

# BAMBOO-WOOD CONSTRUCTION – ADAPTATION THROUGH ARCHITECTURAL PRACTICES



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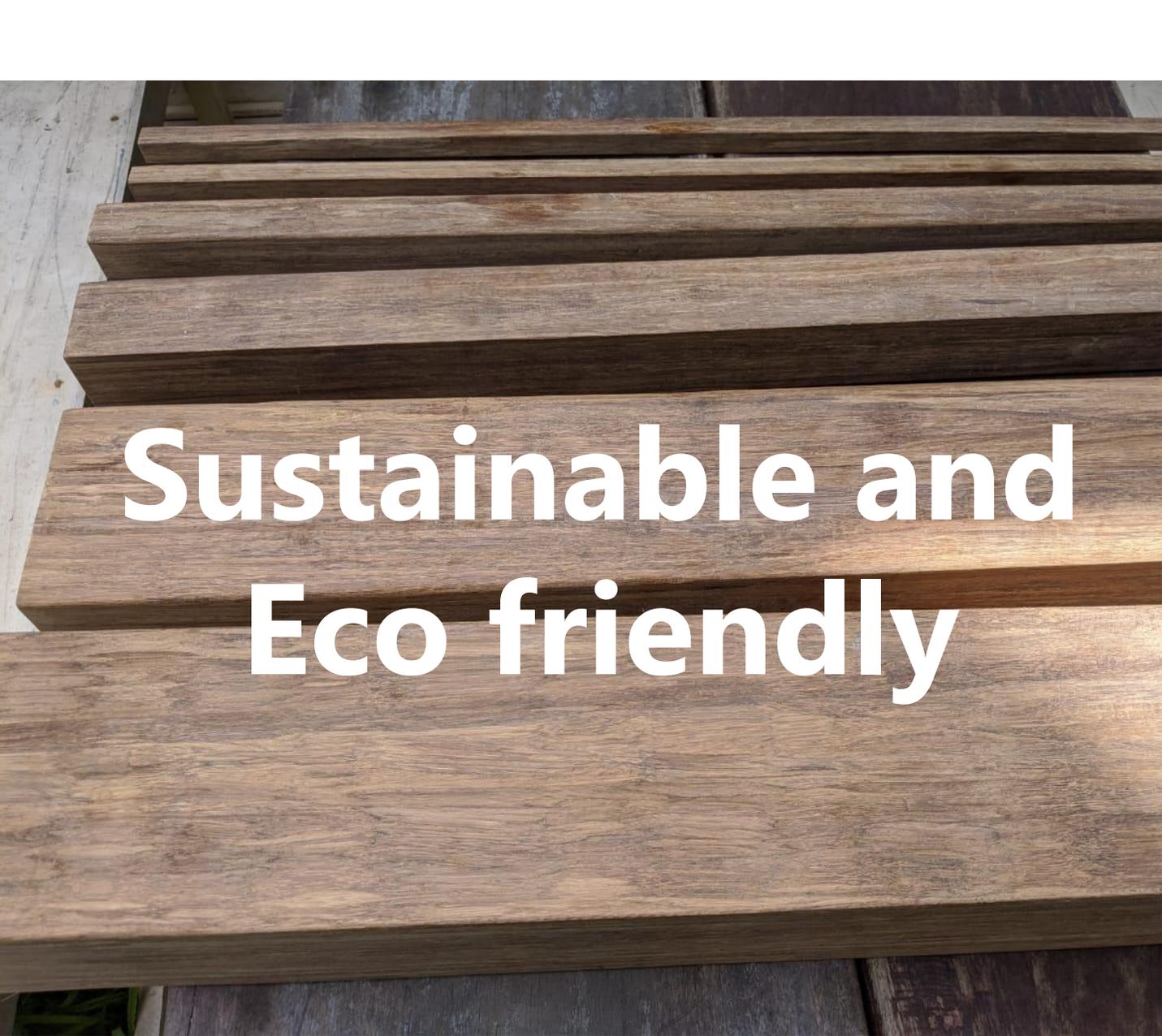
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# POTENTIAL DEVELOPMENT OF INDUSTRY

- **5% OF GDP IS CONSTRUCTION**
- **3% OF THIS MAKES A MINIMUM OF 100,000 CR INDUSTRY ANNUALLY**
- **ALL TYPOLOGIES – HOUSING, INDUSTRIAL, OFFICE+COMMERCIAL & INSTITUTIONAL IN NEXT 3 YEARS CAN ADOPT ATLEAST 10 MILLION SFT OF CONSTRUCTION SPACE**
- **NETT BENEFIT TO ENVIRONMENT : 30% OF CO2 EMISSIONS IS VIA CONSTRUCTION. ONE 20 FLOOR BUILDING EMITS CO2 EQUAL TO 1000 CARS ANNUALLY.**
- **REQUIREMENT: 8'X4' – 20MM THK BAMBOO BOARDS CONVERTED TO CLT**
- **ENABLERS & TECHNOLOGY : POLIC, BIS CERTIFICATION / SPECS AND ARCHITECTURE + STRUCTURAL APPLICATIONS WILL NOW BE DEMONSTRATED**

A photograph showing several long, rectangular planks of bamboo wood stacked horizontally. The planks have a natural, light brown color with visible wood grain patterns. The text 'Sustainable and Eco friendly' is overlaid in white on the middle of the stack.

# Sustainable and Eco friendly

**Bamboo-Wood** made from bamboo which is a grass and not a tree.

Bamboo can become useful in 3-4 years, a 60-foot tree needs 60 years to recover, and a bamboo only needs 59 days.

Absorbs CO<sub>2</sub> from the atmosphere while it is growing, at a faster rate than most tree species, helping reduce Global Warming. Use of bamboo-wood reduces deforestation

# BETTER PROPERTIES THAN HARD WOOD

It is a hard material, high in density and high in abrasion resistance and scratch resistance. It has better physical properties than solid wood, such as good water resistance, hardness, small coefficient of expansion and drying shrinkage when exposed to water

