

Solid **Bamboo** Pole Standardization & Furniture Making

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राष्ट्रीय डिजाइन संस्थान
NATIONAL INSTITUTE OF DESIGN



Earth Day 2024 wishes to you

“Being **Green is no longer going to be a choice.
Its something increasingly becoming mandatory”**

Prof. **Ashok Chatterjee**, former Executive Director, NID

Renewable
Sustainable
Eco-friendly
Natural Resource

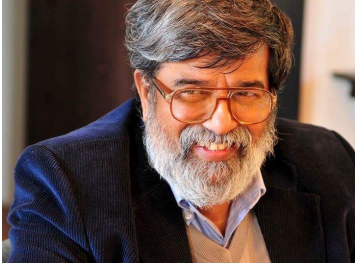
Bamboo, is one of the fastest growing plants and it is one of the amazing raw materials to explore in various ways and means for all kinds of applications for day to day uses.



India have many species of **bamboos** has been used by various communities for different purposes

Rich tradition of **Bamboo** utilization





Late
Prof. M P Ranjan

‘NID’s Centre for **Bamboo Initiatives** has been set up for various activities related to **bamboo** - based research, design, technical development and training to support the **bamboo** clusters in the country’. It is established in 2010 at **NID – Bengaluru**





Possibilities of Standardization in Solid **Bamboo** Pole Furniture Making

Commonly Available Standardized **Bamboo** Forms

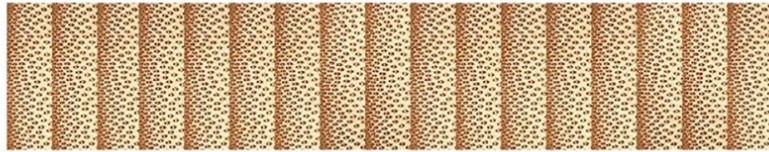


plain
pressed



© Bamboolimport.com

side
pressed



Laminated bamboo board furniture - NID 2000-02



Various forms of **bamboo** utilized for making furniture – NID 2000.....



Bamboo Species – varieties – in India



Solid **Bamboo** Species – varieties – in India



Around four different solid / partially solid **bamboo** species/variants has been found which is good for making furniture and structure

Out of the 4 *Dendrocalamus stocksii* is selected for experiments, according to availability, strength property, physical property etc.

Solid **Bamboo** Species



Thyrsostachys oliveri

Pseudoxytenanthera ritcheyi

Dendrocalamus stocksii

Dendrocalamus strictus

Dendrocalamus stocksii



The Culms are very straight and mostly cultivated by farmers in the western region of India.

The maximum Diameter at bottom of the culms are approx. 60 mm

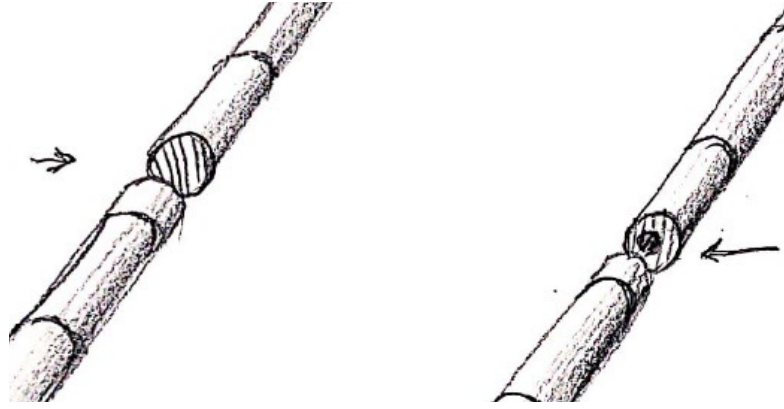
Mostly an average culm will have 35 to 40 mm diameter which is very common

The culms have more diameter in the bottom will have more chances of hollowness after 5-6 feet height

The culms have lesser diameter in the bottom are found more solid or hollowness after 8-10 feet height

