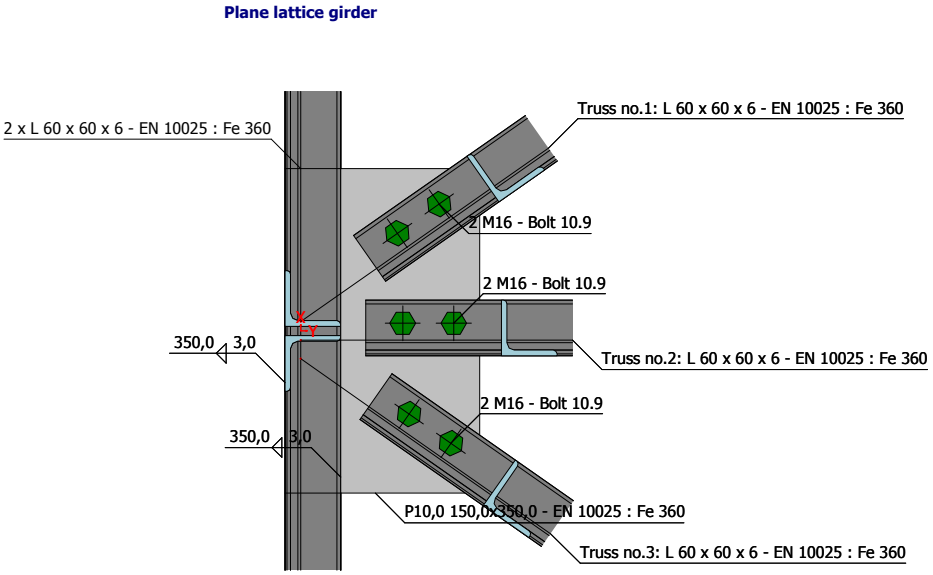
1 Project

1.1 Calculation parameters

Standard : ČSN EN 1993-1-8 (γ_{M0} = 1,00; γ_{M1} = 1,00; γ_{M2} = 1,25; γ_{M5} = 1,00)
Structure type : Frame with sway mode failure

2 S.Connection 1 - Plane lattice girder

2.1 Connection scheme



2.2 Data recapitulation

2.2.1 Lattice girder chord

Profile

Section: 2 x L 60 x 60 x 6
Material: EN 10025 : Fe 360
Yield strength : f_y = 235,0 MPa
Ultimate tensile strength : f_u = 360,0 MPa
Elasticity modulus : E = 210000,0 MPa

2.2.2 Connection to framework chord - Bars to joint plate

Truss no.1

Profile

Section: L 60 x 60 x 6
cross-section height : h = 60,0 mm
thickness of vertical cross-section wall : t_1 = 6,0 mm
cross-section width : b = 60,0 mm
thickness of horizontal cross-section wall : t_2 = 6,0 mm
Material: EN 10025 : Fe 360
Yield strength : f_y = 235,0 MPa
Ultimate tensile strength : f_u = 360,0 MPa
Elasticity modulus : E = 210000,0 MPa

Position

Reference point : X = 10,0 mm
: Y = 0,0 mm
Truss offset : D = 100,0 mm
Truss pitch : α = 35,00 °

Bolts

Type: Bolts for steel structures (M16)
shank length : L = 35,0 mm
thread length : L_b = 23,0 mm

Material: Bolt 10.9
Yield strength : f_{yb} = 900,0 MPa
Ultimate tensile strength : f_{ub} = 1000,0 MPa
Distribution of bolts
e_1 = [40,0, 55,0], e_2 = [35,0]
Bolt head on beam side

Truss no.2

Profile

Section: L 60 x 60 x 6
cross-section height : h = 60,0 mm
cross-section width : b = 60,0 mm
thickness of vertical cross-section wall : t_1 = 6,0 mm
thickness of horizontal cross-section wall : t_2 = 6,0 mm
Material: EN 10025 : Fe 360
Yield strength : f_y = 235,0 MPa
Elasticity modulus : E = 210000,0 MPa
Ultimate tensile strength : f_u = 360,0 MPa

Position

Reference point : X = -10,0 mm
: Y = 0,0 mm
Truss offset : D = 70,0 mm
Truss pitch : α = 0,00 °

Bolts

Type: Bolts for steel structures (M16)
shank length : L = 35,0 mm
thread length : L_b = 23,0 mm
Material: Bolt 10.9
Yield strength : f_{yb} = 900,0 MPa
Ultimate tensile strength : f_{ub} = 1000,0 MPa
Distribution of bolts
e_1 = [40,0, 55,0], e_2 = [35,0]
Bolt head on beam side

Truss no.3

Profile

Section: L 60 x 60 x 6
cross-section height : h = 60,0 mm
cross-section width : b = 60,0 mm
thickness of vertical cross-section wall : t_1 = 6,0 mm
thickness of horizontal cross-section wall : t_2 = 6,0 mm
Material: EN 10025 : Fe 360
Yield strength : f_y = 235,0 MPa
Elasticity modulus : E = 210000,0 MPa
Ultimate tensile strength : f_u = 360,0 MPa

Position

Reference point : X = -30,0 mm
: Y = 0,0 mm
Truss offset : D = 90,0 mm
Truss pitch : α = -35,00 °

Bolts

Type: Bolts for steel structures (M16)
shank length : L = 35,0 mm
thread length : L_b = 23,0 mm
Material: Bolt 10.9
Yield strength : f_{yb} = 900,0 MPa
Ultimate tensile strength : f_{ub} = 1000,0 MPa
Distribution of bolts
e_1 = [40,0, 55,0], e_2 = [35,0]
Bolt head on beam side

Joint plate

plate width : b_p = 150,0 mm
plate height : h_p = 350,0 mm
plate thickness : t_p = 10,0 mm
weld height : a_w = 3,0 mm

2.3 Results

2.3.1 Connection to framework chord - Bars to joint plate

Member no.1 capacity
Decisive component : Weakened section in tension

Check : $N_{1,Rd}$ = 78,4 kN > $N_{1,Sd}$ = 45,0 kN **PASS**

Member no.2 capacity

Decisive component : Bar section in bruise

Check : $N_{2,Rd}$ = 93,0 kN > $N_{2,Sd}$ = 52,0 kN **PASS**

Member no.3 capacity

Decisive component : Bar section in bruise

Check : $N_{3,Rd}$ = 93,0 kN > $N_{3,Sd}$ = 44,0 kN **PASS**

Joint plate capacity (14,20%) PASS

Bending capacity : $M_{y,Rd}$ = 67,49 kNm (6,18%)

Shear capacity : $V_{z,Rd}$ = 474,9 kN (10,75%)

Axial capacity : $N_{x,Rd}$ = 822,5 kN (6,22%)

Welds capacity : Max utilization (14,20%)