Philosophy of Machinery and Technology in Relation to the Modern Construction Industry

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Abstract. Formulation of the scientific problem in this article is aimed at identifying the anthropological criterion and the principle of organoprojection in relation to modern construction machinery, but also of the primacy of technology at the modern stage of the construction industry development. In general, the relevance of E. Kapp philosophy of machinery in the context of the application of anthropological criteria and the principle of organoprojection to modern construction equipment, technology and design of unique buildings and structures is observed. The modern reception of the ideas of organoprojection is analyzed. The authors specify that, implementing the philosophical explication of the Genesis of construction equipment, its anthropological nature on the basis of organoprojection, construction equipment should be considered as a special purpose equipment designed to perform a wide range of tasks in the construction industry. The article notes that the lack of a single interpretation of the concepts of «machinery» and «technology» partially leads to a misunderstanding of the basic essence of these terms in the philosophical perspective. Although experts in the field of philosophy of machinery can not come to a consensus about the origins of machinery, the problems caused by its development, and the possible prospects for overcoming them, based on the analysis of scientific publications, it is emphasized that the concept of E. Kapp has a productive potential to improve the culture of technical thinking.

1. Introduction

Philosophy of machinery as an independent area of philosophical knowledge in the last fifteen years is actively studied by domestic and foreign scientists [1-7] primarily in terms of identifying common patterns and principles of machinery development, due to the emergence of new technologies, changes in scientific, technical and engineering activities. Philosophical reflection of machinery reveals not only its essence, but also the attributive properties of a man, society and culture.

The relevance of this study is due to the fact that to date there is no single philosophical interpretation of the terms "machinery" and "technology". In particular, the author of the work [1] on the basis of the analysis of the scientific article [8] emphasizes that the divergence of philosophical interpretations of these terms is based on their incorrect translation from other languages and they are often interpreted in different European languages equally. In another study [9], the interpretation of the terms "machinery" and "technology" is considered within the continental tradition of "identifying social, humanistic and anthropological aspects of human-technology interaction" and the analytical approach based on epistemological [10] and praxiological studies.

The formulation of the scientific problem of this study is associated with the identification of anthropological criteria and the principle of organoprojection E. Kapp (since he is the founder of this area
of philosophical knowledge) in relation to construction equipment; the primacy of machinery or technology at the present stage of development of the construction industry in terms of engineering thinking.

2. Main text

2.1. The evolution of the “philosophy of machinery” by E. Kapp and its applications on modern construction equipment

Thus, of particular interest are the ideas of E. Kapp, expressed in his work «The main directions of the philosophy of machinery. To the history of the emergence of culture from a new point of view» [11], repeatedly republished in the West, but never fully translated into Russian. We believe that in modern conditions in application to construction equipment this is the first attempt of philosophical explication of the Genesis of machinery and its anthropic principles has not lost its explanatory potential. Kapp proposed the principle of organoproduction, the essence of which is the embodiment of the properties of the body in tools or mechanisms, the transfer of the internal to the external.

Following the history of the development of tools, which is identical to the history of mankind, Kapp established that rebuilding the environment, man unconsciously reproduces his organs, their shape, function and he knows himself, based on these artificial creatures.

The process of organ projection is a gradual transition from the natural body in itself to the artificial body for itself [12], it can be both unconscious, instinctive and conscious, rational and systematic. The process of knowledge of machinery and human self-knowledge, which is always due to artificial organs and mechanical devices according to the concept of E. Kapp can be represented schematically as follows (see Fig. 1).

![Figure 1. Stages of knowledge of machinery and human self-knowledge by E. Kapp.](image-url)

In recent years the theory of Kapp gets new meaning in the light of the «computer metaphor» in which the computer is considered as the intelligence organoproduction. Cartesian clock is no longer a model of the Universe, a new universal metaphor is a computer, or rather its software. Computer operations are used as an explanatory scheme to understand the process of knowledge. Computers are talked about in connection with the problem of artificial intelligence, and vice versa, computers themselves are increasingly described in terms of human activity. Accordingly, there are modern reception of organoproduction, for example, the idea of external human expansion of Canadian social theorist M. McLuhan, claiming that qualitative changes in human history, associated with the emergence of new technical means of communication (from the alphabet and writing to the printing press, and then to electronic means of communication) [13].

