Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Personal information	
Name	**Vanessa Maria Heider**
Student number	5865476

Studio		
Name / Theme	Technologies & Aesthetics	
Main mentor	Geert Coumans	Architecture
Second mentor	Claudia van Leest	Architectural Engineering
Argumentation of choice of the studio	I chose the graduation studio Technologies & Aesthetics because it aligns with my interest in sustainable building materials. In my search to find environmentally friendly building materials, I've encountered challenges in the construction industry where promising ideas often fall short of expectations. The common materials, such as concrete, steel, brick, and timber, each have their strengths and weaknesses in terms of sustainability. Timber, for instance, is unique among the major materials as it can sequester CO2 but has issues like overexploitation and decreasing sustainability due to excessive logging. The studio's focus on the relation between technical design innovations, the demands of climate change and the aesthetics of architecture, coupled with a dedication to exploring biobased materials, aligns with my search for a greater diversity of sustainable materials in the construction industry. By testing and experimenting in an unrestricted environment, this studio provides the ideal platform for me to explore the complexity of sustainable materials and contribute to the architectural discourse on climate change and innovation.	

Graduation project	
Title of the graduation project	BIOWOUND. biofiber research laboratory
Goal	
Location:	Zoutkamp, Groningen
The posed problem,	Despite the abundance of sustainable building materials, such as hemp and flax, there is an underutilization in the construction industry.
research questions and	Main question: How can biofibers, such as hemp and flax be integrated in a sustainable architectural construction?

	Sub-question 01: How can this implementation be achieved while addressing forthcoming challenges related to climate change, such as the rising sea level in the Hunze River Valley? Sub-question 02: How can this be utilized to enhance awareness and promote education regarding the benefits and applications of biobased materials?
design assignment in which these result.	The goal is to design a Biofiber Research Laboratory constructed using flax fibers and coreless filament winding, with the aim of fostering innovation, education, and public engagement. This multidimensional facility should integrate research and educational facilities. The objective is to create a dynamic environment that not only facilitates research in biofiber technology but also opens its doors to the public, in order to increase awareness and understanding of biobased materials.

The primary focus of this research is to explore the integration of hemp and flax into sustainable architectural construction. Despite the potential benefits of these biobased materials, there exists a gap in understanding their practical implementation within the construction industry.
To address this, the study will delve into two specific sub-questions.
Firstly, it will investigate how the integration of hemp and flax can be realized in the face of impending challenges associated with climate change, particularly the rising sea levels in the Hunze River Valley.
Secondly, the research and in particular the design aims to explore ways in which this integration can serve as a tool to raise awareness and improve education about the advantages and applications of biobased materials.
By addressing these questions, the research seeks to contribute valuable insights to effective utilization of hemp and flax in sustainable architectural practices.

Process

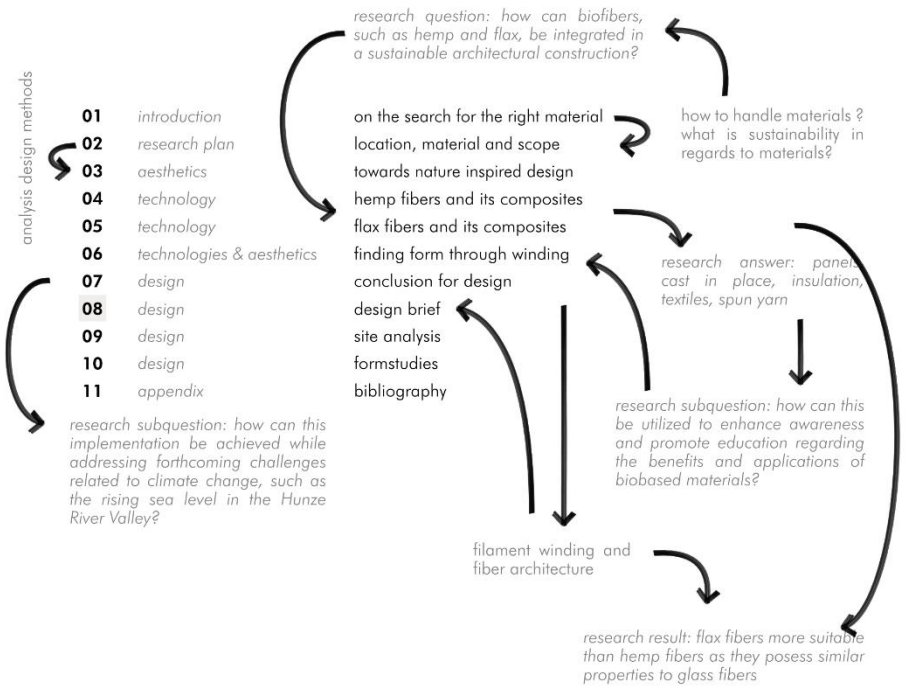
Method description

The main aim of this research is to thoroughly analyze and investigate the potential utilization of hemp and flax as biobased materials in long-lasting architectural

