1,0kN pistekuorma 150mm, kisko

Calculation report №
MQ-41_1.0kN p.kuorma etäisyys 150mm

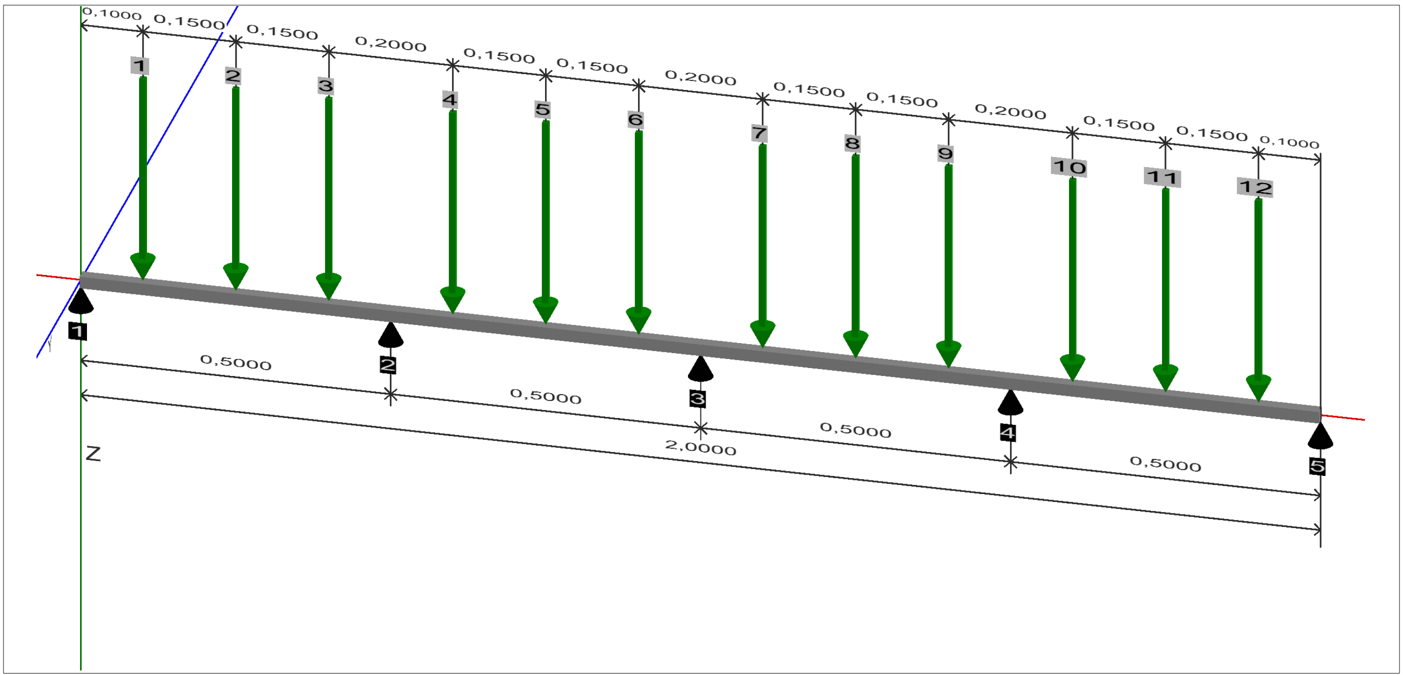
Performed by

20.12.2019

Project Project1

Subproject 1,0kN pistekuorma 150mm, kisko

Statical system



Beam MQ-41 OK

Selected beam

Channel	Length [m]	Rotation	A [mm²]	Iy [cm^4]	Iz [cm^4]	E [N/mm²]
MQ-41	2,0000	⊔	264,92	5,78	7,68	210 000

A= Cross section area, Iy Iz = Moment of inertia, E = Modulus of elasticity

Supports

Support No.	Distance from left A [m]	Span L [m]
1	0,0000	0,5000
2	0,5000	0,5000
3	1,0000	0,5000
4	1,5000	0,5000
5	2,0000	0,0000

