

# Stylization levels of industrial design objects

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**Abstract.** The urgency of the research of form making problem in design is associated with the necessity of new understanding of visual culture and new approaches to design engineering representing the integration of artistic and designed problems. The aim of this research is to study the levels of stylization of design objects and dependance (relation) on the specific project objectives and existing technologies. On the ground of quantitative evaluation, the stylization measures are emphasized: figurative image, stylized image and abstract image. Theoretic conclusions are complemented by practical problem solution over creating openwork metal lantern. Variants of both the traditional mains supply of the lantern and the autonomic supply system based on solar energy were offered. The role of semantic factor, affecting the depth of perception of design objects semantic space, is represented in this paper.

## 1. Introduction

The design is growing rapidly in the modern world, covering even more areas of human life. The phenomenon of design is of interest to sociologists, technologists, philosophers, psychologists, teachers, engineers, material scientists, and a wide range of other specialties can be continued indefinitely. The design is incorporated in all spheres of modern life. But the dilution of design phenomenon happens.

Defining the boundaries of design, we have to answer the question – what is not design, and whether all the objects created by man are worthy to be referred as "design projects"? Applying new technologies and materials, creating new forms of objects and environmental compositions design always solve the problem of harmonization and aestheticization. [1,2] And not only in terms of enhancing the convenience and comfort zones, but from the point of spiritualizing influence of beauty in human development.

Estimating the quality of design the methods of visual perception evaluation are applied which allow to estimate the levels of visual comfort as far as the formation of emotional and visual comfort is the main purpose of design.

This paper is devoted to the research of stylization problem in design and practical aspects of modeling openwork metal objects.

## 2. Materials and methods

The engineering methods which allow projection of environmental design objects, based on existing technologies, are applied in the research as well as modeling, which is conducted to clarify the parameters and characteristics of a design object. Semantic and evaluation methods of perception give the possibility to estimate the factors affecting the quality of visual perception.

## 3. The levels of stylization in design



Design is the area of conventional forms in which style formation mechanisms are subjected to function, technology, construction and fixation of ideas about the aesthetic expression. In design, the establishment of an appropriate form is expressed not so much at the level of plot (it is rather the prerogative of art) as at the level of stylization.

Functional, technical and aesthetic factors influence the process of stylization in design.[3] A functional factor is associated with the appointment of things, the specificity of their operation; a technologic one is expressed in technology, materials and technical equipment; and an aesthetic factor is associated with the artistic expression of design objects.

The aesthetics of the form dependent on the function and technology also takes into account the psychology of visual perception, semantic interpretation and emotional impact.


Thus, the imperative of the function and technology in design complement the humanistic content, emphasizing human-dimension space of created forms, its aesthetic and visual appeal as well as emotional comfort.[4]

Stylization is comprehended as an operation of formalization of volume-plastic, coloristic, graphic motifs, their simplification, generalization and organization in order to achieve meaningful capacity and visual aesthetics. Stylization involves the transformation of an object and can be studied in quantitative and qualitative terms.

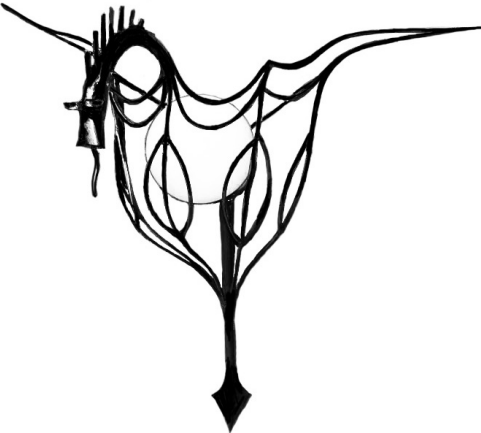

Qualitative transformation may be of two species: soft (biomorphic) and rigid (crystallomorphic) stylization. The main characteristic features of these two types of stylization are as follows: biomorfizm is distinguished by softness, curvilinearity, bend, plasticity; kristallomorfizm – by rigidity, straightness, fracture, "angularity". [5]

The quantitative characteristic is expressed in relative units of deformation of the real image and its stylized version. Stylization measures in a relation coefficient are obtained on the basis of the study of the visual perception process and are presented in table 1, which made it possible to distinguish the following levels of stylization image: a figurative level differs almost by a complete agreement with the object, a stylized image involves changing the form, taking into account technology and functionality, and an abstract image - limit laconism of an image and as a rule it is used in graphic design (Table 1.). The coefficient of deformation increases with a decrease in awareness. [6]

**Table 1.** Levels of stylization in design and art

	Feature image	Measure styling (In relation coefficients)
<p>FIGURATIVE (Realistic art)</p>		<p>0-1</p>

