

3. The speed of a shaft is $n = 2000$ rev/min, and the allowable shear stress of the shaft is $\tau_a = 70$ MPa . a) Select a preferred diameter of the shaft to transmit 40 KW? b) If $\tau_a \sim N(70, 1^2)$ MPa and $n \sim N(2000, 50^2)$ rev/min and τ_a and n are independent, determine the probability of failure using Monte Carlo Simulation.

Answer: a) $d_{preferred} = 25$ mm; b) $p_f = 4.430(10^{-5})$