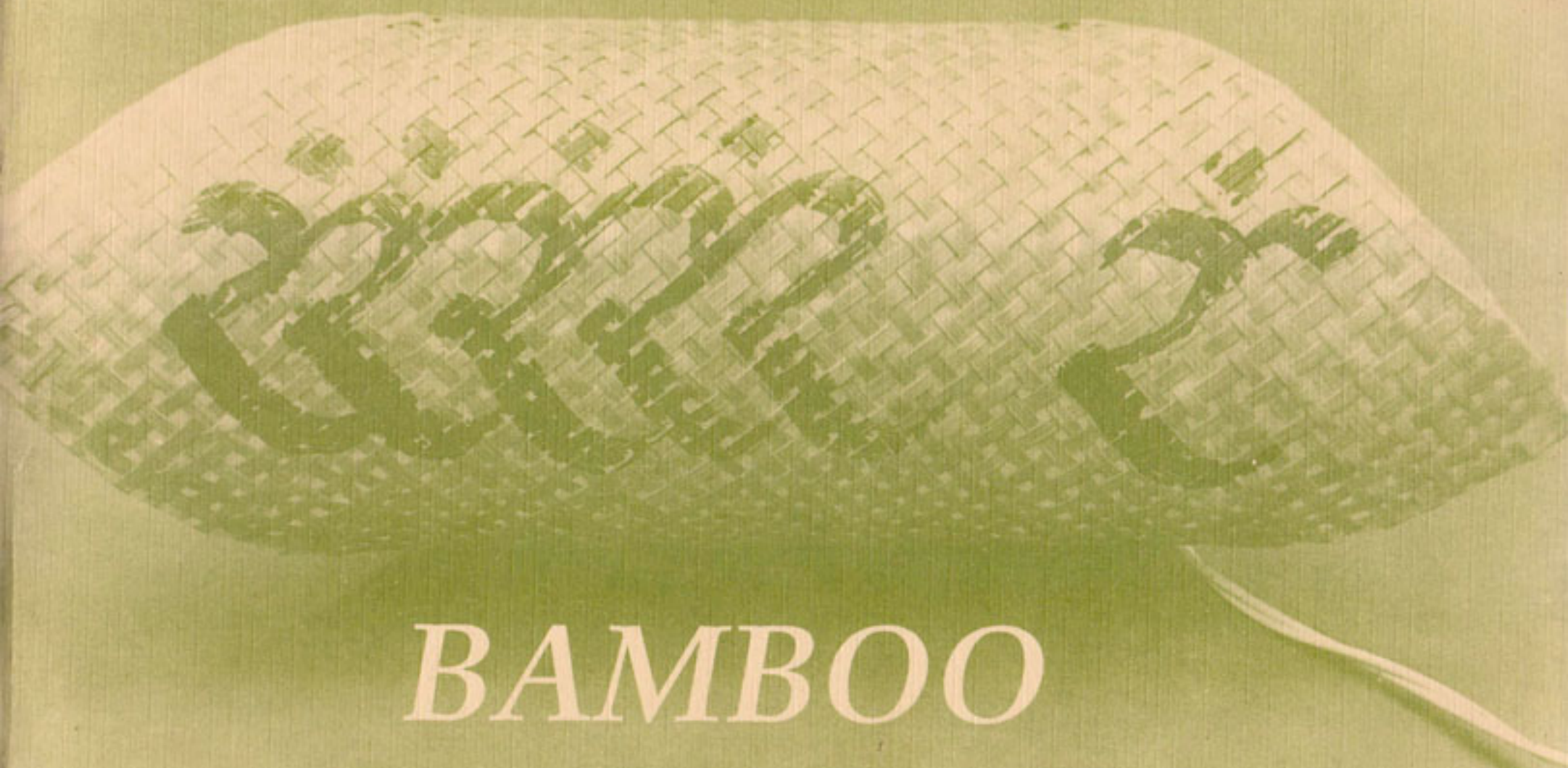




BAMBOO
CRAFT DESIGN

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Conceived and Edited by

A. G. RAO and MADHAVI KOLI

INDUSTRIAL DESIGN CENTRE

Indian Institute of Technology, Bombay

Bamboo Craft Design

This publication is based on 'Jagruti', a craft design seminar cum workshop on Bamboo held at IDC in May 1993 and is partly supported by MHRD.

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Front: Lamp using bamboo mat designed during Jagruti

Back: Bamboo Lamp by Adicrafts

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A. G. Rao
Madhavi Koli.



INTRODUCTION

Various presentations made during 'Jagruti' forms the core of this document. Many authors took trouble to write elaborate articles after the seminar based on their brief presentations, extending the scope of their topics. In few cases we have done the write-up, based on the presentations and subsequent briefing by the authors. In addition to this, the design output of the various design groups in the form of sketches and product photographs are documented in the subsequent part of the document. The coverage of the Jagruti events along with details of the participants and the

organisations interested in bamboo, comes in the end. The post seminar efforts have culminated into a comprehensive coverage on the theme of bamboo craft design. All the material is dealt in eleven sections for convenience and ease of comprehension.

In the first section on bamboo properties, traditions and techniques, M. P. Ranjan looks at the bamboo as a designer material. He covers the properties of bamboo starting from a live plant to final finishes in an end product. The tradition and techniques of shaping bamboo are copiously



dealt with numerous drawings and visuals by him.

The section on developmental issues deals with economic development, employment, ecology, Government policies and supports to bamboo craft. Vinoo Kaley laments at the lopsided policies in the past which have led to craftsmen paying as much as twenty times more than what is being paid by an ecologically damaging paper mill. He gives a grand blue print for preserving bamboo forests as well as development of bamboo artisans. P. S. Mukharjee elaborates on the role of bamboo craft in Integral Tribal Development. He elucidates the successful endeavours of Bharatiya Agro Industries Foundation (BAIF), which covers 1500 villages with integral development programmes. He also pointed out the useful interaction BAIF had with Industrial designers in developing marketable, user-friendly gadgets using local wood. Unmesh Kulkarni, who was involved in designing sericulture gadgets and other products for BAIF, presents his case study. The role of Industrial design becomes clear in making the tribal products competitive in Urban markets.

The ensuing panel discussion focusses on the desirability of global outlook, when we are tackling the difficult developmental problems. The need for professional design inputs to make bamboo craft competitive in Urban markets as well as international markets is stressed in the discussions. Pradeep Babar's write-up gives the frame work under which Development Commissioner's Office (DCO) gives assignments to designers working in craft areas.

Japanese model for bamboo craft is the content of the third section. Success of Japanese in

integrating bamboo craft with modern product culture is significant to India, where craft is emotionally spoken about, put on a pedestal for a brief moment and then forgotten.

Kirti Trivedi elucidates the sensitivity of Japanese towards cutting, selecting, seasoning and treating of bamboo. The refined aesthetics in bamboo products is a result of this sensitivity and attitude towards the material, that is deeply ingrained in Japanese culture. Thus craft products still are revered and bought by Japanese. In fact this 'quality' consciousness has successfully been ingrained into Japanese mass produced products as well.

Boban Varghese informs us of the systematic design approach Japanese adopt for bamboo craft today. Research and Development (R & D) Institutes base their work on market feedback and the combined efforts culminate into craft products in bamboo. After trial marketing the 'design' is passed on to craft groups. The R and D Institutes give full support by developing required processes in bamboo. This holistic, pragmatic approach is worth emulating in India.

In the next section on 'Themes for bamboo craft', R. K. Joshi articulates the potentials of letter forms. Use of innumerable Indian letter forms can give an endless variety as well as exclusive identity to bamboo craft products. The decorative use of Devnagari script was put into practice during the workshop session. Examples of bamboo lamps with letterforms as decorative elements can be seen in the second part of the document. Ravi Poovaiah dwells in detail on the semantic aspects of packaging. He points out at the 'violence' ingrained in the very design of



present packages, which prompt insensitive tearing. He suggests the use of bamboo for value added, bio-degradable, user friendly and non-violent packages.

The section on potential product areas, covers Furniture, Carry items, lamps and Jewellery. In bamboo furniture, Satish Raut elaborates with examples on the joints and structural combinations possible in bamboo. Bamboo furniture is still unexplored area in India compared to what has been achieved in countries like China, Japan or Malaysia.

Sunil Patel in his presentation on luggage design gives us the methodology adopted in developing market oriented designs in plastic. He points out the potential opportunity for bamboo carry items. Two examples of bamboo briefcases follow, one made at 'Khamana' under Vinoo Kaley's leadership and another made by Adicraft at Nagpur.

Suresh Sethi explains the intricacies in designing a luminaire, with his experience in designing for Philips. Ravi Nafde tells us the success story of 'Adicraft' in bringing out designer-lamps in bamboo. The product examples illustrate the advantage of Industrial designer working hand in hand with craftsmen. In jewellery design Pradyumna Vyas briefs us on how he went about developing jewellery in wood. A live material like bamboo offers many opportunities to designers in this area.

The sixth section deals with Marketing issues in craft products. D. D. Mane gives an overview of marketing handicrafts, with his earlier experience as regional director in the office of Development Commissioner for Handicrafts.

Debasis Mandal briefs us on the market considerations in designing gift items. The pricing strategies of gift items are important in innovating new bamboo craft products to fit into gift market.

Next section deals with the various issues involved in giving design inputs to bamboo craft. The four presentations are culminations of a year long study undertaken at IDC by a design team of two faculty members and two design associates. In 'an approach to bamboo craft' A. G. Rao looks at fundamental issues starting from inculcating value for craft in school children to defining bamboo craft industry for future survival of bamboo craft. He elaborates on possible methodologies and design strategies and comes out with many ideas for marketing, entrepreneurship and technology development to make bamboo products competitive in the coming years. In Market Studies for craft products, Madhavi Koli gives details of research work done to identify the potential products in bamboo which would have market edge. Design strategies for craft products based on the market studies are also pointed out by her. One could see the application of such a product strategy in the bamboo products like paper knives developed in the project.

Vijay Bapat and Parag Vyas focus on the product explorations based on physical properties of bamboo. Traditionally this has been the craft approach. Use of machinery has brought a new dimension to the possible shapes. Visual examples illustrate the variety of products generated making use of geometry and the properties of bamboo. These explorations got linked with the market studies done during the project resulting in market friendly products.



The eighth section is on finishing techniques. J. P. Mehta details out the variety of coatings possible on bamboo. He gives the technical information to achieve these coatings. Boban Varghese's compilation on bamboo dyeing is useful to craftsmen. A brief on three printing processes on bamboo, silk screen printing, pad printing and hot stamping opens new possibilities in product get up. These processes were demonstrated during the workshop.

In conclusion, we can say that an attempt has been made to look at bamboo as a product, which will stay in the coming times. Recognition of inherent, interdependent link between the craft and Industrial design has been the basis of this effort. We hope with more such efforts, a congenial , theoretical framework will develop bridging Craft and Industrial design to assist the practice of craft design.

*1.0 BAMBOO : PROPERTIES,
TRADITIONS AND TECHNIQUES*



BAMBOO AS A DESIGNER MATERIAL: Its Properties and Manipulation

M. P. Ranjan

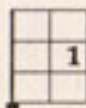
Prof. M.P.Ranjan , who gave the key note talk in the Jagruti -Workshop, is well known for his studies in Bamboo. He and his team did a pioneering work in study and documentation of bamboo products in the North Eastern India .Their efforts culminated into an excellent publication "Bamboo and Cane crafts of North east India" .

In this article Prof. Ranjan uses a "design frame" in looking at bamboo. His approach helps us to see the virtues of traditional crafts in to-days context.The objective way he explains bamboo helps us to break the barriers between craft and design. The enthusiastic insight he provides about bamboo, encourages us to see the bright future for bamboo .

Bamboo and Human Destiny

Bamboo is an old material that has been put to use by man from the very beginning of civilization. There is evidence to suggest that early man in Asia used bamboo tools long before the discovery of Stone Age tools. In a paper titled "Bamboo and Human Evolution" (Natural History, October 1989) Geoffrey G Pope suggests that bamboo played a significant role in the evolution of man and guided the technological destiny of early man in Asia with evidence of its

use extending as far back as a million years ago. If this idea is accepted then bamboo takes on a much greater significance in the evolution of human civilization than we have hitherto granted. Being such an ancient material and available in such abundance in India, Asia and over much of tropical Africa and Latin America, modern man is missing nature's cues by not sustaining his association with this wonder material in new ways to meet contemporary needs of our society.

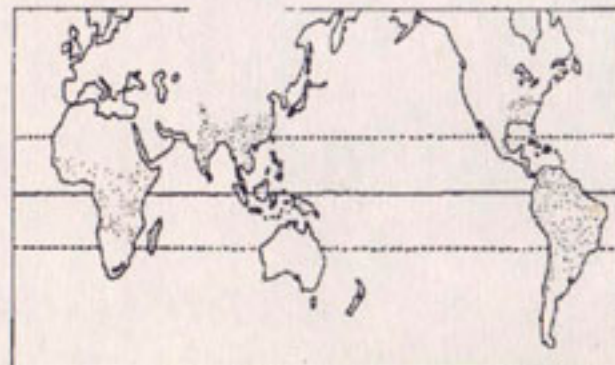


1. World distribution of Bamboo. (F1)

There is however a renewed interest in bamboo and its contemporary significance evidenced from the increased research efforts at understanding this enigmatic material from several vantage points. My own interest in bamboo was kindled when I saw — and experienced — the multitude of uses that it was put to by the local tribes of the Northeastern states of India. In our research and subsequent publication of our book on bamboo crafts (Ranjan et al, 1986), my colleagues and I, have tried to piece together a complex matrix of images that record the appreciation of bamboo as understood by the local mind. Pondering over the refinement of structure and the appropriateness of particular construction details developed by tribal communities over centuries of experiment and experience has been an exhilarating journey for me. While we were looking at bamboo from the vantage point of designers interested in exploring new and significant applications for this material for contemporary needs we could not ignore the poetry and beauty of the material in its natural and its man-transformed forms.

When I was invited by Prof. A.G.Rao to lecture at Jagruti - the bamboo workshop, conducted by the Industrial Design Centre — for me it was a valuable opportunity to once again choose a particular facet of bamboo that I could elaborate on from the codified body of knowledge in the technical index of my book. I have chosen to dwell at length on the properties of bamboo as a structural and engineering material while speaking to an enlightened audience at India's leading technological institute of higher learning, the Indian Institute of Technology in Bombay. I wish to stress the need for a deep understanding of these properties amongst

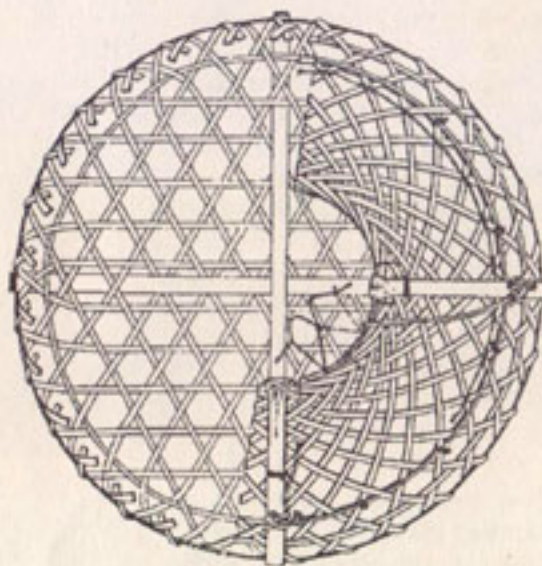
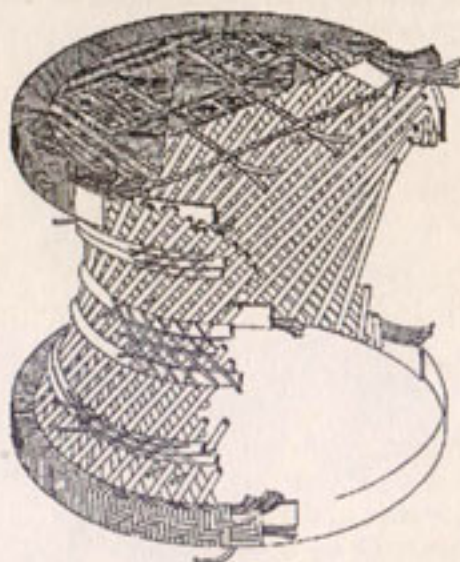
designers, engineers, scientists and craftspersons wishing to develop application concepts in this material during this workshop. I think of bamboo as an enigmatic material due to its vastly varying properties and the subtle nuances of the multitude of species that make up the group of materials that are referred to by a single and quite inadequate name — Bamboo. Let me explain; there are over one hundred and twenty species of bamboo available in India and over one thousand two hundred worldwide, each with varying properties (F1).



Our vocabulary as trained industrial designers and engineers, for exploring the properties of this material, is at best rather limited and in the worst case totally inadequate. Traditional users of bamboo, particularly the tribes of the Indian northeast and their Asian counterparts do not face this problem since each of them deals with a few local species that they are familiar with and for which they each have distinct and appropriate names. This familiarity encompasses both the plant aspect of bamboo as well as the processed material forms since the

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1. Modak from Tripura (top) and Egg basket from Assam (below). (F2)



same individual is involved in the cultivation, extraction and conversion of the material into objects of everyday use and the very same individual lives and raises his family in an environment that is rich in bamboo artifacts and structures. Besides naming and distinguishing individual species they have also invented name concepts for particular attributes of bamboo that are significant hence enhancing their ability to handle this material in unimaginably poetic ways that reflect their deep understanding of the material. (F2)

Their knowledge is embodied in their products and their construction details and finishes but unfortunately for us very little published material is available in the form of hand-books due to our predecessors' preoccupation with stone, wood, metals and, more recently, the synthetic materials and plastics. In India, the British foresters and their Indian counterparts dismissed bamboo as a weed to be controlled or eliminated from teak plantations and this attitude has affected the study of bamboo by a host of disciplines that would otherwise have addressed these issues. However, there is one exception here, that is, the intensive study of the fibre properties of bamboo driven by the economic exploitation of bamboo for paper and rayon production in India. This kind of use for industrial production contributed to research being extended to the study of distribution of bamboo species to aid exploitation and in the identification of useful species, their growth, propagation and some major properties. Much of this work, although of a high quality, is not applicable to those who are interested in exploring structural and engineering uses of bamboo. Hence there is still a good deal of research work to be done in this area and these

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1. Bamboo culm with branches and leaves.(F3)

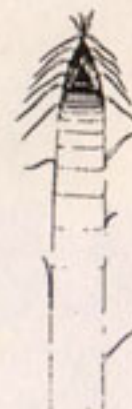
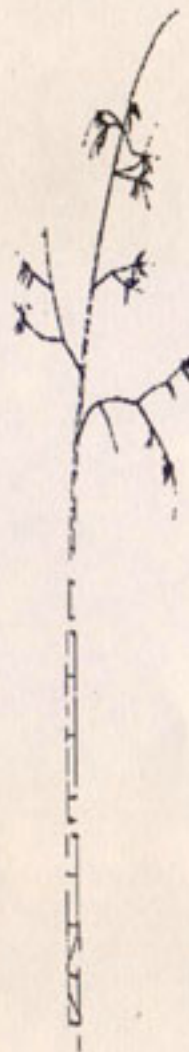
2. Section of bamboo shoot(F4)

3. Bamboo node and internode.(F5)

efforts need to be directed to certain core areas to answer the design questions that are faced by every designer working with bamboo as the chosen material for the creative generation of new products and structures for contemporary uses.

Bamboo as a Plant

I will first explore some of the properties of bamboo as a plant and those of some of its significant parts before looking at some interesting correlations between these properties and particular constructions and applications that are supported by these properties. Bamboo culms are tall hollow cylindrical stems that are rhythmically divided by transverse walls at the nodes. (F3, F4, F5) Culms of different species of bamboo have different physical characteristics. These are reflected in the variations in the diameter of the culm, height of the culm, wall thickness of internodes, size of lumen, length of internodes, density of fibre distribution, branching pattern, and so on (F6,F7) . Each of these variations results in a variation in the suitability of that bamboo for a particular application. Besides, the culm is the most commonly used part of a bamboo, and it is also the only part that is normally included by the term — Bamboo. There are many other useful parts of the bamboo plant that are often overlooked. The bamboo plant has branches and leaves, culm sheaths and buds and rhizomes all



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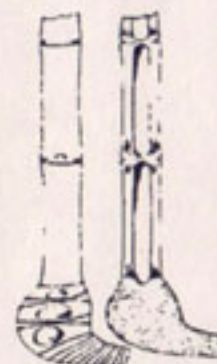
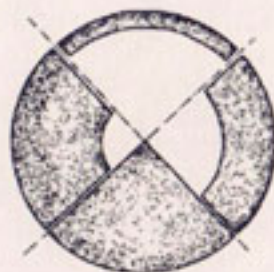
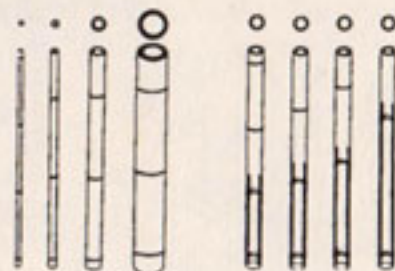
1. Range of diameters and internode lengths in bamboo.(F6)

2. Range of wall thicknesses in bamboo.(F7)

3. Fibre distribution in bamboo radial split and a typical pachymorph rizome.(F8)

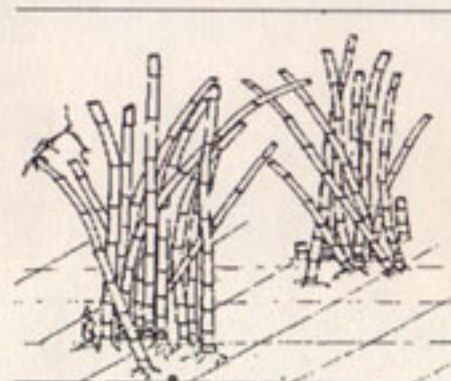
4. Basal node of pachymorph type.(F9)

5. Clump habit based on pachymorph rizome.(F10)



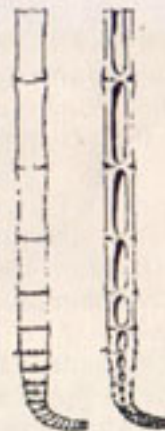
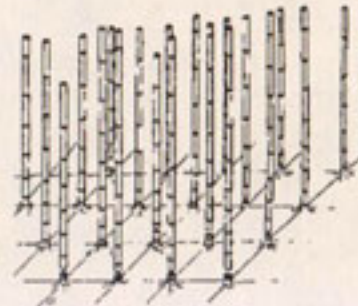
of which vary with the species(F8, F9, F10, F11, F12, F13) . Traditional user communities in India and elsewhere have found interesting uses for these parts as well, although the culm is the major component that is put to use.

Even the bamboo culms from a single species can have varied properties that are governed by several related factors. The properties of a culm part vary according to the position of that part on the culm. The basal parts are thicker and have a greater density of fibres while the upper parts taper down to an apex that has a low density of



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1. Dispersed habit based on leptomorph rizome.(F11)
2. A typical leptomorph rizome.(F12)
3. Basal internodes of leptomorph type.(F13)



fibres. This variation affects the structural and strength characteristics of the particular part of the culm that is used. Bamboo culms are used whole for various applications and are used split for a host of other applications. When split, the resulting radial or tangential splits behave quite differently due to the typical distribution of fibres across the cross section of a culm wall. The culm consists of basically two types of tissue : prosenchymatous and parenchymatous. The former consists of the xylem vessels that carry water, the phloem vessels that conduct food solutions and the thick-walled fibres while the latter constitutes the ground mass in which starch is stored. All these cells are vertically oriented. The fibrovascular bundles are smaller, more numerous and compact towards the periphery while they are more open and diffuse towards the inner wall of the lumen.

The maximum number of fibrovascular bundles are found towards the base of the culm resulting in greater thickness and strength characteristics. Some of these fibres pass into the branches hence reducing the density of fibres towards the top of the culm. There is no branching of the vessels or the fibres along the internodes, resulting in weak transverse bonds — the bamboo splits easily along its length. However, at the nodes the fibres and vessels cross over the transverse diaphragms resulting in the characteristic resistance to splitting at the nodes. The natural bond or joint between the culm and a branch is sometimes used to great structural and constructional advantage.

The properties of a culm of a particular species also change with the age of that culm. As the bamboo ages the cells get lignified and harden while they are soft and tender when young and



immature. It is evident from the foregoing statements that a large number of factors influence and induce varied properties in bamboo culms and splits of even a single bamboo species. Scientists and technologists researching performance characteristics and individual physical properties of bamboo must account for these variables in their research agenda. Such research would need to be repeated over the different species that are available in particular regions. Only then will this research be of any use for those using the findings in appropriate applications in the process of development of new products and systems. Only then will the hard data generated by technological research provide a matrix for a higher level of understanding of the properties of bamboo. Such a high level understanding is critical for the application of this knowledge in product development.

Traditional Wisdom and Bamboo Research

Let me now explore some of the significant properties of bamboo and try to illustrate these through examples from northeast India and elsewhere. Some of these properties are general to all species of bamboo while others can only be found only in particular species of bamboo. The correlations between a set of properties, both strengths and weaknesses, need to be examined and articulated clearly. This

knowledge becomes a critical input for those involved in product innovation and design. For instance, bamboo is both popular and notorious for splitting easily along its length. While this property of most bamboos enables industry and craft to generate consistent splits with ease, this very property is a hindrance when developing nail jointed bamboo structures. When nails are driven into its culm, it acts as a wedge that separates the fibres longitudinally, thus weakening the nail jointed construction. Bamboo splits easily at that point and weakens the joint. Yet the designers working with bamboo many a time tend to look at timber and wood processing know-how as a source for analogies and principles which they could apply to bamboo quite indiscriminately.

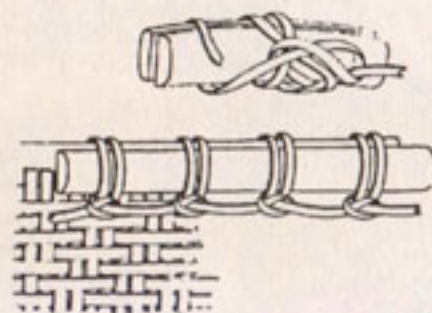
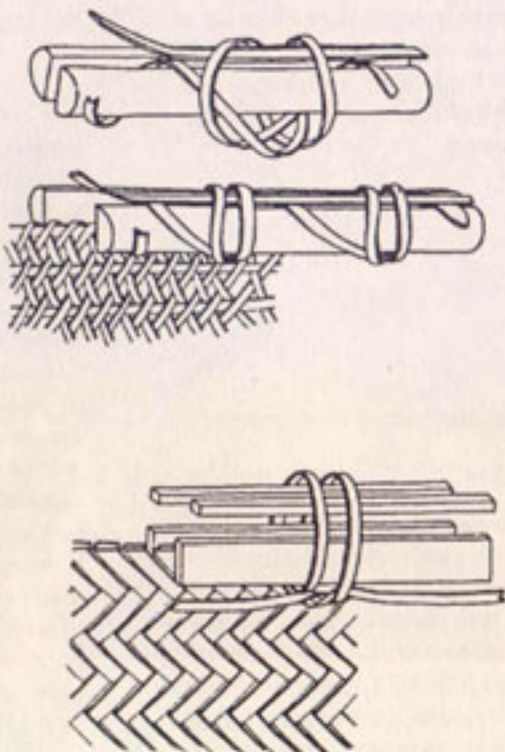
However one species of bamboo that is well known in Latin America — *Guadua* bamboo (*Bambusa guadua*) — is highly resistant to splitting and has excellent nail holding properties. Hence this species is used extensively for house construction with nailed joints as the primary mode of construction. Oscar Hidalgo Lopez of the University of Colombia has exploited this property in design of houses that can obviate the need for steel and cement in a capital starved economy. *Guadua* works where most other bamboos would fail miserably. Tissue culture and genetic engineering may soon give us new species of bamboo combining useful properties with the same ease and consistency that is possible with plastics. Such developments would make bamboo a strategic material of the future just as petroleum and metals are the strategic materials of this millennium.

In our search for a deeper understanding of the

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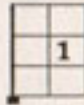
1. Rim strengthening detail of Apa Tani barju.(F14)
2. Rim strengthening detail of the Khaloi from Assam.(F15)
3. Rim strengthening detail of the Thlangra from Mizoram.(F16)

subtle and meaningful properties of bamboo we looked very closely at the baskets and other bamboo products from northeast India (F15, F16, F17). Our methodology was to observe the products in use and the fabrication process while these were being made. Products were selected on the basis of the uniqueness of construction as each one had some significant feature that was interesting if not intriguing. Drawing and sketching was used as the primary tool for documentation and analysis which was supplemented by photography and textual notes, records and descriptions. Selected products were



analysed on an interaction matrix of products vs attributes. As many as 400 products were reviewed against 60 to 70 attributes that covered functional categories, type of craft, region and tribe which made the product, species used, part of culm used, finishes used and features on the product. This interaction matrix that was painfully produced by hand like a massive spreadsheet began showing up patterns of relationships when subjected to a higher level of enquiry. These findings moved from the particular case or repeated occurrence in several product examples to throw up interesting propositions about the useful properties of bamboo at a more general level that could give us the insights required to understand the material in a format that designers could access.

The significant properties identified and listed in the technical index of our book were drawn from specific cases discovered in the northeast India products. Some of these are listed below with an appreciation of the product since each construction detail is an embodiment of the deep understanding of a significant property of



1. Typical saddle joint used for post and beam construction.(F17)

bamboo that has been encoded by centuries of product evolution and the application of the local mind. These are overlapping categories that can appear simultaneously in a single product or part made of bamboo.

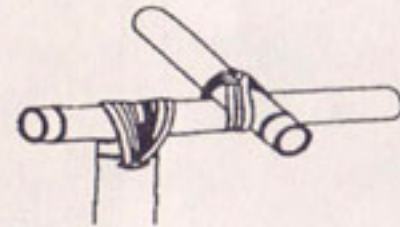
Properties general to all species of bamboo

Composite nature of bamboo, the distribution of fibres, its density and orientation, linear arrangement in the internodes and crosslinking at the nodes and in branching.

The composite nature of bamboo is perhaps the most commonly used property as a result of its unique anatomical structures where tough fibres are held in a resinous matrix. The fibres are oriented along the longitudinal axis of the cylindrical culm in the internodes. Some of these fibres cross over at the nodes to form the diaphragm and some pass through the branches. Fibres are densely distributed around the outer walls of the culm and the density is considerably less at the inner wall. Outer fibres are far stronger and finer while the inner layer is coarse, hence weaker. Traditional craftsmen always use the outer layer when strength, toughness and smoothness are required. These layers also age differently and the resultant colour of the surface is significantly different for both types of splits. In the case of tangential splits, both sets of fibres

are present at either edge of that split, determining its surface quality and structural performance.

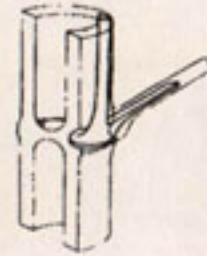
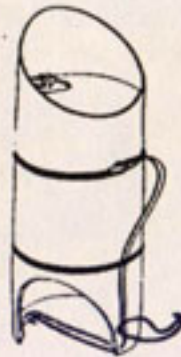
Ease of splitting is a direct result of the linear arrangement of these fibres, and the resistance to splitting at the nodes is a result of the crossing over of these fibres across the diaphragm. When bamboo is used in house construction for pillars and beams it is almost always cut near the nodes, and holes when used are pierced near a node (F17). This strategy ensures that stresses generated at the joints are supported by the



nodes and splitting is prevented. Whole bamboo mugs have handles that are fixed with holes near the nodes in response to the same principle. (F18). When the traditional craftsman is compelled to leave a whole bamboo part open at the internode, a restraining ring or a braided band is invariably used to prevent the splitting from that end(F19). The use of a branch segment and parts of a node in fashioning the legs and side-strengthening elements of an Angami Naga basket very eloquently demonstrates a deep understanding of the various properties of bamboo that result from its anatomy (F20).

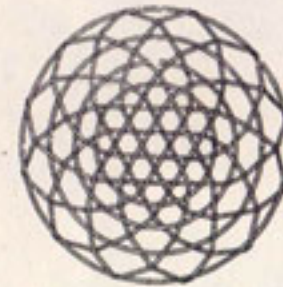
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1. Cutaway diagram of beer mug showing the use of nodes. (F18)
2. Braided bands on an Apa Tani Bamboo container. (F19)
3. Use of branch and node in leg detail of the Agami Naga Kophi. (F20)
4. Geodesic structure of the grass carrying basket from Assam. (F21)



Physical strengths and weaknesses, tensile strength, rigidity, flexibility and resilience of culm and a variety of splits such as half-rounds, quarters, radial and tangential.

Bamboo has a very high tensile strength hence most basket structures use this material in tension using very thin sections. The grass basket from Assam is a good example of a very strong basket using little material and the strength is derived from its configuration and the tensile strength of bamboo outer splits (F21). Large structures too are made to exploit this property.



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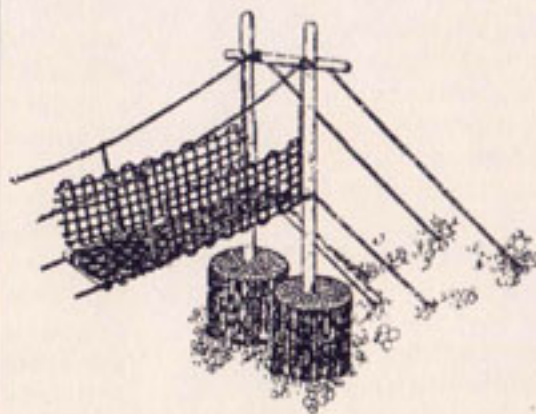
1. Monpa suspension bridge built with bamboo ropes. (F22)

2. Use of node and thick split for strengthening the base of the kashi khoh. (F23)

3. Shaped bamboo elements used to strengthen the base of the shang, a Jaintia basket from Meghalaya. (F24)

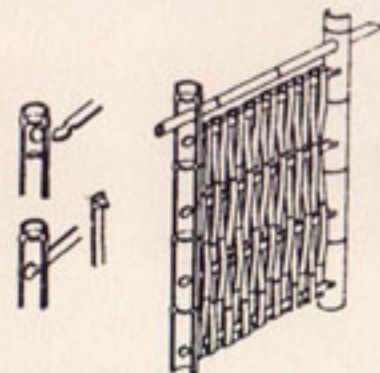
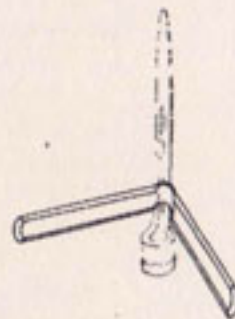
4. Mizo window with sprung strip construction (F25).

The Monpa bamboo suspension bridge uses twisted bamboo ropes as the main suspension cables that span hundreds of metres to carry the load of passing villagers. (F22). Bamboo is also used in a variety of ways to construct rigid compression structures. The base and sides of baskets are strengthened by short and thick bamboo members that resist compression forces in use. (F23). A variety of configurations are used in this case. The base and side-strengthening detail of the Dimasa Cachari basket is a good example of such use (F24).



Thickness of the bamboo member in relation to its length is a critical factor for its effective use in compression structures. Posts used in house construction are normally of a large diameter, thick walled with short internodes. These characteristics enhance their performance in load bearing and retard splitting.

Whole and split bamboo exhibits resilience and flexibility in various forms. Of the numerous examples of the use of this property, an outstanding one is the Mizo window (F25).

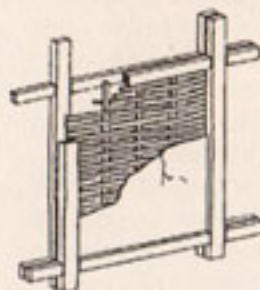


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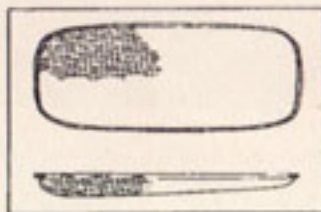
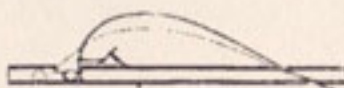
1. Bamboo sprung strip wall panels of the Assam type house.(F26)

2. Bamboo pop gun from Mizoram (upper) and mat tensioned winnowing tray from nagaland.(F27)

3. Super graphics on bamboo mat walls.(F28)



Rigidity of the rectangular window plate is achieved by the stresses in the interlaced bamboo splits that are fairly thick. Cross-bows and single beam bows use this property of resilience very eloquently and a pop-gun toy from Mizoram mimics the mechanism used in the bird and animal traps that use the resilient property of bamboo (F27). Another fascinating use of this property is in the construction of bamboo winnowing trays and mat moulded basket forms used for making strainers. Woven bamboo mats are held in tension by rings of thick bamboo splits. These rings retain the

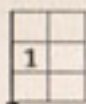


stresses of bending and keep the mat in tension, keeping the mat surface stretched like a drum-skin (F 27).

Surface quality of culm and splits, impermeability and porosity of particular parts and their response to ageing, to smoking and mechanical and chemical finishes.

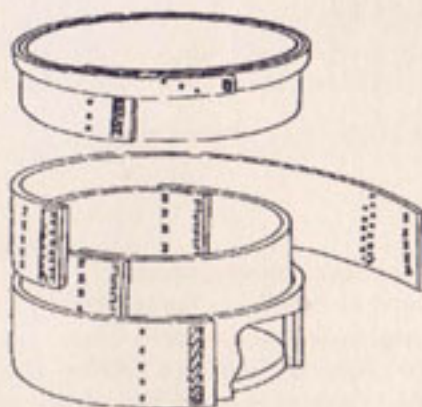
Many tribes in northeast India use the differential ageing qualities of the outer and inner layers of bamboo to decorate their baskets and houses. Large flattened bamboo mats used for house wall construction and decoration are woven in interesting patterns that expose alternate surfaces of the flattened bamboo to enhance the graphic effect of the weave (F28). The outer layer of the culm is hard and smooth while the inner layers, when exposed, are coarse and soft. Splits made for baskets invariably address this property in anticipation of both structural performance as well as the eventual quality of the surface after a good deal of use. Contact with the body or hands and with other substances and chemicals gives subtle finishes to the surface of the bamboo splits that considerably enhance the beauty of the basket or product.





1 Monpa milk pail from heat flattened bamboo (F29)

The walls of the lumen are impermeable to liquids just like the outer skin of the bamboo culm. This property is critical for the use of the surfaces of whole bamboo and heat-flattened bamboo to make containers for the storage of liquids (F29).. The surface of bamboo can be marked by the application of heat and by burning. Some chemicals react with the surface offering the possibility of using this property in the surface decoration of products. The Chang Naga mug is decorated by the use of a red hot metal poker and a bold tribal pattern is branded



on to the surface. Many handicraft products are decorated with the flame of a blow-torch applied through a metal template carrying a predetermined pattern. Smoke is an effective medium for surface decoration. Tribal baskets are stored on top of a shelf above the household fireplace and prolonged smoking between cycles of use give the bamboo surface a sheen and a rich colour. This kind of smoke treatment also prevents insect and borer attack.

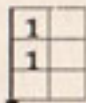
Carving as a form of surface decoration is rarely

used due to the susceptibility of the bamboo to splitting. However the bamboo rhizome which has a short and dense fibre structure, and the basal internodes of thick-walled species, are used to make carved decorations. The short internodes and greater density of fibres at the base of the culm, support the possibility of carved decorations that would otherwise not be appropriate.

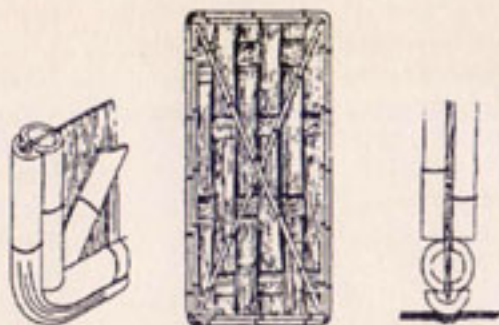
Morphology of culm parts and use by virtue of shape and structure such as roundness of culm, hollowness of culm, and shape advantage of branches, nodes, and diaphragm.

Bamboo comes in a variety of shapes and sizes. Roundness is a dominant property of the bamboo culm just as is the hollowness of the lumen. Some bamboos are however not round or not hollow and these are exceptions to the general rule. Whole culms are used for posts and rafters of houses after trimming branches and rhizome. Whole bamboo splits easily and needs running maintenance to keep the house in good structural condition. Structures made of split bamboo, split in halves, quarters and other sections are less easily split when moisture levels in the environment change. Many tribes prefer the use of split bamboo for the production of structural frames used for roof, doors and windows as these are far more stable than configurations of whole bamboo. (F30). The only exception to this is when the locally available species is resistant to splitting or when running maintenance is not a difficult proposition and whole members can be replaced at will.

Large diameter bamboos are particularly suitable for containers such as mugs and water tubes. Thin wall thickness provides greater



1. Detail of door from mechanically flattened bamboo.(F30)



scope for use as a container. Small diameter bamboos are also used as containers for spices and herbs. The natural hollowness within the bamboo is exploited by many tribes in a variety of ways. Bamboo water pipes are made to direct the flow of water from natural springs to the village in many hill areas. The nodes in a length of bamboo are removed, in a variety of ways, to permit the free flow of water in the tubes thus formed. The diaphragm forms a natural base in most bamboo mugs and water tubes. The branches attached to a culm provide the opportunity of using a natural fork at the joint which is exploited in many tribal constructions. In house construction such natural forks are used to hold main beams to the posts so that the lashed joint is stable and does not slip if loosened.

Properties that vary in particular species of bamboo

Some characteristics are found only in particular species of bamboo. In order to avail of these properties that particular bamboo species will have to be sourced or cultivated. The significant characteristics of bamboo culms and their parts are identified below with illustrations of typical applications that use this characteristic.

Diameter of the culm

The diameter of the bamboo culm of mature plants varies by the species. The smallest diameter can be as little as 6 to 8 mm with branches offering culm-like members that can be even smaller. The largest diameters can be found in some tropical species that are as large as 300 to 450 mm in diameter. Each species would have an average range of diameters located somewhere between these extremes. Small diameter culms are used for fishing poles and for sprung traps while the large diameter culms are used for making containers to store liquids. This characteristic should always be taken in conjunction with the other major characteristics like length of internode and wall-thickness of culm.

Length of internode

The length of internodes varies considerably between species. A particular species of bamboo in Manipur, sondak, with internode length of about 900 mm and diameter of 60 mm is used to make heat-flattened bamboo containers. Short internodes are particularly useful when combined

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1. Angami Naga bamboo spoon using a node. (F31)

2. Use of node and diaphragm for smoking. (F32)

with large diameter and wall-thickness for applications such as load-bearing posts in house construction. For making splits used in basket construction, a uniform internode length, without bends, is preferred.

Height of culm

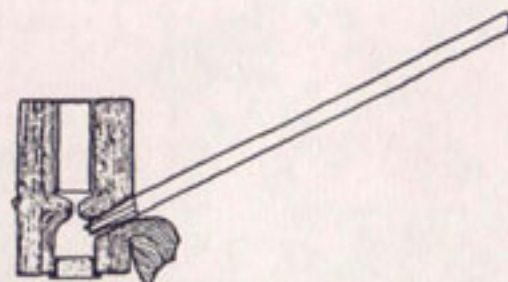
In a number of cases the total length of the culm available is significant. Bamboo used in the construction industry for scaffolding and those used to hoist flags and support banners are normally 8 to 15 metres long. In some species the maximum height of a mature culm would not exceed 1 to 2 metres, normally with a corresponding wall-thickness and internode length.

Wall-thickness of culm and size of lumen

The wall-thickness of the culm and the size of the lumen have an inverse relationship. When one increases, the other decreases. In large diameter bamboos both variables could have large dimensions, offering many possible applications. Some bamboos are solid and these are very strong and tough as a result. *Bambusa affinis* is one such bamboo species that is cultivated in Tripura for conversion into fishing poles and pole-vault staves for the export market.

Nature of rhizome, leaves, culm sheaths and other parts

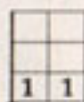
Besides the culm, there are a variety of other parts in a bamboo plant that can be used for their structural properties. Leaves are used to line baskets and to thatch roofs. Bamboo rhizome is used for making smoking pipes and



for decorative carvings. The node and diaphragm are used to make spoons and smoking pipes. (F31, F32).

Bamboo manipulation processes

Besides the properties described above, there are a set of material manipulation processes that are typically bamboo related and some of these are listed in the next page.



1. A variety of sections or splits that are extracted from the bamboo culm, each to suit a particular purpose. (F33)

Splitting of bamboo, variety of sections and variety of orientations.

Bamboo splits, in a variety of sections, are extracted from a culm, (F33). Radial and tangential splits have varying properties due to the changes in fibre density in the outer and inner layers of the culm wall. Particular orientations of splits are chosen, based on both structural and visual criteria.

Bending of bamboo splits by a variety of methods

Bamboo splits are bent in the process of making baskets and other products using a variety of techniques. Some of these techniques are identified below.

Localised application of heat

Bamboo splits are bent using heat applied over a fire or with a blow-torch. Heating softens the resin of the composite permitting the fibres to move in relation to each other to achieve a sharp bend. Bamboo members used for cycle-rickshaw hoods and handles for umbrellas are bent using heat applied with a blow-torch. Squared frames

for winnowing fans and trays also use this technique of bending to achieve the small radius required at the corners of the squares.

Localised reduction of thickness or width

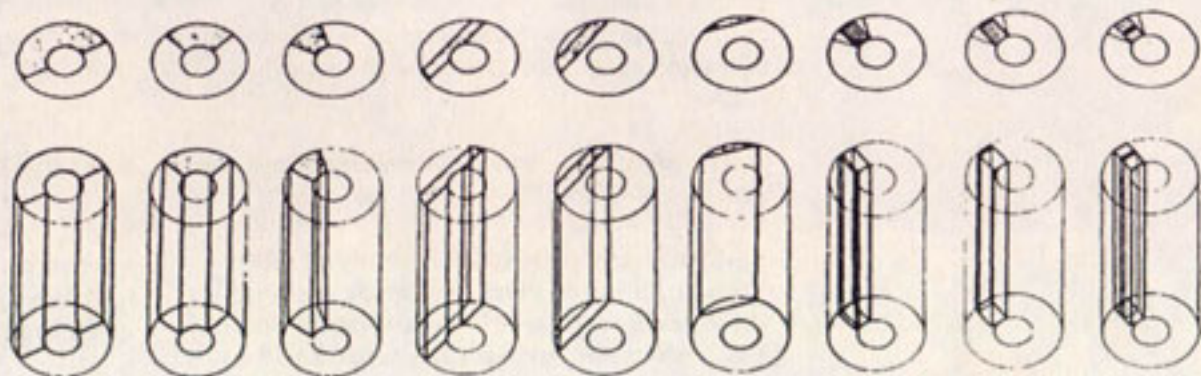
Localized reduction of thickness by paring off mainly the inner wall of a bamboo split at the point where the bend is required is a fairly common strategy for achieving sharp bends in bamboo members.

Localised separation of fibres by mechanical action

An important characteristic of bamboo is that tensile strength is not lost when parts of the bamboo splits are crushed by hammering to separate the fibres to induce flexibility. This form of manipulation is very typical for bamboo and is used extensively to achieve sharp bends in fairly thick bamboo splits.

By separation into multiple longitudinal splits

In construction details at the rim of baskets, fairly thick bamboo splits are bent sharply by

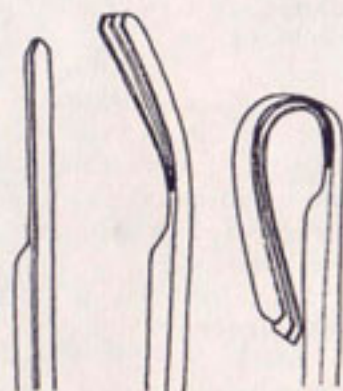
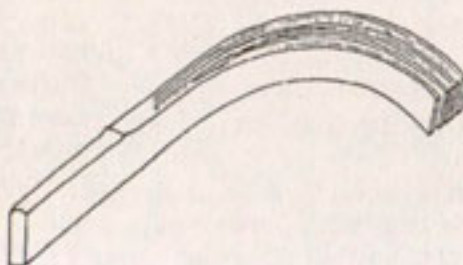


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1. Bamboo splits made flexible by multiple longitudinal slits.(F34)

2. Sharp bends achieved by reduction of thickness and multiple longitudinal slits.(F35)

3. Toughness and flexibility demonstrated by the rim details.(F36)



splitting the member into numerous multiple splits, (F34). This ensures uniformity of size and that all splits stay together since they are connected at one end while the split is now quite flexible since all the sub-splits are of a small thickness and hence easy to bend. This too is a very commonly used strategy in northeast India. One illustrative example is the termination of the side-strengthening element at the rim as used in the Longkhai, a Dimasa Cachari basket (F35).

Soaking in water to induce flexibility

Soaking of bamboo splits in water is a common practice to make work easy and it also prevents tools from getting blunt while splitting. This soaking operation also induces a good deal of flexibility to the splits facilitating the bending process.

By use of thin cross-sections that are inherently flexible

Most baskets can be woven in bamboo only because the splits used are fairly thin. Thin splits are inherently flexible and can be easily



1. Heat flattening of bamboo and trays made using the technique..(F37)

2. Construction principle used for Monpa bamzi, a heat flattened bamboo container.(F38)

manipulated into complex weave structures and can be bent over and over to form knots for binding constructions (F38).

Heat distortion or deformation of bamboo by the following methods

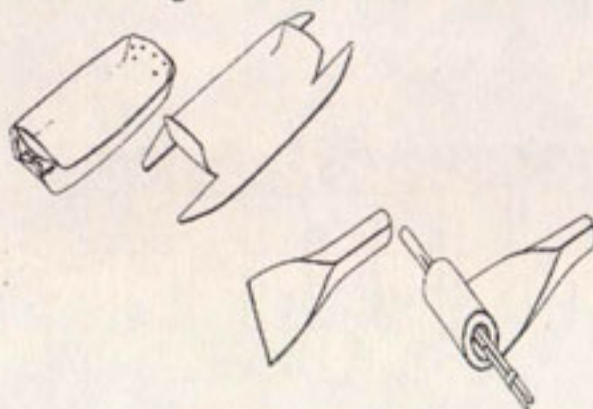
Heat is used to deform or distort bamboo whole or split in a variety of ways. This is possible due to the composite nature of bamboo since the resin matrix supporting the fibres behaves like a thermoplastic material, by softening on the application of heat, and regaining its rigidity when it cools down.

In bending by the localised application of heat

Direct flame or indirect application of heat at a point is commonly used for achieving sharp bends in fairly thick bamboo members and some applications are described above.

In flattening of whole culm into sheet

An unusual form of material manipulation is seen when a length of bamboo culm is heated



uniformly and then flattened into a sheet by the application of pressure when still hot. Such sheets are used to fabricate large containers for keeping valuables, liquids and grain. The flattened bamboo rice dishes of the Chang Nagas and the Nocte tribe are exquisite examples of the use of this construction principle(F37). The Monpa Bamzi is another fascinating example of this process (F38).

In surface decoration by burning or discolouration by heat

The application of heat and fire are used to decorate bamboo surfaces in a variety of ways and motifs.

Mechanical flattening of bamboo culms into sheets

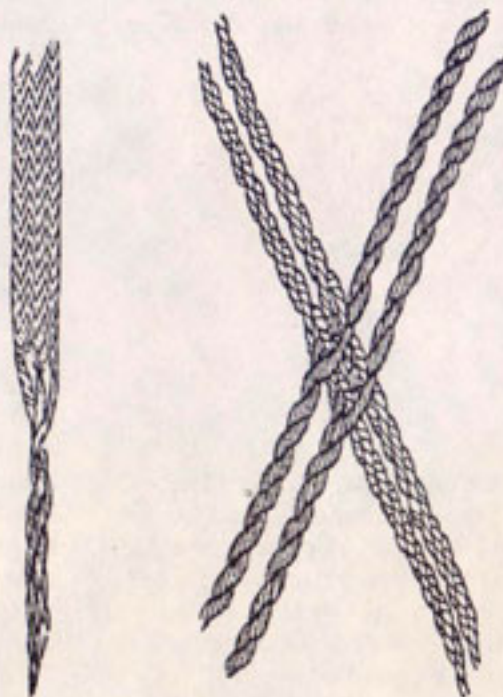
Bamboo walls for houses are woven using wide sheets of mechanically flattened bamboo culms. The thin walled culms used for this application are hammered at the nodes and slit open to be flattened out into a wide sheet. The width of the resultant sheet is equal to the circumference of



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1. Twisted rope constructions used in
Apa Tani yarn basket.(F39)

the culm used. In some cases this sheet is further split in two layers resulting in two grades of sheets, the superior one retains the outer layer while the other only the inner layer. A novel method of flattening employed by the tribal craftsmen is to place these bamboo culms on a highway and passing trucks complete the process of flattening.



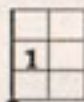
Enhancing tensile property by twisting into ropes

Bamboo ropes are used for building suspension bridges and for making head-straps for carrying containers and baskets. Fairly thin ropes are used to strengthen baskets using very flexible but extremely strong elements, (F39). Long ropes are possible by overlapping lengths of bamboo splits that are twisted together. The outer skin is used to enhance the quality of the rope and some thin walled species are particularly well suited for this application since no splitting is required and the culm can be easily crushed by hand and twisted into very strong ropes.

Surface finishes and preservation techniques

A number of surface finishes are used for bamboo products. Some are for decorating the surface while others are used for preserving the bamboo from insect attack.

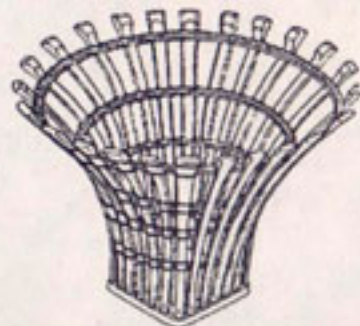
Use of dyes, chemicals and smoking finishes and chemical treatment to decorate and ward off insect, fungus and borer attack. Varieties of vegetable dyes, chemical dyes and a variety of smoke treatments are used to decorate and preserve the bamboo parts or products as a whole. These processes are either executed on the prepared and sized raw materials or after the product is fabricated.



