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RBE 2001 HW 5

1. Output Torque:

   $T = weight * drum_{radius}$

   $T = 500(5) = 2500in - lbf$

2. $\omega = fd$

   $\omega = 500(60) = 30,000in - lbf$

3. $P = \tau(\omega)$

   $= (250/8.851)400(\frac{2\pi}{60}) = 1183(\omega)$

4. $Power = \frac{work}{time}$

   $time = \frac{work}{power} = \frac{500(60)}{800(500)\frac{2\pi}{60}} = .716sec$

5. Gear Box input torque: $500in = lbf$

6. Gear Ratio: $\frac{2500}{500} = 5$

7. $P = IV$

   $\frac{1183}{48}(.55) = I$

   $I = 44.8A$

8. $FOS = \frac{\tau_y}{\tau_{max}}$

   $3 =$

   $tau = 833.33$

   $P = 8$

   $P = \frac{N}{r}$

   $8 = \frac{22}{p}$

   $P = 9$

   $\tau = Fr -> 2500 = F(4.5) -> F = 555.56lbf$

   $area = \frac{F}{\tau_{max}} -> \ = \frac{2}{3}$

   $t = \frac{\pi}{2P} = \frac{\pi}{2(8)} = \frac{\pi}{16}(in)$

   $area = bt -> \frac{2}{3} = b(\frac{\pi}{16}) -> b = 3.39in$