SECTION 1. Terms and Definitions

1.00 The following terms are basic and will be referred to in subsequent sections.

1.01 **Gears** are machine elements that transmit motion by means of successively engaging teeth. (Figure 1.1)

1.02 **A Gear** is any machine part with gear teeth. Of two gears that run together, the one with the larger number of teeth is called the gear. (Figure 1.1)

1.03 **A Pinion** is a gear with a small number of teeth. Of two gears that run together, the one with the smaller number of teeth is called the pinion. (Figure 1.1)

1.04 **A Rack** is a gear with teeth spaced along a straight line, and suitable for straight-line motion. (Figure 1.1)

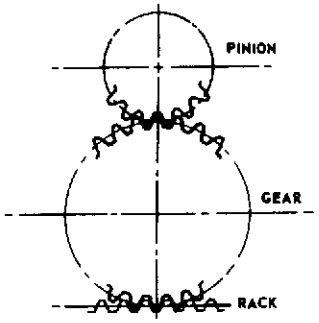

FIGURE 1.1 — GEARS

1.05 **A Worm** is a gear with one or more teeth in the form of screw threads. (Figure 1.2)

1.06 **A Wormgear** is the mate to a worm. A wormgear that is completely conjugate to its worm has line contact and is said to be single enveloping. It is usually cut by a tool that is geometrically similar to the worm. An involute spur gear or helical gear used with a cylindrical worm has only point contact. (Figure 1.2)

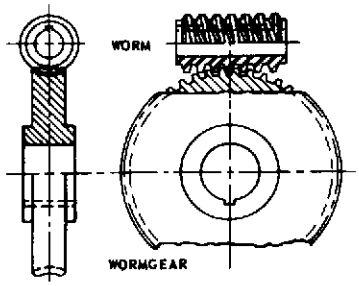

FIGURE 1.2 — WORMGEARING

1.07 **A Helical Gear** is cylindrical in form and has helical teeth. (Figure 1.3)

1.08 **Parallel Helical Gears** operate on parallel axes and, where both are external, the helices are of opposite hand. (Figure 1.3)

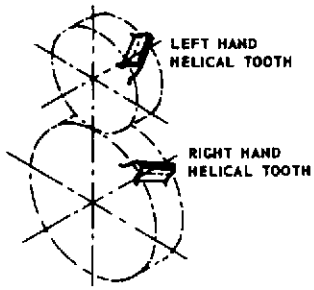

FIGURE 1.3 — PARALLEL HELICAL GEARS

1.09 **Crossed Helical Gears** operate on crossed axes and may have teeth of the same or opposite hand. The term Crossed Helical Gears has superseded the old term "Spiral Gears." (Figure 1.4)

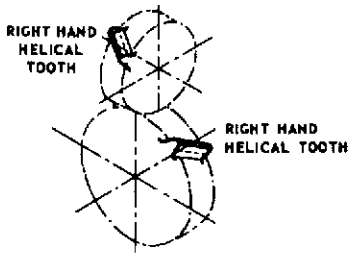

FIGURE 1.4 — CROSSED HELICAL GEARS

1.10 **Bevel Gears** are conical in form and operate on intersecting axes which are usually at right angles. (Figure 1.5a)

1.11 **Miter Gears** are mating bevel gears with equal numbers of teeth and with axes at right angles. (Figure 1.5b)

1.12 **Straight Bevel Gears** have straight tooth elements, which if extended, would pass through the point of intersection of their axes. (Figure 1.5a)

1.13 **Angular Bevel Gears** are bevel gears in which the axes are not at right angles. (Figure 1.5c)

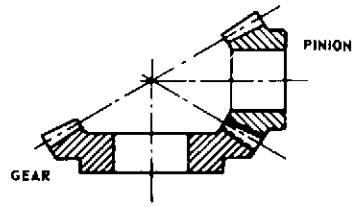

FIGURE 1.5a — BEVEL GEARS

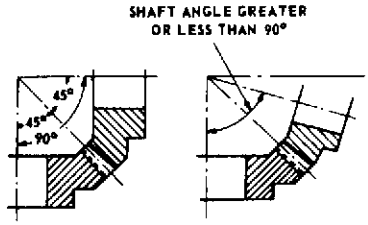

FIGURE 1.5b — MITER GEARS

FIGURE 1.5c — ANGULAR BEVEL GEARS

1.14 **An Internal Gear** is one with the teeth formed on the inner surface of a cylinder or cone. An internal gear can be meshed only with an external pinion (Figure 1.6)

1.15 **An External Gear** is one with the teeth formed on the outer surface of a cylinder or cone. (Figure 1.6)

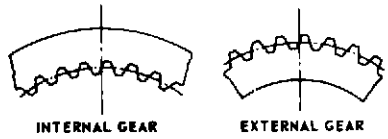

FIGURE 1.6 — INTERNAL & EXTERNAL GEARS

1.16 **The Axial Plane** of a pair of gears is the plane that contains the two axes. In a single gear, an axial plane may be any plane containing the axis and a given point. (Figure 1.7)

