

PANTA P1 53.5 m33A



$$\Delta H_{AB} = 3 [H]$$

$$Q = 12,87 \left[ \frac{m^3}{m \cdot m} \right] = 0,2145 \left[ \frac{m^3}{s} \right]$$

$$Q = V \cdot A \quad Q = cte \Rightarrow$$

$$V_A = \frac{Q}{\frac{\pi D_A^2}{4}} = 2,94 \left[ \frac{m}{s} \right]$$

$$V_B = \frac{Q}{\frac{\pi D_B^2}{4}} = 0,73 \left[ \frac{m}{s} \right]$$

Pérdidas. Se evalúan en  $V_A$  o  $\frac{V_A + V_B}{2}$ .

$$V_A \Rightarrow P_{nd} = k \cdot \frac{1}{2} \cdot \rho V_A^2 = 432,18 \left[ \frac{N}{m^2} \right]$$

$$\bar{V} \Rightarrow P_{nd} = 168,36 \left[ \frac{N}{m^2} \right]$$

Bernoulli entre A y B.

$$P_A + \frac{1}{2} \rho V_A^2 + z_A \rho \cdot g = P_B + \frac{1}{2} \rho V_B^2 + z_B \rho \cdot g + P_{nd} + \text{Turbina}$$

$$\Rightarrow \text{Presión Turbina} = 194596,8 \left[ \frac{N}{m^2} \right] = 194,59 [kPa]$$

luego la potencia de la turbina será.

$$P_{ot} = \text{Turb} \cdot Q = 194,59 [kPa] \cdot 0,2145$$

$$= 41,741,017 \left[ \frac{J}{s} \right] = 41,741 [kW]$$

# PUNTA P2 EJ. 5 ME33A

PRIMERO SE DEBE PLANTEAR CORRECTAMENTE Bernoulli:

$$\frac{P_1}{\rho} + \frac{1}{2} \vec{V}_1^2 + g z_1 + \frac{\dot{W}}{Q} = \frac{P_2}{\rho} + \frac{1}{2} \vec{V}_2^2 + g z_2 + \Delta P_e \quad (1)$$

SE PUEDE REDUCIR TERMINOS EN LA ECUACION (1):

$$P_1 = P_2 = P_{\text{atm}}$$

$$V_1 + V_2 = Q \quad (\text{ESTANQUES LO SUFICIENTEMENTE GRANDES})$$

$$z_1 = 0$$

$$z_2 = 50 \text{ ft}$$

CON LO ANTERIOR, LA ECUACION QUEDA COMO SIGUE:

$$\frac{\dot{W}}{Q} = g z_2 + \Delta P_e \quad (2)$$

$$Q = 3.5 \frac{\text{ft}^3}{\text{s}} = \vec{V} \cdot A = \vec{V} \cdot \pi \cdot (4 \text{ in})^2$$

Radio del tubo

$$\Rightarrow \vec{V} = \frac{3.5 \frac{\text{ft}^3}{\text{s}}}{\pi \cdot 16 \text{ in}^2} = \frac{3.5 \cdot \frac{\text{ft}^3}{\text{s}}}{16 \pi \cdot 6.944 \cdot 10^{-3} \text{ ft}^2} \Rightarrow \vec{V} = 7.162 \frac{\text{ft}}{\text{s}}$$

$$\text{LUEGO, } \Delta P_e = 61 \cdot \frac{\vec{V}^2}{2} \frac{\text{ft}^2}{\text{s}^2} = 1564.47 \frac{\text{ft}^2}{\text{s}^2}$$

REEMPLAZANDO LOS VALORES EN (2):

$$\frac{\dot{W}}{Q} = (g z_2 + \Delta P_e) \Rightarrow \dot{W} = \left( 32.2 \frac{\text{ft}}{\text{s}^2} \cdot 50 \text{ ft} + 1564.47 \frac{\text{ft}^2}{\text{s}^2} \right) \cdot 3.5 \frac{\text{ft}^3}{\text{s}}$$

$$\Rightarrow \dot{W} = 7736.19 \frac{\text{ft} \cdot \text{lb}}{\text{s}^2}$$

$$\text{MULTIPLICANDO POR } \ell: \quad \dot{W} = 7736.19 \frac{\text{ft} \cdot \text{lb}}{\text{s}^2} \cdot 1.74 \frac{\text{ft}}{\text{ft}} = 15396.2 \frac{\text{ft}^2 \cdot \text{lb}}{\text{s}^2} = 15396.2 \frac{\text{ft} \cdot \text{lb}}{\text{s}}$$

$$\Rightarrow \dot{W} = 24.99 [\text{hp}]$$