Role of materials selection in establishing the identity of a product from its design

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Introduction

We live in a world full of images and perceptions, where reality is composed of materials. Stimulated by competition, the increasing consumption of products leads design professionals to expand their considerations and reflections on their use. Aside from being widely studied by science and materials engineering, the knowledge about the origin, properties and selection processes of materials can be useful in the design process and thereby provide professionals updated information about their technical characteristics and creative possibilities.

When designing a product, one should consider both tangible and intangible aspects. Tangible features are intrinsic to the object, that is, are widely recognizable and measurable by human perception: water transparency, stone hardness, and fire heat. Intangible features are dependent upon certain particularities of the process of perception, i.e., they are contextualized, contemporized and non-measurable: beauty, goodness, and ethics.

Thus, the appropriate choice of materials has an important role in this process both when it comes to assigning meaning and bestowing intrinsic characteristics. Accordingly, design is developed in a multidisciplinary way and, through the material, it searches for an identity with the product on the basis of differentiation and competitiveness.

Identity, perception and design

Identity can be seen as sets of characteristics associated with something, or someone, allowing for their recognition and perception. The way of conceptualizing identity can be understood as the result of experiences of human impressions from which awareness is created and then attached to characteristics relating to itself. Identity arises from the assimilation of an experience. The way these experiences are perceived undergoes particular forms of cognition. The process of cognition can be understood as a logical process, a reasoning.

According to Einstein (1982), reasoning begins at the reception of sense impressions from which images emerge. Images form sets, whereas each set demands new images which, in sequence, form new sets. When an image appears in multiple sets, it will then arrange decoupled sets, becoming an ordering element of reasoning and, thereby, defining a

concept. From this recognition concept we take science reality. This concept is in constant interplay between what is perceived and the perceiver. It is a particularly human subjective behavior. Therefore, identity can be seen as a particular logical process that creates a concept of recognition from a natural ordering of sets of perceived images.

The images perceived to create identity, on the other hand, can stem from tangible or intangible characteristics. They have contextual, contemporized and non-measurable dimensions. The logical ordering of tangible and non-tangible images of identity occurs through the concepts already established on the subject, which mediate them. These concepts are of individual, social, momentary and specific character, and define an identity that is intrinsic to the subject who drives the process of logical ordering of the object's identity.

The definition of identity entails a number of possibilities and can be seen as a process of recognizing, in our own identity, the relevant images perceived in the object. Thus, the same object can be defined in distinct ways by different individuals and societies. This leads us to question the concept of real identity and to consider that identity is inherently subjective. In this particular game of logic, tangible images can be consistent or not with non – tangible images. The creation of the identity of an object would be therefore a contextualized and contemporized confrontation between our particular identity and our impressions.

The role of design is to connect a problem to a possible – or already conducted – solution in an objective manner. This search starts from the identification and recognition of the problem, that is to say, from the perception of it by the designer. The imagination of design *a priori* starts from this perception. The problem can be understood as an object yet to be defined, with tangible and intangible characteristics. From its perception, the designer makes a parallel between the problem and the images of imagined possible solutions. This process is contextualized, once different culture systems have different perceptions. As an initial idea, the studied solution has its characteristics expressed by factors such as shape, color and materials. Each of these expressions stems from the association of images of the problem and the solution organized and synthesized by the logical process of the designer. The concept of solution is then conceived. In order to conclude the process, this idealized concept should be concretely established, i.e., it should be materialized in an object. Similar

to the imagined solution, the consummate object has its own images with tangible and intangible characteristics. These characteristics are expressed by dimensions like form and materials. Accordingly, materials, or more precisely, the identity of materials is seen to exert important influence on the design process both in the search for the solution as in the perception and reception of the consummate object.