The usable height varies up to 10 feet to 16 feet, for usage of furniture making

Dendrocalamus stocksii - Solidness



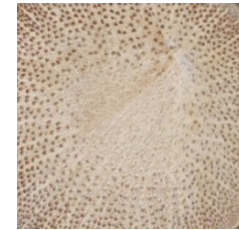
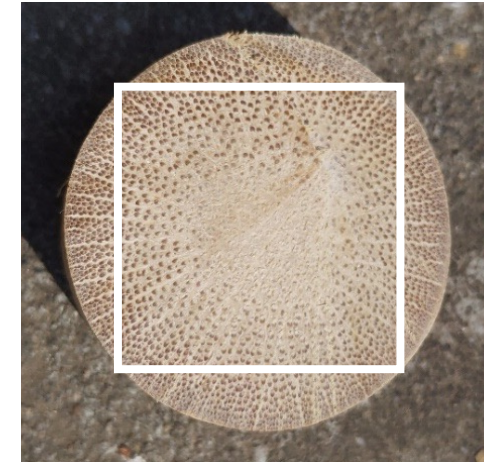
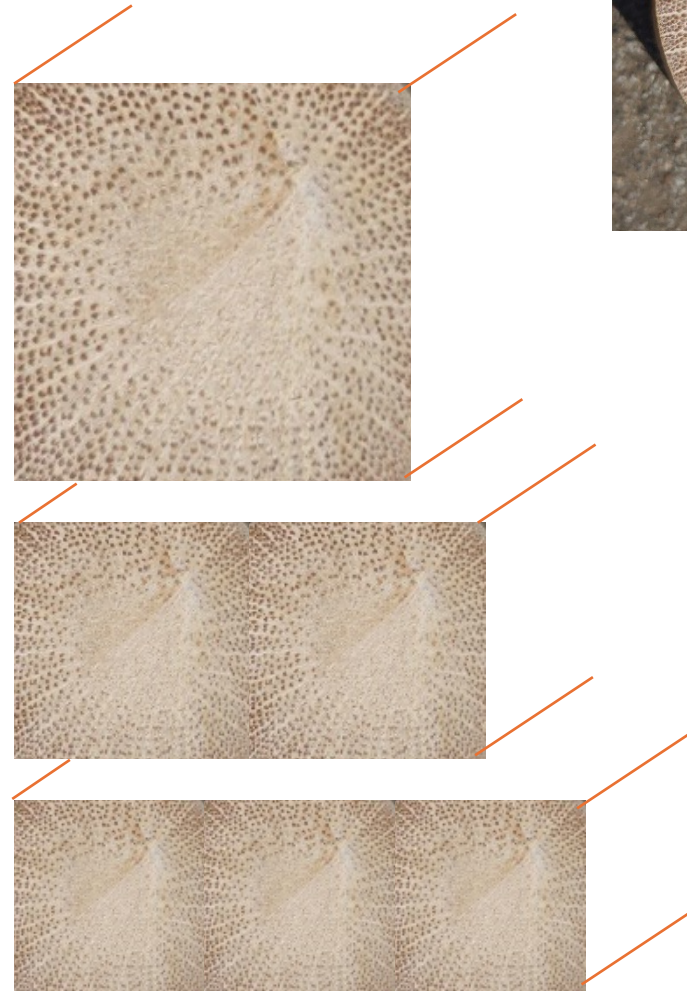
*Mostly the bottom of culms are solid, and some fully solid or some partially solid
This varies depend on the diameter of the culm*

The standard dimension can be achieved from bottom to top as per the available sections and diameter in various culms



Some culms will be fully solid from bottom to top, while few will be partially solid from 8 to 9 feet onwards depend on the bottom diameter. However, for making furniture we need maximum length of 7 feet

One method of standardizing is making the culm to square sections and further to rectangle by joining two square sections, as shown in the image below. This way a natural material can be used in its natural form without much elaborate process to standardize for making furniture products



Depend on the diameter of raw **bamboo** culms the standard diameter can be achieved to 6 variations



