

EXPLAINING THE DESIGN & STYLING OF FUTURE PRODUCTS

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ABSTRACT

In many industries technological innovation is the most important driver of competitive success. Within our master curriculum Industrial Design Engineering, we therefore implemented a course that is dedicated to the development of innovative technology. This course, called “Sources of Innovation”, provides insight in innovation processes regarding emerging technologies. One of the methods provided is Innovative Design & Styling. The shaping of innovative products is complicated, because the intended new objects have no real ‘predecessor’ in their existence. On the other hand, design and styling have a major influence on the perception and acceptance of such innovative product concepts. To support the complex process, a special workshop was developed, based on three principles supporting this task: the communication function of design, the balance between novelty and typicality (aka. the MAYA principle: most advanced, yet acceptable), and the proper application of metaphors.

Keywords: Design education, Innovation Methods, Technology, Future, Aesthetics

INTRODUCTION

In many industries technological innovation is the most important driver of competitive success. Within our master curriculum Industrial Design Engineering, we therefore implemented a course that is dedicated to the development of innovative technology. This course, called “Sources of Innovation”, provides insight in innovation processes regarding emerging technologies. Fifteen resulting design concepts range from small products up to roof systems. Our favorites are a solar electric vehicle charger and an integrated sunshade and lighting system for terraces (Figure 1). Six years of experience with executing and refining this course learned that three innovation process methods are apparently most beneficial, because they yielded the best student results [1]. These are platform-driven product development, TRIZ engineering creativity method, and Innovative Design & Styling. We decided to elaborate on these topics and, amongst others, introduced a dedicated workshop on design and styling.



Figure 1. ‘Tulip’ electric vehicle charger by Jorien Bootsveld & Katja Schuitemaker (left) and sustainable parasol by Ivar Kamies & Kyan Kuiper (mid and right).

After the execution of the course we investigated the effect of giving attention to design and styling in the total design process by visually exploring the conceptual designs resulting from our project, and by

quantitatively rating them with respect to product concepts that originated from processes that excluded a dedicated phase to aesthetics. We will start with briefly introducing the complete course. After that we will describe the background theory on innovative design and styling that we used, and the way that this was explained and practiced in the workshop setting. Then the analysis of the results of both the workshop and the total course will be presented and discussed.

COURSE

Innovation can arise from many different sources such as firms, research institutes and individuals. By their involvement in product development processes the topic of technological innovation is of major concern for industrial product designers. It is for this reason that the course Sources of Innovation provides information about innovation processes and useful tools for the design of technology-based products. The approach in the course is twofold. Theory will be provided on innovation processes and innovation methods. Besides this, the theory will be applied in a design project.

The course is laid out as project based learning [2], where the students have to develop an innovative concept, based on a given new technology. For 2012, the student teams were invited to design an innovative product or system using a solar energy technology called CPV -Concentrating Photovoltaic-, fit for use in the built environment and/or energy landscapes. The students worked in teams of two, during ten weeks (one quartile) with a total workload of five European Credits. The course was finalized with a report and presentation of the developed design concept, accompanied by an oral exam about the design and the application of the underlying design principles and innovation methods. The students are supported in this task with a series of weekly lectures and workshops on both methodological and technological aspects. Complementing the teaching staff and guest lectures by technology experts, several speakers with a different professional background share their experiences with innovation processes with the audience. Topics that are attended are for instance: Delft innovation model, lead user study, platform driven product development, innovation journey, technology road mapping and the TRIZ creativity method. Theory is provided by the publication *The Power of Design: Product Innovation in Sustainable Energy Technologies* [3]. Within their general design process, the student couples have to apply at least four of the given innovation methodologies. The students are free to choose which of the methodologies is most suitable for their own project, however platform driven product design is compulsory. The other methods (totaling nine) are; constructive technology assessment, risk diagnosing methodology and innovative design & styling. In this paper we focus on the set-up and effects of the workshop on design & styling, since the application of this method was found to be effective [1] and because this set-up in 2012 was new.

