

9. A shaft is designed to transmit a power $H = 3$ kW. It has a round cross section with a diameter of $d \sim N(80, 0.8^2)$ mm and If the allowable shear stress of the shaft is $\tau_a \sim N(200, 20^2)$ MPa and the maximum probability of failure is designed to be $p_f = 10^{-5}$, determine the minimum shaft working speed to transmit the required power.

Answer: $n = 9041$ rpm