Encouragement of “State” Design
-From product design to relationship design

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Between Designer and Engineer

What is there between the designer and engineer? I often think of such a thing. In fact, there are many differences between the design and engineer such as, the design object (product properties), methods, and knowledge used. It is also well-known that these differences become the complementary relationship in product development, and leads to effective functionality. This fact has been already mentioned in many discussions of the design methodology. However, there is one thing that I realized through various designs. There is a difference in the mind of both, and it is that difference which affects the quality of the product design.

Generally, it seems that the engineers mind is based on the mind to “pursue”. In product development, the engineers at first, understands the usage environments and circumstances of the user and product. The reason to this, is because the functionality of a product depends on the circumstances. Then, the circumstances become the prior conditions, and it is tended to carry out a new design of a product suitable for the given circumstances. This design process can be described as a mountain climb, which the climber only pays attention to one of the mountains and tries to attain the top of the mountain. It is called the mind of “optimum design” type in design theory, and plays a huge role in raising completeness of the product design.

On the other hand, designers seem to be focusing on the mind to “originate”. In general, the designer pays attention to the relationships of the conventional product and its circumstances. Then, the designer tries to generate a new and non-conventional relationship of the product and its circumstances. In other words, the position of a designer is to aim to generate a new relationship with the circumstances, by casting a new product to the market. This act could be described as a mountain climber, who aims for another mountain before climbing on top of one mountain. It is called the mind of “emergent design” type in design theory, which aims for a new phase in multimodality problem.

The differences of minds between the designer and engineers could be frequently noticed. Nevertheless, it does not mean that the engineer thinks lightly of the mind to

“originate” and the designer thinks lightly of the mind to “pursue”. However, such traits of each minds are only given from the relative relations, and as a fact, it is the power of either minds that gives a huge influence to the quality of a product design.

From a Design Suited to the Circumstances to a Design that Creates the Circumstances

These two minds are complementary in product development, and both minds require each other. In a design which seeks novelty, one must at first, generate the relationship of the new product and its circumstances using the mind to “originate”. Next, one must use the mind to “pursue” to optimize the new relationship. Whether one performs these two design processes, will greatly affect the quality of the design.

Generally, in an improvement type of design, optimum design is performed with the mind to “pursue”. In an improvement type of design, the conventional circumstances are conditioned to promote the optimization of the product. However, in a novelty type of design, the coexistence of both the novelty and optimum, which are the mind to “originate” and “pursue” are necessary. The coexistence of these two minds are an important key in designing.

When a new product is cast into the market, it is up to the coexistence of the novelty and optimum which leads to the evaluation in the market. Especially, the design that created novelty in the relationship of the product and circumstances is thought to earned high evaluation. Such design is assuming non-conventional circumstances. Rather, it may be said that the casting a new product to the market, is a designing of a new relationship of the product and its circumstances. Furthermore, this leads to the creation of a new circumstances. In other words, the act of reconsidering the conventional circumstances to design a new relationship of the product and circumstances, means to create new circumstances. Such design can generate the product’s new possibilities.

Considering the “State” which Describes the Relation of the Product with its Circumstances

It is effective to use the “state” as an index to design a new relationship of the product and its use circumstances. “State” is a property affected by the circumstances, and is different from the “attribute” properties such as the product’s color, materials, and shape.

For example, the dynamic properties (e.g. stiffness and intensity) of the product’s

material, such as Young modulus is an “attribute”, but the stress distribution affected by the load conditions and restriction conditions is a “state”. As a matter of fact, the product’s stiffness evaluation is affected by the circumstances, like the load conditions. Therefore, it is necessary to promote design with an “state” as an evaluation index.

This is similar to molding. The product’s own color and shapes are an “attribute”, but the color taste and shades of how the product looks is affected by the light, which is considered as a “state”. The original molding evaluation of a product is affected by the circumstances. It may be easily understood, if you imagine a color rendering of light source or a vehicle’s highlight. Therefore, it is also important in molding to pay attention to the “state” and undergo design.

However, the past molding design tends to directly evaluate the “attribute”. For example, “a shape that is ◯◯, receives a △△ kind of evaluation”. As for this tendency, a similar tendency is recognized in the past scientific studies. Nevertheless, the “attribute” evaluation result, in general, becomes unusable when the circumstances changes (even with the slightest change). Therefore, it is important to promote design that uses “state” in future molding.

The essence of design is not to design the product, but to design the functionality (includes molding characteristics and operability). In other words, this means to design the relationship of the product and circumstances, thus meaning in the importance of paying attention to the “state” when designing.

The Knowhow Tradition Using “State”

The consideration of “state” to a design, can lead to a contribution of knowhow tradition. This is because, the product’s functionality depends on its circumstances. Circumstances has many varieties and changes with time. Therefore, it is not the “attribute” but the “state”, which shows the relationship of the product and its circumstances, is important in passing down the knowhow of the design. The “state” that shows the general relation of the product and its circumstances, and is the knowhow that should be passed down as wisdom and ingenuity of the design.

The consideration of “state” in designing, leads the the strengthening of the company’s design. Product design takes the role of developing new products and also to construct a knowhow of the design. Consequently, by creating a document on the knowhow of the

“state” obtained through product design and passing it down, will become an effective means to raise the design abilities of the company.

Currently, improvement of product development technology that cannot be imitated by other companies is being questioned. Under such conditions, it is an urgent task for the companies to construct, pass on, and accumulate their own knowhow of the design as a “state”. Then, the designing of a new relationship of the product and its circumstances is expected by employing the accumulated knowhow.