

Connections in Drawing and Their Place in Our Life

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Abstract. This article contains drawings of connections based on a standard, a smooth connection of two straight lines to each other, a smooth transition of two circles and a connection of two circles of different diameters to each other, as well as working with internal and external connections. This explains how to find connection nodes and the best ways to connect connection points.

Features of building connections in drawing lessons, which is one of the topical issues of modern pedagogy.

The purpose of the work is to study the place of joints in the development of adaptations encountered in our life and the best ways to draw them. The implementation of the connections in the drawing is extensively explained.

Information about connection centers, methods for finding connection points, and the formation of various connections is also disclosed. The use of unions in life, their examples and diagrams explaining which unions are used in these examples are shown.

Key words: parallel, perpendicular, circle, radius, diameter, joint, joint center, joint point, outer joint, inner joint, mixed joint.

Today, drawings in their manufacture are given great attention, they are subject to a number of specific requirements. Knowing all these requirements and mastering and understanding the various signs and rules adopted in the execution of the drawing, of course, requires special training and excellent graphic literacy.

It is known that various graphic representations of any inventive object are drawn, defined and tested for strength and durability through mathematical modeling through its geometry.

The execution of drawings and the solution of graphic problems should be well known and mastered by everyone, especially a specialist related to production.

A drawing is an image made with the help of special drawing tools based on certain laws and rules, and this is a document that gives us complete information about an object, that is, about its internal and external structure and dimensions.

In the current rapidly developing era, drawing occupies a special place in its production.

After all, every day our factories produce various machine tools, machines and mechanisms, household goods and much more. Drawing is a kind of graphic, international (international) language that is understandable to anyone literate in the field of technology, regardless of what language he speaks.

Drawings are sent from one factory to another, from one country to another. Any specialist who can read a drawing will understand them, he will study on their basis the structure of a complex machine. Therefore, anyone who wants to be literate in the field of technology must know and master drawing.

Drawing is a complex process that requires patience and diligence from the artist. Lines of the same type must be of the same thickness and evenly drawn. If a person has a well-developed sense of the hand, he can skillfully drive a pen on paper. Drawing plays a very important role in our life.

Today's production is impossible to imagine without drawings. The accepted ways of depicting things in technology have been created over many centuries. In production, it is necessary to know their drawings in order to manufacture a product, for example, parts of machines and mechanisms, and assemble them, as well as build buildings and structures. Because without drawings you can't do anything. An image that clearly shows the shape and dimensions of an object on a plane is called a complex drawing or, for short, a drawing. Standardization is important for accelerating technical progress, introducing comprehensive mechanization and automation of production, specializing and cooperating enterprises, improving product quality and reducing its cost.

In drawing, the norms of the drawing have the force of law. They are forced to be introduced at enterprises producing machinery and equipment, in design bureaus associated with industry, in all educational institutions.

Enterprises that produce goods prepare their products in accordance with the standards adopted for these products.

Previously, there were the following categories of standards: All-Union Standard (GOST); standards of sectors of the national economy (OST); republican standards (PCT); corporate standards (STP). On January 1, 1963, the CMEA standard (Union for Mutual Economic Assistance) was introduced. After that, GOST (CMEA) is affixed to the appearance. ESKD standards have been in force since 1971.

After Uzbekistan gains independence, all standards will be reformed. According to the Decree of the Cabinet of Ministers No. 93 dated March 2, 1992 on the organization of work on standardization in the Republic of Uzbekistan, the state standards of the former union GOST are used as the standard of the CIS countries. The Unified System of Construction Documents of the Republic of Uzbekistan (UzKHYT) was adopted on November 17, 2003 and received the designation UzDST 2.001:2003.

Any drawing is a conditional image, and it is drawn with lines of different thicknesses. UzDST 2.303:2003 approved the following types of drawing line:

The main connection is a thick contour line; 2. The strip is an invisible contour line; 3. Fine line; 4. dotted line; 5. Continuous wave line; 6. Double dash-dotted line; 7. Long thick lines. It is a graphical representation and implementation of lines.

We know that the science of drawing consists of "Geometric Drawing", "Projection Drawing", "Geometry Drawing", "Perspective Drawing", "Mechanical Drawing", "Construction Drawing" and "Topographic Drawing".

