Büro für Tragwerksplanung und Ingenieurbau
vom Felde + Keppler GmbH & Co. KG

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Structural Report

F34-DNA

18468

for the system by

Global Truss
Furong Industrial Area
Shajing Town

Baoan District Shenzen China

Compiled by: C. Fox

Aachen, 07th March 2019

This Structural Report includes pages 1 - 8 + annexes

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	Span 5 m	2 pages
	Span 6 m	2 pages
	Span 7 m	2 pages
	Span 8 m	2 pages
	Span 9 m	2 pages

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1 PRELIMINARY NOTES

1.1 Basics

The currently applicable regulations and standards, in particular:

DIN EN 1991-1	Actions on structures (Eurocode 1)
DIN EN 13814	Fairground and amusement park machinery and structures
DIN EN 13782	Temporary Structures – Tents
DIN EN 1993-1	Design of steel structures
DIN EN 1999-1	Design of aluminium structures

1.2 Materials

Tubes	Aluminium EN AW-6082 T6
Bolts	Güte mid. 8.8 (grade min. 8.8)

1.3 General remarks

The truss system is part of a "modular construction system" with the different truss lengths

500mm, 1000mm, 1500mm, 2000mm, 2500 mm and 3000mm.

The Trusses consist of 4 main chords (round tubes 50 x 2mm), which are arranged in a spiral shape. Between the main chords welded diagonal bracings (round tubes 20 x 2mm) are arranged according chapter 2.

The distance between system lines of the mainchords is 24 cm in vertical- and 24 cm in horizontal direction.

The trusses are connected at the 4 mainchords with couplers consisting of female fittings, connectors and bolts.

The loads are applied acc. chapter 1.4. The allowable loads are listed in tables (see chapter 5).

The verification of the single parts is done according the safety concept of EN 1990 with a partial safety factor of the loading side of 1.50 for payloads.

For applications which can be calculated on the basis of other codes, the partial safety factors can be adjusted (for example temporary structures acc. EN 13814, yF = 1.35 for payloads).

To use the resulting allowable loads with British Standard (BS) and ANSI, the allowable loads listed in tables have to be multiplied by 0.85

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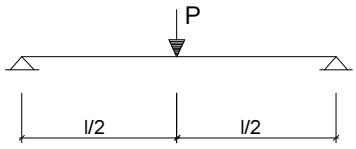
1.4 Geometry and loadings

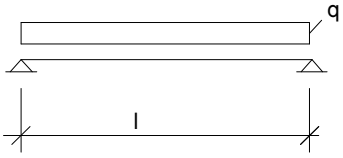
The selfweight of the truss is approx. 6 kg/m

For the payloads there are 2 loadcases taken into account:

LC 1) Center point load (CPL) in the middle of the span



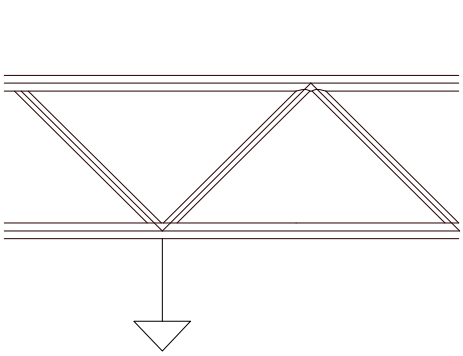
LC 2) Uniformly distributed load (UDL)

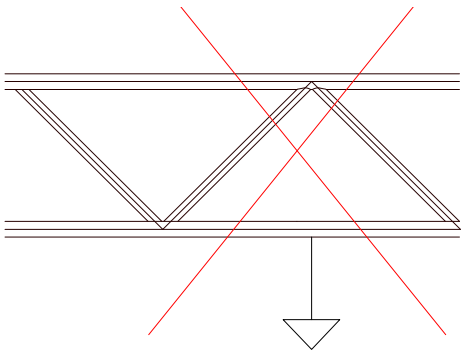


Distributed along the chord tubes ø50x2mm.

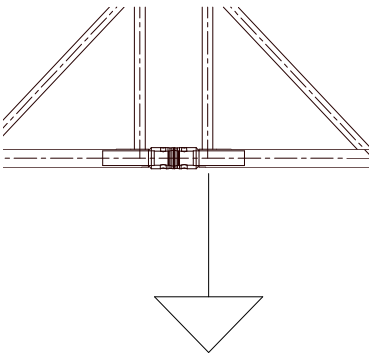
For the application of the calculated allowable loadings the following rules have to be regarded:

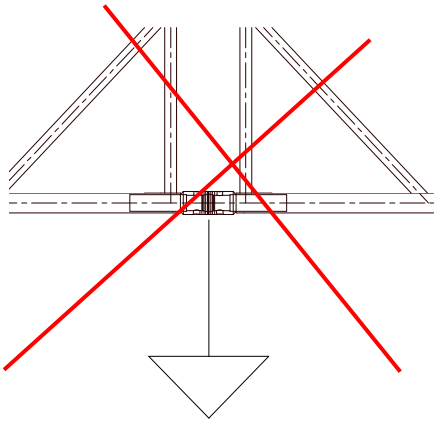
Large loads have to be applied at the nodes or have to be distributed by appropriate constructions.





Loads at the middle of the couplers are not allowed.





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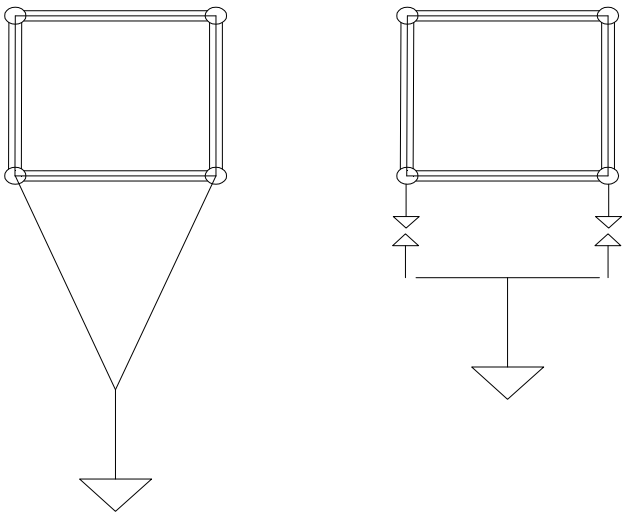
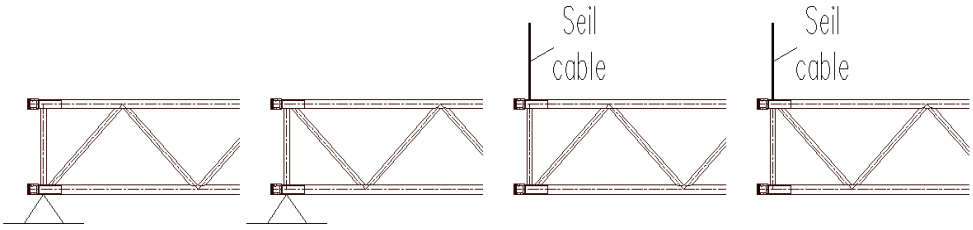
All loads have to be distributed equally to both chords.



For the support or suspension there are the following possibilities:



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2 SYSTEM

Drawings F34-DNA

see annex

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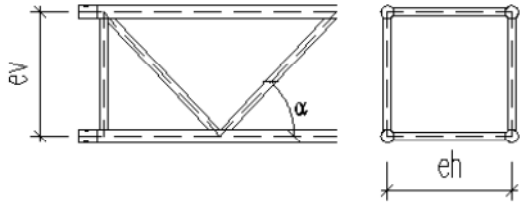
3 SECTION- AND MATERIAL PROPERTIES

Querschnittswerte Rohre / properties Tubes

	D [mm]	t [mm]	A [cm²]	I [cm⁴]	Wel [cm³]	i [cm]
Gurtrohre / main chords	50,0	2	3,02	8,70	3,48	1,70
vertikal Diagonalen / Bracing	20	2	1,13	0,46	0,46	0,64
horizontal Diagonalen / Bracing	20	2	1,13	0,46	0,46	0,64

Geometrie Traverse / truss geometry



Achsabstand Gurtrohre	vertikal	ev	24	[cm]
distance axes main chords	horizontal	eh	24	[cm]

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Material properties

Gurtrohre + Diagonalen EN AW 6082 T6 (AlMgSi1)
chords and bracing

zulässige Spannungen nach EN-1999-1-1 / allowable stress acc. to EN-1999-1-1

Teilsicherheitsbeiwerte Material / partial safety factors material

γ_{M1}=	1,10	Beulklasse / BC=	A
γ_{M2}=	1,25		

0,2%-Dehngrenze / 0,2%-Proof Strength			Zugfestigkeit / ultimate tensile strength		
fo $t \leq 5mm$=	250	[N/mm²]	fu $t \leq 5mm$=	290	[N/mm²]
fo $t > 5mm$=	260	[N/mm²]	fu $t > 5mm$=	310	[N/mm²]
fo,haz=	125	[N/mm²]	fu,haz=	185	[N/mm²]

Festigkeit der Schweißnaht — fw= 190 [N/mm²]
Strength of welding seams

Faktor für die WEZ-Werte beim WIG-Schweißen: 0,8
Factor for HAZ-values for TIG-welding:

Bolzen / Bolt 42 CrMo (8.8)

Verbinder / Connector EN AW 2011 T6 (AlCuBiPb)

0,2%-Dehngrenze / 0,2%-Proof Strength			Zugfestigkeit / ultimate tensile strength		
fo>	230	[N/mm²]	fu>	310	[N/mm²]

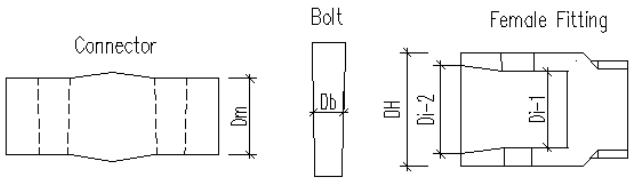
Hülse / Female fitting EN AW 6082 T6

zulässige Spannungen nach EN-1999-1-1 / allowable stress acc. to EN-1999-1-1

Teilsicherheitsbeiwerte Material / partial safety factors material

γ_{M1}=	1,10
γ_{M2}=	1,25

0,2%-Dehngrenze / 0,2%-Proof Strength			Zugfestigkeit / ultimate tensile strength		
fo=	250	[N/mm²]	fu=	290	[N/mm²]



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4 ALLOWABLE LOADING

The allowable loading is determined by the maximum stress in the heat affected zone of the tubes.

The allowable characteristic stress σ_{Rk} is calculated as follows:

fu,haz = 185 N/mm²

reduction factor due to welding process = 0,8

partial safety coefficient material side y_M = 1,25

partial safety coefficient loading side y_F = 1,50

σ_{Rk} = 185 · 0,8 / 1,25 / 1,5 = **78,93 N/mm²**

The loadcapacity of the truss strongly depends on the arrangement of the bracing tubes.
In comparative calculation it was determined that the 1m truss pieces have the most unfavorable bracing arrangements.

On account of this the determination of the allowable loadings is done for each span with the following truss arrangements:

Span:	**Truss pieces**):
2 m	2 x **1,0 m**
3 m	3 x **1,0 m**
4 m	4 x **1,0 m**
5 m	5 x **1,0 m**
6 m	6 x **1,0 m**
7 m	7 x **1,0 m**
8 m	8 x **1,0 m**
9 m	9 x **1,0 m**

The results of the calculation are shown in the annex!

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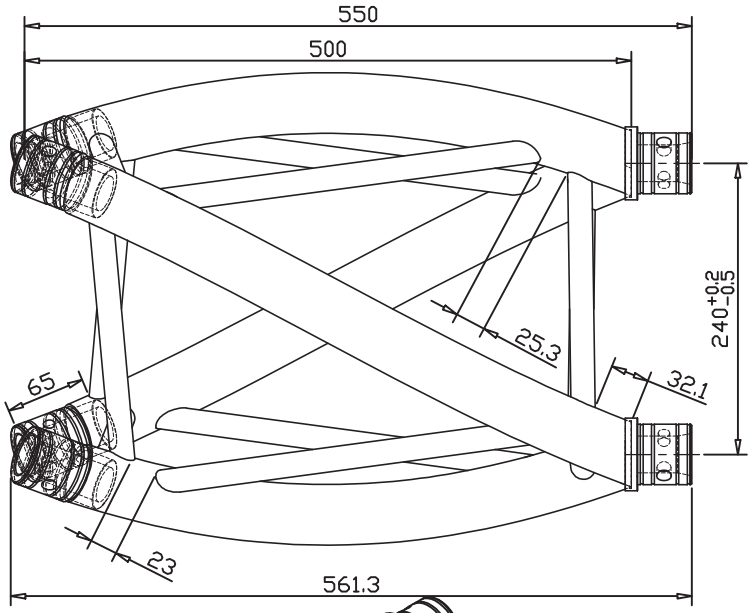
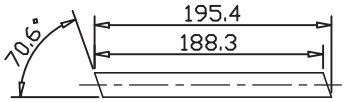
5 ALLOWABLE LOADING SINGLE SPAN GIRDER

The values of the table below are only valid for single-span girder.
The truss-elements have to be braced with diagonals according chapter 2.
Large loads have to be applied at the nodes or have to be distributed by appropriate constructions.
Loads at the middle of the couplers are not allowed.
All loads have to be distributed equally to both chords.
The specified values include partial safety coefficients on the loadings side acc. EN 1990 of yF = 1.50 for payloads and yG = 1.35 for selfweight of the truss.
For applictaions which can be calculated on the basis of other codes, the partial safety factors can be adjusted (for example temporary structures acc. EN 13814, yF = 1.35 for payloads).
To use the resulting allowable loads with British Standard (BS) and ANSI, allowable loads listed in tables have to be multiplied by 0.85.
The values are calculated with no requirements for the location of the couplers.

span	**central point Load CPL**		**uniformly distr. Load UDL**	
[m]	**[kg]**	deflection [mm]	**[kg/m]**	deflection [mm]
2	**328**	4	**228**	4
3	**198**	8	**104**	8
4	**138**	12	**54**	12
5	**102**	17	**34**	19
6	**78**	23	**21**	26
7	**61**	32	**14**	35
8	**48**	42	**10**	46
9	**36**	53	**6,5**	57

deflection > L / 200





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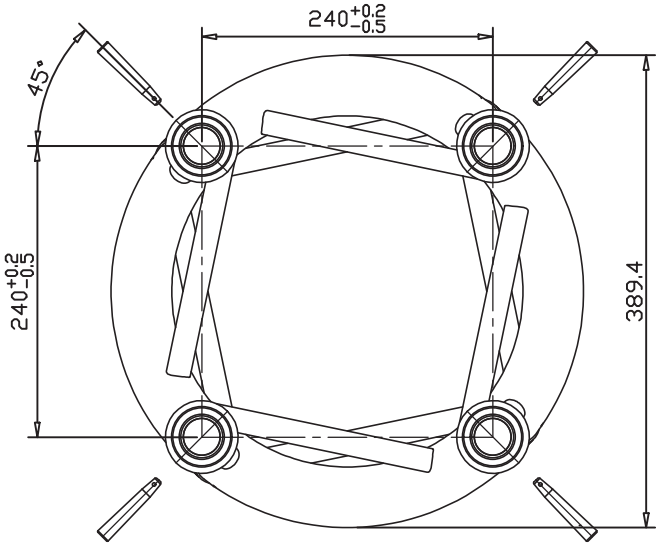

