

4-6. The forces acting on a shaft are shown in the figure. P is a random force with $P \sim N(900, 80^2)$ lb, and q is a distributed load with $q \sim N(600, 20^2)$ lb/ft. The allowable bending stress of the shaft is $S_a \sim N(22, 1.6^2)$ ksi. P , q , and S_a are independent. Determine the diameter of the shaft to make sure that the probability of failure is less than 10^{-4} . (**Ans.** $d > 6.54$ in.)