structures. This comprehensive investigation will encompass a multifaced approach, primarily focusing on the examination of mechanical properties, architectural form language, and the overall sustainability aspects of hemp and flax. The methodology will involve an extensive literature review to gather in-depth knowledge about the materials, including their mechanical characteristics, ecological benefits, and any relevant advancements or best practices in their application. This theoretical foundation will be further reinforced by conducting case studies of existing buildings that have successfully incorporated hemp and flax as building materials.
To address these inquiries effectively, a comprehensive analysis and assessment of the contemporary applications of the biobased materials hemp and flax is required. Furthermore, it is imperative to scrutinize and critique the factors that pose obstacles to the implementation of biobased materials in the Hunze River Valley. The process of scrutinizing and critiquing involves a thorough examination of hemp and flax, with the aim of understanding, evaluating, and making informed judgements.
The form language, regarding its freedom of form and movement, and inherent properties are then examined, with a focus on evaluating its advantages and disadvantages. It will shed light on the barriers, flaws, errors, inconsistencies, and challenges that need to be overcome and understood to enhance the widespread use of sustainable and environmentally friendly materials in construction practices.
By comparing the biobased materials with already in the building industry used materials, a more comprehensive understanding of the outcomes will be achieved. The appropriate material for comparison will be selected following the evaluation of the mechanical properties of both hemp and flax. The comparative analysis is expected to yield valuable insights through a multi-faceted approach, including performance evaluation, benchmarking and environmental impact assessment. The performance evaluation will provide a thorough assessment of biobased materials in comparison to their conventional non-biobased counterparts.
By scrutinizing materials with similar characteristics, such as strengths and limitations associated with the use of biobased materials in the field of architecture. Additionally benchmarks serve as a valuable reference for assessing the performance and effectiveness of biobased materials. It offers a clear perspective on whether these materials can compete with or surpass non-biobased alternatives.

Literature and general practical references

Upon reviewing the research for both materials, a thorough analysis and first conclusion will be conducted to ascertain their suitability for practical implementation. The subsequent design process will be tied to addressing the research questions.
To gain a profound understanding of the material, including its potential forms and applications, a series of material- and form tests will be executed. These tests will serve to explore the inherent properties, strengths, and limitations of the chosen materials, informing the design approach and ensuring a suitable application in the development of the Biofiber Research Laboratory.



Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?
2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

The relation between my graduation project, the studio focus, my master trach and my program is evident in the cohesive exploration of sustainable architecture, technical design innovations, and the implications of climate change. My graduation topic centers around the investigation of two biofibers, hemp and flax, as sustainable building materials, examining their implementation and understanding both the technical and aesthetic dimensions. Specifically, I am delving into how technical advancements and innovations align with the aesthetic principles of architecture and the inherent form language of these materials. This closely aligns with the studio's goal, which is to explore the relationship between technical design innovations and the challenges posed by climate change, emphasizing the architectural form language and aesthetics associated with these developments. This focus seamlessly aligns with my master track providing a comprehensive approach to addressing the pressing issues of our time within the context of sustainable architecture.

The relevance of my graduation work extends across multiple dimensions within the larger social, professional, and scientific framework. Socially, my investigation into hemp and flax as biobased sustainable materials holds significance as it addresses the growing awareness and urgency surrounding sustainable practices in architecture, both for the general public and for architects. By exploring how there materials can be implemented, my work contributes to the discourse on environmentally friendly construction methods, fostering a more sustainable built environment.

Professionally, the findings from my research carry implications for architect, builders, and designers seeking innovative solutions aligned with the principles of sustainability. Understanding the technical and aesthetic aspects of biofibers broadens the tool set available to professionals, offering insights into creating structures that are both environmentally conscious and aesthetically compelling.

In the scientific realm, my work contributes to the ongoing exploration of biofibers and their application in architecture. Investigating the technical advancements and aesthetic considerations of these materials adds valuable knowledge to the scientific community, enhancing our understanding of sustainable building practices and their potential on climate change.

Overall, my graduation work serves as a bridge between social, professional, and scientific domains, offering practical insight into sustainable architecture and biofiber technologies, ultimately contributing to the collective effort towards a more sustainable future.