The Geometric Drawing section introduces the topic of simple geometric constructions, which examines the rules and methods for performing geometric constructions. These include drawing straight lines in various situations, dividing a section into equal parts, dividing a circle into equal parts, and making joins.

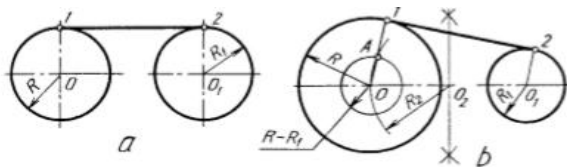
The article contains drawings, divided by the levels of complexity of the connections, which students of the geometric pattern should master, as well as guidelines on the sequence of their solution, as well as information aimed at testing the theoretical and practical knowledge gained.

Connections are connecting elements. When drawing detailed contours, it is often necessary to smoothly connect one line to another. Such drawings are called joints. Making connections along arcs of a circle is based on the features of the tendency of a straight line to a circle and a circle to a circle. Connections are made on the basis of certain laws and rules, in which the connection center, initial and last, i.e., are located. e. connection points. Only after that did they begin to establish ties.

a) Types of compounds and methods of their application. (Fig. 1, a) we see that two identical circles are connected to each other by a straight line. When drawing a straight line to the circles (Fig. 1, a), if the radii of the circles are equal to each other, their centers are connected and their radii are drawn perpendicular to the line O_1O_2 through O_1O_2 points. Then transition points 1 and 2 in the circle are determined.

If the radii of the circles on which the test line is drawn are of different sizes (Fig. 1, b), the difference between their radii is equal to $R-R_1$, an auxiliary circle is drawn from the center of the larger circle. If we draw an arc from $O_2(O_1G'2)$ with a radius of O_2O_1 , this arc intersects the auxiliary circle with center O at point A . If points O and A are connected and continued, transition point 1 is in a large circle. If O_1A is drawn parallel to O_1O_2 , transition point 2 is formed in a small circle.

If points 1 and 2 are connected, then a straight line is drawn to circles of different radii.



1-Figure.

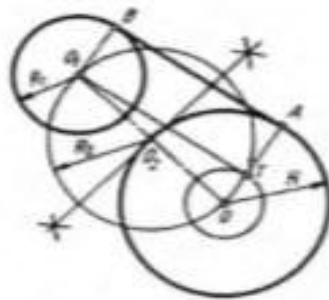
Circle attempt. The circle is drawn as desired. If from point A , at which the radius of the circle intersects, a line is drawn perpendicular to the radius, then an attempt at a circle will be drawn. (Fig. 2, a) When trying to move from point A outside the circle to the circle, point A is connected to the center of the circle O , and the distance OA is divided into two equal parts. An arc of a circle is drawn from point O_1 , passing through points O and T , and point A , crossing the circle, is connected to point O . If points T and A are connected, it is considered that an attempt to pass the circle started from point T . (Fig. 2, b)



2-Figure. (a) 2-Figure. (b)

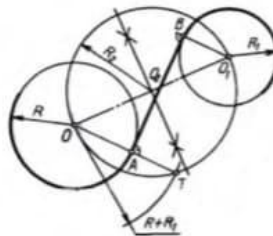
Figure 3). To test two circles of different diameters, their centers are connected and the distance OO_1 is divided into two equal parts. If we draw an auxiliary small circle from the point O with a radius $R-R_1$ passing through the centers of both circles from the point O_2 , then it intersects the auxiliary circle drawn from the point O_2 at the point T. If the points O_1 and T are connected, a straight line is formed that intersects the auxiliary small circle. If points O and T are connected and extended, it intersects the circle with center O at point A.

Drawing parallels O_1V and OA , we find a point V on a circle with center O_1 . If points A and V are connected, two circles will be attempted Figure (3)



3 Figure.

Two circles of different diameters are cut out at distance OO_1 , their centers are connected, and distance OO_1 is divided into two equal parts. An auxiliary circle passing through O and O_1 is drawn from the point O_2 . An auxiliary arc of a circle with radius $R-R_1$ is drawn from point O and point T is found. Points T and O are connected and point A is formed. Point V is determined by drawing a parallel from O_1 to OT . Points A and V are connected and an attempt is made to construct circles. On fig. 4 shows the connection of points A and B, found by drawing an auxiliary line on two circles of different diameters.

