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Intersection of Surfaces with Planes and Straight Lines in Drawing Geometry Formation of Lines in Computer Graphics

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Annotation. Thanks to the scientific research of a number of researchers in this regard, scientific results are being achieved, the practical application of which can give great results to the educational process. K.A. Grebennikov studied the problem of developing the pedagogical and technological basis of using computer graphics in the teaching of general professional subjects in the secondary special, vocational education system in the "Design" specialty. In this research work, a pedagogical model of using computer graphics in the professional training of expert designers in the secondary special vocational education system was created and the importance of computer graphics was revealed in it. E.M. In the scientific research conducted by Tretyakova, the technology of designing and implementing the content of "Computer graphics" for the construction specialty in vocational colleges was developed. A special course "Computer graphics" was designed and based on the model program developed for it, it was scientifically proven that it is possible to increase the knowledge and skills of students in using computer technologies.

Key words: computer graphics, graph, plane, surface, curve, point, top, frontal projection.

Introduction. The role and importance of "Computer graphics" science, which is currently being taught in higher education institutions, can be considered in the satisfaction of the material and spiritual needs necessary in our social life and in the wide range of opportunities for automating the work of all specialists. That is why, at the same time, computer graphics are divided into various fields in the HEIs of our Republic, creating methodical bases for using its capabilities in a number of fields, effective use of computer technologies and new fields that are entering our lives (specialized artist, special effector, vector art master, The issue of providing qualified specialists such as CAD-master, modeler, animator, texturist, visualizer, etc.) has led to an increase in the need to teach "Computer graphics" as a subject in HEIs. Today, the teaching of "Computer graphics" in HEIs is aimed at students

It is important to apply the necessary pedagogical and psychological tools in practice and their scientific justification when forming their actions and instilling the possibility of achieving a certain result.

It is known that before coming to OTM, if students have the necessary basic knowledge and skills in the subject of "Computer graphics", then they will develop the spatial imagination and the ability to read drawings, which are necessary in the field of graphics. This indicates that it is expedient to start the related courses from the secondary special vocational education system. Thanks to the scientific research of a number of researchers in this regard, scientific results are being achieved, the practical application of which can give great results to the educational process. K.A. Grebennikov studied the problem of developing the pedagogical and technological basis of using computer graphics in the teaching of general professional

subjects in the secondary special, vocational education system in the "Design" specialty. In this research work, a pedagogical model of using computer graphics in the professional training of expert designers in the secondary special vocational education system was created and the importance of computer graphics was revealed in it

E.M. In the scientific research conducted by Tretyakova, the technology of designing and implementing the content of "Computer graphics" for the construction specialty in vocational colleges was developed. In it, a special course "Computer graphics" was designed, and the possibility of improving the knowledge and skills of using computer technologies of the students trained on the basis of the sample program developed according to it is scientifically based and proved by experience. Also, in the scientific research conducted by D.C. Saidahmedova, the theoretical foundations of teaching the subject "Technical drawing" in vocational colleges using the possibilities of computer technologies were developed.

As a result of the research carried out by L.V. Pavlova, it is scientifically based that it is possible to use computer graphics in the education of graphic subjects and to develop the creative activity of students with the help of the AutoCAD graphic program.

M.V. In Matveeva's opinion, the illustrative function of computer graphics is fulfilled when students learn ready-made graphic, animated and video educational materials. If they acquire knowledge by creating a mathematical model of the studied object, the cognitive function of computer graphics is fulfilled. Illustrative and cognitive functions of computer graphics are conventionally distinguished.

The intersection of surfaces with a plane can consist of straight lines, broken lines, and curved lines. This point depends on the intersection of the plane and the surface and the mutual situation of the surface and the plane.

The shape of the line of intersection of the plane with the surface can be known before making it. Accordingly, a method of making it is chosen. If the intersection line is a straight line, find its two points, if it is a broken line, its breaking points (ends), if it is a curved line, its base (characteristic) and some arbitrary points , they are interconnected.

