

# KADEN Project—Towards the Construction of Model for Sharing Cognition in Manufacturing—

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**Abstract.** One of the methods which create new ideas to secure the quality of the relationship of the product and human is to find the many participants in manufacturing and to integrate the knowledge between different fields. Therefore, in order to perform the manufacturing integrated, we aim to construct a cognitive sharing model for sharing the recognition of each other, and take advantage of the expertise of each using the shared recognition. In this paper, we propose a process that worked as project-based educational activities.

**Keywords:** creativity, innovation design, cognitive sharing model, design process.

## 1 Introduction

In order to improve the quality of home appliances in Japan, various efforts have been made currently. There is a "quality" as the part accuracy of the product. For this quality, careful consideration has been made so far in the field of quality management. Manufacturing that is hard to break, easy-to-improvement have been made by ensuring the quality. This construction-oriented manufacturing formed the basis of the manufacturing of the world. This is apparent from the fact that it was based on ISO9001. The quality of the accuracy of the performance is satisfied, products with sufficient functionality is produced. The opportunity to use in life the computer increases rapidly, rather than the traditional relationships between computer and the human being, more natural relationships are needed. Under these circumstances, it is difficult to correspond to developing a new product in the conventional idea. Therefore, manufacturing innovation through new thinking has become necessary.

IDEO is innovation consulting firm to lead the design thinking. The values of human life point of view which derive from the future are incorporated on the products and services that have been developed by IDEO. IDEO has been successful in a wide area.

Tim Brown is the president and CEO of IDEO mentions as follows: "Design thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success." [1] Thus, the design of the future is essential in order to utilize the potential of the technology, to establish as a business, and to be worthwhile to

human life. Therefore ideas for the innovation are required in the design process. Sugino[2] presented a model of the design process in design-driven innovation from the case analysis. This model proposed a design process for design-driven innovation that started with a finding of use of an artifact for another purpose.

The innovation thinking is required in addition the constructed type of current design process for the future of consumer electronics products in Japan. One of the methods which create new ideas to secure the quality of the relationship of the product and human is to find the many participants in manufacturing and to integrate the knowledge between different fields. Therefore, in order to perform the manufacturing integrated, we aim to construct a cognitive sharing model for sharing the recognition of each other, and take advantage of the expertise of each using the shared recognition. In this paper, we propose a process that worked as project-based educational activities.

## **2 KADEN Project**

KADEN is an abbreviation of home appliances in Japanese. This is a so-called common name. The characteristic of this project was a project-based class of graduate school, to perform collaborative work by students of design field and engineer field, and to produce a prototype production in a short period of three months.

This project was carried out mainly in group activities, students could gain experience to come up with a good idea, and it was subjected to a membership that lets you take a niche and characteristics of people cooperating. The product was designed for the purpose rather than the design of self-expression. The education in this project was "training to learn oneself, to think, to act". This project was with the aim of fostering capacity that could be applied to own use, to create a forum to challenge the manufacturing and creative cooperative.

Students with knowledge in different fields had been taking this project. Therefore, lectures on design innovation and design thinking have been performed. The next step is to include the seeds of their own knowledge, to organize the teams. Team formation herein includes the possibility to change later. In each team, discussion about the proposed product has been made. Next chapter describes the design process to proceed in the team.

## **3 Design Process on KADEN Project**

The seeds were conceived in early stages of the design and the process to tie the user's needs is required to achieve the products with innovation. It is possible to find the problems and use of new technologies by conceiving and conceptualizing using techniques of design thinking product ideas based on the seeds, and to achieve a product concept that links to the new value. One of the issues that arise in the design process, there is a difference in the cognitive model due to the difference in the specialized field. That is to say, problem occurs that members of another can not be recognized exactly what some members is intended because the team is composed of members

with different areas of expertise. In the design process, how to express the knowledge of different disciplines, how to share the perception of each other. The method was used to prevent differences in cognitive model by visualizing at an early stage in the product image.

The main process (Fig.1) was as follows.

- Survey of proposed product
- The problem finding and analysis
- Idea, concept setting: The heavy use of scene sketches, and share images on the target product. In addition, consider the functions required for the product and users' needs.
- Prototyping: Styling sketch, consider the design requirements, dirty prototyping, real-time renderer
- Production of actual working study model

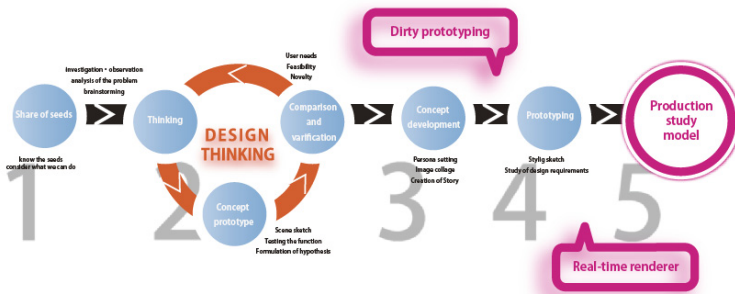


Fig. 1. KADEN Project's Design Process

## 4 Three Type of Cases

This report introduces the three products as a development case.

