

TOOLS, TECHNOLOGIES FINISHES AND DESIGN FOR BAMBOO

Industrial Design Centre, IIT Bombay, Mumbai

The Project "Tools, Small Technologies and Finishes" for Bamboo Craft is sponsored by **U.N.D.P.** through **Development Commissioner (Handicrafts), Ministry of Textiles, Government of India.**

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The booklet mainly brings out the work done under U.N.D.P. Project, sponsored through D.C.(H). It also partially covers another U.N.D.P. project sponsored through K.V.I.C. to set up 4 Micro Common Facility Centres.

Work done by students of I.D.C. over a decade with guidance of Prof. A.G. Rao also have been included for benefit of wider audience.

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Bamboo Studio
Project Team at IDC:

Prof. A.G.Rao
Shri M.S.G.Rajan
Prof. B.K.Chakravarthy
Project Staff
S. Sunder Mohan
Niranjan Rudrapaul
Poornima Shenoy
*Avinash Shinde
*Khyati Nagar
*Vinayak G. Deshmane
Dr. Krishna Lala (consultant)
Chandan Halder (consultant)
John
Gangamma
Krishna

For further information - contact:

Prof. A.G.Rao,
Industrial Design Centre, IIT-B,
Powai, Mumabi - 400 076.
Tel: 022-5767828 (O)

Introduction

Tools, Technologies and Finishes centered on Design play a significant role for the development of Bamboo Craft. Creation of value added items meaningful to 13 lakh crafts-persons living in remote parts of the country. Industrial Design Centre has been working on Bamboo craft for more than a decade. 'Jagruti'- a national Workshop on 'Bamboo Craft Design' organized in 1993 brought designers, craftsmen, students, officials and entrepreneurs together. A Publication 'Bamboo Craft Design' was released in 1994 as an outcome of the workshop. IDC took up a UNDC financed project on tools, small technologies and finishes in Bamboo and cane through Development Commission (Handicrafts). IDC developed 97 tools, a toolkit, small machines and new technologies under this program. Several finishes with natural dyes, as well as smoke finish for prevention of fungus and protection from insects have been developed. Bambu Studio has taken shape at IDC with the increasing activities in Bamboo Craft.

IDC floated the idea of Micro Common Facility Centres (MCFSs), which was readily accepted by Development Commission (Handicrafts) to facilitate the transfer of

technologies developed at Bambu Studio to the rural areas/

IDC has undertaken 3 M.C.F.C.s through D.C. (Handicrafts) in following places in

North East India.

1. Diezhphe (Nagaland)
2. Nalchar (Tripura)
3. Barapeta (Assam)

Bambu studio at IDC also has taken up 4 MCFCs with U.N.D.P. funding through Khadi and Village Industries Commission (K.V.I.C.) in collaboration with local NGOs :

1. Sahaj, Dahod (Gujarat)
2. Sampurna Bamboo Kendra, Melghat (Maharashtra)
3. Uravu, Wained (Kerala)
4. A.D.S., Karjat (Maharashtra)

IDC believes in an integral approach to craft which encompasses Design, Technology, Training and Marketing. MCFCs are being supported Bambu Studio at IDC with the same spirit.

Following pages illustrate the details of the activities mentioned above.

Tools for Bamboo

Traditionally craft persons in India have been using few tools, Dhau being the central tool adopted for various uses. Tools from different countries like China, Japan, Indonesia, Thailand and Philippines were studied to identify various tools. Tools from wood working and other trades were also looked at. 97 tools were identified, categorized and named which could act as a tool bank. Each tool was drawn, plastic model was made to get the prototypes. Full set of Tools were supplied to Cane and Bamboo Technology Centre (C.B.T.C.) at Guwahati as well as Bamboo and Cane Development Institute (B.C.D.I.) at Agartala. One set is kept at Bamboo Studio, IDC for use and development.

Tools

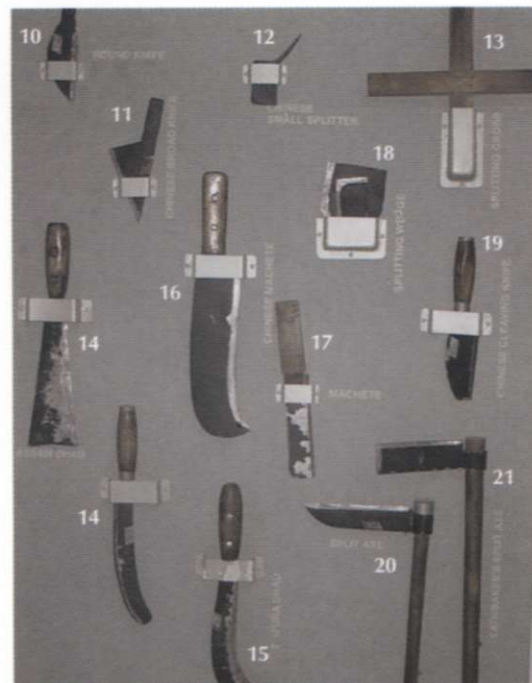
BOARD 1

1. L-SHAPE SAW
2. COMMON HACK SAW
3. HUNTER'S SAW
4. ADJUSTABLE HACKSAW
5. CHINESE HACKSAW
6. COPING SAW
7. CHINESE BOW SAW
8. INDIAN CANE FRAME SAW
9. HAND SAW



