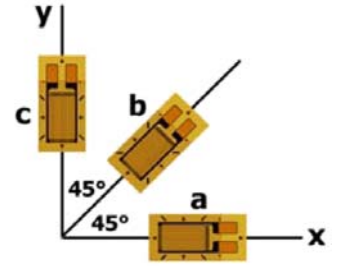
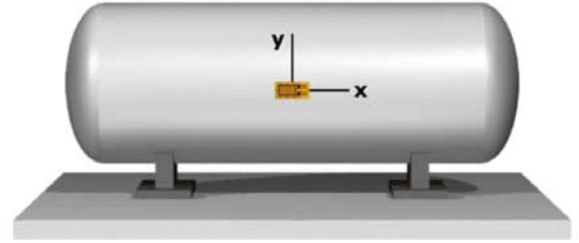


1. The strain rosette shown was used to obtain normal strain data at a point on the free surface of a machine part.  $\varepsilon_a = 550\mu$ ,  $\varepsilon_b = -730\mu$ , and  $\varepsilon_c = -375\mu$ . Poisson's Ratio for the material is  $\nu = 0.30$ .

- Determine the strain components  $\varepsilon_x$ ,  $\varepsilon_y$ , and  $\gamma_{xy}$  at the point.
- Determine the principal strains and the maximum in-plane shear strain at the point.
- Draw a sketch showing the angle  $\theta_p$ , the principal strain deformations, and the maximum in-plane shear strain distortions.
- Determine the magnitude of the absolute maximum shear strain.



2. A strain gage is mounted to the outer surface of a thin-walled boiler. The boiler has an inside diameter of 60 in. and a wall thickness of 1.0 in., and it is made of stainless steel [ $E = 28,000$  ksi;  $\nu = 0.27$ ].
- Determine the internal pressure in the boiler when the strain gage reads  $120 \mu\epsilon$ .
  - Determine the maximum shear strain in the plane of the boiler wall. (a sketch is not required)
  - Determine the absolute maximum shear strain on the outer surface of the boiler.



3. A 2.5-in.-diameter solid aluminum post is subjected to a horizontal force of  $V = 3$  kips, a vertical force of  $P = 7$  kips, and a concentrated torque of  $T = 11$  kip-in., acting in the directions shown. Assume  $L = 3.5$  in. Determine the normal and shear stresses at:

- a. point H
- b. point K

