PROJECT 1

SUMMER INTERNSHIP REPORT

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ACKNOWLEDGEMENT

We would like to express our gratitude to Uravu Indigenous Science & Technology Study Centre for giving us an opportunity to do our internship with them and for their meticulous guidance and efforts.

We take this opportunity to thank our course coordinator Prof. Poorba Joshi and Head of the Department IDC Prof. G.V. Sreekumar for providing us the necessary facilities to carry out the summer internship.

CONTENTS

ABSTRACT

The motive of the project was to study the existing chair design and document the process involved in it. Studying the chair involved analysing and finding the existing flaws in the design, and produce a new chair by rectifying all the faults. Documentation process included documenting all the process involved in make of the chair by creating a detailed report on time, labour and machinery involved in the make, which will help uravu in the mass production of the chair as a industrial product. As they are building a platform to start a bamboo furniture wing in Uravu.

ABOUT URAVU

URAVU is a non-government organization working with people, governments and businesses to implement programs for sustainable employment and income generation in rural areas. Uravu is a non-profit trust, established in 1996, registered under the Indian Trusts Act.

Uravu promotes social enterprises based on value addition of local, natural resources, especially bamboo, the "green gold". Uravu implements integrated, end-to-end programs in the bamboo sector, which include providing skill training in bamboo processing, establishing micro enterprises, marketing of bamboo handicraft, cultivation of bamboo and promotion of eco-tourism.

Uravu strives for empowering marginalized social groups, especially the traditional artisans, women and the Indigenous People.Uravu is located in Thrikkaipetta village in Wayanad district, Kerala state, South India.

ACTIVITIES OF URAVU

Skill Development

Uravu is a premier agency in the country providing skill training in bamboo processing. Since its inception in 1996, Uravu has provided training in bamboo handicrafts to over 1000 women in different parts of Kerala and the neighboring states.

The master craftspersons at Uravu have undergone trainers' training in various institutions including the Bamboo Studio,

IIT-Mumbai, Cane and Bamboo Technology Centre (CBTC), and National Institute of Design (NID). With the support of the Common Facilities Centre (CFC) in Thrikkaipetta village, Uravu has upgraded its training programs to include training in using various bamboo processing machines.

Establishing Micro Enterprises

Promoting rural micro enterprises based on processing of local natural resources and assisting the enterprises to attain sustainability by providing various hand-holding services is the major challenge taken up by Uravu. Under the Rashtriya

Sam Vikas Yojana program of Government of India, Uravu established nine decentralized micro enterprises in various Panchayats in Wayanad district. Later on, through the support of the cluster development programme of the Khadi and Village Industries Commission (KVIC), more micro enterprises and SHGs were added to the Kalpetta Bamboo Cluster. Uravu has promoted the establishment of four micro enterprises in Thrikkaipetta village, making a variety of products using local natural resources and providing employment to local women.

Resource Enhancement and Eco Restoration: Bamboo Nursery

To ensure availability of raw materials to bamboo-based production units in Wayanad and also to assist eco-restoration programmes of various agencies, Uravu has been running a bamboo nursery and conducting bamboo planting programs since 1998.

The nursery was set up with technical support of Kerala Forest Research Institute. Uravu Bamboo Nursery has planting materials of over 25 species of bamboos including the following: Dendrocalamus giganteus - Dendrocalamus brandisii - Dendro-calamus strictus - Dendrocalamus hamiltonii - Ochlandra travancorica - Ochlandra scriptoria - Green vulgaris - Yellow vulgaris - Guadua angustifolia - Melocanna baccifera - Bushbamboo- White leaf – Budhdha's belly. The nursery supplies saplings of different bamboo species to various user groups including farmers and local self-government institutions and for the bamboo planting programs conducted by Uravu.

