DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

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

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name: Haagmans
initials: N.S. given name: Nadine
student number: -
street & no.: -
zipcode & city: -
country: -
phone: -
email: -

Your master programme (only select the options that apply to you):

IDE master(s): ( ) IPD (★) DfI ( ) SPD
2nd non-IDE master:
individual programme: - - (give date of approval)
honours programme: ( ) Honours Programme Master
specialisation / annotation: ( ) Medisign
( ) Tech. in Sustainable Design
( ) Entrepeneurship

SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair: Ir. A.L.M. Minnoye dept. / section: SDE, MF
** mentor: Dr. Ir. M.H. Sonneveld dept. / section: HCD, AED
2nd mentor: M. Meinhardt
organisation: Deeluxe
city: Innsbruck country: Austria

comments (optional)

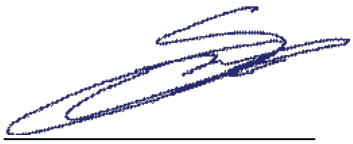
Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Ir. A.L.M. Minnoye date 11 - 03 - 2021 signature 

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, 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: _____ EC

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

List of electives obtained before the third semester without approval of the BoE

YES all 1st year master courses passed

NO missing 1st year master courses are:

name _____ date - - signature _____

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: APPROVED NOT APPROVED

Procedure: APPROVED NOT APPROVED

comments

name _____ date - - signature _____

Initials & Name N.S. Haagmans Student number -

Title of Project A Personalized Sustainable Snowboard Boot

A Personalized Sustainable Snowboard Boot — project title

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

start date 24 - 02 - 2021 — 20 - 07 - 2021 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

The winter sports industry is lagging behind when it comes to sustainability. Occasionally renewable energy sources are used to power parts of the ski resorts, but overall the industry is not that considerate. Winter sports gear and apparel have their share in the environmental footprint of the industry. The focus of this project will be on snowboarding gear, boots in particular. The construction of snowboard boots has been the same for the last few decades, whilst the used mixture of materials is hard to recycle.

The main functionalities of a snowboard boot are:
1. Fit, 2. Warmth, 3. Waterproofness, 4. Defined flexibility.

The fit of a boot is dependent on the ergonomic dimensions of its users. Warmth and waterproofness help the users to stay comfortable on the mountain. The defined flexibility of the boot relates to the 'type' of user.
In general, the stiffer the boot, the more control you have, which is required for technical riding during carving, speeding and riding bigger freestyle obstacles. A more flexible boot is more forgiving, which can serve beginning snowboarders or snowboarders who like to use the mountain and park as their playground. Some snowboarders, also referred to as riders, prefer or only have one set-up at all times while others have gear that is adaptable specifically for certain conditions or activities.

Deeluxe is pioneering in hard and soft snowboard boots since 1996. The Austrian company focuses solely on snowboard boots and has the expertise/resources/time/team to back this project. Recently they have been exploring soft boot designs using recycled materials. However, the boots did not comply with the requirements and therefore failed the test. Consequently, Deeluxe offered the opportunity to explore a really new type of snowboard boot and to look for alternative approaches.

During this thesis, designs for a personalized, more sustainable boot could be explored in close connection to the desires expressed by the different types of snowboarders. Deeluxe is a firm believer of getting the 'defined flexibility' functionality as a separate part of the boot, instead of just the traditional inner- and outer-boot. A snowboard boot would then consist of a warm inner boot, a flex defining part and a water-resistant, hard, outer shell. The project concerns the soft boots product category, as this type of boot is most common and most popular.

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introduction (continued): space for images

image / figure 1: Deeluxe - Footloose model. Sample for further design developments.

