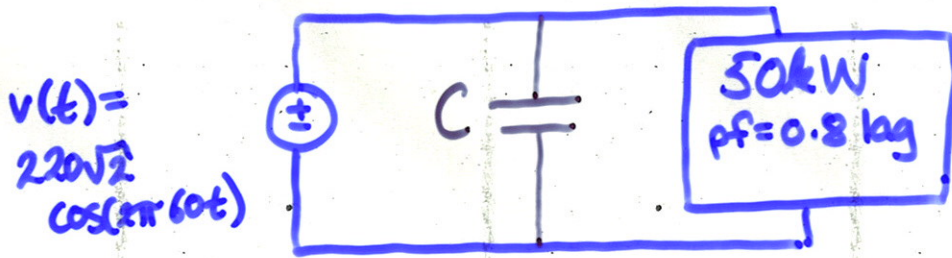
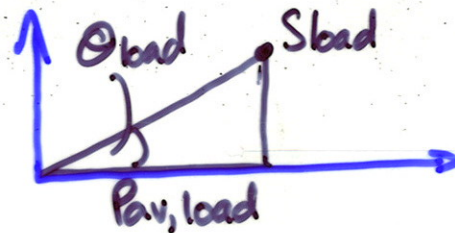


EXAMPLE



Find the value of C that raises the power factor to 0.95 lagging

Power triangle for load.



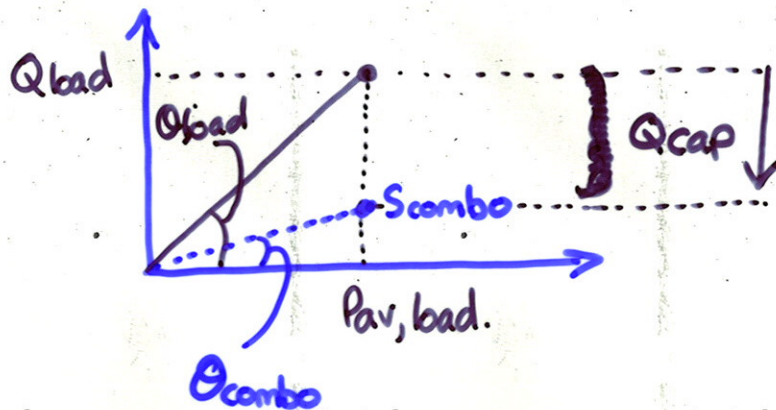
$$|S_{load}| = \frac{P_{av, load}}{pf_{load}} = \frac{50 \times 10^3}{0.8}$$

$$\theta_{load} = \cos^{-1}(0.8) = 36.87^\circ$$

$$\Rightarrow S_{load} = \frac{50 \times 10^3}{0.8} e^{j36.87^\circ}$$

$$= 50,000 + j37,500$$

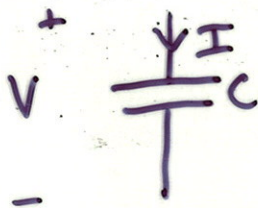
factor Power correction triangle



$$\theta_{\text{combo}} = \cos^{-1}(0.95) = 18.19^\circ$$

$$\begin{aligned} \Rightarrow S_{\text{combo}} &= 50 \times 10^3 + j 50 \times 10^3 \cdot \tan(18.19^\circ) \\ &= 50 \times 10^3 + 16.43 \times 10^3 \text{ VA} \end{aligned}$$

$$\begin{aligned} S_{\text{capacitor}} &= S_{\text{combo}} - S_{\text{load}} \\ &= -j 21,070 \text{ VA} \end{aligned}$$



$$S_{\text{capacitor}} = \frac{VI^*}{2} = \frac{|V|^2}{2Z_c^*}$$

$$= \frac{2(220)^2}{2(j/\omega C)}$$

$$= -j(220)^2 120\pi C$$

$$\Rightarrow \text{Therefore } -j 21,070 = -j(220)^2 120\pi C$$

$$\Rightarrow C = 1.155 \text{ mF}$$