

[9.2절]

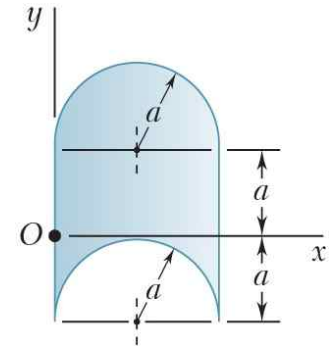
9.35 ① 직사각형, ② 위 반원, ③ 아래 반원 구멍

$$I_{y1} = \bar{I}_{y1} + A_1 d_1^2$$

$$= \frac{1}{12} (2a)(2a)^3 + (2a)^2 a^2 = \left(\frac{4}{3} + 4\right) a^4 = \frac{16}{3} a^4$$

$$I_{y2} - I_{y3} = 0$$

$$I_y = I_{y1} + I_{y2} - I_{y3} = \frac{16}{3} a^4 = 5.33 a^4$$



$$I_{x1} = \frac{1}{12} (2a)(2a)^3 = \frac{4}{3} a^4 = 1.333 a^4$$

$$I_{x2} = \frac{\pi}{8} a^4 - \frac{\pi}{2} a^2 \left(\frac{4}{3\pi} a\right)^2 + \frac{\pi}{2} a^2 \left(a + \frac{4}{3\pi} a\right)^2 = \frac{\pi}{8} a^4 - \frac{8}{9\pi} a^4 + \frac{\pi}{2} \left(1 + \frac{4}{3\pi}\right)^2 a^4$$

$$= 3.30 a^4$$

$$I_{x3} = \frac{\pi}{8} a^4 - \frac{\pi}{2} a^2 \left(\frac{4}{3\pi} a\right)^2 + \frac{\pi}{2} a^2 \left(a - \frac{4}{3\pi} a\right)^2 = \frac{\pi}{8} a^4 - \frac{8}{9\pi} a^4 + \frac{\pi}{2} \left(1 - \frac{4}{3\pi}\right)^2 a^4$$

$$= 0.630 a^4$$

$$I_x = I_{x1} + I_{x2} - I_{x3} = 1.333 a^4 + 3.30 a^4 - 0.630 a^4 = 4.00 a^4$$