Some considerations on materials

Materials are present in human's life ever since the early beginnings of our origins. In a holistic view, materials are a specific part of our existence and are part of something real. Materials are substances with properties that make them useful to the development and construction of various objects such as machines, structures, devices and products (Cohen, 1974). In the early days, humans used materials *in natura*. Materials were limited and could be even scarce, though, not always adapted to human needs. As mankind evolved, creativity and even the chance were used to surpass difficulties, whereas materials gained new characteristics and properties. In this evolution, the assemblage of different materials allowed for the production of increasingly complex products: starting from key stone, through stone ax/wood/leather, up to the sword; from the hut made of leaves to the pyramids and castles.

In the beginning, materials were identified and recognized on the basis of certain tangible characteristics. The diversity of materials was small and they had their characteristics and properties easily recognizable. Hence, each material corresponded to a different class of performance. Either a specific material was associated with a certain set of tested properties or a performance – derived from the experience of previous generations – was identified on it. The appearance of a new material or the modification of an existing material was slow. The history has therefore seen the association of perceived characteristics of a given material to its performance and measurable properties. In other words, a material had its identity perceived from its intrinsic properties.

The recent history has witnessed a huge development in the creation of new materials. The establishment of the science and engineering of materials in the mid-twentieth century led to the development of a plethora of new materials. Scientific studies have led to the development of

different natures, but which exhibited similar performance in certain situations. Technology allowed for associating, in a single material, properties hitherto incompatible. Both situations have generated new perspectives on the traditional forms of perception of materials by contrasting and frequently conflicting with their perceived historical identity.

By further increasing the complexity of the recent situation, the current society faces new challenges and expresses new desires. Sustainability, wellness and innovation are some of the raised matters. Materials of low environmental impact, intelligent and capable of sensing environmental impacts and responding to these changes in a predetermined manner are objects of study in the search for answers to our moment. Nanomaterials or nanostructured materials promise to revolutionize our technologies soon. The speed of the development and emergence of new materials makes increasingly broader and complex the perception and assimilation of their characteristics. The perceived images of materials and their selection now exhibit a challenge in the game of association between tangible and intangible by design.

Materials and design

As mentioned earlier, solutions and concepts are created in the design process and through the confrontation between a problem and hypotheses developed by the designer. These solutions are then transformed into an object put into practice. For achieving this, materials are required. According to Walter (2006), no product can be generated without materials. Therefore, the selection of proper materials is critical in the design process.

According to Dieter (2000), there have been more than 100,000 materials available for engineering applications in late twentieth century and, for a given project, and depending on specific characteristics, the number would be within the range from sixty to eighty. In this universe of materials characterized by large amounts and a number of possibilities, the designer is faced with a major challenge: which materials to use.

The exploration of possible solutions requires critical thinking, creativity and technical knowledge. The act of producing something new is not sufficient to characterize the design in its fullness. Kotler defines good design from the standpoint of the company: “a product with a good design is that easy to manufacture and deliver. For the customer, in turn,

good design is that aesthetically pleasing, easy to open, install, use, repair and discard (KOTLER, 2000).

An incorrect choice of the material can cause failure or increase the product life cycle costs. According to Ashby (2005), the project and the selection of materials can and should occur simultaneously, that is, one process supporting and assisting the other in a reciprocal manner (FIG. 1).

