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APPLICATION OF INTERACTIVE METHODS OF USING AutoCAD IN TEACHING THE SUBJECT "DRAWING GEOMETRY" IN TECHNICAL HIGHER EDUCATIONAL INSTITUTIONS

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Abstract
The article is intended to perfectly master computer technologies that meet the requirements of today, as well as to solve and explain the problems that students of technical universities study on the subject of "Geometry Drawings" using interactive methods in the AutoCAD program.

Keywords: computer technology, intelligence, plane, projection, command, object, point

In the twenty-first century, in the era of the development of technology, information, especially computer and information technologies, the Ministry of Higher Education has set an urgent task to teach students the most advanced methods of information and computer technologies in Technical Higher Educational Institutions of our Republic. In order to fulfill this task, the subjects “Computer Graphics” and “Drawing Geometry” have been included in the curriculum of almost all general engineering universities. The AutoCAD program was created to master the subjects “Computer Graphics” and “Drawing Geometry”. AutoCAD was created by the American company Autodesk in the early 1980s. Its initial versions aroused great interest among designers, technicians, and others. Because they really wanted to automate at least some of their projects. At that time, designers working in the fields of architecture, construction, and mechanical engineering spent a lot of time drawing their designs.

The first version of AutoCAD to be released in Uzbekistan was version 10, which ran on the MS DOS operating system. The eleventh, twelfth, and thirteenth versions of AutoCAD were also created on the MS DOS operating system. The fourteenth version was adapted for the Windows system.

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In 1999, the 15th version was named AutoCAD 2000. From year to year, the AutoCAD program has been improving. In the initial versions, it mainly included commands for drawing, editing and printing two-dimensional geometric objects, which mainly included simple primitives - that is, simple geometric shapes (section, rectangle, polygon, circle, arc, point, etc.). Currently, the AutoCAD system has become extremely developed, so its demand is increasing all over the world. In the latest versions, the ability to design extremely complex surface structures in 3D space is increasing.

The purpose of studying the subjects "Computer Graphics" and "Drawing Geometry" in AutoCAD at technical universities is to develop students' intelligence, to visualize various three-dimensional objects in space and their relationships, to develop thinking skills related to the logical analysis and generalization of spatial constructive-geometric structures based on graphic models of space in the form of two-dimensional drawings on a plane. This direction is provided at the level of knowledge determined by the educational standard.

In addition, the goal is to help students develop the skills to effectively apply their knowledge using graphics programs such as AutoCAD, create 2D drawings, and develop drawings in an automated system.

AutoCAD is an excellent and popular program that allows you to create any type of diagrams and drawings with high accuracy and quality.

In the process of mastering general engineering disciplines, the following are emphasized in the process of mastering the technologies of designing mechanical engineering details in the AutoCAD system and drawing their drawings step by step:

—The main goal of teaching geometric geometry and computer graphics is to teach students the procedure and rules for creating all types of graphic information in engineering and specialized disciplines - images such as drawings, diagrams and schemes in two or three dimensions using a computer.

"The main task of computer graphics is to teach students the knowledge and skills necessary to freely perform work on a computer to create models of design and technological processes using practical and operational programs and ready-made command packages." From this we can see that performing problems related to drawing geometry using the AutoCAD program increases students' spatial imagination and makes it easier to understand the sequence of solving problems.

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Problem: Let the horizontal, frontal, and profile traces of the triangle ABC plane with coordinates A(34 27 60); B(54 23 48); C(41 38 37) be constructed Pv; PH; Pw.

Solution:[4].

The AutoCAD program interface is switched to the 3D modeling section, from which the planes window opens.

The horizontal, frontal, and profile (H,V,W) planes of projections are constructed.

Using the PCK command from the PCK command panel, the coordinate axes are placed at the intersection point of the projection planes (coordinate origin) in the directions shown in Figure 1.

From the drawing toolbar, the point command is loaded and the coordinates of the ABC point are entered based on the following algorithm

1- The “Point” command is loaded;

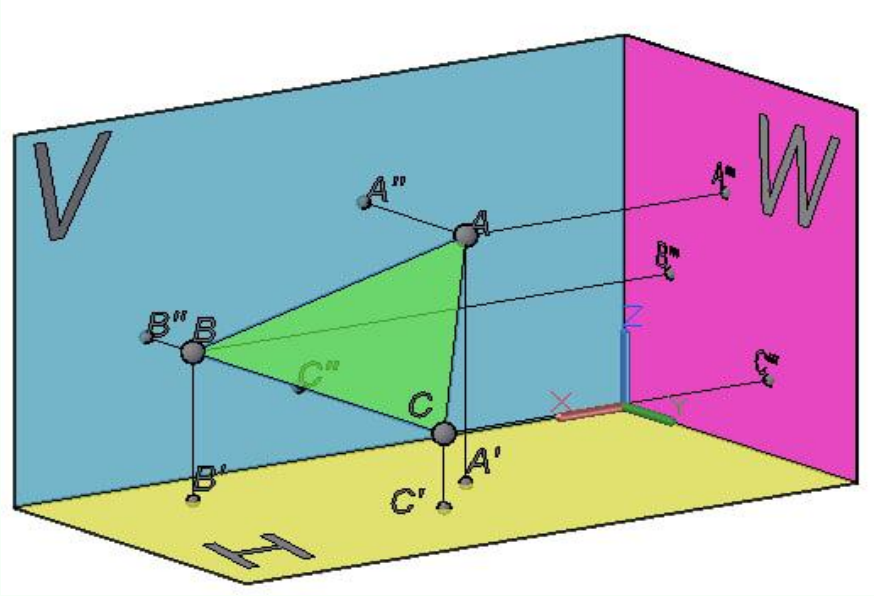
2- 2- (34,27,60Enter)

