PRODUCT POSSIBILITY OF FORM GENERATION TOOLS FOR BAMBOO CRAFT

DESIGN RESEARCH SEMINAR
PDSPL 176

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GUIDE: PROF P KUMARESAN

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INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY 2017

DECLARATION

I declare that this written document represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any data, facts or sources in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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APPROVAL SHEET

The design research seminar titled 'Product Possibility of Form/Shape Generation Tools for Bamboo Craft' by Antik Mallick, is approved for partial fulfilment of the requirement for the degree of 'Master of Design' in Industrial Design.

Guide

Date

ACKNOWLEDGEMENT

I would like to thank Prof. P Kumaresan for his guidance and support throughout the duration of the project.

Thanks to URAVU for the resources and help me with the Evaluation of the tools

I would also like to thank Alice and Sourab for helping me with photo documentation of the project.

Most importantly, I would like to thank god and my parents, for supporting me during the course of this project and for motivating and believing in me and my work.

CONTENT

Chapter 1

Introduction

This Shape generation tools aim towards modernization of bamboo, where bamboo strips are used as an industrial material. Bamboo strips have been a traditional material for weaving baskets and many more different kinds of lifestyle accessories. IDC Bambu Studio is also putting its effort to develop many mass manufacturing tools, products manuals and workshops for working with bamboo strips and the system connected with it.

During the time duration of my project 2, we decided to make the shape generation tool specifically for jewellery application because of its need in the system.
These tools follow A. G. Rao sir's philosophy of 'Product Specific Tools for Bamboo Craft'. They also provide opportunities for further design and developments of may tools, which could prove to be a game changer in both craft and industrial product design.

1.1: Description of tools

The tools and techniques is similar to bamboo coiling technique which was only limited to coiling and some limited application. But, the developed tools enables to make precise shapes in efficient way, which is new innovation in bamboo craft. The developed tools are inspired by paper quilling craft, in which strips are rolled, curled, looped or otherwise manipulated to create shapes and further permutation and combination of shapes can lead to many applications beyond quilling and jewellery.

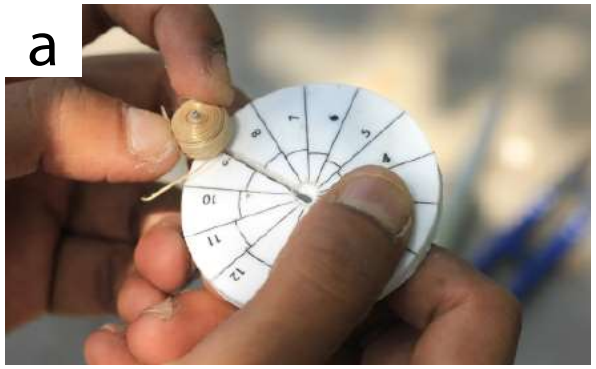
The tools are designed for the system connected to bamboo. Where the strips are the major part of the system, which can only made an artisan because, for micro application the strip thickness requires must be less than 1 mm which is not possible through any machine.

The following are the shape generation tools which were developed during in the earlier project

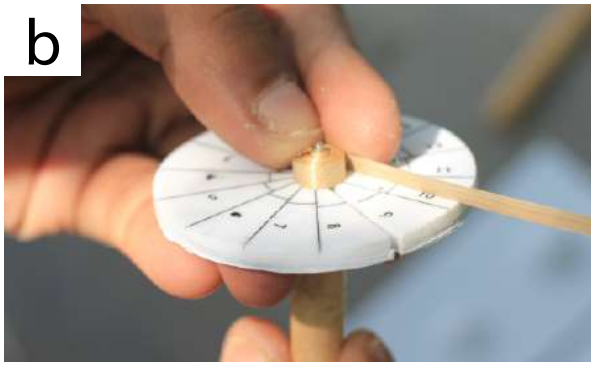
1 The **basic slot tool** basically has a vertical slot at the tip on which the strip is placed and then the tool is rotated to get tight coils.
And to for uniform tight coils a guide is used which is known as coach tool.

2 The **thick slot tool** basically has a thicker vertical slot at the tip on which multiple strips can be placed and then the tool is rotated to get multi- coloured tight coils.
And similarly for uniform coils the guide is used which is known as thick coach tool.