Loads

Single loads

No.	Load type	Position [m]	Forces [kN] Y	Forces [kN] Z
1	Design load	0,1000	0,0000	1,0000
2	Design load	0,2500	0,0000	1,0000
3	Design load	0,4000	0,0000	1,0000

Single loads

No.	Load type	Position [m]	Forces [kN] Y	Z
4	Design load	0,6000	0,0000	1,0000
5	Design load	0,7500	0,0000	1,0000
6	Design load	0,9000	0,0000	1,0000
7	Design load	1,1000	0,0000	1,0000
8	Design load	1,2500	0,0000	1,0000
9	Design load	1,4000	0,0000	1,0000
10	Design load	1,6000	0,0000	1,0000
11	Design load	1,7500	0,0000	1,0000
12	Design load	1,9000	0,0000	1,0000

Calculation summary

Beam MQ-41 OK

Deflection utilization [%] 7,38
Stress utilization [%] 26,02

Calculation factors

Design basis: Eurocode 1993
Load combination design basis: Eurocode 1990

L1 Dead load
L2 Live load
L3 Design load

Load combinations:

ULS

LC1-ULS = 1,35 * L1 + 1,50 * L2
LC2-ULS = 1,35 * L1 + 1,00 * L3

SLS

LC1-SLS = 1,00 * L1 + 1,00 * L2
LC2-SLS = 0,90 * L1 + 0,67 * L3

Partial safety factors material γM: 1,1
Maximum beam allowable deflection: L/200
Maximum cantilever allowable deflection L/150
Min. deflection limit [mm] 1,5

Detailed results

Support position [m]	Length [m]	Force at. supp. point [kN] Z	LC	Y	LC	Bending moment [kNm] My	LC	Mz	LC
0,0000		1,1430	LC2-ULS	0,0000	LC2-ULS				
	0,5000					0,1810	LC2-ULS	0,0000	LC1-ULS

Support position [m]	Length [m]	Force at. supp. point [kN]				Bending moment [kNm]			
		Z	LC	Y	LC	My	LC	Mz	LC
0,5000		3,4920	LC2-ULS	0,0000	LC2-ULS				
	0,5000					0,1810	LC2-ULS	0,0000	LC1-ULS
1,0000		2,7840	LC2-ULS	0,0000	LC2-ULS				
	0,5000					0,1810	LC2-ULS	0,0000	LC1-ULS
1,5000		3,4920	LC2-ULS	0,0000	LC2-ULS				
	0,5000					0,1810	LC2-ULS	0,0000	LC1-ULS
2,0000		1,1430	LC2-ULS	0,0000	LC2-ULS				

Support position [m]	Length [m]	Bending stress [N/mm²]
0,0000		
	0,5000	68
0,5000		
	0,5000	68
1,0000		
	0,5000	68
1,5000		
	0,5000	68
2,0000		

Support position [m]	Length [m]	Deflection [mm]			
		Z	LC	Y	LC
0,0000					
	0,5000	0,2	LC2-SLS	0,0	LC2-SLS
0,5000					
	0,5000	0,1	LC2-SLS	0,0	LC2-SLS
1,0000					
	0,5000	0,1	LC2-SLS	0,0	LC2-SLS
1,5000					
	0,5000	0,2	LC2-SLS	0,0	LC2-SLS
2,0000					

