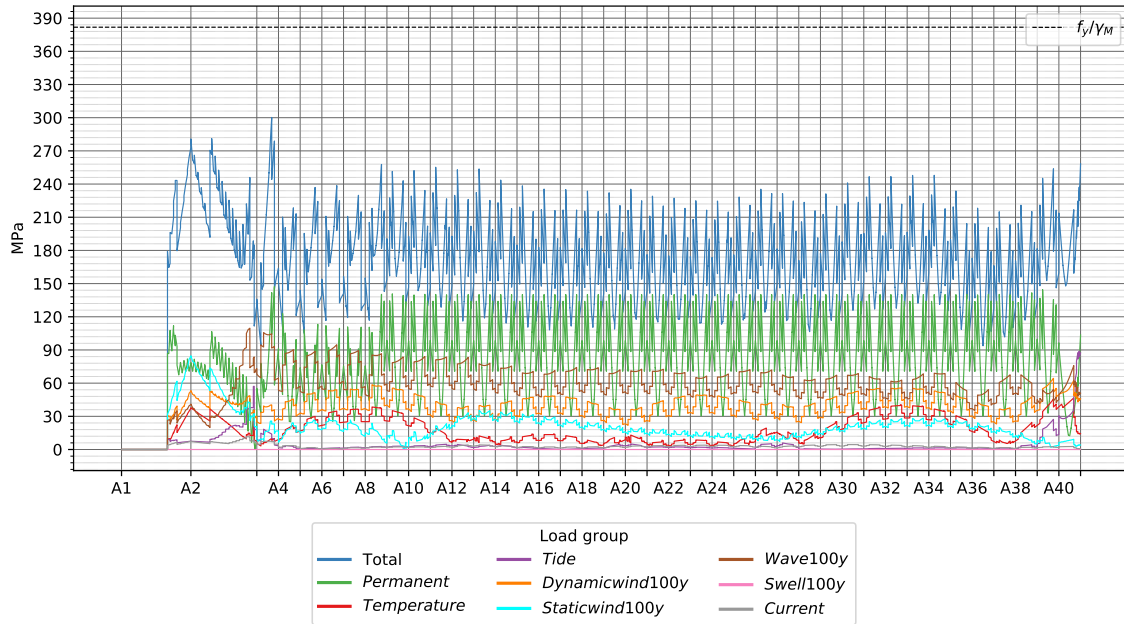
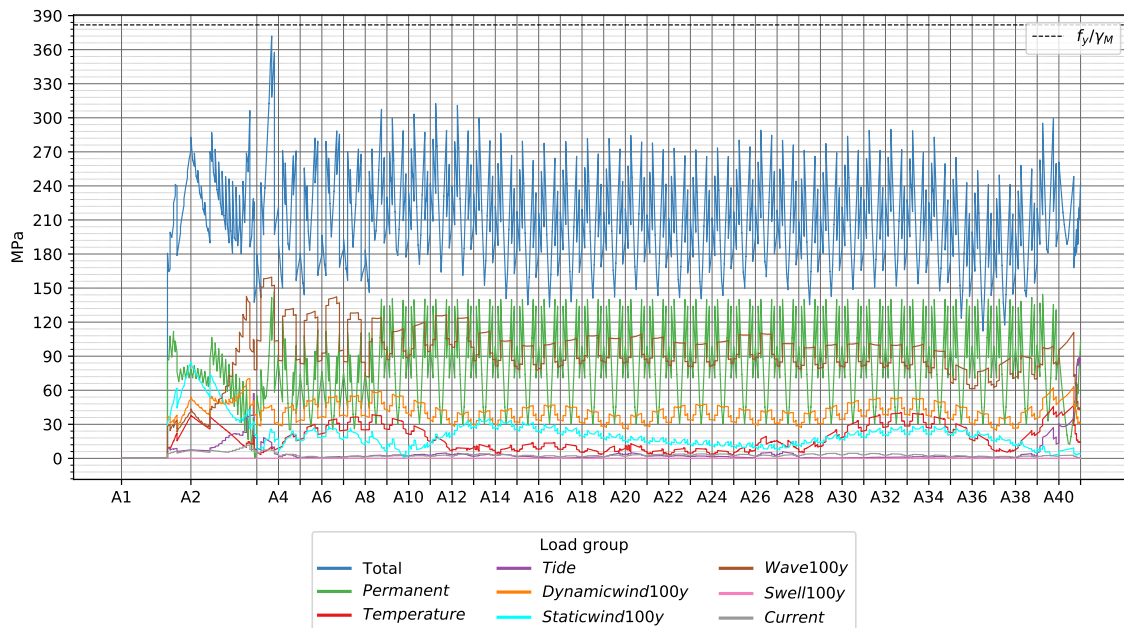


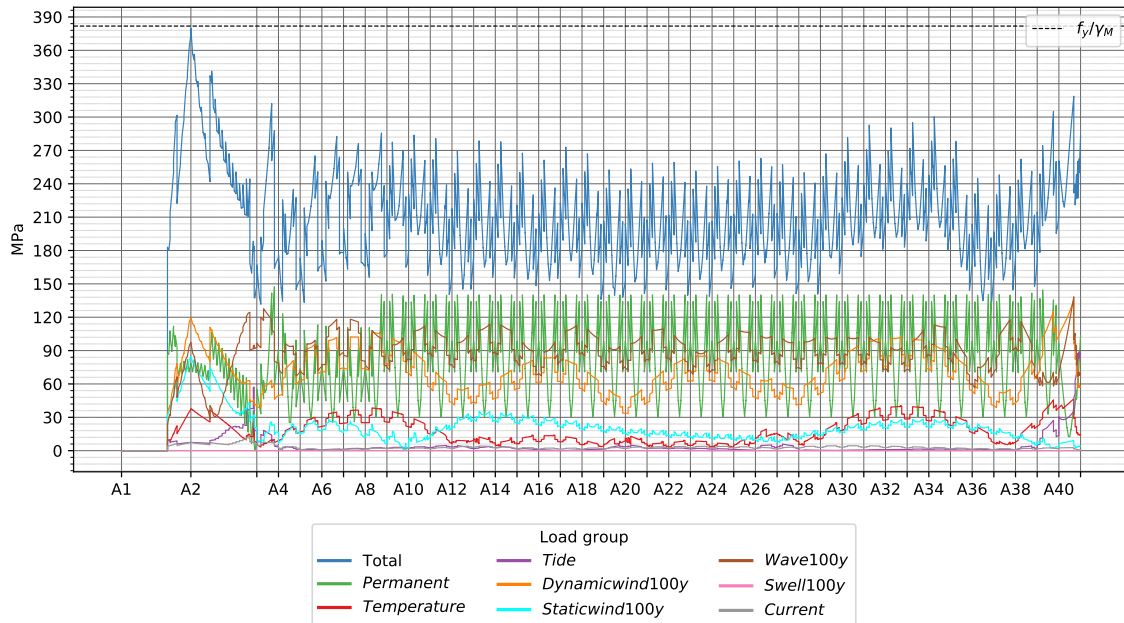
11.12.2 case 1 - Dom. Weak axis moment



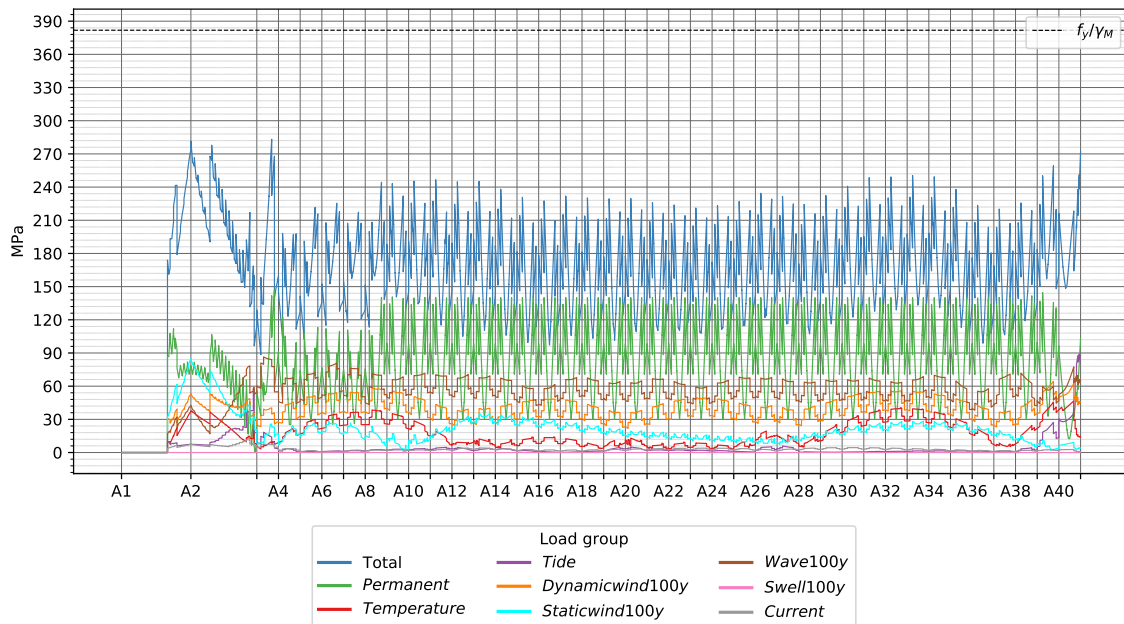
11.12.3 case 1 - Dom. Torsion



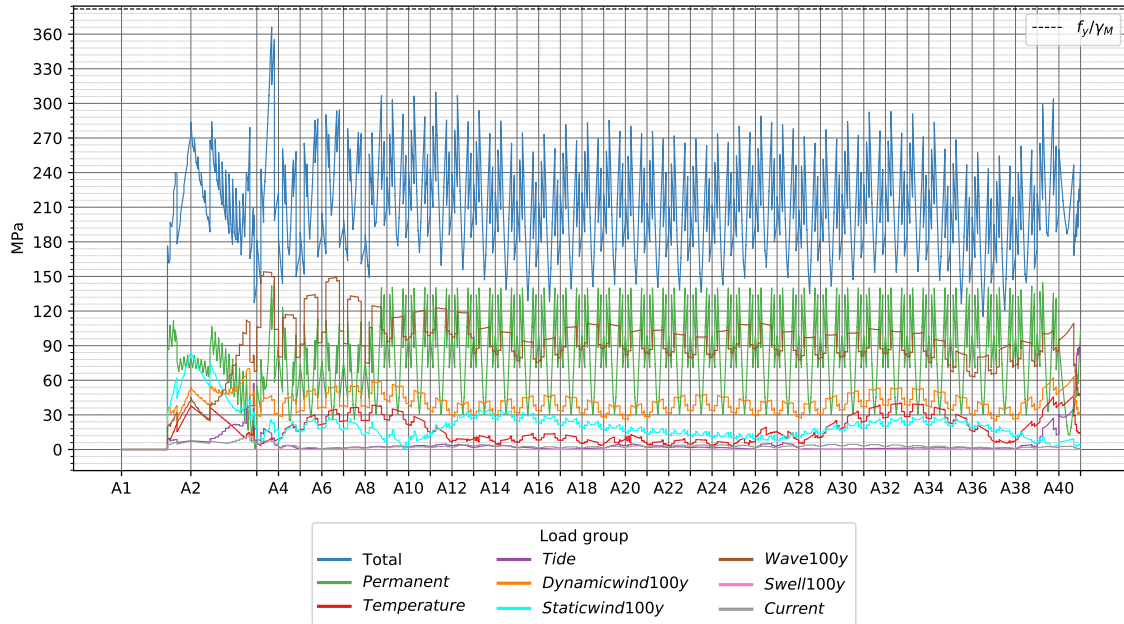
11.12.4 case 2 - Dom. Strong axis moment



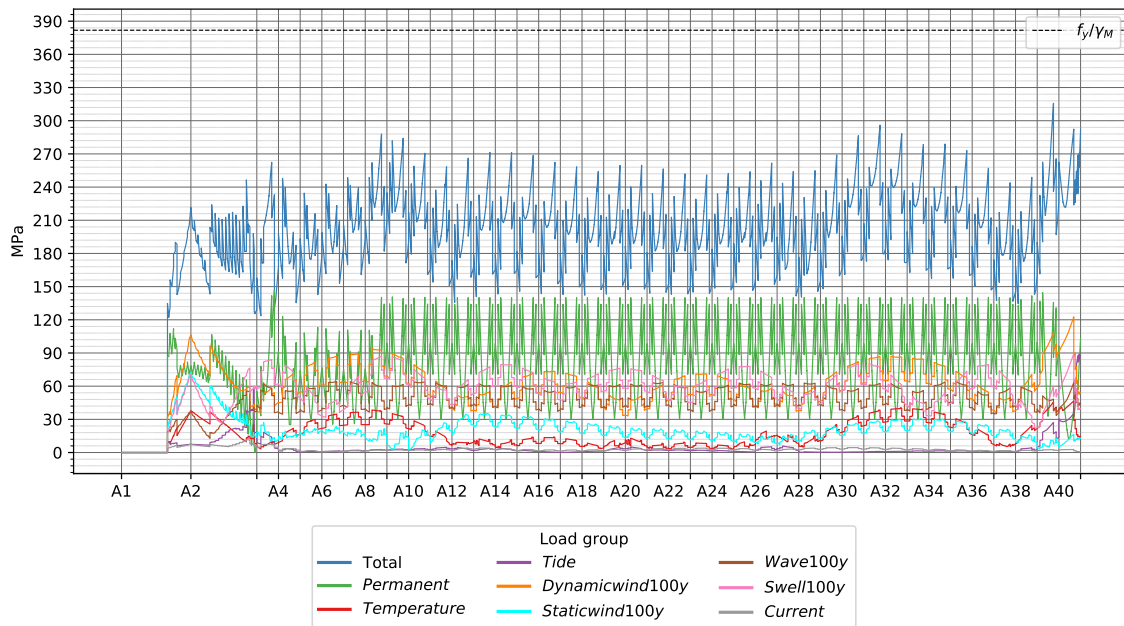
11.12.5 case 2 - Dom. Weak axis moment



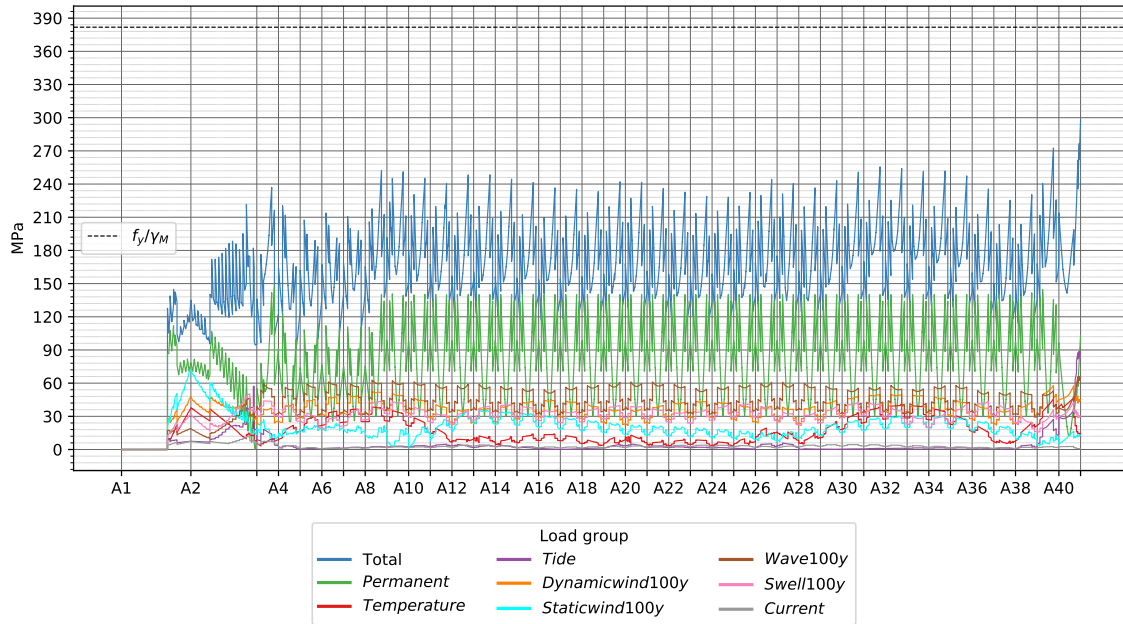
11.12.6 case 2 - Dom. Torsion



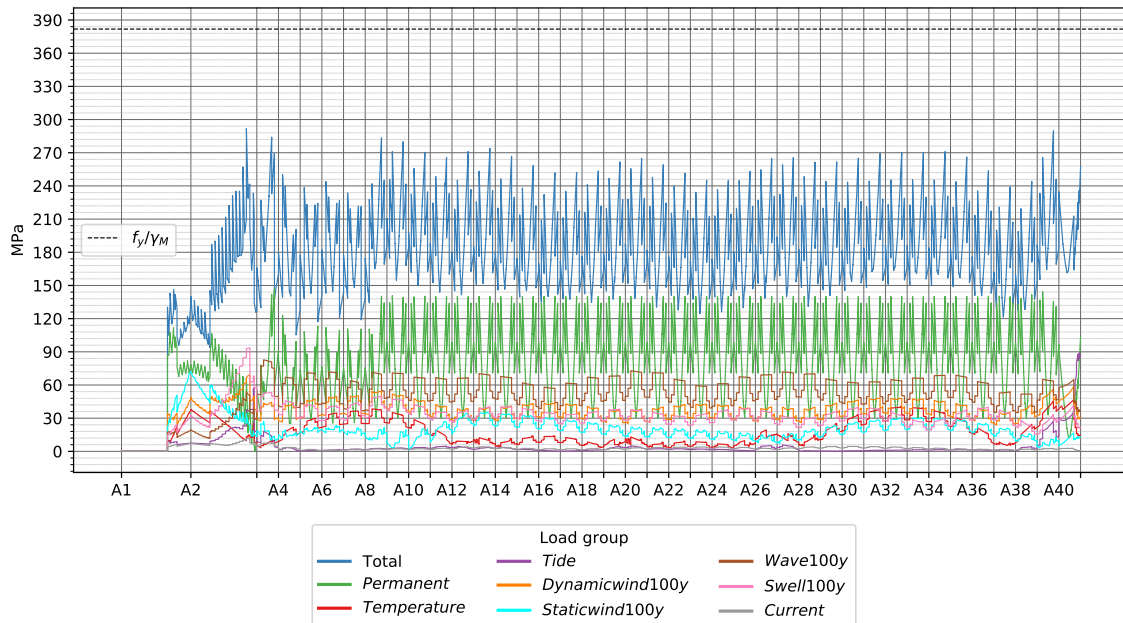
11.12.7 case 3 - Dom. Strong axis moment



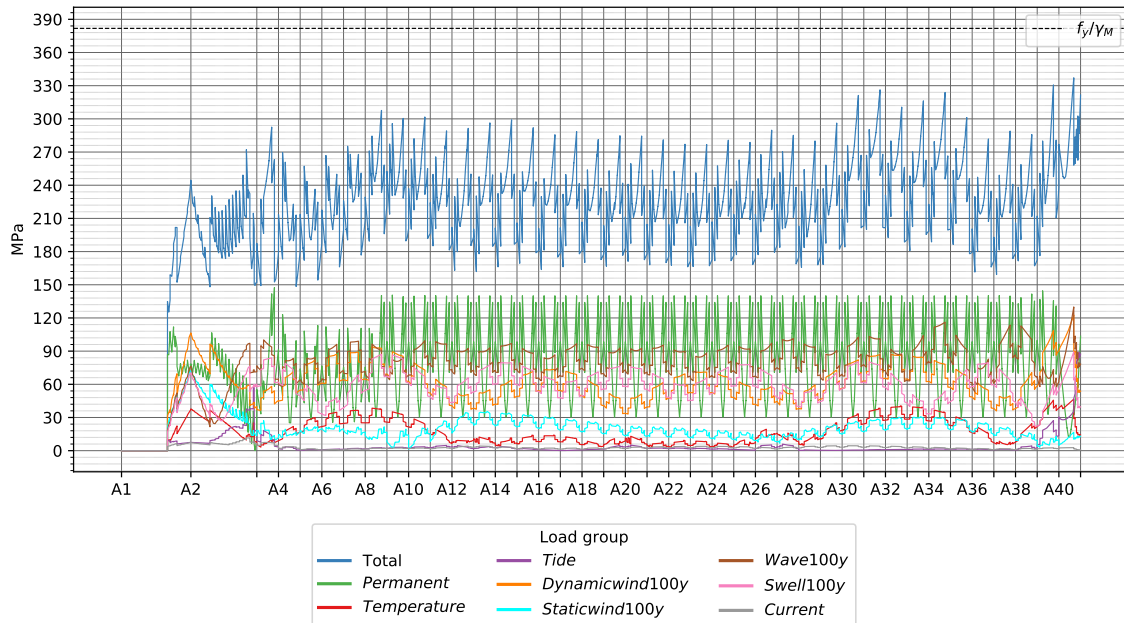
11.12.8 case 3 - Dom. Weak axis moment



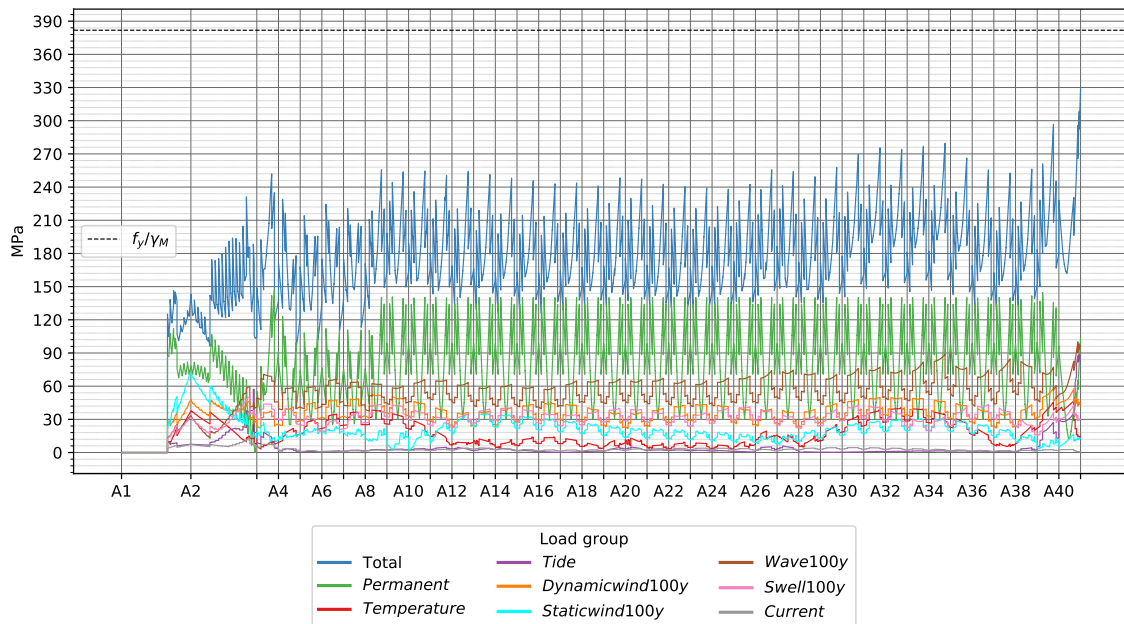
11.12.9 case 3 - Dom. Torsion



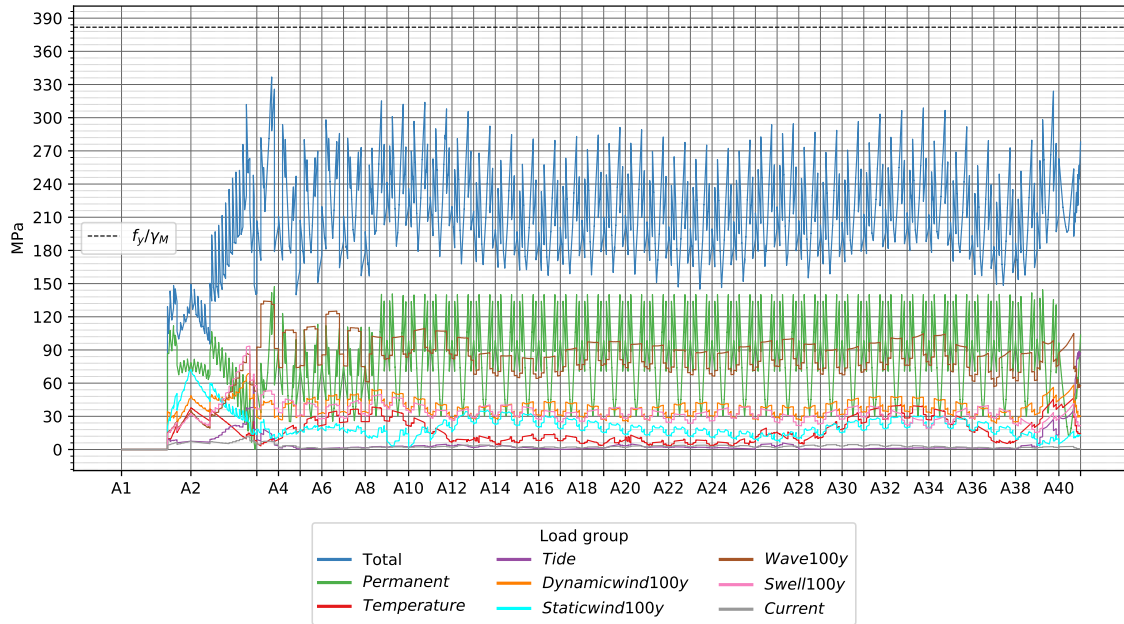
11.12.10 case 4 - Dom. Strong axis moment



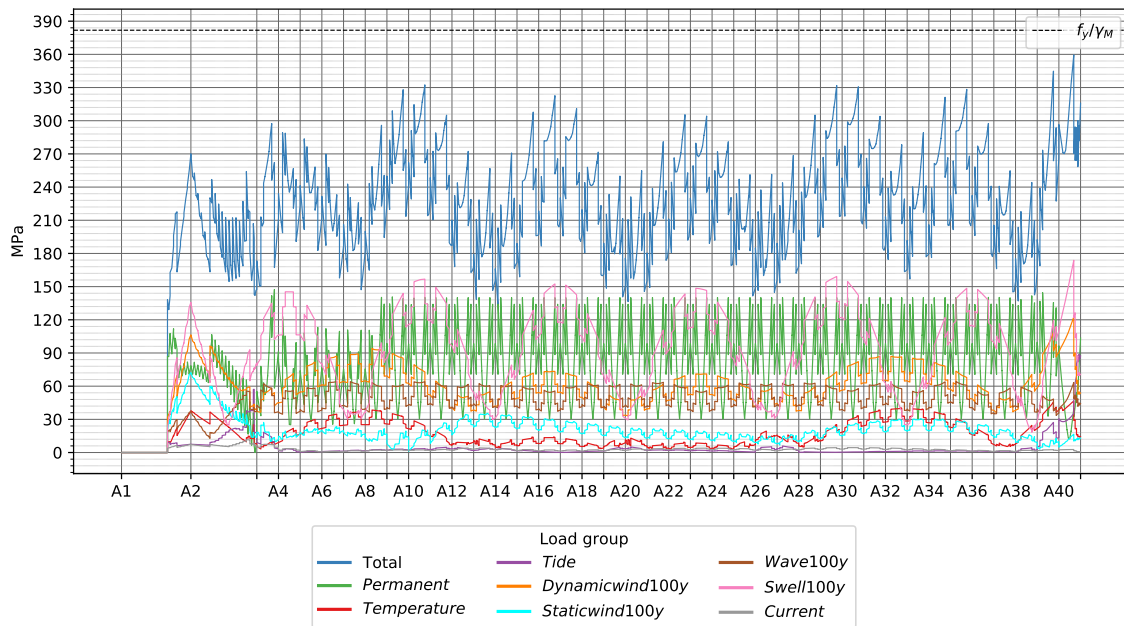
11.12.11 case 4 - Dom. Weak axis moment



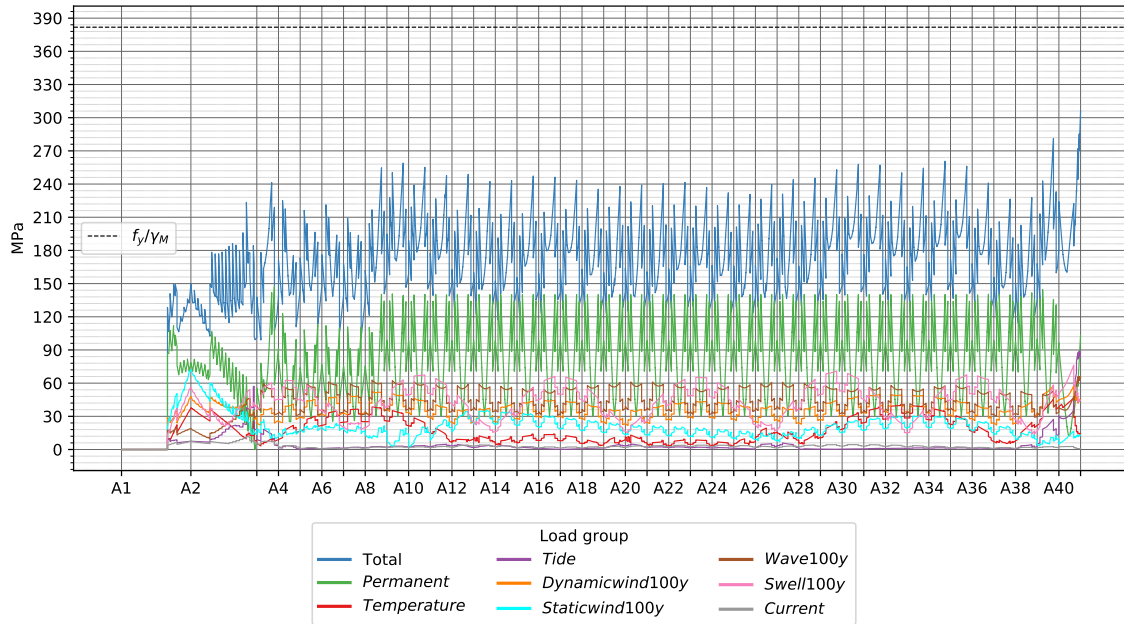
11.12.12 case 4 - Dom. Torsion



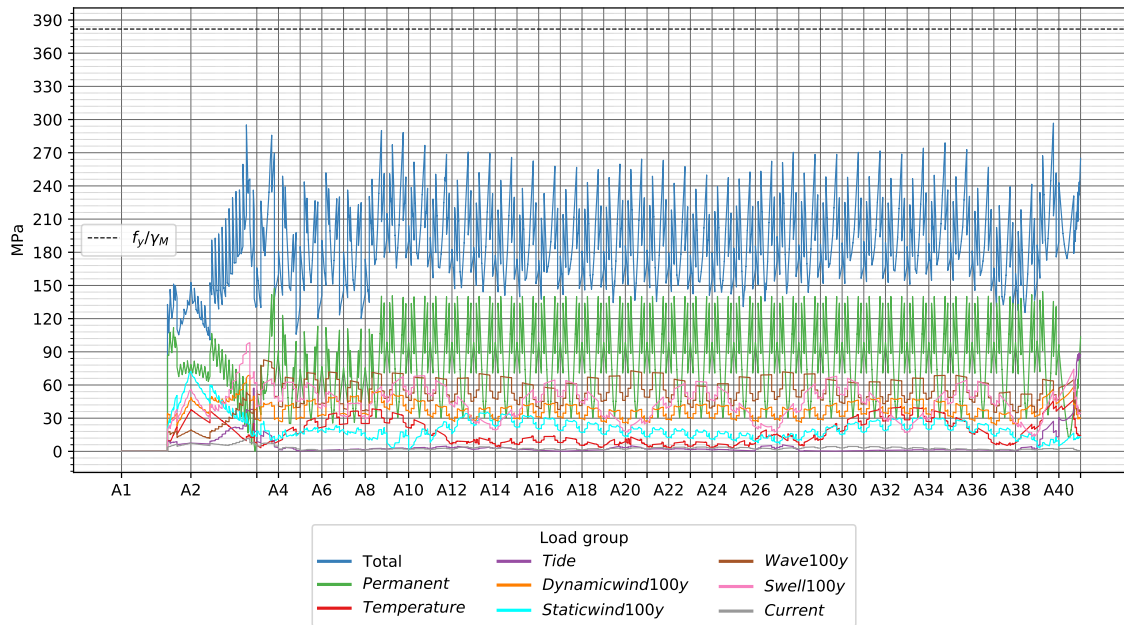
11.12.13 case 5 - Dom. Strong axis moment



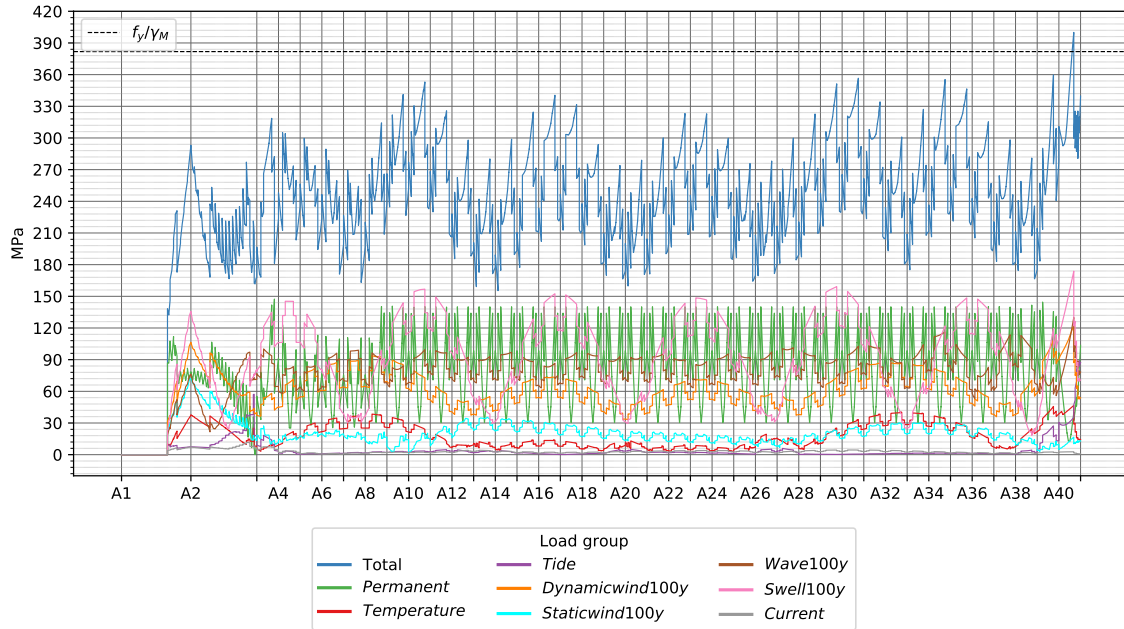
11.12.14 case 5 - Dom. Weak axis moment



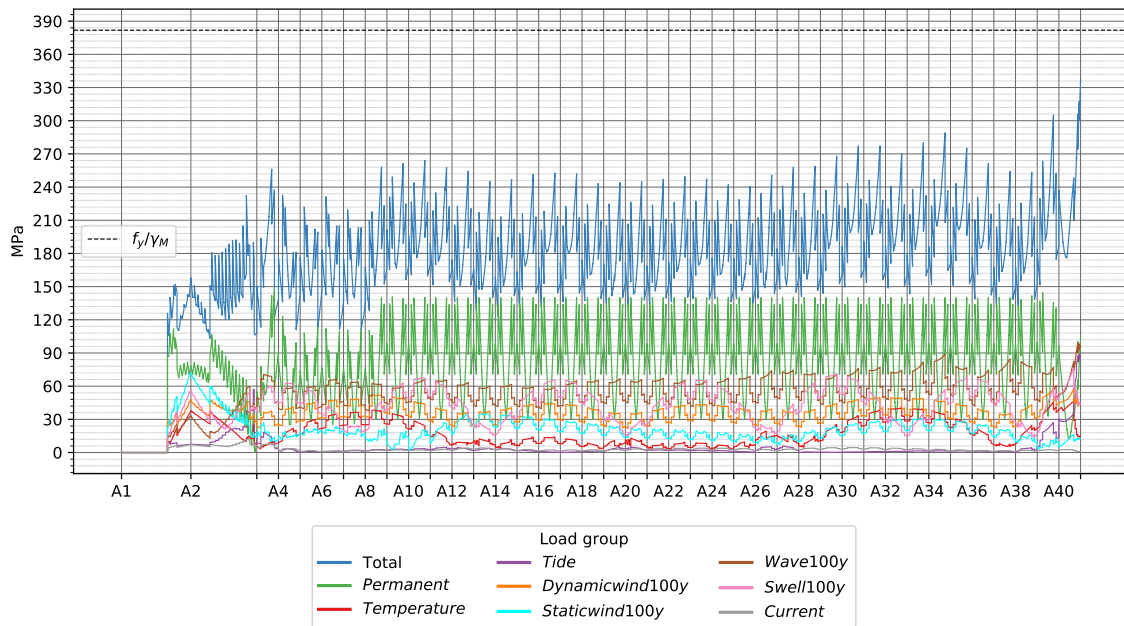
11.12.15 case 5 - Dom. Torsion



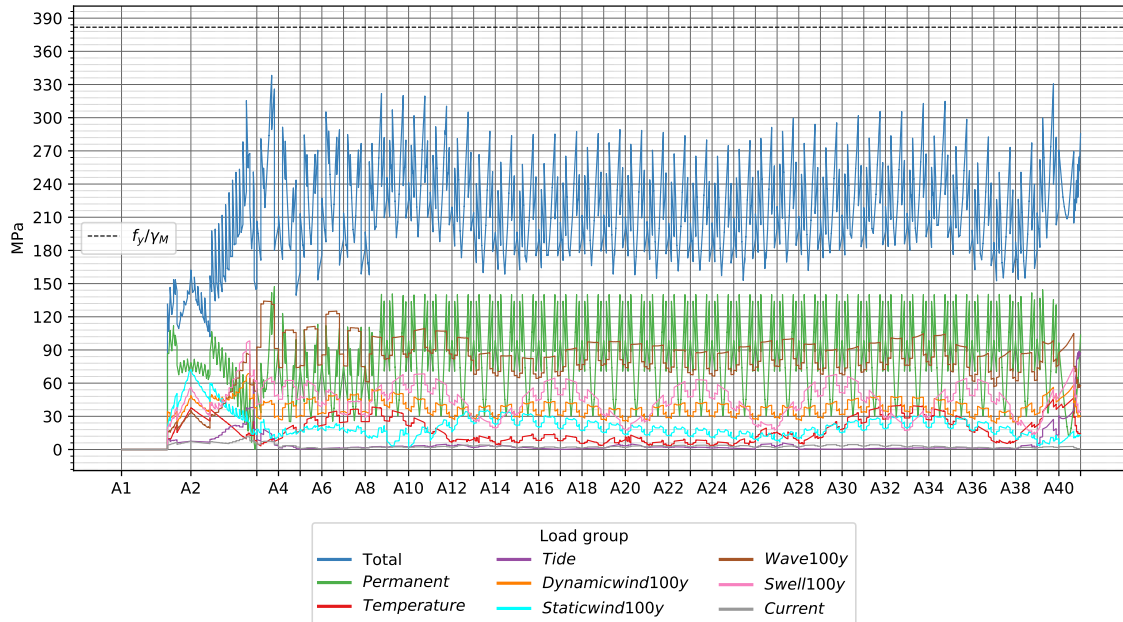
11.12.16 case 6 - Dom. Strong axis moment