1. Mould used to construct Angami Naga kophi, dowry basket of high value (F40).

Manufacturing processes such as cutting, smoothing, drilling, boring, shaving, etc.

While splitting is the primary means of converting bamboo into workable splits a number of other manufacturing processes are used to make bamboo components. Cutting is achieved by using hack-saws or by a sharp knife swung against the bamboo part. Holes are possible by the use of conventional twist drills but there is the danger of the bamboo splitting along the length in case the stresses developed



during drilling are not managed carefully. Another method that is commonly used for making holes in bamboo is by piercing the bamboo with a red-hot poker. Burning a hole does not induce any stresses hence the danger of splitting is reduced. Holes are advisably located near the nodes where cross-linking of fibres prevents the development of splitting. Surfaces are smoothed with a sharp edged knife and sand-paper is rarely used. All these processes can be mechanised and the Japanese have developed machines to carry out these tasks efficiently.

Tools, jigs and fixtures used to perform production and quality control tasks

Working with splits and from numerous linear elements is the normal construction method when using bamboo. Many tribes in northeast India have developed very fine techniques for achieving the uniformity of size and finish that are the hallmark of good quality products. Simple jigs and fixtures help reduce the skill required in the precise fabrication of products and components and this also helps improve productivity of the craftsman. Gauges, templates, moulds and dies for drawing splits of uniform dimensions are all used to achieve high quality standard, (F40).

Conclusion

There are enormous possibilities for the exploration of bamboo as a designer material of the future particularly for the developing countries of Asia and Latin America. Integration of research efforts in a large number of scientific disciplines are required to understand and utilise this fascinating material to achieve hitherto unimagined possibilities. While bamboo is one of the oldest materials exploited by man, recent developments suggest that completely new ways of using this material, in an ecologically sustainable manner, are possible that will put this natural material on par with the most sophisticated synthetic materials ever invented by man. To realise this vision a great deal of learning will have to come from the re-examination of the traditional wisdom developed by the bamboo cultures of Asia and Latin America. To this knowledge base we would need to add the emerging studies in



biotechnology and advanced structural engineering and design. Along with this we need to mobilise the use of human cooperation at a decentralised level of manufacture that is practiced in the traditional agriculture and the crafts sectors. Taken together, these areas of human knowledge and cooperation can take the utilisation of bamboo by mankind to a new plateau, Bamboo - as a structural material of the future.

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IS THERE NO ALTERNATIVE TO BAMBOO DESERTS ?

Vinoo Kaley

Shri Vinoo Kaley, an architect by training is an ardent social worker involved in organizing rural artisans in bamboo work. His love for bamboo is well known. If one visits his house, one could see almost every item made out of bamboo. His presentation brings focus to the politics behind the neglect of bamboo craft. A new vision is demanded at a policy level to make use of an eco-friendly employment generator like bamboo. A "bamboo mission" would be certainly an appropriate move to be initiated by the government, based on the basic facts brought out by Shri Vinoo Kaley.

Shri Vinoo Kaley is associated with Centre of Science for Villagers at Wardha as well as Habitat Policy Group and a voluntary agency called Aprup Nirmiti at Nagpur.

Bamboo - A restorative of our forests

Bamboo has a natural habitat in most regions of our country. Adapted to a wide variety of soil, climate and interdependence of plant life, there are hundreds of identified species that grow in our country meeting variety of user needs.

Essentially a Grass, some species grow up to 60 feet in height and one foot in diameter, while some of them form a middle tier in the mixed natural forests. As a general feature, the root system of bamboo and its closely placed stumps

create numerous little barriers and holds the top soil firmly, arresting erosion and flash floods. It thus allows water to soak into the soil and prevents the soil from being washed away, creating ideal soil conditions for vigorous plant life.



Life and death of a bamboo plant

Bamboo is a fast growing plant reaching its mature height and full growth in about 5 years. The life span of most of bamboo species is in the range of 40 years at the end of which they flower only once. Immediately after this the plant dies, generously shedding seeds (resembling wheat grains in looks and even in nutritional quality). These seeds sprout into next generation clumps. Thus flowering of bamboo is inextricably associated with its life term being naturally completed, which means that if the plant dies due to any other cause, there would be no seeds.

Bamboo features - User's side

Bamboo is full of fibrous matter possessing a formidable strength. It surpasses many metals in mechanical properties on weight to strength basis, except in shear.

Bamboo is a recurring and harvestable plant, the first mature stem being available for harvesting in 3-5 years. If one removes even a sizable percentage of mature stems, selectively retaining a minimum percentage necessary for sufficient photosynthesis, the root system again throws up

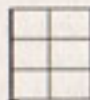
new coppices, thus ensuring further growth.

Strength, lightness, workability and easy availability especially through rapid regeneration being favourable assets, it has been an ideal choice for several applications, particularly for the poorer segments of the society for housing, grain storage barrels (rat proof), agricultural implements, animal carts, furniture items, tool handles, house hold containers, miscellaneous domestic items, ladders, temporary structures.

In certain regions like the Andamans and the North Eastern states where bamboos with very large girths grow, they are used as water carrying buckets and cooking vessels. In many areas, bamboo is eaten as a vegetable. Tender bamboo shoots are relished as a delicacy through a variety of recipes.

Traditional conservationist wisdom

In spite of these multifarious uses of bamboo, the plant has been thriving because of socio-religious controls observed in the country. A bamboo plant is not to be cut during the bright half of the lunar month (waxing period). No bamboo is cut in the monsoon up to Dassera. Bamboo is not to be used as a fuel of any sort except for the stretcher that carries the corpse to the funeral ceremony where it is broken up and burnt away. Sadly these injunctions are losing their sanctity.



Bamboo and modern forestry

There has been a remarkable change in the above scene in the 20th century. The famed bamboo forests of Karnataka disappeared in the space of a few decades while those in Kerala have an estimated balance life of a decade. There is a strong need to arrest the onward march of these bamboo deserts.

Unscientific forestry of British foresters

The British had long lost their own native forests when they found themselves in command of the affairs of the Indian subcontinent. Little recorded by the popular history, they had tremendous interest in the forest produce, particularly the timber, initially as a shipbuilding material and later as railway sleepers, fuel for steam engines etc. Totally overlooked has been the timber which moved out of the country in the form of packing cases.

However they had no use for bamboo as a commercial commodity and this plant, playing a crucial role in common man's life; was treated almost like a weed. In several forests, bamboo was cleared away to make space for "valuable" species.

In 1920 the research institute at Dehradun proudly proclaimed that they had found a "use" for bamboo as a feedstock for making industrial pulp, thus bamboo began receiving attention which is now becoming a cause for its extinction.

Bamboo as an industrial feedstock

Without thinking of the impairment it can cause to the traditional bamboo user and with admirable twin objectives of Import substitution of paper and Industrialisation of backward areas; a series of long term agreements were effected between the forest department and the prospective paper manufacturers. An attractive package of long term stability of low prices, assured annual supplies along with other incentives was developed, resulting in newspaper mills using bamboo as a raw material.

Availability to traditional sectors

As a result of this, last year the large industries picked over two million tonnes of bamboo out of our total national extraction of three million tonnes, while the revenue from these leases is becoming increasingly insignificant. In fact it does not even meet the monitoring cost, which alone was expected in the beginning. As against this the bamboo available to the depots is few hundred times its price 40 years back.

Are the two related?

Most of the agreements with industrial consumers did not provide for the steep fall in the value of rupee in the period of agreement with the effect that in many cases, a tonne of bamboo. In case of Gadchiroli bamboo, 330 nos of 6mts long and 7.5 cms girth/ tonne, is transferred at a compensation of a few rupees or in some cases even less than a rupee! Even the latter date agreements are fetching the government about Rs 125 per tonne.



Unrealistic cost and technology/ Trade irrationalities

This was the first time that bamboo was extracted on a large scale in concentrated pockets and by the profit conscious petty contractors. For such traders, it was uneconomic to exercise traditional conservationist wisdom and care which good forestry demanded.

The bamboo available for open market which caters to most of the bamboo artisans in the country, comes from forest areas left out after meeting the priority commitments of the above mentioned industrial agreements. Due to general deterioration of forests, these pockets go on shrinking in size while the auction method goes on extracting higher prices. The traders in turn make the buyers pay more.

Even out of the open market segment, the principal customer's place was taken by the fast urbanising centres which use bamboo as the scaffolding material and had sizable hard cash to part with. Such market orientation led to neglect of rural segment where markets were widely dispersed and the cash flow was poor.

The absurdly low prices of bamboo, at which it is supplied to industrial sector have naturally generated irrationalities in the trade and technology, few of which are:

- * It has become uneconomical for bamboo using industries to look for and avail alternative feed stocks in the dynamic real life situation.
- * It is technologically unintelligent to chop strong and long bamboos to millimeter lengths

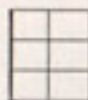
and then digest them in strong chemicals. Generally it requires a lot of external inputs to lengthen structural or engineering elements. Here it is the other way round. From a purely technological perspective for example, sugarcane baggese would have been more cost effective in making paper. But the unnaturally low prices in the administered sector inhibit this shift, even where substitutes are available.

In a grotesque case it has even resulted in bamboo pulp export to another third world country which itself is wise enough to put an embargo on export of forest produce, though it exports the final product, i.e. the paper.

In effect, due to the low prices of paper and board, the paper converters have found a new (and not necessarily healthy) product lines, thus leading to efficient use of natural resources.

The need to consider it as a natural resource

After the near decimation of local level forests and the bamboo clumps therein, the informal sector although dispersed, has come to depend on supplies through the market. Let us not emulate the British forester's error of ignoring the poor Indian's rights over this resource nor take such a step to grind the industrial wheel to a violent halt. Let us start by looking at the basic issues once again.



Bamboo is a biomass resource that has a natural affinity to our soil and climate.

It is inexpensive to grow but expensive to revivethe growth where called for. Many errors have reached common man's perception which need to be ractified. For example: The disappearance of bamboos from the village forests is perhaps the single most important cause for shortage and deterioration in the rural housing sector. Contrary to the urban perception, bamboo and mud play symbolic relationship as the most widely used combination material in rural house construction in most regions of our country. If one thinks of meeting the shortfall thus wrought - up, by so called conventional materials like steel, cement, bricks etc. one soon comes to know that it is a bottomless pit.

There are 30 lakh bamboo, reed and cane artisans in India, out of which the bamboo weavers should easily exceed 20 lakhs (exact figures not available) Does one have to add this figure to our present number of unemployed?

On a comparative basis, bamboo is used highly efficiently as a work generating resource by the informal sector. A tonne of bamboo creates 30 mandays work in the artisan sector, without placing any demands on our power/ capital/ energy/ water infrastructure and clean environment, all of which gets adversely affected in the pulp digestion.

Bamboo as a housing or craftsmen's material has received no original research, design and development (R D & D) input so far while its potential in many new applications like rickshaw frames are explored. Such R D&D will

throw up radically new ideas and applications if the dimensional stability/ joining/ glue/ preservation of bamboo is given fresh thought based on the most modern advances of science and technology. Designers could then think of the moon, one might say. The products will not only be large export earners but also improve the quality of one's domestic life, besides meeting the basic needs.

Propagation of right species could form a subject of study for our scientists, extension agencies in the agricultural or forestry sectors.

Very thin silver lining

The prices of bamboo in Bombay are surprisingly lower than in Delhi, Calcutta, Madras and Nagpur, which is sited in the midst of some of the thickest bamboo forests in the country with the exception of Andamans and the North East.

The simple reason is that farmers in the nearby Ratnagiri district continue the tradition of growing bamboo on their farm boundaries and feed the Bombay market. One such effort is also located in Karnataka. In the Nasik district of Maharashtra there is a major voluntary trust in bamboo farming at work now.

Further a small effort at instilling love of technology and design into Bamboo craft is being made by a small combine of designers and craftsmen in Nagpur which has brought forth exciting new product lines and new exposures. This seems to be on the spread. Industrial Design Centre at IIT Bombay has been working on a MHRD sponsored project "Design Inputs in Craft Areas" with Bamboo as the focus.



The shape of the solution

Through the force of reality and persistent efforts of conscientious citizens, a general awareness is growing in all the participants that a commonly acceptable and ecologically sustainable bamboo policy needs to be worked out in earnest. The principal participants i.e. the state, the industrialist and the artisan together must see that their final welfare lies in the same solution though their immediate interests may appear to be in conflict.

A draft frame work

The protection, conservation and enrichment of our virgin forests being of paramount importance, grant of any further release of bamboo to paper industry should be stopped.

Appraising the beneficiaries of the present arrangements, of the inequitability and short sighted nature of the lease agreements, voluntary surrender of the residual legal rights should be sought. Failing that, they may be terminated through a constitutional amendment preceded by an ordinance.

The annual commitments, once stripped of their legal validity should be phased out gradually, allowing time for readjusting the industrial apparatus. Integrated into this should be a switch over to bamboo and / or other biomass plantation on waste lands.

The compensation rates should be brought in conformity with the ecological costs of forest rejuvenation to become an incentive for research about acceptance of alternative feed stocks.

To meet the capital needs of the plantation programme, new financial instruments like "paryavaran bonds" maybe looked at.

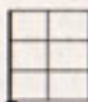
The state should develop a package of instruments for proper environmental guardianship of such plantations and set up a machinery involving local villagers to monitor them.

The development of waste lands for bamboo plantation should be accompanied by a foolproof arrangement of supply, work, fodder and fuel to the affected populations and other complimentary mechanisms.

The department of Agriculture together with science and technology inputs from INCAR, (Indian Council of Agricultural Research) should encourage bamboo plantations as a supportive income generating activity on farm boundaries and thus help meet local needs of the informal sector.

Till this is operational, forest department should make bamboo available to the informal sector through appropriate distribution network at a reasonable cost price.

There is a need to promote science, technology and design inputs in the informal sector, both for domestic and urban/ export markets. For this a national institute of bamboo advancements should be setup with the necessary region based networks, which themselves would become full fledged research institutes in times to come!



BAMBOO CRAFT IN INTEGRATED TRIBAL DEVELOPMENT

P. S. Mukharjee

Mr Mukharjee's presentation becomes significant as he represents BAIF (Bharatiya Agro Industries Foundation) which is well known for its pragmatic and successful approach to rural development. He has been working for BAIF for many years and both he and BAIF need to be commended for recognising the role of an Industrial Designer in the rural development. His interaction with "Design Hive", a design consultancy office in Pune, set an example of how modern professional talents in design could be harnessed for rural development.

Mr Mukharjee's presentation also brings into focus bamboo as a part of integral development of villages. Though bamboo grows widely in India, little efforts have been made to grow bamboo commercially. It would be advantageous to grow specific varieties of bamboo which are better for making thin strips used in weaving bamboo mats. Villagers having control on the raw material would certainly get an edge in making their products competitive.

Introduction

BAIF development research foundation is a non government, non profit making voluntary organisation working for the development of the rural poor through the introduction of appropriate technologies. The strategy adopted is to develop natural resources i.e. livestock which would in turn provide gainful employment to the rural poor at their door step. Unique feature of the BAIF's programmes is that it considers FAMILY as the unit of development because area development approach has failed

miserably in our country due to heterogeneous nature of economic strata of families in any given village. Poverty seems to be a bottomless pit in India, which four decades of various plans, approaches and strategies by both governmental and non governmental agencies have not been able to fill. The reason is non availability of a replicable model, design for rural development and poverty removal, flexible as well as appropriate.

Since 1982 BAIF has been working in the tribal areas of south Gujrat at Vansda and started a



comprehensive programme keeping in mind the objective of rehabilitation of tribal families on privately owned waste lands.

skills. Later they are involved in extension of these technologies and programmes. As forward linkages to production, a farmer's cooperative has already been installed. The plant is producing mango pulps, bar, slice, pickles etc. In all these activities, BAIF is providing techno-managerial support to strengthen the local initiative. Besides, number of research studies have been initiated in this area.

The Core Project

The core economic generation programme is called WADI, which is basically plantation of fruit (Mango in Vansda), fuel and fodder trees in one acre of land. Water resource development, land shaping and providing irrigation facilities are three other major components. The total gestation period of the programme is about 7 years. However, the tribal families start earning from the third year onwards by selling timber and fuel from trees. The species planted are Subabul, Eucalyptus, Acacia etc. However, the problem is to hold the families in the village until a steady flow of income starts, i.e. in seven years. For this purpose, a number of peripheral components are added such as a watershed development, sericulture, mushroom cultivation, vegetable cultivation involving women, cattle breeding to produce good quality cattle, kitchen garden etc. Health and Nutrition programme has also been initiated as one of the major components from the comprehensive development programme. To effectively implement the programme, local youth and women are trained in different technologies and

Design in development programmes

So far design was considered as an important component only for industries. However, in the last few years it has been our experience that design can play an important role in the development programmes as well. Programmes like sericulture, mushroom cultivation, cattle breeding etc. are being promoted by BAIF in many far flung areas of the country. Considerable design inputs are required in such programmes for developing appropriate packages for cocoon, spawn transport, designing racks, mountages or developing products from wood etc.

Mr Unmesh Kulkarni, an ex-student of IDC, IIT Bombay designed some kitchen utility items using wood of Eucalyptus tree. He has also designed tools to make these products. His expertise has also been used to design worm transport containers, mountages for sericulture programme. Other design expertise is also being utilised for making toys from available wood species. In future programmes of BAIF, Design input will play a major role to transfer technologies to the interiors of the country.



Bamboo craft development

So far, BAIF has introduced a number of activities in Gujrat. However there is a primitive tribal group called Kotliwalas who are traditionally bamboo artisans. The main item they make is baskets of different shapes and sizes. We believe that there is considerable scope to train these people to make some items which would have higher market value. The income of these people can be increased if the mechanism is established. BAIF can help the artisans in this regard. As it is true for any other marketable product, bamboo craft development should also follow the following path.

Production:

- 1 Infrastructure of raw materials
- 2 Training
- 3 Choice of products (designing)

Optimum utilisation of produce

Marketing of products of farm employment

Value addition

Income generation at a local level.

BAIF has the required infrastructure and is already involved in the production, promotion of bamboo as one of the major species in the WADI programme. There is a need of help from the experts in designing new and marketable products and help us in conducting training programmes.

Bamboo related activities and BAIF's involvement

In the last few years, BAIF has taken up a number of programmes related to bamboo. These are:

Encourage plantation of bamboo in the WADI programme.

40 Wadi plots have been developed with exclusive bamboo plantation to meet the requirements of the Kotliwalia owners.

Implement a project on bamboo germ-plasm collection and multiplication. Under this project, germplasm was collected from inside and outside the country.

Conducting training for the artisans . One training programme has been conducted on bamboo crafts with the help of Development Commissioner of Handicrafts office.

Promote use of bamboo products new designs in programmes like sericulture , mushroom cultivation etc. have been introduced.

1	1
1	1

1. Unusual form for Salt and pepper shakers using local wood created by Design Hive. A combination of natural finish of the wood and bright coloured elements used as design features.





MARKETABLE PRODUCTS USING LOCAL WOOD AND BAMBOO

Unmesh Kulkarni

Unmesh Kulkarni gained valuable experience in consumer product design at "Eagle Vacuum Fasks" where he worked for a couple of years after completing his M Des from IDC. He and his partner, at Design Hive, Rashmi Ranade, who also graduated from IDC are ardent enthusiasts in development work. They have been going out of their way and offering design services at concessional fee to developmental agencies. Unmesh's work shows the advantages of professional approach. His presentation through slides demonstrated, designer's ability to look at problems in the overall perspective.

The consumer products he showed, had the sophistication needed in such products if they are to be marketed in Urban areas or exported. The detachable nets for sericulture frames save time and increase the productivity of the workers. Most of the items which he has developed in wood can also be made in Bamboo.

The project aimed at employment generation in rural areas through manufacturing activity and utilisation of local materials in value added products which could be sold in urban areas or could be used in better farm management.

Client: Bharatiya Agro Industries
Foundation, Pune
Designers: Design Hive, Pune
Project: Design of products in wood
Design of transportation system
for silkworms and cocooning
frames in sericulture.

Project outline

The stages involved in the project were:
Study of skills, economics, material, sericulture,
wood, machining properties of jungle wood, user
groups etc.
Initial concepts.
Testing and trials -Tested in real life situation.
Feedback and analysis- Design development.
Testing and trials.
Finalisation of design, drawing and costing.
Tools and machines procurement.
Training the work force.



Products in Jungle wood

Study of wood

Characteristics of wood: sizes, drying, cutting, dimensional stability, strength, grain structure, colours.

Machining characteristics: Turning, planing, cutting, sanding, drilling, carving, sizing.

Design

Design aimed at the following:

Achieving finished and quality product using machining processes.

To allow all the wood working skills to be tried and applied.

To minimize the hand skills required and to avoid errors due to limitations as the craftsmen were not experienced in woodworking.

Products designed

A set of tableware products aimed at upper end of the market and export. The products form a range which could be selectively packed. The products are in five categories such as bowls, trays, boxes, spoons, salt and pepper shakers.

Sericulture products:

Worm transport system

To transport the baby worm.

To suit various modes of transport

Modularity.

Maintenance of environmental conditions such as temperature, light, aeration, humidity etc.

Design used paper tubes, jute, cotton straps, corrugated sheets etc so that it can be produced locally and it would be biodegradable as well.

Designing of cocoon frames

Silk worms are mounted on a frame during the last stage so that they could build cocoons.

Material selection was done considering the requirements of texture, absorption stiffness characters etc.

Space frame created to save space.

Use of materials like jute, cotton cloth, jungle wood, bamboo rods, handmade papier-machie was experimented.

Conclusion

Designer could play a very effective role in the rural development activities as the village needs effective and appropriate designs which could fetch them money.

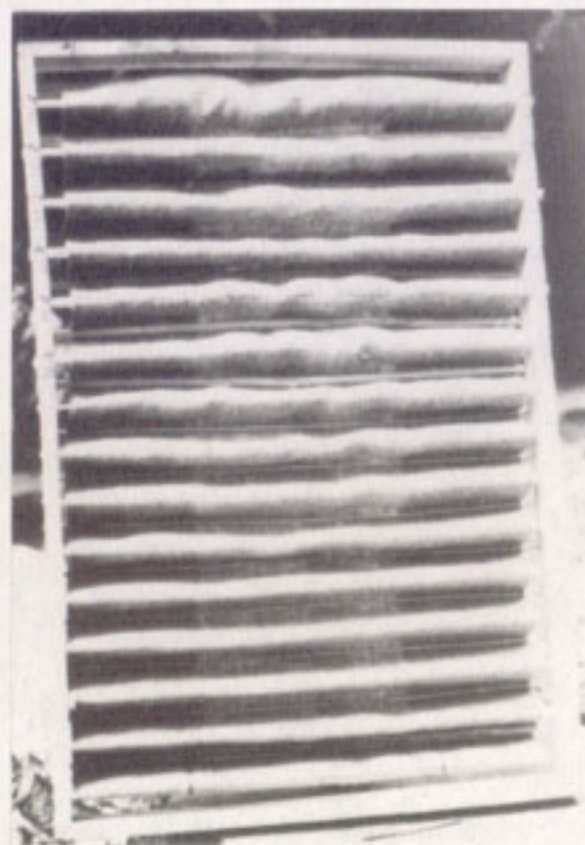
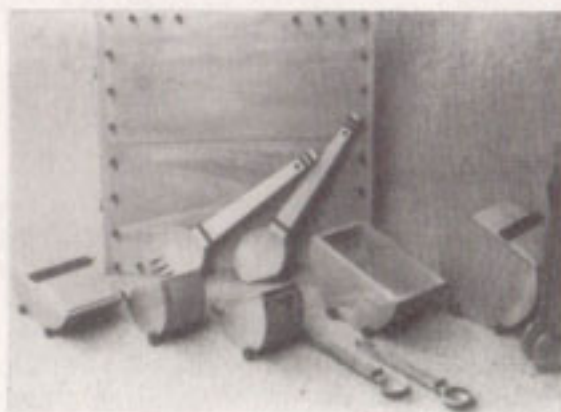
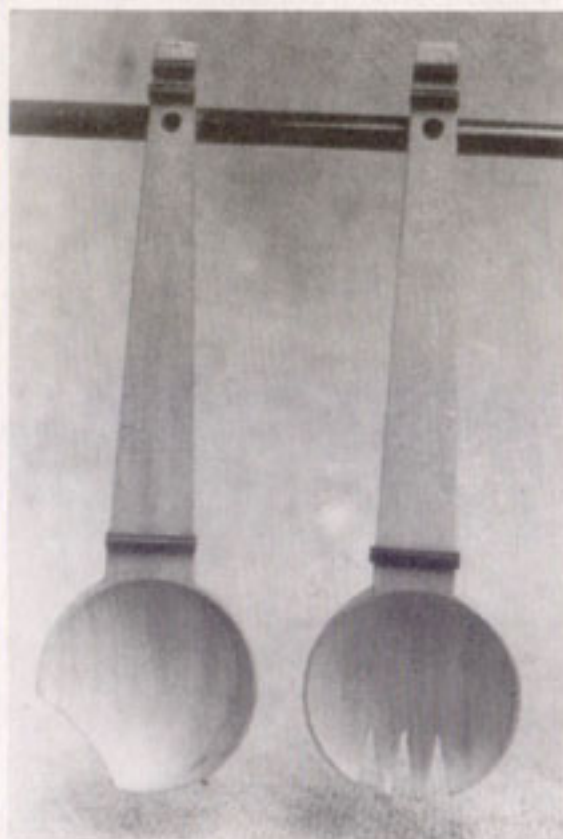
Designer has a very important role in deciding products, raw materials and designs after analysing the local skills, infrastructure, finance and raw material procurement.

Involvement of a non Government agency helps in establishing an effective system for such activities.

Designs for rural use or manufacture need to be established in a setup, which should be designed to maximum detail. The designer should involve himself in the process of implementation of the designs. The design solutions should be most appropriate in terms of use of skills, requirement of machines, materials and needs of the user group.

1	
1	3
2	3

1. Serving spoons made out of local wood.
2. The entire range of kitchen items including tray, shakers, spoons, bowls and tongs.
3. Sericulture frames for mountages of cocoons.





Participants

Prof. A. W. Date
Shri. Darshan Shankar
Shri. Vinoo Kaley
Mr. P. S. Mukharjee
Mr. Unmesh Kulkarni
Prof. A. G. Rao

PANEL DISCUSSION

A Panel discussion was held on the second day of the seminar to bring out some of the issues of bamboo craft and the reasons for its deterioration. These issues not unknown yet ambiguous in our minds, were discussed and clarified by the panel members. Raw material procurement problems, distribution inequalities, government policies, the role and the relevance of developmental agencies, the economics of the bamboo craft, the craftsmen's earnings, the scope of design, specific design endeavours and many such issues came up for discussions. Prof. Date chaired the session.

Shri Darshan Shankar

He has been associated with the Academy of developmental sciences, Kashele, Karjat, where a Cane and Bamboo craft training centre has been set up to generate employment in that area. He briefed on the workings of this organisation and also stressed on the role of government in such areas.

Should the government be solely responsible for the state of crafts and its development? Developmental work indeed needed long term



strategic planning and this could progress in stages only.

The main objective of the Kashele project was to provide a basic minimum income of Rs 1500 per month and provide a vocation by developing products which could be sold through exhibitions etc. He also mentioned the attempts of design inputs made at Kashele to evolve newer products in bamboo such as pin holders, letter holders etc. However due to low returns the bamboo workers at Kashele have switched over to cane furniture, which has a ready market.

Shri Vinoo Kaley

Shri Vinoo Kaley is the motivating force of the bamboo artisans at the village Khamana, in District Adilabad, where they have developed new range of bamboo suitcases, briefcases, sling-bags, all using hand-tools and simple jigs and fixtures.

He noted that although Japanese traditions have exposed the world to the potentials of bamboo, the bamboo craft has not flourished in India, as it is in an unorganised sector. Organised sectors like paper industry have been getting bamboo at highly subsidised rates.

He gave convincing statistics of the relative man-hours of employment generated by using bamboo in the craft sector. It was over ten times compared to paper industry. He emphasized that since British, during their regime in India, treated Bamboo as a reed, it was used as a low grade fodder and consequently it conditioned our perception of the material as well. It commonly became known as poor man's timber.

Accidentally when research institutes found its use in the paper manufacture, the plantations were leased out to the paper industry at ridiculously low rates.

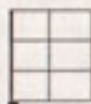
With the bamboo rapidly diminishing into the industry, the craftsmen have to pay Rs 14-18 per bamboo in the open market. Consequently basket weavers are slowly looking for alternative jobs because baskets do not fetch enough returns in the market. He cited the case study of the village Khamana, where the craftsmen are making 25 suitcases per month which ensures an income of Rs 1500.

Mr P. S. Mukharjee

He underlined the role of developmental agencies in providing rural employment. In introducing any new programme to the villagers, it's essential to involve the entire family in the enterprise. Craft is no exception. Man, wife and his children all contribute in the family earnings.

So the programmes have to be devised keeping in mind this collective work force. He also pointed out the middle man's problem, often reiterated in the craft sector. The role of the NGO's and the middlemen has to be defined clearly. Often the image of the middle man is wrongly depicted as being grossly unfair to the craftsmen and not giving them proper market exposure.

He also stressed on the importance of participation of the designers in such projects. He mentioned the work done by a Pune based design firm, in sericulture implements and house hold products out of local wood. BAIF planned to involve designers in their future efforts too.



Mr Unmesh Kulkarni

He is a practising designer in Pune and has worked with BAIF to develop sericulture implements and products using local wood.

He elaborated on the need of design inputs in the rural development schemes, especially in the craft sector as there is no change from the traditional ways and the crafted products lack contemporary touch. He felt that designers could definitely contribute in making newer products, which could sell better in the markets and fetch higher prices.

Prof. A. G. Rao

He defined two basic approaches of dealing with the craft. One might be craftsman oriented, where the designer could study the existing products, the conventional tools and techniques used by the traditional craftsmen and suggest changes, improvise and standardise the processes, increase the productivity and achieve better aesthetics to maintain the competitiveness of bamboo craft products.

On the other hand sensing the enormous market potential for quality products for both urban and export markets, entrepreneurs could take initiative to start small scale craft based industries employing craftsmen with machines and better working facilities. This would ensure employment to both skilled and semiskilled craftsmen and also meet the market requirements of better quality and larger quantities.

The market studies could help in categorising the products which could be developed in either of the cases and appropriately positioned in the market.

A lively discussion developed with the participation of audience and the panel members regarding the need for selling bamboo products in urban markets. A strong view was expressed by the professional designers that bamboo craft cannot survive if it is not able to capture urban and export markets. It was pointed out that China and Taiwan have already adopted this strategy. In India, the returns for the craftsmen in the bamboo products sold in rural markets has been low, resulting in many craftsmen abandoning the bamboo work. The need to rejuvenate the craft compels us to take a global perspective.



Mr Pradeep Babar is an assistant director in the Development Commissioners office, (DCO) in their western region design centre. He was trained at the National Institute of design, Ahmedabad. He participated in the workshop and briefed the craftsmen and designers on the working of the DCO and the various schemes and programmes undertaken by the government to promote crafts and craft design.

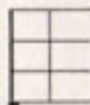
SCHEMES AND INCENTIVES FOR DESIGNERS/ CRAFTSMEN.

Pradeep Babar

All India Handicrafts Board, now known as the Development Commissioners office, set up by the Government of India under the Ministry of Textiles, as a government body aims at promotion of the handicrafts. The department has various schemes to provide infra-structural supports to the craftsmen. It organises marketing meets and exhibitions where the craftsmen could sell their wares and also interact with the designers and marketing people.

To facilitate effective interaction with the craftsmen the D.C.O. has set up separate Marketing and service extension centres.

The regional design centre initiates training programmes in crafts in different parts of the country to teach the local people basic skills, which enables them to pursue it as a vocation. In the western region, various such programmes have been conducted in bamboo craft. Trained craftsmen from Agarthala bamboo training centre, are conducting these courses at Kashele (Karjat), Kolhapur, Sangli etc.



The trainees are taught the basic skills of slitting, strip making, basket weaving, staining, bending, edge treatments etc. They learn to make conventional craft articles like houses, boats, fans, hair-clips, mats, lamps, diwali lamps, trays etc. During the training period which lasts for six to eight months, they are also provided a stipend of Rs 250 per month, and their articles are sold through exhibitions etc.

The course is structured at generating self employment without much investment, so use of only hand-tools and simple techniques of staining, burnishing and bending are emphasized. After the training the craftsmen can earn from Rs 30 to 60 per day or even more.

The DCO has also special schemes for designers to contribute to the crafts. A designer can work in any craft of his / her liking for six to twelve months. The designers can take projects in any craft and give their inputs under any of the following heads.

To develop new products/ new designs
To develop new tools, fixtures, methods or techniques
To develop processes for better quality and output.

The DCO provides the infrastructure and funds for documentation, making of prototypes, travel expenses and the designer fees. The total remuneration is upto Rs one lakh per project.

Mr. Babar mentioned that last year 10 such projects were handed out to various designers across the country, some of which have been in collaboration with the National Institute of Design, Ahmedabad. The audience was keen to

know the result of such projects, however the project documents were not accessible during the workshop.

He accentuated the need to involve free-lance designers and design students in craft design. He also invited designers present at the seminar to pursue such collaborations.



BAMBOO CRAFT TRADITIONS IN JAPAN

Kirti Trivedi

Prof Kirti Trivedi has great love for Bamboo. He spent nine months in Japan on a UNESCO fellowship in 1981. During this period he studied the love and respect Japanese had for bamboo. He has a rich collection of bamboo products and visuals from Japan. He has also a rare collection of books on bamboo.

Inspired by the Japanese attitudes towards Asian traditions, Prof Trivedi has made pioneering efforts in understanding Indian traditional thought in design and its implication on today's product design and visual communication.

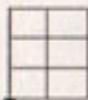
Prof Kirti Trivedi presented a visual essay on the bamboo traditions in Japan. Bamboo is an integral part of the culture, traditions and the religious ceremonies of Japan.

Bamboo has been an important resource for Japanese and bamboo craft is one of the cherished traditions of their culture. Bamboo craft has a significant contribution in their Tea ceremony. Certain craftwares are integrated with their marriage rituals and some specific type of bamboo baskets are given away in dowry, which command exorbitant prices. Some of these crafted

items have symbolic connotations associated in the ceremonial functions.

Bamboo is treated as a precious material akin to gold and the care and attention with which the craftsmen work is reflected in the exquisite quality and craftsmanship of Japanese bamboo products.

Bamboo plantations are well planned and neatly laid out in the woods and each task of cutting the bamboo at the right time, seasoning, slitting, treating and weaving are all done meticulously



and with utmost care. Some of the cut pieces of bamboo are wrapped in muslin and stored away for months until they have matured and right for weaving. Great care is taken to protect the skin to save it from getting scratched or damaged.

Japanese bamboo products are refined in aesthetics and form. The sensitivity in each stage of operation, right from cutting the bamboo to seasoning, treating, selecting the right variety for the right product, intricate weaving patterns, the forms generated within the weaves, their colour and texture, all contribute to making Japanese products of very high value. The sensitivity in detailing and aesthetics are of high order. Japanese consider even the irregularities in the bamboo to be a unique feature of beauty in art and craft.

The craft persons perform each job with painstaking diligence and this involvement and dedication to their profession is reflected in their lifestyle as well. As Prof Trivedi puts it, 'A good craftsman can never be a bad person'.

Craftsmen in Japan are very highly respected and it is a glorified profession. A master craftsman has even been endowed the honour of being the living heritage of Japan.

1	
1	2
	3

1. Bamboo furniture showing intricate detailing.

2. Bamboo spoons with long handles kept outside the shrines for washing the feet before prayer time.

3. Detail of the spoon with calligraphic inscriptions.



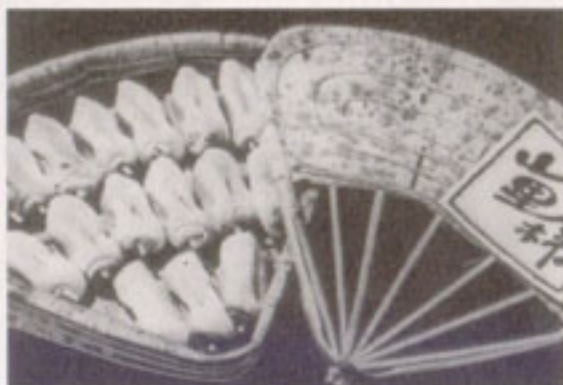
1	2
3	4

1. Bamboo used for packaging of sweatmeats, candies etc.

2. Bamboo cylinders used for packaging with attractive graphics.

3. Fine bamboo sticks make the intricate framework for the Japanese umbrellas.

4. Transverse slices of bamboo cut at the nodes and painted to form interesting shapes for saucers.

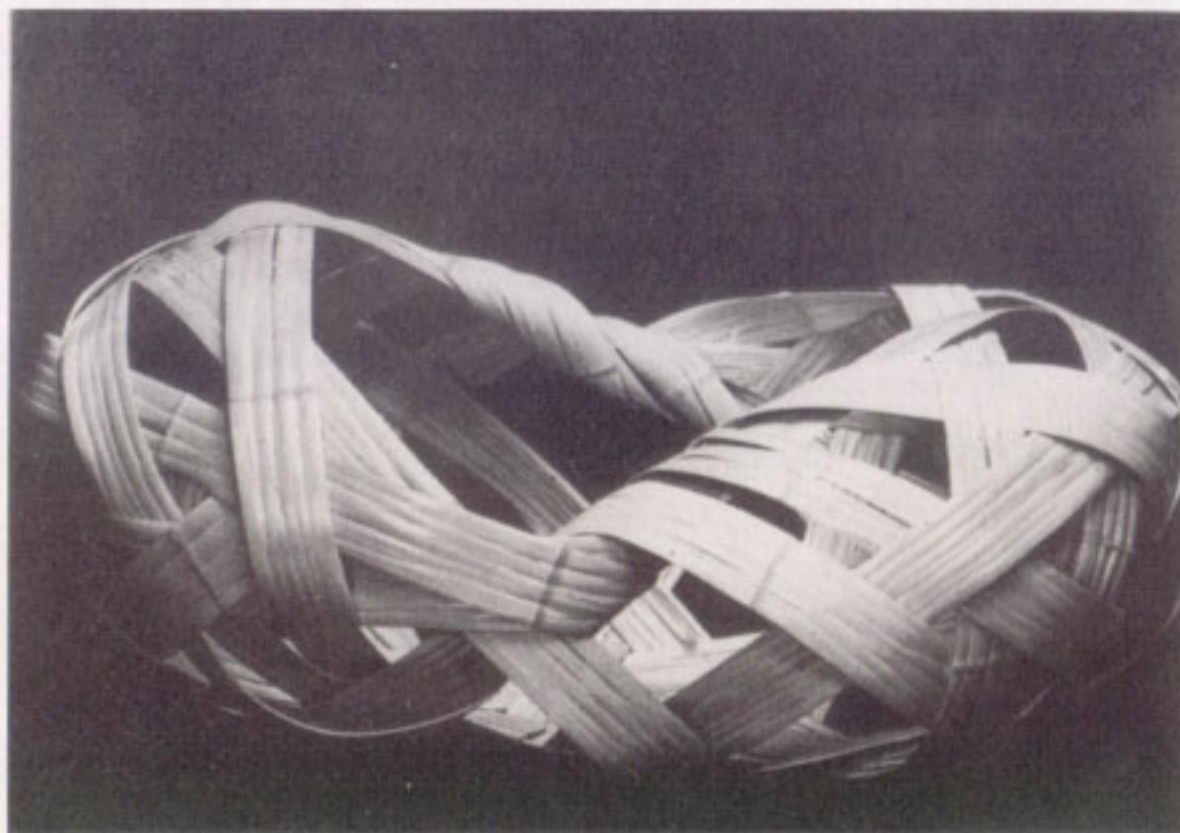
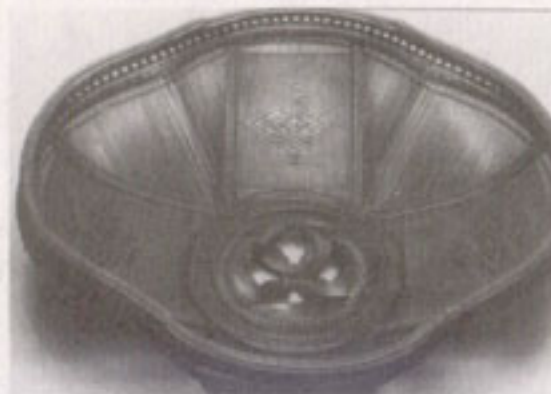
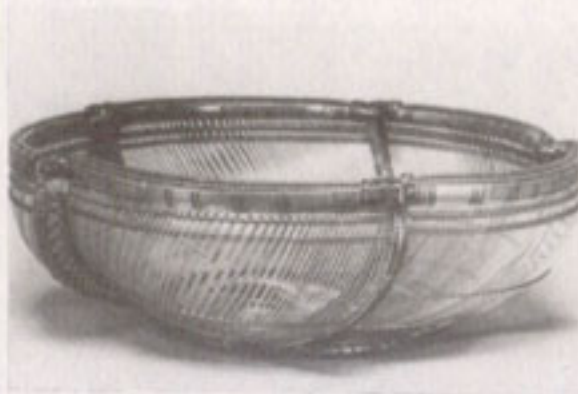


1	2
3	3
3	3

1. Intricacies in Japanese basket weaving seen through the fine details of edge treatments and ribs.

2. Another basket viewed from the top reveals the beauty of form achieved through minute weaves.

3. The aesthetics of form evolving out of simplicity of weave and flexural quality of the material.

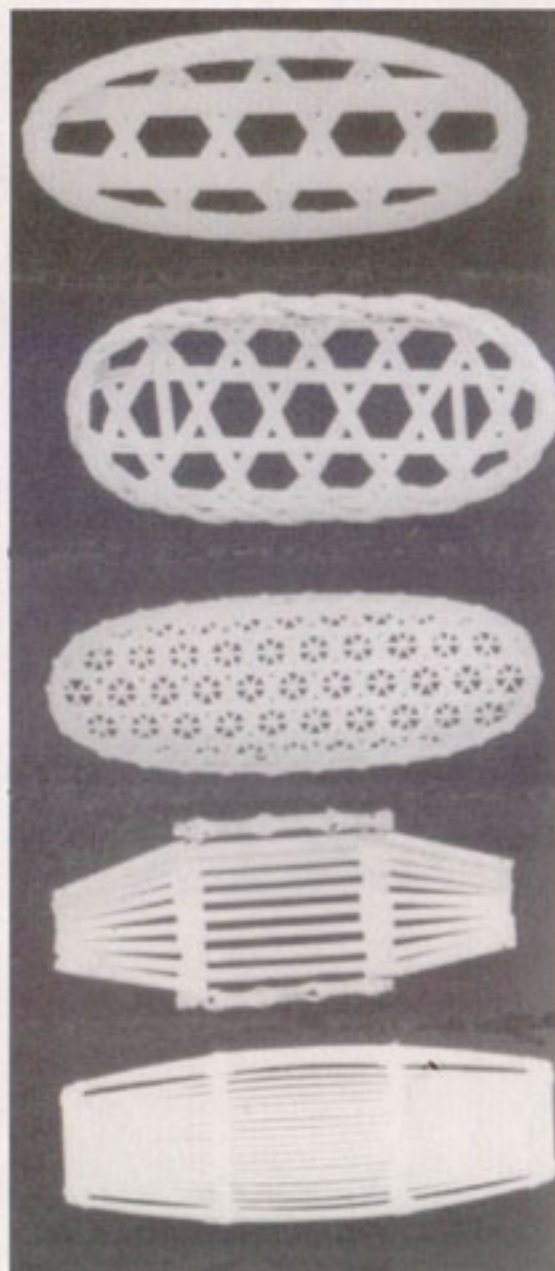
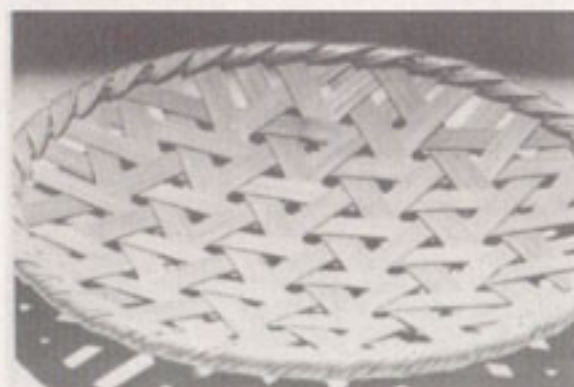
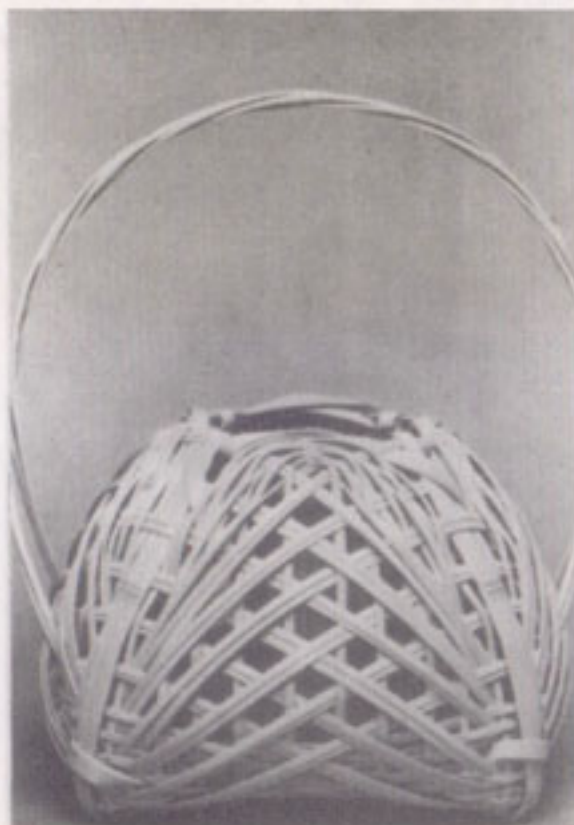


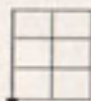
1	2
1	2
3	2

1. Japanese woven basket with an integral handle.

2. Different designs for trays in bamboo.

3. Woven shallow tray.





DESIGN METHODOLOGY IN JAPAN

Boban Varghese

Boban Varghese was drawn towards bamboo when he did his final M Des project in bamboo products. Later he went to Japan for six months to study and learn bamboo work. His paper gives rich information on Japanese methodology and techniques. Boban also brought out many points in his talk with slides and bamboo product samples from Japan.

Japanese 'sensitivity to bamboo' makes a big contribution in their achievements. The Government and Institutional supports to bamboo crafts in Japan are pragmatic, market oriented and meaningful. Japanese have integrated craft attitude with modern Industrial practices. Quality and productivity remain the main focus.

Japanese strip making method is different from that used by Indian craftsmen. They use a fixed knife on a bench or floor. Use of Vernier Callipers to check the uniformity in size of the bamboo strips is a common practice. Much of Japanese success in product quality stems from their attitude and concern for quality in their crafts.

Bamboo possesses a unique warmth and tenderness like any other organic craft material such as wood, leather etc. In addition to this, a clean simplicity of surface and modest shine makes bamboo an extremely attractive material.

Bamboo is also strong, resilient and can be split into fine filaments with the help of simple tools. It can be woven like a thread. Bamboo is a fast growing plant, abundantly available in South East Asia, Japan and literally in all continents. The range of products that are made of bamboo are enormous. Its endless use includes basketry,

making dolls, lighting fixtures, furniture, "Hashi" chopsticks, toothpicks etc.

It is astonishing to see the wide range of bamboo products that exists in the domestic market of Japan. A glimpse into the development of design and making revealed the role of an organised, sensitive agency and the dedicated people of the bamboo industries.

Majority of the bamboo products of Japan comes from OITA prefecture, in Kyushu Island, Japan. It has the Beppu Industrial Art Institute



to conduct research and develop new products. More than 60 units of small scale industries are working here.

In the Beppu Industrial Art Institute, traditional bamboo craftsmen and the designers work together to develop new products. A theme based on the market need, human need etc. is picked up and a range of products based on this are developed. Two such pilot projects are taken in a year. Some of the earlier projects were:

1985	Hiking, Picnic ware
1986	Carrybags
1987	Retrospective office stationery
1988	Tableware.

Based on the theme, "Te-ma Sette", Brain storming session is formed and a keyword and design strategy are selected.

Macro view

Keywords: Market need of the society
Human need
Competition
Development of constitution and direction.

Micro Eye Strategy

What to make?

Image board: 8 types of life style.

Characteristics of products.

Present techniques Present marketing	Present Techniques New Marketing
New Techniques Present Marketing	New Techniques New Marketing REVOLUTION

Act of realisation (tactics level)

Marketing strategy
Market introduction
Packaging
Reconsideration, Valuation.

Design concepts are developed based on these considerations and the prototypes are made with meticulous detailing and stringent quality considerations. Vernier callipers are used to check the width and thickness of bamboo strips and its spacing tells clearly what kind of quality and finish are aimed for.



Range of products are brought to the public through exhibitions at selected points within the country.

Questionnaires are prepared to get specific results like price range, finishes, most attractive form etc. After analysing the feed-back these products are redesigned or refined, if necessary.

The final designs are presented to the industry people. This interaction can further bring in refinement in the products. Individuals can make use of these and produce with or without modification.

Many of these products are made in small units of 6-12 people. Even a spoon needs about 10-14 stages of production, like an assembly line production.

These products finally through the trader and the supermarket, reaches the end user. This organised setup in Beppu helps the craftsmen and industry to maintain quality levels as well as to create products needed for the society. It also helps the Japanese bamboo products to fight against the inferior quality mass produced products flooding in from China and Korea.

To support these activities, the Beppu Industrial Art Institute has a set of craftsmen experimenting on new finishes and another team on preservation and treatment of bamboo. Dyeing of bamboo using various dyes, lacquering, carbonisation of bamboo for preservation and giving dark brown shade and high frequency bending are being worked out.

High frequency bending

Bamboo laminates can bend into desirable shape, quickly with the help of high frequency bending.

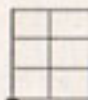
First 2-3 mm thick bamboo strips are bound together by resin. The mould is prepared for the desired shape. The strip is kept in the mould under pressure and connected to the equipment. In ten minutes the bamboo strips acquire the shape of the mould.

Dyeing

Bamboo strips, outer strips as well as inner strips can be dyed for various colours and finishes. Various types of dyes are used for this purpose. They are Basic, Cationic dyes which are easy to dye; Direct dyes, Disperse dyes, Acid dyes, Mordant acid dyes, Reactive dyes etc.

Dyeing process

Bamboo strips are thoroughly cleaned and made free of dirt or oil. 0.1 to 0.2 % dyes to water is added to cold water. This is boiled. The strips are put into the dye and stirred occasionally. At the end of 30 minutes bamboo strips are taken out, washed in running water and dried. Strips can be dyed again. Clear polyurethane can be applied over.



Carbonisation

This process removes the moisture and reduces starch content and thus makes strips less susceptible to fungi and insects. This also gives a darker colour which can be exploited in the design.

The bamboo strips or pieces, preferably of thin sizes, one put into a wire basket and moved into the autoclave. Compressed air is admitted into the autoclave at 5kg/ sq.cm and temperature increased to 150-160 degrees C. The strips are steamed for 10-30 minutes. Water is drained off. Steaming is stopped after 30 minutes. Exhaust is opened and the pressure is reduced. The autoclave is opened and the basket taken out. The carbonised strips get a strong brown colour which forms a good contrast to the golden brown of the Madake or Moso bamboo.

*4.0 THEMES FOR BAMBOO
CRAFT DESIGN*



AKSHAR SAAJ: LETTERS AS DECORATIVE DEVICES

R. K. Joshi

Prof R. K. Joshi is an authority in Calligraphy in India. For more than two decades he has been doing research on calligraphy and Indian letterforms. In his presentation he brings out a new dimension to 'Bamboo craft design' by exposing many insights.

Initially he discusses the semantic significance of decorative devices. Later he shows us the potentials of letterforms to create an Indian Identity. Thus we can see a new opportunity and challenge in bamboo craft design in post modern context.

Decorations have been an integral part of human life all over the world for a long time. Decorations are the elaborations of a basic element into variety of manifestations through a systematic approach. They are pleasing to the eye as they are the expressions of an aesthetic mind and creations of skilled hands. Executed on various surfaces using different techniques and tools to portray various themes. Decorations are supposed to beautify human bodies, energise human life and activate the surroundings. The decorations can be seen as the reflection of a cultural ethos of a given era.

Decorative devices: their practice and philosophy in the Indian tradition.

In India, decorations have acquired an important role in the social life in the context of their display at the public places, mass congregations, functions and festivals at an individual level. It is observed that the life cycle has been identified with specific decorations from the birth ceremony to the death rituals of a human being. Indian culture and art is full of decorative devices which serve the function of beautification as well as connote a semantic



relevance in a given situation. India is a country of many faiths. Therefore the worshipping places all over India are decorated with decorative signs symbols motifs and artifacts of religious nature. Even colours are suggestive of a faith and are used exhaustively to reflect a certain religious environment. At the entry point of a house many decorative objects such as toranas, garlands on the doors are regularly displayed to celebrate festivals and to enhance the joyous mood of festivity. Even in the day to day activities, many decorative designs, (Alpana, Rangoli etc) are drawn by the house ladies in the front courtyard of the house and have been accepted as auspicious symbols of the well being of the home and a symbolic gesture of hospitality ensured to the guest, (Atithi).

In performing art, elaborate ornamentation is accepted as a part of the presentation, on the body of the dancer as well as within the surrounding area of the performance. The temple architecture in India displays a rich heritage of decoration of pillars, gateways and garbhagrihas(main body sanctums).

