

ME-340 LAB

ROLLER BEARINGS/QUIZ

February 18, 1999  
10:00

Name: Solution

A shaft rotates at 1725 rpm and is to be simply supported by two, 25° angular-contact ball bearings. Both bearings are to support a radial load of 600 pounds, while one of them also supports a thrust load of 250 pounds. The design life is to be 5000 hours with the a gearing load which is considered to be moderate impact and a reliability of 95%. The design is to be "idiot-proofed" such that one bearing is to used in either location. Using the Timken data, select that bearing.

$$\omega = 1725 \text{ rpm}$$

$$l = 5000 \text{ hr}$$

$$F_t = 250 \text{ lb}$$

$$F_r = 600 \text{ lb}$$

$$L = (1725 \frac{\text{rev}}{\text{min}})(60 \frac{\text{min}}{\text{hr}})(5000 \text{ hr})$$

$$L = 517.5 \times 10^6 \text{ cycles}$$

$$C_{\text{req}} = K_a F_e \left( \frac{L}{K_R L_R} \right)^{0.3}$$

$$K_a = 1.5$$

$$K_R = 0.62$$

$$L_R = 90 \times 10^6 \text{ cycles}$$

$$F_t / F_r = \frac{250}{600} = 0.42$$

$$F_e = F_t$$

$$C_{\text{req}} = (1.5)(600)(16)(4.45 \frac{\text{N}}{\text{lb}}) \left[ \frac{517.5}{.62 \times 90} \right]^{0.3}$$

$$C_{\text{req}} = 7.8 \text{ kN}$$

L11	} available bearings
207	
306	