

Boston Gear[®] Open Gearing

Mounting, Assembly and Lubrication of Boston[®] Gears

Doc. No. 57792

Open Gearing



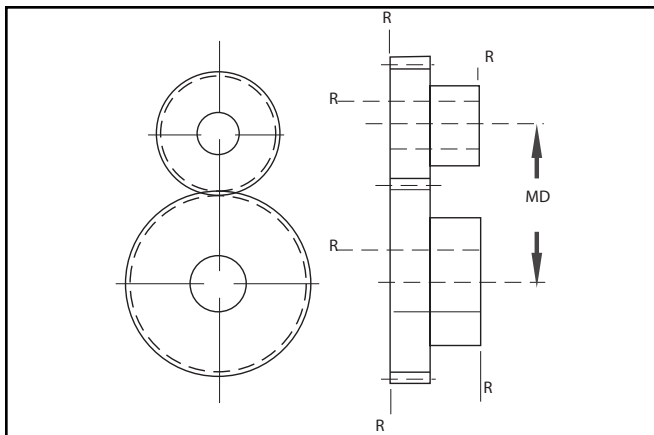
For more than a century, Boston Gear has offered the most complete line of gears available to meet the increasing demands of modern power transmission. From fine pitch brass, plastic and stainless steel gears, for "hi tech" applications to rugged steel and cast iron gears for heavy duty applications. Boston gears set the quality standard for the industry.

Boston Gear also produces a wide variety of customer gears for individual applications. From a simple rebore or keyway to highly complex configurations, our engineering staff specializes in finding the right solutions to your gearing applications.

SPUR GEAR PAIR

Boston spur gears will provide long trouble free operation when properly mounted and lubricated. There are several important considerations in mounting these gears:

- 1) Axes must be parallel for proper tooth bearing.
- 2) Endwise location is necessary to keep faces aligned.
- 3) Mounting distance must be correct to provide backlash.



$$\text{Mounting Distance} = \frac{\text{Gear P.D.} + \text{Pinion P.D.}}{2}$$

P.D.'s for all spur gears are listed in Boston Catalog.

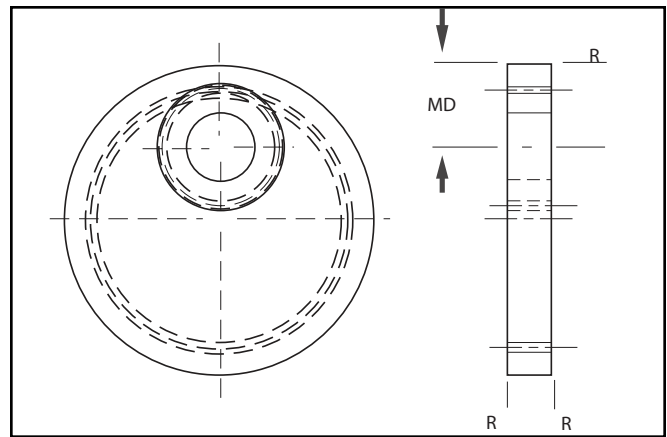
SPUR GEAR AND INTERNAL GEAR

Preferred mounting of an internal gear is from its outside diameter and one face. Mounting considerations for spur gear pairs apply.

$$\text{Mounting Distance} = \frac{\text{Internal P.D.} - \text{Pinion P.D.}}{2}$$

SYMBOLS

- R** = Reference Surfaces
- M.D.** = Mounting Distance
- T** = Direction of thrust load (when present)

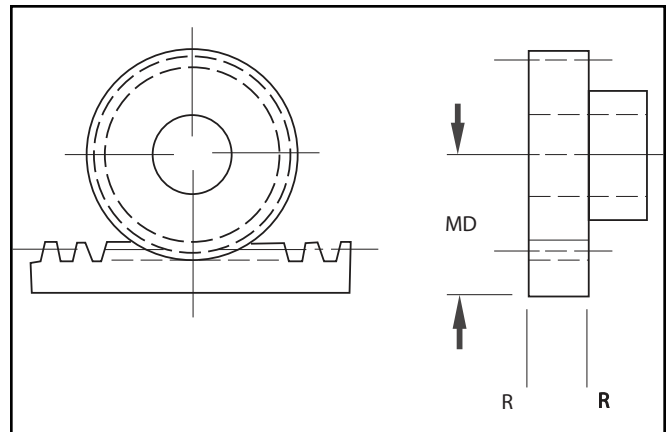


SPUR GEAR AND RACK

Normal mounting for rack is from the back (opposite the gear teeth) and /or the face. Sufficient fasteners should be provided to seat the rack against a flat surface for its full length. Mounting considerations for spur gear pairs apply.