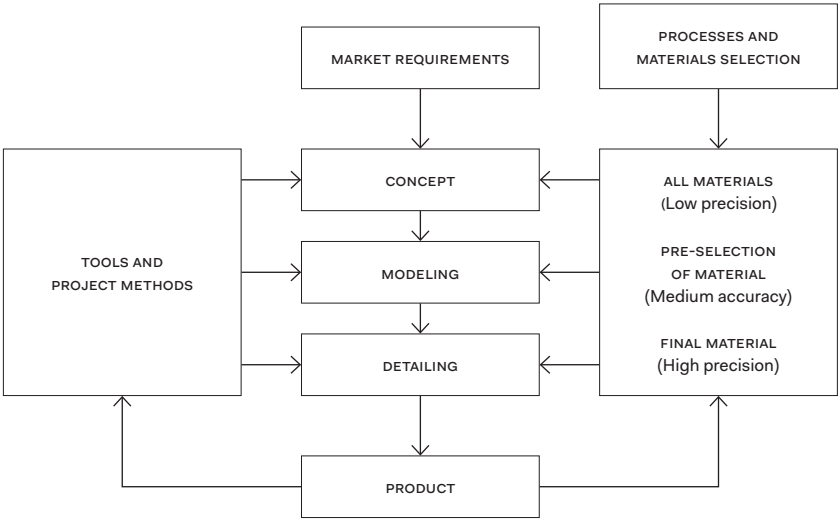

FIGURE 1 – Selection of materials and manufacturing process
Source: ASHBY, 1995, p. 3057, adapted.

The first major difficulty in the selection of materials during the design process is to associate its characteristics and properties, i.e., its image, to the objective demands of the problem. The second difficulty is to contemplate and prioritize these associated images that are often incompatible. Lastly, the chosen materials will influence the representations to be perceived in the product; in other words, they are part of their identity. According to Ashby and Johnson (2002), the personality of the product is created from aesthetic aspects, associations, and attributes of perception. As has been said, the personality or identity has tangible and intangible characteristics. Many of these intangible aspects are associated with historical and cultural meanings (Kroes, 2002). After a study involving

twenty professional designers, Karana *et all* (2008) have concluded that these characteristics are the first to be considered by industrial designers (Fig. 2). The identity and the perceived images vary in space and time and can be reassessed in light of new experiences that go through the knowledge obtained with new realities.

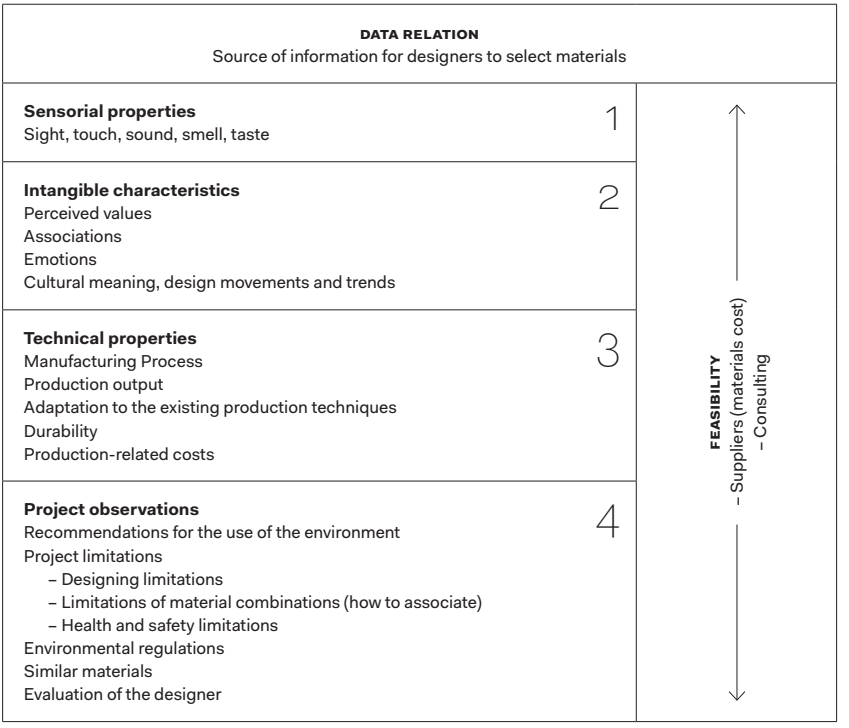

FIGURE 2 – Prioritization of aspects considered in the selection of materials by industrial designers
Source: Karana *et all*, 2008, p. 16.

