Geometrical figures in engineering drawing pdf

The introduction of a strict interpretation of geometric design allows the use of only a compass and a tool for drawing straight lines, and with them the geometer, following mathematical theory, performs its decisions. In the technical drawing, geometry principles are used constantly, but the tools are not limited to the two main ones, as T-squares, triangles, scales, curves, etc. are used to build structures with speed and precision. Since there is a constant application of geometric principles, the methods given in this topic must be carefully mastered. It is assumed that students using this book understand the geometry of the plane and will be able to apply their knowledge. The designs given here allow themselves excellent practice in the use of tools. Remember that the results you get will be as accurate as your skill. Take care in measurement and drawing so that your drawings are accurate and professional in appearance. A. Points in Space A are the exact location in space or on the surface of the drawing. The point is actually represented in the picture by a cross in the exact place. The exact point in the space where the two lines of intersection intersect. When the point is located on the existing line, light, short dotted line or cross bar is placed on the line at the exact point. Never symbolizing the point in the picture; except for sketch locations. B. Line lines are straight elements that are not wide, but infinite in length (size), and they can be located by two dots that are not in the same place but fall along the line. Lines can be straight or curved lines. The straight line is the shortest distance between the two points. It can be pulled in any direction. If the line is uncertain and the ends are not fixed in length, the actual length is a matter of convenience. If the endpoints of the line are important, they should be marked with a small, mechanically drawn crossbar, as described by a pint in space. Straight lines and curved lines are considered parallel if the shortest distance between them remains the same. A symbol used for a parallel line/. Lines that are tangential and at 90º are considered perpendicular. The symbol of the perpendicular line ⊥. The corner of the corner is formed by the intersection of two lines. There are three main types of angles: right angels, sharp corners and blunt angles. The right angle is the angle of the 90º, the sharp angle of the corner is less than 900, and the blunt angle is more than 90º, the straight line is 180º. The symbol of the corner is (the only one) (Plural). To draw a angle, use an editorial, triangle, or protractor. D. Triangle triangle is a closed plane shape with three straight sides and their inner angles add up exactly 1800. Different types of triangles: right equilateral triangle, triangle of isoceles and blunt angular triangle. E. quadrialteral This plane figure is limited to four straight sides. When the opposite sides are parallel, the quadrilateral is also considered a parallelogram. F. The landfill is a closed plane shape with three or more straight sides. The most important of these landfills as they relate to the design is probably a triangle with three sides, a square with four sides, a hexagon with six sides, and an octagon with eight sides. G. Circle A is a closed curve with all the dots on the circle at one distance from the central point. The main components of the circle are diameter, radius and circumference. The diameter of a circle is a direct distance from one outer curved surface through the central point to the opposite outer curved surface. The radius of a circle is the distance from the central point to the outer curved surface. The radius is half the diameter, and is used to set up a compass when drawing a diameter. Central corner: this is an angle formed by two radial lines from the center of the circle. Sector: this is the circle between the two radial lines and the circle. Quadrant: This is a sector with a central angle of 900 and usually with one of the radial lines oriented horizontally. Chord: this is any straight line, the opposite ends in the circumference of the circle. Segment: this is a smaller part of the circle divided by a chord. Concentric circles are two or more circles with a common central point. Eccentric circles are two or more circles without a common center point. A semicircle is half a circle. H. Solid Bodies They are geometric shapes, limited by plane surfaces. Surfaces are called faces, and if they are equal to conventional landfills, solids are common multi-edras. Methods of geometric structures To build the above geometric shapes we need to know some principles and procedures of geometric design. Thus, the remainder of this chapter is devoted to illustrating the step-by-step geometric design used by compilers and technicians to develop different geometric shapes. A. How to divide a line or arc to split the line in half or find its central point. In this process, the line will also be built at an exact central point at exactly 90º. Considering: Line A-B. Step 1: Set the compass about two-thirds the length of the A-B line and swing the arc from point A. Step 2: Using exactly the same compass setting, swing the arc from point B. Step 3: At two intersections of these arcs, find points D and E. Step 4: Draw a direct point of connection D with point E. Where that line crosses the A-B line, it shares the A-B line. The D-E line is also perpendicular to the A-B line at the exact central point. B. How to divide a line by a number