12.3 Reflection

What is the relation between your graduation project topic, your master track (A, U, BT, LA, MBE), and your master programme (MSc AUBS)?

The Master of Science in Architecture, Urbanism, and Building Sciences program employs an interdisciplinary approach to provide innovative solutions for the built environment. By bridging the gap between the track's emphasis on sustainable practices and my specific focus on innovative glass fabrication, my project contributes to the broader objectives of the Building Technology (BT) master track. My graduation project topic is based on a novel curved float glass fabrication method, utilizing lightweight knitted moulds, which is consistent with the objective of the BT master program, which stresses advanced technology and new approaches to building design. My investigation into cutting-edge fabrication processes for curved glass is linked to the BT studio's larger focus on digital manufacturing.

How did your research influence your design/recommendations and how did the design/recommendations influence your research?

The topic's complexity required a multi-method approach. The thesis is divided into three parts: literature study, laboratory experiments, and prototyping.

Literature reviews served as a methodology for research of existing glass curving methods, as well as moulds utilized within these techniques. A comparative study of all methods and moulds with specific criteria led me to select the most promising and appropriate techniques to what I was trying to achieve for this project and put it to the test with the experimental work at the lab.

Since the proposed fabrication method of my thesis hypothesis has not been tested before, as far as the literature review of state-of-the-art papers and articles in the field of glass innovation, the second part of my graduation project, the experimental work, was the most crucial in determining which elements I should research further and how I should design my final prototype.

How do you assess the value of your way of working (your approach, your used methods, used methodology)?

The selected way of working during this thesis is a methodical research by design and design by research approach. Qualitative comparison between all researched fabrication techniques and set assessment criteria helped determine the most promising technique for curving glass based on research examples. Following that, qualitative assessment of the moulds used for each of the aforementioned techniques but also used for different materials dictated that the use of knitted moulds could be suitable for this project. Further research on specific yarns in order to create the knitted textile based on the fabrication technique chosen and criteria such as temperature resistance, led to the initial choice of material for the experiments.

Initial testing at the lab already showcased that the use of hand-woven basalt moulds is a viable option for creating curved glass, proving the feasibility of the method proposed. Accidental testing of a simple double curved geometry led to a freeform shaped glass plate and proved my thesis hypothesis to be correct, that a knitted mould can be used for glass freeform shaping.

Next step was to discover by experimental testing the geometrical limitations for freeform geometries by investigating the limits of curving glass by slumping by comparing it to findings in literature and trying to recreate and exceed these experiments.

Decision making after examining each experiment's results was crucial in my workflow. It led to strategically designing the next experiment, to figure out how to solve issues that occurred and improve the fabrication method.

How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

My graduation work has a broader social, professional, and scientific context, making it relevant outside academia. Socially, my study on a novel fabrication technology for curved glass corresponds to the growing need for sustainable and aesthetically pleasing building solutions. My work contributes to the larger societal goals of resource efficiency and environmental responsibility by presenting a method that provides lightweight moulding options for making non-standardized components of geometric complexity. As the industry embraces technology

innovations, my study offers a practical and forward-thinking approach to meeting the changing needs of fluid architecture.

Scientifically, my graduation work contributes to the growing body of knowledge in the field of building technology. It introduces a new perspective on fabrication methods for curved glass, adding valuable insights to the ongoing discussion on sustainable construction practices. This research has the potential to inspire further studies and advancements in the broader scientific community, fostering innovation and pushing the boundaries of what is achievable in architectural design and construction with glass.

How do you assess the value of the transferability of your project results?

My project serves both as a database for existing fabrication methods and moulds for glass curving but also as a documentation of various experiments utilizing the knitted basalt textile as a mould for curving float glass. The workflow and details of the experimental work of this thesis can be further developed and improved by future researchers aiming to develop a lightweight mould for glass.

Furthermore, the workflow could be improved in the future to explore the possibility of reusing or recycling the used moulds. Also, another aspect would be to further explore the detailing of connections between the produced freeform glass panels. By reading through the detailed description of the performed experiments, their designed set-up, documentation and discussion of the resulting geometries, a future researcher would be at a position to continue the project itself or focus on a specific issue.

How are your project results transferred to the built environment? Are the results applicable in practice?

Freeform curved glass is a research field with very few real-life applications. The main reason for this is that, despite the rising demand for fluid architecture in recent years, the fabrication is extremely expensive, especially due to the moulds needed to produce the panels. These moulds are usually made of steel and are very bulky, not flexible and not reusable. The transferability of my project results in the glass industry would be the introduction of a novel fabrication technique that attempts to solve the problem of the mould by testing a new flexible and lightweight method.

The stage of development of the method proposed, in combination with the short time of this thesis, does not make this novel technique directly applicable in practice. However, with further research it has potential to be a revolutionary method for curving float glass in the future, enriching the architectural language that may be used from designers.