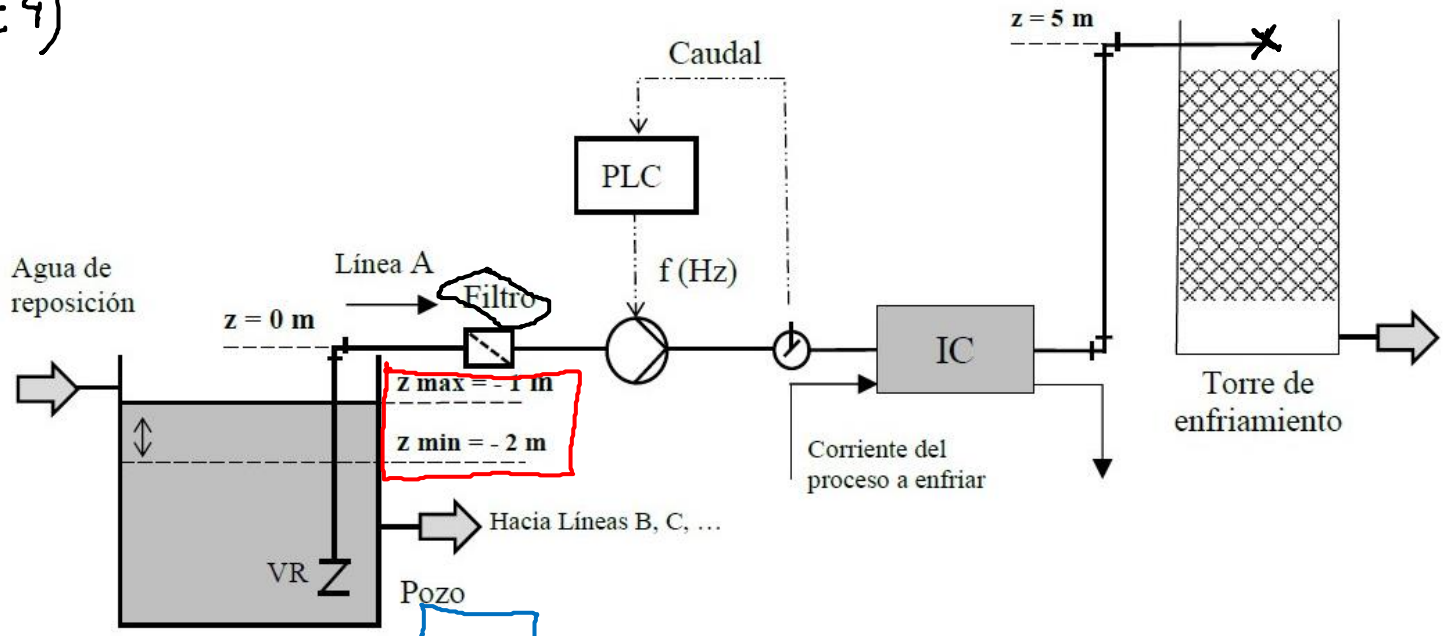
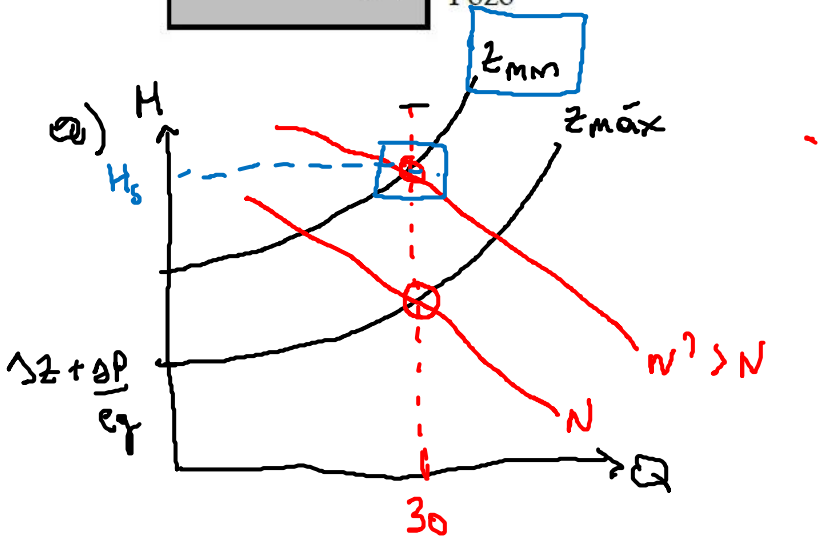
c 4)





BEM sup pozo (z_{min}) y torre

$$\frac{\Delta v^2}{2g} + \Delta z + \frac{\Delta p}{\rho g} + \Delta h_F = H$$

$$\frac{v^2}{2g} + 5 - (-2) + \left(f\frac{L}{D} + \sum K\right)\frac{v^2}{2g} + \frac{\Delta p_{filtro} + \Delta p_{cau} + \Delta p_{IC}}{\rho g} = H$$