11.12.17 case 6 - Dom. Weak axis moment

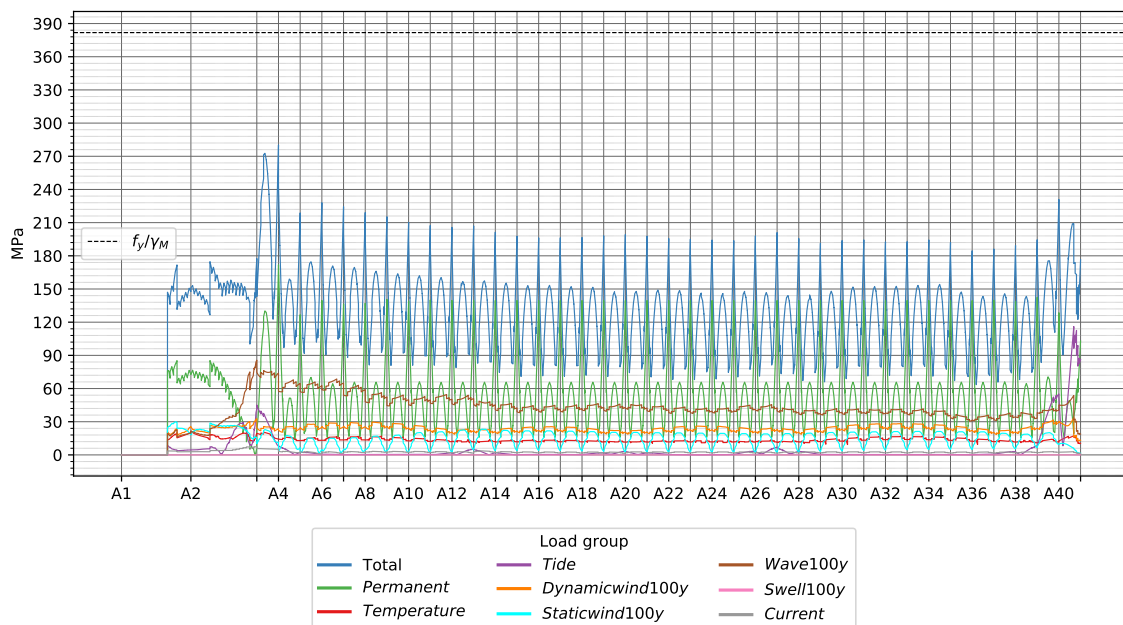


11.12.18 case 6 - Dom. Torsion

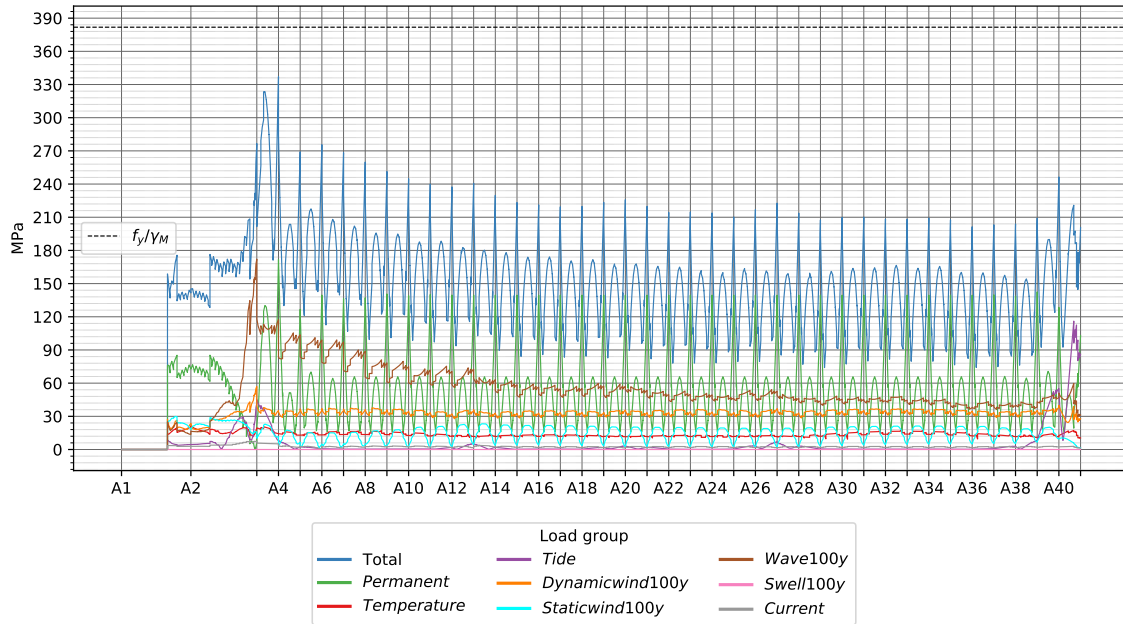


11.13 Stress per load group Pt. B'

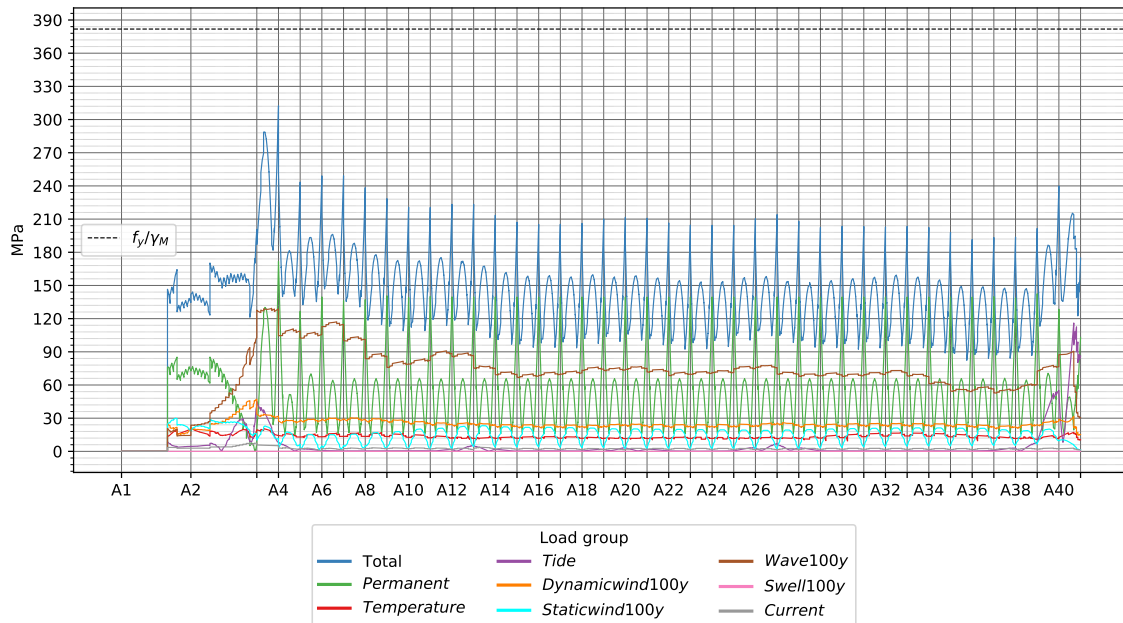
11.13.1 case 1 - Dom. Strong axis moment



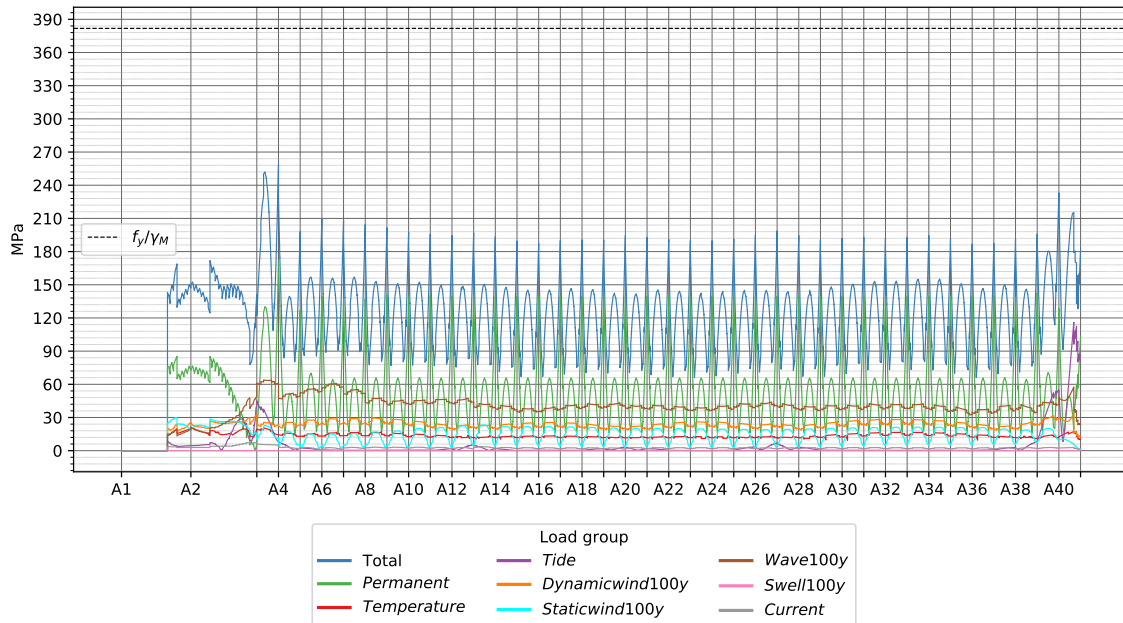
11.13.2 case 1 - Dom. Weak axis moment



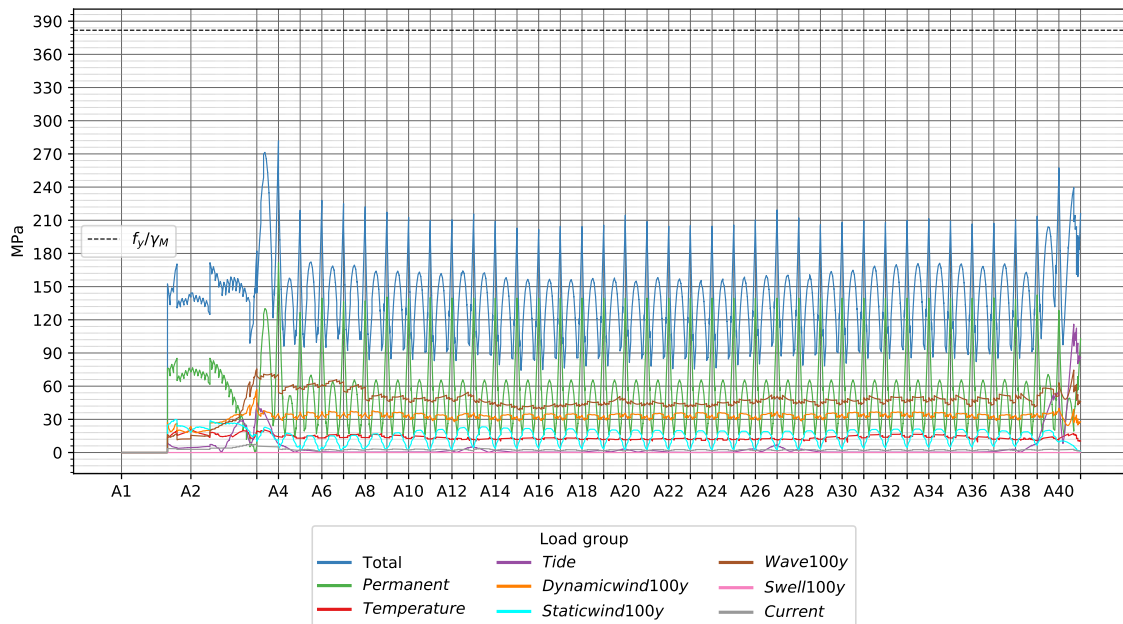
11.13.3 case 1 - Dom. Torsion



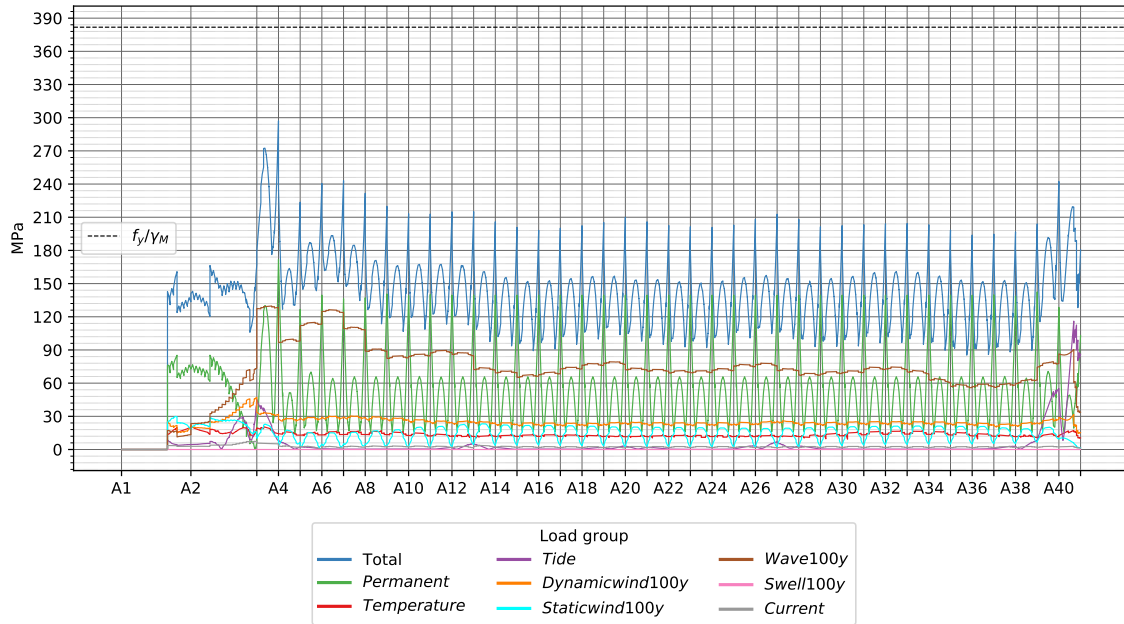
11.13.4 case 2 - Dom. Strong axis moment



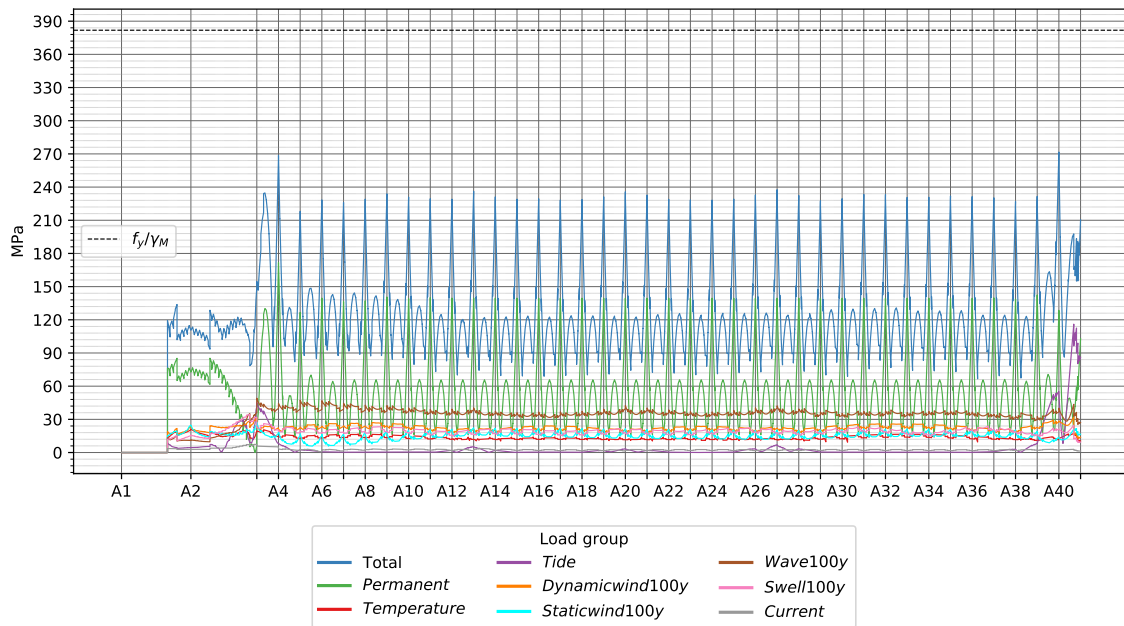
11.13.5 case 2 - Dom. Weak axis moment



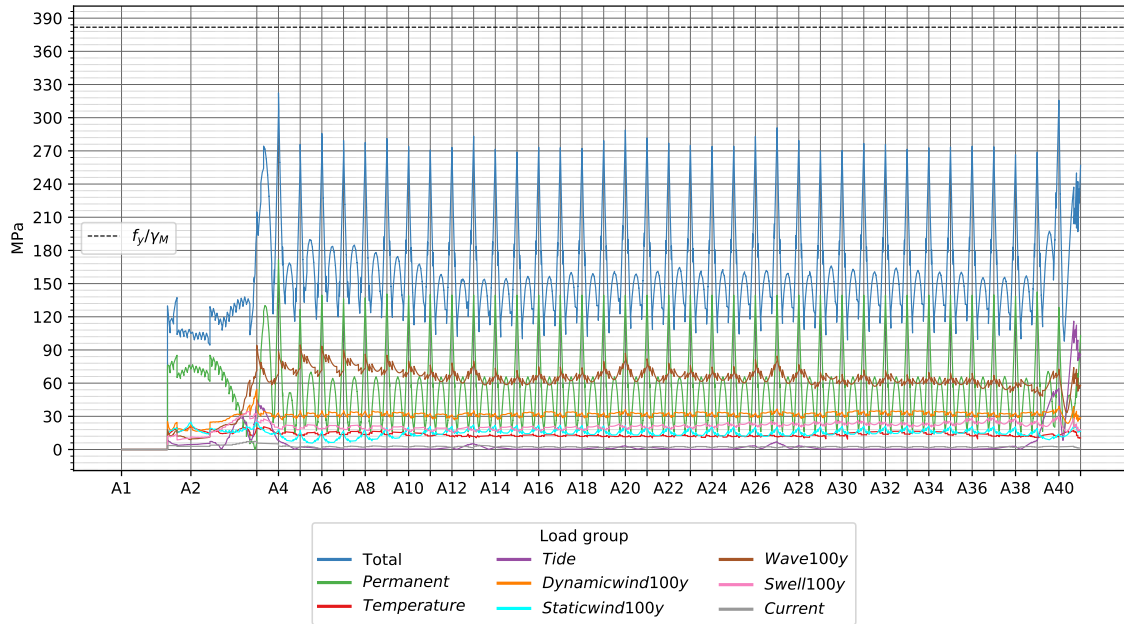
11.13.6 case 2 - Dom. Torsion



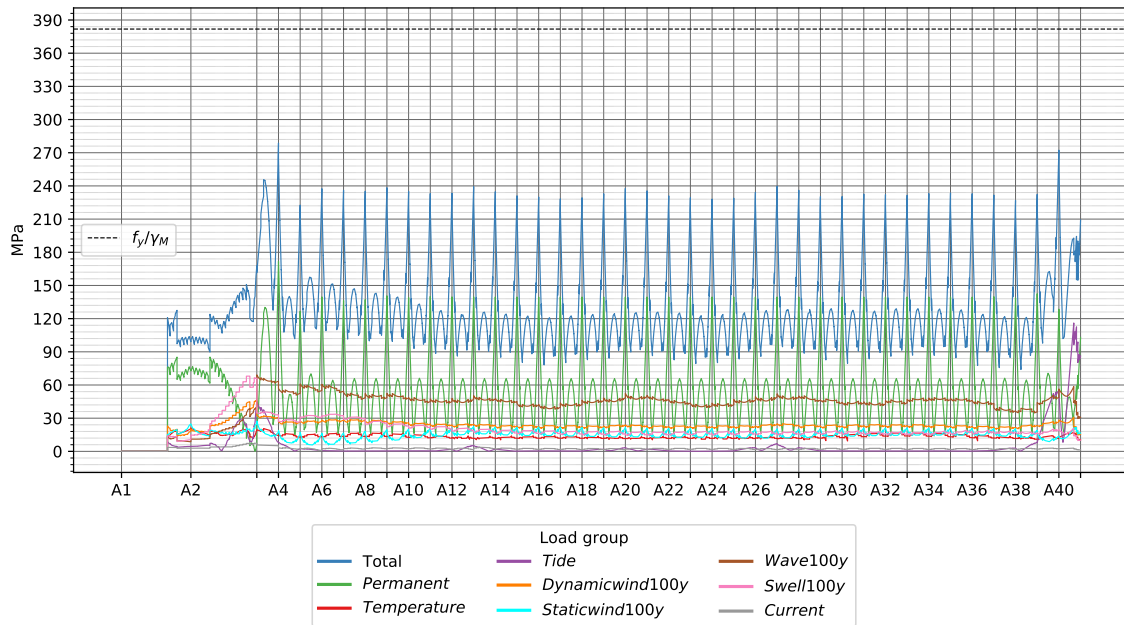
11.13.7 case 3 - Dom. Strong axis moment



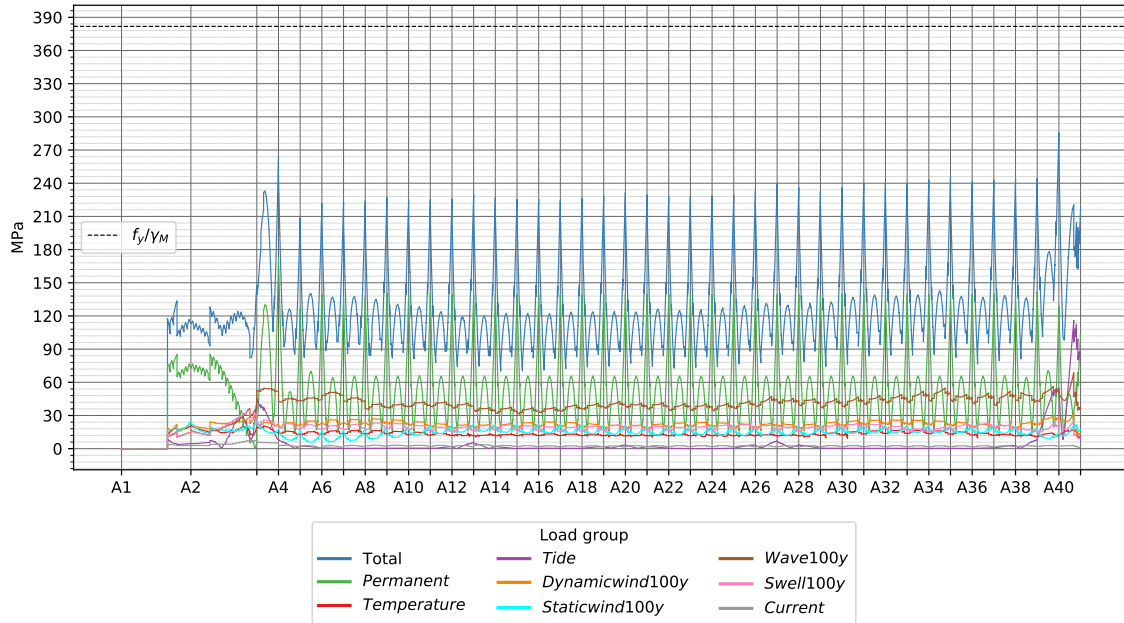
11.13.8 case 3 - Dom. Weak axis moment



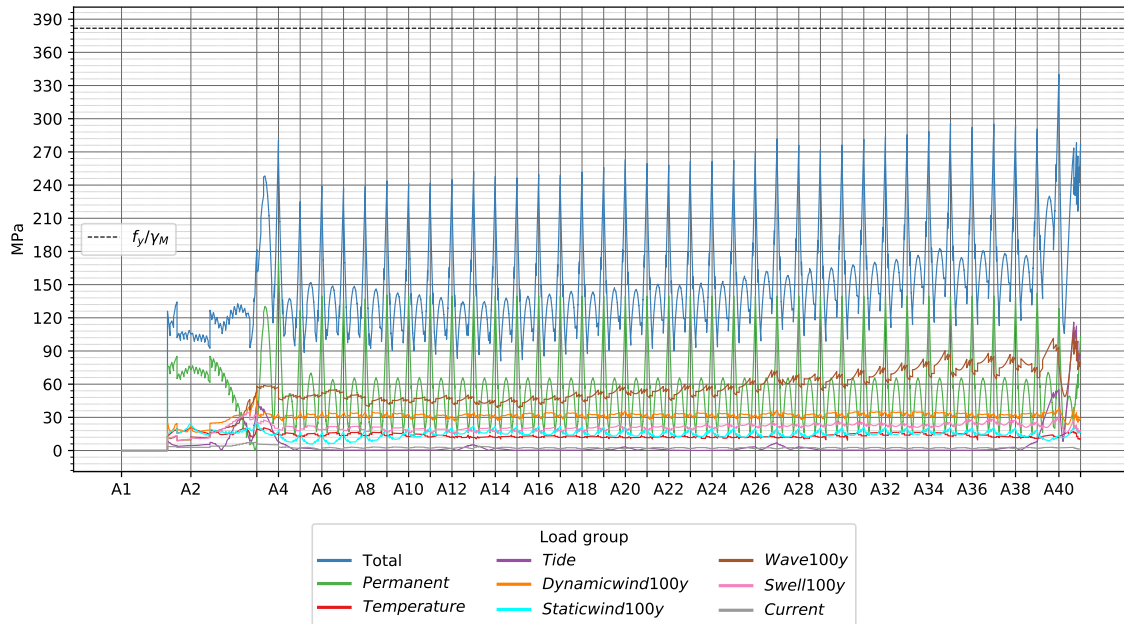
11.13.9 case 3 - Dom. Torsion



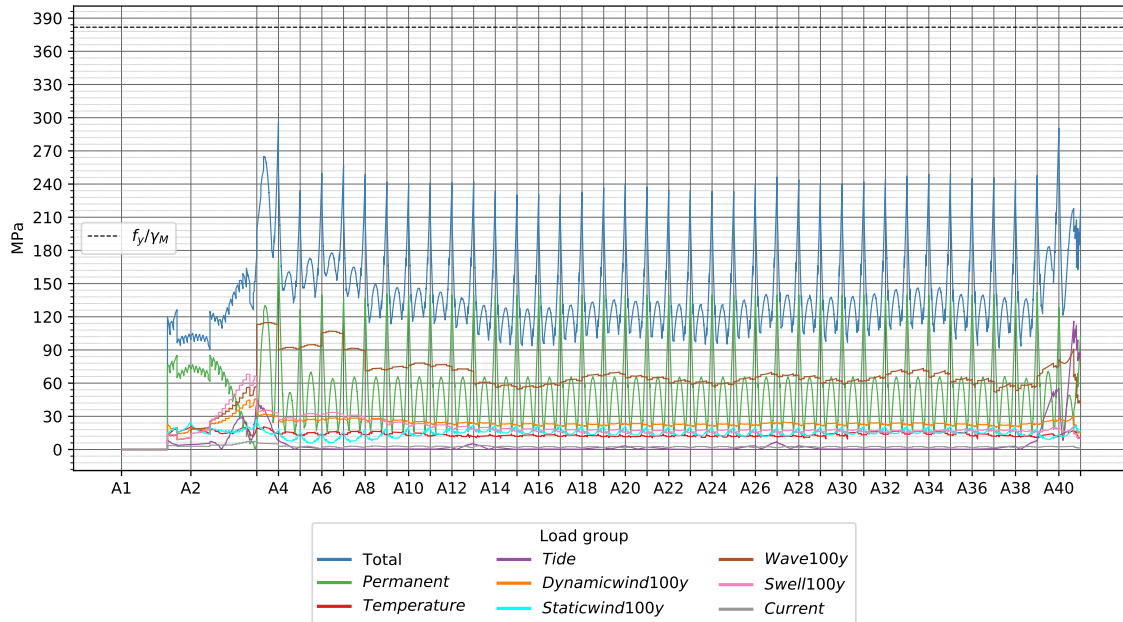
11.13.10 case 4 - Dom. Strong axis moment



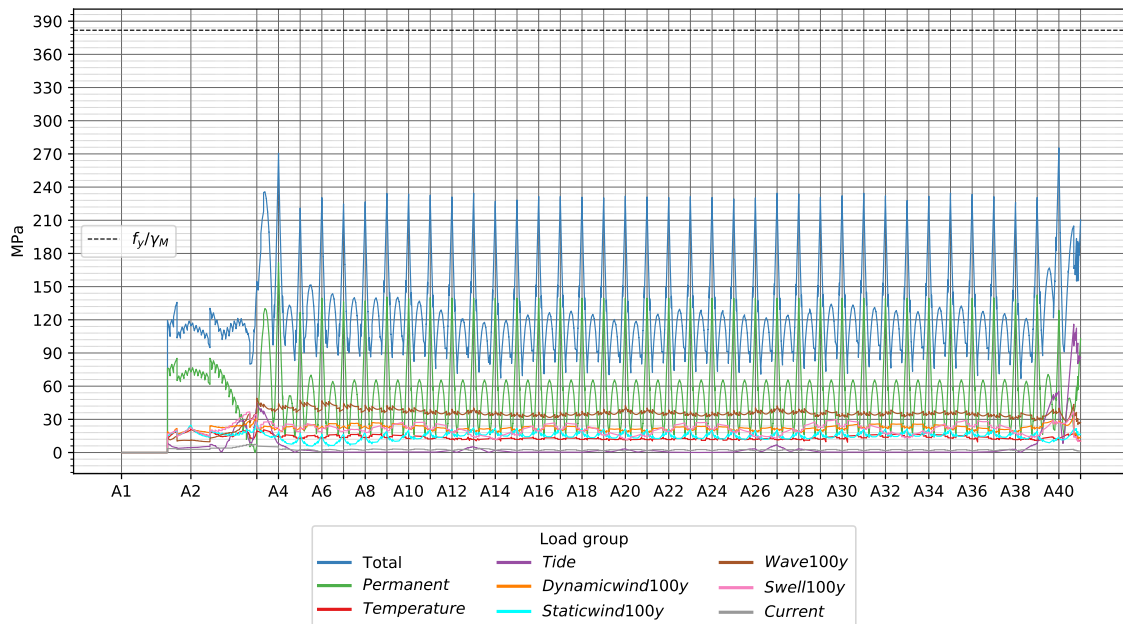
11.13.11 case 4 - Dom. Weak axis moment



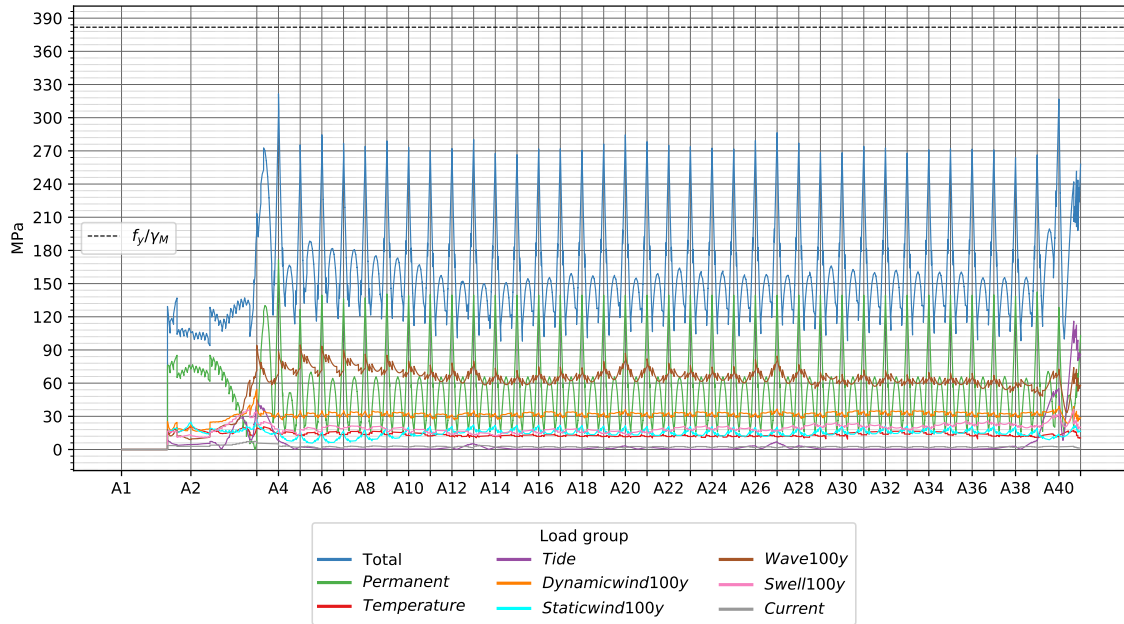
11.13.12 case 4 - Dom. Torsion



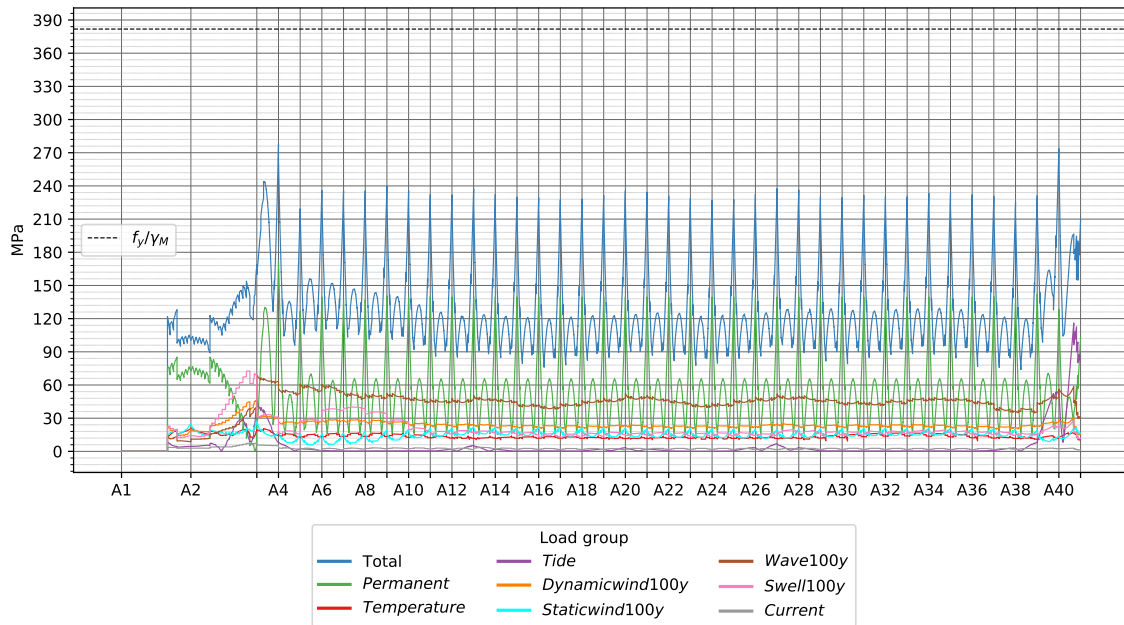
11.13.13 case 5 - Dom. Strong axis moment