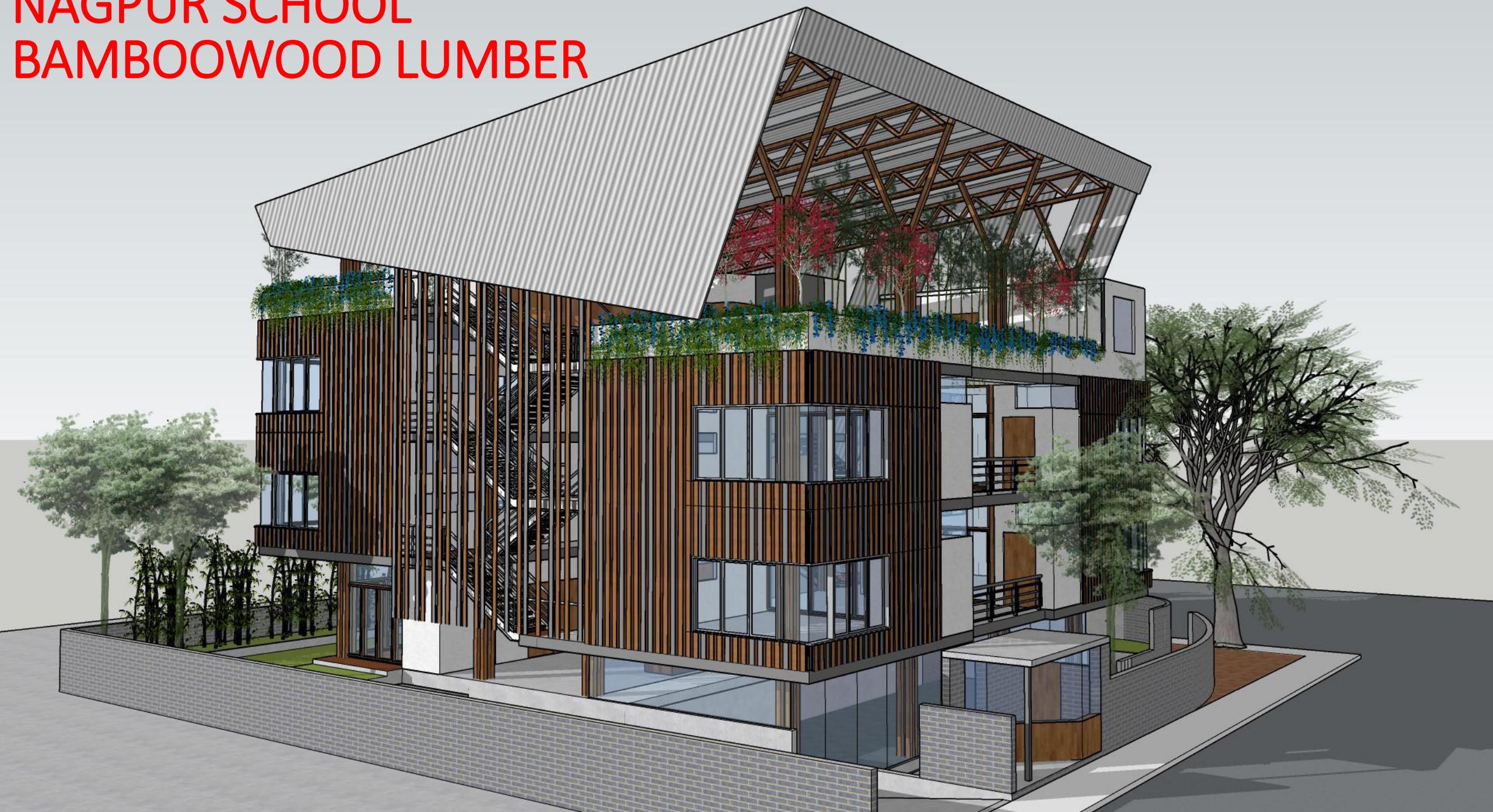


# TERMITE PROOF

During the production and processing of bamboo, high-temperature cooking and carbonization destroys parasitic eggs in bamboo. Besides, sugar, fat, starch, protein and other nutrients are removed, leaving no environment for eggs to grow. Therefore, it has a strong ability to prevent termites, moth and mildew.



# NAGPUR SCHOOL BAMBOOWOOD LUMBER

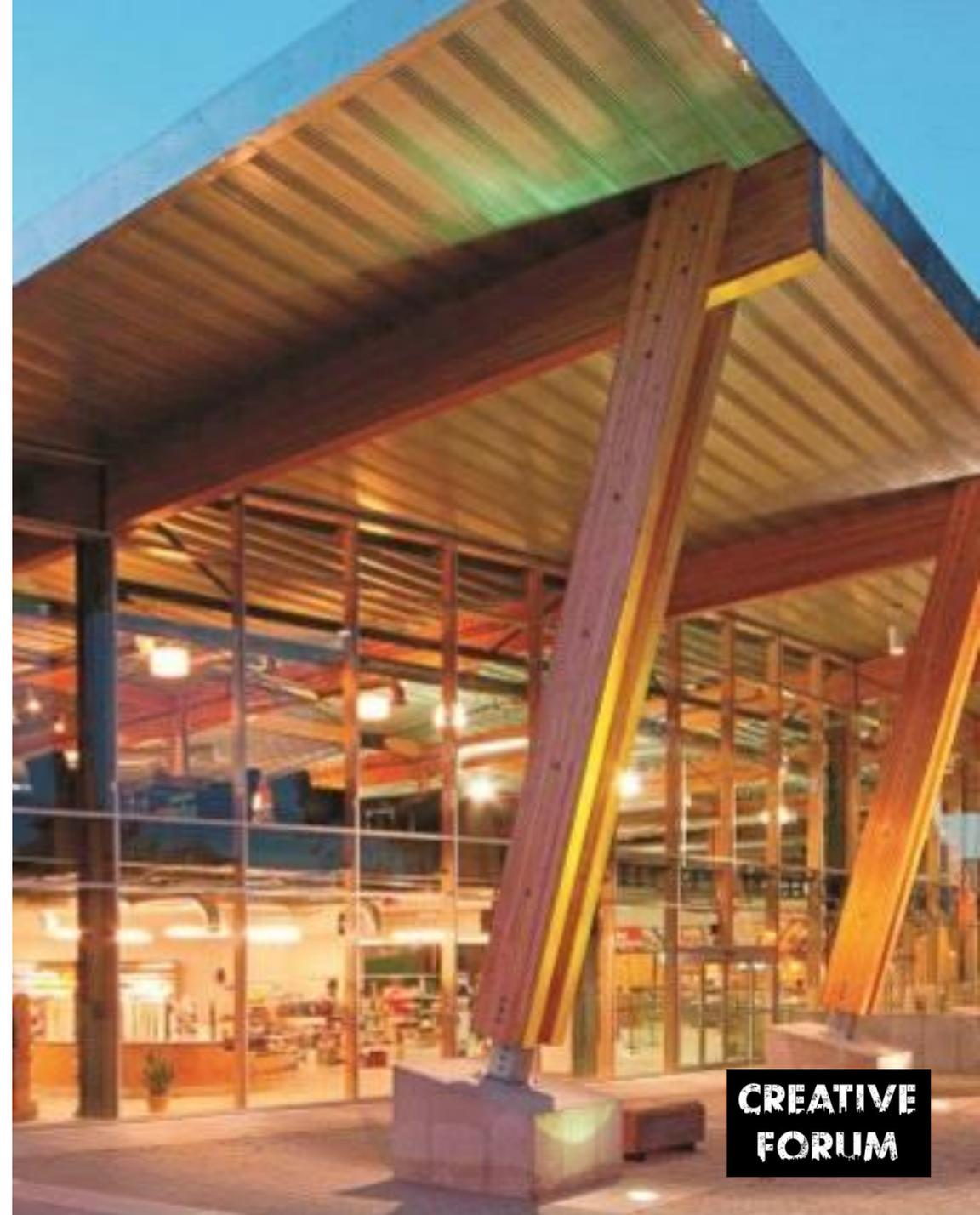


# CONSTRUCTION FEATURES

- 60-70% OF CONSTRUCTION USING PRE ENGINEERED BAMBOOWOOD – COLUMNS AND BEAMS
- BASEMENT IN RCC – RETAINING WALLS / COLUMNS AND SLAB
- DECKING SHEET FLOORS
- LIGHTROOF IN BAMBOO TRUSSES AND METALSHEETS ON TERRACE
- PREFABRICATION SYSTEM REDUCES CONSTRUCTION TIME BY HALF