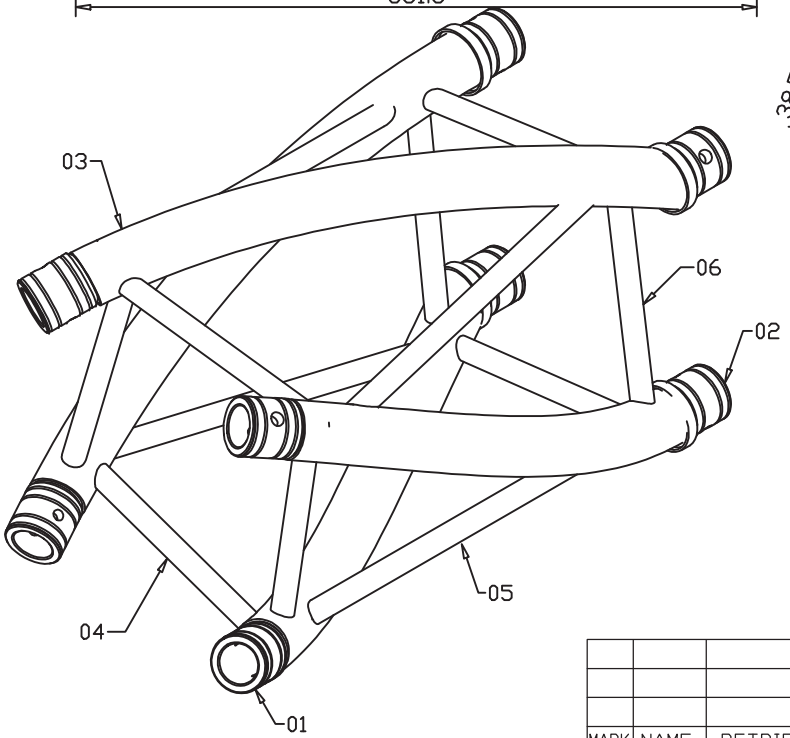

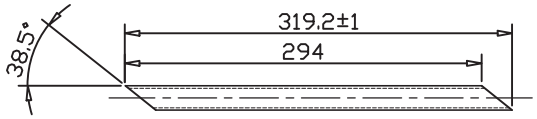

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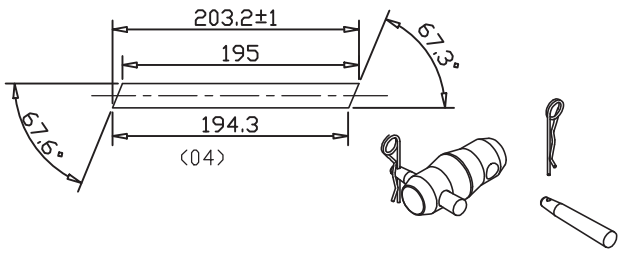

(04)

part	DMS-01-1	steel	ZP	8
	DMS-01-4	S45C	ZP	8
	DMS-01-3	#2011	T6	4
06	ø20*2.0t*195.4mm	#6082	T6	4
05	ø20*2.0t*319.2mm	#6082	T6	4
04	ø20*2.0t*203.2mm	#6082	T6	4
03	ø50*2.0t*966mm	#6082	T6	4
02	ST5023P	#6082	T6	4
01	DMS-01-2BR	#6082	T6	4
NO.	SPEC.	MATERIAL	FIN.	QTY.

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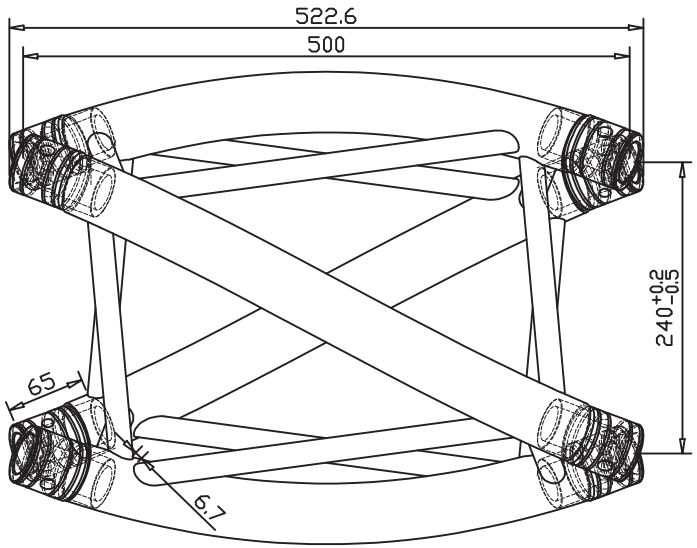
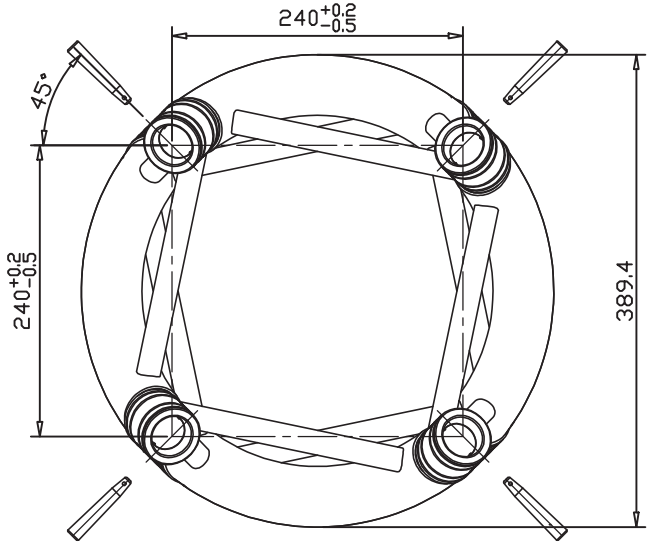
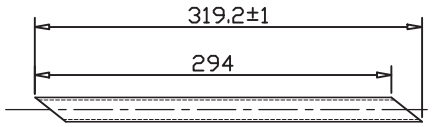
MARK	NAME	RETRIEVE CONTENTS	DATE

Global Truss







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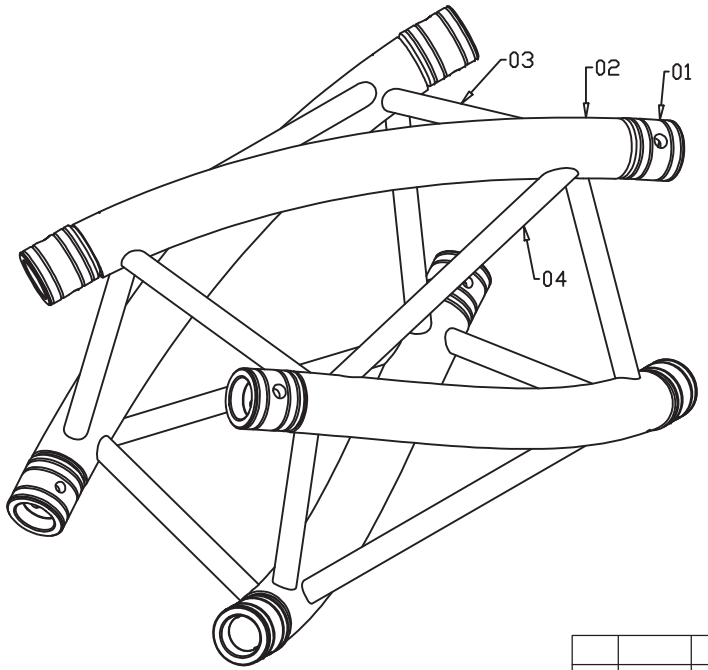

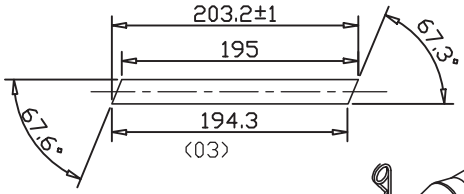

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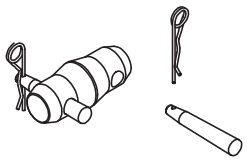

part	DMS-01-1	steel	ZP	8
	DMS-01-4	S45C	ZP	8
	DMS-01-3	#2011	T6	4
05	ø20*2.0t*319.2mm	#6082	T6	4
04	ø20*2.0t*203.2mm	#6082	T6	8
03	ø20*2.0t*966mm	#6082	T6	4
01	DMS-01-2BR	#6082	T6	8
NO.	SPEC.	MATERIAL	FIN.	QTY.

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MARK	NAME	RETRIEVE CONTENTS	DATE

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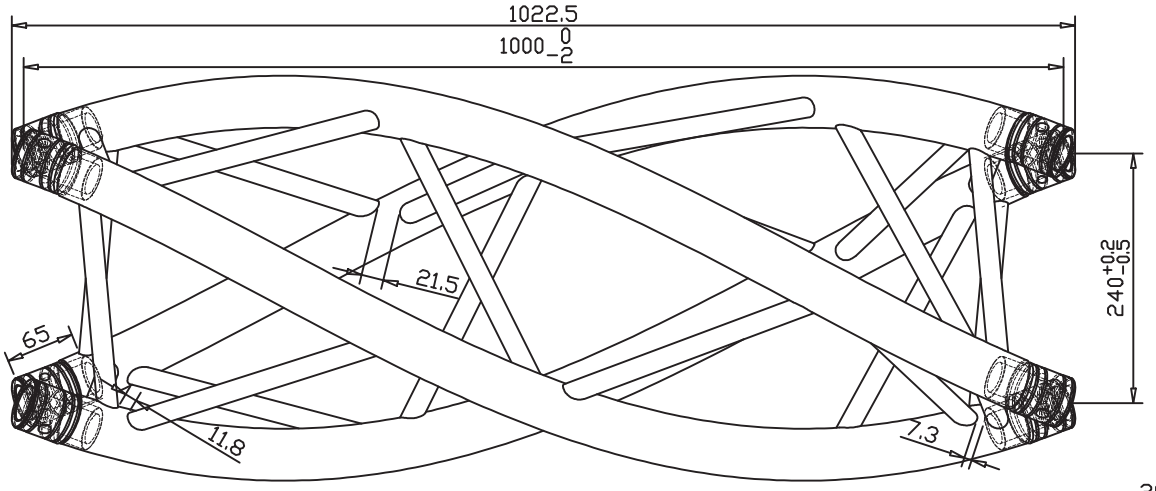

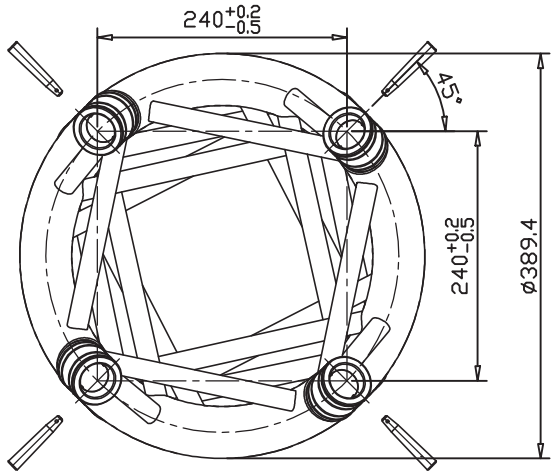

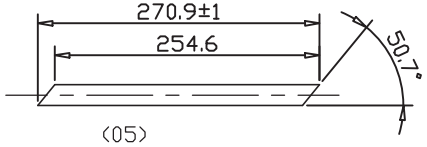

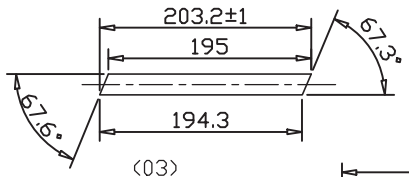

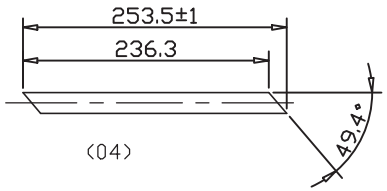

part	DMS-01-1	steel	ZP	8
	DMS-01-4	S45C	ZP	8
	DMS-01-3	#2011	T6	4
05	ø20*2.0t*270.9mm	#6082	T6	8
04	ø20*2.0t*253.5mm	#6082	T6	8
03	ø20*2.0t*203.2mm	#6082	T6	8
02	ø50*2.0t*1533mm	#6082	T6	4
01	DMS-01-2BR	#6082	T6	8
NO.	SPEC.	MATERIAL	FIN.	QTY.

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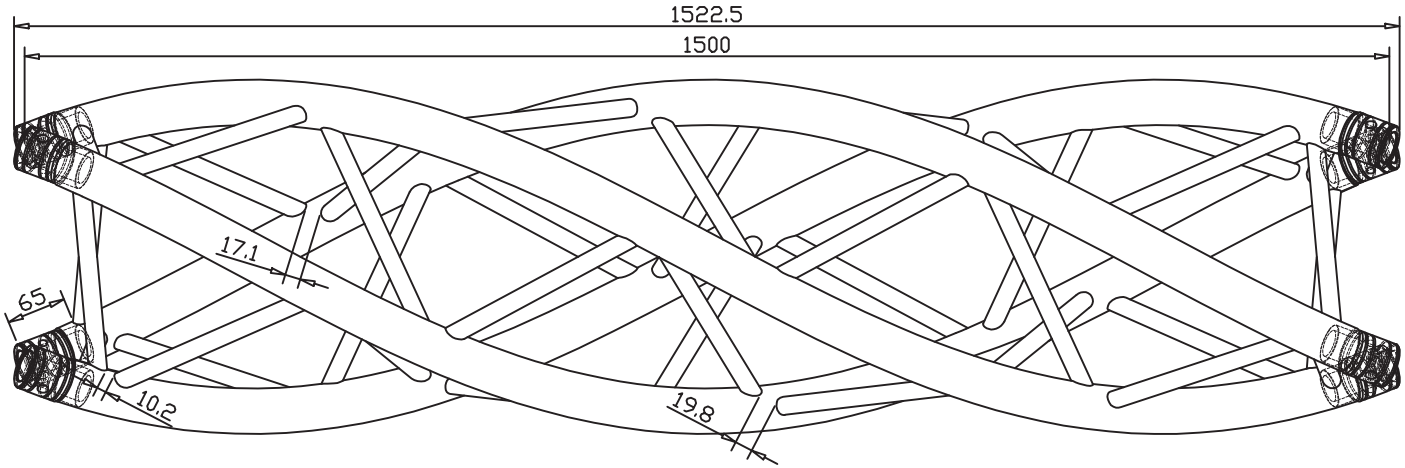
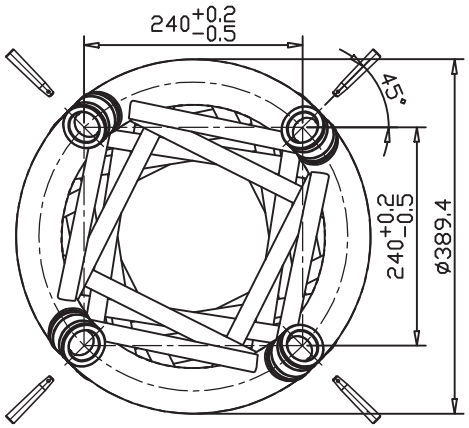
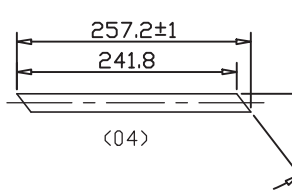
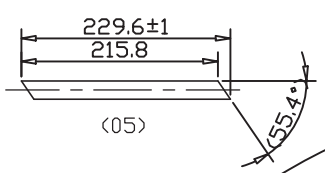
MARK	NAME	RETRIEVE CONTENTS	DATE