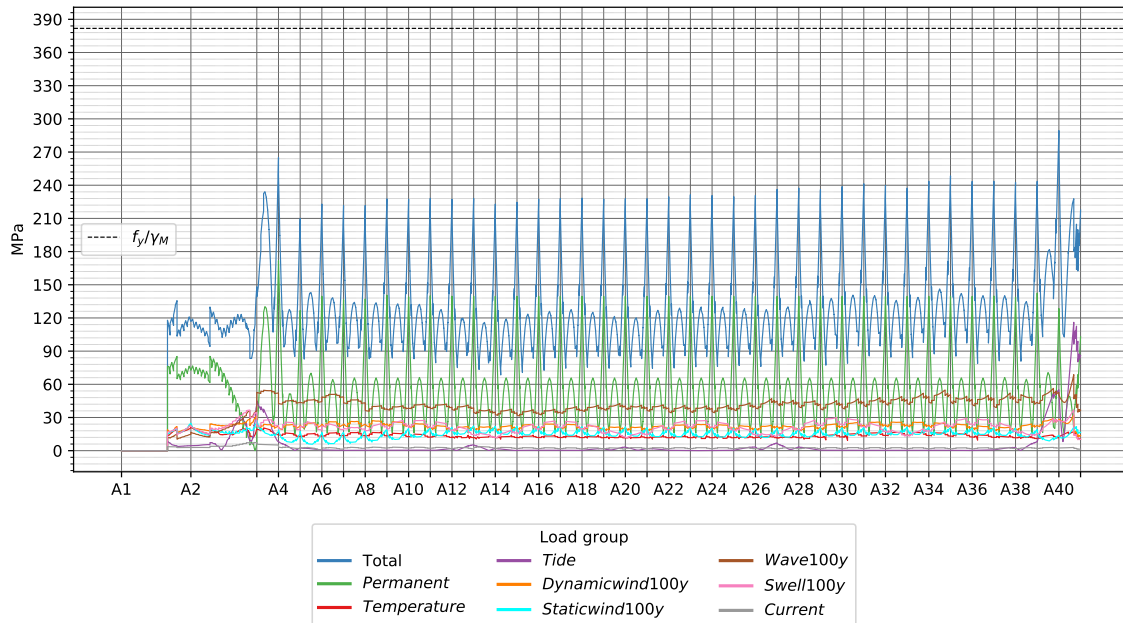
11.13.14 case 5 - Dom. Weak axis moment



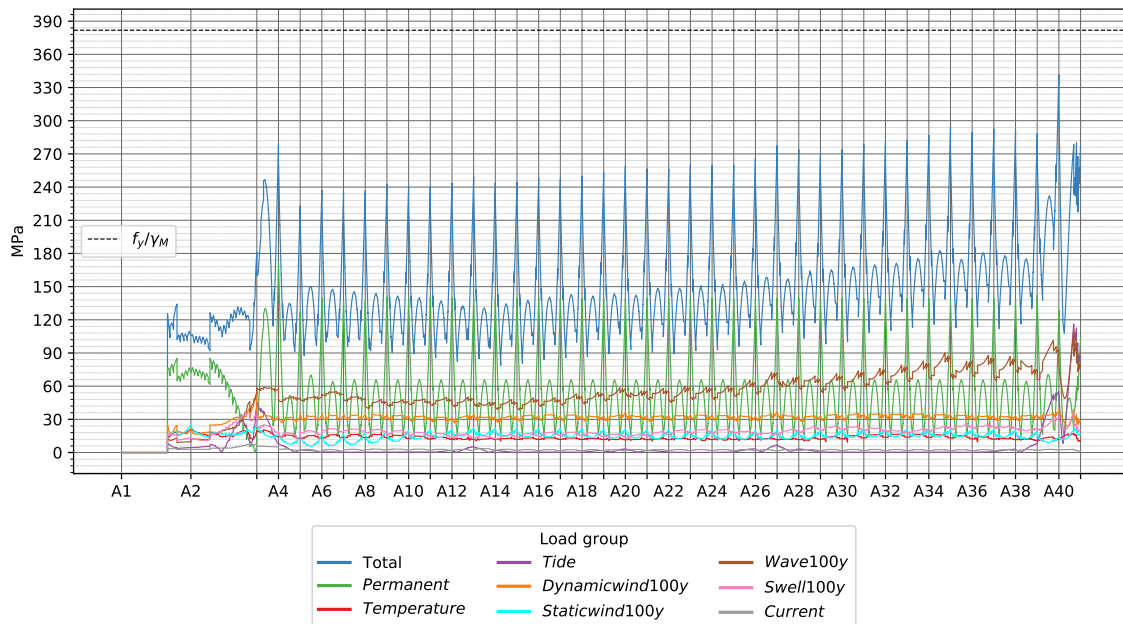
11.13.15 case 5 - Dom. Torsion



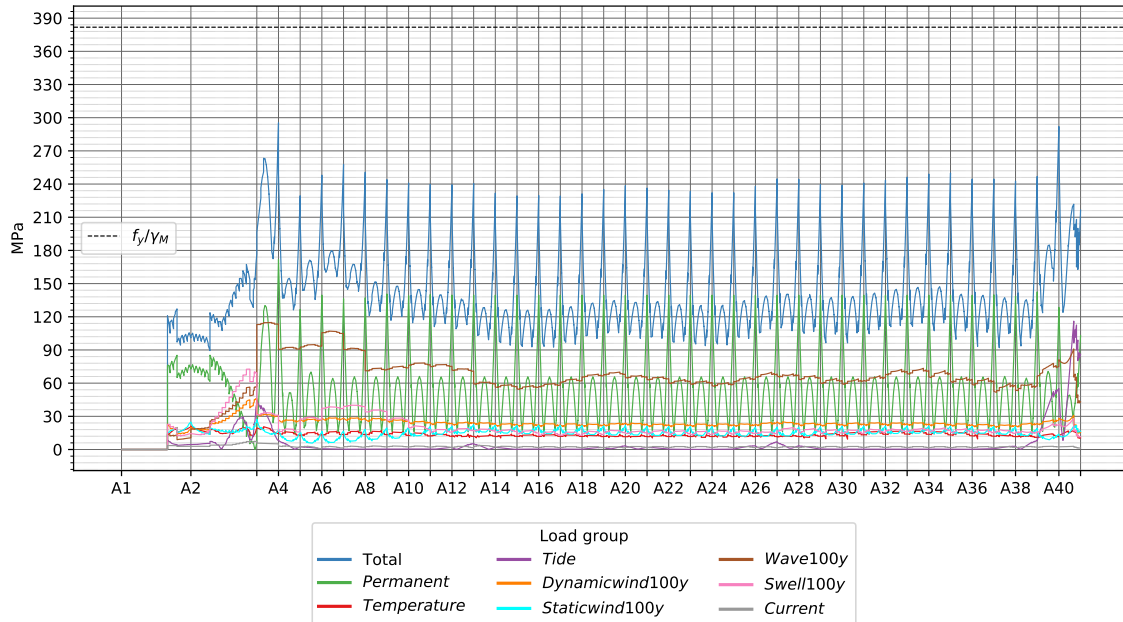
11.13.16 case 6 - Dom. Strong axis moment



11.13.17 case 6 - Dom. Weak axis moment

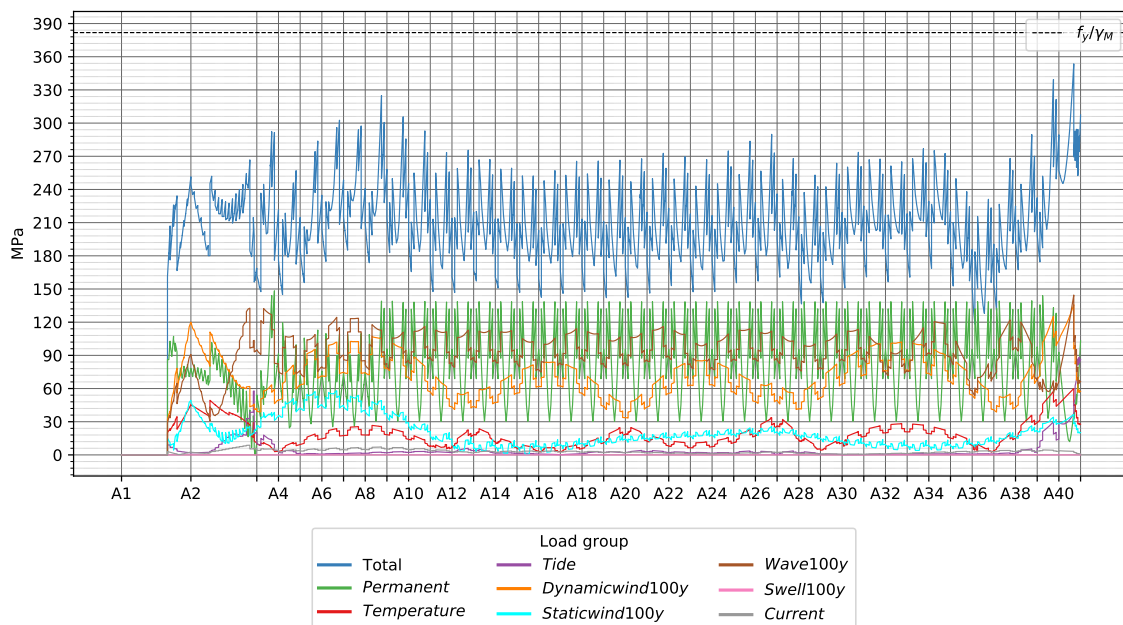


11.13.18 case 6 - Dom. Torsion

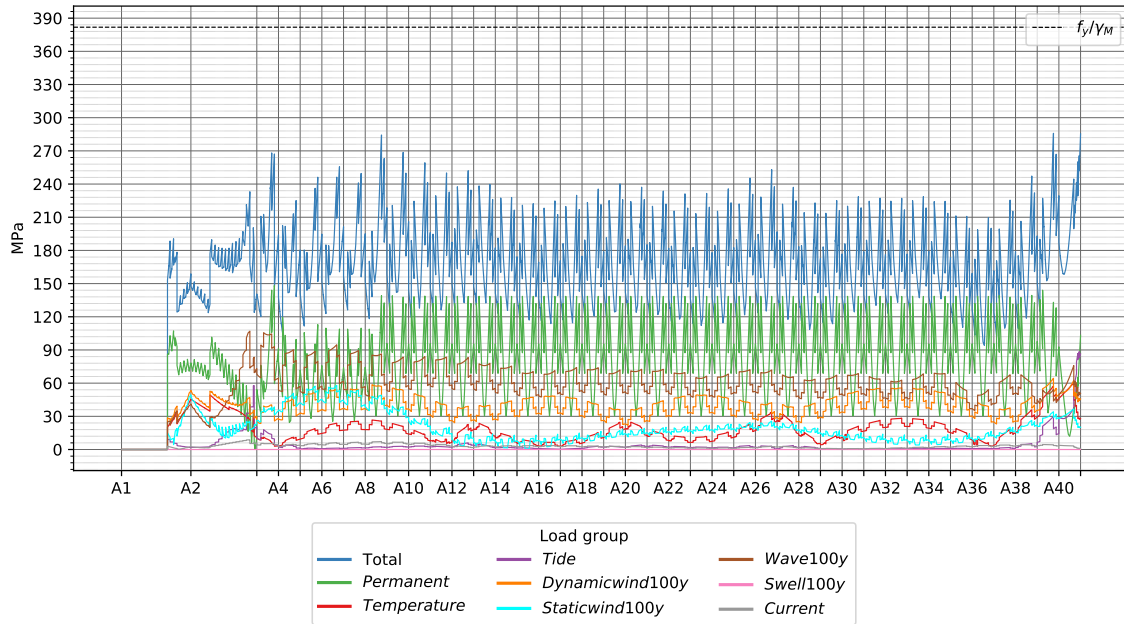


11.14 Stress per load group Pt. C'

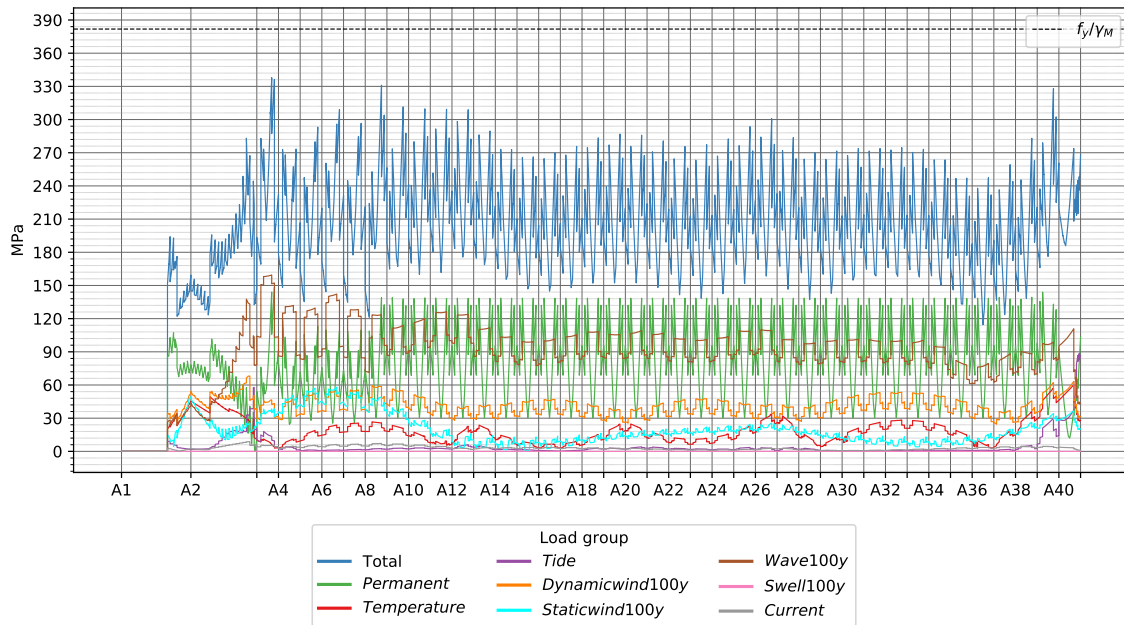
11.14.1 case 1 - Dom. Strong axis moment



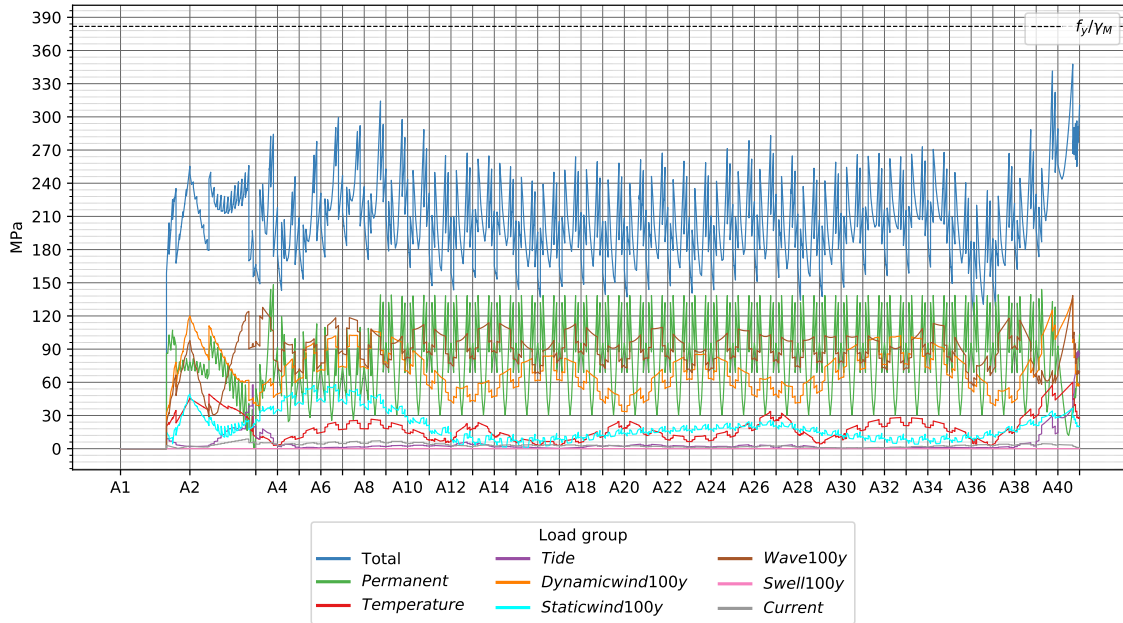
11.14.2 case 1 - Dom. Weak axis moment



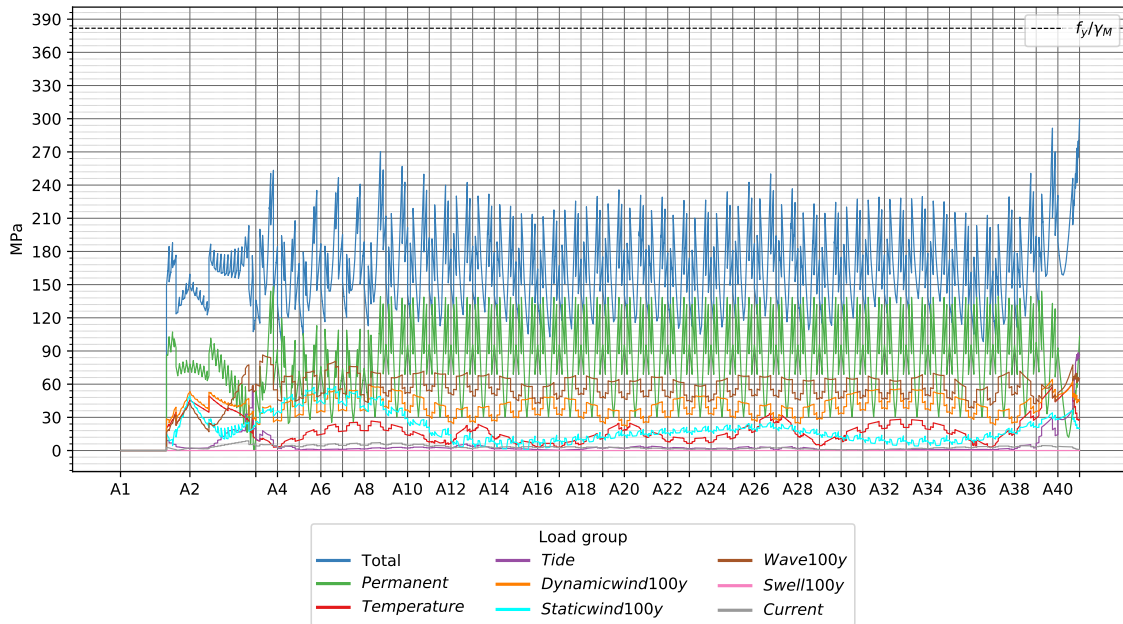
11.14.3 case 1 - Dom. Torsion



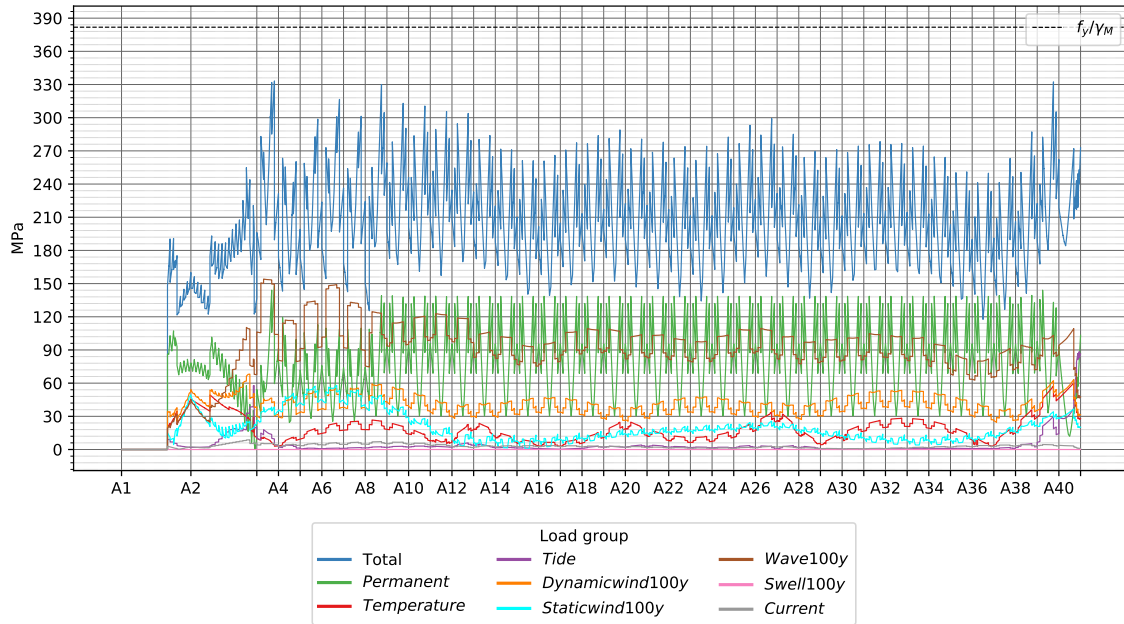
11.14.4 case 2 - Dom. Strong axis moment



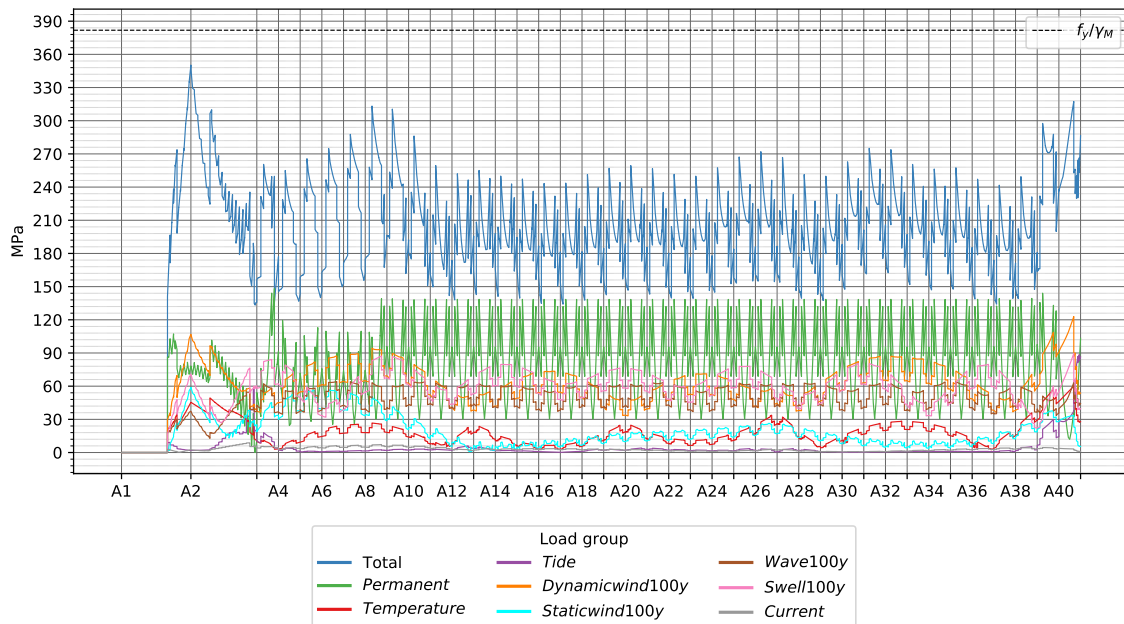
11.14.5 case 2 - Dom. Weak axis moment



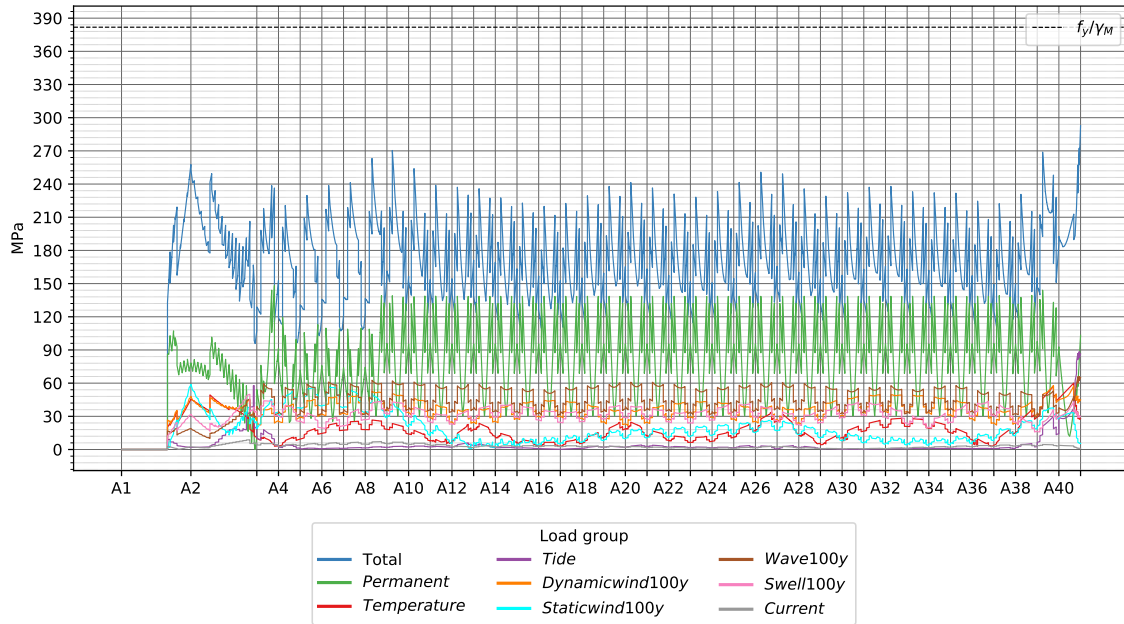
11.14.6 case 2 - Dom. Torsion



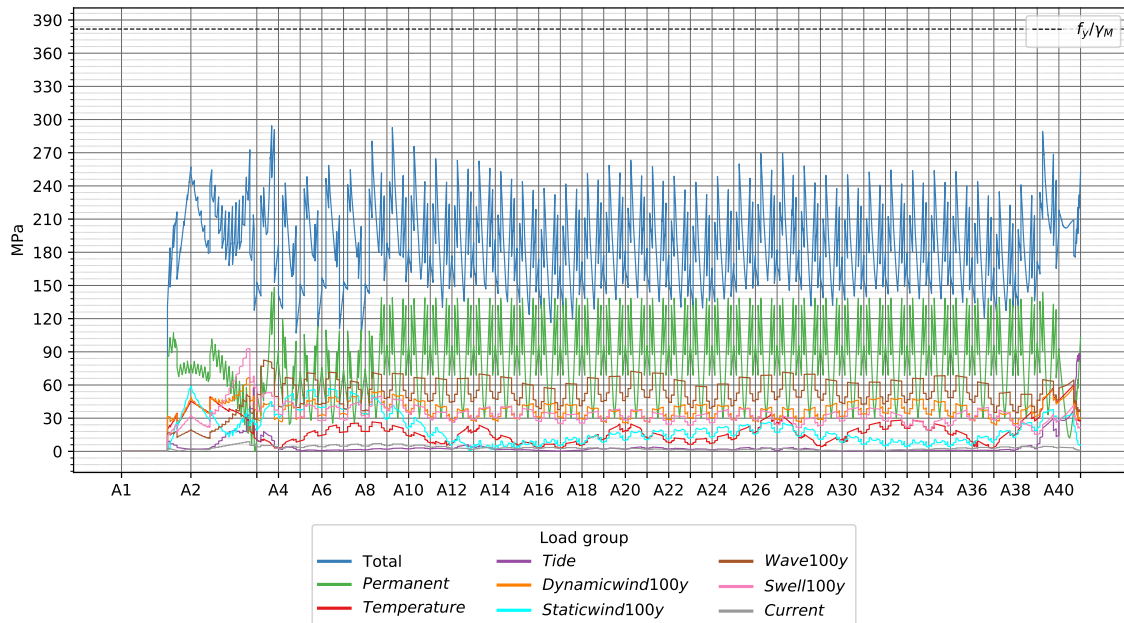
11.14.7 case 3 - Dom. Strong axis moment



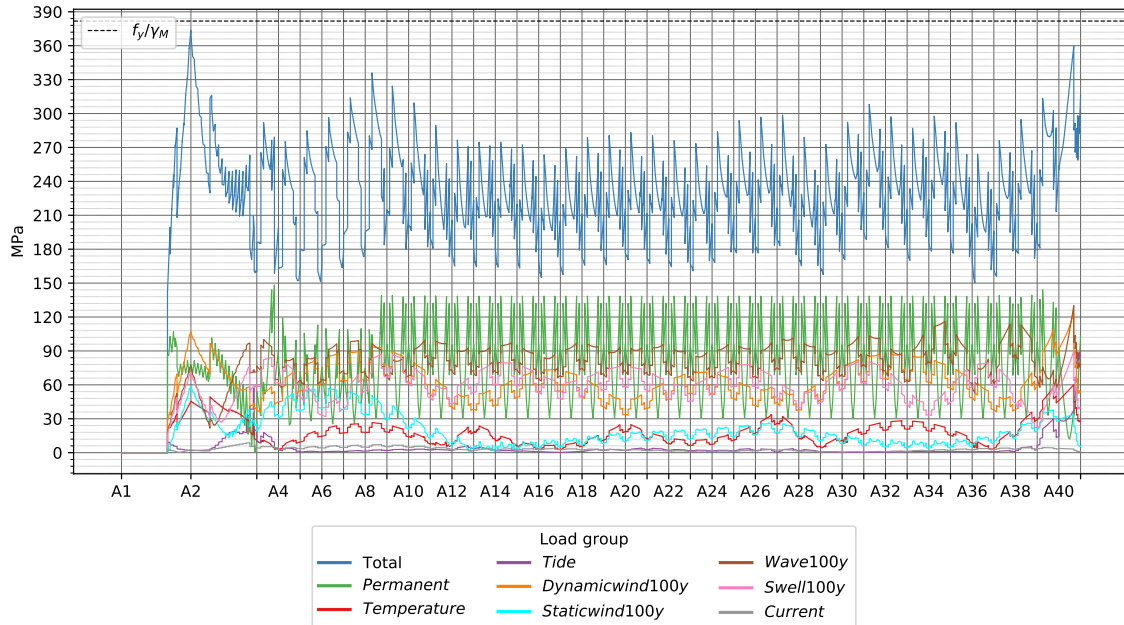
11.14.8 case 3 - Dom. Weak axis moment



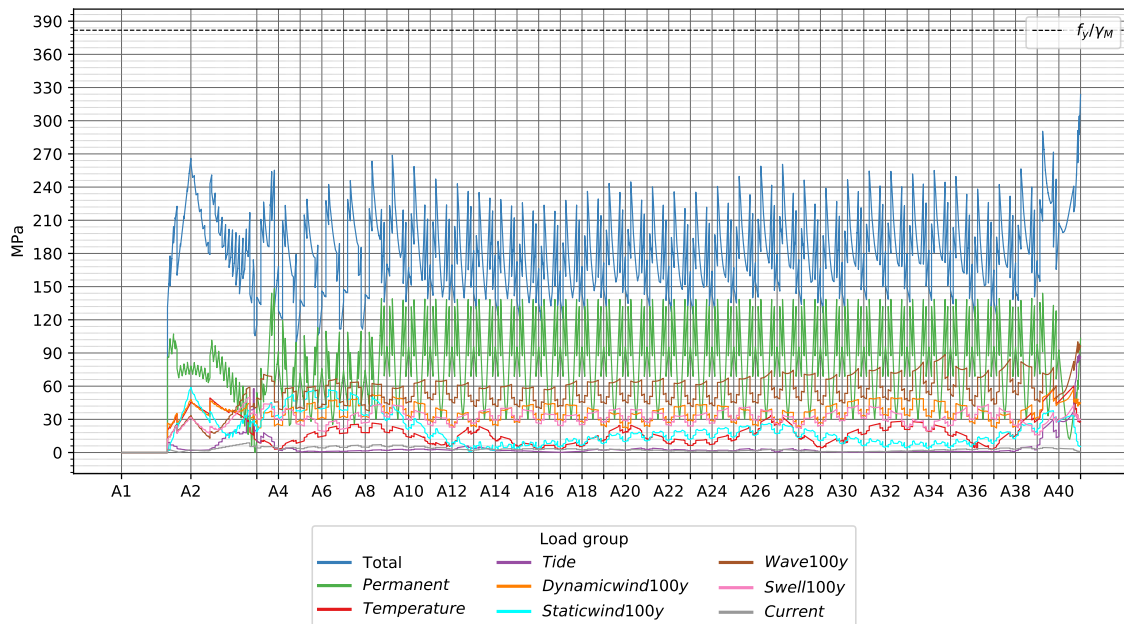
11.14.9 case 3 - Dom. Torsion



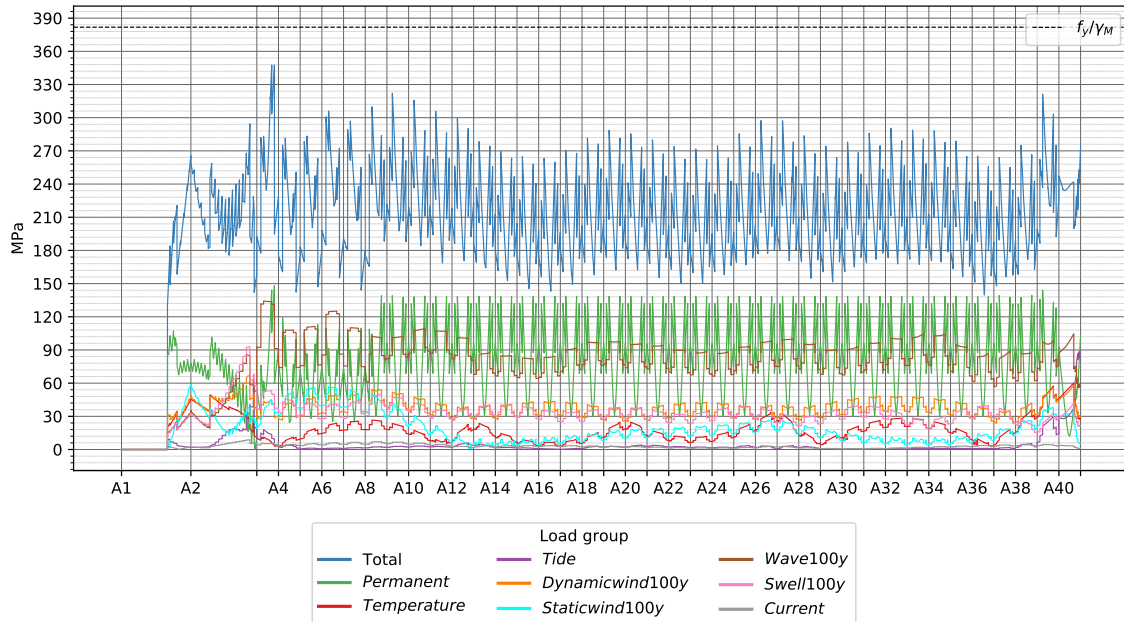
11.14.10 case 4 - Dom. Strong axis moment



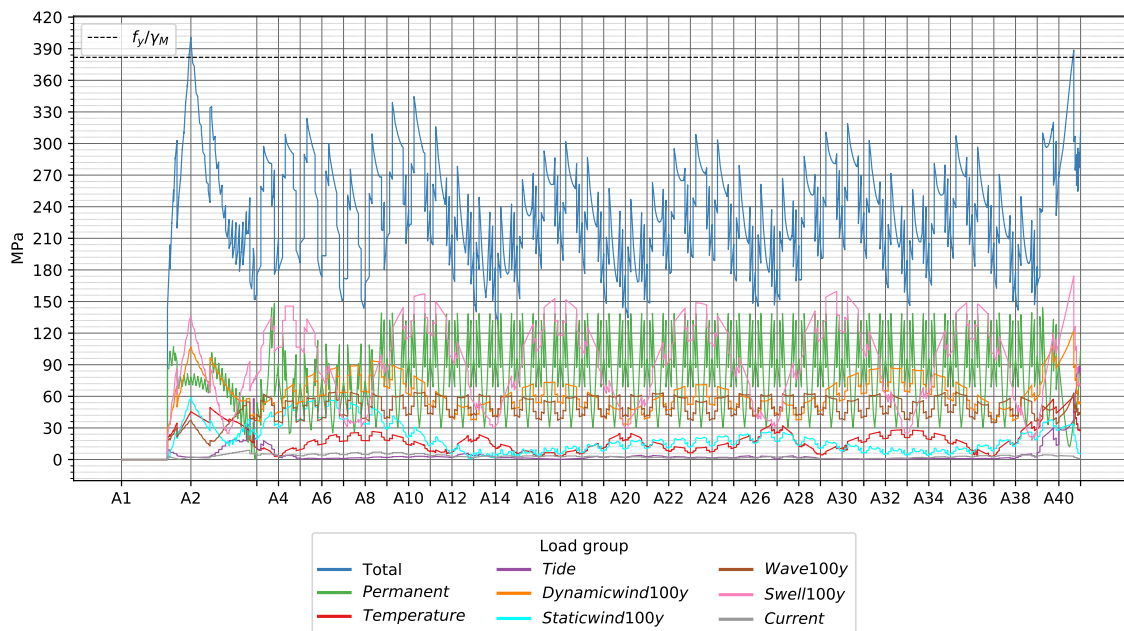
11.14.11 case 4 - Dom. Weak axis moment



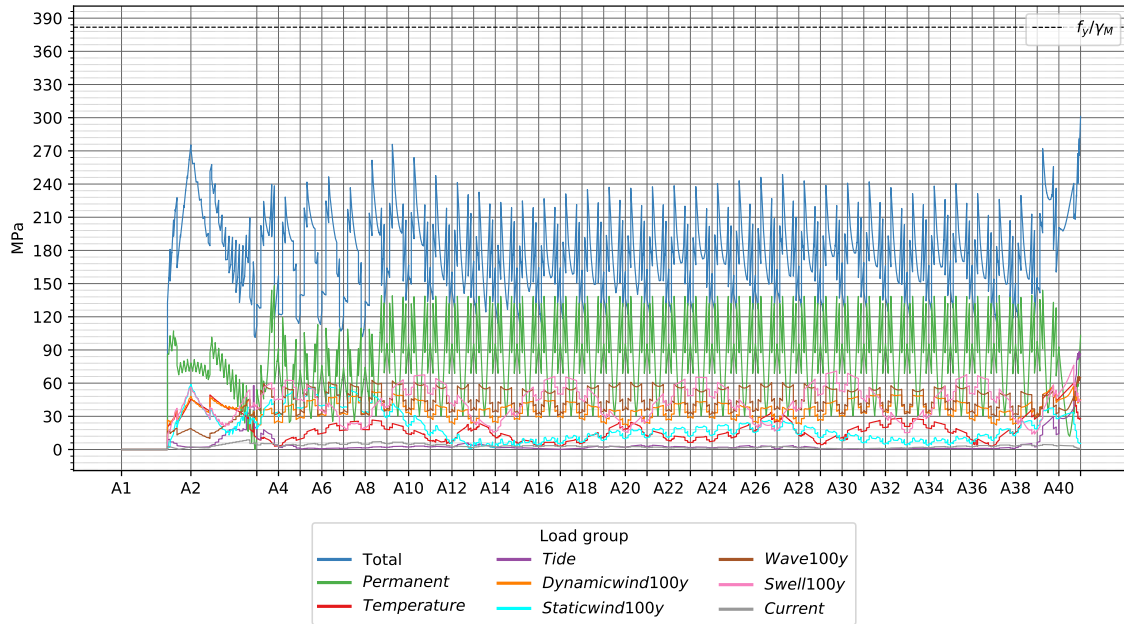
11.14.12 case 4 - Dom. Torsion



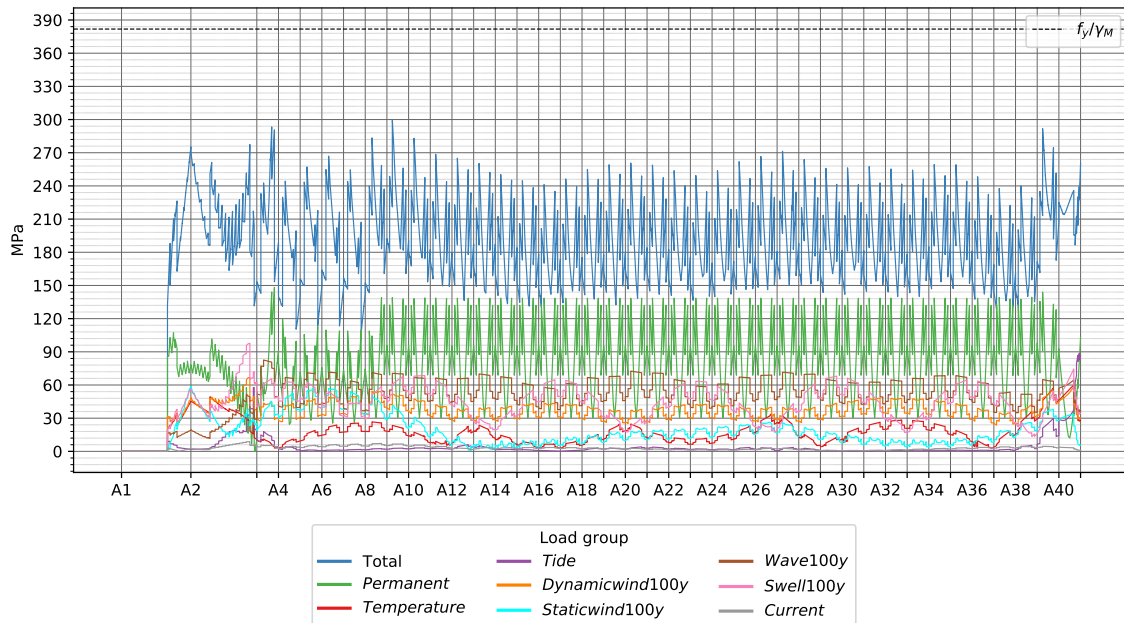
11.14.13 case 5 - Dom. Strong axis moment



