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Efficiency Application of the "KOMPAS-3D" Program in the Educational Process

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ABSTRACT: This article shows the development of science and technology that requires constant adjustment and improvement of work programs. About the introduction of the KOMPAS-3D system in the educational process, which makes it possible to conduct training at a qualitatively new level? Students who study this program become high-class specialists who have all the necessary professional skills in modern conditions.

KEYWORDS: KOMPAS-3D, science and technology, educational process, training, high-class specialist, computer technology, CAD/CAM/CAE/PDM systems, intersection of two surfaces, cone, cylinder, frame.

I.INTRODUCTION

Widespread introduction of computer technologies in production involves the training of qualified specialists who can use modern computer-aided design systems [1]. High-quality training of a modern engineer can be implemented only on the basis of an integrated approach to the development of information technologies, which is based on an end-to-end system of training students using CAD/CAM/CAE/PDM systems that are actively used in industry.

How is this approach organized in practice? Starting from the first year, students are introduced to modern means of preparing design and technological documentation in parallel with the study of classical drawing. Then, the basic knowledge obtained at the departments, students use in the study of General technical disciplines: the theory of mechanisms and machines, machine parts. The logical conclusion of this process is the use of CAD systems at graduate departments in the preparation of course and diploma projects [2].

In most universities and colleges, CAD is firmly embedded in the educational process, but only a small part of the available technologies is used (usually only 2D design, less often-3D modeling).

When preparing training programs, you should pay attention to the trend of gradual displacement of two-dimensional design from the process of design and technological preparation of production. With a complete digital model of the product, manufacturing companies can manage data about the product throughout its life cycle (PLM concept). In addition to CAD systems, the industry uses CAE, CAM, and CAPP calculation packages. Advanced enterprises have created a single information space using PDM systems [3].

Another important aspect is the choice of a complex of computer-aided design systems for implementation in the educational process.

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This choice is determined by the following criteria:

- the degree of software distribution in the relevant industry;
- availability of development and terms of implementation in the educational process;
- complexity of the tasks to be solved (availability of all necessary modules in training);
- methodological support (books, available electronic materials, guidelines);
- the hardware requirements;
- the cost of the software.

ASCON has been supporting our education for many years. In complex programs delivered in universities and colleges includes design CAD KOMPAS-3D for three-dimensional modeling and KOMPAS-Graph for flat sketching, CAD processes, KOMPAS-Avtoproekt, electrical CAD KOMPAS-electrician, CAD stamps KOMPAS Stamp, and, most importantly, the system of electronic archive and document management KOMPAS Manager.

When studying Descriptive geometry, one of the most difficult sections is the section "Positional problems", which deals with methods for determining the position of a geometric body relative to the projection planes and the mutual position of two bodies. the Problem of the mutual intersection of two surfaces, seemingly purely geometric, is widely used in design practice. For example, when designing a tank-to-pipeline connection node, it may be necessary to correctly set the connection point, shape, and length of the connection line, and in a practical sense, the line of intersection of two surfaces. Students experience certain difficulties when studying problems on intersecting surfaces. Reading a textbook or lecture material does not always lead to positive results, since not all students are able to see spatial bodies behind a set of flat lines, points and notations [4,5].

The introduction of computer technologies in the educational process allowed us not only to teach students to automate the creation of design documents on the basis of KOMPAS-3D, but also to introduce a new work "Building a line of intersection of two surfaces on the basis of three-dimensional modeling". Cards were developed that present front and horizontal outlines of intersecting surfaces.

Students are asked to create solid-state models of intersecting surfaces using these cards on the display screen. Surfaces are created based on extrusion and rotation operations. As a result, students have the opportunity to see a model of intersecting surfaces (Fig. 1), as well as automatically calculate the length of the intersection line. Then, using the associative types, students will automatically receive the three projections of intersecting bodies (Fig. 2). Thus, students have the opportunity to compare a drawing obtained using a computer with one that was created by traditional methods (i.e., with manual drawing), get a complete picture of a three-dimensional object, divide it into final elements, which in the future will allow them to calculate, of course, with the help of appropriate software tools.

