TEXT 6

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P.141–155

THE POTENTIALITY OF SWISS INDUSTRIAL DESIGN

We Swiss industrial designers have to engage with the topics of our time and rethink our own roles. The contradictions and challenges to which industrial design has to find answers have long been obvious, as it is itself part of the world economy that does considerable damage to the environment and to humankind. We have to renew our basic principles, primarily for the following reasons:

1. Swiss industrial design is under pressure because manufacturing companies have successively been leaving Switzerland. This does not mean that we are not needed. On the contrary: research, development and consulting are areas in which it is imperative that we should make a greater contribution.
2. Industrial design is part of our environmental problem. With the appeal generated by its functional aesthetics, often in conjunction with effective marketing, industrial design has often helped to stimulate too much demand (and still does), boosting consumption and serving purely commercial interests.
3. Objects that are urgently needed and socially relevant are not being produced, due to profit expectations' being too low (in this text, we generally understand "objects" as being either things, services or virtual spaces).
4. New technologies are changing production, trade and research. Digitisation, robotics and artificial intelligence are revolutionising just about every field. The connection between analogue

physical objects and algorithmic interaction touches on ethical questions that we spend too little time discussing.

5. Creating state-of-the-art innovations and solutions demands a deeper engagement with the research findings of other specialist fields that are relevant for us.

We are convinced that industrial design has what it takes to react to these challenges. Paradoxically, we recognise our opportunities too seldom, and thus squander them too frequently. And yet industrial design is in a position to help sustainable, socially relevant and technologically innovative, state-of-the-art projects to achieve success, as long as we take our qualifications seriously. This ability is what we aim to demonstrate in the following reflections. We will begin with the professional training of industrial designers, something that we in Zurich believe can provide a great leveraging effect.

WHAT WE KNOW AND WHAT WE CAN DO

What knowledge do we possess as industrial designers, what methods and competences?

FUNCTIONAL SYNESTHESIA

In general, an unerring mastery of aesthetic functions is one of the core competences of design. We have studied the beauty of form and colour, and understand how to introduce these into objects.

Even if industrial design is in many cases still charged with carrying out mere styling, this view belongs to the past, as reality is far more complex than that. In order for an industrial product to win approval, our field has developed a list of aesthetic criteria whose scope is constantly expanding as a kind of synesthetic catalogue with multiple interlinkages. The inventory of the design tools that have to be connected to each other has essentially remained the same to this day: form, material, surface, colour, construction, function, context and technology.

However, each of these individual areas is constantly differentiating itself inwardly, and has to be adapted to the demands of the project at hand. For example, digitisation alone is bringing forth new variants of designable surfaces—such as tactile surfaces for fingertips and haptic surfaces for the whole hand. Digital manufacturing processes also offer a whole series of new possibilities for formats and construction: mass customisation, collaborative development processes (co-creation), on-demand production independent of location, the construction of prosthetics that can be controlled by chip implants, and the use of an increasing multiplicity of materials from which we can choose the most appropriate on a case-to-case basis, according to their synesthetic characteristics. Then there are mechanical, physical, technological, economic, cultural and resource-relevant aspects too.

The more differentiated and suitable the tools and the procedures, the more effective the design and production. However, to what end, with what intention and with what con-

Gerhard Heufler, Michael Lanz and Martin Prettenthaler, *Design Basics: Von der Idee zum Produkt,* 5th ed. (Sulgen: Niggli, 2019).

sequences we may be able to invoke this effectiveness is something we have to consider precisely, and assess from an ethical standpoint.

CRITERIA SPECIFIC TO INDUSTRIAL DESIGN

The above-mentioned criteria provide quality assurance when designing objects. For example, an object may be supposed to demonstrate optimum handling, service, usability, controllability, ergonomics, safety, care, maintenance, durability, reparability, and noise levels. The transport sector, however, has fixed parameters: for weight, means of transport, packaging, transport frequency, storage volume, sensitivity, protection, logistics and safety. Ensuring the best possible storage facilities at the place of use also demands qualities such as foldability, stackability or connectability, and special hygienic conditions too. And when later disposing of an object, we have to adhere to constraints such as separability, recyclability, combustibility and compostability, along with lowering its ecological footprint. This list of criteria can expand considerably during the development and production process.

