

## CATEGORY BUILDING SYSTEMS



### PRODUCT / TECHNOLOGY



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Technology Detail

## BAMBOO REINFORCED CONCRETE HOUSING

*Alternate to Steel reinforcement in Reinforced concrete construction*



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Video

### CONTACT DETAILS

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### BRIEF

This technology replaces steel rebar with bamboo reinforcement in concrete structures, providing a cheaper, cleaner and sustainable alternative to steel reinforced concrete structures, while providing a comparable degree of disaster-resiliency and durability. The high tensile strength of Bamboo is utilized in conjunction with concrete for structural stability. The suitable adhesives are used to improve bonding between bamboo and concrete.

As regards the technology, the extensive experimentations have been carried out at the structural engineering laboratory at IIT Kharagpur over the past fifteen years. The results have been published in international journals and are highly cited. The technology has potential to save steel to a large extent in housing construction.



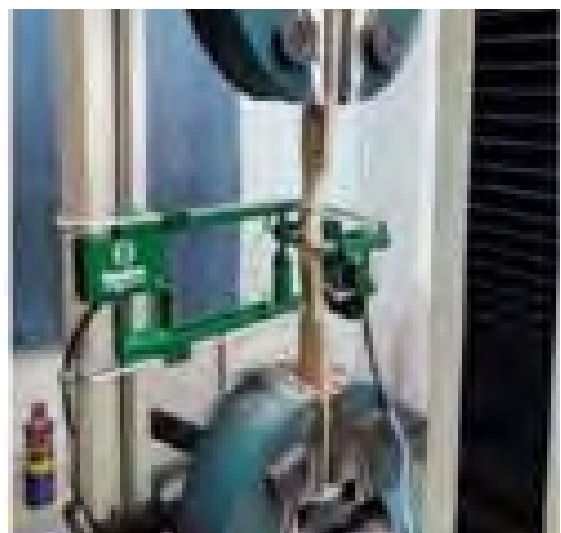
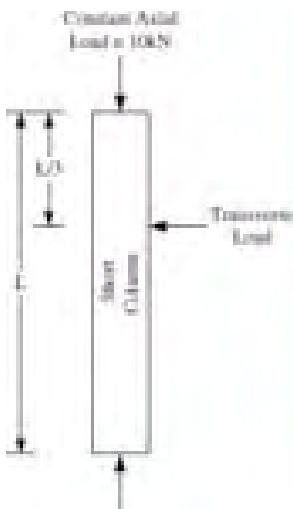


## SALIENT FEATURES

- Bamboo is environment-friendly as it is natural, recyclable & locally available.
- Quality & durability of bamboo reinforced concrete is similar to steel reinforced concrete structures, once bamboo is properly treated chemically to prevent infestation and rotting
- In terms of energy efficiency, it is superior to reinforced concrete structure since steel production is replaced by the use of natural and fast growing plant bamboo
- Houses constructed using this technology have performed satisfactorily for more than seven years, after being exposed to several natural calamities like cyclones and floods
- The developed technology can be implemented in rural areas with the help of local people which is cost effective & easy to implement.
- Local labor can easily be trained to treat bamboo, cast bamboo reinforced concrete elements and build single-family houses.

## ECONOMIC ASPECTS

- As bamboo is naturally fast growing plant & available abundantly, bamboo reinforced houses works out to be 25% cheaper than reinforced concrete structures with steel rebars.





## SUSTAINABILITY ASPECTS

- The bamboo is widely available and can be cultivated as per the requirement, the developed technology would be quite sustainable.
- Use of this technology will create a great demand for bamboo which could lead to widespread and planned bamboo cultivation.

## SUITABILITY & AVAILABILITY

- Technology is suitable for single and double storied houses for any climatic conditions, however local bamboo can be grown in tropical climate. Otherwise, bamboo may be cultivated nearby and transported to site.
- Both concrete and bamboo are widely available. If bamboo is naturally dried and treated, then additional treatment/technology is not required. However, mechanized cutting and preparation of bamboo speeds up the process significantly & such machines are already manufactured by existing industries across the country.
- Precast wall panels would increase the efficiency of construction and result in greater quality control, however, further research is required on the prefabricated connection ductility and strength.





### LIMITATIONS, IF ANY

1. Public perception: People are reluctant to use bamboo for their own houses as it is not considered as par with conventional RCC houses, even though the technology has been demonstrated to be at par with conventional reinforced concrete/brick masonry structures.
2. The durability under earthquakes requires further research, though it is certainly superior to unreinforced masonry or mud housing.

### MARKET LINKAGES

The research study & technical know-how is available with IIT Kharagpur.

### DETAILS OF PROJECTS

Two houses, 1BHK and 2BHK, with area 275 sqft and 390 sqft respectively, have been constructed at the school premises of Jagriti Vidya Mandir near IIT Kharagpur. These houses are being used for office purpose in the school presently.

### CERTIFICATION/INDIAN STANDARD/ ENDORSEMENT

- Structural designs as per IS 456 (Plain and reinforced concrete), Mix design as per IS 10262 (concrete mix proportioning), bamboo testing as per IS 6874.
- Extensive Research & experimentations at Structural Engineering Laboratory at IIT Kharagpur

