11-44

Estimate the remaining life in revolutions of an 02-30 mm angular-contact ball bearing already subjected to 200 000 revolutions with a radial load of 18 kN, if it is now to be subjected to a change in load to 30 kN.

From Table 11-2: Angular contact ball bearing wih C_{10}=20.3 kN, C_o=11 kN.

Damage (K): $\quad F_1^a L_1 = C_{10}^a L_{10} = K = (20.3)^3 (10^6) = 8.365(10^9)$

At a load of 18 kN, life L_1 is given by: $\quad L_1 = \dfrac{K}{F_1^a} = \dfrac{8.365(10^9)}{18^3} = 1.434(10^6)$ rev

For a load of 30 kN, life L_2 is: $\quad L_2 = \dfrac{8.365(10^9)}{30^3} = 0.310(10^6)$ rev

$\dfrac{l_1}{L_1} + \dfrac{l_2}{L_2} = 1 \implies \dfrac{200\,000}{1.434(10^6)} + \dfrac{l_2}{0.310(10^6)} = 1 \implies l_2 = 0.267(10^6)$ rev