DINING CHAIR IN **BAMBOO**

for Goa restaurants

Guide
Prof. A. G. Rao

Prajakta S. Bamanikar
07613010

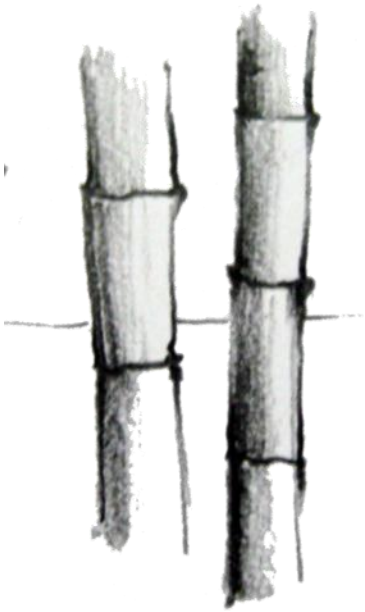
- Why this project?
- My Inspirations…

- Design Methodology

  - Material study
  - Field study
  - Suitable environment for material
  - Existing Product study
  - User study
  - Ergonomical approach
  - Ideation and brain storming
  - Design development
  - Validation and concept finalization
  - Marketing

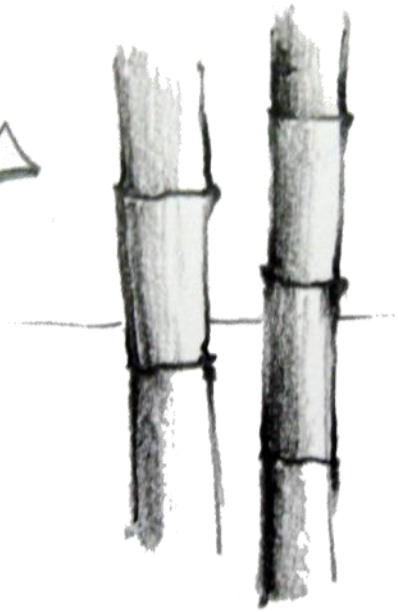
- Data Collection
  (primary research)

- Material Study



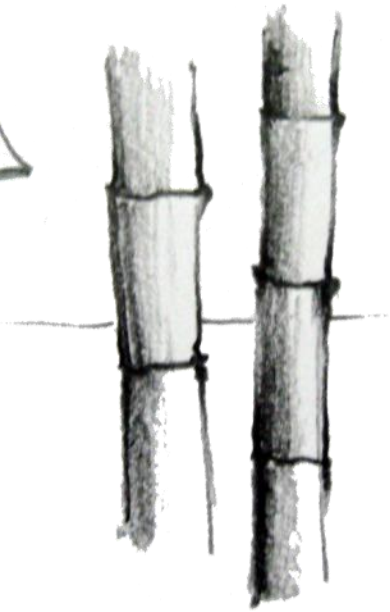
- Material Study

Traditional



- Material Study

Traditional

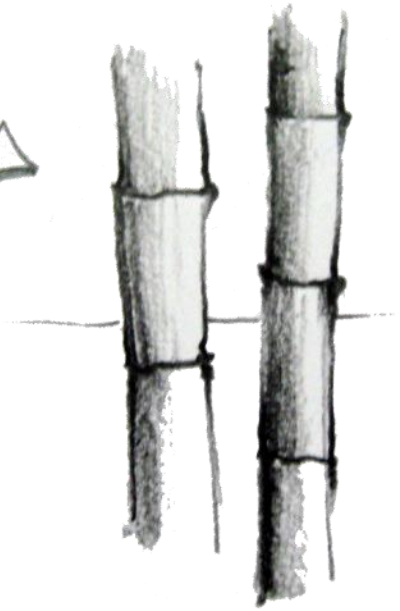


Construction

- Material Study

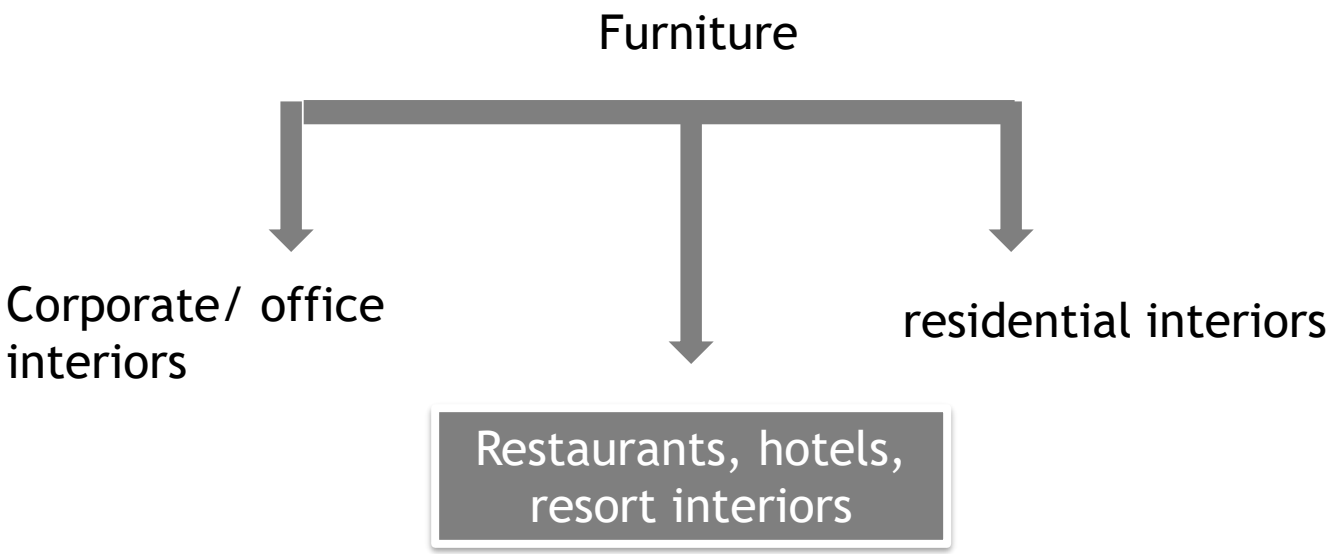
Industrial

Traditional



Construction

- Industrial use of Bamboo



- Field study at KONBAC Kudal

5.2 CURRENT METHODS:

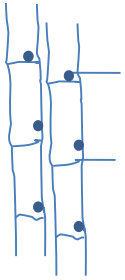
Current method of using bamboo for furniture purpose include following steps:

1. Sorting:

   In this method bamboo is been sort according to its age , type, and diameter.

2. Drilling:

   After sorting out bamboo is drilled near every node. This allows chemical to spread inside the hollow portion.



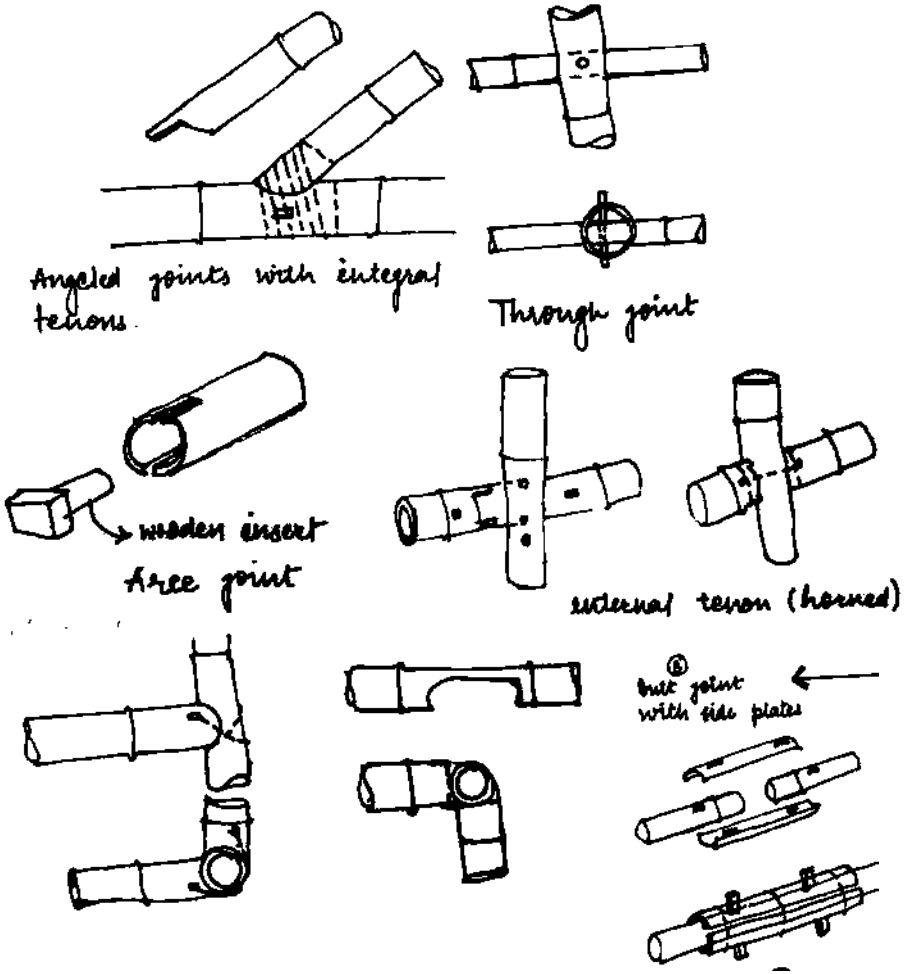
3. Treatment:

Water- air removing

- vacuumed process to remove air from bamboo.
- pressure treatment for chemical to spread all over.
- drying.
- stacking of bamboo is done according to type and diameter of a pipe.

Existing Furniture at Kudal

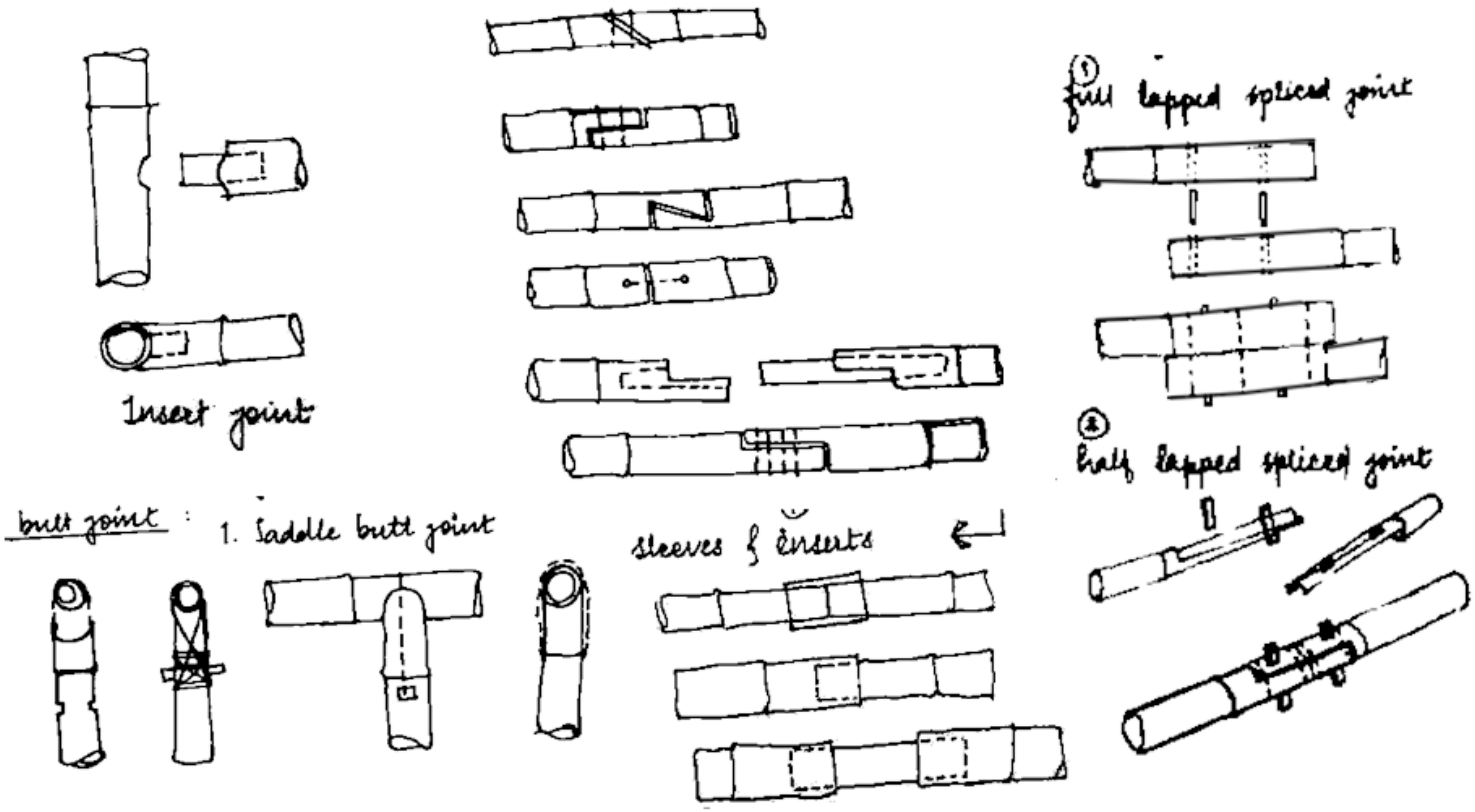
- range of furniture varies from kitchen, living room to dining room.
- feeling of robust nature.
- Use of full bamboo.



