the oxidation of graphite and are a source of amorphous SiO_2, which is able to interact with α–Al_2O_3 to form mullite.

The introduction of an optimal or minimum amount of finely dispersed silicon carbide not only protects graphite from burnout, but also selectively improves the properties of products, in particular, compressive strength and density.

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APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE TRANSPORT INDUSTRY

The practical application of artificial intelligence methods in engineering, despite the actual successes achieved and the many practical projects being implemented in the transport industry, is from a historical point of view at the initial stage, primarily if assessed based on the degree of realization of its potential [1, 2].

Artificial intelligence is used in a large number of sectors of the economy, with particular application in transport: for managing traffic and parking spaces in large cities, processing data from users of toll roads, and in implementing complex logistics processes. At the same time, artificial intelligence acquires particular importance in the design of complex technical systems, the success of which is largely determined by the use of decision support methods necessary, including for the analysis of big data, solving interdisciplinary and other problems of increased complexity [3, 4].

The use of artificial intelligence is very productive in the operation of facilities. In this case, constant remote monitoring of the structure provides a huge amount of information. It is quite difficult, and often impossible, for a person to track and correctly interpret changes in the condition of a structure, identify risks at the initial stage and prevent negative consequences.

According to the generally accepted algorithm, the design process begins with the initial assignment of design parameters that vary in space by control functions [5]. Initially, these functions can be set arbitrary and constant. Using a mathematical model of the system's behavior over time, a transition occurs to the state space, where the system's behavior is described, and then, using criteria, the quality of the decision made is assessed in the assessment space. If there is a possibility of further improvement of quality or if the established restrictions on the behavior of the system are violated, the control functions are corrected and the procedure is repeated.

Assessment of the quality of the design does not directly follow from the description of the system, since a complex mathematical model operates between these stages. In this case, it is a system of ordinary differential equations and partial differential equations. In addition, the assessment is mediated by quality functionals (criteria) in the form of double integrals. Analysis of trends in the behavior of a system and the sensitivity of this behavior to changes in control (design parameters) cannot be comprehended by human intelligence, since it requires orientation in the multidimensional space of states, where the behavior of systems in certain conditions is described. It is necessary to record the state of the system at extremely short time intervals, which entails the formation of an array of big data.

Since the directions of changes, being mediated by complex relationships and operations, are not obvious, the choice of the direction of changes in control (design parameters) in the assessment space to improve system performance and fulfill the prescribed restrictions on interaction is also not subject to human control.

It is also obvious that many issues must be resolved on the basis of an interdisciplinary approach, in a comprehensive manner, due to the interaction of the components of a complex system considered within different disciplines. This dictates, among other things, the vector of development of competencies among today's and future transport complex specialists in the field of artificial intelligence.

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REMOTE MONITORING OF CONTACT NETWORK CONDITION FOR MOTION HIGH-SPEED ROLLING STOCK

One of the infrastructure objects, the requirements for which increase during high-speed traffic, is the contact network. The safety and uninterrupted operation of trains depends on the mechanical strength, geometric parameters and technical condition of its elements [1, 2]. The contact network of railways includes contact suspension and supporting structures, auxiliary units and devices. Traction current is collected from electric rolling stock using a contact wire. Sagging and sudden changes in suspension height cause changes in contact resistance, arcing and can lead to burnout of the contact wire or pantograph strips.

Most suspension malfunctions result in changes in the position of the weights on the anchor supports. For example, when a support cable or contact wire breaks, the load moves downward with acceleration. Sagging of the support cable or contact wire beyond the permissible limits as a result of improper adjustment, foreign objects falling