



IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

Family name	de Haan	IDE master(s) IPD	☒	Dfi	☐	SPD	☐
Initials	SK	2 nd non-IDE master					
Given name	Sam	Individual programme (date of approval)					
Student number	4853547	Medisign					☐
		HPM					☐

SUPERVISORY TEAM

Fill in the required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair	Sepideh Ghodrat	dept./section	Emerging Materials	! Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why. ! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter. ! 2nd mentor only applies when a client is involved.
mentor	Stefano Parisi	dept./section	Materials Manufacturing	
2 nd mentor	Floor Hoogenboezem			
client:	Alain Schievink			
city:	Dronten	country:	Netherlands	
optional comments	Floor Hoogenboezem from The Green Village will act as a 2nd mentor to guide me through the building industry as well as get me in contact with relevant startups and initiatives. She has previously guided graduation students from the Architecture faculty.			

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in by the Chair of the supervisory team

Sign for approval (Chair)

Name _____ Date _____ Signature _____

CHECK ON STUDY PROGRESS

To be filled in by **SSC E&SA** (Shared Service Centre, Education & Student Affairs), after approval of the project brief by the chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total 27 EC

Of which, taking conditional requirements into account, can be part of the exam programme _____ EC

★	YES	all 1 st year master courses passed
☐	NO	missing 1 st year courses

Comments:

Sign for approval (SSC E&SA)

Name _____ Date _____ Signature _____

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE's Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

YES	☐	Supervisory Team approved
NO	☐	Supervisory Team not approved

Comments:

Based on study progress, students is ...

☐	ALLOWED to start the graduation project
☐	NOT allowed to start the graduation project

Comments:

Sign for approval (BoEx)

Name _____ Date _____ Signature _____

Personal Project Brief – IDE Master Graduation Project

Name student Sam de Haan

Student number 4,853,547

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title Exploring bio-based materials and stakeholder demands in permeable blue-green pavement

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

Due to climate change the heat island effect and flooding become increasingly prevalent issues for the built environment. An increased urban air temperature compared to that of rural or suburban areas is called the heat island effect (Zoulia et al., 2008). This not only affects living comfort, it also increases a city's footprint through increased electrical needs. The evapotranspiration of plants reduces air temperature and increases humidity (Zoulia et al., 2008). This characteristic makes added greenery an effective measure for cooling microclimates and subsequently the city as a whole (Dimoudi 1996; Santamouris 2001).

As a result of climate change the moisture in the air increases, which in turn increases the chance of heavy downpour (Climate Central, 2024). Due to the impermeability of paved roads, the soil is not able to store this rainfall or slow its path (Environmental Defense Fund, n.d.). This results in floods that damage nature and the built environment and pose a threat to human life.

To challenge these issues, Tonn has developed pavement elements that incorporate space for grass or other plants to grow, while remaining structurally sound for parking of vehicles. Incorporating plants and connection to soil makes this pavement a so-called blue-green solution that solves issues related to water and lack of greenery within the built environment.

The main stakeholders are the building companies, municipalities, inhabitants, and nature. The building companies have to incorporate this novel product in their designs. Municipalities have an important role in water and heat management as well as providing the rules for tenders. Inhabitants of urban areas have