### 4.1 Feeling Navi

At first, "Feeling Navi" is mobile navigation with vibration. For those who get lost, there is a tendency to lose the sense of direction each time through the corner and branch point. Therefore, it is impossible to make the cognitive map, and stops in the place, it is necessary to check the map. Fig.2 shows the image sketch of "Feeling Navi". "Feeling Navi" was achieved navigation by vibration that could not rely on vision in order to always keep the sense of direction of the pedestrian. "Feeling Navi" is used around the neck. This is vibrated by bodysonic on the left, right and back side of the neck. Fig.3 shows the production study model of "Feeling Navi" and Fig.4 shows the prototype. "Feeling Navi" could be realized a navigation that do not rely on vision of seeing the map, it was considered to be useful as a navigation for people with visual impairment.

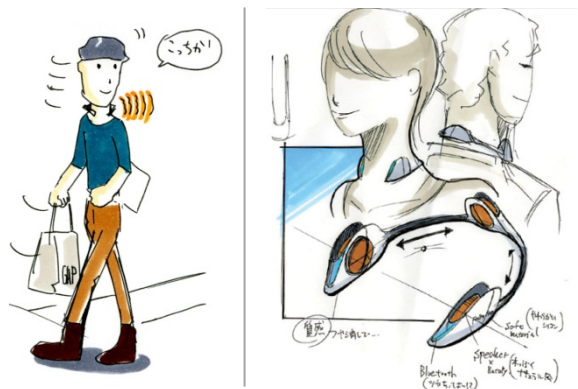


Fig. 2. Image sketch on Feeling Navi



Fig. 3. The production study model of Feeling Navi



Fig. 4. The prototype of Feeling Navi

4.2 Good Sleep Maker

The second is a "good sleep maker" pillow for a short nap in the office which is focused on the 1 / f fluctuation. This was a product that provides a nap effective environment that is proposed as a product for a comfortable break in the workplace(Fig.5).

It is known to have the effect of increasing the efficiency of work nap 15 to 30 minutes in general, and it is said that power nap. The sense of security such as hugging organisms is obtained by the contraction and expansion in the 1 / f fluctuation on the side of the device, and it is possible to give a fragrance to give a relaxing effect.



**Fig. 5.** The scene of use



**Fig. 6.** The production study model of good sleep maker

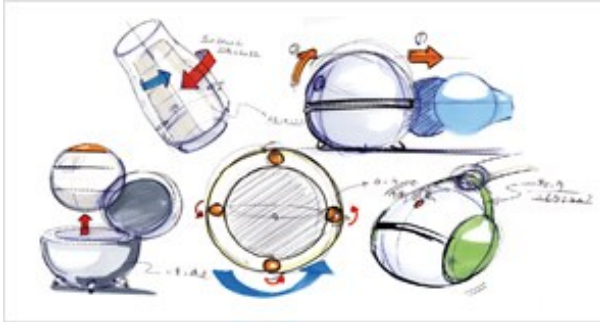


**Fig. 7.** The prototype of good sleep maker

### 4.3 Yoriben-Narazu

The third is "Yoriben-narazu" lunch box which the contents is not biased in the slope detection. The contents in the lunch box mess up at an angle when you carry it,

the phenomenon of so-called "Yoriben" often occurs. This case paid attention to the experience which contents of lunch box got mixed and it had disappointed at eating. Fig.8 shows image sketch of "Yoriben-narazu". Then, "Yoriben-narazu" has been incorporated a mechanism to correct horizontally inside by detecting in real time the slope with an acceleration sensor. This allowed the contents of the lunch does not become messy, to realize comfortable lunch life. Fig.9 and Fig.10 show rendering and production study model.



**Fig. 8.** Image sketch of Yoriben-narazu



**Fig. 9.** Real time rendering of Yoriben-narazu



**Fig. 10.** The production study model of Yoriben-narazu

## 5 Discussion

We aimed to construct a cognitive sharing model for sharing the recognition of each other, and take advantage of the expertise of each using the shared recognition in order to perform the manufacturing integrated. In this paper, we proposed a process that worked as project-based educational activities. The two characteristics of cognition in this study were the design image preceding type and Engineers thinking building type. This paper proposed the process to share the cognition of these two types. Good conflict has occurred and consciousness has been integrated by using sketch and image collage on the early stage in order to share the cognition of these two types. As a result, products with high innovation have been proposed.

Image sketch and collage are used in traditional development processes after the concept is set and design requirements are determined. However, in this development processes, image sketch and collage were used before concept was set and design requirements were determined. Therefore, it was possible to share the cognition of each other at an early stage. It was considered that concept and design requirements became apparent, then subsequent activity within the team was performed smoothly.

## 6 Conclusion and Future Works

In this study, it aimed to construct the shared cognitive model in order to realize the manufacturing integrated.

This report was in the education project, however, the students with different specialized fields used image sketch effectively, repeated the discussion, and were fabricated prototype to production. It was able to be a better understanding of technology and design by it, we propose the way product development collaborative.

Digital Contents EXPO is being held every year in Japan. This project was exhibited at this DC Expo and attracted the attention of the media and companies. In addition, the results of increased employment Jobs in the university were obtained.

We plan the following future issues:

- Training of entrepreneurship through business-academia collaboration project.
- Construction and use of model for sharing cognition in the design process.
- Proposal of a new idea techniques that can be continue to originate innovative products from Japan.

## References

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