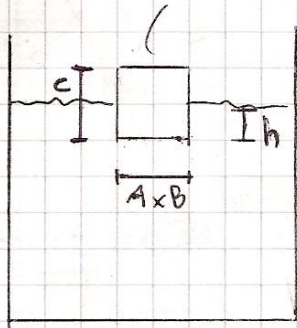


HIDROSTATICA E HIDRO DINAMICA

(8 EXEMPLOS DA PROF.)

1

madera $\rho_m = 700 \frac{\text{kg}}{\text{m}^3}$



$a = 1\text{m}$
 $b = 1\text{m}$
 $c = 0,8\text{m}$

CALCULAR h

$\rho_a = 1000 \frac{\text{kg}}{\text{m}^3}$

PESO = EMPUJS

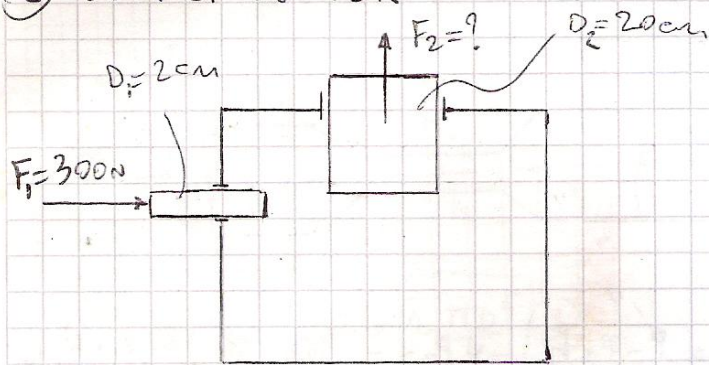
$\rho_m = \frac{m_m}{\text{Vol}} \Rightarrow m_m = \rho_m \cdot a \cdot b \cdot c$

$E = \rho_a \cdot g \cdot \text{Vol} \Rightarrow E = \rho_a \cdot g \cdot a \cdot b \cdot h$

$\rho_a \cdot g \cdot a \cdot b \cdot h = \rho_m \cdot g \cdot a \cdot b \cdot c \Rightarrow h = \frac{\rho_m \cdot a \cdot b \cdot c}{\rho_a \cdot a \cdot b} \Rightarrow h = \frac{700 \frac{\text{kg}}{\text{m}^3} \cdot 1\text{m} \cdot 1\text{m} \cdot 0,8\text{m}}{1000 \frac{\text{kg}}{\text{m}^3} \cdot 1\text{m} \cdot 1\text{m}}$

$h = 0,56\text{m}$

2) ESTÁ EN LA GUÍA



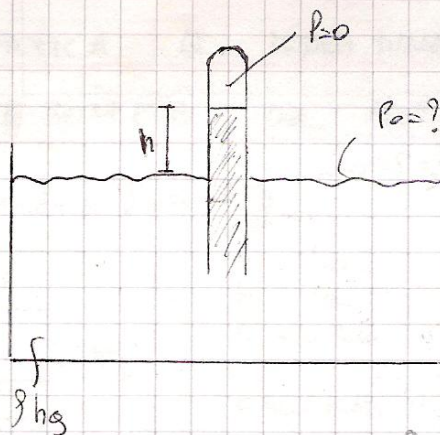
$$F_1 = P_1 \cdot \text{Sup}_1 \Rightarrow P_1 = \frac{F_1}{\text{Sup}_1} \Rightarrow P_1 = \frac{F_1}{\frac{\pi D_1^2}{4}}$$

$$F_2 = P_2 \cdot \text{Sup}_2 \Rightarrow P_2 = \frac{F_2}{\text{Sup}_2} \Rightarrow P_2 = \frac{F_2}{\frac{\pi D_2^2}{4}}$$

$$P_1 = P_2$$

$$\frac{4F_1}{\pi D_1^2} = \frac{4F_2}{\pi D_2^2} \Rightarrow F_2 = F_1 \cdot \frac{D_2^2}{D_1^2} \Rightarrow F_2 = 300 \text{ N} \cdot \frac{(0,2 \text{ m})^2}{(0,02 \text{ m})^2} \Rightarrow \boxed{F_2 = 30000 \text{ N}}$$