In addition, our design tools are a product language with its own syntax. How precisely should one specify how to use a device optimally? By clicking, swiping, pressing, licking, blowing or with gestures? How should it be constructed—should it be additive, integrative or integral? What specific, project-dependent contextual criteria should one consider—such as social, legal, cultural, medicinal, religious, political or gender-related criteria—given that projects take place at different places under different institutional and organisational conditions that should also be explicitly shown in the final result?

Nor can we simply use materials, surfaces, colours, functions, technologies or whole objects in a naïve manner, because their significance and how they are assessed will change continually, depending on the zeitgeist.

Our aim here is to make it clear that we industrial designers have at our disposal a large number of criteria that have an express impact on human beings and on their senses and sensibilities, their cultural environment and their handling of objects—which makes us very different from engineers and other experts involved in development projects.

ACHIEVING BALANCE AND PRIORITISING

Simply working through these criteria with a checklist will not provide us with any attractive solutions, however. What's more, such criteria often come into competition with each other in the course of a project, and are subject to an increasing number of variants. Only a subtle process of prioritising and balancing out the fundamental focal aspects of a product or service, filtering and assessing them, can enable us to determine what is truly specific to the object. Only once we have determined our emphases can we find out what is coherent and consistent. This means that the conceptualisation stage is a trial of patience that requires stubborn persistence and the art of arguing convincingly, if one is to keep one's team and decision-makers on board throughout the entire process.

OBSERVING AND PERCEIVING

We industrial designers need content from the outside world. To this end, we employ our own powers of perception, but we also take on suggestions and outcomes from the natural and technological sciences, and whatever else we may need to create our designs. We are "hunters and gatherers" of structures, principles, constructions, typologies, transformations, mutations, processes, contexts, theories and concepts. These encompass a knowledge of the history and the theories of our own discipline, its protagonists and achievements, objects and challenges, ideologies and fallacies.

Yet our discipline has perhaps paid too little attention to the fact that designing to achieve humane results must be based on the precise observation of human beings themselves, from the perspectives of cognition, psychology and the social. We should increasingly adopt an ethnological perspective, from which we may be able to observe people, their behaviour and their approach to things—both as individuals, in groups and en masse. Our efforts to achieve empathy should always begin anew, and our scenarios should be based on the world as it really is—because even alternative worlds only become meaningful on the basis of such observations.

The design theoretician Wolfgang Jonas succinctly summed up the fact that design is a process "that uses *knowledge* in order to generate new forms and *new (forms of) knowledge*." Wolfgang Jonas, "Schwindelgefühle: Design Thinking als General Problem Solver?," in *Entwurfsbasiert Forschen,* ed. Jürgen Weidinger (Berlin: Universitätsverlag der TU Berlin, 2013), 47 (translated from German).

In 1991, Otl Aicher explained that "the virtue of science can also be transferred to design. The virtue of science is curiosity, not knowledge […] the scientist […] learns to ask questions and is trained to find things […] that is also the virtue […] of the new designer." Otl Aicher, *Die Welt als Entwurf* (Berlin: Ernst & Sohn, 2015), 59 (translated from German).

CREATIVITY—LATERAL THINKING—TRANSFER CAPACITY

Parallel to our research, our research, many of us develop particular fields of interest, and we take delight in subjecting all we have gathered to uninhibited combinations. *Transfer*—the title of a book published in 1999 by the designer trio Erni, Huwiler and Marchand, is very apt here, as it anticipated the characteristic that has meanwhile become a fundamental differentiating factor between the creative, lateral thinking of humans and so-called "artificial intelligence." According to the biologist and brain researcher Gerhard Roth, humans are able to transfer and link different contexts and otherwise unconnected things in an inspired manner, whereas "computers … are today already superior to human beings in everything that can be understood by algorithms, formulated precisely, and determined in exact steps."

For us industrial designers, that is good news. The specific procedures peculiar to our profession mean that we have no reason to fear that our jobs will be rationalised away and assigned to artificial intelligence. As lateral thinkers, we bring content together in unusual ways and achieve more than merely processing calculable procedures and routines.

The Japanese industrial designer Naoto Fukosawa is among those who insist "that good designers ought to be good observers. Like ethnologists, they should perceive their own social environment with that defamiliarised view that can also discover what is special in seemingly everyday actions." Martin Ludwig Hofmann, "Gestaltung als sozialer Katalysator: Entwurfsstrategien für die Herausforderungen der Zukunft," in *Der menschliche Faktor: Wie Architektur und Design als soziale Katalysatoren wirken* (Munich: Wilhelm Fink, 2012), 32 (translated from German).