a



b



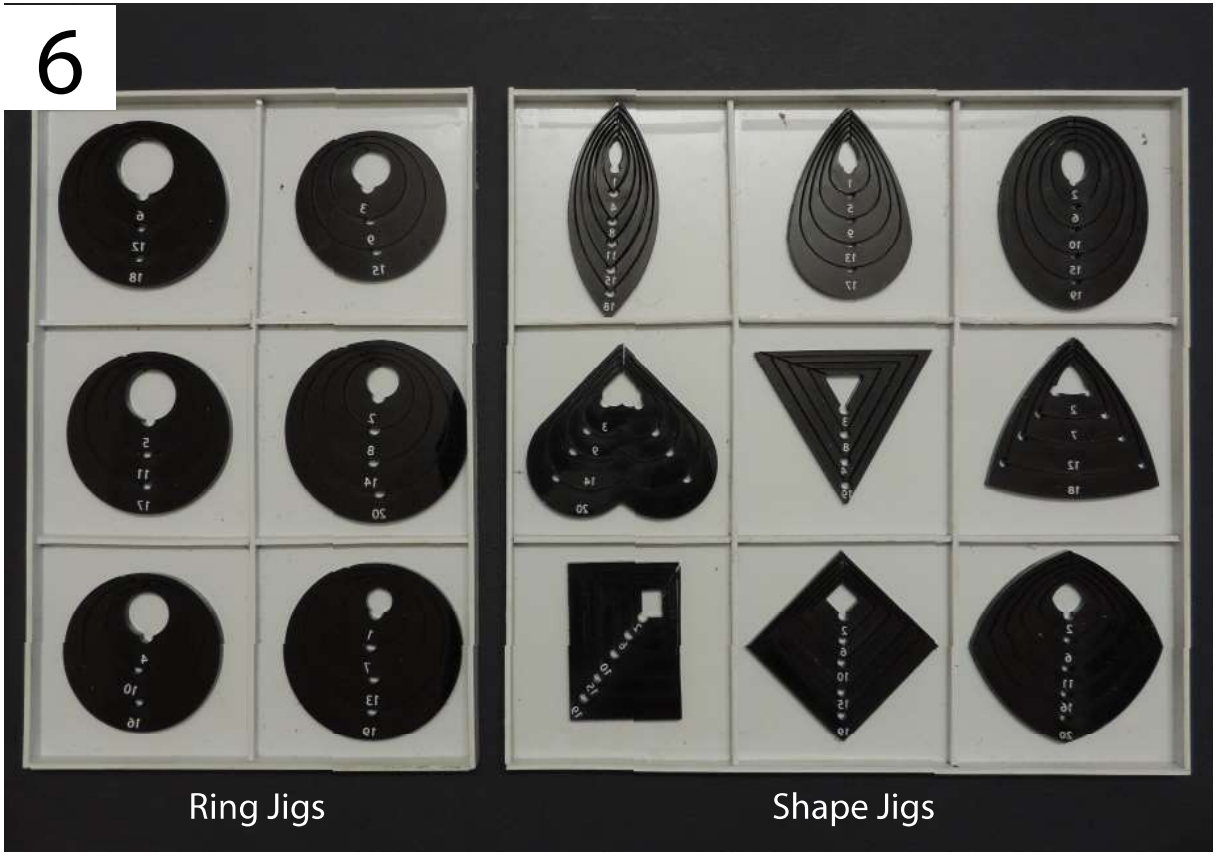
3

a & b The **Coach tool** is basically a circular disk having a slot along the centre to the circumference of the disk to guide the slot tool in centre during the operation of making flat tight coils. It have markings for making precise diameter of coil which is also helpful in making mini mould shapes which is the 3rd tool in the description.

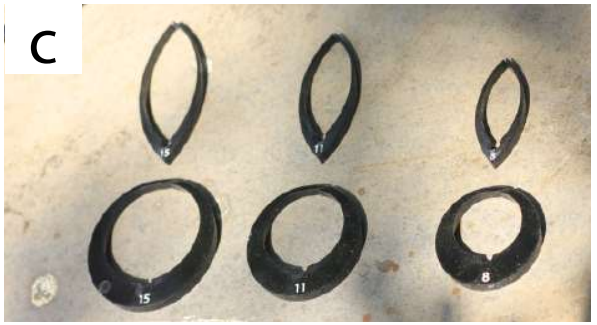
3 **Mini mold tool** a three dimensional shaping tool which transforms tight flat coils into perfect domes, is basically a set of hemispheres of various sizes.
The domes can be used to make spherical and conical shapes.

4 The method is a quick and easy way to make evenly shaped loops. Coils made with a comb tool are generally bigger than those made with a slot tool.

5 **Vortex tool** is basically change of circular cross section of slotted tool to a 1 mm plate with three sizes of tight coil and then expanded into three different sizes of shape called as vortex coil.



6 Set of ring and shape jigs. Ring jigs are used to make required size of coil and the shapes jigs used to form desired shape.



c The perimeters of rings jigs corresponding to the perimeter of shape jigs are mapped because the shapes cannot be made directly,

d Ring jig corresponding to the shape jig is selected and coil of desired thickness is made,

e the coil is then formed into the corresponding shape,

f different permutation and combination of shapes can be made,

1.2: Selected tools for Evolve

Since the shape generation tools will be new to the system so further development of the tools cannot be done until tool evaluation (at a mass scale for further understanding), which will take time.
The idea is :
Premium kit (Evolve) - the set of tools,which can be tested by
An artisan,
A craftsman
A designer,
A hobbyist.
for whom the tools would be one time investment.
Fig no 1.2a showing the selected shape generation tools for evolve kit.
Fig no. 1.2b showing the other selected tools which are required tools along the jewellery making process.
Fig no 1.2c showing the branding for evolve kit.

