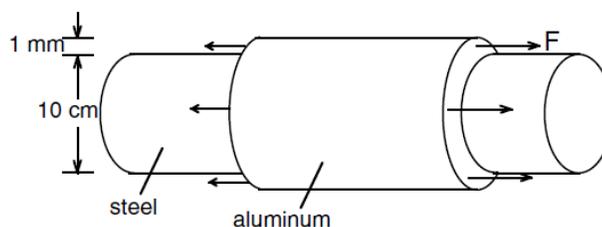


- 1- A brass tensile specimen, with initial diameter 0.18 in, was tested and the maximum load of 105 ksi was recorded at an elongation of 27%. What is the load for an identical tensile specimen when the elongation is 15%? (Note: % elongation = $100*(l_f - l_0)/l_0$. Approximate stress strain function: $\bar{\sigma} = K\bar{\epsilon}^n$).
- 2- During a tension test the tensile strength (UTS) was found to be 580 MPa. This was recorded at an elongation of 22%. Determine n and K if the approximation $\bar{\sigma} = K\bar{\epsilon}^n$ applies.
- 3- Show that the plastic work (energy) is $\sigma_x \epsilon_x / (n + 1)$ for a metal stretched in tension to ϵ_x if $\bar{\sigma} = K\bar{\epsilon}^n$.
- 4- For plane-strain compression **a)** Express the incremental work per volume, dw , in terms of $\bar{\sigma}$ and $d\bar{\epsilon}$ and compare it with $dw = \sigma_1 d\epsilon_1 + \sigma_2 d\epsilon_2 + \sigma_3 d\epsilon_3$. **b)** If $\bar{\sigma} = K\bar{\epsilon}^n$, express the compressive stress as a function of σ_1 , K , and n .
- 5- The strain-hardening of a certain alloy is better approximated by $\bar{\sigma} = Q - \exp(1 - b\bar{\epsilon})$ than by $\bar{\sigma} = K\bar{\epsilon}^n$. Determine the true strain at necking in terms of Q and b . Also, express the tensile strength in terms of Q and b .
- 6- A metal sheet undergoing plane-strain deformation is loaded to a tensile stress of 560 MPa. What is the strain if the effective stress–strain relation is $\bar{\sigma} = 520(0.01 + \bar{\epsilon})^{0.25}$.
- 7- An aluminum tube fitted over a steel rod is shown in the figure. The steel may be considered rigid and the friction between the aluminum and the steel may be neglected. If $\bar{\sigma} = 210\bar{\epsilon}^{0.20}$ MPa for the tube and it is loaded as indicated, calculate the force F at instability.



- 8- A thin-wall tube with closed ends is subjected to an ever-increasing internal pressure. Find the dimensions r and t in terms of the original dimensions r_o and t_o at maximum pressure. Assume $\bar{\sigma} = 750\bar{\epsilon}^{0.24}$ MPa.