# FORM SYNTHESIS: INTERACTIVE FUNCTIONS AND AESTHETIC ORGANS IN THE FUNCTION-MEANS TREE

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The greater aim of this work is to bridge the knowledge gap between the traditional engineering and industrial design disciplines by improving their means of communication. We believe that one key issue in doing so is to clarify and make visible the relations between functional descriptions on one hand and (form) concept descriptions on the other. In doing so, one must treat both hierarchic and spatial function models and form. The approach in this article is to explore how functionality related to industrial design (aesthetics, semiotics, ergonomics), i.e. interactive functions, logically fit within the frames of an earlier introduced product information model for spatial and hierarchic functionality, i.e. the function-means tree and organ model[‡].

**Figure 1.** Schematic overview of the information model.
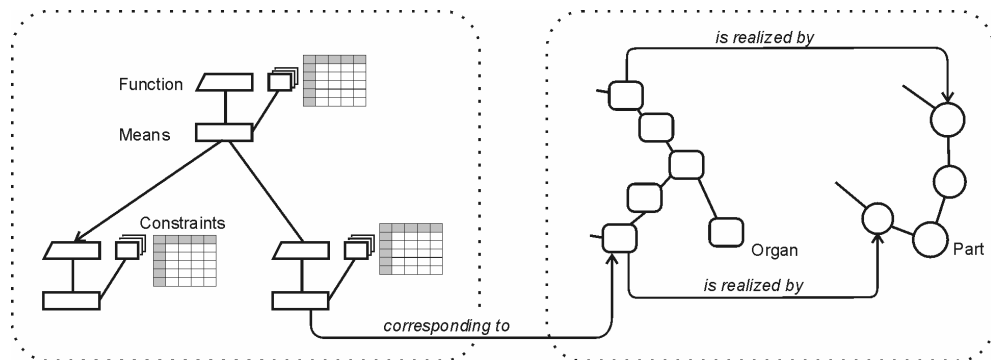
Semantic functions (descriptive, expressive, exhorting, identifying) are focused especially in this work. Machine and aesthetic organs are treated in relation to form elements, detailing and concretization.

Contributions

Representations of form are in this work suggested to be divided into symbolic and iconic (showing spatial entities).

**Figure 2.** Symbolic and iconic representation of part structures (disc brake and drum brake)
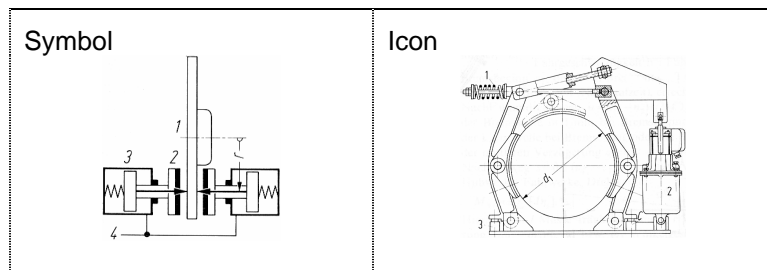
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Detailing and the use of form elements. Form elements are used here for describing means (if these are organs) and constitute one cause of further decomposition, since these elements need to be realized physically.

Figure 3. Connection between the hierarchic and spatial representations
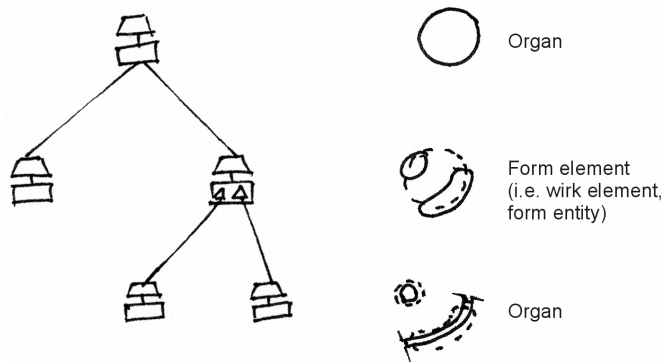
Modelling form entities. The interdependence between organ detailing and conctretization can be described by the use of form elements. To avoid accidental handling, one might wish to create an item which should repel (i.e. "Don't grab here!"), a property which the sharpness and height of the form of this item intend to express. The edge and surface organs then realize these sharpness and height entities.

Figure 4. Hierarchic relations on a pitch protection hoop.
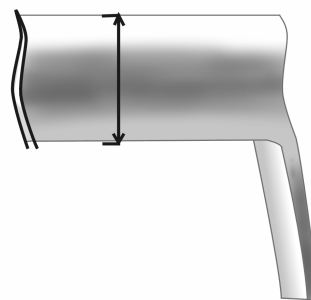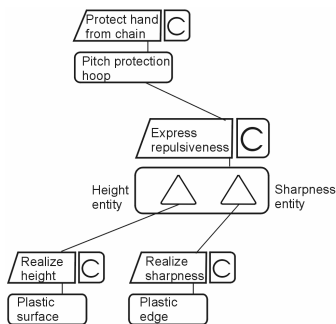
Two different occurrences of aesthetic organs in a function-means breakdown. Following the characterization of functions stated above, there exist communicative functions which do not logically fit into the main function-means tree, since these can not be related to the causal user-product breakdown. It is suggested in this work how these can form parallel function-means trees, having no relation in between them.
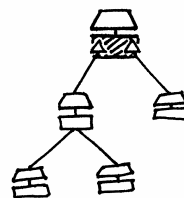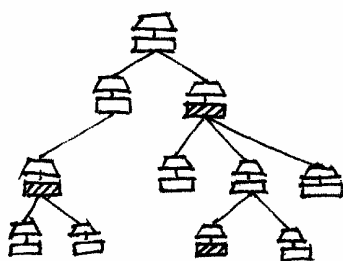
Origin of an organ/means which demands a communicative function.

Origin of an overall statement of a communicative functionality.

The degree of concreteness possible for form entities depends on the concreteness of the part structure. A form entity can be described by a simple line in an abstract case and as a row of holes in a more concrete case.