

# **THE POTENTIAL FOR A CRITICAL DESIGN APPROACH TO CREATE INNOVATION WITHIN THE CONSTRUCTION INDUSTRY THROUGH PARTICIPATORY DESIGN WORKSHOPS**

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## **ABSTRACT**

This paper explores the potential and possibilities for applying a critical design approach and critical design thinking to industrial company Mapei AS, mainly focusing on improving product development and creating innovative concrete surfaces for the construction industry and urban spaces. The paper also discusses the methodological challenges and possibilities of working in a cross-disciplinary team consisting of product designers, tertiary-level product design students, chemical engineers, and relevant stakeholders. The study presents an overview of a critical design approach, which is a continuation of previous work on how methods such as design fiction and poetic estrangement can add value and explore the possibilities of critical design as interventions in industrial, material, and educational systems. The research consists of a series of case studies and participatory design workshops that involved testing the critical design approach with tertiary-level product design students. The participatory design workshops focused on creating design fiction and a collection of conceptual design proposals that shift the focus from design and object to ideas and concepts, challenging the stakeholders and the established ideas and materials. The results of the conducted research and the participatory design workshops represent an expansion of the critical design approach into industrial and educational contexts, as well as the public realm.

*Keywords: Critical design, participatory design, cross-disciplinary, materials engineering.*

## **1 INTRODUCTION**

This research focuses on creating innovative concrete surfaces for the construction industry and urban spaces through the use of a critical design approach. Mapei AS has been a leading Norwegian supplier of adhesives, sealants, and other chemical products for the construction industry since 1976. Mapei AS is the world's largest corporation in its industry, and has employees in over 80 countries on all continents. Five percent of its revenue is used on research and product development, which is geared towards ecologically sustainable products and systems that do not contain solvents and pollutants. In collaboration with local industry experts at Mapei AS and two educational institutions, a local upper secondary school and at tertiary level education, the research was conducted through a series of case studies [1] on relevant projects. The study consists of a theoretical framework found in the broader field of critical design, critical theory, and innovation. The author believes that the combination of theories in this study has not been attempted before. This theoretical framework is based on using a critical design approach and a critical artefact methodology [2] as a conceptual lens to create a discursive space, by applying the tools and method to several workshops in which a series of critical design proposals have been put forth. The research on applying and developing a critical design method dealt with several domains. Firstly, the work started from a supposition that critical thinking and critical design proposals and approaches can be applied to design in the public space. Secondly, it addressed the expansion of the initial critical design approach from galleries into the public realm and industrial contexts. Thirdly, the work explored the expansion of a critical design approach that was originally artistic and conceptually-oriented, to offer opportunities for further study on developing a research methodology framework and testing it as a research tool through participatory design workshops.

## 1.1 Critical Design

The term Critical Design was first used in Anthony Dunne's book *Hertzian Tales* [3] and later in *Design Noir* [4]. Critical Design uses design artefacts as an embodied critique or commentary on consumer culture. Both the designed artefact and the process of designing such an artefact (as well as its subsequent use) causes reflections on existing values, mores, and practices within a culture. Design as critique builds on the attitudes of Italian Radical Design in the 1970s, which was critical of popular social values and design ideologies [5]. Dunne [5] described Critical Design as being related to critical theories, in quoting this passage by Raymond Guess: 'Critical theories aim at emancipation and enlightenment, at making agents aware of hidden coercion, thereby freeing them from that coercion and putting them in a position to determine where their true interests lie.' Critical Design seeks to avoid or challenge existing production and consumption, offering alternative perspectives within design. Simon Bowen [6] argued in his article, 'Crazy ideas or creative probes', that: "Critical artefacts" have proved more useful tools than direct questioning techniques; in particular, as a way of enabling stakeholders to engage with novel situations and consequently engage in creative thinking about possible futures.'

## 1.2 Background

Product design education in the 21<sup>st</sup> century demands new competencies and skills, including the ability to work with product design in more complex ways. In this study, the intention was to address how designers and design students could engage in design for society, the construction industry, and design education through participatory design workshops and stakeholder involvement in the design process. Social dialogue is a form of Relational Aesthetic [7], virtual and physical places where the audience can participate in a discussion or form an exchange, with the opportunity for all stakeholders to acquire knowledge and understand and reflect upon their choices. With such an intervention, the shareholders or audience co-create within the process.

## 2 METHODS

Research through design (RtD), the practice of using design thinking, processes, and products as inquiry methodology, has gained considerable attention in design discourse [8]. As an emerging practice, there is still some confusion about what RtD is and what it should be. The theoretical development of RtD and its potential to contribute to knowledge that not only focuses on the world as it is, like most scientific disciplines, but also attempts to develop descriptions, interpretations, and explanations of existing objects, processes, and activities. Design and design research share a fundamental interest with engineering in focusing on the world as it could be, on the imagination and realization of possible futures, as well as on the disclosure of new worlds.

The main method used in this study is the critical artefact methodology by Simon Bowen [2]. Through research into and practical experience with this method, the aim was to utilize similar techniques and tactics to develop a Critical Design method suitable for other contexts, such as product design education at the tertiary level or higher and design in urban spaces. The intention was to present this method and its underlying methodology in participatory workshops for stakeholders related to the study. The intention of the following case studies was to use this methodology to gain insight into the application of its design principles, and to see how this methodology might be deployed in collaborative projects between stakeholders and educational institutions, and in industrial contexts. Under these considerations, the following research question was formulated: How can a critical design approach create innovation within the construction industry through participatory design workshops.