40
mm



35
mm



30
mm



25
mm



20
mm



15
mm



This will help
Standardized making process
Standardized Joints
Maintain quality
Ease the production
Knockdown
Transportation
Assembly

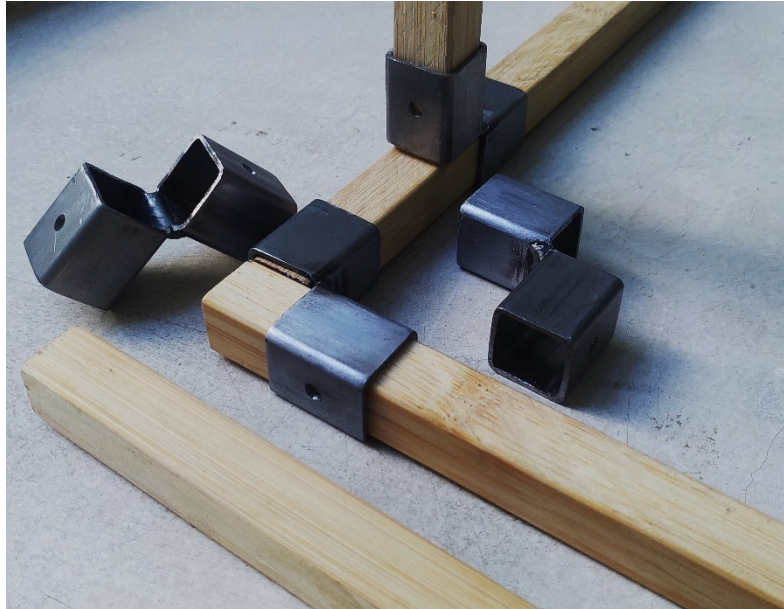
Production of standard solid **bamboo** pole material



The standardized **bamboo** poles made in lathe have limitations in length and quantity of production for furniture

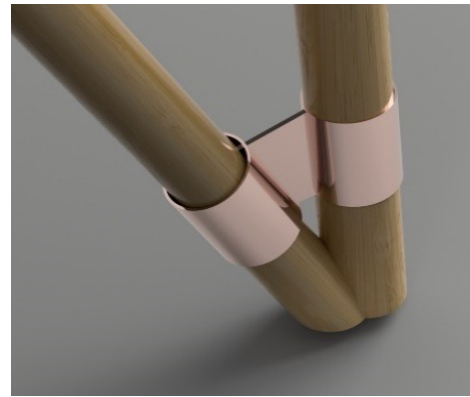
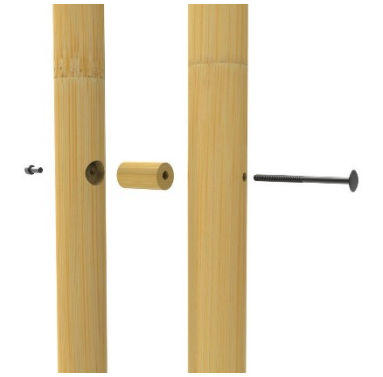
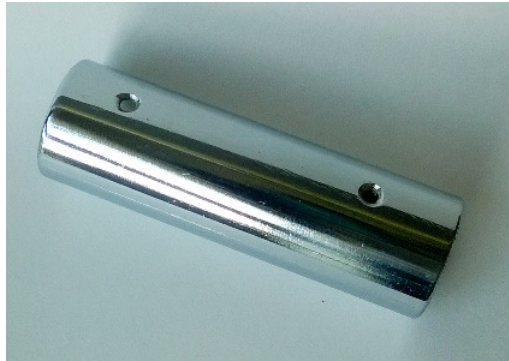


The standardized **bamboo** poles made using machine, could be mass produced and accurate for furniture production.