$$\text{Mounting Distance} = \frac{\text{Rack Pitch Line to Back (B)} + \text{Pinion P.D.}}{2}$$

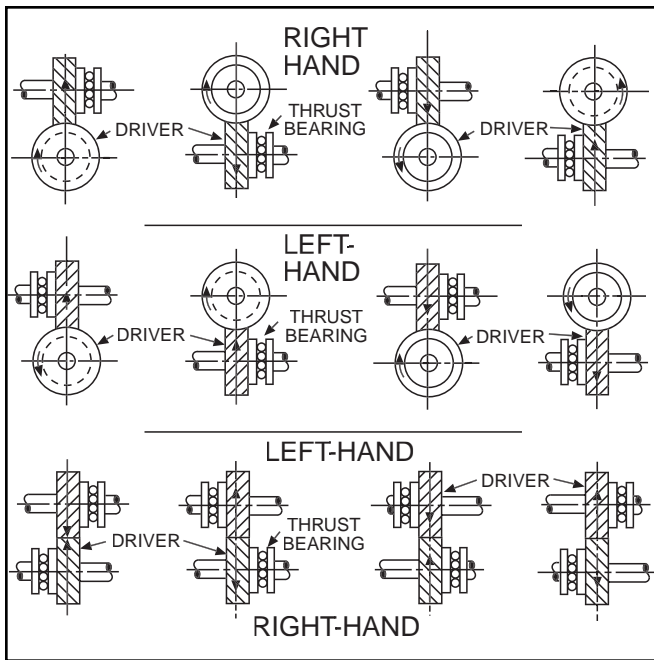
These dimensions are listed in Boston Catalog.



HELICAL GEARS

Boston stock helical gears are similar to spur gears with regard to mounting distance and reference surfaces. However, the helical gears are made with a 45 degree helix angle and are stocked in both right-hand and left-hand configurations. For parallel shaft applications, gears of different hands are needed. For shafts at 90 degrees, the gears must be of the same hand.

In mounting helical gears, provision must be made for substantial thrust resulting from meshing of the angled teeth. The figures below show where thrust bearings are needed for the various combinations.

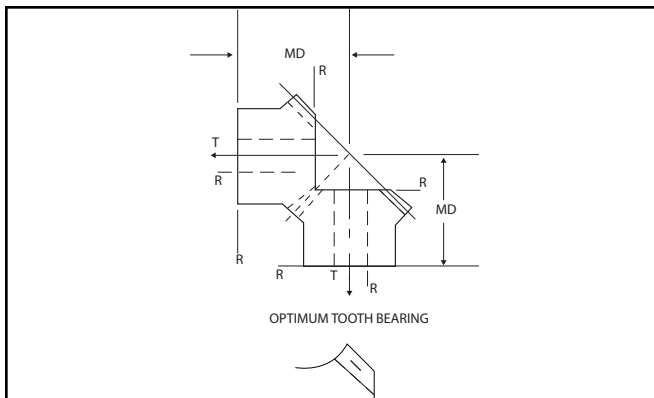


STRAIGHT-TOOTH BEVEL AND MITER GEARS

Boston bevel and miter gears, like spur gears, must be correctly mounted to operate properly. Mounting considerations include:

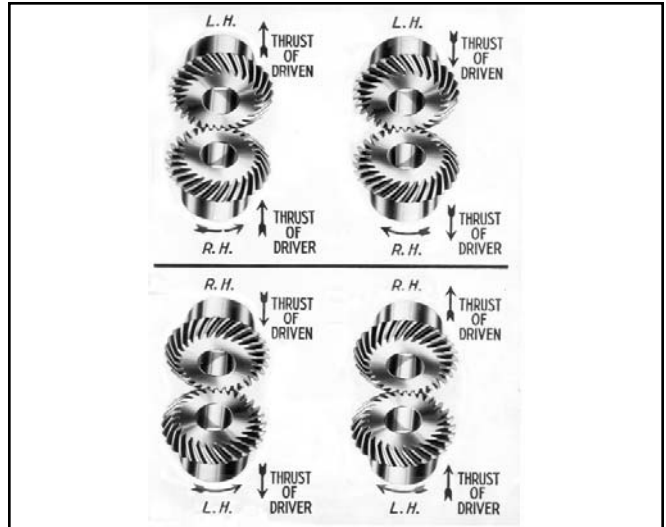
- 1) Axes must be at right angles (90°) for proper tooth bearing.
- 2) Mounting distance must be correct to provide proper backlash and insure the ends of gear teeth will be flush. Mounting distances for all bevel and miter gears are listed in Boston Catalog.
- 3) All bevel and miter gears develop thrust loads. These thrust loads must be accommodated by the use of bearings. On straight-tooth types, these loads tend to separate the gears from meshing.

