12. A shaft has a diameter $d \sim N(60, 0.1^2)$ mm. The allowable shear stress of the shaft is $\tau_a \sim N(120, 10^2)$ MPa, respectively. If the maximum probability of failure is desinged to be $p_f = 10^{-5}$, estimate the maximum power that the shaft can transimit at speed $n = 3000$ rpm using the First Order Second Moment Method. Note that d and τ_a are independent.

Answer: $H = 1030.12$ kW