THE ROLE OF MODERN COMPUTER-AIDED DESIGN IN AUTOMOTIVE TRANSPORT

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In today's context of rapid development in the automotive industry, there is active digitalization on each stage of vehicle design, production, and operation. The widespread implementation of Computer-Aided Design (CAD) systems is becoming increasingly relevant, as they are a key component of the digital engineering environment. These systems play a vital role not only in the creation of drawings or 3D models but also in the comprehensive analysis, optimization, and improvement of automotive designs.

CAD systems enable effective integration of various stages in a vehicle's life cycle from conceptual sketching to the product release. They significantly reduce development time, minimize design-stage errors, optimize material usage, and improve the quality of technical documentation. Moreover, the use of digital tools greatly enhances the accuracy of calculations, promotes process standardization, and facilitates further technical modernization.

Today, leading software products such as SolidWorks, AutoCAD, Siemens NX, CATIA, Creo (PTC), and others are actively used in the automotive industry. Each of these systems has its own specialization: some focus on parametric 3D modelling, while others are tailored for complex engineering analyses, including aerodynamics, heat transfer, and vibration loads. CAD tools make it possible to create digital models of components and assemblies, conduct strength, flexibility, and load-resistance tests even before producing a physical prototype, thereby allowing potential problems to be identified and resolved early in the development process.

Another critical component of the modern engineering environment is the integration of CAD with other systems: CAM (Computer-Aided Manufacturing), CAE (Computer-Aided Engineering), and PLM (Product Lifecycle Management), creating a unified digital design space.

Special attention should be given to the use of cloud technologies, which enable engineers from different geographic locations to work on the same project simultaneously in real time. This significantly improves team efficiency, ensures seamless communication, and accelerates decision-making. Thanks to such capabilities, companies can respond faster to market needs, reducing the time to develop new models and increasing their competitiveness.

Thus, the implementation of modern computer-aided design systems in the automotive transport sector not only automates and optimizes engineering processes but also acts as a catalyst for innovation, contributing to the creation of next-generation high-tech, energy-efficient, reliable, and safe vehicles.

In the future, the role of CAD will only grow, as digital transformation becomes the basis for the sustainable development of the automotive industry.