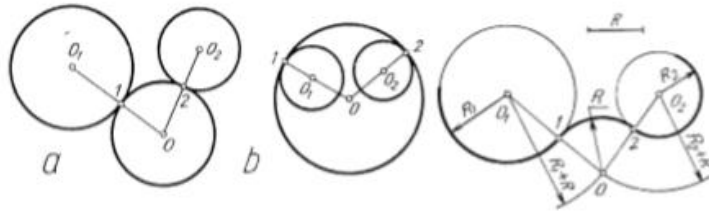


4- Figure.

Circles with centers O_1 and O_2 intersect external (Fig. 5, a) and internal (Fig. 5, b) circles with center O. So, there are external and internal connections when connecting circles to each other with an arc of a circle.

To connect the circles outside with an arc of a circle (Fig. 6,) by adding a given connection

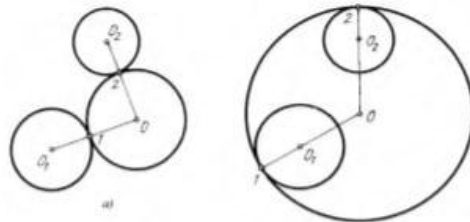
radius R to R_1 , arcs are drawn from O_1 with a radius equal to $R-R_1$, from O_2 with a radius equal to $R-R_2$, and from their intersection a bond center is formed O . If O and O_1 and O_2 are connected, then transition points 1 and 2 are in circles. Through the point O , these transition points are connected at the radius R .



5-Figure. 6-Figure.

External and internal connection of circles using an arc. If two circles are connected by a third circle trying to pass them from the outside, then such a connection is called an external connection of circles. (Fig. 7, a)

If the circles with centers O_1 and O_2 are connected to the inner side of the circle with center O , then such a connection is called an inner connection. (Fig. 7, b)



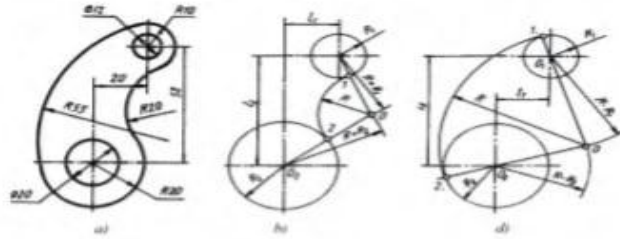
7-Figure. a) 7-Figure. b)

On fig. 8, a) shows a part with external and internal communication, first with external, then with internal communication. Performing an external connection, (Fig. 8, b) shows the external connection of two circles drawn from the centers O_1 and O_2 with radii R_1 and R_2 , respectively, using a given radius R . The center O of the intermediate circle should be located at a distance R from these circles. It is known that the distance from a point to a circle is measured along a radial line. Therefore, we draw arcs from the center O_1 with a radius R_1-R and from the center O_2 with a radius R_2-R . The intersection point of this arc will be the center of the joint O . Let's connect the center O with O_1 and O_2 and mark the points of their intersection with the numbers 1 and 2, respectively. 1 and 2 will be connection points. Now let's complete the construction by connecting them from the center O with radius R . Thus, the center of the joint in the outer joint of the circle O is found by adding the radius of the joint to the radii of this circle.

Perform an inner join. Circles with radii R_1 and R_2 and centers at points O_1 and O_2 should be connected with a radius R (Fig. 8, d), and it is required that the connection arc be concave to both circles, i.e. to its inner side.

Subtracting the radius of the given circle from the radius of the connection, arcs with a radius $R-R_1$ are drawn from the center O_1 , and also from the center O_2 with a radius $R-R_2$, forming a point O . If this center O is connected to the centers of this circle, the center lines

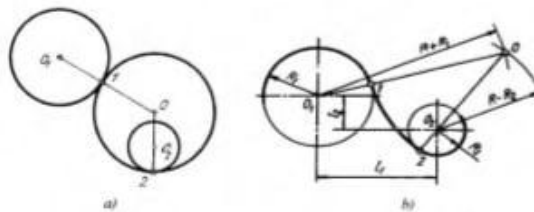
OO1 and OO2 will be straight. The circles defined by the extension of these lines intersect respectively, giving points 1 and 2 of the connection (internal attempt). Then points 1 and 2 are connected from point O with radius R.



