions I got:

•9 seater sells more
•Seats should be forward facing, passengers prefer windblast in the face.
•Most of the people step in or out of the boat through the side shoulder.

•Increase front/side height to avoid splashing
•Provide a specific place for keeping floating devices.
•Front windshield is too high to cross over it comfortably.
•Poor ergonomics
•Canopy is useless when it rains.

7. Manufacturer requirements

•Should be 6 to 9 seater compatible. So not possible to integrate seats to the deck.

•Take into account the thickness of sidewall design. Thinner sidewall results in more interior space, Thicker sidewall- easy to make and release mould.

•Seat design problems: the existing seat is un ergonomic, unnecessary wide and very unstable.

•Driver seat position : some drivers prefer rear seating as it reduces cost of control systems, battery etc

•Give markings/indicators on the mould for attachments, so the workers don"t have to measure and find the point. It saves time and money.

•There is water splashing problem at the engine mount. Try to avoid that in the new design.

8. Colour exercise on existing Freedom

This exercise is done for bringing freshness into the old design of Freedom. Lines and graphics are to be kept clean and minimal to make the coloring process easier. As complex designs may cause splattering of paint, simpler designs are preferred.

9.0 Final colour sceme and preparation

9.1 Final colour sceme and preparation

- Did a tape drwing of the pattern
- Applied a sheet of paper and cut it in the shape to get a pattern.
- Applied the pattern on the mould and made tape drawing on the mould.

9.2 Final colour sceme and preparation

10. Benchmarking

Sea Ray **19 SPX OB (outboard engine)**

The Sea Ray 19 SPX OB is one of the highest selling 8 seater speed boat in India with an outboard engine. It‟s design is very clean and understated. It has clever windshield in front which allows passengers to go to the front of the boat.

