

ENGINEERING AND COMPUTER GRAPHICS ARE AN ELEMENT AND COMPONENT OF THE EDUCATION OF TECHNOLOGICAL ENGINEERS

Jabbarov Anvar Egamovich

Annotation: *Traditional teaching methods, developed at the time for moderate amounts of information, have proved to be of little use in the context of the modern information explosion. There was a problem of an acute shortage of study time needed to study complex systems using old methods. Thus, there is a contradiction between the changed requirements for the qualification of engineers and traditional teaching methods, which turn out to be ineffective with a sharp increase in the volume of information. Initially, the course of descriptive geometry and engineering graphics did not have priority in the development of design competence of a student of a technical university.*

Keywords: *information technologies, engineering personnel, geometric objects*

Today, there is a need to improve the teaching methods of this discipline by integrating the courses "descriptive and engineering geometry, engineering and computer graphics" to obtain systemic knowledge that ensures deeper development of design competencies of engineering students as professionally important qualities of the future work of an engineer. Currently, computer graphics is being introduced into the training of engineers at a technical university as a component of a block of graphic disciplines.

Taking into account the basic requirements for a modern engineer, it is necessary to rethink the teaching of the discipline of descriptive geometry and engineering graphics with the involvement of information technologies embedded in engineering geometry and computer graphics. It is necessary to create conditions in the educational organization system and give the student the opportunity to choose to study and master engineering and graphic disciplines of any system computer-aided design - SolidWorks, Autodesk Inventor, **KOMPAS-3D, ADEM CAD/CAPP/CAM, Solid Edge** and others that allow you to fully reveal its abilities. It is necessary to pay special attention to the teacher's ability to completely abandon traditional teaching methods. The integrated training module "descriptive and engineering geometry, engineering and computer graphics" should be the basis for the education of technological engineers.

General engineering training at a higher educational institution makes a certain contribution to the quality of training of engineering personnel for various purposes and their professional formation and development. A special place for high-quality training of engineering personnel is occupied by academic disciplines, which include engineering graphics, the basis for teaching a number of general engineering and special educational disciplines in technical education. Engineering graphics, as a complex discipline that includes descriptive geometry, engineering and computer graphics, as well as other sections of engineering geometry, contributes to the development of the theoretical foundations of computer geometry and graphics and is the basis for geometric and graphic training of specialists in a technical educational institution. Studying various



problems of teaching and improving a comprehensive discipline - Many scientists and teachers have been engaged in engineering graphics at various periods, but in this direction the problems of studying the discipline in connection with the teaching of disciplines of the general professional block, taking into account the peculiarities of future professional activity, have not been sufficiently investigated. To solve this problem, an interdisciplinary approach is needed, based on the integration of disciplines, ensuring the systematization, generalization and development of knowledge based on interdisciplinary connections using modern computer technologies and software complexes, which contributes to improving the technical level of knowledge of the future engineer. The SolidWorks software package is a hybrid parametric modeling system that is designed for the design of parts and assemblies in three-dimensional space with the ability to perform various types of analysis, as well as design documentation in accordance with the requirements of the ESCD.

SolidWorks uses the SD modeling method using a construction tree. In systems with a construction tree, the model is divided into structural elements during its creation and editing, which are controlled by dimensions. Therefore, automatically performed geometry changes turn out to be reliable and predictable. Given the very limited number of classroom hours in the curricula, which is currently allocated to the study of descriptive geometry (while maintaining the volume of the material studied), special attention should be paid to the content of practical classes, supplementing them with independent studies. When using CAD systems in self-study, students will have a great opportunity to consider special cases and various construction options, design geometric objects, etc. The presence of SolidWorks makes it possible to use it independently at home, which will allow you to master it in a shorter time. The use of SolidWorks in the study of descriptive geometry will also greatly increase interest in this discipline.

Working with the SolidWorks system allows you to solve the following tasks:

- to model products in order to create the design and technological documentation necessary for their release (details, assembly drawings, specifications, etc.);
- develop parametric models and drawings of standard parts.
- develop drawing and text-graphic documentation in accordance with standards and GOST standards;

The use of the SolidWorks 3D computer-aided design system in the educational process makes it possible to increase motivation to learn and acquire skills in mastering along with modern means of AutoCAD, Compass 3d, Inventor, ADEM CAD /CAM computer-aided design using modern computer technologies that ensure the effectiveness of professional activity in a competitive environment.

It should be noted that the range of tasks that are solved with the help of Solidworks is quite large and its application is not limited to simple geometric modeling. In general, the use of computer graphics and geometric modeling using software in the training of

specialists in the field of engineering and technology will raise the process of training self-thinking highly qualified personnel to a qualitatively new level.

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