9.3.1.2 Helical Gear **using Mott*

In helical gear questions, you will usually be specifying a single gear only. You will likely be given the following:

- Diametral Pitch (P_d)[49] *or* Normal Diametral Pitch (P_{nd})
- Transverse Pressure Angle (ϕ_t) *or* Normal Pressure Angle (ϕ_n)
- Number of Teeth (N)
- Face Width (F)
- Helix Angle (ψ)

In return, you will need to specify the following:

- Transverse Circular Pitch (p_t)
- Normal Circular Pitch (p_n)
- Axial Pitch (p_x)
- Pitch Diameter (D)
- Whichever diametral pitch and pressure angle you are not given
- Number of Axial Pitches in the Face Width

These questions are very straight-forward. You'll be zooooooming using the calculator! Steps are below.

1. **Start by calculating the normal diametral pitch[50].**

$$P_{nd} = \frac{P_d}{cos(\psi)}$$

2. **Find the Transverse and Normal Circular Pitch.**

$$p_t = \frac{\pi}{P_d}$$

$$p_n = p_t \ cos(\psi)$$

3. **Calculate Axial Pitch.**

$$p_x = \frac{p_t}{tan(\psi)}$$

[49] Sometimes also called the Transverse Diametral Pitch

[50] Use the equation to solve for P_d in-case the question gives you the transverse diametral pitch instead

4. **Calculate Pitch Diameter.**

$$D = \frac{N}{P_d}$$

5. **Find the Normal (or Transverse) Pressure Angle**

$$\phi_n = tan^{-1}[tan(\phi_t)cos(\psi)]$$

$$\phi_t = tan^{-1}\left[\frac{tan(\phi_n)}{cos(\psi)}\right]$$

6. **Find Number of Axial Pitches in Face Width.**

$$No.\ of\ Axial\ Pitches = \frac{F}{p_x}$$

**Full Helical Action if greater than 2*

That's basically it! Good job!