Materialdesign

An interdisciplinary material-based design approach

Markus Holzbach

University of Art and Design
Offenbach, Germany

Abstract

The Institute for Materialdesign (IMD) understands itself as a hub for inspiration – analog and digital methods are combined - along an interdisciplinary context - to create cross-material innovations. Ideas are frequently generated through the characteristics of the material itself, its qualities and its possibilities as well as its limits. Through the speculative combination of materials, transferring traditional processes of fabrication into innovative contexts, surprising results are achieved. Experimenting, questioning and researching become ever more important in an interdisciplinary context – especially at art college. Many of the student's design came about through playful investigation, which also involved unconventional routes. The primary concerns were getting to know materials, structures and systems, technical, physical and chemical characteristics, and a feel for sensory qualities. This interdisciplinary experimental approach and freedom of creative research is a characteristic of the IMD's approach to teaching. Here, research-driven projects stand alongside object-related product design. Many of the works addresses the relation between man and material. The extended understanding of the material shifts toward the role of the actual object. This new role of materials also comprises the intersection of nature and artifact. Materials are brought to life through layering and combining natural and synthetic elements and blending in digital techniques. The borders of perception are erased and the material itself is redefined. Designing with materials creates a new context between art and science. Material-centered design opens up the field of design to new possibilities and creates a broad space of conceivable tasks.

In the following text we want to present the experimental and material driven approach of the IMD alongside selected student works from the last two years that are located in the areas of interaction, generative design, adaption, digital fabrication, bionic and form generation.

Keywords

Materialdesign; cross-material innovations

 Holzbach, M. (2017). Materialdesign: An interdisciplinarymaterial-design approach. SPOOL. 4 (1). doi:10.7480/spool.2017.1.1916

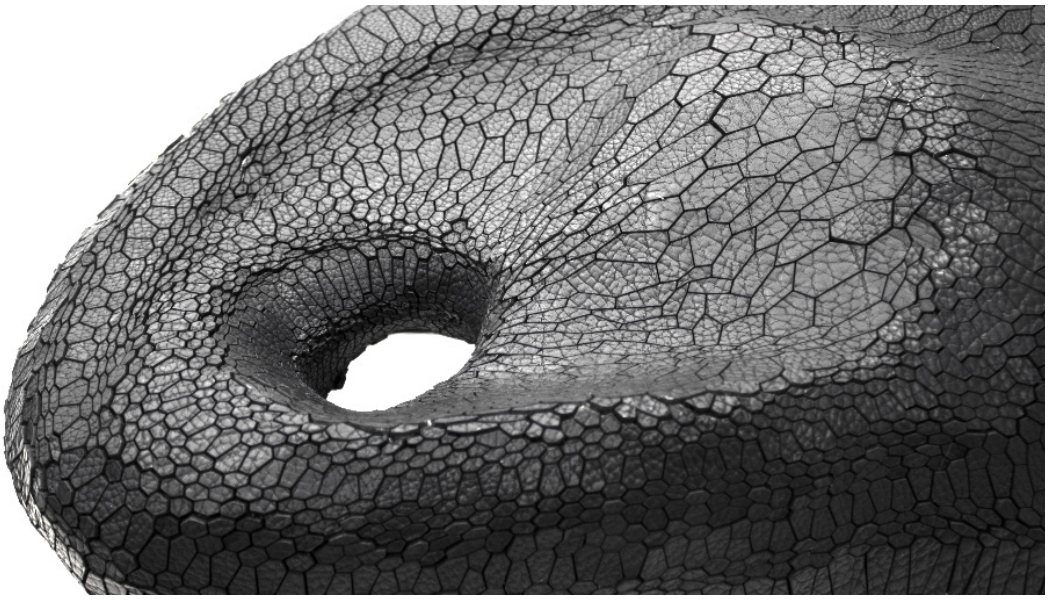

FIGURE 1 'Parametric Skin' by Johannes Wöhrlin, IMD

Parametric Skin

Parametric Skin is a structure that enables us to experience leather in a new way. The design superimposes a graphic, computer-generated honeycomb structure on the natural micro-structure of leather. This artificial structural pattern changes the natural appearance of leather by exaggerating it, in particular in the transition from the two to the three-dimensional. The digital net structure that Parametric Skin is based on is made by parametric programming of the organic leather grain. This is why it adapts to any surface shape. The distortion of the structure emphasizes the edges and specific areas of an object. Using several such 'informed' leather areas, complex spatial objects without no seams can be made. The leather gives objects such as these, inherent stability though they remain flexible.