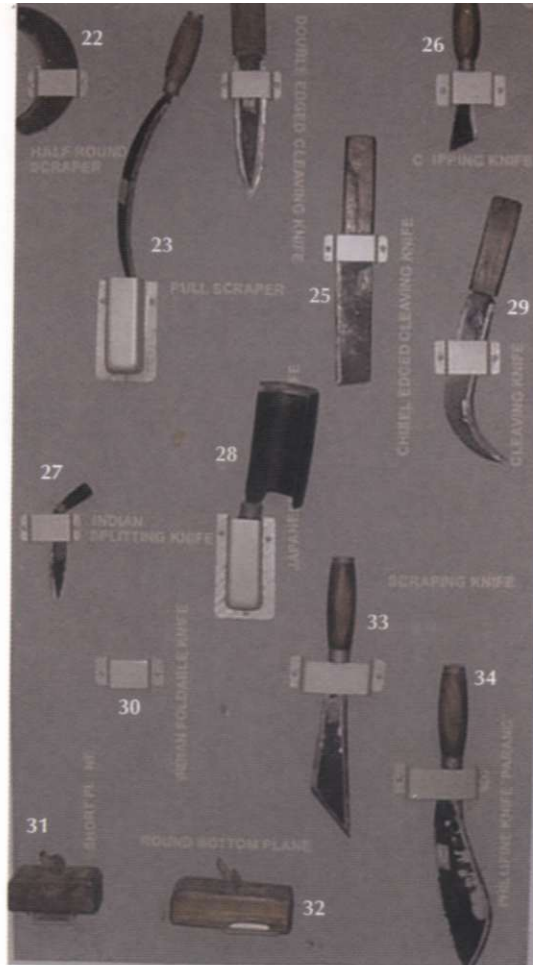
BOARD2

10. ROUND KNIFE
11. CHINESE BOARD KNIFE
12. CHINESE SMALL SPLITTER
13. SPLITTING CROSS
14. ASSAM DHAU
15. TRIPURA DHAU
16. CHINESE MACHETE
17. MACHETE
18. SPLITTING WEDGE
19. CHINESE CLEAVING KNIFE
20. SPLIT AXE
21. LATHMAKER'S SPLIT AXE



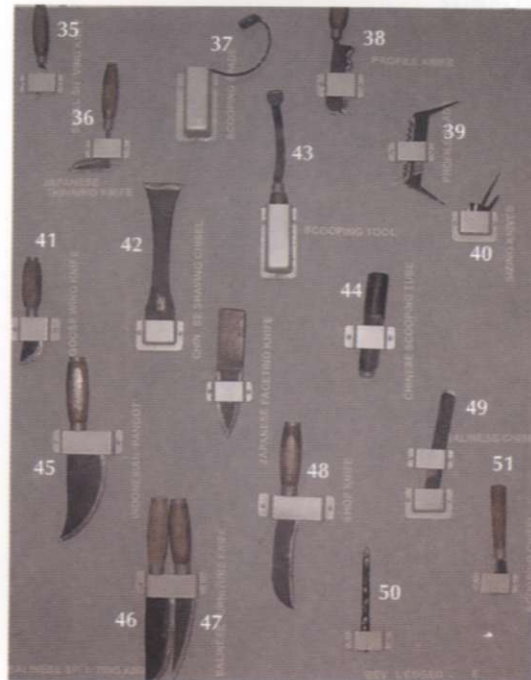
BOARD 3

- 22. HALF ROUND SCRAPER
- 23. PULL SCRAPER
- 24. DOUBLE EDGED CLEAVING KNIFE
- 25. CHISEL EDGED CLEAVING KNIFE
- 26. CLIPPING KNIFE
- 27. INDIAN SPLITTING KNIFE
- 28. JAPANESE SCRAPING KNIFE
- 29. CLEAVING KNIFE
- 30. INDIAN FOLDABLE KNIFE
- 31. SHORT PLANE
- 32. ROUND BOTTOM PLANE
- 33. SCRAPING KNIFE
- 34. PHILIPPINE KNIFE PARANG