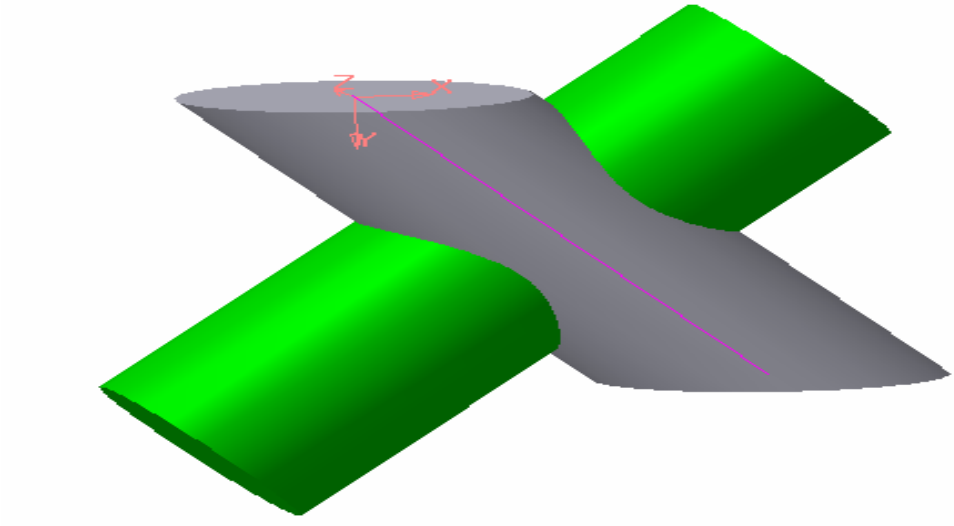

Fig. 1. Intersecting surfaces.

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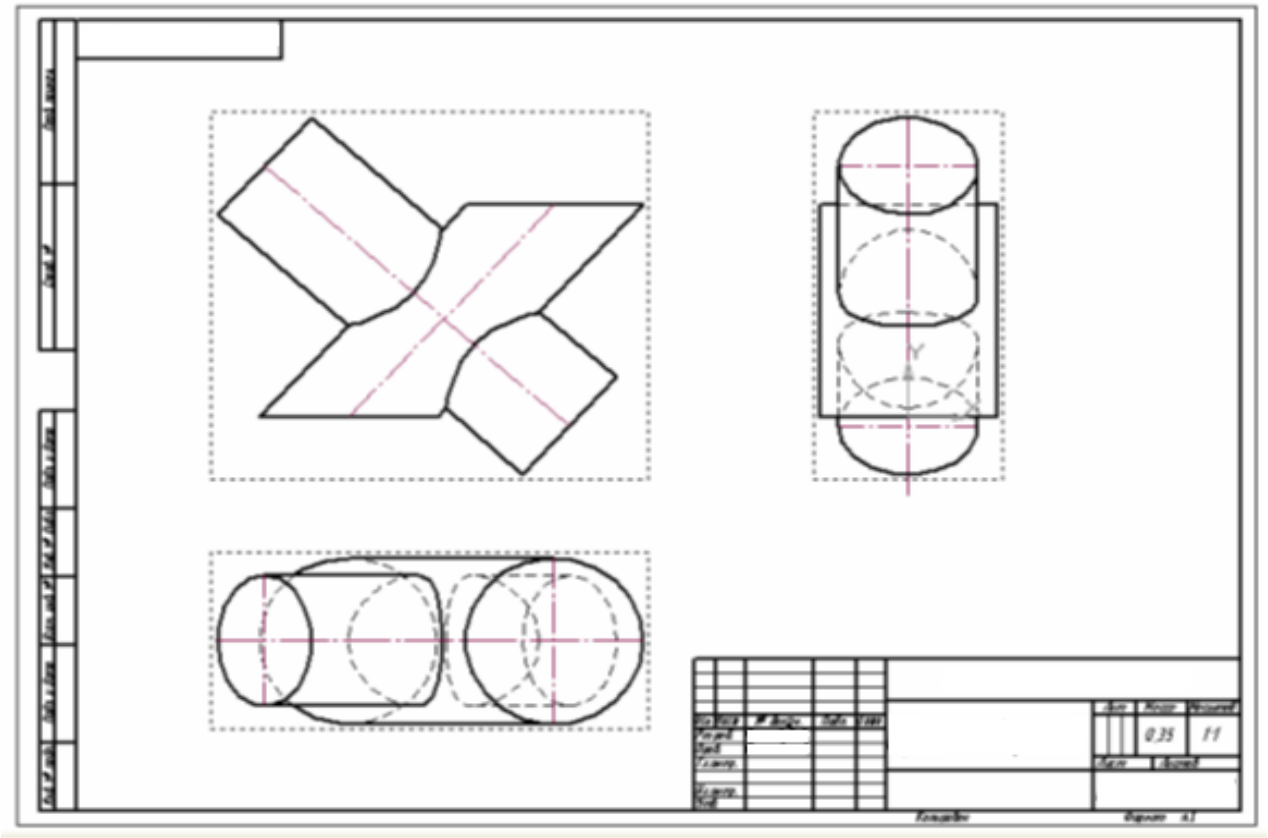

Fig. 2. Automatic construction of an intersection line between two surfaces.

