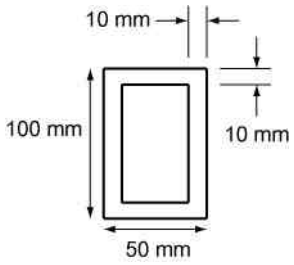
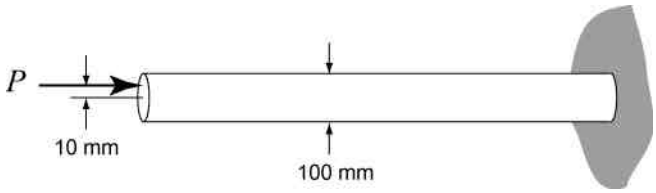
ME 354 Homework #9 Due: March 14th, 2008 before class.

1) A steel column made from A-36 (E = 200 GPa) has a length of 5 meters and is fixed at both ends. If the cross-sectional area has the dimensions shown below, what is the critical load for buckling?



2) A brass rod is free at one end and fixed at the other end. If the rod has length L = 2 m, diameter D = 100 mm, and an eccentric load P applied 10 mm above the column axis, determine the greatest allowable load P that can be applied so that rod does not buckle. Also, determine the largest sideways deflection of the rod due to the loading. E = 101 GPa, σ_0 = 69 MPa.



Suggested Problems:

Dowling	7.39	τ_i = 26.5 MPa	m = 0.5760	
	7.40	θ_c = 18.7°	τ_i = 33.42 MPa	
	7.41	σ_{uc}' = -48.5 MPa	σ_{ut}' = 10.97 MPa	
	7.47	(a) X_{CM} = 11.2	(b) X_{CM} = 10.48	(c) X_{CM} = 9.59
	7.48	(a) X_{CM} = 1.9 (no facture)	(b)	p = 33.4 MPa

What are the critical loads applied to the following structures that cause buckling?

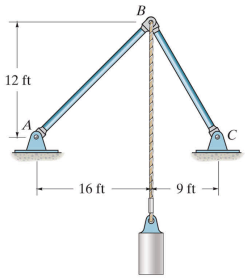


Figure: 13-14-19P13.031/032

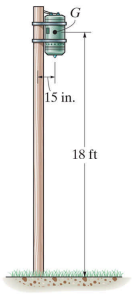


Figure: 13-34-11P13.122

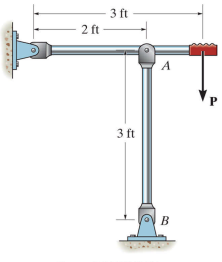


Figure: 13-14-08P13.012