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	Russ Daverveld
Student number	5733138

Studio		
Name / Theme	Circular building design and renovation	
Main mentor	Thaleia Konstantinou	Architectural Engineering & Technology Department (Architectural Façades & Products)
Second mentor	Stijn Brancart	Architectural Engineering & Technology Department (structural design)
Argumentation of choice of the studio	The topic of circulation has become increasingly interesting to me over the past few years. I have always enjoyed drawing the details and connection points of a building. I focused my bachelor thesis also on designing a circular and modular building component.	

Graduation project	
Title of the graduation project	ADJUSTABLE CIRCULAR INDUSTRIALISED FACADE SYSTEM
Goal	
Location:	Delft
The posed problem,	[Problem Statement]
research questions and	[Research Question]
design assignment in which these result.	[Design Assignment]

What industrialised facade renovation system integrates component reuse and enhances thermal performance?

The objective of this research is to find an industrialized facade renovation method that integrates component reuse and enhances thermal performance. However, a few boundary conditions apply. The research will focus exclusively on façade renovation. Given the goal of achieving a fully circular construction economy by 2050, the study will focus on material savings and reuse. Nevertheless, as the current market for used materials is quite limited, new materials with a promising end-of-life potential will be prioritized. These materials will form components that can be easily reused after demolition, either as whole units or as separate parts. This approach aims to

make material recovery from deconstructed buildings more attractive in the future, contributing to the circular economy.

Cost is another critical factor, as contractors and clients are often concerned about expenses. Efforts will therefore be made to keep costs as low as possible to demonstrate that circularity can be not only environmentally friendly but also be cost-efficient and easy to build.

The research will use row houses and multi-family homes as case studies, as these dwelling types accounted for 78% of homes in the Netherlands in 2023 (Wobma, 2023). Due to this large number, the renovation approach will involve standardized prefabricated components, as this method will address the demand for circular renovation more quickly. Industrialized renovation is also more feasible and profitable for these types of dwellings since they differ less than individual detached homes. However, because not all row houses or multi-family homes are homogeneous, an adjustable method will be employed.

The design of the renovated façades aspires to maintain the appearance of the original façade to preserve the architectural style and character as much as possible. If this is impractical, such as when original materials conflict with circularity or regulations (e.g., the presence of asbestos), alternative materials will be used. Achieving CO2 neutrality during construction is also a key objective. Therefore, Bio-based materials will be explored, with biodegradability and reusability serving as central criteria.

Process

Method description

The research project adopts a mixed-methodology approach, combining a literature review with research-through-design. The research will be divided into the following 5 phases: Literature study (1), Case study (2), Preliminary Design and framework (3), Design Evaluation (4) and Discussion (5)

Phase 1 – Literature Review
During this phase, extensive research will be conducted on specific topics to establish a solid foundation for the report. Key questions will address facade renovation and circular design, such as: What sustainable building materials and cutting-edge technologies are currently preferred for reducing CO2 emissions in renovation projects? The literature review will explore academic papers, graduation theses, and relevant reports.

Phase 3 – Framework, Case study and Preliminary design
In this phase, a design framework will be created, outlining the requirements that a circular component must fulfil. This framework will be applied to the case study examples and will be the guidelines for the preliminary designs. These design options will be based on circular strategies, offering flexibility and adaptability for application across multiple buildings.

A selection of buildings will serve as case studies for detailed analysis. The existing façades and underlying construction will be analysed to assess their current condition. Various parameters and construction details will be examined to develop an appropriate renovation strategy. Data will be gathered from existing architectural reports, archival drawings, and site visits.

Phase 4 – Evaluation
In this phase, an evaluation tool will be chosen to assess the design options based on their adaptability and circularity. Each design option will be evaluated, and the best-performing option will be selected for the next stage.

Phase 5 – Final Design and Conclusion
During this phase, the selected design option will be further developed into a final design. The report will end with a conclusion and a discussion of the final design and its outcomes.

Literature and general practical references

[The literature (theories or research data) and general practical experience/precedent you intend to consult.]

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.