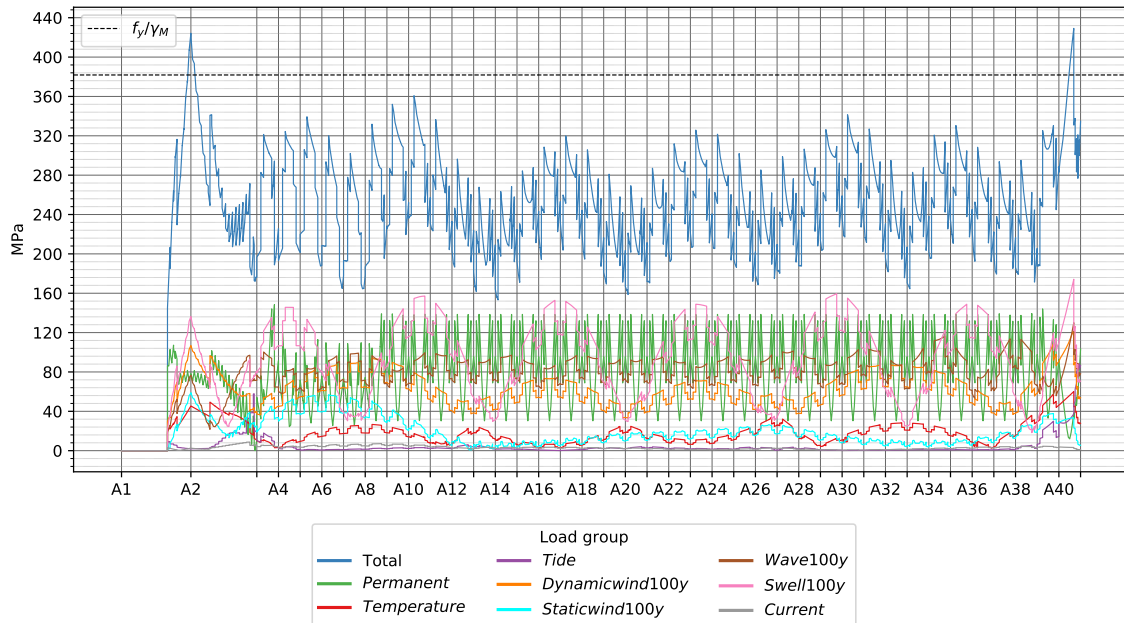
11.14.14 case 5 - Dom. Weak axis moment



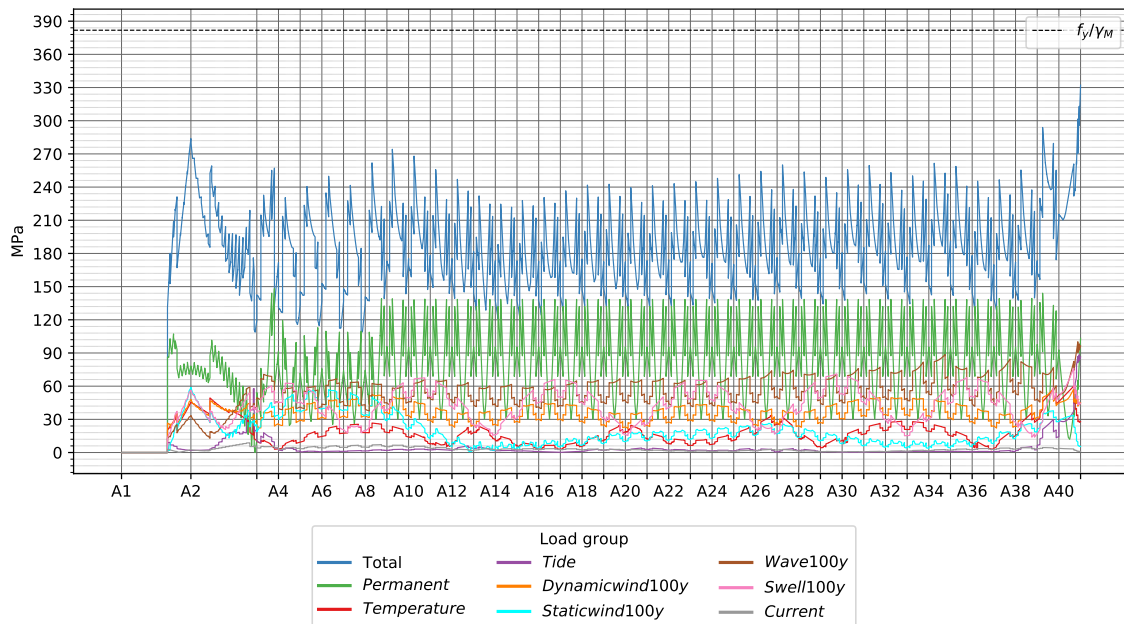
11.14.15 case 5 - Dom. Torsion



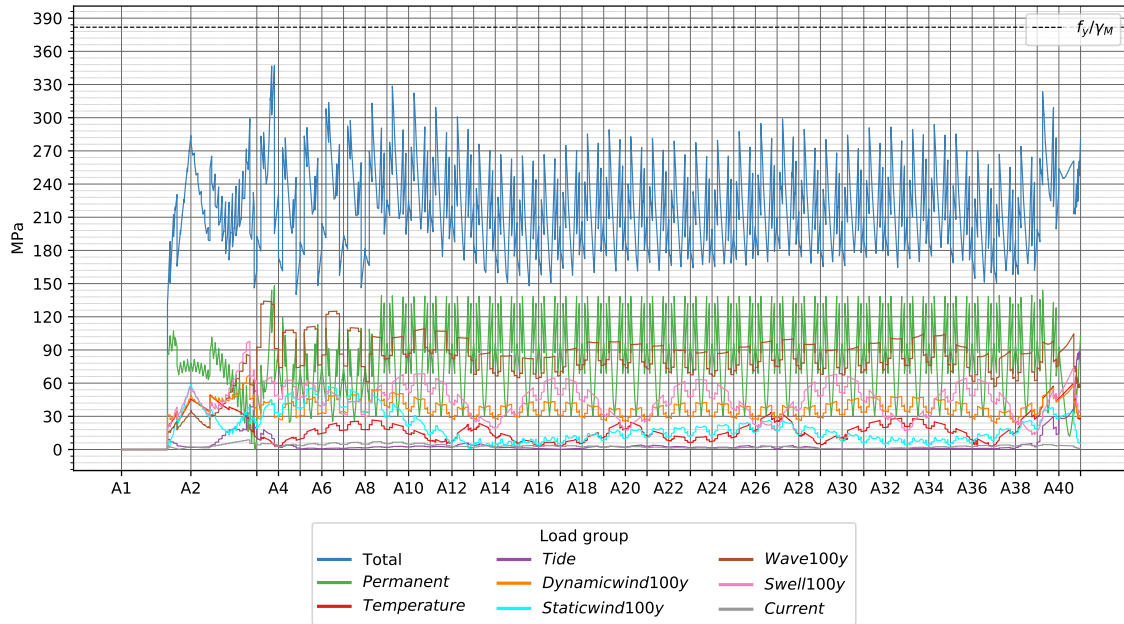
11.14.16 case 6 - Dom. Strong axis moment



11.14.17 case 6 - Dom. Weak axis moment



11.14.18 case 6 - Dom. Torsion



Concept development, floating bridge E39 Bjørnafjorden

Appendix G – Enclosure 4

Load combinations AUR method 100 year

K12_07_PROD_load_combinations_direct

August 2, 2019



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1 Load groups

1.1 Permanent

	Description
run case	
1	LC 1

1.2 Temperature

	Description
run case	
1	Min N
2	Min Qy
3	Min Qz
4	Min Mx
5	Min My
6	Min Mz
7	Max N
8	Max Qy
9	Max Qz
10	Max Mx
11	Max My
12	Max Mz

1.3 Tide

	Description
run case	
1	LC 1
2	LC 2

1.4 Current

	Description
run case	
1	LC 1
2	LC 2
3	LC 3
4	LC 4

1.5 Env. 100 y

	Description
run case	
1	LC 1
2	LC 2
3	LC 3
4	LC 4
5	LC 5
6	LC 6

2 Load combinations

2.1 ULS3

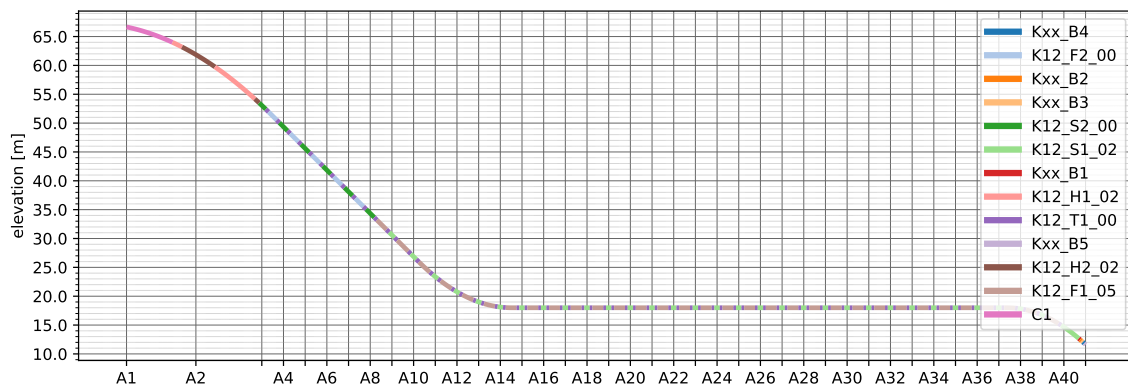
2.1.1 Load group info

load group	load_factor	return_period	system	restype	use_envelope
Permanent	1.20	N/A	rmbridge	static	N/A
Temperature	0.84	N/A	rmbridge	static	True
Tide	1.60	100	orcaflex	static	True
Current	1.60	100	orcaflex	static	True
Env. 100 y	1.60	100	orcaflex	timeseries	False

2.1.2 Combination info

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Permanent	1	1	1	1	1	1
Temperature	Envelope	Envelope	Envelope	Envelope	Envelope	Envelope
Tide	Envelope	Envelope	Envelope	Envelope	Envelope	Envelope
Current	Envelope	Envelope	Envelope	Envelope	Envelope	Envelope
Env. 100 y	1	2	3	4	5	6

3 Section types



4 Stress point description

Stress point	Description
Pt. A	Lower flange west
Pt. B	Upper flange west
Pt. C	Upper flange east
Pt. D	Lower flange east
Pt. A'	Knuckle west
Pt. B'	Upper flange mid
Pt. C'	Knuckle east

5 Stress coefficients - ULS

Section type	Stress point	A	W_strong	W_weak	W_torsion	A_vert	
C1	Pt. A	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. B	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. C	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. D	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. A'	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. B'	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. C'	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
K12_F1_05	Pt. A	1.2699	10.608467	-1.408093	2.252976	-0.122399	
	Pt. B	1.2699	6.275785	2.442868	2.252976	-0.083333	
	Pt. C	1.2699	-6.260940	2.663681	2.252976	0.084034	
	Pt. D	1.2699	-10.566118	-1.408093	2.252976	0.121655	
	Pt. A'	1.2699	6.275785	-4.198973	2.252976	-0.086207	
	Pt. B'	1.2699	46.182116	1.936649	3.003968	-0.813008	
	Pt. C'	1.2699	-6.260940	-4.198973	2.252976	0.087719	
K12_F2_00	Pt. A	1.3310	11.224881	-1.557238	2.628472	-0.142045	
	Pt. B	1.3310	6.638782	2.463707	2.628472	-0.098039	
	Pt. C	1.3310	-6.621120	2.672783	2.628472	0.097330	
	Pt. D	1.3310	-11.174482	-1.557238	2.628472	0.141243	
	Pt. A'	1.3310	6.638782	-5.001431	2.628472	-0.100503	
	Pt. B'	1.3310	48.906659	1.976258	3.003968	-0.826446	
	Pt. C'	1.3310	-6.621120	-5.001431	2.628472	0.101523	
K12_H1_02	Pt. A	1.2970	11.234910	-1.236506	1.930800	-0.102354	
	Pt. B	1.2970	6.634875	2.309572	2.574400	-0.093979	
	Pt. C	1.2970	-6.610869	2.569574	1.930800	0.095663	
	Pt. D	1.2970	-11.148176	-1.236506	1.930800	0.102145	
	Pt. A'	1.2970	6.634875	-5.097787	1.930800	-0.067227	
	Pt. B'	1.2970	49.219901	1.731784	2.574400	-0.699301	
	Pt. C'	1.2970	-6.610869	-5.097787	1.930800	0.077519	
K12_H2_02	Pt. A	1.7969	15.469710	-1.928723	3.218000	-0.170940	
	Pt. B	1.7969	9.134266	2.872534	3.218000	-0.134138	
	Pt. C	1.7969	-9.097883	3.148356	3.218000	0.133869	
	Pt. D	1.7969	-15.365641	-1.928723	3.218000	0.170358	
	Pt. A'	1.7969	9.134266	-11.129969	3.218000	-0.107701	
	Pt. B'	1.7969	67.657707	2.228720	3.218000	-0.884956	
	Pt. C'	1.7969	-9.097883	-11.129969	3.218000	0.109469	
K12_S1_02	Pt. A	1.7790	13.827655	-2.247520	3.759600	-1.926782	
	Pt. B	1.7790	8.178989	2.739420	2.631720	-0.312500	
	Pt. C	1.7790	-8.159645	2.936487	2.631720	0.390625	
	Pt. D	1.7790	-13.772455	-2.247520	3.759600	1.814882	
	Pt. A'	1.7790	8.178989	-9.765086	2.631720	-0.259740	
	Pt. B'	1.7790	60.196292	2.260978	3.007680	-0.884956	
	Pt. C'	1.7790	-8.159645	-9.765086	2.631720	0.268817	
K12_S2_00	Pt. A	1.8829	15.265004	-2.396543	4.135560	-1.633987	
	Pt. B	1.8829	9.023776	2.764809	3.007680	-0.306513	
	Pt. C	1.8829	-8.998449	2.957340	3.007680	0.318725	
	Pt. D	1.8829	-15.192667	-2.396543	4.135560	1.589825	
	Pt. A'	1.8829	9.023776	-11.414044	3.759600	-0.342466	
	Pt. B'	1.8829	66.537411	2.293917	3.007680	-0.892857	

Continued on next page

Section type	Stress point	A	W_strong	W_weak	W_torsion	A_vert
K12_T1_00	Pt. C´	1.8829	-8.998449	-11.414044	3.759600	0.351000
	Pt. A	1.5210	12.346024	-1.871555	3.007840	-0.289855
	Pt. B	1.5210	7.302985	2.627541	2.631860	-0.144092
	Pt. C	1.5210	-7.286791	2.833805	2.631860	0.146843
	Pt. D	1.5210	-12.299813	-1.871555	3.007840	0.287356
	Pt. A´	1.5210	7.302985	-6.757167	2.631860	-0.136293
Kxx_B1	Pt. B´	1.5210	53.723706	2.137067	3.007840	-0.877193
	Pt. C´	1.5210	-7.286791	-6.757167	2.631860	0.139110
	Pt. A	2.0900	17.100000	-2.760000	4.870000	0.320000
	Pt. B	2.0900	11.900000	3.390000	4.870000	0.320000
	Pt. C	2.0900	-11.900000	3.390000	4.870000	0.320000
	Pt. D	2.0900	-17.100000	-2.760000	4.870000	0.320000
Kxx_B2	Pt. A´	2.0900	11.900000	-6.410000	4.870000	0.320000
	Pt. B´	2.0900	1000000.000000	2.760000	4.870000	0.320000
	Pt. C´	2.0900	-11.900000	-6.410000	4.870000	0.320000
	Pt. A	2.2800	18.900000	-3.160000	5.500000	0.320000
	Pt. B	2.2800	14.800000	3.680000	5.500000	0.320000
	Pt. C	2.2800	-14.800000	3.680000	5.500000	0.320000
Kxx_B3	Pt. D	2.2800	-18.900000	-3.160000	5.500000	0.320000
	Pt. A´	2.2800	14.800000	-5.040000	5.500000	0.320000
	Pt. B´	2.2800	1000000.000000	2.950000	5.500000	0.320000
	Pt. C´	2.2800	-14.800000	-5.040000	5.500000	0.320000
	Pt. A	2.8000	24.400000	-4.240000	9.200000	0.400000
	Pt. B	2.8000	19.400000	4.570000	9.200000	0.400000
Kxx_B4	Pt. C	2.8000	-19.400000	4.570000	9.200000	0.400000
	Pt. D	2.8000	-24.400000	-4.240000	9.200000	0.400000
	Pt. A´	2.8000	19.400000	-4.240000	9.200000	0.400000
	Pt. B´	2.8000	1000000.000000	3.690000	9.200000	0.400000
	Pt. C´	2.8000	-19.400000	-4.240000	9.200000	0.400000
	Pt. A	3.3400	28.200000	-5.240000	9.900000	0.480000
Kxx_B5	Pt. B	3.3400	24.800000	5.590000	9.900000	0.480000
	Pt. C	3.3400	-24.800000	5.590000	9.900000	0.480000
	Pt. D	3.3400	-28.200000	-5.240000	9.900000	0.480000
	Pt. A´	3.3400	24.800000	-4.510000	9.900000	0.480000
	Pt. B´	3.3400	1000000.000000	4.550000	9.900000	0.480000
	Pt. C´	3.3400	-24.800000	-4.510000	9.900000	0.480000
Kxx_B5	Pt. A	3.4800	35.600000	-5.580000	10.400000	0.480000
	Pt. B	3.4800	25.700000	5.930000	10.400000	0.480000
	Pt. C	3.4800	-25.700000	5.930000	10.400000	0.480000
	Pt. D	3.4800	-35.600000	-5.980000	10.400000	0.480000
	Pt. A´	3.4800	25.700000	-4.800000	10.400000	0.480000
	Pt. B´	3.4800	1000000.000000	4.820000	10.400000	0.480000
	Pt. C´	3.4800	-25.700000	-4.820000	10.400000	0.480000

6 Capacity check parameters - Method 1

	K12_F1_05	K12_F2_00	K12_H1_02	K12_H2_02	K12_S1_02	K12_S2_00	K12_T1_00
Aeff_c	1.004000	1.049000	1.032000	1.521000	1.451000	1.552000	1.240000
Aeff_t	1.269900	1.331000	1.297000	1.796900	1.779000	1.882900	1.521000
ew_N_c	-0.064000	-0.071000	-0.057000	-0.005000	0.020000	0.030000	-0.008000
ew_N_t	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
es_N_c	0.010000	-0.016000	-0.004000	0.000000	0.018000	0.007000	0.012000
es_N_t	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
W_pos_weak	1.077681	1.185575	0.940834	1.653827	1.903196	2.054337	1.540270
W_neg_weak	-1.621417	-1.653886	-1.460815	-1.916000	-1.872232	-1.905601	-1.771596
W_pos_strong	5.305701	5.584846	5.676491	8.101229	7.088986	7.878492	6.283661
W_neg_strong	-5.305701	-5.584846	-5.676491	-8.101229	-7.088986	-7.878492	-6.283661

7 Capacity check parameters - Method 2

		K12_F1_05	K12_F2_00	K12_H1_02	K12_H2_02	K12_S1_02	K12_S2_00	K12_T1_00
Pt. A	Aeff_c	1.0040	1.049	1.032	1.5210	1.451	1.5520	
	Aeff_t	1.2699	1.331	1.297	1.7969	1.779	1.8829	
	ew_N_c	-0.0640	-0.071	-0.057	-0.0050	0.020	0.0300	
	ew_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000	
	es_N_c	0.0100	-0.016	-0.004	0.0000	0.018	0.0070	
	es_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000	
	W_pos_weak	1.0780	1.186	0.941	1.6540	1.903	2.0540	
	W_neg_weak	1.3900	1.530	1.220	1.9000	2.193	2.3360	
	W_pos_strong	-10.5080	-11.114	-11.119	-15.2950	-13.706	-15.0860	
Pt. B	W_neg_strong	-8.6320	-9.080	-9.271	-13.3380	-11.596	-12.9240	
	Aeff_c	1.0040	1.049	1.032	1.5210	1.451	1.5520	
	Aeff_t	1.2699	1.331	1.297	1.7969	1.779	1.8829	
	ew_N_c	-0.0640	-0.071	-0.057	-0.0050	0.020	0.0300	
	ew_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000	
	es_N_c	0.0100	-0.016	-0.004	0.0000	0.018	0.0070	
	es_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000	
	W_pos_weak	-2.4270	-2.446	-2.257	-2.8260	-2.719	-2.7400	
	W_neg_weak	-2.0000	-2.020	-1.870	-2.3900	-2.231	-2.2620	
Pt. C	W_pos_strong	-5.9590	-6.293	-6.320	-8.7840	-7.826	-8.6350	
	W_neg_strong	-5.3060	-5.585	-5.676	-8.1010	-7.089	-7.8780	
	Aeff_c	1.0040	1.049	1.032	1.5210	1.451	1.5520	
	Aeff_t	1.2699	1.331	1.297	1.7969	1.779	1.8829	
	ew_N_c	-0.0640	-0.071	-0.057	-0.0050	0.020	0.0300	
	ew_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000	
	es_N_c	0.0100	-0.016	-0.004	0.0000	0.018	0.0070	
	es_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000	
	W_pos_weak	-2.6930	-2.697	-2.563	-3.1220	-2.935	-2.9480	
Pt. D	W_neg_weak	-2.1600	-2.170	-2.050	-2.6000	-2.376	-2.4050	
	W_pos_strong	5.3060	5.585	5.676	8.1010	7.089	7.8780	
	W_neg_strong	5.9590	6.293	6.320	8.7840	7.826	8.6350	
	Aeff_c	1.0040	1.049	1.032	1.5210	1.451	1.5520	
	Aeff_t	1.2699	1.331	1.297	1.7969	1.779	1.8829	
	ew_N_c	-0.0640	-0.071	-0.057	-0.0050	0.020	0.0300	
	ew_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000	

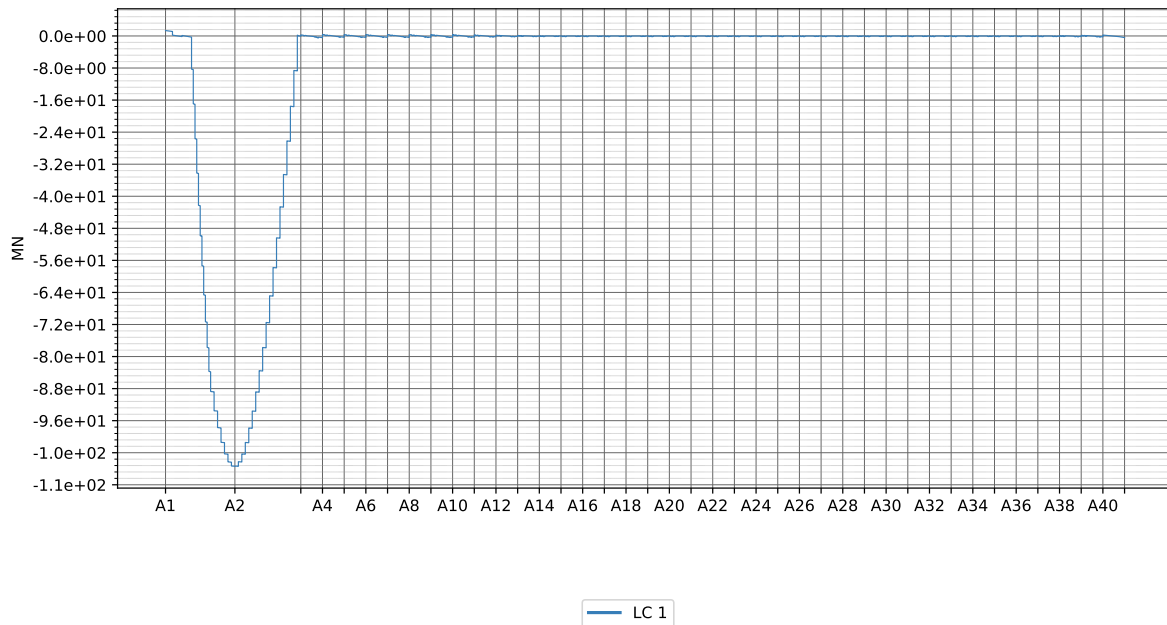
Continued on next

	K12_F1_05	K12_F2_00	K12_H1_02	K12_H2_02	K12_S1_02	K12_S2_00	K12_T
	es_N_c	0.0100	-0.016	-0.004	0.0000	0.018	0.0070
	es_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000
	W_pos_weak	1.0780	1.186	0.941	1.6540	1.903	2.0540
	W_neg_weak	1.3900	1.530	1.220	1.9000	2.193	2.3360
	W_pos_strong	8.6320	9.080	9.271	13.3380	11.596	12.9240
	W_neg_strong	10.5080	11.114	11.119	15.2950	13.706	15.0860
Pt. A'	Aeff_c	1.0040	1.049	1.032	1.5210	1.451	1.5520
	Aeff_t	1.2699	1.331	1.297	1.7969	1.779	1.8829
	ew_N_c	-0.0640	-0.071	-0.057	-0.0050	0.020	0.0300
	ew_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000
	es_N_c	0.0100	-0.016	-0.004	0.0000	0.018	0.0070
	es_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000
	W_pos_weak	2.7490	3.160	3.064	7.3140	6.670	7.7800
	W_neg_weak	4.9100	5.910	6.300	15.1700	13.179	16.1030
	W_pos_strong	-5.9590	-6.293	-6.320	-8.7840	-7.826	-8.6350
	W_neg_strong	-5.3060	-5.585	-5.676	-8.1010	-7.089	-7.8780
Pt. B'	Aeff_c	1.0040	1.049	1.032	1.5210	1.451	1.5520
	Aeff_t	1.2699	1.331	1.297	1.7969	1.779	1.8829
	ew_N_c	-0.0640	-0.071	-0.057	-0.0050	0.020	0.0300
	ew_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000
	es_N_c	0.0100	-0.016	-0.004	0.0000	0.018	0.0070
	es_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000
	W_pos_weak	-1.8520	-1.596	-1.639	-2.1740	-2.208	-2.2400
	W_neg_weak	-1.6200	-1.650	-1.460	-1.9200	-1.872	-1.9060
	W_pos_strong	-71.1490	-76.604	-71.902	-87.5220	-84.984	-90.2710
	W_neg_strong	-28.7950	-28.795	-31.414	-47.5770	-39.927	-45.1170
Pt. C'	Aeff_c	1.0040	1.049	1.032	1.5210	1.451	1.5520
	Aeff_t	1.2699	1.331	1.297	1.7969	1.779	1.8829
	ew_N_c	-0.0640	-0.071	-0.057	-0.0050	0.020	0.0300
	ew_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000
	es_N_c	0.0100	-0.016	-0.004	0.0000	0.018	0.0070
	es_N_t	0.0000	0.000	0.000	0.0000	0.000	0.0000
	W_pos_weak	2.7490	3.160	3.064	7.3140	6.670	7.7800
	W_neg_weak	4.9100	5.910	6.300	15.1700	13.179	16.1030
	W_pos_strong	5.3060	5.585	5.676	8.1010	7.089	7.8780
	W_neg_strong	5.9590	6.293	6.320	8.7840	7.826	8.6350

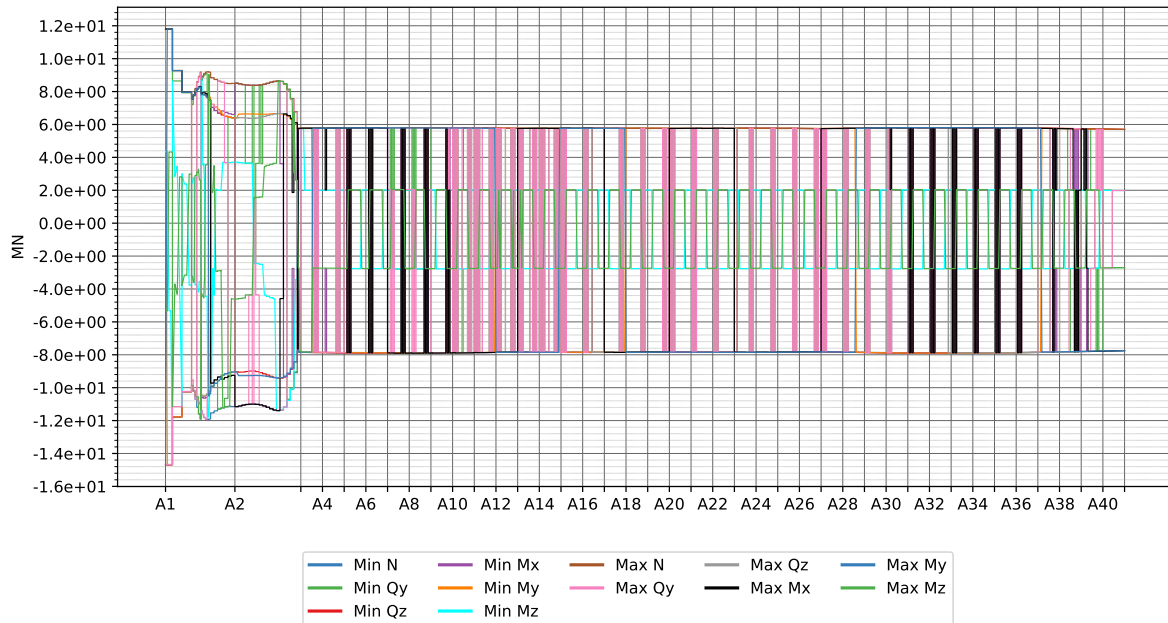
8 Results per load group (characteristic values)

