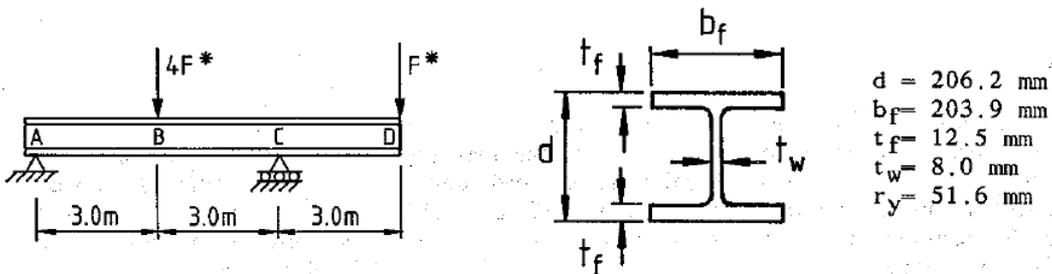


## 5.8 Determining the Spacing of Lateral Restraints

### 5.8.1 Problem

Determine the spacing of lateral restraints which will prevent lateral buckling of a 200UC52.2 beam of Grade 250 steel.



### 5.8.2 Discussion

This problem illustrates the determination of the spacing of lateral restraints which will prevent lateral buckling, in which case the moment capacity is equal to the section capacity.

### 5.8.3 Solution

(a) In-plane analysis

$$R_A^* \times 6.0 - 4F^* \times 3.0 + F^* \times 3.0 = 0, \quad R_A^* = 1.5 F^*$$

$$M_B^* = 1.5F^* \times 3.0 = 4.5 F^*$$

$$M_C^* = -F^* \times 3.0 = -3.0F^*$$

(b) Segment ABC

$$t_f = 12.5 \text{ mm}, \quad f_y = 250 \text{ MPa}$$

$$\beta_m = -0.8$$

$$L \leq [80 + 50 \times (-0.8)] \sqrt{(250/250)} \times 51.6 \text{ mm}$$

$$L \leq 2.064 \text{ m} < 6.0 \text{ m} \text{ and so intermediate restraints are required.}$$

(c) Segment AB (full or partial restraint at B).

$$\beta_m = M_A^*/M_B^* = 0.0/4.5F^* = 0.0$$

$$L \leq (80 + 50 \times 0.0) \sqrt{(250/250)} \times 51.6 \text{ mm}$$

$$L \leq 4.128 \text{ m} > 3.0 \text{ m}$$

and so no restraint needed between A and B.

(d) Segment BC (full or partial restraint at B).

$$\beta_m = -M_C^*/M_B^* = 3.0F^*/4.5F^* = 0.667$$

$$L \leq (80 + 50 \times 0.667) \sqrt{(250/250)} \times 51.6 \text{ mm}$$

$$L \leq 5.848 \text{ m} > 3.0 \text{ m}$$

and so no restraint needed between B and C.

$$d = 206.2 \text{ mm}$$

$$b_f = 203.9 \text{ mm}$$

$$t_f = 12.5 \text{ mm}$$

$$t_w = 8.0 \text{ mm}$$

$$r_y = 51.6 \text{ mm}$$

T2.1, P5.1.4

5.3.2.4(b)

5.3.2.4

5.3.2.4(c)

5.3.2.4

5.3.2.4(c)

5.3.2.4

(e) Segment CD (full or partial restraint at D)

$$\beta_m = M_D^*/M_C^* = 0.0/3.0F^* = 0.0$$

$$L \leq (80 + 50 \times 0.0) \sqrt{(250/250)} \times 51.6 \text{ mm}$$

$$L \leq 4.128 \text{ m} > 3.0 \text{ m}$$

and so no restraint needed between C and D.

5.3.2.4(c)

5.3.2.4

#### 5.8.4 Comments

In this problem, the beam can be considered to have full lateral restraint against lateral buckling when there are restraints at the load points B and D as well as at the supports A and C. The restraint at B need only be a lateral restraint (Clause 5.4.2.4) at the critical (compression) flange (Clause 5.5.2), but the restraint at C must provide restraint against twist rotation (Clause 5.4.3.2) as well as against lateral deflection (Clause 5.4.3.1) before the provisions of Clause 5.3.2.4 can be used.