German researchers F. Edel, S. Wegshider agree with Kappa that the machinery is nothing but a continuation of the human body and spirit and give an example with Turbo-Boost technology: in the event that the processor for a short time requires power gain, it is possible to increase the frequency-clock pulses. Similarly, the brain acts when it recognizes the danger: the glands are given the command to allocate hormones, which then affect the work of individual organs. They write that it is
necessary to be critical of The Kapp thesis that a person unconsciously designs parts of the body, and then after the fact only comes the awareness of copying and conclude: it does not matter whether a person can understand that he is dealing with the projection of the organ or not, the existence of projection is not canceled, it is taken as a given[14].

In contemporary Russian literature the concept of E. Kapp considered in different contexts, such as O. F. Tereshcoon analyses of organoprotective as a methodological principle of the study of the Genesis of the phenomenon of technology [15]; N.A. Balakleets examines the main provisions of this theory in the context of socio-cultural and technological dynamics of the modern society, paying particular attention to the phenomena of the body, power and transgression [12]; O. M. Gray, M. A. Homenkov analyze it in the light of the historical and cultural existence of the metaphor the «body-machine» on the material of Russian poetry [16], etc.

Realizing the philosophical explication of the Genesis of construction equipment, its anthropological nature, on the basis of organoprojection, we specify that this is a special purpose equipment designed to perform a wide range of tasks in the construction industry. In the terminology of construction production, all construction machinery (machines, mechanisms, equipment), tools, inventory are called tools, with which a person acts on objects (materials, semi – finished products, products, parts, etc.) of labor to get the finished construction products-real estate (construction system).

Regarding modern construction equipment, it can be argued that this is a complex and powerful technique, controlled in various ways, up to automated. Consider working bodies of certain types of construction equipment in the context of the concept of organoprotective (see Fig. 2.3).

![Figure 2](image1)

**Figure 2.** Comparison of brushes of hands with the working bodies of dredges: a – hand; b – grapple excavator; c – the seizure of the excavator.

![Figure 3](image2)

**Figure 3.** Comparison of the human hand with the working body of the excavator – backhoe.

Such comparisons can be many: the human body with outstretched arms and modern T-shaped tower cranes, bridge construction, based on the principles of the organization of bone tissue and human bones themselves as a prototype of concrete structures, etc.

In connection with the development of scientific progress in the construction market there are more and more advanced technologies that provide high technology, environmental friendliness, energy efficiency, resource saving, unlimited architectural capabilities and high quality of work in the shortest possible time. These technologies include the technology of additive manufacturing, using the
technology of 3D printing through special printers in construction. The additive method allows, gradually adding materials, to increase the necessary form for the production of buildings, structures. The work of modern construction 3D-printers can be compared with the work of not only the human gastrointestinal tract (the extruder and the process of feeding and transmitting the construction mixture), but also his brain (automated control unit complex 3D-printer).

And referring back to Kappa: The Gradual extension of the meaning of «suit», which was originally used to describe the need to cover up and conceal the body, characteristic architecture, which is no longer confined to notions of utility and functionality, and creates free monumental forms in which man, like all works of art, coming to the realization of his desire to do when he realizes the organic idea» [11, p. 270]. Today, the monopoly of stationary architecture is gradually being replaced by multifunctional transformable spaces, which clearly embody the idea of Kapp architecture as a suit. The replaceable shell, for example, made of special fabric or Teflon, is used in the buildings of exhibition halls, sports arenas, megamalls, in the reconstruction of construction systems, energy efficiency problems are solved with the help of polyvalent walls, etc. In the construction of modern unique buildings with curvilinear outlines, the core of rigidity is designed taking into account the features of the human spine (see Fig. 4), and modern man does it consciously.

