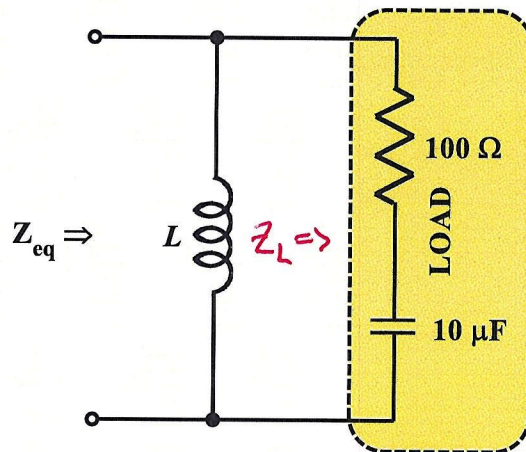


## Homework Problem #011

An industrial load has been modeled as a series combination of a capacitance and a resistance as shown below. The plant engineer has proposed placing an inductance  $L$  in parallel with this load in an attempt to make the equivalent impedance appear to be purely resistive (i.e., the imaginary part is zero) at a frequency of 159.2 Hz. What value should be chosen for this inductance?



$$\omega = 2\pi f = 1000 \frac{\text{rad}}{\text{s}}$$

$$Z_L = 100 + \frac{1}{j1000(10 \times 10^{-6})} = 100 - j100 = 141.4 \angle -45^\circ \Omega$$

$$Y_L = \frac{1}{Z_L} = 7.071 \angle 45^\circ \text{ mS} = 5 + j5 \text{ mS}$$

$\therefore$  Choose  $L$  so that

$$\frac{1}{j\omega L} = -j5 \text{ mS}$$

$$\Rightarrow L = \frac{1}{5} \text{ H} \text{ or } 0.2 \text{ H}$$