BOARD 4

- 35. SMALL SHAVING KNIFE
- 36. JAPANESE THINNING KNIFE
- 37. SCOOPING SPADE
- 38. PROFILE KNIFE
- 39. PROFILE BLADE
- 40. SIRING KNIVES
- 41. GOOSE WING KNIFE
- 42. CHINESE SHAVING CHISEL
- 43. SCOOPING TOOL
- 44. CHINESE SCOOPING TUBE
- 45. INDONESIAN PAN GOT
- 46. BALINESE SPLITTING KNIFE
- 47. BALINESE FURNITURE KNIFE
- 48. SHOP KNIFE
- 49. BALINESE CHISEL
- 50. BEVELEDGE KNIFE
- 51. SCOOPING CHISEL



BOARD 5

- 52. BOW HAND DRILL
- 53. HAND DRILL
- 54. CANE BENDING TOOL
- 55. HAMMER
- 56. DROPIING KNIFE
- 57. GIMLET
- 58. PIERCING SPIKE
- 59. BENDING WRENCH
- 60. WOODEN MALLET
- 61. BENT DROPIING SPIKE
- 62. STRIP CROSSING KNIFE
- 63. SPACING KNIFE
- 64. TAPER SPACING KNIFE]
- 65. METAL MALLET
- 66. CARVING MALLET



BOARD 6

- 67. IDC GAUGE
- 68. STEEL RULE
- 69. COMMON SCISSORS
- 70. BRUSHES
- 71. OUTSIDE CALIPERS
- 72. INSIDE CALIPERS
- 73. FOLDING SCALE
- 74. TAILORS TAPE
- 75. STEEL TAPE
- 76. CURVED JAW SHEARS
- 77. NEEDLE FILES



Tool Kit

The newly designed Toolkit for bamboo ushers bamboo craft into an era of 'new generation craft products' which can compete with industrially produced plastic products for daily use. It facilitates various operations to make bamboo products with defined sizes and better finishes. With the use of the tool kit craft person gets introduced to the concepts of measurement, gauges, jigs and fixtures to make craft products of high quality in large numbers economically. Combining with other materials like paper, jute, glass, leather, metals (brass, copper, steel) will become possible with better joints and defined size of bamboo components.

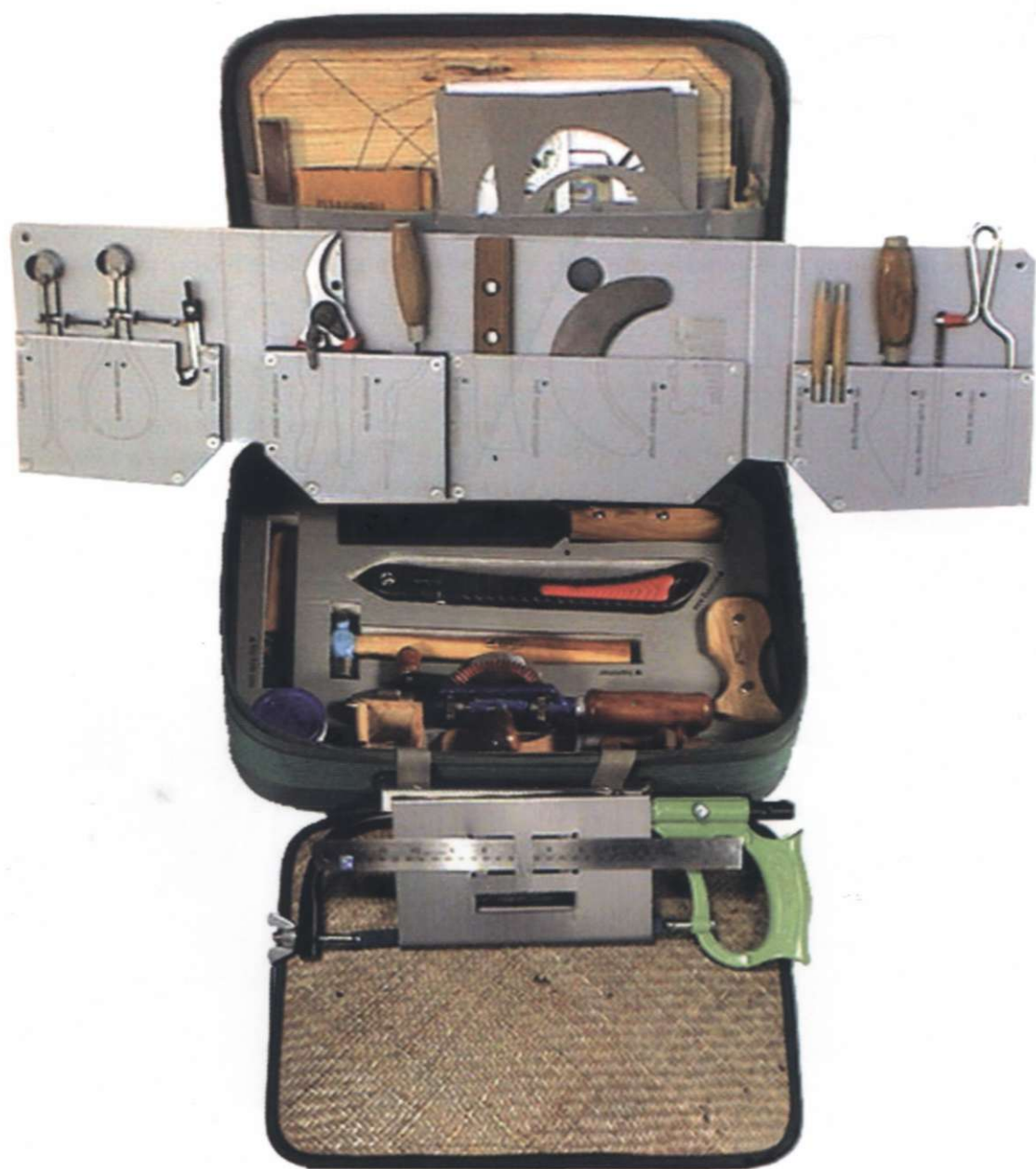
The toolkit contains overall 30 tools. Some of the tools are adopted from traditional craftsmen of India and China. Some are adopted from other areas like wood work. Some are newly innovated at Bamboo Studio IDC IIT Mumbai.



