Abstract: The features which characterize the perception of the aesthetic nature of a product are various: emotional features, knowledge features, intellectual features and psycho-physiological features. Using different weights these features intervene for the connection to the object. The analysis of this relational system is very complex concerning the conception of industrial products.

Key words: product, factor, proportion, composition, shape, durability, culture.

1. INTRODUCTION

The term aesthetics comes from the Greek “aisthetike” and was coined by the philosopher Alexander Gottlieb Baumgarten in 1735 to mean “the science of how things are known via the senses”. Aesthetics is a branch of philosophy called value theory or axiology, which is the study of sensory or sensory-emotional values, sometimes called judgments of sentiment or taste. Aesthetics is closely associated with the philosophy of art.

Aesthetic elements should exist in all stages of a product creation process. The presence of aesthetic elements has to consider the fact that an object perception implies an interaction between object properties and the person seeing the object.

Giving someone an aesthetic emotion depends on various personal factors: pure emotional, cognitive, cerebral, psycho-physiological. Those having different weights leads to the reception of some imagines with certain significative structures. Thus, the object is perceived in its components and as a whole.

Beyond providing functional characteristics, designers heed many aesthetic qualities to improve the marketability of manufactured products: smoothness, shininess/reflectivity, texture, pattern, curviness, color, simplicity, usability, velocity, symmetry, naturalness, and modernism.

Common aesthetic design principles include ornamentation, edge delineation, flow, solemnity, granularity, the interaction of sunlight and shadows, transcendence, and harmony.

Design aesthetics is interested in the appearance of products; the explanation and meaning of this appearance is studied mainly in terms of social and cultural factors.

2. VISUAL INFORMATION PERCEPTION

According to the principles of shape psychology (Gestaltpsychologie), the perception experience does not consist in fragmented and distinctive sensorial elements joined then by an associative process but it is composed by perceptive wholes organized in a certain structure with a certain meaning.

The Gestalt persons emphasized the primordiality of the whole to the parts and considered the object characteristic value as an important part of formal and structural object properties. As per gestalt psychology, an object or phenomenon perception is based on an elementariness principle according to which any visual imagine tends to the simplest configuration available to visual sense, under certain given conditions.

On the other hand, we may not disregard the fact that perception as a superior manifestation of sensorial knowledgement, is an expression of personality. Some mentalities, habits, preconceptions have influences on processing the received information.

A connection can also be achieved between the subjective phenomena of visual perception and the aesthetic empathy theory. Empathy (Einfühlung) means the capacity to project our feelings, emotions and attitudes in inanimate objects. Thus, the formal object qualities can be explained as symbols and expressions of our subjectiveness.

3. AESTHETIC COMPONENTS OF A PRODUCT

A product conception technically rests with a designer. He has responsibilities regarding aesthetic aspects, as well. He may act or appeal directly to the consultants in the industrial shapes scope or plastic artists. In all mentioned situations, the aesthetic elements introduction has to represent a basic concern for a designer.

The aesthetic quality of a product should be accepted for a long time. Thus, the product receives a new purposefulness.

Good results can be obtained in virtue of the designer sensibility and congeniality to space, shapes, colours, symbols, and a permanent development of designer knowledgement on cultural values.

A conception process may be also considered as a communication system where the objects are message carriers. In that system, the emitter may be the designer (the group consists of engineers, plastic artists, designers) and the receiver is the end-user, the client.

In the communication theory, there is two types of messages: a strict and coherent semantic message, and an aesthetic and symbolical one.

A product aesthetic is defined by various factors: consonance, functional, historical and technological, and cultural and social factors (Fig. 1).
3.1 Consonance factors

The consonance relationships taking place among the elements of an entire product depends on the component elements, on the one hand (lines, surfaces, volumes) and their relative position and rhythmical unity, on the other hand. The main consonance factors are: proportion, rhythm, symmetry, composition.

**Proportion** is an important mean for creating the order. "Proportion is a correspondence among the measures of the members of an entire work, and of the whole to a certain part selected as standard. From this result the principles of symmetry. Without symmetry and proportion there can be no principles in the design of any temple; that is, if there is no precise relation between its members as in the case of those of a well shaped man" (Vitruvius, *De architettura*).

The proportion concept influenced not only painting, sculpture and architecture but also industrial products. Among of the systems and proportion methods applicable in studying complex architecture and design geometry we can mention: „the dynamic symmetry” of Jay Hambidge, F. Lund’s theory „the circle geometry” of Mossel.

One of the reasons proportion is often considered important in composition is that viewers respond to it emotionally. One proportion that is often cited as occurring frequently in design is the golden number (Φ) or golden ratio. The proportion called golden number (Φ) is given by the measure ratio of two lines and its value is 1,618. It was used in setting the Parthenon proportion and in works of Middle Age and Renaissance plastics artists, as well. The connection between „Fibonacci row” and the golden number proves and makes out a connection between the two consonance manifestation ways: arithmetic (numbers) and geometric (shapes).

