Problem 27.33

When running normally:

$$P = iV$$

$$\Rightarrow \quad \left(10^2\ \text{W}\right) = i\left(120\ \text{V}\right)$$

$$\Rightarrow \quad i = .833\ \text{A}$$

Knowing the current, we can find the resistance (which doesn't change in the problem):

$$P = i^2 R$$

$$\Rightarrow \quad \left(10^2\ \text{W}\right) = \left(.833\ \text{A}\right)^2 R$$

$$\Rightarrow \quad R = 144\ \Omega$$

With the resistance, we can determine the surge current:

$$V = iR$$

$$\Rightarrow \quad (140\ \text{V}) = i(144\ \Omega)R$$

$$\Rightarrow \quad i_{surge} = .972\ \text{A}$$

With the surge current, we can determine the surge power output:

$$P_{surge} = i_{surge} V_{surge}$$

$$= (.972\ \text{A})(140\ \text{V})$$

$$= 136\ \text{W}$$

Yielding a power ratio of:

$$\%\ \text{increase} = \frac{P_{surge} - P_o}{P_o} x100$$

$$= \frac{(136\ \text{W}) - (100\ \text{W})}{(100\ \text{W})} x100$$

$$= 36\%$$