Templates and work board are introduced to facilitate precision work even in houses of craft persons in the remote villages. A Manual explains how to use the tools, with illustrations.

Tool kit has been validated through feed back taken at 'Get up' and other workshops in different parts of the country.





Small Machines

Bamboo craft work is spread all over the country. Most of the work happens in villages, where seldom electric supply is available.

Hand operated machines and hand tools for bamboo processing can play a significant role in this context.

Initial operations like bamboo felling, cutting the bamboo from the grove, clearing the branches, cutting to required lengths and

splitting radially can be done efficiently using hand tools.

Small hand operated machines can play a significant role after the radial splitting is done with hand tools.

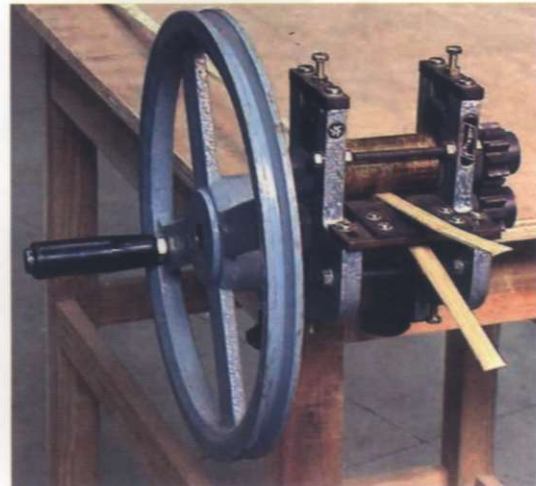
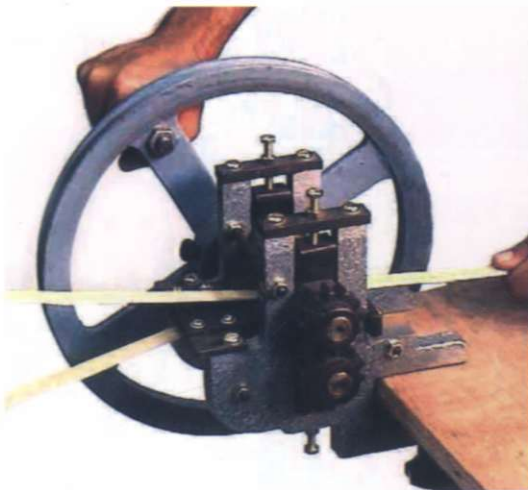
Four hand operated small machines for splitting, width sizing, uniform thickness and sanding were developed by IDC

An entrepreneur has started making these small machines under guidance of IDC.

Splitting Machine

A new design of the splitting machine is developed at IDC based on a Chinese model. The structure of the machine is simplified for easy manufacture and assembly. Fixing and adjustment of cutting blades have been made easy for a craftperson.

Thick bamboo strips are split into thin strips in the splitting machine by rotating a wheel. The operation of the machine is simple and effortless. No special skills are required to operate the machine. A short period of training is sufficient to use and maintain.