All Boston straight-tooth stock gears have a Coniflex® tooth form that localizes initial tooth contact at the center, as indicated. A tooth bearing check at assembly should confirm this location.



SPIRAL-TOOTH BEVEL AND MITER GEARS

Considerations for mounting of Boston spiral-tooth types are the same as for straight-tooth types. However, direction of the thrust loads depends upon the hand and direction of rotation of each gear, as shown in figure below. Check the initial tooth bearing at assembly for central location, as indicated for straight-tooth types.



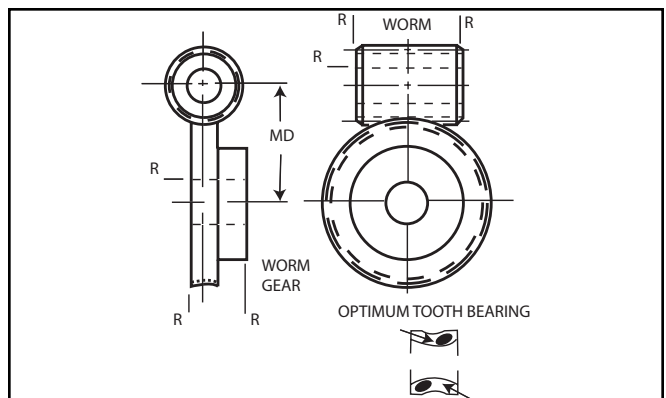
THRUST BEARINGS

Thrust bearings for use with helical, bevel and miter and worm and worm gears are available from stock. See Boston Bearing Catalog or consult your local Boston Gear Distributor.

WORM GEARS

Boston worm gears are similar to helical gears mounted at 90°, and the same thrust bearing recommendations apply. However, since the worm gear envelopes the worm, it must be positioned axially so its center plane passes through the center of the worm. A tooth bearing check will verify proper position. Markings should be balanced on both flanks of the teeth, either central or favoring the leaving sides.

The illustration shows the optimum initial tooth bearing for opposite sides of teeth. Arrows indicate direction of rotation of mating worm as the thread contacts each tooth flank.



MOUNTING

Accurate, rigid assembly mountings must be provided for any type of gear. Gear teeth are generated with respect to reference surfaces, which may then be used for mounting surfaces. Refer to specific gear types, listed in this folder, to identify reference surfaces.

RE-MACHINING

When a gear is altered by re-machining (facing, boring, turning, etc.), the new mounting surface thus created must be accurately positioned with respect to the gear teeth. Most Boston spur and helical gears are top-hobbed, which permits accurate positioning when re-machining from the outside diameter and one face. For other cases, a gear may be mounted on an arbor and surfaces machined for holding in subsequent chucking operation.

BACKLASH

Backlash (space between engaging teeth at their pitch diameters) is desirable in gear assemblies to ensure clearance for lubrication and to accommodate minor tooth cutting errors such as runout and spacing. In designing gear assembly mountings, tolerances should be aimed toward providing greater backlash rather than less. When assembling gears, make sure that backlash is present through one full revolution of the of the larger gear.

For more detailed engineering information and for complete information on Boston Gear's wide range of power transmission products, refer to current Boston Gear catalog 50116.

TOOTH BEARING

Some gears require accurate endwise positioning for proper meshing. This is usually accomplished by adjustment during assembly. A final check may be made by applying a marking compound such as red lead or Prussion blue to the teeth of one member. Rolling the gears together under light pressure will indicate the tooth bearing.


LUBRICATION

Oil lubrication by an immersion, splash, or circulating system is recommended for best results. Drip application or an intermittent spray may be satisfactory where operation is infrequent.

For all gear types except worm gears, a mineral oil corresponding to AGMA lubricant number 4 is recommended for normal environments. Viscosity specification is 135-165 cSt at 40°C (equivalent to 626-765 SSU at 100°F). EP oils of equivalent viscosity are also satisfactory.

Worm gears require a compounded oil meeting AGMA 7c (414-506 cSt at 40°C or 1919-2346 SSU at 100°F).

Small-diameter gears (3" or less) operated intermittently at low speed can be lubricated by repetitive application of a firm-consistency grease.

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