- Existing Joinery Details

- Not aesthetically appealing.
- Hide unfinished joints.
- Nailing causes splitting and notching
- A bamboo lashes are generally used as binding elements

- Existing Joinery Details



- Problems they are facing with production
  - Lack of treatment plants
  - Telescopic growth of bamboo
  - Joineries of bamboo
  - Existing cost of a product
  - Lack of skilled labors
  - Transportation

Bamboo

Skilled labors

Telescopic growth

Treatment plant

Furniture Manufacturing

Transportation

- Synchronic analysis




- Existing dining chairs in restaurants:

  - studied almost 37 types of chairs in different restaurants.
  - middle class restaurants chairs very much common in looks.
  - made up of wood for getting distinguished looks ,
  - and most of the seats were made out of foam with either Rexene cover or thick cloth covers.
  - some chairs had rubber bushing to their legs as it spoils the floor surface.
  - No hand rest but some of the chairs had foot rest.

- Existing chairs in restaurants:

  - Elite class restaurants

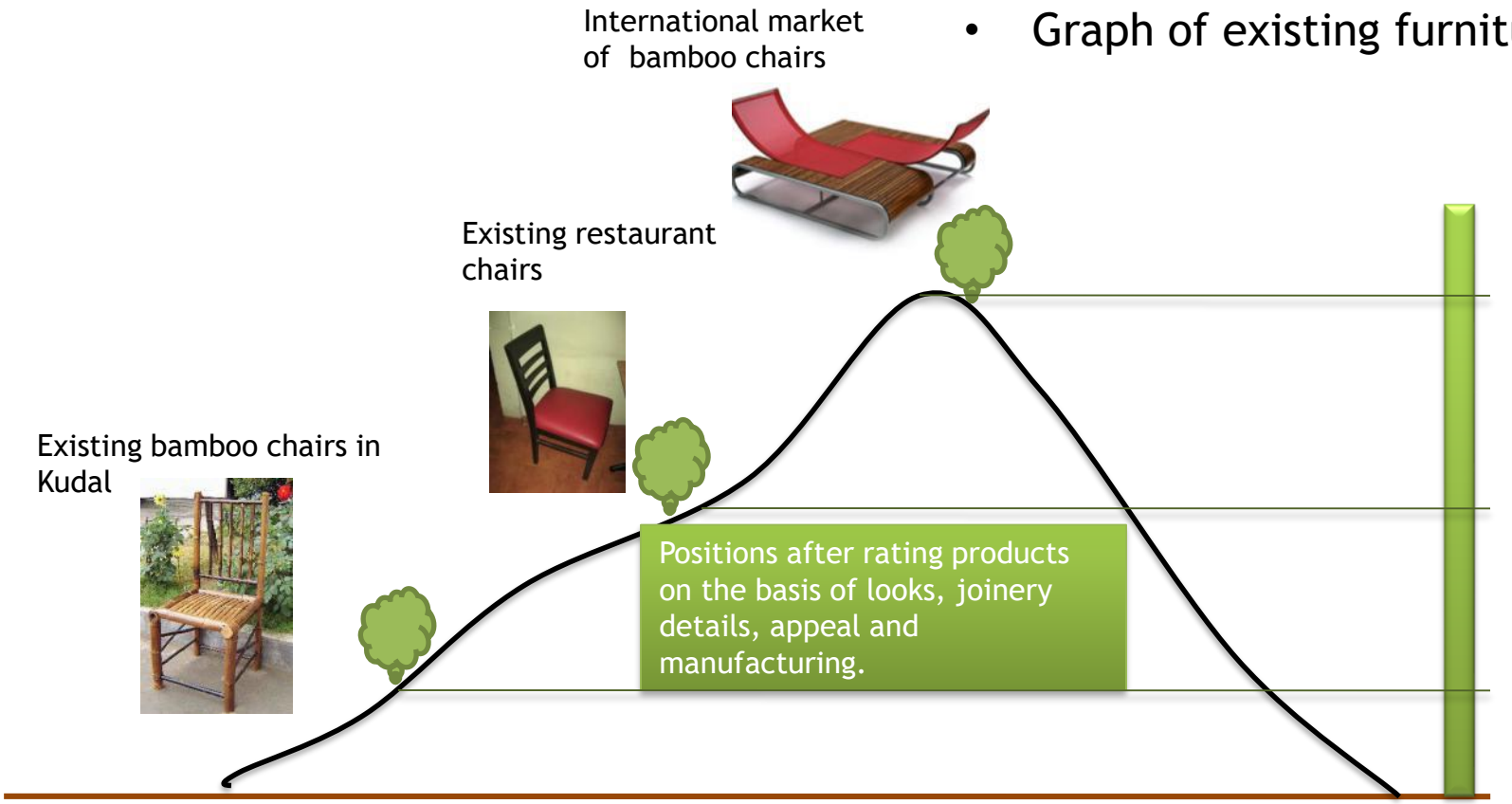
made out of exclusive materials like cane and vicker.

unique in there own form and overall appeal.

The fine workmanship and incredibly done joinery adds into the beauty of the product.

- Existing chairs in international market:
  - use of bamboo with various complimenting industrial materials.
  - These exclusive, stylish furniture looks elegant because of well finished materials and precisely done joinery details

- Graph of existing furniture:



How to raise the position of existing bamboo chair in terms of all aspects???

- WHY DINING CHAIR???

- The decision of selecting dining chair for this project is an outcome of analytical approach It involved following steps

- Feedback from the KONBAC.

- Interviewing restaurant staff, owner and users.

- Expectations from project.

- Feedback from the KONBAC

• Furniture is very robust in looks,

• non stackable furniture

• Very expensive in terms of transportation

• Because of these disadvantages demand of products is not increasing.

• Stackable furniture which will help them to reduce the transportation cost and which Will take lesser area for functioning.

- **Interviewing restaurant staff, owner and users.**

owners point of view

- Does not go with our style of interiors.
- If its not stackable then creates problem for storage.
- While cleaning the floor everyday is very disturbing.
- Cushioning gets dirty

Customers point of view

- After sitting on a chair its very difficult to pull it ahead.
- It creates noise.
- It was too cold as ac was on and chair was made up of
- plastic chairs look boring and monatomic.

•Expectations from project:

- Exploring bamboo as a material and using it with other complimentary materials. More learning of form and expressions. Working on joinery details.

- WROUGHT IRON

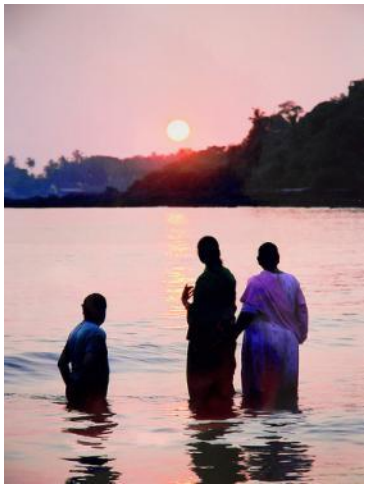
•Bamboo as a material has some restrictions

•Overcome this problem wrought iron is used as a complimentary material

•Very low carbon content.

•It is a fibrous material due to the slag inclusions

•Wrought iron is tough, malleable, ductile and easily welded.



- Why Goa ?

- Abundantly available material source
- Familiar looks of material
- Traditional craft material
- Feel of the material

What is a dining chair ?

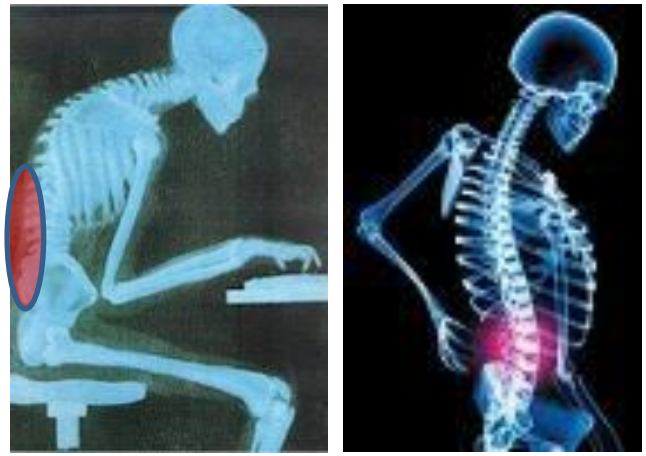
A chair is a kind of furniture for sitting, consisting of a back, and sometimes arm rests, commonly for use by one person. Chairs also often have four legs to support the seat raised above the floor.

—Dining chair is a kind of furniture which helps in the act of eating dine by supporting body.

- Ergonomical considerations

- **Existing chair data:**

– After analyzing various types of dining chairs I got following data about each part of the chair . Following table contains lowest and the highest dimensions.

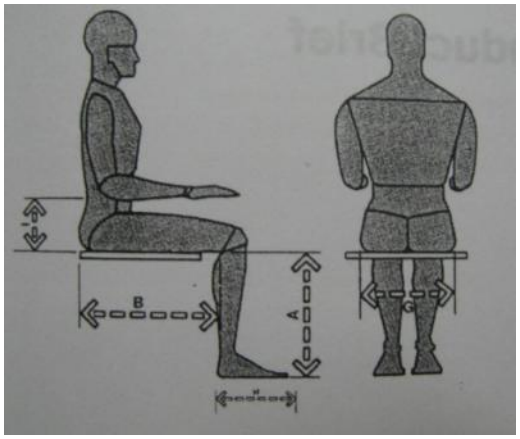


Picture showing area of limber support

feature	observations
Adjustability	Not a single chair was adjustable
Seat height range	30cm- 70cm
Backrest	15cm- 50cm
Seat depth	3cm- 9cm
Weight	500gms- 4.2kg
Surfaces	Tiles, carpets, wooden flooring, vitrified tiles, plastic mats
Stability	Heavy chairs were more stable Light chairs were unstable

Ergonomical considerations:

- Standard dimensions considered for dining chair



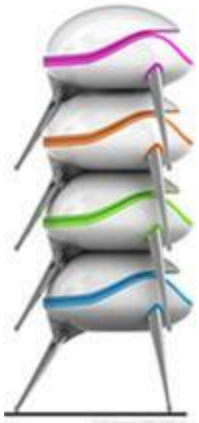
	Dimensions (combination)
A. Popliteal	409mm
B. Buttock	451mm
I. Lower lumbar	100mm
G. Hip breadth	326mm
H. Foot length	244mm

- Stack ability

- Why stackable???