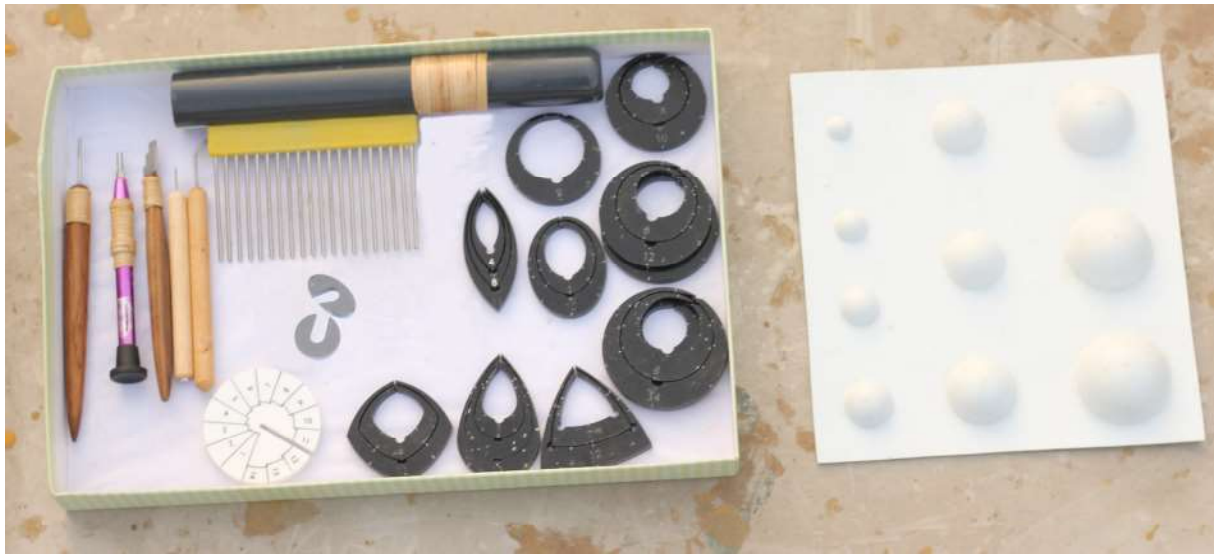


Fig. No: 1.2a

Fig. No: 1.2b

Fig. No: 1.2c

Chapter 2

Objective

The project aim to find further product possibilities of the tools developed.
To understand and go next step further, the following steps were taken during the project -
1) Evolve Tool Kit -packaging.
2) User Testing - URAVU (NGO)
3) Product Possibilities for bamboo craft.

Fig. No: 3.1a

Chapter 3

Packaging

For the tool kit evaluation, the effective place would be URAVU (a NGO situated in Kerala ,Wayanad distct) .Because, they are already making similar bamboo jewellery.
For that packaging is a important aspect of the tools kit evaluation .
The existing packaging of shape generation tools are shown in Fig no. 3.1a,b&c.

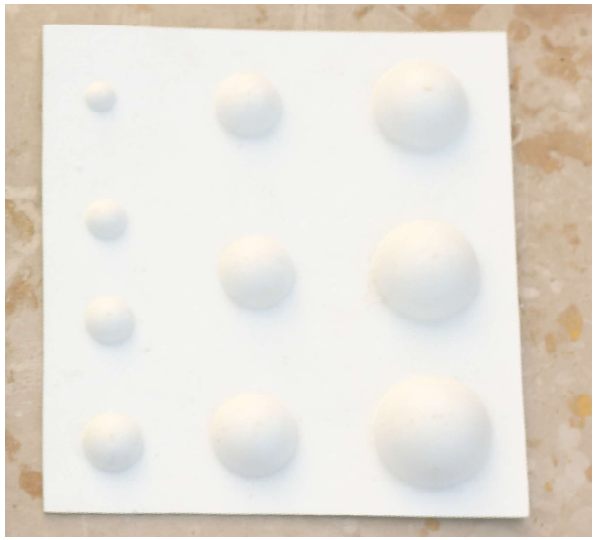


Fig. No: 3.1b

3.1: Existing packaging and branding

Existing packaging of shape generation tool kits are separated (not in a single) Fig no.3.1a,b&c.

Fig no.3.1a soft material packaging (cloth -for prototype), folding method. Disadvantages of this packaging was that all the tools were not pen like so it was difficult close the packaging.

Fig no.3.1b existing mini mould tool was difficult to incorporate in the tool kit because of it bigger size compared to other tools

Fig no.3.1c Two styrene box with transparent acrylic covering containing rings jigs and shape jigs of similar perimeters the major disadvantage of the tools are they are larger and more in no. compared to a quantity of tools for a testing.