In case of designing machines and equipments, and working a certain geometrical shape, the proportion setting can be achieved by using the golden section number Φ, the values of Fibonacci row, the dynamic rectangles, with irrational module.

Le Corbusier introduced a proportion scale called modulor. That is a stabilized measure scale similar to a music one. Modulor is a 216 cm segment (the total height of a man of 174,50 cm with a raised arm). By means of that measure and the golden section number, Le Corbusier conceived a row: 41,5; 66,5; 108; 174,5... The modulor is not well suited to introduce proportion and pattern into architecture, to improve its form qualities (gestalt pragnance) and introduce shape grammar in design in building.

**Plastic number.** The plastic number (also known as the plastic constant or silver number) is approximately 1,324718. It is the limiting ratio of successive terms of the Padovan sequence and the Perrin sequence, and bears the same relationship to these sequences as the golden ratio does to the Fibonacci sequence.

The concept of the plastic number was first described by the Dutchman Hans van der Laan (1904 - 1991) in 1928, shortly after he had abandoned his architectural studies and become a novice monk, and has subsequently been explored by the English architect Richard Padovan (n. 1935). It is derived from a cubic equation, rather than a quadratic in the case of the golden ratio, and is intimately linked to two ratios, which van der Laan considered fundamental in the relationship between human perception and shape and form.
Rhythm. In a very general sense, rhythm means an order for an object, process or movement achievement and organization. It may be defined by time or space periodicity or iteration, and is a consequence of rows of chords or proportions. Apparently, the rhythm scope is closer by the continuance arts (poetry, music, dance); visual arts are defined by an instantaneous perception of shapes. In fact, even the simply contemplation of shapes and proportions enchainment making a space structure, requires a period of time because the perception of the composition elements takes place alternately, similar to any phenomenon that is in progress in time.

Symmetry. Generally, symmetry is a property of an unit to be composed of reciprocally corresponding elements and to display regularity, order and consonance.

In formal terms, we say that an object is symmetric with respect to a given mathematical operation, if, when applied to the object, this operation does not change the object or its appearance. In 2D geometry the main kinds of symmetry of interest are with respect to the basic Euclidean plane isometries: translations, rotations, reflections, and glide reflections.

The German geometer Ch. Felix Klein (1849-1925) enunciated a very influential Erlangen programme in 1872, suggesting symmetry as unifying and organizing principle in geometry. Initially it led to interest in the groups attached to geometries, and the slogan transformation geometry.

In the fields of architecture, plastic arts and design, symmetry as an elementary consonance is the arrangement of two identical elements on the both sides of an axis. In consonance, the symmetry is not applicable in all directions. Symmetry is used in the design of the overall floor plan of buildings as well as the design of individual building elements such as doors, windows, floors, frieze work, and ornamentation; many facades adhere to bilateral symmetry.

The concept of symmetry is applied to the design of objects of all shapes and sizes – you can find it in the design of beadwork, furniture, sand paintings, knotwork, masks, and musical instruments. Symmetry does not by itself confer beauty to an object – many symmetrical designs can be boring or overly challenging, and on the other hand preference for, or dislike of, exact symmetry is apparently dependent on cultural background. Along with texture, colour, proportion, and other factors, symmetry does however play an important role in determining the aesthetic appeal of an object.

Composition is the plan, placement or arrangement of the elements of art in a work. The general goal is to select and place appropriate elements within the work in order to communicate ideas and feelings with the viewer. Organizing the various elements within the frame of the viewfinder in order to create an effective design is more challenging than it might seem at first. Nature is not perfect and variation within organization leads to greater interest. Composition is an organization and balance activity performed by a designer or an artist in the process of shapes creation for the object to become functional and/or aesthetic and to have an own expression force, at the same time.

The intellectual and sensitive elements of a composition are:

- **Line** – the visual path that enables the eye to move within the piece;
- **Shape** – defined by edges within the piece whether geometric or organic;
- **Value** – the lights, midtones and darks throughout the piece;
- **Texture** – surface qualities which translate into tactile illusions;
- **Color** – hues with their various values and intensities;
- **Direction** – visual routes which take vertical, horizontal or diagonal paths;
- **Size** – the relative dimensions and proportions of images or shapes to one another.

A line can be straight, curved, vertical, horizontal, diagonal, or zigzag. Lines imply motion and suggest direction or orientation. Placing four dots on a page in the shape of a square can imply the points are linked as the mind searches for recognizable patterns. The direction and orientation of a line can also imply certain feelings. Horizontal lines imply tranquility and rest, whereas vertical lines imply power and strength. Oblique lines imply movement, action and change. Curved lines or S shaped lines imply quiet, calm and sensual feelings. A line is an effective element of design because it can lead the viewer’s eye.