- Ease in transportation
- Reduces product cost
- Easy to store

- Existing stackable dining chairs in contemporary market



- Design Objectives :

A. Material for the dining chair which will be prominently visible would be bamboo.

B. Use of other complimentary materials like wrought iron, cane strips , etc.

C. Minimum joinery for reducing the time of manufacturing and as skilled labors are not available these kind of details will take less time for learning.

D. Dining chair will have functions of stack ability which will help in storing furniture while it is not in use.

The product aims at eco-friendly outdoor dining chair which will suit the Goan environment.
The target market for the product will be Goan beach outdoor restaurants.

- Ideation

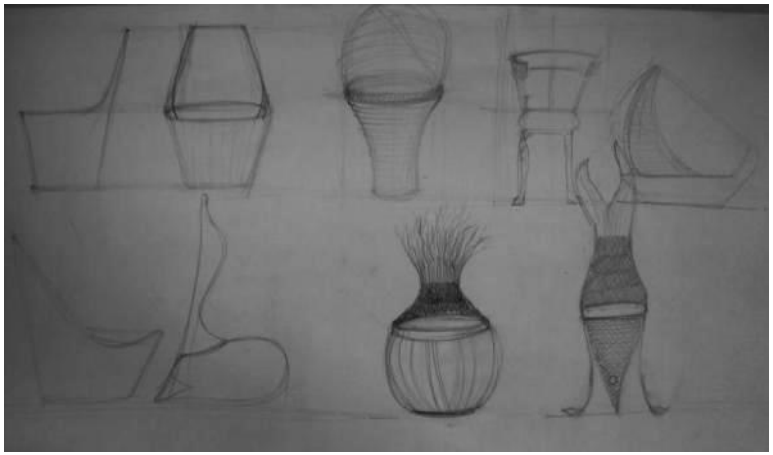
- **Initial Ideation**

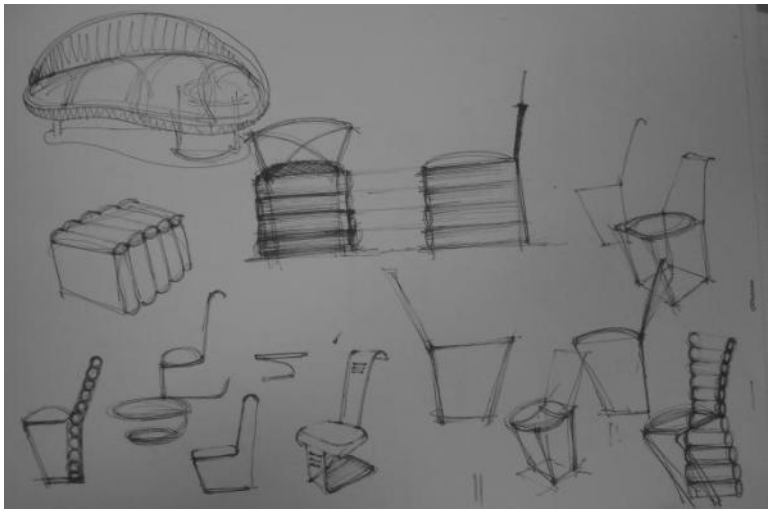
- initial ideation was made considering goa in mind in this ideation existing research on goa gave me different ideas and analogies.

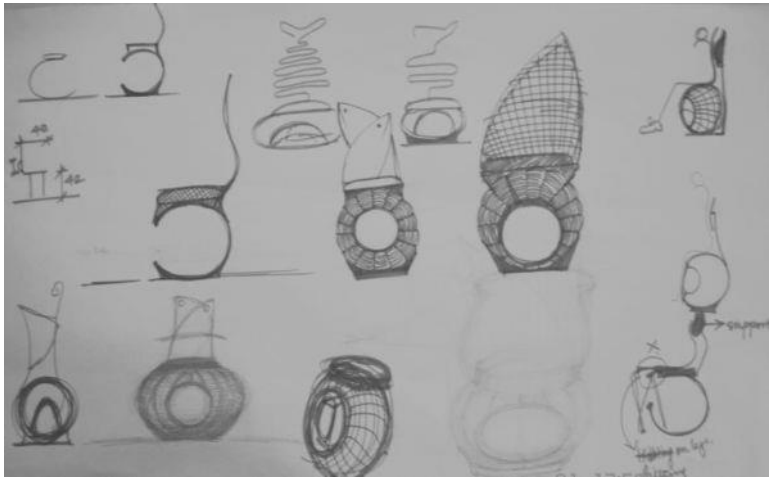
- Few ideas were generated from the keywords of goa.

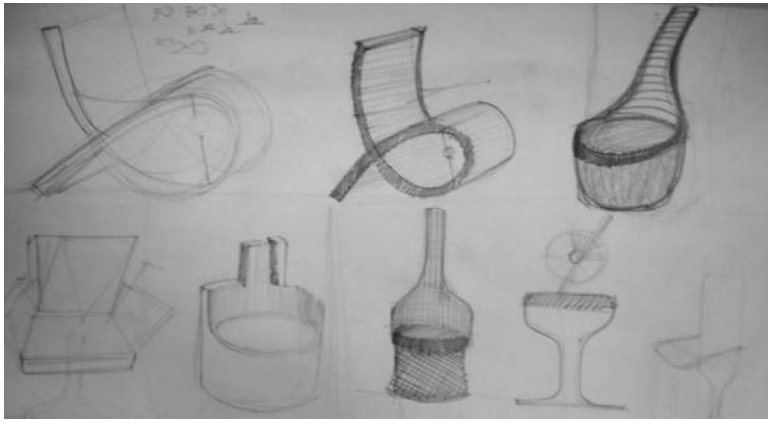
  For example fish, wine glass, boat etc.

- **Initial ideation**









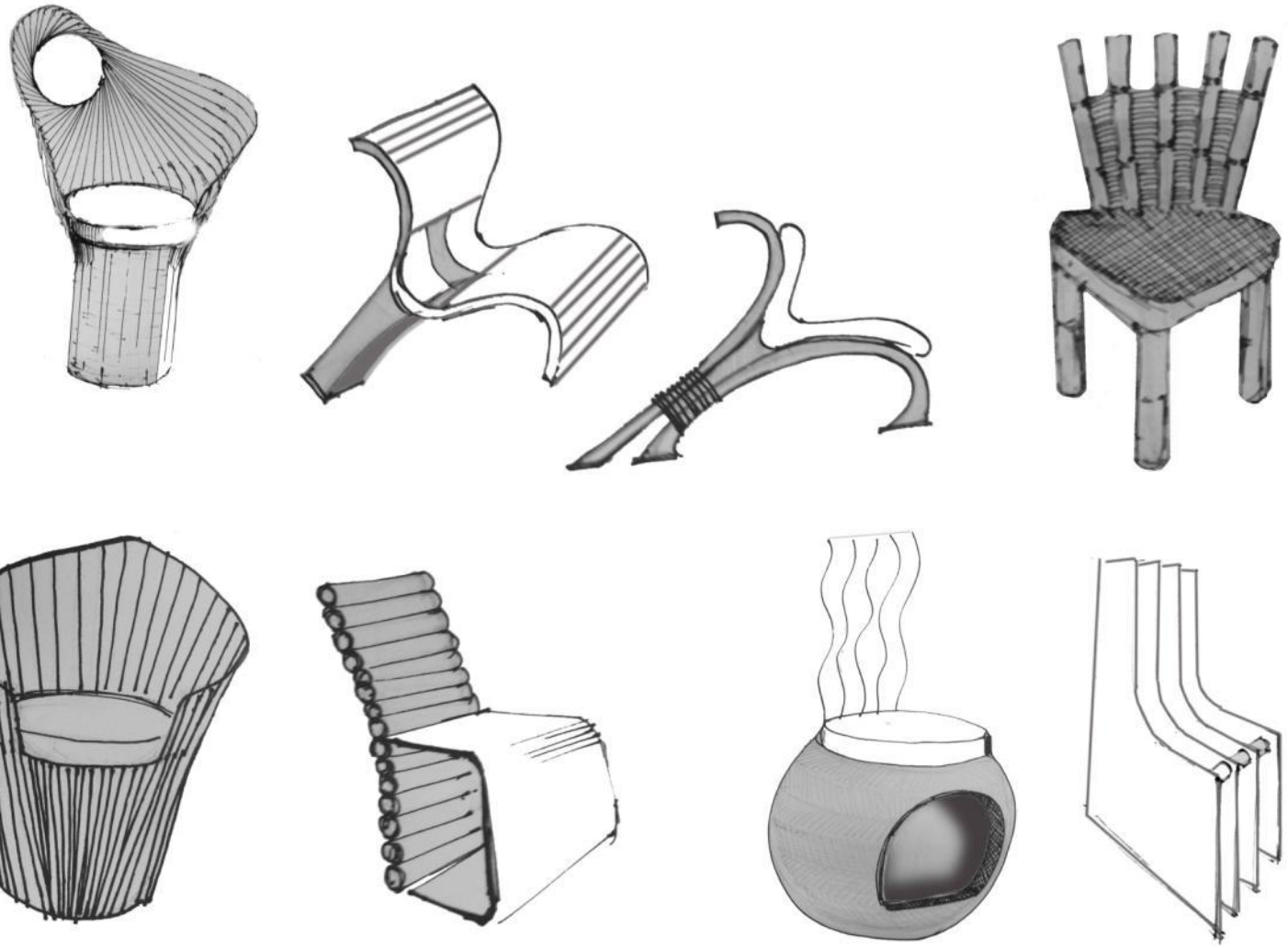
- **Second stage ideation**

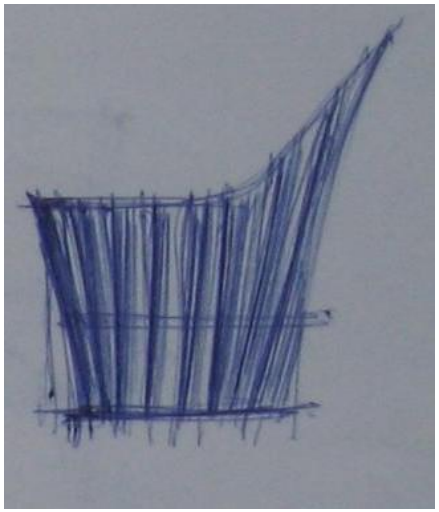
Second stage ideation was done specifically concerning product material. Various forms of bamboo were explored for making innovative looks and techniques.

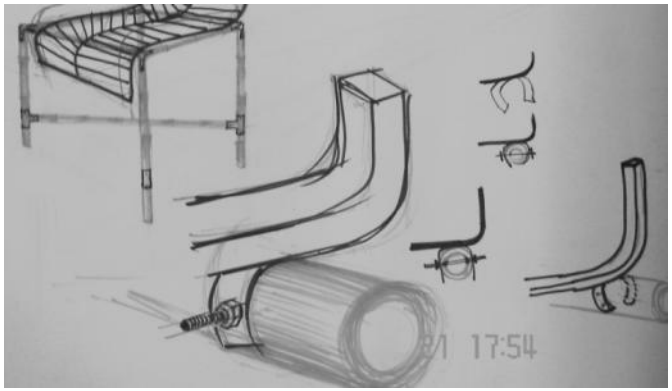
In this ideation bamboo in its various forms like tube, plank, ply, and strips was explored.

In few designs, bamboo as a cladding material and in few designs bamboo as a structural strength giving material was used.

To overcome with the problems like telescopic growth of the bamboo use of small bamboo rings were introduced as a idea.