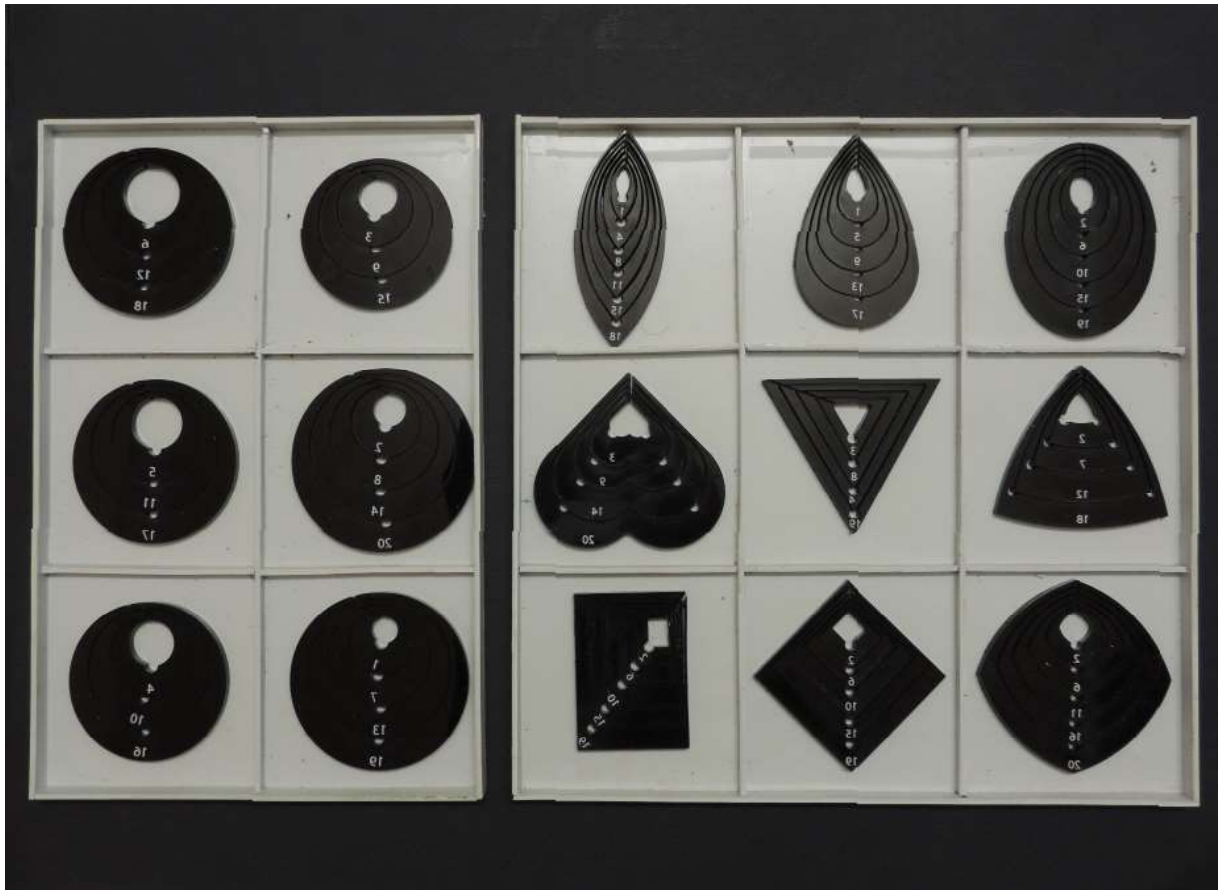


Fig. No: 3.1c

Fig. No: 3.2a

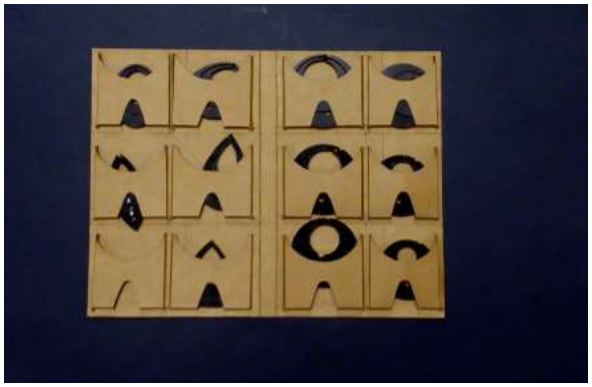


Fig. No: 3.2b

Fig. No: 3.2c

Fig. No: 3.2d

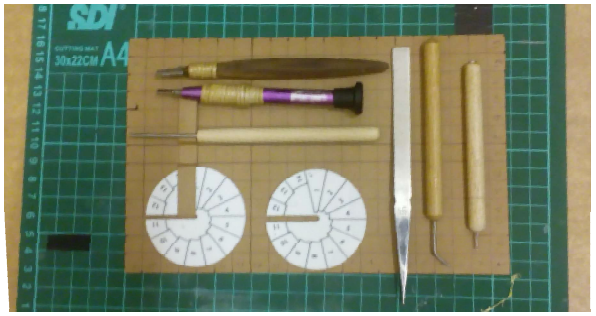


Fig. No: 3.2e

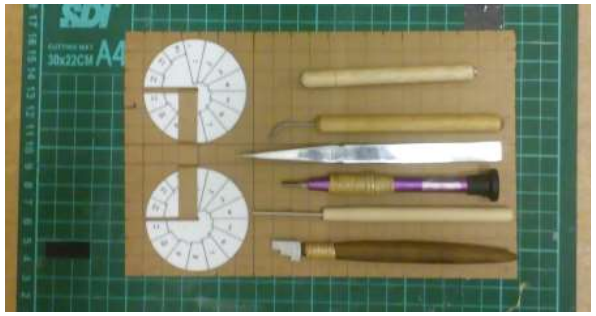


Fig. No: 3.2f

3.2: Ideations

The following are some important considerations made during the ideation phase

Fig no.3.2 a&b - The no of ring jigs and shape jigs were reduced which reduce the no. of tools, with reduction of cost and increase its value as test kit for evaluation and packaging.

