

9.5 Calculation for Worm gear pair

1. Finishing method of Worm gear pair	5. Module	$m_n =$	9. Addendum	$h_a = m_n$ $h_a = m_x$
2. Finishing method of Worm wheel	6. Reference pressure angle	$\alpha =$	10. Dedendum	$h_f = h_a + c =$
3. Number of thread/s for Worm gear $z_1 =$	7. Reference diameter of Worm gear	$d_1 =$	11. Tooth depth	$h = h_a + h_f =$
4. Number of teeth for Worm wheel $z_2 =$	8. Bottom clearance	$c =$		

Gear terms	Worm gear	Worm wheel 2
12. Lead	$p_z = z_1 p_x = z_1 \pi m_x = \pi d_1 \tan \gamma$	
13. Reference cylinder lead angle	$\gamma = \tan^{-1} \left(\frac{p_z}{\pi d_1} \right) = \tan^{-1} \left(\frac{z_1}{Q} \right) = \sin^{-1} \left(\frac{z_1 m_n}{d_1} \right)$	
14. Reference diameter	$d_1 = m_x Q = \frac{p_z}{\pi \tan \gamma}$	$d_2 = z_2 m_x = \frac{z_2 m_n}{\cos \gamma}$
15. Centre distance	$\alpha = \frac{d_1 + d_2}{2} = \frac{(Q + z_2) m_x}{2}$ (Standard worm wheel) $\alpha = \left(\frac{Q + z_2}{2} + x \right) m_x$ (Rack shifted worm wheel)	
16. Axial module	$m_x = \frac{m_n}{\cos \gamma} = \frac{p_x}{\pi}$	
17. Normal module	$m_n = m_x \cos \gamma = \frac{p_x \cos \gamma}{\pi}$	
18. Axial pitch	$p_x = p_t = \pi m_x = \frac{p_z}{z_1} = \frac{\pi m_n}{\cos \gamma}$	$p_t = p_x = \frac{\pi d_2}{z_2} = \frac{p_n}{\cos \gamma}$
19. Normal pitch	$p_n = p_x \cos \gamma$	$p_n = \pi m_n = p_t \cos \gamma$
20. Axial pressure angle	$\alpha_x = \tan^{-1} \left(\frac{\tan \alpha_n}{\cos \gamma} \right)$	
21. Normal pressure angle	$\alpha_n = \tan^{-1} (\tan \alpha_x \cos \gamma)$	
22. Rack shift coefficient	$x_1 = 0$	$x_2 = \frac{a - 0.5(d_1 + d_2)}{m_x}$
23. Gorge radius		$r_t = 0.5d_1 - h_a = a - \frac{d_r}{2}$
24. Throat diameter		$d_r = (z_2 + 2x_2)m_x + 2h_a$
25. Tip (Outside) diameter	$d_{a1} = d_1 + 2h_a$	① $d_{a2} = d_2 + (2x_2 + 3.5)m_x$ ② $d_{a2} = d_r + (d_1 - 2m_x) \left(1 - \cos \frac{\phi}{2} \right)$
26. Facewidth	$b_1 = 4.5 \pi m_x$ Or $= p_x \left(4.5 + \frac{2 \cdot z_2}{100} \right)$	$b_2 = m_x \sqrt{7Q - 12.25}$ Or $= 2\sqrt{(d_1 + h_a)h_a} + 0.5 p_x$
27. Diameter quotient	$Q = \frac{d_1}{m_x}$	

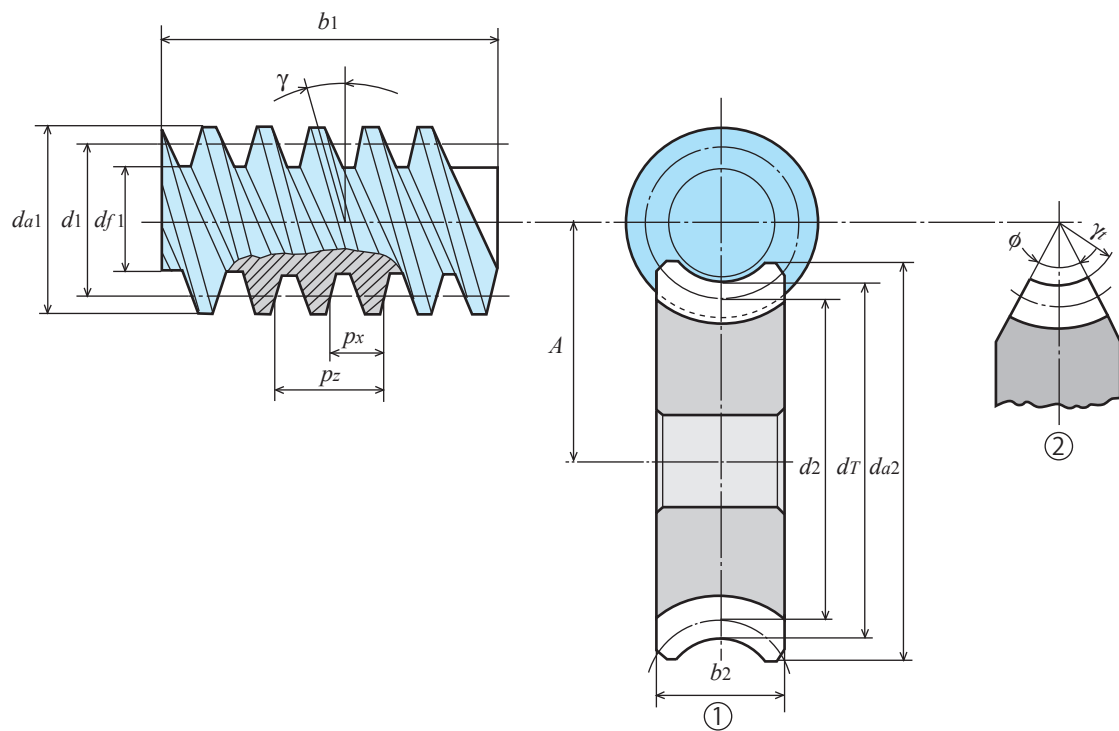


Fig. 1 Worm gear pair