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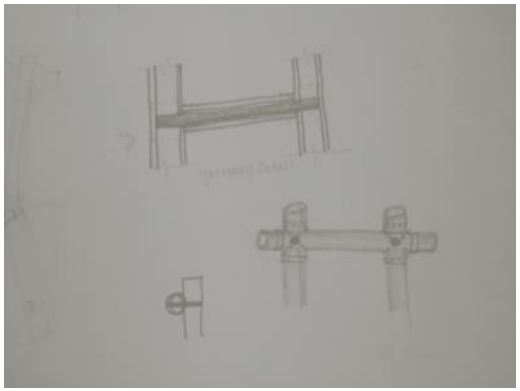
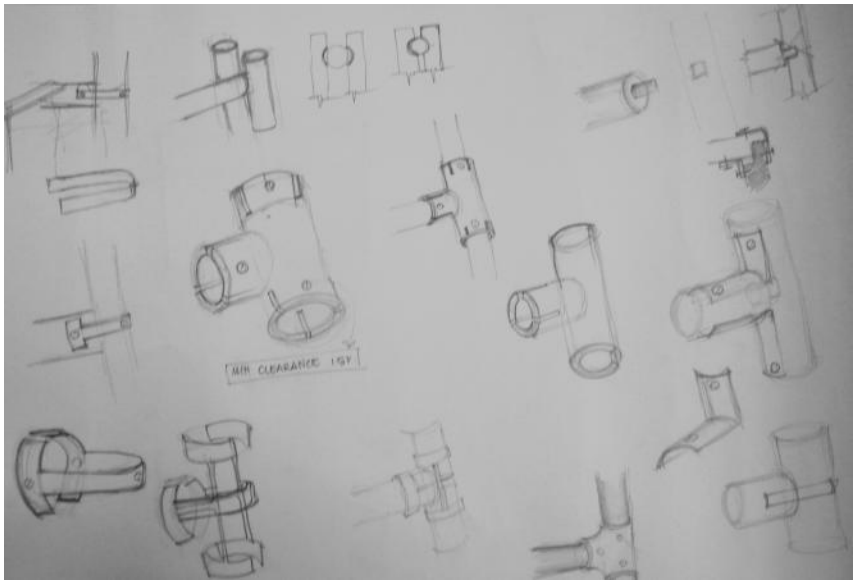
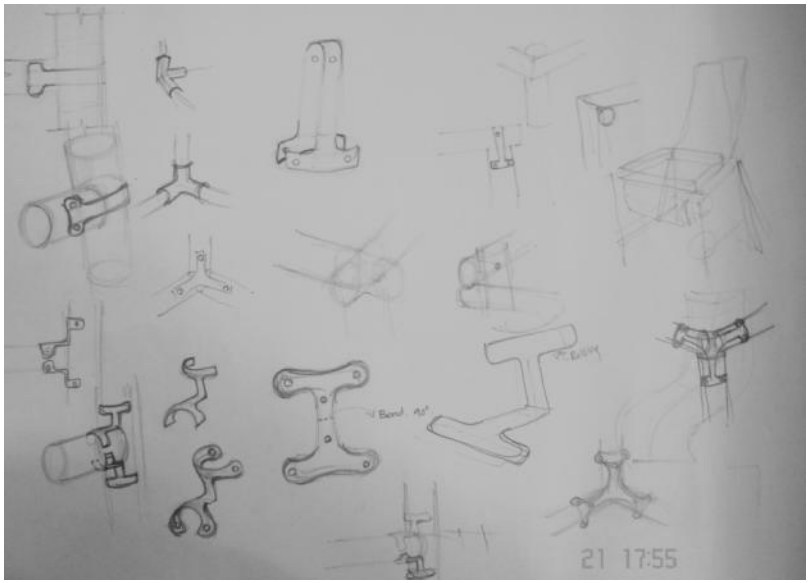



MIN CLEARANCE 1.5"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- **Exploratory models:**

