

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Priyanka Ganatra
Student number	4409841
Telephone number	+31 619340699
Private e-mail address	ganatra.priyanka@gmail.com

Studio	
Name / Theme	Sustainable Design Graduation Studio
Teachers / tutors	Christian Louter, Faidra Oikonomopoulou, Frank Schnater
Argumentation of choice of the studio	Only option in Building Technology

Graduation project	
Title of the graduation project	Structural analysis of bending bamboo and thin glass for gridshells.

Goal	
Location:	INDIA
The posed problem,	<p>Durability of bamboo structures. Bamboo has varying material properties. It is not a homogenous material and to predict its structural strength becomes difficult. When treated bamboo is used for construction, it can last for 25-50 years. Because of the kind of cladding materials and connection used, these structures deteriorate in few years.</p>
Research questions and	<p>- What kind of connections and detailing between thin glass and bamboo is required to serve as durable roof structure?</p> <ul style="list-style-type: none"> - How to deal with tolerances on site in terms of joinery detail? - Can one size of thin glass module be used to clad the roof? <p>- What factors should be considered to develop a free form bamboo and thin glass gridshell structure?</p>

	<ul style="list-style-type: none"> - What is the maximum curvature that can be obtained for bamboo and thin glass? - What is the spring back deflection while bending bamboo? - Is it possible to bend bamboo to some extra amount so that it spring backs to the curvature desired?
Design assignment in which these result.	<p>The research is split into 3 parts: understanding material and its properties, analyzing the radius of curvature of bamboo and thin glass. Finally developing a joint based on advantages and drawbacks of both the materials.</p>

Process

Method description

To obtain free form geometry for the roof structure bamboo canes are pre-bent. Thin glass is also cold bent and cladded. The tolerances that occur in bamboo construction are accounted by this bending of thin glass. Hence bending behavior of both the materials is studied. Different types of cladding options and connection systems will be evaluated to obtain a permanent roof structure

Literature and general practical preference

[The literature (theories or research data) and general practical experience/precedent you intend to consult.]
 Literature study will be covering: bamboo and thin glass properties, existing bamboo structures, theory on shells and its structural behavior, joinery analysis of glass and bamboo

Reflection

Relevance

Bamboo is used for the roof as an alternate sustainable lightweight structure. By integrating bamboo with modern material, thin glass, the durability of the structure increases. The type of connections used also makes a significant difference for longevity of the structure. Because of the flexibility of thin glass, one panel size is used throughout the structure. This is usually difficult to clad free form, organic structures and every panel has to be custom made.

Time planning