## FINISHES TO BE KEPT BASIC AND MINIMUM:

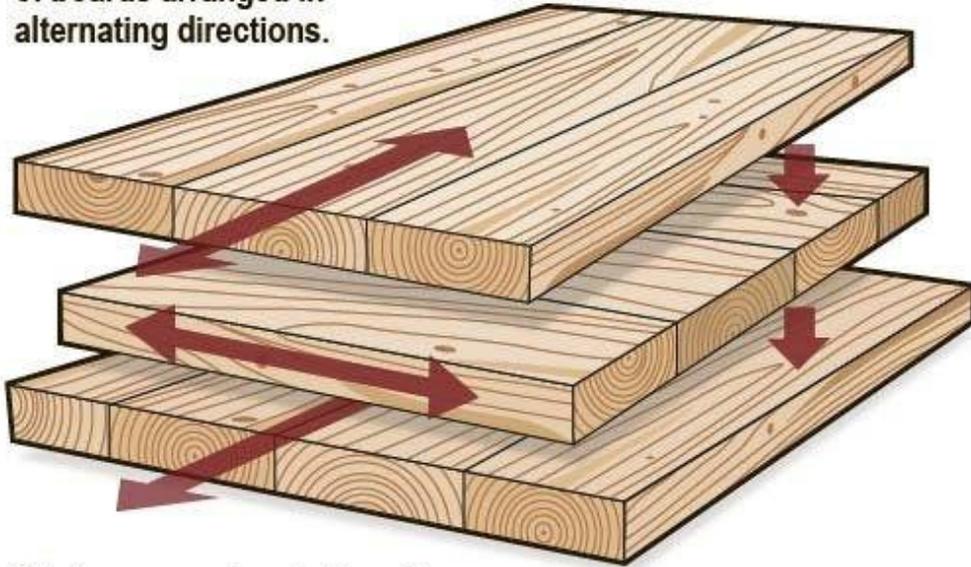
- CEMENT FLOORING IN CLASSROOMS AND CORRIDORS
- TOILETS – VITRIFIED TILES
- OUTDOOR PAVING – TERRACOTTA TILES



# CLT explained

Cross-laminated timber (CLT) is a prefabricated, solid wood panel used in residential and industrial construction.

CLT consists of several layers of boards arranged in alternating directions.



The layers are bonded together with industrial adhesives and pressed together to form a solid, straight rectangular panel.

Common applications include long spans in walls, floors and roofs.

Sources: Oregon State University;  
APA-The Engineered Wood Association

Alan Kenaga/Capital Press

Courtesy USDA; Structurlam



# 8X4, 20MM THK BAMBOOWOOD BOARD CONVERTED TO CLT

- 3 PLY OR 5 PLY BOARDS GLUED TOGETHER TO FORM CROSS LAMINATED TIMBER PANELS ARE THE BUILDING BLOCK FOR COSTRUCTION
- THESE PANELS CAN BE CUT TO ANY SHAPE OR SIZE TO BE USED AS BEAMS/ COLUMNS AND FLOOR SLABS
- **BUILDINGS UPTO 60MTS ALREADY BUILT – 300MTR BUILDING IN THE PIPELINE**

