

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	Anna Serysheva	
Student number	5447836	
Studio		
Name / Theme	Architectural engineering	
Main mentor	Anne Snijders	Architecture
Second mentor	Gilbert Koskamp	Architecture/Building Technology
Argumentation of choice of the studio	<p>I chose the Architectural Engineering studio, driven by my fascination about parametric design and innovation within the architectural domain.</p> <p>This studio provides an ideal platform for me to delve deep into the academic research of architectural practice through advanced technological design concepts.</p>	
Graduation project		
Title of the graduation project	Parametrisation of an adaptable timber intervention	
Goal		
Location:	Rotterdam M4H	
The posed problem,	<p>In rapidly urbanizing societies, the challenge lies in efficiently repurposing underutilized urban industrial buildings to meet the increasing demand for individualized and sustainable housing solutions. This project investigates the potential of parametric design in timber construction to facilitate the adaptive transformation of these buildings into student housing, addressing both environmental sustainability and the evolving spatial needs of urban populations</p>	
research questions and	<p>How can the principles of transformable and flexible architecture, in conjunction with the specific constraints of timber construction, inform the development of</p>	

	a parametric model and act as general design guidelines for the adaptive redesign of an industrial building into student housing.
design assignment in which these result.	Transformation of Industrial structure into an adaptable student housing
<p>The design assignment within this graduation project is set to address the emerging needs of TU Delft's expansion into Rotterdam. The primary objective is to innovatively redesign an industrial building, assigning it a temporary function as student housing. This approach not only caters to the immediate requirements of the expanding university but also acknowledges the impermanence inherent in architectural design. The project emphasizes anticipating societal shifts, ensuring that the design remains adaptable and responsive to future changes.</p> <p>The project's foundation is in the principles of adaptable architecture. These principles are vital in creating a design that is not only suitable for the current demand for student housing but also versatile enough to adapt to future changes in societal needs and environmental conditions. The use of timber construction, plays a pivotal role in this adaptability. Timber's inherent qualities, such as its light weight, sustainability, and ease of assembly and disassembly, make it an ideal material for creating structures that can be easily modified or repurposed.</p> <p>Furthermore, the development of a parametric model, is integral to this design assignment. This model will incorporate the constraints and possibilities of timber construction, allowing for an efficient and responsive design process. By translating these constraints into mathematical parameters, the model enables the exploration of various design configurations, ensuring that the final structure is not only functional as student housing but also adaptable for future uses.</p>	
Process	
Method description	
<p>It's anticipated that certain elements of the existing building may restrict the new design's possibilities. Consequently, the design anticipates a large degree of intervention, predicting major structural alternations. This may be because the load capacity of the building no longer meets modern safety requirements for the intended new function. Alternatively, the building's capacity may be increased by removing and re-planning the original floors or walls. Therefore, in the process of selecting a building for transformation, considerations of the inside structure will be made. Evaluation will be conducted on which internal elements will support the design and therefore will be kept, and any elements deemed restrictive to the design will be removed. Should the removal of structural elements compromise the building's integrity, the remaining original structure will be fortified in accordance with the researched design strategies to enhance its adaptability further. This approach grants considerable freedom to the designer to optimize the spatial and structural configuration, aligning with the design's predetermined objectives. However, the selection of a building for intervention will prioritize structures without internal load-bearing constraints that may limit this freedom.</p>	
Methodology of the research	

The primary aim of this project is to repurpose an existing structure into student housing while also ensuring its adaptability for future transformations. This means focusing on both accommodating current housing needs and anticipating future shifts of demands for spatial organization or function.

The research starts with an extensive exploration of the state-of-the-art literature, exploring the theoretical concepts, categorisations and definitions of adaptability and establishing one definition and focus category for this research.

The literature review intends to synthesize the literature for design approaches and characteristics that contribute the potential of the building to be easily adapted. A comprehensive selection of practical design characteristics is essential for enabling the selected adaptability degrees in the context of this project's objectives.

