COWI DESIGN

Section properties of girder used in analysis

Length	Dimension	
General dimensions		
Total width	m	31
Cross-section height	m	6.5
Height lower inclined web	m	3.5
Height upper inclined web	m	3
Width upper inclined web	m	2.2
Width lower inclied web	m	7.25
Equivalent plate thickness		
Top	m	0.025
Upper inclined	m	0.02
Lower inclined	m	0.02
Bottom	m	0.025
Cross-section properties	m	
Area	m2	1.5
Distance from centroid to bottom plate	m	3.6
Distance from centroid to top plate	m	2.6
Iy weak axis top plate	m4	0.0
Iz strong axis top plate	m4	39.2
Iy weak axis bottom plate	m4	0.0
Iz strong axis bottom plate	m4	9.4
Iy weak axis upper inclined	m4	0.1
Iz strong axis upper inclined	m4	0.1
Iy weak axis lower inclined	m4	0.3
Iz strong axis lower inclined	m4	1.4
Iy weak axis	m4	11.3
Iz strong axis	m4	126.3
It torsion*(approx by rectangular)	m4	48.7227
Torsional moment of inertia (J/Ip)	m4	39.10399912
Radius of gyration about local x-axis	m	5.02548915
Material		
E	Pa	2.10E+11
v	-	0.3
G	Pa	8.08E+10
Axial stiffness	**N**	**3.2515E+11**
Bending stiffness y, weak axis	**Nm^2**	**2.38E+12**
Bending stiffness z, strong axis	**Nm^2**	**2.65E+13**
Torsional stiffness	**Nm^2/rad**	**3.16E+12**
Weight		
Steel density	kg/m3	7850
Steel skin (including longitudinal stiffeners)	kg/m	12154.42
Transverse stiffeners (16% of longitudinal)	kg/m	1944.71
Total steel weight	kg/m	14099.12
Total girder weigh	kN/m	138.3124099
Asphalt, railings etc (from COWI)	kN/m	54.3
Total permanent load (selfweight)	**kN/m**	**192.6124099**

Total permanent load (selfweight)	kg/m	19634.29255

RISNES DESIGN

Section properties of girder used in analysis		
Length	Dimension	
General dimensions		
Total width	m	22
Cross-section height	m	6
Height lower inclined web	m	3
Height upper inclined web	m	3
Width upper inclined web	m	3.5
Width lower inclied web	m	3.5
Equivalent plate thickness		
Top	m	0.02
Upper inclined	m	0.006
Lower inclined	m	0.006
Bottom	m	0.02
Cross-section properties	m	
Area	m2	0.71
Distance from centroid to bottom plate	m	3
Distance from centroid to top plate	m	3
Iy weak axis top plate	m4	0.000
Iz strong axis top plate	m4	5.625
Iy weak axis bottom plate	m4	0.000
Iz strong axis bottom plate	m4	5.625
Iy weak axis upper inclined	m4	0.021
Iz strong axis upper inclined	m4	0.028
Iy weak axis lower inclined	m4	0.021
Iz strong axis lower inclined	m4	0.028
Iy weak axis	m4	5.6545
Iz strong axis	m4	20.7726
It torsion*(approx by rectangular)	m4	16.17942857
It Torsional moment of inertia	m4	11.44838648
Radius of gyration about local x-axis	m	4.013737693
Material		
E	Pa	2.10E+11
v	-	0.3
G	GPa	8.08E+10
Axial stiffness	**N**	**1.49233E+11**
Bending stiffness y, weak axis	**Nm^2**	**1.19E+12**
Bending stiffness z, strong axis	**Nm^2**	**4.36E+12**
Torsional stiffness	**Nm^2/rad**	**9.25E+11**
Weight		
Steel density	kg/m3	7850
Steel skin (including longitudinal stiffeners)	kg/m	5578.48
Transverse stiffeners (16% of longitudinal)	kg/m	892.56
Total steel weight	kg/m	6471.04
Total steel weigh	kN/m	63.48088339
Asphalt, railings etc (% from COWI)	kN/m	30.62030075
Total permanent load (selfweight)	**kN/m**	**94.10118414**

Total permanent load (selfweight)	kg/m	9592.373511

Cross sectional property	Unit	Value
Area	[\si{\meter^2}	0.71
Iy weak axis	[\si{\meter^4}	5.65
Iz strong axis	[\si{\meter^4}	20.77
It Torsional moment of inertia	[\si{\meter^4}	16.18
Radius of gyration about local x-axis	[\si{\meter}]	4.01
Axial stiffness	**[\si{\newton}**	1.49E+11
Bending stiffness y, weak axis	**[\si{\newton**	1.19E+12
Bending stiffness z, strong axis	**[\si{\newton**	4.36E+12
Torsional stiffness	**[\si{\newton**	9.25E+11
Weight		
Steel skin (including longitudinal stiffeners)	[\si{\kilogram/	5578.48
Transverse stiffeners (16% of longitudinal)	[\si{\kilogram/	892.56
Total steel weight	[\si{\kilogram/	6471.04
Total steel weigh	[\si{\kilo\newt	63.48
Asphalt, railings etc (% from COWI)	[\si{\kilo\newt	30.62
Total permanent load (selfweight)	[\si{\kilo\newt	94.10
Total permanent load (selfweight)	[\si{\kilogram/	9592.37

Moment	Analytical [\si{\gls{sima}	[\si{\newtor	Difference [\si
M_{end}	2.65E+08	2.70E+08	1.73
M_{centre}	1.33E+08	1.31E+08	-1.21

Moment	Analytical [\si{\gls{sima}	[\si{\newtor	Difference [\si
M_{centre}	1.88E+09	1.35E+09	-28.43

Vertical force	17305207.8	
	17860295	

COWI "mellomregninger"			Risnes "mellomregninger"
Top length	26.6		Top length
Bottom length	16.5		Bottom length
upper inc length	3.72021505		upper inc length
lower inc length	8.05062109		lower inc length
top area	0.665		top area
bottom area	0.4125		bottom area
upper inc area	0.1488086		upper inc area
lower inc area	0.32202484		lower inc area
Total area	1.55		Total area
centroid bottom	3.63418503		centroid bottom
Centroid top	2.86581497		Centroid top
upper alpha(weak)	0.93804749	53.7461623	upper alpha
lower alpha(weak)	0.44975961	25.7693276	lower alpha
upper alpha(strong)	0.63274884	36.2538377	
lower alpha(strong)	1.12103671	64.2306724	
Outer Area Top	3.3	m2	Outer Area Top
Outer Area Bottom	12.6875	m2	Outer Area Bottom
Encloesed area	169.525	m2	Encloesed area
int ds/t top	1330	-	int ds/t top
int ds/t bottom	825	-	int ds/t bottom
int ds/t upper inc	248.014337	-	int ds/t upper inc
int ds/t lower inc	536.708073	-	int ds/t lower inc
sum ds/t	2939.72241	-	sum ds/t

535500000
1.88E+09

15.00		
15.00		
4.61		
4.61		
0.30		
0.30		
0.06		
0.06		
0.71		
3.00		
3.00		
0.71	40.6012946	
0.71	40.6012946	
5.25	m2	
5.25	m2	
111	m2	
1000	-	
1000	-	
1152.443057	-	
1152.443057	-	
4304.886114	-	