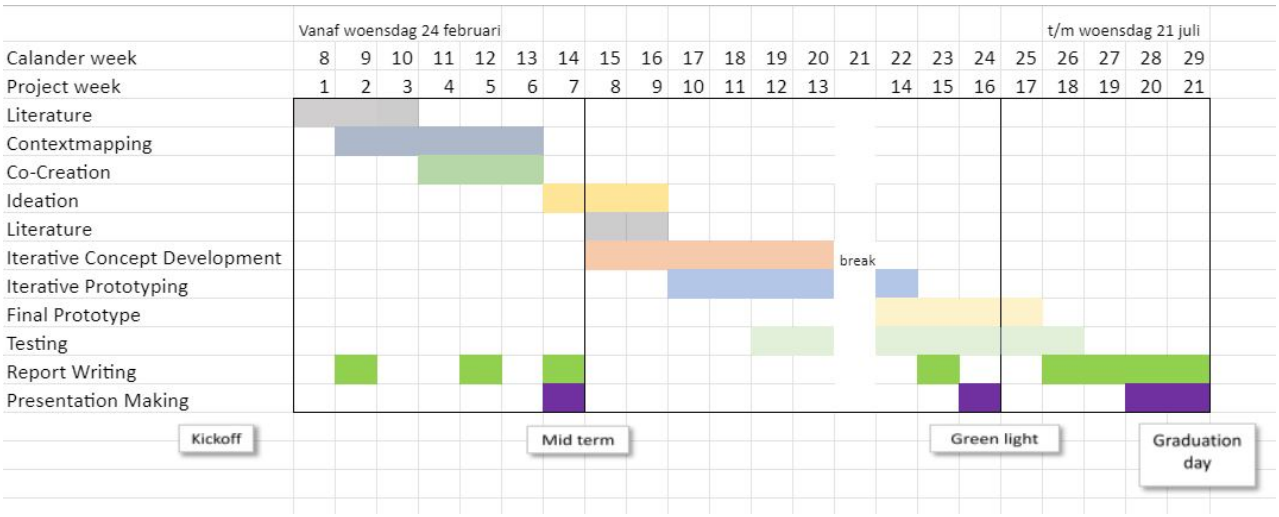


image / figure 2: Overall Planning

Initials & Name N.S. Haagmans Student number -

Title of Project A Personalized Sustainable Snowboard Boot

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

In general, the current construction of snowboard boots has not changed in the last 20 years across all the different brands. Certainly, progress has been made, but at a slow pace. The current design is not suitable for recycling nor is the use at the end of life of the boots taken into account by the company. The stiffness of the snowboard boot is acquired in the construction of the outer boot. In addition the outer boot contains a tightening system, it serves as a waterproof layer and it exhibits the visual design of the product. The combination of these functionalities currently result in a multi-layered product part that consists of monstrous hybrid materials*, as parts are glued and sewed together. This compromises the recyclability of the snowboard boot and therefore research is required to arrive at a new type of construction easing the decomposition process at the end of life.

On top of that, little is known about users' behavior and willingness to put in effort for a more sustainable alternative, when it comes to their snowboard gear. This project is an opportunity to connect behavioural change linked to sustainability to a new kind of snowboard boot.

*monstrous hybrid materials (n.d.) In Sustainability Dictionary. 'A term coined by Michael Braungart and William McDonough for a product, component, or material that combines both technical and organic nutrients (such as recyclable paper and poly-vinyl-chloride) in a way that cannot be easily separated, thereby rendering it unable to be recycled or reused be either system.' - Source: Monstrous hybrid materials (n.d.) In Sustainability Dictionary. https://sustainabilitydictionary.com/2005/12/03/monstrous-hybrid/#:~:text=A%20term%20coined%20by%20Michael,or%20reused%20be%20either%20system.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

In this research the context of snowboard boot users will be explored extensively to define their needs, expectations and behaviour, resulting in different user archetypes. A sustainable, modular snowboard boot will be designed with a strong focus on the part that defines the flexibility rate of the boot to meet the defined needs. The Deeluxe Footloose model functions as a base for the project.

