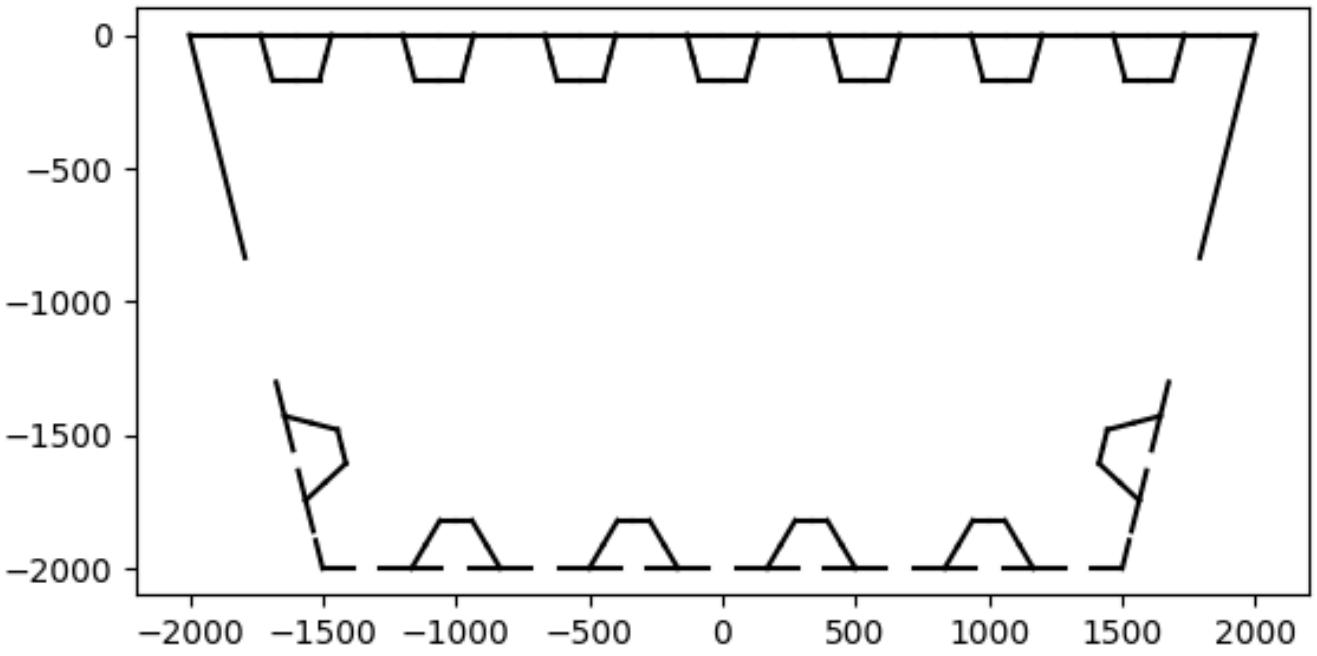


Buckling Proof according to EC 1993 Part 1-5

3.2 Effective width for elastic shear lag

Shear lag reduction for flange 1

Shear Lag is not neglectable

alpha_0: 1.6

Beta: 0.3760575260584114

Shear lag reduction for flange 3

Shear Lag is not neglectable

alpha_0: 1.6

Beta: 0.46405618432646983

4.4 Plate elements without longitudinal stiffeners

Iteratively changing the widths until M_Rd_el_eff converges to a limit of 0.02

4.5 Stiffened plate elements with longitudinal stiffeners

Side 2

4.5.2 Plate type behaviour

sigma_cr = 756.791922651447

Lambda: 0.4299030397651981

Rho_Global: 1.0

4.5.3 Column type buckling behaviour

Column number 8

A_sl=7610.47, A_sl_eff=6240.43, I_sl=9543602.04

sigma_cr_c=25.99

e1=72.05, e2=39.61

All tension =False

Buckling Values 8

beta_A_c =0.8199798233602403

lambda_c_bar =2.7228620890708544

Phi_c =4.691666778172728

Chi_c =0.11747612166952198

Critical buckling values

Chi_c: 0.11747612166952198

sigma_cr_c: 25.99080542600357

4.5.4 Interaction between plate and column buckling

all_tension: False

rho_c = 1.0

Side 3

4.5.2 Plate type behaviour

sigma_cr = 693.1498711897681

Lambda: 0.5287901196881709

Rho_Global: 1.0

4.5.3 Column type buckling behaviour

Column number 9

A_sl=6025.64, A_sl_eff=4969.69, I_sl=9435491.89

sigma_cr_c=32.45

e1=60.88, e2=49.17

All tension =False

Buckling Values 9

beta_A_c =0.8247568824337757

lambda_c_bar =2.4437510790180608

Phi_c =3.9330231379677976

Chi_c =0.14255770761590786

Column number 10

A_sl=6025.64, A_sl_eff=4969.69, I_sl=9435491.89

sigma_cr_c=32.45

e1=60.88, e2=49.17

All tension =False

Buckling Values 10

beta_A_c =0.824756882433776

lambda_c_bar =2.4437510790180585

Phi_c =3.933023137967792

Chi_c =0.14255770761590808

Column number 11

A_sl=6025.64, A_sl_eff=4969.69, I_sl=9435491.89

sigma_cr_c=32.45

e1=60.88, e2=49.17

All tension =False

Buckling Values 11

beta_A_c =0.824756882433776

lambda_c_bar =2.4437510790180585

Phi_c =3.933023137967792

Chi_c =0.14255770761590808

Column number 12

A_sl=6025.64, A_sl_eff=4969.69, I_sl=9435491.89

sigma_cr_c=32.45

e1=60.88, e2=49.17

All tension =False

Buckling Values 12

beta_A_c =0.8247568824337754

lambda_c_bar =2.4437510790180554

Phi_c =3.9330231379677842

Chi_c =0.14255770761590839

Critical buckling values

Chi_c: 0.14255770761590786

sigma_cr_c: 32.454870278807846

4.5.4 Interaction between plate and column buckling

all_tension: False

rho_c = 1.0

Side 4

4.5.2 Plate type behaviour

sigma_cr = 756.791922651447

Lambda: 0.42990303976519817

Rho_Global: 1.0

4.5.3 Column type buckling behaviour

Column number 13