8.1 Axial force

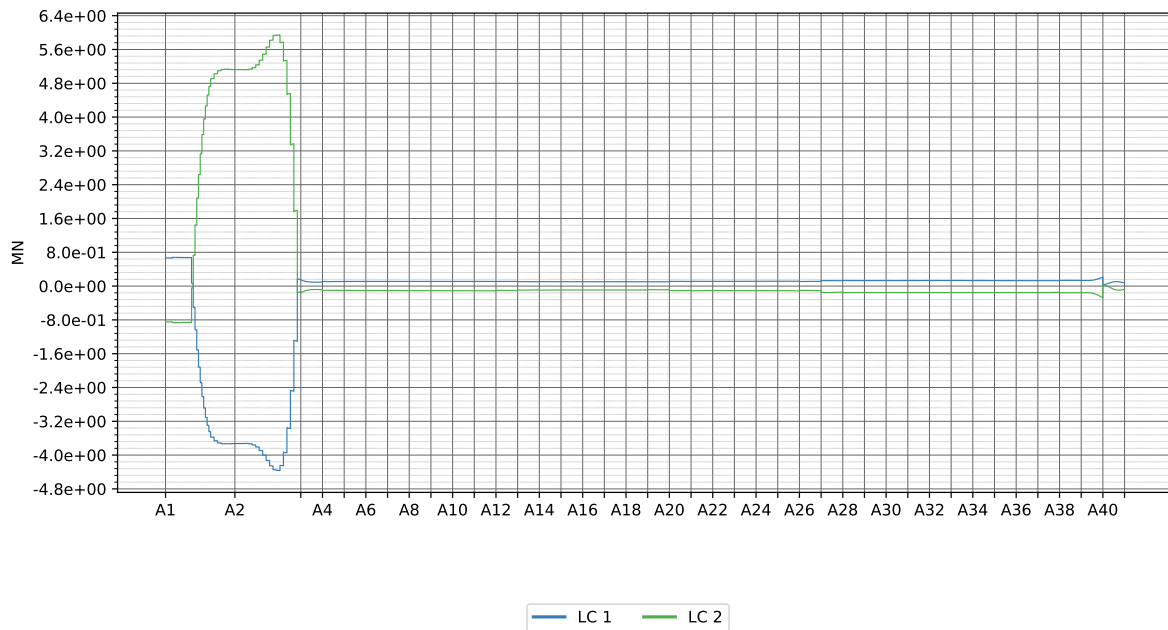
8.1.1 Permanent



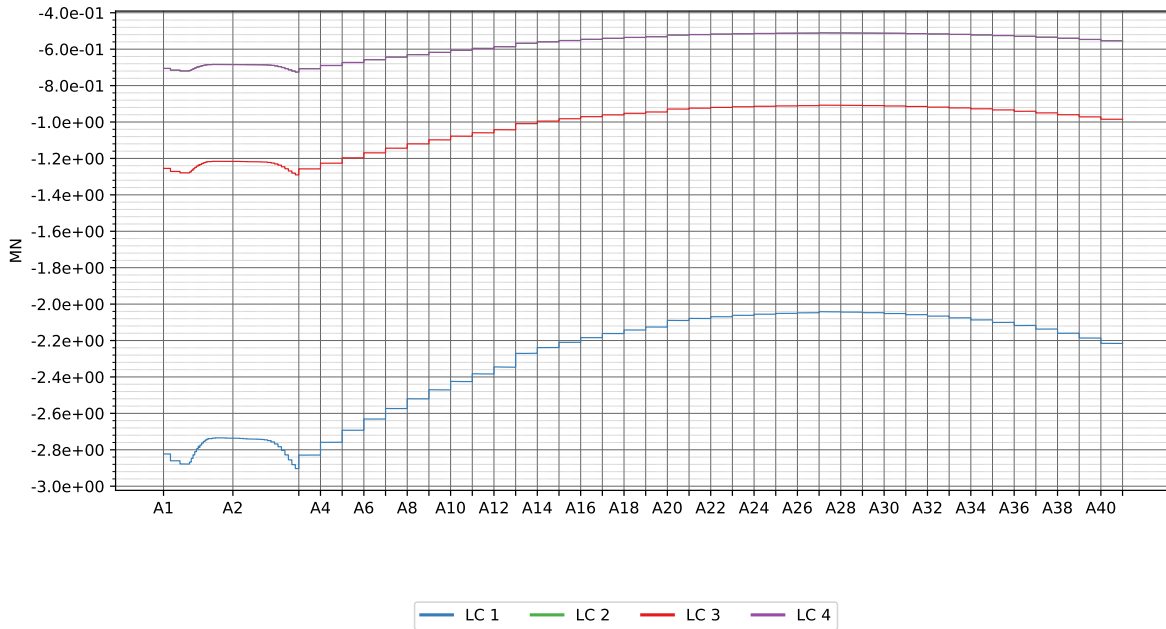
8.1.2 Temperature



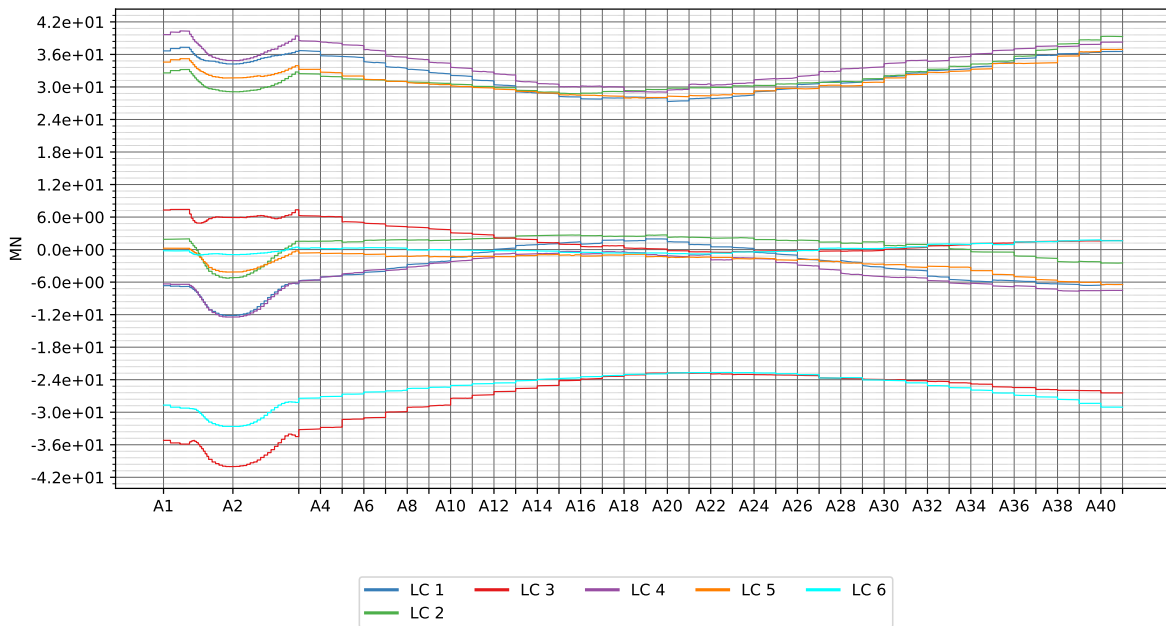
8.1.3 Tide



8.1.4 Current

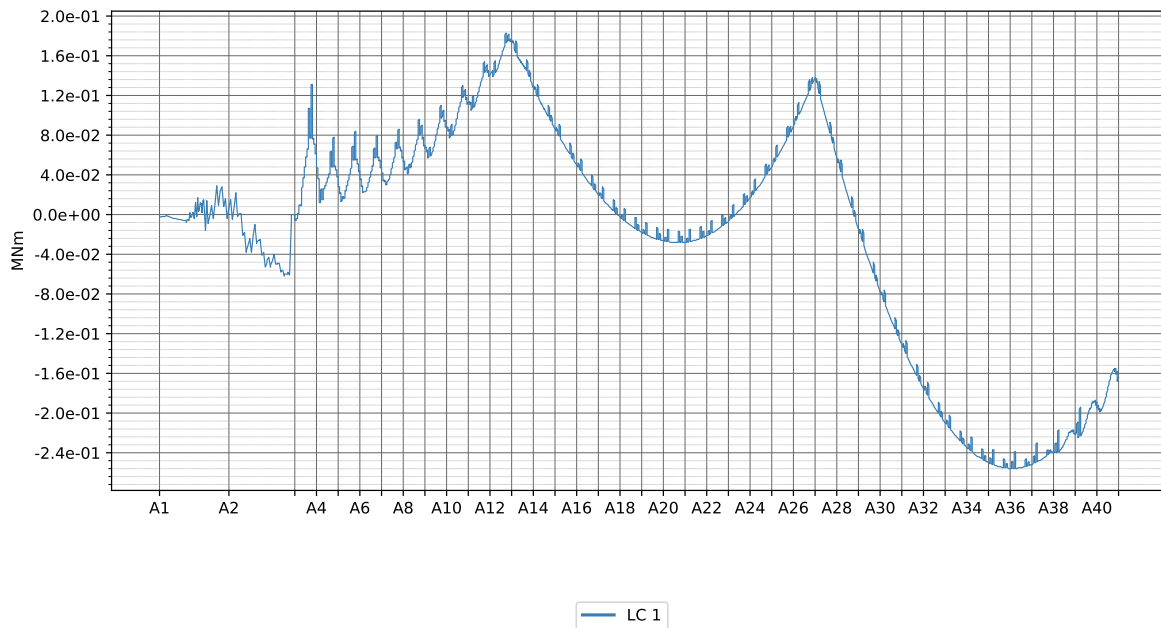


8.1.5 Env. 100 y

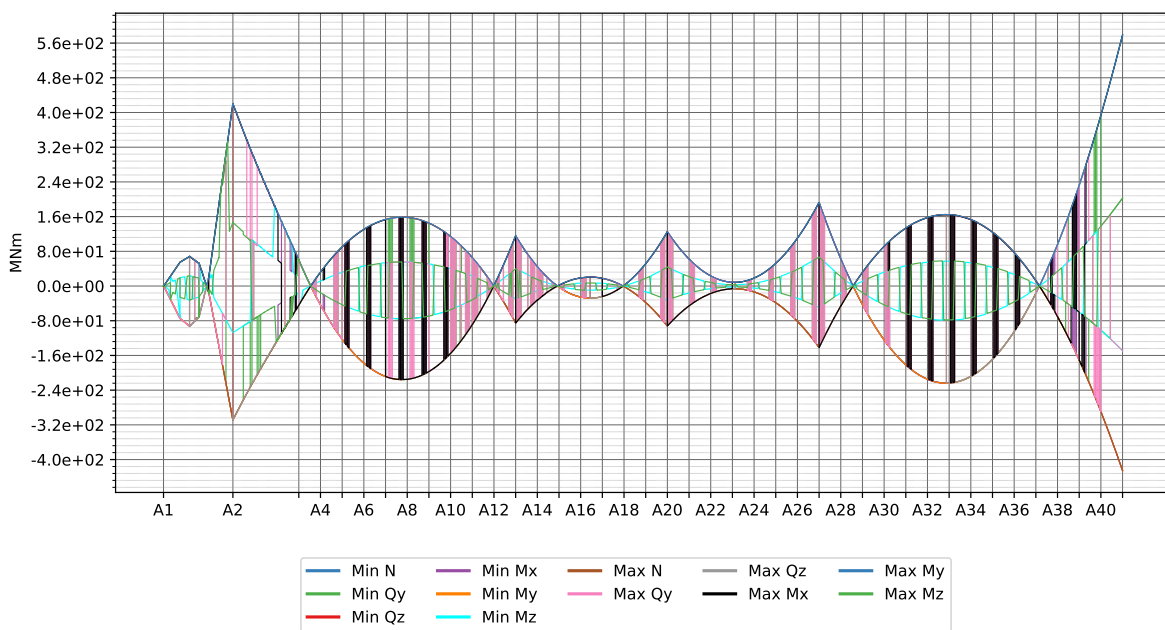


8.2 Bending moment about strong axis

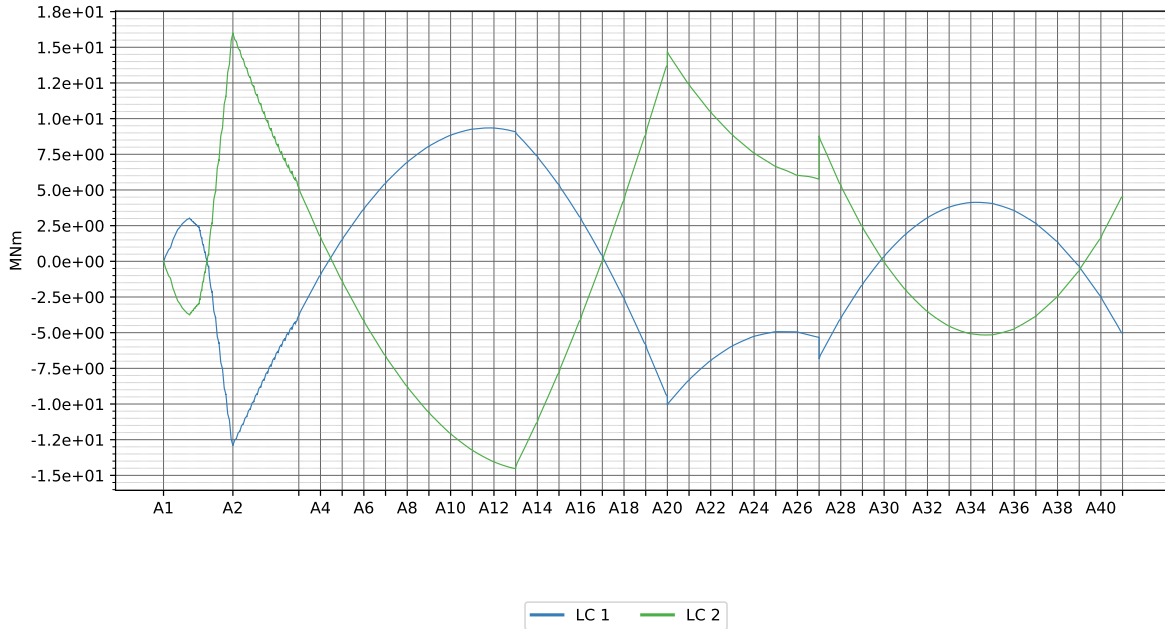
8.2.1 Permanent



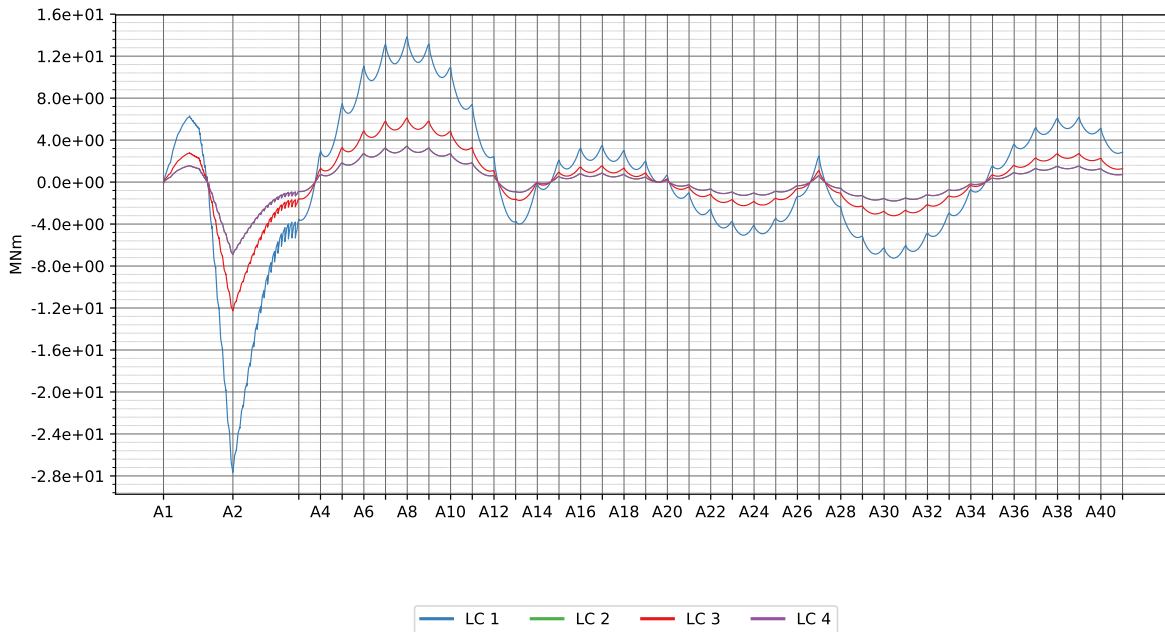
8.2.2 Temperature



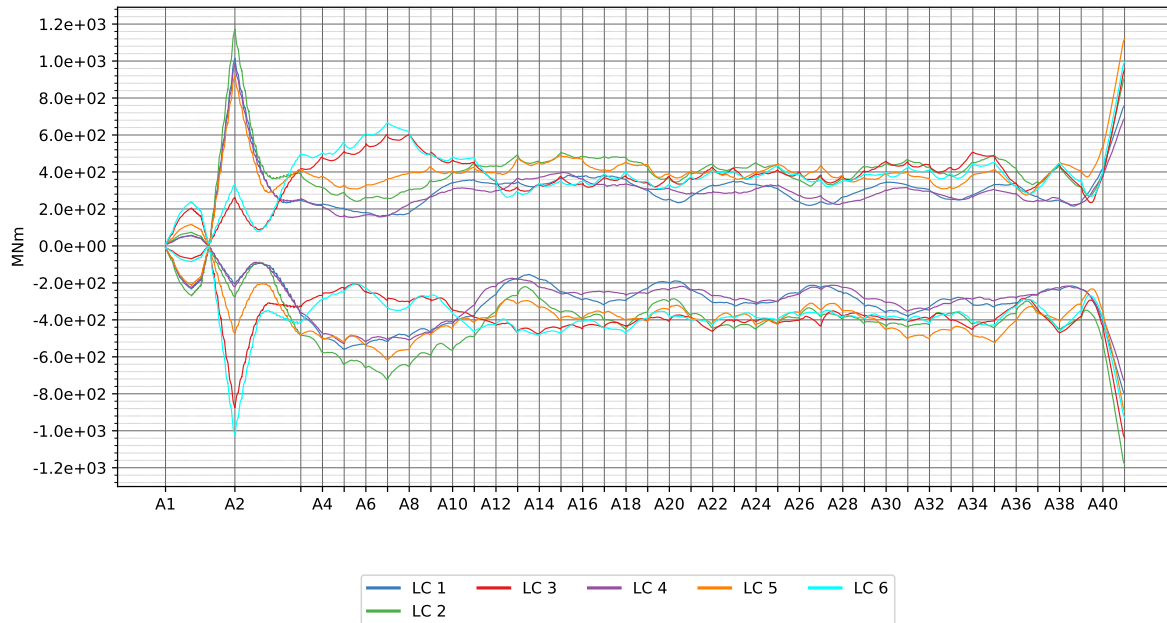
8.2.3 Tide



8.2.4 Current

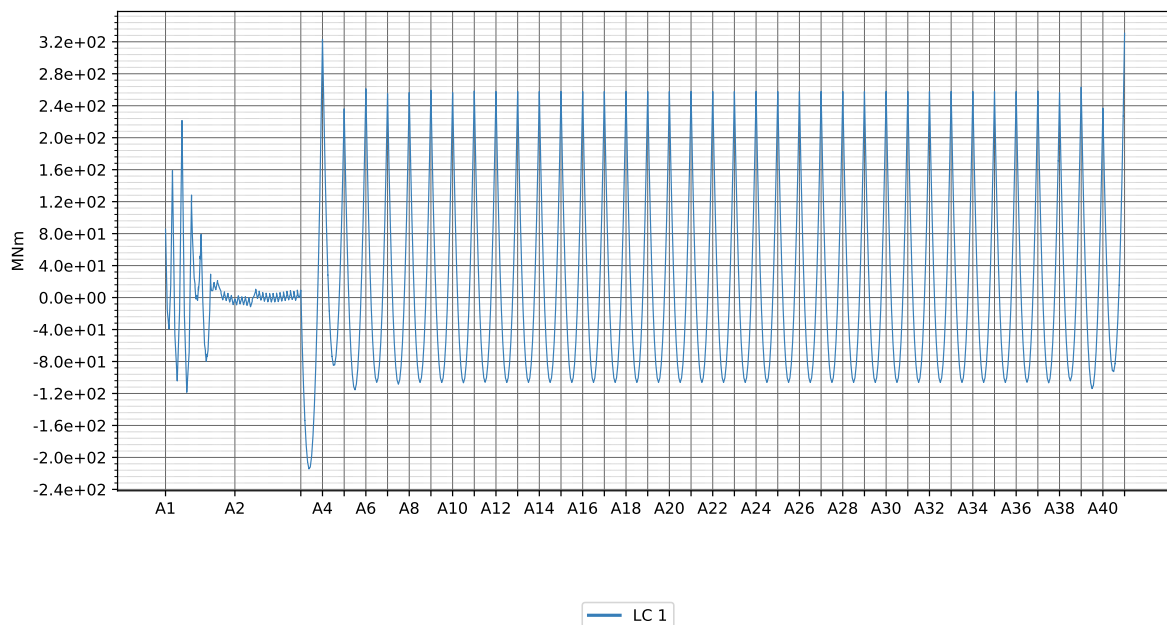


8.2.5 Env. 100 y

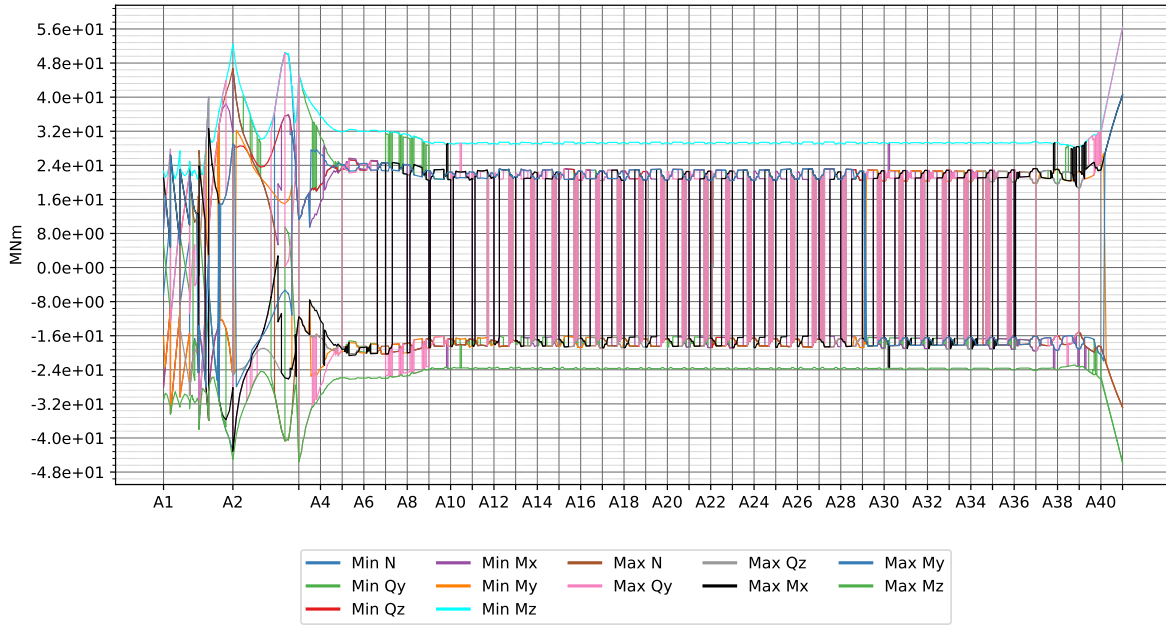


8.3 Bending moment about weak axis

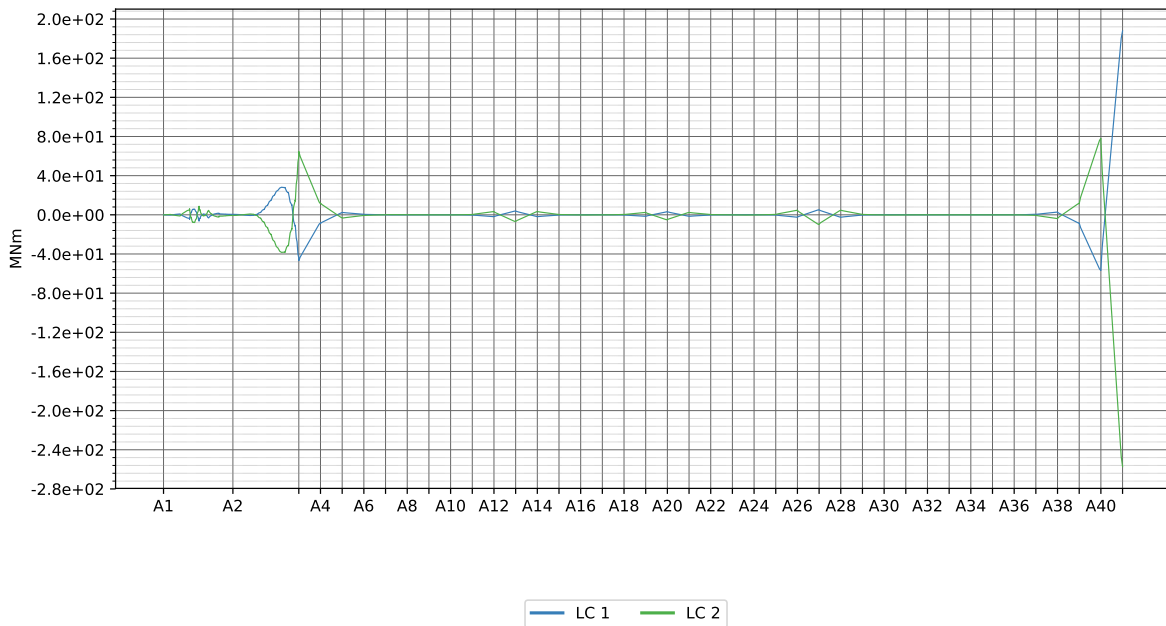
8.3.1 Permanent



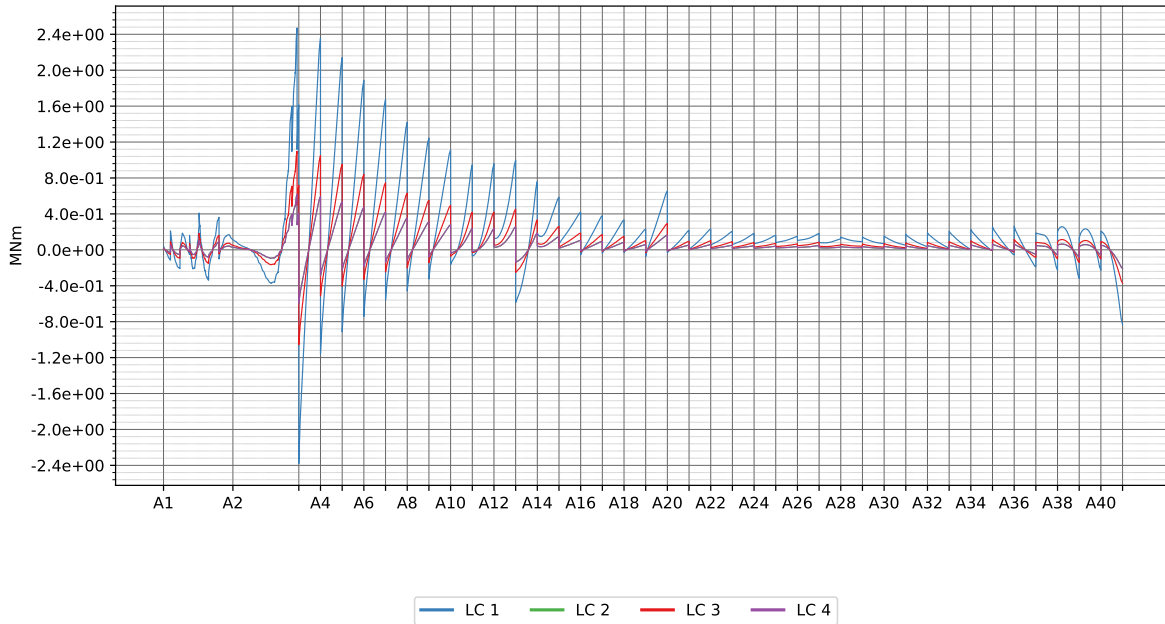
8.3.2 Temperature



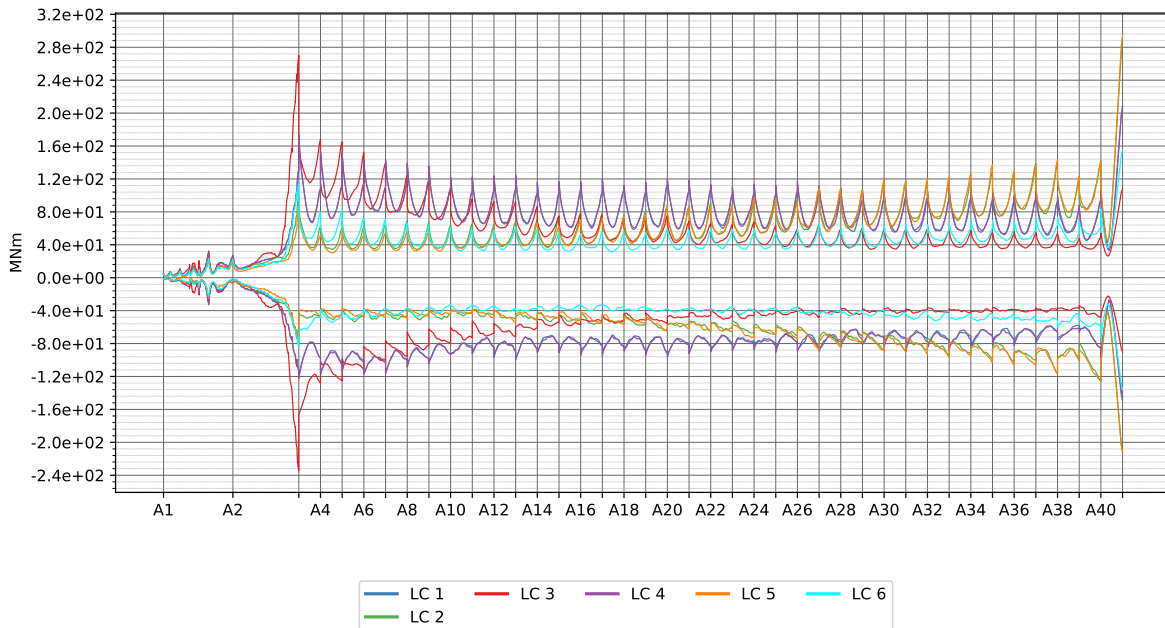
8.3.3 Tide



8.3.4 Current

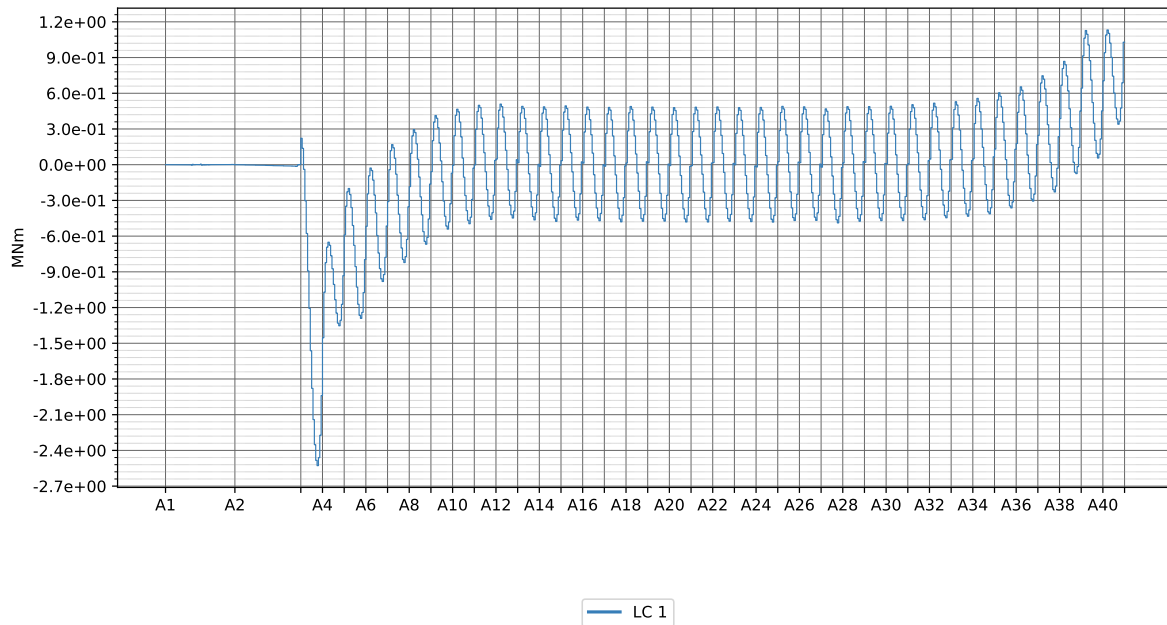


8.3.5 Env. 100 y

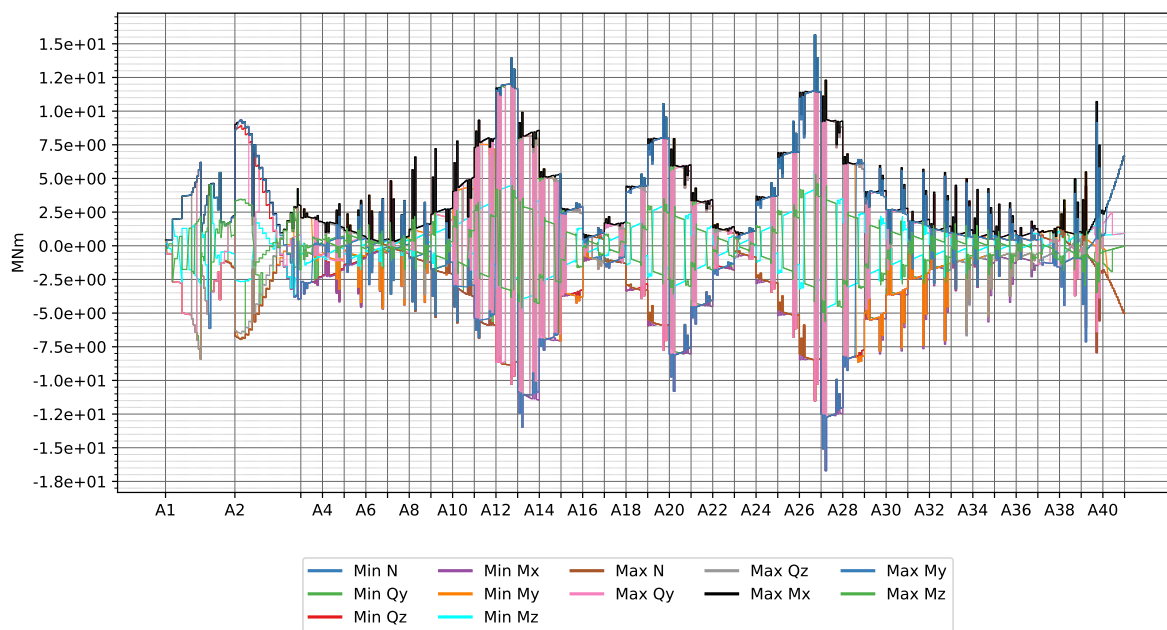


8.4 Torsional moment