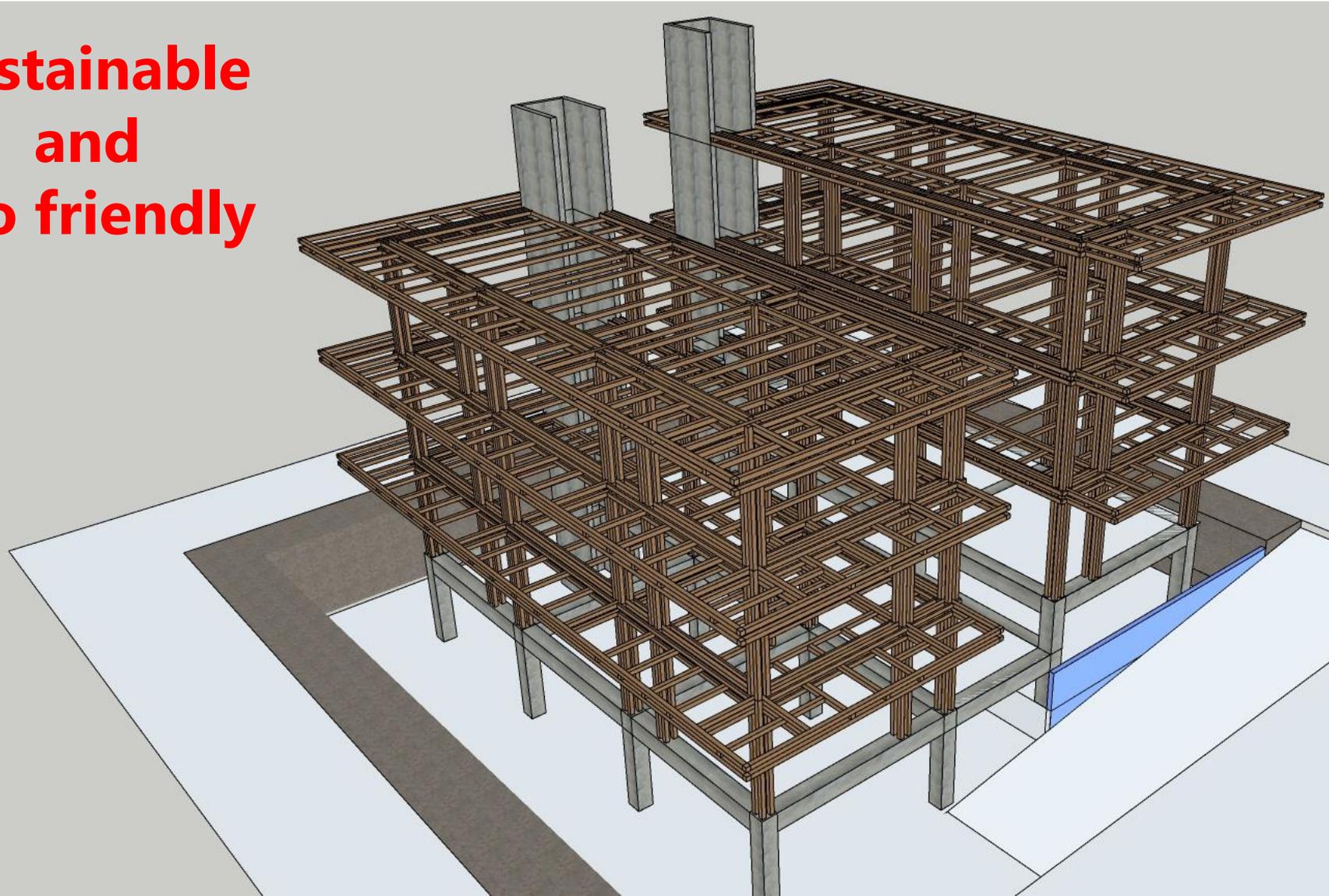


WOODEN BUILDINGS  
HAVE A NATURAL  
WARM FEEL AND  
INHERENT RICHNESS  
OF MATERIAL



# STRUCTURAL SYSTEM – LUMBER TECHNOLOGY

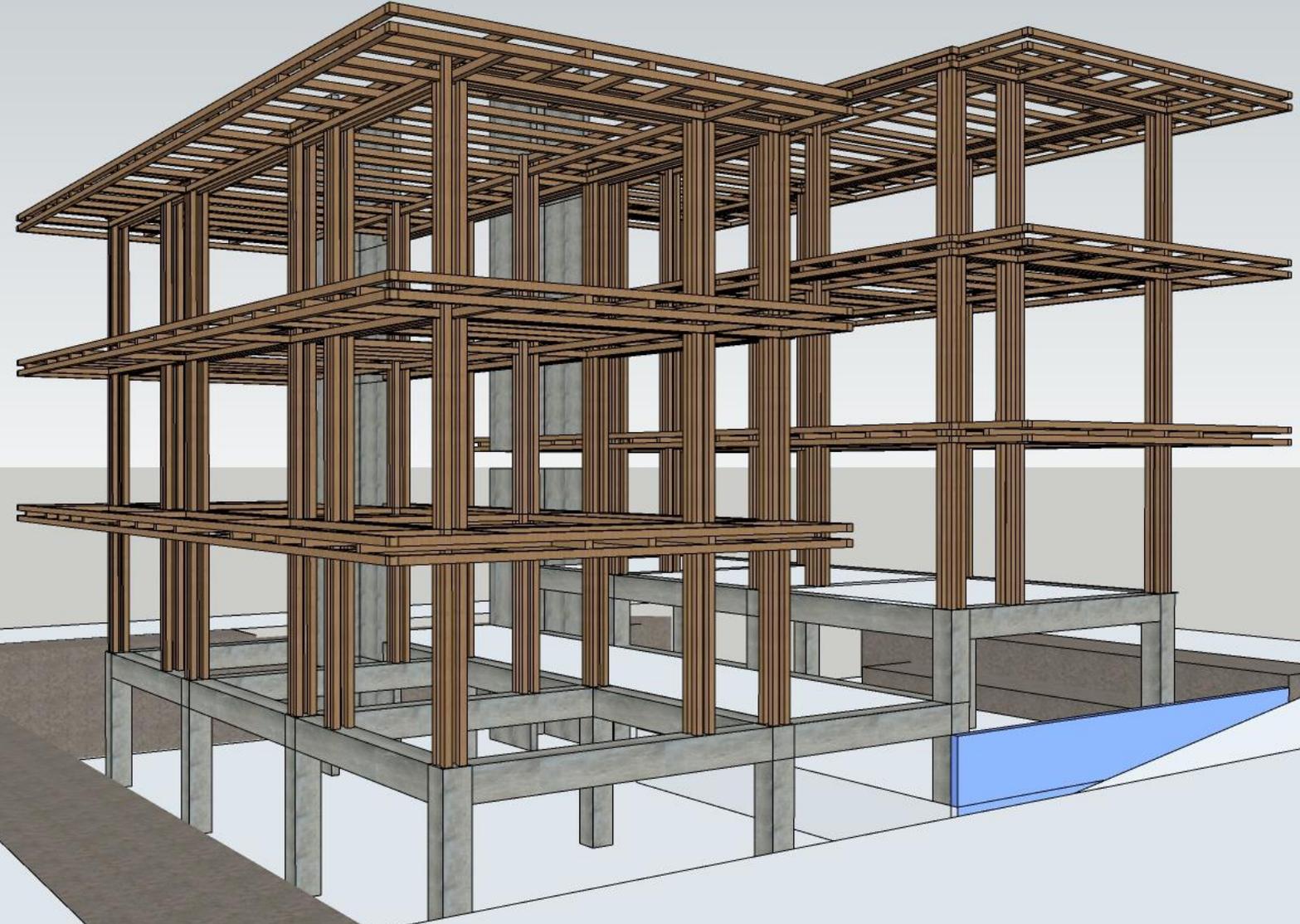
**Sustainable  
and  
Eco friendly**



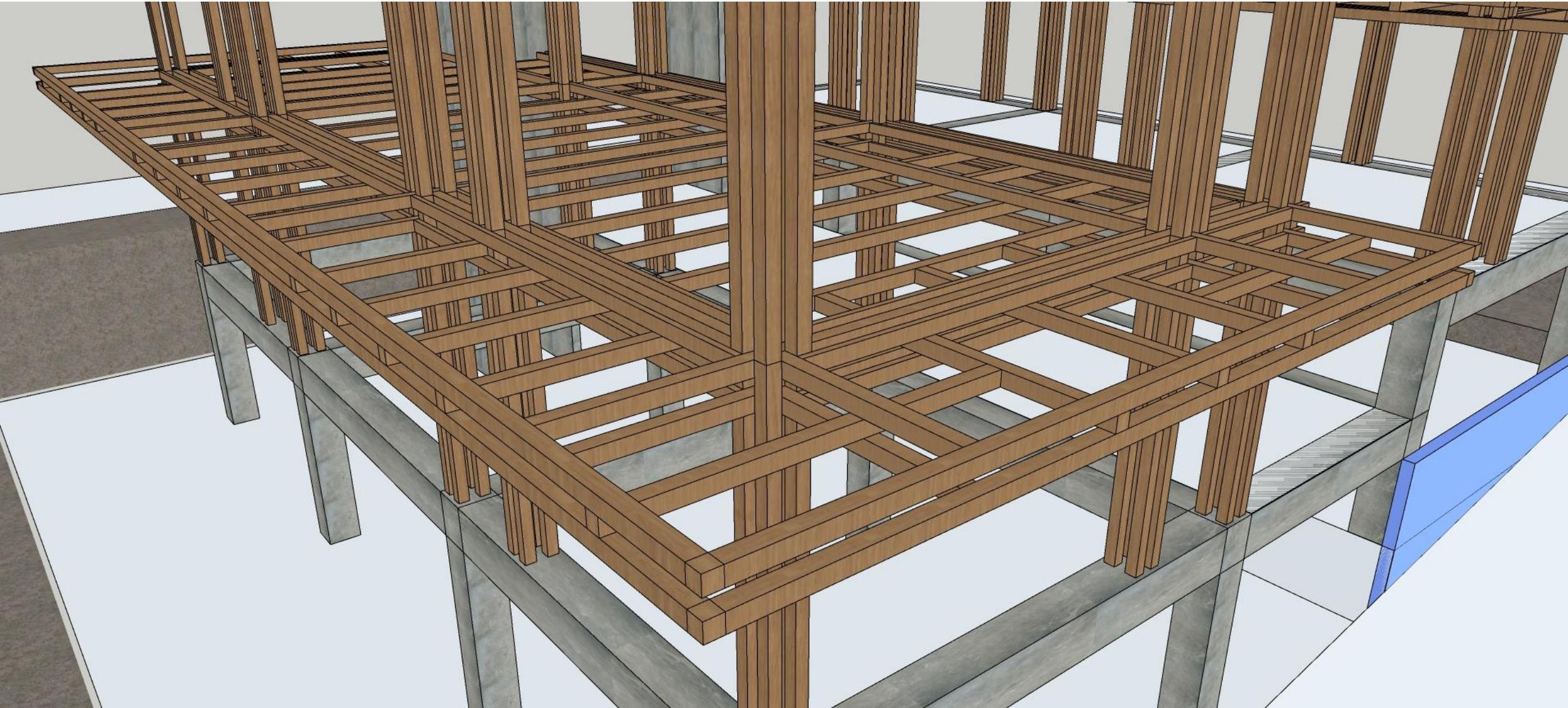
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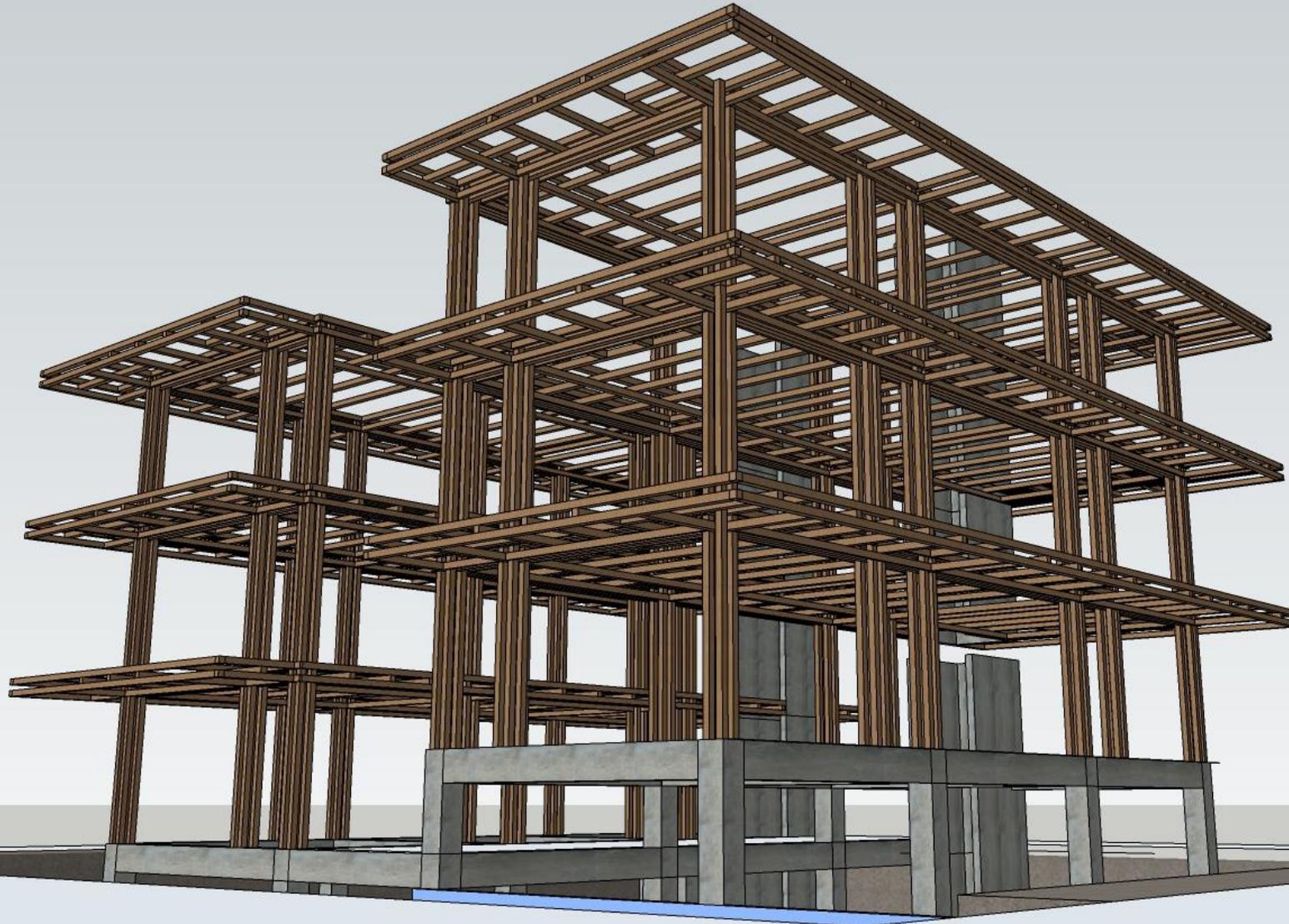
# TERMITE PROOF – WATERPROOF - FIRE RESISTANT



