

Chapter 2 Precaution for usage

2.1 Precaution of usage for Helical gear

- ① To obtain ideal engagement for Crossed helical gear (Screw gear), provide both shaft angles to be 90° as accurately as possible.
- ② Provide the bearing that will completely support the thrust load when Helical gear is operated in the axial thrust direction.
- ③ Thrust load in Helical gear:
Helical gear is able to obtain a smoother engagement as compared to Spur gear. However, Helical gear produces thrust load in the axial direction due to Tooth trace is helix shape. Therefore the design of the shafts between driver gear (pinion) and driven gear (gear) should have bearing that will completely support against axial thrust load. (Refer to Fig. 1)
- ④ Load applied on Helical gear

(a) Tangential load

$$F = \frac{1.432H \times 10^6}{dn}$$

Hereby

H : Transfer power(PS)

n : Revolution per minute (rpm)

d : Pitch diameter (mm)

(b) Axial direction thrust

$$F_a = F \tan \beta \text{ (kgf)}$$

Hereby

β : Helix angle

(c) Calculation for load to displace the axis

$$F_s = F \tan \alpha_t \text{ (kgf)}$$

$$= \frac{F \tan \alpha_n}{\cos \beta}$$

Hereby

α_t : Transverse pressure angle

α_n : Normal pressure angle

(d) Normal load (Perpendicular to flank)

$$F_n = \frac{F}{\cos \beta \cos \alpha_n} \text{ (kgf)}$$

Load applied to bearing: ① Tangential load- F is divided between two bearings in connected direction of gears, ② Load to displace the axis- F_s is divided between two bearings, perpendicular to ①, ③ Couple of force by axial direction thrust- F_a (in the direction perpendicular to tooth surface where F_a is applied) Therefore the sum of 3 types of load vector acts to each bearing.

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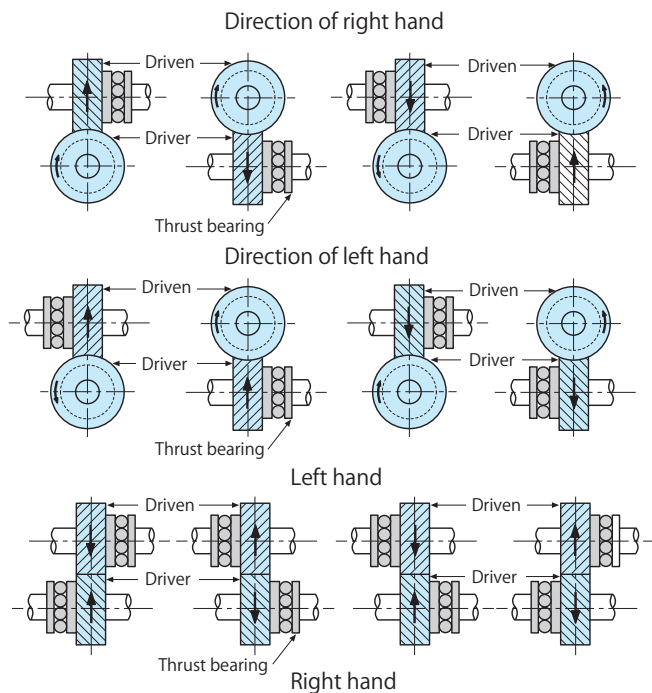


Fig. 1 Axial thrust load of Helical gear and location of bearings

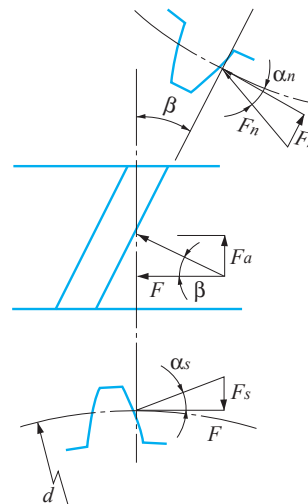


Fig. 2