The line of intersection of curved surfaces with a plane is, in general, a curved line. constructing this line begins with finding its base points. The reference points include the points that are the edges of the surfaces - the points corresponding to their contours and the points that are at the furthest and closest distances from the projection planes. The remaining points are intermediate points. Since the points mentioned above belong to the surface, these points are the builders, frameworks, parallels, meridians, etc. of this surface. also applies to lines. Therefore, to make a line of intersection of a surface with a plane, it consists in finding the points of intersection of these lines of the surface and the plane.

To make a line of intersection of a linear surface with a plane, it is necessary to determine the points of intersection of the plane with each component of the surface.

So, making a line of intersection of a plane with a polygon or curved surfaces is based on finding the points of intersection of a straight line or curve with a plane.

Make a line of intersection of the moving elliptic cone H1(H1V) with the horizontal plane (Fig. 1). Several generators of the cone are drawn and their points of intersection with the cutting plane are determined.

The frontal projection of the cutting line A″B″ overlaps with the frontal trace of the cutting plane. Points A(A′, A″) and B(B′, B″) are the points that limit the section from the right and left sides. Their horizontal projections A′ and B′ are S′1′ and S′2′ and the horizontal projections of S1 and S2 passing through them. In order to make the intersection points of the H1 plane with the horizontal outline generators S′3′, S′4′ of the cone, the intersection points C″ and D″ of the trace of the plane H1V with the frontal projections S″3″ and S″4″ of these generators are determined. Projection connecting lines are drawn from these points and their points of intersection with S′3′, S′4′ formants C′ and D′ are found.

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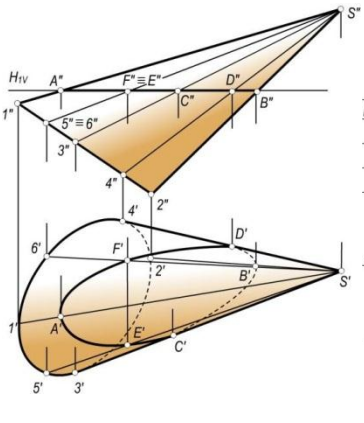

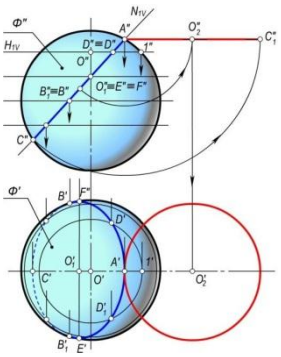

Figure 1. **Figure 2.**

In order to make intermediate points of the section, arbitrary points E″≡F″ are marked on the section A″B″. The frontal projections of the S″5″≡S″6″ components are passed through these points, and then E′ and F′ are marked on their horizontal projections S′5′ and S′6′. In this way, horizontal projections of several more points are made.

The visibility of the section in the horizontal projection is determined as follows. Points D′, F′, A′, E′, and C′ are visible for generators passing through points 4′, 6′, 1′, 5′, and 3′ of the cone. The remaining points are not visible. Based on this, the parts D′, F′, A′, E′, C′ of the section are connected by a continuous line, and the parts D′, B′, C′ are connected by a dashed line.

Make projections of the intersection line of the sphere with the N frontal projecting plane (Fig. 2).

The frontal projection A″C″ of the section coincides with the frontal trace of the plane NV. The horizontal projection of the section is made according to the condition that the points belong to the sphere. Since the points B and B1 belong to the equator of the sphere, their horizontal projections B′ and B1′ are marked on the outline of the horizontal projection. The horizontal projections of points A and C, and the points A′ and C′ lie on the horizontal projection of the prime meridian of the sphere.