3-(54,23,48Enter)

4-(41,38,37Enter)

The resulting ABC points are combined using the “intersection” command to form a broken line of triangle ABC, and the horizontal, frontal and profile projections of the vertices of this triangle (A'A"A'"; B'B"B'"; C'C"C'") are determined

The resulting broken line triangle ABC is replaced with the plane of triangle ABC using the “plane” command from the planes section. (Figure-1).



1-figure

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The horizontal, frontal, and profile projections of triangle ABC (Δ A'A"A"'; Δ B'B"B"'; ΔC'C"C"') are constructed by combining the corresponding projections of the points using the intersection command (Figure-2).

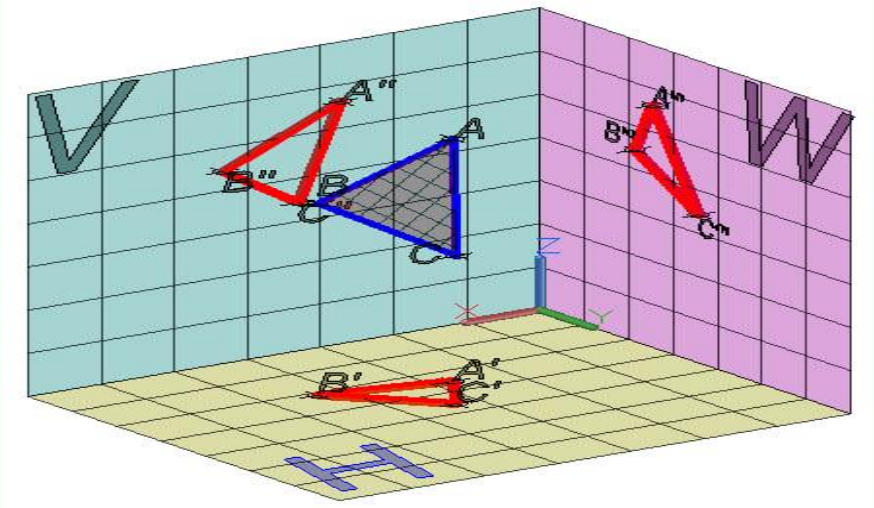

figure-2

We extend the side AB of the plane ABC using the “extend plane” command until it intersects the frontal plane, as a result, the plane of the triangle ABC intersects the horizontal plane H, forming a horizontal trace of the line PH

ΔABC ∩ H= PH

the plane of the triangle ABC intersects the frontal plane V, forming a frontal trace of the line PV ΔABC ∩ V= PV

the plane of the triangle ABC intersects the profile plane W, forming a profile trace of the line PW ΔABC ∩ W= PW (Figure-3)

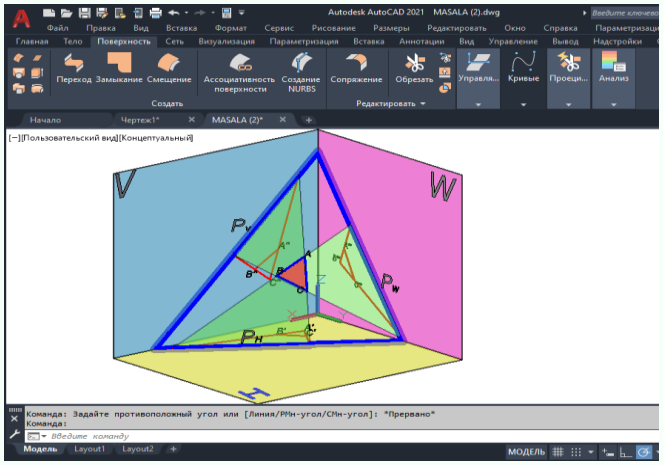

figure-3

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Answer: PH, Pv, Pw

From this we can see that a similar drawing is used in all geometry

-Point. Drawing projections of a point by coordinates

- Straight line. Determining the actual length of a straight line segment in a general situation and the angles of inclination to the projection planes.
- Determining the traces of a straight line.
- Dividing a straight line segment by a ratio. Mutual situations of two straight lines

-Plane. A point and a straight line lying on a plane.

- The main lines of a plane. Determining the traces of a plane
- Determining the line of intersection of planes in a general situation.
- Determining the shortest distance from a point to a plane.
- Problems on the parallelism and perpendicularity of planes
- Polygons. A point and a straight line lying on a polyhedron.
- Performing all problems such as determining the intersection of a polyhedron with a plane using the AutoCAD program creates some convenience for students, as they see the spatial solution sequence of the problem, it becomes easier to understand and imagine its essence.

In the near future, it is one of the current issues to conduct such disciplines as "Drawing Geometry", "Drawing", "Computer Graphics" and similar graphic work in large volumes in all technical higher educational institutions in Uzbekistan in the future using the AutoCAD program

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