

Design of an innovation lab for desktop production purposes

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The assignment is offered by FlevoBike Technology, of which the production facility and development centre is in Dronten. It was founded by J. Vrielink in 1989. It started back when Johan Vrielink still worked as a mechanical engineering professor. FlevoBike produces specialty bikes, but nowadays offer advice to customers, (product) development as well as prototyping activities.

Professional industries and companies have a demand for employees with expertise and skills in digital production software and equipment. These employees are scarce. [4] Knowing the current situation in society and with experience as an engineer, Johan Vrielink came up with an idea to design and produce a mobile innovation lab. This innovation lab would come in the form of a movable device, of which the contents are modular and can be adapted to the users wishes. This idea was carried out in the form of this project.

To complete this, the goal is formulated as follows: *To create a mobile and modular device, a so-called innovation lab, which is produced by FlevoBike. This Innovation lab provides a dedicated workspace and storage for the equipment and accessories needed for desktop production in the form of 3D-printing. It can be easily transported and moved around and is easy to set-up for use. The product can be used for demonstrations by or at schools, at events, seminars or fairs provided by the people of Dutchy.*

To reach this goal, different steps are taken in the design- and development process with a research and analysis phase, followed by ideation to find potential design solutions. Then, the most feasible options are chosen and developed to create a producible final design.

During research, a deeper look is taken into the specific background of the project. The societal context of the assignment and the final goal is elaborated on. A significant part of the project is rooted in difficulties found in educational programs for the engineering field. To research, interviews are held with teachers and statistics are analysed. Competitors, the history of similar projects and design solutions in different fields that might be helpful for this specific project are also elaborated on the take a broader look at potential solutions. All research activities lead to a concise list of requirements. The requirements are discussed together with the supervisor and form the guidelines to the design phase.

After conducting research, the product itself is designed using the knowledge gained during the first phase. This process consisted of two parts, conducted in a systematic approach; the ideation phase and the development phase. In the ideation phase, a selection is made to find the design challenges for which a solution is needed. These items are the general elements of the final product that define its functionality and use. Using sketches, different ideas are presented on paper for these items. After this, the best solution for each design problem is picked, to be used in the final product.

In the second phase of the design process, the development phase, the design-process is continued digitally, using SolidWorks. This CAD specific phase is used to get a better sense of the scale, sizes and proportions of the design. It also provided the opportunity to implement modifications into the product on the go and the creation of technical drawings and renders. Through this process, a final design is made with realistic materials and measurements, ready for production.

The final product solution meets the basic elements of the initial targets that were set. For the purposes described for the product, the design will suffice in its functionalities for the activities intended to be carried out using the innovation lab. However, the linear systematic approach focussing on basic requirements used in the project resulted in a decrease in versatility and possibilities of the final product.

The current final result is focussed on use by people with at least a basic understanding of 3D-printing, its capabilities and intended use. In the future, it is an interesting opportunity to develop an innovation lab with its contents such that it comes as a full educational package for schools, or as a quick prototyping workstation for professional companies. These are two entirely different markets that can be addressed with the same product, if the contents are adapted accordingly. Taking a broader approach to the research activities including different stakeholders helps achieving this goal.