# JOINERY OF VARIOUS BAMBOOWOOD MEMBERS



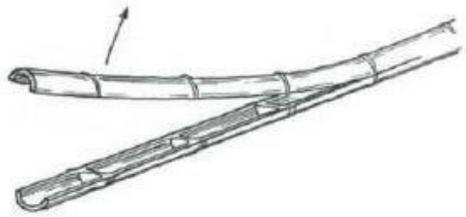
CAN LAST MORE THAN 50 YEARS



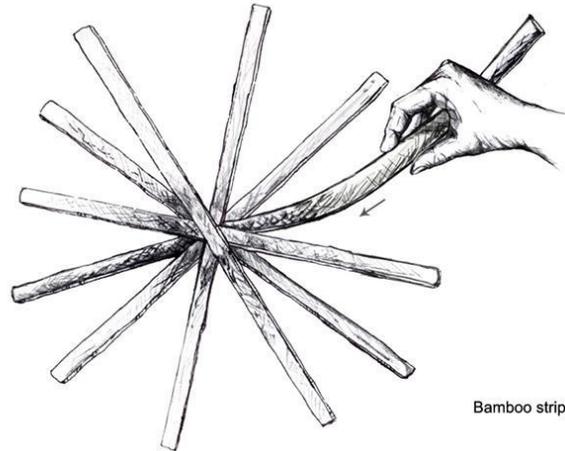
# STRUCTURE DESIGN CONCEPT

## WEAVING THROUGH GEOMETRY AND NATURAL SYSTEMS

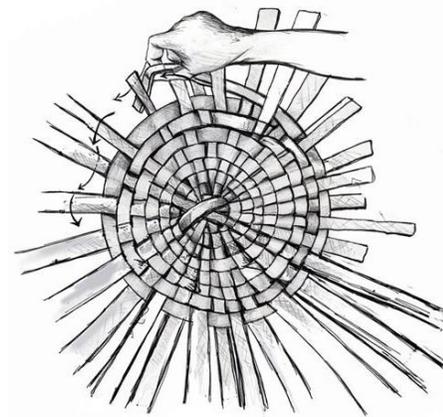
Creating a unified stable form by using another stable form processed through fragmentation and uniting it back.