introduction (continued): space for images

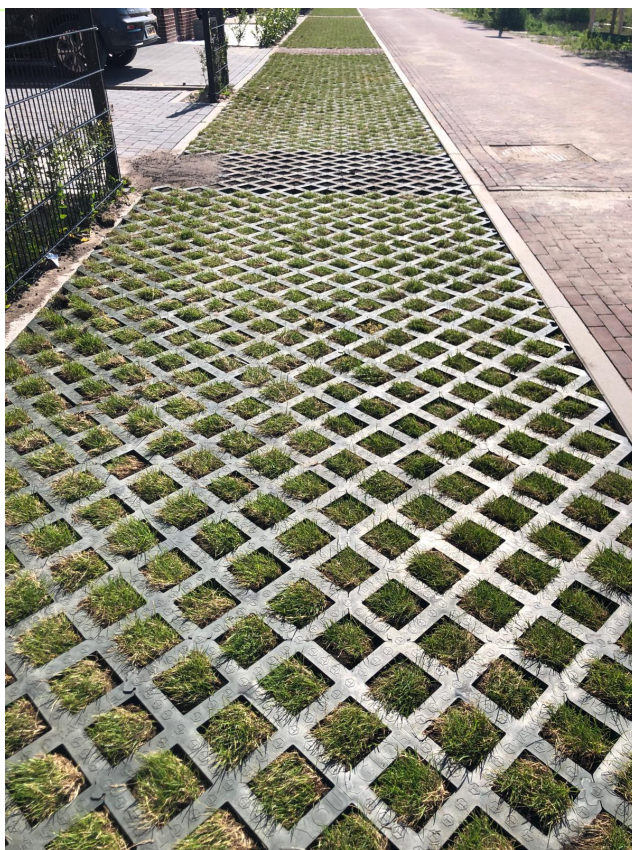


image / figure 1 TAWWA Grids placed on the side of the road, functioning as a parking lane

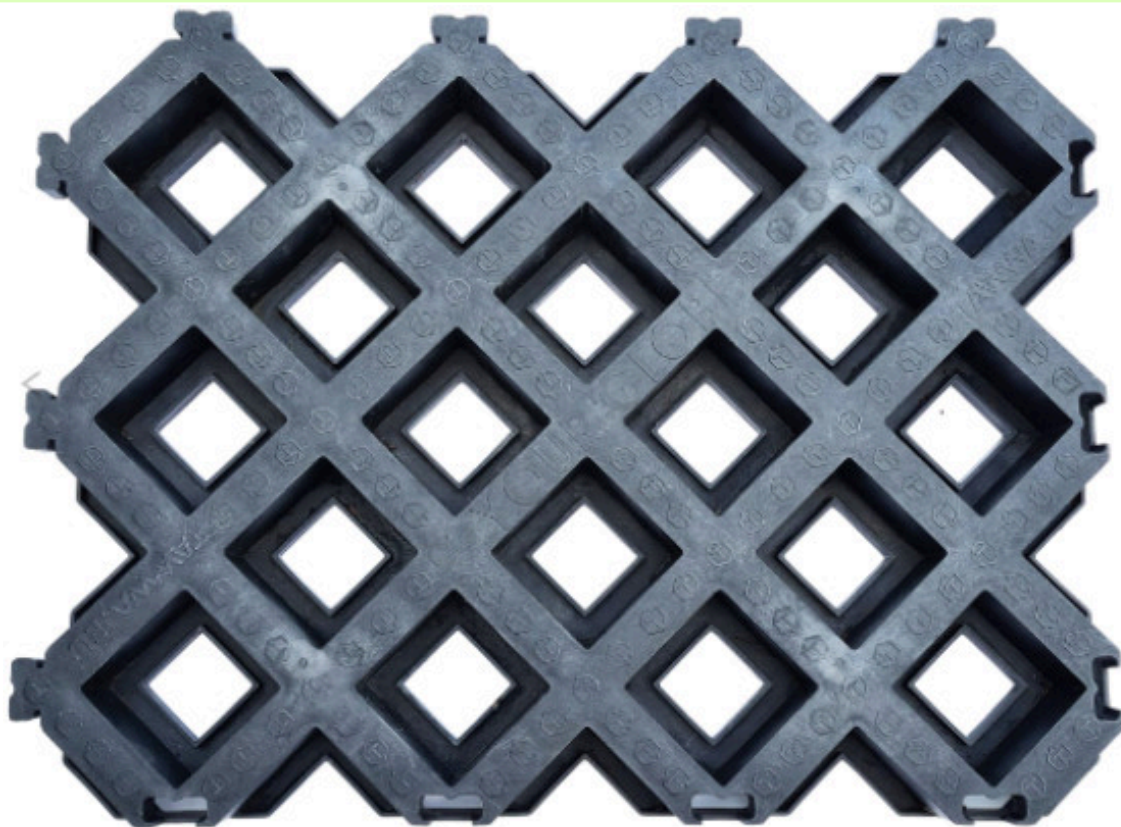


image / figure 2 A single TAWWA Grid. Multiple grids can be connected to form a parking space/lot. Size: 600 x 800 mm