DESIGN THEORY

The design and styling of innovative technology based products is complicated, because the intended new objects have no real 'predecessor' in their existence. In other words, there is no reference to determine how they should look like. On the other hand, design and styling have a major influence on the perception and acceptance of innovative product concepts. To prepare our students for this task, a special workshop was developed as part of the course. This workshop was based on three principles supporting this task: the communication function of design, the balance between novelty and typicality, and the proper application of metaphors [4]. The first principle means that the styling of the innovative product can communicate its function, goal or means. This can be very practical, depicting where to "hold" or "plug-in", but also abstract information like "simplicity" can be expressed [4]. The balance between novelty and typicality is an extension on the MAYA principle (Most Advanced, Yet Acceptable) by Raymond Loewy. Following Hekkert et al. [5], this means that innovative products need to be *both* novel to express their innovativeness *and* typical, to facilitate recognition and acceptance from the user. Our own research showed that this is feasible when design features from different sources of inspiration are combined for one design [6, 7].

WORKSHOP

During the half-day workshop the student teams were made familiar with the theoretic principles, and practiced in several steps to apply the principles in their own project. The workshop was derived from earlier work on creativity, innovation and design, which we called 'disruptive images' [8]. The basis for this workshop lies in the application of images in order to visualize the design goals on a higher

level of abstraction. Transforming to a higher level of abstraction is a well-known creativity principle, that is copied from TRIZ [9] and also appears in the Vision in Product Design approach [10]. For instance Leblanc [11], effectively showed that the assignment “design a new stool” renders far less innovative results than “design a seating element (for a particular context)”.

After explanation of this basic principle, the students were asked to describe their product/concept/idea, and to re-scribe that to the higher abstraction level. This was done first in text, which for example resulted from: “*The design of a high-tech sightseeing hotspot, energy self-sustainable through concentrated photovoltaic technology*” in: “*Adding to the tourist experience*”.

In the next step the students were asked to visualize essential aspects of this idea with use of the so-called disruptive images, where ‘disruptive’ expresses the idea that the visuals represent something uncommon. By combining different images, mostly of recognizable objects that are displayed ‘out of context’, the resulting visual should contain elements of surprise. Hereby stimulating the viewer to question conventions and propose a new perspective on the subject at hand. An exemplary example that is also shown in the instructions of the workshop is the “Prada value meal” by artist Tom Sachs. In this artwork, a McDonalds happy meal is mimicked with a print of Prada logos to articulate the cheapness of the original.

Eventually, the combination of extended Photoshop skills and the functionality of Google-Images makes that students are very profound in making this kind of images in the short time-span of this part of the workshop, which was approximately half an hour (Figure 2).



Figure 2. Disruptive Images from the workshop by Jorien Bootsveld & Katja Schuitemaker: ‘Charging points without polluting the landscape’ and ‘CPV technology and entertainment’.

The next step was to combine and present the (disruptive) images in the form of a short visual story, also referenced to as ‘visual essay’ [12, 13]. These little presentations were shown in class and discussed briefly, before going into the next step. This next step consisted of the search for the right styling cues, with aid of the three theoretical principles mentioned before. The students had to point down the message(s) that their product idea should communicate, and then split the abstract product idea into aspects that should be typical and aspects that could be novel. In the remainder of the workshop they collected inspirational images and brainstormed for visual or literal metaphors that could be associated with these aspects (see also figure 5).

RESULTS

In total, fifteen student couples finished the course with a complete product concept design and a full report describing the design process, including the four innovation methods chosen. Eight groups handed in a visual essay at the workshop, and in six projects, Innovative Design & Styling was explicitly used as an innovation method. For these projects, the workshop exercises were extended, or repeated more thoroughly during the course and documented in the final report. From the comparison of the project results, it showed that the theory was applied in several different ways and we will show four distinct approaches.

In two cases, the results of the disruptive images were directly used in one or more of the product concept ideas. For instance figure 3 shows how the disruptive images of the combination of “children playing” and “CPV technology” resulted in a concept of self-sustainable playground equipment.