In addition, it will be easy for students to imagine a model of the intersection of a cone with a cylinder (Fig.3) and the wireframe mode of the invisible contour line (Fig.4).

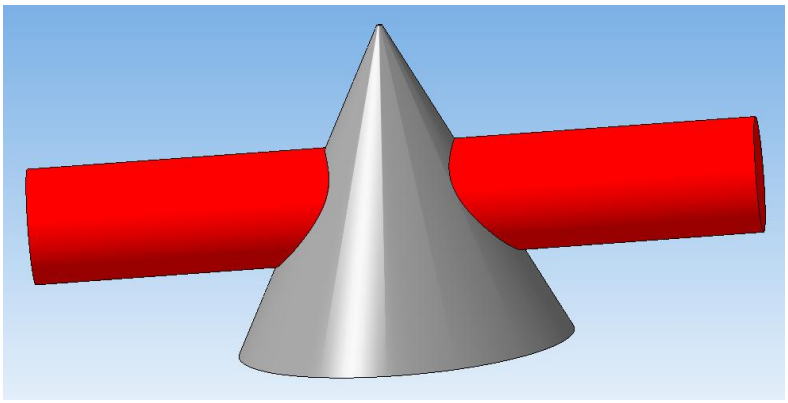

Fig. 3. Model intersection of a cone with a cylinder

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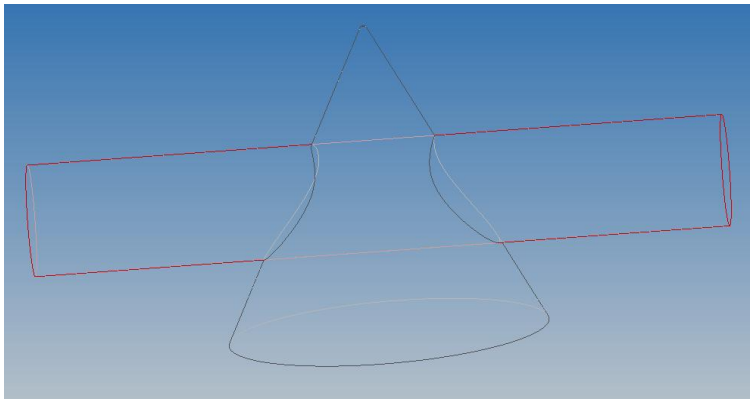

Fig. 4. Intersection of a cone with a cylinder in wireframe mode with lines of an invisible contour

A new direction of computer graphics — 3D modeling, which is based not on a drawing, but on a three-dimensional geometric model, has become widely used in various areas of human activity. Therefore, in the course of training at our University, considerable attention is paid to the methods of building three-dimensional models of parts and models of Assembly units. In this case, a special place is given to the use of parameterization.

KOMPAS-3D is used by teachers and in scientific research. Using this CAD, a new method has been developed for determining the contact area of the shaft with the surface of the sliding bearing and the amount of wear on the shaft. The method is quite simple and does not require complex calculations, while allowing you to get the necessary values with greater accuracy.

The KOMPAS-3D CAD system allows you to model real sliding bearing inserts, taking into account their different thicknesses obtained during the manufacturing process. In this case, not only two inserts can have different thickness, but also one insert for different sections. By connecting the liner models into a conventional sleeve and determining the position of the center of mass, you can select options in which the center of mass will have the smallest deviation from the theoretical model, and thus determine the most favorable combinations of inserts for optimizing the operation of the engine and other mechanisms and machines that use sliding bearings.

II.CONCLUSION

When carrying out the training process, it is necessary to remember that the development of science and technology requires constant adjustment and improvement of work programs. The introduction of the KOMPAS-3D system in the educational process makes it possible to conduct training at a qualitatively new level. Students who study this program within the disciplines of "Machine graphics" and "Computer graphics" become high-class specialists who have all the necessary professional skills in modern conditions.

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