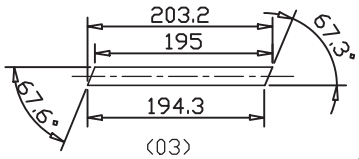
Global Truss

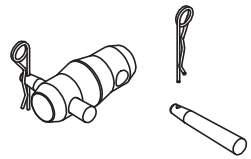










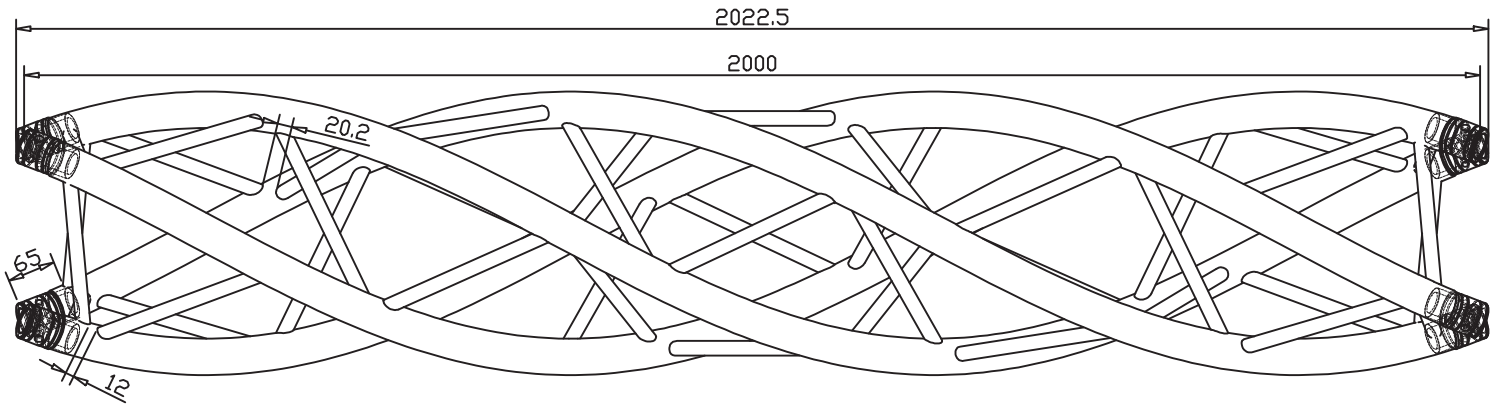


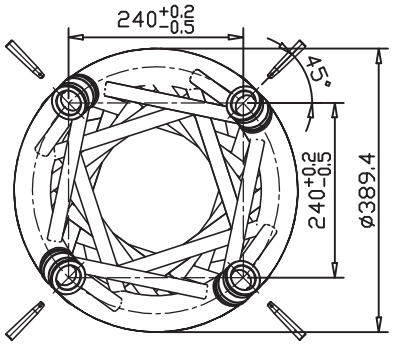
part	DMS-01-1	steel	ZP	8
	DMS-01-4	S45C	ZP	8
	DMS-01-3	#2011	T6	4
05	ø20*2.0t*229.6mm	#6082	T6	12
04	ø20*2.0t*257.2mm	#6082	T6	16
03	ø20*2.0t*203.2mm	#6082	T6	8
02	ø50*2.0t*2100mm	#6082	T6	4
01	DMS-01-2BR	#6082	T6	8
NO.	SPEC.	MATERIAL	FIN.	QTY.

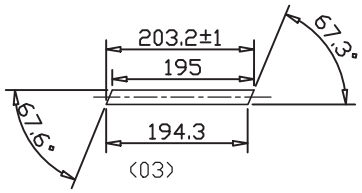
DRAWN	F34N	DRAW NO	F34150N		2D/3D	edition	1
Specification	F34N-1.5M	DESIGN	RWW	DATE 18.10.30	CHECKED	APPROVED	
Weight	10.4kgs/pcs	UNITS	mm	Proofread			
SURFACE	RAW	SCALE	1:10				

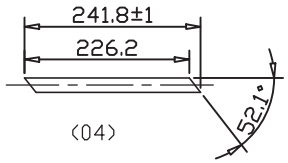
MARK	NAME	RETRIEVE CONTENTS	DATE

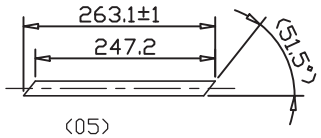
Global Truss







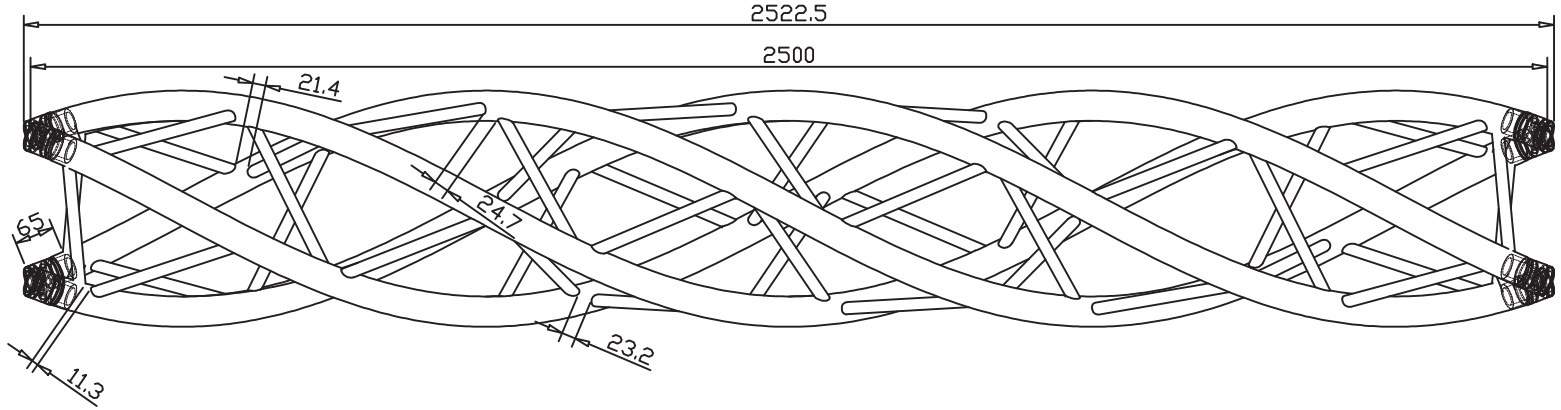


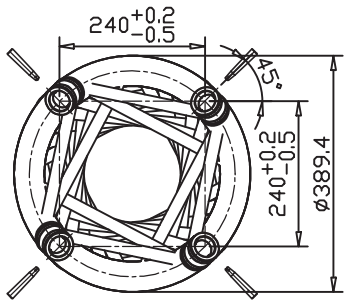


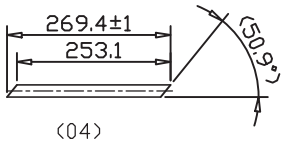
part	DMS-01-1	steel	ZP	8
	DMS-01-4	S45C	ZP	8
	DMS-01-3	#2011	T6	4
05	ø20*2.0t*263.1mm	#6082	T6	16
04	ø20*2.0t*241.8mm	#6082	T6	20
03	ø20*2.0t*203.2mm	#6082	T6	8
02	ø50*2.0t*2667mm	#6082	T6	4
01	DMS-01-2BR	#6082	T6	8
NO.	SPEC.	MATERIAL	FIN.	QTY.

DRAWN	F34N	DRAW NO	F34200N		2D/3D	edition	3
Specification	F34N-2.0M	DESIGN	Iris	DATE 18.07.28	CHECKED	APPROVED	
Weight	**kgs/pcs	UNITS	mm	Proofread			
SURFACE	RAW	SCALE	1:10				

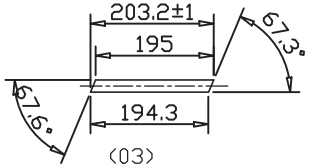
MARK	NAME	RETRIEVE CONTENTS	DATE



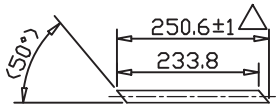




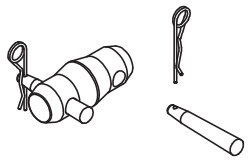
(04)



(03)



(05)



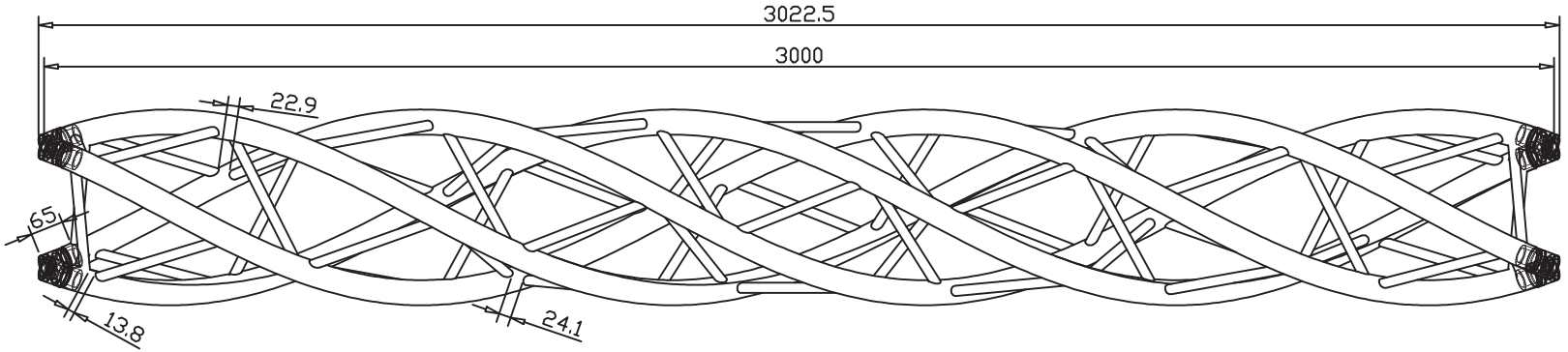
(fitting)

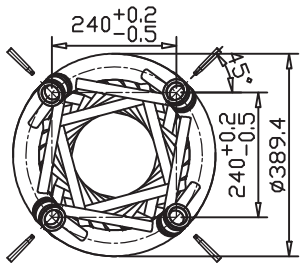
fitting	DMS-01-1	steel	ZP	8
	DMS-01-4	S45C	ZP	8
	DMS-01-3	#2011	T6	4
05	ø20*2.0t*250.6mm	#6082	T6	20
04	ø20*2.0t*269.4mm	#6082	T6	24
03	ø20*2.0t*203.4mm	#6082	T6	8
02	ø50*2.0t*3233mm	#6082	T6	4
01	DMS-01-2BR	#6082	T6	8
NO.	SPEC.	MATERIAL	FIN.	QTY.

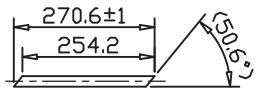
DRAWN	F34N	DRAW NO	F34250N		2D/3D	edition	1
Specification	F34N-2.5M	DESIGN	RWW	DATE 18.11.02	CHECKED	APPROVED	
Weight	14.4kgs/pcs	UNITS	mm	Proofread			
SURFACE	RAW	SCALE	1:10				

MARK	NAME	RETRIEVE CONTENTS	DATE

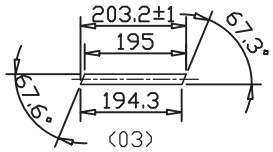
Global Truss



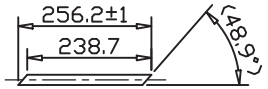




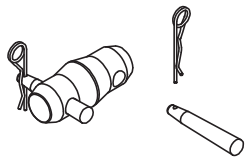
(05)



(03)



(04)



(fitting)

fitting	DMS-01-1	steel	ZP	8
	DMS-01-4	S45C	ZP	8
	DMS-01-3	#2011	T6	4
05	ø20*2.0t*270.6mm	#6082	T6	24
04	ø20*2.0t*256.2mm	#6082	T6	28
03	ø20*2.0t*203.2mm	#6082	T6	8
02	ø50*2.0t*3800mm	#6082	T6	4
01	DMS-01-2BR	#6082	T6	8
NO.	SPEC.	MATERIAL	FIN.	QTY.

DRAWN	F34N	DRAW NO	F34300N		2D/3D	edition	1
Specification	F34N-3.0M	DESIGN	RWW	DATE 18.11.02	CHECKED	APPROVED	
Weight	16.5kgs/pcs	UNITS	mm	Proofread			
SURFACE	RAW	SCALE	1:14				

MARK	NAME	RETRIEVE CONTENTS	DATE

Global Truss

18468 – F34DNA–100 Einfeld 2m
ANNEX

04.03.2019
M 1 :

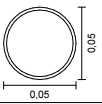
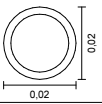
System characteristics

228	Nodes		
274	Elements	274	Beams
4	Supports	0	Slabs
0	Link elements	0	Plains
2	Material properties	0	Shells
2	Section properties	0	Cables
3	Load cases	0	Solids
0	LC Combinations	0	Spring elements
0	Tendon groups		

Result location in area elements: Node
2 Result locations in beam elements

Rotated element systems
0 Element systems
0 Internal force systems
0 Reinforcement systems

Section properties

1	Polygon 	Chord 50x2 Centroid [m] ys = 0,000 zs = 0,000 Area [m²] A = 2,9966e-04 Moments of inflertia [m4] Ix = 1,7159e-07 Iy = 8,5898e-08 I1 = 8,5898e-08 Iz = 8,5898e-08 I2 = 8,5898e-08 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width
2	Polygon 	Bracing 20x2 Centroid [m] ys = -0,000 zs = -0,000 Area [m²] A = 1,1237e-04 Moments of inflertia [m4] Ix = 9,1504e-09 Iy = 4,5777e-09 I1 = 4,5777e-09 Iz = 4,5777e-09 I2 = 4,5777e-09 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width

Material properties

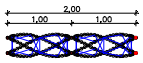
	No.	Type	E-Modu. [MN/m²]	G-Modu. [MN/m²]	Poiss. ratio	alpha.t [1/K]	gamma [kN/m³]	Miscellaneous
1	1	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0
2	2	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0

18468 – F34DNA–100 Einfeld 2m
ANNEX

04.03.2019
M 1 :

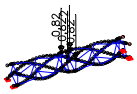
Sum of installed loads and support reactions

LC.	Label	Fx [kN]	Fy [kN]	Fz [kN]
1	CPL	-0,000	0,000	3,398
	Support reactions	0,000	0,000	3,398
2	UDL	-0,000	-0,000	5,284
	Support reactions	0,000	0,000	5,284
3	selfweight	-0,000	0,000	0,118
	Support reactions	0,000	0,000	0,118



dim

DEAD LOAD



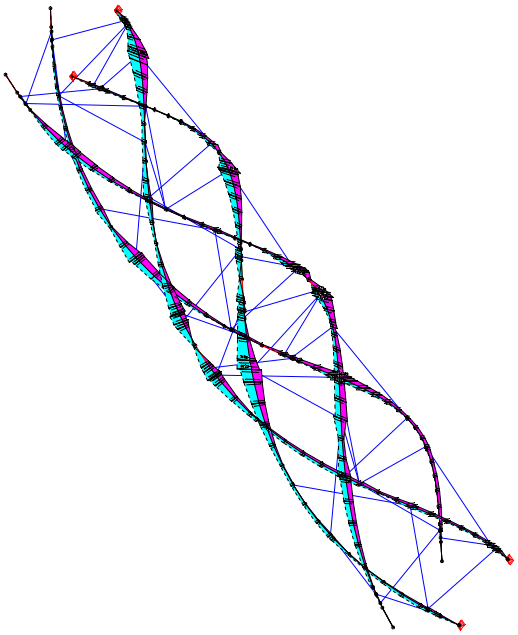
LC 1: Load, CPL

DEAD LOAD

LC 2: Load, UDL

18468 – F34DNA–100 Einfeld 2m
ANNEX

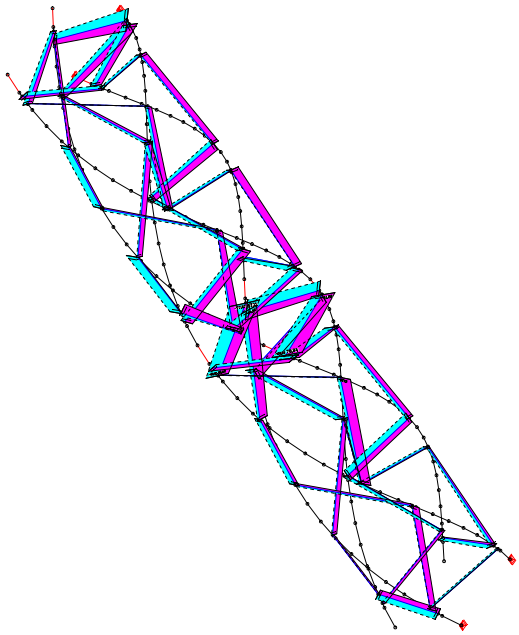
04.03.2019
M 1 : 9



LC 1: GPL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –67,38/68,16 [MN/m²]

