Reflection | Rianne den Ouden

**Personal Information**

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Name of studio  
Architectural Engineering

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Project title  
A second life, a second experience  
A balance between building physics and architectural design

**Introduction in graduation project**

Within this graduation project the focus has been on the adaptability of the indoor environment/building physics in existing buildings in relation to the transformation towards a new functional program for the building. Research has shown the importance of indoor environmental quality in relation to the health of the users. With this graduation project the focus has been on one of the indoor environmental aspects, the indoor air quality.

A large amount of energy use of buildings comes from maintaining a healthy environment via a mechanical system, I have chosen to study until what extend the buildings configuration and functional program can make use of natural forces, like natural ventilation concepts.

As a case study and design project the Central Market Hall of Amsterdam has been chosen. A building listed as national monument of approximately 12,000 m². The building will be transformed to a public building hosting a daily food market, shops, cafeteria, restaurants and a Long-stay hotel, offering the surrounding area a new attractive public space.

1| The relationship between research and design.

The goal of the research was to find a balance between fitting a new functional program in an existing building and the technique that is needed to realize this within that building. When do you adjust your building, when the functional program or do we choose to add as much mechanical equipment to make the combination possible.

The research I did can be partitioned in two parts. The first part has been supplementing my knowledge about which concepts there already have been developed to create natural air streams within a building, independent from if the building is existing or new.
The second part was to test these concepts on the case study chosen. Which of these concepts were initially used in this building and what part of this is still suitable for a new use. Adjacent to this the needed air supply for ventilation and cooling has been calculated what would be needed for this functional program. Concluded from this a statement could be made if the current configuration of the building with the proposed new functional program is suitable for this building, solely based on space measurements and occupation of the building. Finally by combining these two parts a ‘roadmap’ could be made, with possible ventilation and building physics concepts for the case study. Beyond the fact that the research had provided soled knowledge of the capacity of the building and an idea of what was needed as renovation improvements to create a good indoor environment, the research didn’t enhance any architectural handles to start the design with. So after the technical research period a second research period was needed to analyse the architectural possibilities and needs of the case study. In a later stadium of the design process the research knowledge found its way back in the design process, during the fitting of all the systems needed and detailing of the transformation.

Finding that balance between architectural design, new functional program and the use of technique is not a linear process, but the same accounts for any design process. However starting the research with a point of few of the technical capacity of the building, made me realize what certain design decisions would mean for the adjustments to the building, in relation to the energy use, ventilation concepts, thermal concepts or any other building physics component. That doesn’t mean that the technical considerations always dominated the architectural design decisions, but it gave an extra dimension to take into account.

2| The relationship between the AE-studio and the graduation project.

In the architectural engineering studio it is stimulated to start the research with a certain fascination in technique, varying from working with a specific material, certain sustainability concepts or in my case a fascination for building physics. To get started there are 3 locations provided to choose the case study from, however none of these location really fitted my demands of case study. An outdated industrial building that had the potential of being transformed to a multi-functional building demanding high standards of the building physics. Nevertheless this studio is set up in such a way that the research and fascination are more important than the proposed locations, providing me with the freedom to choose my own case study and location.

By choosing my fascination of using an existing (monumental) building there was added an extra research layer to this graduation project. The graduation studio in my case became a combination studio of Architectural Engineering and a little bit of Heritage & Architecture. But as the name of the studio outlines the graduation is about Engineering (technical research) and Architecture, so during the design process it has not been a problem to sometimes leave the research for a moment and focus on a total different aspect, like the heritage part of the design process.

However there has to be admitted that combining these two subjects is not an easy tasks to do properly within one graduation year, as both elements on their own already are interesting to focus on. But I think that the AE- studio is the most suitable place to have done my graduation project in. It gave me the freedom to fill my knowledge about building physics, but also dealing with my interest of designing with the existing building stock.

3| The AE methodological line of approach and the actual chosen research method.

As mentioned in the sections above the setup of the AE-studio is to start the graduation with the technical research. This research will in many cases, after one semester, lead to a design concept, what will be developed to a final design during the following semester. Where in the first stadium
the technical research will be of more importance and in the following stage it will be turned around. The designing/architectural process being the more present one. Initially planned my graduation also had that methodological line of approach, however I think my process didn’t had that clear iterative process where research and design where evenly balanced each other out over time. In the diagrams below the process line is shown of my graduation process as I have experienced it. On the left the more evenly balanced out process and on the right hand the process that I think to have followed. Having a main focus on the technical research during most of the first semester, starting the second semester with most of the focus on the design. This happened because my research hadn’t have given me the complete design tools to finish this design properly, referring to the missing analysis of the heritage and architectural analysis of the existing building (outlined in the previous section). After having found a decent architectural concept the integration of the technical research could make its way back in in the graduation process. Resulting in my final design, where to my opinion my technical fascination and research have found a balance with my overall design result.

4| The graduation project in a wider social context.

Choosing a subject as transforming existing buildings with a focus on creating a healthy indoor environment in a sustainable way is a subject that is no stranger in the transformation and modification sector of Architecture. There are many more empty industrial buildings that have the potential of being transformed to a new well received architectural type of public buildings, combined with the growing knowledge of needing a healthy indoor environment, shows the importance of developing a strategy of how to approach such projects. Where I followed a strategy of first finding how to use the existing building in its original configuration, using its existing elements to create a natural air stream. So finding the limit until where natural existing forces can provide what you need and then added the mechanical appliances, and not the other way around. Not looking to the potential of the building, but just adding appliances until the needed indoor environment is reached. Energy use in buildings is responsible for approximately 40% of the overall energy use in the world, energy use mainly concerned with creating a comfortable surroundings. If we want to lower the energy use in buildings there should be a better cooperation between the configuration of the building out of architectural reasons and from building physics reasons. In transforming existing buildings that initially where designed for different purposes, and in that case also provide in different building physics are in this case an even more important challenge. How to deal with the existing, its capacity and what we as architects want to create within such buildings. In some cases I think, how beautiful a new design may be, we should accept the fact that buildings are not suitable for certain ideas, without having to add a group of energy consuming appliances. By analysing the potential of the building upfront of the initial design process can help make a realistic and sustainable approach of transforming these beautiful industrial buildings into their new purpose being a pearl within the cities.