

## Reflection

Project:

Under the Sea

*An underwater habitat for the human exploration and research of our oceans.*

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### Aspect 1: The relationship between research and design in the graduation project.

In the Architectural Engineering and Technology (AE+T) studio, the majority of the research is carried out in the first two semesters, accumulating in a technical research paper at the P2.

At the start of the graduation studio I decided that I would research the possibilities of constructing an underwater habitat. The posed problem was that our knowledge of the oceans and marine life is drastically lacking and underwater research carried out from the surface is too slow. The reason for this, is that divers need a lot of time to resurface after a dive because of the high pressure of the water. An underwater habitat can speed up this research by eliminating the need to decompress between dives.

To get a grip on what I would mean to construct an underwater habitat I started with a very broad research question: *"How to design an underwater research habitat, which can facilitate saturation diving and research at The Great Barrier Reef?"* The first step was understanding the basic physics involved with an underwater structure. This mainly meant understanding the principles of water/air pressure and how certain materials behave underwater. I used this research to determine the basic parameters for my design. What materials can I use, what shapes are beneficial, what is the maximum depth for my design?

The next step of the research was looking at precedents of underwater structures. This part of the research was split into three categories tied to three materials, three uses of underwater space and three engineering backgrounds. Marine engineering which builds submarines from steel, civil engineering which builds tunnels out of concrete and architectural engineering which builds transparent tunnels. This part of the research I mainly used to generate ideas for the design and get inspired by the underwater structures already out there. While this concluded the technical research paper I needed more information before I could get started on the design.

The final step in the research therefore had to be an analysis of the program. What exactly do I want to build underwater? To answer this question I analysed previous underwater habitats used for research and the only underwater habitat that is still operated today: Aquarius.

This broad approach was very useful to get an idea of what was possible when constructing an underwater habitat. However, when I started with the design I discovered there was still a lot of research to be done. I mainly investigated the use of steel and concrete and didn't go into much depth of the Acrylic glass (used for transparent tunnels) and glass fibre reinforced polymer composites (used for lightweight bothulls). These materials later on became a central part of the design and still required a lot of research to understand their capabilities.

### Aspect 2: The relationship between the theme of the graduation lab and the subject chosen by the student within this framework

The AE+T studio offered a number of different assignments to choose from, but also implored us to look for our own technical fascination. My personal fascination with designing an underwater structure didn't fit with the choices of locations and assignments, therefore I decided to formulate my own assignment. This was done in dialog with the tutors of course who agreed the assignment still fitted within AE+T. Formulating what needed to be researched probably required more effort than if I had chosen one of the prepared assignments, but for me personally it was important to try and do something extreme and exciting for my final graduation project.

### Aspect 3: The relationship between the methodical line of approach of the graduation lab and the method chosen by the student

AE+T looks for technical innovations which can benefit the social economical assignments of our society. Working in an interdisciplinary field requires inspirational and cunning designs which lead to sustainable and feasible solutions.

While I was familiar with the AE+T method from my minor at the same studio, it took me some time to find the right inspiration for my design. I always look for a practical solution and needed an extra push to take the next step and really develop my ideas and look for innovative solutions. To explore your personal fascination all the students designed a small pavilion incorporating their fascination at the start of the studio. To overcome the boundaries formulated by my design I decided to look back at this quick design. What was it I was trying to accomplish? How can I again incorporate those ideas in the design after they've had been pushed out for practical solutions? Inspirational projects provided by my tutors and bouncing my ideas off experts from other faculties really helped me formulate and shape my design. AE+T always encourages to look for contacts in other disciplines and this paid dividend for me.

### Aspect 4: The relationship between the project and the wider social context.

Because my project really started from a personal desire to construct an underwater habitat I had to discover a relevance to the wider social context early on. This is when I discovered Aquarius, an underwater habitat of the coast of a small island in the California Keys. The habitat has been there since the eighties and showed me the importance of underwater research. The oceans are vital to our planet's survival, but we know little to nothing about this completely different world beneath the waves, for a fact we've only explored 5% of our oceans vast water mass. While human exploration of our underwater world poses a lot of challenges the same can be said about space exploration which has overcome a lot of the same challenges. Now that the public interest in the sustainability of our planet is on a rise I think the time has come to explore our own little blue dot before we venture off to colonize Mars. My project might inspire the next generation to become aquanauts instead of astronauts and look for the many wonderful things still hidden in the 95% of our waters which we haven't visited yet.