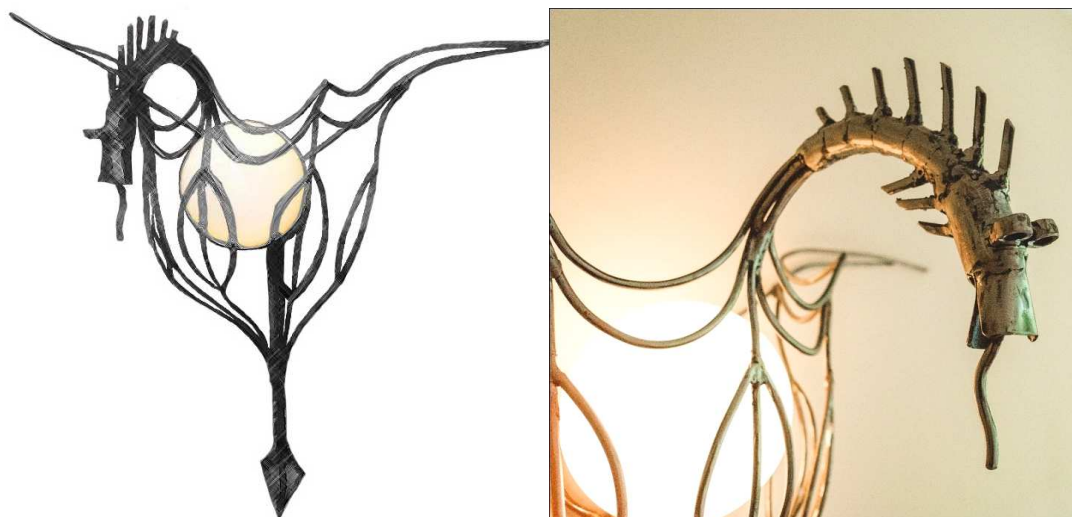
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STYLIZED (Product design)		2-3
ABSTRACT (graphic design)		4-5

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#### 4. Semantics and technology in the design of an ornamental lantern

Practical implementation of the study is presented by the design of a decorative street lantern.



**Figure 1.** An ornamental lantern "Dragon": a - graphical sketch, b - fragment of a full-scale model made in metal with forging and welding technologies.

There are three elements in the ornamental lantern: a lamp, a dome lamp and a metal frame. The lamp and the dome lamp are made in the production sector. Thus, the metal frame becomes the main object of design engineering. The search of the image is associated with a functionally important detail – a dome lamp-sphere. The image of the luminous element-sphere is semantically associated with the perception of light, as the beginning of life and image of fire. The image of Dragon was selected as a base object, which has a deep symbolic significance in the world culture, it embodies the visible expression of the fire element and transmits multiple semantic interpretations that imparts semantic capacity to the object (Fig. 1).

Stylization of the image of Dragon was conducted, taking into account the technological and functional factors. Functional factors affecting its shape are shown in Table 2.

**Table 2.** Functions of ornamental lanterns

The main function	The lighting of surrounding space
The secondary function	The element of environmental design - aesthetically pleasing and artistically expressive art object
Enabling function	communication element that affects visual communication

Technological factors influence the form making of lanterns, which can be illustrated by the analysis of dynamics changes in the shape of the street lantern. Technological advancement, materials and techniques of lighting change not only the form of its dome lamp, but also the nature of the form of the metal frame. Ornamental metal openwork elements which protect lanterns from moisture (rain, snow) in the modern world have changed their destination to the dawn of birth. [7,8] The absence of necessity to protect the light source allows changing the composition of the lantern. Thus the dominate function of a metal frame has become a decorative function. The modern dome lamp protects not only the lamp from atmosphere condensation, but also scatters the rays of lamp, which has a beneficial effect on the sense of vision. The dome lamp is partially or entirely closed by the openwork lattice which divides the monolith of the dome lamp-sphere. This openwork metal framing of dome lamp harmonizes the combination of glass and metal and allows obtaining samples of aesthetically elegant ornamental lanterns, original elements of architectural space.

The use of modern fuel-efficient semiconductor light sources and the supply system on the basis of solar energy including a mechatronic module and orienting a solar battery towards the sun allow us not to assign the lantern to an electrical power network. The solar battery, tracking the sun, drives and controls equipment of motor means and an accumulator charge, and it may be located at some distance from the lantern, for example, on the roof of the construction, on the wall of which the lantern is located.

The choice of material (structural steel) and technology (forging with welding) have determined the shape and the type of stylization of the future object design. [9] The plasticity of structural steel requires a soft (biomorphic) type of stylization, and the shape can be created in the process of creative exploration and take into account all semantic connotations of the multidimensional Symbol (Figure 1).

Openwork metal setting can be of any shape, but the surface of simple geometric shapes, such as a sphere, a cylinder, or an ellipsoid, is aesthetically justified to be more harmonious and more technological. These surfaces are the "bases of visual perception" [10]. In case of lamp, the details were made from the steel rod produced by plastic deformation and welding with each other. This was followed by a cleaning operation, grinding, polishing, coating and painting. The considered structures of supporting of the spherical dome lamp and electrical engineering created the conditions of comfortable operation of the lantern.

### 3. Conclusion

On the basis of visual perception assessment of methods, the differentiation of design images was carried out and a measure of stylization was defined for the first time: for images of realistic art and figural design the measure of stylization is from 0 to 1 nominal units, for stylized images in design - from 2 to 3 nominal units, for abstract images (graphic design, design of logotypes, signs) from 4 to 5 nominal units. Visual methods are completed by semantic researches, which take into account the semantic connotations of images in design engineering.

### 4. Acknowledgments

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