In order to make horizontal projections D′ and D1′ of arbitrary points D and D1 belonging to the section, the HIV frontal trace of the horizontal plane is passed through the point D″≡D1″. This plane intersects the sphere with a circle of radius 0″1″. In the horizontal projection of this circle, points D′ and D′1 are generated. Horizontal projections of other arbitrary points in the interval are made in the same way. In horizontal projection, all points located above the equator of the sphere are visible, and points located below the equator are not visible. Accordingly, the horizontal projections of points A, D, D1, E, F, B and B1 located above the equator will show points A′, D′, D1′, E′, F′, B′ and B1′. The remaining points are not visible because they lie below the equator. Here A, B, B1 and C will be the base points. The picture shows the actual size of the cutting face by turning it.

Make the projections of the intersection line of the hyperbolic paraboloid with the parallelism plane M(MH) with the horizontal projecting plane (Fig. 3).

The horizontal projection of the intersection line is superimposed with the MH trace of the plane.

it falls over. To make its frontal projection, several generators of the hyperbolic paraboloid (curved plane) are transferred, and their points of intersection with the M plane are determined. For example, to make the point of intersection of the oblique plane a(a′, a″) with the plane M, the intersection point 2′ of the horizontal trace MH of the a′-generator and the intersecting plane is determined. Then the projection connection line is drawn from the point 2′ and the frontal projection 2″ on a″ is determined. Making the points 3(3′, 3″)…7(7′, 7″) of the section is done like making the point 2(2′, 2″).

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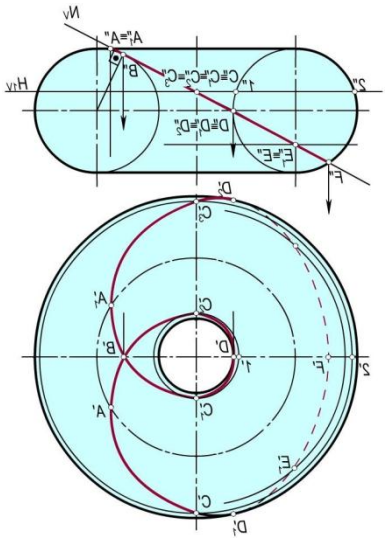

Figure 3.

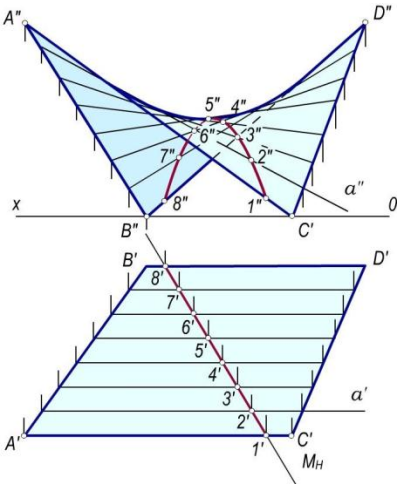

Figure 4.

Make the points of intersection of the oblong elliptic cylinder Φ with the given straight line a (Figures 5, 6).

Making intersection points E and E1 is done as follows:

an arbitrary plane Q parallel to the components of the cylinder is drawn through the given straight line. For this, an arbitrary point A belonging to the straight line a is determined, and through it, the straight line b is drawn parallel to the components of the cylinder. Intersecting straight lines a and b represent the auxiliary plane Q;

The intersection lines ℓ and ℓ1 of the cylinder Φ with the plane Q are made. For this, the line BC of intersection of the plane Q and the base plane P of the cylinder is made. The generators ℓ and ℓ1 (intersection lines) are passed through the

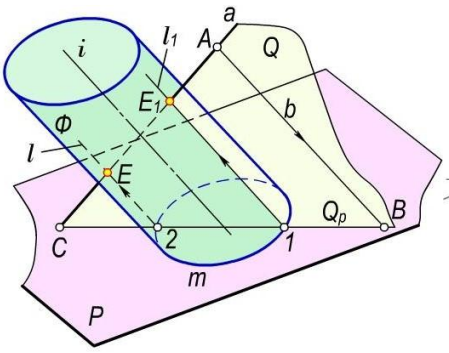

Figure 5.

