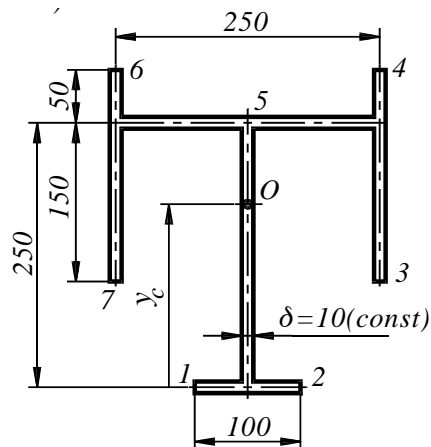


**PRIMER 08-01**

Za profil na slici odrediti položaj centra savijanja.



**Rešenje:**

**1. Određivanje karakteristika poprečnog preseka**

1.1 Težina

$$y_c = \frac{2 \cdot 20 \cdot 1 \cdot 20 + 24 \cdot 1 \cdot 25 + 24 \cdot 1 \cdot 12,5}{2 \cdot 20 \cdot 1 + 24 \cdot 1 + 10 \cdot 1 + 24 \cdot 1} = 17,35 \text{ cm}$$

1.2 Momenti inercije

$$I_x = 2 \left[ \frac{1 \cdot 20^3}{12} + 1 \cdot 20 (20 - 17,35)^2 \right] + 24 \cdot 1 (25 - 17,35)^2 + \frac{24 \cdot 1^3}{12} + \frac{1 \cdot 24^3}{12} +$$

$$+ 1 \cdot 24 (12,5 - 17,35)^2 + 1 \cdot 10 \cdot 17,35^2 + \frac{10 \cdot 1^3}{12} = 7748 \text{ cm}^4$$

$$I_y = 2 \left( \frac{20 \cdot 1^3}{12} + 20 \cdot 1 \cdot 12,5^2 \right) + \frac{1 \cdot 24^3}{12} + \frac{1 \cdot 10^3}{12} + \frac{24 \cdot 1^3}{12} = 7490 \text{ cm}^4$$

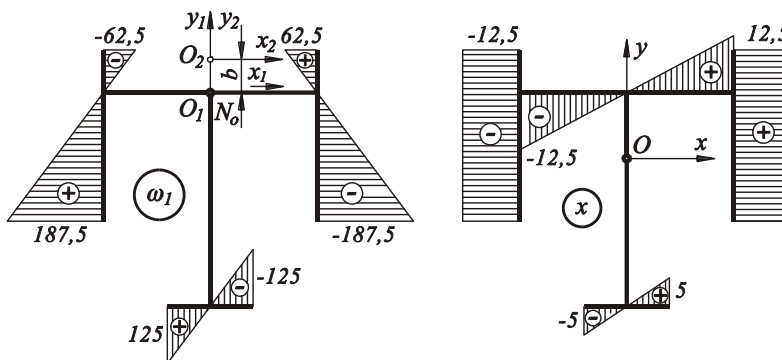
1.3 Centar savijanja

$$b = - \frac{I_{\omega_{1x}}}{I_y} = - \frac{-29166}{7490} \cong 3,9 \text{ cm}$$

Centrifugalni sektorski moment konture, prema (Sl. 3.99) iznosi:

$$I_{\omega_1 x} = \int_A \omega_1 x dA = \delta \int_s \omega_1 x ds = 1 \left[ 62,5 \cdot 5 \cdot \frac{1}{2} \cdot 12,5 + (-187,5) \cdot 15 \cdot \frac{1}{2} \cdot 12,5 + \right. \\ \left. + 125 \cdot 5 \cdot \frac{1}{2} \cdot \frac{2}{3} \cdot 5 + (-125) \cdot 5 \cdot \frac{1}{2} \cdot \frac{2}{3} \cdot (-5) + 187,5 \cdot 15 \cdot \frac{1}{2} \cdot (-12,5) + (-62,5) \cdot 5 \cdot \frac{1}{2} \cdot (-12,5) \right],$$