Other activities and establishments

Kalpetta Bamboo Cluster Program

Marketing rural products

Uravu Eco Links

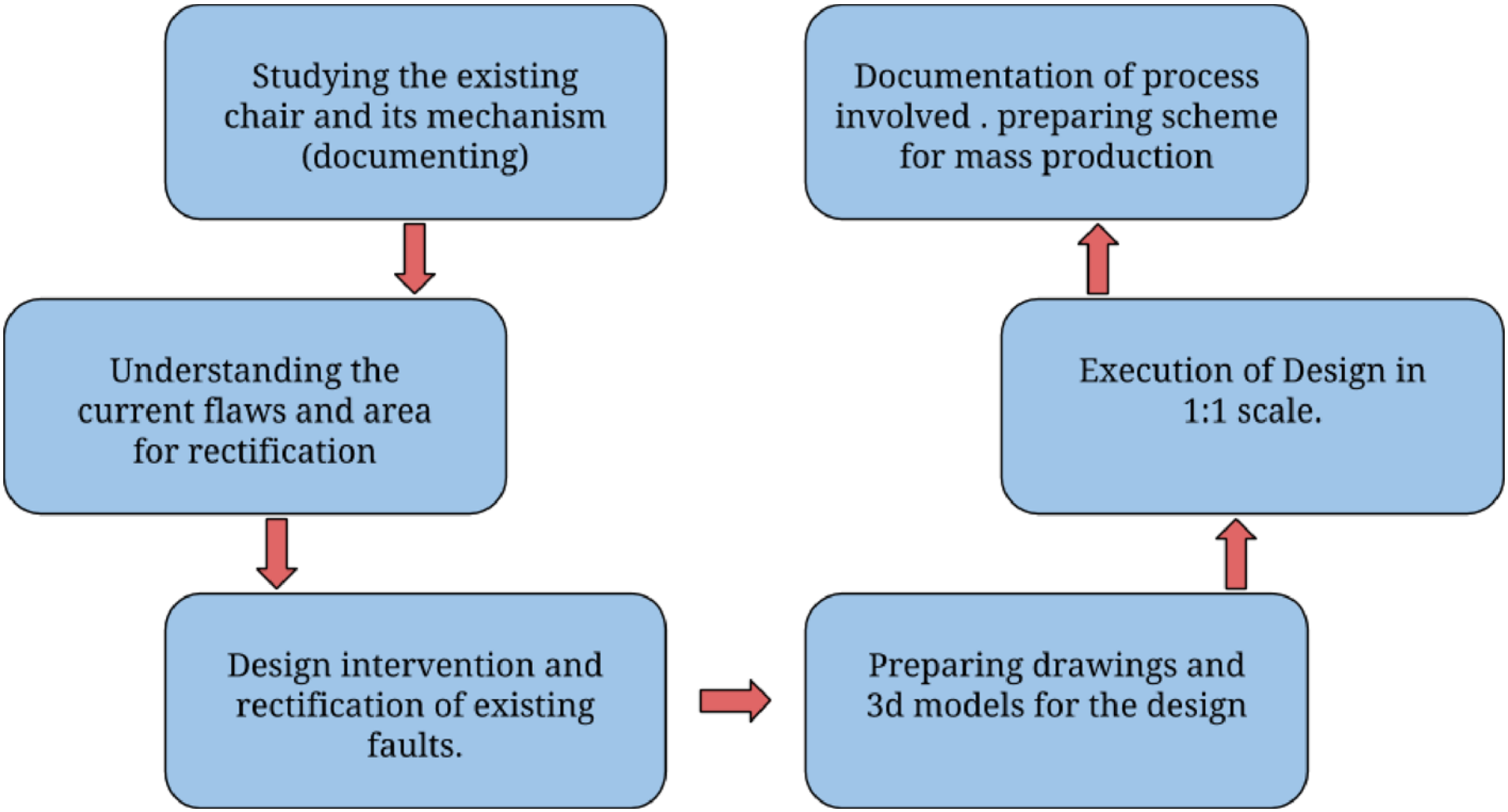
DESIGN BRIEF

The brief was to recreate the existing chair design by analysing the present flaws and rectifying it, creating a detailed documentation of the process and material involved in making of the chair.

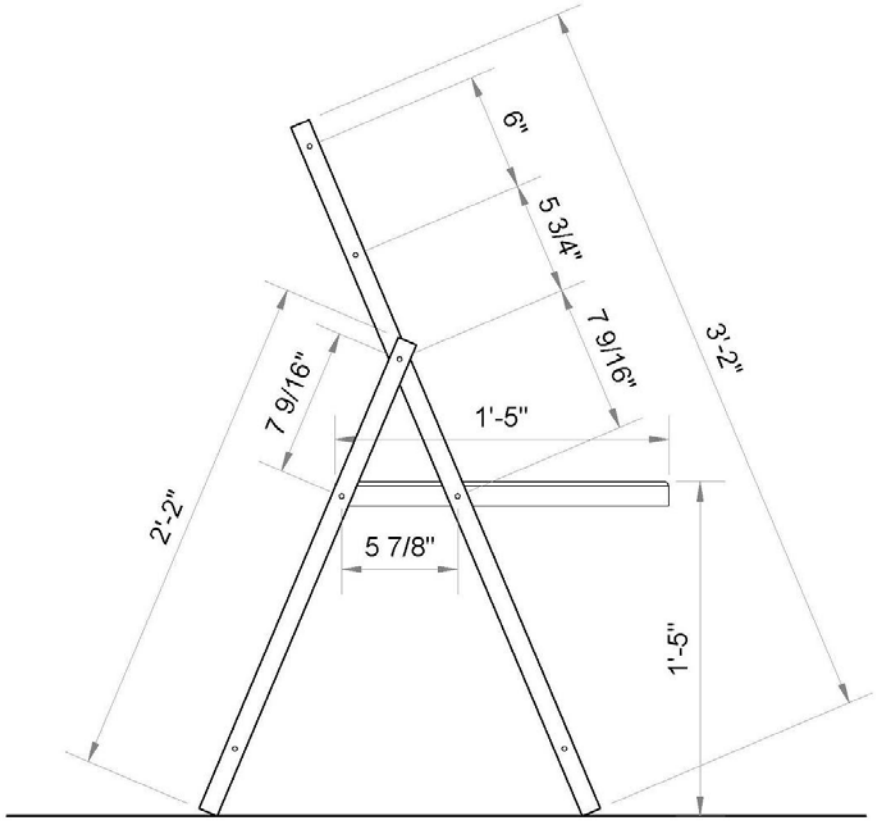
USER REQUIREMENTS

Their requirements was to quantify the material requirements, labour , time and machines required for the manufacturing of the chair and to create a scheme for the production of the chair when it comes to mass manufacturing.