Exploration & Experiments
of joints & fixture for solid
bamboo sections

Study of Existing **Bamboo** Joints and Connectors used for solid bamboo Furniture Making at NID















Experiments with **Bamboo** Joints



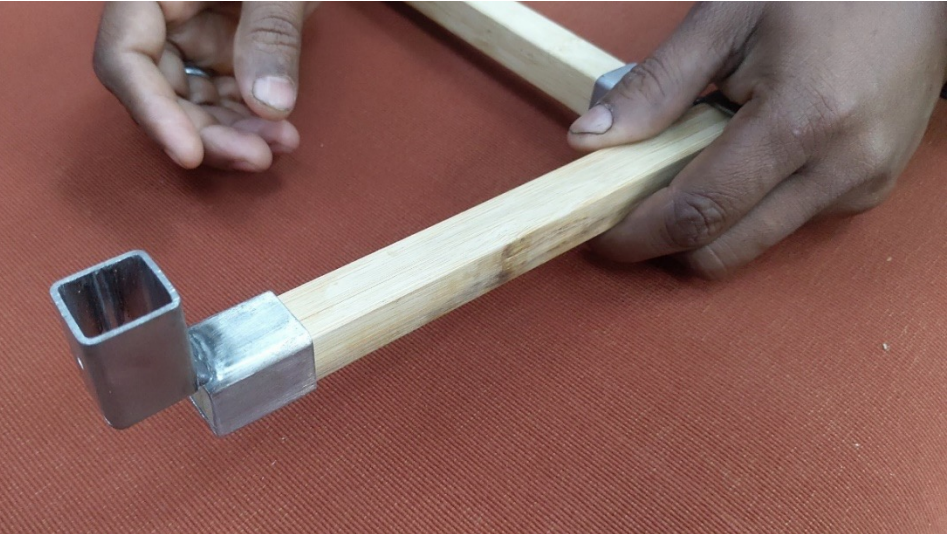
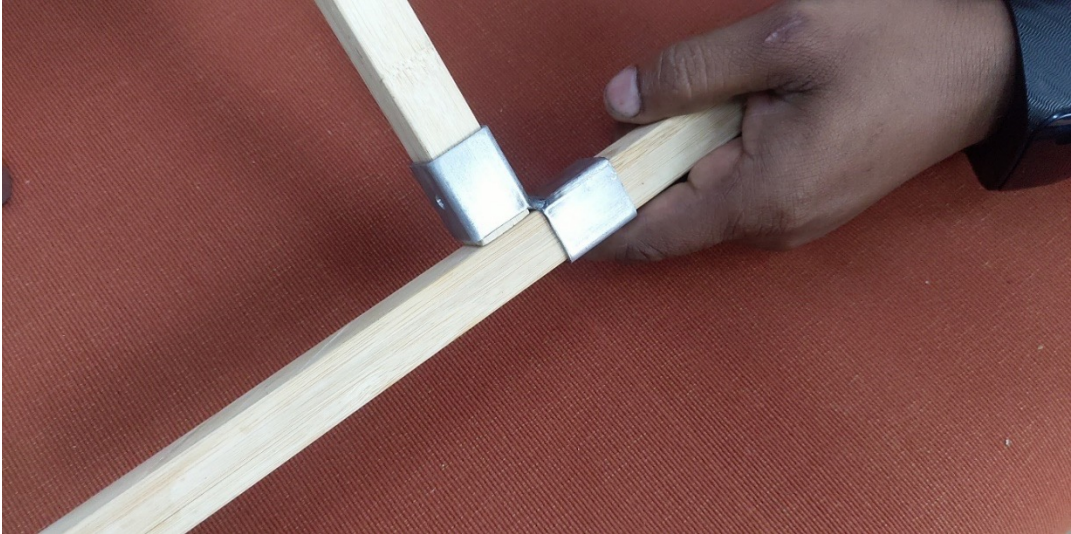
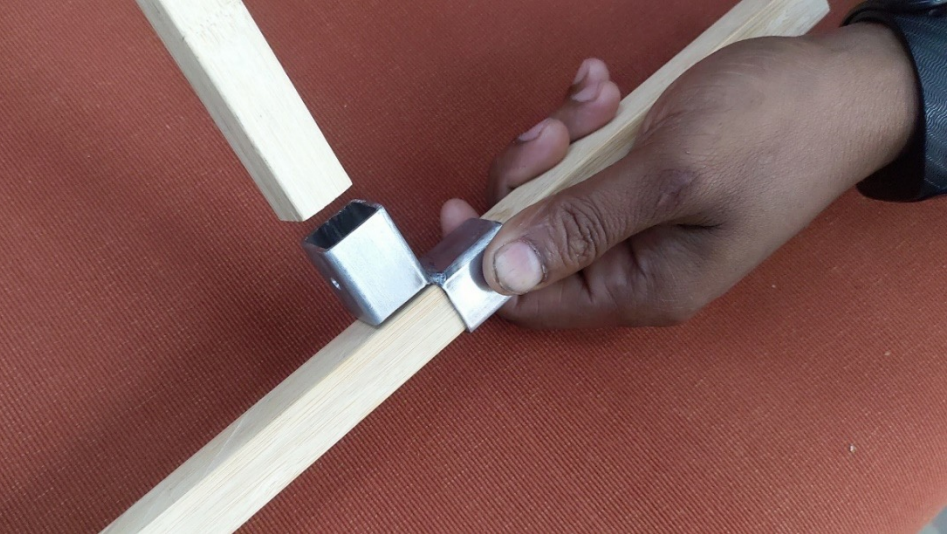
tenon and mortise joint and its aesthetic in the variations of this joint



