9.3 Calculation for the Normal standard helical gear

1. Finishing method
2. Number of teeth of Pinion $z_1 =$
3. Number of teeth of Gear $z_2 =$
4. Normal module $m_n =$
5. Normal pressure angle $\alpha_n =$
6. Reference cylinder angle $\beta =$
7. Bottom clearance $c =$
8. Addendum $h_a = m =$
9. Dedendum $h_f = m + c =$
10. Tooth depth $h = h_a + h_f =$

Gear terms	Pinion 1	Gear 2
11. Centre distance	$a = \frac{m_n(z_1+z_2)}{2\cos\beta} = \frac{d_1+d_2}{2}$	
12. Lead	$p_{z1} = \frac{\pi z_1 m_n}{\sin\beta}$	$p_{z2} = \frac{\pi z_2 m_n}{\sin\beta}$
13. Reference diameter	$d_1 = \frac{z_1 m_n}{\cos\beta}$	$d_2 = \frac{z_2 m_n}{\cos\beta}$
14. Tip (Outside) diameter	$d_{a1} = d_1 + 2h_a = d_1 + 2m_n$	$d_{a2} = d_2 + 2h_a = d_2 + 2m_n$
15. Sector span of teeth	$z_{m1} = \frac{\alpha_n z_{v1}}{180} + 0.5$ (Refer to Gear terms 19)	$z_{m2} = \frac{\alpha_n z_{v2}}{180} + 0.5$
16. Sector span	$W_1 = m_n\cos\alpha_n\{\pi(z_{m1} - 0.5) + z_1\text{inv}\,\alpha_t\}$	$W_2 = m_n\cos\alpha_n\{\pi(z_{m2} - 0.5) + z_2\text{inv}\,\alpha_t\}$
17. Transverse module	$m_t = \frac{d_1}{z_1} = \frac{m_n}{\cos\beta}$	Note: May use vocabulary of gear instead of pinion. Change z_1 to z_2 if calculating for gear.
18. Normal module	$m_n = m_t\cos\beta = \frac{d_1\cos\beta}{z_1}$	Note: May use vocabulary of gear instead of pinion. Change z_1 to z_2 if calculating for gear.
19. Virtual number of teeth of spur gear	$z_{v1} = \frac{z_1}{\cos^3\beta}$	$z_{v2} = \frac{z_2}{\cos^3\beta}$
20. Transverse pitch	$p_t = \frac{p_n}{\cos\beta}$	
21. Normal pitch	$p_n = p_t\cos\beta = \pi m_n$	
22. Transverse base pitch	$p_{bt} = \frac{\pi d_1\cos\alpha_t}{z_1} = \frac{\pi m_n\cos\alpha_n}{\cos\beta_b}$	Note: May use vocabulary of gear instead of pinion. Change z_1 to z_2 if calculating for gear.
23. Normal base pitch	$p_{bn} = \frac{\pi d_{b1}\cos\beta}{z_1} = \frac{\pi d_1\cos\alpha_t\cos\beta}{z_1}$	Note: May use vocabulary of gear instead of pinion. Change z_1 to z_2 if calculating for gear.
24. Transverse circular thickness	$s = \frac{p_t}{2} = \frac{\pi m_n}{2\cos\beta}$	
25. Normal circular thickness	$s_n = \frac{p_t}{2} = \frac{\pi m_n}{2} = s_t\cos\beta$	
26. Base diameter	$d_{b1} = d_1\cos\alpha_t = \frac{z_1 m_n\cos\alpha_\omega}{\cos\beta_{b1}}$	$d_{b2} = d_2\cos\alpha_t = \frac{z_2 m_n\cos\alpha_\omega}{\cos\beta_{b2}}$
27. Transverse pressure angle	$\alpha_t = \tan^{-1}\left(\frac{\tan\alpha_n}{\cos\beta}\right)$ or $\tan\alpha_t = \frac{\tan\alpha_n}{\cos\beta}$	
28. Normal pressure angle	$\alpha_n = \tan^{-1}(\tan\alpha_t\cos\beta)$ or $\tan\alpha_n = \tan\alpha_t\cos\beta$	
29. Reference cylinder helix angle	$\beta = \tan^{-1}\left(\frac{\pi d_1}{p_{z1}}\right)$	Note: May use vocabulary of gear instead of pinion. Change z_1 to z_2 if calculating for gear.
30. Base cylinder helix angle	$\beta_b = \tan^{-1}\left(\frac{\pi d_{b1}}{p_{z1}}\right)$	Note: May use vocabulary of gear instead of pinion. Change z_1 to z_2 if calculating for gear.
31. Contact ratio	$\varepsilon_a = \frac{\sqrt{\left(\frac{d_{a1}}{2}\right)^2 - \left(\frac{d_{b1}}{2}\right)^2} + \sqrt{\left(\frac{d_{a2}}{2}\right)^2 - \left(\frac{d_{b2}}{2}\right)^2} - \frac{m_t(z_1+z_2)}{2}\sin\alpha_t}{\pi m_t\cos\alpha_t}$	Note: This does not apply to Crossed helical gear (Screw gear).

9.4 Calculation for Crossed helical gear (Screw gear)

Crossed helical gear can use the same calculation formula of Normal standard helical gear taking careful consideration that Reference pitch cylindrical helix angle β and Transverse pressure angle α_t are different between Pinion and Gear (Except item 31 in section 9.3)

Gear terms	Same direction of Helix between both gears	Different Helix directions between both gears
1. Shaft angle	$\Sigma = \beta_1 + \beta_2$	$\Sigma = \beta_1 - \beta_2$ or $= \beta_2 - \beta_1$