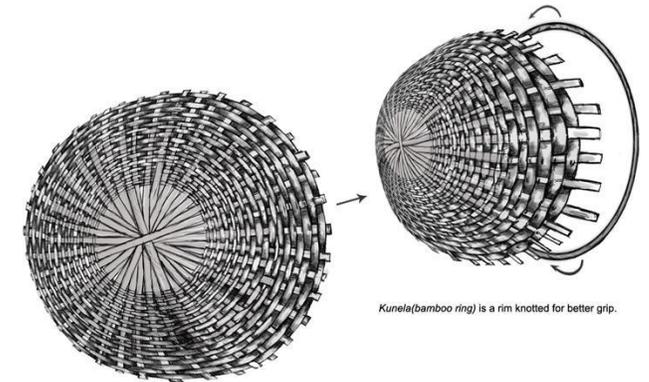
Splitting bamboo



Forming thin strips



Interweaving the strips

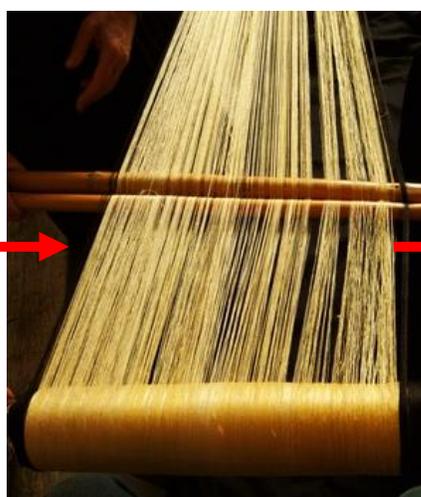


Forming a stable product in the form of basket

# WEAVING THROUGH GEOMETRY AND NATURAL SYSTEMS



**COTTON**



**THREAD**



**CLOTH**



**RUG**



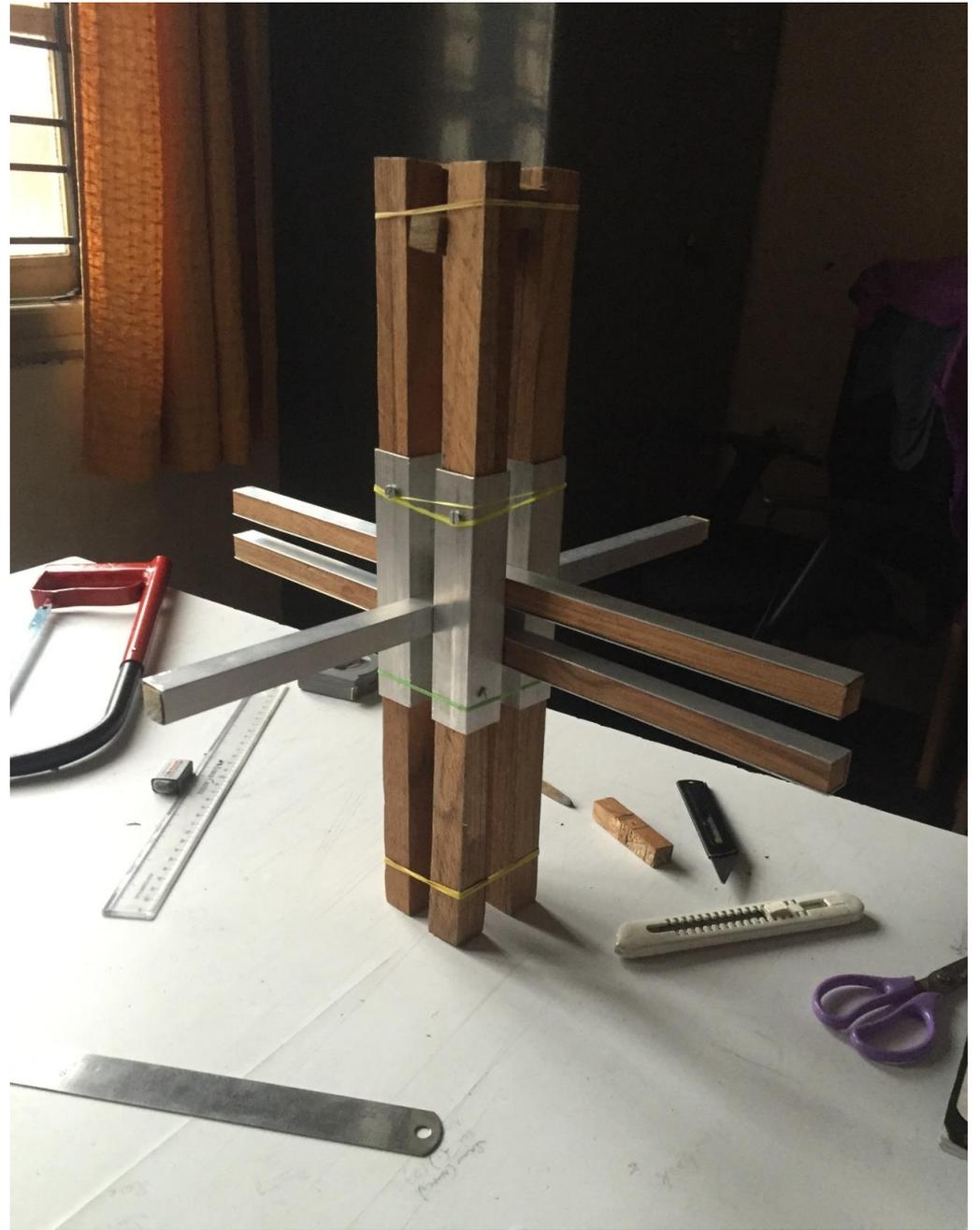
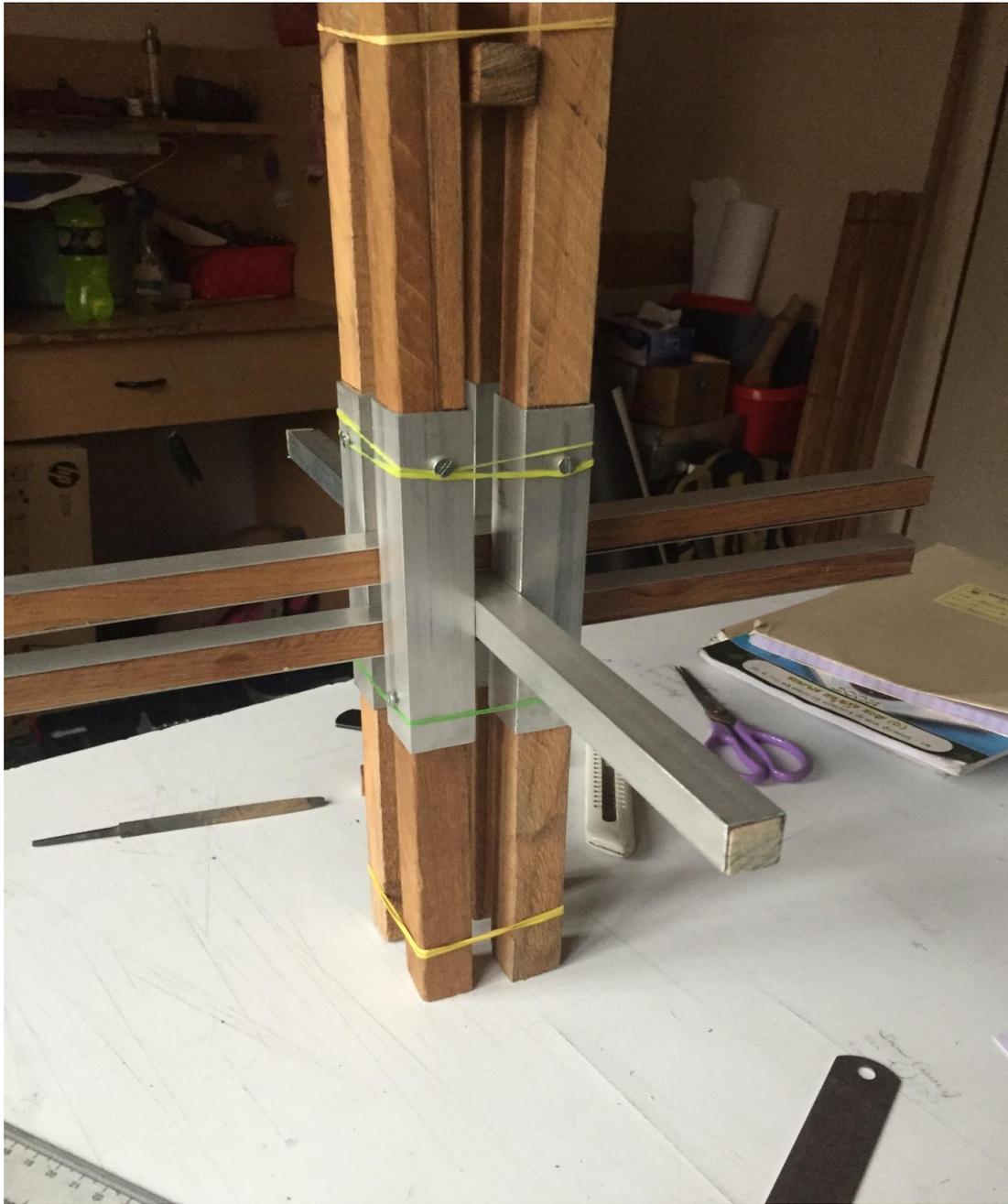
**TWIGS**

