

# Reflection

My graduation subject is 3D printing of concrete. More scientific additive manufacturing (AM) of concrete. Compared to the other topics it was a very wide subject. I had to decide where I would focus on and in what direction I should search for my results. After the second presentation I agreed to make a design of a façade element and to look for or explain how the production technique used would look like. At the third presentation this still seemed too wide, as I lost myself in the subject. There is still limited theoretical information available but we decided to change the direction of my research. I would make a vision how we should develop AM of concrete and enumerate the involved aspects that need to be explored. The roadmap would be the outcome of my graduation project.

What I missed in the process was the practical testing of models. Because we did not have a printer, evaluating and experimenting with different concrete types was impossible. I would have appreciated this but probably it would not be focused enough, but that is also my weakness. It proved hard to make decisions because the subject challenged me to have a look at very different but very interesting topics. From design to materials and from machining to life cycle assessments.

So during my graduation project I lost track several times. I tried to get an overview of the current developments. Because AM is a recent technique with a lot of new research initiatives, it is important to know what is going on at the moment. Unfortunately no one wants to share what they are doing, so the only information could be found in publications that dated from before 2012.

Reflecting on my overall process I should have focused more on future visions from the beginning. My initial idea was to design and build a façade element, using a self-build machine. This was too complicated, but I certainly believe it is the next step. For now it was important and sufficient to get an accurate understanding of the problems and possibilities, as well as the competitive techniques and the field where AM of concrete should operate. From this understanding new initiatives at the university can be developed. Probably to tackle this subject completely there should be a collaboration of multiple graduate students from the different faculties at the university. For example, my research suggests that because of the properties of AM Architecture, Civil engineering and Mechanical engineering would provide the best result.

Reinventing the wheel makes less sense and I think it would be good to search for a collaboration between the faculties, using the roadmap I made as a template. It is also possible to search for third parties to join, but before that can take place a prototype has to be made.

In addition to the changes in my learning process this thesis is a complete review of AM in the field of concrete processing and its possibilities. Although the practical part with experiments is missing, the outcome of my research is a crucial stepping stone for further exploration of the subject.