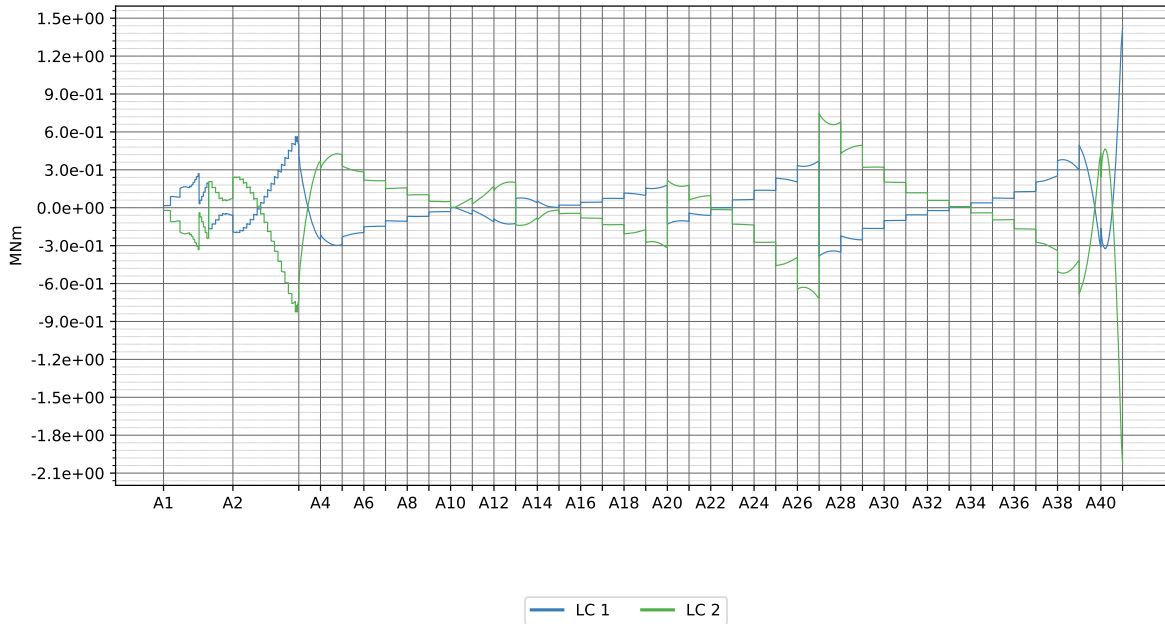
8.4.1 Permanent



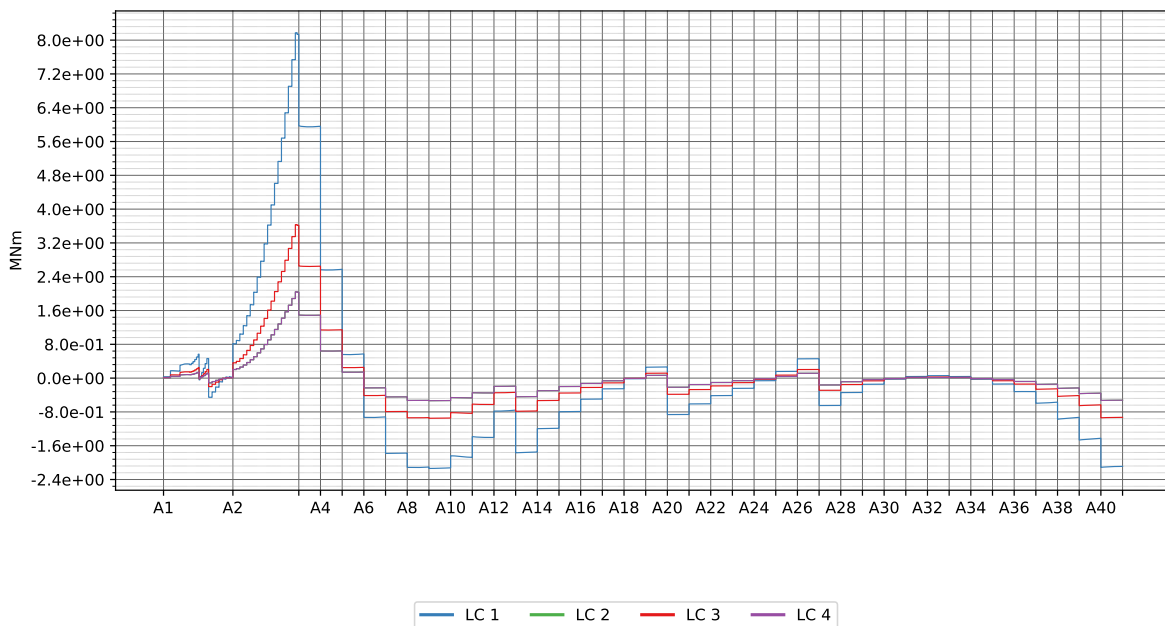
8.4.2 Temperature



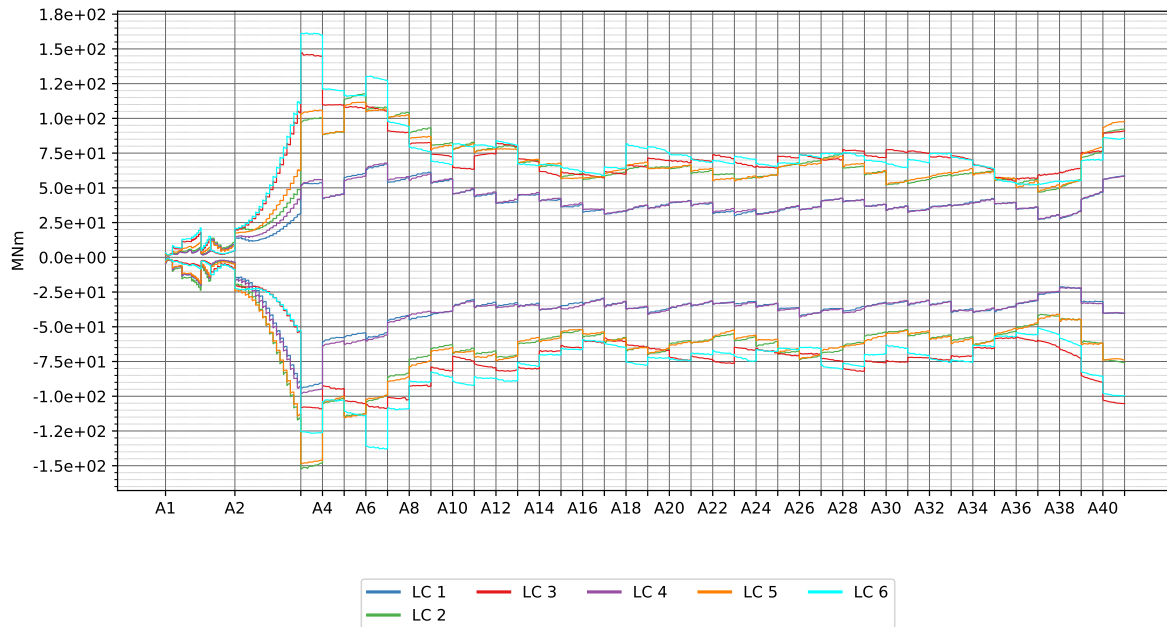
8.4.3 Tide



8.4.4 Current

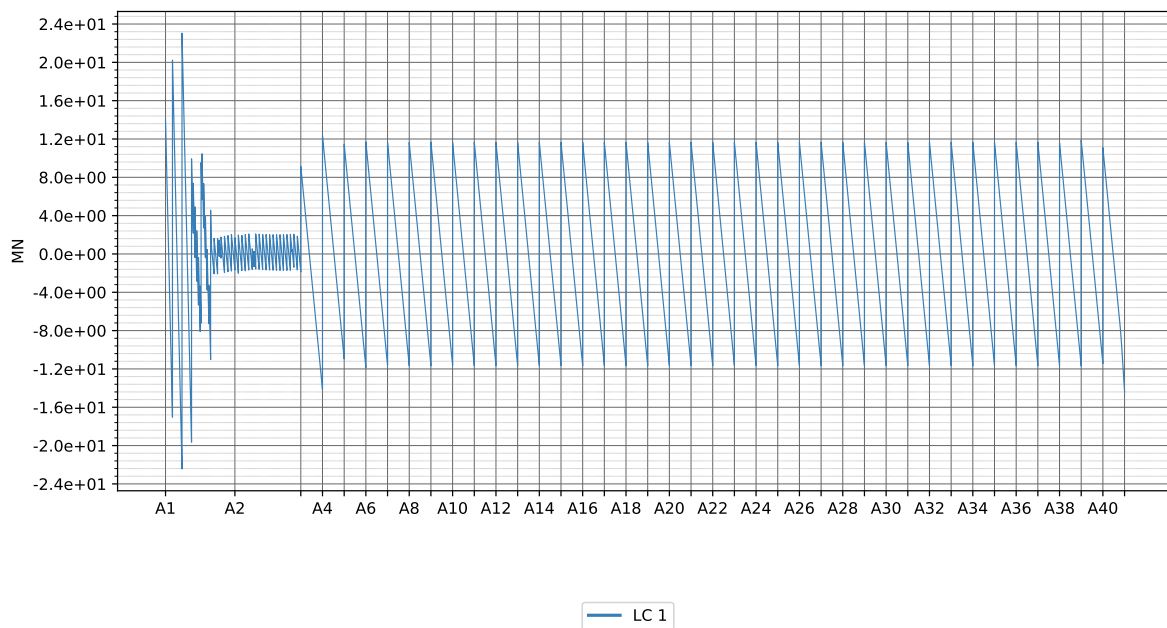


8.4.5 Env. 100 y

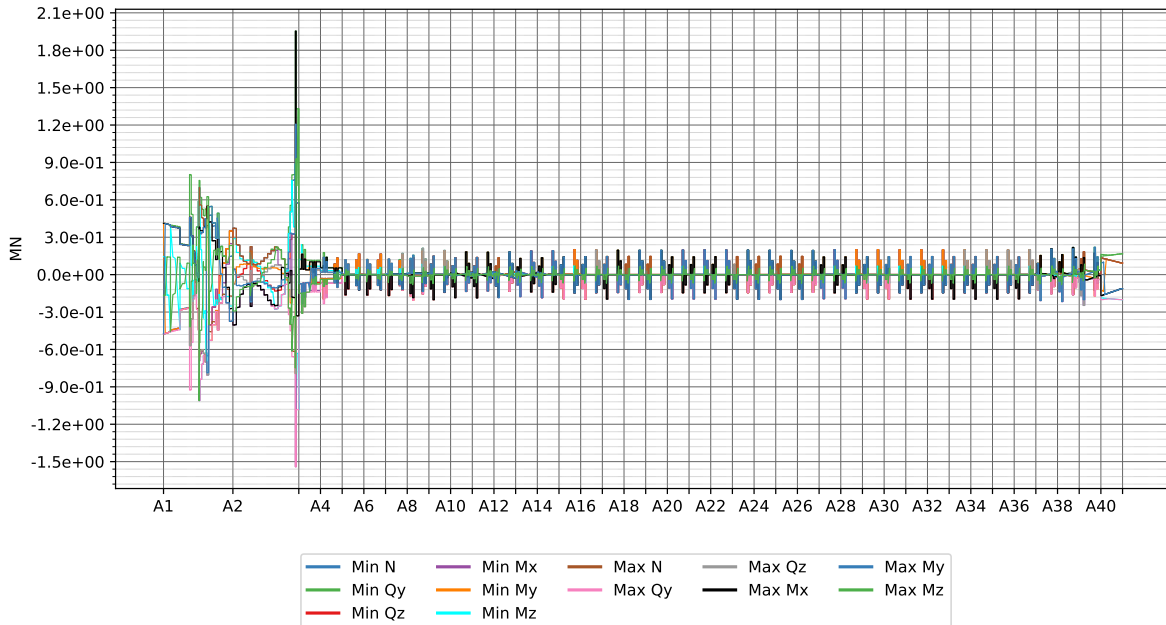


8.5 Vertical shear force

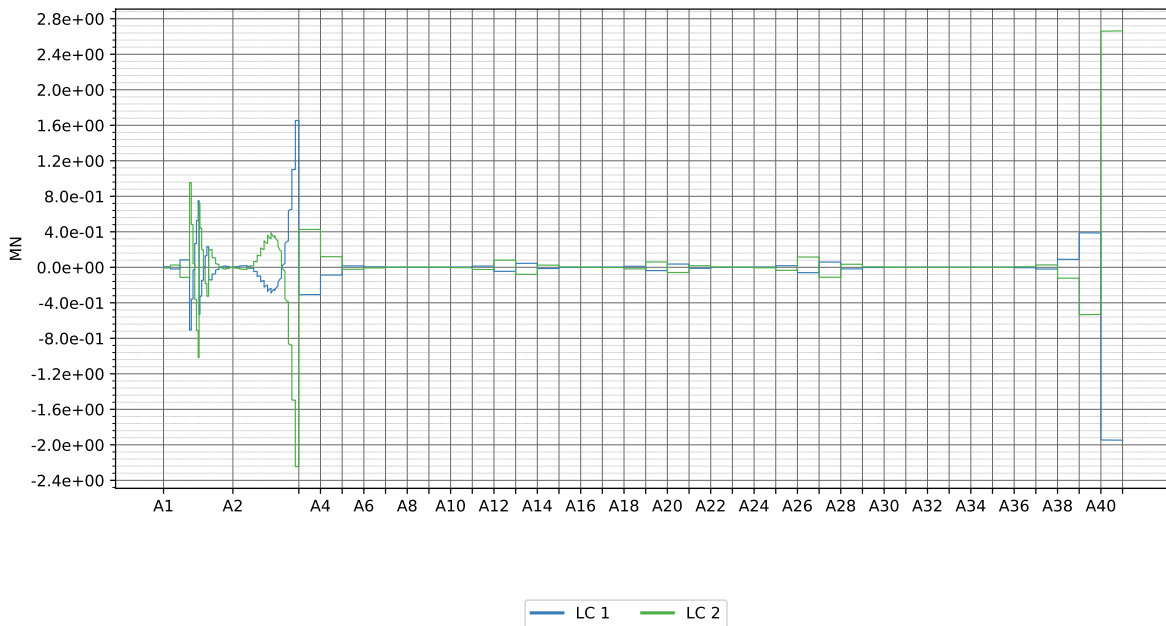
8.5.1 Permanent



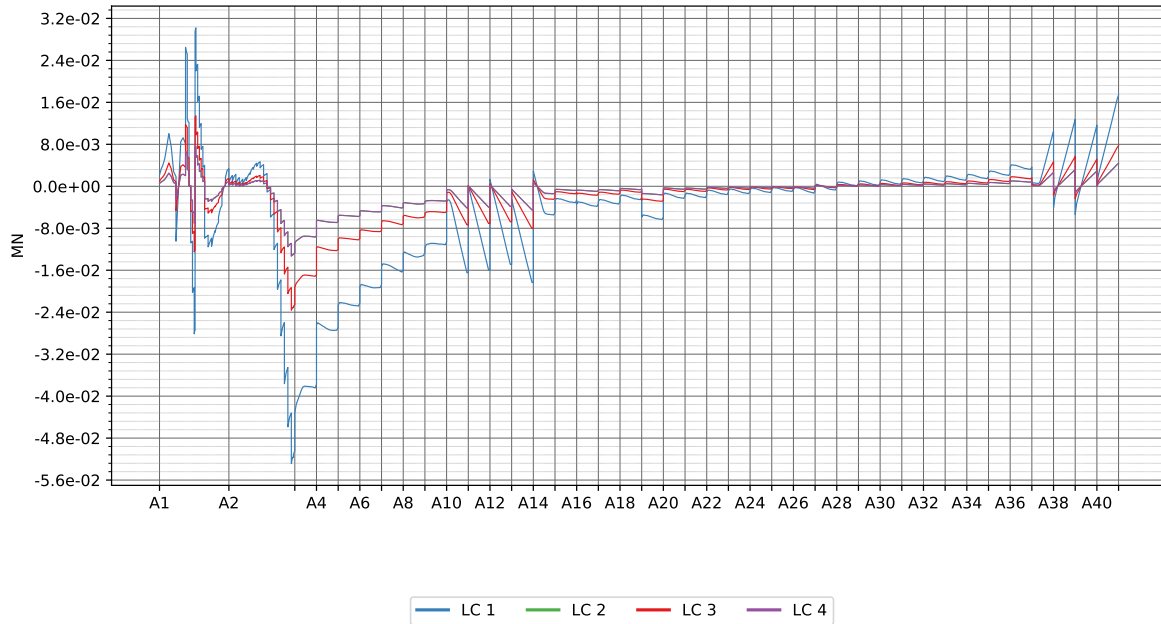
8.5.2 Temperature



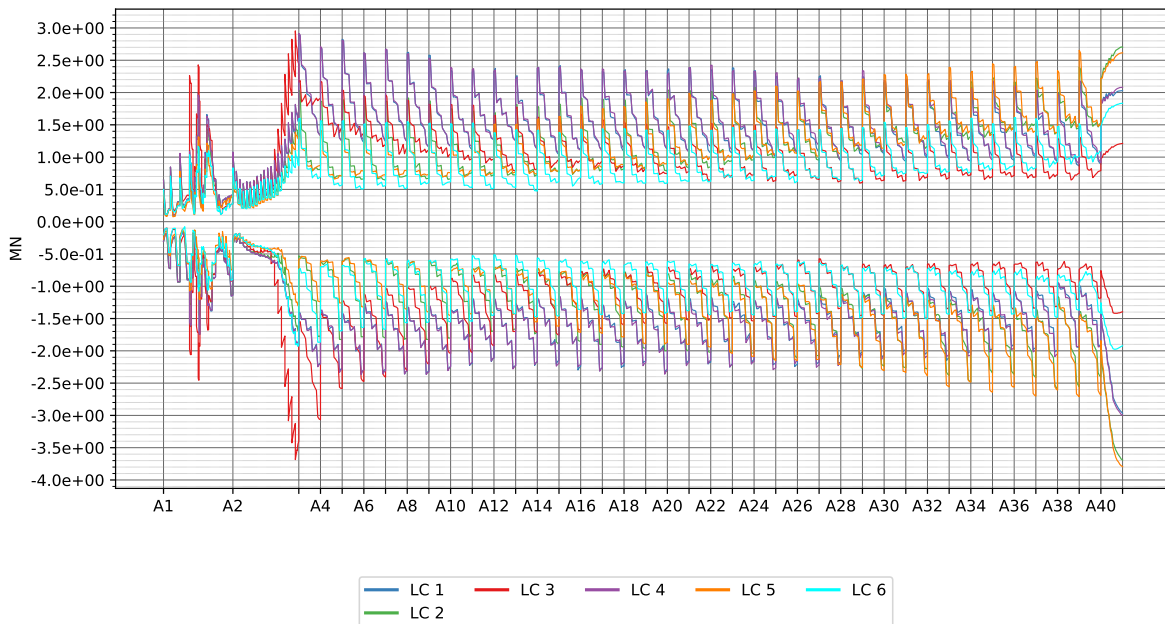
8.5.3 Tide



8.5.4 Current

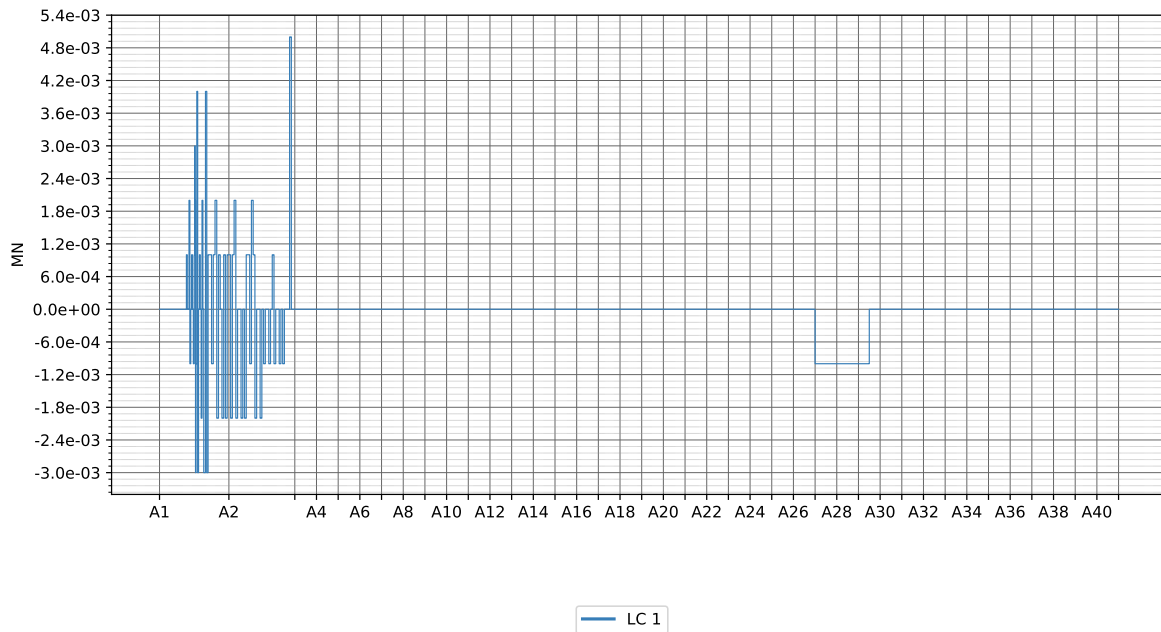


8.5.5 Env. 100 y

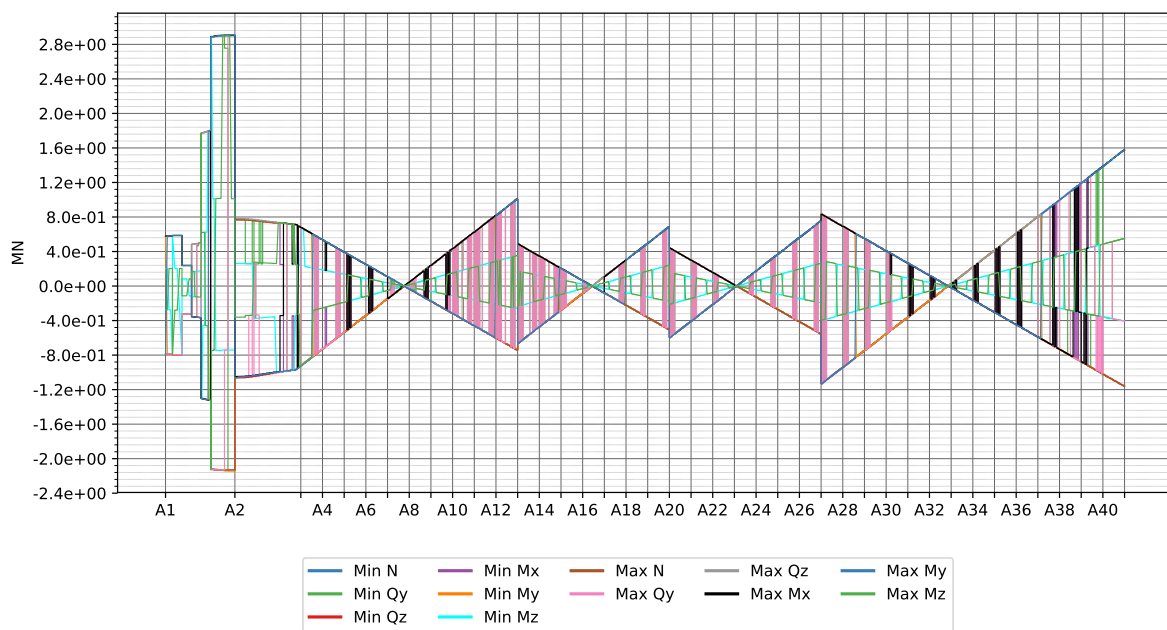


8.6 Transverse shear force

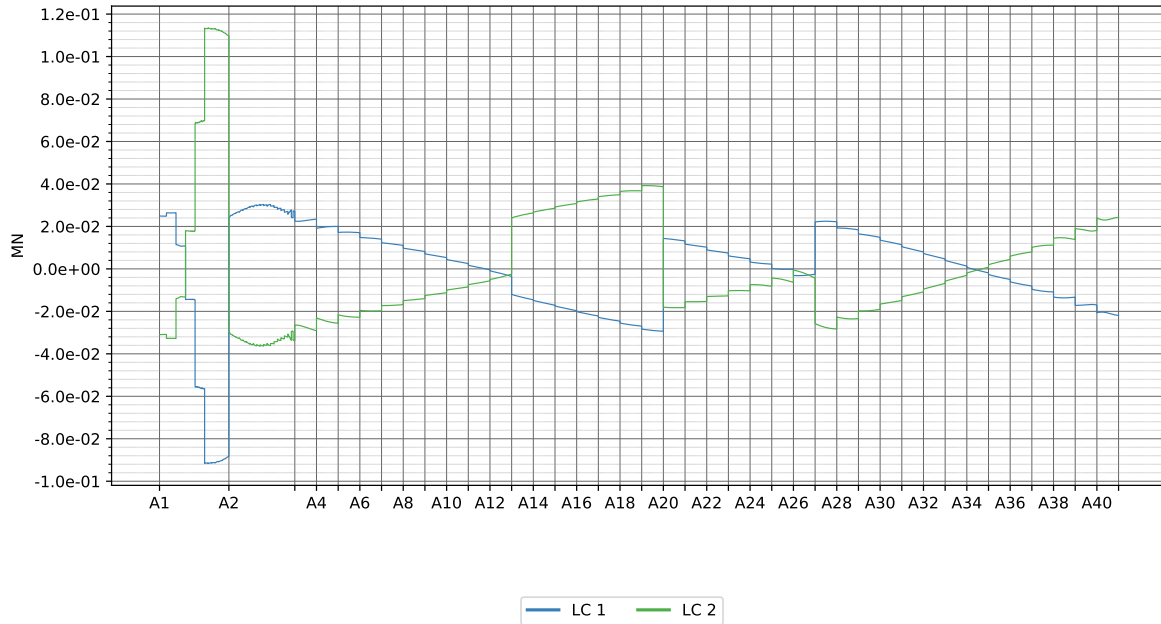
8.6.1 Permanent



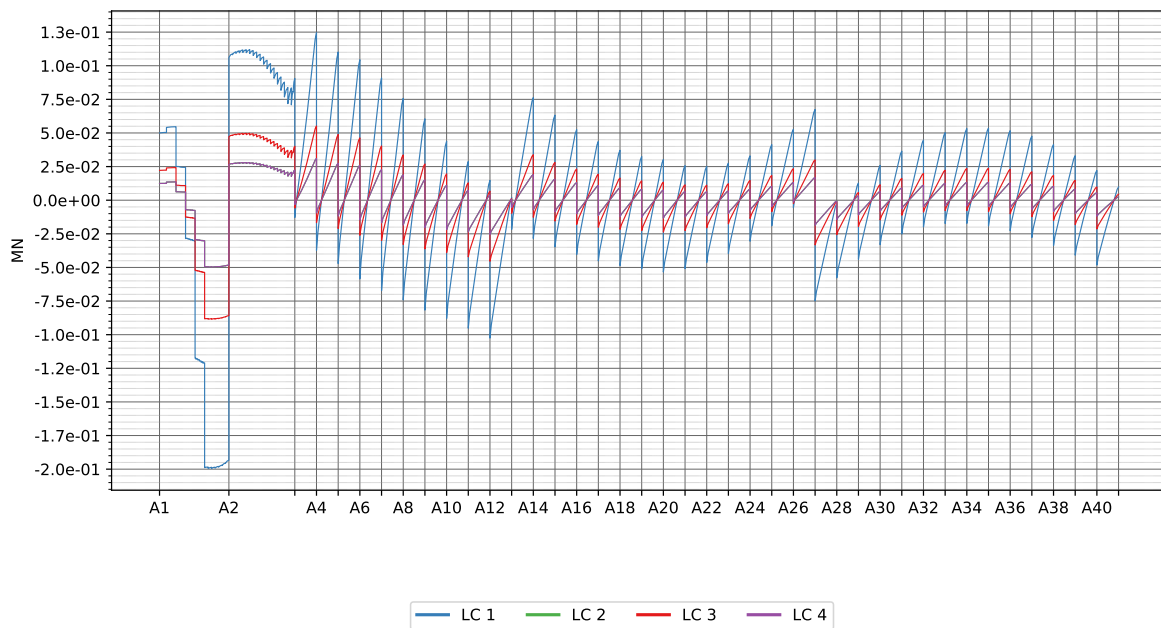
8.6.2 Temperature



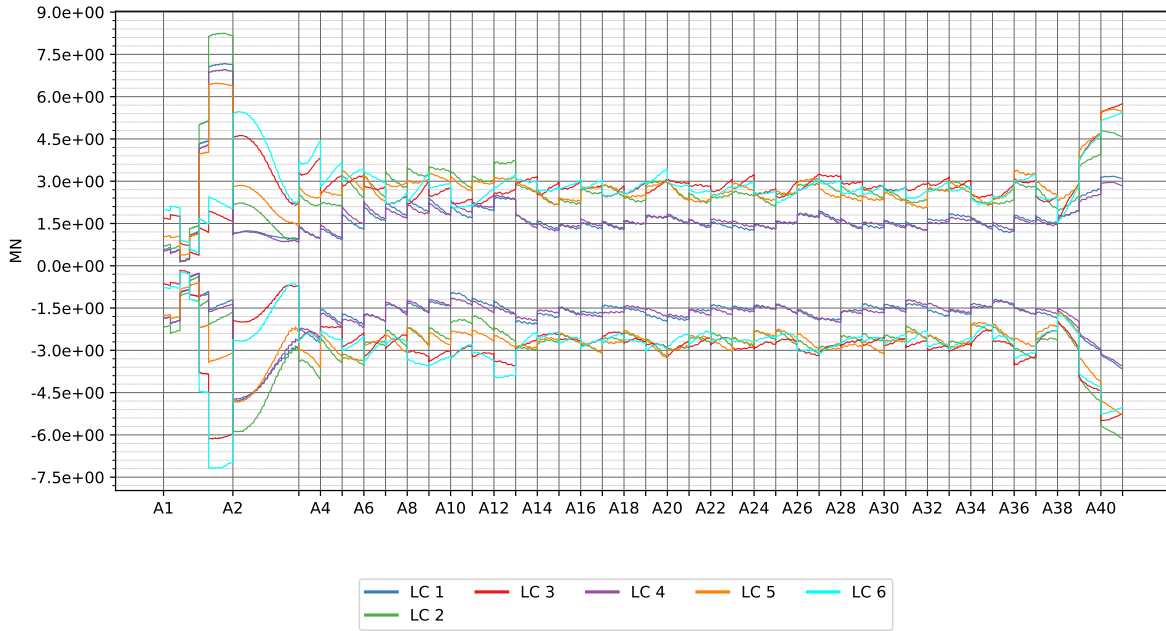
8.6.3 Tide



8.6.4 Current



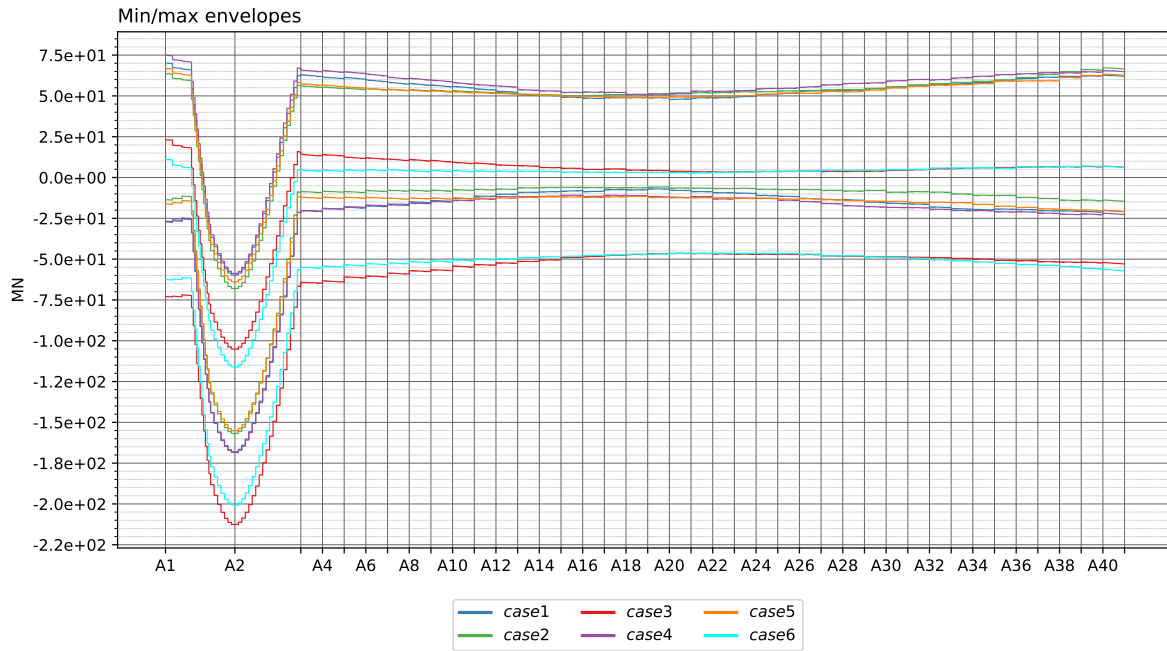
8.6.5 Env. 100 y



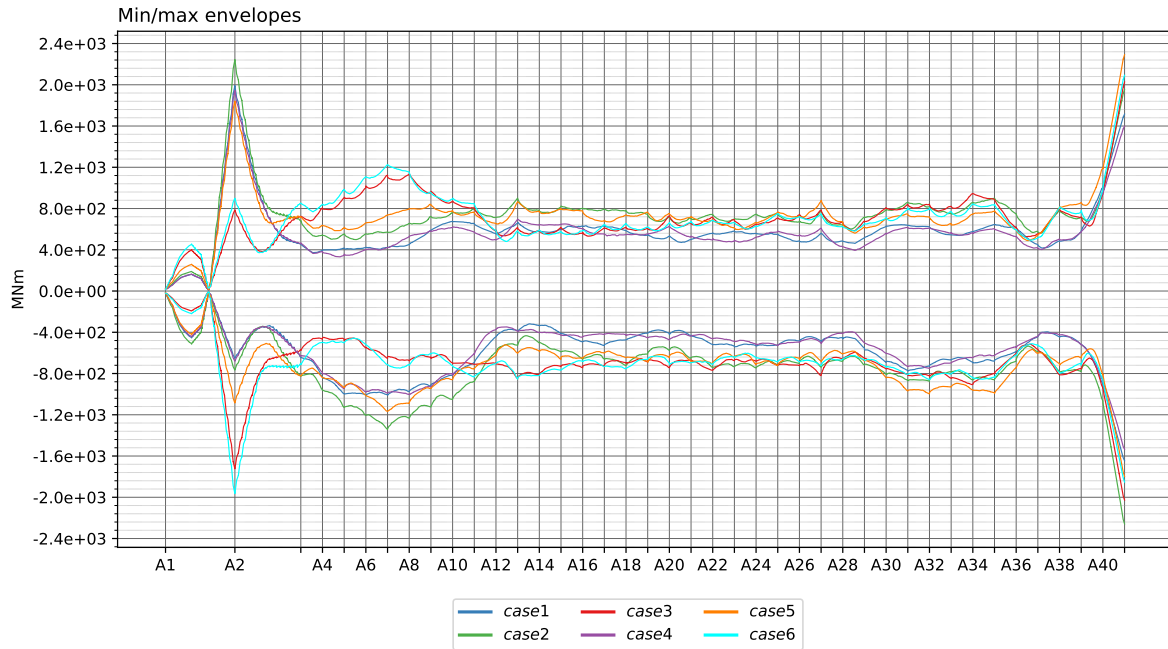
9 Combined results (incl. load factors)