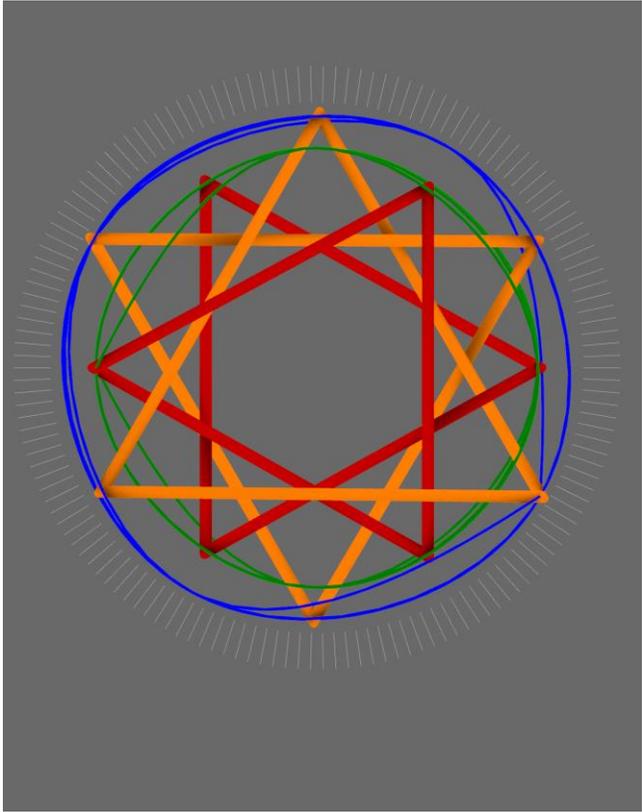


**INTERWOVEN TWIGS**

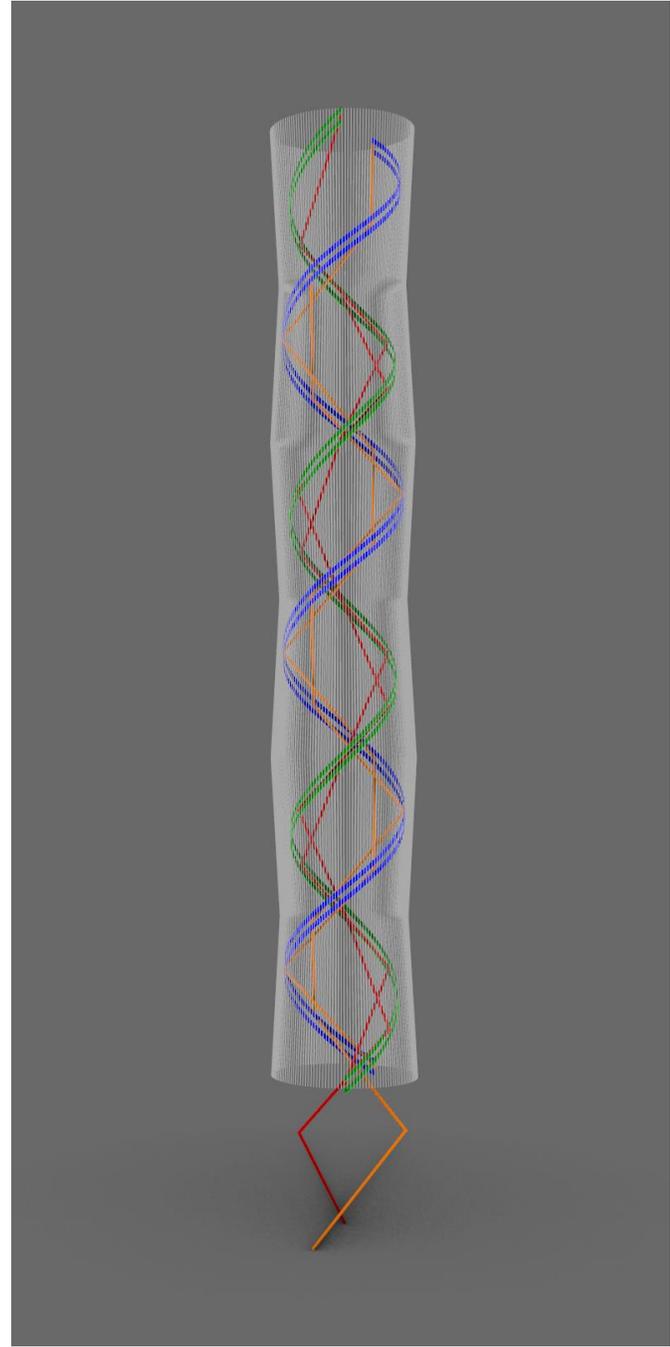
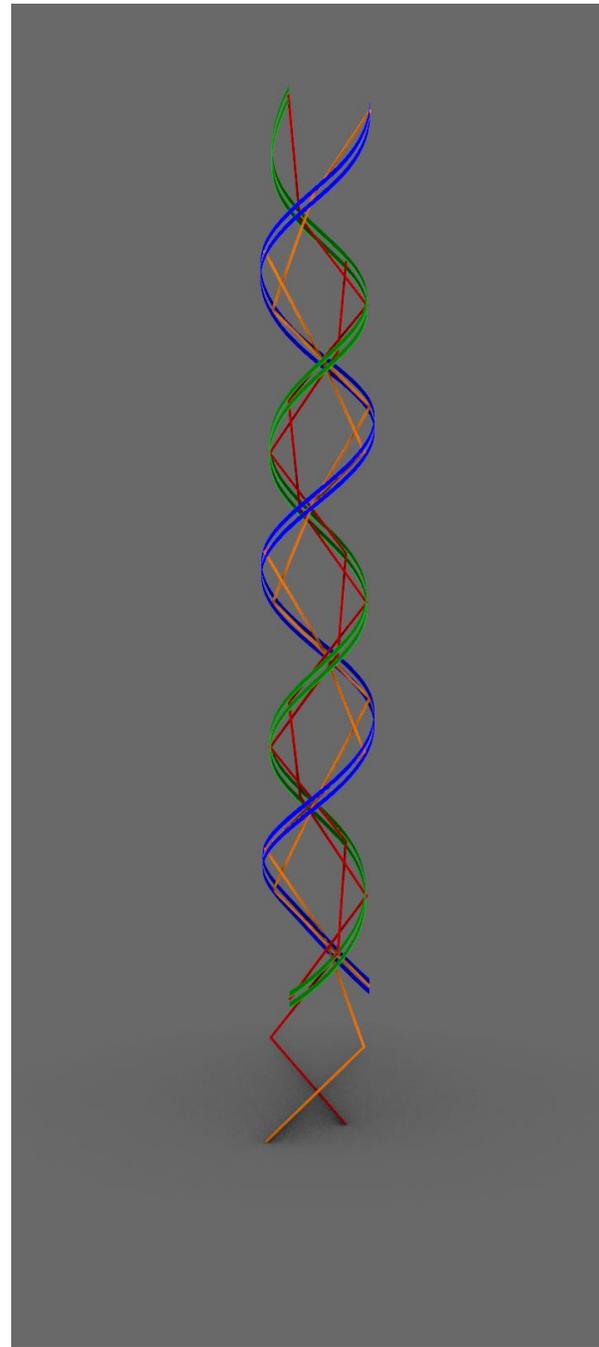
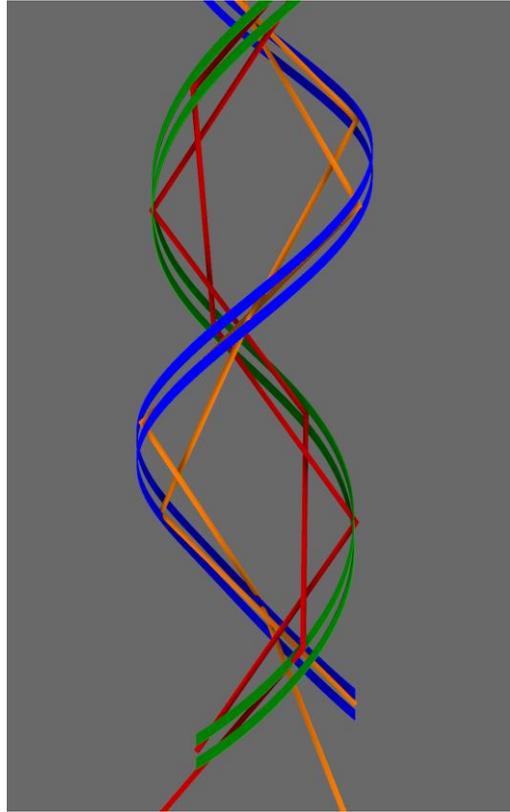