Considering: Line A-B. Step 1: Draw a AC construction line that starts at the end of the AB line. This new line is longer than this line and makes the angle no more than 300 with it. Step 2: Find a scale that roughly divides the AB line by the number of parts you need (11 in the example below) and mark those divisions on the AC line. Currently, the AC line (11 in this example) has equal separations from A to D. Step 3: Set an adjustable triangle to draw a construction line from point D to point B. Then draw the construction lines through each of the remaining 'n-1' divisions, parallel to the first BD line, moving the triangle along the straight edge. The AB's original line will now be exactly split. C. How to divide a corner to divide a corner means to split it in half or cut it into two equal angles. Considering: BAC Corner. Step 1: Set the compass in any convenient radius and swing the arc from point A. Step 2: Find E and F points on the legs of the angle, and swing two arcs of the same same length from E and F points, respectively. Step 3: Where these arcs intersect, find point D. Draw a straight line from A to D. This line will tease the BAC angle and set two equal angles: CAD and BAD. D. How to draw an arc or circle (radius) through three these points: Three dots in space at random: A, Band C. Step 1: With a straight line, lightly connect points A to B, and B to C. Step 2: Using the method outlined to separate the line, the A-B and B-C lines. Step 3: Find point X where two extended bisections meet. Point X is the exact center of the arc or circle. Step 4: Place the compass point on point X and adjust the lead to any of the points A, B or C (they are at the same distance) and swing the circle. If all the work is done correctly, the arc or circle must pass through each point. E. How to draw a line parallel to a straight line at a given distance: the A-B line and the required distance to the parallel line. Step 1: Set the compass at the required distance to the parallel line. Place the compass point anywhere on the given line, and swing the light arc, the radius of which is a necessary distance. Step 2: Adjust the straight edge of either the editorial machine or the adjusted triangle so that it sticks out with the A-B line, slide the straight edge up or down to the extreme high point, which is the tangent point of the arc, then draw a parallel line. F. How to draw a line parallel to a curved line at a given distance: A-B curved line, and the required distance to a parallel line, Step 1: Set the compass at the required distance to the parallel line. Starting at both ends of the curved line, place the compass point on the given line, and swing a series of light arcs along the given line. Step 2: Using an irregular curve, draw a line along the extreme highs Arc. G. How to draw perpendicular lines to the line at point method 1 Given: Line A-B with P point on the same line. Step 1: Using P as a center, make two arcs of equal radius or a more continuous arc (R1) to intercept the A-B line on either side of point P, at points S and T. Step 2: Swings more, but equal arcs (R2) from each of the points S and T to cross each other at point U. Step 3: Line from P to U perpendicular line A-B at point P. H. How to draw perpendicular line at point method 2 Given : A-B line with P point on the line. Step 1: Swing arc of any convenient radius, whose center O is in any convenient location is not on the A-B line, but is positioned to make the arc of the A-B cross line at points P and z. Step 2: The line from point to center O intercepts the opposite side of the arc at point R. Step 3: R-P line perpendicular to the A-B line (right angle was in the halfway corner). J. How to draw perpendicular lines from a point not on the line, given: Line A-B and Point P. Step 1: Using P as a center, swing arc (R1) to intercept the A-B line at points G and H. Step 2: Swing more, but equal to the length of the arc (R2) from each of the G and H points to intercept each at point J. Step 3. : P-J line perpendicular to the A-B line. J. How to draw a triangle with known lengths of the sides: lengths 1, 2 and 3. Step 1: Draw the longest length line, in this example length 3, with ends A and B. Swing arc (R1) from point A, the radius of which is either a length of 1 or a length of 2; in this example, the length is 1. Step 2; Using a radius length not used in step 1, swing the arc (R2) from point B to intercept the arc, swung from point A to point. Step 3: Connect A to C and B to C to complete the triangle. K. How to draw a square method-1 Considering: The location of the center and the necessary distance on the sides of the square. Step 1: Lightly draw a circle with a diameter equal to the distance on the sides of the square. Place the compass on half the required diameter. Step 2: Using triangles, lightly complete the square by building tangent lines to the circle. Allow light construction lines for the project with an area, with the erasure of them. Step 3: Check that there are four equal sides and, if so, darkens in a real square using the correct thickness of the line. Method-2 Considering one side of AB. Through point A draw perpendicular. With A as a center, and AB as radius; draw an arc to cross perpendicular to C. C. B and C as centers, and AB as a radius, percussion arcs intersect on the D. Draw cd and BD lines. L. How to draw the Pentagon (5 sides) Given: The location of the Pentagon center and the diameter to be limited to the pentagon. Step 1: Two-section OD radius on C. Step 2: C as center, and CA as radius, AE impact arc. With