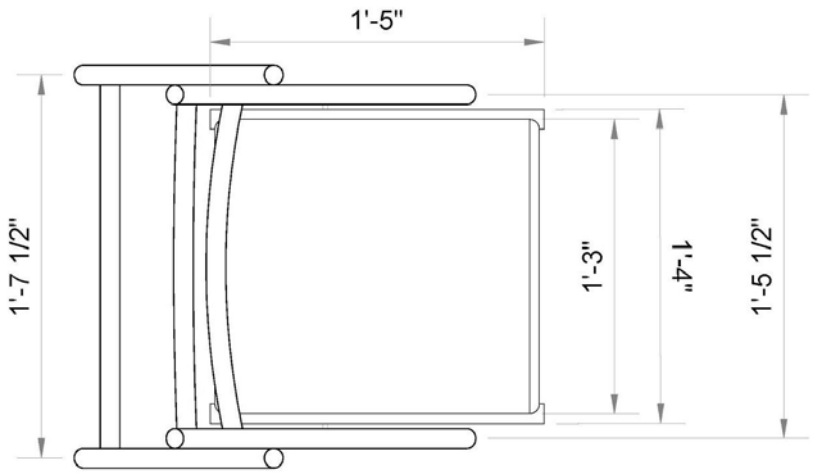
DESIGN METHODOLOGY



EXISTING CHAIR DOCUMENTATION

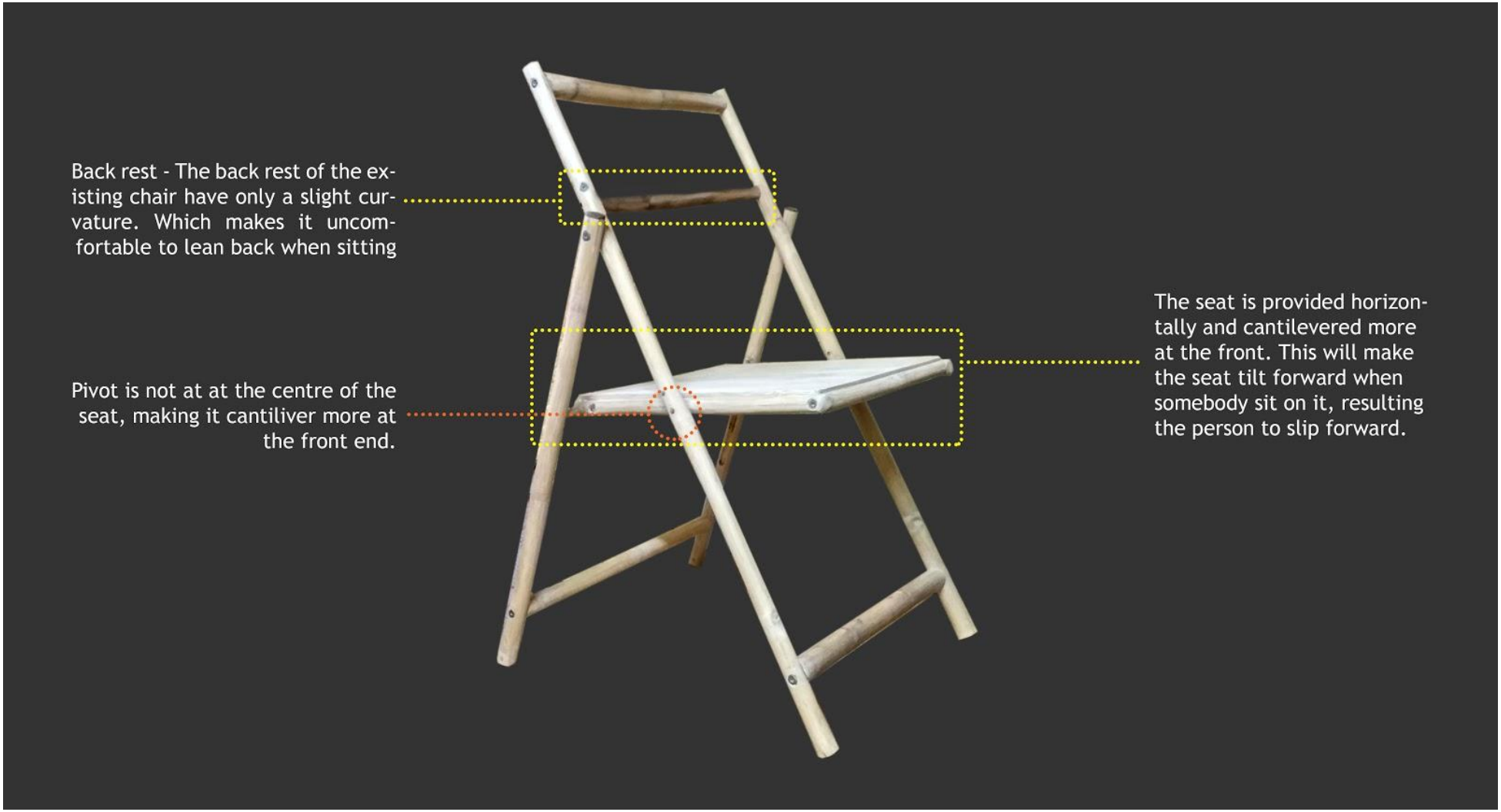


SIDE ELEVATION



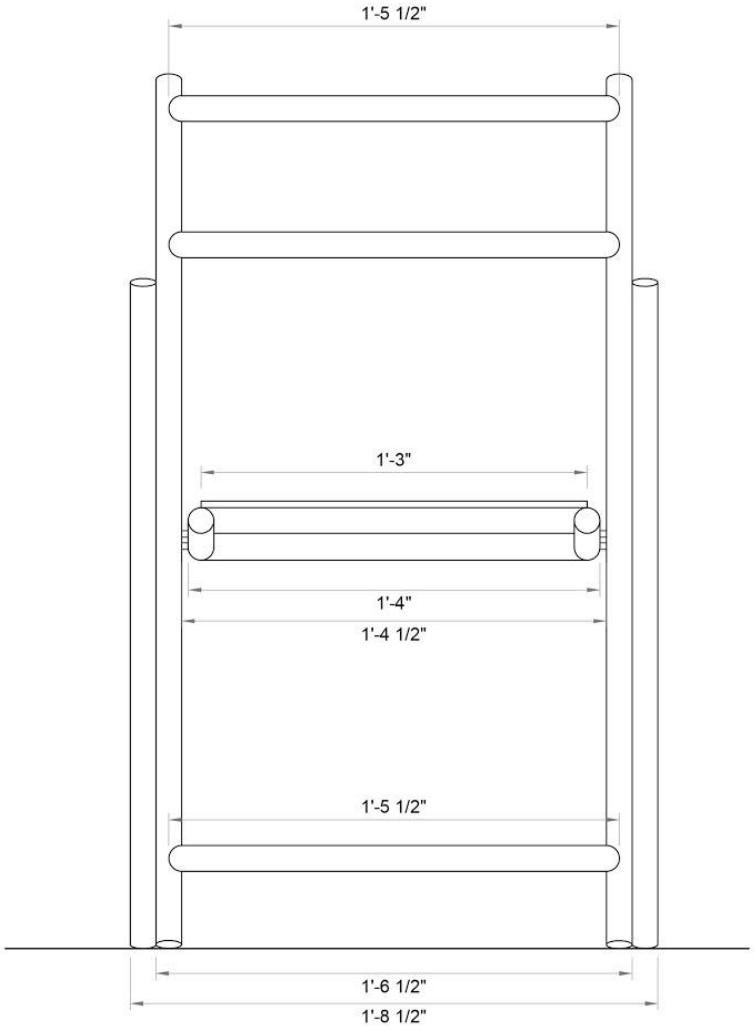
PLAN

EXISTING CHAIR - PROBLEM IDENTIFICATION

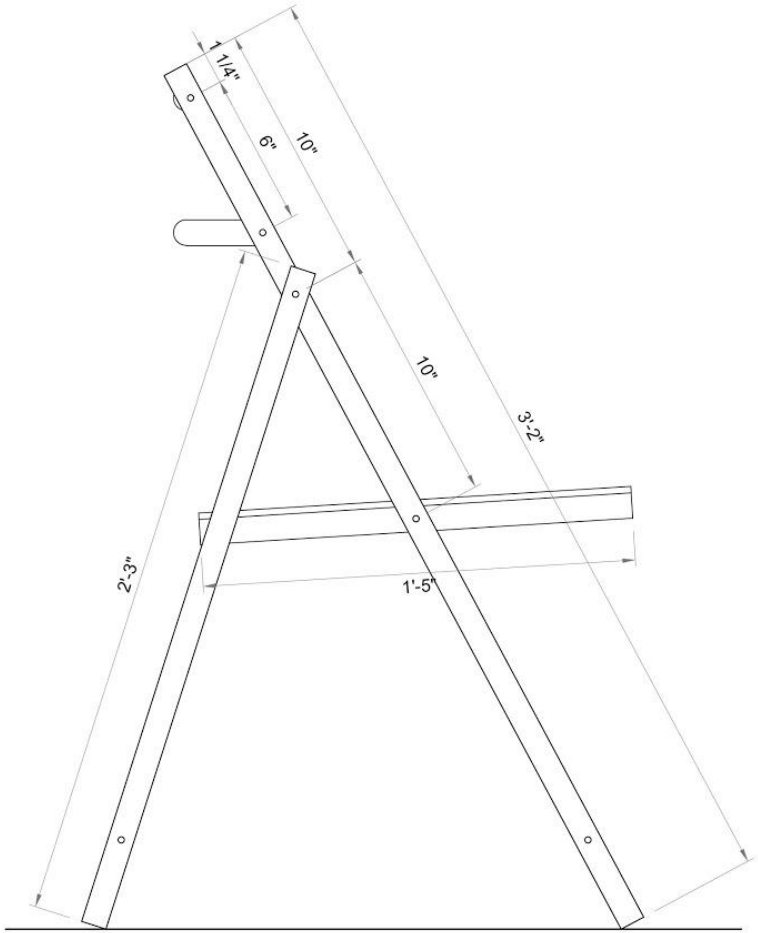


MODIFIED CHAIR DESIGNS

CHAIR DESIGN 1 - CAD DRAWINGS AND 3D VIEWS



FRONT ELEVATION



SIDE ELEVATION

3D VIEWS

MAKING PROCESS - CHAIR 1

Sticking gigantus bamboo reapers to make the seat

Straightening the strictus pieces using an LPG blow torch

Scraping the surface of the bamboo using a knife

Cleaned up Strictus pieces

Finishing the seat piece using an angle grinder and then using sand paper

Assembling the seat piece to the strictus frame

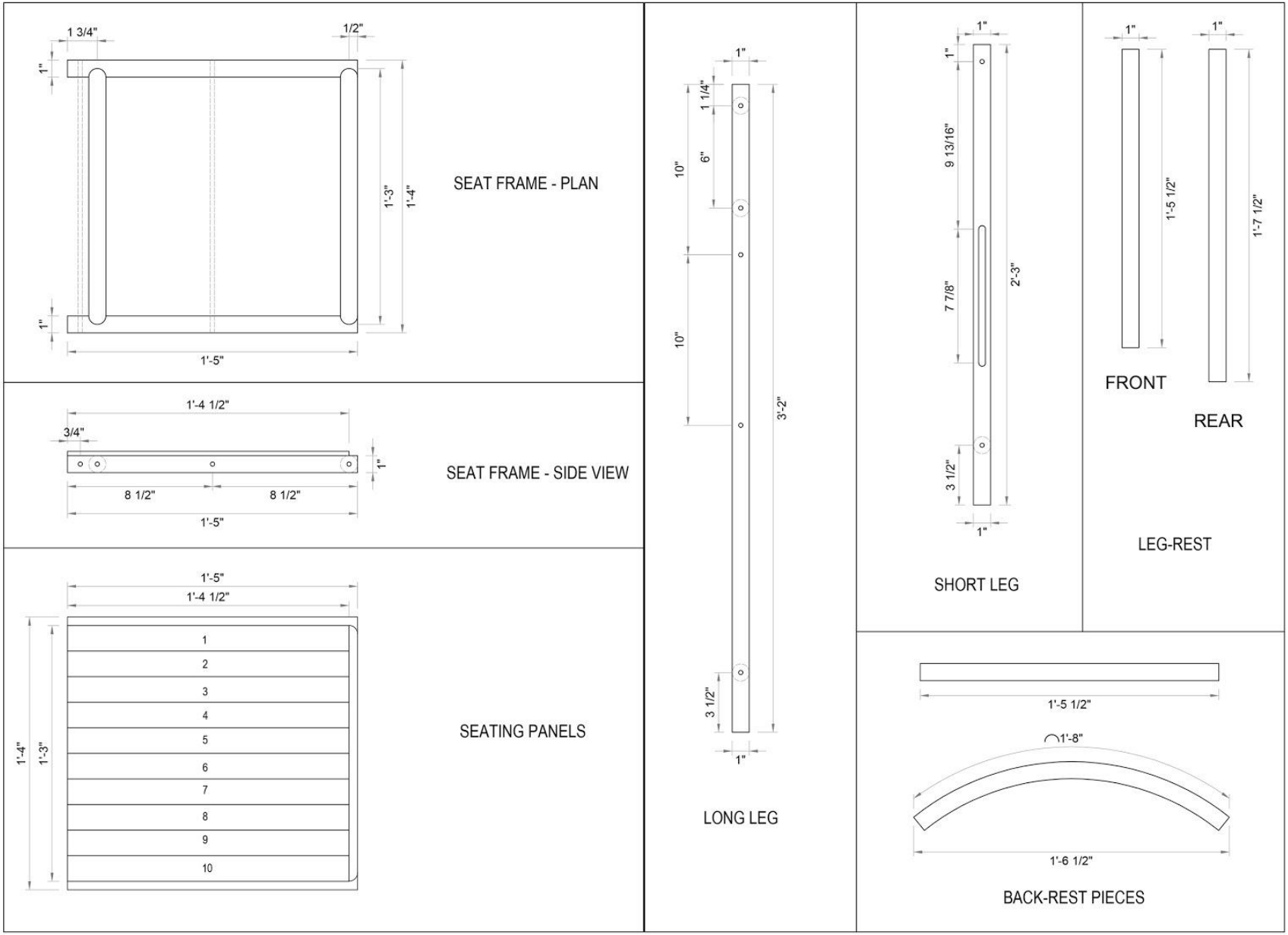
Final assembly of the seat and leg pieces

Final sanding and finishing

Photos of finished chair after polishing

Photos of finished chair after polishing

Photos of finished chair after polishing



Chair 1 - Details

Design 1			
Item	**Process**	**Time**	**Total time**