Intuitive Brain

In cooperation with BMW AG

Functional surfaces are reinterpreted as an aesthetic medium of communication and of information. How can materials and experimental research help to achieve more tangible and intuitive interfaces? Through combining creative and scientific research with human-centered design new functionalities are created. The main priority was to layer physical materialities and interaction. Experimental series, material patterns as well as physical and digital processing lead to a broad variety of projects. Interactive mock-ups where developed to enhance feasibility and perception.

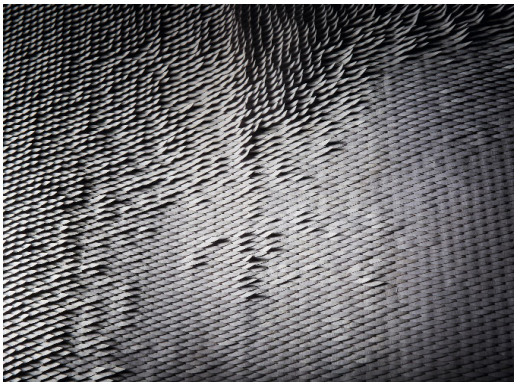

FIGURE 2 Interactive Wood' by Johannes Wöhrlin, IMD

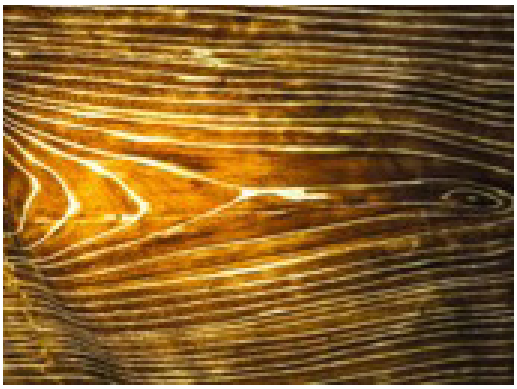

FIGURE 3 'Transformative Paper' by Florian Hundt, IMD

1 Transformative Paper

The anisotropic material properties of moisture expansion in industrially produced paper and natural wood are similar and mostly tried to be avoided. Combined with other materials though, the expansion of the paper reveals interesting effects, which can be used in rather atypical contexts.

The project is a layered structure, which reacts to short-term environmental conditions, morphing into various states. Thoroughly dry, it creates a tactile and exciting surface by raising the seperate segments. Exposed to minimal change of humidity it creates a gesture so subtle it is almost invisible, while it performs a vast transformation when it gets wet. Under the influence of rain the layers shape a closed surface and respond by glowing gently.

2 Interactive Wood

Wood is perceived as a high-quality material and creates a surface with anisotropic properties and individual grain. Every piece of wood is as unique as a finger print.

In this project the aesthetic of the wooden surface brings light to the dark interior of the car.
The shimmering glow of the wooden grain improves the orientation while driving. Through touching the surface, the light is activated on-spot, creating a gesturally controlled functionality. After activation the light is dimmed over time and the grain emits a soft light for a further while. Re-narrating the connection between the hand and the material, the glowing surface resembles a path which is expires after time.

3 Magnetic Fabrics

The goal of this work was to explore new limits of fabrics, to experimentally further develop familiar features of them through unexpected modifications.

To create these modifications different aspects of magnetism are incorporated into traditional fabrics. The combination of methodically arranged magnetically active and passive components causes a mechanical accumulation of elements and thus a dynamic rearrangement of the entire medium. Over and above the original intention to set the fabric in motion, a surprising set of innovative aesthetics was achieved. The work illustrates the relationship between media and shape by unique motion sequences.

Ceramic Woods

Ceramic woods, which is short for ceramics made from wood, is the result of a material-inspired process which addresses the question of the composition of contrary material properties. Combining the technology involved in ceramics production and the properties of natural wood produces biomorphic ceramics. This extraordinary material preserves the structural makeup of plants in ceramics. Each variety of timber is different and so each of these ceramic objects is a one-off. All of the lumbers have their natural blueprint of carbon compounds in common. When subjected to great heat, these carbon structures com-bine with silicon to produce silicon carbide ceramic. The combination of plant structures with ceramic properties opens up previously un-tapped potential for design. In biomorphic ceramics, the results of natural evolution can be used to enhance technological systems.

FIGURE 4 'Ceramic Woods' by IMD

FIGURE 5 'Magnetic Fabrics' by Lilian Dedio, IMD

Acknowledgements

This research is from the Institute for Materialdesign IMD at the University of Art and Design Offenbach