Model 1

Model 2

Model 3

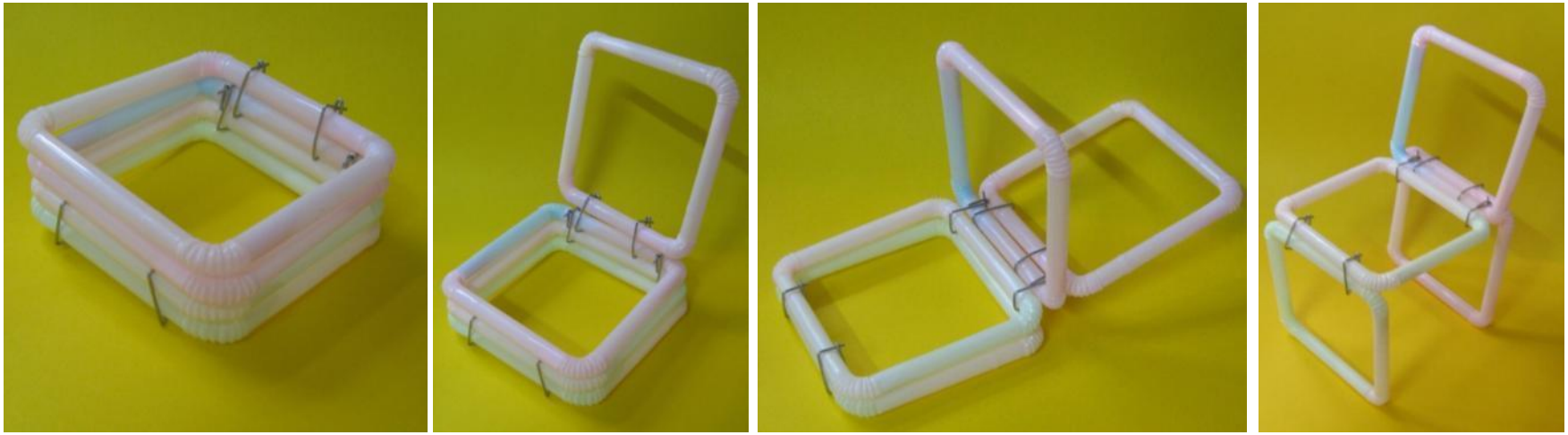
- **EXPLORATORY MODELS:**

Model 4

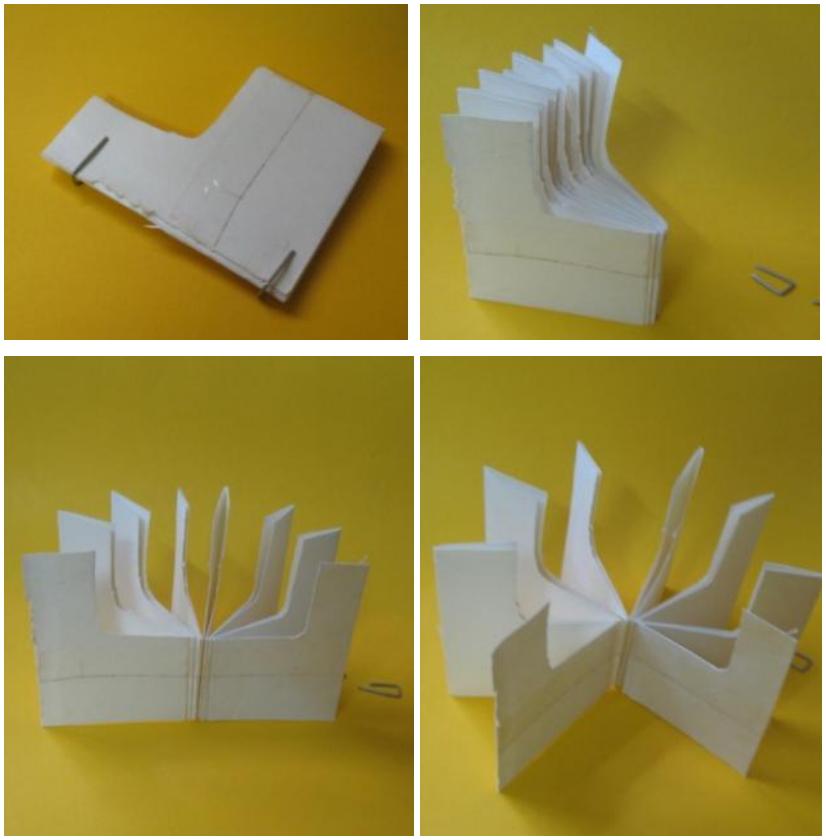
Model 5

Model 6

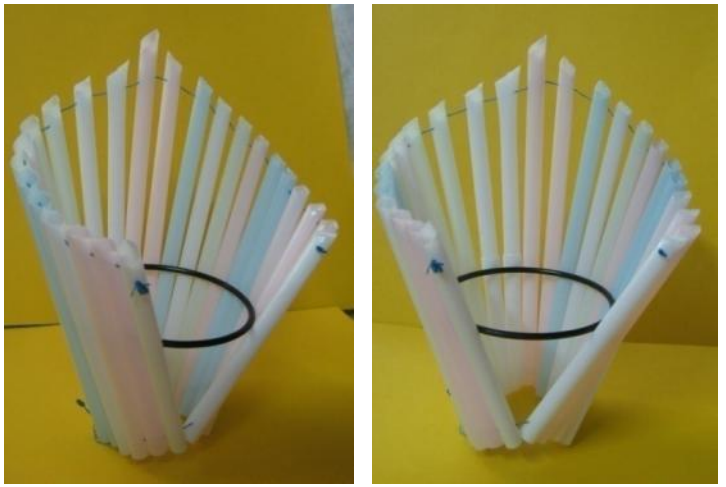
- **EXPLORATORY MODELS:**



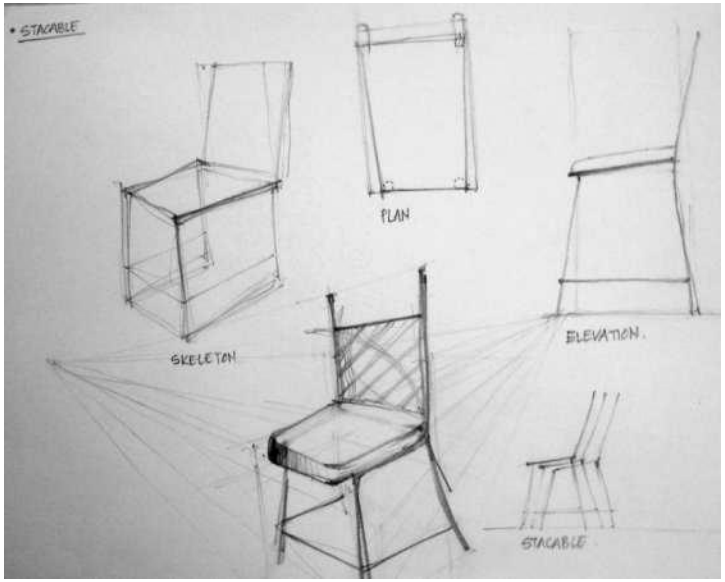
Model 7

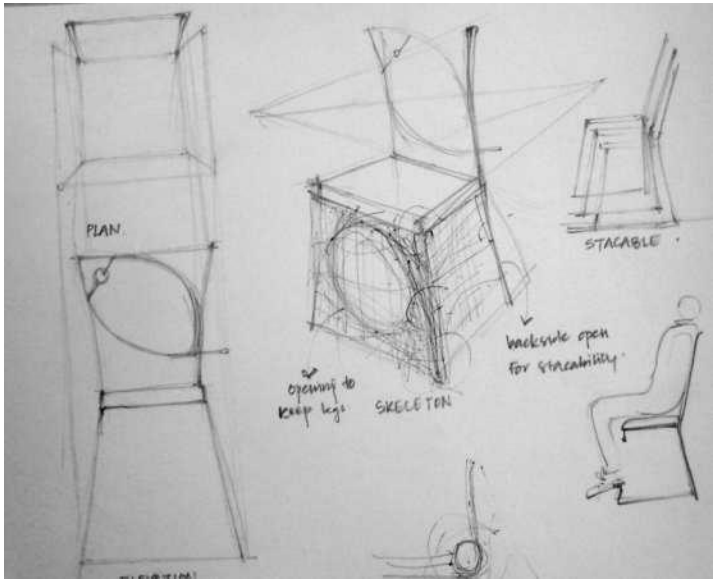


Model 8



Model 9

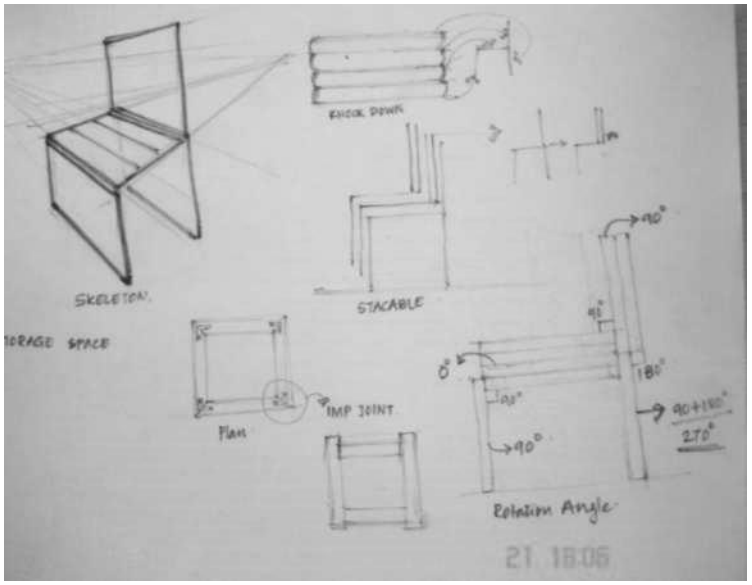


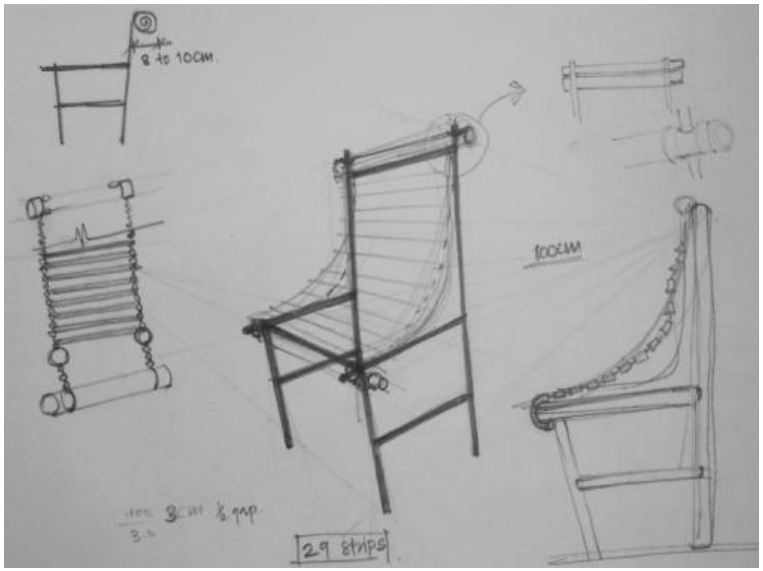


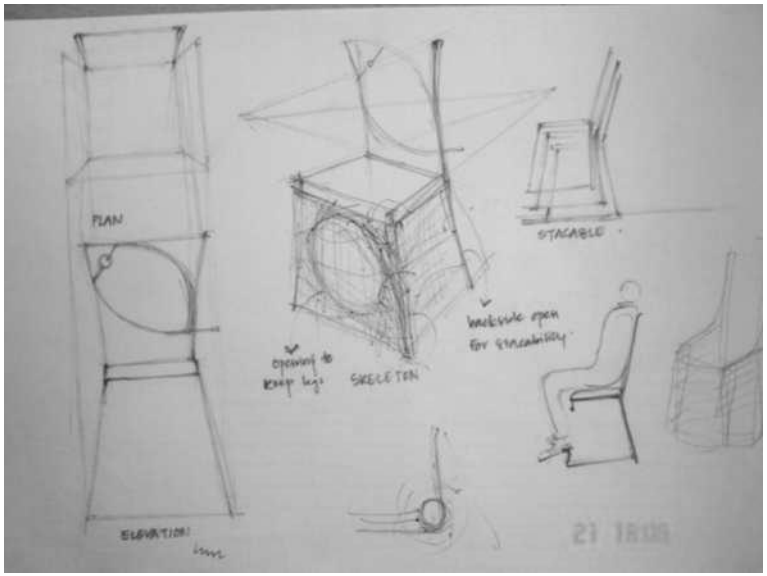
- **Third stage ideation**

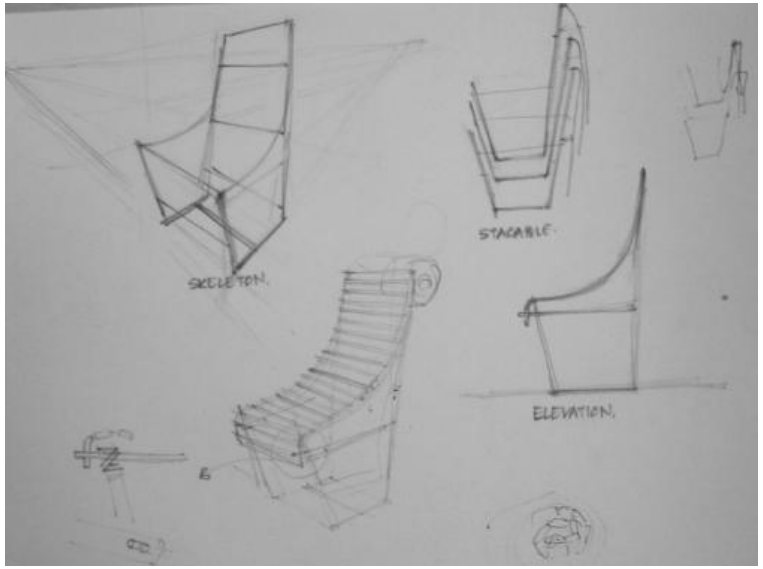
Third stage of ideation was done by concerning system issues in mind. Main problem bamboo furniture manufacturers are facing with the products is transportation, as these furniture's are not stack able the transportation cost increase.

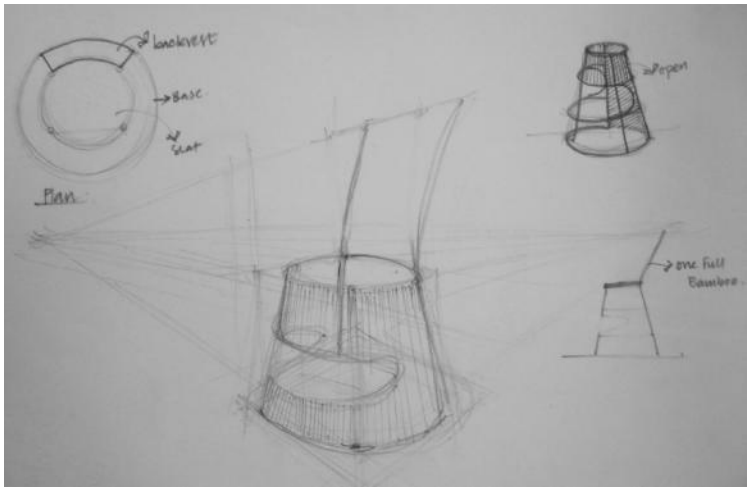
In most of the hotels bamboo chairs were not preferred because of lack of stack ability. They say while cleaning the floor its very difficult if furniture is non stackable.