Seating			
Day 1			
Making panel	Sanding and plaining	2:00 hours	2:30 hours
	Sticking and clamping	0:30 hours	
	Drying	over night	
Framework	Straightening	0:30 hours	3:35 hours
	Scraping top Surface	0:30 hours	
	Cutting	0:15 hours	
	Marking , carving ends	0:20 hours	
	Drilling and counter sinking	1:00 hours	
	Assembling framework	0:30 hours	
	plaining the top of the frame	0:30 hours	
Day 2			
Making panel	Sanding and plaining	1:00 hours	2:00 hours
	Rounding the ends	0:15 hours	
Full Assembly	Gluing Panelling on to the mainframe	0:30 hours	
Main Members			
Day 1			
Legs, Footrest and Backrest	Straightening	1:30 hours	8:00 hours
	Scraping top surface	1:30 hours	
	Cutting	0:20 hours	
	Topping with Coconut shell	1:00 hours	
	Bending backrest	0:30 hours	
	Carving ends for fitting	1:00 hours	
	Marking, Drilling holes and countersinking	2:00 hours	
Day 2			
Final Assembly	Marking channel with router	0:45 hours	6:45 hours
	Nailing, drilling etc.	4:00 hours	
	Sanding	2:00 hours	
Day 3			
	Polishing and sanding		