The aim of this project is to deliver a product-part alongside a rich set of user-data that allows for further development of this new snowboard boot. This project will have a co-creation approach: the different types of users will be involved throughout the design process. In the first half of the project, knowledge about how to design for sustainable behavioural change will be gained from existing studies and translated to this project. Co-creation will illuminate what moves users to behave environmentally conscious, as a bridge between this general knowledge and snowboard boots. Understanding and manipulating this behaviour through design is extremely important because even a 100% recyclable boot is worthless if it ends up in waste streams. Therefore, ways to communicate the new boot to new users will be suggested to Deeluxe. A modular boot requires users to think and act 'modular', e.g. users only buy a new outer boot instead of an entire new boot, if it is broken. An alternative could be the use of different flex-defining-parts for snowboard activities (back country or slope riding for instance).
The second half of the project is an iterative process consisting of concept development, prototyping, user testing and functionality testing. Circular economy principles like design for modularity and recyclability influence the project, aiming to prolong the products' lifetime. Concepts can be developed using computational design tools (CAD-software) alongside DINED anthropometric database for body dimensions of the target group. 3D printing and existing samples of snowboard boot parts can be used as a means of prototyping. User tests create a feedback loop and either validate or initiate change to the design. Finally, changes can be made to the final design, resulting in a final prototype for this project.

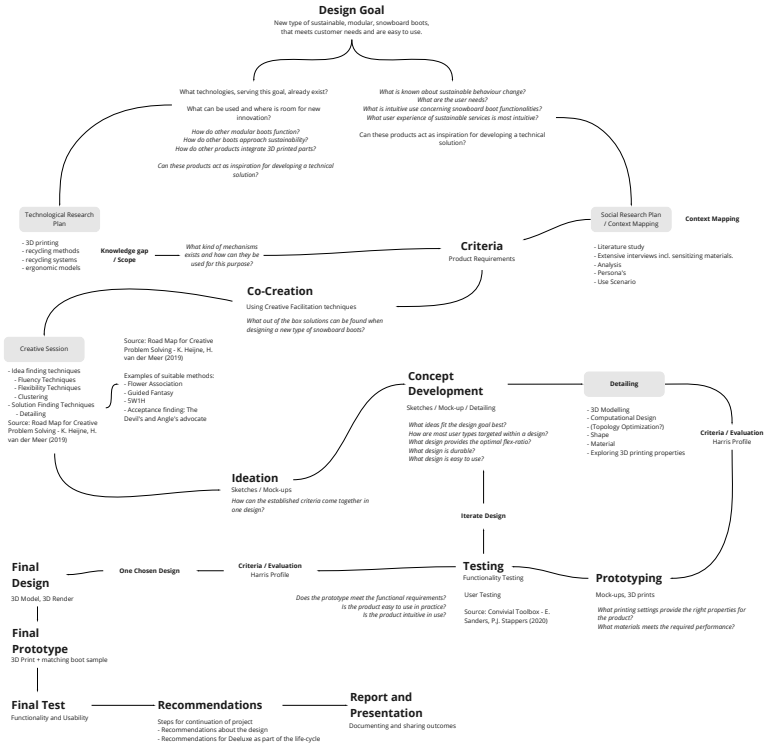
Initials & Name N.S. Haagmans Student number -

Title of Project A Personalized Sustainable Snowboard Boot

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and 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 activities.

start date 24 - 2 - 2021 20 - 7 - 2021 end date



A general overview of the planning of the Graduation Study can be seen in figure 2, an elaborate explanation of each step is attached as appendix to this project proposal. The image seen at the top of this page is a visual approach of the all the steps in the planning. Possible methods, techniques, research questions and sources are also included. The planning and process are iterative and might change during the course of the project.

Initials & Name N.S. Haagmans Student number -

Title of Project A Personalized Sustainable Snowboard Boot

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

First thing first, snowboarding is a big passion of mine. I have spent a decent amount of time snowboarding in the mountains from an early age on and have the first snowboard teaching degree you can get in Austria (Anwärter). Next to that I have been studying both snowboarding- and skiing-gear for my seasonal job as hardware advisor in a winter sport gear shop. In 2016 I played a significant role in organizing a wake/snowboarding competition on the Market square in Delft, called Flatstyle. So far, the highlights of my affinity with the topic.

When choosing a Masters program 1,5 years ago, I had some doubts whether I wanted to study Integrated Product Design or Design for Interaction. Eventually, I chose Design for Interaction because it challenged me to dive into the users' perception and tackle problems from a different angle. What I really like about this Graduation Project is that it gives me the opportunity to work from both ends of the spectrum: where both co-creation and detailed product design play a role. Precisely these two angles play an important role in my decision to take on this challenge.