![Figure 4. The similarity of the human spine and the multifunctional unique building [17].](image)

The metaphor of the human body becomes digital architecture, in which the building is treated not just as a curvilinear form, but as a biological natural organism, constructed by means of mathematical algorithms [18]. This direction occurs in the beginning of 90-ies of XX century in the Wake of the achievements of science and computer technology, when the architects of many countries actively engaged in the search for new principles of formation of spectacular images. Distinctive features of non-linear architecture are: implementation of stages of design of buildings and constructions by means of digital methods of animation and emergence of features peculiar to parametrism: asymmetry, the phenomenon of dynamism of forms, time variability, lack of the standard module. By changing the parameters or geometric relations, parametric modeling allows for a short time in the virtual space to «play» a variety of design schemes and avoid fundamental errors. The design process becomes an algorithmized program of self-organization of the architectural form.
Perhaps, with the development of technology, understanding the ideas of Kapp will cause more difficulties, already now this concept raises a number of serious objections. For example, doctor of technical sciences, prof. V. I. Gnatyuk believes that the main Kapp thesis is the understanding of technology as a projection of human organs, is outdated: «Modern scientists and engineers in their design activities have already forgotten about human organs by 99%. I think, really only narrow specialists remember about them who develop medical instruments, sports equipment and dentures» [19]. The anthropocentric approach, the essence of which is that the machinery is considered as a result of the creativity of man exclusively, provides only his needs and is controlled and controlled only by him, also seems to V. I. Gnatyuk controversial, we give his arguments.

First, any modern technical device is the result of the creativity of socio-cultural and technical systems (from norms and standards to aesthetic and even socio-political ideas), and not an individual creative product. The processes of manufacturing technical artifacts are increasingly automated, intellectualized and carried out without the participation of a particular person. There are already technologies in which the participation of a person with psychomotor limitations is prohibited or limited.

Secondly, the technical reality is already largely providing not human needs, but their own, and this is happening at a much higher rate than the satisfaction of human needs.

Third, the role of man in the management of technology is reduced, especially when you consider that the rate of change in the capabilities of technology is already much greater than the capabilities of the human operator. Often a person acts as a stopper, not allowing to reveal all the possibilities inherent in the technical product, which he manages.

Romanticism, which arose in Germany and influenced the formation of Kapp ideas, replaces the era of Enlightenment and coincides with the industrial revolution, marked by the appearance of the steam engine (one of the brightest images of its organ projection), and this is a specific stage in the development of European culture, philosophical and aesthetic direction. In German romanticism formed a new image of man as an open, unfinished project with endless opportunities for self-improvement and self-creation. Science and art displace the instinct of animals in man, he becomes the Creator of himself, the source of modernization of his body. For Kapp, which shares many of the provisions of Hegel's dialectics, the human body through external tools, provides a key to the interpretation of the reality of human nature.

2.2. Construction technologies and machinery: what is primary at the present stage of development

The lack of a common interpretation of the terms "machinery" and "technology" leads to the fact that technology, in comparison with technology, is of secondary importance. Therefore, machinery becomes dominant in any production process and engineering solution. Speaking in everyday language, including in relation to the construction industry, it turns out that under the developed equipment developed technology for the creation of construction products.

As you know, the scientific use of the term "technology" Was introduced by I. Beckman. But technology as a scientific discipline, which arose on the basis of knowledge about technology, in his own words, is «much more» [20]. Later, he developed this concept more precisely, arguing that at the present stage of development technology is a scientific discipline that develops and improves methods and tools of production. To create machinery, a certain technology is required too. In the construction industry, depending on the technology of work selected one or the other special equipment. With the advent of new construction technologies, existing equipment is adapted to these technologies [21] or new equipment is developed for them. Here, obviously, there would not exist the confusion, the technology of performance of works determines the necessary equipment to produce the final products.

3. Conclusion

Whatever the positions of the researchers, it should be noted that scientific discussions on issues related to various aspects of the philosophy of Kapp machinery play an important role in the formation
of a humanistic approach to technology, which in turn contributes to the improvement of the technical culture of thinking of the professional community and society as a whole. Experts in the field of philosophy of machinery can not come to a consensus about the origins of machinery and the problems caused by its development, as well as about the possible prospects of overcoming them. Nevertheless, it seems to us, at present, taking into account the specifics of the development of even the most complex construction equipment and the industry as a whole, the main provisions of E. Kappa's philosophy are quite applicable for its interpretation. In this connection we should not forget that in terms of the technocratic society a man is not only regarded as the designer of the world, but he plays the role of the object construction, since the conditions of social life and the sense of being of the individual caused by problems of a technical civilization.

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