Personal Project Brief – IDE Master Graduation Project

Problem Definition

*What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)*

The current product of Tonn is made out of a 100% recycled plastics. This positively impacts the world through utilization of waste materials, other threats arise. Use and installation of Tonn's product exposes it to wear caused by building machinery, cars, people, and nature. This can cause microplastics to enter the environment. According to Cheah et al. (2023) pollution through plastics and microplastics pose the biggest environmental challenge to mankind and the environment. Plastics and other materials derived from biological sources can have similar structural, chemical, and physical characteristics to those found in materials originating from petroleum sources (Cheah et al., 2023). Besides providing a non-polluting alternative, bio-based materials have the potential to capture carbon while the raw material grows. Next to that, since the product is in direct connection with the soil, any risks of toxins from plastics seeping into the soil poses a threat for nature. In the built environment, the scale of reducing the impact of building materials has the potential to have a great positive impact on climate change and reducing the consequences. Lastly, as a designer, a product's material should be equally beneficial to its environment as the design intervention itself. Making Tonn's product from bio-based materials has the potential to prove great added value for people living in urban environments as well as the health of nature and the environment.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence) As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Design and manufacture a bio-based blue-green pavement element that suits the needs of the main stakeholders.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

The graduation time will be split between material research and testing, and researching stakeholder needs. These different topics will influence each other and therefore will be performed simultaneously. Material research and testing will make up 60% of the time, while stakeholder research will take up 40% respectively.

The main source of knowledge for materials will be that of existing companies, research, and products. This way the material will be further developed and readily available to develop into a product. As this product will be used outside for parking, the main parameters to be tested are: yield strength, wear resistance, abrasion resistance, water resistance, UV resistance, cold and heat resistance. This will be done through small-scale testing of material samples. Testing equipment needed will be a climate room, tensile strength tester, and abrasion tester.

A crucial element of this design is the cultural shift needed in municipalities and building companies to abandon conventional building materials and embrace novel ones. To understand this it is important to understand the current situation as well as the past. The needs of current stakeholders will be researched through interviews. These interviews will lead to an extensive collection of needs. Through user testing, the correct implementation of these needs should be validated. To understand how we got to these issues, researching the past of urbanization is key. Municipalities as well as building companies will provide interesting facts. Next to this, desk research will provide information about how prior civilizations tackled issues regarding water and heat.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a **kick-off meeting, mid-term evaluation meeting, green light meeting and graduation ceremony**. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting 4 Sep 2024

Mid-term evaluation 31 Oct 2024

Green light meeting 31 jan 2025

Graduation ceremony 21 feb 2025

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time ☐

For how many project weeks

Number of project days per week

Comments:

I have a holiday planned lasting from 3rd to 23rd of November

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.

(200 words max)

Through this project I seek to revolutionize the building industry. I seek to show the potential of bio-based materials to building companies and municipalities. As an industrial designer I believe the building industry should collaborate more and aim to tackle a design through multidisciplinary co-creation. I want to show an innovative approach to building while fulfilling needs of nature as well as that of future users. I want to explore different design methods and combine these for the best outcome of my project.

I want to become an expert on bio-based material researching and testing. I want to learn how to prototype with materials and test them sufficiently to prove future effectiveness. I want to see what kind of companies are currently active in the bio-based materials for the building industry and how they approach design. This will also give me a better understanding of future work opportunities.

I want to complete my student career by becoming an expert in scientific discussion. Next to that I want to improve my critical thinking capabilities by challenging conventional pavement solutions. I want to become a valuable designer by being able to present my ideas and concepts in a convincing, motivating, and confident way.