A_sl=7610.47, A_sl_eff=6240.43, I_sl=9543602.04

sigma_cr_c=25.99

e1=72.05, e2=39.61

All tension =False

Buckling Values 13

beta_A_c =0.8199798233602408

lambda_c_bar =2.722862089070857

Phi_c =4.691666778172735

Chi_c =0.11747612166952179

Critical buckling values

Chi_c: 0.11747612166952179

sigma_cr_c: 25.99080542600354

4.5.4 Interaction between plate and column buckling

all_tension: False

rho_c = 1.0

Resistance to shear and interaction shear force and bending moment for side 1

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 948.2010275167215

eta_3: 0.059725598223899445

7.1 Interaction between shear force, bending moment and axial force

Flange -> (7.1), comment (5)

eta_3 <= 0.5; no interaction needed

utilisation: -1

Proofing Resistance to shear for each subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.04192581999281811

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.03593641713670124

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.029947014280584366

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.02395761142446749

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.01796820856835062

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.011978805712233745

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.005989402856116871

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 5.106872029145569e-18

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.0059894028561168775

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.011978805712233751

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.01796820856835063

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.0239576114244675

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.029947014280584366

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.03593641713670126

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.357777777777778

eta_3: 0.04192581999281812

eta_3_panel < 1: pass subpanel

Resistance to shear and interaction shear force and bending moment for side 2

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 14.284473684210527

eta_3: 0.6796839934815232

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

Resistance to shear and interaction shear force and bending moment for side 3

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 2140.0961969962336

eta_3: 0.07818151255373514

7.1 Interaction between shear force, bending moment and axial force

Flange -> (7.1), comment (5)

eta_3 <= 0.5; no interaction needed

utilisation: -1

Proofing Resistance to shear for each subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.06449887004543704