Why it sells?
: build quality, looks ,versatility and brand value

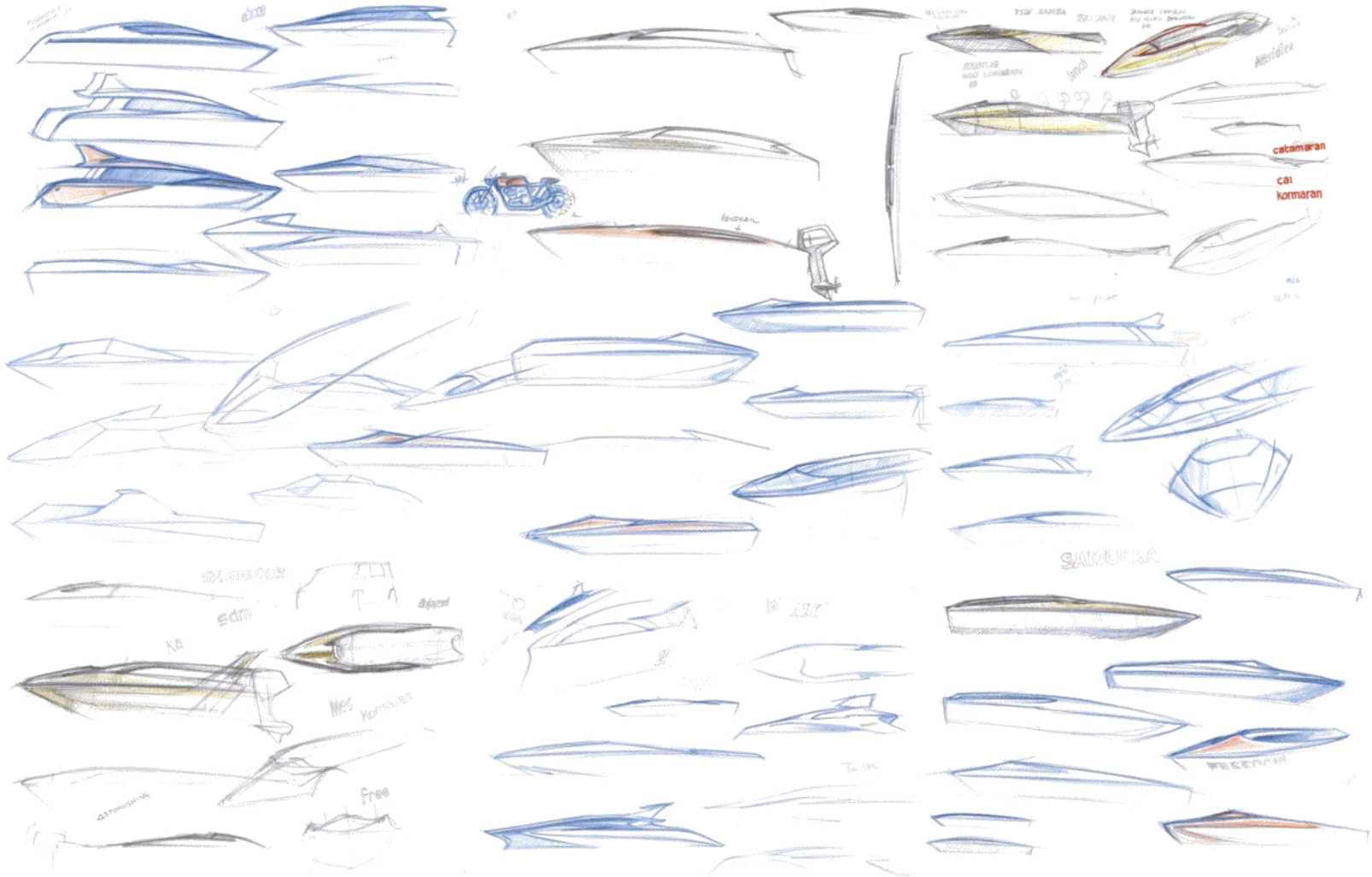
11. Mood board

The company wanted their speedboat to look fast and safe for customers.

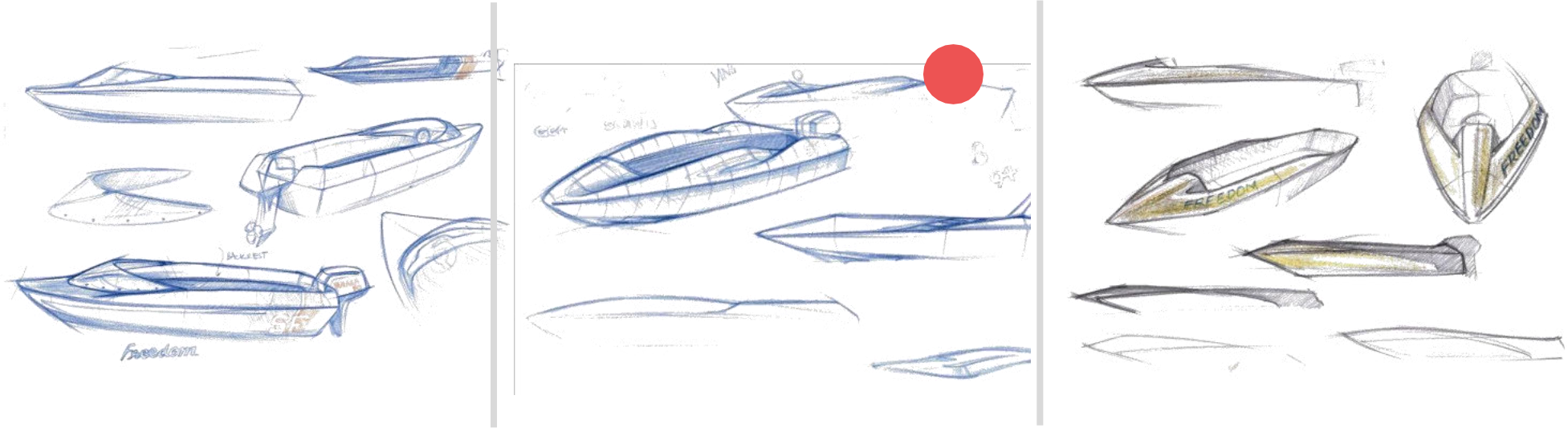
Mood board was prepared by asking potential customers/users of the speed boat. The idea was to understand what they think is **fast** and **safe.**

For them, surfaces that emphasizes the size and long directional lines together creates the feel of speed and safety.

