Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

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:

Personal information	
Name	**Okan F.Ş.F. Türkcan**
Student number	4309634
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Studio	
Name / Theme	**AR3B025 Sustainable Design Graduation Research**
Teachers / tutors	dr. ir. P. Nourian, dr. ir. P. J. W. van den Engel, dr. ir. M. J. Tenpierik
Argumentation of choice of the studio	**Desire to learn and deepen knowledge on optimization, computational design and (natural) ventilation**

Graduation project	
Title of the graduation project	**Optimized design of a hybrid-ventilated airport terminal**
Goal	
Location:	Lelystad Airport (application of computational model)
The posed problem,	High energy consumption at airports and HVAC being the largest consumer, doubling of aviation market by 2040 and construction and expansion of airports globally
research questions and	How do aspects of thermal comfort, ventilation effectiveness and reliance on buoyancy/wind/combination influence the design of a hybrid ventilated low-cost terminal? -What are appropriate computational design methods for the proposed design? -What geometry allows for minimization of air recirculation and pressure losses? -How can design iterations (computing cycles) and computing time be minimized by input of design

	constraints? -What is the resulting geometry for different input parameters (thermal comfort, ventilation efficiency, dependency on buoyancy/wind/combination)? -What is the energy consumption of the hybrid optimized design compared to a mechanically ventilated design for a heating/cooling and average annual day?
design assignment in which these result.	Therefore, the aim of this thesis is to design a computational model to generate the geometry of a multi-objective optimized hybrid ventilated low-cost airport terminal in a temperate climate.

Process

Method description

Exploratory research-by-design combined with a literature review and interviews from practice experts. Development of a computational tool based on best-practices input to guide a genetic algorithm and CFD model into determining exhaust and removal locations and sizes. Topology optimization to the final shape to improve final internal airflow with wind-assistance. In-depth analysis of the best-performing design for indoor environmental quality and energy consumption.

Literature and general practical preference

Established "capita selecta" literature on topics of energy performance, indoor environmental quality (IEQ), ventilation and airports (please see bibliography). Mentors' field and academic experience on their own fields (IEQ, natural ventilation, computational design) and interview with expert on wind in the built environment (Arjen Pleysier, Deerns Building Physics Advisor).

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