

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

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

Personal information	
Name	Santiago Reinel Tarazona
Student number	5100518

Studio		
Name / Theme	Architectural Engineering / 1 Million homes	
Main mentor	Mo Smit	Design
Second mentor	Pierre Jennen	Research
Argumentation of choice of the studio	<p>I choose aE studio because I believe that many of the answers to the current problems that I wish to address in my graduation, can be addressed through a technical approach.</p> <p>Researching on bioclimatic and sustainable architecture can provide me with the sustenance to confront the current housing crisis while supporting comfortable and ethical living conditions.</p>	

Graduation project	
Title of the graduation project	Living with the tropics
Goal	
Location:	Santa Marta, Northern coast of Colombia
The posed problem,	<p>Confronted with a rapidly moving real estate sector facing an emerging population growth and the demand for economic demands, quality and esthetics on the part of users, architecture in Colombia has taken a turn in its principles by following prototypes or architectural models far from its tradition and its climate analysis. It is common to find very similar buildings in Santa Marta then those you can find in cities with radically different climates. This proves the lack of rigor that their design has in terms of form, materials, structures and other aspects that have been overshadowed by stereotypes of modern architectural movements that do not go beyond the aesthetic appearance and are incompatible with their specific regional climate and context.</p>
research questions and	What if the default antiquated construction systems currently used for urban tropical architecture in Colombia

	could be substituted for an innovative hybrid building system centered on local material sourcing of standardized engineered bamboo construction products, therefore establishing bamboo as a contemporary and sustainable architectural element that promotes environmental and social values?
design assignment in which these result.	What I would like to achieve through this graduation project is to develop a critical project that opposes the current touristic development in Santa Marta with the ambition to showcase the potential of an alternative model for contemporary architectural design in the urban tropical climate regions of Colombia. This will be approached by attempting to reinstate the values and essence that vernacular architecture from the tropics, like community, openness and nature inclusiveness design.

Process

Method description

Recognition of the state of the art. This consists of a detailed investigation and re-examination of past and current developments focusing on tools and manufacturing processes of building material and how these developments become drivers of change as they translate into architectural design. So multi-story timber building construction and the current engineered bamboo products and technology. This will be done mainly through literature and case studies. To provide weight on the position of pros and cons of engineered bamboo against other traditional building materials, I do quantitative material comparison studies, which takes into account: mechanical properties, vulnerabilities and costs, both financial and environmental.

Research by design. This consists on establishing design guidelines for a hybrid construction system that integrates bamboo as a construction material and reconsiders the traditional construction culture into a contemporary vernacular system.

Literature and general practical preference

- Archila, H. F. (2019). Elastic response of cross laminated engineered bamboo panels . *Construction Materials*.
- Arregi, B. (2020). Assessment of thermal performance and surface. *IOP Conference Series: Earth and Environmental Science*.
- Kaufmann, H., Krötsch, S., & Winter, S. (2018). *Manual of Multi-storey Timber Construction*. Detail.
- Lauber, W. (2005). *Tropical Architecture*. Prestel.
- Lippsmeier, G. (1969). *Tropenbau, Building in the Tropics*. Munich.
- Lugt, P. v. (2017). Booming Bamboo. *Materia*.
- Serra Florensa, R., & Cosh Roura, H. (2001). *Energia y Medio Ambiente*. Barcelona: UPC.
- Thomassen, L. (2019). *Engineered bamboo in Europe: a study into practical applications of Moso Bamboo based- building elements in European Architecture*. Delft.
- Wijewardane, S., & Jayasinghe, M. T. (2008). Thermal comfort temperature range for factory workers in warm humid tropical climates. *ScienceDirect*, 7.
- Yaeng, K. (1987). *Tropical urban regionalism : building in a south-east Asian city*. Singapore.
- Zea Escamilla, E., Habert, G., Archilla, H., Correal Daza, J., Echeverry Fernández, J., & Trujillo, D. (2018). Industrial or traditional bamboo construction? *Sustainability*.

Reflection

1. What is the relevance of your graduation work in the larger social, professional and scientific framework.

The aim is to design an alternative strategy to provide economic, social, environmental and cultural benefits to Colombian communities. Guadua bamboo is sometimes considered a poor material , especially in a country rich in extraordinary woods like Colombia, perhaps this image the material has can change into a contemporary building alternative. On the other hand it brings into discussion a feasible way to start incorporating sustainable/ circular principles into Colombia architecture. This is possible because of the low-weight and CO2 compensation potential in using bamboo.