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Different Images of Life Surround Us Everywhere

Jabbarov Anvar Egamovich [1], *Mamurova Feruza Islomovna* [2]

Annotation: Not every image of an object on a piece of paper allows you to accurately determine its geometric shape. Therefore, it is necessary that the image of the object be constructed according to certain geometric rules that allow moving from flat shapes to spatial shapes of the depicted object. Such a geometrically regular image of a spatial object on a plane is achieved using the projection method, which is the method of descriptive geometry.

Keywords: images, geometric shape, space, plane, descriptive geometry.

Descriptive geometry is one of the academic disciplines studied in higher technical educational institutions. She studies and substantiates ways of depicting spatial shapes (lines, surfaces, bodies) on a plane and ways of solving problems of a geometric nature based on given images of these shapes. In life, different images surround us everywhere. These are posters and photographs, advertisements and signs in front of shops, movie stills, etc. But we will be interested in images of objects that need to be manufactured in the future. At the same time, such images will be performed by one person, and another person will produce an object based on them. Therefore, both must not only see the shapes of a three-dimensional object from its two-dimensional image, but also be able to solve geometric problems to determine the size of the object and its individual parts, as well as determine the relative position of individual elements of the object. The rules and techniques of descriptive geometry make it possible to do this. Many technical problems can be solved analytically and graphically, while always choosing the most appropriate solution method. Many tasks are solved graphically faster and easier than analytically. Descriptive geometry helps the application of graphical methods for solving problems. Students of higher technical educational institutions study the course of descriptive geometry in the first semester of the first year. Freshmen who came from high school have not yet got used to the requirements of higher education, control from the teacher. After all, according to the Regulations on higher education, the teacher does not teach students, but only helps them acquire knowledge. To successfully master descriptive geometry, students must have sufficient knowledge in the field of stereometry. Even in high school, they should have learned basic information related to the relative position of straight lines in space, the relative position of a straight line and a plane, two planes, determining the magnitude of the angles between a straight line and a plane and two planes. Descriptive geometry is a new discipline for students compared to those studied in high school. A large number of new concepts, conventions, and designations are introduced here. Among the subjects studied at a technical university, applied technical drawing is of particular importance. It is one of the ways to express engineering thought in graphic form. To master the language of technical drawing, it is necessary first of all to study the rules ("ABC" and "grammar") of drawing and reading images. The "ABC" of a drawing is all those types of lines that are used in its execution (solid, dashed, dashed, etc.) and which students study in the course of mechanical engineering drawing.

The "grammar" of drawing is descriptive geometry, which studies ways to depict three-dimensional bodies having three dimensions (length, width and height) on a plane that has only two dimensions (length and width). Thus, the subject of descriptive geometry is the presentation and justification of ways to depict spatial shapes (lines, surfaces, bodies) on a plane and ways to solve problems of a geometric nature based on given images of these shapes. The meaning of descriptive geometry becomes clear from the definition — it develops the theoretical foundations of drawing. Images constructed according to the rules, 8 studied in the course of descriptive geometry, allow you to

[1],[2] Tashkent State Transport University

mentally imagine the shapes of objects, their mutual location in space, determine dimensions, and explore geometric properties. By studying descriptive geometry, students get acquainted with the methods of graphical problem solving. These methods, although they have less accuracy than analytical ones, can be successfully used, in particular, when solving problems using computers. This further enhances the role of descriptive geometry in engineering education. However, the importance of descriptive geometry is not limited to the listed factors. Spatial thinking and spatial imagination are extremely important for a future engineer, especially a design engineer. Descriptive geometry, causing increased work of spatial imagination, develops it. Most of the tasks solved by students in the course of descriptive geometry will not be encountered in their future engineering activities, but they will help the much-needed engineer develop spatial thinking and imagination. Descriptive geometry is necessary for a wide range of specialists: design engineers of machines and apparatuses, builders of various structures, architects, topographers, etc.

Descriptive geometry is faced with the following tasks: 1) teach you to build images of objects accurately enough; 2) teach you to read images, i.e. to represent them in space using the image of objects; 3) teach you to use images to solve geometric problems to determine the shape, position and size of an object; 4) develop students' spatial thinking, i.e. teach them to quickly and clearly represent spatial forms are in the mind (without which it is impossible to design and construct).

Projection method. Not every image of an object on a piece of paper allows you to accurately determine its geometric shape. Therefore, it is necessary that the image of the object be constructed according to certain geometric rules that allow moving from flat shapes to spatial shapes of the depicted object. Such a geometrically regular image of a spatial object on a plane is achieved using the projection method, which is the method of descriptive geometry. There are two main projection methods: 1) central (polar, conical) projection; 2) parallel (cylindrical) projection.

Central projection. Let's choose the plane π in space and a point S that does not lie in the plane π (Fig.1). The plane π is called the plane of projections, and the point S is the center of projection. The projection plane π and the projection center S define the apparatus of the central projection method. To construct a projection of some point A, a straight line should be drawn through the projection center S and a given point A until it intersects with the projection plane π at point A'.

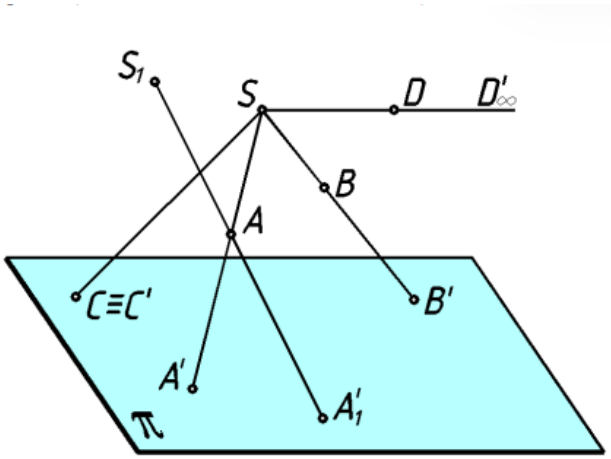

Fig.1

Point A' is called the central projection of point A, and the straight line passing through points S and A is the projecting line. Similarly, you can find projections of any point in space, for example, point B and point C. Point C lies in the plane of projections, so its projection coincides with the point itself When the central projection all projecting lines pass through the center of projection (point S). The projection drawing must have the property of reversibility, i.e. it allows you to determine their position in space from the projections of points. If the projection A' of point A and the projection center S are given, it is possible to construct a projecting line, any point of which will be projected to point A'. From this we can conclude that one projection of a point does not determine its position in space. If

you set the second projection center (point S1), then you can find another projection A'1 of point A. Having drawn the projecting lines SA' and SA'1, we will find the point of their intersection, which will determine the position of point A in space. Therefore, two projections of a point determine its position in space. When the expression "a point is given" is used in descriptive geometry, it means that two projections of it are given. If the point D is positioned in such a way that its projecting line SD is parallel to the projection plane π, then we will not be able to find its projection. There are countless such points, all of them belong to a plane parallel to the plane of projections π. In order to find its projection at any position of a point in space, it was necessary to reconstruct three-dimensional Euclidean space.

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