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GENERAL INFORMATION ABOUT AXONOMETRIC PROJECTIONS

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Abstract:
This article examines axonometric projections as a method for accurately and clearly representing three-dimensional objects on a plane based on the principle of parallel projection. Using this method, the spatial structure, dimensions, and shape of an object are represented simultaneously. Axonometric projections include isometric, dimetric, and trimetric types, which are widely used in technical drawing, engineering, and computer graphics.

Keywords: axonometric projection, isometric projection, dimetric projection, trimetric projection, parallel projection, technical drawing, spatial representation, 3D modeling.

Axonometric projections are considered one of the important methods for representing three-dimensional objects on a two-dimensional plane. This method is based on the principle of parallel projection, where projection rays remain parallel to each other and the viewpoint is assumed to be at infinity. As a result, axonometric drawings provide a representation that is clear and relatively proportional to the actual dimensions of the object.

A key feature of axonometric projection is that it simultaneously displays the three spatial coordinate axes—length (x), width (y), and height (z). This allows the three-dimensional structure of an object to be clearly represented within a single drawing. In this respect, axonometric representations are more comprehensible and visually informative than simple orthographic projections. This method is particularly valuable when explaining complex parts or engineering structures.

Axonometric projections are divided into three main types: isometric, dimetric, and trimetric projections. In isometric projection, the angles between all three axes are equal, typically 120°. In this case, all axes are equally scaled. Therefore, isometric projection is the simplest and most widely used type. It is commonly applied in technical drawings, educational materials, and computer graphics.

In dimetric projection, two axes are drawn with the same scale, while the third axis is represented at a different scale. Although this method is slightly more complex than isometric projection, it can provide a more realistic representation of certain objects. In trimetric projection, all three axes are scaled differently. This is the most complex but also the most flexible and precise method of representation. However, due to its complexity, it is used less frequently in practice.

One of the main advantages of axonometric projections is their ability to clearly and accurately represent the spatial form of an object. Such drawings make it easier to understand the internal structure of a component, the relationships between its parts, and the overall construction. In addition, measurements and interpretation of axonometric drawings are more convenient, which is highly important in engineering and manufacturing processes.

Below is the academically adequate English translation of your added text (continuing from the previous section):

At the same time, this method also has certain limitations. For instance, axonometric drawings do not fully correspond to real visual perspective, as distant objects do not appear reduced in size. As a result, the representation may seem somewhat artificial or schematic. In

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addition, depicting complex shapes using the trimetric method requires more time and experience.

Axonometric projections are widely applied in many fields such as mechanical engineering, construction, architecture, design, and computer graphics. For example, they are very useful in manufacturing mechanical parts for clearly illustrating their shapes, as well as in visually presenting architectural designs of buildings. Today, this method is also actively used in 3D modeling and visualization software.

Conclusion: In conclusion, axonometric projections represent one of the most important and practical methods for depicting three-dimensional objects on a plane, based on the principle of parallel projection. Through this method, not only the external appearance of an object but also its spatial structure, dimensions, and interrelationships between components can be expressed clearly and comprehensibly. Therefore, axonometric representations play a significant role in developing engineering thinking and in the reading and creation of technical drawings.

Axonometric projections include isometric, dimetric, and trimetric types, each of which is applied depending on specific tasks. While isometric projection is distinguished by its simplicity and convenience, dimetric and trimetric projections are more complex but can provide more precise and realistic representations in certain cases. This allows users to better understand objects from different perspectives.

At the same time, axonometric projections differ from other representation methods in that they do not fully reproduce real visual perspective. That is, distant objects do not appear smaller, which indicates the schematic nature of this method. However, this feature is precisely an advantage in technical drawing, as it facilitates accurate measurement and calculation.

Overall, axonometric projections not only ensure clear and comprehensible drawings but also contribute to the development of scientific and technical thinking by enabling complex objects to be represented in a simplified form. In modern technologies, particularly in computer graphics and 3D modeling systems, the fundamental principles of this method are widely applied. Therefore, studying and correctly using axonometric projections is considered an essential skill for any engineer, designer, or technical specialist.

REFERENCES

1. Yodgorov J. **Chizma geometriya.** – Toshkent: O‘qituvchi, 2018.
2. Solihov S.S., Karimov A.A. **Muntazam ko‘pyoqlar kesimlari.** – IJODKOR O‘QITUVCHI, 2025, 4-jild, 47-son.
3. **Cross section (geometry).** – Wikipedia, “Cross section of polyhedron” bo‘limi (ko‘rilgan sana: 2026).
4. Ko‘pyoqlarning tekislik bilan kesilishi va uning yoyilmasini yasash. – Referat materiali, 2024. (algoritmik qurish usullari).
5. Khojamov, Z. S. (2021). Problems of modeling on the subject" drawing geometry and engineering graphics". World Bulletin of Social Sciences, 5, 90-91.
6. Xujamov, Z. S., & Saparov, X. R. (2023). Formation of Graphic Literacy of Requirements in Drawing Lessons. Journal of Intellectual Property and Human Rights, 2(3), 24-26.
7. Khojamov, Z. S. (2021). Models of Computer Graphics of Special Curved Lines Lying on A Curved Surface. European Journal of Agricultural and Rural Education, 2(12), 85-88.