Fig no.3.2c to 3.2f showing the ideations of different positions and details of other tools with reference to the shape and ring jigs.

3.3: Cardboard model

On the basis of ideation a card board prototype is made
Fig no.3.3 a,b&c - Showing the step by step opening of the tool kit.
Fig no.3.3 a- Step 1 closed A5 folder kit with branding.
Fig no.3.3 b- Step 2 first fold showing the basic coilling tools
Fig no.3.3 a- Step 3 second fold ,shape and ring jigs. Which can be a separated from the kit.

Fig. No: 3.3a

Fig. No: 3.3b

Fig. No: 3.3c

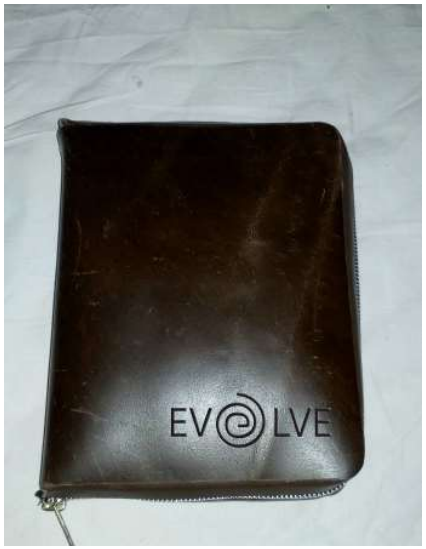


Fig. No: 3.4a

Fig. No: 3.4b

Fig. No: 3.4c

3.4:Leather packaging

For the tool kit leather seemed to be a suitable material with longer durability. On the basis of the cardboard prototype a leather packaging was made.

Fig no.3.4 a,b&c - Showing the step by step opening of the tool kit.

Fig no.3.4 a- Step 1 closed zip ~A5 folder kit with branding embossed.

Fig no.3.4 b- Step 2 first fold exposes the basic coilling tools(left). with separate right closed packaging

Fig no.3.4 a- Step 3 second fold shape and ring jigs having different identification. Which can be a separated from the kit.

Other details of the leather tool kit .
Fig no.3.4d,e,f&g - Showing the separate tool kit of ring and shape jigs using rivets.
Fig no.3.4e - Shape jigs with Link making tools
Fig no.3.4f - Ring jigs transparent acrylic to differ it from shape jigs.(Two different kinds of button joinery to hold the jig in the packaging)
Fig no.3.4g - Basic coiling kit with separate section for generally used tools during the intermediate processes.

Fig. No: 3.4d

Fig. No: 3.4e

Fig. No: 3.4f

Fig. No: 3.4g

Fig. No: 3.5a

Fig. No: 3.5b

Fig. No: 3.5c

Fig. No: 3.5d

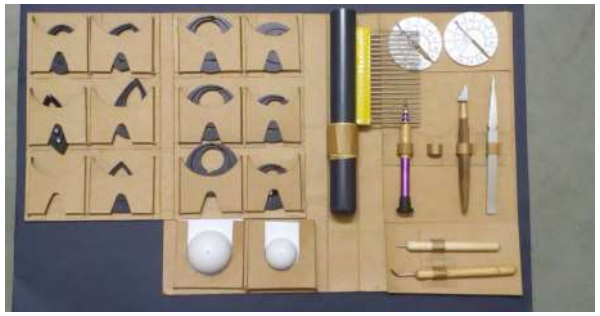


Fig. No: 3.5e

3.5:Development of mini mould tool

During the same time the mini mould tool was also developed for packaging. Fig no.3.5 a & b showing the staking of the tools which make it compact and easy to use according to the no allotted.

for which the tool kit was further developed and the mini mould was incorporated in the tool kit shown in fig no. 3.5c to3.5e.

The final prototyping was done at URAVU (bamboo craft based NGO)

3.6: Final prototype in Uravu

During the visit to URAVU I realised that leather packaging is not suitable for a moisture environment,so the further packaging was made using jute, which was in house manufactured by URAVU jute bag unit.

The prototype was made using the help of a craftsman Fig no.3.6c, for which several paper models are made. Fig no. 3.6a&b showing the paper model used for the explaining and making from jute.

