

30. A torsion  $T \sim N(3, 0.3^2)$  kN·m is applied to the end of a cantilever bar. The bar has a round cross section with a diameter of  $d \sim N(40, 0.4^2)$  mm and a length of  $l = 600$  mm. The shear modulus of the bar is  $G = 90$  GPa. What is the mean and standard deviation of strain energy for torsion using the First Order Second Moment Method? Note that  $T$  and  $d$  are independent.

**Answer:**  $\mu_U = 7.6394(10^{-3})$  J,  $\sigma_U = 1.5298(10^{-3})$  J