As an object perceived by third parties, the product of design has concrete and subjective expressions. Thus, design is a language that expresses their identity. In this process it promotes new perception experiences where the design is both the end and the multiplication of such desire.

Materials are historically associated with their properties and performance. With technological development, these properties were broadened

and turned out to be used with emphasis on the traditional perception of the material or bringing new insights on its use. The established patterns of need and use by consumers were not altered, though. In an affirmative approach, design uses materials in such a way to emphasize its historically perceived identity. Products are the result of reaffirmation, by design, of characteristics of their materials, thus stimulating changes in behavior patterns (FIG. 3).

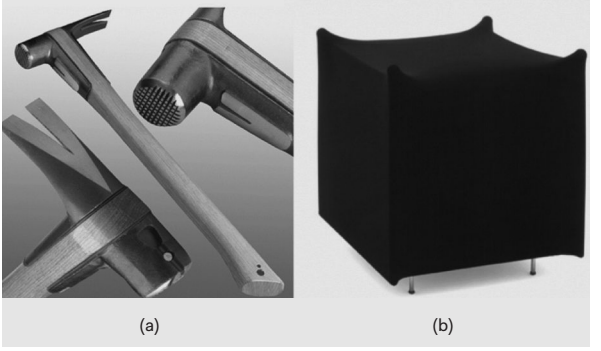

FIGURE 3 –(a) Hammer whose design was composed of traditional materials. (b) Piece of furniture that explores the elasticity of the material.

In an unusual approach, design can explore possible new functions and meanings for materials. Thus, design has the role of seeking new and original processes of perception, assimilation, synthesis and expression of these new materials and thereby generate innovative products and new requirements (FIG. 4).

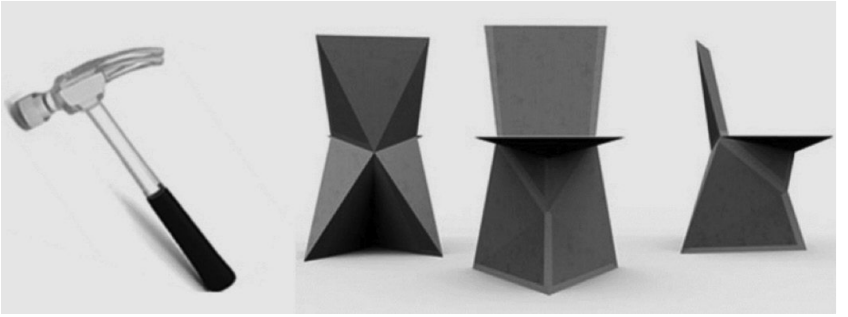

FIGURE 4 – (a) Hammer made of transparent material.
(b) Chair made of paper.

Materials and identity

The selection of materials for a product is seemingly a technical step of the design process. The properties and technical characteristics of this stage should be based on this selection so as to maintain its essence, which is to meet a particular request. Technology has been causing a revolution in these properties. In contrast with the past reality, when the perceived identity was firmly established by the inherent properties of the materials. What we are witnessing is a difficulty in understanding the properties of materials. Therefore, the process of associating images and the definition of their identity is increasingly complex, whereas the selection of materials is seen as a challenge facing the broad possibilities of the latest technologies and the diversity of new materials.

Likewise, we should emphasize the integration and contribution of materials in the creation of objects of desire in the contemporary consumer society. As a broadening of the perceived experience of the object, design aims to explore the various possibilities presented by new materials. Moreover, design is an essential part of the product as useful form, participating in the construction of the exclusive and seductive object identity through its tangible and intangible images. The utilization of these images by design can occur either from an affirmative or an unusual approach relative to historic and traditionally perceived images.

