

7-3. A box with a weight of $W \sim N(700, 60^2)$ N is placed in the center of a T-shape beam shown below. The ends support only vertical forces. If the allowable normal stress of the beam is $S_a \sim N(33, 2^2)$ MPa and the allowable shear stress is $\tau_a \sim N(0.4, 0.03^2)$ MPa, determine the probabilities of failure of the beam caused by excessive bending stress and shear stress. Assume W, S_a, τ_a are independent. (Ans. $p_{f1} = 1.74 \times 10^{-5}$, $p_{f2} = 7.84 \times 10^{-5}$)