18468 – F34DNA–100 Einfeld 2m
ANNEX

04.03.2019
M 1 : 9



LC 1: GPL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –77,27/78,34 [MN/m²]

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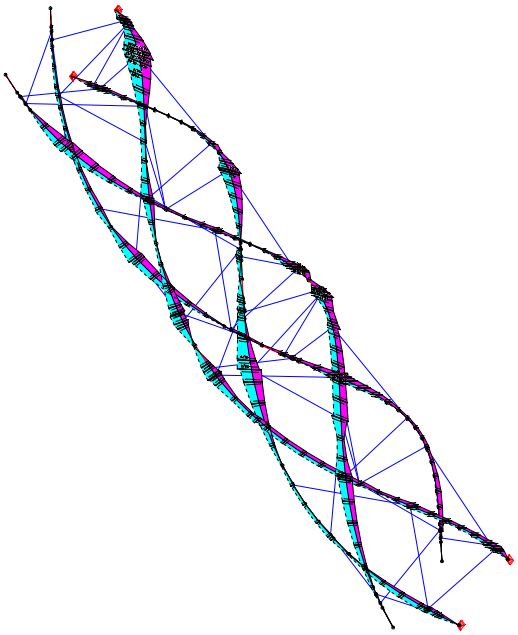
18468 – F34DNA–100 Einfeld 2m
ANNEX

04.03.2019
M 1 : 9



LC 2: UDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –58,91/60,02 [MN/m²]

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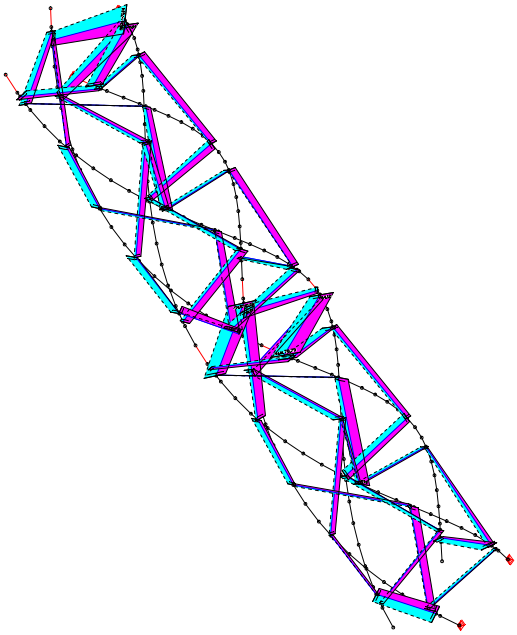
18468 – F34DNA–100 Einfeld 2m
ANNEX

04.03.2019
M 1 : 9



LC 2: UDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –74,57/78,79 [MN/m²]

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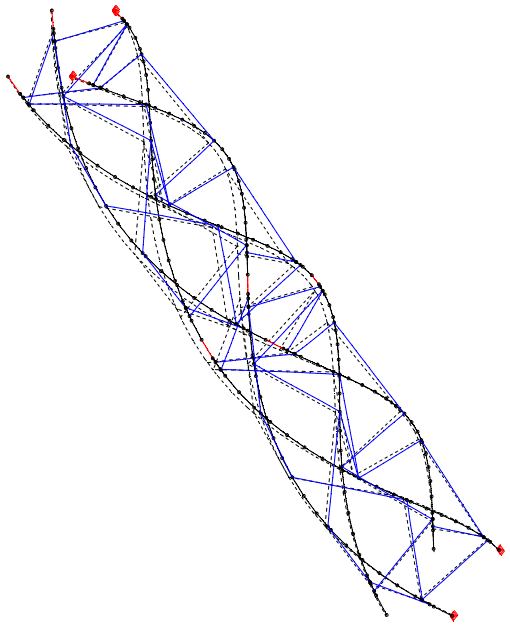
18468 – F34DNA–100 Einfeld 2m
ANNEX

04.03.2019
M 1 : 10



LC 1: SPL-N
Deformations u [mm], Factor = 8,1
Value range (overall system, min/max): 0,00/4,04 [mm]

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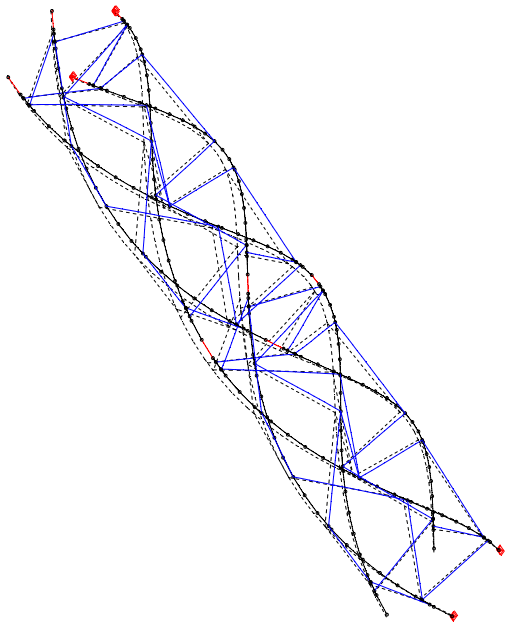
18468 – F34DNA–100 Einfeld 2m
ANNEX

04.03.2019
M 1 : 10



LC 2: UDL-N
Deformations u [mm], Factor = 8,1
Value range (overall system, min/max): 0,00/4,02 [mm]

18468 – F34DNA–100 Einfeld 3m
ANNEX

04.03.2019
M 1 :

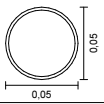
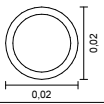
System characteristics

340	Nodes		
411	Elements	411	Beams
4	Supports	0	Slabs
0	Link elements	0	Plains
2	Material properties	0	Shells
2	Section properties	0	Cables
4	Load cases	0	Solids
0	LC Combinations	0	Spring elements
0	Tendon groups		

Result location in area elements: Node
2 Result locations in beam elements

Rotated element systems
0 Element systems
0 Internal force systems
0 Reinforcement systems

Section properties

1	Polygon 	Chord 50x2 Centroid [m] ys = 0,000 zs = 0,000 Area [m²] A = 2,9966e-04 Moments of inertia [m4] Ix = 1,7159e-07 Iy = 8,5898e-08 I1 = 8,5898e-08 Iz = 8,5898e-08 I2 = 8,5898e-08 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width
2	Polygon 	Bracing 20x2 Centroid [m] ys = -0,000 zs = -0,000 Area [m²] A = 1,1237e-04 Moments of inertia [m4] Ix = 9,1504e-09 Iy = 4,5777e-09 I1 = 4,5777e-09 Iz = 4,5777e-09 I2 = 4,5777e-09 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width

Material properties

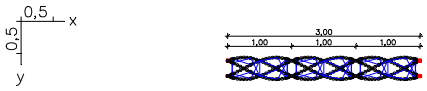
	No.	Type	E-Modu. [MN/m²]	G-Modu. [MN/m²]	Poiss. ratio	alpha.t [1/K]	gamma [kN/m³]	Miscellaneous
1	1	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0
2	2	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0

18468 – F34DNA–100 Einfeld 3m
ANNEX

04.03.2019
M 1 :

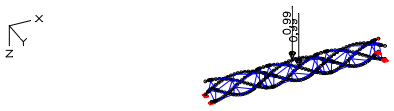
Sum of installed loads and support reactions

LC.	Label	Fx [kN]	Fy [kN]	Fz [kN]
1	CPL	-0,000	0,000	2,156
	Support reactions	0,000	0,000	2,156
2	UDL	-0,000	-0,000	3,711
	Support reactions	0,000	0,000	3,711
3	selfweight	-0,000	0,000	0,176
	Support reactions	0,000	0,000	0,176



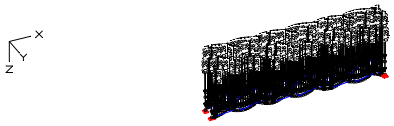
dim

DEAD LOAD



LC 1: Load, CPL

DEAD LOAD



LC 2: Load, UDL

18468 – F34DNA–100 Einfeld 3m
ANNEX

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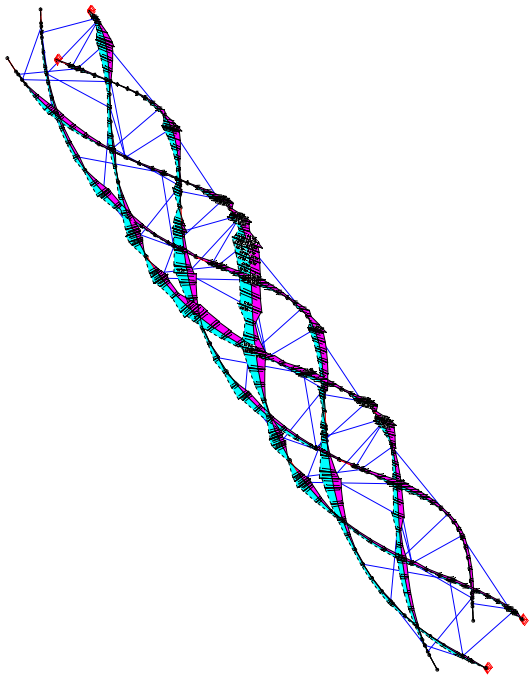
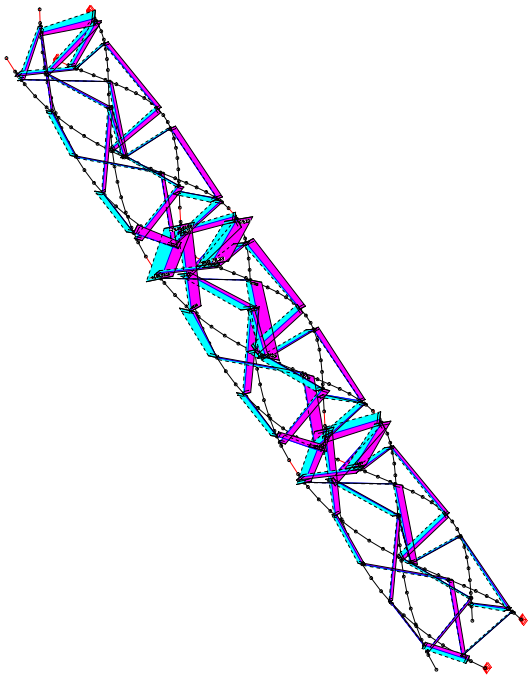
M 1 : 15



LC 1: GPL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): -54,01/53,40 [MN/m²]

18468 – F34DNA–100 Einfeld 3m
ANNEX

04.03.2019
M 1 : 15



LC 1: GPL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): -74,30/78,33 [MN/m²]

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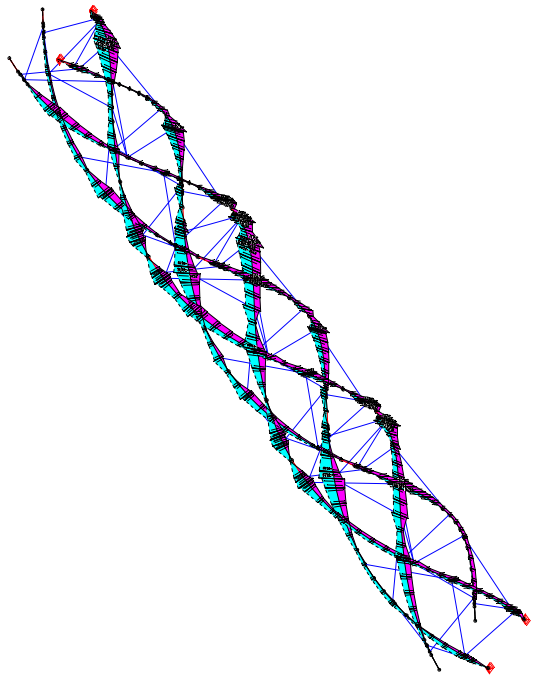
18468 – F34DNA–100 Einfeld 3m
ANNEX

04.03.2019
M 1 : 15



LC 2: VDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –54,59/54,95 [MN/m²]

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18468 – F34DNA–100 Einfeld 3m
ANNEX

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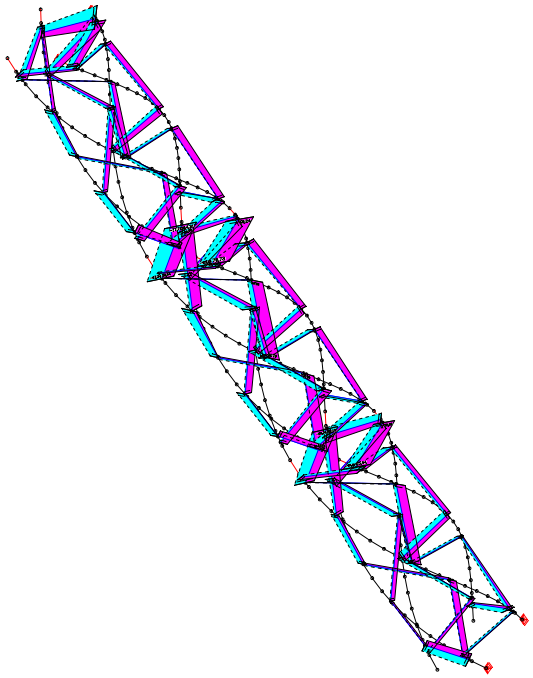
M 1 : 15



LC 2: VDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –77,72/78,73 [MN/m²]

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ANNEX

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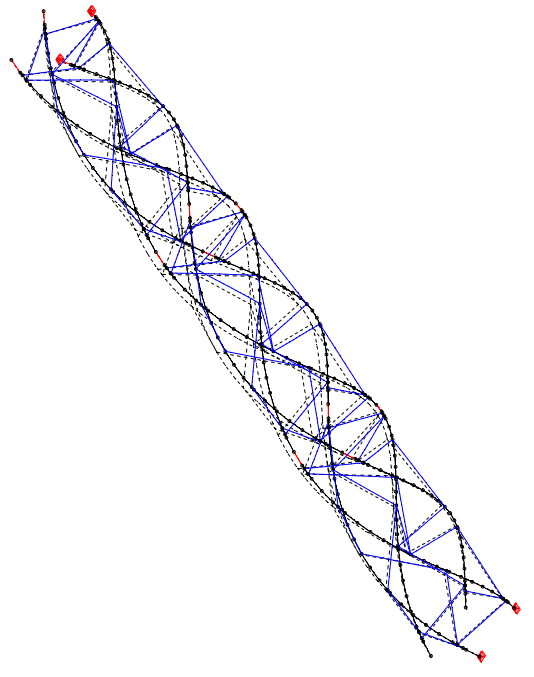
M 1 : 15



