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DESIGN FOLLOWS TECHNOLOGY

ALEXANDER UHLIG

Duisburg Essen University
Department of Design Technology
GERMANY

alexander.uhlig@uni-due.de

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Abstract

Only the combination and interaction between [illegible] material, technology and function enable good art and design. Material and technology have extensive [illegible] of any design process. That means in this context it is important to be aware of the material properties and based on that of the [illegible] of design. The design process is close [illegible] to the material properties, technology and physics.

We use our hands to touch, feel and design – interactive processes which include our brain. Compare building the structure of a stone, for example [illegible] touching and feeling the stone with our hands. The hand is not only [illegible] the other hand does not design.

This article ought to deal with the subject of the interdependence of design and material.

"Form follows function" is the well-known famous thesis, it appears to be tautological.

Sullivan means with this thesis, published 1896 in his article "The tall office building artistically considered", that the form, the design of products should be derived from its function and type of use. In his opinion, wherever it is possible, it should be possible to derive the form from the function.

"Whether it be the sweeping eagle in his flight, or the open apple-blossom, the toiling work-horse, the blithe swan, the branching oak, the winding stream at its base, the drifting clouds, over all the coursing sun, form ever follows function, and this is the law. Where function does not change form does not change." [1] But before the form can follow function, the [illegible] must follow the hand and the materials must follow the hand. [illegible] Kant: "The hand is the visible part of the brain." [2] Left hand or right hand, "fine" hand or "blunt" hand [illegible] the brain [illegible] controlling the design [illegible].

Only the combination and interaction between [illegible] material, technology and function enable good art and design. Material and technology have extensive [illegible] of the [illegible] design process. That means in this context it is important to be aware of the material properties and based on that of the [illegible] of design. The design process is close [illegible] to the material properties, technology and physics.

We use our hands to touch, feel and design – interactive processes which include our brain. Compare

Bending the structure of a stone, for example, is achieved by touching and feeling the stone with fingers and hands. The hand is not of human design but that of nature. Nature, on the other hand, does not design.



Figure 1. two hands. Photo form123rum.com

It is ***gestalt*** *in and of itself, part of evolution. Although the hand is being increasingly replaced by machines in the design process, we must consider that machines cannot replicate human perception and the hand's sense of touch.*

Many products that are man-made need two components in order to function. Oftentimes the very name of the product makes these two component clear, e.g. football = foot + ball, water boiler =water + boiler, hand brush = hand + brush.



Figure 2. dust-pan and hand-broom, 1969, Ellermann-design.com
Photo Ole Akhøj

The word that describes the use of the product is almost always in the secondary position, while the word that represents the pertinent components inseparably involved in the use almost always occupies the primary position.

When one designs a product, for example a hand brush, its physical manifestation may be more than just a reflection of its intended use (to clean). The product may also be designed to provoke a sense of aesthetic approval and acceptance. "The whole is more than the sum of its parts." [3]

In order to progress to 'the sum of its parts', design technology is concerned with the characteristics of materials and physics involved in the design process which facilitate a more comprehensive use and awareness of the designed object.

Therefore, in order to achieve the maximum amount of design possibilities, we at the University of

Duisburg-Essen focus on the following question: How much freedom of design does a material offer a designer? How does, e.g., a red marten brush work? What is red marten hair like in nature and how is it constructed? How can red marten hairs be made into paintbrushes so that these hairs make it possible to predict the results of use on diverse surfaces when paired with pigment and water? Here, concise knowledge of the structure of the hair, pigment, water and paper are required – only then can one begin to count on certain results and increase the potential of design. In connection with creativity, brain and hand, technology can, in such a way, further the design process and in so doing offer more freedom for artistic experimentation. In such a manner new, predictable (and also unpredictable) heights of quality can emerge. An important precondition here is detailed knowledge of the materials and physics.

In this context scientific experimentation is a helpful approach as it allows for the research and discovery of new characteristics of materials, which, in turn, increase the freedom of design. Technology, in this case knowledge of techniques and the characteristics of materials, is the key to artistic and functional design. This knowledge develops and expands the components of aesthetic perception in terms of form, color, materials, structure and texture.

Through cooperation with cultural history (beyond the scope of East/West), presentation methods, didactic concepts and a development of the sense for aesthetic components, technology is the central starting point for successful design that can be accepted regardless of the culture in which it is used.

Knowledge, e.g. of the technique of the Ghiordes knot, makes design possible that is founded especially on the basis of this knotting technique. Other knotting techniques therefore lead to other structures and design.



Figure 3: Ghiordes - Asfi - Rifm. Palastteppiche.com

Isidore of Miletus knew the composition of Opus caementitium [4], "Roman concrete", and could therefore design the large cupola of the Hagia Sophia. A technology imported from West to East; the large cupola, as design, exported from East to West. Sinan was only able to realize his most wonderful constructions because he knew the static and technological basic requirements and the characteristics of the building materials. Technological advancement, curiosity and the desire to experiment have often contributed to an expansion of the design spectrum.

In the mid-19th Century, Michael Thonet's discovery, the steaming of wood with hot water, made it possible to bend wood. In this way Thonet was able to save materials and money, as at this time wooden arches were traditionally still being sawed out of large wooden blocks.



Figure 4. Thonet's Bopfet chair and armchair, 1880
Photo: © thonet.com

Today, form does not only follow function or a strict financial budget. Knowledge of the raw materials, the substance of the product as well as its technological and physical characteristics are much more important for the originality and the artistic content and viability of each object. On the basis of a sound knowledge of the relevant materials, an appropriate joining technique of the natural materials and/or of existing semi-finished products may be developed.

These are the skills that we are cultivating in the design technology degree program at the University of Duisburg-Essen.



Figure 5. Shoulder bag. Materials: cotton, zippers, key-rings, belt. It is possible to combine as much small bags as desired. Student work of Mathias Schneider, 2009. University of Duisburg and Essen, Design-Technology, Univ.-Dr. Alexander Uhlig, Prof.i.V. Photo: S. Bruggen



Figure 6. Shoulder bag. Materials: transparent perlon, frames, cotton, screws, leather, textile cord. Student work of Corinna Schlarb, 2009. University of Duisburg and Essen, Design-Technology, Univ.-Dr. Alexander Uhlig, Prof.i.V. Photo: S. Bruggen



Figure 7. Shoulder bag. Materials: bottling cap, transparent flexible tube, zip, key-rings, textile cord. Student work of Sona Bruggen, 2009. University of Duisburg and Essen, Design-Technology, Univ.-Dr. Alexander Uhlig, Prof.i.V. Photo: S. Bruggen

Sources

1. Louis Sullivan: *The tall office building artistically considered*. In: Lippincott's Magazine of Popular Literature and Science, Philadelphia, March 1896
2. Immanuel Kant 1724-1804, German philosopher during age of enlightenment
3. Aristoteles (384-322 v.Chr.) Methaphysik VII 17, 1041b
4. Opus cementum consists of stones, sand, chalked limestone, Pozzolanes (tones with silicic acid) and lime hydrate, which when mixed with water become binding.

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