

9.7 Calculation for Standard straight bevel gear

1. Number of teeth of pinion z_1	$z_1 =$	6. Bottom clearance	$c = 0.25m$
2. Number of teeth of gear z_2	$z_2 =$	7. Addendum	$h_a = m =$
3. Module	$m =$	8. Dedendum	$h_f = 1.25m =$
4. Reference pressure angle	$\alpha =$	9. Tooth depth	$h = 2.25m =$
5. Facewidth	$b =$	10. Shaft angle	$\Sigma = 90^\circ$

Gear terms	Pinion 1	Gear 2
11. Reference diameter	$d_1 = z_1 m$	$d_2 = z_2 m$
12. Reference pitch angle	$\delta_1 = \tan^{-1} \frac{z_1}{z_2}$	$\delta_2 = 90^\circ - \delta_1$
13. Cone distance	$R_n = \frac{d_2}{2 \sin \delta_2}$	
14. Addendum angle	$\theta_a = \tan^{-1} \frac{h_a}{R_e}$	
15. Dedendum angle	$\theta_f = \tan^{-1} \frac{h_f}{R_e}$	
16. Tip angle	$\delta_{a1} = \delta_1 + \theta_a$	$\delta_{a2} = \delta_2 + \theta_a$
17. Root angle	$\delta_{f1} = \delta_1 - \theta_f$	$\delta_{f2} = \delta_2 - \theta_f$
18. Tip (Outside) diameter (heel)	$d_a = d_1 + 2h_a \cos \delta_1$	$d_a = d_2 + 2h_a \cos \delta_2$
19. Tip (Inside) diameter (toe)	$d_{i1} = d_{a1} - \frac{2b \sin \delta_{a1}}{\cos \theta_a}$	$d_{i2} = d_{a2} - \frac{2b \sin \delta_{a2}}{\cos \theta_a}$
20. Material angle	$\theta_{x1} = 90^\circ - \theta_a = \theta_{x2}$	$\theta_{x2} = 90^\circ - \theta_a = \theta_{x1}$
21. Material angle	$\theta_{y1} = 90^\circ - \delta_1 = \delta_2$	$\theta_{y2} = 90^\circ - \delta_2 = \delta_1$
22. Pitch apex to crown	$X_1 = \frac{d_2}{2} - h_a \sin \delta_1$	$X_2 = \frac{d_1}{2} - h_a \sin \delta_2$
23. Axial facewidth	$X_{b1} = \frac{b \cos \delta_{a1}}{\cos \theta_a}$	$X_{b2} = \frac{b \cos \delta_{a2}}{\cos \theta_a}$
24. Chordal tooth thickness	$\bar{s}_1 = z_{v1} m \sin \theta_{v1} \approx s - \frac{s^3}{6d_1^2}$	$\bar{s}_2 = z_{v2} m \sin \theta_{v2} \approx s - \frac{s^3}{6d_2^2}$
25. Chordal height	$\bar{h}_1 = m + R_{v1}(1 - \cos \theta_{v1}) \approx m + \frac{s^2 \cos \delta_1}{4d_1}$	$\bar{h}_2 = m + R_{v2}(1 - \cos \theta_{v2}) \approx m + \frac{s^2 \cos \delta_2}{4d_2}$

Note * Table of Chordal tooth thickness can be used assuming Standard spur gear with Number of teeth $Z_v = z / \cos \delta$.

Standard angular straight bevel gear

Calculation for Standard angular straight bevel gear is the same as 9.7 except (12) and (22)

Gear terms	Pinion 1	Gear 2
12. Pitch angle	If shaft angle Σ is smaller than 90° $\delta_1 = \tan^{-1} \frac{\sin \Sigma}{\frac{Z_2}{Z_1} + \cos \Sigma}$ If shaft angle Σ is greater than 90° $\delta_1 = \tan^{-1} \frac{\sin(180^\circ - \Sigma)}{\frac{Z_2}{Z_1} - \cos(180^\circ - \Sigma)}$	$\delta_2 = \Sigma - \delta_1$
22. Pitch apex to crown	$X_1 = R_e \cos \delta_1 - h_a \sin \delta_1$	$X_2 = R_e \cos \delta_2 - h_a \sin \delta_2$

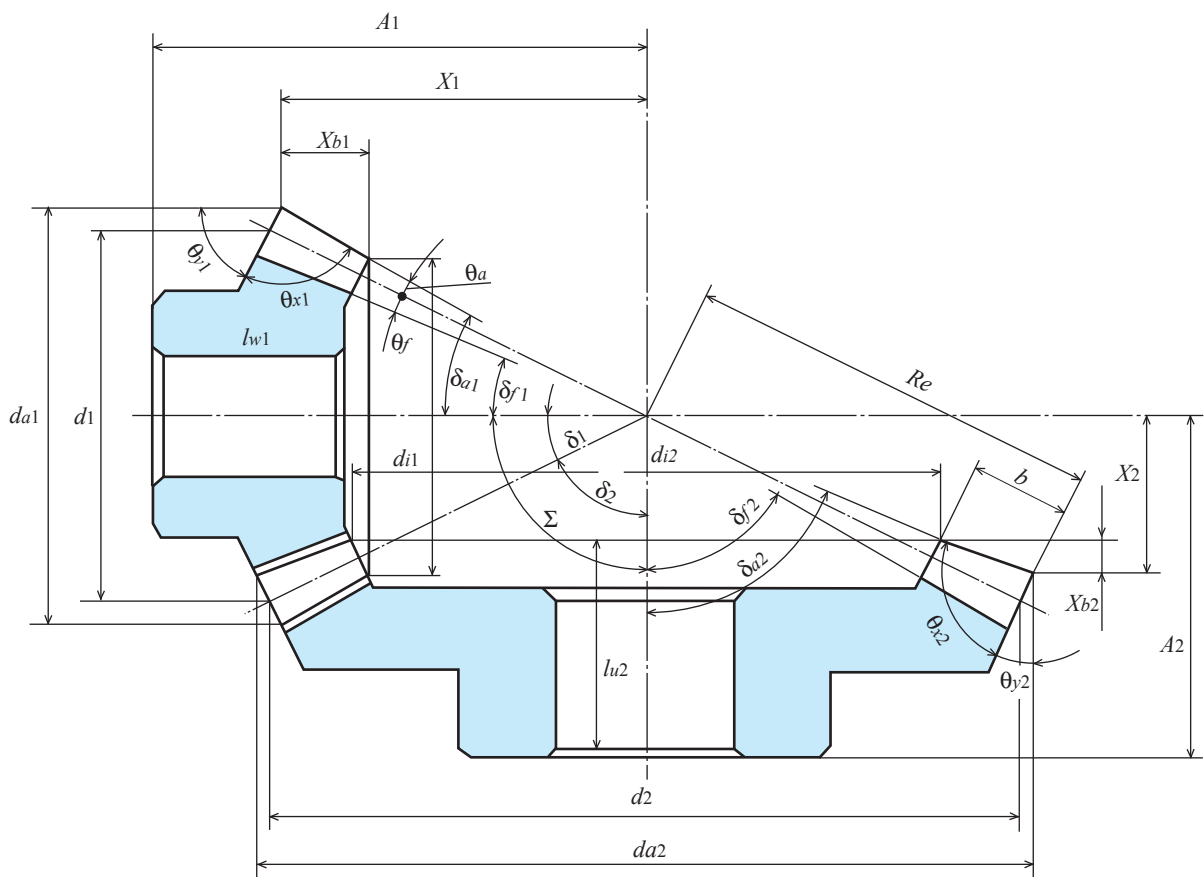


Fig. 3 Bevel gear