LC 1: SPL-N
Deformations u [mm], Factor = 6,6
Value range (overall system, min/max): 0,00/7,26 [mm]

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ANNEX

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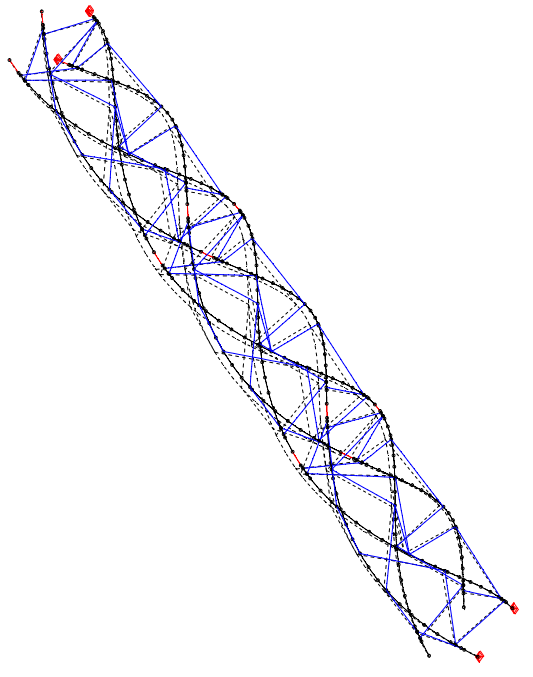
M 1 : 15



LC 2: VDL-N
Deformations u [mm], Factor = 6,1
Value range (overall system, min/max): 0,00/7,91 [mm]

18468 – F34DNA–100 Einfeld 4m
ANNEX

04.03.2019
M 1 :

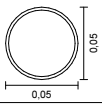
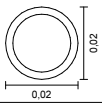
System characteristics

452	Nodes		
548	Elements	548	Beams
4	Supports	0	Slabs
0	Link elements	0	Plains
2	Material properties	0	Shells
2	Section properties	0	Cables
4	Load cases	0	Solids
0	LC Combinations	0	Spring elements
0	Tendon groups		

Result location in area elements: Node
2 Result locations in beam elements

Rotated element systems
0 Element systems
0 Internal force systems
0 Reinforcement systems

Section properties

1	Polygon 	Chord 50x2 Centroid [m] ys = 0,000 zs = 0,000 Area [m²] A = 2,9966e-04 Moments of inertia [m4] Ix = 1,7159e-07 Iy = 8,5898e-08 I1 = 8,5898e-08 Iz = 8,5898e-08 I2 = 8,5898e-08 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width
2	Polygon 	Bracing 20x2 Centroid [m] ys = -0,000 zs = -0,000 Area [m²] A = 1,1237e-04 Moments of inertia [m4] Ix = 9,1504e-09 Iy = 4,5777e-09 I1 = 4,5777e-09 Iz = 4,5777e-09 I2 = 4,5777e-09 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width

Material properties

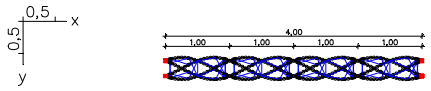
	No.	Type	E-Modu. [MN/m²]	G-Modu. [MN/m²]	Poiss. ratio	alpha.t [1/K]	gamma [kN/m³]	Miscellaneous
1	1	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0
2	2	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0

18468 – F34DNA–100 Einfeld 4m
ANNEX

04.03.2019
M 1 :

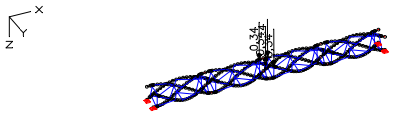
Sum of installed loads and support reactions

LC.	Label	Fx [kN]	Fy [kN]	Fz [kN]
1	CPL	-0,000	0,000	1,615
	Support reactions	0,000	0,000	1,615
2	UDL	-0,000	-0,000	2,682
	Support reactions	0,000	0,000	2,682
3	selfweight	-0,000	0,000	0,235
	Support reactions	0,000	0,000	0,235



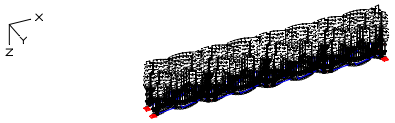
dim

DEAD LOAD



LC 1: Load, CPL

DEAD LOAD



LC 2: Load, UDL

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ANNEX

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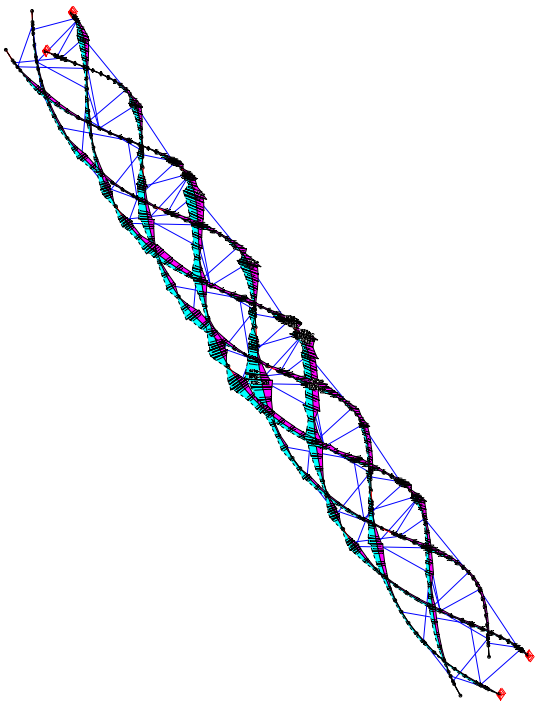
M 1 : 15



Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –62,22/62,36 [MN/m²]

18468 – F34DNA–100 Einfeld 4m
ANNEX

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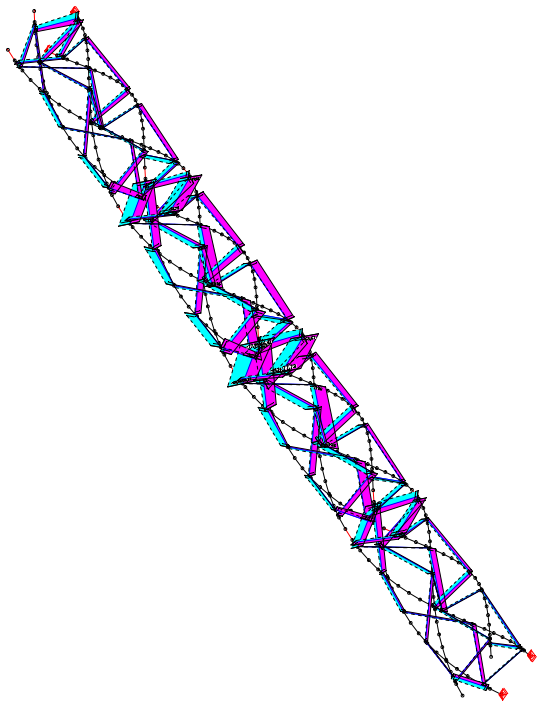
M 1 : 15



Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –77,99/77,73 [MN/m²]

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ANNEX

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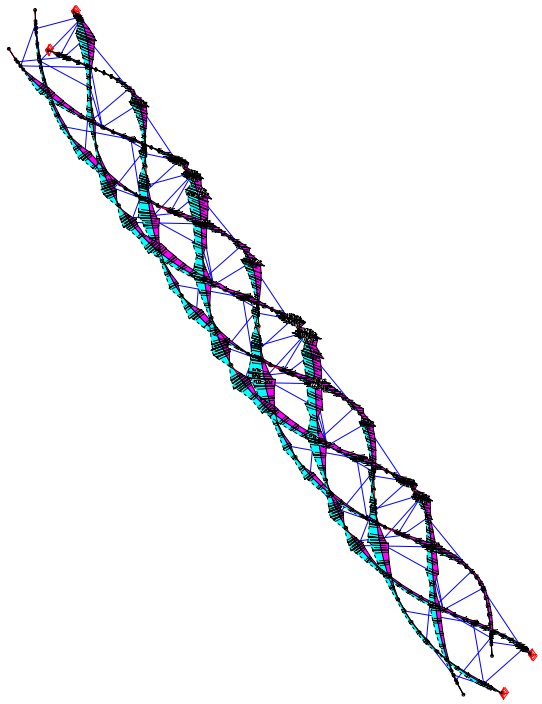
M 1 : 15



LC 2: UDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –57,70/57,86 [MN/m²]

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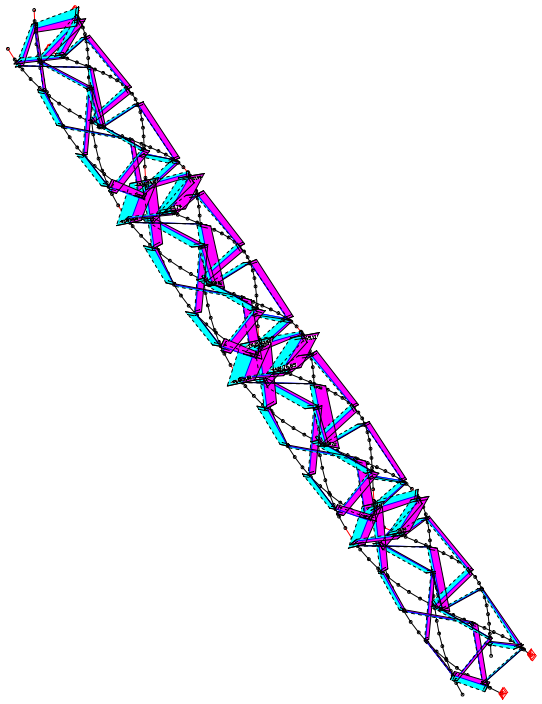
M 1 : 15



LC 2: UDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –76,21/76,85 [MN/m²]

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ANNEX

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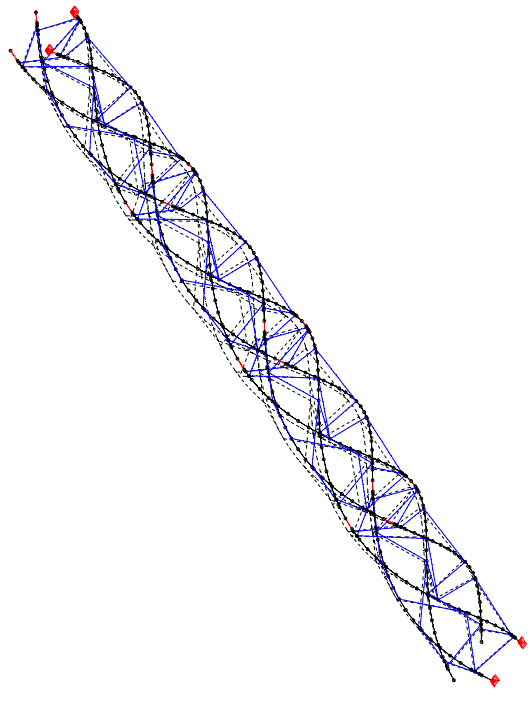
M 1 : 15



LC 1: SPL-N
Deformations u [mm], Factor = 5,7
Value range (overall system, min/max): 0,00/11,15 [mm]

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ANNEX

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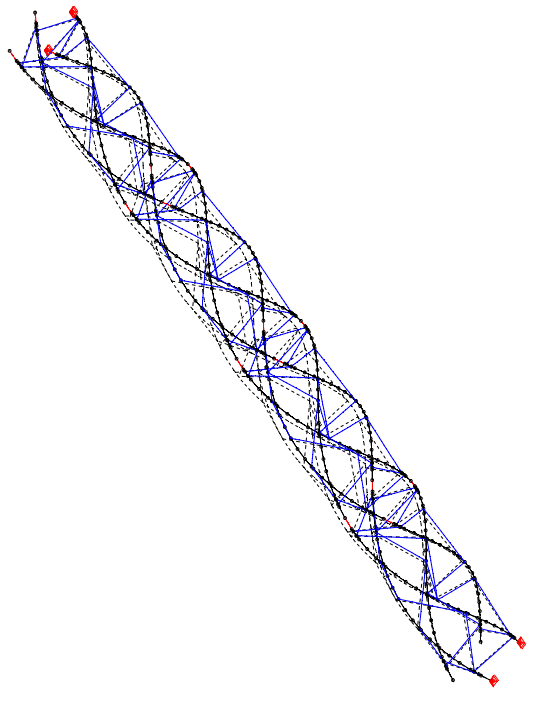
M 1 : 15



LC 2: UDL-N
Deformations u [mm], Factor = 5,2
Value range (overall system, min/max): 0,00/12,17 [mm]

18468 – F34DNA–100 Einfeld 5m
ANNEX
04.03.2019
M 1 :

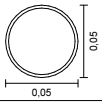
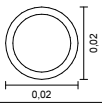
System characteristics

564	Nodes		
685	Elements	685	Beams
4	Supports	0	Slabs
0	Link elements	0	Plains
2	Material properties	0	Shells
2	Section properties	0	Cables
3	Load cases	0	Solids
0	LC Combinations	0	Spring elements
0	Tendon groups		

Result location in area elements: Node
2 Result locations in beam elements

Rotated element systems
0 Element systems
0 Internal force systems
0 Reinforcement systems

Section properties

1	Polygon 	Chord 50x2 Centroid [m] ys = 0,000 zs = 0,000 Area [m²] A = 2,9966e-04 Moments of inertia [m4] Ix = 1,7159e-07 Iy = 8,5898e-08 I1 = 8,5898e-08 Iz = 8,5898e-08 I2 = 8,5898e-08 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width
2	Polygon 	Bracing 20x2 Centroid [m] ys = -0,000 zs = -0,000 Area [m²] A = 1,1237e-04 Moments of inertia [m4] Ix = 9,1504e-09 Iy = 4,5777e-09 I1 = 4,5777e-09 Iz = 4,5777e-09 I2 = 4,5777e-09 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width

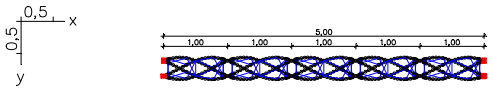
Material properties

	No.	Type	E-Modu. [MN/m²]	G-Modu. [MN/m²]	Poiss. ratio	alpha.t [1/K]	gamma [kN/m³]	Miscellaneous
1	1	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0
2	2	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0

18468 – F34DNA–100 Einfeld 5m
ANNEX
04.03.2019
M 1 :

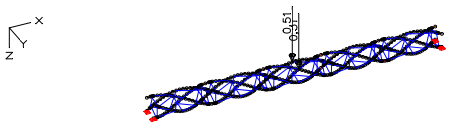
Sum of installed loads and support reactions

LC.	Label	Fx [kN]	Fy [kN]	Fz [kN]
1	CPL	-0,000	0,000	1,314
	Support reactions	0,000	0,000	1,314
2	UDL	-0,000	-0,000	2,220
	Support reactions	0,000	0,000	2,220
3	selfweight	-0,000	0,000	0,294
	Support reactions	0,000	0,000	0,294