These decorations include elaborately carved motifs from the nature (trees, flowers, leaves, birds etc), from the animal world (birds, serpents, wild animals such as lions, elephants etc) including human figures as individuals in a group or superhumans, man made objects (pots and pans as artifacts) as well as geometric patterned motifs. Thus the range of decorative devices on Indian scene is exhaustively varied because of the existence of many faiths, different ethnic behaviours and cultural approaches. Such a situation has contributed very positively to enrich contents and concepts of Indian symbology. Yet one more element

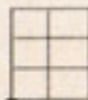
which is very peculiar to India has not been effectively used so far, for decorative purpose and that element is

“ Indian Letterforms “.

Indian letterforms as decorative devices

On Indian scene, it is observed that many languages and their scripts are being used for spoken and written communication. These languages and scripts have a definite evolutionary historic background and variety of forms as their distinctly different signs. The phonetic approach of these languages is based on classification of sounds into two main streams. Vowels and consonants. These are further classified and grouped according to the nature and origin of the sounds from the human body. These sound symbols when written down are seen as many letter signs of one script. For example in Devanagari script (which is used for Sanskrit, Hindi, Marathi Languages) the letterform range consists of following lettersigns.

1. Vowel letter signs(12-18)
2. Consonant letter signs(36-38)
3. Vowel(matra) signs(12 - 18) which are used to combine consonants and vowels into syllabic signs - Barakhadi.(12x36=444 or 18x38=684)
4. Conjunct signs consisting of 2 or 3 consonant letters (100).



5. Barakhadi (as in #3) of conjunct signs
(12x100=1200)

Therefore the possible range of letterforms in a single script works out to be around 3000. This figure multiplied by the number of scripts(12) gives a fascinating range of Indian letterforms as 36,000. These distinctly different looking signs are being used effectively in the multilingual communication in India.

It is proposed that these 36,000 Indian letterforms can be further treated as decorative devices and on the strength of their formal variety can be considered for their usage as decorations to enhance the decorative quality of the present environment. This could be one of the ways to introduce Indian (visual) identity by integrating Indian letterforms into product designs, craft products, architecture, art and design.

The usage of Indian letterforms

The usage of Indian letterforms as decorative devices can be considered on the basis of three categories and under three levels. The Indian letterforms can be broadly divided into three categories as per their physical shapes.

1. Triangular letterforms from the north eastern region. (Bengali, Assamese etc.)

2. Squarish forms of scripts used in Central, Western, North India, Devnagari, Gujrati etc)

3. Curvilinear forms of scripts as observed from coastal East and Southern parts of India.(Oriya, Telugu, Kannada, Malayalam, Tamil etc)

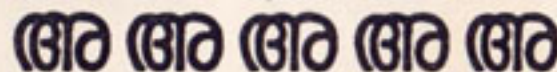
The three levels are:

1. Formal level
2. Semantic level
3. Meta level.

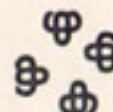
1. Formal level

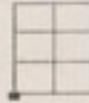
At this level the letters are not used as linguistic signs but as pure visual forms- (images without meaning) as the objects of beautification. With these letterforms varied and distinctive shapes one can create various patterns, which can serve as decorative inputs. Decorative patterns using Indian letterforms can be achieved in the following way.

Repetition of one letterform in a linear way to create new types of borders.



Rotation and repetition to design motifs and multidirectional patterns.

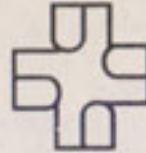




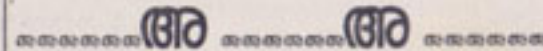
Rotation with continuous change in angle to get animated effects.



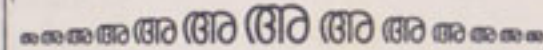
Mirror images to create symmetrical compositions.



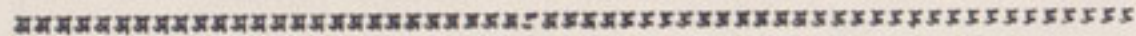
Repetition of one letterform at intervals to get rhythmic patterns.



Size up and size down with weight variations.



To design end pieces in a text as to design borders for bilingual text.



The creation of decorative devices through Indian letterforms (Akshar Saaj) can be a rewarding creative activity which can be further integrated with Indian crafts and arts such as Bamboo articles, Jewellery, Pottery, Textiles etc. This will create a positive new Indian identity for Handicraft products to be considered for export markets. In addition such decorations will be unique feature of 'added value' to the artefacts.

2. Semantic level

At this level, letterforms are not used just as pure shapes but a certain semantic association (meaning) is created through them. Therefore complex concepts and ideas can be manifested by integrating the letter and the image (meaning and the form). Such integration is possible through many approaches. The probing of the structure of the letter, analysing the style of the letter, exploring various strokes of a letter, combining sizes and weights, arriving at an ideal syntactic arrangement of letterforms are some of the methods to achieve the fusion of the letterform and the desired semantic image.



A- In the complex concept of "Panchamahabhootas" (five essential power principles of the environment) was represented through the usage of Devnagari Letterforms as beejaksharas (seed syllables), the micro level(sukshma) representation has been achieved through the arrangement and exploration of the inner structure of letterforms , (Kam for Earth, Vam for water, Yam for wind, Ram for fire and Hum for sky.)

The letter Kam has been arranged in a repeated fashion to form the square tantric shape of the earth with four exit gates, whereas the top stroke of the letterform Vam has been stylised to create the illusion of water, forming a wave pattern. The all embracing wind has been portrayed through multidirectional placement of the letterform Yam. The force of the wind is visually seen through the style of lettering. The repetition of the letter Ram in a triangular form as seen below along with the exploration of its downward stroke to reflect the concept of fire has been achieved in this seemingly decorative yet meaningful pattern.



The dot on the seed letter Hum (sky) has been integrated with dots of other four principles suggesting the all powerful principle of the sky through the patterned arrangement of seed letters.

B- Multilingual letterforms if arranged in the existing motifs can create a different type of decorative patterns. Interestingly, such exercises can be effective and joyful reference material for children as visual aids for creating formal awareness regarding our scripts.

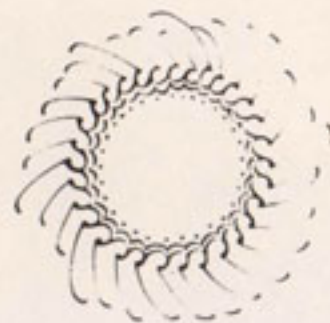
Multilingual letters and numerals can also be arranged in such a way as to create the meaning through their juxtaposition and placements) which acquire a meaning through their bilingual association.

C- Letterforms can be integrated with images through a creation of their repeated pattern in the form of outlines, innerlines and contours of objects.

It should be noted that in some cases such usage may go against the set norms of respect and hence some areas can be treated as taboo areas under specific conditions. The designers have to be extra careful in such applications, while creating letter patterns.

1	2
3	3
3	3

1, 2 and 3. Meta level patterns created with Devnagari letters in different orientations.





The repetition of a letter to form an image of an object can be a teaching aid. The association of a first letter of a word with an image, is a traditional method of teaching alphabets. However the repetition of a letter can be graphically illustrated through the outline or the mass of the letter. Such approaches can be tried out effectively in adult literacy programmes. Such calligrams will help to create the simultaneous Bi- sensory perception giving us a new tool to be used in teaching/ learning environment.

3. Meta Level

Decorations can be used as just pretty patterns in terms of borders, motifs, and artifacts to decorate a person or a place. These can be further identified as acts of thoughtful systems, exploratory extensions of basic elements which can have a definite semantic associations in a particular situation or environment.

However there could be a third level of decorations which go beyond the normal two levels described earlier. It is submitted that decorations are conceptually a certain type of energy units discovered and manifested by the craftsman, Designer.

This inner energy within the self, affects the material which reproaches in the similar way through the inherent energy embodied in that material surface. In that sense an inscription is an energised stone. The written signs and the text (a stone surface) can look sincere and beautiful only to the extent by which the carver is able to discover the energised positions

within the stone (or any other material), and is able to transfer his energy into the act of engraving, sculpting, writing, articulating, singing, gesturing and dancing.

In the process, whatever portion the material (stone) wants to get rid of in its static surface in order to get 'energised' profile, is removed by some outside force (natural or unnatural/ man made) which undertakes such a job. The weathered rock on the banks of a river or a sea-side becomes ornately energised through the rhythmic strikings of the waves over a period of time. (designer = water, Surface = stone)

In a man made situation the designer (calligrapher) writes onto a 'Page' (paper, cloth, palmleaves surfaces) to energise the writing surfaces by putting text on it or tearing a portion (punched holes) or folding in(origami) to create tensions in passive pieces of paper surface thus creating a synergy in the empty space.

A dancer, through her body movements activates the space around her. The dance is applied only through her efficient ways to break into an empty space which is full of energy yet passive and unexplored(till the dancer comes into it).

Sculpture is energised marble. No wonder it is repeated that the great Michelangelo used to touch and feel the marble before he could cut in. Many unfinished sculptures are at his credit, due to the nonenergised passive portions in the marble.

Paintings add colour reenergises, the canvas through the dialogue of the brushstrokes and the 'spatial' environment.



Writing breaks the surface through the text, sentences, words, letters and acquires meanings by energising the empty blank space within and around them. In order to get the text read, empty space must be energised through letters.

Let us energise ourselves with the letterforms by using them at any level, the formal semantic or beyond. Let ourselves, our products, our designs and surroundings look beautiful with Indian Letterforms. It will make a lot of difference within and outside of us to create the Indian Identity through such harmless, yet energetic element..... The Indian Letterforms as **AKSHAR SAAJ**.



Prof Ravi Poovaiah has wide experience in Product design as well as Visual communication. In this presentation he brings out with great care the fine aspects of packaging. Quite often packages are taken as protective cover to be torn and thrown. Package as an interface which provides a rich relationship with the product is forgotten. Prof Poovaiah brings us the details of such relationship.

Bamboo has high potential as packaging material in the western markets. With the insights of connotative domain of packaging provided by him. Designers can take up the challenge of utilising the richness of bamboo craft.

THE KINESTHETICS OF PACKAGING : ITS CONNOTATIVE DOMAIN

Ravi Poovaiah

This paper is concerned with extolling the virtues of appropriate packaging, which is normally just seen as an utilitarian interface between the product and the user. In addition to serving its primary function of protecting, communicating, transporting and marketing a product, the package in the context of this paper, is also being seen as an extension of one's cultural and emotional requirements, with emphasis on its connotative qualities. This paper tries to find pointers that are felt to be of considerable importance towards the design of packaging.

Packaging: User - interaction process

Formation Stages

Design
Produce
Parcel
Transport



Communication Stages

Advertise
Display
Purchase

Consumption Stages

Carry
Open
Use
Dispose

Packaging: nature as a model

Nature's innumerable examples of packaging exist out there, visibly or invisibly for us to adopt, modify and make use of. We package ourselves against modulations of the environment by means of our clothing. In fact, our skin itself functions as a living, breathing, regenerating package. Sea shells, seeds, the walnut, tortoise, coconuts, the pomegranate, etc., are all examples of nature's ways of packaging. An egg is a veritable wonder of nature by the way it is packaged. Its protective shell is very tough along its vertical axis. But while the shell remains strong as a unit, it remains fragile for the new born chick to just peck and break it from inside. Additionally the shell is not spherical but elliptical so that, instead of rolling off if disturbed, it merely rolls back to the same place.

The implications of adopting examples of packaging from nature cannot be underestimated. In the process of using such examples, one is typically attempting to modify a concept or principle already inherent in nature

to suit a different situation or application. The advantage of such a methodology of simulating nature's examples lies in the following: namely, that the similarities of construction allow easier and intuitive acceptance of an idea through a sense of familiarity.

Packaging: as an extension of locally available materials

Packaging as an extension of locally available materials used to be the norm until we started using technology to process raw materials, and transforming these into mass producible packages. Although primarily meant to store and transport food according to local needs, packaging has also served the function of containing artefacts related to religious, cultural and social needs. In this context, the factors that have influenced and shaped packaging have been the available skills and tradition, as well as the environment. The underlying approach being rooted in an innate concern for the ecology, and this getting translated in the use of bio-degradable materials for packaging. The traditional use of locally available materials is still very much in vogue in our country: banana leaves for eating, leaves for packing sweets, a cup of tea in an earthen pot and special dishes steamed in wrappings of leaves. The distinct advantage of such tradition lies in the pragmatic fact that natural materials are being reused and recycled rather than being



wasted; and an extended advantage of this lies in the possibility of such materials imparting a natural feel about them, consequently allowing a closeness with nature.

Packaging: technology offers possibilities

Technology offers new possibilities. It finds ingenious, appropriate answers to many practical difficulties. The concept of mass produced, uniform, quality-conscious packaging has an advantage in terms of predictability, dependability, convenience, etc. Regularity and standardisation definitely help to impart a sense of confidence in a product. New technologies for extruding, forming, shaping, casting, decorating, printing offer alluring opportunities for developing packaging of products with distinct personalities. And yet, often, factors contributing towards the ease of manufacturing packaging have veritably overshadowed those factors that go to make for user-friendly packaging. Basically, this is a situation where technology has dictated the form rather than the convenience of the user. Advances in technology have also facilitated in integrating packaging with the product itself. The instant camera, spray cans, swiss knives are examples where packaging is actually the product, or almost the product.

We relate to different materials from considerations of our familiarity drawn from our past experiences, traditional conventions and their pragmatic implications. Based on these factors we form opinions and attitudes about the meaning of materials. Some of the semantic suggestions that the materials connote are its value in terms of durability, costliness, sacredness, dependability, beauty, etc. For instance, the material gold denotes security because of its lasting economic value, earthen pot represents life as its created from earth, copper connotes the feeling of being sacred form its use in religious ceremonies. Choosing a proper material decides the characteristics of packaging. Below are outlined three commonly used materials for packaging.

Bamboo - the natural material

Bamboo has been used in many innovative ways as a packaging material in almost all places where this material is available. Bamboo offers its hollow pipe structure to serve as a container, its wide long leaves as a wrapping material and its cut strips to be woven into a variety of carrying cases. Many a times bamboo has been used in such a way as to add on to the flavour and taste of the eatable that it has packaged. In Japan, for example, jam is traditionally wrapped on different sides of bamboo leaves so as to



impart two different flavours. Bamboo as packaging material can be used in a way to highlight its properties of freshness, emphasize its natural textures, make use of its structure and explore its form.

Paper - the versatile material

Factors that easily make paper a favourite material for packaging are its ability to fold, its adaptability in terms of forming cardboard or corrugated sheets, its versatility to print images, text and graphics on it, and its suitability for mass manufacturing. Paper board, cartons, wrapping sheets, envelopes, corrugated containers are all variations available in paper. Additionally, paper presents for itself a certain merit of naturalness in the manner, for example, in which it can be held and felt. In the context of our culture, paper is treated with respect and reverence, as it represents a vehicle for diffusion of knowledge. Incidentally, although paper is derived from bamboo and other organic materials, it reflects none of the natural properties that are inherent in these original materials.

Plastic wrapping - the synthetic option

This flexible material seems increasingly to be replacing paper apart from pervading many other forms of packaging. Its ability to be speedily mass manufactured, its properties of being sterile and clean, its capability for transparency and its ability to be air and water proof seem to be some of the reasons for which this material is preferred. Many ingenious ways of wrapping up a product are being discovered with respect to plastics. Plastics can be formed into varied shapes to impart distinct identities towards packaging. However, plastic is essentially synthetic to the sense of touch and has a feel about it of being artificial. Pragmatic aspects of its short usable life span and it being used in the context of a throw-away consumer culture make the relationship of the user to this material uncaring, frivolous and negligent. The factor of its non-bio-degradability and the fact that it makes use of scarce natural resources, are questions that need to be seriously considered while designing a package with this material.

We have been concerned till now about the connotative aspects of packaging from the viewpoint of the materials that go to make the package. We shall change our viewpoint and look at packaging from its relationship with the consumer. It is being submitted here that there is an entire world within the contexts of sensory, visual, communicative and psychological factors that give packaging a dimension worth researching, outside its definitive domain of serving an utilitarian function alone. In our opinion, these sets of factors seem to communicate the meaning of what the package stands for through their connotative



associations. Essentially the interaction between the packaging and the user here is being seen at an emotive and behavioural plane. Some of the main interaction points along the packaging-user interaction matrix have been identified below and their respective emphasis underlined.

Attributes of packaging

Utilitarian

- protection
- transportation
- storage

Sensory

- tactile - textural
- olfactory - fragrance
- visual - attractive

Visual

- expressive/passive
- traditional/modern
- aesthetic/formal

Communicative

- to identify
- to instruct
- to persuade

Psychological

- value addition
- personality
- emotive

The act of carrying a package

A user interacts with a package by holding it with or without the means of a handle, by strapping it on to his back or by just carrying it with his hands or on his shoulders or in some instances by carrying it on the head. Questions that need to be addressed here are whether a package is to be carried, held, worn on, strapped on, pushed on or pulled at and consequently whether to include handles, straps, wheels and such other devices on to a package. The physical manifestations of the package in terms of its dimensions, its form and weight could determine the way it is to be handled. The way a user interacts with the package in terms of its portability is normally seen from the viewpoint of convenience. If portability is considered from a behavioural point of view, it might be contended here that social habits, convention, cultural factors and traditional factors influence the way things are to be carried. For example, it is quite common to see women folk carrying quite a bit of load on their back in hilly terrains, such as in the mountains of Bengal or Uttar Pradesh or in Nepal. A plastic shopping bag would seem terribly incongruous when carried alongside a formal dress. A backpack simply refuses to fit in with the conventions of the office space and yet looks quite adequate and natural in a campus atmosphere. The behavioural patterns that dictate the carrying of a package in a certain manner by users must, therefore, be considered as a significant prerequisite in the design of packaging.

To carry

- | | |
|---------------|--------------------------|
| • Portability | • hold, grip, lift |
| • Transport | • strap, tie, push, pull |



The act of unwrapping

The process of opening a package can be an exciting, memorable and beautiful experience. By concealing the product, the package creates enough curiosity or mystery to evoke a desire to open, uncover and discover the object that is inside the package; the need to satiate one's curiosity is an inevitable concomitant of the act of unwrapping a package. There is also a certain sensuality involved in this act of unwrapping. A package could end up revealing a surprise or continue to remain a puzzle until one has accessed the inner object. Packaging can also be thought of in layers that are made up of different materials, with surprises vested at each level. So when opened, the package reveals its inner layers, each with a different kind of material or surface, with attendant discoveries at each level making it a wonderful experience that cumulatively progresses on with unwrapping until the actual object which it has housed has been revealed. Even simple concepts like packaging in paper that has varied patterns or textures on the inner and outer sides could create considerable interest in the act of opening up a package.

To unwrap

- | | |
|-------------------|------------------|
| • Reveal | • open, unfold |
| • Discover | • break, tear |
| • Create interest | • unscrew, untie |

The violence of packaging

By shifting emphasis to the process of manufacture rather than the 'convenience of use' by the consumer, many modern packages have violence inherently imbedded in the act of opening them up. There are entire types of plastic packaging that endorse violent behaviour. In the instances of these packages more often than not one has to tear off a packet to open it, and this could require force. Plastic wrappings usually have a propensity for being crushed at. Unconsciously this might be a reflection of the society in which we live, perhaps this could be reflection of the pace of modern living, undoubtedly, however, reinforcing certain behavioural patterns that take an indifferent or aggressive attitude towards materials. Further, many of the technology - oriented packaging have a certain violence attached to them - for example, one cuts open a tin, one pierces a can, all of which could be quite different from the act of just turning on a lid or removing a cap. There definitely are gentle ways of unpacking.

A feel for respect and gratitude

A feel for respect and gratitude towards a product could get reflected in the way it is wrapped. Package design must be addressed not at the narrow act of merely covering a piece of physical matter with some material but must be conceived with a broader view to 'house' the 'being' present therein. How much importance and care one fixes to the object inside can be gauged by the care gone into packaging. The package can even take on a symbolic value. For example, the package could be envisaged as



layers of envelopes one inside another so as to express different aspects and to create levels of importance, in terms of values. Some of these factors become quite relevant and significant if the product is meant to be a gift. An emotional extension of one's feelings is then translated into the intrinsic value of the product and in this, the packaging as the the initial interface plays an important role.

Extension of personal space

When one touches a package, it is the texture, the surface, the feel of the material and such factors that are being experienced by the user. Touch is also the most personally experienced of all the sensations. A packaging meant for containing items such as cosmetics or jewellery is essentially housing a set of artifacts that eventually comes in physical contact with the user's body. Hence the need to be concerned with parameters that are tactile sensitive. The desire to express ones personality within this space is very strong. The design of packaging meant for personal use in a personal space can also be made to be visually expressive so as to reflect the identity and the personality of the user. With the exception of packaging meant for big industrial products which are primarily packaged for the purpose of transportation, most other packaging needs to be physically handled by the user and interacts mainly within the domain of one's personal space.

To give importance

- . Respect . *care and detail*
- . Dominance . *prominence*

To feel

- . Tactile . *touch, feel*
- . Textural . *hold, lift*

Aesthetics of packaging

Packaging needs to be designed with a feel for the natural material as well as for the consumer who intends to use it. Visual features like the form, the shape, the colour and the texture of the package has to be designed so as to be honest and appropriate to the product it contains. Attention to these details could help to playfully excite one's sense of touch, sight and even smell. One regrets having to throw away a good work of packaging. If we consider the principle that everything could and should be aesthetic, then even packaging can be conceived of as an art form by itself. For example, there are certain perfume bottles that are supposed to appeal to a sense of beauty; this has been achieved by exploiting the visual potentials of glass, which veritably adds on to the charm of the bottle. Nina Ricci's perfume bottle with a glass cork that appears in the shape of a winged bird definitely makes the whole thing ethereal - the bottle, the perfume, as well as the final getup.



To visualise

- Harmony, Contrast

graphics

- Balance, Proportion

textures

- Structure, Symmetry
- shape, colour

bamboo help transmute a sense of warmth and naturalness into the given environment.

To enhance value

- Sensitive
- Tradition

craftsmanship, history

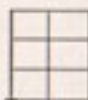
- Intricacy
- detail

Reflection of nature/ tradition/ craftsmanship

In the context of a mechanical, mass produced, consumer oriented, urban society one never fails to appreciate the soft chord that touches one's senses to be able to be near nature, or to be able to value tradition and appreciate craftsmanship. Hence objects of rituals, social functions, etc., have these aspects built into them. For example, there are products such as wines and pearls that enhance in value with age. Packaging of such products can take on a dimension of its own. Also packaging of products with strong associations with tradition, culture and history, would perforce require the above factors to be taken into account. The package for a bottle of saki uses natural materials to announce its freshness. Beedi packaging still remains quite traditional, and it almost feels as if the beedis would lose their flavour if packed in a cardboard case. It could come as a relief to be able to use natural materials for packaging meant for occasions such as a get-together, because a get-together evokes a sense of cosiness, just as materials like

The consumption of packaging

Packaging has a language that sets moods, triggers impulses, satisfies hungers and can emotionally move a person. Marketability is sometimes the prime mover and motivation in the design of a package. Packages are meant to entice and persuade the consumer to consume it. Communications help to advertise about the product and draw the attention of the user towards the product. The graphics on the packaging would aid in its recognisability and create an identity of its own. To be able to differentiate a product from the others it is essential to create a distinct personality for the given product. The consumer has to discriminate, identify and select from among many the appropriate product to suit his own requirement. Once the confidence of the consumer is built-up for the product, it mostly leads to a loyalty towards that particular brand. This is a very important criteria in the context of the busy consumer oriented society, because this loyalty to a particular brand relieves him from the burden of having to make decisions from innumerable possible alternatives. Conformity



in the user develops because of repeated habit and the added security it connotes. These aspects have to be considered as essential in the design of packaging.

To Personify

- Identification . *differentiate*
- Symbolic . *social symbols*

The architecture of enclosed space

The construction of the package is primarily meant to protect and transport an object in transit; but outside the utilitarian mechanistic confines of packaging, packaging must serve the function of a wider hyper-bole, for example, one of sheltering and housing an object in such a way that the house itself reflects the character and semantics of the object or the product that has been packaged. The construction of the packaging can incorporate the detailed intricacies of form that make the package formally exciting and appropriately functional. The package must attempt to reflect the intrinsic value of the product, the personality of it. In the extreme case, the package could even serve the function of value addition, that ends up enhancing the original value of the given product. In other words, the package must speak a language of its own that makes the whole of the package greater than the sum of its parts. It is also important to consider packaging design from an architectural viewpoint as referring to the design in totality and not merely treatment of the outer surface.

To construct

- Spatial . *enclose*
- Structural . *support, hold*

The life after

The life of a packaging is extended when it allows other functional uses after its primary function as packaging has been served. Examples of such extension are cardboard boxes that can be converted into toys for children. Or the use of visually interesting bottles that could end up as show pieces, or empty bottles as jars in the kitchen to store other things. This concern towards packaging design also helps in developing an attitude against the throw-away culture. Conservation, reuse and preservation instead of wastage existing in economies characterised by conspicuous consumption could then contribute towards an ecologically sound goal.

To Reuse

- Life after . *find another use*
- Preserve . *recycle*



It is hoped that many of the concerns expressed above in this paper can be seen as pointers towards design of user-friendly packaging. Contemporary packaging design has to recognise these semantic factors as offering opportunities for further design explorations. Packaging conceived in this direction is expected to further enrich the kinesthetic interaction between the user and the packaging.

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*5.0 BAMBOO: POTENTIAL
PRODUCT AREAS*



BAMBOO FURNITURE

Satish Raut

Mr Satish Raut's interest in bamboo furniture has been since his student days. He has been working at Small Industries Service Institute (SISI) as an Industrial designer for many years. He has developed many furniture items. Over the years he has developed a good feel for the needs of the Small scale manufacturer. Keeping such a manufacturer in mind, he has covered the properties of bamboo in addition to various types of joints.

Bamboo furniture has wide potential. Design, development and transfer of knowledge to small scale manufacturer are going to be the key issues in tapping this vast potential.

My association with bamboo is since final year project on bamboo furniture. In the forests bamboo grows naturally, but most of it goes to the paper mills as a raw material. The value realised for bamboo in paper is very low. Bamboo if used for products like furniture can get enhanced value for the craftsmen thereby increasing their self employment opportunities. With this background in mind this project was tackled.

India has been a home for bamboo. Lord Krishna's flute is supposed to have been made of

bamboo. Introduction to Mahabagvata mentions bamboo groves. Bamboo is a common name for the species of the grass family of bambuceae. They are large, often tree like with woody stems. The largest of them reaches a height of 40 meters. Stems are slender, 25 cms or so in diameter and hollow.

Harvesting

One and a half year old bamboo, cut in the proper season, are extremely soft and of attractive colour; they are easy to work on. They



are adequate for manufacture of articles needed for temporary use. If the articles should last, they should be made from bamboos of 4-6 years of age, older ones being harder to work. Care should be taken to see that culms are not damaged. Use of hack saws or handsaws gives better results but the time consumed limits their use.

Why Bamboo

Bamboos are called poor man's timber. This is on account of many its good characteristics. It is circular in shape and solid or hollow. It can be cut easily into required sizes or split with simple tools. This helps the manufacture of a large number of articles and the quick construction of houses.

At every joint in bamboo, there is a cross partition wall, a diaphragm. Hence it is very hard and does not bend or break easily.

The structure of bamboo gives it a high tensile strength. It is elastic and does not break easily. The dimensions of bamboo are such that it can be conveniently stored and easily used in construction as it needs little skilled labour.

The surface of bamboo is hard and clean. The colour of bamboo is pleasant. It is comparatively cheap and available readily all over the country. When maintained and treated properly, it has sufficiently long life. It is light in weight.

Defects

In damp conditions it starts decaying and rotting soon. Termites and borers attack and start eating bamboo. This reduces the life of bamboo and bamboo structures.

When buried in ground, the decay starts very soon. So it is very unsuitable for the foundation.

It catches fire quickly. With the passage of time, its strength decreases. It shrinks on drying.

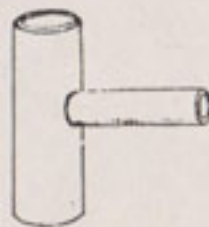
Bamboo cannot be nailed properly. Some of these defects can be rectified to certain extent by treatment before the manufacture of articles or prior to the construction. The life span of the treated bamboo increases to a great extent.

Treatments

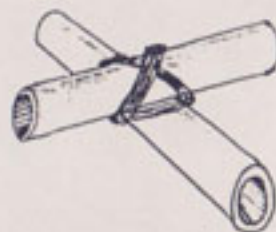
The bamboo is cut after 5-6 years and left in vertical position for seasoning. Rainy season is generally avoided. Bamboos get easily damaged due to the presence of sugar and carbohydrates. Our villagers keep bamboo for three months in water and then dry it. Smoked bamboos last longer.

Joining methods

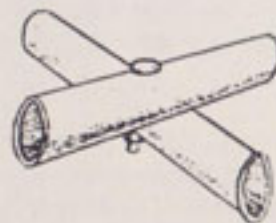
In the manufacturing of furniture which is mainly carpentry, bamboo is used instead of wood and that makes a difference. The difficulty is that bamboo cannot be nailed like cane because of which bamboo is not currently being used in the furniture industry. Therefore various joining methods were developed for bamboo furniture.



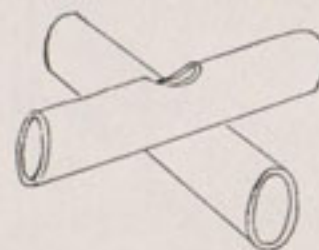
This joint is commonly used for bamboo ladders. Similar to a timber joint, tongue and groove or male - female joint; for better looks drilling can be done and then smaller diameter bamboo inserted. It can be glued or fixed with wedges.



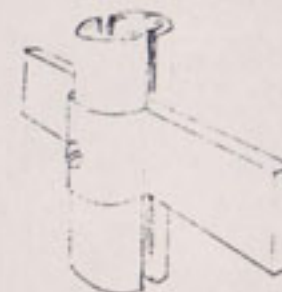
This joint is generally used for scaffolding and temporary structures. Two pieces of bamboo are overlapped and tightened with a jute rope. Problem with this joint is that it gets loosened up or slips after prolonged use. The joint can be strengthened with a nut and bolt.



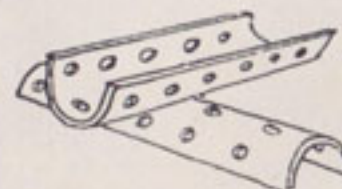
Bolt fastening offers better strength with ease of working and saving in time. Folding furniture becomes possible with this joint.



Nut and bolt can be hidden if two holes are drilled on opposite sides and the inner walls are used for fastening. Additional metal plates/washers can be added to increase its strength.



A slight improvement over the previous joint by cutting segment equal to the width of the overlapping bamboo and then tightening it with rope etc, this prevents sliding and makes the joint stronger.

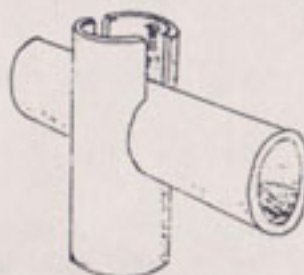
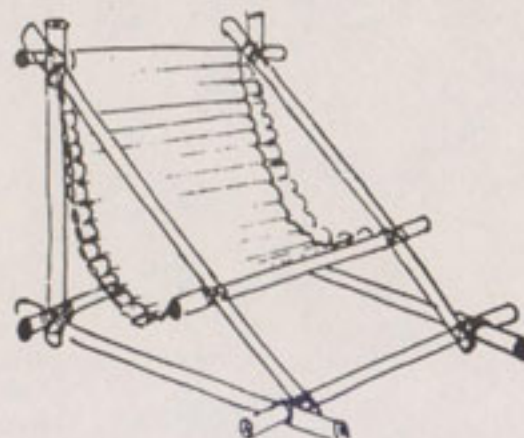


By splitting bamboo into two and joined face to face by rope or nut and bolt with small segment, this prevents it from sliding.

1 and 2. Beach and Garden chairs.

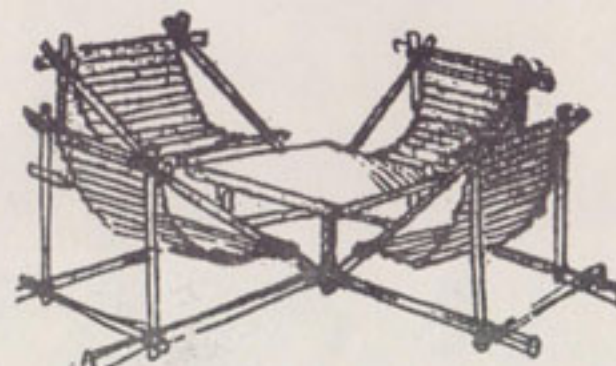
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	2

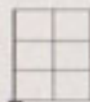
This joint is different from other types of joints as there are three members. Horizontal member is a whole bamboo with a square cut outs from both sides and vertical member is half split with notches. These can be tightened with rope and cane or by using nut and bolts.



The previous joint is further improved by cutting 'U' shaped notch in vertical member and then sliding horizontal member into the notch. This can be tightened by rope, cane or nut and bolt. This joint prevents sliding and looks elegant and clean.

Besides bamboo joints, other materials like sheet metal and angles were used by bending or welding respectively. Advantages of these type of joints are that they are fast and clean and can be standardised but they are costlier. Bamboo sections can be obtained by splitting bamboo in different ways. The split pieces can be used for making seats, back rests, panelling, partition etc.





Products developed

Wall Chair

A jute cloth with sleeves sewed to accomodate bamboo splinters, forms the main part of the chair. Bamboo pieces at the end of the sleeves function as structural supports. This frame can be hooked to a wall when the chair is not used. The chair can also be used as a wall hanging when folded, as painting can be done on the rear side of the cloth. Sag and height of the chair can be adjusted by inserting the member of the frame in suitable sleeve of jute cloth.

Beach and garden chair

On a fixed triangular frame, jute cloth is used. The wall chair fixed at two ends of the frame, forms the seat. Two or four such triangular frames can be fixed on a rectangular cross frame respectively to form the whole system. A small table made of bamboo splinters, fixed over a hollow bamboo frame can be fitted in the centre of the system. The chair being light in weight can be easily carried and kept in different places.

Dining table

The table consists of two members placed over each other, supported by four vertical members using the joint explained earlier. These four vertical members protrude out above the top 'cross'. A glass sheet or bamboo mat top can be placed over the supports.

Dining chair

This chair is three legged with rear leg made out of two long bamboo pieces which also serves as a back rest. Front frame is joined to the rear with two pieces of bamboo, both at top and bottom. Seat is made out of bent wooden plank with leather upholstery.

Relaxing chair

This chair has been made by arranging thin bamboo (20-25mm dia) pieces in a criss cross fashion. Holes are drilled at the junctions and tied with cane. Metal wires prevent sliding of bamboo pieces and help in positioning the bamboo, making fabrication easier.

Swing

Swing uses bamboo of two different diameters. Thicker one around 50 mm forms the seat and the back rest. Thick and thin bamboos can be placed alternatively and a cable passes through holes at the free end, forming loops which can be tied to a tree branch or hooked to a beam.

Centre table

Centre table consists of two bamboo frames placed diagonally apart with a common central member. Bamboo mat is placed on the central square. The mat may be resin coated for ease of cleaning.

1	
1	2
	2

1. Dining chair designed with split bamboo joined by cane.

2. Relaxing chair made by using small sized bamboo.





LUGGAGE DESIGN

Sunil Patel

Shri Sunil Patel has considerable experience in hard core product design. He studied at National Institute of Design after completing his B. Tech from IIT Kanpur. He worked at the 'Philips Industrial Design group' for several years. Since the last five years he has been running his own consultancy firm. Many products designed by him are in the market. He is an active general secretary of the Society of Industrial Designers for several years. He is a visiting faculty in design at NID, Ahmedabad, IDC, IIT Bombay and SNTD, Bombay.

He has rich experience in designing luggage items in plastic. He works with his clients till production stage solving the intricate design details which arrive at production stage..

In his presentation, covered the intricacies of luggage design. The potentials of use of bamboo for luggages seems to be high if the user requirements of finish and ease of use are solved by the designers and craftsmen.

I have not worked with bamboo so far and hence my knowledge about this fascinating material is limited. I have been designing plastic moulded luggage for Aristocrat marketing Ltd, for whom I have designed 2 Briefcases and 2 ranges of Suitcases. I would like to share this experience with you to see how bamboos can be used for luggage design.

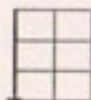
Criteria for design are defined by the design brief worked out jointly by the Marketing team, Production team and the Designer.

Design criteria: Marketing brief

It is going to be a framed luggage where an Aluminum frame is used between two identical plastic shells of the same mould,

or

Integrated Moulded Luggage (IML) in which no frame is used but there are two different plastic moulds for the top and the bottom shells.



It is for the domestic market or for exports. For exports, major design constraint is that various sizes within a range should be nesting type so as to save freight cost. Styling trends may differ for different marketing segments.

Some of the prominent features which affect the design brief are given below-

Sizes: Decided by the marketing department.

Appeal: Sturdy, sleek, sporty etc.

Market profile: Profile of the users.

Portfolio: Inside conveniences that are affordable for a particular range.

Quality of production.

Locking system: Click shut, toggle, centre MSL combination side latch etc.

Wheels: Two or four.

Technical brief

Standard parts like locks, hinges, stoppers, clamps etc.

Moulding criteria like parting line etc.

There are also a number of ISI standards. Clients also have their own stringent testing methods.

Customer's perception

Spacious, better space utility, sturdy, safety, light weight, hi-tech, futuristic look, economy, deluxe, scratch protection etc.

Ergonomic considerations of handle (recessed in suitcases), locking and unlocking, opening and closing.

Limitations in moulded luggage

Not for smaller quantities and hence can't be designed for specific users like Doctors, Lawyers etc.

Poor scratch protection

Not enough light weight and Expensive

No dimensional flexibility

No easy access compartment

In briefcases nothing to stop clothes from coming out while closing

Moulding constraints (under cuts).

Bamboo for luggage

Potentials

Light weight

Tougher

Customer built design possible, for various professionals

Fabrication possible, easy access compartment can be provided

Better grip for handles

Flexibility to accommodate more

Compromise between soft luggage and moulded luggage.

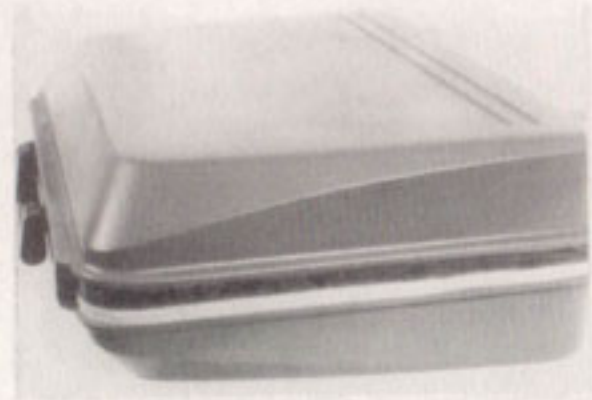
Limitations

Fixing of hardware, standard hardware has to be fitted by fabrication.

1	
1	2
	3

1. Briefcase designed by Sunil Patel.

2. and 3. Design details of side profiles and parting lines of the two suitcases with guards.



1	
1	
2	

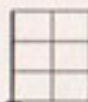
1. Bamboo suitcase developed by the Khamana group of craftsmen using woven bamboo strips. All the joints and locks are developed in bamboo.

2. Bamboo briefcase designed and developed by Ravi Nafde of Adicrafts.



CASE STUDIES IN BAMBOO CARRY ITEMS





Suresh Sethi has wide design experience. He was in the 'Industrial Design' team of Philips, which is well known for mass produced lighting fixtures. He later studied at Domus Academy at Milan. He is currently practising design through his office, "Circus" covering interiors and product design.

Important points that he brought out in his presentation are: Rigour in detailing which is essential for good product design whether the material is sheet metal or bamboo. Use of standard components, which again is essential if one thinks of lamps in bamboo. Form of a lamp transforms itself dramatically when lighted. This adds to the complexity of lamp design.

DESIGNING LUMINAIRES

Suresh Sethi

Luminaire is a large irritating gadget which is rather fragile even though it has to bear its own weight and has to hang there, whether it is in use or not.

Luminaire initially invented to protect, has today changed to gesture and pose. The protective quality has become ambivalent about new forms. Designer desires to maintain a level of excitement but also requires a scheme in which to entertain new symbols which confirm his existence.

There are few designs that represent a return to simplicity where ephemeral fashion is ignored in favour of more enduring forms.

The form does not change dramatically from the status quo of what a product is; it relates to what it has superseded. It achieves a sense of continuity. Lacking confidence in their ability to discriminate, most consumers will choose what is familiar.

Market segments seem to be created by people's



aspirations and myths to which they relate. Analysing consumer's fantasies is a fairly predictable measure of possible products to sell them. Because of the number and variety of products available to the consumers, market success of a product is rarely due to some outstanding success of a product, but rather to a successful image of his preconceived notions of how the objects will be used within his or her sought after ideal lifestyle.

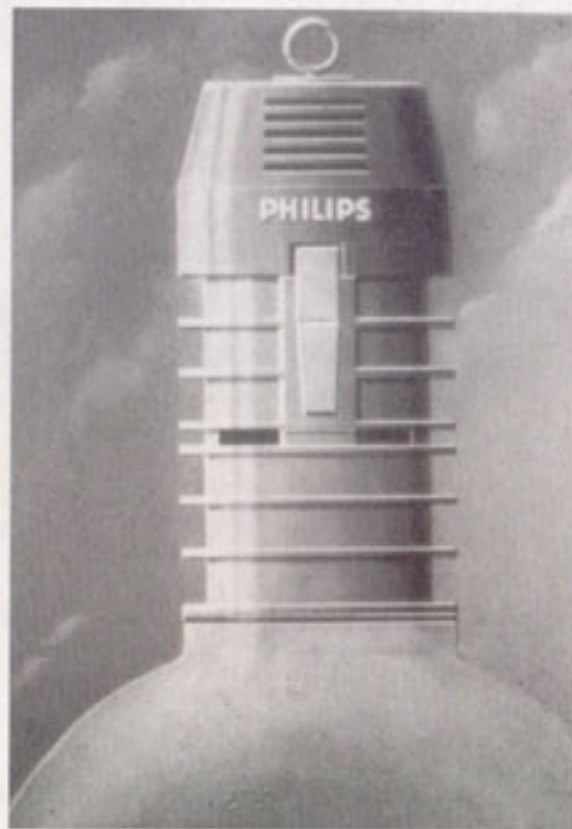
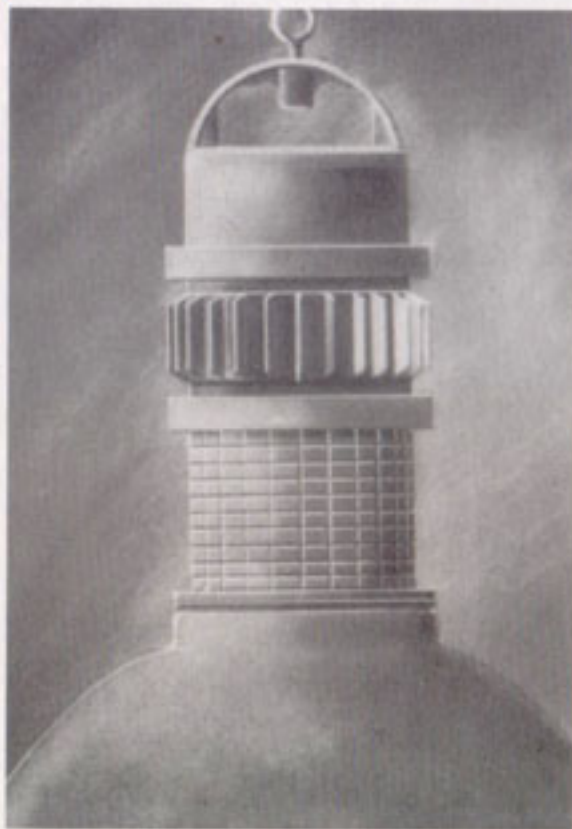
Some of the designs try to reflect 'luminaire' as an active object when not in use. This is achieved by making use of metaphors. The potential consumer has grown up in a city environment and his memories, associations, fantasies are rooted in the city culture. The new myths are born out of this city culture. The metaphors are found within the city.

The key to success of the product is to put the users first, the need is to be flexible.....only then would the 'image' be unique and novel. I feel that is how it should be.

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1. Rendering of lighting fixture shown in exploded view.

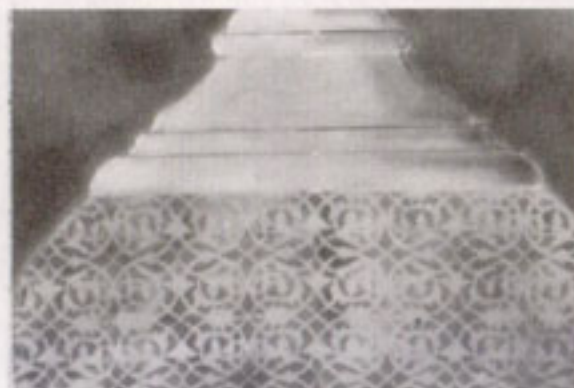
2. and 3. Two concepts for industrial lighting developed for Philips.



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1. Lamps with Indian identity. Decorative luminaires using standard moulded parts.

2. Detail of the lamp showing the intricate jali motif screen printed over moulded acrylic shade.





BAMBOO LAMPS

Ravi Nafde

Ravi Nafde made a slide presentation in which he showed bamboo lamps which Adicrafts has developed. Ravi Nafde is a trained Industrial Designer, with an M Des degree from IDC, IIT, Bombay. Efforts of Mr. Nafde and his partner Mr. Joshi, demonstrate how aspects of modern design can combine with traditional craft.

Adicraft is a well organised setup employing about 30 persons, many of whom are skilled craftsmen. The workers and the craftsmen are paid wages at par with good industrial setups.

Indians have experienced a moment in history, although very few know when it was, where a number of articles in home changed from a majority of handmade articles to factory made products. The form and decoration of such handmade products have evolved over the years by a slow process in which everybody could participate and evolve products of high aesthetic value.

The lamps of Adicrafts are elegant, well finished, capable of entering into international markets. Consequently they are sold at high prices in Bombay and other places. They typically fit into the upper end of the market. The feed-back from the workshop was that the work of Adicrafts is commendable..

Adicrafts could cater to bigger middle class market by bringing down the prices. This could be achieved by larger volume of production and giving subcontracts to other groups of craftsmen.

In crafts production, conception and realisation are linked and coordinated by interplay of hands, eyes and materials giving it a human scale and apparent simplicity. The practitioner, the user, the observer enjoy and experience the craft as a comprehensive unity. The expansion and growth in this field is generally met by an extension of craft methods and aesthetic quality of work inevitably deteriorates under pressure of large scale production. Revival of these crafts is the need of the day.



Adicraft

Adicraft is an attempt to revive Adivasi crafts. The primitive! The original!

It is an enterprise conceived to put a consistent effort in design and development of crafts. The outcome of this effort is a range of utilitarian artifacts supporting a contemporary lifestyle and modern usage of today's economy.

The first phase of this pioneering effort is to popularise the primitive craft sector, generating employment in rural areas for adivasis and physically disabled persons.

Basketry is a major craft category of cane and bamboo products in India. Craftsmen engaged in basket work are predominantly rural and they produce variety of baskets manually. Our efforts are concentrated to give these products a functional and visual structure with developed tools and techniques, to simplify the manual operations in production. This cultivates the entire activity in an atmosphere designed for healthy growth of adivasi crafts.

Design operative development

It is one of the most important aspects of this enterprise. Design has formulated this enterprise into an activity undertaken not only to meet the changing circumstances but also to bring about a change in the circumstances by the nature of products it creates.

It also opens up opportunity to develop technology, evolve standards for assessment of artifacts produced, identify and create standards

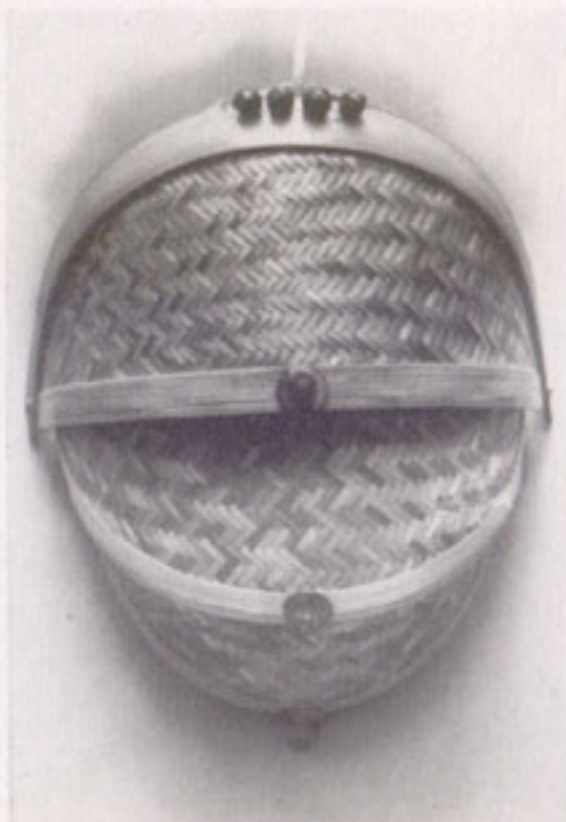
for work areas, work stations, illumination and other ergonomic considerations. It offers more and more avenues of development not only at production base but other fronts also. It is a challenge to create a continuous market for these developing artifacts which are new to the urban market. The natural warmth of these craft materials which is retained in the design process, enlivens the metaphysical existence of life in the urban chaos. These attributes have created a new market sector for craft creations, generating a need for strategic development of domestic and export markets.

In brief, this enterprise is voluntarily setting up patterns for rural development, self employment, social upliftment by creating an environment friendly atmosphere for growth.

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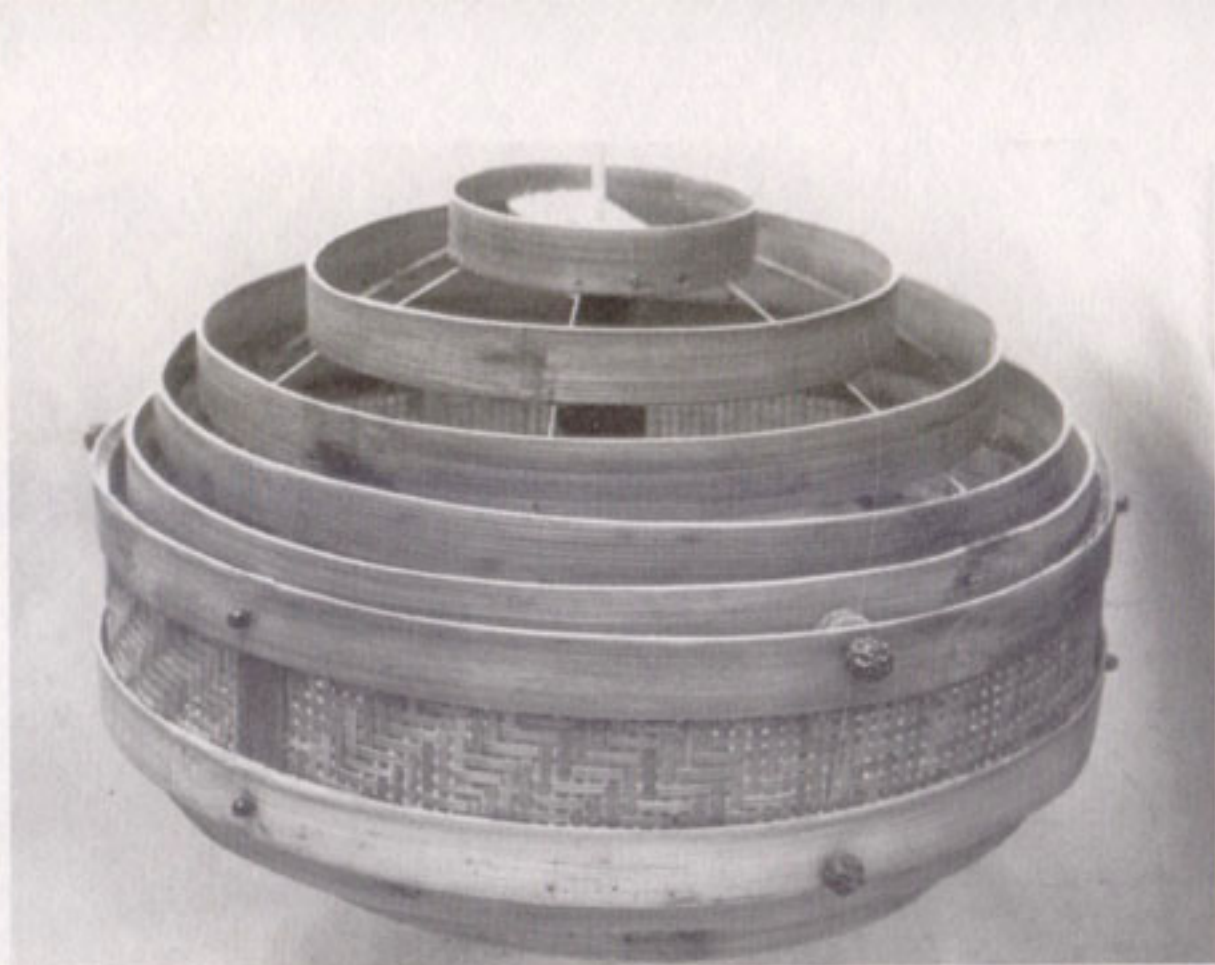
1. Bamboo Lamps designed by Adicrafts of Nagpur show skilled workmanship, finish and clever detailing. Seen here is a wall mounted lamp with flexible bamboo woven fins.

2. A table lamp in bamboo using woven mats for the shade and turned bamboo for the base and the stand. The lamps are lacquered and adequately finished.





1. Another design developed by Adicrafts for bamboo lamps using concentric circular rings held together by threads. One feature evident in Adicraft designs is the use of Rudraksha bead in place of all joints, giving it a clean and ethnic look.





Mr Pradyumna Vyas spent a year in Kilkenny design studio and workshop in Ireland after completing his M Des at IDC. For the last few years he has been an active faculty member at National Institute of Design, Ahmedabad.