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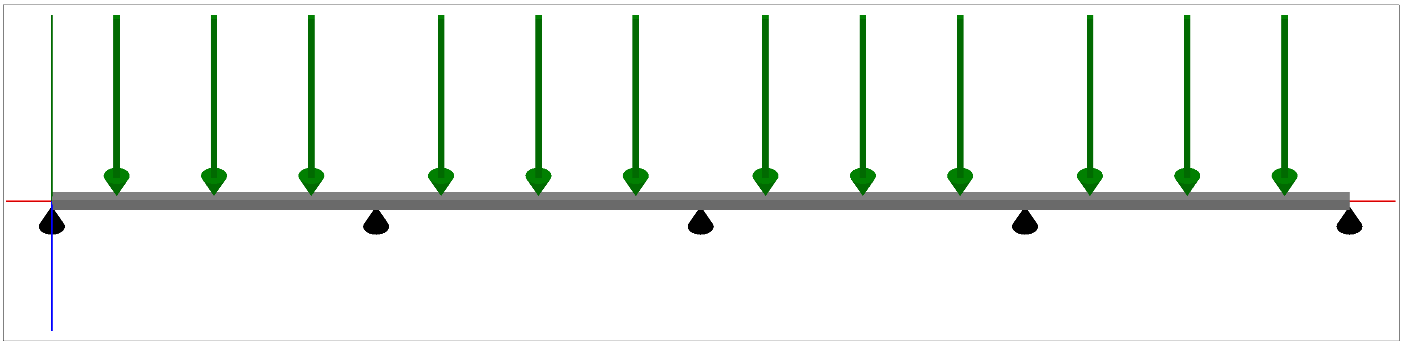
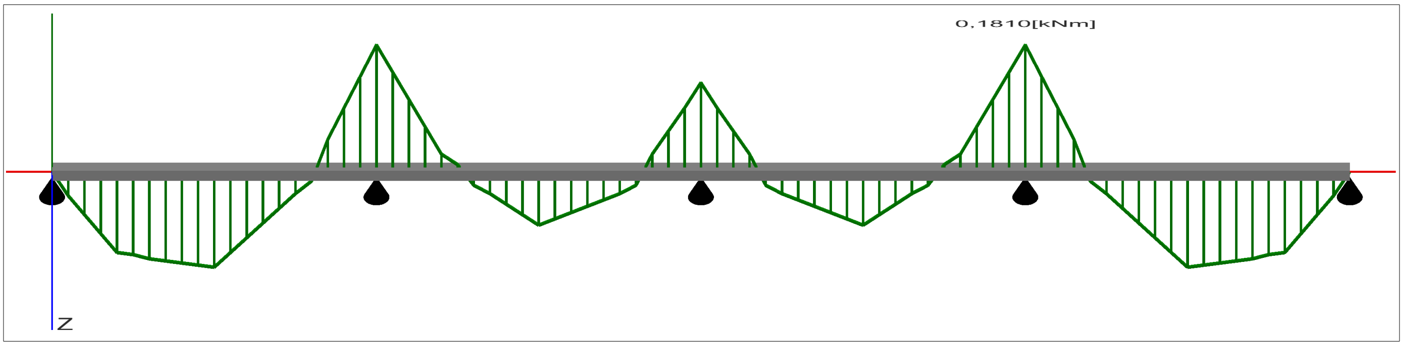
Diagrams / Charts

