

67. A beam with a round cross section is subjected to a uniform load of $w \sim N(500, 50^2)$ lbf/in shown in the figure. If the allowable bending stress is $S_a \sim N(6000, 600^2)$ psi and the maximum probability of failure is designed to be $p_f = 10^{-5}$, estimate the minimum diameter of the beam and select a preferred one. Assume that w and S_a are independent.

Answer: $d = 5.5$ in, $d_{preferred} = 5.6$ in

