

P4 Reflection

Tim van der Linden - 4855981

Approach

My research aimed to discover to what extent processing impacts the GWP of a gridshell structure and what influence it has on embodied carbon optimization. The research was done in collaboration with Octatube, and this proved to be very helpful. As one of their gridshells was selected for the case study, they could provide me with a lot of information about the gridshell, but also in general. In the early stages of the graduation project, I knew what I wanted to get as a result, but sometimes I was a bit clueless how to get to that result. At first my focus was purely on learning the impact of processing on the total GWP of a gridshell, this later shifted towards comparing different node types. Finally, the methodology itself became the focus. The node types were gathered by searching for references on the internet. This worked quite well as some very useful documents were found which contained a lot of node types, as well as useful information about them. This was also helpful in the next step: determining which fabrication processes are necessary to produce each node type. When these documents were lacking information, this could be found in the expertise of Octatube, again proving the value of the collaboration. The collection of carbon data was harder than anticipated beforehand. Mostly the process carbon data was sometimes harder to find as the intended source, the ecoinvent database, did not have data for all processes. Other sources were eventually found, albeit with some improvisation sometimes. Maybe the largest obstacle in my research turned out to be the structural analysis with Karamba. Many problems were encountered, and although this was somewhat expected, I did not anticipate on the amount of time and effort it took to overcome these problems. At the time of writing, the script is not functioning 100% correct, but useful results could still be produced. After multiple meetings with Stijn Brancart, the problem was not resolved yet, but a number of possible fixes were identified, that should ultimately get the script working properly. As these are quite time consuming, they will be worked on after P4.

Transferability of research

This research is deemed to be very transferable. It could easily be used to analyze the GWP of other gridshells by simply replacing the data. The methodology still works the same. This was often emphasized by my mentors and by Daniel and Maria from Octatube. The methodology I have come up with, is perhaps the most important result/product of the research. The carbon data that was used was sometimes less accurate, as the intended sources did not have certain data. In those cases, the data came from less reliable sources. If the missing data from the intended source ever becomes available, this can also simply be implemented/updated to produce more accurate results.

What I've learned

Throughout the whole process, I have learned a lot. First of all, I have gained a lot of knowledge and insights on gridshells. From the design questions and practicalities to the way the elements are put together on the construction site. Researching which fabrication processes are necessary, taught me a lot about the processes itself, as well as why these specific processes are utilized. I think this gathered knowledge is not purely into gridshells, but also in a broader sense. I did not solely learn things in the form of knowledge, this thesis also taught me skills. I learned to work with Grasshopper and Karamba. While this was not the first time that I used Grasshopper, I feel like I learned to actually understand the logic of it. Before, if something was not working in the script, I would look up how it could be fixed. While I also did that during the graduation studio, I did not just search for the solution, I looked deeper to understand why that was the solution. Eventually, I could fix issues myself. I believe this is very helpful and will make working with Grasshopper more easy for me in the future. Finally, the graduation studio leaves students with a lot of responsibility. Throughout my educational career, I always had the feeling that there was someone telling you what to do. For the thesis, you basically have to figure everything out yourself, with some guidance of course. This was sometimes unfamiliar to me, but I think it was a very useful experience.