Combination of Bamboo to Bamboo Joints of various Diameter					
	20 mm	25 mm	30 mm	35 mm	40 mm
20 mm	20 x 20	20 x 25	20 x 30	20 x 35	20 x 40
					
25 mm	25 x 20	25 x 25	25 x 30	25 x 35	25 x 40
					
30 mm	30 x 20	30 x 25	30 x 30	30 x 35	30 x 40
					
35 mm	35 x 20	35 x 25	35 x 30	35 x 35	35 x 40
					
40 mm	40 x 20	40 x 25	40 x 30	40 x 35	40 x 40
					

Experiments with Connector Joints for Square **Bamboo** Sections

One of the connector/joint explored for the standardized square solid bamboo sections for furniture/structure making. The similar approach can be taken for the rectangular sections as well.

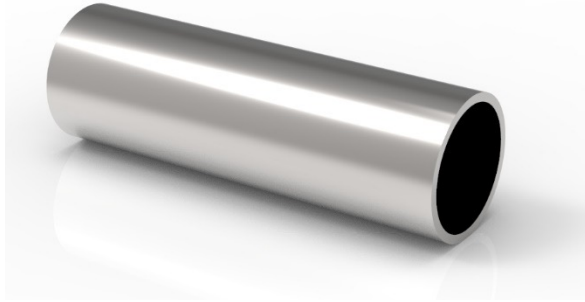


Experiments with Connector Joints for Circular **Bamboo** Sections



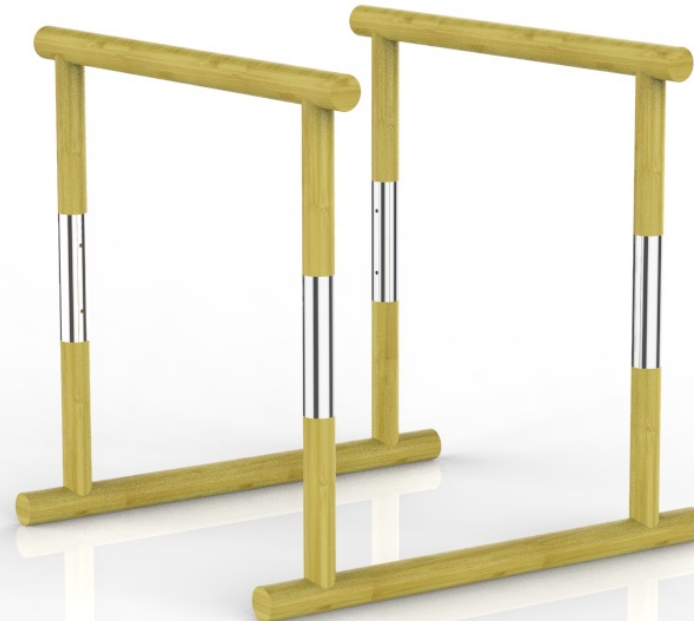
Circular pipe connector/joint for the standardised round solid bamboo poles for making the furniture/structure. There could be a set of this in different diameter to achieve any forms to use in any applications.

