Design Engineering

(1) Aims

The purpose of design engineering is supporting, guaranteeing, and creating product development. We believe that it is one of missions of design engineering to predict the future as correctly as possible based on the past changes of product development in the latter half of the 20th century, though we know that it is difficult to predict products in the future (in 2025, for example).

(2) Social and technical needs

When we consider how product development has changed from the latter half of the 20th century and how it will change in order to predict the design engineering in 2025, needs-oriented innovative portable audio products were produced and propagation of semiconductors since then changed their quality further, for example. Notebook PCs were produced following word processors and have had wide applications in industries and homes. Automobiles aim at low fuel consumption and hybrid systems to reduce influences upon environment. It is possible to develop hybrid systems by utilizing existing motor technology relatively early. Like this, epoch-making products were produced timely in the portable audio and car industries. On the other hand, home electric appliances are lack in remarkable products, though they show continuous progress toward higher performances, higher efficiency, and advanced functions. We must say that elements (technologies) and concept for leading product development is insufficient.

(3) Future directions for determining key mechanisms and parameters

We try to classify designs to clarify the direction in which design should progress by 2025. We correlate designs with the Kano model and classify them into I, II and III as shown below:

I. Must design (corresponding to the “Must-be quality” in the Kano model)
   Design must provide a design warranty. Many trouble occur if Must design is ignored. This is the basis of design, though it can hardly be evaluated and coped with properly.
II. Better design (corresponding to the “One-dimensional quality” in the Kano model)
   This can be coped with easily, since it may be evaluated clearly. It finally results in cost competition. This is the design for improving efficiency.
III. Delight design (corresponding to the “Attractive quality” in the Kano model)
   Design in which design concept is the most important. Many hit products were produced in this field. The point is anticipating the technological and customer needs, though they are likely to consider this as creative design.

(4) Contributions to society

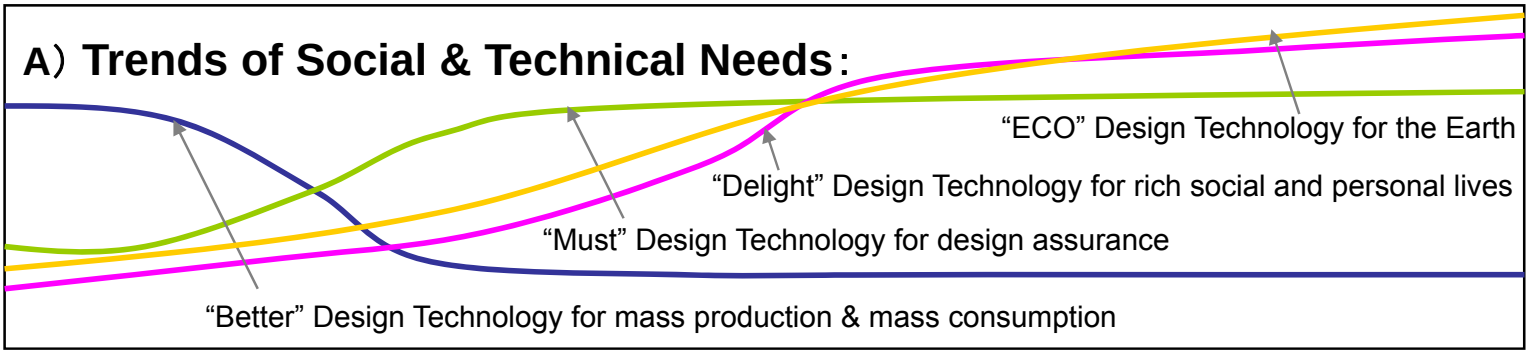
Three products and design technologies correspond to three designs: Better products that support mass production and mass consumption will be sorted, Must products providing a design warranty will be the main stream in the near future, and Delight products that make us happy will be needed in the future. To achieve such development, the design technologies must change from the traditional individual technologies into unification technologies (true computer-aided design and true system engineering).

Roadmap to realize CO_2 reduction by Design Engineering

2009年度版

2005—	2010—	2015—	2030—

A) Trends of Social & Technical Needs:



B) "Better" Design Technology:

Limitations of local optimization, so will and choice of current design technology

- 3D-CAD: Drawing
- Designing CAD
- CAE for verification
- CAE for design
- Optimization
- Optimization for design

→ Computer-Aided Design

C) "Must" Design Technology:

Realization of Systems Engineering applying full mechanical engineering

- DfX methodology
- DfX for design
- Infrastructure
- Human centric design
- Design process modeling
- Design process optimization

→ Systems Engineering

D) "Delight" Design Technology:

Total design applying not only mechanical engineering but other engineering and science

- Design theory concept
- Design theory application
- Generalized design theory
- Text baser KM
- KM application for shape
- KM for design
- KANSEI design method
- Integrated KANSEI information
- Integration of KANSEI & design

E) "ECO" Design Technology:

System design in harmony with the Earth

- Simulation technology
- **LC design**
- Reduce design technology
- LC design tech.
- Scenario for sustainable society
- **Sustainable design**
- Sustainable design technology
- **Recycling design**
- Recycling design technology
- **Energy & resource saving design**
- Manufacturing system
- Manufacturing by minimum resource
- Energy saving technology