Fig. No: 3.6a

Fig. No: 3.6b

Fig. No: 3.6c

Fig. No: 3.6d

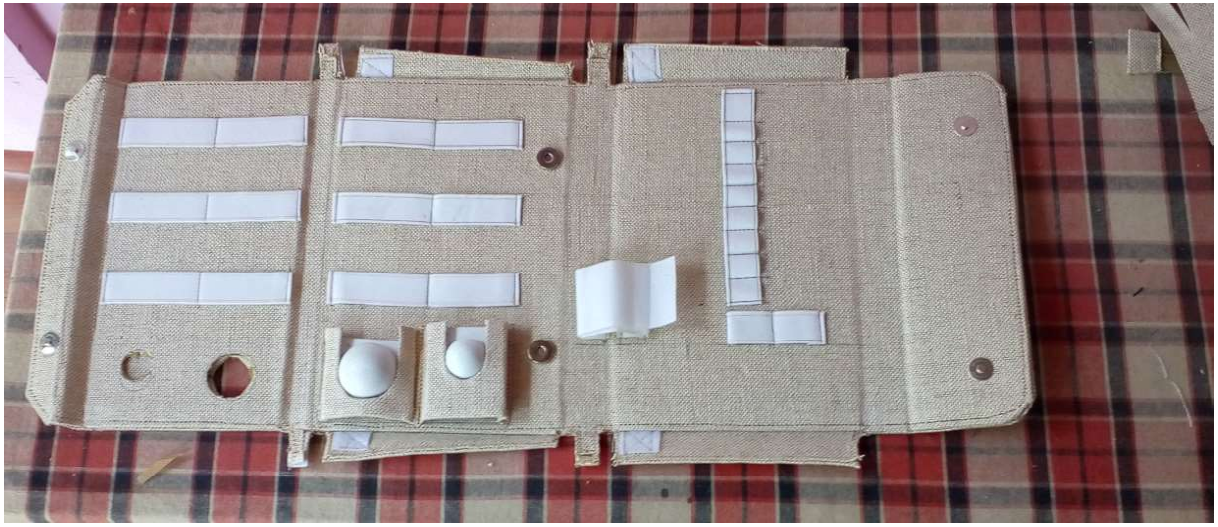


Fig. No: 3.6e

Fig no.3.6d showing a test jute packaging 1 having box form. The box form was a failure because of it complexity to manufacture using sewing

Fig no.3.6e showing a jute packaging 2 having finishing details.

