Helical Gears

$$d = mN$$

$$= \frac{m_n}{\cos\psi} N$$

$$\tan\varphi_n = \tan\varphi_t \cos\psi$$

$$W_a = W_t \tan\psi$$

$$W_r = W_t \tan\varphi_t$$

Spur gears:

Bending Stress:

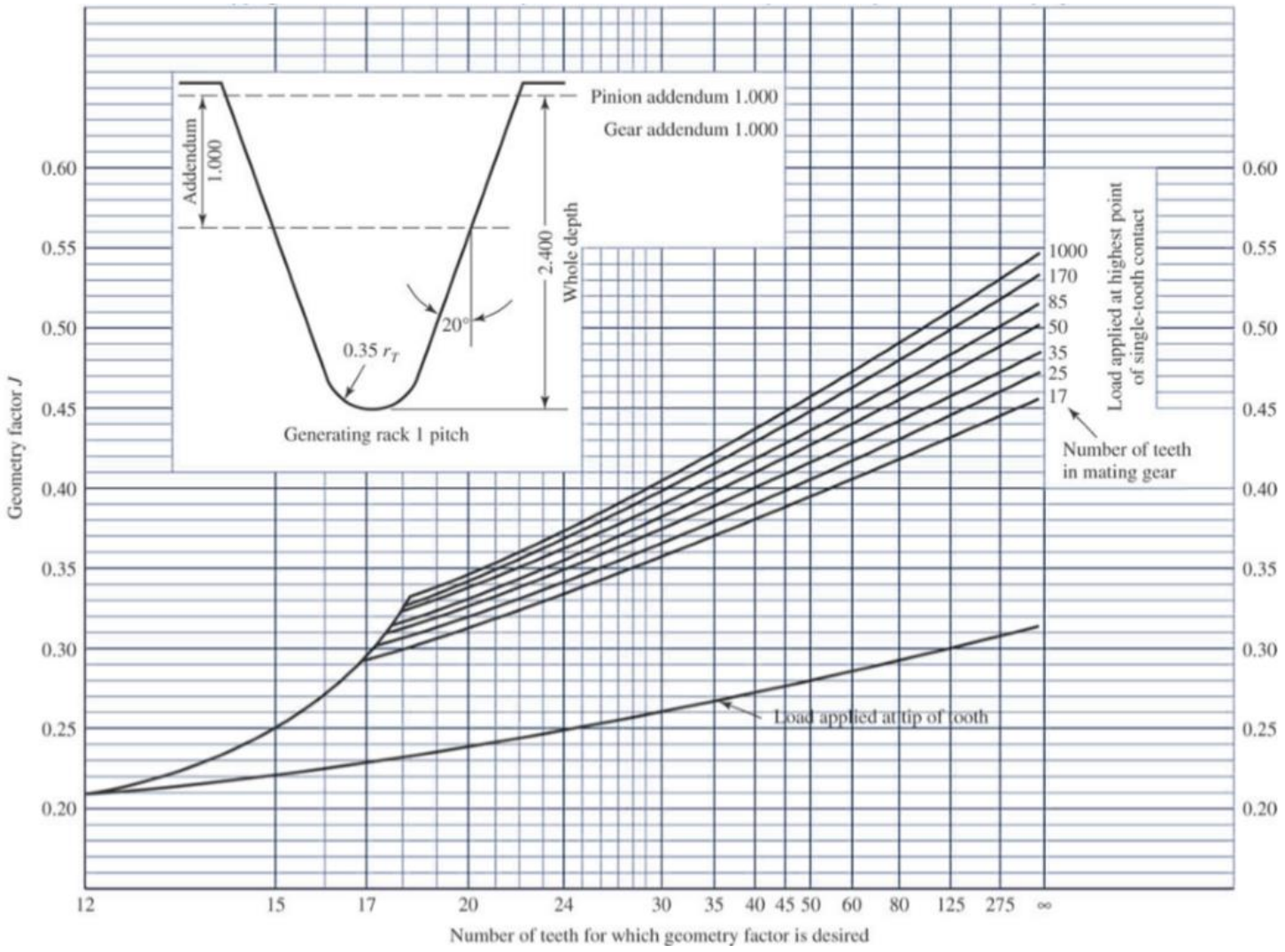
$$\sigma = \frac{W_t}{bmJ} K_v K_0 K_s K_H K_B$$

Dynamic factor K_v:

$$K_v = \left(\frac{A+\sqrt{200V}}{A}\right)^B, \quad \text{V is the tangential velocity in m/s}$$

$$A = 50 + 56(1-B)$$

$$B = 0.25(12 - Q_v)^{\frac{2}{3}}$$



Module *m*	Factor k_b	Module *m*	*Factor* k_b
1-2	1.000	11	0.843
2.25	0.984	12	0.836
2.5	0.974	14	0.824
2.75	0.965	16	0.813
3	0.956	18	0.804
3.5	0.942	20	0.796
4	0.930	22	0.788

$$\mathbf{K_s = 1 / k_b}$$

Characteristic of support	Face Width, mm			
	0-50	150	225	400 up
Accurate mounting, small bearing clearance, minimum deflection, precision gears	1.3	1.4	1.5	1.8
Less rigid mountings, less accurate gears, contact across full face	1.6	1.7	1.8	2.2
Accuracy and mounting such that less than full face contact exists	Over 2.2			

Bending Strength:

$$\sigma_{FP} = \sigma'_{FP} \, (Y_N / Y_\theta Y_Z)$$

$$\sigma'_{FP} = 0.703 \, H_B + 113 \quad \text{MPa}$$

Reliability	Y_Z
0.9999	1.5
0.999	1.25
0.99	1
0.9	0.85
0.5	0.7

Contact Stress:

$$\sigma_c = C_p \sqrt{\frac{W_t}{b d_p I} K_v K_o K_s K_H C_f}$$

$$I = \frac{\cos\varphi \sin\varphi}{2} \frac{m_G}{m_G + 1}$$

Contact strength:

$$\sigma_{HP} = \sigma'_{HP} \frac{Z_N C_H}{Y_\theta Y_Z}$$

$$\sigma'_{HP} = 2.22\, H_B + 200 \quad \text{MPa}$$