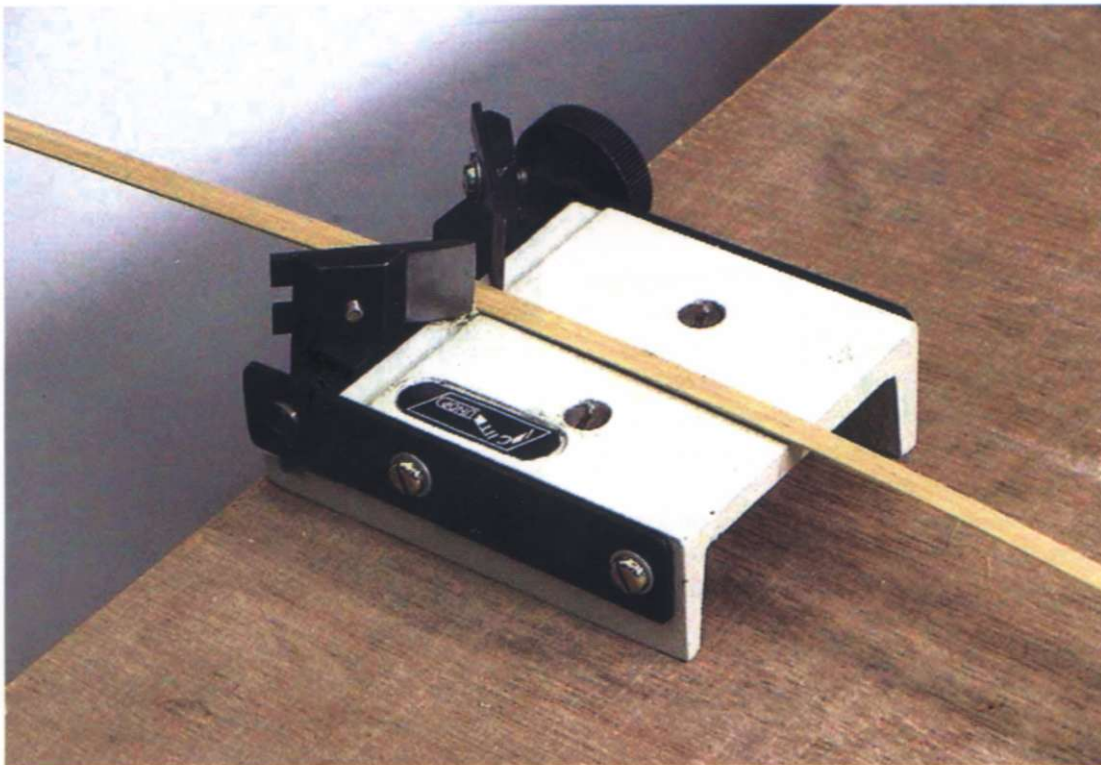


Width Sizer

Width sizer is a handy gadget to size bamboo strips to uniform width. The design based on an existing model of Japanese origin is improved at IDC for ease of production and use.

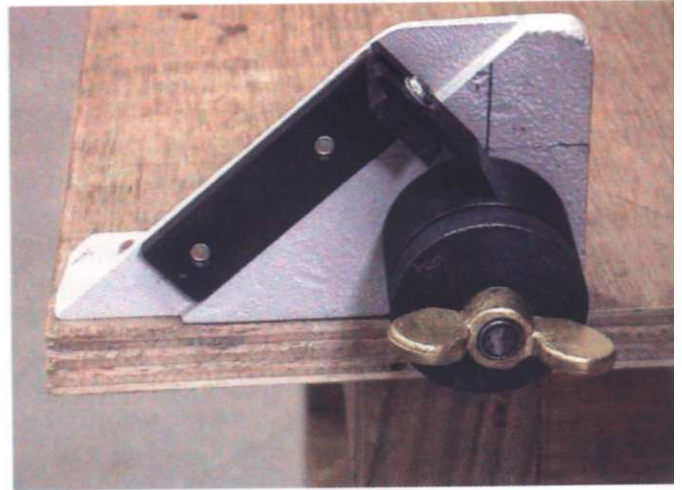
Bamboo strips can be made to uniform width by pulling through two knife edged blades.

The blades can be adjusted to widths ranging from 2mm to 25mm.



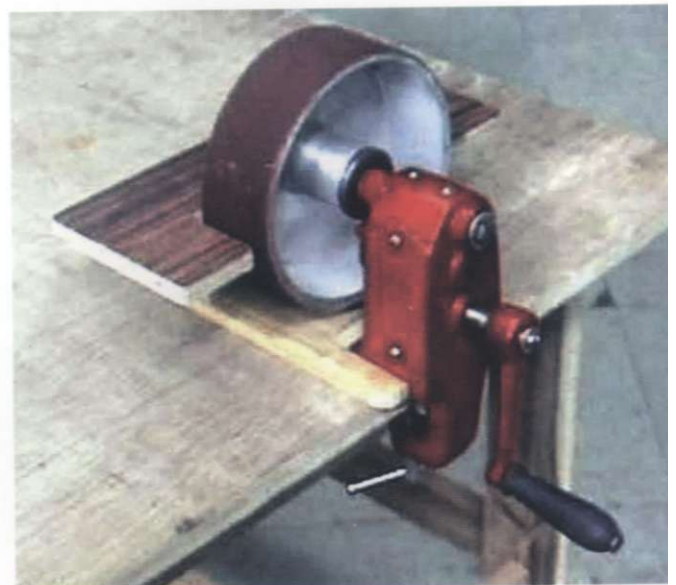
Thickness Sizer

Thickness sizer is a small gadget to finish bamboo strips to uniform thickness. The design is improved for easy adjustment. The cutting blade over the roller shaves the material when a bamboo strip is pulled between the roller and the blade, resulting in a strip of uniform thickness with smooth finish throughout.