Fig no. 3.6f - Final packaging and branding of the product

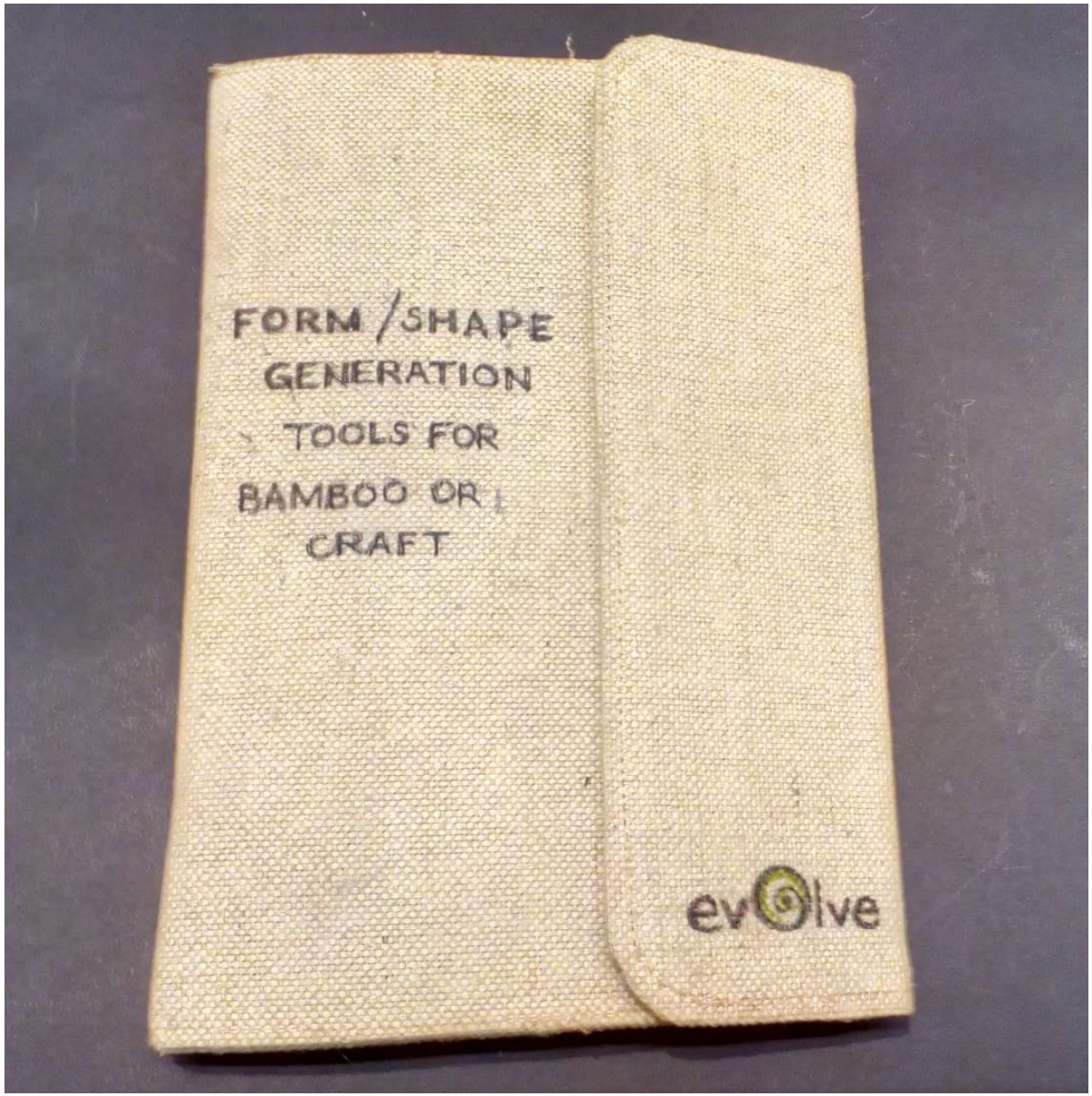


Fig. No: 3.6e

Chapter 4

User Testing

The next step after packaging was deployment and testing of the tools. For which I went to URAVU jewellery unit.

"Uravu is a non-government organization (located in Thrikkaipetta village in Wayanad district, Kerala state, South India), which works with people, governments and businesses to implement programs for sustainable employment and income generation in rural areas. Uravu is a nonprofit 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'[1]".

4.1:URAVU visit for evaluation for the tool kit

at the jewellery unit I inquired about the existing jewellery making cost and time to manufacture, the following insights were observed.

1) The prize of the jewellries are not decided according to the labour or material cost but it was more dependent on the exhibition sale price which were given to them.

2) The jewellery price are lower than the labour cost because of the quality of the products.

Fig no 4.1a,b,c&d - showing the jewelleries with its price along with the time to manufacture

Fig. No: 4.1a

Fig. No: 4.1b

Fig. No: 4.1c

Fig. No: 4.1d

Fig. No: 4.1e

Fig. No: 4.1f

Fig. No: 4.1g

Fig no. 4.1e&f showing the training session done in uravu.
Fig no. 4.1g showing the deployed kit for testing at URAVU.

To conclude the training at there jewellery unit I would like to say that the shape generation tools can be very effective tool for mass manufacturing jewelleries because it can reduce the time for replication by 5 times with the precision of the shapes which is very time taking process.

some other problems which are assciated with jewellery making which could be solve along with the designs

1) Splitting while fittings Fig no 4.1a
2) Joinery to connect with each element of joinery Fig no 4.1i
3) Assembly of shape with each other Fig no 4.1g

Fig. No: 4.1h

Fig. No: 4.1i

Fig. No: 4.1g

Chapter 5

Product Possibilities

The aim of the project was to generate product possibilities of the shape generation tools. For which the above necessary step were taken to understand.

As the tools are new to the system it is important to understand its value and proper product placement.
The understanding was based on the user study in uravu and further exploration and development of the coiling products made during my Project 1 at IDC IIT Bombay. Further product possibility and placement was concluded as **Product Specific Shape Generation Tools for Bamboo Craft**. Which enables the tools to develop and effective for evaluation in different context.

5.1: Product specific Shape generation tools

During my evaluation of tool at URAVU some important about the tools were observed which are as follows.

Fig no 5.1a showing links which are used for making hanging lamp. usually the first coil takes 2 min and after which the successive coil takes 5min

I demonstrated (Fig no 5.1b) the use of the link tool with the glue tool which makes hands free of fevi quick

The artisans under stood the use of the link tool the moment I showed how the second link has to be placed in the tool. And when they tried using the tool they made 5 links in about 4 min (22min without the tools)and they also can make different shapes using different shapes jigs.

Which gives a important validation of the use of tools for lifestyle products which can reduce time manufacturing