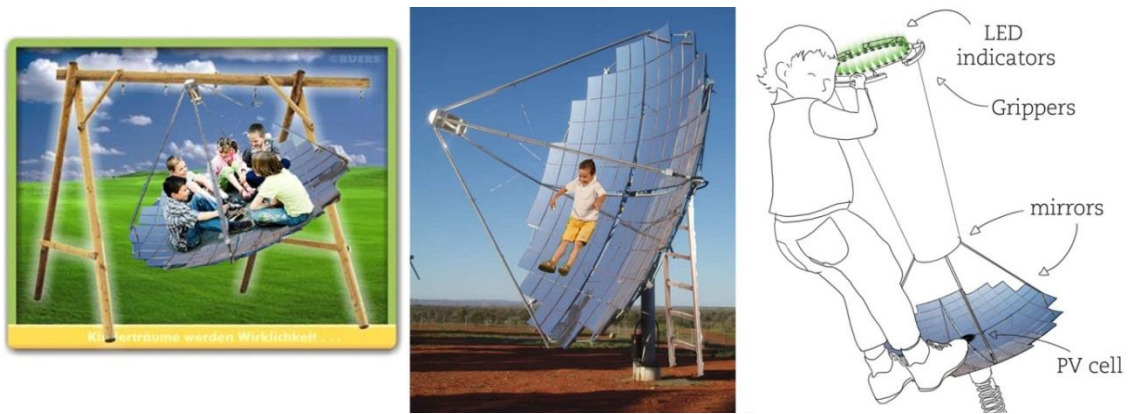


Figure 3. The disruptive images of the workshop (depicting the integration of CPV technology and children's play), rather directly translated into a product concept by Anouk Dantuma & Eileen Knook.

In other projects, the communication function was explicitly assigned. In a project that resulted in a modular CPV roofing system, the abstract product idea was translated into the design by using the associations and metaphors that were connected with the message of an “energy providing structure”. The associations applied were tree structures and plants, referring to the energy conversion of chlorophyll. In the final design, also the metaphor of the hexagonal structure of a honeycomb, referring to the active and busy nature of bees, was implemented (Figure 4).

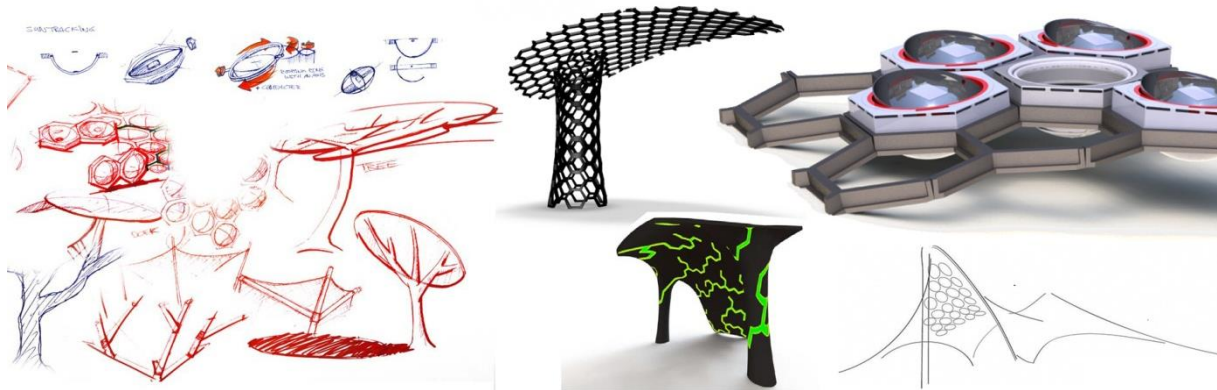


Figure 4. The shapes of trees and plants are used to communicate the idea of an energy providing structure. The upper-left corner shows the final design by Remko Balk & Jan van Nifterik.

Five projects used the extended MAYA principle in full. In one project, the division between aspects that should be typical and aspects that could be novel was made in text only. In the other projects the aspects were visualized separately, before implementing them in the final design. Figure 5 shows an example of such process. First, the design problem (for the development of a charger station for electric vehicles) was visualized with aid of the disruptive images technique (left).



Figure 5. The disruptive image technique is used to visualize the design problems (left). The Typicality-Novelty aspects are explicitly assigned and visualized (right).