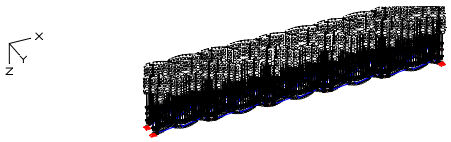
dim

DEAD LOAD



LC 1: Load, CPL

DEAD LOAD



LC 2: Load, UDL

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ANNEX
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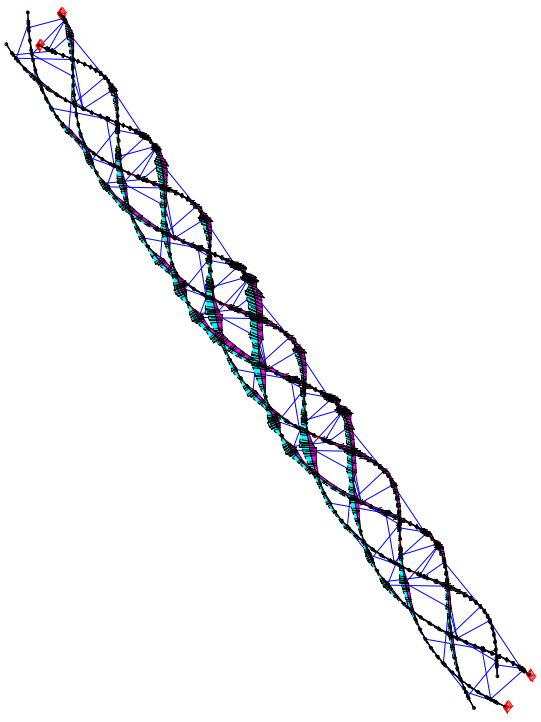
M 1 : 20



Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –51,69/53,63 [MN/m²]

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ANNEX
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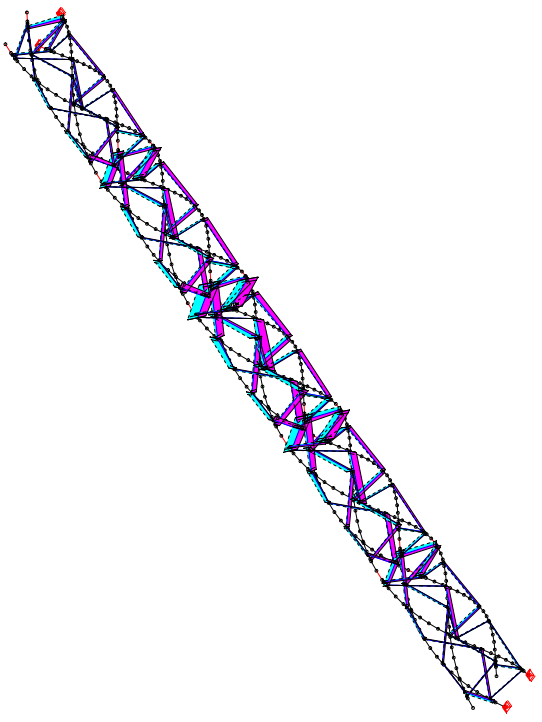
M 1 : 20



Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –75,77/77,86 [MN/m²]

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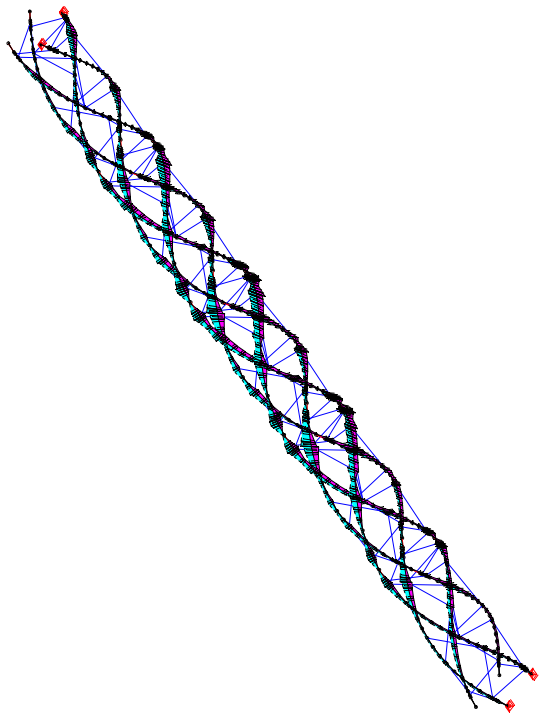
ANNEX

04.03.2019
M 1 : 20



LC 2: ~~UDL~~ N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –57,34/57,45 [MN/m²]

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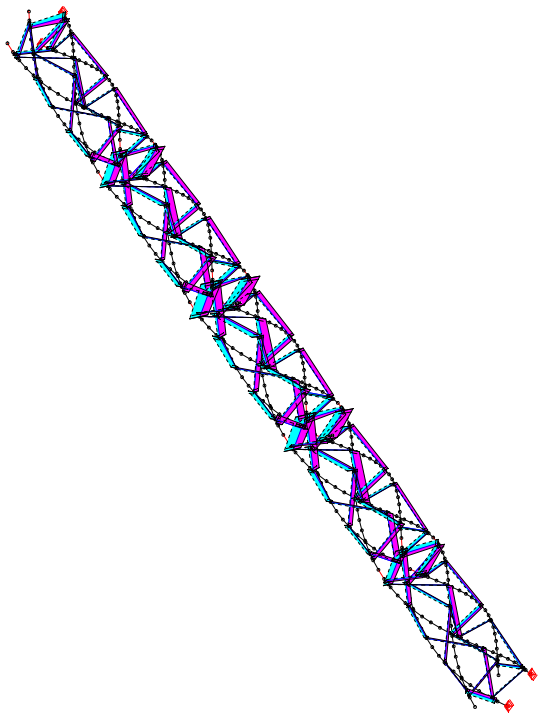
ANNEX

04.03.2019
M 1 : 20



LC 2: ~~UDL~~ N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –78,36/78,81 [MN/m²]

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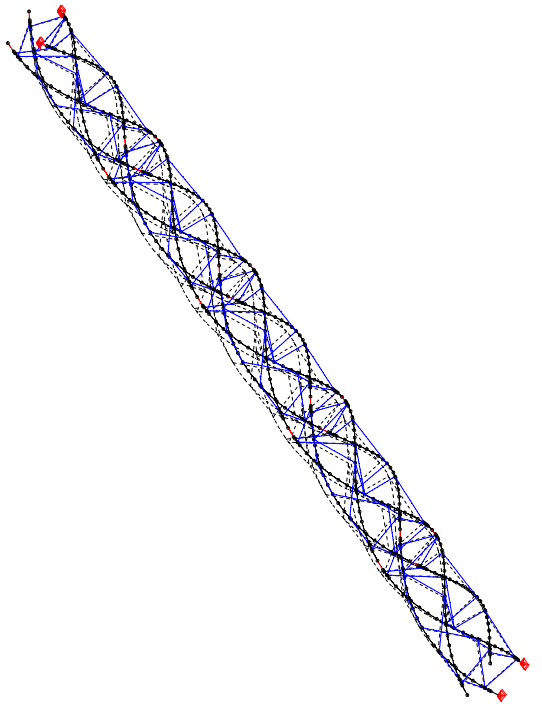
ANNEX

04.03.2019
M 1 : 20



LC 1: ~~SPL~~ N
Deformations u [mm], Factor = 4,8
Value range (overall system, min/max): 0,00/16,72 [mm]

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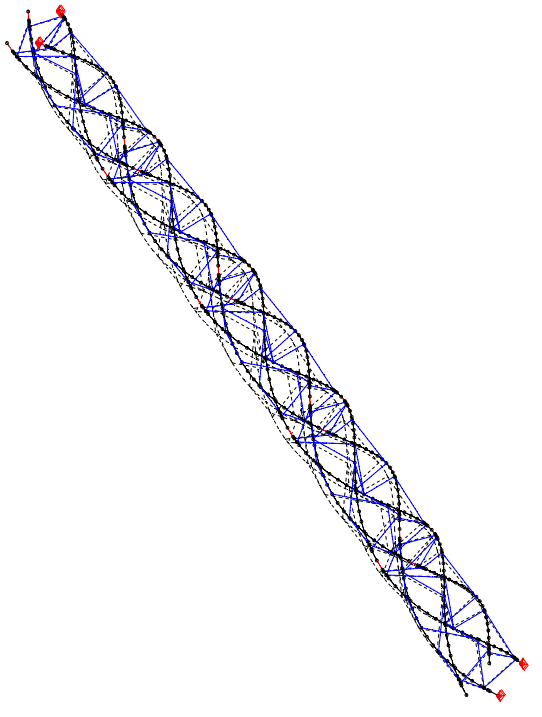
ANNEX

04.03.2019
M 1 : 20



LC 2: ~~UDL~~ N
Deformations u [mm], Factor = 4,2
Value range (overall system, min/max): 0,00/19,10 [mm]

18468 – F34DNA–100 Einfeld 6m
ANNEX

04.03.2019
M 1 :

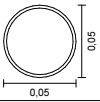
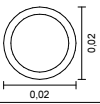
System characteristics

676	Nodes		
822	Elements	822	Beams
4	Supports	0	Slabs
0	Link elements	0	Plains
2	Material properties	0	Shells
2	Section properties	0	Cables
4	Load cases	0	Solids
0	LC Combinations	0	Spring elements
0	Tendon groups		

Result location in area elements: Node
2 Result locations in beam elements

Rotated element systems
0 Element systems
0 Internal force systems
0 Reinforcement systems

Section properties

1	Polygon 	Chord 50x2 Centroid [m] ys = 0,000 zs = 0,000 Area [m²] A = 2,9966e-04 Moments of inertia [m4] Ix = 1,7159e-07 Iy = 8,5898e-08 I1 = 8,5898e-08 Iz = 8,5898e-08 I2 = 8,5898e-08 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width
2	Polygon 	Bracing 20x2 Centroid [m] ys = -0,000 zs = -0,000 Area [m²] A = 1,1237e-04 Moments of inertia [m4] Ix = 9,1504e-09 Iy = 4,5777e-09 I1 = 4,5777e-09 Iz = 4,5777e-09 I2 = 4,5777e-09 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width

Material properties

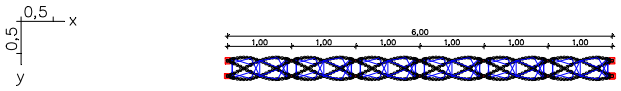
	No.	Type	E-Modu. [MN/m²]	G-Modu. [MN/m²]	Poiss. ratio	alpha.t [1/K]	gamma [kN/m³]	Miscellaneous
1	1	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0
2	2	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0

18468 – F34DNA–100 Einfeld 6m
ANNEX

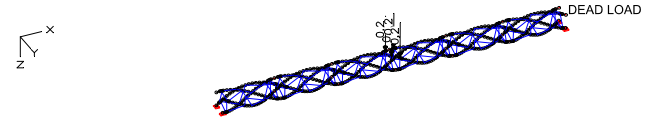
04.03.2019
M 1 :

Sum of installed loads and support reactions

LC.	Label	Fx [kN]	Fy [kN]	Fz [kN]
1	CPL	-0,000	0,000	1,133
	Support reactions	0,000	0,000	1,133
2	UDL	-0,000	0,000	1,780
	Support reactions	0,000	0,000	1,780
3	selfweight	-0,000	0,000	0,353
	Support reactions	0,000	0,000	0,353



dim



LC 1: Load, CPL

LC 2: Load, UDL

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ANNEX

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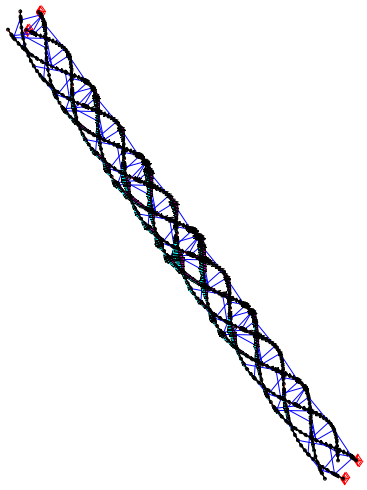
M 1 : 35



LC 1: GPL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –60,20/60,27 [MN/m²]

18468 – F34DNA–100 Einfeld 6m
ANNEX

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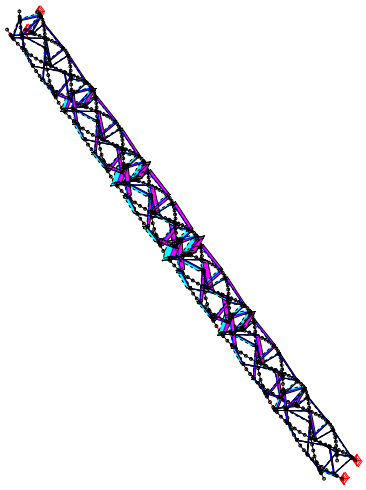
M 1 : 35



LC 1: GPL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –77,53/77,35 [MN/m²]

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18468 – F34DNA–100 Einfeld 6m
ANNEX

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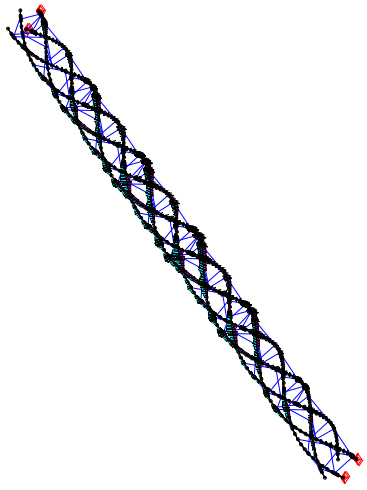
M 1 : 35



LC 2: VDL N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –57,05/57,13 [MN/m²]

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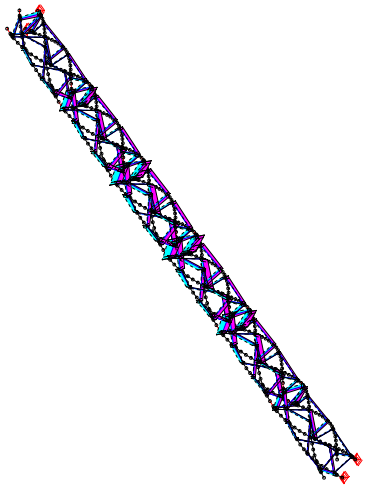
M 1 : 35



LC 2: VDL N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –75,88/76,20 [MN/m²]

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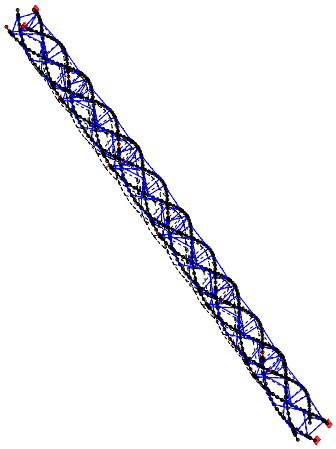
M 1 : 35



LC 1: SPL N
Deformations u [mm], Factor = 4,1
Value range (overall system, min/max): 0,00/23,19 [mm]

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ANNEX

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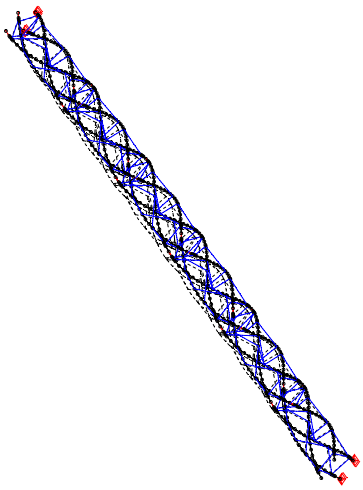
M 1 : 35



LC 2: VDL N
Deformations u [mm], Factor = 3,7
Value range (overall system, min/max): 0,00/25,69 [mm]

18468 – F34DNA–100 Einfeld 7m
ANNEX
04.03.2019
M 1 :