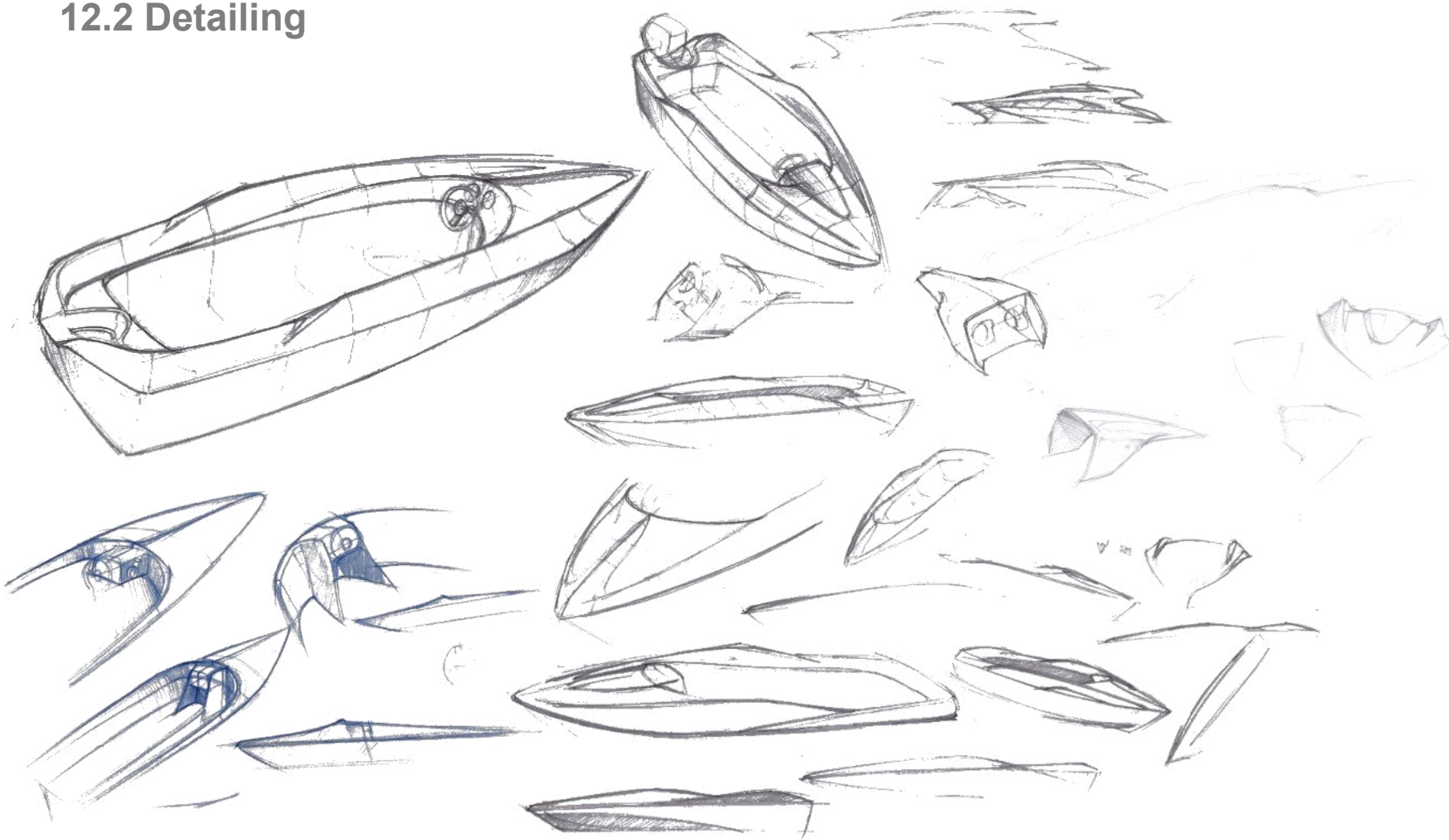
12. Initial sketches



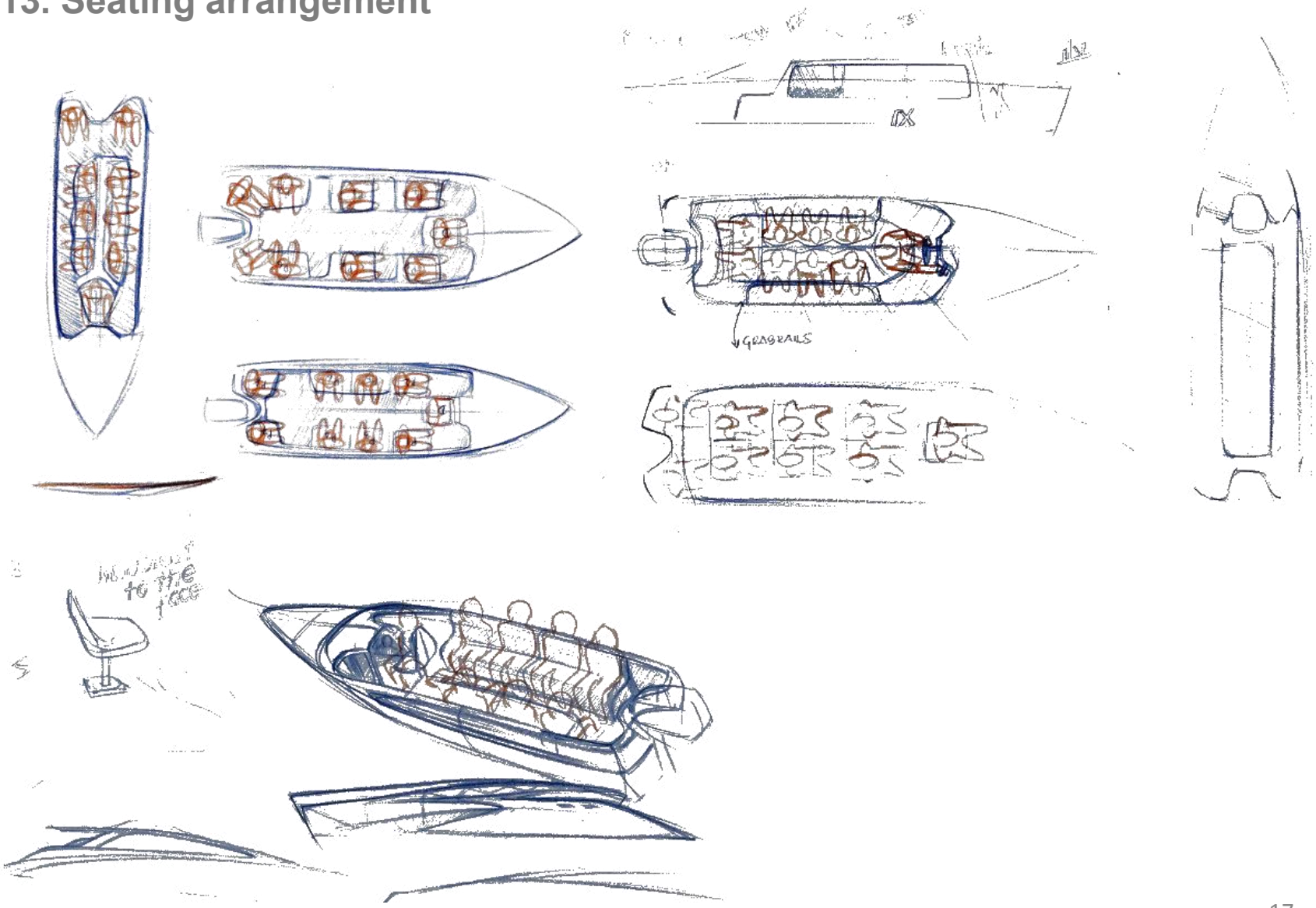
12.1 Design Directions



12.2 Detailing



13. Seating arrangement



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