This relationship occurs through symbolic interactions typical of the contemporary society (Costa, 2006). Mutual influence occurs through

signs (whatever bears meaning), symbols (whatever refers to ideas) and images (everything that represents what is real). Through design, the product assumes an identity, or in other words, a meaning before the subject. The consumption ratio of the object as a product entails an exchange between the personality of the individual, i.e., the identity of the subject and that of the product. At the time of purchase the consumer expresses his/her own personality by associating and recognizing the product images to his/her own images (Baudrillard, 2000). This process involves a set of feelings and perceptions that cause the product to be special and unique. Accordingly, the impression of identity in the product identity by design has the intrinsic function to differentiate, identify, and highlight its characteristics while facilitating and initiating the selection process by consumers.

The current projection of design is much due to the relationship with a capitalist and liberal society. As compared to technological development, consumerism gives designers creative opportunities (Dormer, 1996). In a purely technological context, the object only has to meet an objective demand. The product is based on its inherent properties. Therefore, a variety of products is not necessary when a single product is sufficient to meet a particular need. Intangible and seductive considerations are unnecessary while the product becomes a technical result (FIG. 5). The properties that ensure product performance are associated with tangible images. These properties will be part of the product's identity, but will hardly ever be used to attract the consumer.

In the consumer society, objects must attract a potential consumer. The competition to attracting prospective purchasers leads the exploitation of intangible images to distinguish the identity of products having the same function. Design synthesizes these complex images into a unique and seductive identity, i.e., an object of desire. The object transcends its essential function to a certain demand and performance, and gets a new identity composed of new aspects. The exploitation of the intangible by design oftentimes achieves levels that surpass even its essential function (FIG. 5).

COLLECTION OF ADVANCED STUDIES IN DESIGN – IDENTITY, 2016 / p. 211 – 223

FIGURE 5 – Examples of footwear with strictly technical considerations (a) and extreme considerations of intangibles images (b).

Intangible images have key role in the creation of identity by design. The way to look at reality and imagine possible solutions in the different scopes of everyday life seeks to disseminate design as fundamental values for creating objects of desire rather than just a product. Hence, the design activity is seen as crucial in the renewal process, once it refers to the land of creativity wherein ideas are generated and the technical possibilities and requirements/business opportunities are combined together. Even the most radical idea needs to be materialized into a usable form through the design process. The premise is that design is an approach to build scenarios that seek to stimulate reflections of a society considering not only its needs, but new possibilities, materials, processes and values .

Final Remarks

Design is an activity heavily inserted and correlated to characteristics of the society, which is strongly connected to the culture of consumption in the recent history. New materials have greatly contributed to the development of industry and the design culture. This was basically due to the development of production with the use of new materials and possibilities of aesthetic and formal exploration of the conceived products. As an economic concept of continuous growth, the ideology of consumerism has associated to the notion of liberty. The liberal capitalist communities

have become a reference in development and wellness. In such communities the right to consume as much as and when possible is increasingly seen as a necessity (Dormer, 1996). The reflection on identity needs to focus on the qualitative development of peoples. That is because identity is something that is built and has, as a baggage, individual and collective memories with a view to specific needs arising from internal cultural conflicts and social conflicts that destabilize the meanings people attach to their actions and, hence, to their material production. In this context, something besides products is created so as to meet certain demands; the aim is to create objects of desire. Design somehow develops the identity of the object by creating a spiral of growing consumption that is typical of our contemporary society. Design thereby promotes the unalterable but renewed desire for new products by developing a close and intense relationship between the consumer society and design itself.

Critical considerations are needed at all stages of the design process, but in particular at the planning phase. From a well-founded perception, the design process should impart information and specific key details about the technical characteristics of materials, as well as their manufacturing, in line with the idealized conception. It can be noted that the current concept of design is strongly influenced by the sensory aspects of materials or, in other words, by their intangible images. Despite the importance of these images on the existence and meaning of design, though, the technical considerations of materials selection should be part of the process. These considerations can greatly contribute to the improvement of the design process.

COLLECTION OF ADVANCED STUDIES IN DESIGN – IDENTITY, 2016 / p. 211 – 223

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