Straight S.S. pipe connector

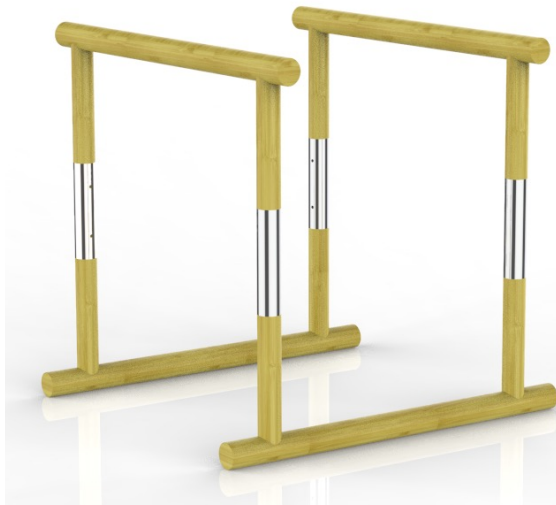


Straight pipe connector

- ***Easy to make and use***
- ***Appropriate for solid standard poles of solid bamboo***
- ***It can be glued, and screw fixed***
- ***Can use for extending the length of member***
- ***Can use for constructing simple furniture as shown in the picture***



Sample Prototype



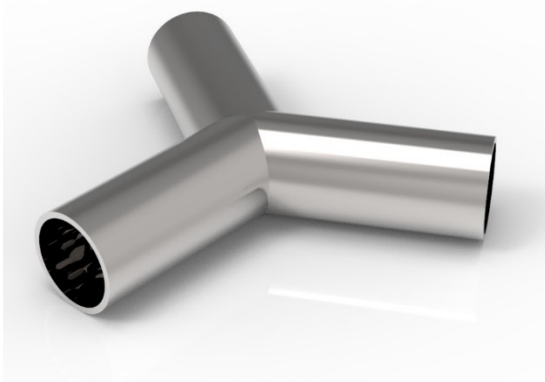
Sample Prototype



One of the furniture (rocker) constructed using the straight steel pipe connector as easy assembly system