IDC Sander

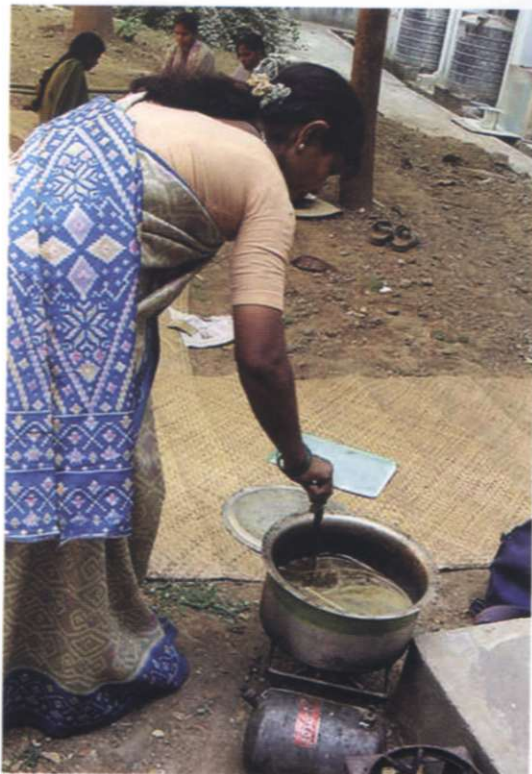
A hand operated Sander is an IDC innovation using existing gear mechanism of a hand grinder, to get a smooth finish on bamboo. A stand supplied with the machine has smooth laminated top as well as foam padding below to facilitate sanding of variety of bamboo parts and strips. IDC sander can give smooth finish on long strips, rims of baskets as well as variety of bamboo parts used in modern products.



Finishes

Colouring with Natural dyes

Finishes play a significant role in enhancing the set up of Bamboo Craft Products. Colouring with Natural dyes can add a new dimension to Bamboo Craft.





IDC has been trying and verifying several natural dye finishes in Bamboo like:

- Brown 1 with Katha
- Brown 2 with Tea leaves
- Brown 3 with Cow Urine
- Black with Haritakki
- Yellow with 'Haldi' (Turmeric)
- Blue with Indigo
- Orange with Mangishta

Smoke Finish

Smoking is a traditional way of treating Bamboo in North East. A smoke chamber has been developed at IDC to be used in M.C.F.Cs. Smoking gives golden yellow to rich brown colour depending on the duration of smoking. Smoking is also effective as a preventive against insect attack. Saw dust or any organic waste can be effectively used as a fuel in the smoke chamber.



Micro Common Facility Centres(MCFCs)

MCFCs have been conceived by IDC, IIT Mumbai to cater to the needs of Bamboo craft persons in the remote villages. Each MCFC will cater to the needs of 15 craft persons who could form a self help group or a co-operative society.

The number can increase with proper planning of utilization of facilities.

Each MCFC will be provided with two sets of 4 hand operated machines and two toolkits. A smoke chamber and jigs and fixtures will also be added to the facility.

A workshop is expected to be provided by local Governments or NGOs to get the funding for machines, technology and product design through organisations like DC(H) and KVIC in UNDP and other schemes.

MCFCs need to be seen as instruments to induct new culture of upgrading bamboo and cane craft on a self sustaining basis. They can become organising units for bamboo craft to compete with industrial products in the global markets.

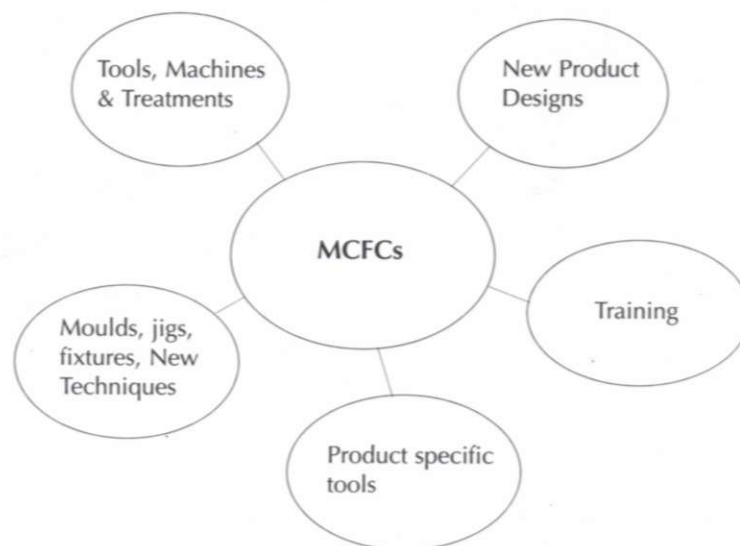
MCFCs can become 'Windows' to outside world for craft persons in remote villages to get Design, Technology, Training and Marketing inputs on a continuous basis. In due course they will be profit making units able to hire all such services

Each MCFC or a group of them can specialize in a product line to capture a sizeable market share.