He has been experimenting and grappling with the intricacies of jewellery design using unconventional materials like wood. The sensitivity to form, material and detail required in jewellery design was emphasized by him.

JEWELLERY DESIGN

Pradyumna Vyas

Pradyumna presented his jewellery collection, mainly costume jewellery designed as fashion wear using wood in combination with various other materials such as beads, metal, silk etc.

The costume jewellery he presented, comprised of ear-rings, pendants, brooches, bracelets, anklets etc.

He uses waste pieces of wood, selected with care for their colour, grain structure and texture. One of the strategies that seems to come out very prominently in his work is use of attractive

compositions. This is enhanced by contrasting the natural textures of wood with brightly coloured beads, especially vibrant hues of turquoise blues and maroons. Intricately twisted wires and metal pieces add to the aesthetic appeal.

He has also designed other fashion accessories such as buttons, belts, cufflinks, hairclips and hairpins. He sees tremendous possibilities of exploring design within the small trifles to cater to the constant need for newer designs and changing fashions of the teenage markets.



1. and 2. Bangles designed by Pradyumna Vyas using wood and metal parts to create smart costume jewellery.

Following points were brought out in Pradyumna's presentation regarding designing jewellery in bamboo.

Potentials of formal explorations using the hollowness of the bamboo: This could be done using different cuts and hollow rings of varying thicknesses to create interesting forms. Bamboo in its strip form offers enormous flexibility. Using the flexural properties to twist the bamboo into interesting curves and planes it is possible to get dynamic profiles. This could also be seen in the hair clip which he developed later in the workshop.

Experimenting on the finishes and surface treatments such as staining, polishing or burnishing adds to the visual value.

Simplicity of form and good detailing become vital for intricate and refined workmanship of jewellery. This becomes evident while adding functional parts such as clips, screws and fasteners.

His presentation opens out the potentials of yet another design intensive product line for bamboo.



*6.0 MARKETING ISSUES IN
CRAFT PRODUCTS*



MARKETING OF HANDICRAFTS WITH RESPECT TO BAMBOO CRAFT

D. D. Mane

Shri Mane has long experience in dealing with Handicrafts in various capacities. Since his retirement as director of western region, in the office of Development commissioner (Handicrafts) a few years ago, he has been working as a consultant to Madhya Pradesh Hastakala Nigam and NABARD (National Bank for Agricultural Research and Development).

In his brief presentation, he gives us inputs he has accumulated over the long years as a Government official dealing with crafts.

Marketing of handicrafts is a specialised task. It is a complex phenomenon. It deserves systematic approach and strategy to develop the market.

Handicraft items broadly fall into two main categories, first is decorative handicrafts and the second is utilitarian or functional handicrafts. These could be further divided into traditional and non traditional handicrafts. By and large decorative and traditional handicraft articles have inelastic demand vis-a-vis utilitarian or functional and non traditional handicrafts which have elastic demand.

Class of consumers for traditional items are usually rich. However in case of bamboo craft this is not so. For example, basketry is present in every household in rural India. Rich artistic basketry is seen in five star hotels as well. Class of customers for utilitarian articles are both rich and poor.

Accordingly prices in the rich markets for handicraft goods are comparatively higher than those in other markets. Marketing items in bamboo is no exception to the rule. It could be generalised that prices of the same items are



distinctively different in different markets. North Eastern states are manufacturing sophisticated items of bamboo. These items are decent, designed profusely, workmanship is of high order and their raw material i.e. bamboo is different as compared to other types available elsewhere in the country.

Information gap and communication factors are also playing vital role in the development of bamboo craft. Tools and equipment have been designed and adopted widely by the craftsmen in order to improve the quality of the products. Various attractive designs in bamboo craft are required to be introduced in order to popularise these items on a larger scale. These designs should be attractive, for poor and rich alike.

To use bamboo craft in household furniture is a challenging task. It will substitute wood and price wise it could be very attractive.

Introduction of lacquer coating, painting, enamelling and other processes should be tried on bamboo craft in order to increase the utility and beauty. This will certainly enlarge the market and spread of bamboo craft.

To popularise bamboo craft, exhibitions of exclusive bamboo articles with new designs should be held in various parts of the country. There is no dearth of demand, however it has to be cultivated properly and systematically.



DESIGNING FOR GIFT MARKETS

Debasis Mandal

Mr Debasis Mandal joined Crompton Greaves soon after completing his M Des programme in '90. He is a partner of the design consultancy firm, 'Design Touch'. Design Touch has been evolving new strategies to sell quality design services. One of them is 'designing and supplying' custom made gift items.

In his presentation he brought out the insights Design Touch has gained in market and design requirements of gift items.

The market segmentation and cost range he has provided could be used as valuable parameters to design several gift items in bamboo which could fit into different markets.

Market segments

Institutional segment

Consumer segment

The design strategies would differ for each category, as the institutional markets would emphasize on their brand name, logo, image, identity and the occasion. In consumer segment the users perception would be more relevant.

Since most of the design work done by Design Touch configured in the institutional segment, the examples and the market feedback was also focussed in that zone.

Debasis presented slides of the gift articles designed and supplied for pharmaceutical industries and other consumer industries, which were mainly Table top and stationery items made in plastics. Their market surveys of cost and quantity estimations will however prove useful and valid for craft products as well.



Institutional segment

Business gifts

*Seasonal
Clients, suppliers
Diaries, Calenders
Rs 20 - Rs 100*

Sales promotional gifts

*Complimentary gifts
Dealers - Stockists
Unique/ unrelated
Rs 10 - Rs 50*

Corporate gifts

*Long service awards
Product launch
Special clients
High value designs
Rs 500 - Rs 1500*

Pharmaceutical companies

*Gifts to doctors
Quantity 50,000 to 1,00,000 nos
Rs 6 - Rs 20*

Consumer segment

*Direct purchase
Attractive packages*

*Idols
Festive Gifts
Ceremonial gifts*

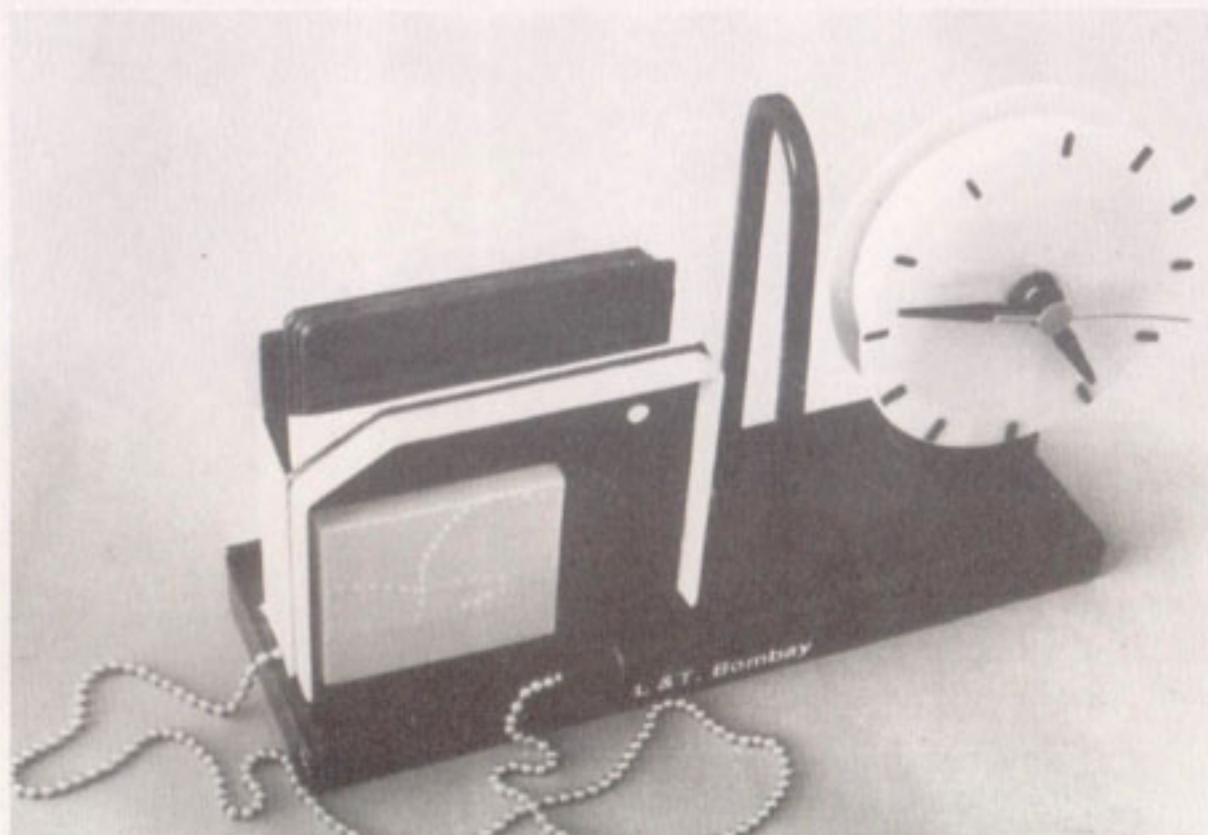
The strategy adopted by Design Touch makes use of the company logo or their corporate image as a distinguishing visual feature in designing corporate gifts. These products are made in acrylics and other plastics, using simple machinery and are assembled manually, so the process not different from that of a craft industry.

The quantity and cost estimations prove valuable in ascertaining the feasibility of a product to be developed in a specific craft. This is vital for correct product identification.

The range of gift products and stationery items shown by Debasis could be very easily translated into bamboo products as well.

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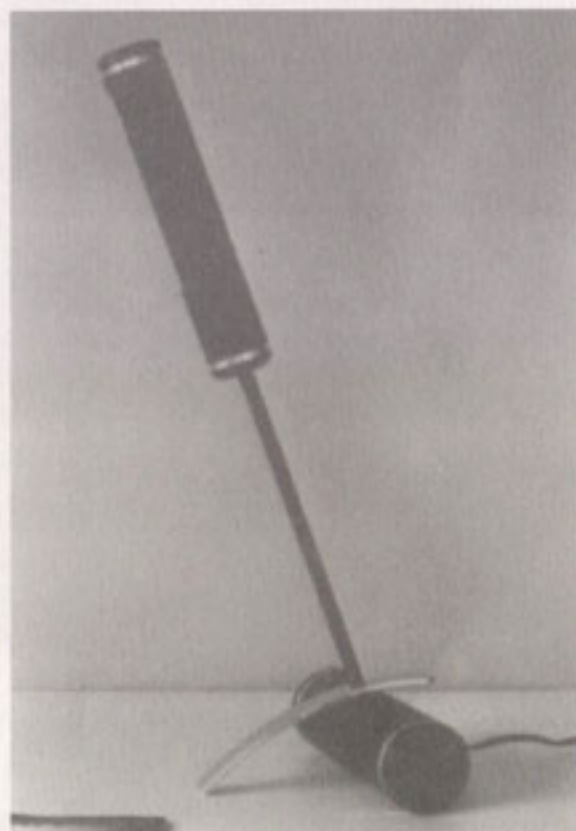
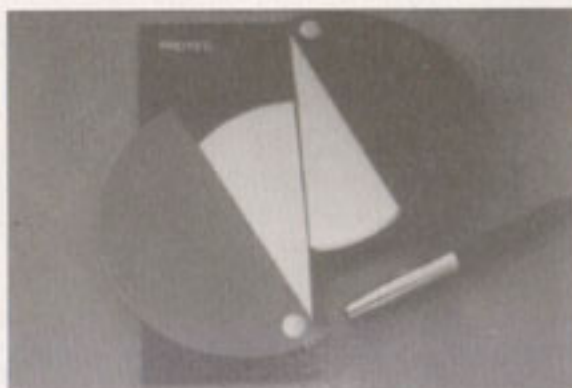
1. A stationery item incorporating specially designed and supplied to L & T by Design Touch.



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1. A table top stationery sorter for a pharmaceutical concern. An exclusive identity based on the company's logo has been developed as a promotional gift.

2. A table lamp developed as an exclusive gift item.





BAMBOO CRAFT PROJECT AT IDC

A project titled Design inputs into Craft Areas, sponsored by Ministry of Human Resources and Development was undertaken at IDC with two faculty members and two design associates forming the design team. Initially, bamboo craft was taken up. The project focus remained 'bamboo' due to the vast potential it offered. Two lines of development were pursued while gaining familiarity with the material and the craft.

To start with, physical properties of bamboo were explored with the use of simple machinery

like band saw, sander and lathe. These explorations led to many product possibilities. But the form explorations as well as product explorations remained intuitive and random. The second line of development pursued was a product related market study. Initial data collection revealed that a very limited product range exists in bamboo, comprising mainly of baskets and mats. Importance of developing a 'product-strategy' for bamboo craft became obvious. Consequently, systematic study was done to compare various crafts of India and the products made therein. These comparative



studies in the form of charts became the basis for identifying 'products' for development in bamboo.

Office stationery items were identified as one of the potential product lines for bamboo, as wood is already used extensively for stationery items. Several new designs for trays and containers to keep pins, pencils, pens etc. were developed in bamboo. Each unit became unique with craft qualities in it. Market study however, revealed that the latest trend in office stationery is towards an office organiser, which accommodates all stationery items on the office-table. Developing such a unit in bamboo would demand greater technology and organisational inputs at the manufacturing end.

To get the strategic advantage of craft-base, a different approach was experimented. One of the stationery items, i.e. a paper knife was taken up for development. Over fifty designs with variations in form and graphics were created. Each design could be offered as a unique gift item. It should be possible for the crafts persons to create endless variations by adopting such an approach.

In most of the product explorations done at IDC, bamboo was used like a plastic pipe. Bamboo used in this fashion leads to the problem of preservation as bamboo is prone to insect attack and a thorough chemical treatment becomes a necessity. Traditional craftsman has overcome this problem by using bamboo in strip form most of the time. In its strip form bamboo is impervious to insect attack. But strip making demands special skills, training and the right variety of bamboo. Certain varieties of bamboo like 'Assam bamboo', available in Bombay or

'Sona' from Sangli region can give very fine strips.

Several attempts were made to get the services of a skilled crafts person, to facilitate development of designs more conducive to 'craft-process'. It was not possible to get crafts persons under the project framework. Development commissioner's office which deals with bamboo craft training, was approached for the deputation of a crafts person for 3-6 months, but the efforts went in vain. Each craft or bamboo related organisation or group had its own set rigid boundaries, which they could not cross. Institute of technology and craft were seen as opposite poles. That was the time, with the enthusiastic support of persons like Shri Vinoo Kaley, Mr Pradeep Babar and Prof M. P. Ranjan, the idea of Jagruti, (which means awakening in Sanskrit) was envisaged.

Seven product groups identified by the market study of the project became the basis to form seven design groups in Jagruti. Some of the product concepts generated during Jagruti were developed further. The bridges made with the crafts person became a base for further development of products using mats woven by crafts persons.

This publication of Bamboo Craft Design based on 'Jagruti' remains the landmark of the project as publications on the topic are few in number.



AN APPROACH TO BAMBOO CRAFT

A. G. Rao

Prof. A. G. Rao belongs to the very first group of Industrial Designers trained in India, at NID, Ahmedabad. He has been working as a faculty member at IDC since its commencement. He was head of IDC during 1987-90. His experiments in teaching Form, Creativity and Product Design have been invigourating the M Des programme.

He has designed many products for the Indian Industries. He is a consultant from inception to Oyster Designs, one of the notable design offices in India. He is a founder member of SIDI and was president during 1975-77.

Prof. Rao is deeply involved in articulating design for economic development. In the project "Design Inputs in Craft Areas" he is trying to find a direction for craft in today's design context.

A well crafted bamboo product stands out as an example of human ingenuity. In 1975, I bought a bamboo basket of astonishing quality in Ranchi (India) for Rs 1.60. Later I found that the basket was actually a sieve used by local tribals for making rice wine. The tetrahedron shaped sieve is intact till today even after 19 years. The integrated geometrical shape of the container reminds us of one of those sophisticated, experimental forms generated at the famous design school of Ulm (Germany). My later involvement with bamboo brought more surprises. India has the second largest resources

of bamboo in the world. The bamboo craft has reached its heights only in the north Eastern parts of the country. Though as many as 13 lakh persons are involved in bamboo work all over the country.

In the other bamboo growing countries like China, Japan, Korea and Malaysia it is well respected craft integrated widely and deeply into their cultures. In Korea, the nobilities of a person are compared with qualities of bamboo. In Japan, bamboo products are a part of many rituals like Tea ceremony and marriage. Even



today one can find bamboo products in shops all over Japan being sold at premium prices. China and Taiwan with their efficient production base are able to sell their bamboo products in the world markets.

The surprising thing in India is that even when bamboo offers a high employment potential in the craft sector, much of the bamboo is supplied to paper industry at a subsidized rate. Unconcerned exploitation of bamboo forests has led to ecological damage.

Can we integrate the incredible knowledge, skills and attitudes inherent in a traditional craft into our Education? Is it possible to use the vast resources of bamboo in the country intelligently without causing ecological damage? Can we offer a meaningful, attractive "craft employment" to our bamboo craftsmen? Can our bamboo products reach international markets? It is attempted to answer these queries under three broad heads.

- 1.0 Bamboo craft in Education
- 2.0 Bamboo resources: appropriate use
- 3.0 Bamboo craft Industry.

1.0 Bamboo craft in Education.

Today our general education is in a dismal state in terms of developing values, aptitudes and originality. Scientists and engineers passing out of our system, who are in large numbers, have great difficulty in conceiving original solutions to our problems. Low status for "working with ones hands" has hampered our engineering education to an extent that we have yet to make a mark in producing innovative, relevant technologies. Failure to recognise "technology"

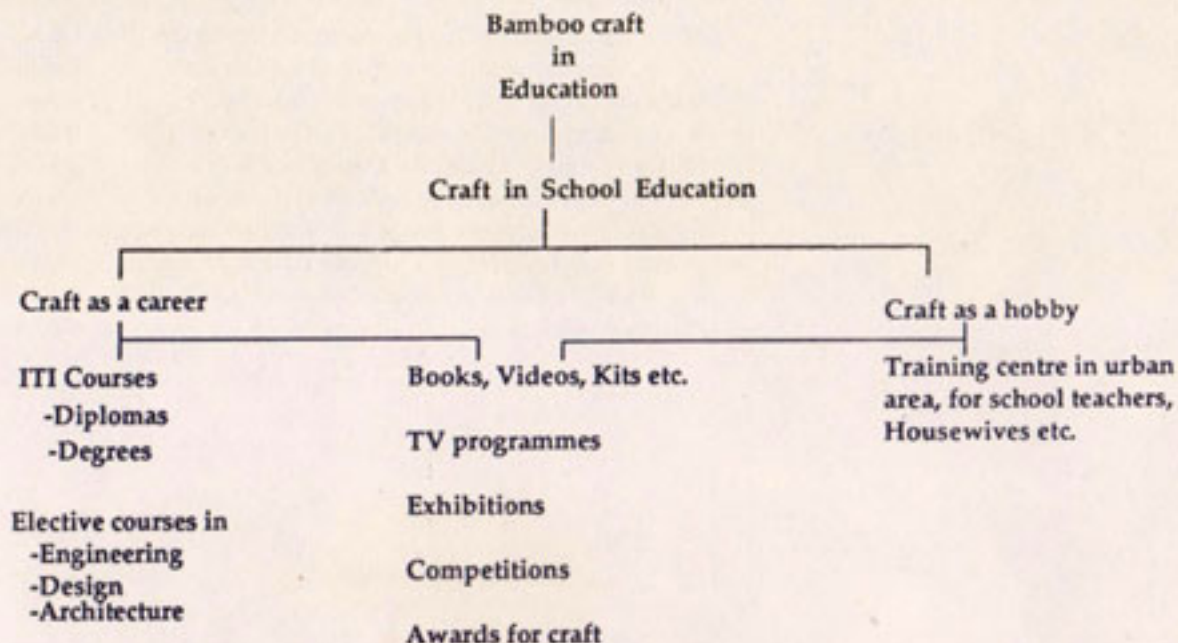
as an extension of craft, has resulted into segregation and neglect of craft.

This aberration has historical roots. In India, crafts were practised by certain communities for generations. But these craft communities belonged to the so called lower castes. The modern education introduced by British attracted the socially dominating upper castes in general and the brahmnical class in particular. Thus people who took to modern education had little traditional family background of crafts and socially disadvantaged craftsmen couldn't get the modern educational inputs. The colonial government had little concern in educating the craftsmen in modern technologies as they saw craftsmen as potential threats to their industries.

The educational pattern and thinking, set at the time of British has continued even after independence. The loss of respect for hand skills and crafts got reinforced over the years making even technical education bookish and examination oriented. As a result even today our educational planners do not recognise the importance of craft learning in the general education.

Once again we need to look at Japan for its ability to link crafts with modern technological progress. Sheridan Tatsumo in his book "Created in Japan from imitators to world class innovators", attributes much of Japanese success in creating miniaturised modern electronic gadgets, to the training given in Origami - papercraft to every Japanese child.

It is high time that we recognise the potentials of craft learning in general education. Specialists in the development of creativity in children, have



long been pointing out the lack of emphasis on the "Right Brain education". Experiments have shown that right side of the brain deals with emotional, aesthetic and intuitive thinking where as left side of the brain deals with language and logical/ analytical thinking.

"Crafts" can become an important mode of developing right brain abilities. Experts dealing with the theories on how children acquire knowledge believe that, base patterns are formed in each child's mind at an early age. Later the knowledge acquisition is by mapping new

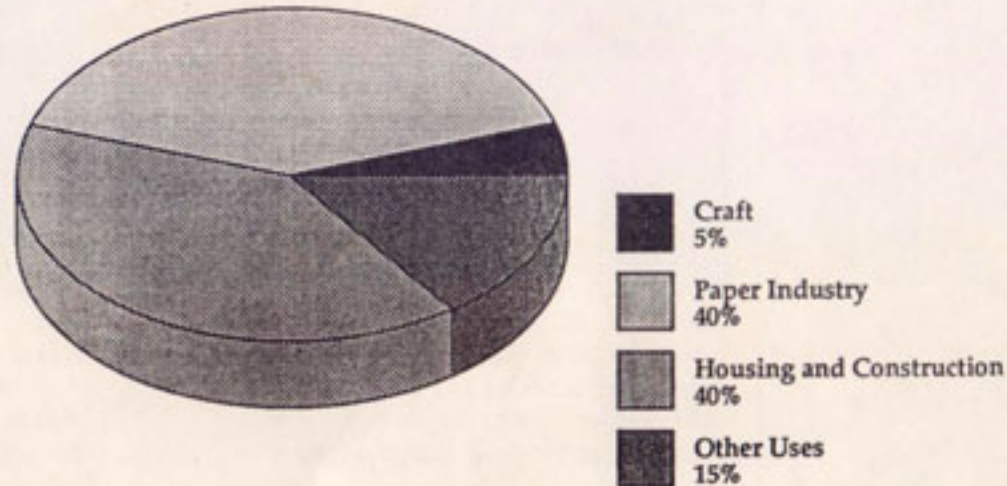
information on to these already formed patterns. Thus the richness and variety of these patterns in each individual is the key to expand knowledge later. Crafts can provide a rich base for formulating sophisticated base patterns. Crafts being kinesthetic in nature, full use of body would be made in acquiring base patterns. It is easily observed that children are more interested and learn faster if physical movement or actions are involved in learning. Thus learning "bamboo craft" could also mean better comprehension of abstract subjects, like mathematics.



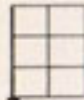
2.0 Bamboo resources: appropriate use

India stands second in the world among bamboo growing countries, China having the largest resource of bamboo. We have in India 10.03 million hectares of bamboo forests producing 3.2 million tonnes of bamboo annually. Of this 40% goes to paper industry at subsidized rate of Rs 50/- to Rs 160/- per tonne. Only 5% of bamboo goes to the craft sector. Craftsmen have to pay as much as Rs 1000 to 3000/- per tonne of bamboo in the open market.

Total number of persons dependent on bamboo are estimated to be 13.5 lakhs out of which 5-6 lakh workers are involved in bamboo craft. Paper industry has been a poor employment generator. Poorly conceived subsidies to paper industry has caused many ills. Forests have dwindled with insufficient incentive for replantation. Paper Industry which gets long term leases has seen bamboo as one time exploitable resource. With the result, industries don't care to leave the one foot high stump while cutting to ensure the regrowth of bamboo.



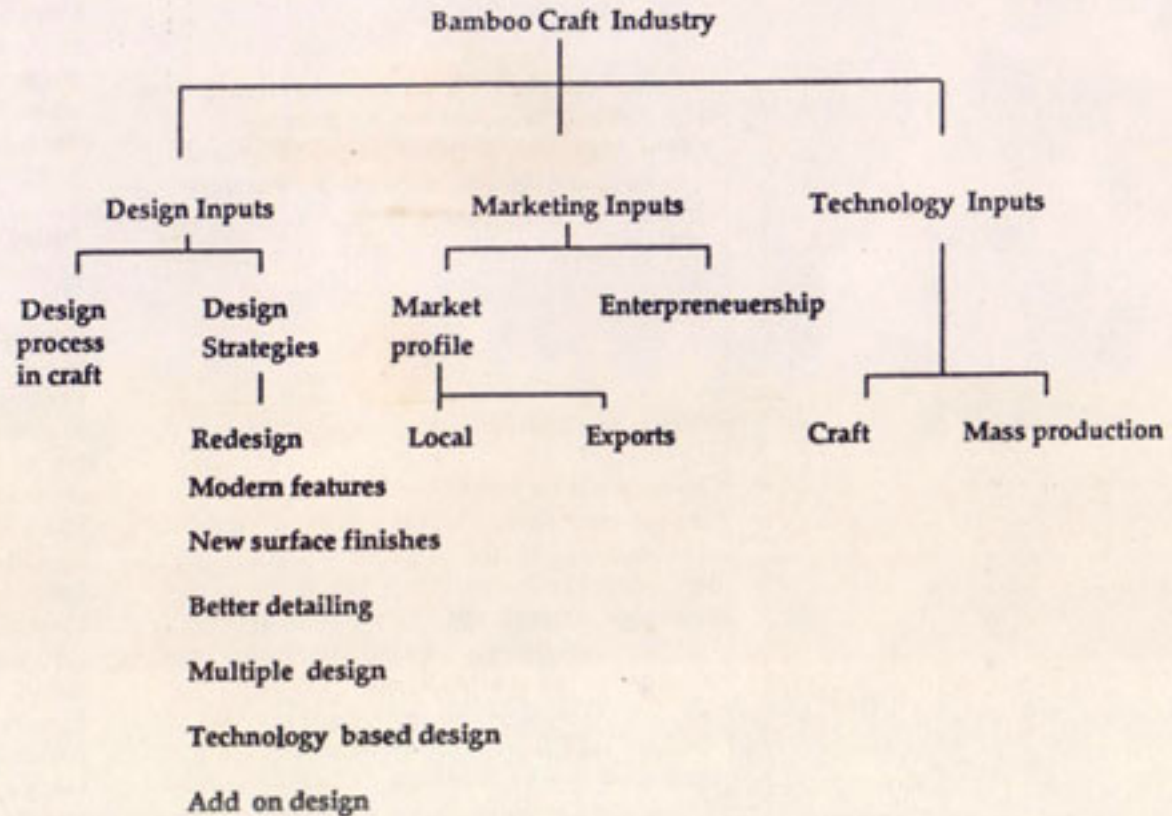
Bamboo Resource Utilisation



A minimum charge of Rs 500/- per tonne, would ensure commercial growing of bamboo. Bamboo is a fast growing plant. As a biodegradable natural material with excellent mechanical properties, it is a better choice for making products than paper. Removing the current subsidies can lead to a stabilised market rate of Rs 500/- tonne, either for product use or for making paper.

3.0 Bamboo craft industry

With the general material crunch and raise in demands for eco-friendly materials, it is strategically advantageous to increase the use of bamboo in products. Little attention has been paid to this aspect so far. Neglect of bamboo craft as well as industry has made bamboo work unattractive. We need to take a fresh look at the bamboo craft industry, with a view to utilise the exquisite craft skills of the north eastern parts for better economic growth and to generate





meaningful employment in bamboo work in the country at large.

It is also imperative that our bamboo products become internationally competitive. For such a quantum change we need to treat bamboo work not merely as a craft but as a craft industry. Let us look at the basic inputs in Design, Management and training required for bamboo craft industry to survive and compete in the world markets.

3.1 Design Inputs

It is important to understand the craft traditions with respect to modern design process to synthesize a craft design process. This would help us in articulating market based design strategies.

3.1.1 Design process

Craftsmen learn bamboo craft traditionally through their families. Some of them learn in the training programmes arranged by the development commissioners office. Even in these programmes, trainers are basically traditional craftsmen. The trainers do not have exposure to Industrial Design.

Products which the craftsmen make are traditional objects like baskets learnt from their families or through training programmes.

Occasionally new product ideas are brought in either by craftsmen's intuition or due to the demands made by a customer. Generally a craftsman sells the products himself. Consequently he has a direct access to user and user demands. Sometimes he makes a new design, to order, by an architect or an interior designer.

Designers formally trained in modern western design methods have been greatly inhibited to enter into craft area. Bamboo craft has been no exception. Lack of ready western model to follow may be one of the reasons. However, National institute of design at Ahmedabad has made a pioneering effort in recent times in documenting the bamboo craft of north eastern areas. This still leaves many gaps to be filled in the course of developing a suitable process for bamboo craft design.

Today the major drawbacks of a craftsman as a designer are :

Unfamiliarity with the requirements of the urban user.

Lack of training in systematic study of user requirements.

No knowledge of marketing channels other than the melas and exhibitions.

Shelf life, modularity and packaging considerations are not understood by the craftsmen today.

Lack of perception in aspects like durable finishes, product ergonomics and product liability etc.

Insufficient knowledge of tools, jigs and fixtures which help to increase productivity.

Little knowledge of other materials like plastics, leather, composites etc.



It is imperative that modern design inputs are incorporated to offset the above drawbacks. A trained industrial designer also has many handicaps to design bamboo products like:

- Lack of first hand knowledge of techniques used by the craftsmen.
- Lack of readily available data on types and properties of bamboo.
- Lack of model making and simulation techniques for bamboo.
- Lack of access to high craft skills for making prototypes.
- Lack of design data on composite materials with bamboo as base.

There is an urgent need to evolve a craft design process for bamboo products. Working groups between designers and craftsmen can be formed in the learning phase.

3.1.2 Design strategies

Bamboo products is limited due to current mind set of the market segment it could cater. It is possible to identify wide spectrum of products by systematic investigation. In a study done at IDC, various craft products were compared to locate the product opportunities in bamboo. Exploration of bamboo as a material further helped in imagining the product possibility in bamboo. Seven product groups evolved out of the various products identified for analysis.

- . Gifts and souvenirs.
- . Stationery items.
- . Household and kitchen items.
- . Lamps.
- . Furniture.
- . Carrying items and containers.
- . Packaging containers.

Several design strategies are proposed which can be applied to different categories. These design strategies can give competitive edge to the bamboo products in the market.

Redesign

Redesign is normally practised in industrial products mainly due to heavy investments in tooling. In bamboo craft 'redesign' concept is valid for a different reason. Some craft products have an established image. Baskets, trays, chics and lamps are associated with bamboo and cane. There is a large market for these items. Even plastic baskets are made to look like bamboo baskets. In these cases it is a better strategy to retain the same product configuration and offer design innovations to improve the quality.

Incorporating modern features

Features like compactness, feasibility, stackability, modularity help in making a product market friendly as well as user friendly. Currently bamboo products like lamps and trays are not compact, consequently they become difficult to carry or for bulk transport. Modularity is generally absent in trays. Design innovations can be made to just incorporate this feature, keeping the traditional product configuration.



Use of new Surface finishes

New surface finishes like melamine spray or spray painted colours can be introduced in bamboo products. The products need to be redesigned to facilitate use of such techniques. Traditional techniques like smoking to get browns need to be used more effectively. For eg. smoked brown tray could have a black matt painted at the rim to give new colour combination.

Techniques like screen printing and pad printing can be used to enhance surface value of the products which acquire a new semantic significance. With such technical inputs, decorative patterns with letterforms of Indian languages can provide a new dimension to transform the products.

Better detailing

Details like joints, rims and hinges need design attention. Mass production of these elements with the help of jigs and fixtures can be thought of. Even moulding some of these elements can make the products durable with better getup and finish. Such elements can give a new scope for aesthetic expressions. Better detailing can reduce number of operations in making the products thus bringing down the costs.

Multiple designs or designs in numbers

Offering a large number of designs or variety is an Indian tradition. Indian sarees are well known for their innumerable variations in the borders, colours and patterns. The strategy of design in numbers will suit well to craft products, especially for 'gift items'. Designing needs to be thought like a computer programme in this case. Each design element can be construed as a variable. The change of variables will give new designs. A paper knife in bamboo was taken up to experiment with this strategy. As many as 50 design variations were developed.

Similar approach is practised in Japan traditionally. Each group of craftsmen belonging to a village or a family produce one variation in design. Similar to saree styles like "Dharmavaram sarees" or "Kanjivaram sarees", the bamboo products can also be identified with that group. Thus each group produces unique product variation.

Technology based new designs

New technology is being applied to bamboo processing. Resin bound bamboo boards, bamboo laminations, bamboo bending, square and triangular sections using bamboo splits are few examples. It is strategically advantageous to think of new product designs with such technology rather than trying to compete with the existing products. For example, resin bound boards made out of bamboo mats are being manufactured by two organisations. The boards are of high quality in strength and looks. But the



user compares them with plywood sheets and formica. Consequently a new product like bamboo board has to be needlessly compared in every detail like workability, cost, weight etc. with plywood boards. Here a design strategy to think of new product lines in resin bound bamboo would be more beneficial. New products using this process would be easier to market. High value chair shells can be moulded with the same process, as bamboo mats are flexible. Many specific furniture items like train seats can be conceived in moulded shapes.

Briefcase shells can be another item which can be made from the same process. Laminated bamboo is one more attraction. Completely new items like "watch straps" can be thought of in laminated bamboo. High quality spoons and forks are already made in Japan by lamination.

Add on design

Add on design can be another concept to arrive at new designs in bamboo. Bamboo parts can be added to the existing products to give them an exclusive 'culture friendly' look. Casings for thermos flasks, thermowares, ice buckets can be made in bamboo. This would be sold as a special value added item for travel or as a gift.

Bamboo basket cover for items like 'Good-night' gadgets, can become culture friendly, in the homes. Similarly some parts of products to be

made in bamboo can be identified. In these cases the bamboo parts will be sold as a unit of the total product. Several possibilities open up with this strategy. Bamboo spoons can be sold along with Teflon coated non-stick frying pans. Handles for various spoons can be made in bamboo. Marketing becomes easier with this approach.

3.2 Market Inputs

Improving the current markets by catering to the newer market segments and thinking of new organisational set ups for marketing are vital for bamboo craft to survive in the future.

Entrepreneurship by designer can ensure growth of craft values even when the bamboo products are made in large numbers.

3.2.1 Market profile

It has been difficult to get data on bamboo products marketed within the country and abroad. Based on the data that 5% of the bamboo produce goes to craft industry, we could estimate that 1.6 lakh tonnes of bamboo is utilised for craft. If we assume a rate of Rs 1000/- per tonne and product cost of bamboo as 5 times that of material cost, we arrive at a figure of Rs 8 crores as current market share of bamboo craft. Export figures are not available fully.



The amounts are not significant considering the high potential of manpower and raw material. One cosmetic manufacturer of Indian origin doing business in USA was ready to place an order for 2 million baskets to be marketed as gift packs during christmas sale.

So far bamboo products are being sold through exhibitions or government craft emporia. This has a limited scope. It is important for bamboo products to enter into general markets. Steady, regular markets would demand lasting qualities in the product. Considerable change is required in the mind set of bamboo craft producer to enter into regular markets. The sale in exhibitions being one time, the craftsmen are less concerned about what happens to the product over a time. Qualities like proper treatment of bamboo, durable joints, compact packaging and modularity have to become features of craft products.

According to the NGO's involved in bambo craft, several export orders are given up for want of supply of bamboo products in stipulated time with requisite design and quality. The gaps between supply and demand have been large. Government agencies meant to strengthen these links have been sluggish. A major effort is required in networking various suppliers of bamboo craft products all over the country. A nodal agency in marketing, preferably in private or joint sector, is required.

Such an agency with a capital fund at its disposal, can act as a store house or reservoir to buy and sell. Buying potentially marketable products will ensure work for the craftsmen throughout the year. Huge export demands can also be met easily. Design and technology

inputs can be channelised through such marketing setup effectively. Such a setup would be self sufficient as well.

3.2.2 Entrepreneurship

In bamboo craft area, craftsmen themselves have been entrepreneurs. They have been producing and marketing. Though this has been advantageous to the craftsmen, the craft industry has not grown as in China and Taiwan. To face the demands of changing markets and competition from materials like plastics, new entrepreneurship is necessary. Professionals like engineers and designers, becoming entrepreneurs could be one solution.

One example in such an endeavour is 'Adicraft' at Nagpur, run by two professionals. One of them is an industrial designer trained at IDC. Adicrafts employs 30 workers, many of them, skilled craftsmen. The company markets exclusive bamboo lamps at premium prices. The products are of export quality. Care in detailing and finishing, ensured by the management has resulted in the success of Adicrafts.

More such entrepreneurs are required to tap the unlimited potentials of bamboo products. Craft industry demands high innovation in product



diversification based on new market strategies. Continuous design inputs of high order are required. Since any small setup finds itself uneconomical to hire an industrial designer, new strategies need to be thought of.

There is a good scope for a designer or design group to link with craft production unit. Designer willing to become an entrepreneur, can identify a marketable bamboo product, develop it and liason with a craft group to produce it. With his/her urban training, it should be possible to find the marketing links. Designer can also ensure technology and training inputs to the craftsmen to achieve higher quality and productivity. It could be possible to tap export markets with such a professional entrepreneurship.

3.3 Technology inputs

Considering the big market potential inputs of technology into bamboo craft needs urgent attention. Taiwan, China and Malaysia have industrialised bamboo work. Use of mass production machinery and high level of worker organisation have made these countries highly competitive and they are already exporting bamboo products to Japan, USA and Western countries. It would not be surprising if they enter Indian markets due to free trade policies currently being adopted in our country. To meet this challenge our bamboo craft industry has to

modernise in many ways.

We could see the potentials of technology inputs into bamboo industry at two levels of production:

Craft level

Mass production level

3.3.1 Craft level

At craft level we need technology development to improve the quality and productivity. These could cover a broad range like

Bamboo treatments

Forming techniques like heat bending

Laminations

Technology to produce edges, rims etc.

Finishing techniques

Measuring and size control gadgetry

Jigs, fixtures and tools to achieve the desired shapes.

Bamboo treatments are known at laboratory level. No equipment or plant for such treatment is available to the craft industry. A small plant for steaming and chemical treatment could improve the quality of bamboo significantly.

Heat bending technique is already used by craftsmen, But to bend bamboo to a predetermined shape needs high skills. Development of gadgetry for this can lead to many new products.



Appropriate technology can be developed to make small laminated bamboo products like spoons, forks, watch straps, handles etc.

Specific gadgetry and methods need to be developed for making certain parts like edges of woven mats. If edges can be done speedily in a finished manner with the help of small machine or fixture, the quality of products like trays, package boxes, lamps which use woven mats will go up. Even other materials like metal, plastic or leather can be used for such details. Finishing techniques like spraying are still new to craftsmen. A compact unit to spray melamine or other resins can be developed.

In Japan a craftman measures thickness and width of the bamboo strip with a vernier callipers. Use of measuring and sizing instruments can result in increased quality of a crafted product. Quite often the craft items lack the exact geometry and finished detail. It is worth using jigs and fixtures to attain well defined shapes of crafted products.

3.3.2 Mass production level

If we have to compete globally, mass production is inevitable. Mass production can happen either by organising large number of craft level producers with small equipments and gadgetry or by using mass producing machinery. It is possible to mechanise bamboo work. Bamboo machines for splitting, sizing and polishing are available. Even weaving machines are used in countries like Taiwan.

As a strategy it will be prudent to centralise mass production of bamboo strips, as strip making is a laborious process. Large number of bamboo workers and craftsmen can then be employed for weaving mats, baskets etc. Weaving by craftspersons will be advantageous as it is a skilled operation. New designs in weaves can be introduced more easily. Thus several subsidiary work in bamboo products can be generated by having a centralised mass production unit.

As suggested earlier, technology based new designs, like moulded articles using bamboo laminates is another potential area. China is reported to be making 10,000 tonnes of bamboo boards. If a proper market is secured for products using bamboo boards, similar potentials exist in India as well.

To conclude, a great deal of efforts are required to bring out the potentials of bamboo craft industry. Though government spends money on various programmes for bamboo craft, these efforts remain ill conceived and poorly co-ordinated. A fresh initiative to rejuvenate bamboo craft, maybe in the form of 'mission' is much needed today.

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Ms Madhavi Koli, has worked for more than an year on the project Design Inputs in Craft Areas, soon after completing M Des at IDC. Her focus of study was the Marketing aspects of Crafts.

Coming from an Architectural background, she has been designing office interiors, products and packages as a free-lance designer. Recently, she has developed a series of biodegradable paper pulp products for packaging of perishable goods.

MARKET STUDIES FOR CRAFT PRODUCTS

Madhavi Koli

The need for market study

Craft traditions have always been held in high esteem in Indian heritage. Over the centuries, Indian craftsmen have been hailed and respected in India as well as the world over for their exquisite skills and ornate handiwork. No matter what the medium, be it Architecture, Textiles or Handicrafts, each region developed its own unique style and technique.

Handicrafts in India evolved through family traditions and skills were refined, improved and passed down the generations within the families. Craft society functioned akin to the Gurukul system of Education or the Gharanas in Music. Craft skills thus permeated only in close knit groups and catered mainly to the local needs of a small population. The products were limited, intuitively crafted, depicting ceremonials, figures and motifs of rural India. New product development and innovations were insignificant.



Planning commissions constituted after Independence, brought Handicrafts into the national economic focus and there was a felt need to revive some of the dying crafts. This led to establishment of various craft promotional bodies. All India handicraft board, Handloom and Handicraft Export Corporation and Craft councils were set up to organize the craft sector, assist the artisans and introduce the craft products into newer urban markets.

Over the subsequent decades, considerable amount of study has been done to understand the traditional crafts, craft persons, lifestyles, skills and methods of working and their tools and techniques. Documentation of crafts and craft products is predominantly region based and all statistical information is derived from the producers end. Publications of Handicraft board and Economic research council reports give a gross picture of the production costs, income of the craftsmen etc. However, little data is gathered from the market or the end user. Since major portion of crafted products are now being marketed through Melas and Exhibitions, there is no systematic feedback from the customers regarding the types of products needed. User preferences could play an important role in incorporating new features to add value to craft products.

Presently, Rural craftsmen have no direct access to the needs of the urban and contemporary users or their changing lifestyles. Besides the 'market meets' organised by Handicraft board to encourage interaction between the artisans and the marketing experts, there is little information reaching the craftsmen.

Lack of information flow has definitely and noticeably resulted in design stagnation in large number of crafts. Traditional designs have limited output and hence confined markets. Moreover, general apathy has further degraded the status of and respect for crafts, consequently newer generation is abandoning their craft for more lucrative professions.

There is need to systematically apply the principles of market research and product planning in this largely unorganised sector. New products and product strategies are required to be developed to revitalise these crafts.

Methodology

Handicraft board has grouped the craft activities in India into subheads depending on the nature of the crafts. (chart 1.) Using this grouping, a matrix was developed by plotting various products against the craft classification. Products were grouped based on the area of use, i.e. Residential, Office or Commercial. Few special product groups were separately classified depending on their use, such as the sports goods, seasonal gifts, traditional and ritualistic products. Products were listed in each of these groups, given in chart 2.

25 product-craft matrices were developed to get a comprehensive picture of the availability of craft items. Given here are two sample tables of this classification to illustrate the methodology which was adopted for further analysis.



Handicraft activity grouping

1. Art -metalware
 - Brass
 - Bronze
 - Bidri work
 - Nirmal
 - Others such as art -plate, Icons, etc.
2. Woodware
 - Wood Inlay
 - Wood Carving
 - Furniture
 - Others such as Lacquerware etc.
3. Others
 - Stoneware
 - Ceramic
 - Glassware
 - Cane and Bamboo
 - Reed, straw, Fibre
 - Coir
 - Jute
4. Miscellaneous
 - Leatherware
 - Papier-machie
 - Bone, Horn
 - Shell craft
 - Ivory
 - Lac Artware
 - Paperboard
5. Plastics:

Chart 1.
(collated from AIHB Publication)

Product area grouping

- Residential areas**
Entrance lobby
Living room
Dining room
Kitchen and store
Prayer room, library, study
Bedroom
Toilet and cloaks
- Office and commercial areas**
Entrance foyer
Reception Lounge
Executive cabins
Offices, workstations
Conference rooms, Show rooms
Pantry, service areas
Cloaks
- Personal items**
Apparel
Jewellery
Footwear and accesories
Cosmetics and toilet products
- Others**
Sportsgoods
Toys, games, Novelties, Gifts, Mementoes
Traditional and ritualistic items
Packaging

Chart 2.

[illegible]

Household Products												
	Brass	Bronze	Bidri	Nizmal	Other metalware	Wood/ Inlay	Wood carving	Furniture in timber	Other woodwork	Stoneware	Ceramics	Terracotta
Living Area												
Seating sofa				•	•	•	•	•	•			
Chairs	•			•	•	•	•	•	•			
Diwans				•	•	•	•	•	•			
Stools				•	•	•	•	•	•			
Coopies				•		•		•	•			
Centre table	•						•	•	•	•		
Coffee table				•								
Telephone rack				•								
Message pads												
Pen stands	•	•	•	•	•	•	•	•	•	•	•	•
TV,VCR cabinets					•	•	•	•	•			
Show cases				•	•		•	•	•			
Display racks					•			•	•			
Artefacts	•	•	•	•	•	•	•		•	•	•	•
Vases	•	•	•	•	•	•	•		•	•	•	•
Mats/ Coasters					•	•	•		•		•	
Ashtrays	•	•	•	•	•	•	•		•	•	•	•
Wall hanging	•		•									
Murals	•	•			•				•		•	•
Paintings												•
Newspaper rack									•			
Magazine rack									•			
Floor mats												
Curtains, Drapes												
Cushions, Mattresses												
Screens							•		•	•	•	
Partitions							•		•		•	
Pelmets, Curtain rods	•				•			•	•			
Bulbs, Lamp shades												
Light fixtures, Tubes	•	•	•	•	•	•	•		•	•	•	•
Fans					•							
AC vents	•			•							•	
Window dressings												



The craft product classification is generic to all crafts in India and is not region based. It is essentially a plot of availability of the range of products in different crafts. The listing of products is through, a survey done at various Craft emporiums and Govt expositions, publications and product catalogues of Khadi Village Industries Commission, Kairali, Handicrafts Board and Export Promotion Councils. In addition to this taking a look into many houses, helped in listing the ritualistic products.

Keeping in mind the versatility in use of plastic product substitutes in almost all facets of our lives, these products were plotted against plastics to gauge the parallel competition and trends.

Since this study is aimed at hand crafted products only, few other crafts such as textiles, floor coverings, embroidery works and Cottage crafts like candle making, musical instruments, bangles etc which already have established identities were omitted from the study.

In an attempt to identify areas where craft products could be designed and developed, it is important to know the existing status of crafts in the contemporary markets. This study aims at establishing guidelines for product identification, formulating design briefs for developing new products and tapping newer markets.

Observations

These matrices give an overall pattern of the types of products made in crafts and also bring out areas where there is no specific craft input. This observation done at preliminary level of product categorisation is also relevant to all crafts. Some general observations which come into immediate focus are

A- Items made in majority of crafts

Planters, vases, plaques, wall displays, ash trays, light fixtures, trays, bowls, candle stands, jewellery boxes, kitchen utensils etc.

B- Items where there is no craft input

Alarms, home appliances, fans, tin openers, ice-pails, scissors, tape dispensers, choppers, mincers, AC-outlets, fire extinguishers, thermoware, bobbins, sharpeners, staplers, locks etc.

This list could be further elaborated on closer perusal and the types of products favoured in each craft area could be derived. However since the focus of this study is on bamboo, further analysis is specific to the bamboo craft. The strategies adopted for product identification and experimented within the scope of the project are discussed as case studies.

Articles currently made in bamboo are

Mats, floorings, baskets, bowls, bins, trays, wall paintings, table mats, curtains, chiks, lampshades, hand fans and other artifacts such as house boats etc.



It is evident that these products have been made out of woven strip forms, as can be seen in the baskets bowls etc. or by joining thin sticks of bamboo by means of threads as seen in the wall hangings and table mats of kerala. This is because bamboo is less susceptible to fungal infection in its strip form.

Bamboo as a material is close in its structure to wood and it may be viable to adapt articles made in wood into bamboo. The design strategies could be devised considering the manufacturing process, detailing and finishing suited to bamboo. This in itself could initiate a new way of looking at bamboo.

Items which could also be made in bamboo by substituting wood:

Stationery items, table tops and sorters, hangers, luggage, suitcases, carrybags handles, gift packaging, trinket boxes, furniture, jalis and partitions, modular display racks, curtain rods, racks for magazines or shoes, laminations, acoustic tiles, coasters, calenders, lighting fixtures etc.

It is important to study the trends and draw analogies from other crafts as well, which could be significant in identifying newer products. This comparison could be also used as an effective design strategy. For example, pen stands made in other crafts are sold as individual pieces. In plastics however, we already have office stationery organisers. This is also seen in leather gift sets. A system of products which takes care of all the items on the table like pins, calender, note pads, appointment schedules, letterpads, card sorters, diaries, even clocks, could be an advanced concept.

As a strategy, stationery items in bamboo need to be designed as an organising system rather than a singular item. The value of these products could be enhanced by incorporating attractive graphics or through innovative design detailing or by formal explorations using metaphors and images suited to a craft product.

Design variations of a single item could be also a strategy used for formal and aesthetic explorations in bamboo. One such example experimented in the project was the paper knife. Paper knives in bamboo has competition from several other crafts like brass work, ivory, nirmal etc. As mentioned earlier, paper knife in bamboo if seen as a stationery item, can become a part of the office stationery organiser. On the other hand if paper knife was to be seen as a gift item, the application of multiple design will provide a competitive edge over other crafted paper knives. Then the design strategy would be to evolve many formal variations and graphic themes. The novelty in design will be its unique selling feature. This strategy has been successfully tried out in wrist watches brought out by the Titan and HMT (The Raga and the Utsav series).

In deciding the design strategies for any given product or system of products, it is important to have insight into other relevant issues like manufacturing and marketing. Design, manufacturing and marketing form an interlinking matrix in deciding the product features.

The manufacturing feasibility will depend on the process itself, the tools and the machines needed and such other parameters.



The marketing channels currently available for the crafted products are

Government emporiums

Expositions, Melas

Departmental stores like Akbarallys, Benzer etc.

Co-operatives like Apna Bazaar, Meena Bazar.

Gift boutiques

Catalogue sale, like Burlingtons etc.

Promotional institutions like WWF, CRY etc.

Novelty shops, trinket shops

Export markets

The product identification may overlap, but the design features and the details would differ for each channel. The clientele patronizing each market segment varies, so do their preferences and buying potential and these factors influence the design strategy.

To design a door handle in bamboo, it is important to know the type of interiors that it would fit in, the kind of residence, office or restaurant and the surrounding decor. Also if it were to fit in a system of interiors, would it be a single piece item sold more as an art piece rather than a family of door handles and knobs, for the entrance door, cabins or cupboards? What image or identity would it convey? Could it be personalised with graphic features such as company emblem? Could the product family concept be extended into other allied systems such as name plates also? What will be the design variations? What will be the quantities needed and how would it be priced in relation to other door handles in the market, both crafted and machine made. Such issues will help designer or the crafts person to decide on the quantities, sizes, shapes, details, finishes, workmanship and visual appeal of the product.

Conclusion

Based on the classification and the analysis seven product groups were identified where design inputs could be given in bamboo. Potential items which could be developed in bamboo were identified in each group. These were taken up during the workshop and several concepts were generated and few translated into actual products by the designers and the craftspeople. These few illustrative examples show the relevance of market studies and the need to evolve a systematic methodology for long term planning in design and development of craft products.

These formats will not only help designers working in craft areas, but also help the craftsmen themselves, the government institutions promoting crafts and other non Government organisations working for upliftment of crafts and craftspeople. This study opens possibilities of new products which could be developed in bamboo for export markets. This could well induce entrepreneurs to invest in bamboo product industry, with the help of skilled and semi skilled craftspeople. If converted into a formal industrial establishment, it could not only offer meaningful employment to many craft workers, but also help in entering the global market.



EXPERIMENTS IN BAMBOO

V. P. Bapat

Prof. V. P. Bapat has been a faculty member at IDC for many years. He has been teaching design with emphasis on materials, processes and detailing. He has a passion for exploration of materials. He is known for his design related knowledge in Plastics.

He is involved in developing many socially relevant products, recent one being pedal operated cycle rickshaw. He has introduced many creative tasks in bamboo in M Des programme. He has been exploring bamboo in the Industrial context.

Bamboo was until recent times seen more as a reed than as a valuable substitute for timber, but if we try to understand the basic structural configuration of this material, it could open multitudes of new applications. Bamboo is a cheap substitute for timber. It is light weight and extremely flexible. Besides being used as pulp in the paper manufacture, bamboo is used mainly in two areas i.e. as scaffolding on construction sites or as woven basketry in the craft sector. Basketry has been refined to creditable finesse by the north eastern craft

persons of India. However there is a need to have a fresh look at the material itself and explore the physical possibilities of converting it into new product forms.

Bamboo products have a competitive edge over other parallel products as the raw material is cheap in comparison to wood and processing is relatively easy. Other low technology processes can be adopted like processing by hand splitting and final finishing on machine.



With an emphasis on material exploration, various experiments were conducted at IDC. Some of these, done as student exercises were specific assignment based. Besides, a more systematic exploration on the structural and formal aspects was done during the project work.