Peter Erni, Martin Huwiler and Christophe Marchand, *Transfer: Erkennen und bewirken* (Baden: Lars Müller Publishers, 1999), 7.

Gerhard Roth, "Künstliche Intelligenz: Menschliche Kreativität ist unersetzbar," interview by Markus Brauer, *Stuttgarter Zeitung*, February 15, 2019, accessed September 20, 2029, http://www.stuttgarter-zeitung.de/inhalt.kuenstliche-intelligenz-menschliche-kreativitaet-ist-unersetzbar.0a72b1ed-c47d-4594-8918-3772ad6e7378.html.

PROCESSUAL MATERIALISATION

Regardless of whether we are at a workbench engaging directly with the material, or at a computer screen modelling our interim results with rapid prototyping, one of our other strengths is that we need the corporeal: we want to be able to "touch" our ideas, as it were, in order to critique them.

This is why all training in industrial design begins with the urge to transform a fleeting idea into something concrete, material and constructed. We do this in a three-step process. The analogue and digital tools used for this begin with a two-dimensional visualisation (the sketch, drawing, flow chart), followed by the three-dimensional model (the functional, formal and utility models) and then the prototype, the pilot series.

Visualisation—model—prototype: this is the series of concretisation steps that has proven to be an efficient tool of perception, comparison and communication, and above all of project management, both in multidisciplinary projects and in projects with several partners. Whereas in (abstract) terms all participants in a project are talking about the same thing, are presumably of one mind and yet can still be talking about different things, the visualisation and model only allow for a single possibility. Disagreements that are not properly formulated, assumptions of agreement, or different notions among the team members of

Buxmann, an expert in artificial intelligence, insists that robots possessing artificial intelligence can thus far only carry out routine, standardised processes. "Artificial intelligence is the result of a specific utilisation of algorithms and data." Peter Buxmann and Holger Schmidt, eds., *Künstliche Intelligenz: Mit Algorithmen zum wirtschaftlichen Erfolg* (Berlin: Springer, 2019), v.

what a project should be, usually only become evident during the process of two-dimensional or three-dimensional concretisation.

Here, highly fruitful project management effects can make themselves known through two fundamentally different functions of the model. A model may serve to further develop an as-yet embryonic concept (a project, an object or a scientific theory). In this case, as soon as the model is physically visible, the participants can discuss, clarify and rework their concept based on the model that now clearly stands before them. This process can last until the *concept* has matured properly. The model is then no longer valid, but has fulfilled its purpose of providing a concrete means of reflection. It is superfluous and can be disposed of.

Alternatively, the model can represent an object that still has to be manufactured. Now it is the model of the object itself that is improved by the team, step by step. Over several concretisation steps, different variants can be created, compared and assessed for their usability. In contrast to architecture, we can work with 1:1 models and try them out before they become a template for mass production. We can observe a model's real behaviour using test groups and can perfect it by applying the results of our ob-

Gui Bonsiepe, *Entwurfskultur und Gesellschaft: Gestaltung zwischen Zentrum und Peripherie* (Basel: Birkhäuser, 2009), 32f. With his concepts of visuality, vividness and clarity, Gui Bonsiepe also explicitly emphasised materialisation as a special tool of design.

The philosopher and science theorist Jürgen Mittelstraß regarded construction as the "acid test of creativity," situated between discovery and understanding, between invention and development, and between development and its realisation in objects. The discoverer discovers things in nature that he understands through analysis, such as the flight of a bird. The inventor invents anew what the discoverer has discovered and understood. He invents a new technique of flying. The developer develops the inventor's invention, turning it into a product. He develops an aeroplane. Jürgen Mittelstraß, *Wissen und Grenzen: Philosophische Studien* (Berlin: Suhrkamp Verlag, 2001), 155f.

servations. These processes can be repeated as often as necessary until the model has become the finished prototype; this then marks the end of the development process.

INDUSTRIAL DESIGN IN ZURICH

Why is Zurich a location that offers special opportunities for Swiss industrial design?