MCFCs can become centres to procure orders based on new designs. They will be able to get financial backup from Banks to stock raw materials and components in other materials like jute, brass, powder coated steel etc to enhance their product getup.

Products from each MCFC or group of MCFCs can go with a brand mark assuring certain standard of quality and reliability to ensure continuous orders.

MCFCs can also become experimental grounds for introduction of internet based interactive distant communications in bamboo craft.



Diezhephe

Diezhephe is a village near Dimapur mainly working in wood. Bamboo work is traditional to the local persons. Bamboo Craft products are combined with wood in the training workshops at I.D.C. to give a new edge to the Bamboo Craft products of Diezhephe.



Nalchar

Nalchar is hub of bamboo craft activities in Tripura. Training workshop of I.D.C. introduced to the Nalchar Craft persons tools, small machines as well as moulds, jigs, etc. A typical Tripura basket selling at Rs.6/- can fetch them Rs.30/- to Rs.40/-, if a rim and close fitting lid are added through the training and moulds provided by I.D.C.



Barapeta

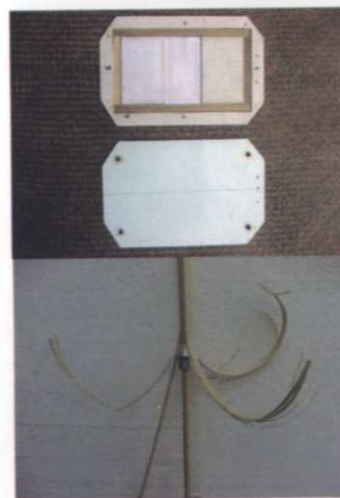
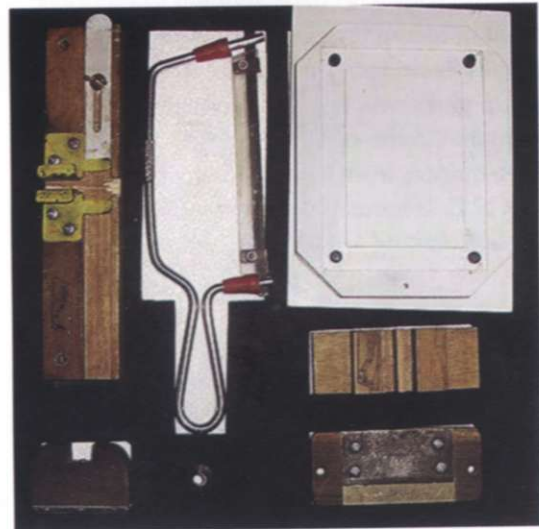
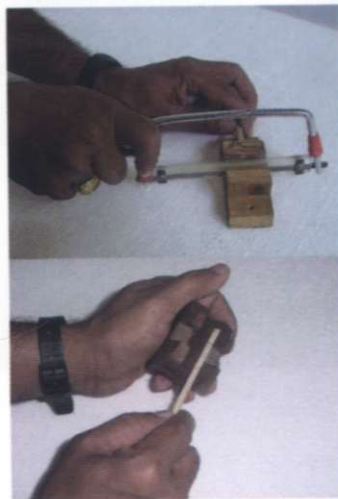
Barapeta in Assam has thousands of bamboo craft persons who have adopted to Bamboo Craft in recent times. Training on Tools, Small Machines, Anti fungus treatment with Alum gives new hope to these groups to compete in the current markets.

Two trainers from Sapthashree where the M.C.F.C. is located were trained at I.D.C. in Mould making and Coil technique.



Product Specific Tools Frame based Products

In course of developing small technologies the concept of 'Product Specific Tools' has evolved at IDC. A range of products in bamboo can be made using such products specific tools. 3 to 4 'Frame based Products' like Note Pad, Menu Card Holder, Office File, Dairy Cover, use similar moulds, jigs and special tools which together become product specific tools for frame based products. Thus in Frame based Products, 8 general tools from the tool kit and '13' product specific tools are used in making each product. Among these 4 tools Half Cut Saw, Step Making Tool, Round Stick Making Tool, Round Slot Making Tool are exclusively innovated. Making Product Specific Tools open a new area of 'design linked Small Technologies' for craft.



Coil Technique for Bamboo Craft

'Coil Technique' used in Thailand and Burma for making bowl shape was adopted and further developed at IDC. Long bamboo strips are wound around a mould to give the 'shape'. 1mm thick bamboo strips can be easily made with the hand operated splitting machine and finished with IDC Sander. These strips joined into long strip can be wound around the mould by a simple hand operated spindle.