9.1 ULS3

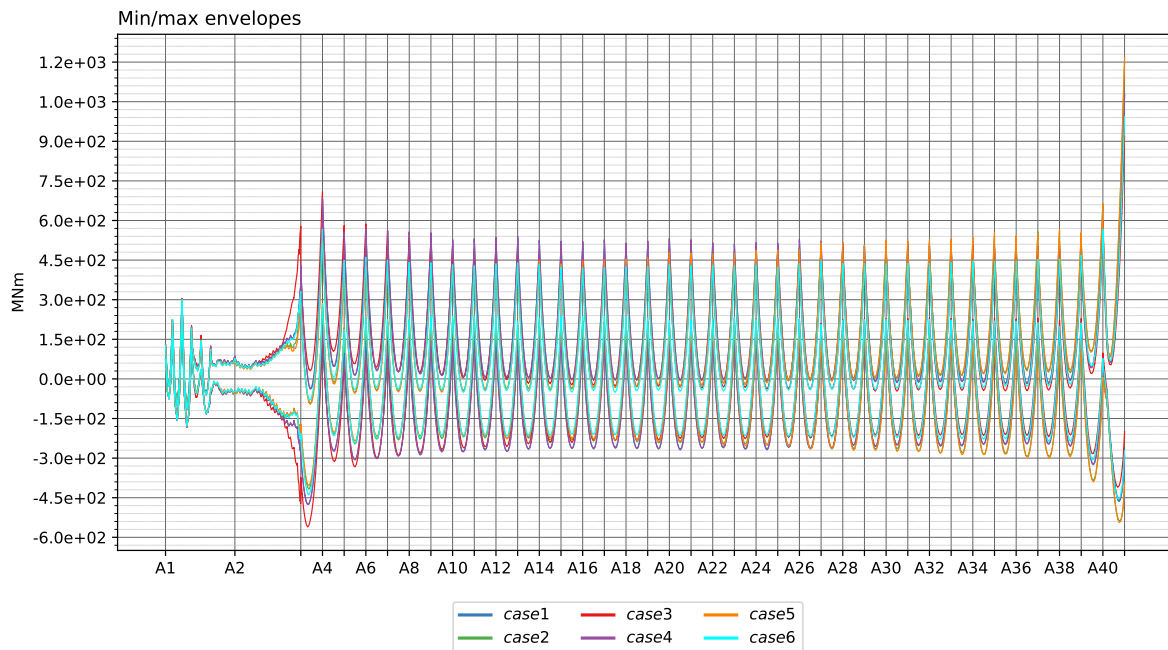
9.1.1 Axial force



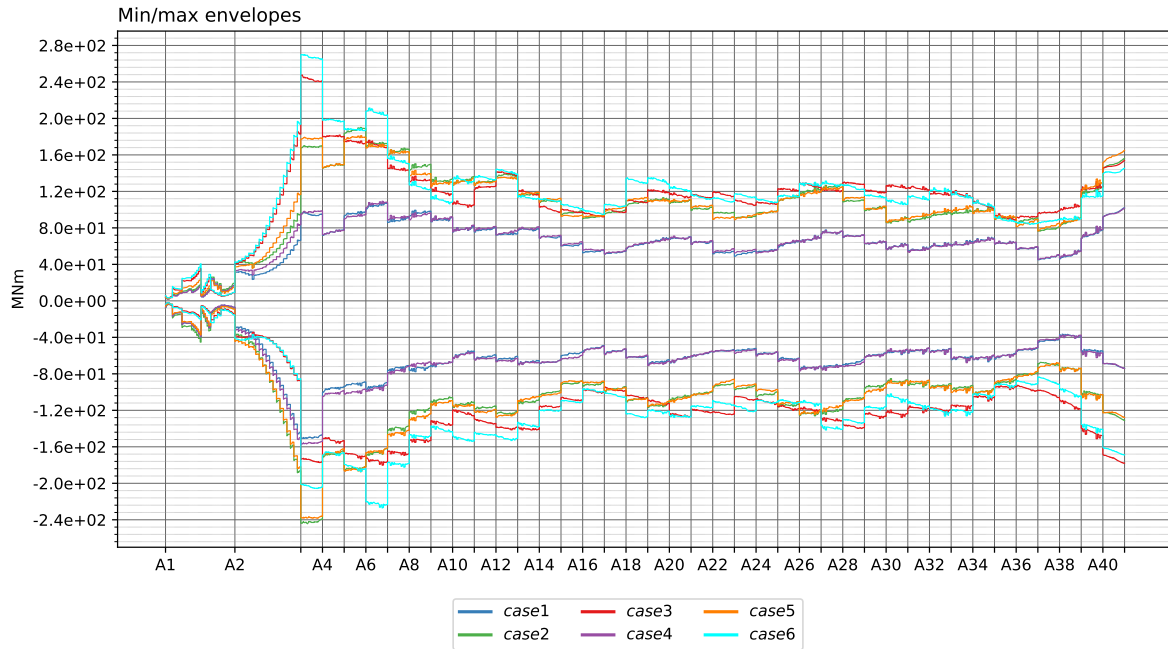
9.1.2 Bending moment about strong axis



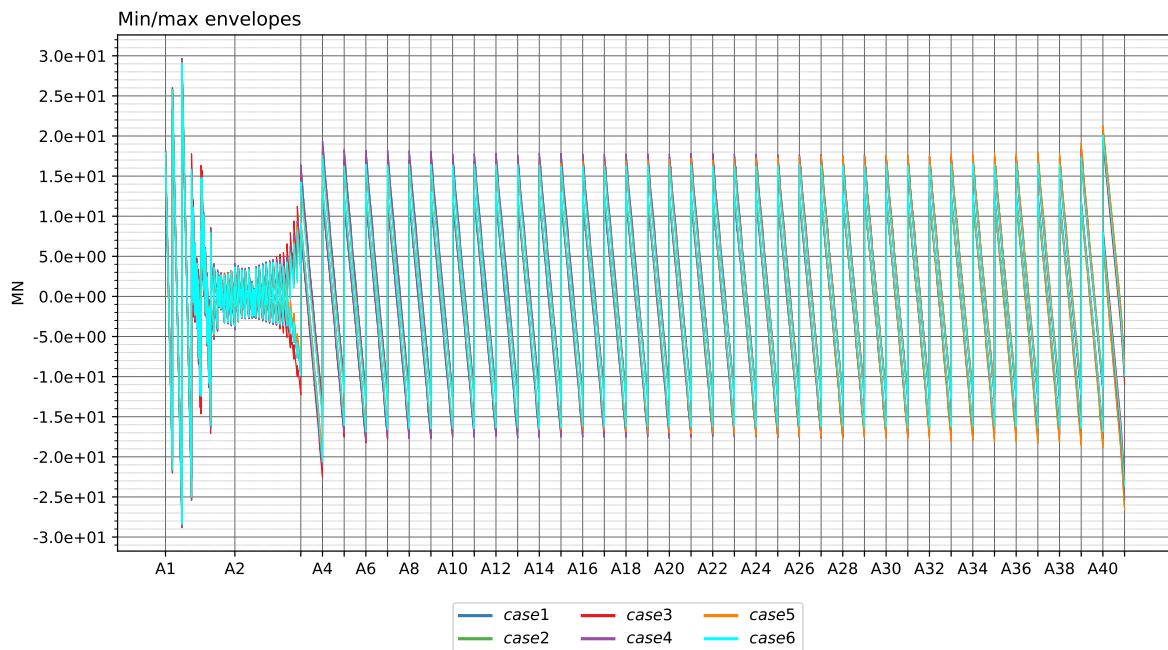
9.1.3 Bending moment about weak axis



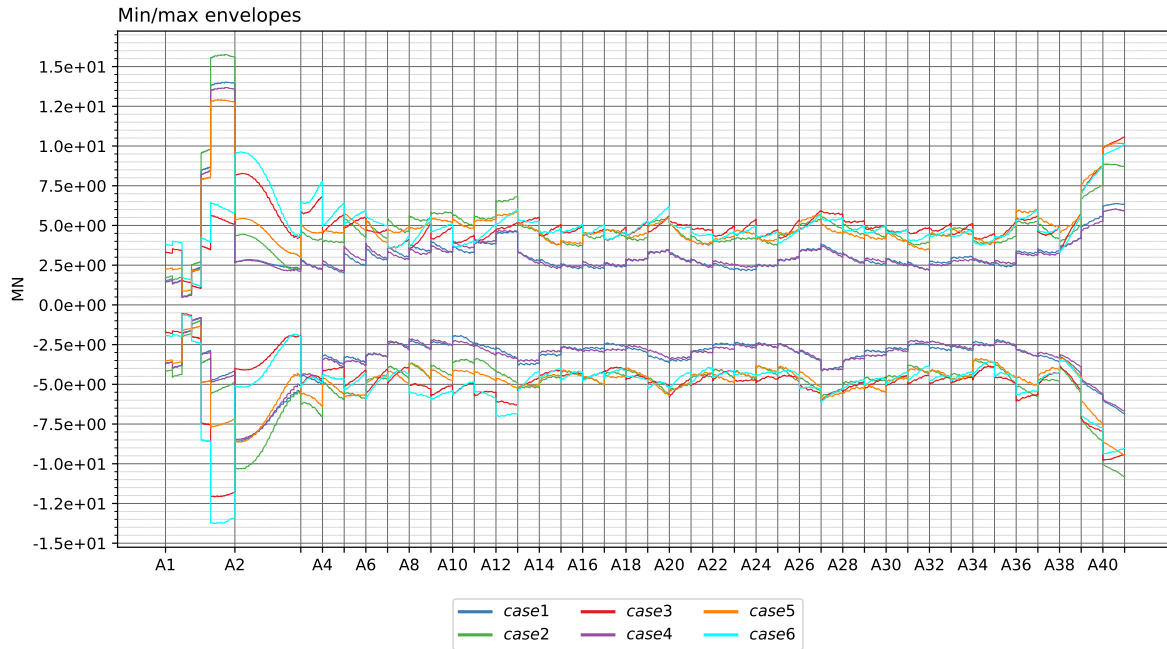
9.1.4 Torsional moment



9.1.5 Vertical shear force

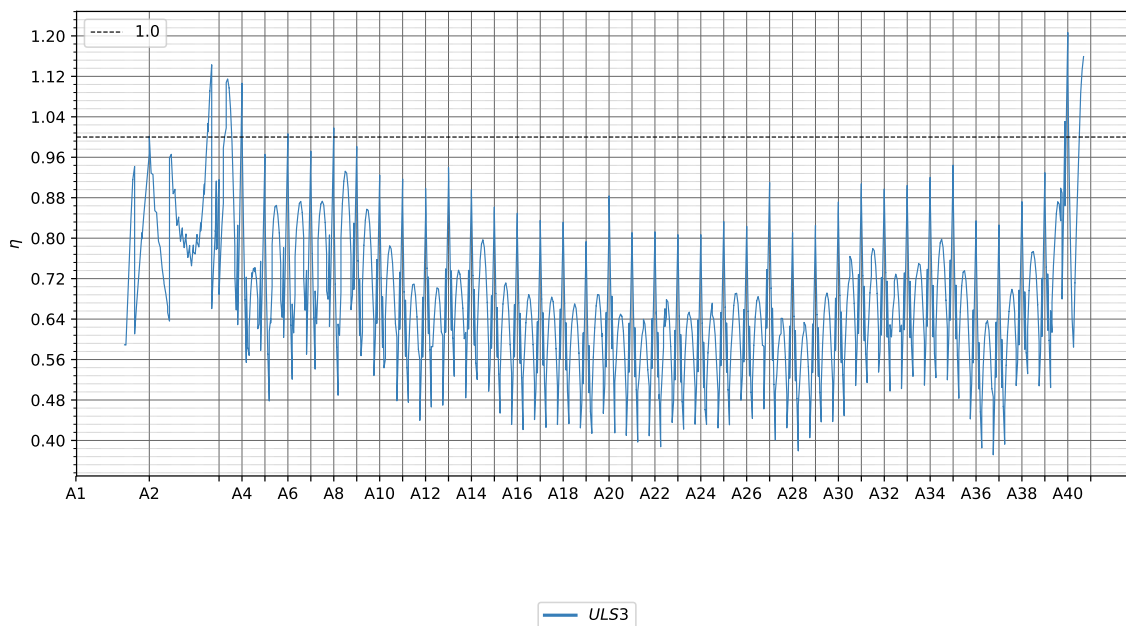


9.1.6 Transverse shear force

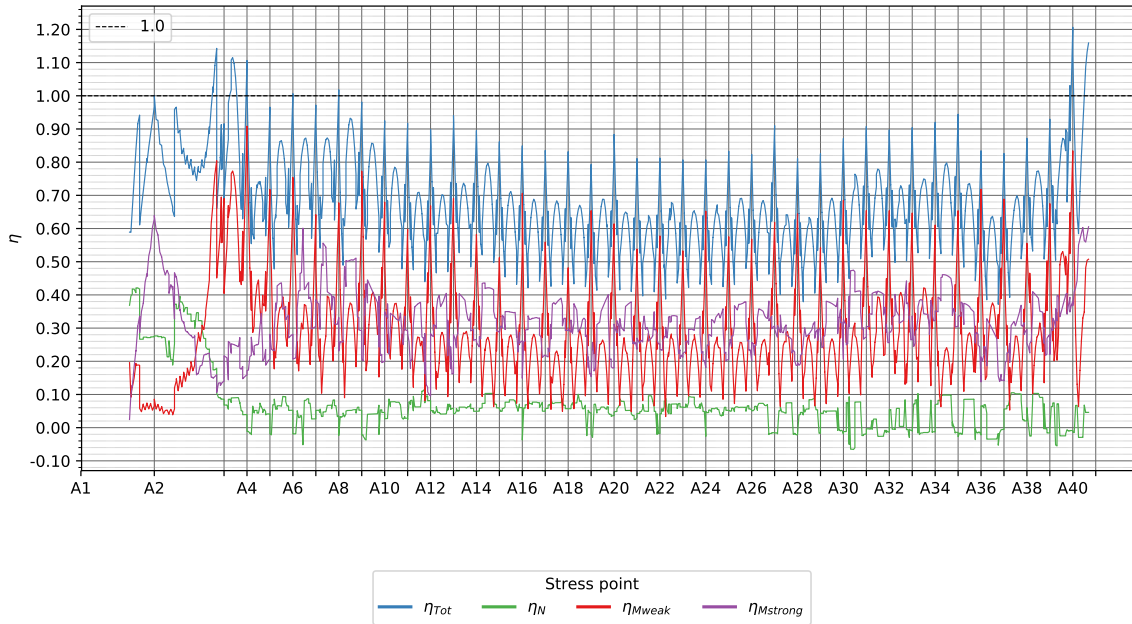


10 Capacity check - Method 1

10.1 Total utilization

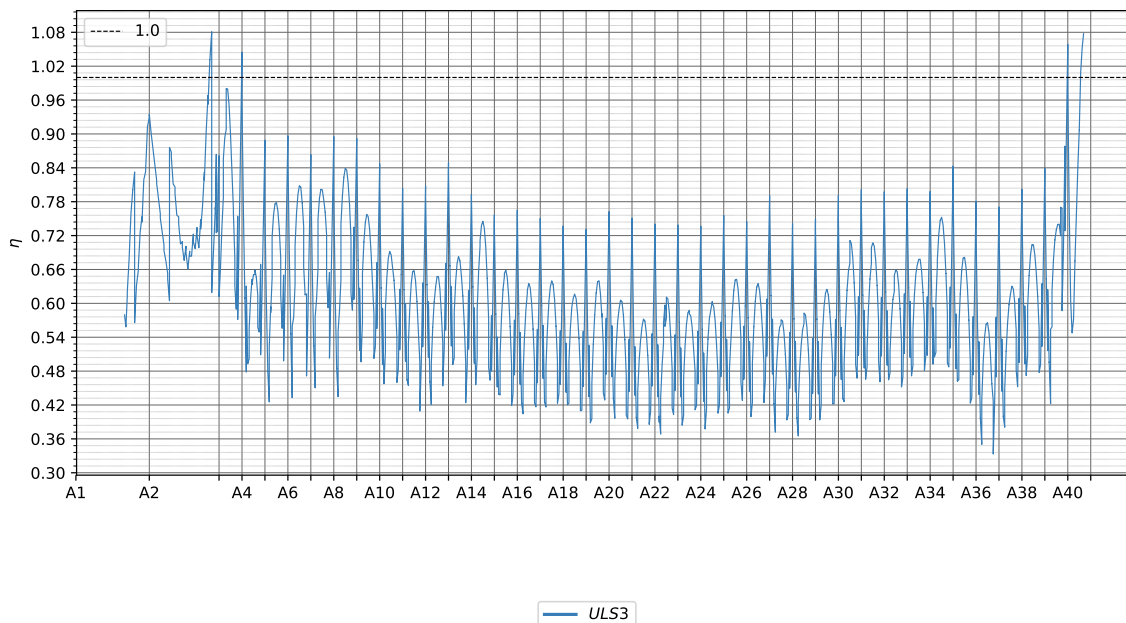


10.2 Utilization breakdown ULS3

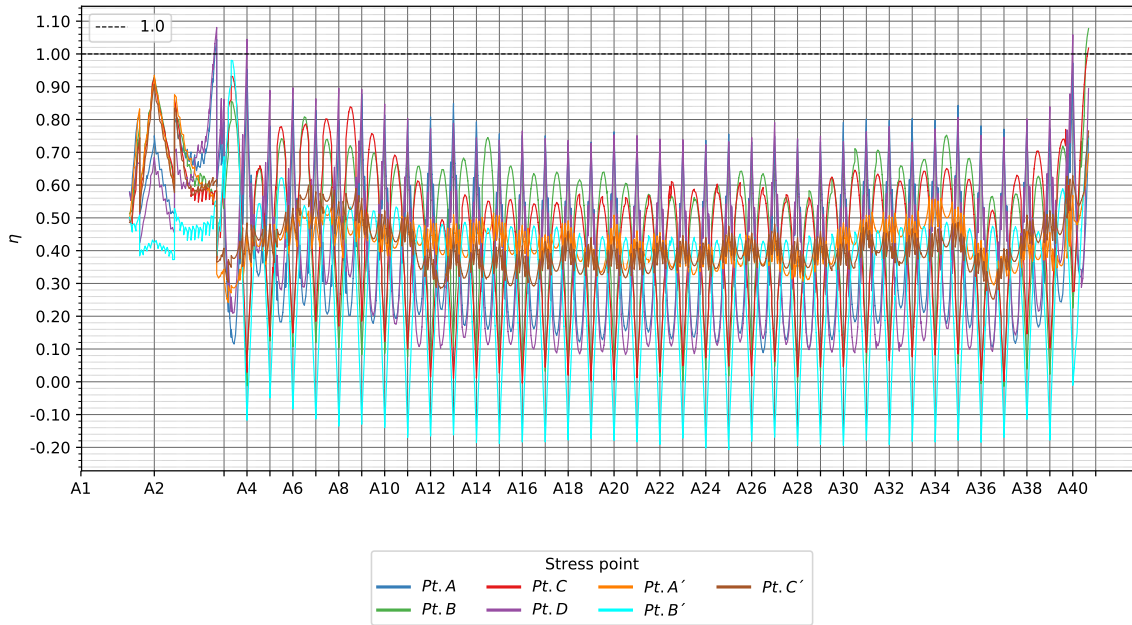


11 Capacity check - Method 2

11.1 Total utilization - Envelope

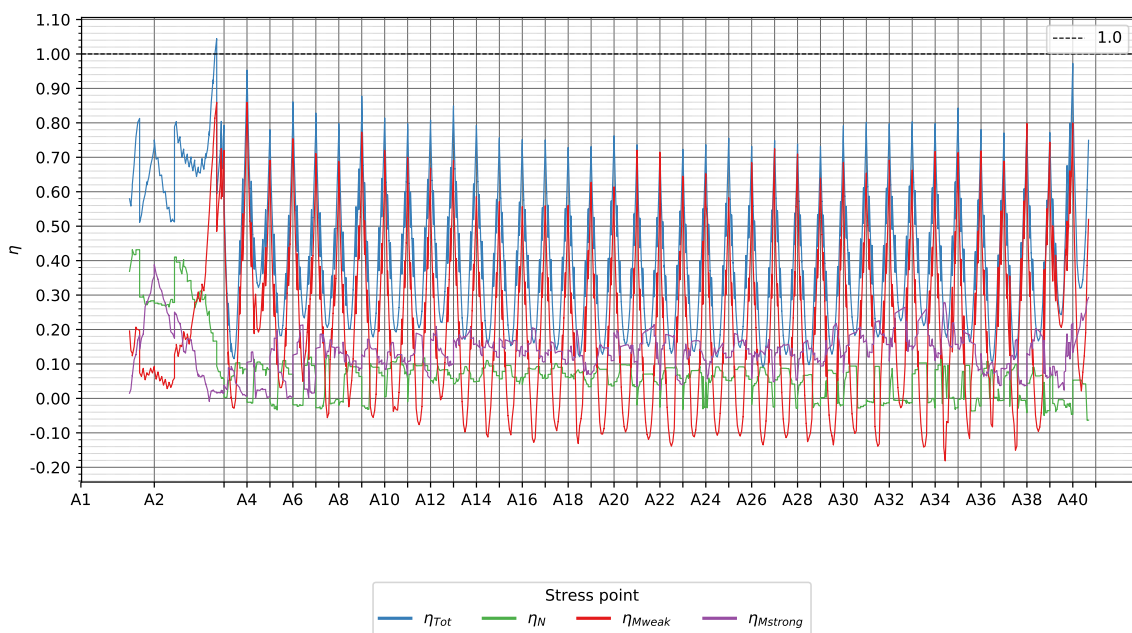


11.2 Total utilization at points ULS3

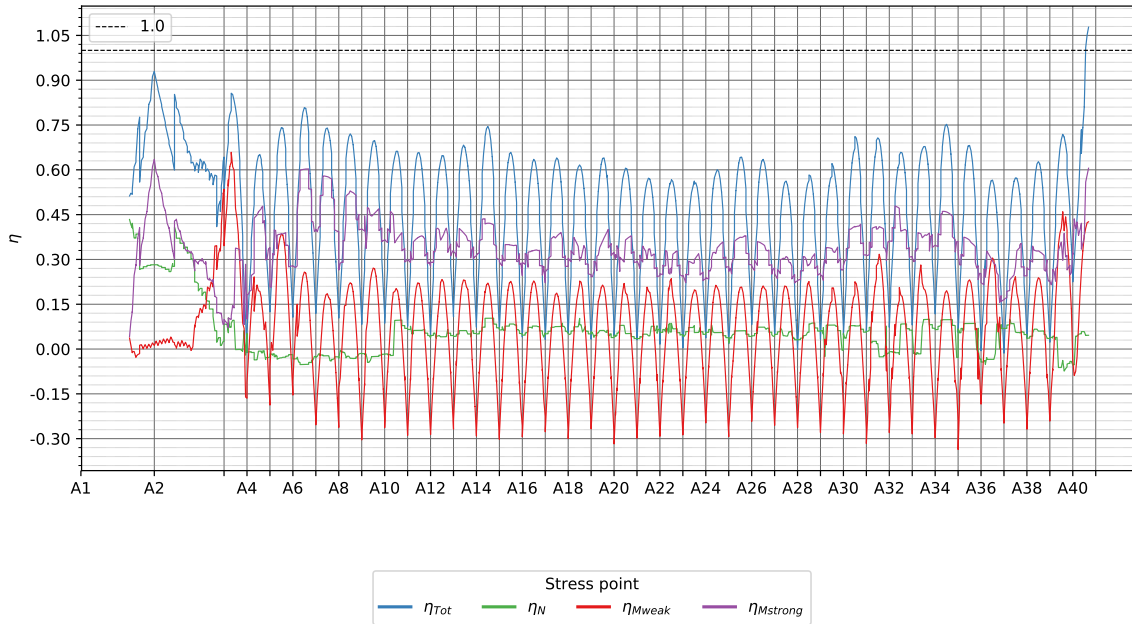


11.3 Utilization breakdown ULS3

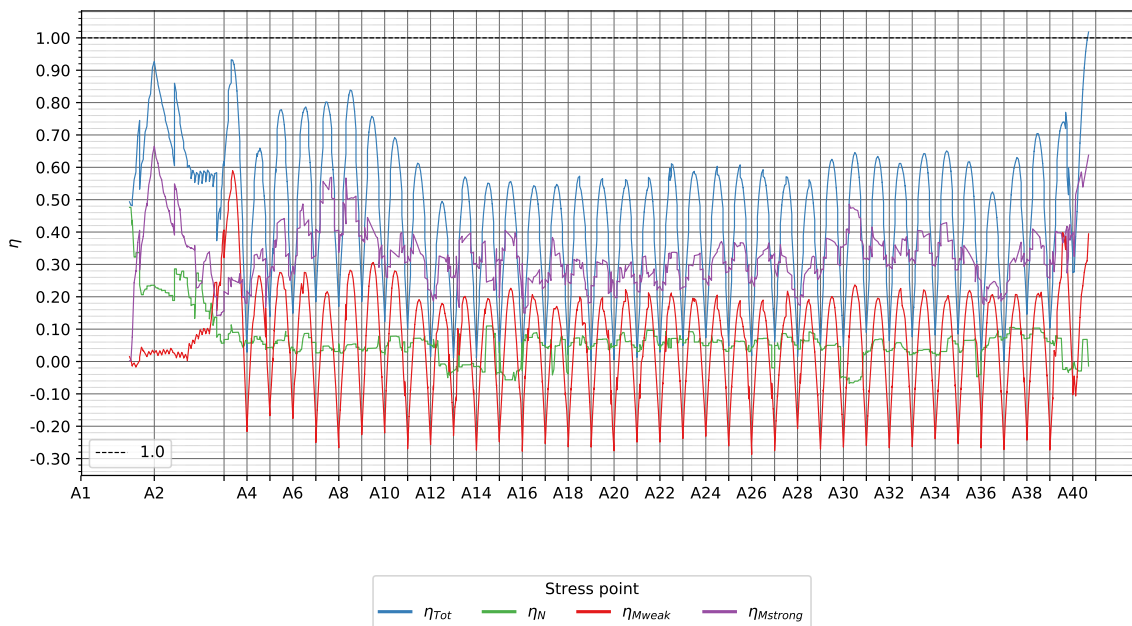
11.3.1 Pt. A



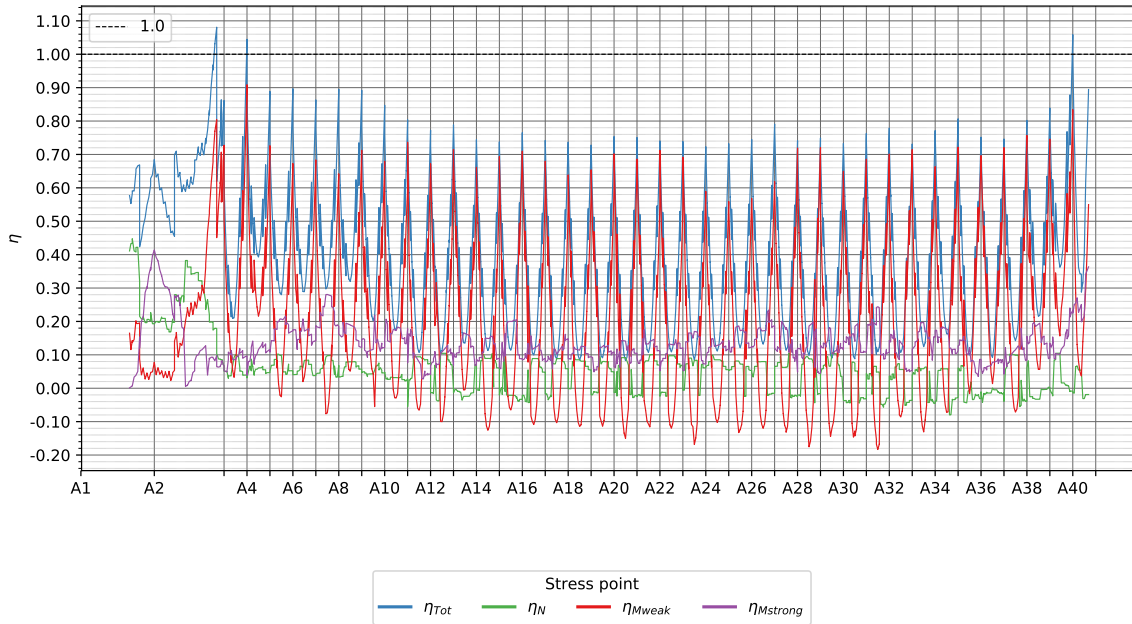
11.3.2 Pt. B



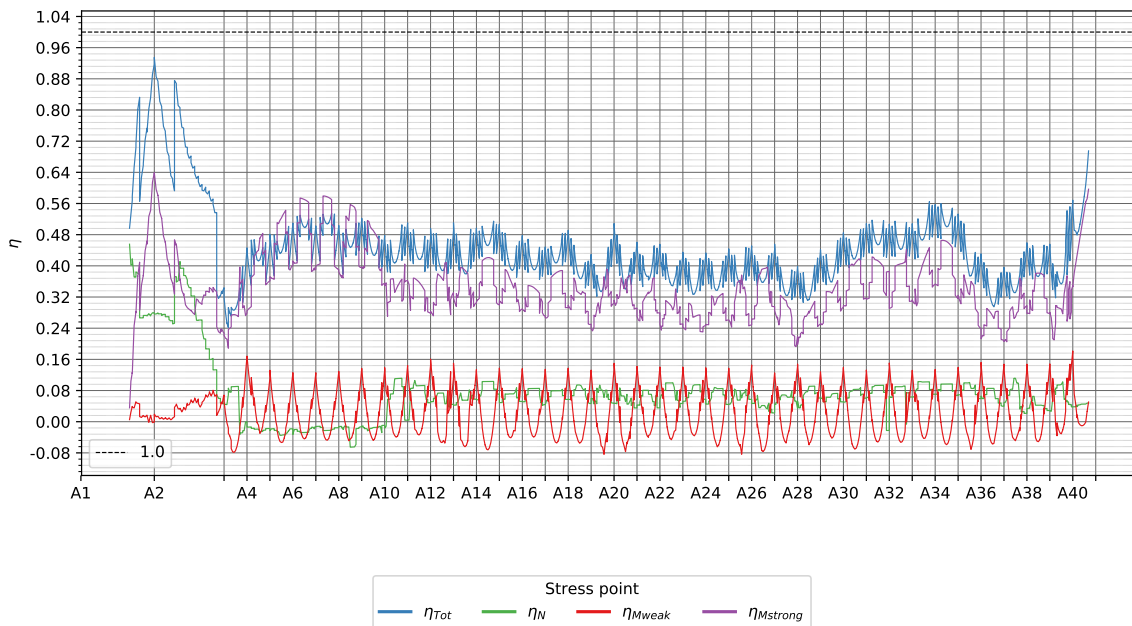
11.3.3 Pt. C



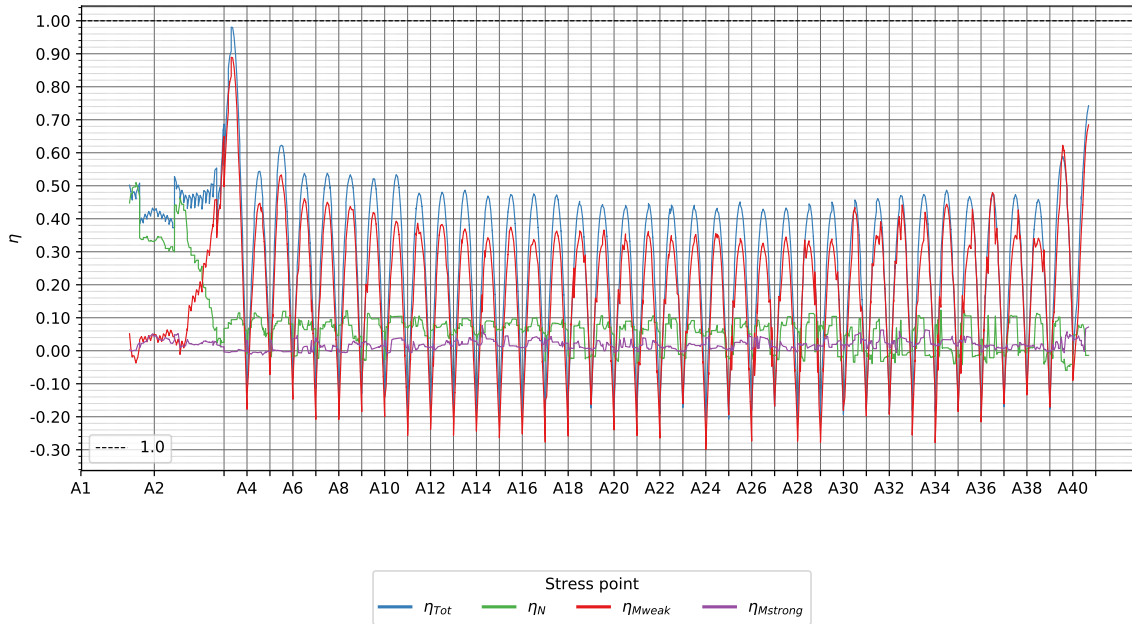
11.3.4 Pt. D



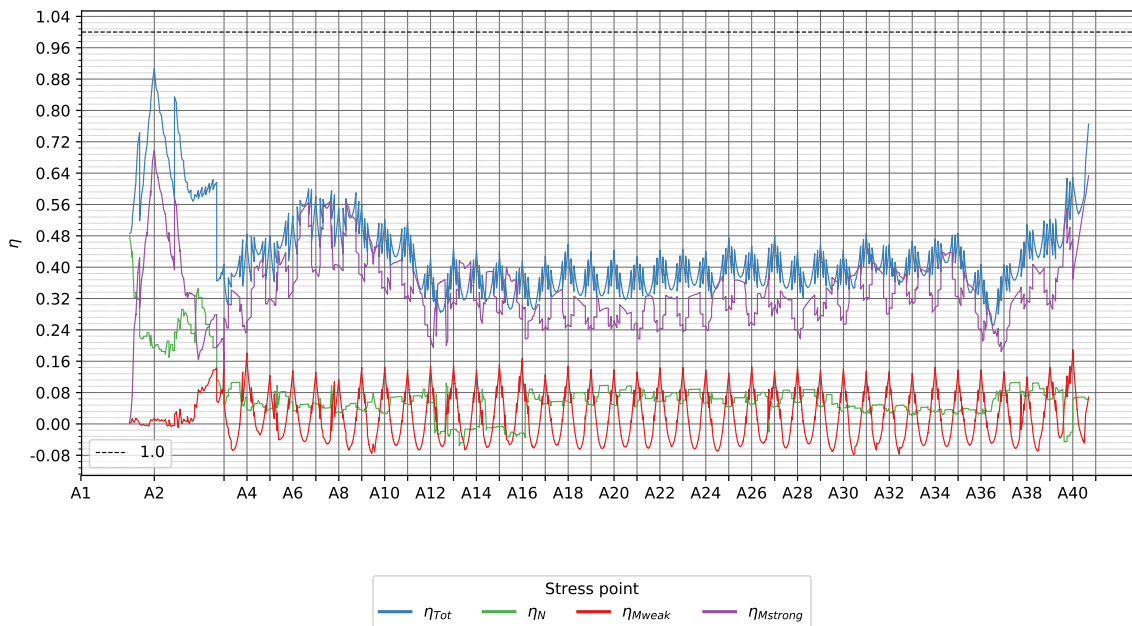
11.3.5 Pt. A'