RESEARCH AND DEVELOPMENT

Zurich is becoming increasingly important as a centre of research and development. This is of use to us, because we industrial designers think constructively and are enthusiastic about the latest engineering achievements. Training and professional practice are no longer conceivable without artificial intelligence. Zurich is exemplary in this respect, because it offers many technological research centres in our immediate vicinity.

In order for research and development to become self-evident in practice, our bachelor programme already introduces development projects from outside universities that involve basic research. This enables students to absorb innovation and to devise solutions to problems in multidisciplinary teams. Together with other students, researchers and trained experts from other fields such as the engineering sciences, biology and medicine, students at the Zurich University of the Arts (ZHdK) learn that a project begins with the joint development of a concept. Developing this concept independently and mastering the initial challenges of different communication, sequencing and strategic processes are all well-established components of our curriculum.

In recent years, many projects have been conducted as collaborations between the Design & Technology Lab of ZHdK Industrial Design and the ETH Zurich Department of Mechanical and Process Engineering, and have then been been pursued further in start-ups and spin-offs.

NEW BUSINESS FIELDS – ENTREPRENEURSHIP

Zurich offers another fundamental locational advantage. In 2019, the European Innovation Scoreboard of the European Commission assessed the metropolitan region of Zurich as overall the most innovative in Europe, thanks to the ETH Zurich, the University of Zurich, other institutions of tertiary education, research institutes and numerous start-ups and spin-offs. These universities, with their institutes of research and development, are closely allied with the start-up cluster; together with the agile, well-funded foundations and sponsors located in the region, they provide the initial impetus for the businesses set up by our graduates. There is a high degree of commitment to new business models that can make their way on the market.

We ZHdK industrial designers have long been a part of the innovation scene in Zurich, in part thanks to our established collaborations in teaching and research, but also

See ZHDK Industrial Design, Design and Technology Lab, http://www.designtechlab.ch.

“Innovationsanzeiger 2019: Deutschland europaweit auf Platz 7, Europa überholt die USA,” press release, European Commission, German office, June 17, 2019, accessed September 15, 2029, http://ec.europa.eu/germany/news/20190617-innovationsanzeiger_de.

thanks to the sheer joy in the act of development amongst our industrial design students in particular. This helps them to recognise the relevance and future perspectives of our professional field.

Technological innovation, social relevance and sustainability are key areas of our training. In 2019, for example, these led to the spin-off social project "Circleg," set up by two ZHdK graduates in industrial design. Using an innovative procedure, plastic objects collected locally are turned into prosthetics for people in Kenya and other African countries. These are affordable, individually adjustable, and allow the wearer to carry out all-important movement sequences.

CONSULTING

The third professional field in Zurich that is both linked to industrial design and relevant for our graduates is consulting. This is not a particular focus of the training programme, as it only becomes important after many years of professional experience. Nonetheless, numerous experienced Zurich design offices have been able to establish themselves successfully on the international consulting scene, which offers exciting long-term prospects for our students. To this end, Zurich as a technology location is ideally positioned at the heart of Europe and its networks.

TAKING ON PROJECT MANAGEMENT

Our materialisation processes have proved to be efficient management tools in development projects. Whereas the engineering sciences, for example, are primarily concerned with optimising technologies, industrial design fulfils the highly complex task of bringing together different elements. In 1989, the London design theoretician John Walker summed up industrial design as follows: “Perhaps the unique ability of the designer is to synthesize.” Industrial designers embody “the man in the middle.” Industrial design can mediate between the manufacturer and the public during projects, linking and binding “several to become one.” To this end, industrial designers are compelled to find a middle way between their own ideas and the demands being made on them (which can often result in mutual blockages)—and they already have to do this at the conceptualisation stage. Above and beyond this, our aesthetic tools fulfil a didactic function, especially when we have to encourage and convince sceptical users to build up a relationship of trust with technologies that are difficult to grasp.

This also means that we industrial designers should ask critical questions of the tasks we undertake, that we should initiate ethical discussions, and negotiate our own standpoints in the projects in which we are involved. This is precisely because societal, political and economic interests often contradict each other.

If industrial design succeeds in seriously upholding its own high standards as described above, actually holding the necessary ethical discussions and taking on a leadership role in development teams, then the core aesthetic tasks of design will succeed in achieving a new, political dimension.

John A. Walker, *Design History and the History of Design* (London, Pluto Press, 1989), 51.

DESIGN TOOLS ARE A PRODUCT LANGUAGE THAT HAS ITS OWN SYNTAX