### 2.1 Participatory Design Workshops

Ethnographic studies are usually conducted 'in the wild', in homes, workplaces, educational settings, and other places where the 'action' of interest takes place [1]. Participation is a critical part of ethnography. As a Master's student in product design, it was interesting to test how designers could contribute to a more socially-oriented design at different stages throughout the process, in collaboration with other experts and working closely with users and stakeholders. Bryan and Wyatt [10] suggested, 'a better starting point is for designers to go out into the world and observe the actual experiences of smallholder farmers, schoolchildren, and community health workers as they improvise their way through their daily lives... design thinkers become embedded in the lives of the people they are designing for.'

## 2.2 Case study 1: Design students at upper secondary school

In this case study, experiences were shared through a collaborative partnership between two designers, industrial concrete company Mapei AS, and a local upper secondary school. Unlike lab-based experiments, case studies focus on the observation of phenomena in a meaningful context that is beyond the control of the investigator. Case studies also focus on activities as they occur in the real world, outside the sterile confines of a usability lab [1]. By using a collaborative approach toward the research, based on a critical artefact methodology [2], we committed ourselves to participating and co-creating a series of concrete tiles for a public space. In collaboration with Mapei AS, 30 students experimented with a selection of the company's products. The students developed ideas for creating their own personal tile and concrete surfaces, based on physical experimentation with cement. One of the findings was a material appearing to be something else; concrete, which is usually cold and hard, was given a soft appearance like that of a textile (Figure 1).



Figure 1. Conceptual Design Proposals: Material investigations in concrete. (Own source)

## 2.3 Case study 2: Design students at master level

The intention of the following workshop was to give the participants some experience using critical design thinking and a critical artefact method. The workshop was based on the research question and the participants were a group of four tertiary-level product design students. Working in a group of four and also one on one, the participants devised ideas for critical artefacts using concrete and concrete surfaces. Through this practical use of critical design and through a participatory design framework for designing concrete objects in an urban space, the intention was to stimulate and generate a debate about design for urban spaces, and to enable the students to explore and utilize similar techniques and approaches for their own studies and practices. The goals for the workshop included:

- Providing the participants with an overview of critical design and a critical artefact method;
- Producing a cross-disciplinary exchange of knowledge between industries, educational institutions, and design practices. This exchange focused on the creative processes based on a critical artefact methodology;
- Stimulating discussion and debate about design for public spaces;
- Creating a collection of conceptual design proposals that challenge ideas, traditions, users, and stakeholders.

## 2.4 Case study 3: Mapei AS

This workshop was held to create proposals and forms that could encourage engagement and discussion on a material: concrete and concrete surfaces. During the earlier workshops, there emerged several themes and material qualities that were explored further and compiled into a series of conceptual design proposals, which were presented to Mapei AS to open a conversation about the values it embodies. The stakeholder's representatives consisted of a team of chemical engineers, product managers, and marketing managers.

## 3 DISCUSSION OF FINDINGS

The findings of these case studies included a set of conceptual design proposals that created discussions and opened up the environment for new ideas and designs in the construction industry. This was achieved by taking a critical design approach, normally restricted to gallery-based objects,

and using participatory workshops to challenge the stakeholders. During the earlier workshops, several themes emerged that were explored further and made into design artefacts; these were later presented to Mapei AS during the third, and final, case study. By focusing on the Mapei AS product range, it was interesting to see how their products and the potential use of materials for urban spaces could be challenged, as well as how these could be further explored for the purpose of developing conceptual design proposals. The proposals were not meant to be a set of practical objects, but to open up the floor for dialogue amongst collaborators regarding the value that these designs might embody.



Figure 2. Conceptual Design Proposals: 'Soft Concrete Chairs'. (Own source)

'Soft Concrete Chairs' (Figure 2) explores the potential of and possibilities for Mapei AS's products, other than usage in the construction industry. Imbuing concrete surfaces with another meaning adds value to the products. A pattern of leaves reveals itself on the flooring when it comes in contact with rain, imparting the concrete with another meaning and experience than just a plain grey surface. In *Design Noir*, Anthony Dunne and Fiona Raby [4] argued that one way complicated pleasures can happen through design is through the development of 'value fictions'. By using such 'value fictions', based on the material findings from the participatory design workshop (i.e., case study 1), a series of design proposals (Figure 2) were developed to would stimulate discussion and debate about the use of concrete in public spaces.

#### 4 CONCLUSION

This study included a series of case studies and participatory design workshops that tested a critical design approach with a team of stakeholders within design education and the construction industry, determining how this approach could contribute to reflection and debate about design and the use of concrete in urban spaces. The methodological challenges, paradoxes, and possibilities of working in a cross-disciplinary team consisting of product designers, tertiary-level product design students, chemical engineers, and relevant stakeholders was demonstrated throughout the process. By visualizing 'value fictions' and possible futures, the research challenges the design of concrete surfaces for urban spaces and the construction industry. Product design education in the 21<sup>st</sup> century requires new competencies and skills. Through the use of more collaborative and participatory design processes and workshops, this research and its findings have concluded that a critical design approach and a critical artefact methodology can create innovation within the construction industry, offering a new dimension to Mapei AS's products and improving the development and use of their products in urban spaces. The methodological framework in this study can be applied to product design education as a conceptual tool aiming to create new, unconventional ideas and solutions.

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