1.17 **The Pitch Plane** of a pair of gears is the plane perpendicular to the axial plane and tangent to the pitch surfaces. A pitch plane in an individual gear may be any plane tangent to its pitch surface. The pitch plane of a rack or crown gear is the pitch surface. (Figure 1.7)

1.18 **A Transverse Plane** is perpendicular to the axial plane and to the pitch plane. In gears with parallel axes, the transverse plane and plane of rotation coincide. (Figure 1.7)

1.19 **A Plane of Rotation** is any plane perpendicular to a gear axis. (Figure 1.7)

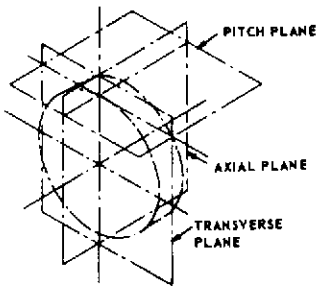

FIGURE 1.7 — PITCH, AXIAL & TRANSVERSE PLANES

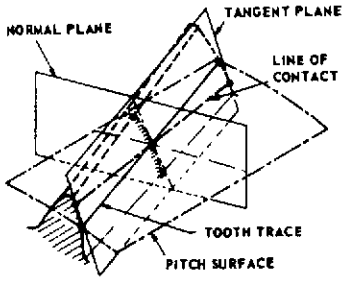

FIGURE 1.8 — NORMAL & TANGENT PLANES

1.20 **A Normal Plane** is in general normal to a tooth surface at a pitch point, and perpendicular to the pitch plane. (Figure 1.8)

1.21 **A Tangent Plane** is tangent to the tooth surfaces at a point or line of contact. (Figure 1.8)

1.22 **Circular Pitch** is the distance along the pitch circle or pitch line between corresponding profiles of adjacent teeth. (Figure 1.9)

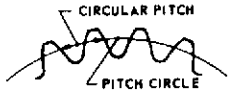

FIGURE 1.9 — CIRCULAR PITCH

1.23 **Normal Circular Pitch** is the circular pitch in the normal plane, and also the length of the arc along the normal helix between helical teeth or threads. (Figure 1.10)

1.24 **Axial Pitch** is linear pitch in an axial plane and in a pitch surface. In helical gears and worms, axial pitch has the same value at all diameters. In gearing of other types, axial pitch may be confined to the pitch surface and may be a circular measurement. (Figure 1.10)

The term axial pitch is preferred to the term linear pitch. The axial pitch of a helical worm and the circular pitch of its wormgear are the same.

1.25 **Transverse Circular Pitch** is the circular pitch in the transverse plane. (Figure 1.10)

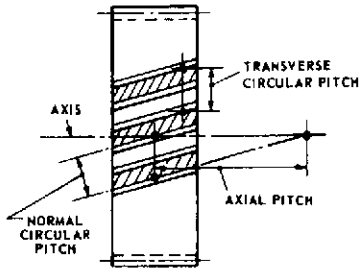

FIGURE 1.10 — NORMAL, TRANSVERSE & AXIAL PITCH

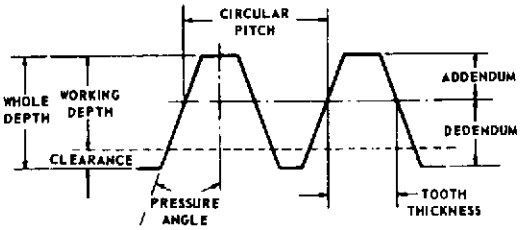

FIGURE 1.11 — BASIC RACK (NORMAL PLANE)

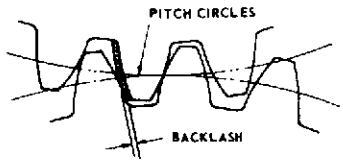

FIGURE 1.12 — BACKLASH

1.26 **Addendum** is the height by which a tooth projects beyond the pitch circle or pitch line; also, the radial distance between the pitch circle and the addendum circle. (Figure 1.11)

1.27 **Dedendum** is the depth of a tooth space below the pitch circle or pitch line; also, the radial distance between the pitch circle and the root circle. (Figure 1.11)

1.28 **Clearance** is the amount by which the dedendum in a given gear exceeds the addendum of its mating gear. (Figure 1.11)

1.29 **Working Depth** is the depth of engagement of two gears; that is, the sum of their addendums. (Figure 1.11)

1.30 **Whole Depth** is the total depth of a tooth space, equal to addendum plus dedendum, also equal to working depth plus clearance. (Figure 1.11)

1.31 **Pitch Diameter** is the diameter of the pitch circle.

1.32 **Outside Diameter** is the diameter of the addendum (outside) circle.

1.33 **Backlash** is the amount by which the width of a tooth space exceeds the thickness of the engaging tooth on the operating pitch circles. (Figure 1.12)

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