Graduation Project Reflection
aE Studio 2014-2015

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Title

Following the Sun
Low-energy, mixed-use, student housing redesign with a Climate Adaptive Facade
The present content is a reflection on the graduation project developed this past year and is an opportunity to go back to the initial approach of the project and the research made on it and see whether it worked or not, how that was accomplished and the gained knowledge as a result.

**Introduction:**

The graduation project of architectural engineering track is divided in two parts. First is the technical research on the fascination and second the integration of it into the design. The fascination has been since the beginning of the year the driven force for the design but the program and building were inspired but the location.

The fascination for the graduation studio has been the climate adaptive façade, which constitutes a vital building component and a crossing point between the ambient climate and the building interior, characteristics that make it both interesting and quit unique. The lectures by the tutors on the various locations, gave an insight on many problems that need to be dealt with in the Netherlands. One of which is the increasing vacancy rates in many industrial areas. Therefore, The Brettenzone was considered an interesting location of intervention, not because of the green line, barrier that it is in the city of Amsterdam, but because of a small part of it, the Sloterdijk station area, where the signs of vacancy and abundance are very clear. On discovering a few universities on site, the decision for the program was clear, student housing with mixed-use functions for both the residents and potential visitors.

Overall the result is a responsive climate design that reduces the demand for energy by implementing energy-saving measures, uses sustainable sources of energy and a combination of passive design principles with some well-considered active systems. Important element of the design is that it is covered with a climate adaptive building shell that allows the building to be in an equilibrium with the nearby environment, contributes to the zero energy potentials of the building and the wellbeing of the building’s users.

**Relationship between research and design:**

The research was focused on the climate adaptive façade, its principles and various types, as well as components such as thermal comfort, user comfort, energy performance and maintenance, all of which are found in the final design. Through the research it became clear that a climate adaptive façade, apart from climate conditions, depends also on numerous and various constraints such as the user, the cost, the effectiveness of the components in time, etc.

Aim of the project, both on the façade and the interior, was designing according to the sun path, the wind orientation and the needs of the user. Important and determinant aspects where also heat gain and protection, direct sunlight and glare, natural ventilation, heat storage and reuse and sound insulation.

During the research important questions arose:

- How does a Climate Adaptive Façade work?
- What are the requirements for such a façade to be built in the chosen area?
- What are the requirements for a climate adaptive façade for a student housing?
- How to maximize the energy supply integrated in the building envelope and how to minimize the energy demand of the building?
- How, can a climate adaptive façade contribute to the indoor comfort of mixed-use student housing?

As a result, next to the primary research on climate adaptive façade a second research was conducted, focusing on realised case studies on climate adaptive façade, student housing and high rise buildings (chosen building) in order to investigate and understand various existing solutions. Upon design however apart from the booklet of case studies that was contacted, additional buildings were researched that applied better to the proposed idea. Moreover, on better understanding on the
program, a student survey was conducted that played a significant role during the design both of the interior and the façade.

At the end of the MSc3 all the information of the research, were gathered and organised and where integrated in the first design. The challenging part of the design overall was keeping consistent with the goal of the project; to design with the sun, considering at the same time the user and integrating elements of nature and sustainability. During the process however, I got lost in the large scale of the project, trying to find solutions for the façade, the program and the surrounding area. Therefore I tried to do so by going back and forth in scale design, from the building as a whole to the floor scale and later to the apartment scale. At the end the combination of all as well as the constant consultation from the research paper helped at giving the most suitable solutions. I now realise that a variety of small models of both the building and the façade would have been beneficial as well.

In conclusion, it is obvious that the research and design were closely intertwined and every design step that has been made has always been after considering information from the research, which formulates the foundation of the project.

Relationship between the theme of the graduation lab and the chosen subject and case study (location/object):

Architectural Engineering is the study of buildings and building performance, including construction engineering and project management, indoor environments and building systems, green building, structural engineering, and construction. Therefore, the studying of the existing building was necessary in order to identify the load bearing structure, the grid lines, the voids and solids, the façade (load bearing), the connection to the surrounding area, the accessibility and in general, what was beneficial for my redesign and what potentially problematic. Furthermore, the proposed design required to be integrated to the existing structure and create a unity between them. By now, the end result is a combination of various architectural proposals with the technical solutions to back them up. The purpose for doing that is to develop the existing building and the proposal into an actual building that can be realised in a way that the architectural design is not lost but is enriched by the integration of those features.

The features that needed an extra attention were the addition of a double façade at three of the four facades of the building that needed apart from being attached to the building to have a stand-alone structure. Moreover, segments of floors that were removed needed extra insulation and protection, and green facades and balconies needed to be able to be attached to the building without adding extra weight to the structure.

Relationship between methodical line of approach of the graduation lab and the chosen method

The methodical line of approach of the graduation lab was divided in the research and the design part with the three way approach of context, program and thematic focus. For our benefit we were given three tutors to guide as throughout the graduation year, a design tutor, a research tutor and a building technology tutor. However, the choice of what method to use was up to us, depending of course on the fascination and the tutors acted as advisors at each step we took. This way of working was greatly beneficial for the process of the project and each tutor provided valuable information and guidance; the design and research tutors during MSc3 and the development of the research and the design and building technology tutors during MSc4, in which all the gathered results needed to be translate into an architectural design. The feedback from all tutors was both constructive and necessary for the development of the design.

It is worthy to mention that even though we were given the opportunity to choose our own methodology, in the end the methodology proposed by the lab was more or less the one that was followed. That was research through literature, case studies, personal observations and design.
Relationship between project and the wider social context:

The reuse of vacant office buildings is a matter of consideration for the development future of Amsterdam, and the Netherlands in general and before designing new buildings it is wise to reuse existing building by applying new and more appealing uses. This way of thinking will promote the upgrade in abandoned areas and the more suitable and sustainable function of unoccupied buildings. The achievement of an energy efficient building that reaches zero energy consumption through the assistance of a climate adaptive facade is an important goal of the design. It is significant, as architects, to consider the energy design, the architectural design and the technical part of those combined. A single but multifunctional gesture upon a building can give a clear and exciting new identity to the Sloterdijk area. The important qualities of the building will contribute to the uplifting of the area and even greater when the program is student housing, since students and young generation in general take advantage of all the possibilities a city has to offer. Housing usually fits well with other features of the core of the city and can simultaneously support culture and leisure. In the Netherlands the idea of housing is an appealing adaptation option and in 2004, the Dutch Minister of Housing, sought to build at least 25,000 dwellings by converting empty office space into housing. Important criteria’s to choosing a building, is of course the building itself and its location, for which there are several reasons why some are less desirable than others. Some are the reduced accessibility by public transport or car and the poor parking facility, and not to forget the negative image it protrudes due to bad spatial and visual quality. Therefore, my graduation project proposal is a multi-functional program within a vacant office building in order to assist the people working in that area and also benefit the surrounding area by giving life and energy to the territory.