2007 INTERNATIONAL BAMBOO BUILDING DESIGN COMPETITION

CATEGORY: Structural Art Installation
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Sustainability and environmental issues are currently dominating the thought processes of much of this generation because of the growing concern with the current energy crisis and consumption of the world's unrenewable resources. The building industry consumes and great deal of resources, most not renewable, in order to meet the needs of the consumers. A relatively simple solution to dealing with this crisis would be to build with bamboo. The problem with this solution is that bamboo, as a building material, is a virtually unknown and unprecedented. One of the main objectives of this competition was to enlighten the public about the capabilities of this natural resource, as an alternative structural and aesthetic material, and the other was to promote environmentally sustainable building practices within the industry.[1]

In accordance with this idea, this project was designed to showcase the potential of bamboo; by using multiple, and sometimes contrasting, construction methods and aesthetic qualities in a series of spaces, essentially using the building itself to bring awareness of the vast possibilities in this material. For generations now, bamboo has been used as a building material historically across the globe, most commonly in South America and Asia, but there has been a rising interest from the rest of the world because since it has an incredibly fast growth rate, it is a highly renewable material, making it a very attractive product to the ecologically conscious consumer. Furthermore, it has very high levels of tensile and bending strength which in testing have both proven to be higher than those of same properties of wood, and often than those of steel.[2] In order to truly prove the potentials of bamboo as a flexible and modern building material, it was decided that the structure would have to be an object, a temporary exhibit, which could be easily constructed and easily adapted to potentially any site. In so doing, the constructability of the project was looked at closely, along with investigating traditional and modern construction methods.

The main structure of the building is based on the construction methods used by the Chinese to construct scaffolding for generations. Structural 3" diameter

bamboo poles of the Bambusa Stenostachya variety are bound together into bundles and form the grid for one of the main spaces:

Phase 1 construction

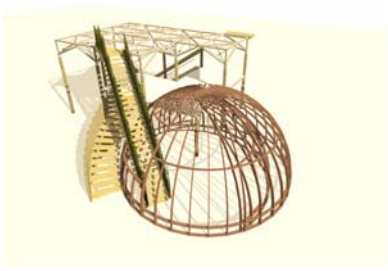
ILL.01
Bamboo scaffolding

ILL.02
Traditional binding methods

The other space is constructed from prefabricated glue laminated bamboo, intended to showcase the variety of shape and space that bamboo can create. Bamboo based pressed fibreboard is installed as flooring, along with steel stair supports with bamboo treads. At this stage secondary bamboo framing is also put in place, consisting of space frames with steel connectors based on the work of Renzo Piano, as pictured below:

Phase 2 construction

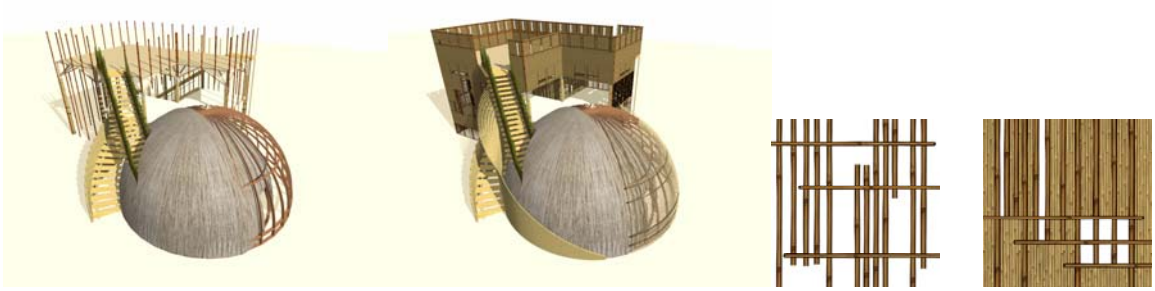
ILL.03
Piano bamboo steel
connection detail



Phase 3 construction

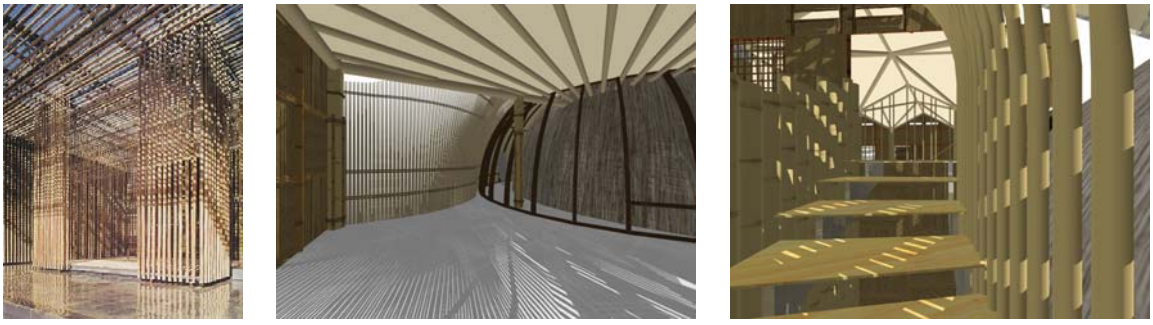
In the final phases the stairs are constructed, and living bamboo planted up one of them to act as a natural railing, then thatching on the dome is applied, and 1m x 1m woven bamboo panels inserted into the rest of the structure. These panels exhibit the wide and traditional use of bamboo as a woven surface and are designed to be very adaptive, with a number of different patterns allowing a