Materials	Quantity
1" dia strictus	22' 4 1/2"
1 1/2" wide, 1/4" thick gigantus reaper (two side plained)	13' 9"
Alen head bolt and D-nut	14 nos each
8mm metal road	3'1"

Table of time taken for each process and material requirements

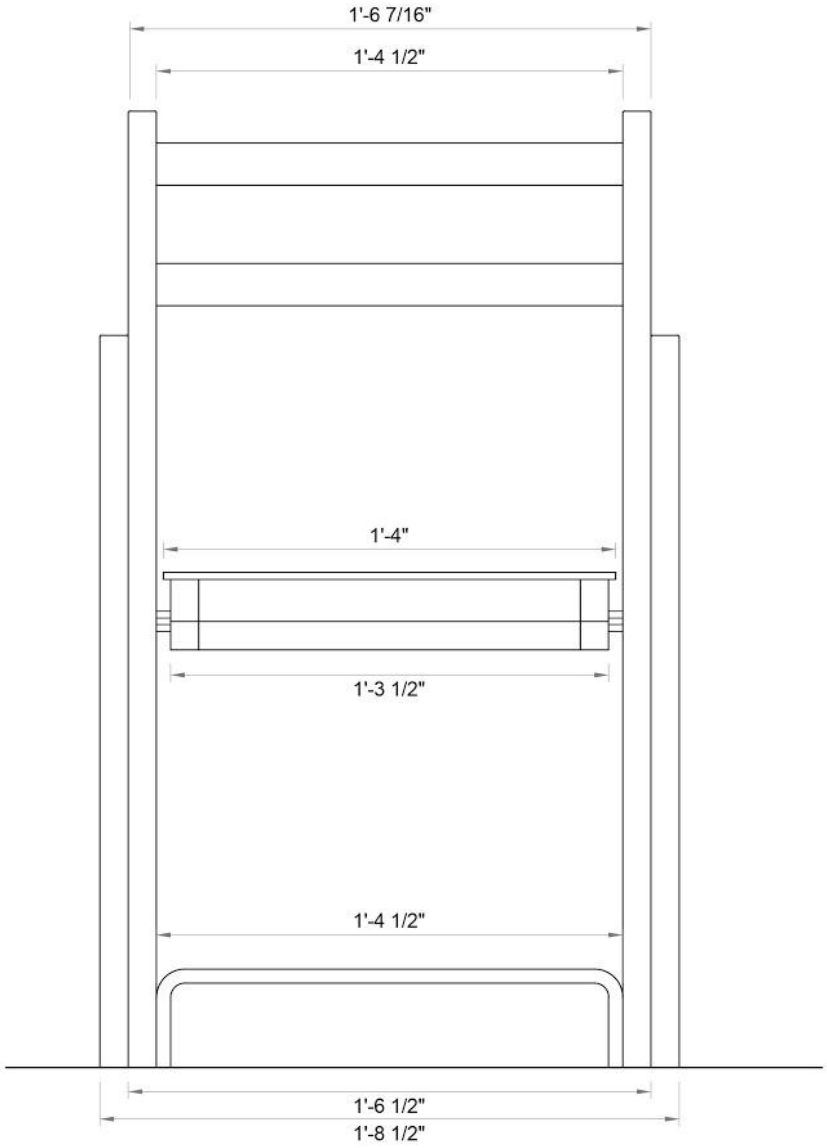
CHAIR DESIGN 1 - USING STRICTUS		
PARTS	**Materials:**	**Processes:**
LONG LEGS - 2 Nos		
	1 Inch dia strictus	**1. Straitening :** the bent of the strictus is straightened by heating and bending. **2. Drilling:** cut it into the specific dimensions and mark the positions for the metal rod and bolts and drill holes. Make counter sink holes where the bolts come. **5. scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
SHORT LEGS - 2 Nos		
	1 Inch dia strictus	**1. Straitening :** the bent of the strictus is straightened by heating and bending. **2. Drilling:** cut it into the specific dimensions and mark the positions for the metal rod and bolts and drill holes. Make counter sink holes where the bolts come. **5. scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
LEG REST - 2 Nos		
	1 Inch dia strictus	**1. Straitening :** the bent of the strictus is straightened by heating and bending. **2. Drilling:** cut it into the specific dimensions and mark the positions for the metal rod and bolts and drill holes. Make counter sink holes where the bolts come. **5. scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
BACKREST - 2 Nos		
	1 Inch dia strictus	**1. Straitening and bending :** the bent of the strictus is straightened by heating and bending. the pieces which need bend is further bent by heating process. **2. Drilling:** cut it into the specific dimensions and mark the positions for the metal rod and bolts and drill holes. Make counter sink holes where the bolts come. **5. scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.