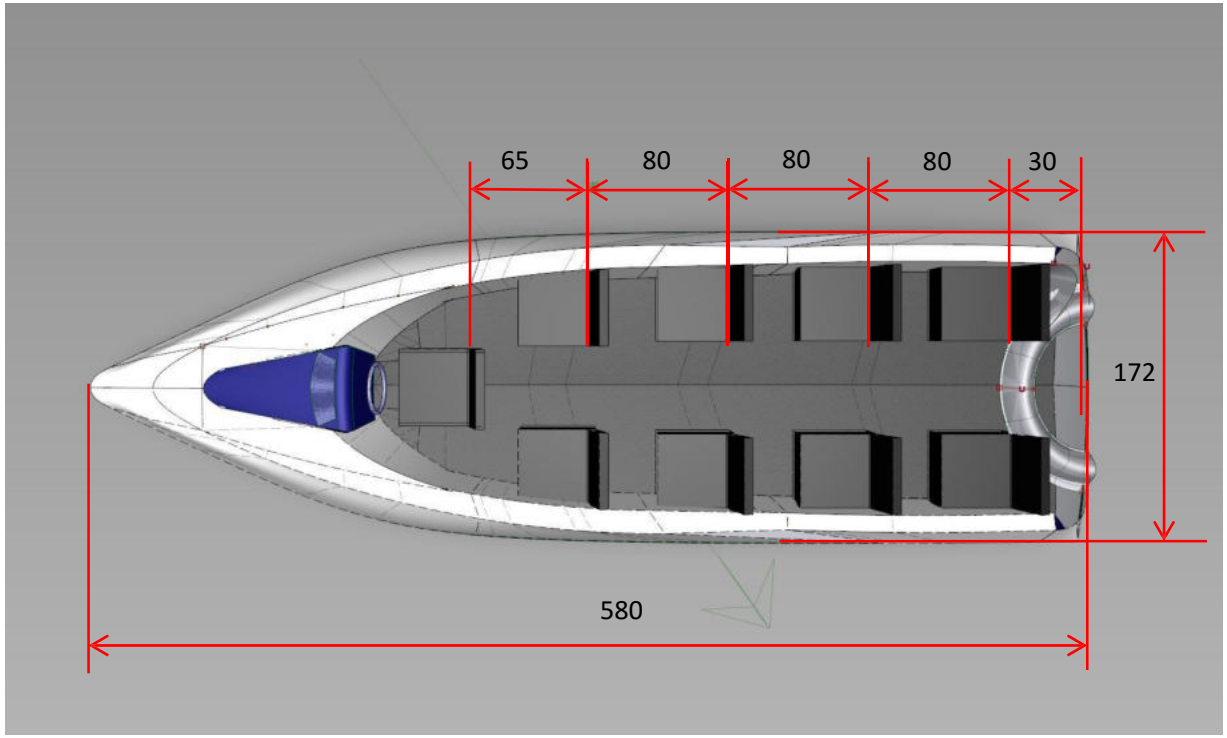


Important dimensions like the engine mount area diameter, engine plate angle are taken from the old boat and kept constant. Seat dimrnsions are taken from a normal comfortable chair. The h-point of the rearmost seat is fixed in such a way that it does not interfere with the engine movement, and it does not take much space also. Based on that other seats are arranged.

