Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Date: 03-02-2024

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Studio		
Name / Theme	Complex Projects – Bodies & Building Berlin	
Main mentor	Henri van Bennekom	Architecture
Second mentor	Jan van de Voort	Building Technology
Third mentor	Maria Finagina	Architecture
Argumentation of choice of the studio	As the studio's name states it is all about complex projects, the complexity of the assignment seemed like an opportunity to research new fields and apply this knowledge to the project. By doing so it is possible to create something which does not exist yet and dive into the processes of a specific type of building in more detail. Also, personal interests played a role as I am more interested in complex structures than for example in dwellings.	

Graduation project	
Title of the graduation project	**Supersonic Worldport**
Goal	
Location:	Berlin – Brandenburg Airport
The posed problem,	The modern aviation industry is experiencing rapid growth, evident in the alarming increase in passenger volumes. Meeting the demand of increasing air passengers by implementing new technologies not only necessitates a meticulous reorganization of the operational processes within airports but also demands a conscientious approach toward climate-conscious practices. Climate-conscious practices are one of the most important aspects of innovations since the world is facing an environmental crisis that poses a threat not only to Europe but the whole world. That is why the European Commission is enforcing different

	proposals like the European Green Deal in which making Europe the first climate-neutral continent in the world is a binding commitment.
research questions and	Taking into account the challenges posed by a growing number of passengers and technological innovations, the following main question should be asked regarding the future architecture of airports: How to design an airport to accommodate the reconfigured European aviation industry? Supported by the following sub-questions: What will change in airport design based on the anticipated increase in passenger volumes and flow speeds? What processes at airports will be changed due to new flows based on technological innovations and different aircraft capacities and speeds? How can airports effectively implement hydrogen infrastructure for aviation, considering the technical challenges? Which architectural strategies can be employed to create multi-disciplinary spaces within airport grounds, fostering collaboration among experts from various fields in the aviation industry? Can the airport check-in processes become as efficient as train check-in processes?
design assignment in which these result.	The research questions result in a design assignment for an airport that is a first-of-its-kind Supersonic Environmental conscious airport. It functions in a more effective way than existing airports. It should be more similar in processes to a train station

	than to existing airports. The airport should be able to process a high number of passengers in a short amount of time, so it should be not focused on dwell time as the traditional airports.

Process

Method description

To conduct this research field, literature, mapping, and interview methodologies are used. Field and interview methodologies are used to verify, support, and complement the literature and mapping methodology.

Literature research

In order to create a program for a new type of airport, the already existing airport programs need to be analysed. The case study approach will be applied. Airports consist of a landside, a terminal and an airside, these general aspects can be researched in a less detailed way. After that considering area-yearly passenger flow, a ratio can be determined and the program of the most efficient airports can be researched in more detail. This will be done by using the existing floor plans and calculating the percentages of different spaces. This way will ensure a list of necessary spaces is established. After that using the described possibilities of various technological innovations, the program can be adapted. Next, the new spaces that are needed to support an intercontinental innovation hub can be added. After completing this process architectural specialist should be consulted.

Literature research and interviews

Literature, online resources, and interviews will support the research of the possible client. Finding out what parties own the airports around the world is the first step to getting an understanding of the possible client. Additionally, since this research is not about a general airport, companies investing and creating applicable technological innovations in the field of aviation need to be researched. This way it can establish what other companies could be a part of this project. Contacting the companies by email or phone is a possibility. Finally, to verify if the innovations of various companies are realistic an interview with a professor of aerospace engineering at TU Delft should be held.

Mapping and field research

The fitting site for such a huge and important structure as an airport is crucial. To establish if the site is suitable for an airport, research based on mapping and field visit is necessary. Finding out the connectivity and identifying surrounding areas is needed. Additionally, analysing possible future scenarios regarding expansions are important.

Literature and general practical references

The following sources were used to conduct research:

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Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

   The Supersonic Worldport project relates to the topic of energy in the studio. This is one of the main topics included in the complex projects studio. Energy is researched on the Berlin as well as on the site scale and it is divided into three categories namely: construction of buildings, energy usage of buildings and transportation to buildings. The project connects to the master track as it is based on extensive research on relevant topics such as innovations and climate change and it is not just a 'cool' project. The project also relates to the master programme of MSc AUBS as in the end, it results in a technical design, which is worked out on an urban scale as in the building science scale.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

   Airports stand as crucial nodes in global connectivity, functioning as gateways to the world. With a growing air travel demand, reaching 16 billion passengers by 2050, the aviation industry faces the challenge of efficiently accommodating this growth while trying to minimize its effects on the environment. 'Technological innovation is a "double-edged sword" and is considered a significant contributor to issues, such as climate change, ecological imbalances, and worsening pollution, and an effective means to solve environmental and sustainable development problems' (Fan & Shahbaz, 2023). Therefore it is important to rethink airport design to facilitate new efficient, effective, and environment-conscious technologies and collaborative spaces for airport staff, airlines, and technology partners encouraging innovation. These spaces can serve as hubs for collaborative efforts in advancing airport technologies, improving operational processes, and minimizing the contribution to climate change.