The depicted problems were: the typical shape of the filling station does not fit in the futuristic surroundings; waiting for the actual charging process is boring, and; the wires that have to be connected-disconnected. In the typicality-novelty analysis (Figure 5, right), the aspects that should stay familiar to the user were the parking spot, paying at a terminal and signing. Novelty could be achieved with different ways of shelter, energy provision (CPV), filling/connecting and lighting. Some projects used a particular metaphor for the basis of the design. In the “sustainable terrace lighting” project, the metaphor of a parasol was used to implement the twofold essence of the product idea; supplying shadow from the sun and providing a protective atmosphere, which was described and visualized in the workshop (Figure 6).



Figure 6. The images from the workshop depict the abstract solution; the sketches (right) and final design (shown in figure 1, right) use the metaphor of the parasol for the concrete solution.

In the final design, shown in figure 1, the parasols have two positions. During the day the dishes are upright to provide shadow and catch the energy of the sun, turning like a sunflower. At night, the dishes face downward to provide light and a protective, sociable atmosphere for the visitors of the terrace.

Table 1. List of projects and the innovation methods that were applied.

	Project	visual essay	IDS applied	Methods applied (in subsequent order)	Concept Grade
1	CPV Spring toy (Figure 3)	yes	no	IJ, DIM, PDPD, RDM	+1
2	High-Tech Sightseeing Hotspot	no	yes	DIM, IDS, TRIZ, PDPD	+0,5
3	Sustainable Bus Info System	no	no	DIM, TRIZ, PDPD, CTA	0
4	Solar Pwd. LED screen for festivals	no	no	DIM, TRIZ, PDPD, CTA	-1
5	Sustainable Parasol (Figure 1 & 6)	yes	yes	DIM, IDS , PDPD, RDM	0
6	Very Large CPV dish	yes	no	DIM, PDPD, TRIZ, RDM	-1
7	Tulip Charger (Figure 1 & 5)	yes	yes	DIM, TRIZ, PDPD, IDS	0
8	CPV charging stations	yes	yes	DIM, IDS , PDPD, RDM	+1
9	Rural application for the 3rd world	no	no	LUS, TRIZ, PDPD, CTA	0
10	Self-sustainable park	no	no	LUS, PDPD, TRM, TRIZ	-1
11	CPV roofing system (Figure 4)	no	yes	DIM, IDS , PDPD, RDM	+1
12	Mobile CPV Fridge	yes	yes	IJ, DIM, IDS , PDPD	0
13	Park Lounge Reader	yes	no	DIM, TRIZ, PDPD, CTA	-0,5
14	Shade providing Electric Charger	no	no	DIM, TRIZ, PDPD, RDM	+1
15	The Solar Balloon	yes	no	DIM, TRIZ, PDPD, RDM	-0,5

IJ = Innovation Journey; DIM = Delft Innovation Model; PDPD = Platform Driven Product Development; RDM = Risk Diagnosing Methodology; IDS = Innovative Design & Styling; CTA = Constructive Technology Assessment; LUS = Lead User Study; TRM = Technology Road Mapping.

Table 1 shows the projects and the innovation methods that were applied for all the groups that finished the course. The last column lists the scores, relative to the average grade for the conceptual designs, on a ten point scale. The average score of the six teams that used the Innovative Design & Styling method explicitly, is 0.6 point better than the average of the others.

DISCUSSION

In the end-results the particular design and styling principles are in ten of the fifteen projects clearly discernible, even if the method is not explicitly mentioned in the reports. This shows that the workshop was quite successful in transferring the theoretical framework. Eight groups directly used results from the workshop in their design process, which shows that the workshop was also effective. On the other hand, the teams that did not use the theory methodically were also able to develop viable and sometimes very attractive solutions, but average grades were lower. That the results of the groups that explicitly applied IDS score better can of course be due to the preferences of the examiner, but this was not the same person as the design & styling expert that executed the workshop. Also the differences may be explained by the combinations with other innovation methodologies, which is an interesting topic for further research. Last but not least the sample is still of limited size, but we will continue to develop the workshop and monitor the results of upcoming cohorts of students.

CONCLUSION

The workshop was an effective means to transfer the theory. The workshop results itself had a considerable contribution to the materialization of the innovative product concepts. Over all, the Innovative Design & Styling methodology that we described in this paper, proved to be a valuable contribution to the total design process of this type of innovative technology based products.

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