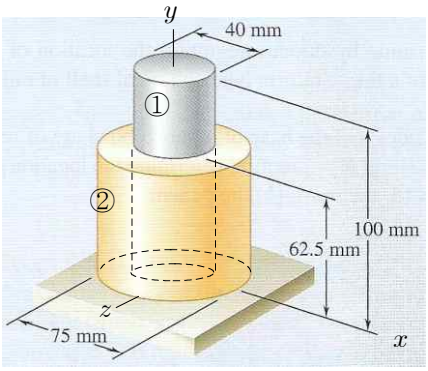
[5.4절]

5.120 ρ_b = 8,470 kg/m^3 = 8.47×10^{-6} kg/mm^3, ρ_a = 2,800 kg/m^3 = 2.80×10^{-6} kg/mm^3

h_b = 62.5 mm, h_a = 100 mm,

d_b = 75 mm, d_a = 40 mm



S; 대칭구조 $\overline{X} = \overline{Z} = 0$

M;

$W = mg = \rho V g \Rightarrow m = \rho V$

$$\overline{Y} = \frac{\Sigma(\overline{y}W)}{\Sigma W} = \frac{\Sigma(\overline{y}m)}{\Sigma m}$$

A; ① 알루미늄 원기둥 + ② 황동 원통

① $V = \frac{\pi}{4} d_a^2 h_a = \frac{\pi}{4}(40\text{ mm})^2(100\text{ mm}) = 125{,}664\text{ mm}^3 = 125.664\times10^3\text{ mm}^3$

$m = \rho_a V = (2.80\times10^{-6}\text{ kg/mm}^3)(125.664\times10^3\text{ mm}^3) = 0.3519\text{ kg}$

$\overline{y} = \frac{1}{2}h_a = \frac{1}{2}(100\text{ mm}) = 50\text{ mm}$

② $V = \frac{\pi}{4}\left(d_b^2 - d_a^2\right)h_b = \frac{\pi}{4}[(75\text{ mm})^2 - (40\text{ mm})^2](62.5\text{ mm}) = 197.577\times10^3\text{ mm}^3$

$m = \rho_b V = (8.47\times10^{-6}\text{ kg/mm}^3)(197.577\times10^3\text{ mm}^3) = 1.6734\text{ kg}$

$\overline{y} = \frac{1}{2}h_b = \frac{1}{2}(62.5\text{ mm}) = 31.25\text{ mm}$

$\Sigma m = (0.3519 + 1.6734)\text{ kg} = 2.025\text{ kg}$

$\Sigma(\overline{y}m) = [(50)(0.3519) + (31.25)(1.6734)]\text{ kg}\cdot\text{mm}$

$= 69.89\text{ kg}\cdot\text{mm}$

$$\overline{Y} = \frac{\Sigma(\overline{y}m)}{\Sigma m} = \frac{69.89\text{ kg}\cdot\text{mm}}{2.025\text{ kg}} = 34.51\text{ mm} \quad \Rightarrow \quad \text{중심} = (0,\ 34.5\text{ mm},\ 0)$$

R; (과정의 타당성 검토) (가령, 원통의 부피 및 질량 계산 과정)

T; (결과의 의미 검토) (가령, 중심의 위치)