1. Exploring the roundness of the material

Conventionally bamboo is used as splits. So it was decided to use the efficiency of machines to create modules and then recreating patterns with new combinations. Initial explorations were done with sections which were thin and wafer like, i.e. $L/D < 1$. Round rings were cut on a saw and these were joined as full circles and cut segments to generate various 2D patterns.

The next stage in this exploration was using angular cuts, varying from 10-70 degrees, this gave interesting elliptical profiles. These were still more or less explorations in 2D.

In exploring the third dimension, the ratio of length of the sections was kept longer than the diameter ($L/D > 1$). Use of 4, 5 or 6 modules of such vertical sections gave rise to new configurations. These explorations were however merely exercises in visual composition and not aimed at building a definite product for any functional purpose.

Using Splits

Use of splits in a different way was tried out. This can be used in laminated and bent wood furniture. Interesting ways of joining sections were tried out to get new shapes, eg. by cutting the node and joining at 45 degrees etc.

Static Toys

In an attempt to crystalise these explorations a student exercise was tried out to create static toys. The aim of this exercise was to use bamboo pieces to simulate natural and man made objects. Animals, birds, cars etc. were abstracted with a constraint of using only bamboo. A special project done by a student, Hari, was an extension of this exercise to develop modules or parts which could be interchanged to create variations in figures. For eg. by changing different parts like tail, legs or head it was possible to recreate new animal forms.

Dynamic Toys

Another student exercise aimed at exploring the springiness of the bamboo. The task was, to create interesting motion based toy using only bamboo and cotton thread. No other material was permitted. Using the springiness and the limited elasticity of the bamboo and the thread as a binding member, it was possible to generate many concepts of dynamic toys. It was observed that the simplest mechanism was the best in performance. Another principle clearly established, was that elasticity of bamboo could be multiplied by using number of bent strips together.



PRODUCT EXPLORATIONS IN BAMBOO.

Parag Vyas.

Mr Parag Vyas worked on the Bamboo Project at IDC for more than a year, after completing his M Des. He loves to work with his own hands. This passion for making things has resulted into many bamboo products.

Recently he worked in Germany at the design office of a well known designer, Alexander Neumeister for six months.

Product variations in bamboo depend to a large extent on the exploration of bamboo as a material. The initial exploration involved use of bamboo in its tubular form rather than the splits. This approach has many merits. The first and most important is lesser demand on the level of skill, although it involves use of few machines. Trainee craftsmen can learn this work quicker than splitting and weaving. The process is faster since little material has to be removed in the products. Also, most of the bamboo is utilised. In almost all weaving processes the use of bamboo is reduced to 40-50%, as the pith side is

rejected along with the outer skin.

In explorations using tubular forms, the use of bamboo is as high as 80-90% since only a light cut is required to even out and finish the surface. Since the tubular form is respected in its original form there is an inbuilt "bambooness" in all products. The initial exploration led to the development of process based products. Later, market concern became the basis of generating new product concepts. Some of the processes tried out are described in brief.



The processes selected were mainly:

1. Angular cutting and gluing
2. Cutting and splitting
3. Turning
4. Lamination
5. Forming and fabrication

1. Angular cutting and gluing

The initial forms were based on modules, which were cut using a circular saw or an angle cutting jig. Several combinations were tried. Though this approach was mechanical, it brought out many interesting forms which could be adopted for flowerpots, penstands, paperweights and table tops. We had to restrict ourselves since the possibilities were endless and changing just one parameter like the angle of cut, it was possible to generate a whole new range of different modules.

2. Cutting or splitting

In this process, splitting was introduced in addition to cutting. Here the gluing was mainly on the cut face. Various utility trays were developed based on this style. The simplest cut i.e. the straight cut and a half split, itself generated many forms by changing the length-diameter ratio (L/D ratio). The end capping also had many possibilities. These forms suited objects like pen trays and other utility trays and desk top organisers. The angular designs made ideal snack servers, gift trays and souvenirs.

When the glue was applied on the cut face, it got absorbed in the capillaries, resulting in faster drying and a stronger bond. As the bamboo had inherent dimensional variations, finer

trimmings and post assembly finishings are better done manually.

3: Turning

In the third stage explorations the process was simple turning and throating which could be done on a floor lathe, on which hubs for bullock cart are made, in any village. A light cut on the outer skin was given for better adherence of the lacquer or varnish. The light cut made the piece look precise and geometric. The exposure of grain also enriched the product by adding a new texture, which was hitherto covered by the skin. The formal variations were achieved by varying L/D ratio and by changing the caps or the lids. The gift packagings utilised acrylic tops which allowed the gifts to be seen, maintaining the subtlety. Main advantage of these packagings was that they were recyclable.

4. Lamination

Lamination was done mainly to develop sections for various applications like, door handles, saucepans and frying pan handles and low level furniture. Circular, square, triangular, I sections and other composites were tried using rosewood, teak and cedar wafers in between bamboo, for strength and aesthetic appeal.

5. Forming and fabrication

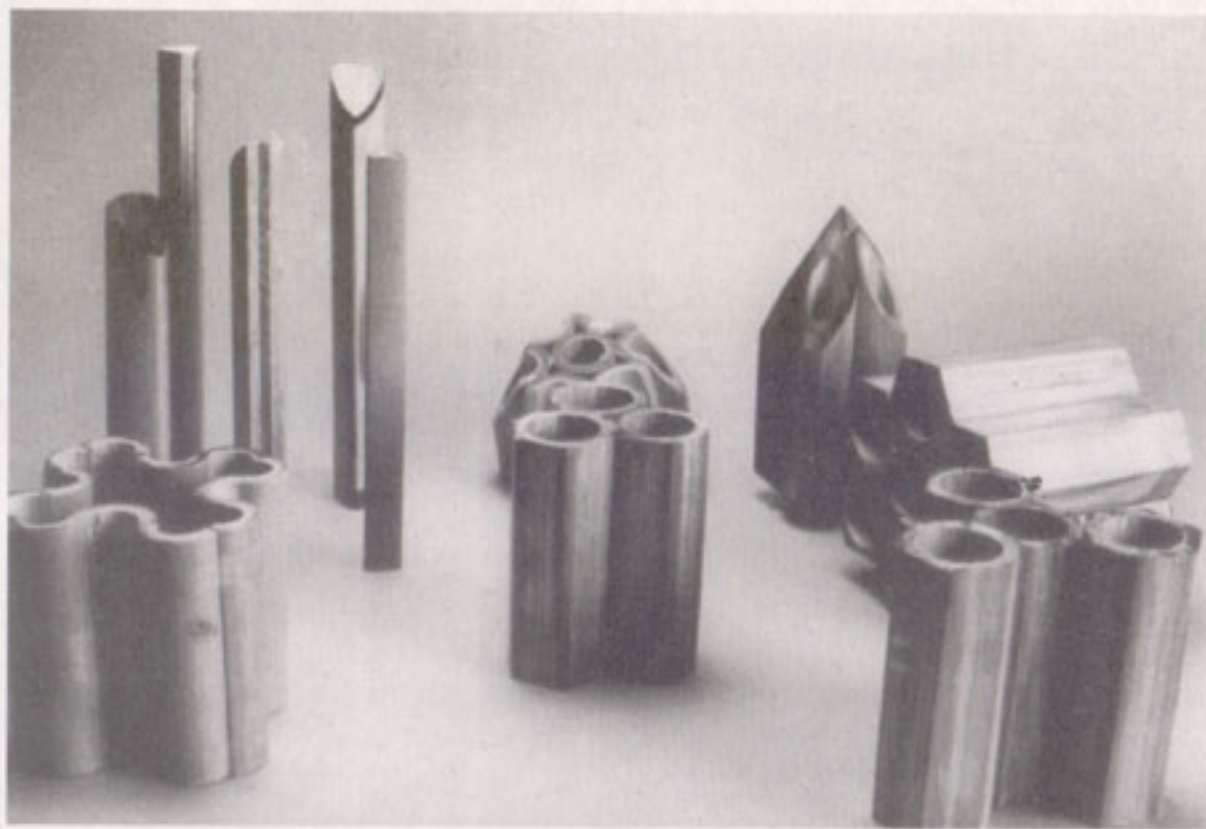
These were a mixture of above mentioned processes and many spoons, salad forks, coasters etc. were made using this.

Visual examples of these explorations are shown in the following pages.

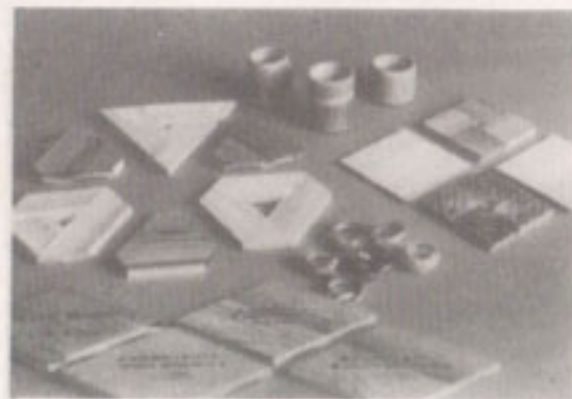
1	1
1	1
	2

1. The material explorations done in bamboo during the project, using different processes. Seen here are formal variations achieved by using turning, angular cutting, gluing and laminating bamboo.

2. A range of coasters developed in bamboo, indicate the formal possibilities with flat bamboo strips. Various graphics and printing techniques were tried out.



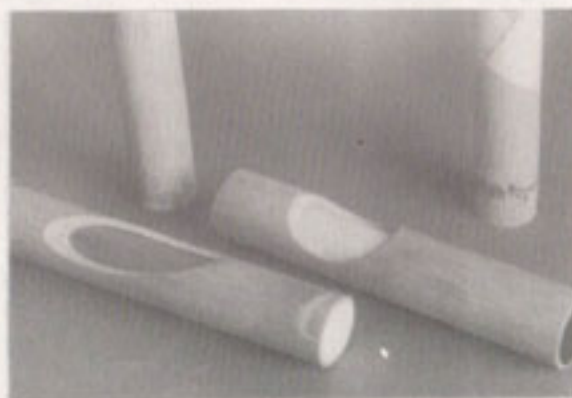
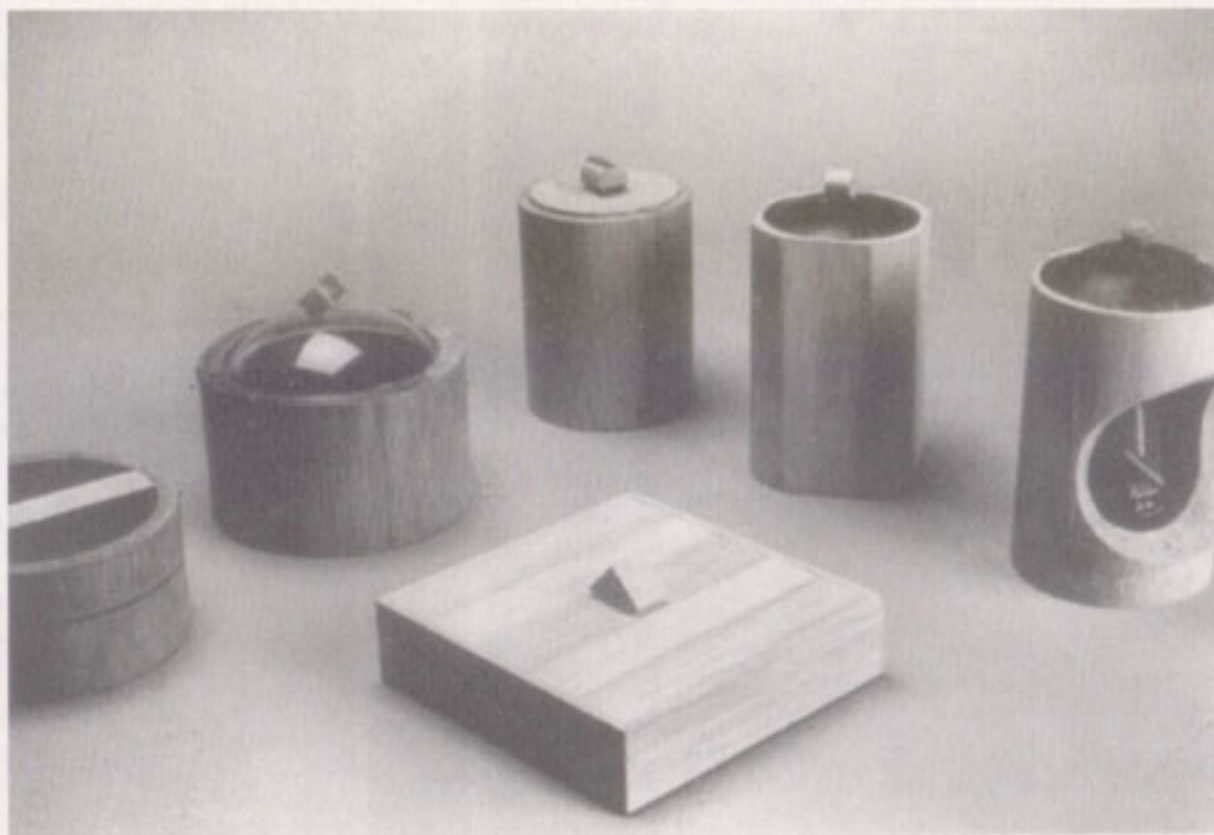
PRODUCTS DEVELOPED IN BAMBOO AT IDC



1	1
1	1
2	

1. A range of boxes developed for packaging dry fruits or mints etc. Bamboos with suitable diameter were taken and turned from outside and slight cut is given on the inner edge for the lid to fit in. Variations were tried using acrylic lids for visibility and rosewood or cedar to lend a different texture. A square box was made by joining thick bamboo strips.

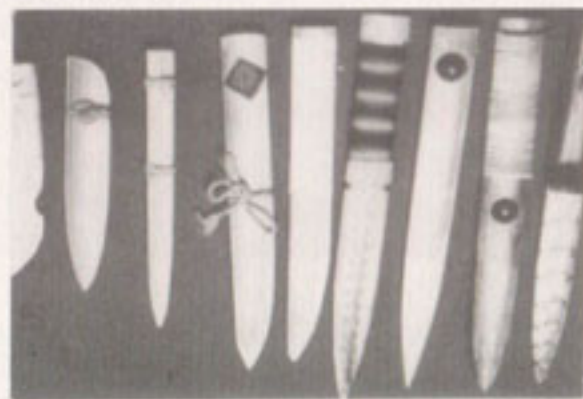
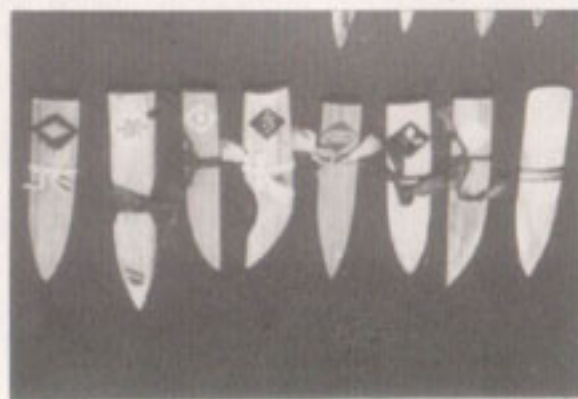
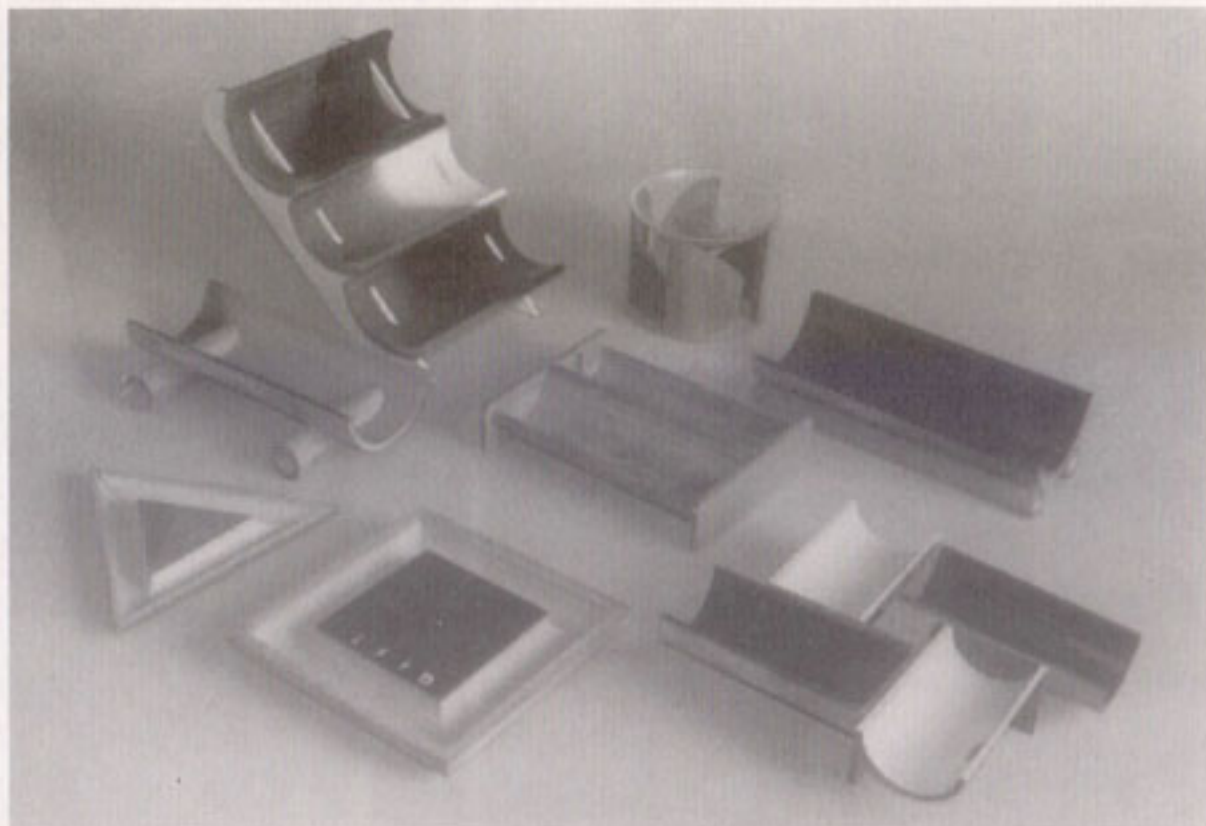
2. Citation boxes made by turning bamboo. The cut in the box exposes the inside scroll aesthetically.



1	1
1	1
2	2

1. A family of utility trays to keep stationery articles like pins etc., made by combinations of half sections of bamboo. Use of Acrylic and other pieces of wood add to the colour and texture. Painting on bamboo was also tried out.

2. A range of paper knives developed as a gift item. Graphics and use of other decorative elements such as silk threads add to the gift value.



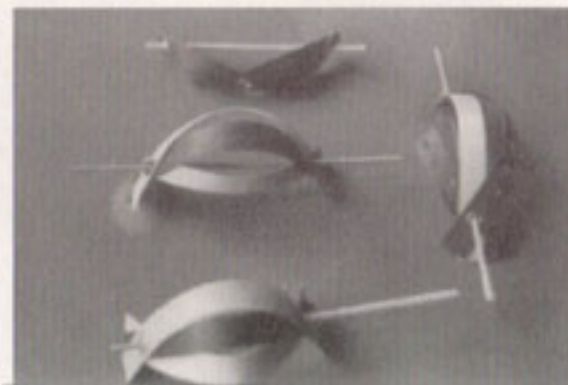
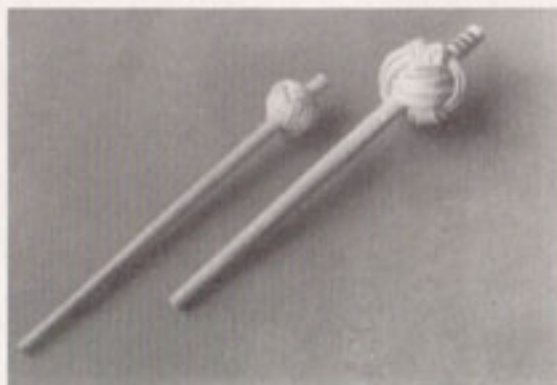
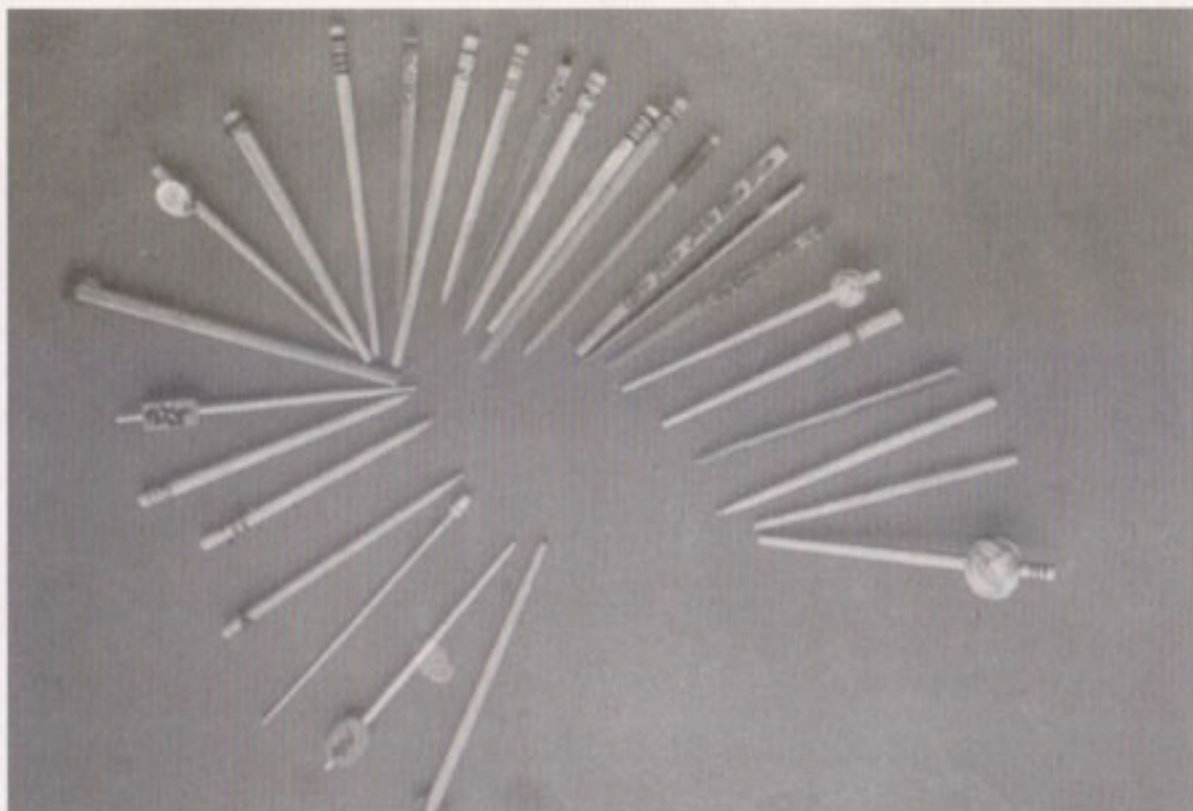
*8.0 SURFACE FINISHES IN
BAMBOO*

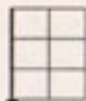
1	1
1	1
2	3

1. Hair pins developed in bamboo. A small graphic motif is introduced to make it more ethnic.

2. Detail of two hair pins developed in bamboo. The rear end is decorated with an intricate woven globe using cane.

3. Hair clips made from thin bamboo strips held together by simple rivets. Combination of both natural finish and stained colours are used effectively.





Jayaprakash Mehta worked on a research project in Bionics at IDC for an year after completing his M Des. Since five years he is leading the design unit of Colour Frost a subsidiary of Star Glass Industries. He has acquired in depth knowledge of finishes and coatings on glass. He has been instrumental in developing a cost effective polymer coating on glass bottles. His presentation covers a variety of painted and varnished surfaces on bamboo, which opens immense possibilities for exploration and use.

FINISHES IN BAMBOO

J. P. Mehta

There are various finishing techniques and processes in bamboo. In this paper we restrict ourselves to only finishing coatings. Finishing coatings on bamboo are generally done to combine protective and decorative functions of this unique material. However their importance in terms of protective function is often under estimated. The finished coatings must have the ability to resist a great range of external and internal stresses, whether physical, chemical or biological and must stay stable in a wide range of temperature conditions. We must bear in mind the material nature of bamboo and

suitable surface preparations needed to be done, prior to the application of the coating material. Bamboo to be coated should be adequately dried (moisture content should be less than 8% w/w) and should be treated for prevention of bacterial growth. After these treatments some of the preparations which may be needed are sanding, slitting, grain filling etc. The coating processes possible on bamboo are described subsequently.

Of the various processes shown, we restrict ourselves to lacquering. In lacquering too, we confine ourselves to only synthetic resin based



lacquers. The reason being that they are the most modern materials offering all the advantages of natural resin lacquers and also the coating materials used in the process of staining, waxing, varnishing, french polishing. Over and above, they are readily available and provide consistent quality and results.

Staining

Spirit Stains
Water Stains
Oil Stains
Varnish Stains

Waxing

Varnishing

French Polishing

Bamboo Finishing



Paint and Lacquer Formulation

Cellulose
Melamine
Polyurethane

Lacquers

Natural resins
copal
rosin
kauri
shellac

Synthetic resins
Phenolic resins
Alkyd resins- polysters
Amino resins
Epoxy resins
Cellulose based

Thickness of some typical coatings

Acrylic resin	25-30 microns
Alkyd resin	25-30 microns
Chlorinated rubber	150 microns
Amino resins	25-40 microns
Epoxy	25-30 microns

moisture content should not exceed more than 10-18%

Various ingredients which can be added to the lacquers:

Solvent soluble dyes
Opacifying dyes
Pigments
Al - Bronze powder
Pearliscient powders



Finishing systems for bamboo

Description	General Composition	Characteristics
Decorative wood stains.	Drying oil, spirit, water media with coloured pigments or dyes.	Used essentially to modify or enhance the appearance of bamboo without obscuring its grain and is usually overcoated with clean finish.
Polyurethane two pack or moisture cum one pack.	Two pack types are supplied as separate base and activator which are mixed before use to initiate chemical curing. With one pack moisture curing types, the reaction is initiated by absorption of moisture from the surface of bamboo and also from atmosphere.	These coatings provide hard, strong film with exceptional resistance to abrasion.
Epoxy resin one pack or twopack system	same as above	These coatings are very shiny, hard and adhere well to many surfaces including bamboo. curing at high temp-120-180 C.
Amino resins (Methaldehyde)	Two pack system	These resins give good hard glossy finish.



Bamboo strips or pieces, both the outer one as well as the inner one can be dyed. Various types of dyes used are basic, Cationic dyes which are very easy to apply, direct dyes, disperse dyes, acid dyes, reactive colours etc.

Bamboo strips or pieces are to be thoroughly cleaned and should be free from dust, oil, etc. 0.1 to 0.2 % dye, should be added to water. This is boiled keeping the strips for 30 minutes, stirring occasionally. The strips are taken out at the end of 30 minutes, washed and dried. These strips can be buffed or a coat of clear polyurethane can be applied on them.

Kinds of dyes

1. Basic, cationic dyes

Bismark brown	Methyl violet
Basic black	Chrysoizoin
Malachite green	Crystal
Auramine	
Rhodamine	

2. Disperse dyes

Acetate dye.....	Kayalon fast
	Diacelliton fast
Polyester dye.....	Kayalon polyester

3. Acid dyes

4. Direct dyes

5. Reactive dyes (food dyes, Azoic dyes, vegetable dyes etc.)

Dye process

a. Dosage

0.1 to 0.2 % dye to water or to materials eg. for 1 kg material,

red-	Auramine- 1.0 gm
	Rhodamine-0.5gm
black-	Basic black-1.0 gm
	Bismark brown-0.5 gm
green-	Auramine- 1.0 gm
	Malachite green-0.1%

b. Process

To be boiled for 30 minutes and stirred
Washed in water
Dried.

BAMBOO DYEING

Compiled by Boban Varghese



DECORATIVE TECHNIQUES FOR BAMBOO.

Parag Vyas.

Many finishing and decorating techniques were demonstrated during the course of the workshop. In finishing techniques, many new finishes such as polyurethane and melamine lacquers were demonstrated. New decorative techniques experimented on bamboo were,
Hot Foiling or stamping
Silk screen printing
Pad printing

Although these processes have been used extensively on other materials, they were experimented on bamboo for the first time.

Hot foiling

Hot foiling is a specialised process for embossing shiny letters or logos on the surface of rexin, leather, plastic and various other materials. Hot foiling has been tried on bamboo strips which were initially machine finished.

In hot stamping process a composed block or engraved logo is used for stamping. The letters or motifs are transferred onto the product by keeping a special film between the product and the block. The block is heated by a heating element sandwiched between the block and the top plate which retains the composed block in position. For optimum performance copper letters are preferred but lead letters also can be used but give reduced sharpness.

This process in its existing form is typically suited for products having flat surfaces, however with small jig, printing can be done on curved surfaces also.

IIT logo was successfully printed on bamboo and the golden stamp added to the richness of the natural texture of bamboo. Using this technique, various ornamental motifs could be created on bambo products.

Silk screen printing

Screen printing was demonstrated in two stages.

1. Flat surfaces
2. Cylindrical surfaces

Screen printing on flat surface is similar to that of the screen printing on paper, only the consistency of the printing ink is different. The ink used is relatively thicker to avoid smudging on the bamboo surface.

Screen printing on cylindrical surface involves a cylindrical screen printing- jig, which has four supporting rollers on which the product is kept and it can rotate freely. The squeegee is set in the place and the screen is moved relative to the product and the squeegee. The process accommodates for slight dimensional variations in the product as the squeegee is floating over the screen.

The pattern is to be carefully chosen so as to reduce the misalignments at the meeting ends.

*9.0 DESIGN CONCEPTS IN
SEVEN PRODUCT AREAS*



A open end pattern which does not wrap the complete 360 degrees is preferred. Fairly round internodes ideally suited for cylindrical packaging.

be printed. However, hand operated pad printing machine can be used to cut down the the costs if the numbers involved are not very high.

Pad printing

Pad printing is a relatively superior and specialised decorative technique for bamboo. The accuracy and precision of the process ensure readability even upto 6 point letter size. It is ideal for product specifications to be printed on the package or the product.

Pad printing is a process of picking up printed letters on a silicon rubber pad and then transfer them on to the product. A steel plate is etched to a depth of 30 microns to give a catchment for the ink in the desired pattern or motif. The doctor knife smears ink over the plate and clears the excessive ink so that only the etched surface has ink on it. The pad presses against the plate, gathers the impression and then presses against the product surface similiar to a rubber stamp.

The pad flexes and curves in the profile of the product thus making printing on curvilinear surfaces possible. The process is very effective but needs sophisticated machinery, also the plate cost is high as compared to silk screen, so it is advisable only when very large numbers are to



DESIGN OUTPUT

The design output in all the areas is the result of intensive efforts by designers, design students, craftpersons and the marketing specialists. Interesting exchanges took place between them. Designers learnt from the crafts persons many intricacies in dealing with bamboo. Few techniques like flame bending led to new design of a tong. Crafts persons were busy in meeting the challenges posed by the designers. Individual creativity got enhanced with group interaction. The results took interesting shapes. A selected part is documented in this section.

Sketches display the flair of the individual creator. Photographs tell us the product possibilities which can be adopted by crafts persons. Deep motivation formed during these creative sessions led to further initiatives which are featured at the end of this section.

The first group dealing with Souvenirs and gifts brought out ideas for various types of gift boxes which have a ready market. Calenders and wall hangings in addition to variety of jewellery items like hair clips were designed by this



group. Gifts using woven mats made by crafts persons from Agartala were developed during the extended period of the workshop. A cover for 'Good- night' (A mosquito repellent) gadget in bamboo makes it a culture friendly gift item which the company can market easily.

Stationery items dealt by the second group covered concepts of specially decorated pencil boxes, containers for paint brushes, paper holders, letter racks, clips etc. The group on kitchen and household items came out with wide range of new designs for spoons, forks, mugs, tongs, salt and pepper containers, napkin holders, menu-stands etc. Four types of trays were made in Bamboo.

The lamp group, brought out new, rich ideas for bamboo lamps. Use of flexibility of bamboo mat to generate new forms and addition of calligraphy to give an exclusive Indian identity make these designs unique.

The furniture group pursued two directions. Firstly, the group came with new ideas for mass produced elements in bamboo for furniture, secondly, the group explored the potentials of joints.

Carrying items like hand bags, boxes for tools, bags with combination of materials like bamboo and canvas, leather, were designed by the next group.

Bamboo packages were explored innovatively by the group working on packaging. Bamboo mats were used to create new forms. Use of threads and ribbons makes the packages exclusive. All the concepts need further development, but they trigger off and open up a

whole lot of new possibilities for bamboo products.



Group participants

S. Nadkarni, Pradyumna Vyas, Vinayak Nabar,
Vina Dalal, Marion Jhunja, Praseed T. V.,
Sandeep Karyakarte, Vandana Ujrekar,
Kiran Sabnis, Bappaditya Roy.

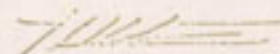
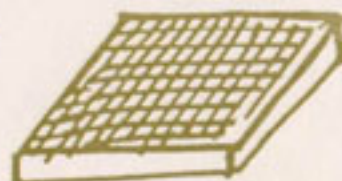
GIFTS AND SOUVENIRS

Potential items identified for design

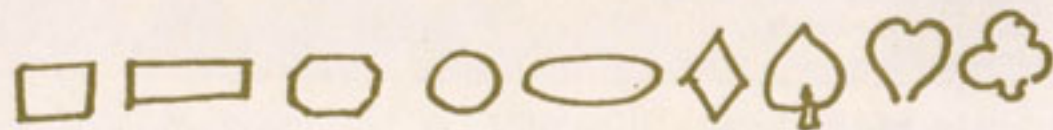
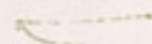
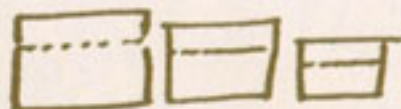
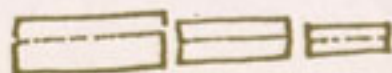
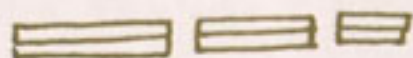
Wall sculptures, mobiles, wall calenders,
picture frames, mirror frames, toys, jewellery,
flower vases, planters, candle stands, cuff-links,
buttons, key chains, dolls, painting and
calligraphic brushes and pens.

Thematic gifts based on wild life: birds,
animals, insects etc.

SCARF BOXES / BAGS



3 BOXES IN ONE
NEST OF BOXES



Multipurpose/Multiple Uses
BOXES: TRINKET/JEWELLERY/SEWING

PENCIL/PENS/BRUSHES/etc

LETTER/PAPER.

GIFT ITEMS.

RACKS SHOE HOLDER
HOLDER SHOE RACK
BOOKS/PAPER RACK/or/HOLDER
MAGAZINE RACK

TRAYS: TO HOLD PAPER, FRUITS
SERVING TRAYS.
To hold anything

BOOK ENDS: that can be used on table
(work Table/Kitchen Table)

IN THE KITCHEN TO HOLD Utensils/Vessels,

FILES.

File Covers

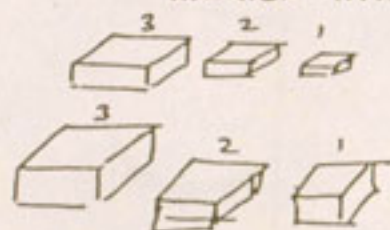
MEMO PAD COVERS

Take strands THE TO 
Export Packing Structure in Bamboo

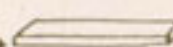
GIFT

BOXES OF ALL KINDS BOXES/CHESTS

TRINKET BOXES: (NEST OF BOXES - ONE INSIDE
ANOTHER - IN A SET OF 3)

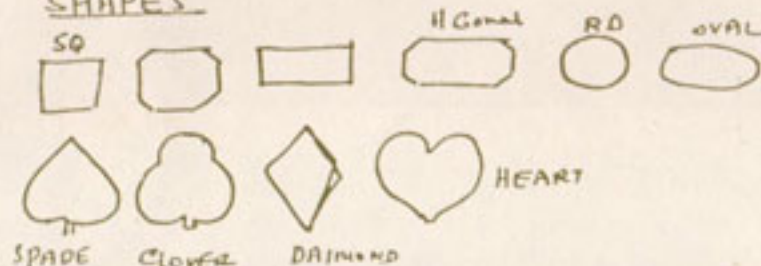


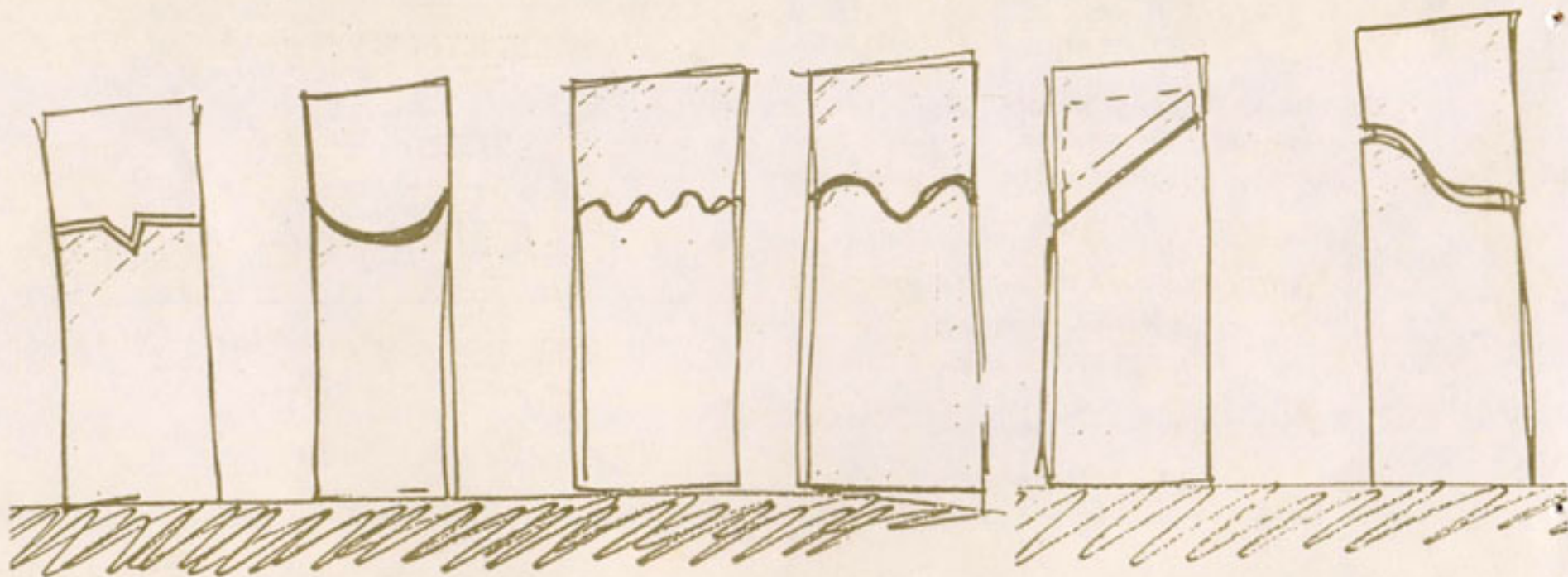
IN EACH SIZE - set of 3 Boxes. each
to sit INSIDE the other.

BOXES CAN BE SHALLOW 

OR DEEP
IN HEIGHT 

SHAPES



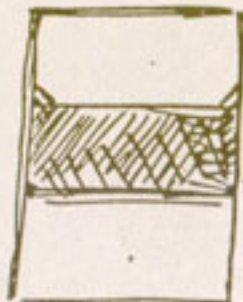
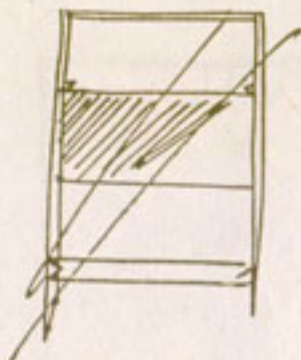


Gift boxes in bamboo with formal
variations in the parting line of lids.



*Concept Layouts for
Wall Calendars in different sizes.*

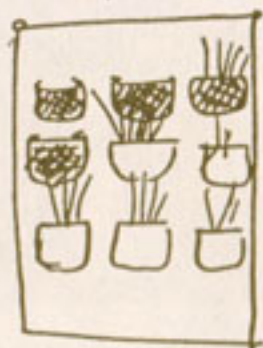
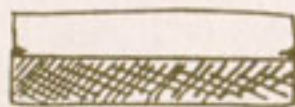
Letter holder



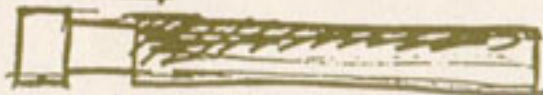
Frame Bamboo
Sheet



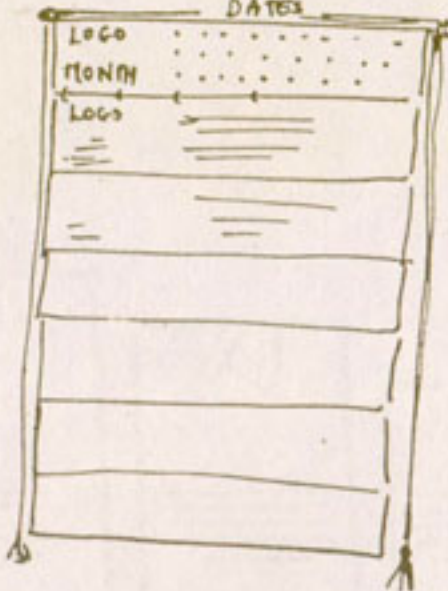
STRIPS OF WOVEN
Bamboo



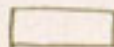
BOARD TO Hold
different articles



DAY
DATES



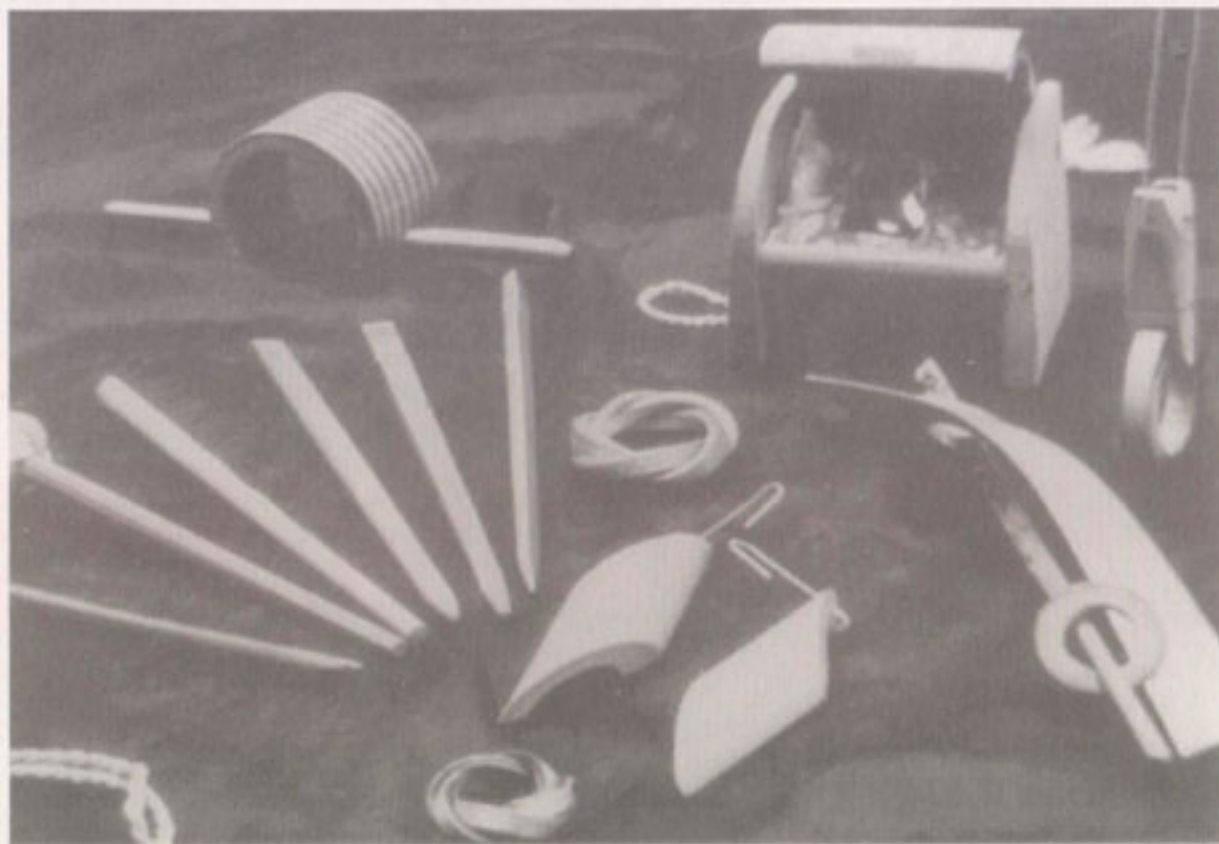
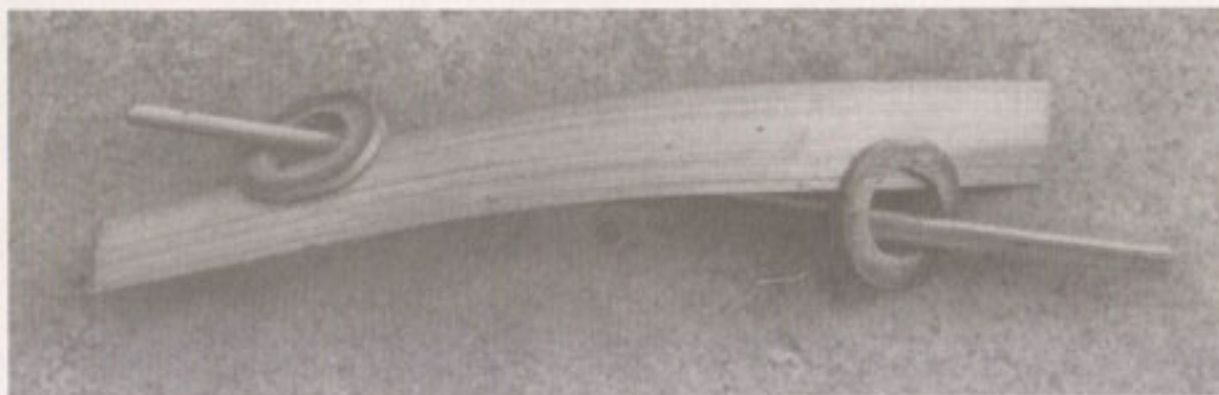
Six months one
side
Six months be
THIN STRIPS
SLICES OF BAM
FLAT STRIPS



1	1
2	2
2	2

1. Hair clip designed by Pradyumna Vyas, using the flexibility of the bamboo strip to get a twisted profile held between two slim bamboo rings.

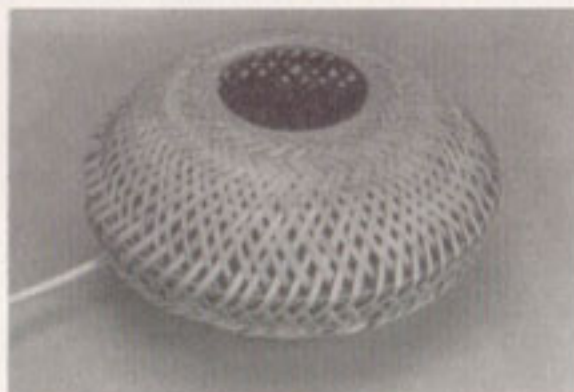
2. Costume jewellery in Bamboo. The range of gift items made during the workshop, which include hair clips, hair pins, pendants, ear-rings, buttons etc, exploring the versatility of bamboo. Angular cuts, slits, scribing, weaving etc are some of the techniques used cleverly for this range of fashion accessories.



1	
1	
	2

1. Traditional weaves are reinterpreted in newer forms for decorative mantle pieces.

2. Another woven pattern used as a casing for the Goodnight gadget. This could become an ideal promotional gift.





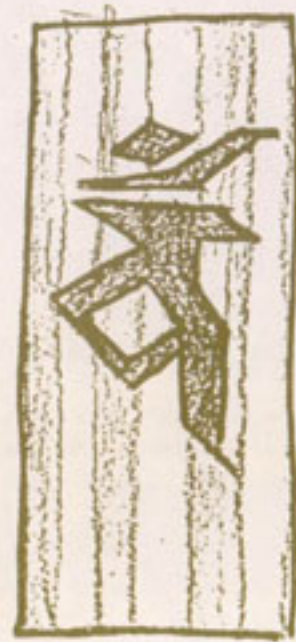
Group participants

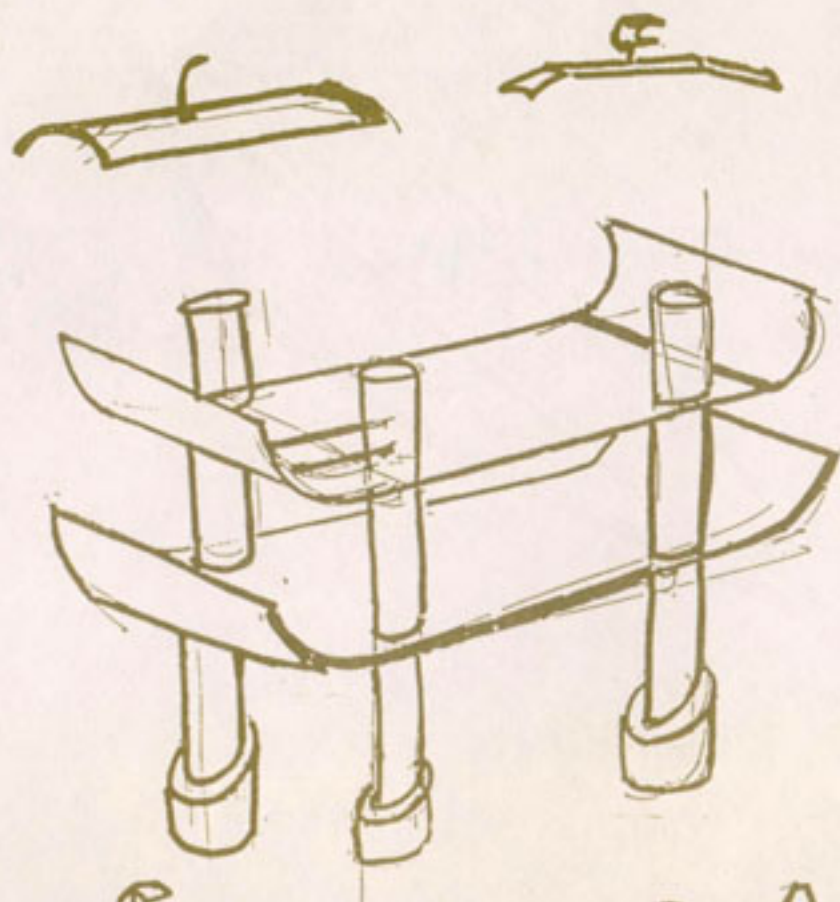
Debasis Mandal, Madhavi Koli, Raja Mohanty,
Nimish Vohra, Sejal Druv, Ratan Gangadhar,
Arun K., Ravi Darad.

STATIONERY ITEMS

Potential items identified for design

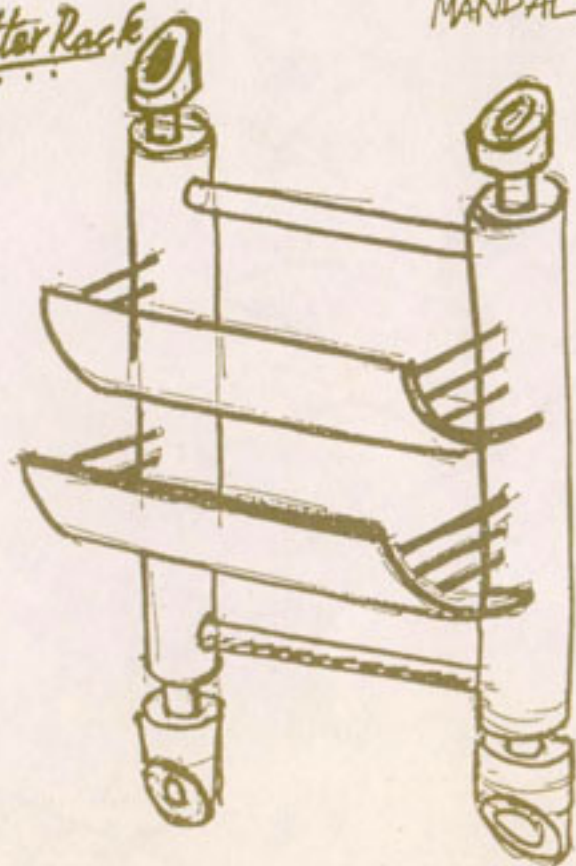
Pens, pencil stands, office trays, desk calenders,
paper knives, book marks, diary covers, seminar
files, stationery items with specific identity.