flexibility in the design of the building, so it can be intentionally adapted to different surroundings and orientations.



Phase 4 construction | Phase 5 construction | Wall panel examples

This can allow the users of the building to formulate the amount of light and shadow in the building. This effect of light and shadow was a primary concern in the design of the building, and adds greatly to the adaptable and soft aesthetic of the bamboo itself. The play of light and shadow on and within the structure adds an elemental quality to the building, directly influencing surface textures and the general quality of the spaces. These design ideas were based largely on the Great Wall House, by Kengo Kuma, which provided an excellent precedent to the aesthetic quality of bamboo when combined with light and shadow:

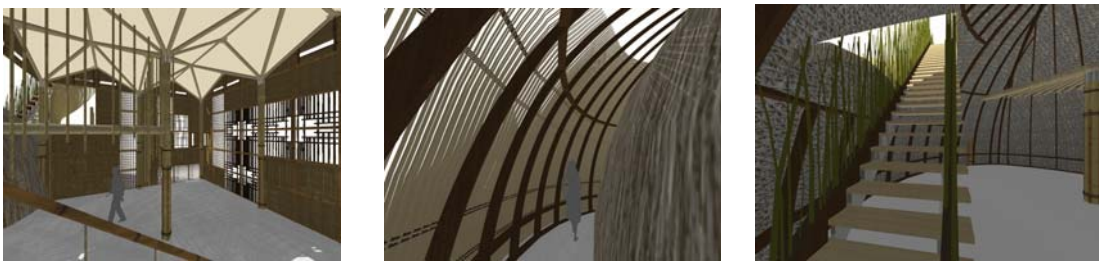


ILL.04
Kengo Kuma, Great (Bamboo) Wall House

Play of light in leading into the dome

Entrance stair

The interior of the building contains flexible and programme free spaces since it are intended not only to house, but also to be potentially a part of a series of public exhibits for bamboo and other renewable materials. While looking at the typology of a museum, or exhibition space, we realized that the experience and journey through such a space can be as influential as the curated exhibit. In this case, with the building being the exhibit itself, this realization was a key element of the design. All of the aspects of the building needed to be engaging while leading people through the structure. In order to create this effect, one is directed through the building with only one possible route, and while each space is highly individual in its form and atmosphere, there is always a glimpse of the next passageway of the building, a promise of something different in the next space. By only revealing part of the proceeding spaces, the inhabitants are tempted to discover what is around the corner. Furthermore, paired with the experience of the passage of space is a sense of contemplation, that can hopefully be reached by moving through these series of spaces, on different levels, made with different materials, creating different atmospheres. The peak of this experience is reached at the highest level of the building, in a garden on the roof of the main structure, which is reached by the staircase shooting out of the dome. Here the disorientation within the building can be nullified and the experience of bamboo as a building material truly absorbed.



Series of spaces through the interior of the structure

Even with this experience of the building and its material, the main objective in this design is to create a building that can effectively showcase bamboo as a building material; in as many different ways as it can be a building material. The

purpose is to promote bamboo through its structural integrity and aesthetic qualities and to put all of the possibilities in one package, to have structural continuity between elements and create a smooth circulation pattern. Also the design utilizes the many forms of bamboo, as a structural pole, as prefabricated pieces, as a grass thatch, pressed fibreboard, as plywood for flooring and as a living wall. It truly is an adaptive material, which is highly renewable, and can have every part of it used. This design and this competition is helping to inform the public of the ability of bamboo.

BIBLIOGRAPHY AND REFERENCES

[1] 2007 International Bamboo Building Design Competition
http://www.bamboocompetition.com/objectives.html

[2] RWTH AACHEN University – Construction with Bamboo – Modern Bamboo Architecture
http://bambus.rwth-aachen.de/eng/reports/modern_architecture/referat.html

ILL.01 – Bamboo scaffolding
http://worldwidewanterings.com/Dcp03467.jpg

ILL.02 - source unknown

ILL.03 – Renzo Piano, bamboo steel connection
http://bambus.rwth-aachen.de/eng/reports/modern_architecture/referat.html

ILL.04 – Kengo Kuma, Great (Bamboo) Wall House
http://www.inhabitat.com/?paged=38