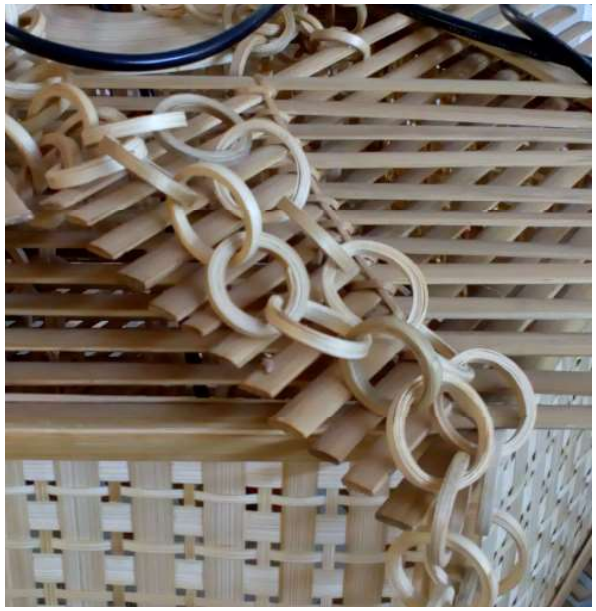


Fig. No: 5.1a

Fig. No: 5.1b

Fig. No: 5.1c

Fig. No: 5.2a

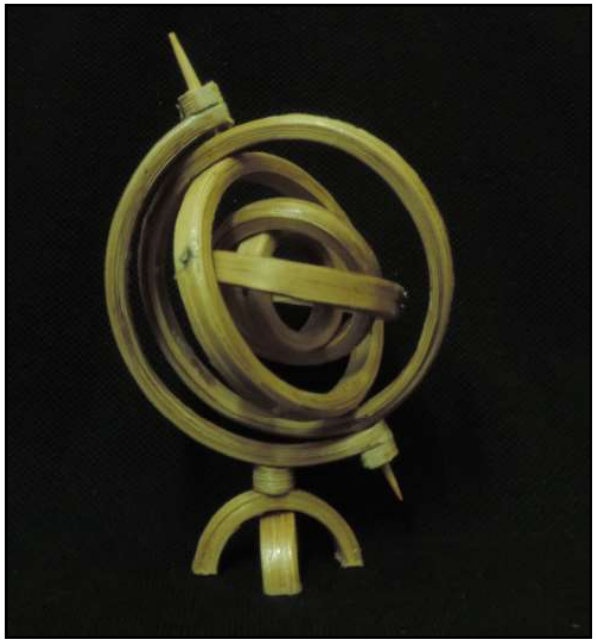


Fig. No: 5.2b

Fig. No: 5.2c

1.1: Exploration

Fig no. 5.2a,b&c - showing the out come of the project 1

During my discuss with the Trustee of Uravu regarding the tools and I also showed more product possibilities like the toy which was developed during my project 1.

They seemed to curious about the product and asked about cost of manufacturing . ‘

After which I inquired about the cost of the bamboo and labour cost related to the product and artisan daily wage.

(the daily wages of an artisan is Rs 400 for 7 hr and the cost of materials was about Rs 20 per day and time taken for one toy for blow toy max^{m} 1 hr ie. 7 toys per day)

So, the manufacturing cost will be much more less than Rs 60

On which the reply was the product will be effective in the market and any guest will be willing to Buy it.

Which become a important validation of Product specific shape generation tools for bamboo craft mass production of products

Fig no. 5.2d&e - Showing the product specific Shape generation tools for concentric rings which is use full for - Blow toy ,Key ring and the Globe(Fig no. 5.2a,b&c)

Fig. No: 5.2d

Fig. No: 5.2e

Fig. No: 5.2f

Fig. No: 5.2g

Fig no. 5.2d&e - Showing the product specific Shape generation tools for a lens. The ring jig are concentric in nature because of that it fitting a lens inside a lens holder become easy for assembling after product is lacquered ie. making use of the inside diameter and out side diameter of the jig (Fig no. 5.2f) hence reducing the time for manufacture.

Fig. No: 5.2h

Fig no. 5.2d&e - Showing the product specific Shape generation tools for a lens. Which can also be used for ther circular products like net lamp clocks

Fig. No: 5.2i

Fig. No: 5.2j

Fig. No: 5.2k

Fig. No: 5.2l

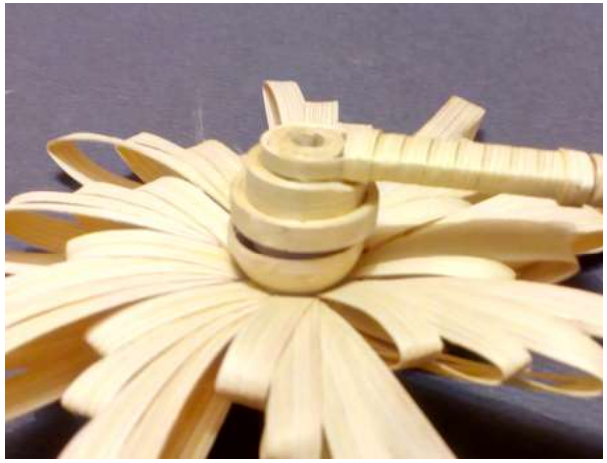


Fig. No: 5.2m

Fig. No: 5.2n

Fig no. 5.2l to 5.2n showing a bamboo toy(independence day celebration) made using comb tool. its low cost because it take half hour to manufacture one piece. manufacturing price would be max^{m} Rs 20 to 30

During the exploration of products. there was always a question that
What kind of products for which the product specific shape generation tool kits should be made?

The idea is to tap Indian markets for bamboo products which could be connected to festivals or place or value of system specifically so that various products are designed. so, that the out come and effectiveness could be tested easily

This system can be effectively implemented and can be use full to understand and develop the shape generation tools in various forms.

Chapter 6

Reference

All images - Author
Text
1 - uravu.net
Reports
PI Report 156130015 Antik Mallick
P2 Report 156130015 Antik Mallick