$D = 0{,}078\ m$

$Q = 30\ m^3/h \rightarrow v = 1{,}74\ m/s \rightarrow Re = 1{,}4 \times 10^5$

$\varepsilon/D = 0{,}0006$

$\Big\} f = 0{,}020$

$L = 30\ m$

$\Sigma K = K_{vp} + K_{codo} + 3K_{codo} = 9,72$

$\rightarrow H = 18,02\ m \rightarrow$ PO: $Q = 30\ m^3/h = Q_2$

$H = 18,02\ m = H_2$

$N = ?\ (N_2)$

N_1

$\|$

C. bba 2900 rpm: $H_1 = 20 + 0,085 Q_1 - 0,0094 Q_1^2$

LS: $\frac{Q_1}{Q_2} = \frac{N_1}{N_2} \rightarrow Q_1 = Q_2 \frac{N_1}{N_2}$

$\frac{H_1}{H_2} = \left(\frac{N_1}{N_2}\right)^2 \rightarrow H_1 = H_2 \left(\frac{N_1}{N_2}\right)^2$

sust LS en c.bba a 2900 rpm

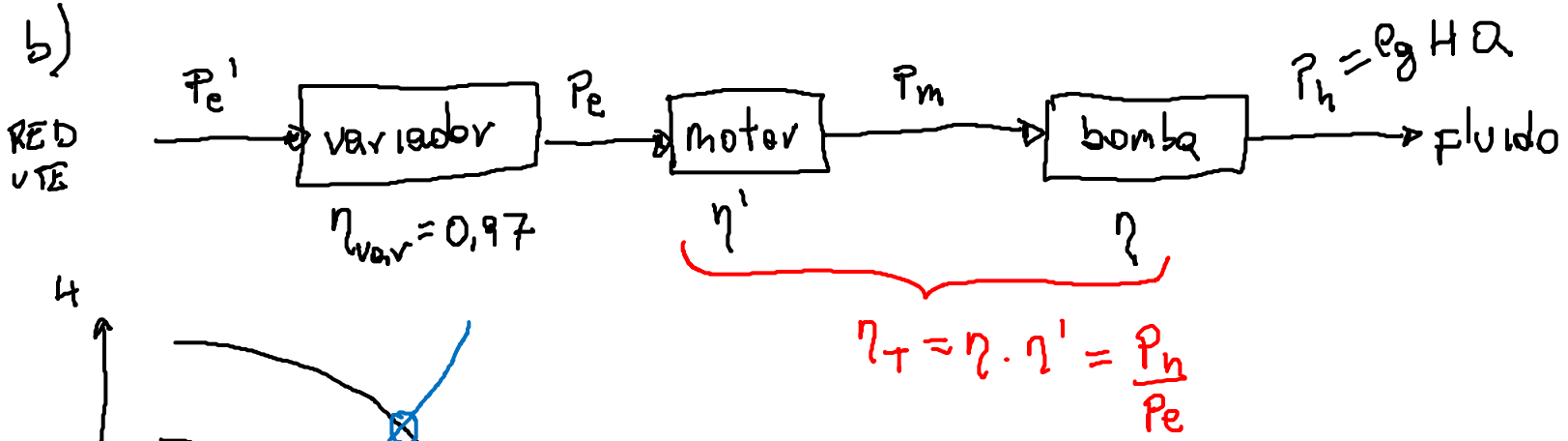
$H_2 \left(\frac{N_1}{N_2}\right)^2 = 20 + 0,085 Q_2 \frac{N_1}{N_2} - 0,0094 \left(Q_2 \frac{N_1}{N_2}\right)^2$

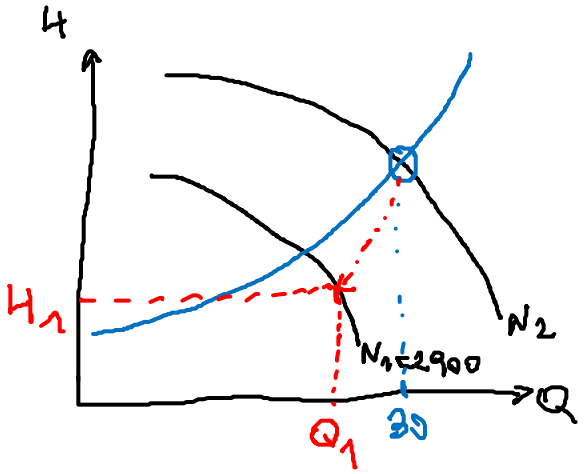
$\rightarrow N_1 = 3157\ rpm$

$N = CF \rightarrow \frac{N_1}{N_2} = \frac{F_1}{F_2}$ ($F_1 = 50\ Hz$)

$\rightarrow F_2 = 54,4\ Hz$

b)





$Q_1 = Q_2 \frac{N_1}{N_2} = 27,6\ m^3/h$ → para ptos homólogos se cumple igual eficiencia

del graf entrando con Q_1, $\eta_T = 75\%$ → $P_e = \frac{\rho g\, 18,02 \cdot (30/3600)}{0,75} = 1958\ W$

$P_e' = \frac{P_e}{\eta_{var}}$, $\boxed{P_e' = 2,0\ kW}$

c) $NPSH_d > NPSH_r$

$$NPSH_d = \frac{P_s}{\rho g} + \frac{U^2}{2g} - \frac{P_{vap}}{\rho g} = 3,78\ m$$

BEM succión bba

$NPSH_r$?

del Pto homologo $Q = 27,6\ m^3/h \xrightarrow[2900]{gráf} NPSH_{r,1} = 1,94\ m$

LS: $\frac{NPSH_{r1}}{NPSH_{r,2}} = \left(\frac{N_1}{N_2}\right)^2 \longrightarrow NPSH_{r,2} = 1,66m$

$NPSHr < NPSH_d \rightarrow$ no cavita.

d). si filtro obstruye ⟶ ↑ pérdidas de carga ⟶ ↑H para mantener $Q = 30\ m^3/h$ ⟶ ↑N

- pto homólogo, $\downarrow Q_1 = Q_2 \frac{N_1}{N_2}$ ⟶ $\downarrow \eta_T$.

- $P_e' = \frac{\rho g H Q}{\eta_T \eta_{var}}$ ⟶ P_e' ↑

- $NPSH_d$ ↓