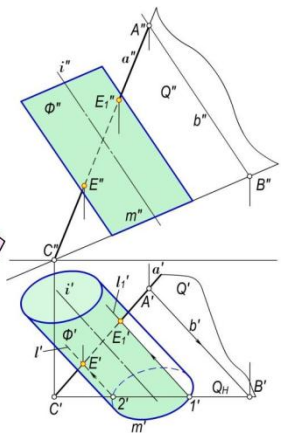

Figure6.

intersection points 1 and 2 of the straight line BC with the cylinder base m; the points of intersection of the generators ℓ and ℓ1 with a given straight line are determined E and E1.

Computer graphics are graphics on a computer or graphics created with the help of a computer. Computer graphics is used as a drawing and modeling tool. If computer graphics is understood as a picture on the monitor, then it can be said that computer graphics appeared at the same time as the computer. Sometimes, the birth of computer graphics is associated with the year when computer games appeared. In other words, computer graphics is one of the rapidly developing directions of new information technologies, and it forms the content of the automatic design system. "A modern automatic design system not only turns a drawing into an "electronic drawing", but computer technology is distinguished by the breadth of its database and the ability to use effective methods of geometric modeling of objects.

Conclusion. Working with information in graphic programs is focused on human vision, hearing and senses, that is, images and sound are widely used to provide information. The main goal is to convert

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information into images and sounds. Although there are many computer graphics programs available today, they differ from each other depending on the areas of mutual application. Specialists in each field choose a graphic program that is convenient for their activities. The capabilities of the programs are also focused on a specific field. Therefore, when choosing a graphic program, it is necessary to take into account its capabilities. In most cases, it is necessary to master other programs or disciplines before using a graphics program.

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1. Harvery Willard Miller. Descriptive Geometry. London, 2013.-149 pages
2. William Griswold Smith. Practical Descriptive Geometry. London 2013.-257 pages.
3. Azimov T.D. The drawing is the text of lectures on geometry. Study guide. - T.: TDTU, 2005.-228 p.
4. Azimov T.D. Drawing geometry. Study guide. - T.: TDTU, 2005.-228 p.
5. Azimov T.D. Nachertatel'naya geometry. Uchebnoe posobiya T.; TGTU, 2011.-167 c
6. Muradov Sh and others. Drawing geometry. Textbook for higher educational institutions -T: "Teacher", 2008-. 260 p.
7. Sabirova D. U. Drawing geometry and engineering graphics. Study guide. - T.: TDTU, 2011-140 p.
8. L. Heifetz "Engineering computer graphics" SpB: BXB.-Peterburg.: 2005.
9. Alimova D.K. Nacheltatel'naya geometry and engineering graphics. -T: Izd-vo "Science and Technology", 2016
10. Alimova D.K., Karimova V.N, Azimov A.T. Drawing, geometry, textbook for technical universities. -T,: "Barkamol fayz media", 2018 -173- p.
11. Kh Ravshanov, Kh Fayzullaev, I Ismoilov, D Irgashev, S Mamatov, Sh Mardonov. The machine for the preparation of the soil in sowing of plow crops under film. IOP Conference Series: Materials Science and Engineering
12. Khayriddin Fayzullaev, Farmon Mamatov, Bakhadir Mirzaev, Dilmurod Irgashev, Sodik Mustapakulov, Akram Sodikov. Study on mechanisms of tillage for melon cultivation under the film E3S Web of Conferences
13. D Irgashev. Improved plug-softener technology for working between garden rows. Science and innovation
14. D Irgashev, O Mamadiyorov, M Xidirov. Technical analysis of the disk working bodies that work the soil and them working between the garden row. Science and innovation
15. D Irgashev, L Daminov, S Mustapakulov. Обосновать параметры рыхлителя, для обработки между садовыми рядами
16. Ibrat Ismoilov, Dilmurod Irgashev. Justification of the Mutual Arrangement of the Working Bodies of the Machine for Preparing the Soil for Sowing Melons and Gourds Under the Tunnel Film. International Journal of Innovations in Engineering Research and Technology