58. A force $P \sim N(2000, 100^2)$ N is applied at B shown in the figure. The cantilever AB is connected to a torsion bar OA which is simply supported at A and is fixed at O. Bar OA has a spring rate of $k_1 = 2 \times 10^5$ N·m/rad and a length of $l_1 \sim N(0.8, 0.001^2)$ m. Cantilever AB has a spring rate of $k_2 = 3 \times 10^4$ N/m and a length of $l_2 \sim N(0.3, 0.001^2)$ m. If the allowable deflection at B is $\delta_a = 0.08$ m, determine the probability of failure. Assume that P, l_1 and l_2 are independent.

Answer: $p_f = 1.16(10^{-4})$