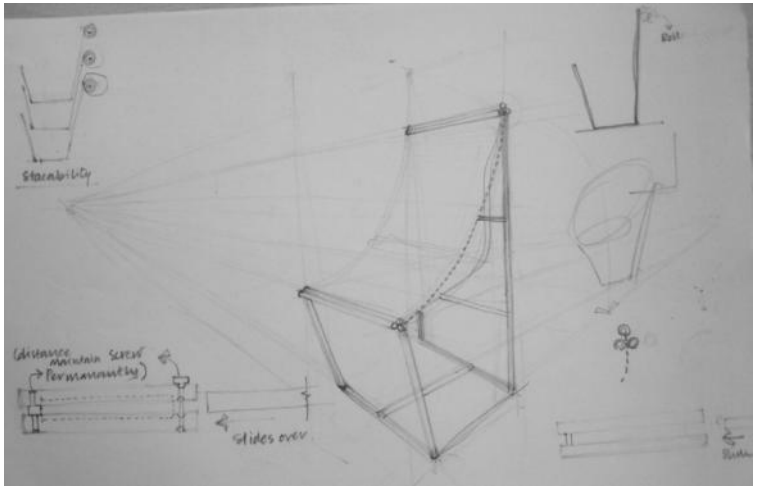

KNOCK DOWN
SKELETON
STACABLE
Plan
IMP JOINT
90°
180°
90+180°
270°
Rotation Angle


8 to 10CM
100CM
29 strips

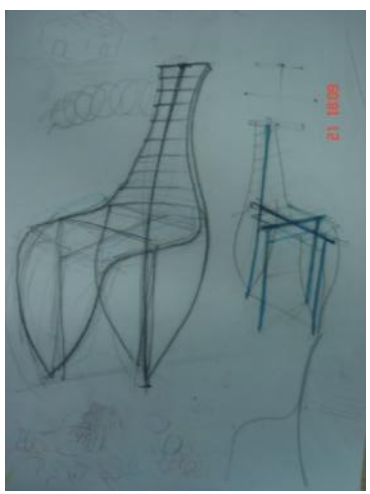

PLAN
STACABLE
SKELETON
ELEVATION

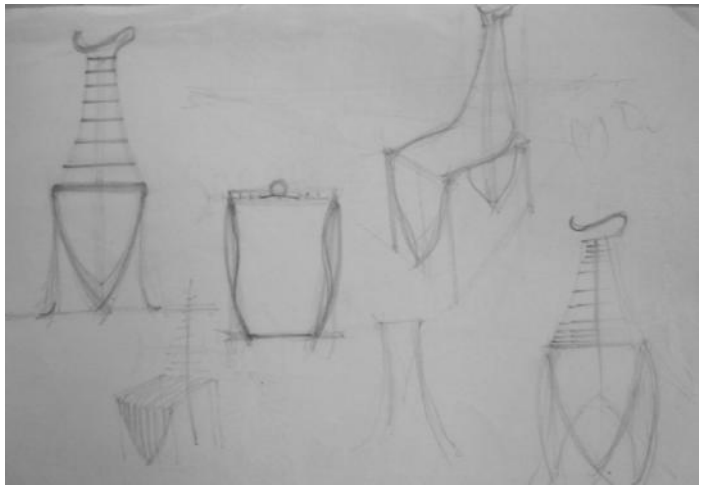

SKELETON
STACABLE
ELEVATION

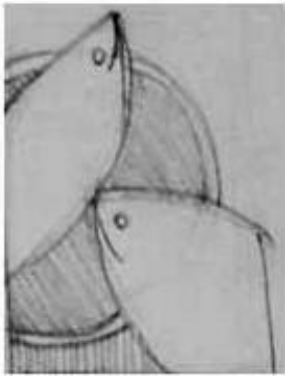

backrest
Base
Seat
Plan
Perpen
one full
Bamboo


Rail
Stability
distance maintain screw
(Permanently)
Slides over

- **THIRD STAGE IDEATION**



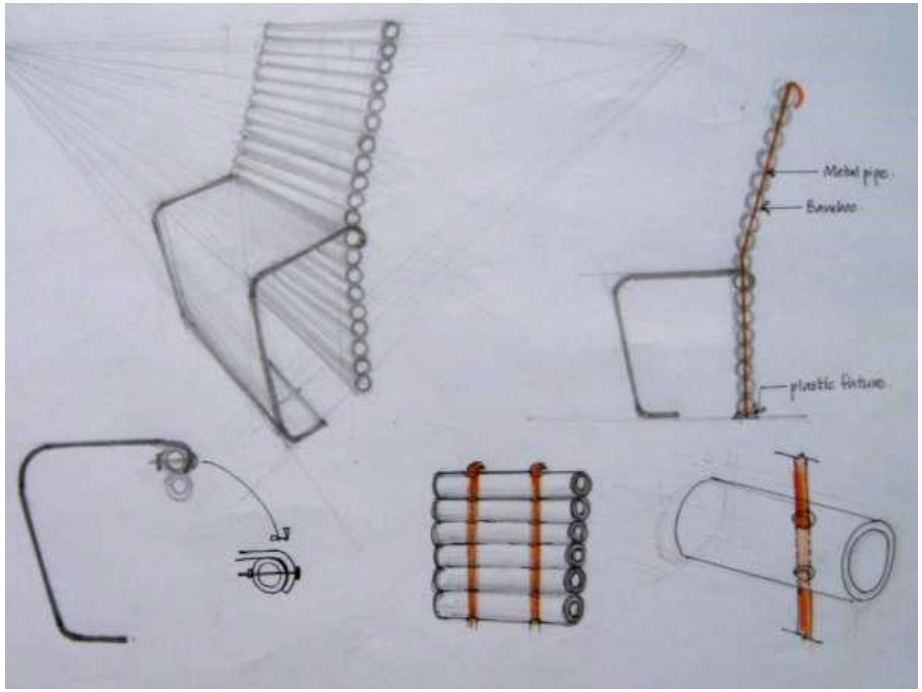


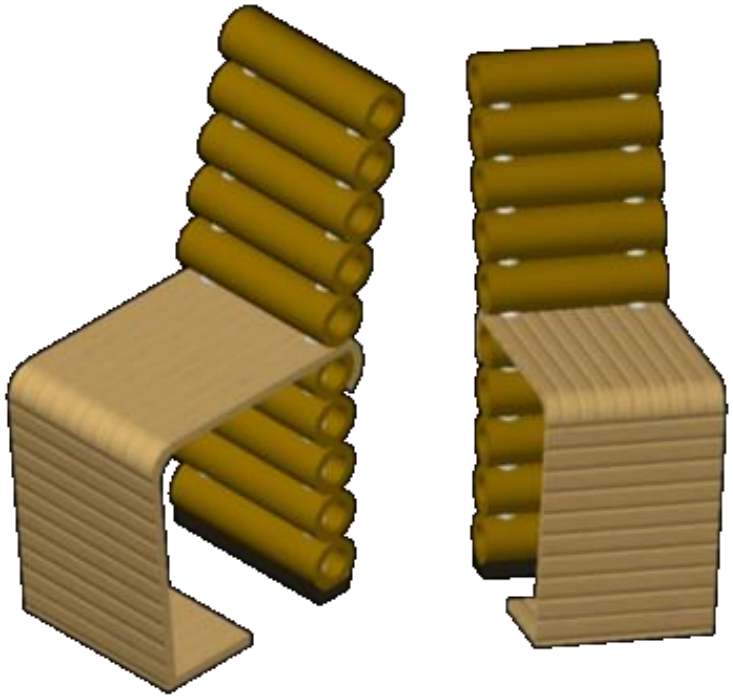


CONCEPT GENERATION

Concept 1:

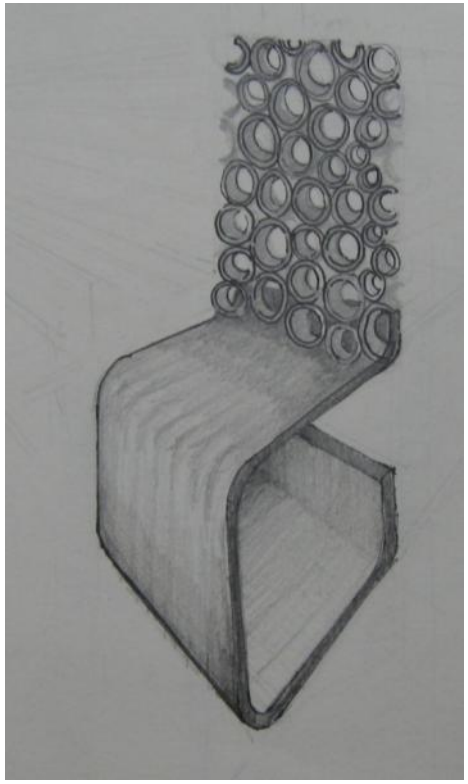
concept one was about using bamboo as a cladding material. Bamboo will come at back rest and it will continuously woven in a steel pipe till ground level.





- **Concept 2:**

– Concept 2 was made by focusing telescopic growth in mind. To overcome with this problem small pieces of bamboo were used as back rest. These pieces were fixed with screws. For seat and structural strength bamboo ply was used.

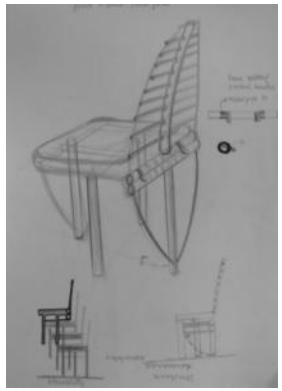


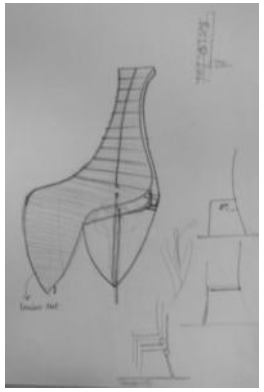
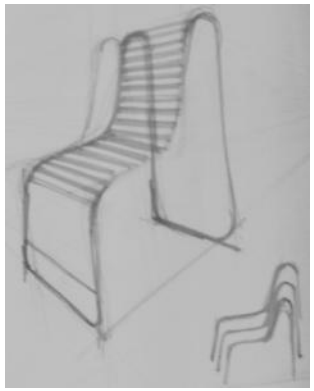
- **Concept 3:**
  ‘Final concept’

– Concept 3 was made focusing production issue and manufacturing processes in mind. Other industrial materials like wrought iron was use for additional functional values of product. Machine pressed bamboo strips were used as seat and back rest supporters. Structural strength was provided by wrought iron rod.

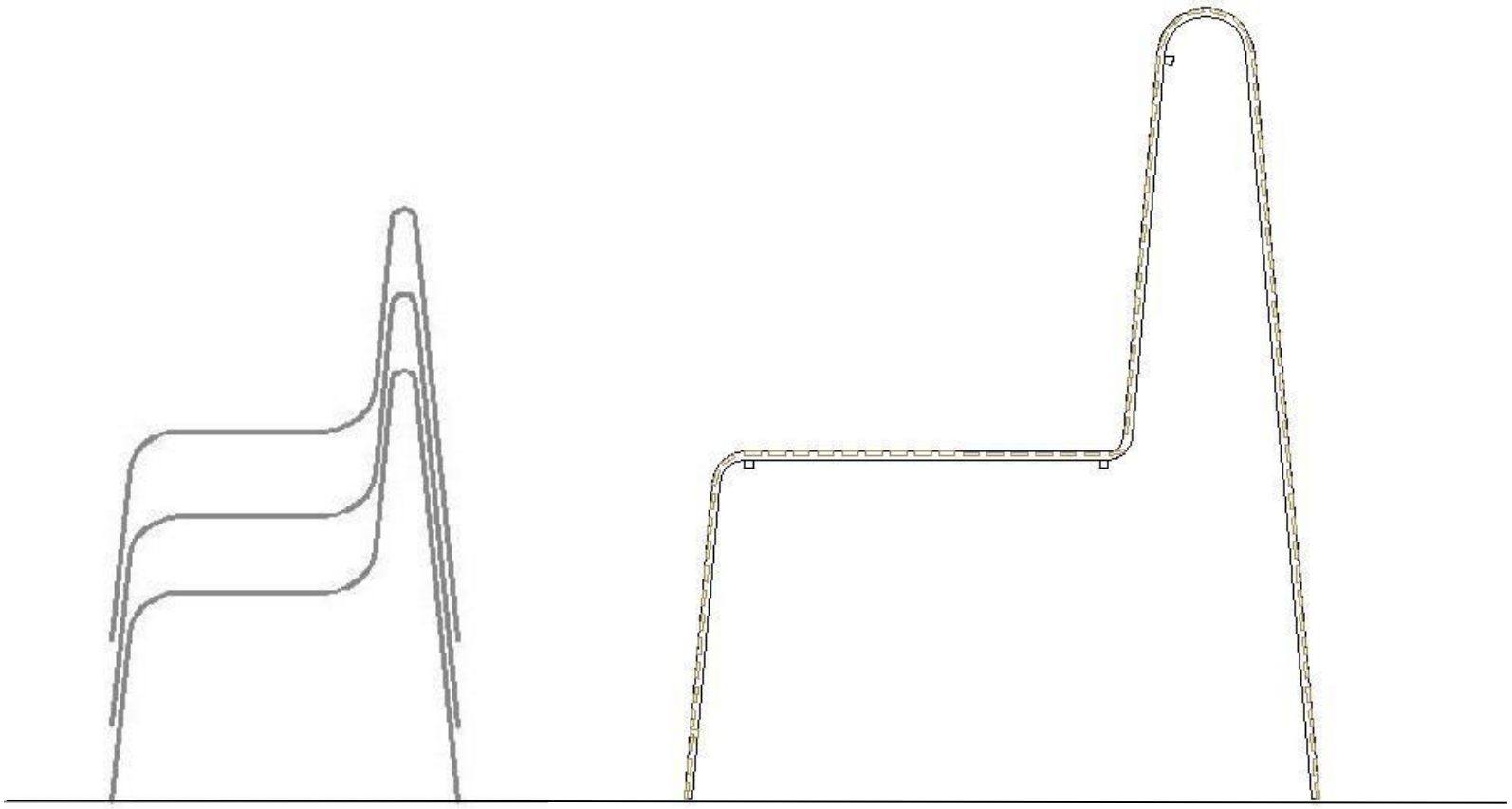
– Formal expression was also given an importance. Considering goa as a destination various analogies were taken from Goan culture and Goan nature.