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.04837415253407777

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.03224943502271852

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.016124717511359254

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 6.874380536328e-19

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.01612471751135926

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.03224943502271852

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.048374152534077786

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.06449887004543704

eta_3_panel < 1: pass subpanel

Resistance to shear and interaction shear force and bending moment for side 4

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 14.284473684210527

eta_3: 0.6796839934815232

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

Results:

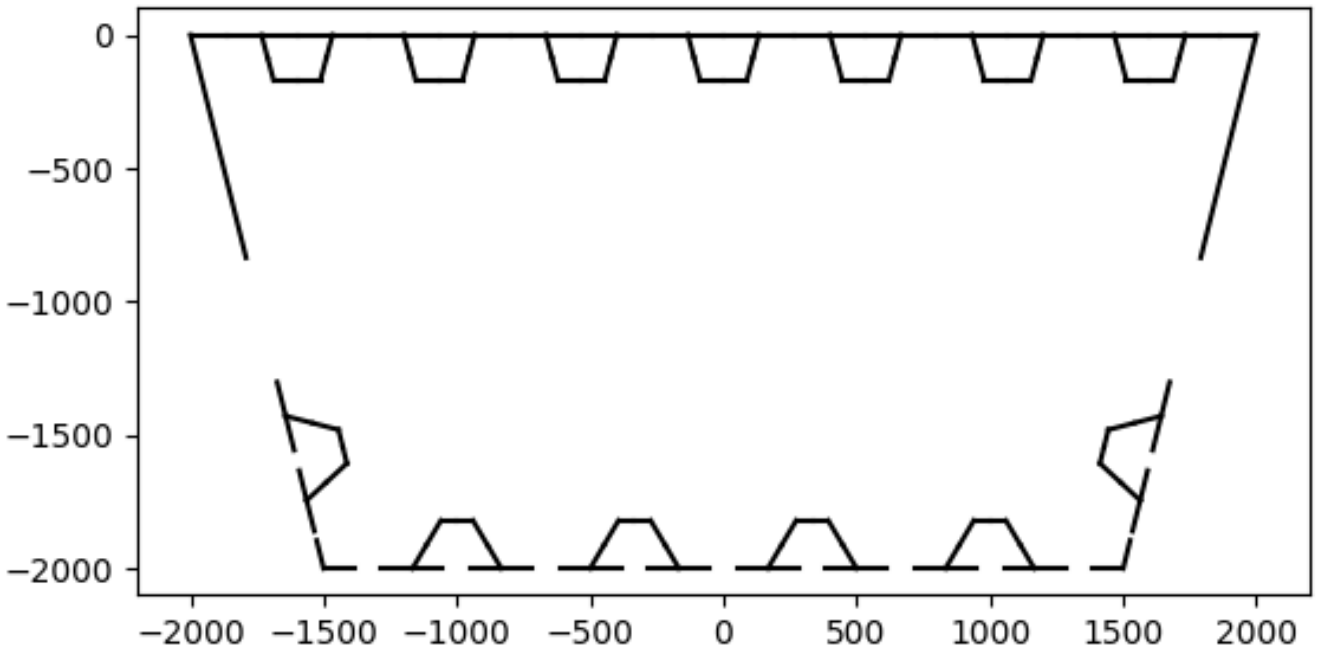
EI: 16589099Nm^2

interaction side 2: -0.05763085584184337

interaction side 3: -1

interaction side 4: -0.05763085584184337

cost: 3530CHF/m


0
−500
−1000
−1500
−2000
−2000
−1500
−1000
−500
0
500
1000
1500
2000