Letter Rack

MANDAL



HANGER



CLIP

Try threading bamboo

CLIP

SHT IN HANDLE

METAL
WIRE TO
HOLD ONE END



GROOVE

Metal
rod / bamboo
in groove



press with
thumb

metal
strip to prevent

ROCKING PIN CUSHION

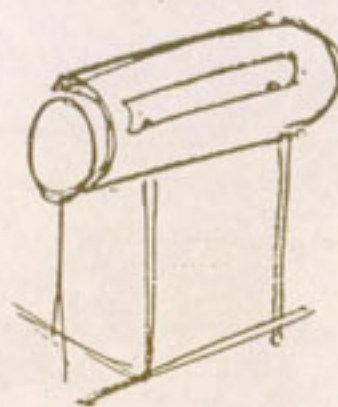
PIN CUSHION

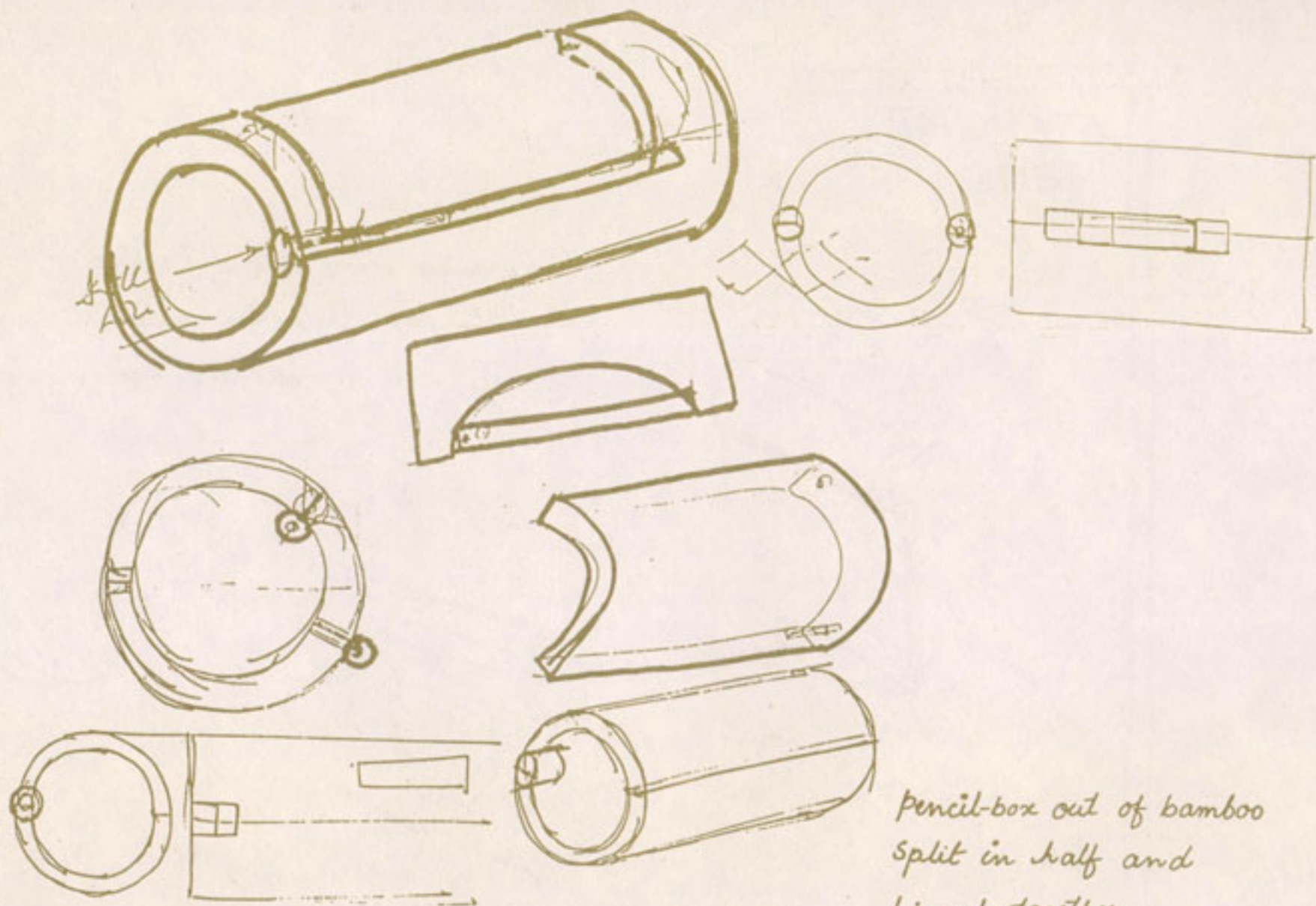


TWO BAMBOO
PIECES STUCK
TOGETHER

STATIONARY ITEMS

Mantle items out of bamboo
with paper rolls for various
uses such as Calenders, memo pads etc

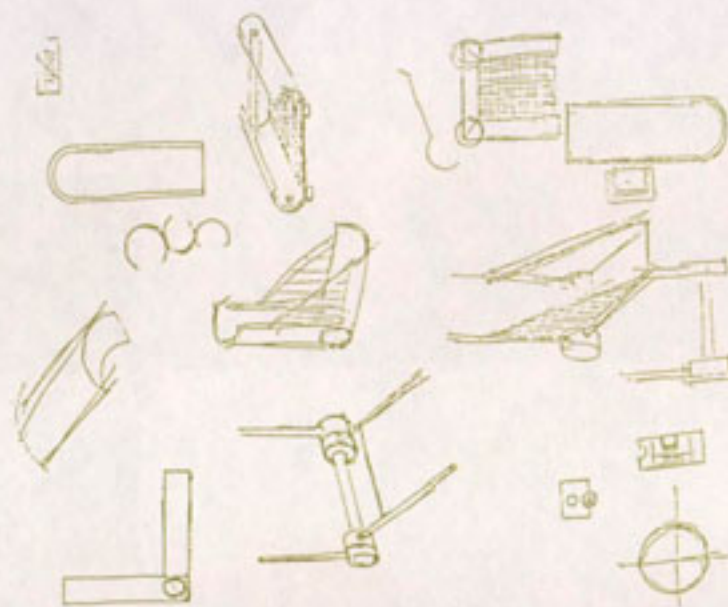
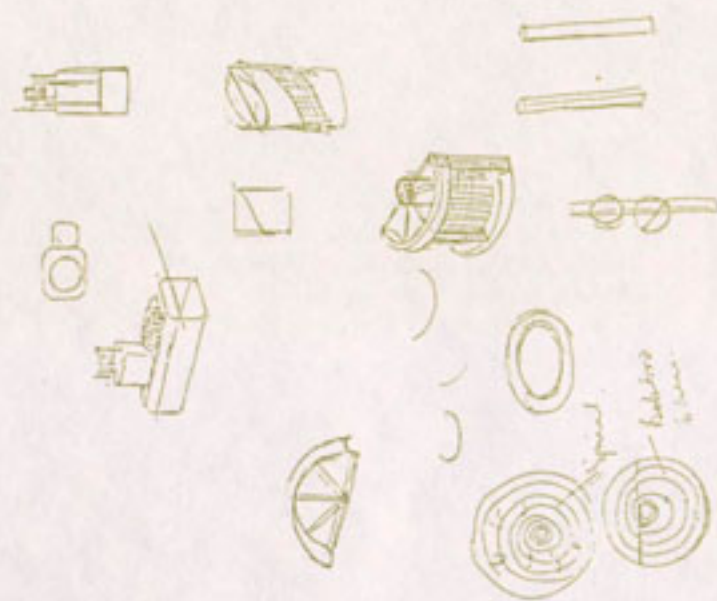
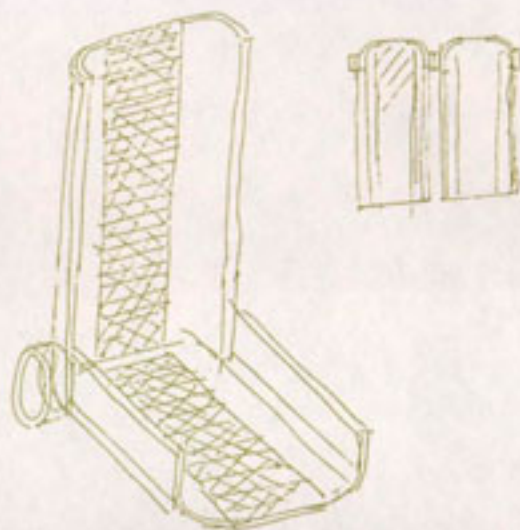




*pencil-box out of bamboo
split in half and
hinged together.*



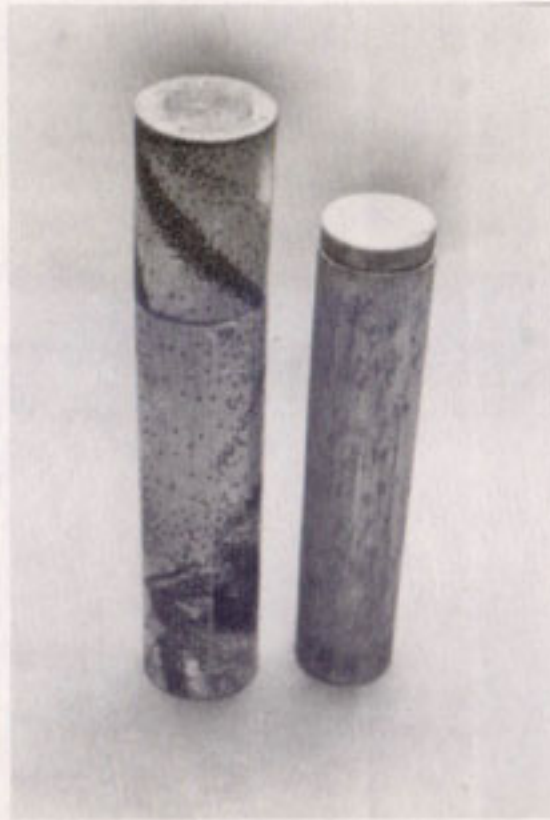
Pencil-boxes and Pen stands using
Combination of bamboo sections and
woven mats.



1	
1	
2	

1. Using the hollowness of bamboo this product was designed as a pencil box. The outer surface is turned and finished. Threading is done from outside to fix the cap. Different types of graphics could be screen printed on the external surface.

2. Paper clip in bamboo.





Group participants

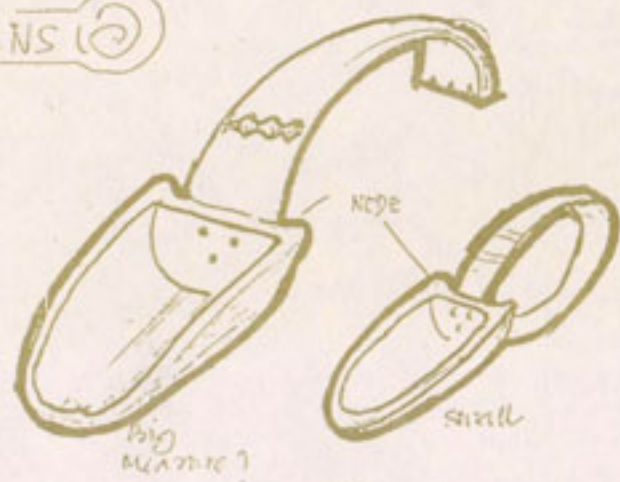
Unmesh Kulkarni, Anuprita Surve, Pradeep Brar, Ganesh Gaikwad, Abhijit Thosar, Alok Govil, Varsha Sathaye, Vijay Kumar.

KITCHEN AND HOUSEHOLD ITEMS

Potential items identified for design

Restaurant items, spoons, cups, tea coasters, dining mats, brush handles, napkin rings, towel stands, cloth hangers, menu stands, name plates, signages, door handles, shoe stands, paper racks, letter storage, salt and pepper containers, waste paper baskets, serving bowls, planters, letter box, magazine racks.

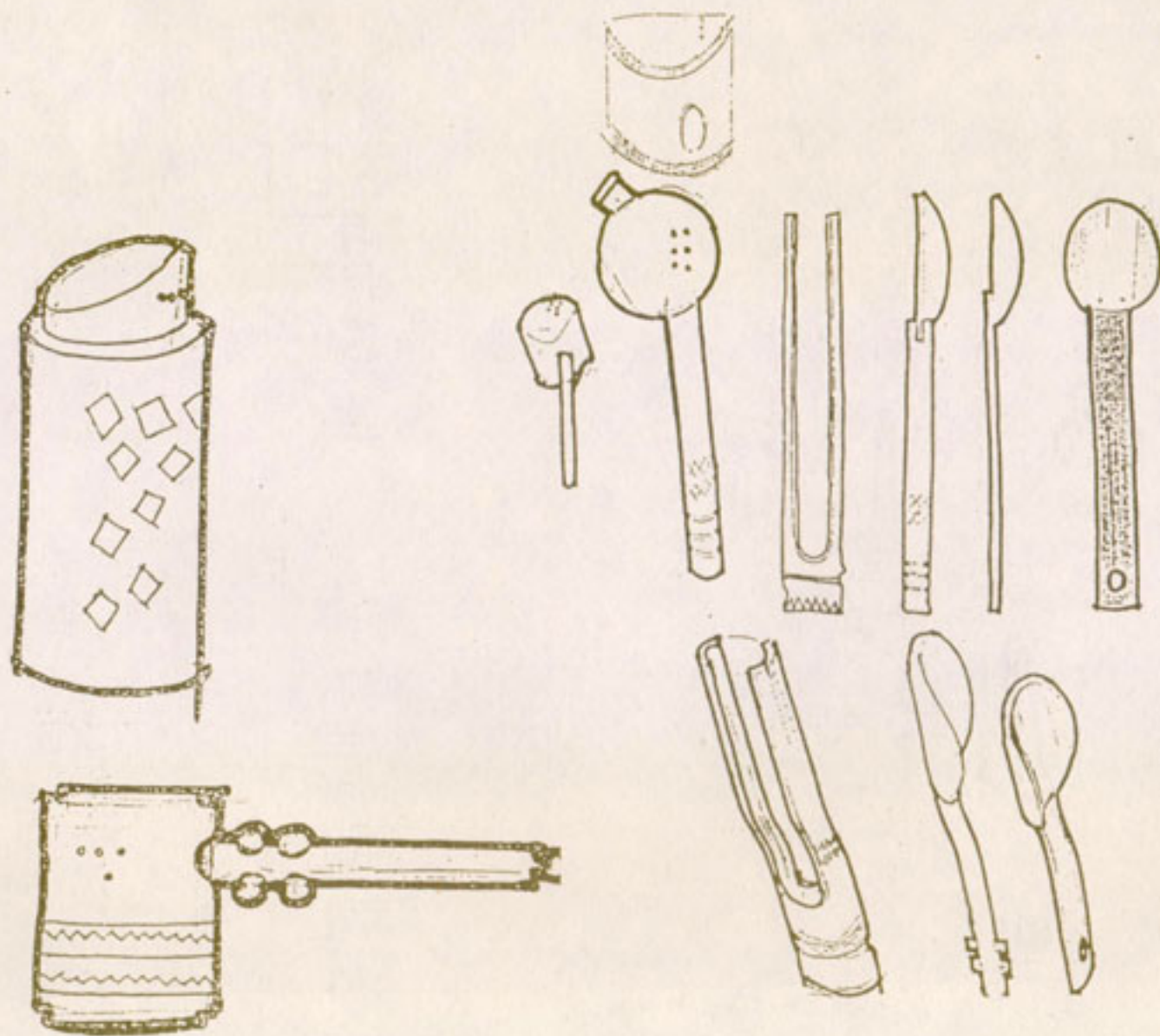
EPGLNS 12

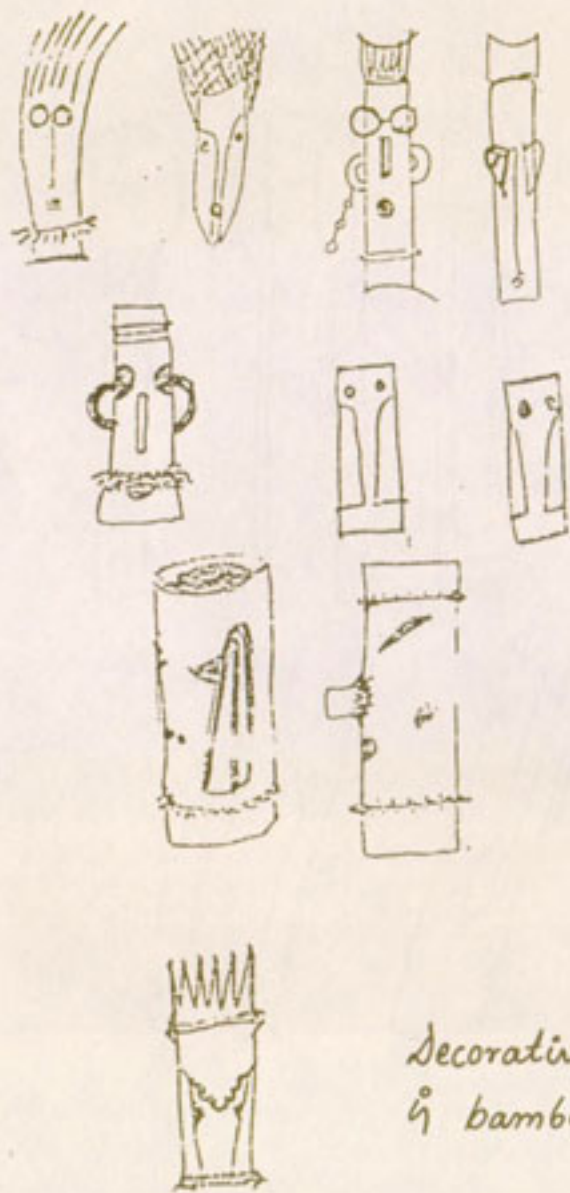


SALT
SHAKER

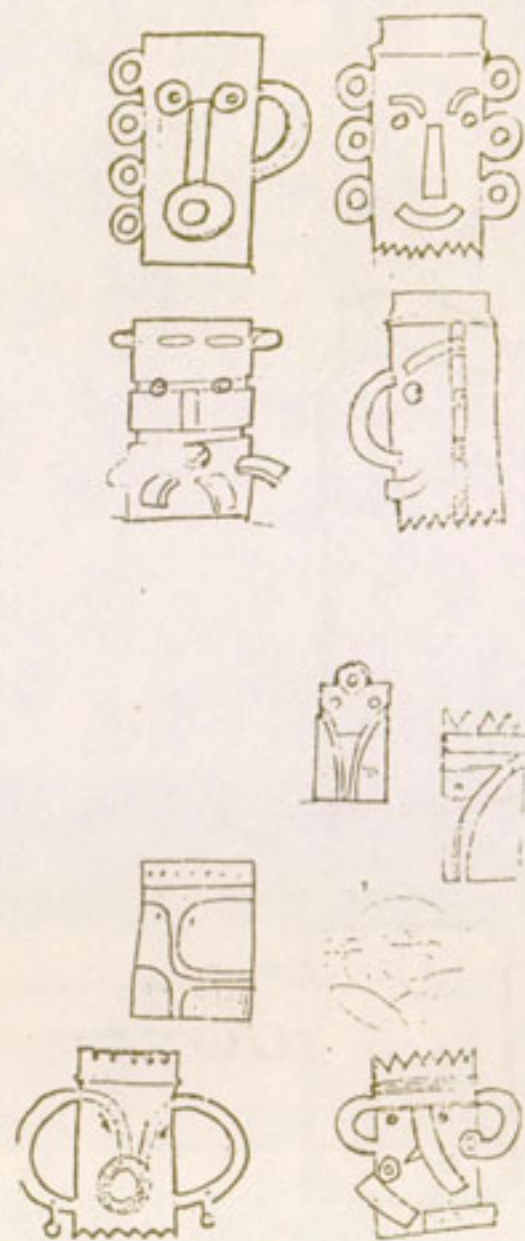


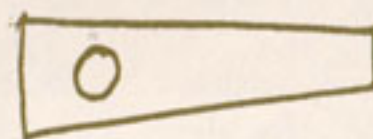
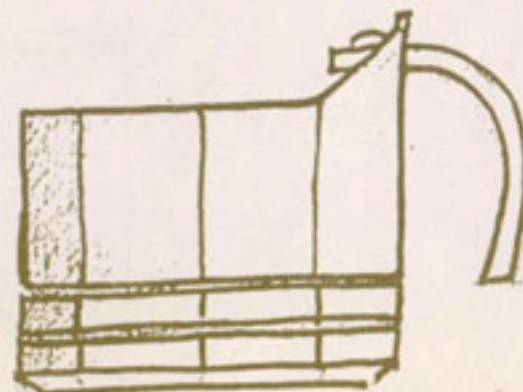
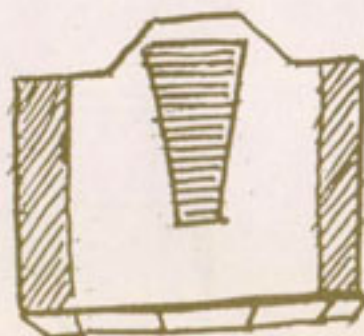
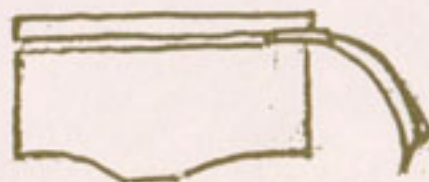
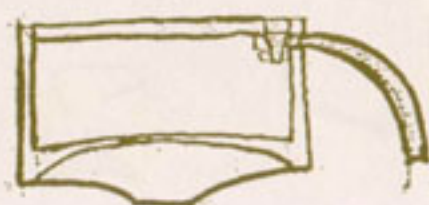
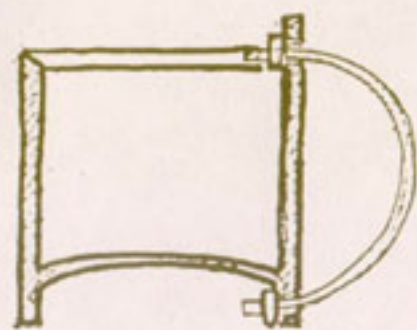
⑥ Unmesh/GR3



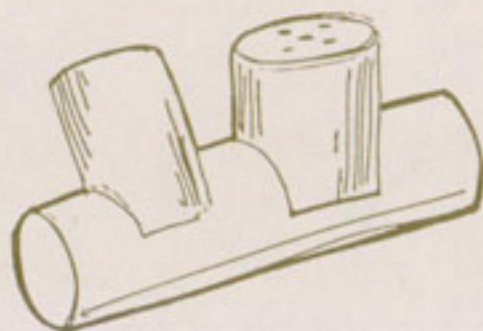


Decorative mugs
in bamboo.





② ANUPRITA / GL. 3



- Examples of mechanical
and electrical components
in a system

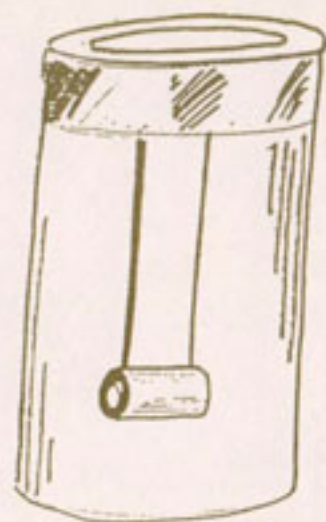


Example of a
mechanical component
in a system



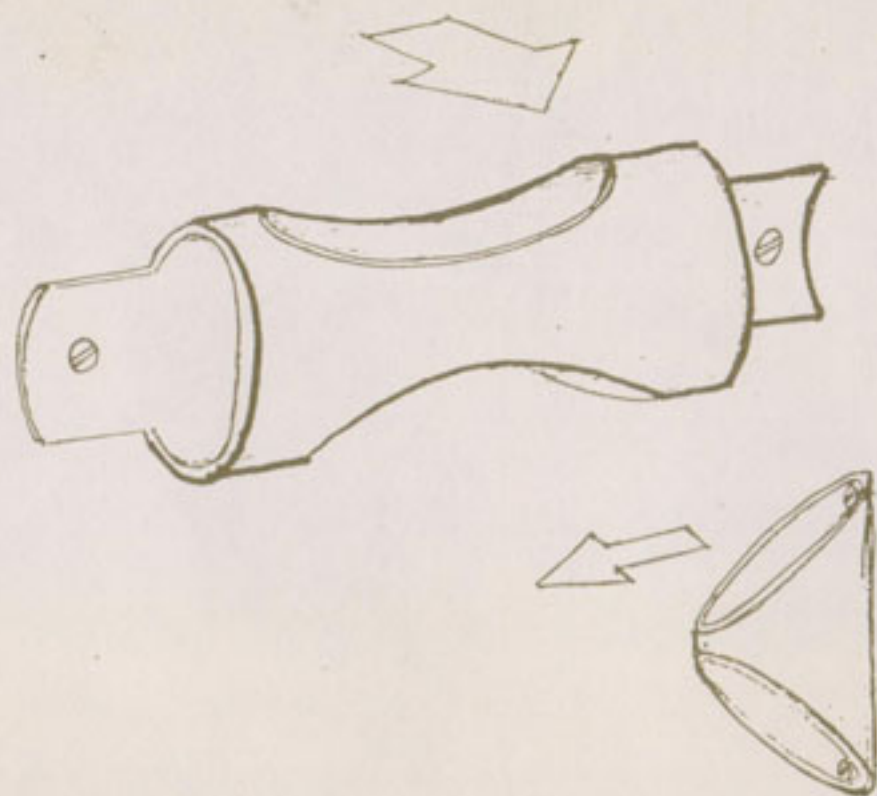
- Examples of
mechanical components
in a system

NAPKIN HOLDER

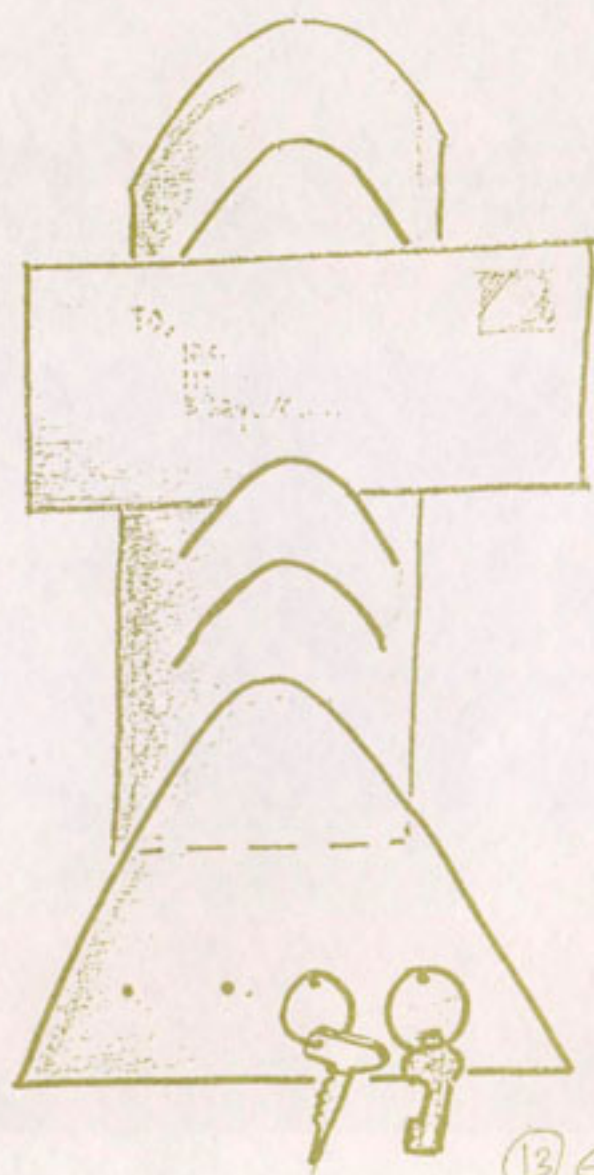


⑤ A2411T

DOOR HANDLES



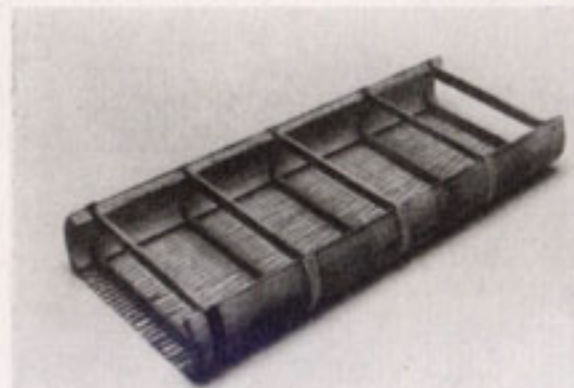
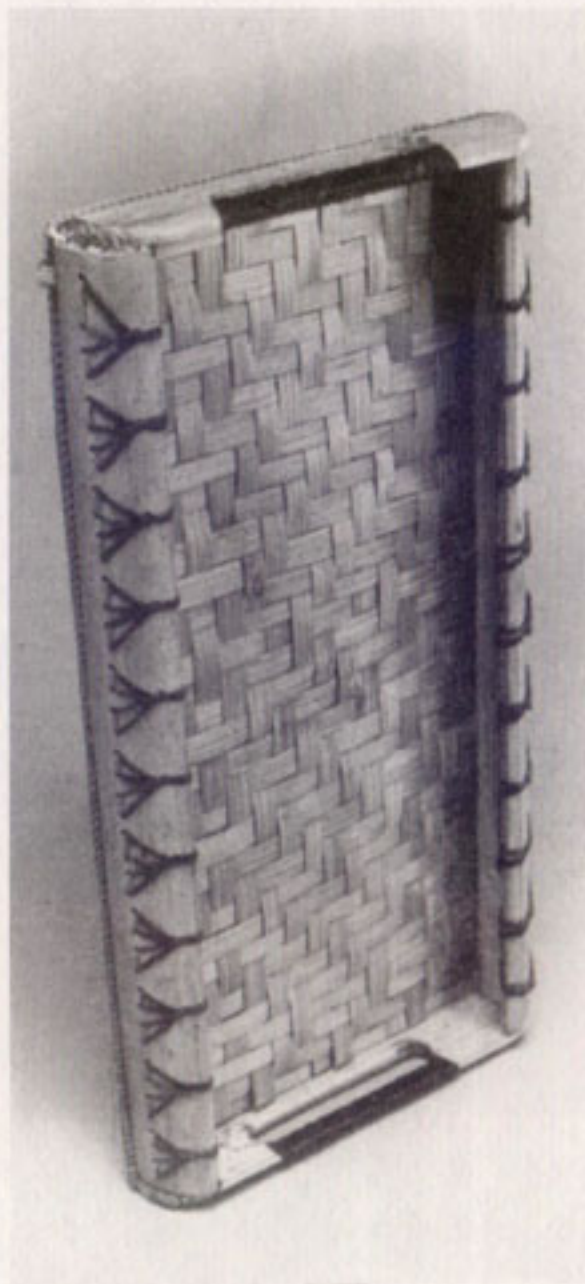
④ A3HJIT/GR 3



⑬ GR 3/ GANESH

	1
2	
2	

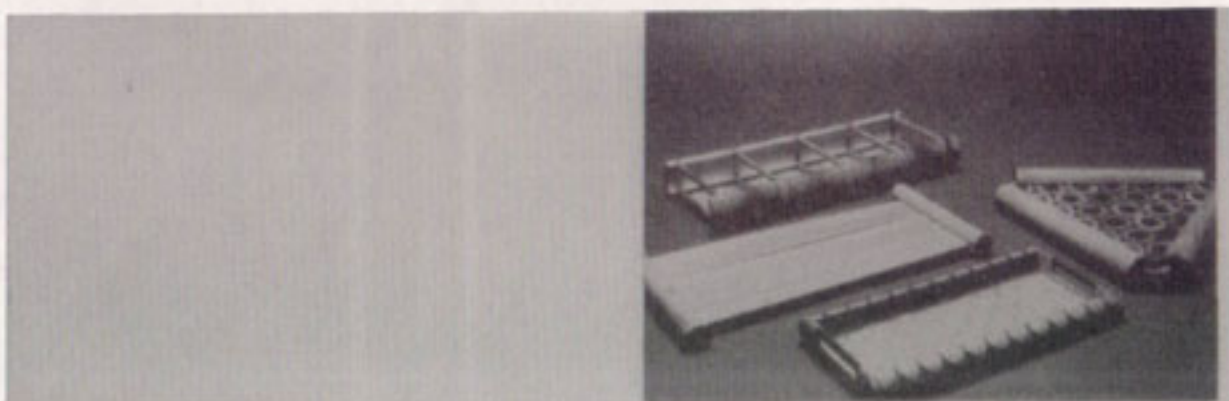
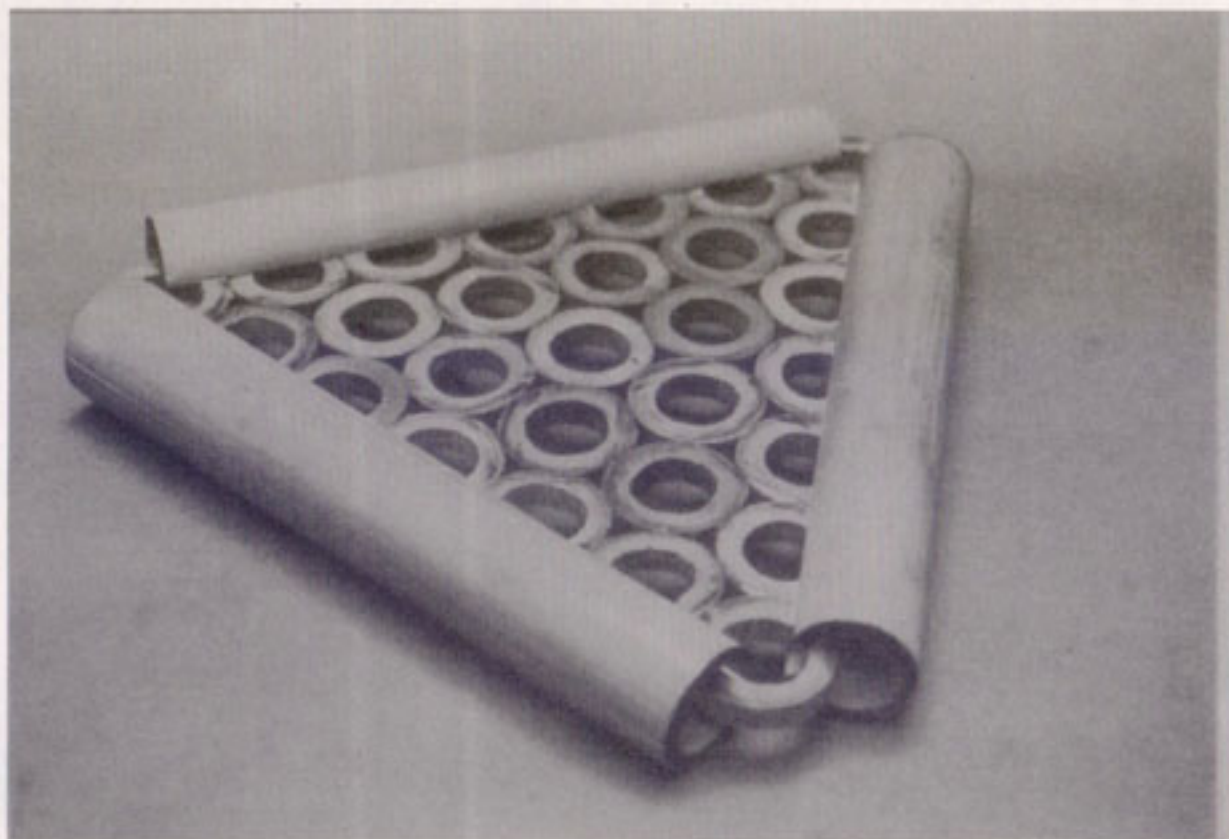
1. Multipurpose tray using a combination of woven strips and sections of bamboo. Cross bars provide the necessary strength and act as separators.
2. Similiar tray for carrying glasses etc. using silk threads for border decoration.



1	1
1	1
	2

1. Simple triangular form created by sticking bamboo rings and held together by three cut sections at the edges make an unusual, elegant tray.

2. Range of trays created in bamboo using combinations of mats, strips, rings, sections etc.

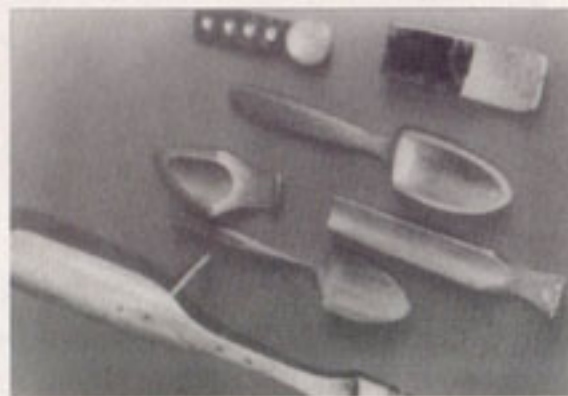
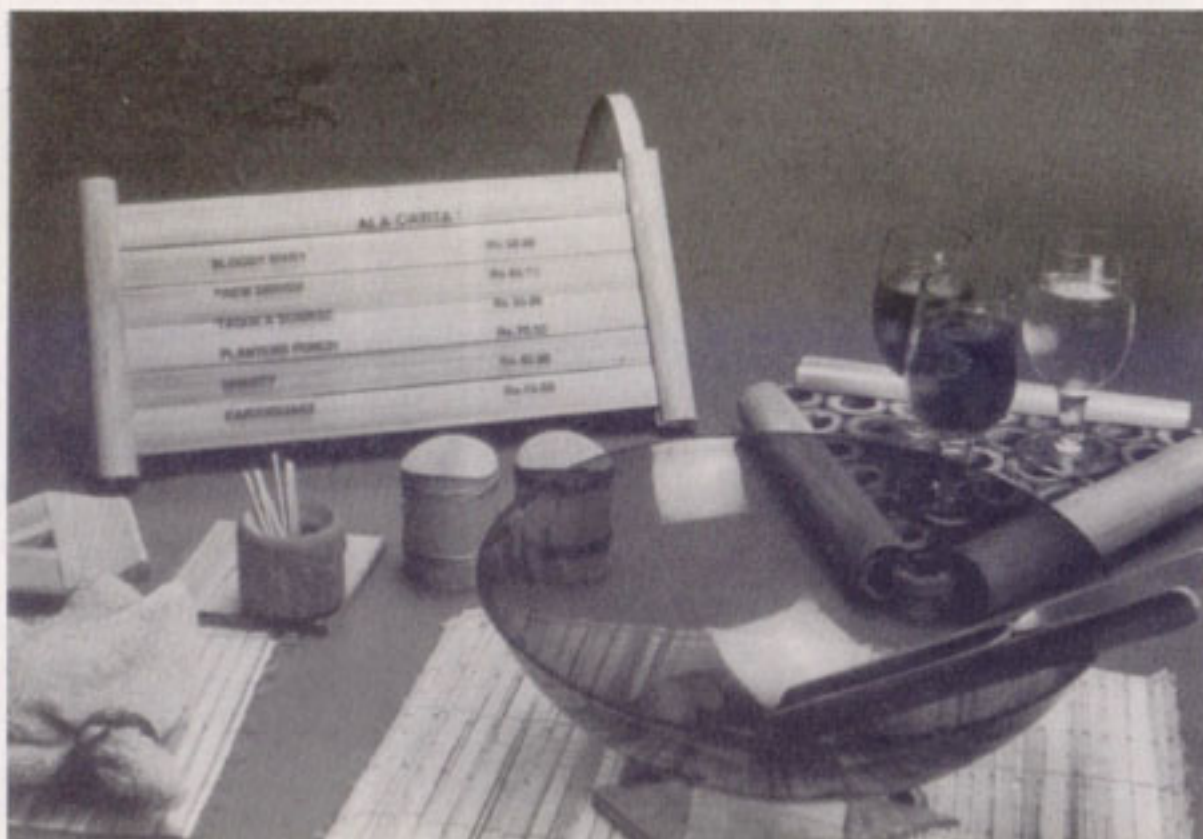


1	1
1	1
2	3

1. A range of table ware in bamboo includes Menu display, coasters, serving tray, napkin ring, toothpick holder, salt and pepper shakers, ice fork, base rings for hot vessels etc.

2. Elliptical salt and pepper shakers made by joining longitudinal sections of bamboo.

3. Serving spoon designed for scooping.





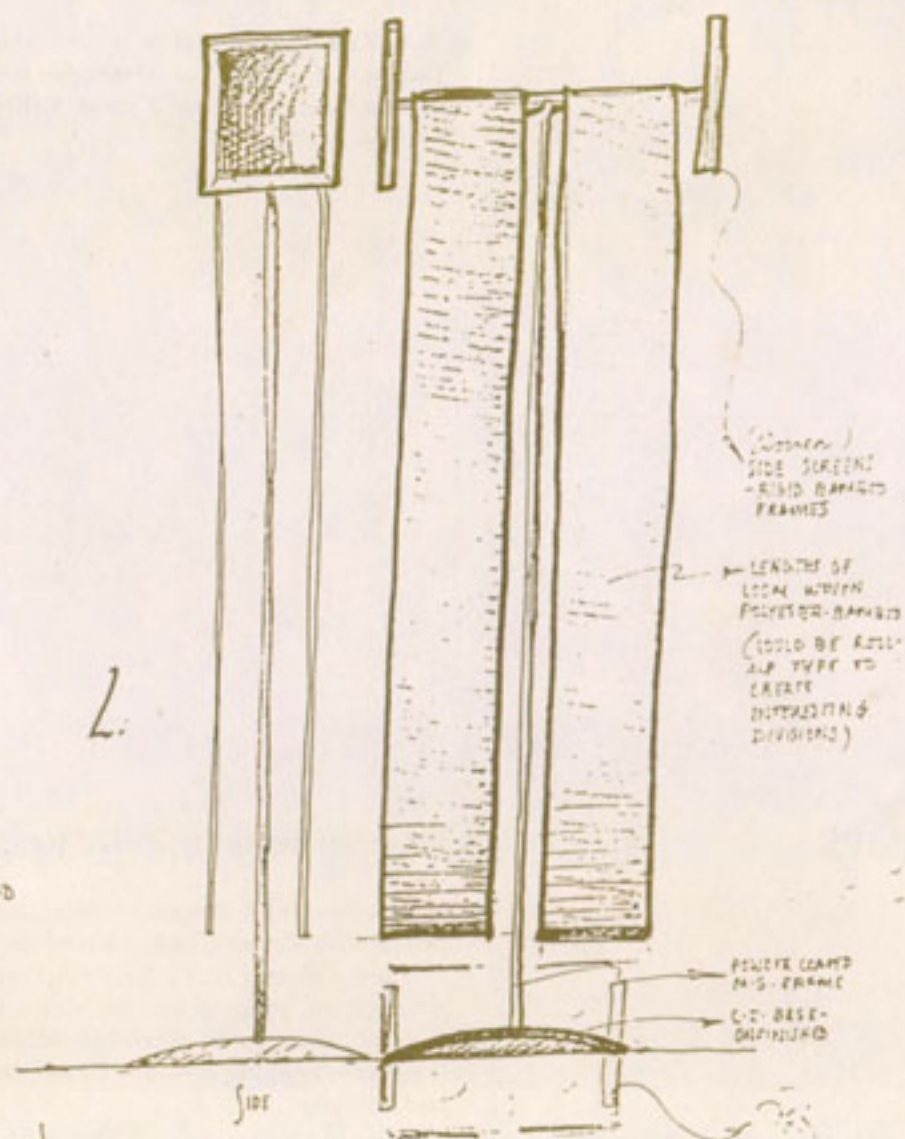
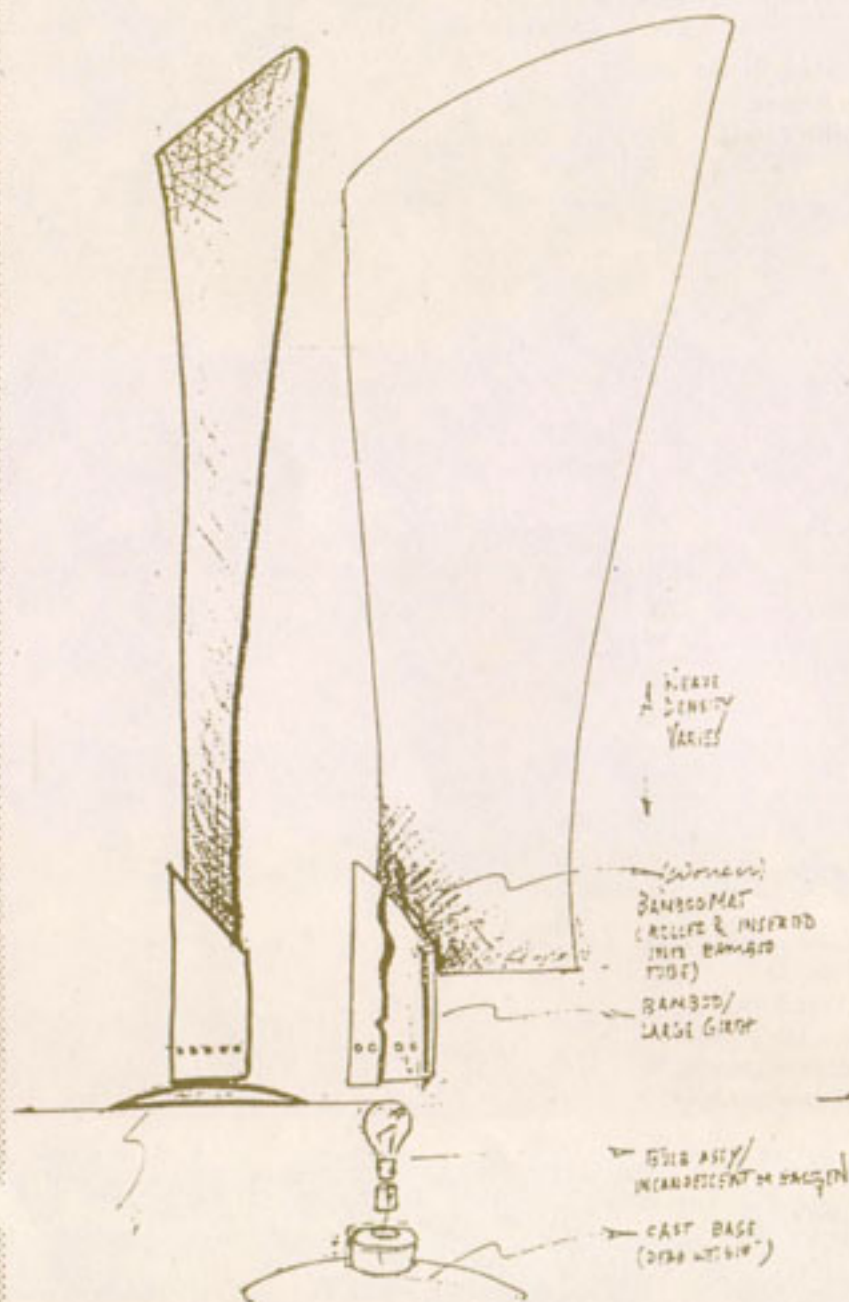
Group participants

M. P. Ranjan, Ravi Nafde, Amit Gulati, Boban Varghese, Gautam Rao, Devendra Bagwe, Suman Banerjee, Phani Kumar, Yatin Patel, Venkatesan N.

LAMPS

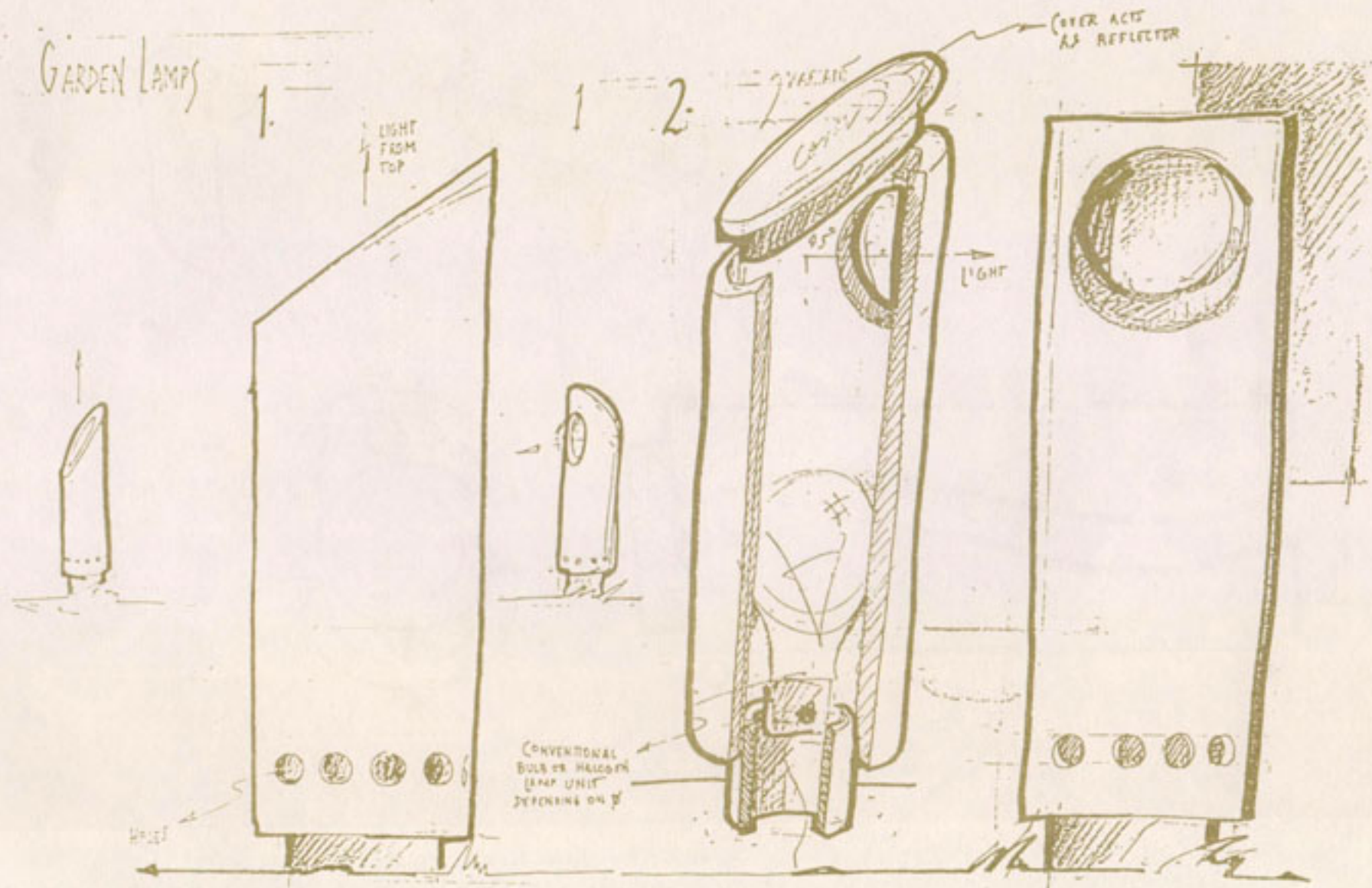
Potential items identified for design

Wall lamps, table lamps, hanging lamp shades, lamps with identity, lamps based on 3D geometric shapes like cube, dodecahedron, tetrahedron, hexagon combinations, lamp shades in combination with other decorative materials, lamp shades using metaphoric heads of birds and animals.