$$I_{\omega_1 x} = -29166 \text{ cm}^5$$

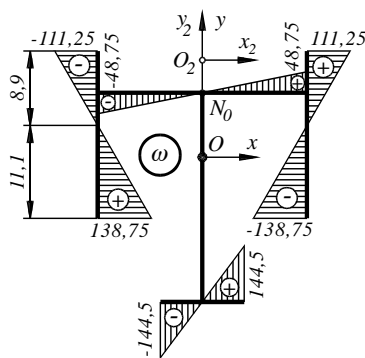


Sl. 3.99

## 1.4 Glavna sektorska koordinata

Usvajajuji  $O_2$  za pol, a  $N_0$  na preseku ose  $O_y$  i pojasa konture (Sl. 3.100), izražava se glavna sektorska koordinata korišćenjem izraza:

$$\omega = \int_0^s r ds$$



Sl. 3.100

## 1.5 Glavni sektorski moment inercije konture

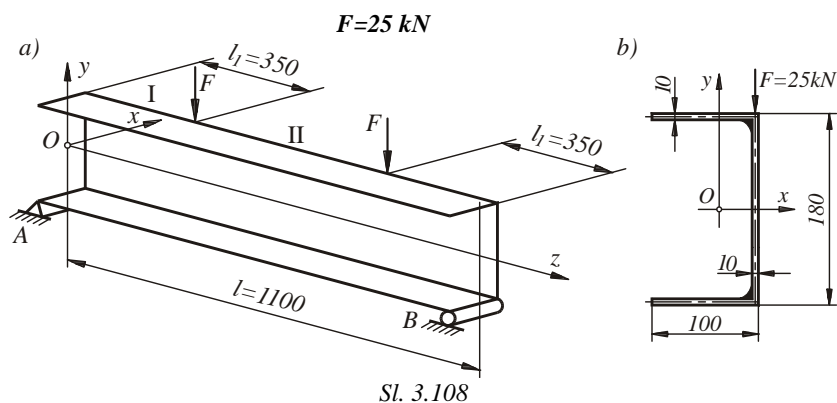
$$I_{\omega} = \int_A \omega^2 dA = \delta \int_S \omega \cdot \omega ds = I \left( 111,25 \cdot 8,9 \cdot \frac{1}{2} \cdot \frac{2}{3} 111,25 + 48,75 \cdot 12,5 \cdot \frac{1}{2} \cdot \frac{2}{3} 48,75 + \right. \\ \left. + 138,75 \cdot 11,1 \cdot \frac{1}{2} \cdot \frac{2}{3} 138,75 + 144,5 \cdot 5 \cdot \frac{1}{2} \cdot \frac{2}{3} 144,5 \right) \cdot 2 = 305301 \text{ cm}^6.$$

## 1.6 Membranski uvojni moment inercije konture

$$I_t = \frac{1}{3} \sum b_i \delta_i^3 = \frac{1}{3} (2 \cdot 20 \cdot 1^3 + 24 \cdot 1^3 + 24 \cdot 1^3 + 10 \cdot 1^3), \\ I_t = 32,67 \text{ cm}^4$$

**PRIMER 08-02**

Odrediti položaj centra savijanja profila desno.

**Re{enje:**

Polo`aj centra savijanja za ovakav oblik profila je odre|en u primeru 3.9.3 i glasi:

$$a = \frac{I_{\omega 1y}}{I_x} = \frac{3\delta_2 b^2}{\delta_1 h + 6\delta_2 b} = \frac{3 \cdot 1 \cdot 9,5^2}{1 \cdot 17 + 6 \cdot 1 \cdot 9,5} \cong 3,65 \text{ cm}.$$

Glavni sektorski moment konture prema (Sl. 3.109.b) iznosi:

$$I_{\omega} = \int_A \omega^2 dA = \delta \int_0^s \omega \cdot \omega \cdot ds = I \left( 49,725 \cdot 5,85 \frac{1}{2} \frac{2}{3} 49,725 + 31,025 \cdot 3,65 \frac{1}{2} \frac{2}{3} 31,025 + \right. \\ \left. + 31,025 \cdot 8,5 \frac{1}{2} \frac{2}{3} 31,025 \right) \cdot 2 = 17439,7 \text{ cm}^6$$