3



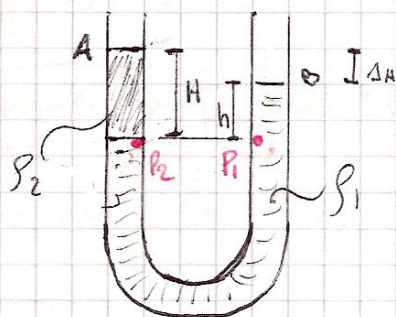
$$\rho_{Hg} = 13600 \frac{\text{kg}}{\text{m}^3}$$

$$h = 0,76$$

$$P_r = P - P_0 \Rightarrow -P_0 = -P + P_r \Rightarrow P_0 = P - \rho g h \Rightarrow P_0 = -13600 \frac{\text{kg}}{\text{m}^3} \cdot 9,8 \frac{\text{m}}{\text{s}^2} \cdot 0,76 \text{ m}$$

$$\Rightarrow P_0 = 101.292,8 \text{ Pa} \quad \left[\frac{\text{N}}{\text{m}^2} \right]$$

5) ¿QUÉ ESTÁ EN LA GUÍA



$$\Delta H = H - h$$

PROFUNDIDAD

MISMA ALTURA, MISMO LÍQUIDO, MISMA PRESIÓN

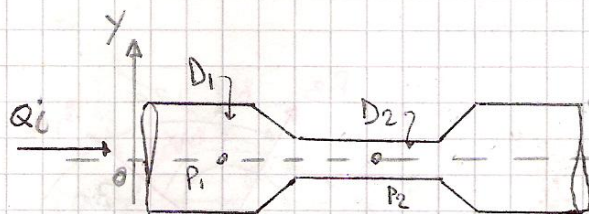
$$P_2 = \rho g \text{ Vol} \Rightarrow P_2 = \rho g H$$

$$P_1 = \rho g h$$

$$P_2 = P_1$$

$$\rho g H = \rho g h$$

④ HIDRODINÁMICA

DATOS

$$\rho = 1000 \frac{\text{kg}}{\text{m}^3}$$

$$D_1 = 0,12 \text{ m}$$

$$D_2 = 0,05 \text{ m}$$

$$P_1 - P_2 = 5000 \text{ Pa}$$

CALCULAR

Q

$$Q_1 = V_1 \cdot \text{Sup} \Rightarrow Q_1 = V_1 \cdot \frac{\pi D_1^2}{4} \quad (3)$$

$$\frac{P_1}{\rho} + \frac{V_1^2}{2} + g z_1 = \frac{P_2}{\rho} + \frac{V_2^2}{2} + g z_2$$

$$\frac{P_1 - P_2}{\rho} = \frac{V_2^2 - V_1^2}{2} \quad (1)$$

$$V_1 \text{Sup}_1 = V_2 \text{Sup}_2 \Rightarrow \frac{V_1 \text{Sup}_1}{\text{Sup}_2} = V_2 \Rightarrow V_1 \frac{\pi D_1^2}{4} = V_2 \Rightarrow V_2 = V_1 \left(\frac{D_1}{D_2} \right)^2 \quad (2)$$

$$\text{USANDO ECU (1)} \dots \frac{P_1 - P_2}{\rho} = \rho \cdot \left[V_1^2 \left(\frac{D_1}{D_2} \right)^4 - \frac{V_1^2}{2} \right] \Rightarrow P_1 - P_2 = \rho \left[V_1^2 \left(\frac{D_1}{D_2} \right)^4 - \frac{1}{2} \right]$$

$$\Rightarrow \sqrt{\frac{P_1 - P_2 \cdot 2}{\rho \left(\left(\frac{D_1}{D_2} \right)^4 - 1 \right)}} = V_1 \Rightarrow V_1 = \sqrt{\frac{10}{15}} \Rightarrow V_1 = 0,816 \text{ m/s}$$

USANDO ECU (3) ...

$$Q_1 = \frac{V_1 \cdot \pi D_1^2}{4} \Rightarrow Q_1 = 6,40 \cdot 10^{-3} \frac{\text{m}^3}{\text{s}}$$