Reflection

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This graduation project focuses on many aspects within the building environment. It is quite an ambitious project that investigates if inner cities can be densified by introducing both new construction techniques and new sustainable materials. By means of robotic fabrication (3D printing) as well as parametrically designed housing units I wanted to achieve a new architectural approach that is in contrast to the traditional approach we still know today. Because the introduction of robotics in the construction industry is something that is still not standardized in the day to day work I had to rely on a rather simple research and design method. State of the art examples became the main source of information whereas several assumptions, interventions and comparisons had to be made in order to make a comprehensive and executable design. The design process originates from those interventions (together with literature studies of the newly introduced material) the influence of the 3D printer can be seen throughout all the different scales of the final design.

The use of the 3D printer is one main focus in the graduation project. Another large portion of the research is done in favor of the sustainable goal that was apparent in the early stages of the design process: the introduction of a new, more sustainable material that can be 3D printed. Literature studies concerning my specific material of basalt fiber reinforced polylactic acid were hard to find. In recent years the attention for both PLA as a construction material as well as using organic and inorganic fibers in PLA has grown significantly. However literature related to the specific material that I used in the graduation project, namely basalt fiber reinforced polylactic acid, has very few research papers. Therefore I opted to define characteristics for both basalt fiber and PLA separately in order to gain information on their strengths and weaknesses. These aspects are compared with a reference of the 3D printing in-situ company that also uses this material in their prototypes.

I think the use of state of the art examples is the most viable way of researching the possibilities the examples could have in the design as well as provide a foundation to proof that the graduation project is not something quite futuristic, but can in a way already be implemented in the construction industry of today. However using this method also means that there is room for assumptions and scientific substantiated choices, which are in most cases just theoretical and not have been introduced in practice.

To see the research topics in a broader perspective of the studio of Architectural Engineering it can be said that my graduation project focuses on the main aspects of the studio. The search for innovative opportunities regarding circularity, digital manufacturing, material research and computational modelling are all aspects that are integrated in my graduation project.

Lastly, the topics of my graduation project also contain some serious ethical debates. It is made from renewable sources like PLA, but the main problem in the production process of PLA is that it is made from agricultural crops. Beside the fact that essential and precious food is used in the material production, the introduction of a robot on the construction site means there is a higher level of work to do for the construction workers. I would not say that all construction workers will lose their job, but they have to be more educated to work with and for the robot. The human-robotic collaboration is an important aspect in the graduation project and this requires new or other types of construction workers that can repair, manage, control and monitor what the robot is doing and what it needs. It would mean an entire shift in the type of people that is needed on the construction site.