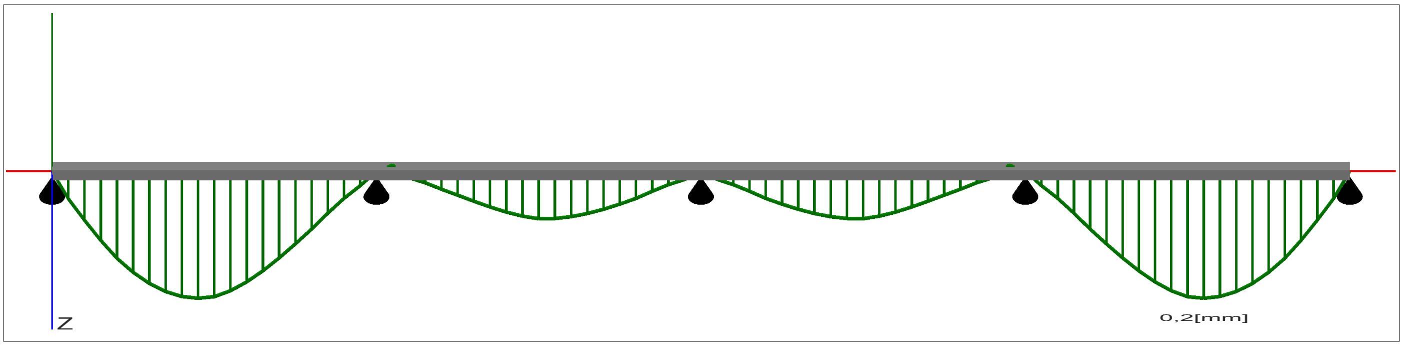
Planning view



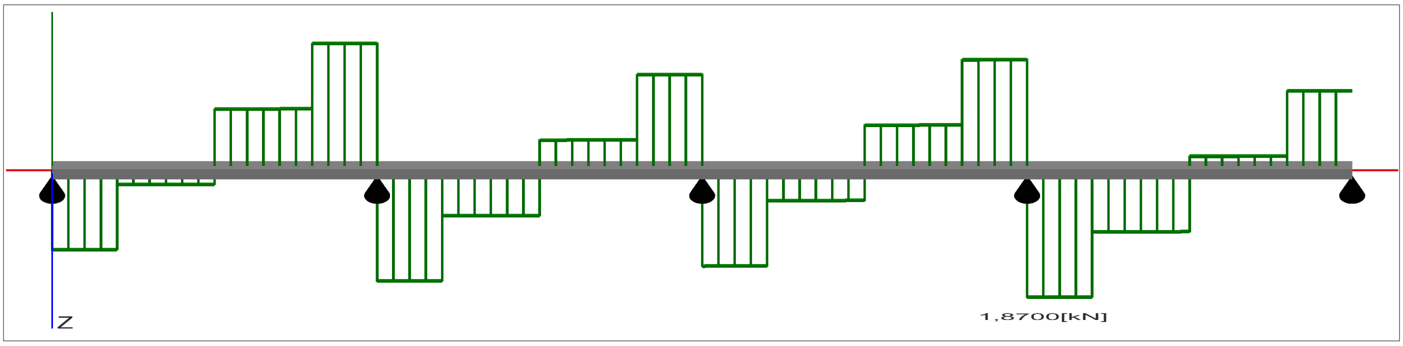
Bending moment (Load combination Z: LC2-ULS Y: LC1-ULS)



Deflection (Load combination Z: LC2-SLS Y: LC2-SLS)



Shear load (Load combination Z: LC2-ULS Y: LC1-ULS)



General design note

Channel design computation is carried out by the calculation engine from the RSTAB 8.04.0131.84645 framework software by Dlubal, analogous to the elastic-elastic method in conformance with EC3/DIN 18800 for Europe and AISI S100 for the US. The connector design method is based on a combination of several calculation models following:
• for Europe the principles of either DIN 18800 or EC 3 and tests carried out by an independent institute (HTL Rankweil, Austria).
• for US the principles of AISC 360 13th Edition and tests carried out by an independent institute (HTL Rankweil, Austria)

The static analysis is performed on the basis of a stationary system. 2nd-Order analysis due to possible eccentricities or deflections in the design (deformation according to DIN 18800 or EC3) must be considered separately by the appropriate personnel.

Only channel sections and standard cantilevers are verified. Connectors need to be checked separately.

Buckling and LTB checks must always be controlled separately by the responsible design engineer.

Local stress and deformation of members at supporting points and loading positions is not considered.

Relative deflection evaluation and stability checks: For the relative deflection evaluation and stability checks PROFIS Installation uses a reference length based on a set of members. A member is a connection from one node to the next on a beam. Members can be connected to a set of members if the nodes in between do not reduce the reference length. This connection of members to a set of members is done automatically based on the assumption that a node with very low global displacement is either a support or can be regarded as a support. The global displacement limit to define a node as a support is 0.1 mm for relative deflection evaluation and 0.005 for stability checks. The connection of members to a set of members can also be done by the user. The user can also decide manually if a set of members is a single-/multispan beam or a cantilever. The buckling ratio can also be manually changed. The user can finally also decide to exclude a set of members from the relative deflection evaluation. In case of any manual adjustment you will find a remark in the report.

The design must be checked for its plausibility before assembly.

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