During my entire Master Program so far, I have always pushed myself to set as many practical steps as possible, to get a good 'feel' for the actual products. Either in prototyping as well as 3D modeling. Courses like Exploring Interaction(EI), Contextmapping Skills, project Usability and User eXperience Assesment in Design(UXAD) and Creative Facilitation prepared me well for performing and analyzing user research, as well as for user experience design. The Sustainable Design Strategies for Product Development Master elective provided tools to navigate a design process towards a sustainable design, together with the Bachelor elective Towards Circular Economy.

A learning objective for this project would be to take 3D modeling and printing to the next level, to utilize its properties for product design. So far in my study I have always tried to use alternatives, because 3D printing felt too simple for prototyping. Well, not in this project. I want to keep gaining experience in multiple aspects that come with context mapping: booklets, interviews, creative sessions, analyses and so on. The courses related to this topic taught me that a smooth process and good results come with practice, so I want to take every opportunity I get to gain more experience. The same concept applies to Creative Facilitation, after finishing this elective I have come to see the values these techniques can bring to a project.
Last but not least, I want to gain more experience in communicating and planning with multiple stakeholders (chair, mentor and company-mentor). A lot of work will be done remotely, so I am eager to find a way to share my work progress, achievements and steps to keep everyone in the loop.

Working on site would be an advantage. Yet, due to covid19 regulations this remains uncertain, which could be a limitation for the course of the project. Therefore, Deeluxe offers the opportunity to have a weekly meeting to utilize their knowhow.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

Initials & Name N.S. Haagmans Student number -

Title of Project A Personalized Sustainable Snowboard Boot

		What?	How?	Why?	Whatfor?
Literature		Learn about existing exoskeletons and ultra personalizable products. Understanding of the ergonomics of the foot.	Read up on ultra personalized products. Get in touch with physiotherapists. Get in touch with Paulien (she works for exoskeleton company).	This knowledge helps steer design choices. Both in terms of materials, use and fit.	Create a more concrete assignment for this graduation project. In other words, problem framing.
Contextmapping		Contextmapping using sensitizing materials and interviews --> personas, use-scenarios	Sensitizing material (booklets) and interviews	To gain a deeper understanding of the needs, desires etc of users alongside their behavior when it comes to the end of life of a product.	Persona's could be made including prefered flex and riding style, alongside an extensive user scenario that helps to dive into the context. Together, these elements form the base for different shoe designs.
Ideation		Finding ideas for an exoskeleton as part of a snowboard shoe.	Using creative facilitation techniques	Explore the topic to form a solid base to design on.	Diverging helps in idea finding. It can also shed a new light on the problem as given. It can be an iterative step in problem framing.
Co-Creation		Involve users in concept development	Using methods from the convivial toolbox	To make the product user friendly.	Concept development
Concept development		Translate gathered data into concrete designs.			
Prototyping		Make prototypes of the concept(s)	Probably using 3D printing	To make the design better by evaluate, iterate and test the design of the concepts.	This could be done for functionality but also for use.
Final Prototype		Choose one design for a more elaborate prototype which can be tested.	Probably using high quality 3D printing	To round up and make decisions on the design that allow for proper testing.	This final design serves both presentational purposes but also will be tested on functionality and use.
Testing		Test its functionality and user experience.	Invite people to put it on and evaluate it. Using presentation materials ask them about their opinion on the product, how they would use it and what their expectations are.	Creating a feedback loop with users.	Iterating on the product. Small and bigger tests will be done throughout the project as medium to improve it. The test on the final prototype will help with forming recommendations.
Report Writing		Write steps and conclusions of the relevant process parts.	Write down insights and conclusions in a Drive document throughout the project.	To make sure rich insights do not get lost in memory. Working in a cloud avoids unpleasant situations were data could get lost.	This helps with a smoother round up at the end of the graduation project.
Presentation Making		Make presenation	Using Powerpoint for instance.	To update my coaches on the process and project and create moments for questions and feedback.	An involved team and better learning curve for me.
Break		Rest.	Movable according to project development.	I choose to keep the date undefined so the break can be used in case an ordered part is late, or I need to wait for something else. It helps to prevent overflow.	A break could help me get new energy and inspiration for the project.