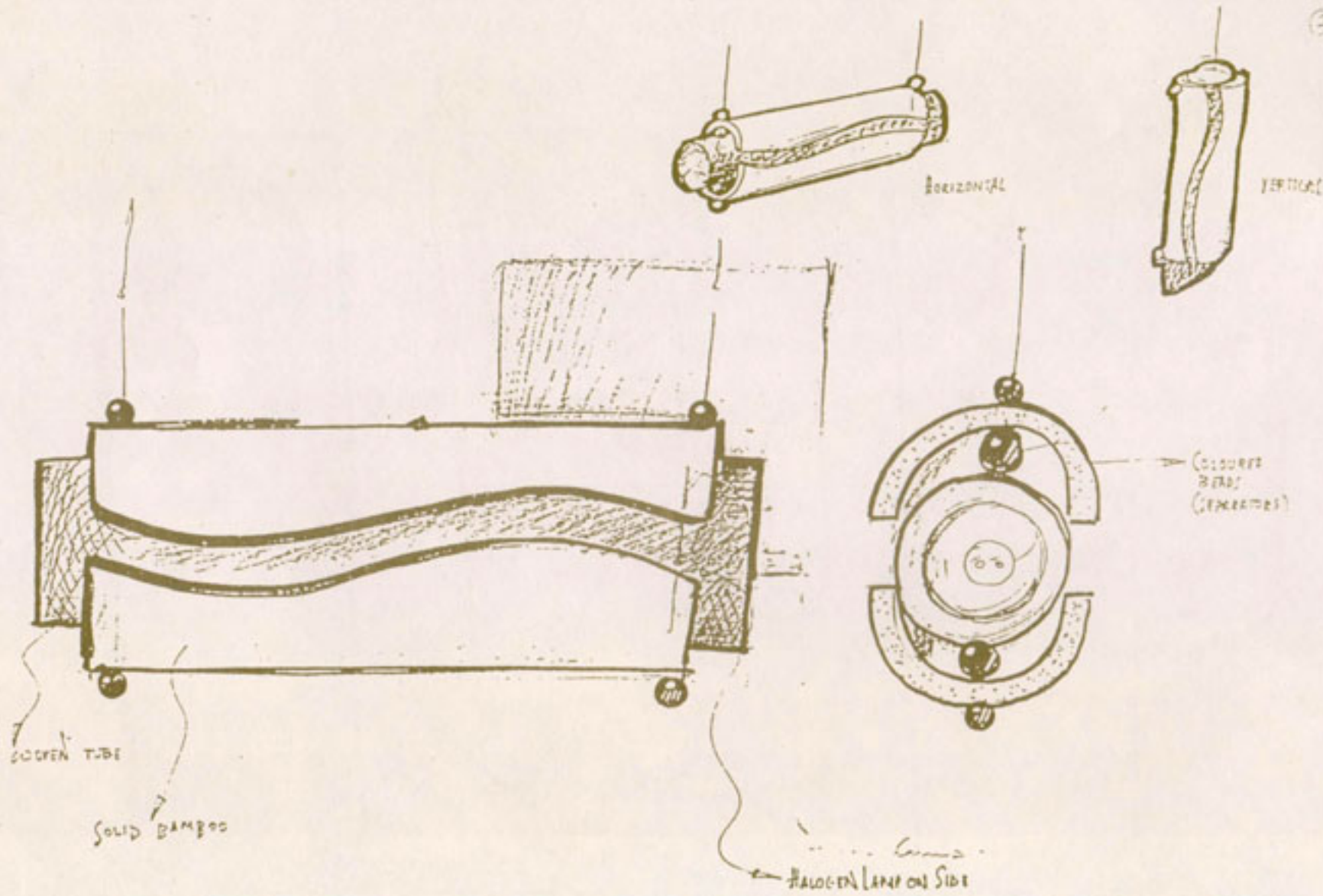


Phila 12 I 75 #3

GARDEN LAMPS

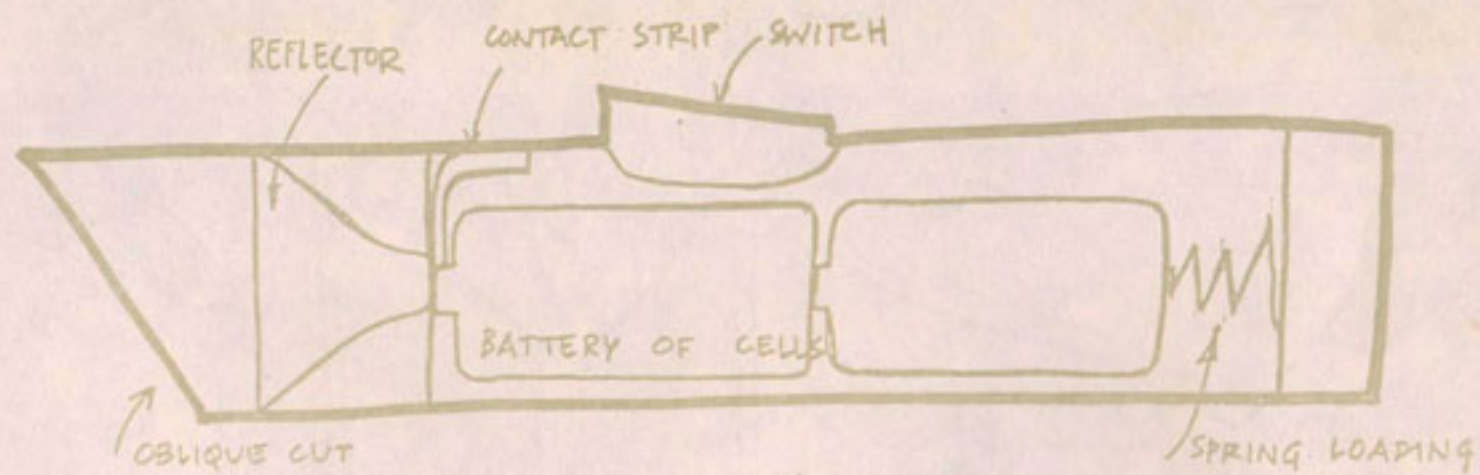


Quilati 12X1973 #1



BASIC IDEA

(15)



Hand
13/5/43

MOBILE LAMPS

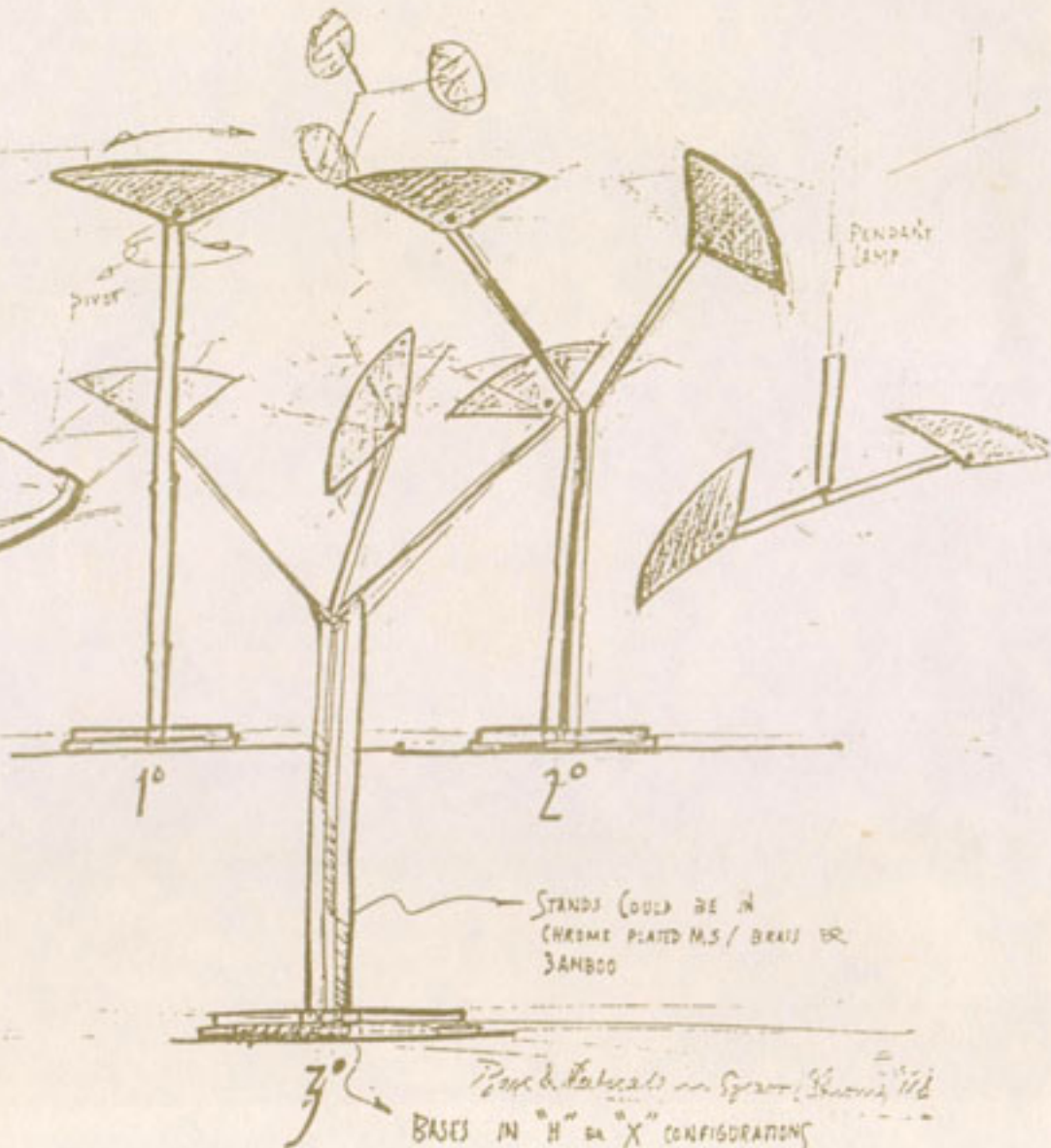
Metaphor
PALM

SHADE-WOVEN



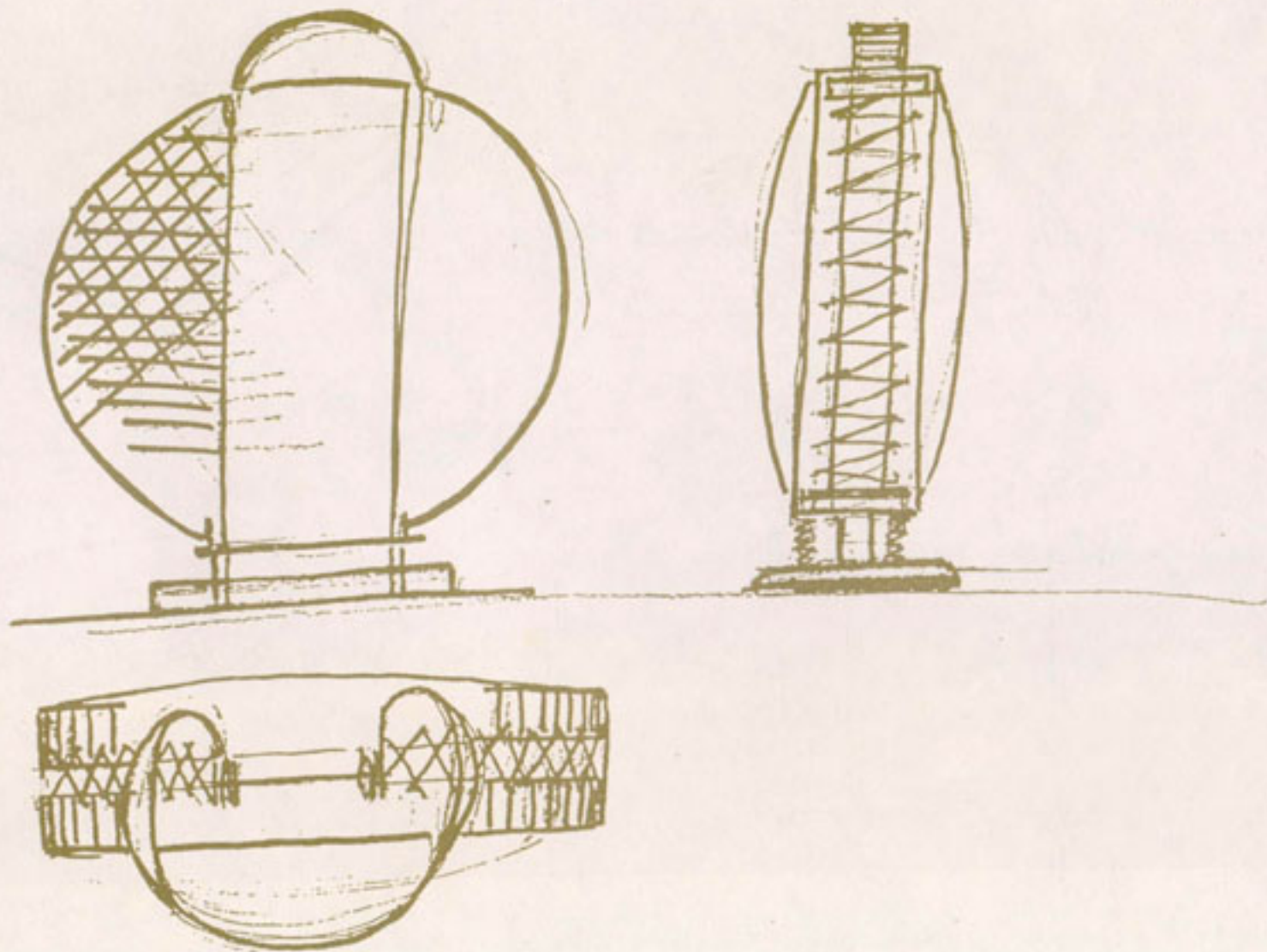
EDGE DEFINED TOPOLOGICAL
VARIATIONS

TWISTED METAL FRAME?

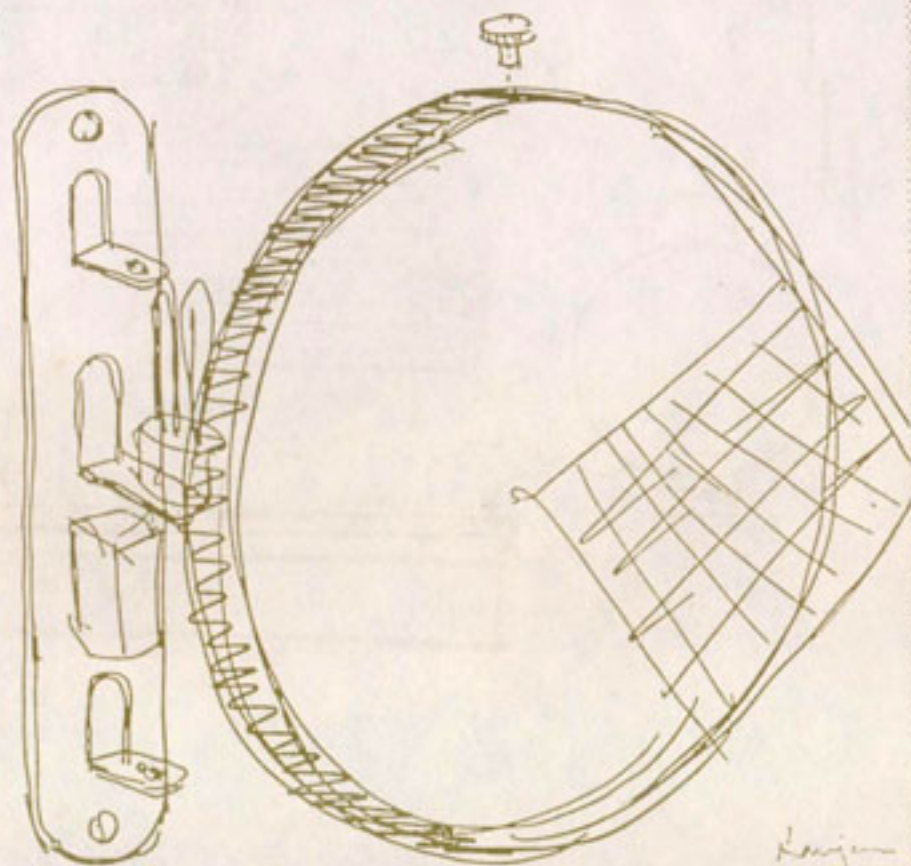
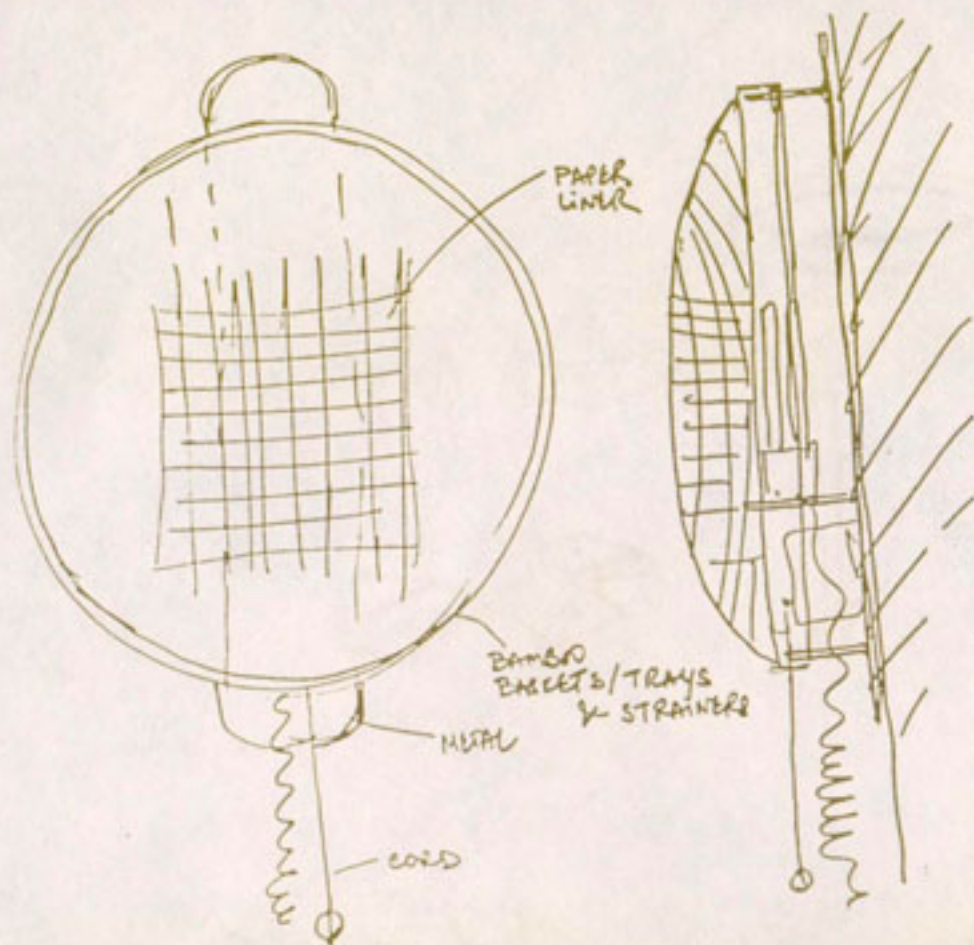


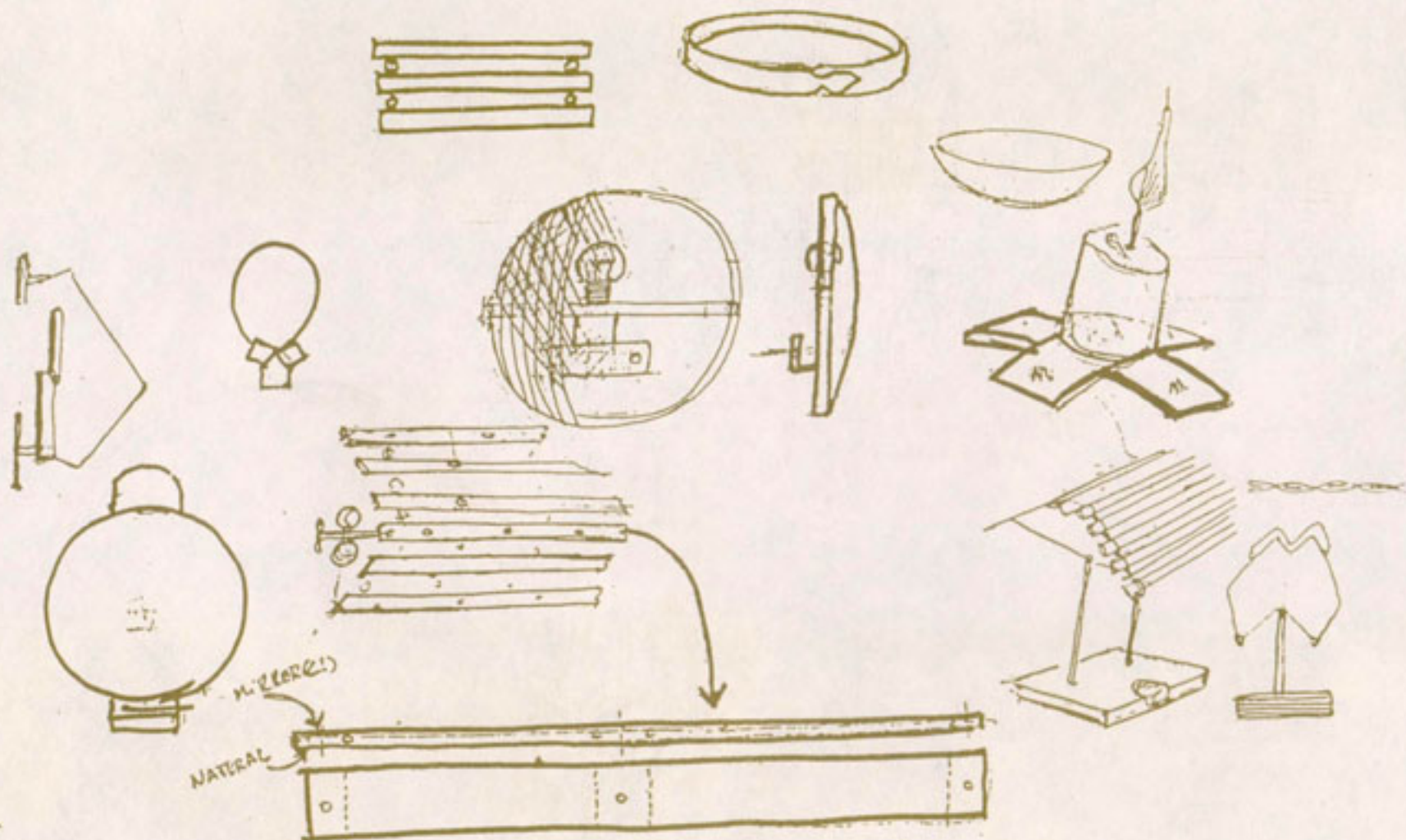
Sketch 12Z1993 #2.

10/5/33

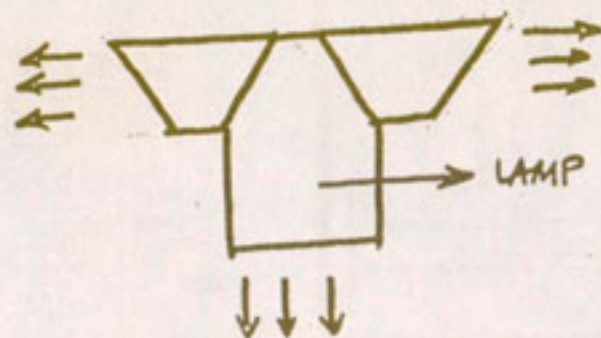


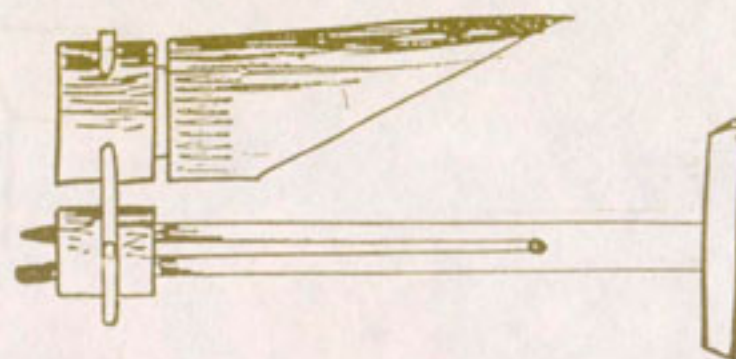
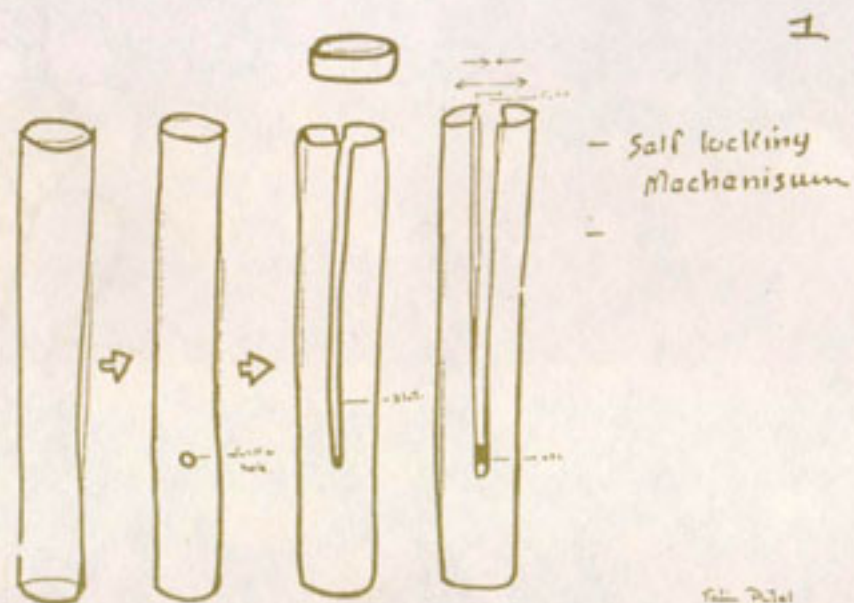
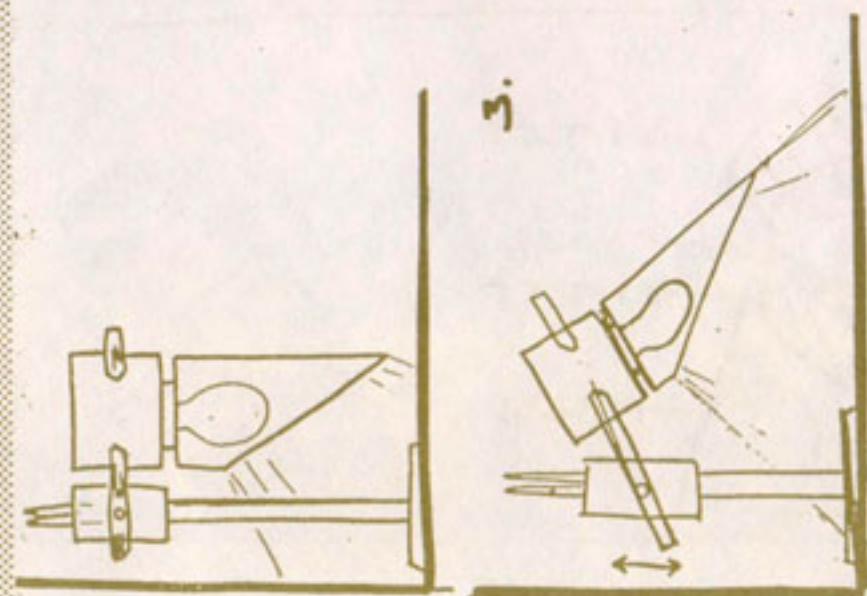
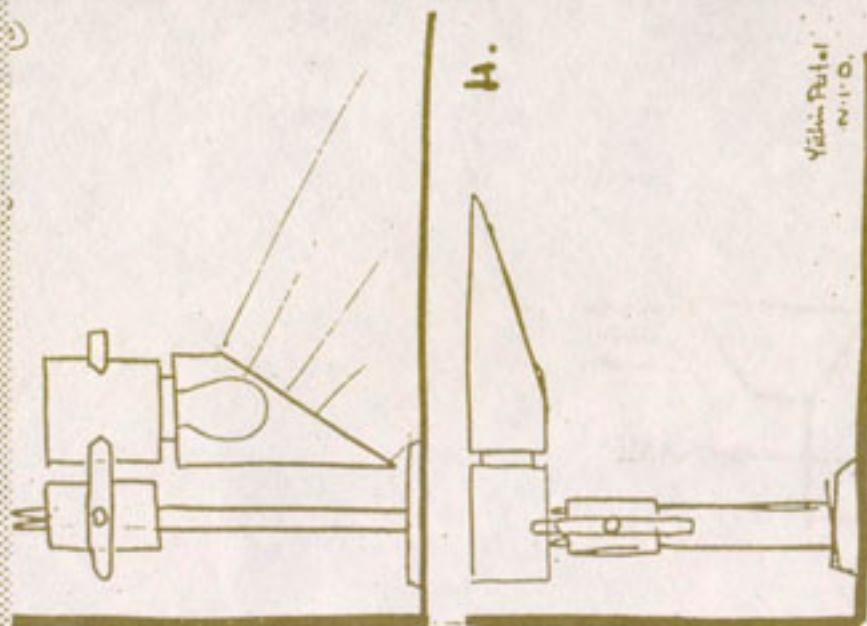
Raujan





Ranjana





1	1
1	1

1. A ceiling lamp made by master crafts-
persons from Agarthala. Intricate weaving is
done using combination of plain and stained
slits.



1	1
1	1
1	1

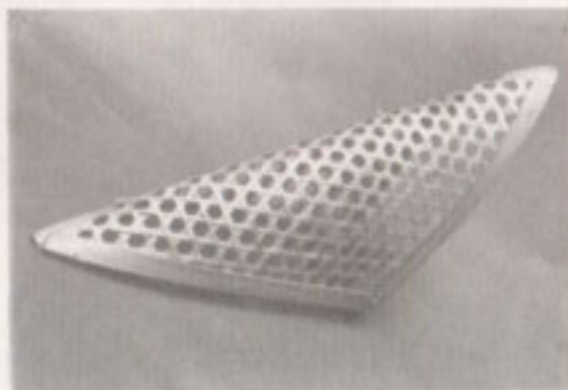
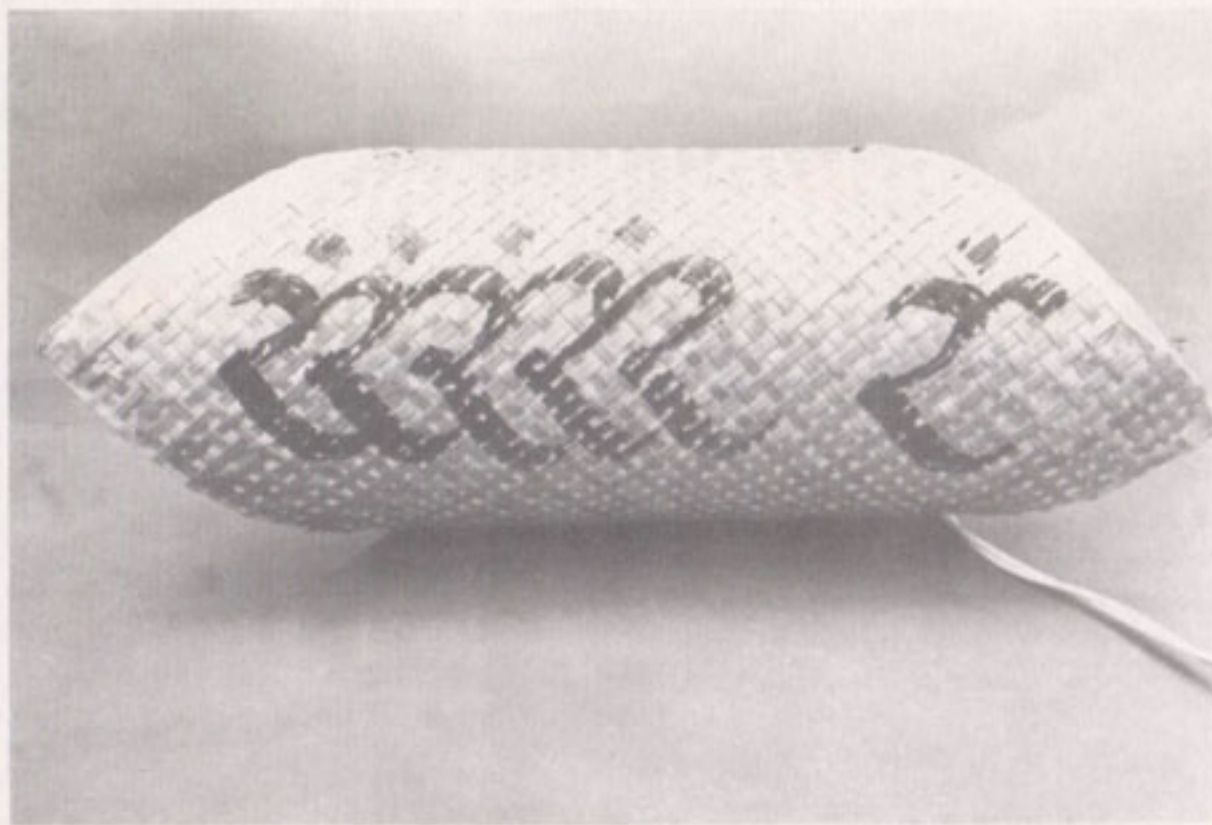
1. An example of a wall mounted lamp using woven mats as shades. The silk threads and the calligraphic expressions add to its visual appeal.



1	1
1	1
	2

1. A simple square woven mat is folded diagonally and fastened with a holder at its tip to make this wall lamp. The curved surface is decorated with calligraphic patterns.

2. A twisted mat converted into an elegant bracket lamp.





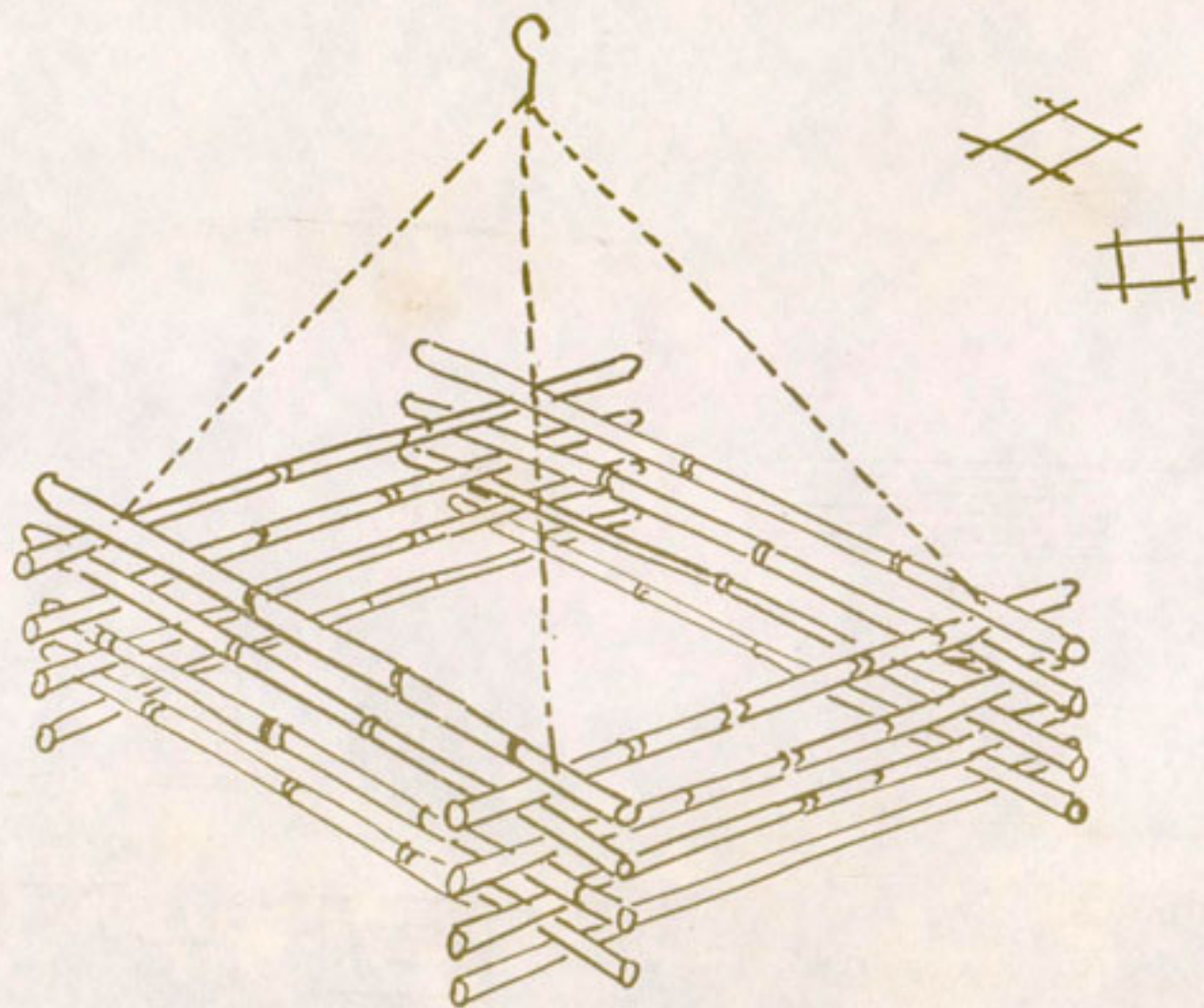
Group participants

Satish Raut, K. Munshi, Neelima Shringarpure,
Vasudha Karhadkar, Vidyadhar Pande,
Aparna Surve, Mugendi, T. Murli.

FURNITURE

Potential items identified for design

Stools, chairs, dining chairs, relaxing chairs,
racks, shelves, cupboard, window curtains
(chiks), veranda curtains, decorative curtains,
screens, partitions and other materials.

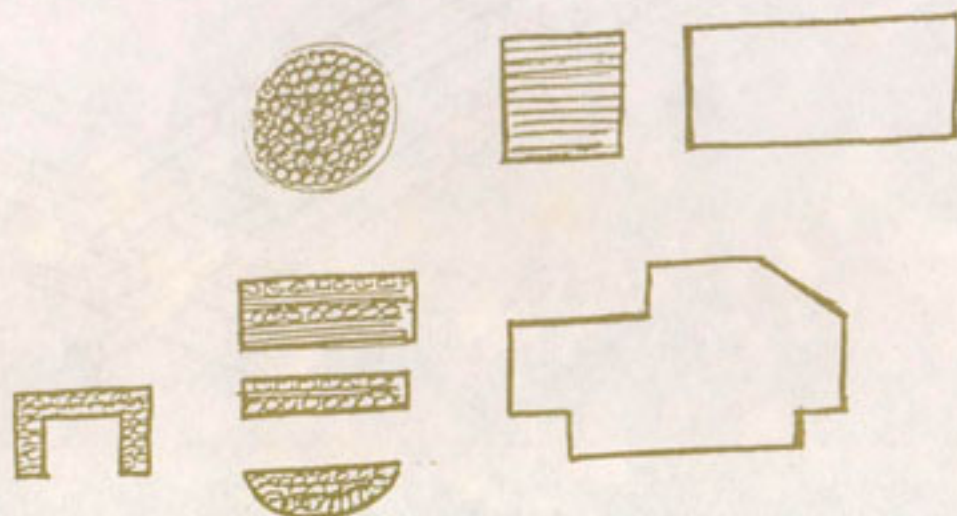


• FURNITURE GROUP

• PLANTERS



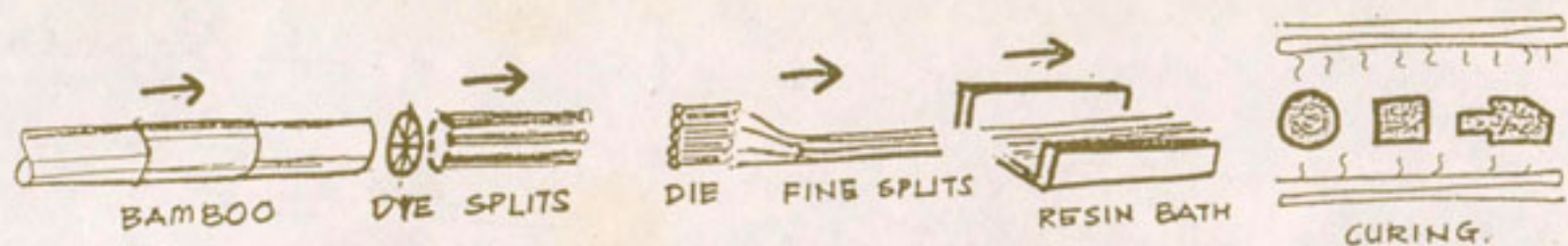
- CHARACTERISTICS :
- CHEAPER THAN WOOD/CANE/PLY
- CAN BE MOULDED



FURNITURE GROUP

• COMPOSITE SECTIONS - 1

• PROCESS FOR MAKING COMPOSITE SECTIONS

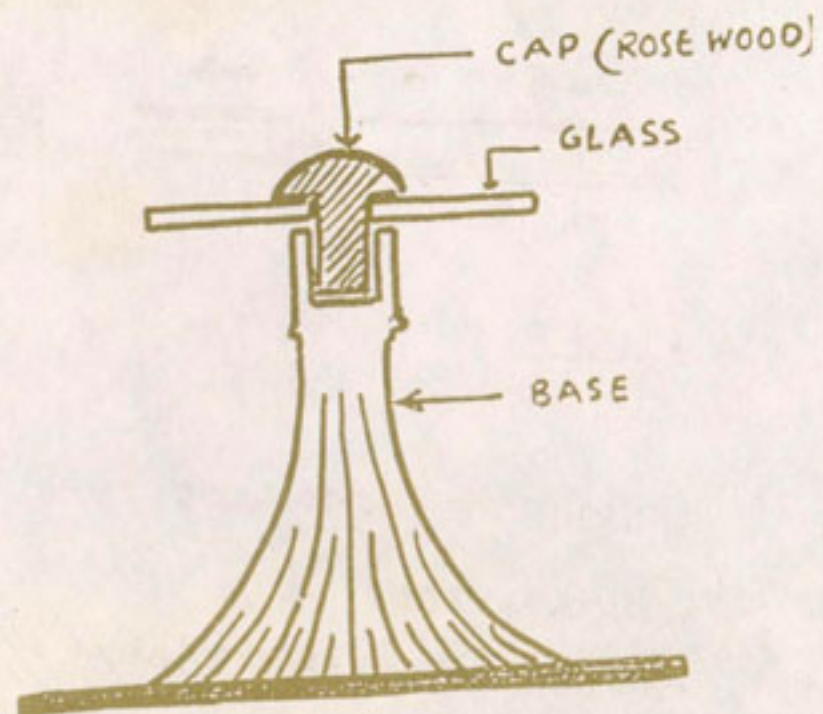


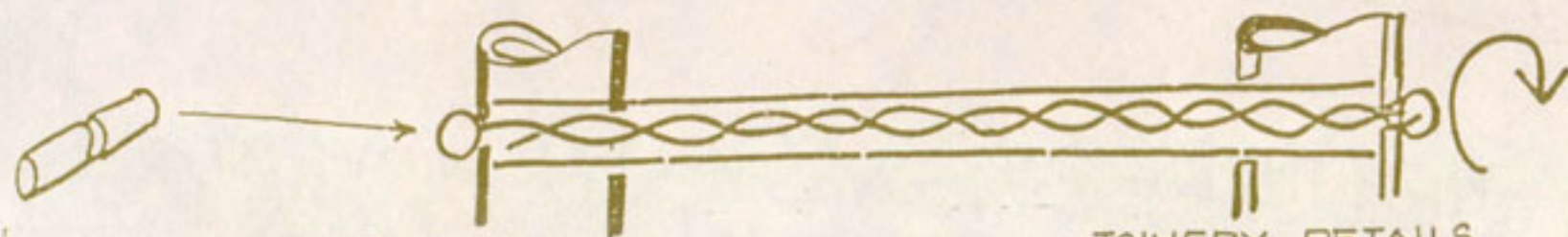
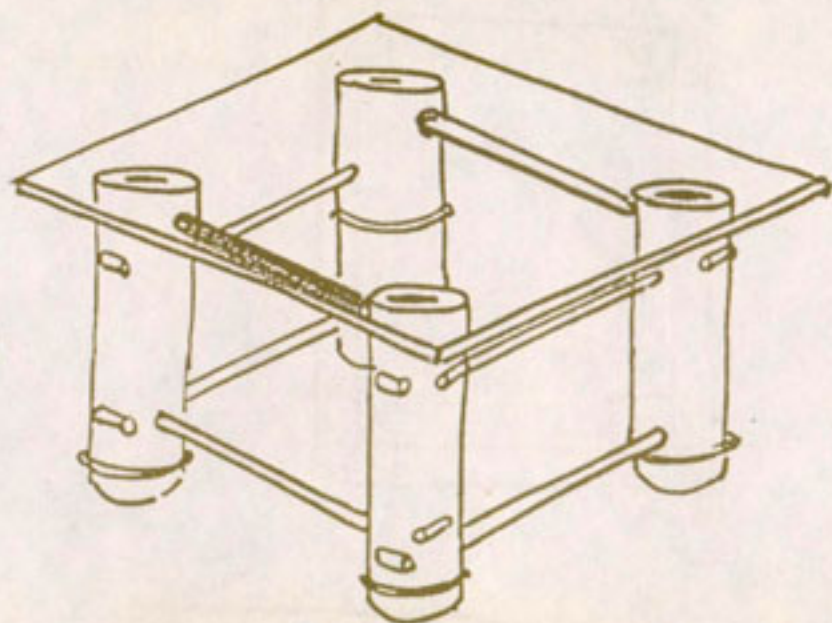
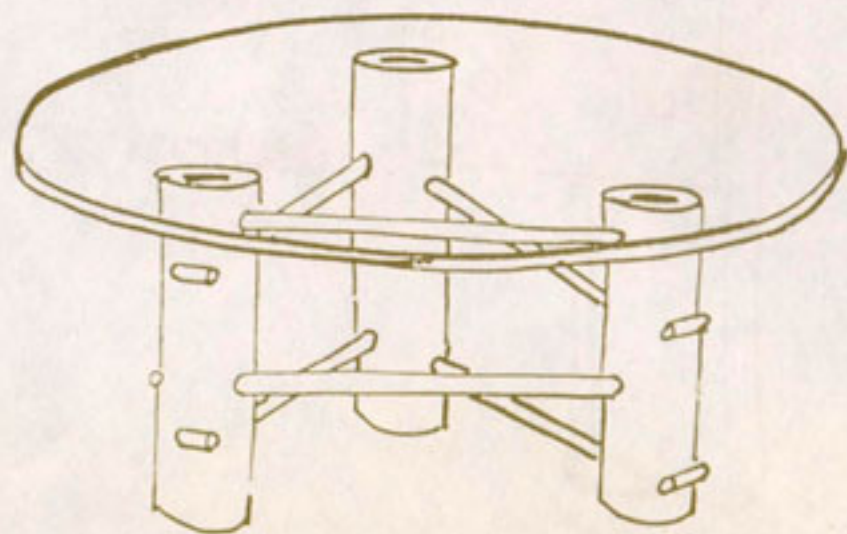
• USES :

- FURNITURE - BENT WOOD TYPE
- CURTAIN RODS
- STRUCTURAL SUPPORTS / BEAMS / COLUMNS / ARCHES / DOOR-WINDOW FRAMES.
- RINGS - TOWEL
- SPORTS EQUIP.
 - PARALLEL BARS / SINGLE BARS
 - ROMAN RINGS / RACKETS + BOARDS.

• FURNITURE GROUP

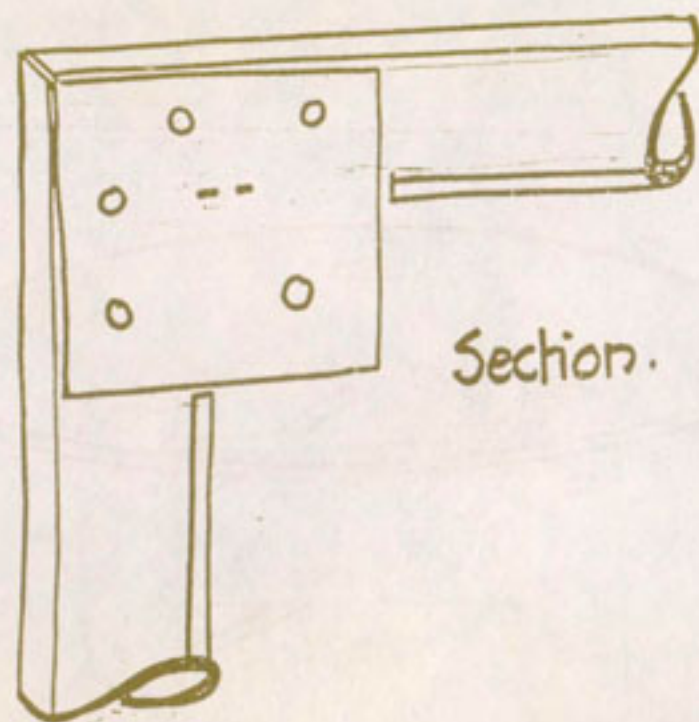
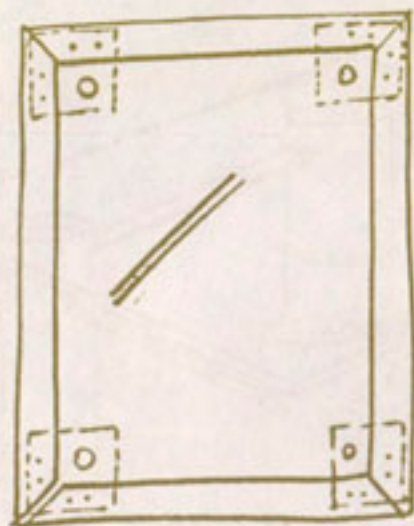
• COMPOSITE SECTION.





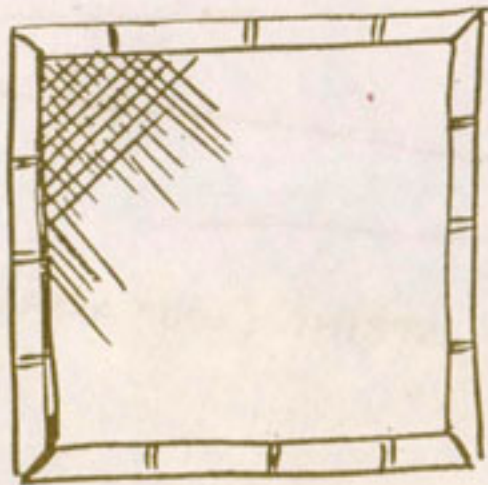
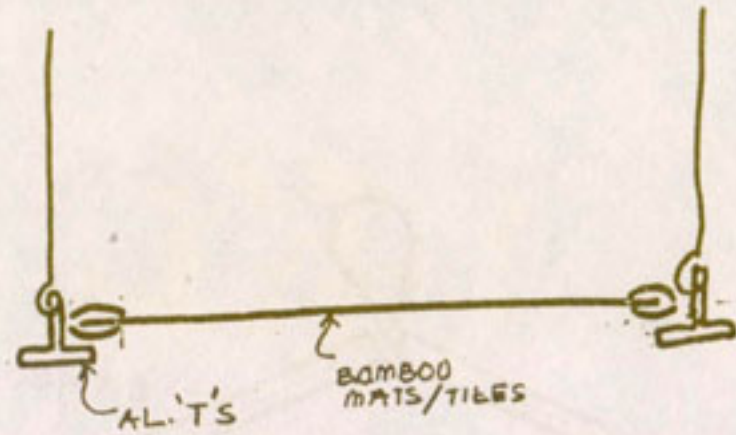
• FURNITURE GROUP

• JOINERY DETAILS.



