MI KADOWEB

innovative lightweight building system

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Point of departure

investigation into design tools conveying strong connections between man and environment
based on traditional Japanese architecture
Initial design idea

Funeral parlour, Kufstein, Austria, 2003,

design tools from „open house“ applied to create a space with multiple connections between man and environment
Project description

- MIKADOWEB
  new method for erecting a freeform shell from short rods suspended by a membrane

- significant high tech structure using low tech material and connections

- bamboo as light weight widespread building material ideal for this ecologically, economically sustainable building system

- current design
  „Dreampavilion“, Community Centre, Freetown Peninsula, Sierra Leone, West Africa
Development

model development, build up system and experimental structure

in cooperation with Prof. Dr. Ing. Eda Schaur, Institute for Structure and Design, University of Innsbruck, Austria
Erection method

- installation of groundring on site
- arches prefabricated flat on the ground
- arches pushed into position on groundring, held by cables
- connection of arches with rod structure
- densification of rod structure until climbable
- montage of membrane
- adjusting high- and lowpoints of membrane
- suspension of membrane
- cleaning edges of membrane
Use of Bamboo

- local bamboo (bambusa spec. in Sierra Leone), 3-5 year old
- cut at end of rain season, treated green, dried carefully
Harvesting Bamboo

The best season for harvesting is after the rainy season when the bamboo sap is low. Starch is the favorite food of pests. Don't harvest during the wet season! Cut bamboo that is 3-5 years old. Bamboo older than 5 years is harder and the inner culm wall becomes impermeable to the BORAX BORIC ACID Solution.

There are 2 different ways to tell the age of bamboo culms:
1) Mostly, culms at the inside of a clump are the oldest.
2) Label the new shoots. This is the easiest method.

The culms should be treated soon after having been cut, but can be left for a few days standing upright, piled on a stone. Due to the ongoing transpiration by the leaves the culm will lose some of its moisture and also starch, which is the food for the pest, i.e. the Powderpost Beetle. But don't wait too long, since moisture is required for the following diffusion process.

Stored bamsos is endangered by beetle infestation which can be recognized in the form of a lacquer-like powder and small holes in the area of the nodes and along the internodes.

The Powderpost Beetle

Planning a Treatment Center

Treatment process

STEP 10 Connect a hose to the container which holds the mixture. Pump the solution into the culms.

STEP 11 Fill the entire bamboo with the solution. Every morning refill the culms which have absorbed approximately 1% of the liquid overnight. Every day absorption rate is less.

STEP 12 On Day 11 don't add more solution. Allow the liquid to go down to avoid overflow when the last node is broken.

STEP 13 On Day 14, test check the culm by sawing off the upper internode. The lacquer has now penetrated the culm wall sideways and colored them brown. Carefully carry the filled culms close to the stump hole and break the last node using a metal pole. Make sure you wear face protection. The diaphragm of the culms should be punctured by using the iron rod. The solution will flow from the slotted bamboo into the stump hole.

Calendar
Details

- no contact to soil for bamboo protection
- connection of bamboo with UV-resistant PE-straps
- superelevation added on structure to allow slight sinking of structure
- improvement of arch geometry
- small hutches cut into bamboo at knots of arches to prevent slipping and control shape
Conclusion

- design idea evolving from spacial aspects is structurally sensible solution
- each model study brought new insights, integrated into building system
- build up system developed at scale 1:20 could be tested and improved in experimental structure 1:3
- elaborated experimental structure will erected this year
- preservation and final solution for footpoints will be applied at scale 1:1
Acknowledgements

Tutors

Prof. Dr.- Ing. Eda Schaur, Institute for Structure and Design, University of Innsbruck, Austria
Guestprof. Michael Dickson FIStructE Hon FRIBA, University of Bath, Great Britain
Guestprof. Dr.- Ing. Switbert Greiner, Greiner Engineering, Stuttgart, Germany
Nicole Zahner, Dipl.-Bauing. ETH, StudioC, Berlin, Germany
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