A as center, and AE as radius, the impact of the EB arc. Step 3: Draw line AB and then set off AB distance around circle, and draw the hand through these points. M. How to draw a hexagon (6 sides) N. To draw any one-way regular landfill to build a conventional landfill with a certain number of sides, divide this diameter using the parallel line method, as shown in the figs below. In this example, let's assume seven sides of the regular landfill. Build an equilateral triangle (0-7-8) with a diameter (0-7) as one of its sides. Draw a line from the top (point 8) through the second point on the line (point 2). Expand the line to 8-2 until it crosses the circle at point 9. The radius of 0-9 will be the size of each side of the shape. Using a radius of 0-9 steps from the corners of the seven sides of the landfill and connect the dots. O. Draw a tangent circle to the line at this point Given: Given the AB line and the point on the line. Step 1: On P erect perpendicular line. Step 2: Set aside the radius of the required circle perpendicular. Step 3: Draw a circle with a CP radius. P. Draw tangent to circle through point-1 method Considering: Point P on the circle. Move the T-square and triangle as a unit until one side of the triangle passes through point P and the center of the circle; then slide the triangle until the other side passes through point P and draw the required tangent line. Method-2 Considering: Point P outside the circle. Move the T-square and triangles as a unit until one side of the triangle passes through point P and, by inspection, is tangent to circle; and then slide the triangle until the other side passes through the center of the circle and slightly mark the tangent point T., finally move the triangle back to its original position and draw the required tangent. To draw tangents to two circles Move the T-square and triangles as a unit until one side of the triangle is tangent, by inspection, to two circles; then slide the triangle until the other side passes through the center of one circle and slightly mark the tangent point. Then slide the triangle until the side passes through the center of the other circle, and mark the touch point. Finally, slide the triangle back into a tangent position and draw tangent lines between the two tangent points. Draw a second touches in the same way. R. How to build an arc against a corner, given: straight angle, lines A and B and the required radius. Step 1: Set the compass in the required radius and, to the side, swing the radius from Line A and one from Line B. Step 2: From the extreme high points of each radius, build a light line parallel to Line A and the other line parallel to Line B. Step 3: Where these lines intersect the exact location of the desired swing point. Set the compass point at the swing point and slightly build the required radius. Allow the swing radius to extend past the required It is important to find all the tangent points (T.P) up to Step 4: Check all the work and darken in the radius using the correct thickness of the line. It darkens when direct lines are connected as needed. Always build a compass work first and then straight lines. Leave all the light construction lines. C. How to build an arc concerning two radii or diameters: Diameter A and Arc B with central points are located, and the required radius. Step 1: Set the compass in the required radius and, to the side, swing the radius of the required length from the point on the circumference of a given diameter A. Out of the way, swing the required radius from point to circle B. Step 2: From the extreme high points of each radius, build a light radius beyond a given radius A and B. Step 3. A: Where these arcs intersect, the exact location of the desired swing point. Set the compass point at the swing point and slightly build the required radius. Allow the swing radius to extend past the required area. Step 4: Check out all the work; darkens in radii using the correct thickness of the line. Darkens arcs or radii in a consistent order from left to right or right to left, thus creating a smooth connecting line that has no visible changes in direction. T. To draw an ellipse (by four-center method) Join 1 and 3, dismissal 3-5 equals 01-03. This is done graphically, as indicated in the figs. Below is a swinging 1 around 5 with O as a center, where currently 03 out of 05 is 3-5; distance required. With 3 as a center, the arc is 5 to 1-3 finds 6. The 1-6 perpendicular transition is 0-1 at 9 and crossing 0-4 is made (if necessary) in 10. Make 0-9' equal 0-9, and 0-10' equal 0-10. Then 9, 9', 10 and 10' will be centers for four tangents of the circle, forming a curve close to the shape of the ellipse. U. How to draw an Ogee curve Ogee curve is used to attach two parallel lines. It forms a gentle curve that changes itself in a neat symmetrical geometric shape. Considering: Parallel lines A-B and C-D. Step 1: Draw a straight line connecting the space between parallel lines. In this example, from point B to point C. Step 2: Make a perpendicular bicector to the B-C line to set point X. Step 3: Draw perpendicular to the A-B line at point B to cross the B-X perpendicular biscector, which finds the first desired swing center. Draw perpendicular to the C-D line at point C to cross the perpendicular CX bisector, which finds the second necessary swing center. Step 4: Place the compass point and adjust the compass leading to point B, and swing the arc from B to X. Place the compass point on the second swing point and swing the arc from X to C. This completes the ogi curve. Curve.