Small Technologies

Small Technologies play a pivotal role in taking 'crafts' into sustainable production mode. Inducting a culture of measurement, fits and tolerances to bamboo craft is essential. Moulds, Jigs and Fixtures, have an impact in making the bamboo craft products more usable in variety of applications.

Moulds, Jigs and Fixtures:

As a part of UNDP Project 2D and 3D moulds, jigs and fixtures were developed at IDC. Making of a tray to size using a 2D mould helps in combining with other materials like acrylic or glass. Design has an important role in using combinations of materials like copper, steel, jute, cane, etc. with woven bamboo shapes. Rims made to size for baskets is a good example. Fitting a lid with a 'close fit' comparable to a 'plastic vessel' is possible using moulds and jigs. IDC has been imparting training to trainees in making moulds and jigs for bamboo products.



Cane Tools

Eight Cane Tools were exclusively developed for sizing and finishing. Tools in the Bamboo Tool kit like IDC multipurpose knife, Cane Bending Needle, etc. also can be used for cane work. The sizing tools are based on traditional tools used in Andaman Nicobar and some parts of North-East. Finishing tools like Rounding Sander are exclusively developed by I.D.C.

1. Cane Scraper
2. Rounding Plane
3. Radius Plane
4. Pull Push Rounding Plane
5. Rounding Sand Paper Block
6. Radius Sanding Block
7. Thickness Sizer
8. Width Sizer
9. Avinash in feed back work shop at Cane Concepts, Dimapur.



1



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9

New Designs for M.C.F.Cs.

I.D.C. developed several new product designs along with moulds and techniques for making these products, to make use of tool kit and small machines meaningful. All the products are market oriented with huge potentials in new areas like gift and export markets.

Products with Coil Technique gives new scope to Bamboo Craft in Barapeta and Diezhphe.



Bowl with Coil Technique



Bowl in Bamboo and Naga Wood Work



Newspaper basket



Tripura basket



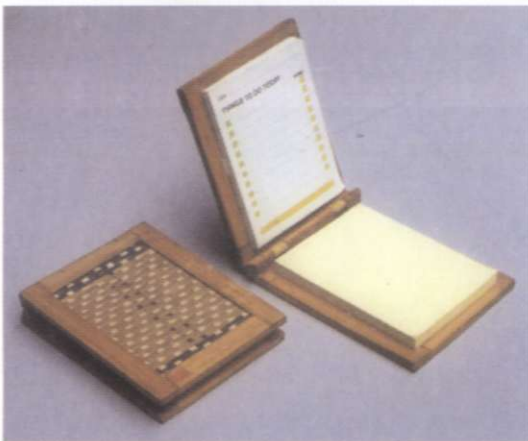
Elliptical tray



Circle tray



Square tray



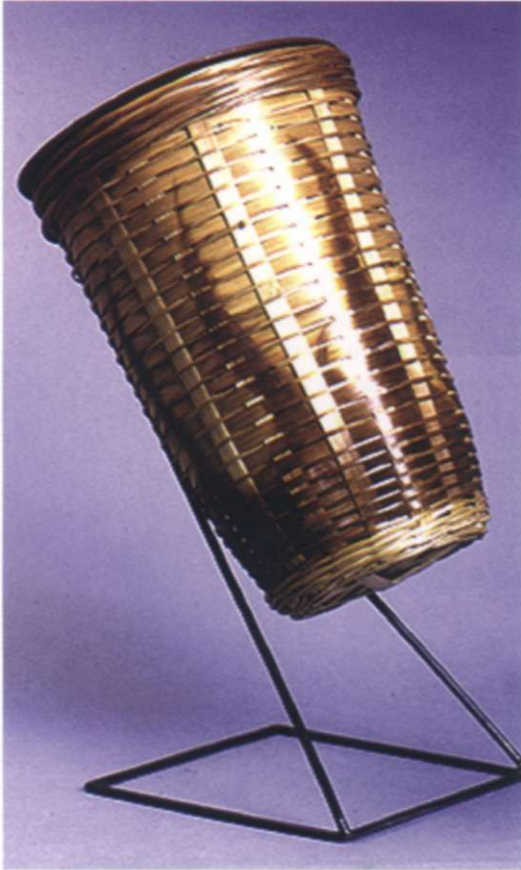
Note pad

I.D.C. Products

Several products have been designed in bamboo at IDC over a decade. A project 'Design Inputs into Bamboo Craft' sponsored by M.H.R.D. and 'Bamboo Link' sponsored by INBAR gave new dimension to students and faculty member's efforts in design and development. Few examples are given to elucidate the scope of bamboo craft products which can be made to compete with plastic products using Tools and Small Technologies.













Bambu Studio, Industrial Design Centre, IIT Bombay
Mumbai 400 076
E-mail : <agrao@idc.iitb.ac.in>