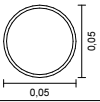
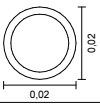
System characteristics

788	Nodes		
959	Elements	959	Beams
4	Supports	0	Slabs
0	Link elements	0	Plains
2	Material properties	0	Shells
2	Section properties	0	Cables
4	Load cases	0	Solids
0	LC Combinations	0	Spring elements
0	Tendon groups		

Result location in area elements: Node
2 Result locations in beam elements

Rotated element systems
0 Element systems
0 Internal force systems
0 Reinforcement systems

Section properties

1	Polygon 	Chord 50x2 Centroid [m] ys = 0,000 zs = 0,000 Area [m²] A = 2,9966e-04 Moments of inertia [m4] Ix = 1,7159e-07 Iy = 8,5898e-08 I1 = 8,5898e-08 Iz = 8,5898e-08 I2 = 8,5898e-08 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width
2	Polygon 	Bracing 20x2 Centroid [m] ys = -0,000 zs = -0,000 Area [m²] A = 1,1237e-04 Moments of inertia [m4] Ix = 9,1504e-09 Iy = 4,5777e-09 I1 = 4,5777e-09 Iz = 4,5777e-09 I2 = 4,5777e-09 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width

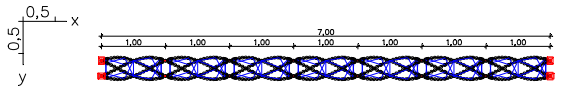
Material properties

	No.	Type	E-Modu. [MN/m²]	G-Modu. [MN/m²]	Poiss. ratio	alpha.t [1/K]	gamma [kN/m³]	Miscellaneous
1	1	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0
2	2	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0

18468 – F34DNA–100 Einfeld 7m
ANNEX
04.03.2019
M 1 :

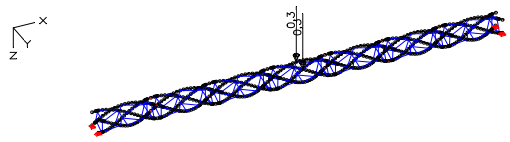
Sum of installed loads and support reactions

LC.	Label	Fx [kN]	Fy [kN]	Fz [kN]
1	CPL	-0,000	0,000	1,021
	Support reactions	0,000	-0,000	1,021
2	UDL	-0,000	-0,000	1,522
	Support reactions	0,000	-0,000	1,522
3	selfweight	-0,000	0,000	0,411
	Support reactions	0,000	-0,000	0,411



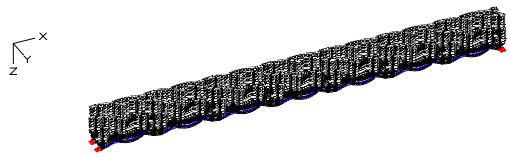
dim

DEAD LOAD



LC 1: Load, CPL

DEAD LOAD



LC 2: Load, UDL

18468 – F34DNA–100 Einfeld 7m
ANNEX
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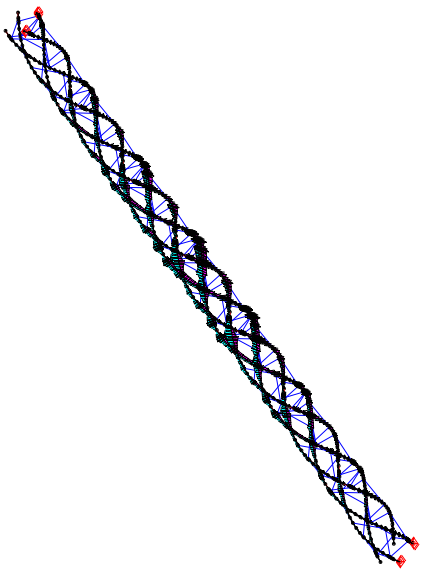
M 1 : 35



LC 1: GPL–N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –54,42/55,58 [MN/m²]

18468 – F34DNA–100 Einfeld 7m
ANNEX
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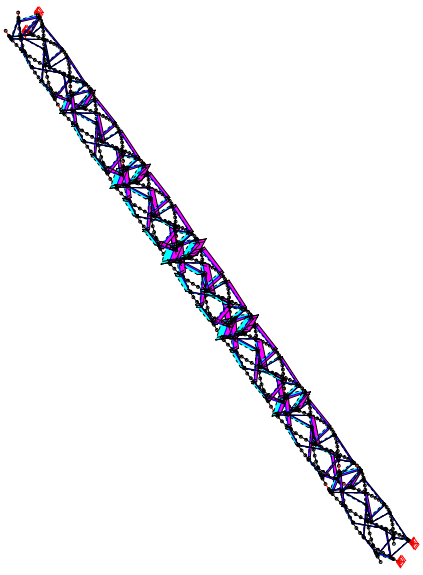
M 1 : 35



LC 1: GPL–N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –76,87/78,13 [MN/m²]

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ANNEX

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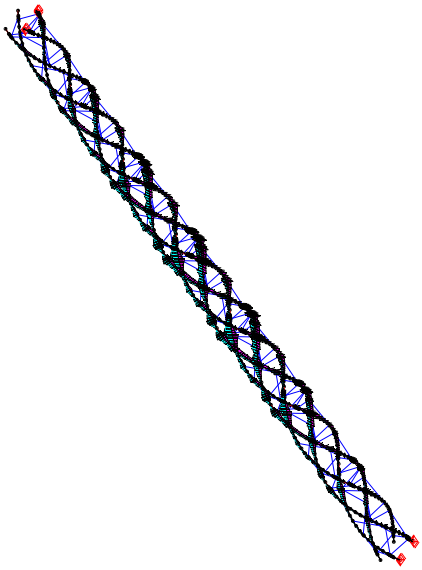
M 1 : 35



LC 2: SDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –55,79/55,85 [MN/m²]

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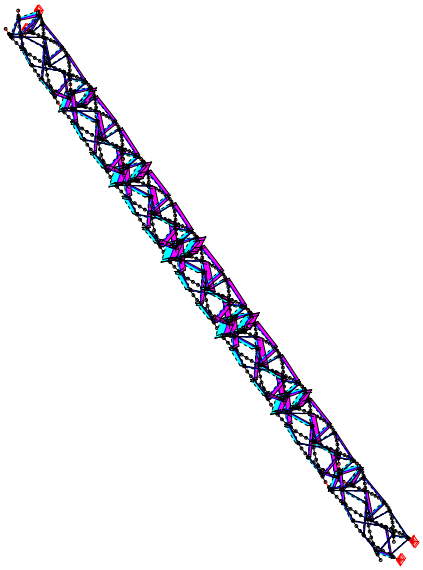
ANNEX

04.03.2019
M 1 : 35



LC 2: SDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –75,45/75,69 [MN/m²]

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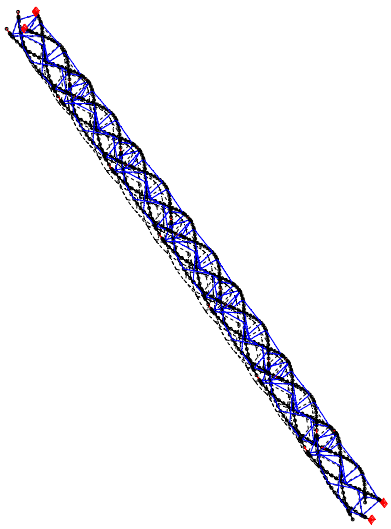
ANNEX

04.03.2019
M 1 : 35



LC 1: SPL-N
Deformations u [mm], Factor = 3,5
Value range (overall system, min/max): 0,00/31,66 [mm]

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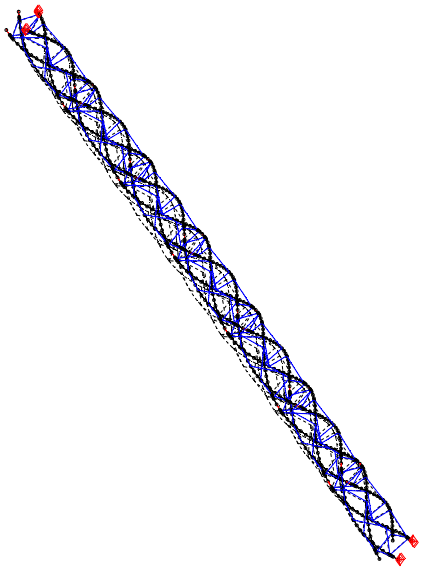
ANNEX

04.03.2019
M 1 : 35



LC 2: SDL-N
Deformations u [mm], Factor = 3,2
Value range (overall system, min/max): 0,00/34,57 [mm]

18468 – F34DNA–100 Einfeld 8m
ANNEX

01.03.2019
M 1 :

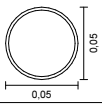
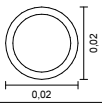
System characteristics

900	Nodes		
1096	Elements	1096	Beams
4	Supports	0	Slabs
0	Link elements	0	Plains
2	Material properties	0	Shells
2	Section properties	0	Cables
3	Load cases	0	Solids
0	LC Combinations	0	Spring elements
0	Tendon groups		

Result location in area elements: Node
2 Result locations in beam elements

Rotated element systems
0 Element systems
0 Internal force systems
0 Reinforcement systems

Section properties

1	Polygon 	Chord 50x2 Centroid [m] ys = 0,000 zs = 0,000 Area [m²] A = 2,9966e-04 Moments of inertia [m4] Ix = 1,7159e-07 Iy = 8,5898e-08 I1 = 8,5898e-08 Iz = 8,5898e-08 I2 = 8,5898e-08 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width
2	Polygon 	Bracing 20x2 Centroid [m] ys = -0,000 zs = -0,000 Area [m²] A = 1,1237e-04 Moments of inertia [m4] Ix = 9,1504e-09 Iy = 4,5777e-09 I1 = 4,5777e-09 Iz = 4,5777e-09 I2 = 4,5777e-09 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width

Material properties

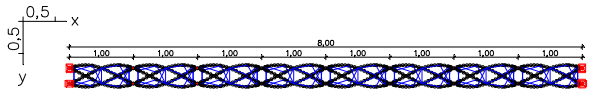
	No.	Type	E-Modu. [MN/m²]	G-Modu. [MN/m²]	Poiss. ratio	alpha.t [1/K]	gamma [kN/m³]	Miscellaneous
1	1	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0
2	2	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 20 [MN/m²] ft = 0

18468 – F34DNA–100 Einfeld 8m
ANNEX

01.03.2019
M 1 :

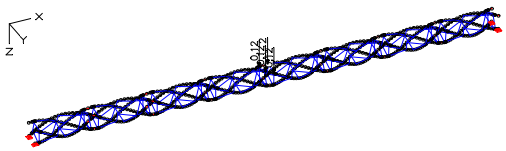
Sum of installed loads and support reactions

LC.	Label	Fx [kN]	Fy [kN]	Fz [kN]
1	CPL	-0,000	0,000	0,950
	Support reactions	0,000	0,000	0,950
2	UDL	-0,000	-0,000	1,377
	Support reactions	0,000	0,000	1,377
3	selfweight	-0,000	0,000	0,470
	Support reactions	0,000	0,000	0,470



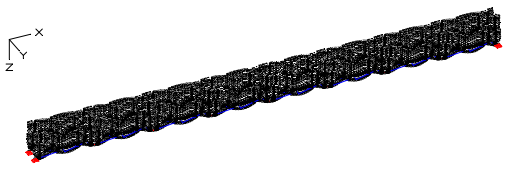
dim

DEAD LOAD



LC 1: Load, CPL

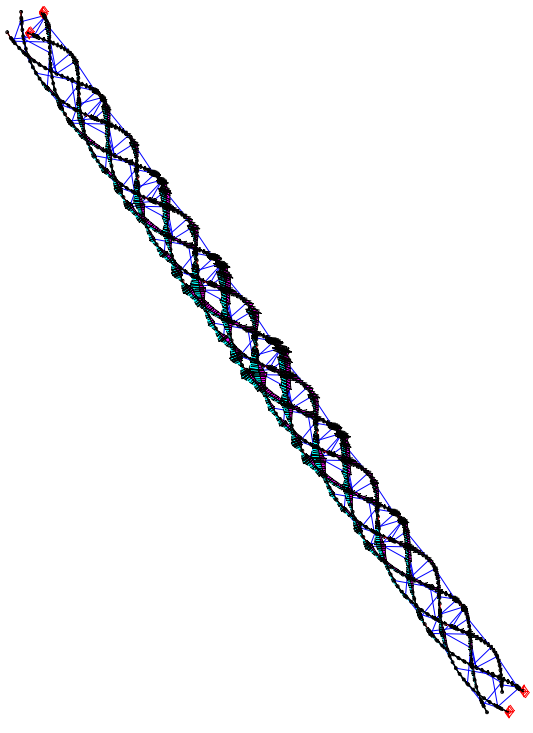
DEAD LOAD



LC 2: Load, UDL

18468 – F34DNA–100 Einfeld 8m
ANNEX

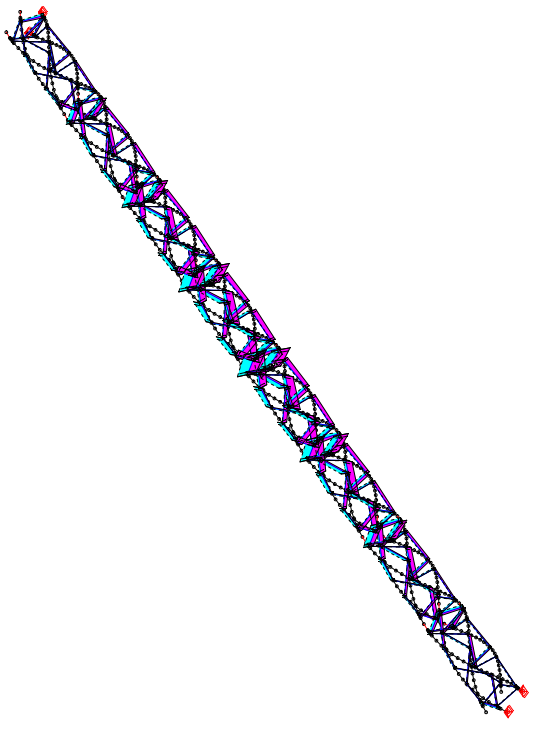
01.03.2019
M 1 : 30



Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –60,33/60,38 [MN/m²]

18468 – F34DNA–100 Einfeld 8m
ANNEX

01.03.2019
M 1 : 30



Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –78,83/78,72 [MN/m²]

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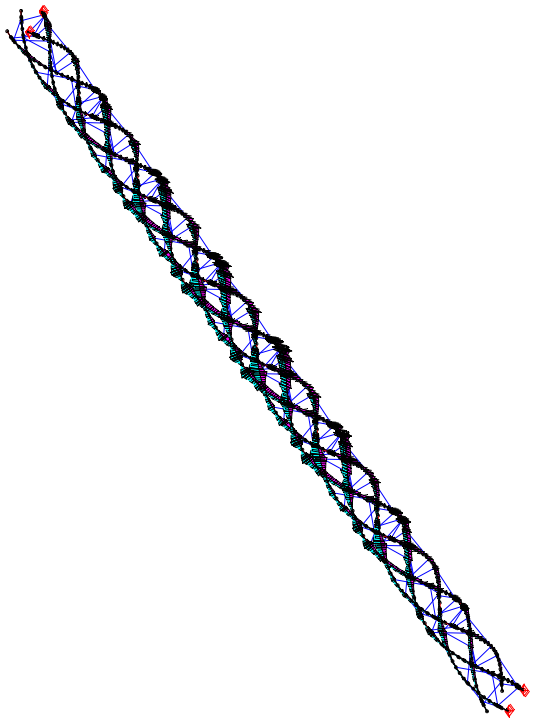
ANNEX