Sample Prototype

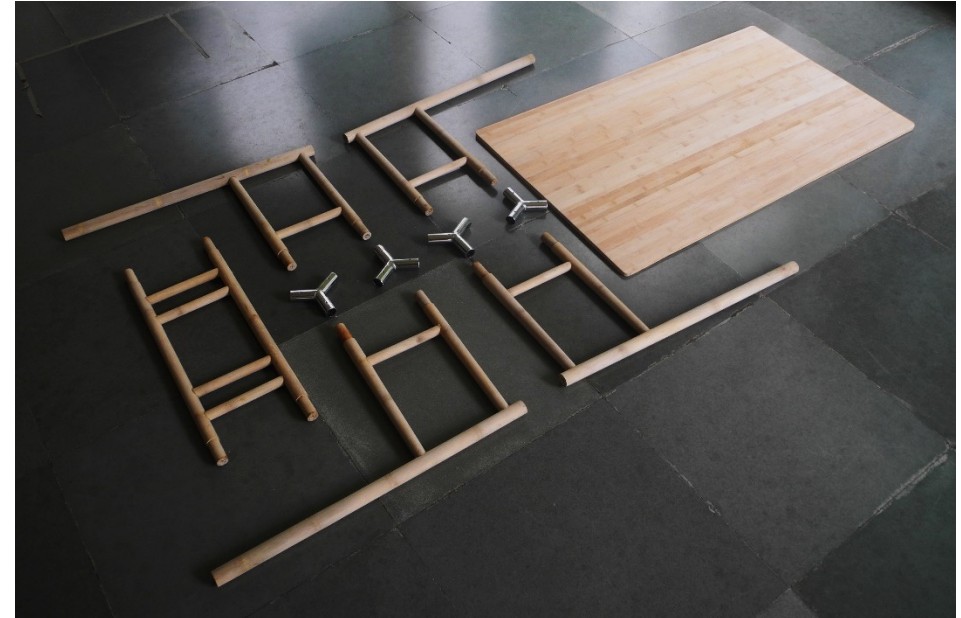


- Use of the three - sided joint combination of Tenon & mortise for the simple furniture form
- Appropriate for the standardised solid bamboo pole - based furniture construction.
- There could be semi-assembled components which could be joined with the connector for complete assembly.

Sample Prototype



Sample Prototype



Sample Prototype

Folding stool made using the standardised poles and the process



Sample Prototype



Sample Prototype



Sample Prototype



10mm ms rod welded to ms pipe, 11 mm hole through bamboo

Hex nut welded to ms pipe helps as lock, as stopper for ms 130mm long ms sleeve

Ms pipe sleeve 100mm long, to lock the hinges.



©

Application in Project



Designed for
Konkan Bamboo & Cane Development Centre
Bamboo Furniture – Seating systems

Application in Project



Designed for
Konkan Bamboo & Cane Development Centre
Bamboo Furniture – Seating systems

Application in Project

Designed for

Oost Venture Pvt. Ltd. Bangalore, India



User test



User test



User test



User test



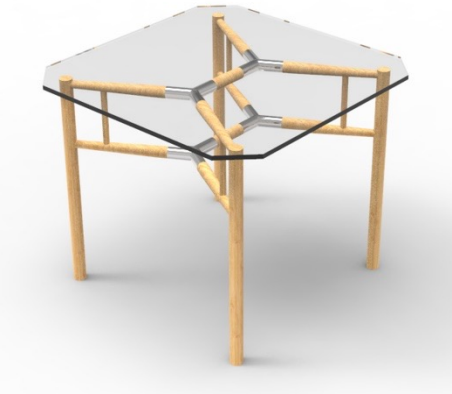
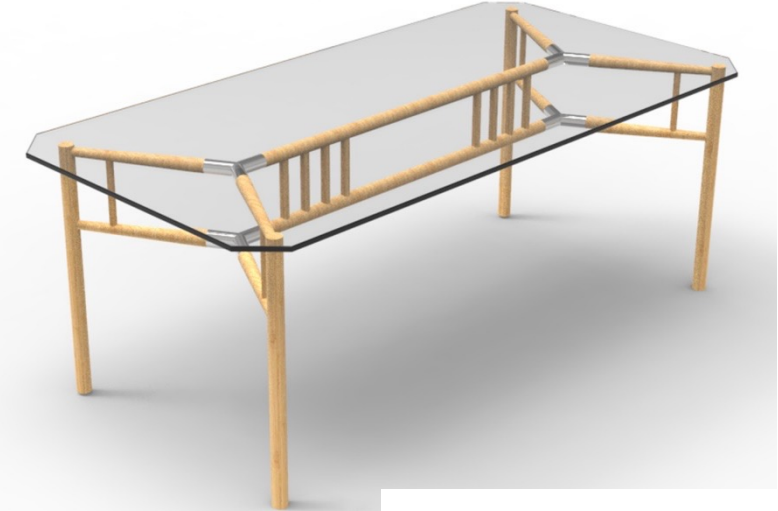
User test



User test



Various example for use of three – sided S. S. pipe connector/joint with combination of Tenon & mortise



Raw Material Processing

Harvesting

Treatment

Segregation

Straightening

Round rod cutting

Sanding

Furniture Making Process

Cross cutting

Drilling

Tenon cutting

Component assembly

Sanding

Finishing

Fixing hardware surfaces & upholstery

Packaging

22nd April

On **Earth Day**

Let us take **Bamboo** forward for
the future of best livable space

and today

It is my **Birthday** too.....

Thank you

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