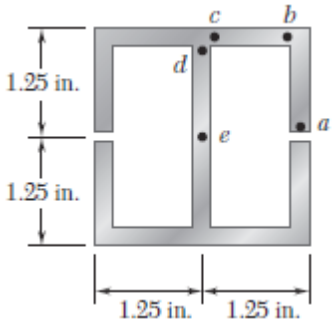
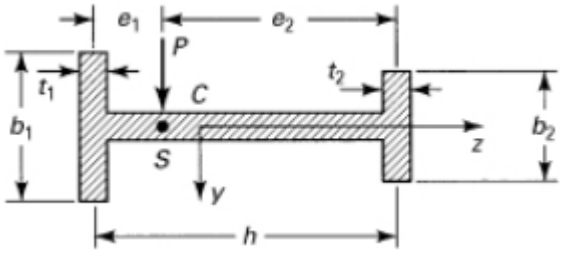
Homework 9

1) The extruded aluminum beam has a uniform wall thickness of $0.125\ in$. Knowing that the vertical shear in the beam is $2\ kips$, determine the corresponding shearing stress at each of the five points indicated. Assume the gaps in the outer webs are small.

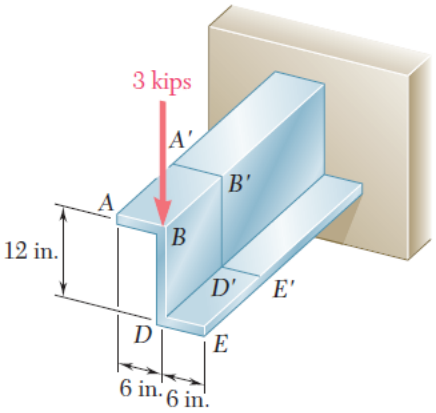


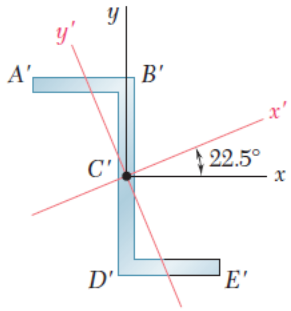
2) An H-section cantilever beam with unequal flanges is subjected to a vertical load P. The following assumptions are applicable:
   a. The total resisting shear occurs in the flanges.
   b. The rotation of a plane section during bending occurs about the symmetry axis so that the radii of curvature of the flanges are equal.

   Determine the location of the shear center S.



3) The cantilever beam shown consists of a Z shape of $1/4\text{-}in$ thickness. For the given loading, determine the distribution of the shearing stresses along line $A'B'$ in the upper horizontal leg of the Z shape. The x' and y' axes are the principal centroidal axes of the cross section and the corresponding moments of inertia are $I_{x'} = 166.3\ in^4$ and $I_{y'} = 13.61\ in^4$.





4) A tubular, stepped shaft with a $16\ mm$ inner diameter is attached to four pulleys that transmit the torques shown. Find the maximum shear stress for each shaft segment.