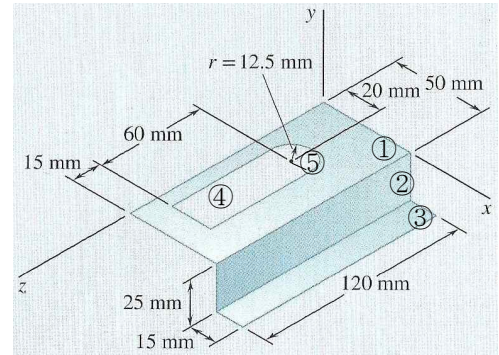


[5.4절]

- 5.112 ① 직사각형 50×120, ② 직사각형 25×120, ③ 직사각형 15×120  
 ④ 직사각형 구멍, ⑤ 반원 구멍



①  $A = (50 \text{ mm})(120 \text{ mm}) = 6\,000 \text{ mm}^2$

$$\bar{x} = \frac{1}{2}(50 \text{ mm}) = 25 \text{ mm}$$

$$\bar{y} = 0$$

$$\bar{z} = \frac{1}{2}(120 \text{ mm}) = 60 \text{ mm}$$

②  $A = (25 \text{ mm})(120 \text{ mm}) = 3\,000 \text{ mm}^2$

$$\bar{x} = 50 \text{ mm}$$

$$\bar{y} = -\frac{1}{2}(25 \text{ mm}) = -12.5 \text{ mm}$$

$$\bar{z} = \textcircled{1}\bar{z} = 60 \text{ mm}$$

③  $A = (15 \text{ mm})(120 \text{ mm}) = 1\,800 \text{ mm}^2$

$$\bar{x} = 50 \text{ mm} + \frac{1}{2}(15 \text{ mm}) = 57.5 \text{ mm}$$

$$\bar{y} = -25 \text{ mm}$$

$$\bar{z} = \textcircled{1}\bar{z} = 60 \text{ mm}$$

④  $A = -[2(12.5 \text{ mm})](60 \text{ mm}) = -1\,500 \text{ mm}^2$

$$\bar{x} = 20 \text{ mm}$$

$$\bar{y} = 0$$

$$\bar{z} = (120 \text{ mm}) - (15 \text{ mm}) - \frac{1}{2}(60 \text{ mm}) = 75 \text{ mm}$$

⑤  $A = -\frac{1}{2}\pi(12.5 \text{ mm})^2 = -245.4 \text{ mm}^2$

$$\bar{x} = 20 \text{ mm}$$

$$\bar{y} = 0$$

$$\bar{z} = (120 \text{ mm}) - (15 \text{ mm}) - (60 \text{ mm}) - \frac{4}{3\pi}(12.5 \text{ mm}) = 39.70 \text{ mm}$$

$$\Sigma A = 6,000 + 3,000 + 1,800 + (-1,500) + (-245.4) = 9,054.6 \text{ mm}^2$$

$$\Sigma(\bar{x}A) = (25)(6,000) + (50)(3,000) + (57.5)(1,800) + (20)(-1,500) + (20)(-245.4) = 368,600 \text{ mm}^3$$

$$\Sigma(\bar{y}A) = (0)(6,000) + (-12.5)(3,000) + (-25)(1,800) + (0)(-1,500) + (0)(-245.4) = -82,500 \text{ mm}^3$$

$$\Sigma(\bar{z}A) = (60)(6,000) + (60)(3,000) + (60)(1,800) + (75)(-1,500) + (39.70)(-245.4) = 525,757 \text{ mm}^3$$

$$\bar{X} = \frac{\Sigma(\bar{x}A)}{\Sigma A} = \frac{368,600 \text{ mm}^3}{9,054.6 \text{ mm}^2} = 40.7 \text{ mm}$$

$$\bar{Y} = \frac{\Sigma(\bar{y}A)}{\Sigma A} = \frac{-82,500 \text{ mm}^3}{9,054.6 \text{ mm}^2} = -9.11 \text{ mm}$$

$$\bar{Z} = \frac{\Sigma(\bar{z}A)}{\Sigma A} = \frac{525,757 \text{ mm}^3}{9,054.6 \text{ mm}^2} = 58.1 \text{ mm}$$

$$\text{중심} = (40.7 \text{ mm}, -9.11 \text{ mm}, 58.1 \text{ mm})$$