Detailed manufacturing process report

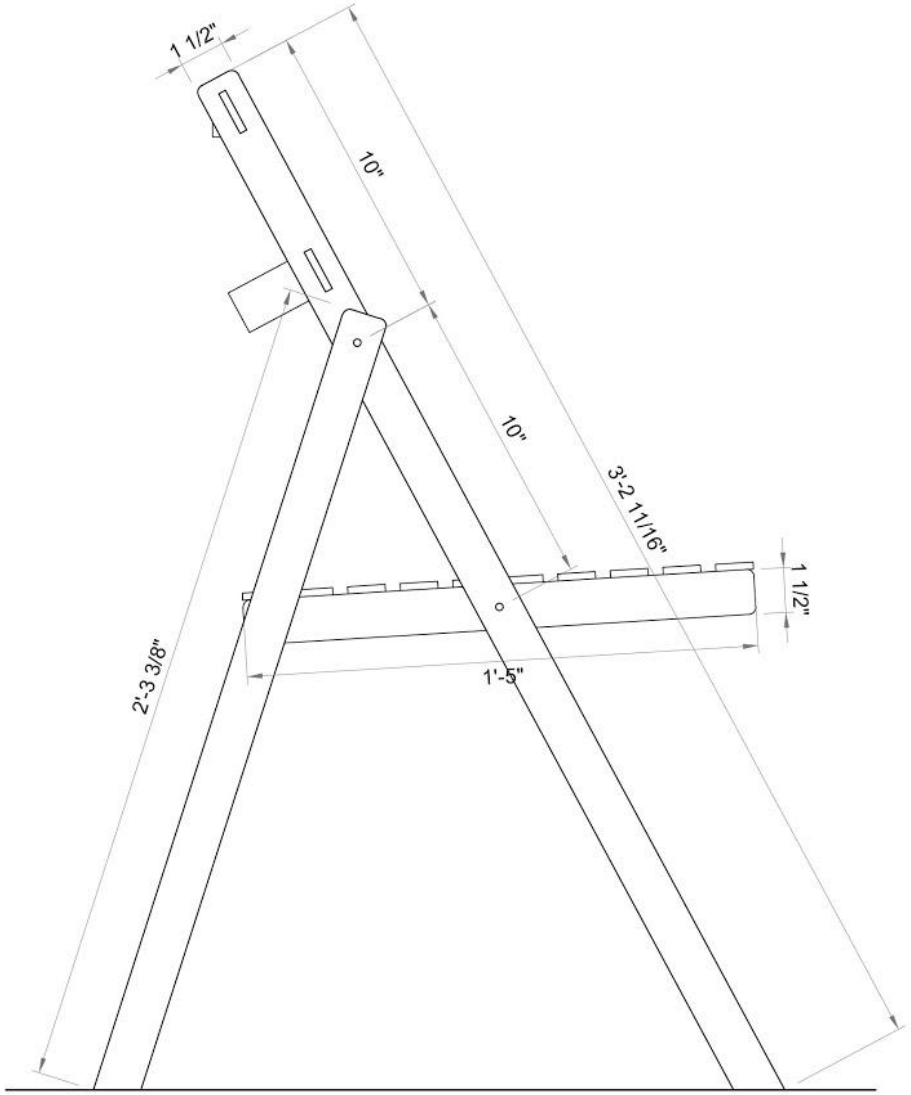
CHAIR DESIGN 1 - USING Strictus		
SEATING UNIT		
PARTS	**Materials:**	**Processes:**
FRAMEWORK		
MAIN MEMBER - 4 Nos		
	1 Inch dia strictus	**1. Straightening :** the bent of the strictus is straightened by heating and bending. **2. scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
PANALLING -		
	Gigantus bamboo reaper - two side planed	**1.Plaining and Sanding :** the sides of the bamboo reaper is planned and sanded so that the sides of it fits perfectly when aligned. **1. Sticking and Clamping :** The plained bamboo is stuck side by side and clamped and kept for drying . **2. scraping and Finishing:** scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper .
SEAT ASSEMBLING		
	1. Main framework	**1.Carving** :cut it into the specific dimensions and carving the end of the bamboo to fit the joints perfectly on to each other. **2. Drilling:** mark the positions for the bolts, steel rod and drill holes. Make counter sink holes where the bolts come. **3. Bolting** : the frame is bolted from for ends
	2. Panelling on top of the seat frame.	**1.Sanding :** the top portion of the main framework is sanded and planed so the panel can sit on it properly and glued. **2. Gluing and clamping :** the panelled is glued and clamped on to the main framework.