**NEST**



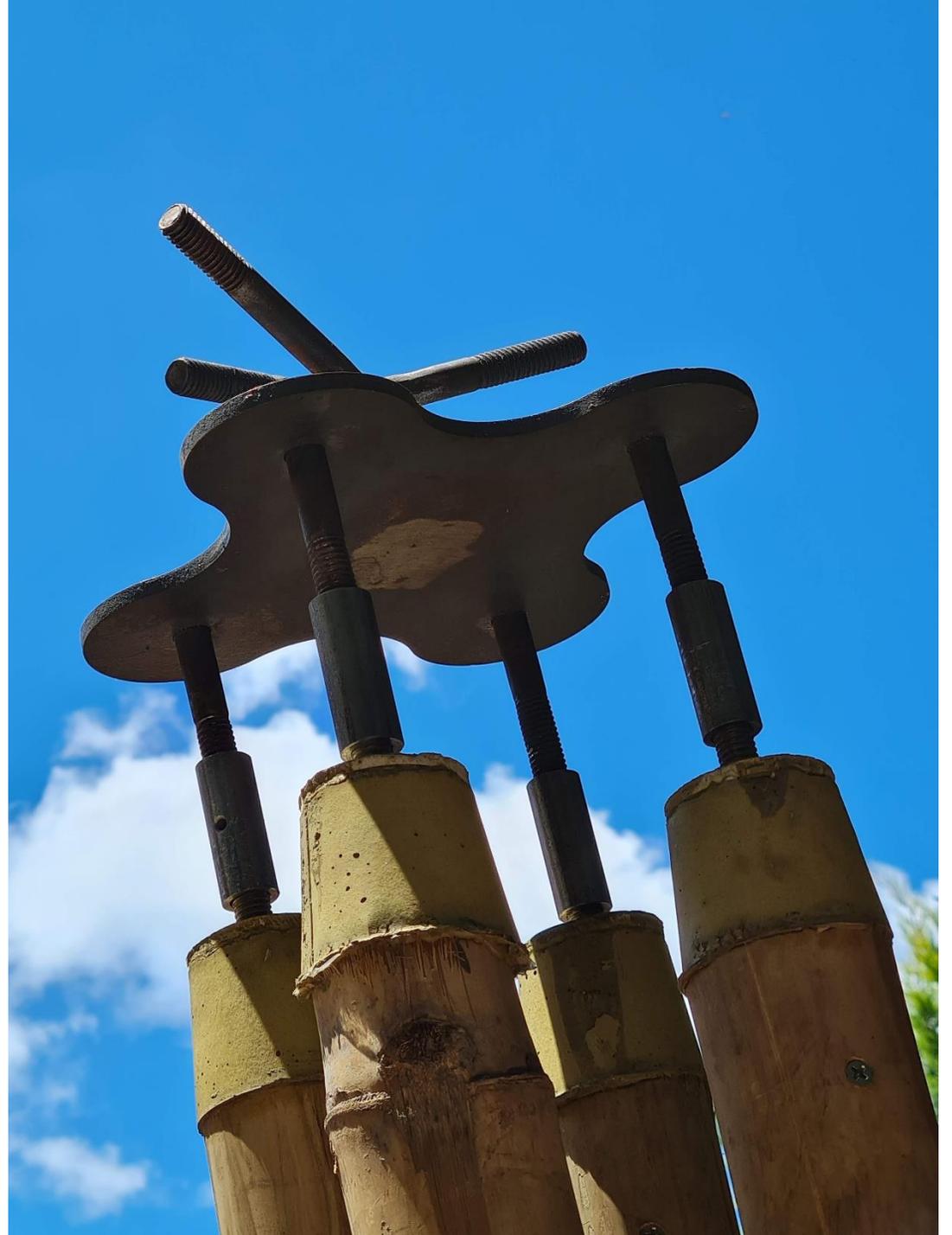


Top view



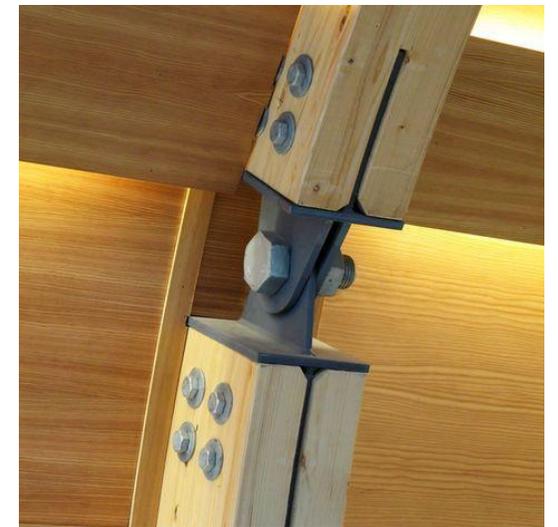
# BAMBOO PAVILION @ WCFA, Mysore







# STEEL JUNCTIONS FOR CONNECTIONS



# LARGESPAN APPLICATIONS - FACTORIES



# PEER REVIEW FOR STRUCTURAL APPROVAL - BIS



# DATABASE OF JOINERIES – COLLABORATION WITH CEPT





# CONCLUSIONS

- **BAMBOOWOOD INDUSTRY PRODUCES 2 MILLION BOARDS @ RS. 8000 PER BOARD. WILL ENABLE A MIN REPLACEMENT OF STEEL AND CEMENT OF 70% FOR 10 MILLION SFT @ RS. 3000/SFT**
- **CURRENT COST = RS 10,000 PER BOARD – SO CONSTRUCTION COST IS WORKING OUT TO RS. 4500/SFT. THIS IS THE VIABILITY GAP**
- **CURRENTLY FROM 3 FACTORIES, AT LEAST 20 FACTORIES NEED TO BE PRODUCING BAMBOOWOOD IN THE NEXT 3 YEARS TO MEET REQUIREMENTS**