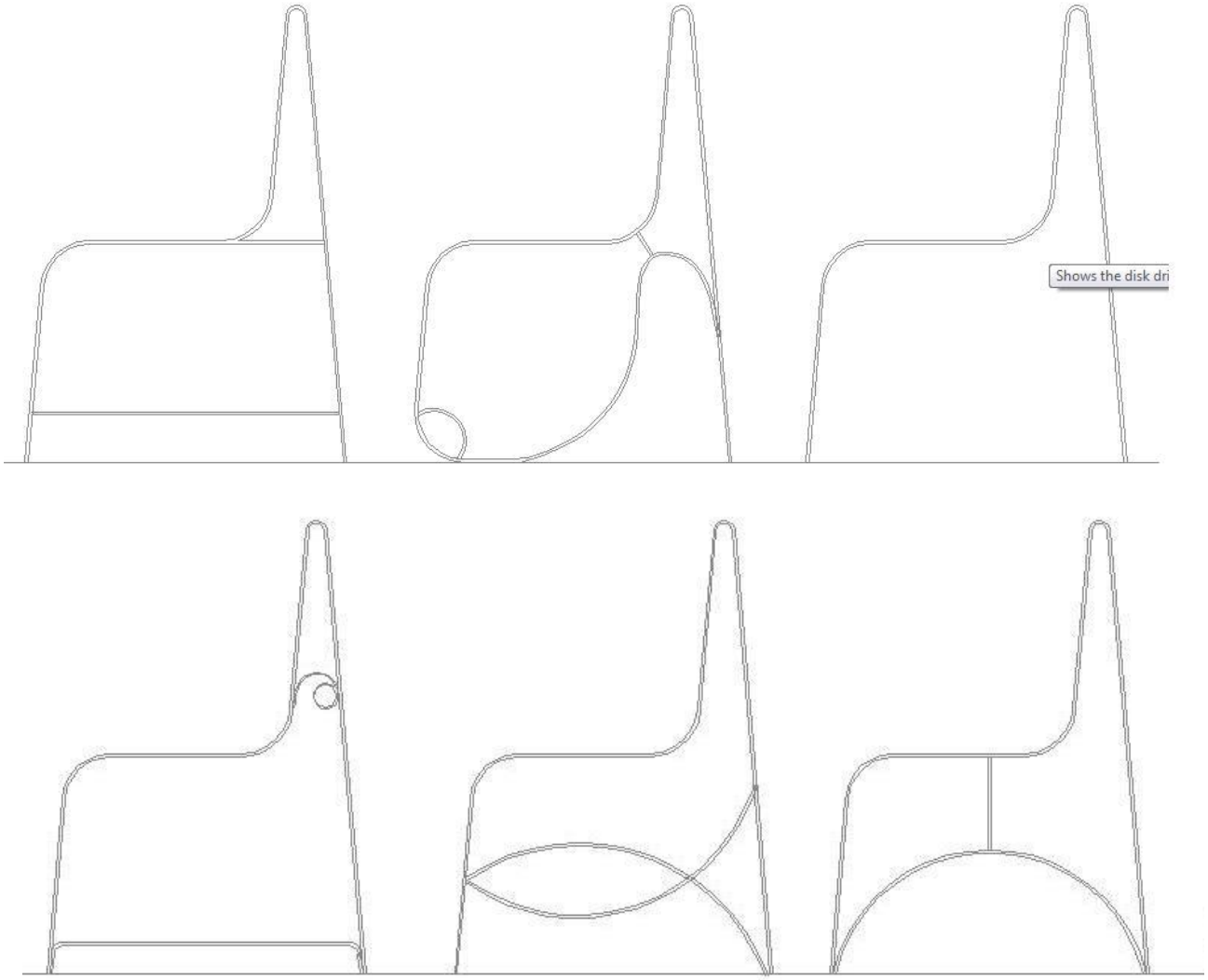



- Final baseline

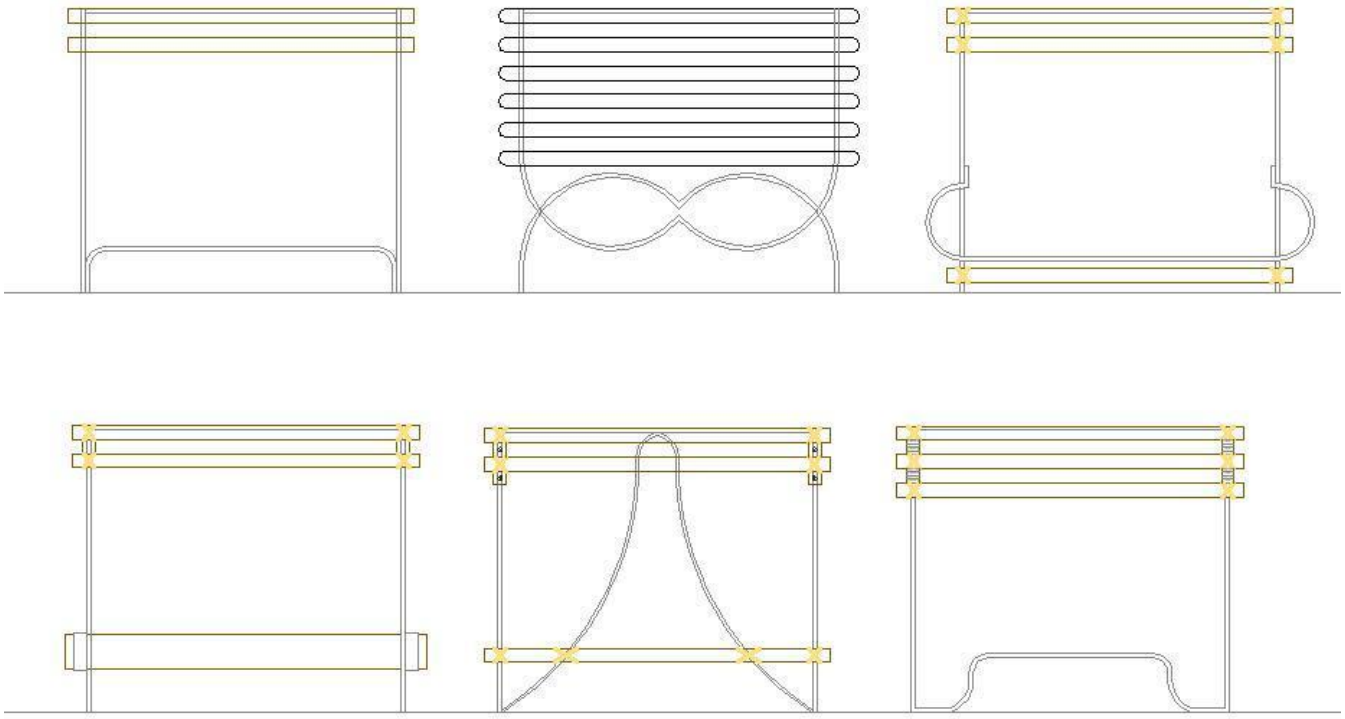


Stack ability.