01.03.2019
M 1 : 30



LC 2: VDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –58,68/58,73 [MN/m²]

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ANNEX

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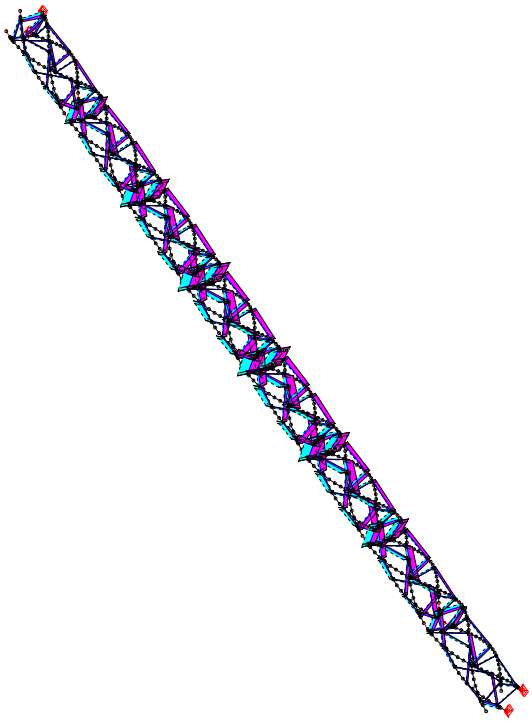
M 1 : 30



LC 2: VDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –78,26/78,45 [MN/m²]

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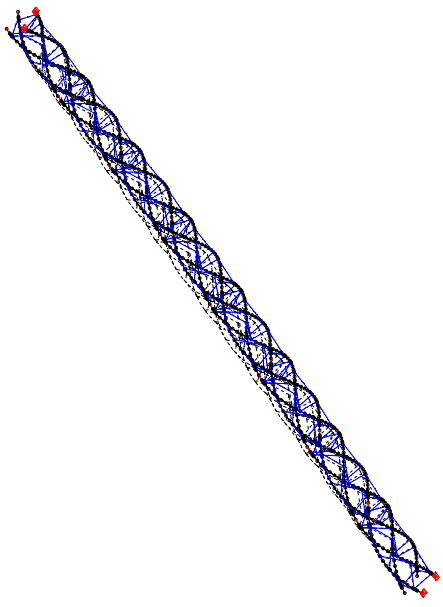
M 1 : 35



LC 1: SPL-N
Deformations u [mm], Factor = 3,1
Value range (overall system, min/max): 0,00/41,55 [mm]

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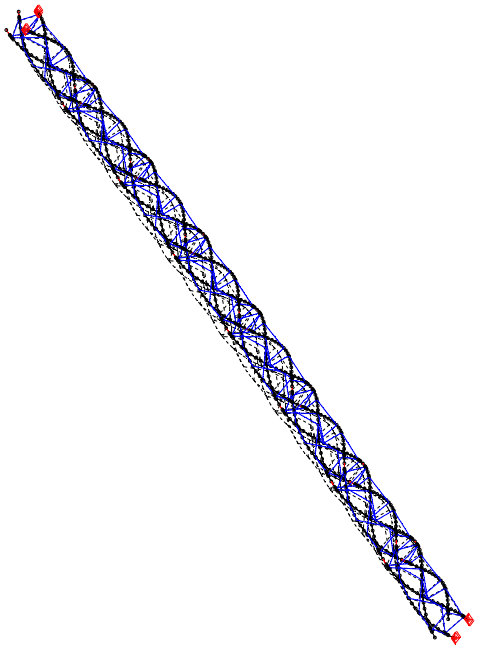
M 1 : 35



LC 2: VDL-N
Deformations u [mm], Factor = 2,8
Value range (overall system, min/max): 0,00/46,10 [mm]

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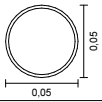
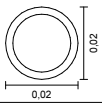
System characteristics

1012	Nodes		
1233	Elements	1233	Beams
4	Supports	0	Slabs
0	Link elements	0	Plains
2	Material properties	0	Shells
2	Section properties	0	Cables
3	Load cases	0	Solids
0	LC Combinations	0	Spring elements
0	Tendon groups		

Result location in area elements: Node
2 Result locations in beam elements

Rotated element systems
0 Element systems
0 Internal force systems
0 Reinforcement systems

Section properties

1	Polygon 	Chord 50x2 Centroid [m] ys = 0,000 zs = 0,000 Area [m²] A = 2,9966e-04 Moments of inertia [m4] Ix = 1,7159e-07 Iy = 8,5898e-08 I1 = 8,5898e-08 Iz = 8,5898e-08 I2 = 8,5898e-08 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width
2	Polygon 	Bracing 20x2 Centroid [m] ys = -0,000 zs = -0,000 Area [m²] A = 1,1237e-04 Moments of inertia [m4] Ix = 9,1504e-09 Iy = 4,5777e-09 I1 = 4,5777e-09 Iz = 4,5777e-09 I2 = 4,5777e-09 Main axis angle [Grad] Phi = 0,000 Iyz = 0,0000e+00 Averaging of the lateral force shear stress over section width

Material properties

	No.	Type	E-Modu. [MN/m²]	G-Modu. [MN/m²]	Poiss. ratio	alpha.t [1/K]	gamma [kN/m³]	Miscellaneous
1	1	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 250 [MN/m²] ft = 290
2	2	Frei	70000	27000	0,30	2,30e-05	27,000	fc = 250 [MN/m²] ft = 290

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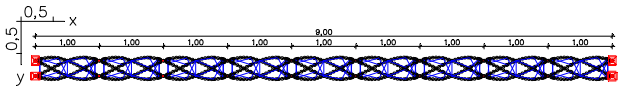
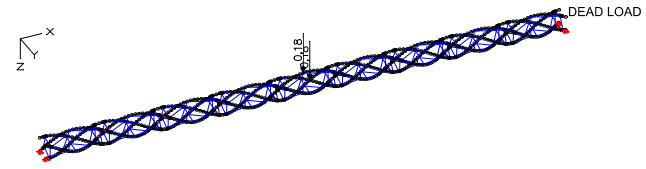
Sum of installed loads and support reactions

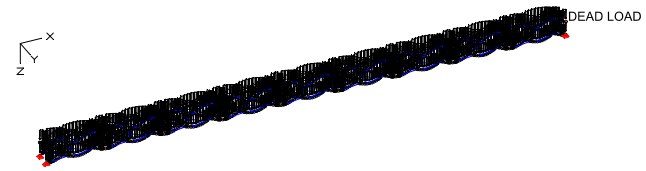
LC.	Label	Fx [kN]	Fy [kN]	Fz [kN]
1	CPL	-0,000	0,000	0,889
	Support reactions	0,000	0,000	0,889
2	UDL	-0,000	-0,000	1,192
	Support reactions	0,000	0,000	1,192
3	selfweight	-0,000	0,000	0,529
	Support reactions	0,000	0,000	0,529



dim



LC 1: Load, CPL



LC 2: Load, UDL

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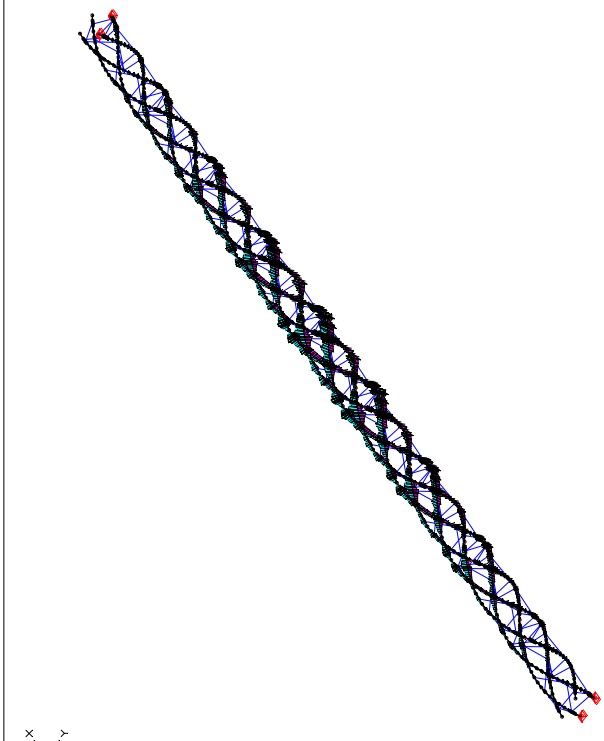
M 1 : 35



Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –55,94/56,63 [MN/m²]

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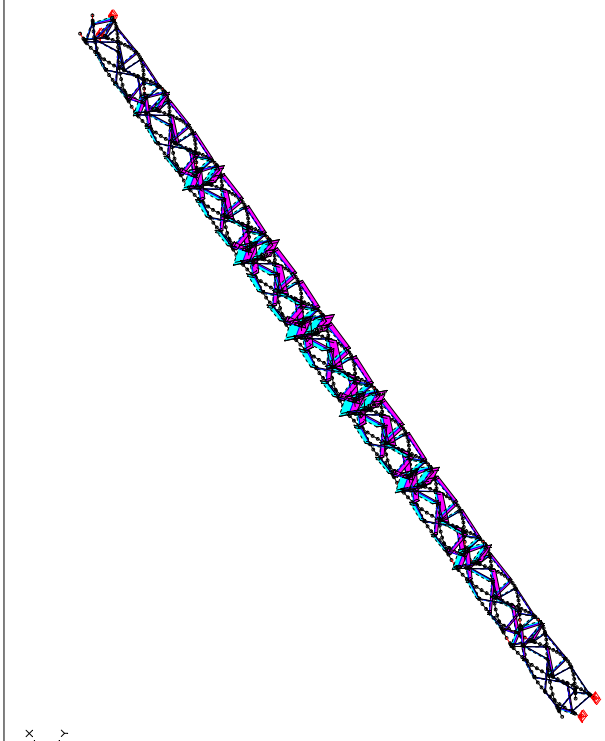
M 1 : 35



Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –77,34/78,10 [MN/m²]

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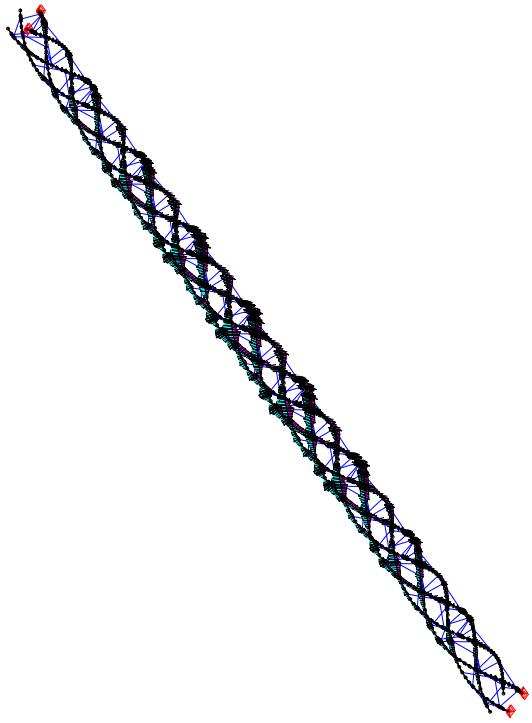
M 1 : 35



LC 2: GDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (subsystem, min/max): –56,49/56,53 [MN/m²]

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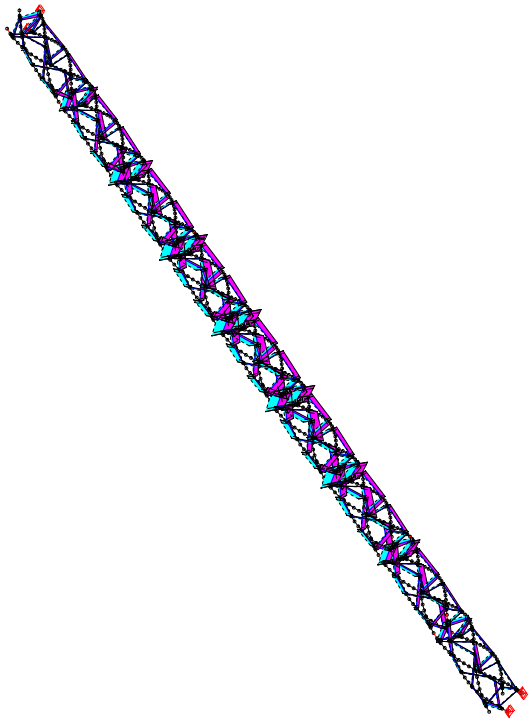

LC 2: GDL-N
Selected Stresses (general – elastic, directly from internal forces) min,max Sigma.x [MN/m²]
Value range (overall system, min/max): –76,08/76,23 [MN/m²]

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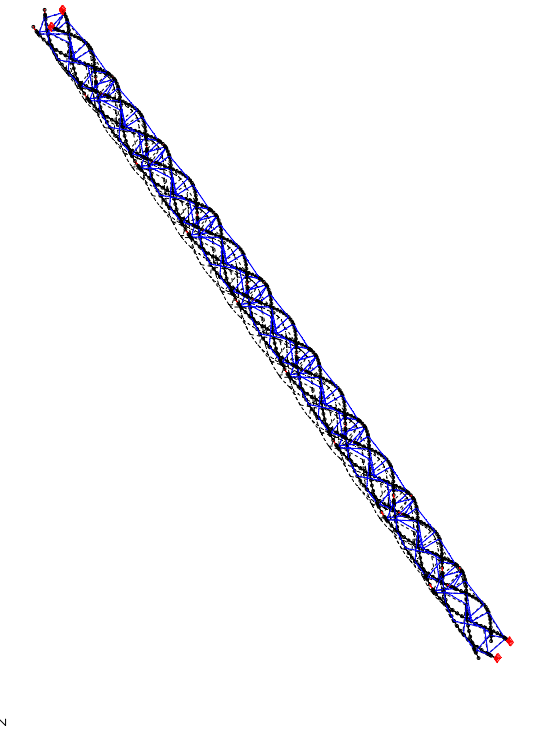

LC 1: GDL-N
Deformations u [mm], Factor = 2,7
Value range (overall system, min/max): 0,00/52,63 [mm]

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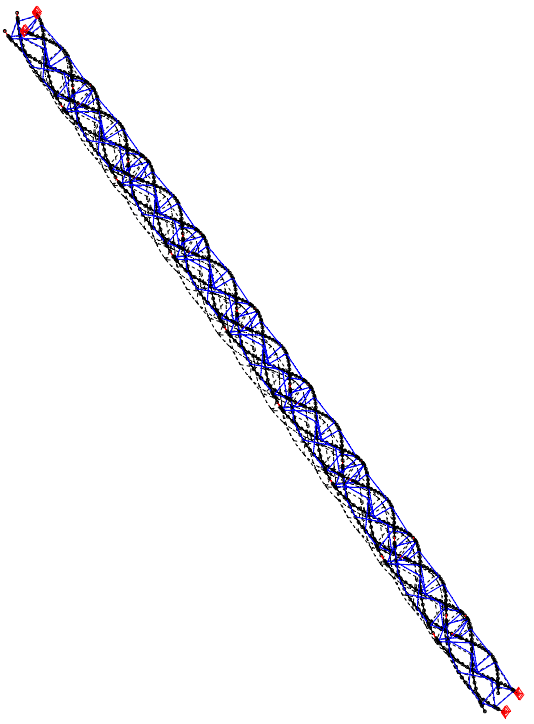
M 1 : 35



LC 2: GDL-N
Deformations u [mm], Factor = 2,5
Value range (overall system, min/max): 0,00/56,64 [mm]