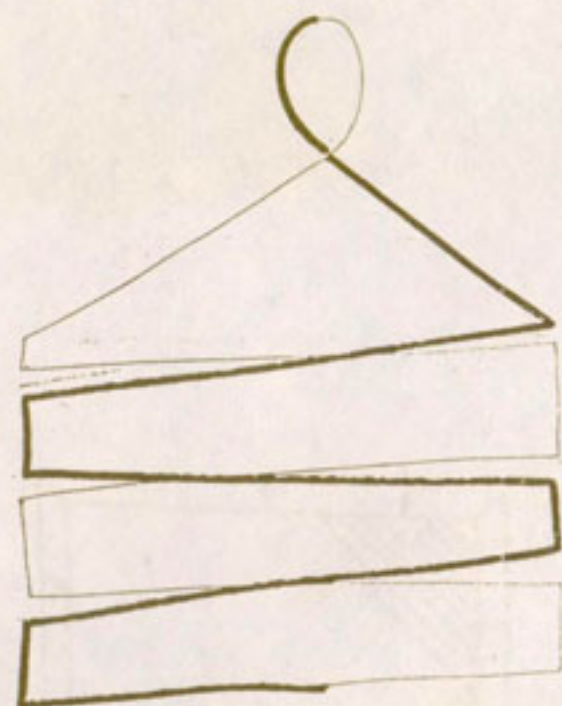
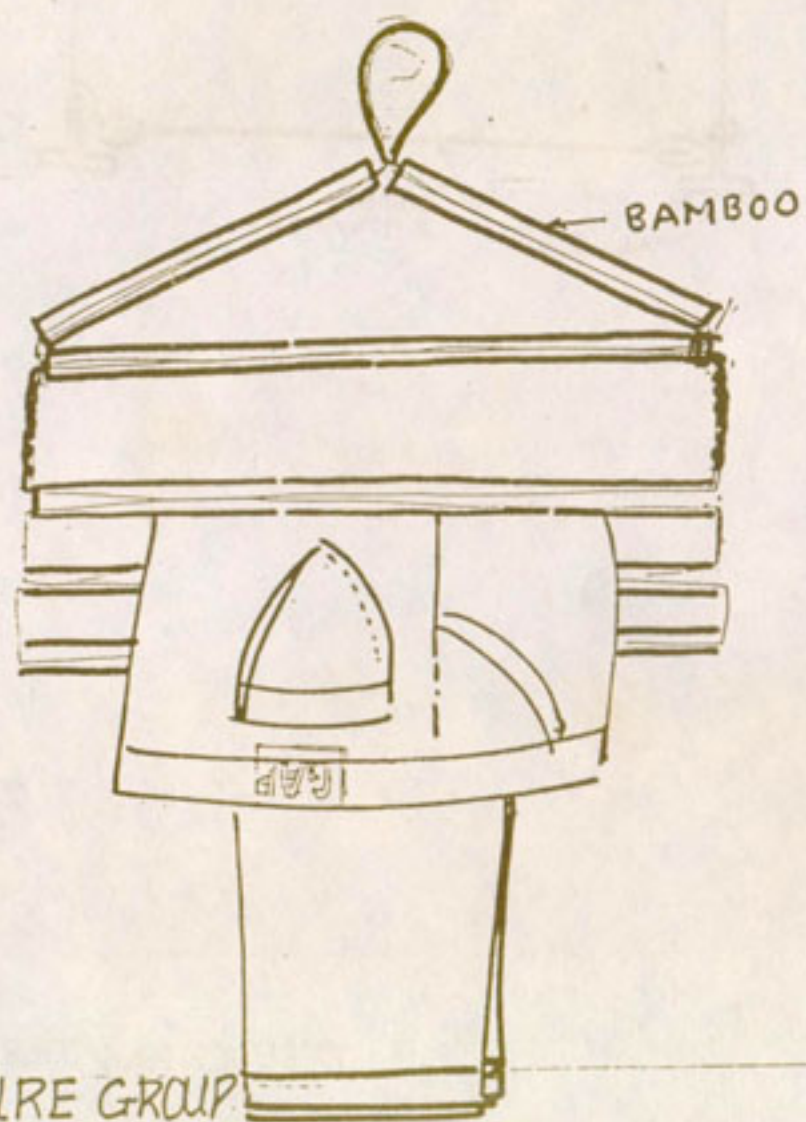
FURNITURE GROUP

FRAMES-MIRROR

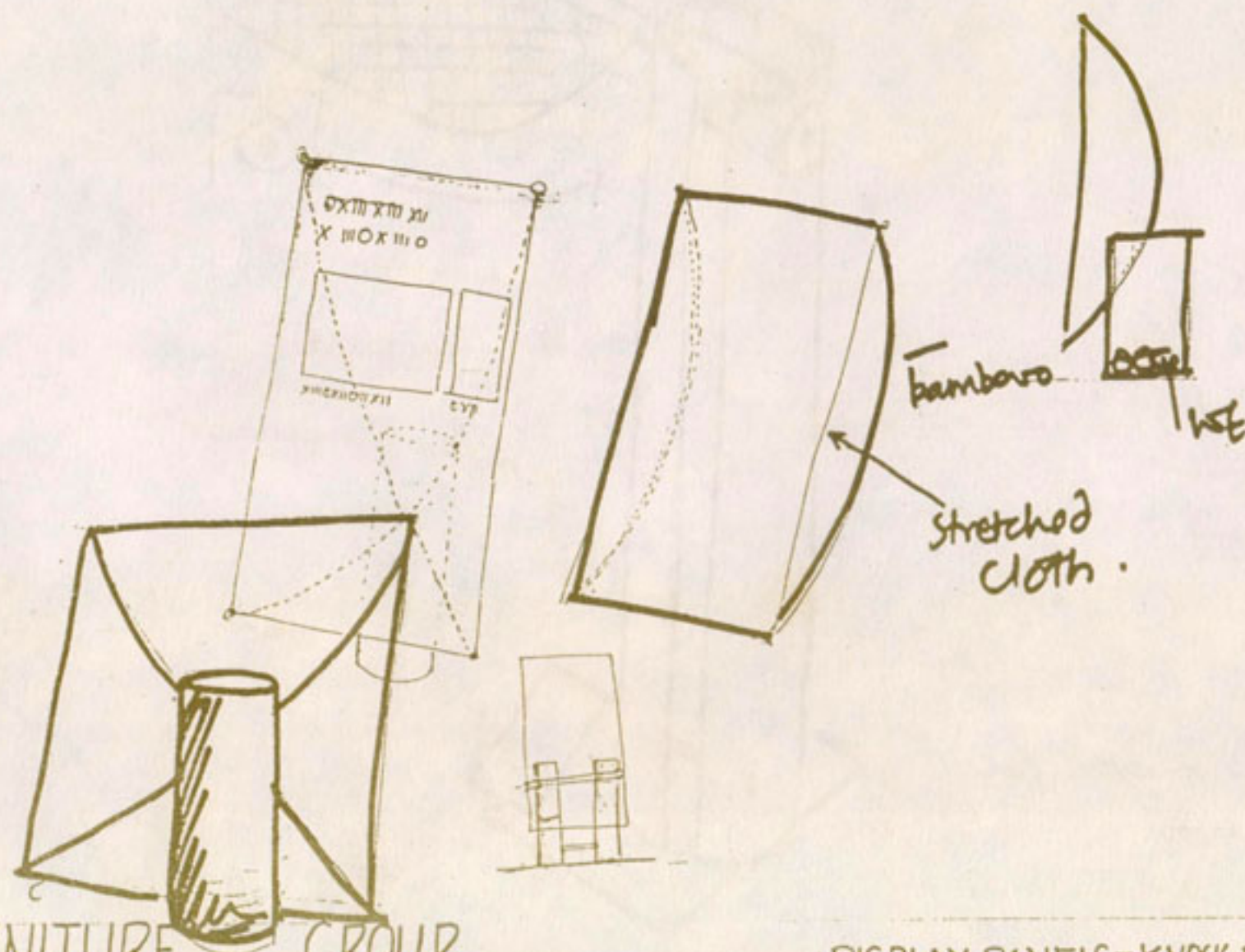


• FURNITURE GROUP

• FALSE CEILING TILES/PANE

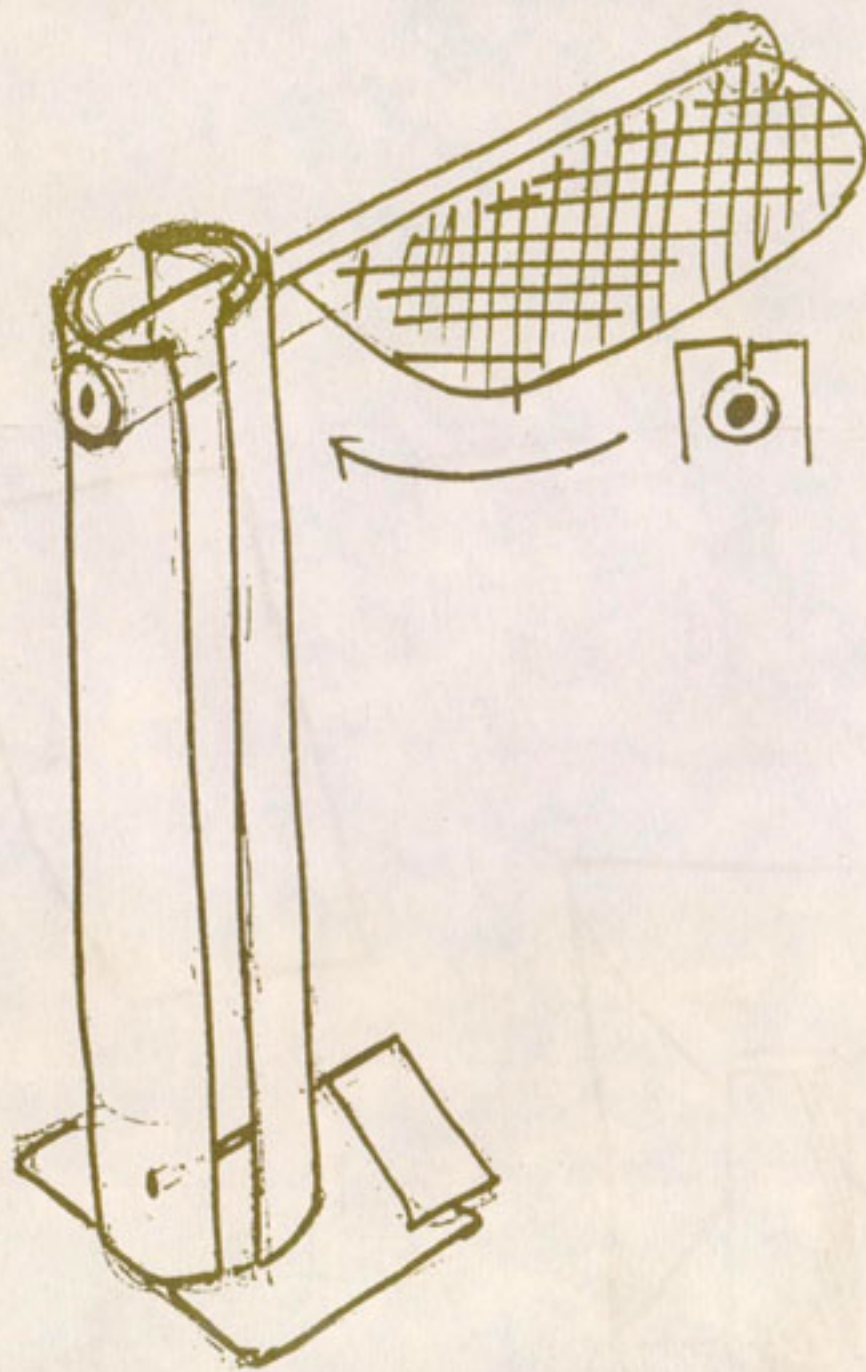


STRING (LOOP ARRANGEMENT)



• FURNITURE GROUP

• DISPLAY PANELS - KNOCK DOWN.



Pedal operated fan
in bamboo.



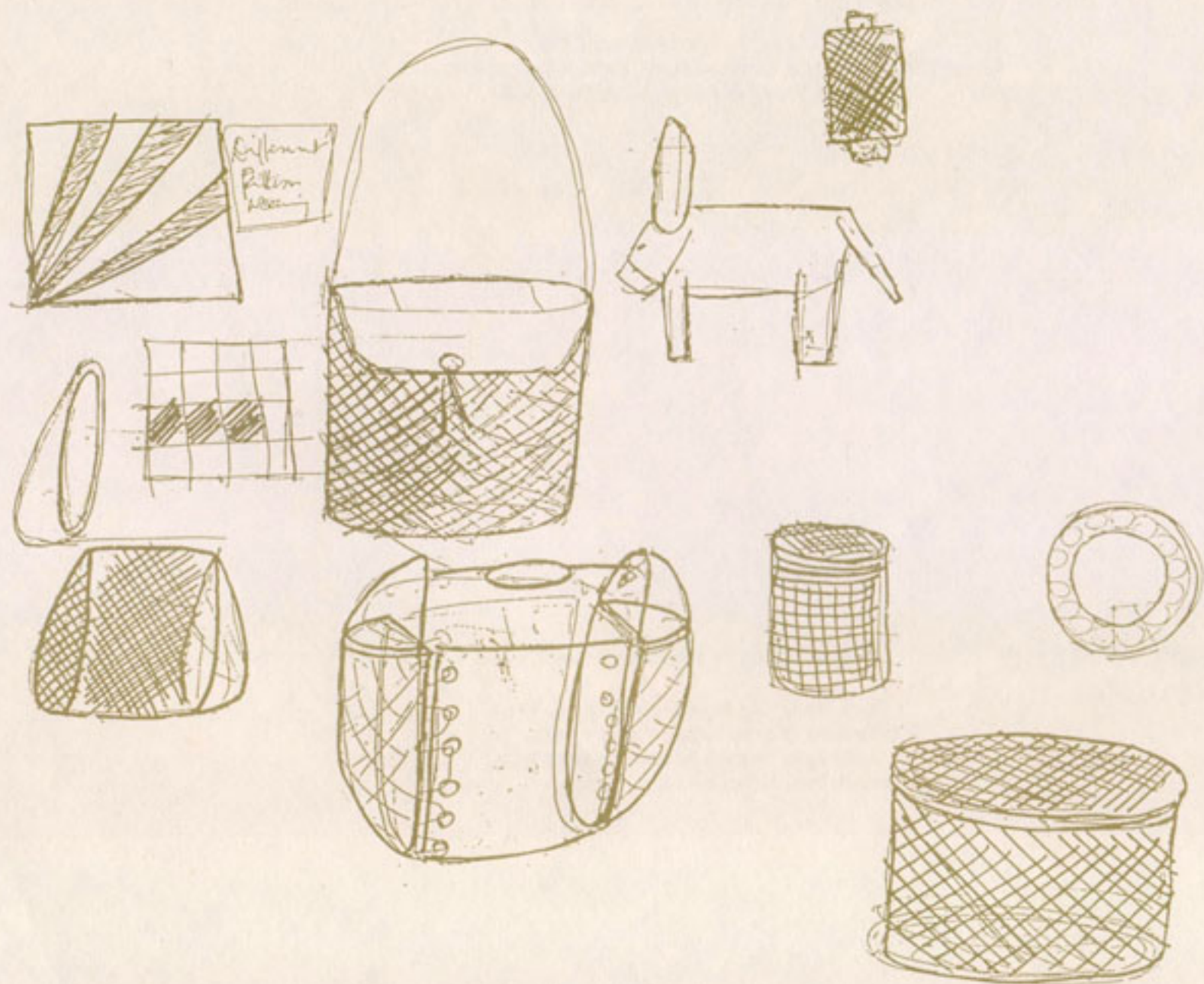
Group participants

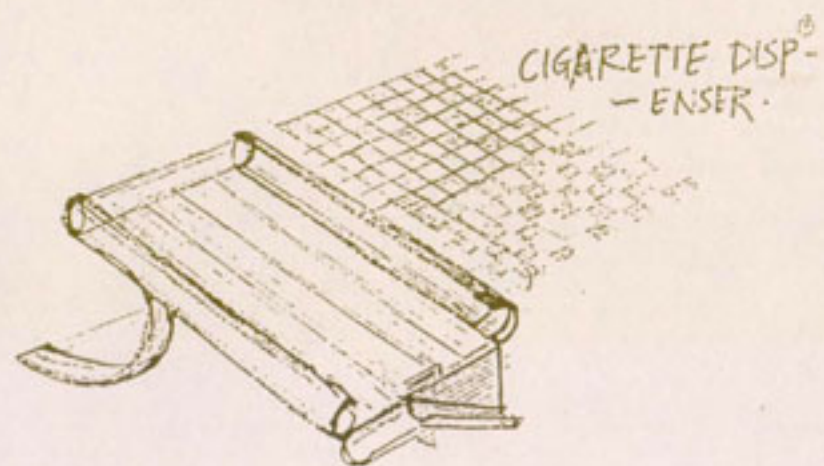
Vinoo Kaley, Ajith Kumar, Sunil Patel, Lalit Narkhede, Sandeep Datar, Shirish Kelkar, Bipin Gupta, Vasudha Atreya, Sunil Deshpande, Ajay, Hari S.

CARRYING ITEMS/ CONTAINERS

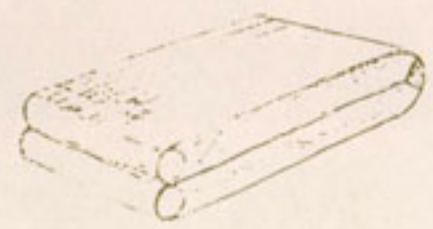
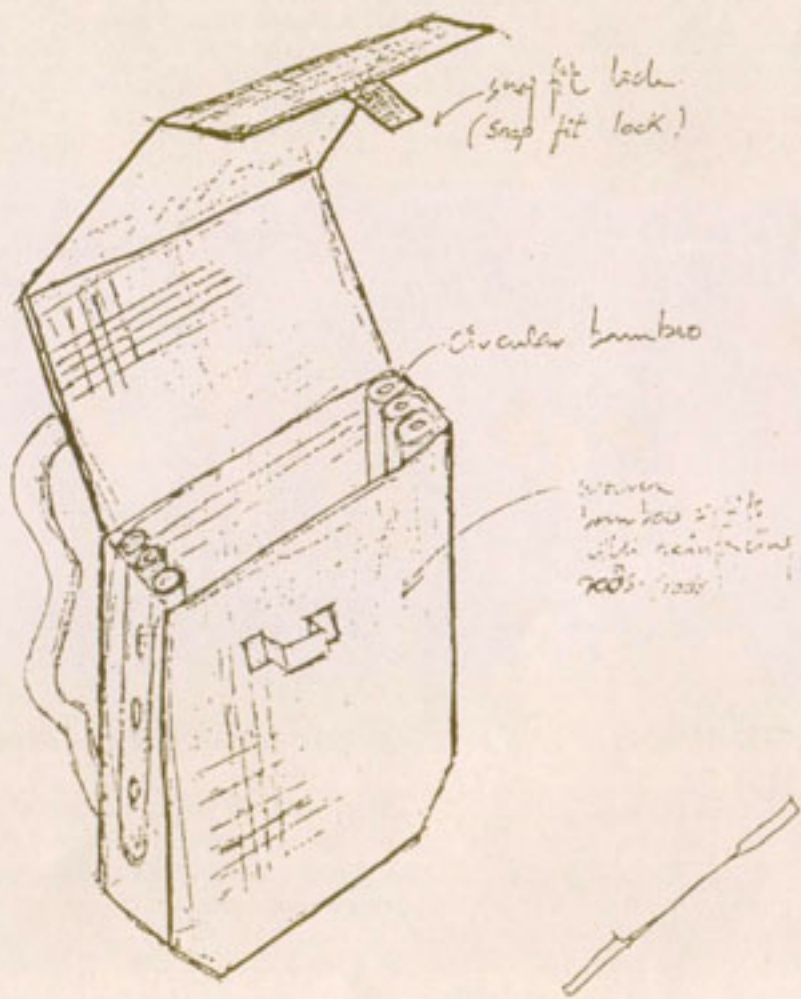
Potential items identified for design

Bags, shopping bags, ladies bags, purses, seminar folders, bamboo canvas bags, brief-cases, storage boxes for clothes and valuables, supari boxes.





Sandwich
19573



Sandwich
19573





Group participants

Ravi Poovaiah, Dennis Kappen, Parag Vyas,
Geeta Joshi, Arivazhagan, A. Savy, Sachin
Paliwal, Sujit Kolke, Amit Choudhari, Nimish
Vohra, Deepa Vyas, Vinod K.

PACKAGING IN BAMBOO

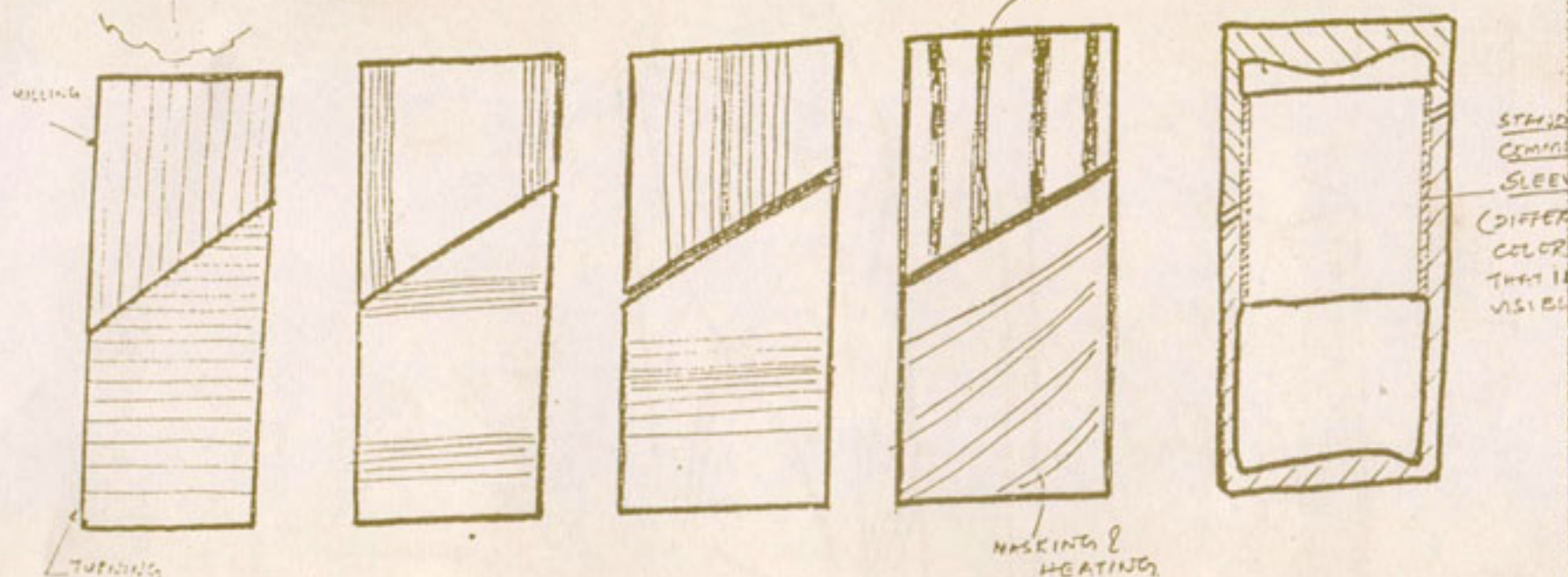
Potential items identified for design

Gift boxes of all kinds, decorations on gift boxes,
boxes for agarbattis, pens, watches, spices, nuts
and many other high value items, boxes with
identity or themes.

CONCEPT.

INTERCHANGEABILITY.

TO GENERATE PERSONALISED PEN STANDS. (PACKAGE)



- 5 DESIGNS CAN GENERATE 5! i.e. 120 designed alternatives (BY MIX & MATCH which could serve for a MARKET SEGMENT.
- THE, IF TRIED IN PLASTIC WILL REQUIRE HEAVY TOOLING COSTS (DIFFERENT TOOLS FOR EACH DESIGN.)
- TEXTURES COULD ALSO BE OBTAINED BY BLOW TOOLING (HEATING) AND FURTHER ALTERNATIVES.
- ALSO TOP & BOTTOM COULD BECOME INDEPENDENT PEN STANDS.

Werner
Skt. C. 1

Weight of the

Compatible with
plastic / cardboard.

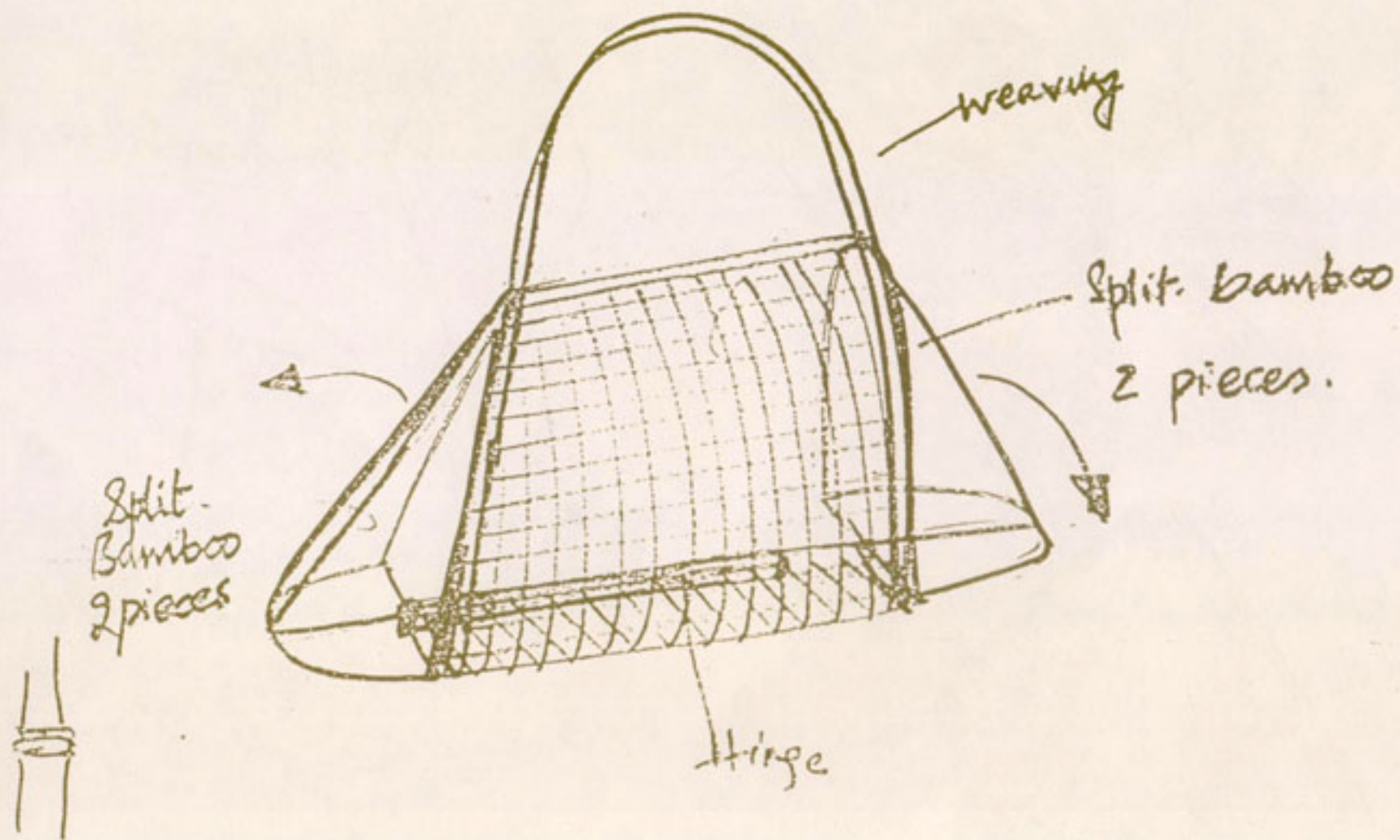
CARD 5491

A RUPE
GARD

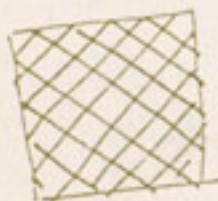
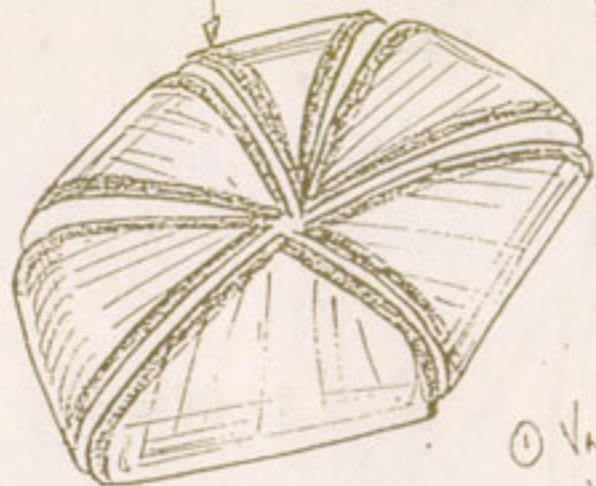
Correction

Quinn 12-5

Solts



Reading with - paper
- cloth.
(Stitching)



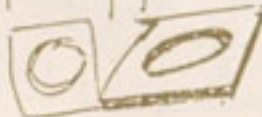
Development
combinations.



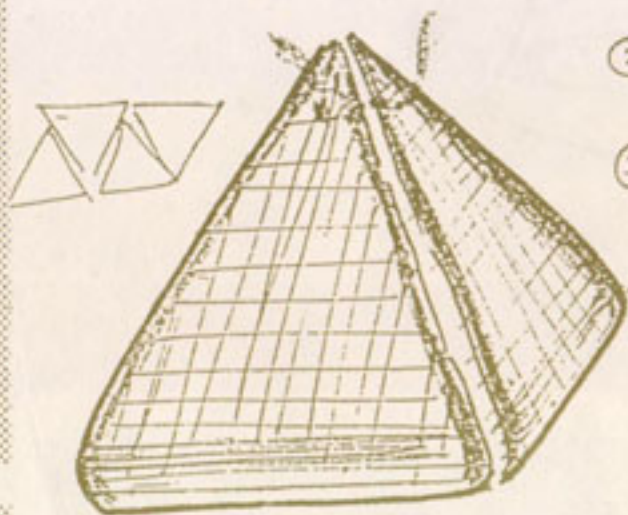
Bamboo mat
core

- ① Various development
various shapes
- ② Bending along ~~the~~
the lines

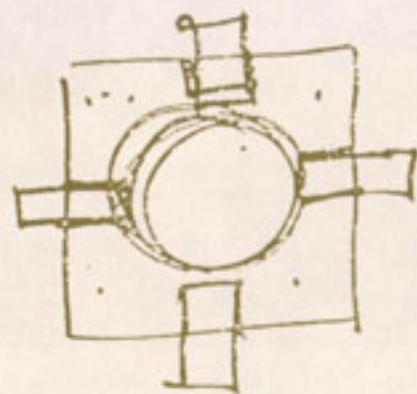
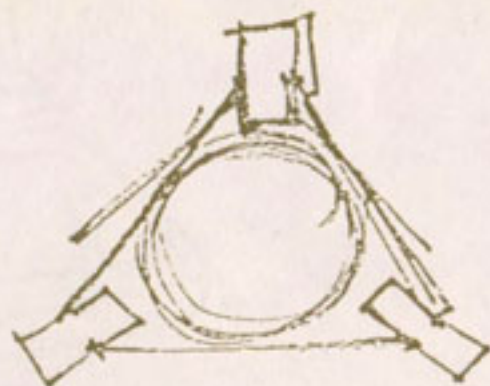
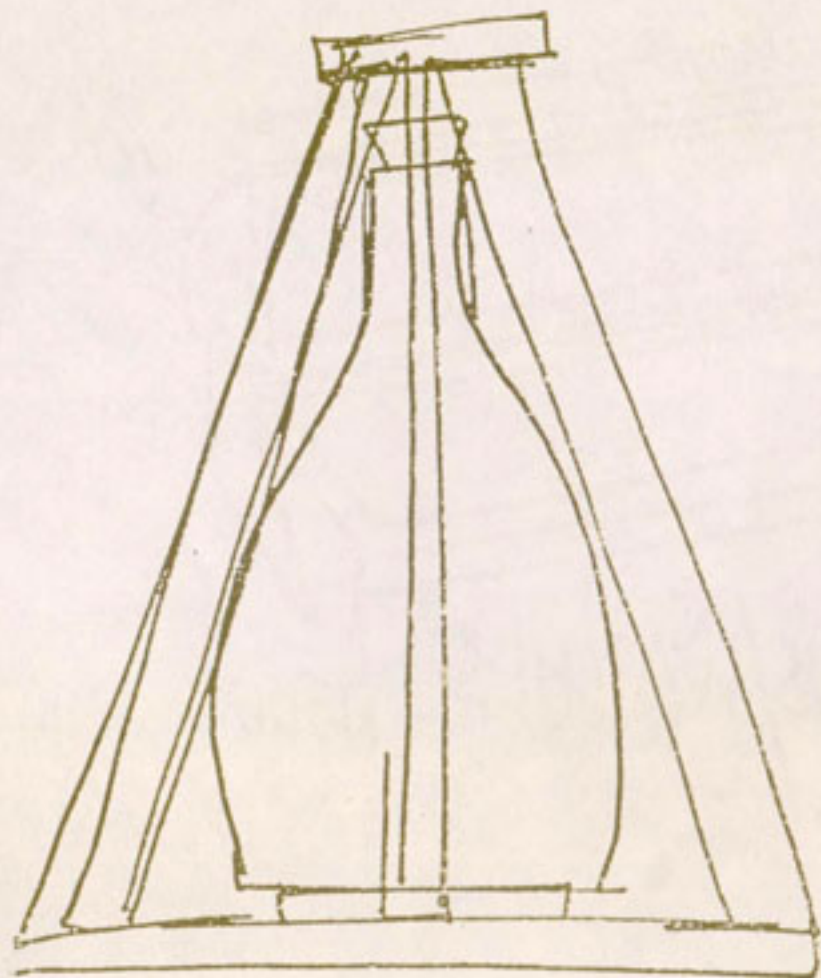
- ③ Product constrained (degree of freedom)
by
 - a) Card board
 - b) Foam.
 - c) Corrugated board.

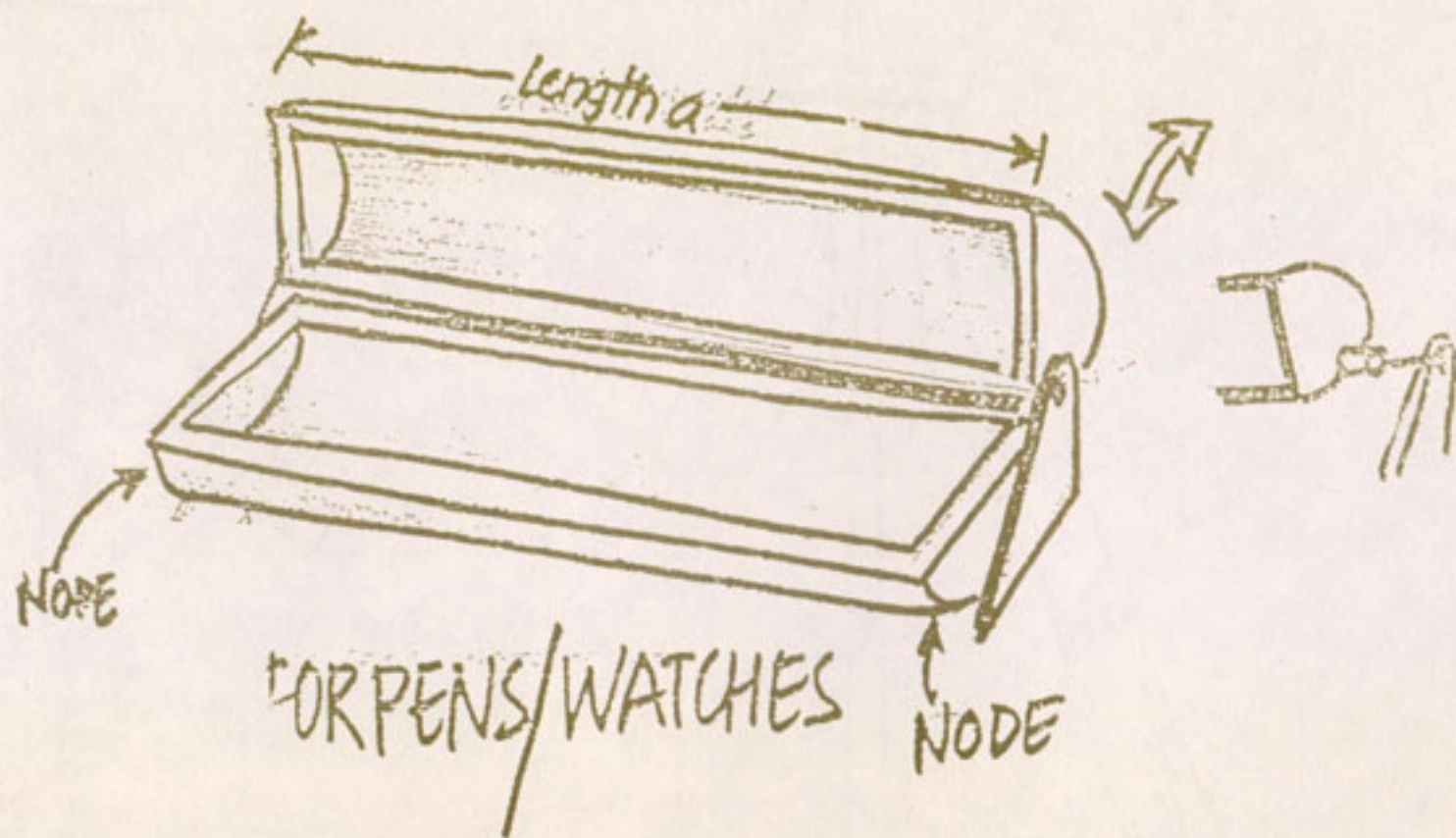


Quicker
slit 2/5



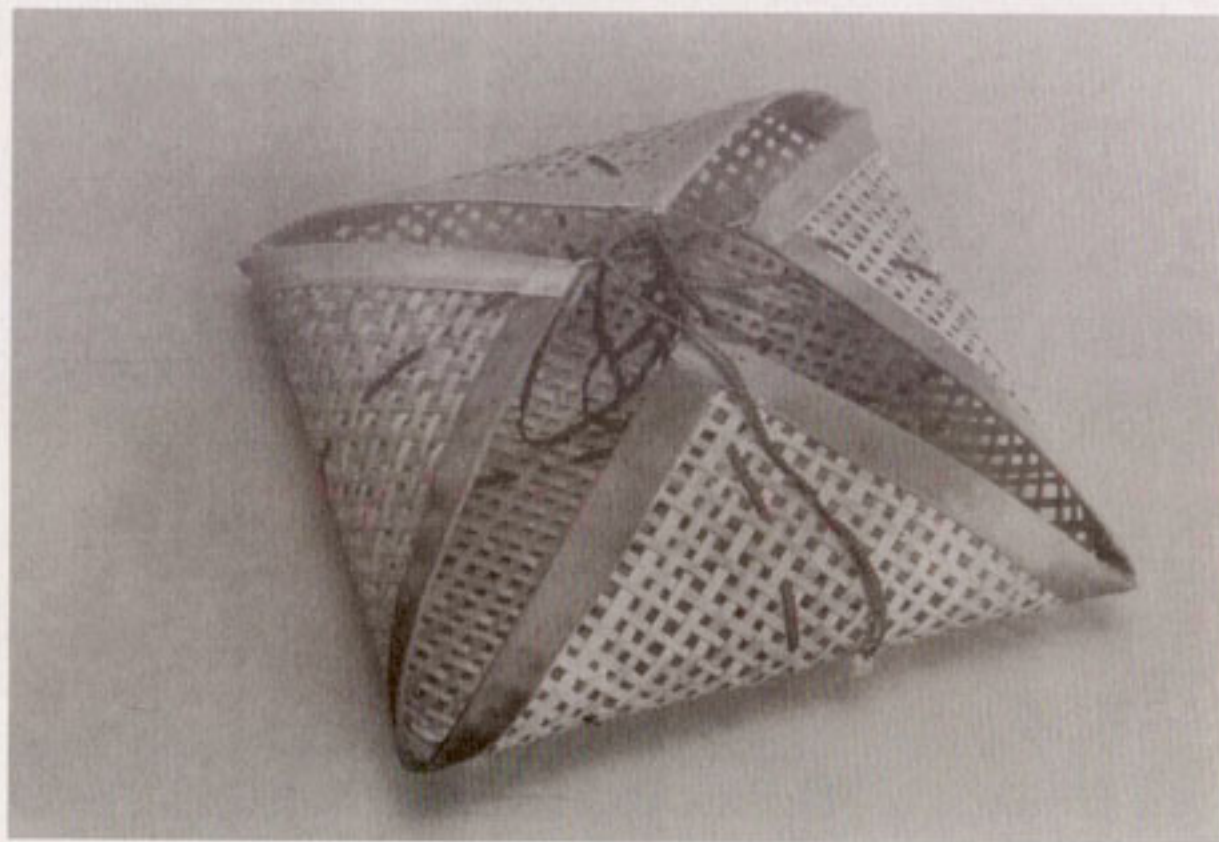
PACKAGING





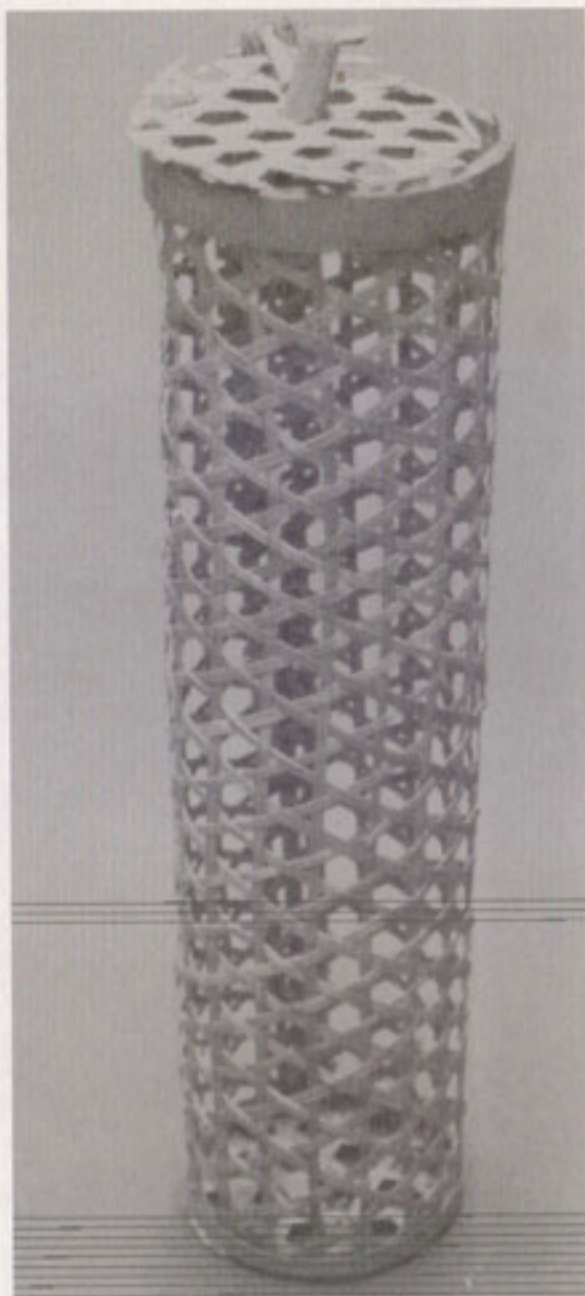
1	1
1	1

1. Gift pack developed from a woven mat using multicoloured satin borders. Coloured lace holds the package together.



1	
1	
1	

1. Cylindrical container with a strong base and lid is designed as a packaging for oranges. Visibility of the fruit from outside is retained.





FURTHER DESIGN INITIATIVES

The project 'Design inputs in craft areas' got a new meaning with Jagruti. The results of the workshop were displayed to public at IDC and at Nehru Centre, Bombay. Efforts were made to link up design with the local craft group at Sangli. A half day workshop was conducted at sangli with the help of two of the IDC alumni, Kiran Sabnis and Ganesh Gaikwad. Kiran and Ganesh who hail from Sangli, went further in their efforts. Their Design office in Pune ventured into designing and marketing a bamboo tray made by Sangli crafts persons. This new design of the tray is now, also taught to the trainees at Sangli, by their crafts teacher, Mr Deka.

Jagruti enthused many design students. At IDC, a carry bag using bamboo and leather was taken up as a design project. The bag for designers, shown in the next page, can be marketed in urban markets or exported.

Currently resin impregnated trays, using woven mats supplied by Sangli crafts persons are being developed as a part of the MHRD sponsored project.

Enthused by Jagruti, craftsmen from Khamana developed a new shoulder bag combining bamboo work with locally made cloth. The sturdy, colourful bag also illustrated in the following page can be sold in rural and semi urban markets.

Students at VJTI. (Victoria Jubilee Technical Institute) developed new colouring methods on bamboo strips using textile dyes.

We are optimistic about this enthusiasm spreading to more craft groups, designers, officials and others with this publication on Bamboo Craft Design. We hope the Regional Design Centres of the D. C. O. would take initiative in assigning design projects to industrial designers, who attended the workshop and were keen on developing bamboo products.

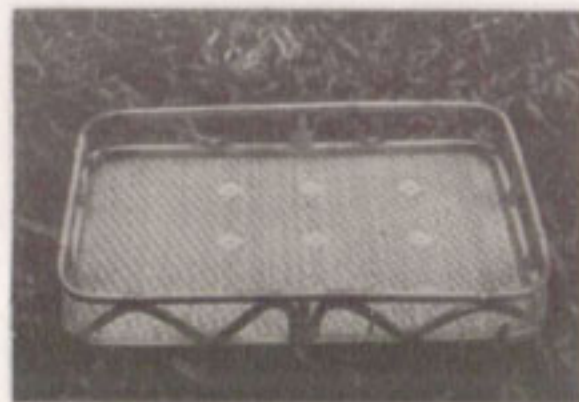
*10.0 JAGRUTI- BAMBOO CRAFT
DESIGN WORKSHOP*

1	2
1	2
	3

1. A carry bag in bamboo made by the Khamana group of craftsmen was refined using matching shoulder strap and flap.

2. A carry bag for designers and architects using bamboo board and leather developed as a student project at IDC.

3. An elegantly designed tray by Sangli group of crafts persons under the guidance of two designers, using woven bamboo slits. The frame is made by bending the bamboo on a flame.





EVENTS OF JAGRUTI

Jagruti - seminar cum craft design workshop turned out to be unique in many respects. With 15 crafts persons, 30 professionals from design and marketing, about 40 students from NID and IDC and 20 school kids from the IIT campus, the event was charged with enthusiasm. Auditorium was full during all lecture sessions as many others interested in bamboo from IIT and Bombay joined. The seminar was open to all interested in the topic.

Jagruti was inaugurated by Prof. Madhav Satawlekar, well known painter from Bombay.

Prof. Kudchedkar, deputy director of IIT presided over the function. Prof. R. K. Joshi Head of IDC and Prof. A. G. Rao, Conveyner of Jagruti welcomed the participants. Ms Madhavi Koli gave vote of thanks.

The morning sessions were devoted to talks by invited speakers. The slide presentations and panel discussions invigourated the event. For the crafts persons it was a new experience. They had difficulty in following talks in English, so some of the speakers adopted to the situation by speaking in Hindi. Lively debates took place



during discussion sessions.

The afternoons were devoted for working sessions. Demonstrations were made on weaving techniques, finishes, explorations on bamboo. Seven design teams were formed. Each of the seven groups comprising of designers and design students worked together in specific product areas identified earlier like the lamps, gift items etc.

Crafts persons who had come from various regions of India, such as Sangli, Karjat, Wardha, Madhya Pradesh and Tripura, interacted among themselves demonstrating and exchanging their skills and techniques of splitting and weaving. IDC workshop-staff took part enthusiastically, trying to learn the techniques of the crafts persons. Crafts persons were exposed to the IDC workshop facilities with machines like sanders and band-saw. Mr. M. S. Govind Rajan and Mr. Pradhan co-ordinated the interaction between the designers and the crafts persons.

There was an eighth group formed by the children, who made several items of their own designs after learning from the crafts persons. First few days went in discussions, brain storming, drawing and sketching. On the third day, each group presented their ideas in the auditorium. After that, intensive activity took place as the time was short. Designers worked in the workshops and with crafts persons, even in the evening and nights. Final presentations of the concepts and models were made on the last day. Prof. Narayanamurti, Dean (R and D) presented the souvenirs to all the participants at the end of the presentations.

Each of the seminar sessions and the presentations in the afternoons were chaired by professors of various disciplines from IIT who were interested in bamboo craft. The chairmen ensured time schedules in addition to summing up of the sessions.

Addresses of the participants along with the bamboo related organisations are given in the end of the publication.

1	1
1	1
2	3

1. The attentive audience at the seminar constituting the craftspersons from Sangli, Nagpur, Madhya Pradesh, Karjat and Agarthala, NGO, representatives, bamboo experts, design faculty from IDC and NID, practising designers, IDC staff, design students and other interested participants.

2. Prof. A. P. Kudchadkar, Dy. Director of IIT, chief guest Prof. Madhav Satavlekar, and Prof R. K. Joshi, head of IDC (from left to right)

3. Informal interactions during tea break.



GLIMPSES OF JAGRUTI



1	
2	2
2	2

1. Children from the campus who participated in the workshop, presenting their concepts.

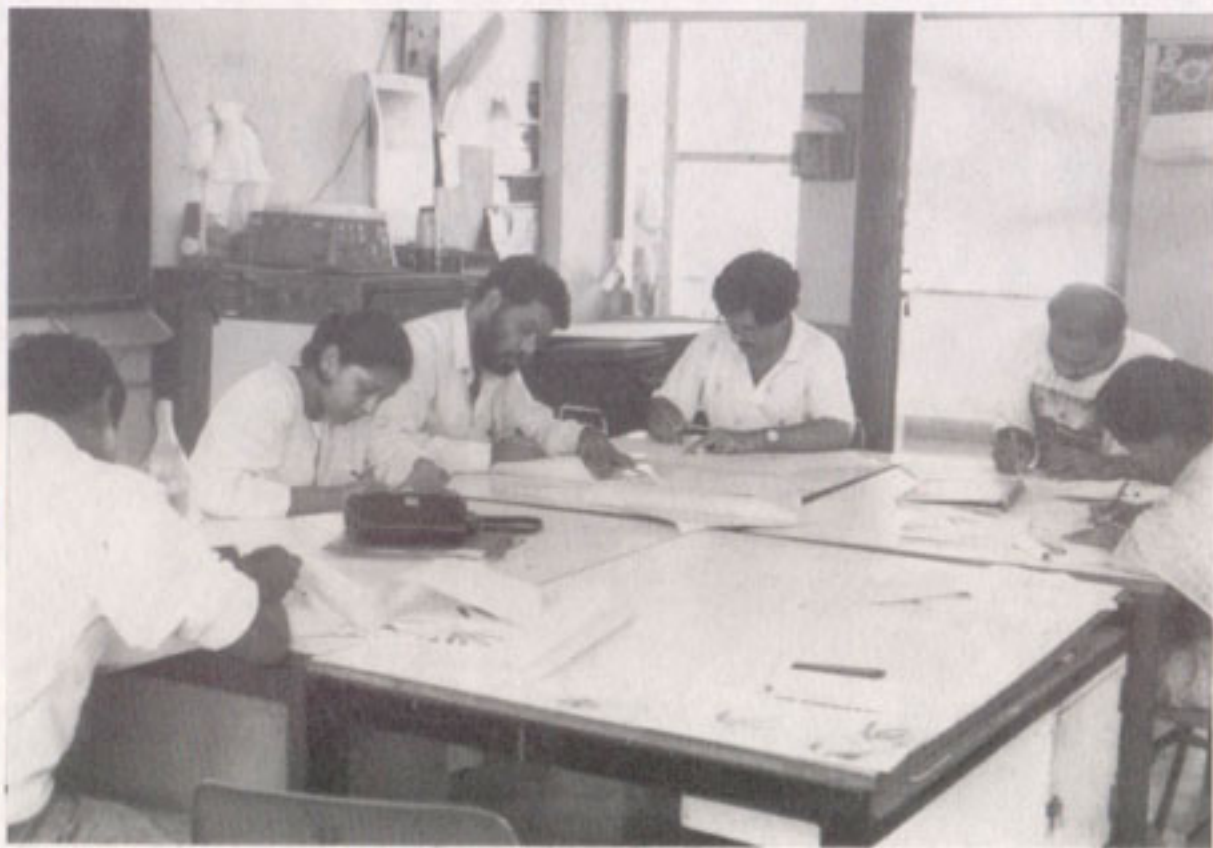
2. Prof V. P. Bapat talking about the exploration of bamboo properties in the IDC quadrangle.



	1
2	2
2	2

1. Designers in the 'Stationery group' discussing the design strategies for their concepts.

2. 'Furniture group' busy sketching out concepts. An important step before making prototypes.



	1
2	
2	

1. Pad printing demonstration during the workshop. Souvenirs were made in bamboo with pad-printed graphics and presented to all the participants .

2. A panel displaying the samples of variety of finishes. The silk screen printing was tried out on both flat and cylindrical surfaces of bamboo.



1	2
	2
4	3

1. Pradyumna Vyas and Abhijit Thosar using band saw to make their models.

2. Prof Nadkarni learning the skills of traditional bamboo weaving.

3. A typical weave being converted into new a product form.

4. A student engrossed in making a bracket-lamp using a simple mat.



1	
1	
	2

1. Sangli crafts woman making wide bamboo strips for new designs. In the background are the craftsmen from the Madhya Pradesh Hasta Kala Nigam, Bastar, trying out new concepts with designers.

2. The Sangli and the Bastar group of craft persons working with the design students and IDC staff.



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1. The Khamana group of craftsmen helping the Kendriya Vidyalaya students to make bamboo rings and other items.

2. Intense activity involving IDC students with craftsmen from Khamana and Bastar to make parts for the bamboo products.



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1. Shri Vinoo Kaley with craftsmen from Khamana. This group has developed carrying items in bamboo like shoulder bags, suitcases etc.

2. Crafts woman from Sangli making traditional woven mats for lamp shades by using stained strips.



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1. Kirti Trivedi
2. Suresh Sethi
3. M. P. Ranjan
4. Darshan Shankar



SPEAKERS AT THE SEMINAR



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2	3
	4

1. Unmesh Kulkarni
2. Pradyumna Vyas
3. Debasis Mandal
4. Ravi Nafde



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	3
4	5

1. Pradeep Babar
2. Satish Raut
3. Madhuri Koli
4. Parag Vyas
5. D. D. Mane



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4	

1. Boban Varghese
2. P. S. Mukharjee
3. Jayprakash Mehta
4. Ravi Pooviah



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	3
4	5

1. A. G. Rao
2. R. K. Joshi
3. Vinoo Kaley
4. Sumil Patel
5. V. P. Bapat



1	
2	
3	4

1. S. K. Lakkad
2. K. P. Madhavan
3. S. Chatterjee
4. A. S. Mahajan



PROFILES OF THE CHAIRPERSONS

	1
	2
3	4

1. S. S. Talwar
2. S. L. Narayana Murthy
3. A. W. Date
4. U. A. Athavankar





WHAT AFTER JAGRUTI?

Jagruti, the craft design workshop, brought many people interested and devoted to bamboo together. It generated enormous enthusiasm in crafts persons, designers and others alike. Everybody in the seminar felt it should not end as one time effort. Two further workshops were envisaged. First one, based on specific case studies, with more craftsmen participating was planned in a rural set up, like Wardha. Aprup Nirman with Vinoo Kaley's leadership would take the organising role. Second would be with an emphasis on craft industry and global markets. NID at Ahmedabad could take the

organising role.

The need for exchange of information among those working in bamboo craft was expressed by many in the seminar. More mechanisms in additions to Seminars and Workshops like Jagruti need to be contemplated. Formation of a Trust on the lines of Bamboo Environment Foundation (EBF), Indonesia is one such possibility. A news letter, useful to all bamboo craft workers is another desirable venture.



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BAMBOO RELATED ORGANISATIONS

Bamboo Information Centre- India

Bamboo Information Centre was established in July 1989 with financial assistance from the International Development Research Centre (IRDC), Canada. The centre is located at the Kerala Forest Research Institute (KFRI), Peechi, Kerala, India. The BIC - India seeks to acquire, organise and disseminate documents and research data relevant to bamboo research to persons concerned.

Objectives and Services

Develop and manage data bases of Asian bamboo literature, scientists and current research programmes.

Generate bibliographies on various aspects of bamboo from its computerised database. Provide photo copies of documents upon request.

Publish a compendium on commercially important bamboo species found in India.

Publish a directory of bamboo scientists and current research programmes.

Popularise research results by producing extension bulletins and slide sets.

Answer queries related to bamboo. Encourage personal visit of users to the centre for on the spot information gathering.

Arrange translation of foreign language texts into English through National and International translation services, on actual cost basis.

Publications

BIC - India carries out effective dissemination and exchange of information through various publications which are widely circulated to researchers, entrepreneurs and other individuals and institutions interested in bamboo.

For further information:
Bamboo Information Centre- India
Kerala Forest Research Institute
Peechi 680 653, Kerala, India.
Tel: (0487) 22375
Telegram: KEFORINST-TRICHUR
Telex: 887-275-KFRI IN.

Gram Vikas

Gram Vikas started in 1979 as a non- profit, secular voluntary organisation with its head quarters in Ganjam District of southern Orissa. Gram Vikas began its developmental initiative in 11 villages of the hilly regions of Karandimal near Behrampur in southern Orissa. The main objectives of Gram Vikas is through empowerment, to help the marginalised people. Gram Vikas has developed a methodology which governs its actions for rural development.

Activities

Over the years, Gram Vikas has extended its developmental interventions in the backward areas to several sectors for an integrated tribal development. These are Education, Afforestation, Savings and Credit, Income Generation, Extension of Biogas technology as alternative energy sources, Rural health and environment and Disaster management.



Gram Vikas manufactures and markets resin bound bamboo ply-boards of different thicknesses. The boards are made from bamboo mats woven by local villagers.

Gram Vikas
Mohuda Post, Via Behrampur-760002.
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Bamboo House, Unit no 4,
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Vanarai

Vanarai was formulated with the initiative from C-Dac of Pune, in 1991, for rural development in the villages Devadi and Gavdewadi in the neighbouring districts of Pune. Vanarai is now spread all over rural Maharashtra working on plantations, irrigation and water supply, improved Agriculture, Biogas, Children and Women Welfare schemes etc.

One such successful enterprise initiated was the Bamboo craft. Nearly 50 artisans work in these two villages to make crafted products such as fruit trays, lamp shades, table lamps, pen stands, calenders, key chains, vases, lanterns etc. These are marketed through co-operative schemes.

Trade inquiries and inquiries for individual products are solicited. Training courses are also arranged in Pune.
Contact address:

VANARAI
2064, Vijay Nagar,
Pune- 411030.
Tel: (0212) 446118.

Environmental Bamboo Foundation

Environmental bamboo foundation (EBF), was founded by Linda Garland in 1993. Ms Garland has many years of Interior design experience in Bamboo. Two years of intensive formal research and world wide networking have given shape to EBF. With its head quarters at Bali, Indonesia, the foundation has other non profit chapters (USA, Holland and Australia).

EBF is involved in the following activities related to bamboo.

Research and data collection
Conservation and Agro factory
Special training for women
Design and marketing
Net working

EBF is planning an international conference on bamboo in June '95 at Bali, Indonesia.
Contact address:

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