All dimensions are in cm

13.2 Seating arrangement





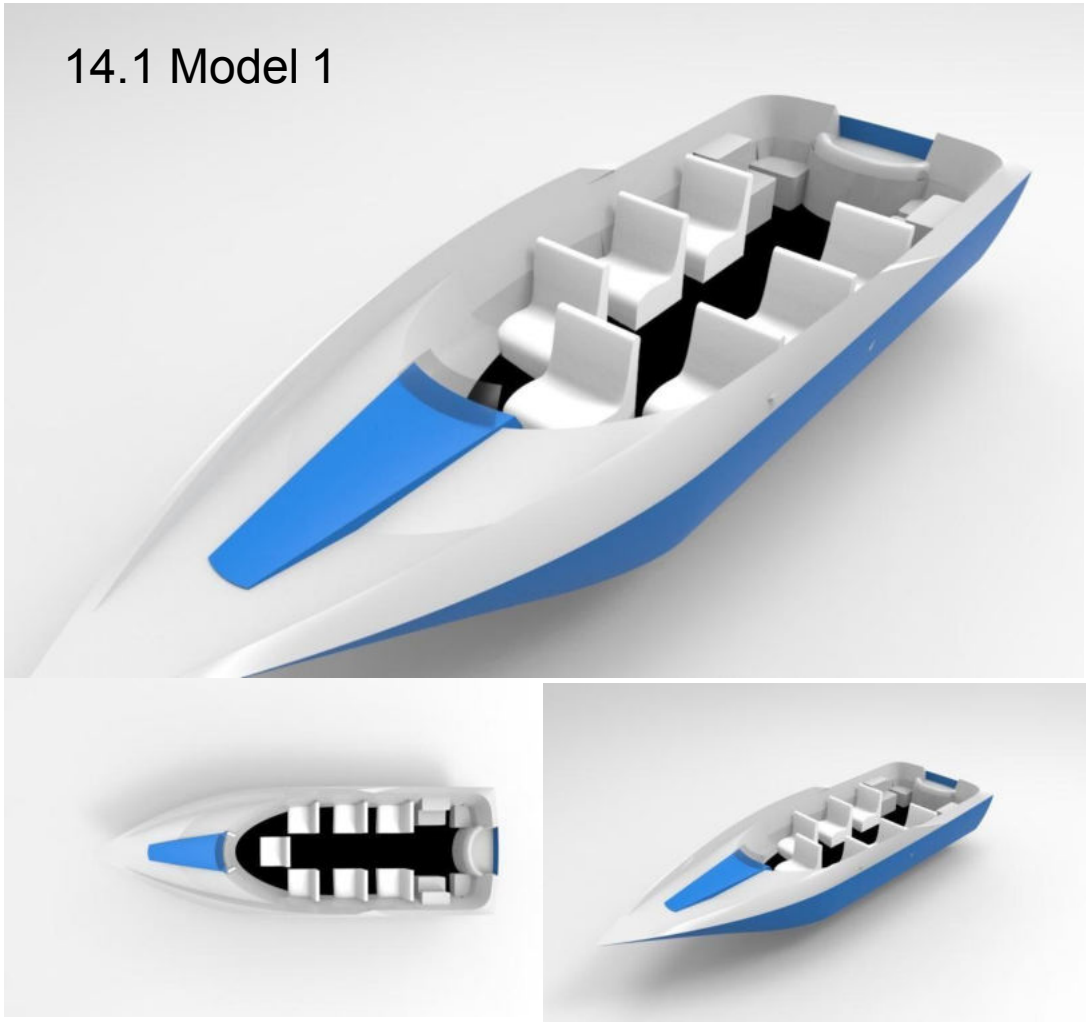




The proposed seating arrangement is verified by a person with 180 cm height (greater than 95 percentile (178.1 cm))

Measurements taken from Indian anthropometric dimensions

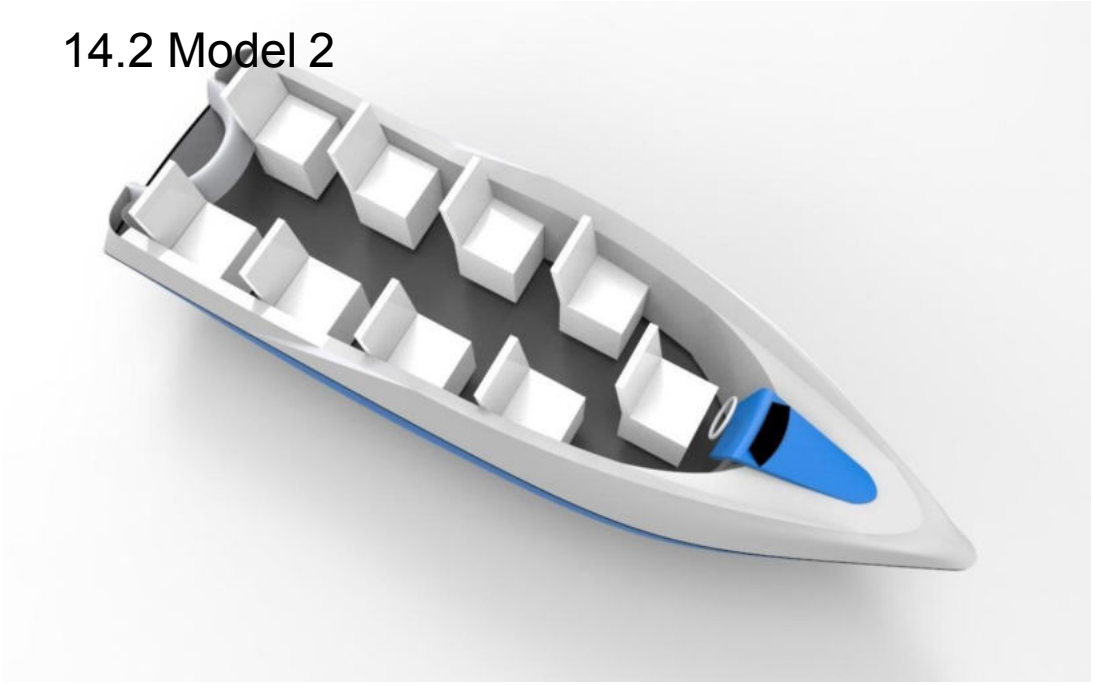
14. Understanding surfaces in 3D



Feedback:

- Front end is too sharp
- Rear steps are not necessary.
- Bring more drama to the design
- Concept of windshield, center console as additional accessories is good. Work on the shape of windshield.
- Windshield is only required for the driver as he is the one who spends most time in it.
- Provide a fixed rear driver seat as there are customers who are not willing to pay for steering system.

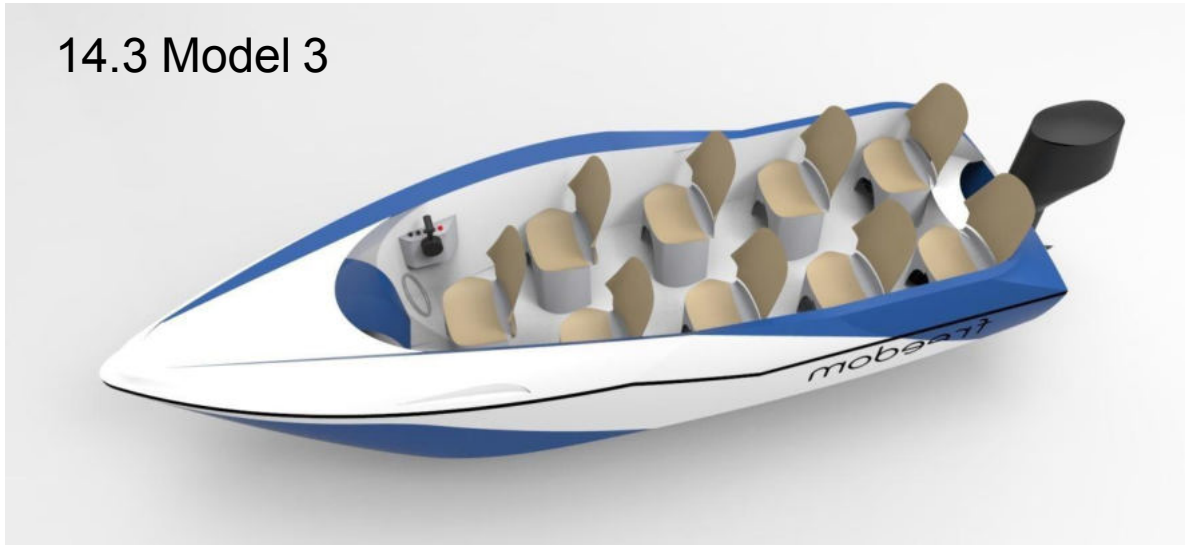
14.2 Model 2

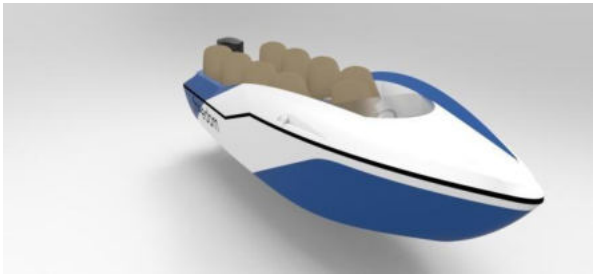


Feedback:

- Increase front height to 1 m atleast. So that this boat can travel in sea.
- Increase the hull height to achieve the total height.
- Make subtle changes to the character curve.
- Try to integrate body graphics to the design
- Front end looks insignificant and lacks power.

14.3 Model 3





Feedback

- Smoothen the joint line of the deck and hull. If it is sharp, during docking, it may damage the flange.
- Make sure to provide ample bending radius of min 8 inches for the steering and control cables.
- Front end looks similar to ecstasy, hence becomes recognizable as a family.

15. Full scale mockup model

16. Interaction with mould makers

•Boat height is too much. It may affect the stability.
•Provide markers for attachments.

16. Bibliography

http://www.samudrashipyard.com/
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http://3.bp.blogspot.com/
http://upload.wikimedia.org/