The construction limitations associated with timber structures necessitate exploring independent or interdependent rules governing timber construction. The second phase of the literature review research focuses on identifying these rules, employing conducting a detailed examination of timber constraints that directly impact selected parameters crucial for developing the parametric model. After that, the synthesis of established rules of thumb for timber structure dimensioning, gathered from diverse sources, is compiled into a comprehensive rulebook informing the parametric model.

The development of the parametric model is the guiding aspiration of this research, enabling a dynamic approach where alterations in design inputs trigger automatic updates across the entire structure. The constraints of timber construction that material characteristics research yielded will be translated into the form of minimums and maximums, and mathematical relations, that would act as the basis of the parametric script. This script allows designers to modify fundamental design elements like ceiling height, span or element dimensions. The script's capacity to change the geometry of the structure in response to specific parameter changes, such as apartment count or grid alterations, aims to facilitate a more efficient design process.

The result includes a set of design principles and a range of parameters that form the foundation of a parametric script. This script will function as a tool for designers to experiment with different structural configurations, with the goal of improving the design process's efficiency.

Literature and general practical preference

Within the research phase, literature was studied to understand the expansive domains this project aims to connect: adaptive architecture and timber construction. Specifically within adaptive architecture, the emphasis is on outlining the evolving theories and principles. This encompasses concepts like Design for Disassembly, and Design in Layers, among others. In this pursuit, a comprehensive array of open-source research papers and articles will be referenced to inform the research. Additionally, the research will be grounded in fundamental and recognized literature pieces. Schmidt's and Austin's seminal work, "Adaptable architecture theory and practice" provides profound insights into the adaptability principles, offering a comprehensive understanding of architectural responsiveness. Similarly, Till and Schneider's "Flexible Housing" explores the multifaceted aspects of flexible dwellings, providing valuable theoretical frameworks that guide contemporary architectural practices.

For the exploration of timber construction literature review will include Timber Typologies by Waugh Thistleton Architects to gain understanding of the key considerations of timber typologies. Various sources were studied to understand the material specific considerations as well as constraints of timber construction.

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)?

My master track is in Architecture (A), and I'm currently pursuing the Master of Science in Architecture, Urbanism, and Building Sciences (MSc AUBS) program. To further my academic journey, I chose the Architectural Engineering studio, driven by my passion for parametric design and innovation within the architectural domain.

This studio provides an ideal platform for me to delve deep into the academic research of architectural practice through advanced technological design concepts. My interest in parametric design aligns perfectly with the studio's focus.

My graduation project centres on the transformation of existing industrial structures into adaptable student housing. This project connects my studio's emphasis on parametric design with my master track in Architecture. The studio primarily focuses on architectural engineering, allowing me to delve deep into the technological consideration of design with the set goals of sustainability and adaptability.

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

The research presented in this graduation work holds substantial significance within the broader academic, professional, and societal contexts. In addressing the exigent demand for adaptable architecture amidst the backdrop of rapidly urbanizing societies, the study focuses on the transformation of underutilized urban industrial structures into versatile student housing. This endeavour responds to the societal challenge of accommodating the increasing numbers of single-

person households, particularly among the student population, necessitating a nuanced approach to individualized dwelling spaces.

From a social perspective, the research directly contributes to enhancing living conditions for students, a demographic segment vital to the vitality and dynamism of urban centers. By repurposing historical industrial edifices while infusing them with contemporary functionality, the study engages with the preservation of historical and cultural significance, thereby enriching the cultural fabric of urban environments.

From a scientific standpoint, this research contributes to the expansion of knowledge within the field of architecture and design. The methodological rigor applied in conducting a thorough literature review and the subsequent formulation of mathematical parameters for parametric modelling represent a scientific understanding of adaptable architecture and explore utilization of modern technological advancements to push the architectural practice forward. This structured framework offers prospects for further scholarly inquiry and experimentation in the domain of architectural adaptability.