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SYSTEMATICITY OF DESCRIPTIVE GEOMETRY AS A CONCEPTUAL BASIS OF ITS FUNDAMENTALITY

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Formulation of the problem. The world of Nature as a boundless and immeasurable environment of the thinking man, created wisely and expediently, constantly arouses in him the desire to know its secrets in order to use them to create nature-relevant objects, processes and phenomena. The diversity of natural objects for cognition has divided people into their types according to their cognitive interests in these objects, each of which has only its own properties. But, despite their fundamental differences, there is a common universal property among them as the main subject of study – their morphology, which reveals the secret of their composition, building, construction or structure.

As a result of morphological research, representatives of various natural sciences have reached the indisputable idea that there is nothing elementary in the world, that any object is a complex system of elements that combines into a single whole, integrating the shape of the local part of space which they occupy.

However, the world in which we live is a very complex system of interconnected worlds of natural nature and the artificial environment created by man from the material of nature, and this creation is impossible without a systematic understanding of the structure of these objects, which underlies their design.

Therefore, the idea of the whole system of everything natural should form the basis for the creation of everything artificial on the basis of a deep understanding of the peculiarities of its structure and the constructive properties of the connections and relations between its elements. If by artificial we mean objects of construction and architecture, the creation of which is preceded by their design and engineering as a mental experimentation with creative images of their elements and connections between them, information about the results of which are encoded on paper by graphic dots and lines, the conceptual basis of descriptive geometry should be the paradigm of their systematic understanding as graphical models of systematic geometric representation of their authors and designed project. In this case, it becomes a natural science as the geometry of pictorial space, the elements of which are reversible projection images, which axiomatically describe their pictorial properties, containing information about the position and metrics of the object, which is necessary and sufficient for its construction in real life.

The problem of this study is to prove the need to modernize the geometric and graphic education of school and student youth through the introduction into their consciousness of understanding the nature of design objects as complex systems of interconnected elements, and its design drawings – as image systems of its interconnected elements, connected by graphical models of interconnections and relations between them.

The purpose of this study is to transform traditional descriptive geometry as a component of applied geometry, which lacks its own axiomatics, in nature-appropriate fundamental systemic descriptive geometry of picture space with its own axiomatics, the elements of which are reversible images of objects-systems of real space in different projections, devoted to the development of constructive methods of their construction, transformation and synthetic description of pictorial properties for their practical application in various fields of science, technology and art.

Results. The crisis state of geometric literacy of high school graduates who become students of technical and architectural faculties of higher educational institutions encourages the development of such pedagogical technology for the gradual transformation of their initial

amateur thinking in the beginning of constructive-compositional, which would removed all the shortcomings of applied geometry and contributed to the education of project thinking.

As a result of many years of research into the genesis and development of theory and practice of the pictorial component of the design process as mental experimentation with the concepts of elements of a virtual object and the relationships between them, a pedagogical system for overcoming this crisis was proposed, which consists of three subsystems: ideological, epistemological and methodological.

The ideological subsystem was devoted to the ideological, philosophical, professional and universal aspects of system descriptive geometry, which considers the reversible image as an intellectual product as a source of information about the properties of the depicted object, the level of perfection of which determines the level of intelligence of its author.

Epistemological system considers architecture as an element of the Earth's technosphere, which interacts with its ecosphere and saturates its noosphere or space of mind, explores the features of sensory perception of space and knowledge of its objects as systems whose elements are geometric concepts of "points", "lines" , "planes" and "surfaces", which create thought-images of objects that are projected, subject to the conditions of five groups of axioms of Euclidean geometry. This determines their morphology and on the basis of information from different fields of knowledge concludes that the architect works on the thought-image of the object in several spaces: first in the perceptual space of sensory perception, then – in the conceptual space of knowledge, after that – in the pictorial space of its reversible image as an element of the design space, and finally – in the real space of existence of the constructed object. This unfolds the concept of the forms of the object as materialized structures of the spaces of its existence. After all, in real space the object has a real or real form, in the visual – many promising visual, in the space of knowledge – one ideal, and in the picture – several conditional forms in the form of its projection images.

The theoretical basis of the process of obtaining an image is the process of projection, which is essentially nothing more than a process of imaginary establishment of collinear correspondences between elements of an existing object and the corresponding elements of Euclidean space, called the process of reflection of a real object in human consciousness, in which image of this object as its geometric model appears, the structure of which is adequate to the structure of this object. As a model of the spatial system, the thought-image is also spatial, systemic and conceptual, and therefore serves as a kind of "nature" for further establishment of already constructive correspondences between its virtual elements-concepts and graphic elements of pictorial space. The result is its image as a graphical model, the process of obtaining which is called the process of mapping the conceptual space of knowledge on the pictorial space of a sheet of paper. In other words, the world is informationally and sensually reflected in consciousness, and from consciousness, as from a "black box", is reflected on a flat carrier of information about its positional and metric properties.

The process of forming thought-images is based on knowledge of Euclidean geometry, and the process obtaining their images – on the knowledge of descriptive geometry system. After all, descriptive geometry "depicts" Euclidean. This circumstance actualizes the need for conscious and creative mastering of system descriptive geometry, which integrally unites these two system mathematical and therefore fundamental sciences.

Conclusion. Systemic descriptive geometry is natural in that it graphically models systemic objects in both the eco- and technosphere, and fundamental because it graphically models Euclidean geometry and synthetically describes its projected rotating images.

References

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