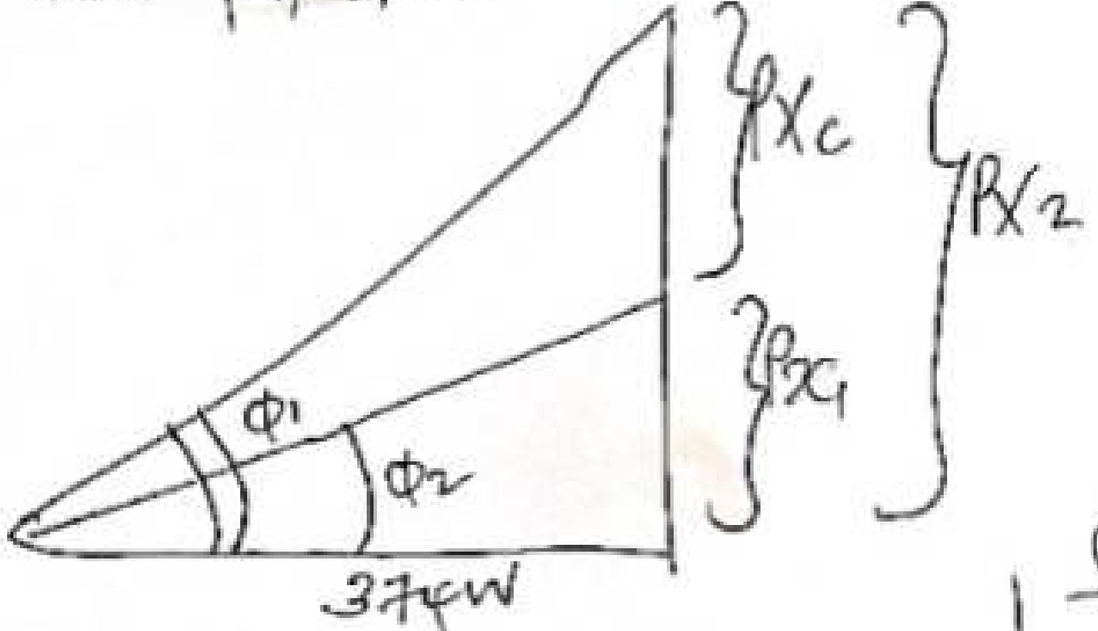
Power factor improvement using capacitor

→ The p.f before use of capacitor is 0.86.
The active pore is 374W.
The desired new p.f is say 0.97.
Find the value of capacitors needed to improve this p.f from 0.86 to 0.97



$\cos^{-1} 0.86 = 30.68$

$\Phi_1 = 30.68$

$\cos^{-1} 0.97 = 14.06°$

$\underline{PX_2}$:

$\tan 30.68 = \frac{PX_2}{374}$

$P_{x2} = 374 \tan 30.68$

$= 221.89 VAR$

$\underline{PX_1}$

$\tan 14.06 = \frac{P_{x1}}{374}$

$P_{x1} = 374 \tan 14.06$

$= 93.66 VAR$

$P_{Xc} = (221.89 - 93.66)$

$= 128.23 VAR$

Say
$V = 330V$

$P = VI$

$I_c = \frac{P_{xc}}{V_c}$

$= \frac{128.23}{330}$

$I_c = 0.3886A$

$V = I_c X_c$

$330 = 0.3886 X_c$

$X_c = 849.26\Omega$

$X_c = \frac{1}{2\pi fc}$ $f = 50Hz$

$C = \frac{1}{X_c 2\pi f}$

$= \frac{1}{849.26 \times 50 \times 2\pi}$

$= 3.75 \times 10^{-6} F$

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1.

Thus by adding capacitor of 3.75 μF, the pf of the system selected would impore from 0.86 to 0.97

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