Detailed Manufacturing process report

CHAIR DESIGN 2 - CAD DRAWINGS AND 3D VIEWS



FRONT ELEVATION



SIDE ELEVATION

3D VIEWS

MAKING PROCESS - CHAIR 2

Scraping the surface of the gigantus bamboo reapers using a knife

Scraped reaper pieces for the seat

Making template to bend backrest

Charring the seat pieces and the backrest pieces using a blowtorch

Sticking and nailing two one-side reapers to make leg pieces

Bending the reapers using hot air gun

Finished pieces before assembly

Assembling the seat frame

Finishing the frame using an angle grinder

Nailing the seat panels to the frame

Trial assembly of chair

Assembling the chair

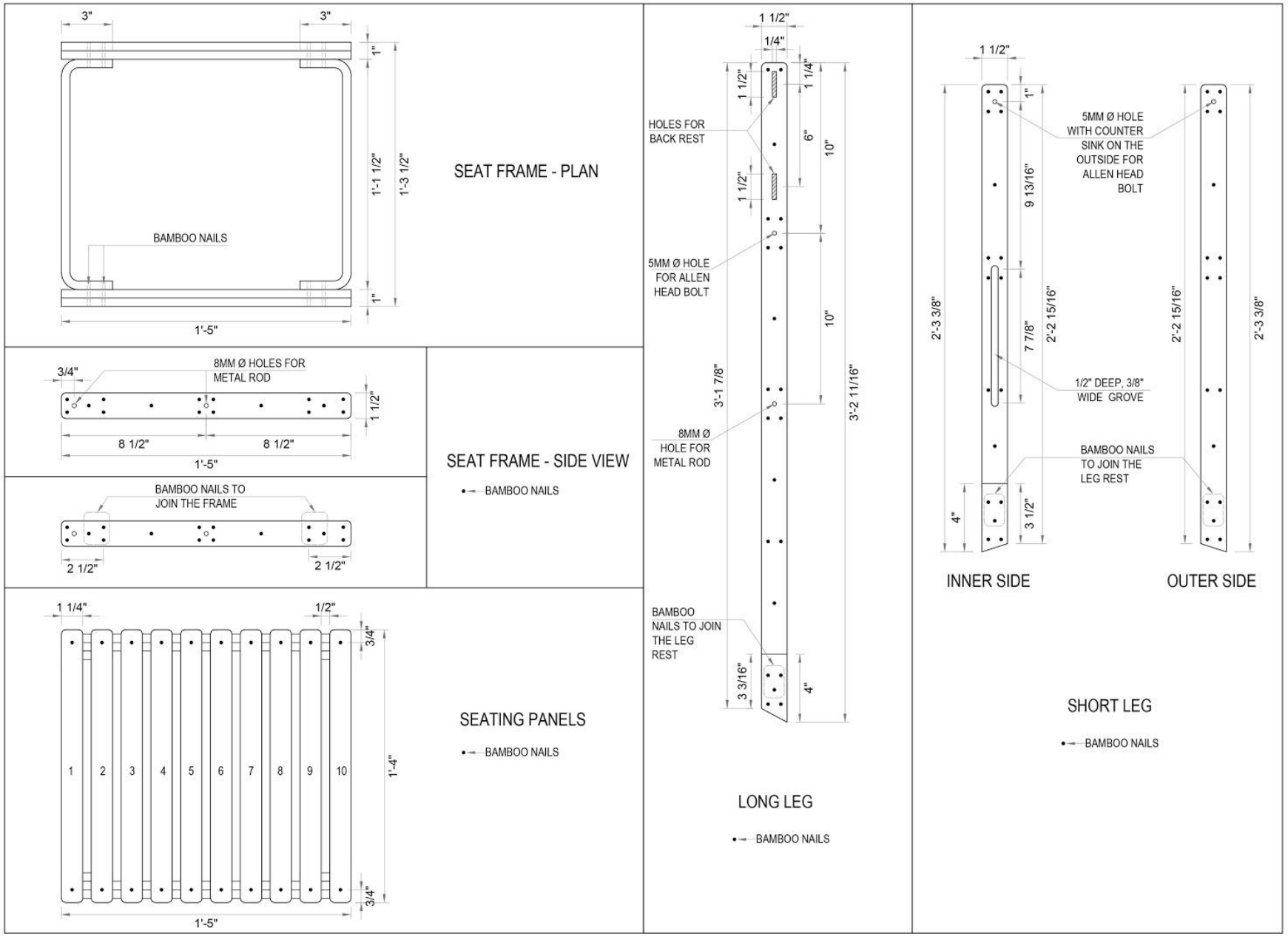
Assembling the chair

Photos of finished chair after polishing

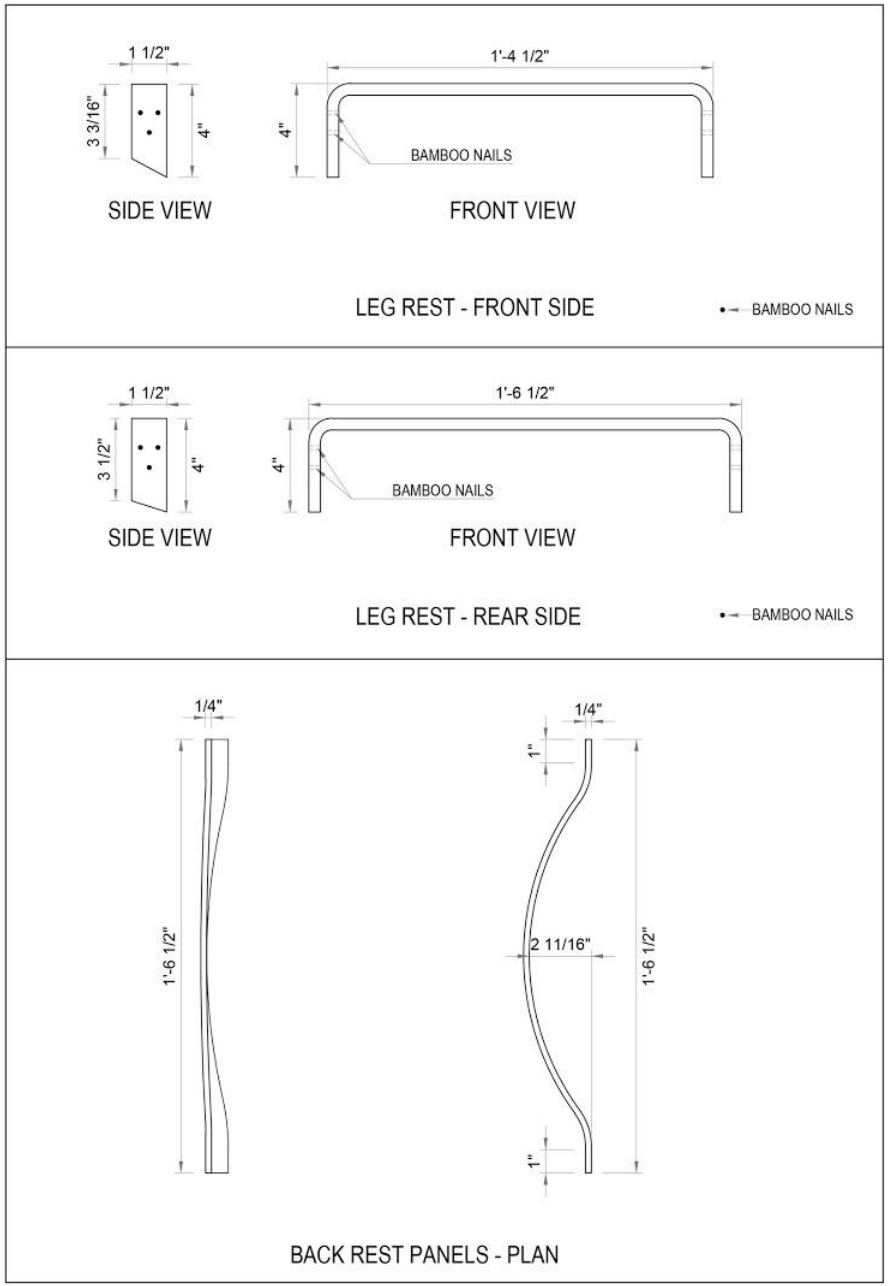
Photos of finished chair after polishing

Photos of finished chair after polishing

Photos of finished chair after polishing



Chair 2 - Details



Chair 2 - Details

Design 2			
Item	**Process**	**Time**	**Total time**
Seating			
Day 1			
Framework	Straightening	0:30 hours	6:10 hours
	Cutting	0:30 hours	
	Sticking, drilling, nailing and clamping	2:00 hours	
	Drying	over night	
	Bending - Second member	0:40 hours	
	Scraping and cutting	0:30 hours	
Panel	Cutting	0:20 hours	
	Edge rounding	0:20 hours	
	Colouring (burning)	0:30 hours	
Day 2			
Assembly			
Main frame	Sanding, nailing and gluing	2:30 hours	5:00 hours
Panelling	Marking, drilling, Nailing and gluing	2:30 hours	
Main members			
Day 1			
Legs, Footrest and Backrest	Straightening	1:30 hours	7:20 hours
	Cutting	0:30 hours	
	Sizing and Sanding	2:30 hours	
	Sticking and clamping	1:00 hours	
	Drying	over night	
	Bending back rest and leg rest	1:00 hours	
	scraping	0:30 hours	
	Colouring (burning)	0:20 hours	
Day 2			
Legs, Footrest and Backrest	Drilling and Nailing	2:00 hours	8:00 hours
	Cutting and sanding	2:00 hours	
	Cutting angle , edge levelling	2:00 hours	
	Drilling, making channels with router	2:00 hours	
Day 3			
Full Assembly	Bending back rest and leg rest	0:30 hours	8:00 hours
	Drilling holes to fix Backrest	1:00 hours	
	Cutting metal rods	0:30 hours	
	Grinding, drilling, nailing, clamping	6:00 hours	
	Drying	over night	
Day 4			
	Polishing and Sanding		