Some primary shapes include circles, squares, triangles and hexagons all of which appear in nature in some form or another. Space is defined and determined by shapes and forms. Positive space is where shapes and forms exist; negative space is the empty space around shapes and forms. Form refers to the three-dimensional quality of an object, which is due in part to light, and dark areas. Light and dark areas within an image provide contrast that can suggest volume.

### 3.2 Functional factors

Functional shapes and dimensions of a product are elements that should carry out the function for which the product is manufactured. At the same time, they should be essential elements of the product aesthetic by means of shape-function relationship.

In this context, we mention the first two laws of *La Chart de l’esthétique industrielle* (1952) of French aesthetician, Jacques Viénot:  
**The law of usage level and functional value** – It is fine only the object faultlessly matched to its function. Industrial aesthetic implies an intimate consonance between the functional feature and outside appearance;  
**The consonance law between aspect and function** – In a work meeting the industrial aesthetic laws, there has to be a consonance between the aesthetical content of a rude observer and the practical content of an user.

Perceptive intelligibility is a ratio between function and usage function perception. There has to be a visual relationship between a product function and its image. To better understand the plastic art of surrounding objects, the objectivist school (K. Lorenz), used the notions proper to biology (analogy, convergence, homology).
The analogy notion is absolutely connected to the environment accommodation. In homology, there is a similarity among shapes, but there is not a same plastic art accommodation for the same function given. In the history of car body development, the shape evolution orientations are different but the function is the same.

Bionics (also known as biomimetics, biognosis, biomimicry, or bionical creativity engineering) is the application of methods and systems found in nature to the study and design of engineering systems and modern technology. The transfer of technology between lifeforms and synthetic constructs is desirable because evolutionary pressure typically forces natural systems to become highly optimized and efficient. Examples of bionics in engineering include the hulls of boats imitating the thick skin of dolphins, sonar, radar, and medical ultrasound imaging imitating the echolocation of bats.

Bionics is an important scope able to create new or perfectible apparatus or equipments by using formal or functional analogies. In the field of computer science, the study of bionics has produced artificial neurons, artificial neural networks, and swarm intelligence.

Roughly, we can distinguish three biological levels in biology after which technology can be modelled:
- Mimicking natural methods of manufacture;
- Imitating mechanisms found in nature;
- Studying organizational principles from social behaviour of organisms.

3.3 Historical and technological factors

The aesthetic product factors may not be isolated by the historical context (environment, politics, religion) and the technological one. The relationship between shape and technology is dominated by the techniques of a certain period of time. Those techniques are able to transform the relational field.

Y. Deforge, in his work „Technology and genetics of an industrial product”, introduced the notions of lines, objects family and object genealogy. Thus, it enables an analysis of technical, socio-cultural or socio-economical factors participating to the creation of new shapes and getting more thorough knowledge on the aesthetic of shapes and their development.

3.4 Cultural factors

Our perception is relative, based on the cultural system we belong to. Human way of seeing and feeling depends on our habits, knowledge and conditions of the environment where we carry out our activities.

Geometrical shapes, their layouts in a unit, layout orientation, and graphical and colour symbols and their interpretation, are a few factors for increasing and extending the engineers and designers eyesight.

3.5 Social factors

From the oldest times, people have demonstrated some of their faiths by signs marked on the objects. There is always a social symbol in our relationship with objects and people. Ceremonies, protocols, signs, fashion is included in that symbol and may identify or differentiate a certain group (occupational, ethnic, social). In some cases, it is very difficult for an object to equilibrate the usage value with the symbol wish.

When a product semantic value acts on and exceeds its function, we witness to a phenomenon called Kitsch.

Kitsch is a German term that has been used to categorize art that is considered an inferior copy of an existing style.

Kitsch is a term used in art and design criticism to describe artifacts that are cheap, ugly, shoddy and overly decorative or sentimental. It is seen as the reverse of „good design“ and, indeed, academic interest in it has burgeoned since the rejection of the Modern Movement.

In this case, the social value of the product seems exacerbated. Generally, the kitsch object is a copy more or less rich in symbols, which belongs to a certain social class.

4. CONCLUSIONS

For an engineer and a designer, the aesthetic of a product means the introduction of different factors, in all designing stages. An engineer who rests with the product technical creation has a certain aesthetic responsibility. He can directly participate to that scope or appeal to plastic artists. But, in all cases the introduction of aesthetic elements should be an essential pursuit for him.

A designer should achieve a balance between the tangible reality of a product and its social and cultural context.

5. REFERENCES


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