Side view

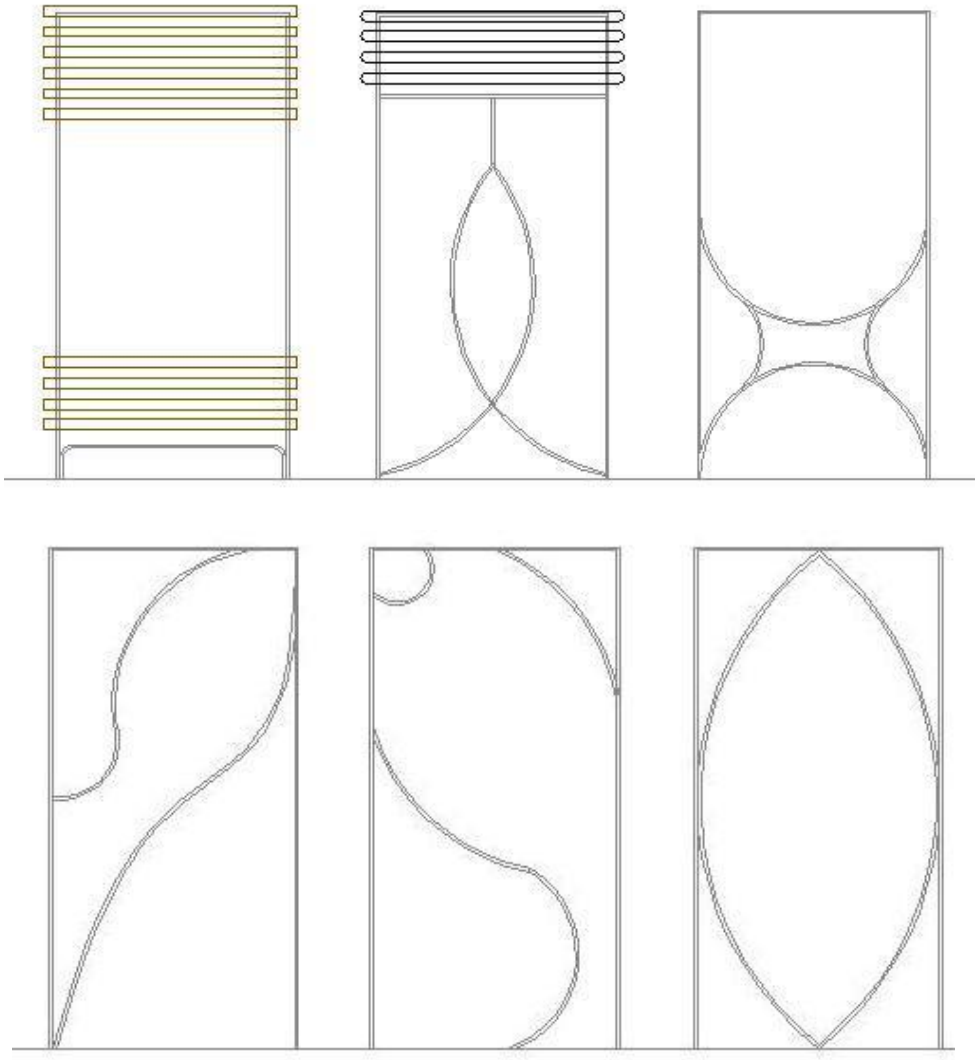


Side view options



Front view options

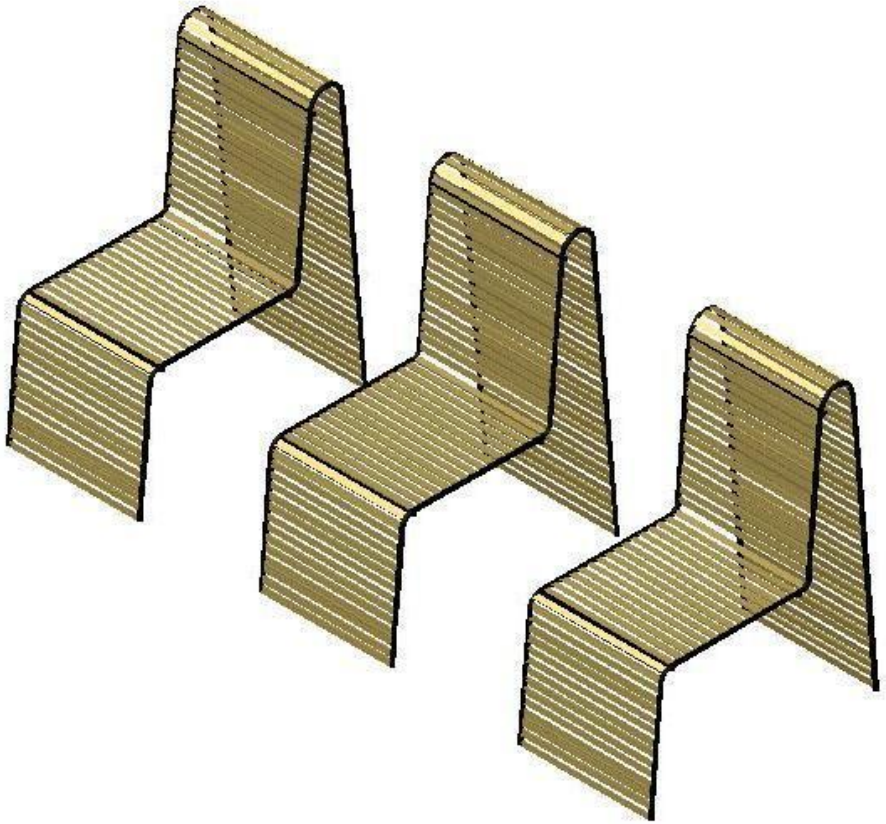
Plan options



Back side view options

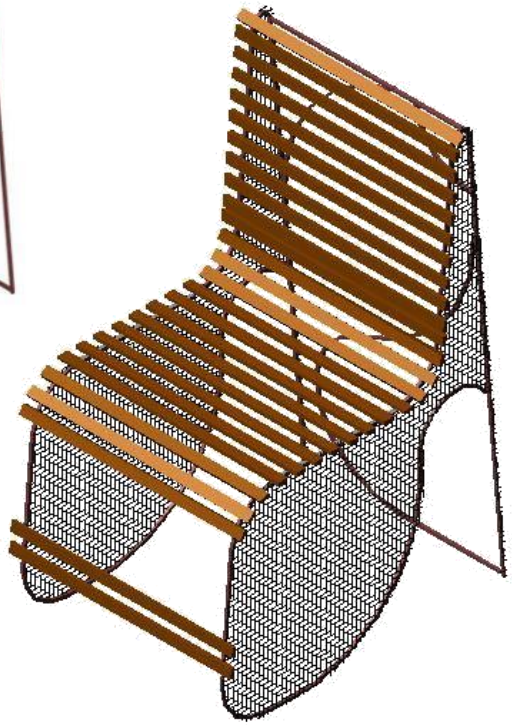
Exploratory model

- **Form explorations:**

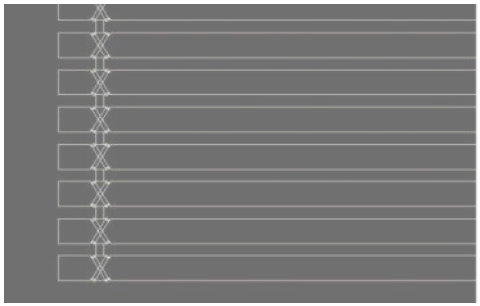


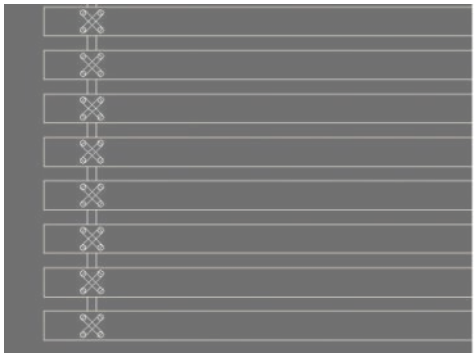
Repetitiveness considerations

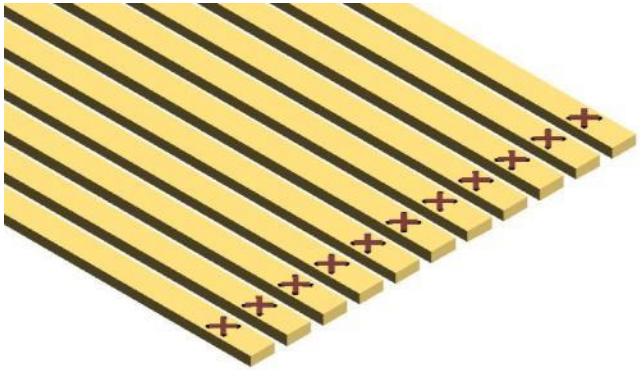
- **form explorations:**

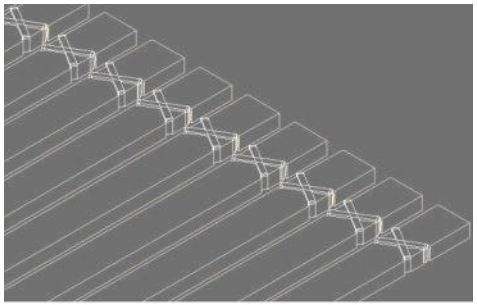


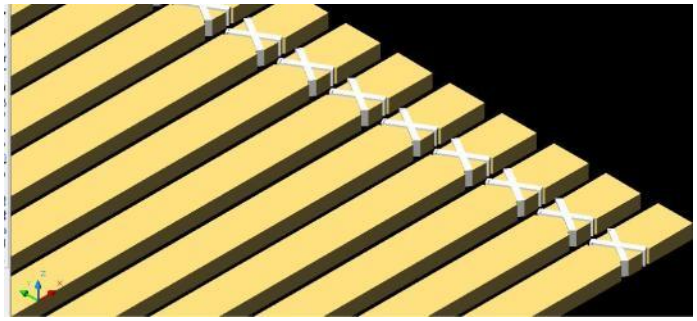
- **WEAVE DETAILING**





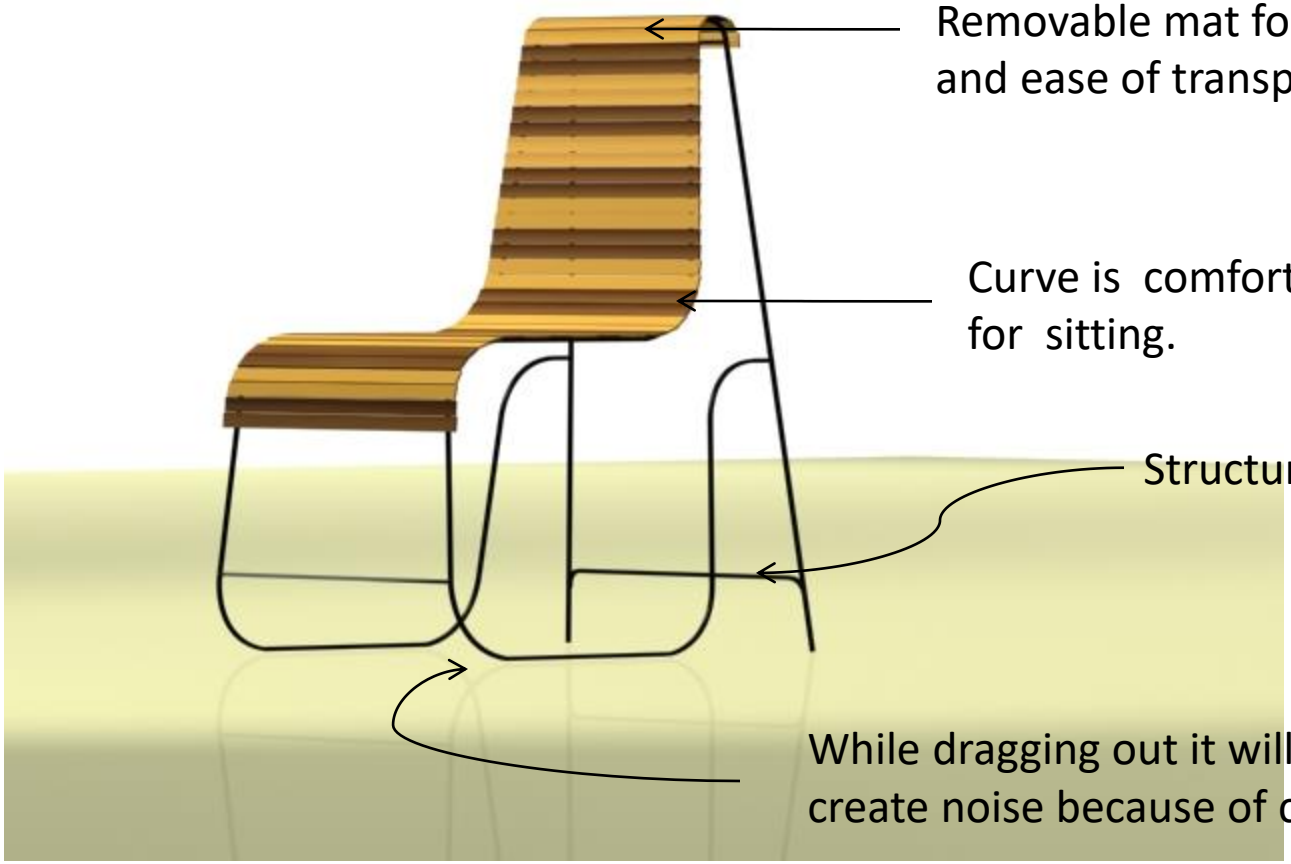




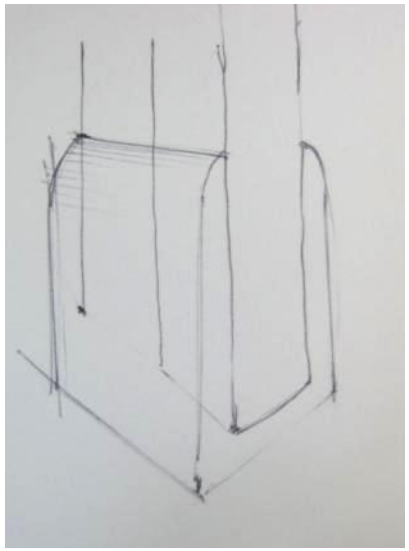
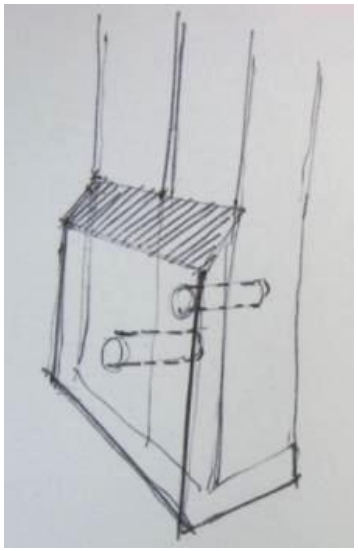
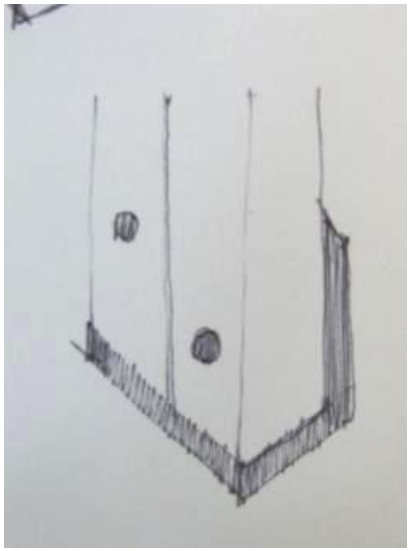


- Final concept

Product characteristics



- Bushing detail:

- Material used:

- Wrought iron squire rod 8mm tick
- Assam bamboo strips.
- Cane for weaving purpose.

- Manufacturing…

Buying bamboo

Searching straight bamboo from bunch

Cutting it in to pieces for ease of transportation.

Cutting bamboo in to strips and finishing strips

Various colour patterns were tried



Dyeing strips (all natural dyes were used)

Same time mock up model was made to test Ergonomical issues, appearance, structural stability, etc.



Various people with different heights were taken in to consideration





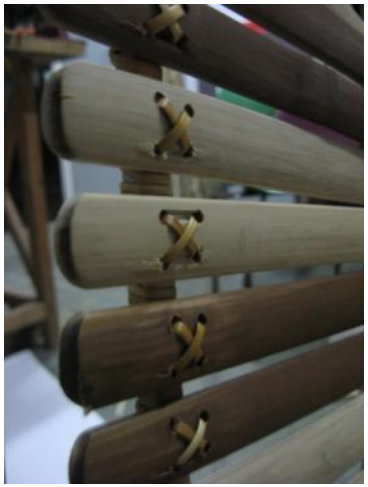
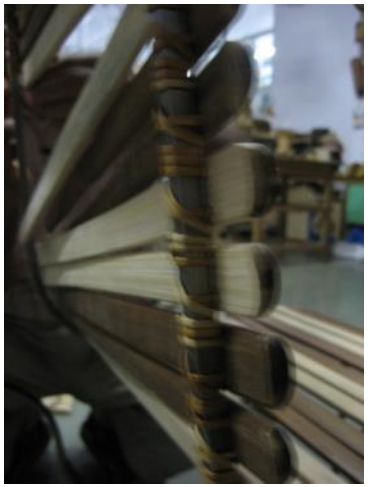


At fabricators workshop




Wrought iron skeleton after polishing

weaving over the frame.

Weaving details.

Testing frame and bamboo mat colour combinations

Mat making

Putting mat on frame and fixing it.

After binding mat on frame.

Experiencing product

- Estimate:

- Wrought iron 8mm squire rod: 10 Rs per feet
- Assam bamboo 18 ft: 60rs
- Bamboo strip with processing = 2 Rs each
- Black paint

- Total length of rod : 25 ft = 250 Rs.
- Total strips: 42= 84 Rs.
- Labor cost : 600 Rs.
- Cane for binding: 50 Rs.
- Powder coating: 50 Rs.
- ----------
- total production cost 1034 Rs.

- And finally……..

Final Model

User sitting

User sitting



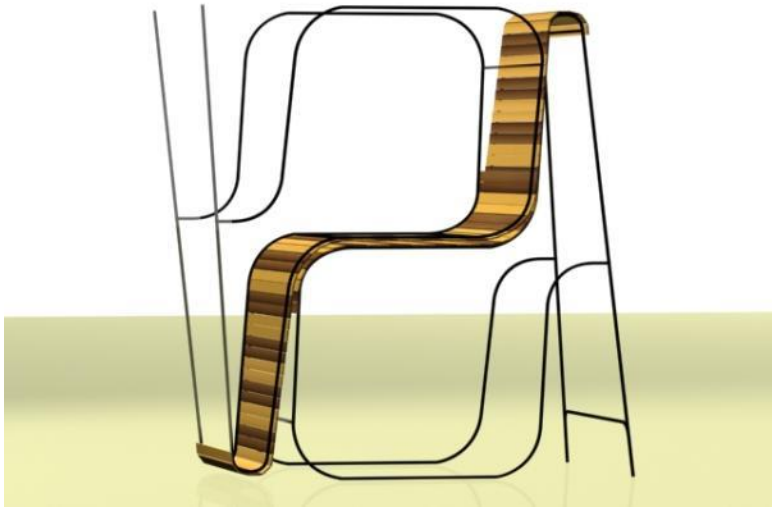
Product environment

Product USP

Product USP

Stack ability

Possible ways of stacking.



Product USP

Stackability

Corrosion resistant

Minimize the noise while moving the chair

Thank you...