Materials	Quantity
1 1/2" wide, 1/2" inch thick gigantus reaper (one side plained)	35'2"
1 1/2" wide, 1/4" thick gigantus reaper (one side plained)	3' 2 1/2"
1 1/4" wide, 1/4" thick gigantus reaper (one side plained)	13' 4"
8mm metal rod	3'1"
Alen head bolt and D-nut	2 nos each

Time taken for each process and material requirements

CHAIR DESIGN 2 - USING GIGANTUS		
PARTS	**Materials:**	**Processes:**
LONG LEGS - 2 Nos		
	Gigantus bamboo reaper - One side plained .5 inch thick	**1. Sticking:** Take two pieces of gigantus bamboo reapers slightly larger than than the specified dimensions and stick them together. **2. Clamping and Drying:** Clamp them together at various points to get a good adhesion and let it dry. **3. Nailing:** Once dried, drill holes and nail them together using bamboo nails and glue at the specified points and let it dry. **4. Drilling:** Once the nails dried, cut it into the specific dimensions and mark the positions for the metal rod and bolts and drill holes. Make counter sink holes where the bolts come. **5. scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
SHORT LEGS - 2 Nos		
	Gigantus bamboo reaper - One side plained .5 inch thick	**1. Sticking:** Take two pieces of gigantus bamboo reapers slightly larger than than the specified dimensions and stick them together. **2. Clamping and Drying:** Clamp them together at various points to get a good adhesion and let it dry. **3. Nailing:** Once dried, drill holes and nail them together using bamboo nails and glue at the specified points and let it dry. **4. Drilling:** Once the nails dried, cut it into the specific dimensions and mark the positions for the metal rod and bolts and drill holes. Make counter sink holes where the bolts come. **5. scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
LEG REST - 2 Nos		
	Gigantus bamboo reaper - One side planed .5 inch thick	**1. Bending:** using heating process, the bamboo reaper is bent to the desired dimension . **2. scraping and Finishing:** scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
BACKREST - 2 Nos		
	Gigantus bamboo reaper - One side plained .25 inch thick	**1. Bending:** using heating process, the bamboo reaper is bent to the desired dimension . **2. scraping and Finishing:** scrape and clean the surfaces using a knife and a grinder . **3. Burning(colouring)** : using gas blower the back rest pieces are given a darker shade.

Detailed manufacturing process report.

CHAIR DESIGN 2 - USING GIGANTUS		
SEATING UNIT		
PARTS	**Materials:**	**Processes:**
FRAMEWORK		
MAIN MEMBER -2 Nos		
	Gigantus bamboo reaper - One side plained .5 inch thick	**1. Sticking:** Take two pieces of gigantus bamboo reapers slightly larger than than the specified dimensions and stick them together. **2. Clamping and Drying:** Clamp them together at various points to get a good adhesion and let it dry. **3. Nailing:** Once dried, drill holes and nail them together using bamboo nails and glue at the specified points and let it dry. **4. Drilling:** Once the nails dried, cut it into the specific dimensions and mark the positions for the metal rod and bolts and drill holes. Make counter sink holes where the bolts come. **5. scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
BENT MEMBER - 2 Nos		
	Gigantus bamboo reaper - One side plained .5 inch thick	**1. Bending:** using heating process, the bamboo reaper is bent to the desired dimension . **2. scraping and Finishing:** scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.
PANALLING - 10 nos		
	Gigantus bamboo reaper - One side plained	**1. Bending:** using heating process, the bamboo reaper is bent to the desired dimension . **2. scraping and Finishing:** scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper. **3. Burning(colouring) :** using gas blower the back rest pieces are given a darker shade.
SEAT ASSEMBLING		
	1. Main frame is made using the main members and the bent member	**1.Sticking** : the main frame work is stuck together and clamped. **2. Drilling and Nailing :** the joints are further made stronger by drilling and nailing them using bamboo nails. **3. Clamping and Drying** : the frame is kept for drying
	2. Panelling on top of the seat frame.	**1. Marking and Sticking :** the position for panel members are marked and stuck on to the frame work. **2. Drilling and Nailing :** holes are made on to the panel members and frame work , which is filled by nailing with bamboo nails. **3. Scraping and Finishing:** once the holes are drilled, scrape and clean the surfaces using a knife and a grinder and then finish it with sand paper.

Detailed manufacturing process report.

INTERNSHIP CERTIFICATES

uravu
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e-mail: uravu.india@gmail.com
website: www.uravu.net

Ref:

Date:

CERTIFICATE

This is to certify that **Nirmal P.J** (Reg. No: 176130009) First year M.Des Industrial design student of **IDC,IIT Bombay** has successfully completed the one month internship Training in our firm **at "Uravu Indigenous Science & Technology Study Centre, Thrikkaipetta, Wayanad, Kerala"** during the period from 07th May 2018 to 06th June 2018 as a part of his M.Des degree course.

It is observed that **Nirmal P.J** has taken very much care during the project work and he found hard working and enthusiastic in his activities.

We wish all success in future.

06 June 2018

Thrikkaipetta

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URAVU

For Uravu

Dr. A K Abdullakutty (President)

uravu
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e-mail: uravu.india@gmail.com
website: www.uravu.net

Ref:

Date:

CERTIFICATE

This is to certify that **Saijith M.S** (Reg. No: 176130007) First year M.Des Industrial design student of **IDC,IIT Bombay** has successfully completed the one month internship Training in our firm **at "Uravu Indigenous Science & Technology Study Centre, Thrikkaipetta, Wayanad, Kerala"** during the period from 07th May 2018 to 06th June 2018 as a part of his M.Des degree course.

It is observed that **Saijith M.S** has taken very much care during the project work and he found hard working and enthusiastic in his activities.

We wish all success in future.

06 June 2018

Thrikkaipetta

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For Uravu

Dr. A K Abdullakutty (President)

REFERENCES

- http://www.uravu.net/