8-Figure.

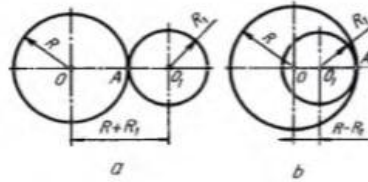
Creation of mixed connections. Circles with radii R_1 and R_2 and centers O_1 and O_2 , respectively, should be connected with a radius R , and the connection should be attempted to be made by the inner side of the small circle and the outer side of the larger circle, fig. 9a). Arcs are drawn from the center of a small circle O_2 with a radius $R-R_1$, as well as from the center of a large circle O_1 with a radius $R-R_2$. These arcs intersect, and the center of the connecting line gives the point O . By connecting the point O with the centers of the given circle O_1 and O_2 , the initial and final (trial) points 1 and 2 of the connection are determined. Then, from the center O , a connecting arc of radius R is drawn, passing through points 1 and 2 to both circles.

Arcs are drawn from the center of a small circle O_2 with a radius $R-R_2$, as well as from the center of a large circle O_1 with a radius $R+R_2$. These arcs intersect, and the center of the connecting line gives the point O . By connecting the point O with the centers of the given circle O_1 and O_2 , the initial and final (trial) points 1 and 2 of the connection are determined. Then, from the center O , a connecting arc of radius R is drawn, passing through points 1 and 2 to both circles. (Fig. 9, b)



9-Figure.

Connection of circles by mutual arcs. The intersection point of two circles lies on the line connecting their centers. (Fig. 9, a), b) If two circles touch each other with their outer sides (Fig. 10, a), then this is called an external connection, and if the smaller circle touches the inner part of the larger circle (Fig. 10, b), it is called an inner join. With an external connection, the center of the circle is $R-R_1$, and with an internal connection, their distance is $R-R_1$.

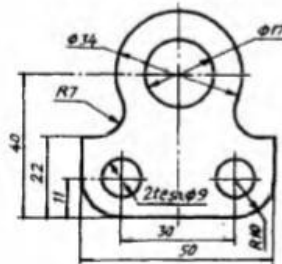


10-Figure.

An example of a connection in question is a bucket ear. (Fig. 11) the drawing shows the connection of a straight line with a circle and the connection between straight lines.

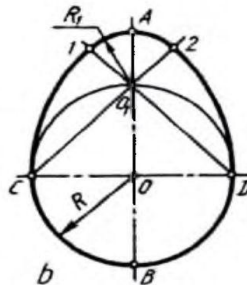
11-Figure.

Internal connection of two circles by an arc of a third circle (Fig. 12). For internal



connection of two circles with centers O_1 and O_2 with a given connecting radius R , first auxiliary arcs of a circle are drawn from the center O_1 along the radius R_1-R , then from O_2 along the radius R_2-R . As a result, the communication center O is determined.

One oval shape is a curved line with an ovoid-ovoid outline. It is convenient to pass it through the minor axis CD . A circle with a diameter CD is drawn, its intersection with the major axis AB is marked as O_1 . C and O_1 , D and O_1 connect and continue. Arcs with radius DC are drawn from point D to points 1 and 2 with radius CD . 12 arcs are rounded off from O_1 . (Figure 12).



12-Figure.

One kind of oval is a curved line with an ovoid-ovoid outline. It is convenient to pass it through the minor axis CD . A circle with a diameter CD is drawn, its intersection with the major axis AB is marked as O_1 . C and O_1 , D and O_1 connect and continue. Arcs with radius DC are drawn from point D to points 1 and 2 with radius CD . 12 arcs are rounded off from O_1 . (Fig. 12).

Summing up, we can say that in all aspects of our lives, school classrooms, university buildings, offices and even in all aspects of our lives, we need to conveniently use various

objects and round the edges, and in the process, the edges of the parts should not be uncomfortable for the person, and joints are always used in our lives to prevent injury.

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