MEMBER #2 DESIGN REPORT

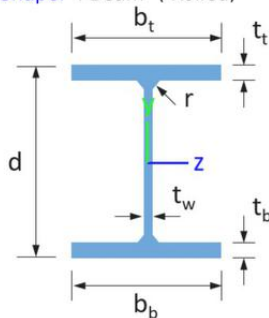## Project details

Project Name: Opti_EU
Project ID:
Company:
Designer:
Client:
Project Notes:
Project Units: metric

General member design information

Section Name: S150x26
Shape: I-Beam (Rolled)

Dimensions:
Height $d = 152.000$ mm
Web Thick $t_w = 11.800$ mm
Top Flange Width $b_t = 91.000$ mm
Top Flange Thick $t_t = 9.100$ mm
Bottom Flange Width $b_b = 91.000$ mm
Bottom Flange Thick $t_b = 9.100$ mm
Fillet $r = 10.900$ mm

Properties:
Area $A = 3260.000$ mm^2
Moment of Inertia about the z-axis $I_z = 10900000.000$ mm^4
Moment of Inertia about the y-axis $I_y = 969000.000$ mm^4
Plastic Section Modulus about the z-axis $Z_z = 173000000.000$ mm^3
Plastic Section Modulus about the y-axis $Z_y = 38900000.000$ mm^3
Torsion Contant $J = 152.000$ mm^4
Warping Contant $I_w = 4950000000.000$ mm^6

Material properties:
Material Name: Structural Steel
Modulus of Elasticity $E = 200000.000$ MPa
Yield Strength $F_y = 223.400$ MPa
Ultimate Tensile Strength $F_u = 357.440$ MPa

Design parameters:
Member length $L = 0.750$ m
Length between braced points $L_e = 0.750$ m
Effective Length factor for flexural buckling about y-axis $K_y = 0.700$
Effective Length factor for flexural buckling about z-axis $K_z = 0.700$

Design Internal Forces

For check axial strength:
Absolute Maximum Axial Force $P = 22.155$ kN

For check axial buckling strength:
Absolute Maximum Axial Compression Force $P = 22.155$ kN

For check flexural strength about the major axis:
Absolute Maximum Major Bending Moment $M_z = 3.693$ kN-m

For check flexural strength about the minor axis:
Absolute Maximum Minor Bending Moment $M_y = 0.000$ kN-m

For check shear strength y-axis:

SkyCiv
CLOUD ENGINEERING SOFTWARE

Maximum Backbone Shear Force $V_u = 1180.87$

http://start.shear.strength.conv

Maximum Backbone Shear Force $V_u = 1180.87$

http://start.eigenvalue.of.combined.strength
$\lambda_{comb}(F_z, V_y, V_z) = 39.1807.87$
$\lambda_{comb}(F_z, V_y, V_z) = 24.4417.87$

http://start.eigenvalue.of.combined.buckling
$\lambda_{comb}(F_z, V_y, V_z) = 39.1807.87$
$\lambda_{comb}(F_z, V_y, V_z) = 24.4417.87$

CHECK: AXIAL STRENGTH (axial compression member)

Rules Of Section

$$\phi_{axial} = 0.9$$

Compressive resistance (EN 3.4.1.1)

$$N_{c,Rd} = 750.982.87$$

Check ratio of axial strength

$$\frac{N_{Ed}}{N_{c,Rd}} = \frac{98.82}{982.982} = 0.0882 < 1.0$$

CHECK: AXIAL BUCKLING STRENGTH (axial compression member)

Rules Of Section

$$\phi_{axial} = 0.9$$

Buckling compressive resistance (EN 3.4.1.1 + 3.4.4.2)

$$N_{b,Rd} = 982.982.87$$

Check ratio of axial buckling strength

$$\frac{N_{Ed}}{N_{b,Rd}} = \frac{98.82}{982.982} = 0.0882 < 1.0$$

CHECK: FLEXURAL STRENGTH ABOUT MAJOR AXIS

Rules Of Section

$$\phi_{bend} = 0.9$$

Moment resistance (EN 3.4.1 + 3.4.5)

$$M_{c,Rd} = 98.982.87 \, kN$$

Check ratio of flexural strength

$$\frac{M_{Ed}}{M_{c,Rd}} = \frac{9.982}{98.982} = 0.0882 < 1.0$$

CHECK: FLEXURAL STRENGTH ABOUT MINOR AXIS

Rules Of Section

CHECK SHEAR STRENGTH (VAR)

Shear resistance from BS5 - 13.18

$$V_{c,Rd} = \text{[illegible]}$$

Check ratio of shear strength

$$\frac{T_{Ed}}{V_{c,Rd}} = \frac{\text{[illegible]}}{\text{[illegible]}} = \text{[illegible]} < 1.0$$

CHECK SHEAR STRENGTH (VAR)

Shear resistance from BS5 - 13.18

$$V_{c,Rd} = \text{[illegible]}$$

Check ratio of shear strength

$$\frac{T_{Ed}}{V_{c,Rd}} = \frac{\text{[illegible]}}{\text{[illegible]}} = \text{[illegible]} < 1.0$$