11.3.6 Pt. B'

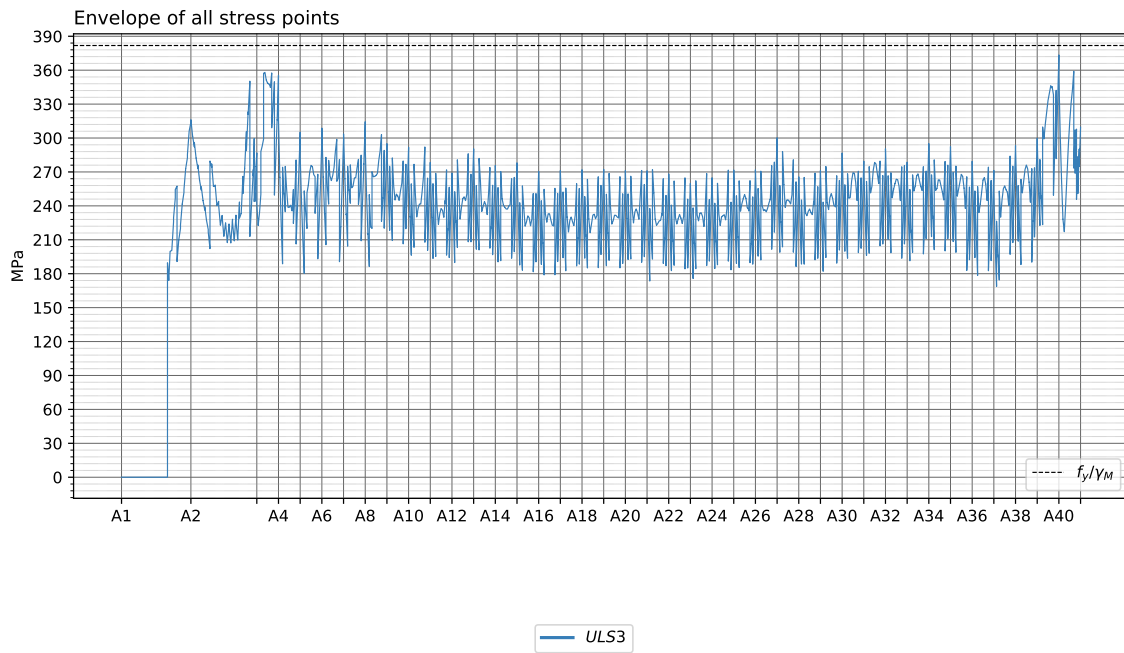


11.3.7 Pt. C'

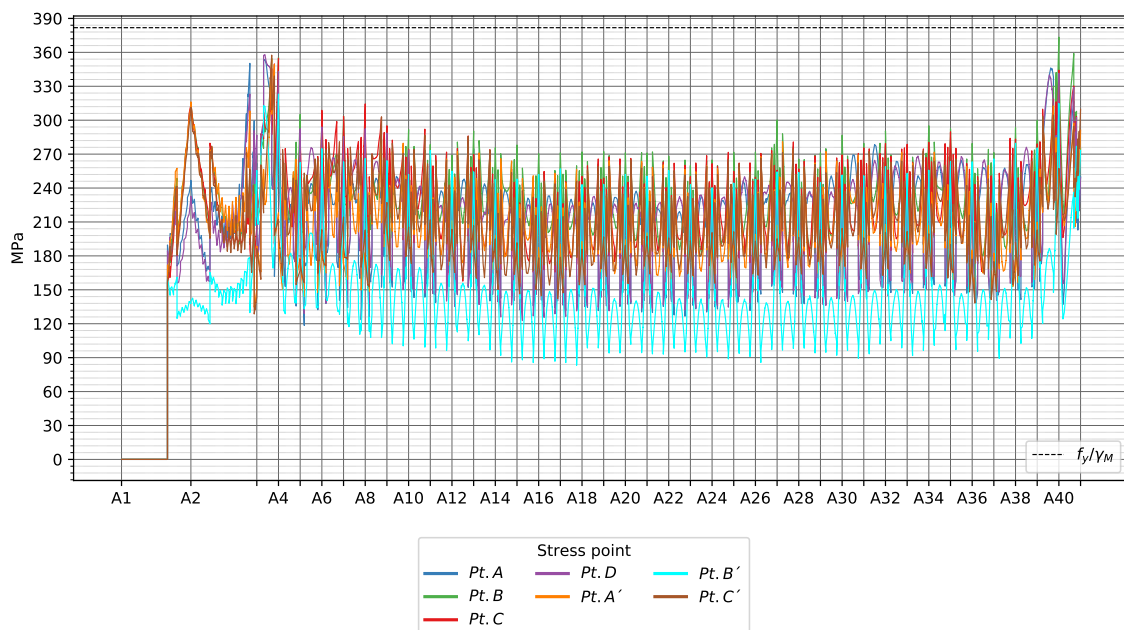


12 Von Mises Summary

12.1 Total stress summary

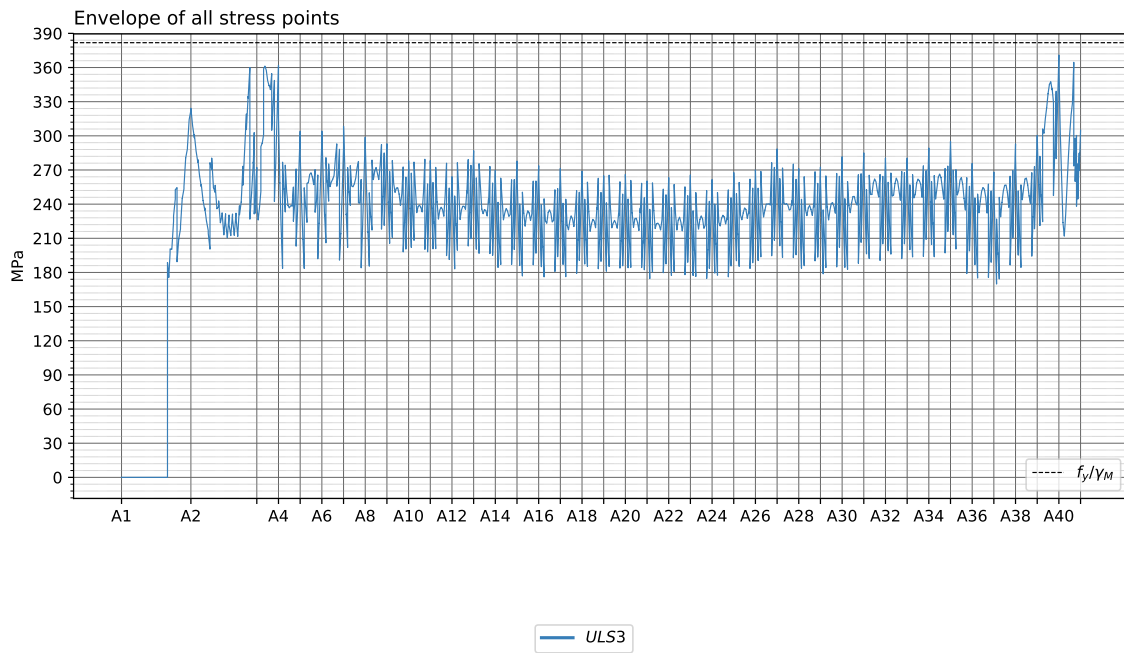


12.2 Total stress ULS3

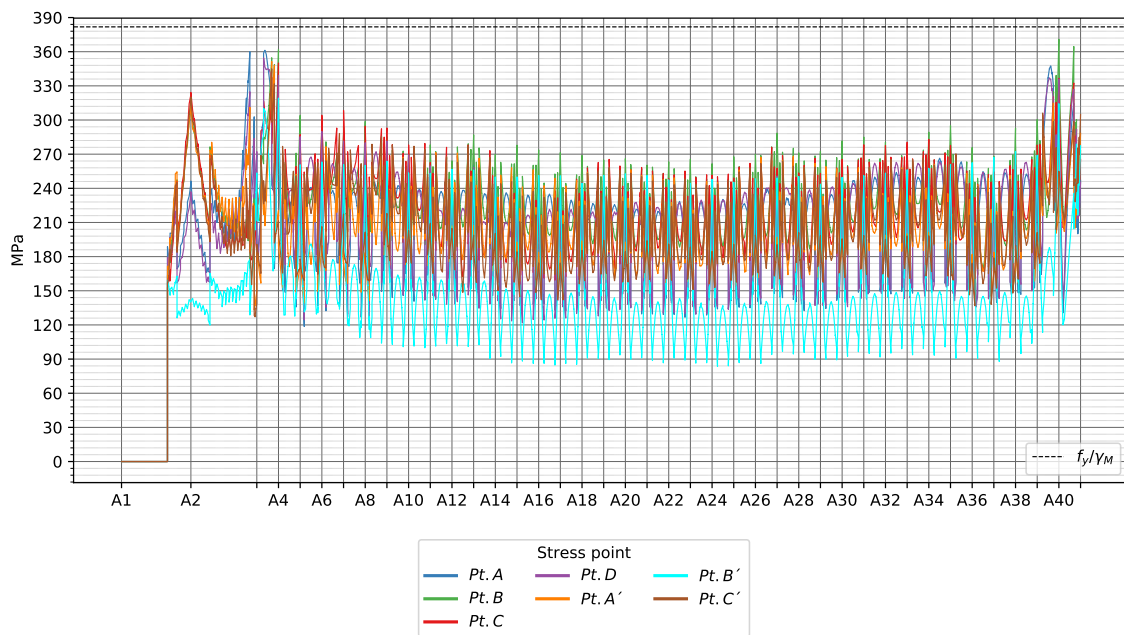


13 Von Mises Summary (90percentile)

13.1 Total stress summary

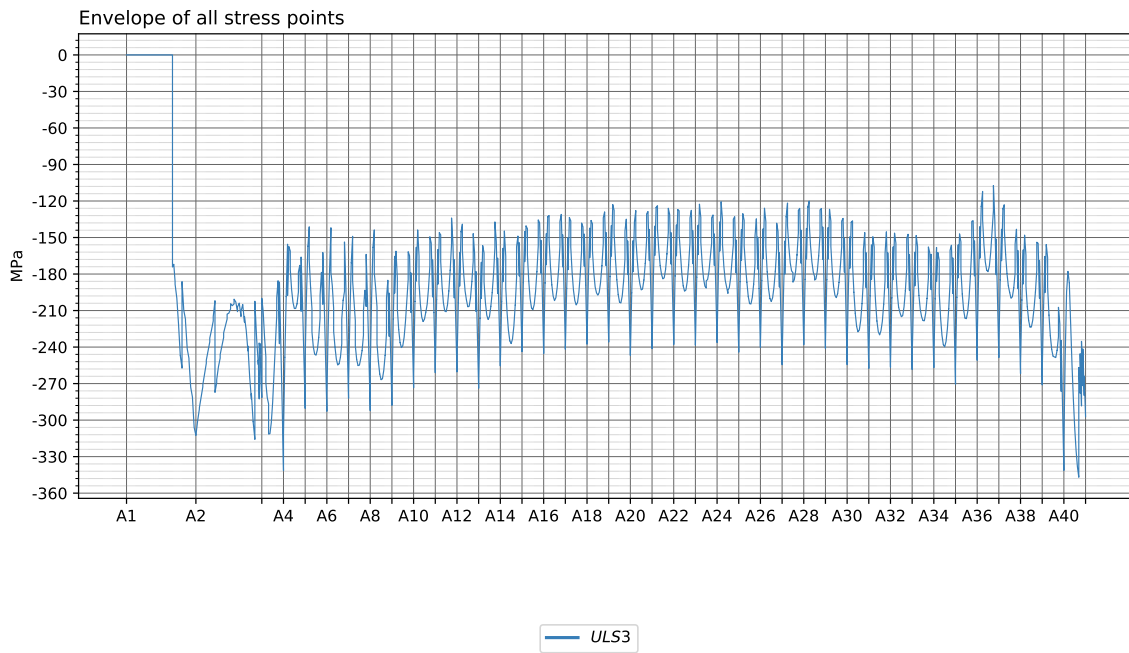


13.2 Total stress ULS3

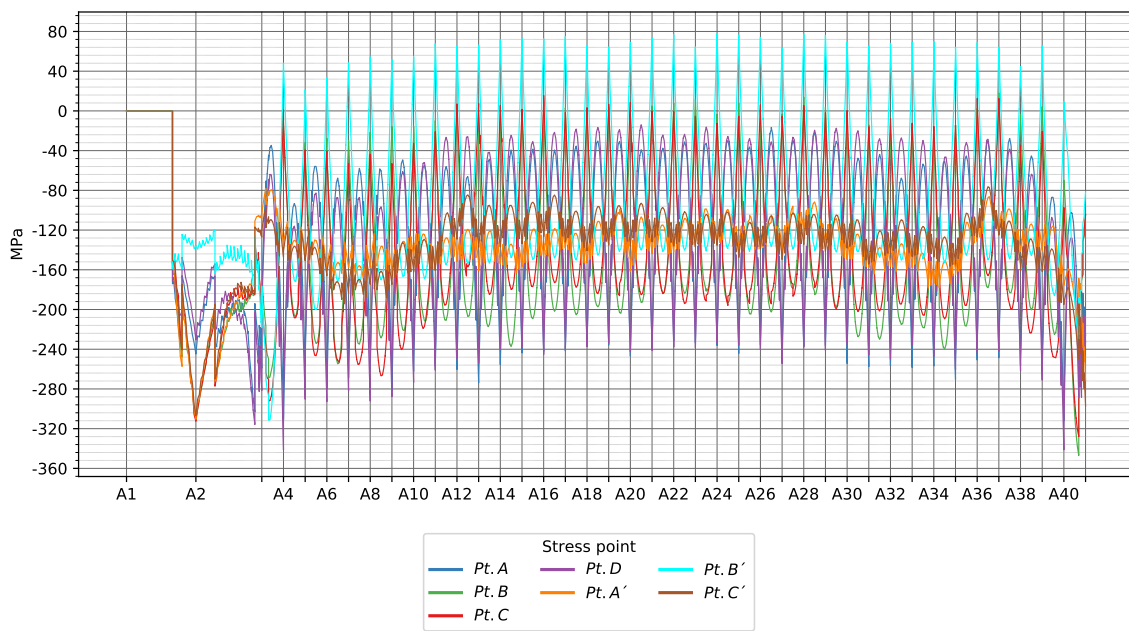


14 Min. Normal stresses

14.1 Total stress summary

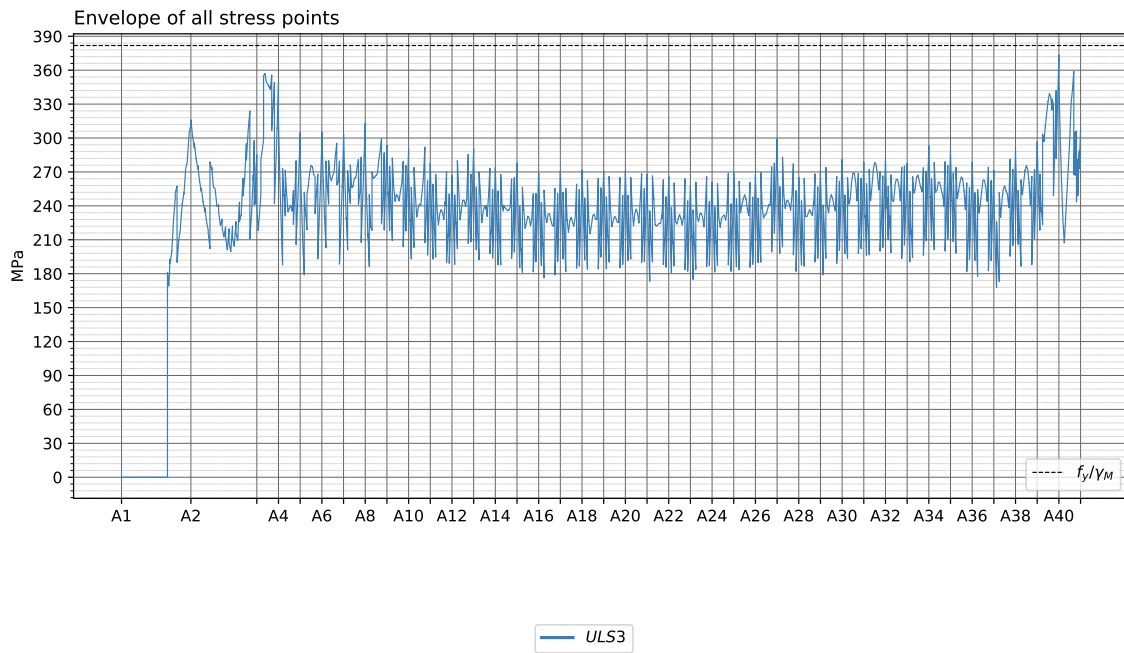


14.2 Total stress ULS3

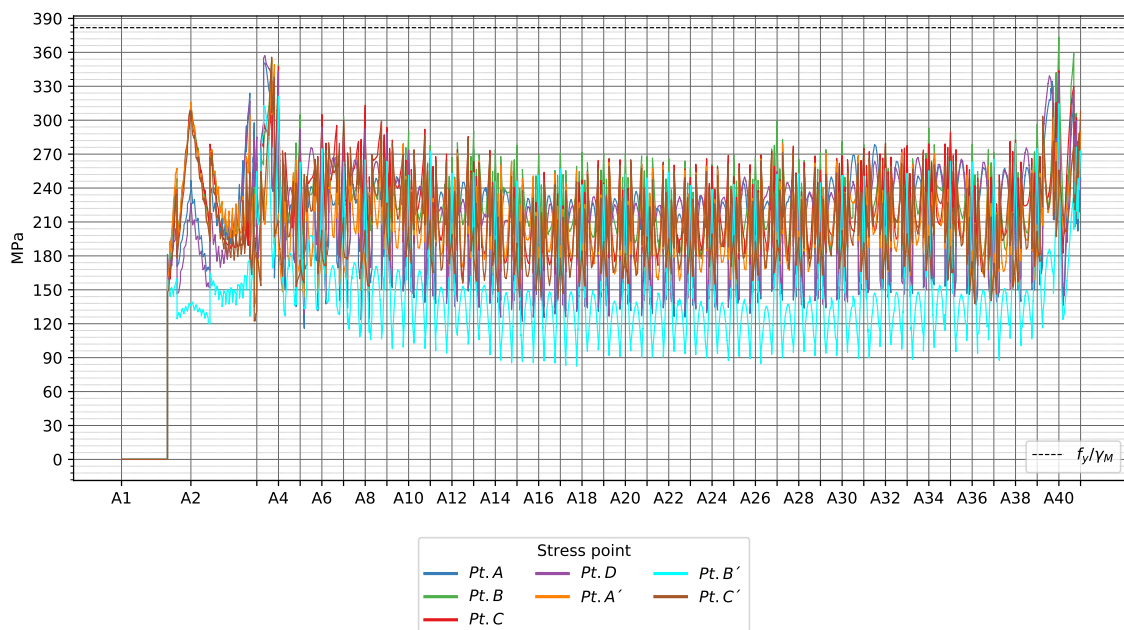


15 Von Mises Summary - Alt.

15.1 Total stress summary

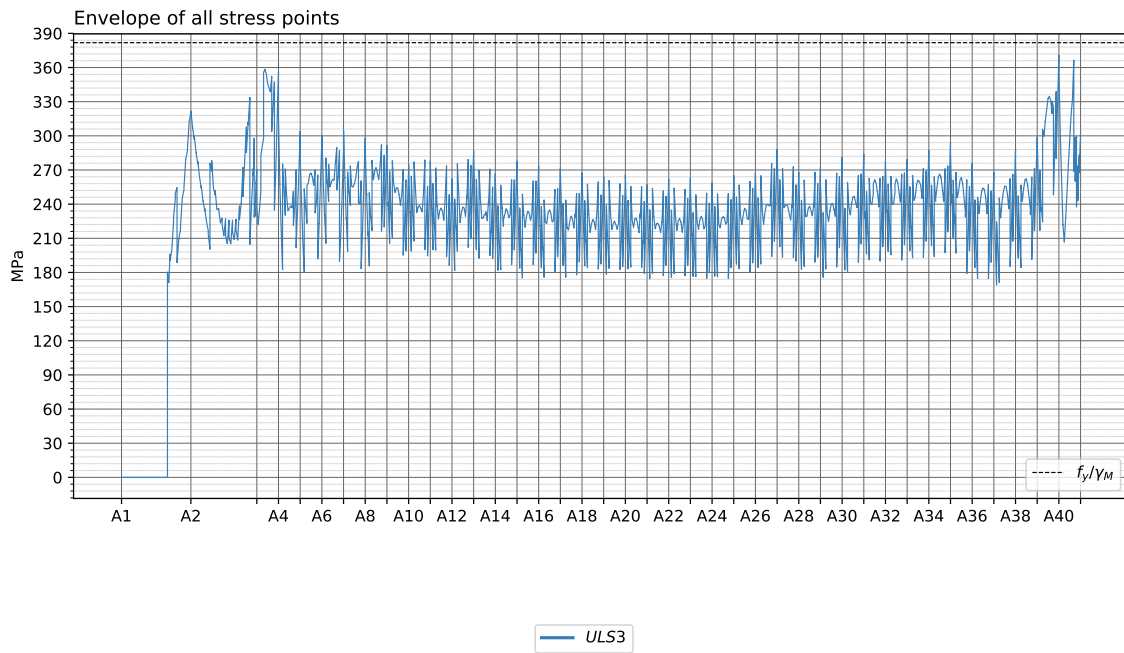


15.2 Total stress ULS3

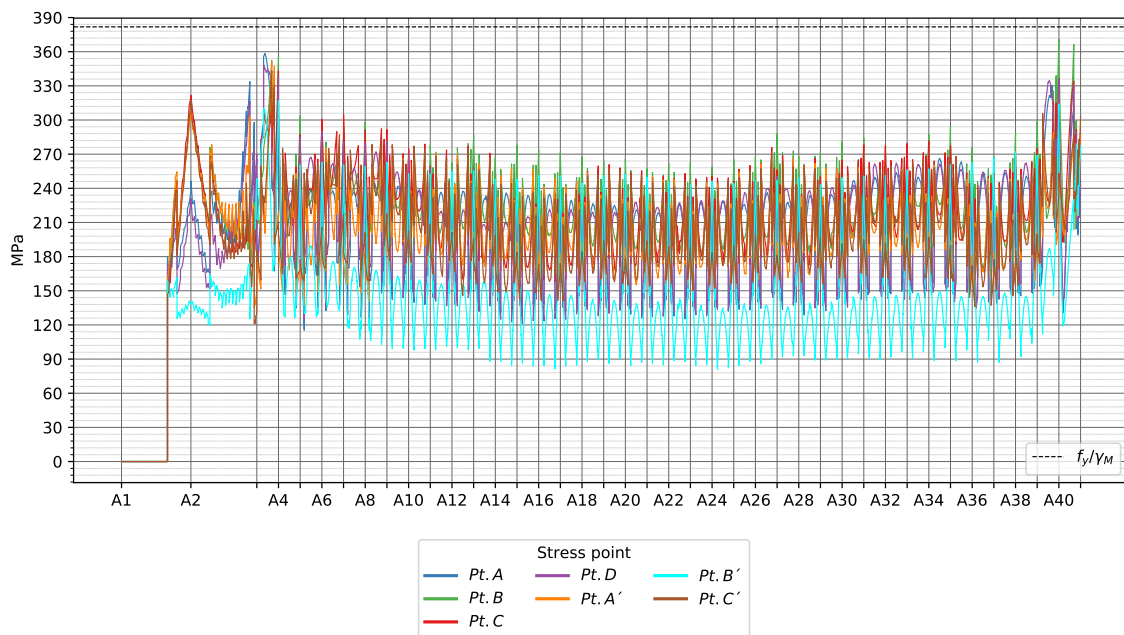


16 Von Mises Summary - Alt. (90percentile)

16.1 Total stress summary

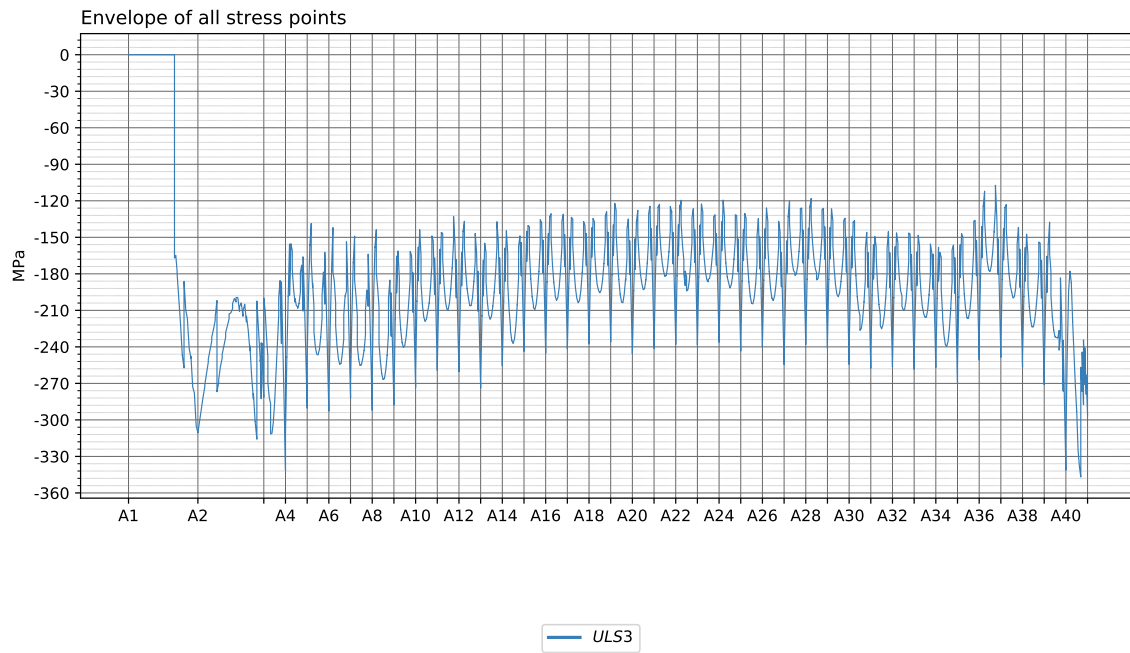


16.2 Total stress ULS3

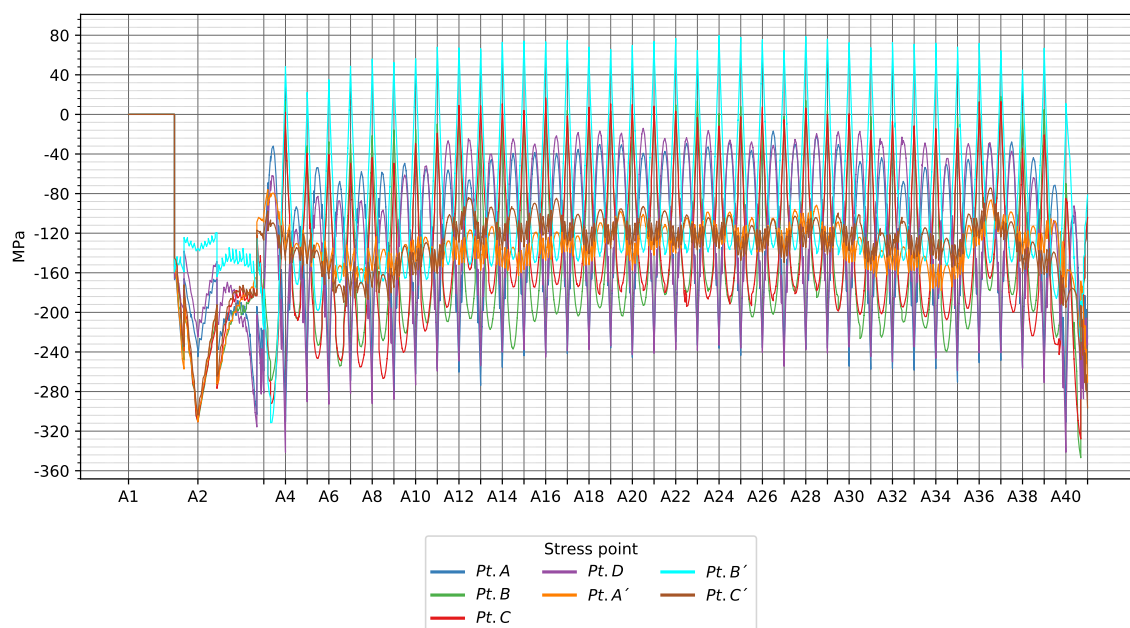


17 Min. Normal stresses Alt.

17.1 Total stress summary



17.2 Total stress ULS3



Concept development, floating bridge E39 Bjørnafjorden

Appendix G – Enclosure 5

Load combinations AUR method 10 000 year

K12_06_PROD_load_combinations_direct

June 21, 2019



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1 Load groups

1.1 Dyn env. 10k y

run case	Description
1	LC 1
2	LC 2
3	LC 3
4	LC 4

2 Load combinations

2.1 ALS

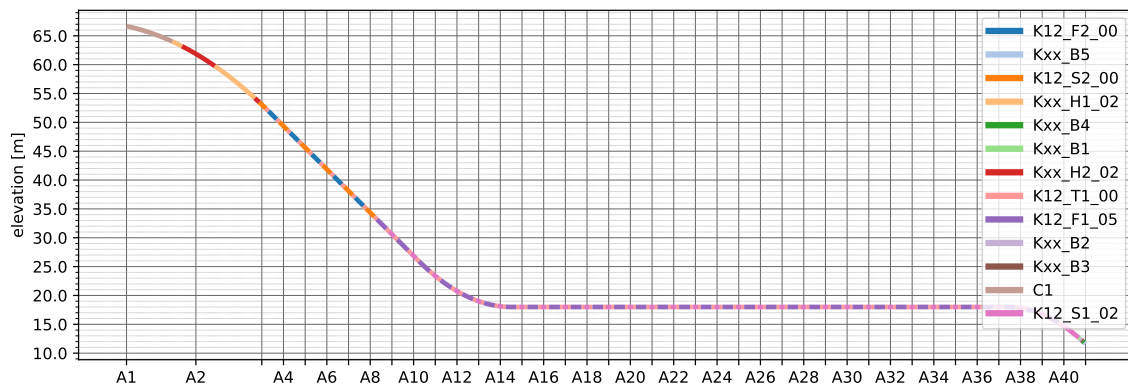
2.1.1 Load group info

load group	load_factor	return_period	system	restype	use_envelope
Dyn env. 10k y	1.0	10000	orcaflex	timeseries	False

2.1.2 Combination info

	Case 1	Case 2	Case 3	Case 4
Dyn env. 10k y	1	2	3	4

3 Section types



4 Stress point description

Stress point	Description
Pt. A	Lower flange west
Pt. B	Upper flange west
Pt. C	Upper flange east
Pt. D	Lower flange east
Pt. A'	Knuckle west
Pt. B'	Upper flange mid
Pt. C'	Knuckle east

5 Stress coefficients - ULS

Section type	Stress point	A	W_strong	W_weak	W_torsion	A_vert	
C1	Pt. A	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. B	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. C	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. D	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. A'	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. B'	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
	Pt. C'	1000000.0000	1000000.000000	1000000.000000	1000000.000000	1000000.000000	1000000.000000
K12_F1_05	Pt. A	1.2699	10.608467	-1.408093	2.252976	-0.122399	
	Pt. B	1.2699	6.275785	2.442868	2.252976	-0.083333	
	Pt. C	1.2699	-6.260940	2.663681	2.252976	0.084034	
	Pt. D	1.2699	-10.566118	-1.408093	2.252976	0.121655	
	Pt. A'	1.2699	6.275785	-4.198973	2.252976	-0.086207	
	Pt. B'	1.2699	46.182116	1.936649	3.003968	-0.813008	
	Pt. C'	1.2699	-6.260940	-4.198973	2.252976	0.087719	
K12_F2_00	Pt. A	1.3310	11.224881	-1.557238	2.628472	-0.142045	
	Pt. B	1.3310	6.638782	2.463707	2.628472	-0.098039	
	Pt. C	1.3310	-6.621120	2.672783	2.628472	0.097330	
	Pt. D	1.3310	-11.174482	-1.557238	2.628472	0.141243	
	Pt. A'	1.3310	6.638782	-5.001431	2.628472	-0.100503	
	Pt. B'	1.3310	48.906659	1.976258	3.003968	-0.826446	
	Pt. C'	1.3310	-6.621120	-5.001431	2.628472	0.101523	
K12_S1_02	Pt. A	1.7790	13.827655	-2.247520	3.759600	-1.926782	
	Pt. B	1.7790	8.178989	2.739420	2.631720	-0.312500	
	Pt. C	1.7790	-8.159645	2.936487	2.631720	0.390625	
	Pt. D	1.7790	-13.772455	-2.247520	3.759600	1.814882	
	Pt. A'	1.7790	8.178989	-9.765086	2.631720	-0.259740	
	Pt. B'	1.7790	60.196292	2.260978	3.007680	-0.884956	
	Pt. C'	1.7790	-8.159645	-9.765086	2.631720	0.268817	
K12_S2_00	Pt. A	1.8829	15.265004	-2.396543	4.135560	-1.633987	
	Pt. B	1.8829	9.023776	2.764809	3.007680	-0.306513	
	Pt. C	1.8829	-8.998449	2.957340	3.007680	0.318725	
	Pt. D	1.8829	-15.192667	-2.396543	4.135560	1.589825	
	Pt. A'	1.8829	9.023776	-11.414044	3.759600	-0.342466	
	Pt. B'	1.8829	66.537411	2.293917	3.007680	-0.892857	
	Pt. C'	1.8829	-8.998449	-11.414044	3.759600	0.351000	

Continued on r

Section type	Stress point	A	W_strong	W_weak	W_torsion	A_vert
K12_T1_00	Pt. A	1.5210	12.346024	-1.871555	3.007840	-0.289855
	Pt. B	1.5210	7.302985	2.627541	2.631860	-0.144092
	Pt. C	1.5210	-7.286791	2.833805	2.631860	0.146843
	Pt. D	1.5210	-12.299813	-1.871555	3.007840	0.287356
	Pt. A'	1.5210	7.302985	-6.757167	2.631860	-0.136293
	Pt. B'	1.5210	53.723706	2.137067	3.007840	-0.877193
	Pt. C'	1.5210	-7.286791	-6.757167	2.631860	0.139110
Kxx_B1	Pt. A	2.0900	17.100000	-2.760000	4.870000	0.320000
	Pt. B	2.0900	11.900000	3.390000	4.870000	0.320000
	Pt. C	2.0900	-11.900000	3.390000	4.870000	0.320000
	Pt. D	2.0900	-17.100000	-2.760000	4.870000	0.320000
	Pt. A'	2.0900	11.900000	-6.410000	4.870000	0.320000
	Pt. B'	2.0900	0.000000	2.760000	4.870000	0.320000
	Pt. C'	2.0900	-11.900000	-6.410000	4.870000	0.320000
Kxx_B2	Pt. A	2.2800	18.900000	-3.160000	5.500000	0.320000
	Pt. B	2.2800	14.800000	3.680000	5.500000	0.320000
	Pt. C	2.2800	-14.800000	3.680000	5.500000	0.320000
	Pt. D	2.2800	-18.900000	-3.160000	5.500000	0.320000
	Pt. A'	2.2800	14.800000	-5.040000	5.500000	0.320000
	Pt. B'	2.2800	0.000000	2.950000	5.500000	0.320000
	Pt. C'	2.2800	-14.800000	-5.040000	5.500000	0.320000
Kxx_B3	Pt. A	2.8000	24.400000	-4.240000	9.200000	0.400000
	Pt. B	2.8000	19.400000	4.570000	9.200000	0.400000
	Pt. C	2.8000	-19.400000	4.570000	9.200000	0.400000
	Pt. D	2.8000	-24.400000	-4.240000	9.200000	0.400000
	Pt. A'	2.8000	19.400000	-4.240000	9.200000	0.400000
	Pt. B'	2.8000	0.000000	3.690000	9.200000	0.400000
	Pt. C'	2.8000	-19.400000	-4.240000	9.200000	0.400000
Kxx_B4	Pt. A	3.3400	28.200000	-5.240000	9.900000	0.480000
	Pt. B	3.3400	24.800000	5.590000	9.900000	0.480000
	Pt. C	3.3400	-24.800000	5.590000	9.900000	0.480000
	Pt. D	3.3400	-28.200000	-5.240000	9.900000	0.480000
	Pt. A'	3.3400	24.800000	-4.510000	9.900000	0.480000
	Pt. B'	3.3400	0.000000	4.550000	9.900000	0.480000
	Pt. C'	3.3400	-24.800000	-4.510000	9.900000	0.480000
Kxx_B5	Pt. A	3.4800	35.600000	-5.580000	10.400000	0.480000
	Pt. B	3.4800	25.700000	5.930000	10.400000	0.480000
	Pt. C	3.4800	-25.700000	5.930000	10.400000	0.480000
	Pt. D	3.4800	-35.600000	-5.980000	10.400000	0.480000
	Pt. A'	3.4800	25.700000	-4.800000	10.400000	0.480000
	Pt. B'	3.4800	0.000000	4.820000	10.400000	0.480000
	Pt. C'	3.4800	-25.700000	-4.820000	10.400000	0.480000
Kxx_H1_02	Pt. A	1.2970	11.234910	-1.236506	1.930800	-0.102354
	Pt. B	1.2970	6.634875	2.309572	2.574400	-0.093979
	Pt. C	1.2970	-6.610869	2.569574	1.930800	0.095663
	Pt. D	1.2970	-11.148176	-1.236506	1.930800	0.102145
	Pt. A'	1.2970	6.634875	-5.097787	1.930800	-0.067227
	Pt. B'	1.2970	49.219901	1.731784	2.574400	-0.699301
	Pt. C'	1.2970	-6.610869	-5.097787	1.930800	0.077519
Kxx_H2_02	Pt. A	1.7969	15.469710	-1.928723	3.218000	-0.170940
	Pt. B	1.7969	9.134266	2.872534	3.218000	-0.134138

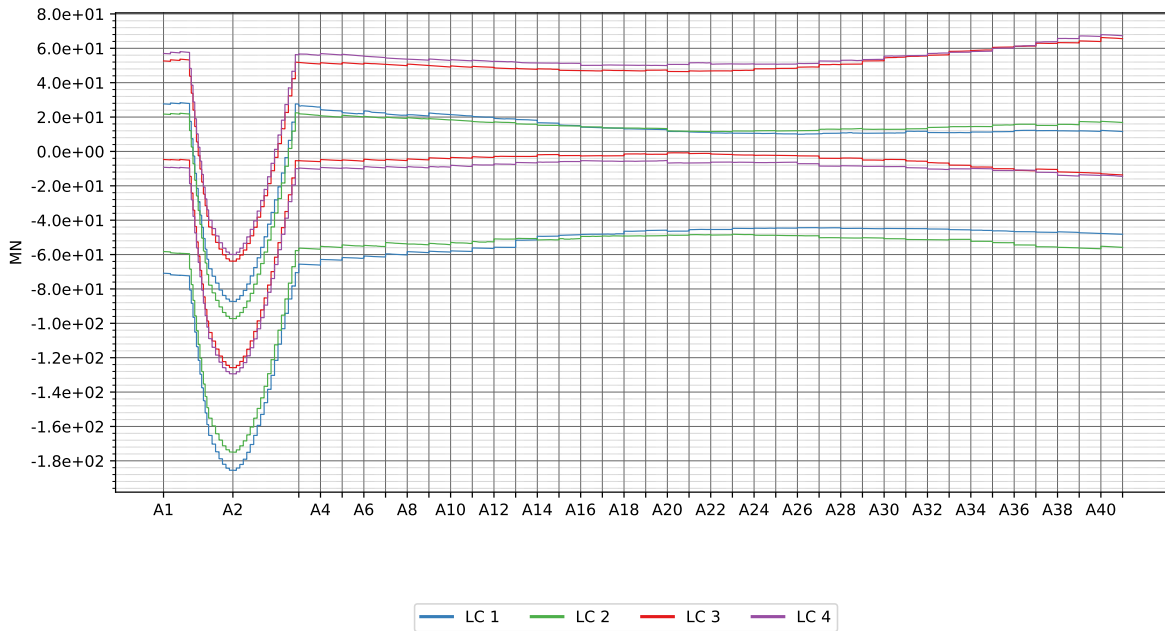
Continued on r

Section type	Stress point	A	W_strong	W_weak	W_torsion	A_vert
	Pt. C	1.7969	-9.097883	3.148356	3.218000	0.133869
	Pt. D	1.7969	-15.365641	-1.928723	3.218000	0.170358
	Pt. A'	1.7969	9.134266	-11.129969	3.218000	-0.107701
	Pt. B'	1.7969	67.657707	2.228720	3.218000	-0.884956
	Pt. C'	1.7969	-9.097883	-11.129969	3.218000	0.109469

6 Results per load group (characteristic values)

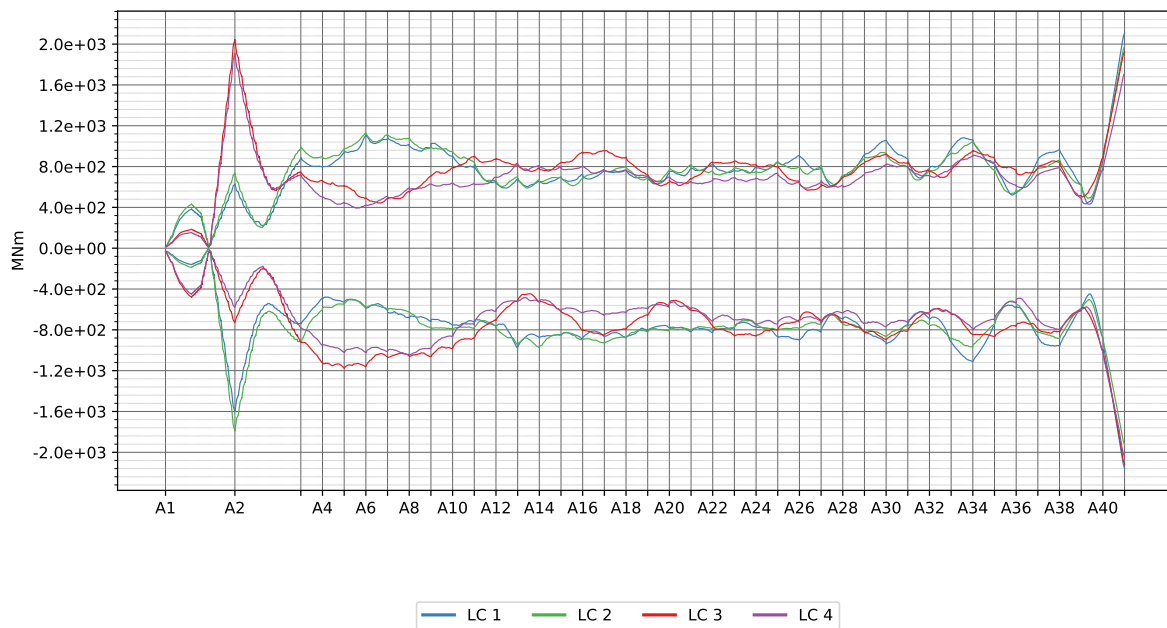
6.1 Axial force

6.1.1 Dyn env. 10k y



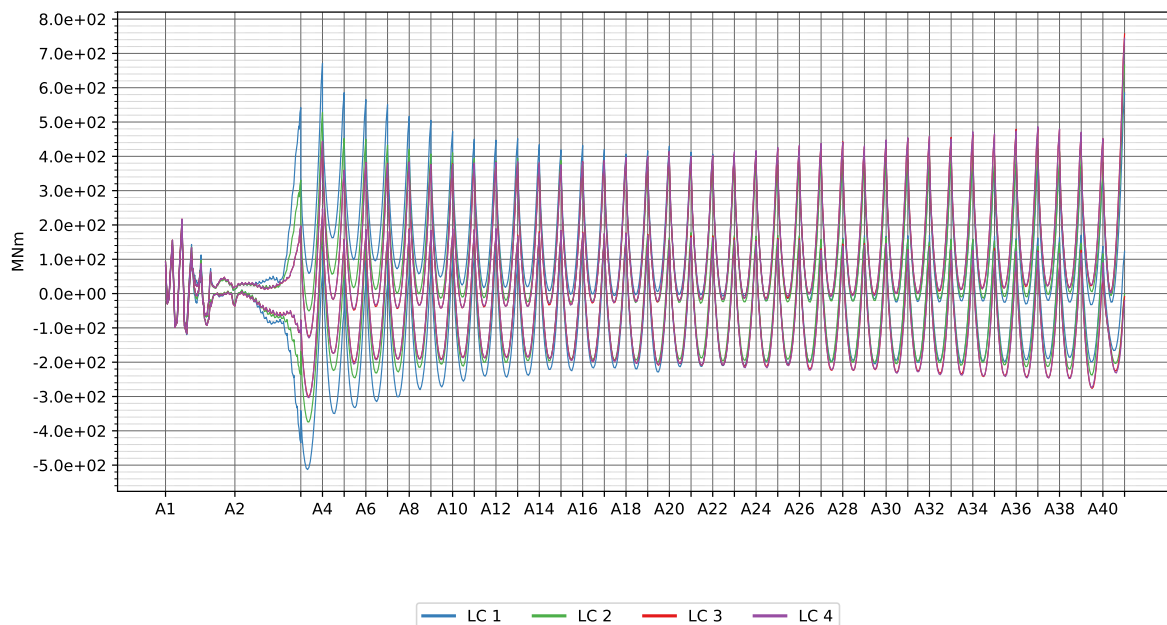
6.2 Bending moment about strong axis

6.2.1 Dyn env. 10k y



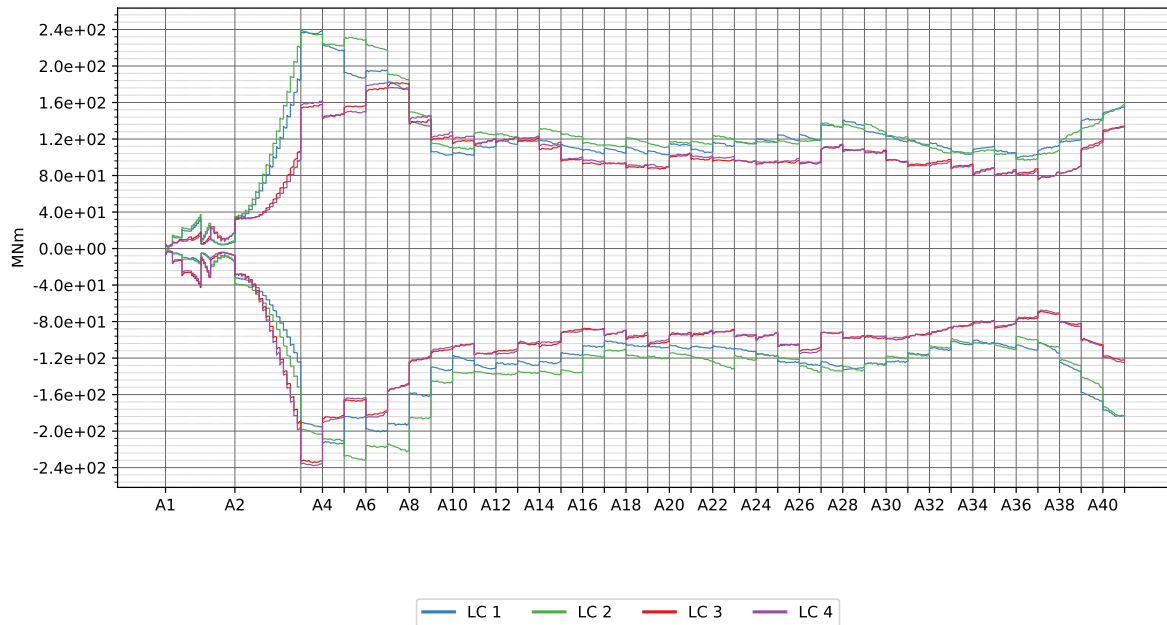
6.3 Bending moment about weak axis

6.3.1 Dyn env. 10k y



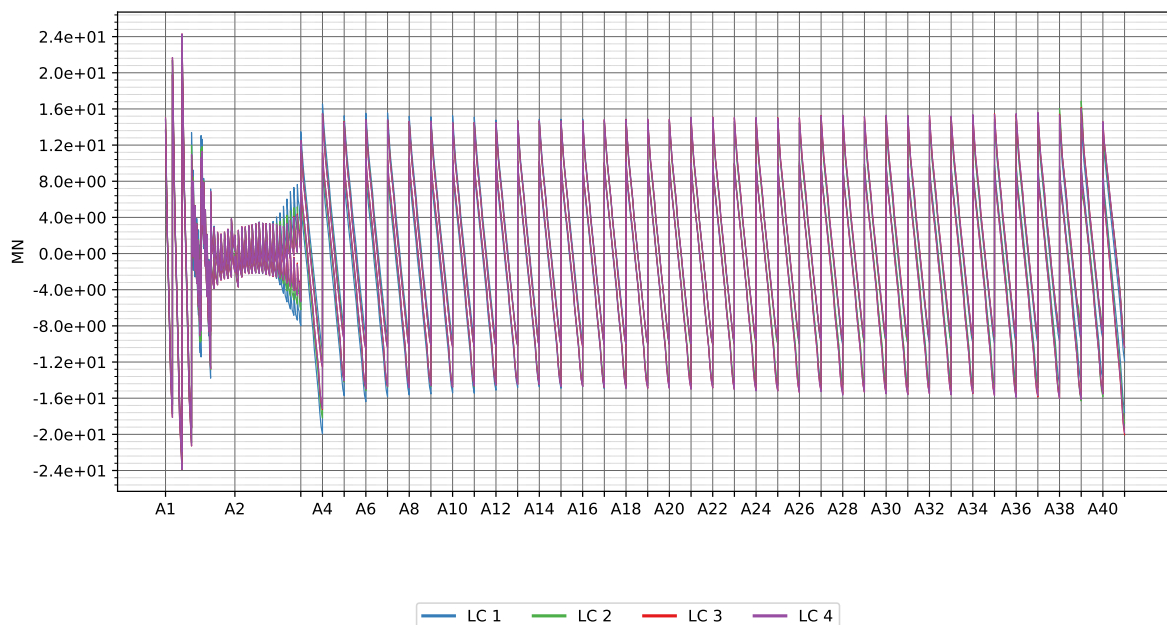
6.4 Torsional moment

6.4.1 Dyn env. 10k y



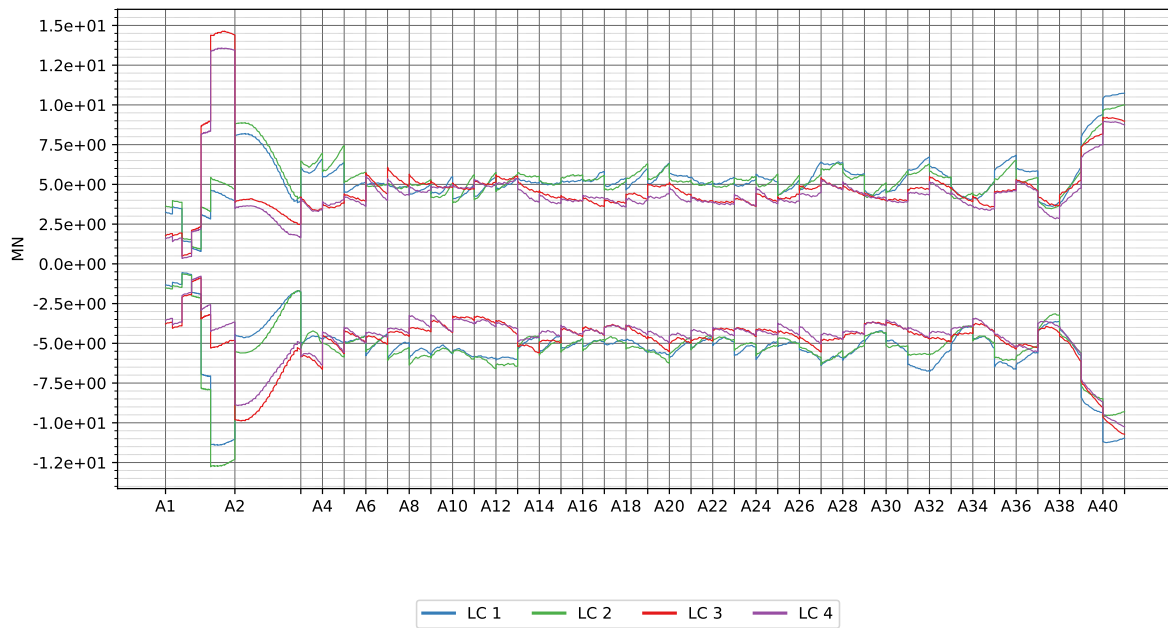
6.5 Vertical shear force

6.5.1 Dyn env. 10k y



6.6 Transverse shear force

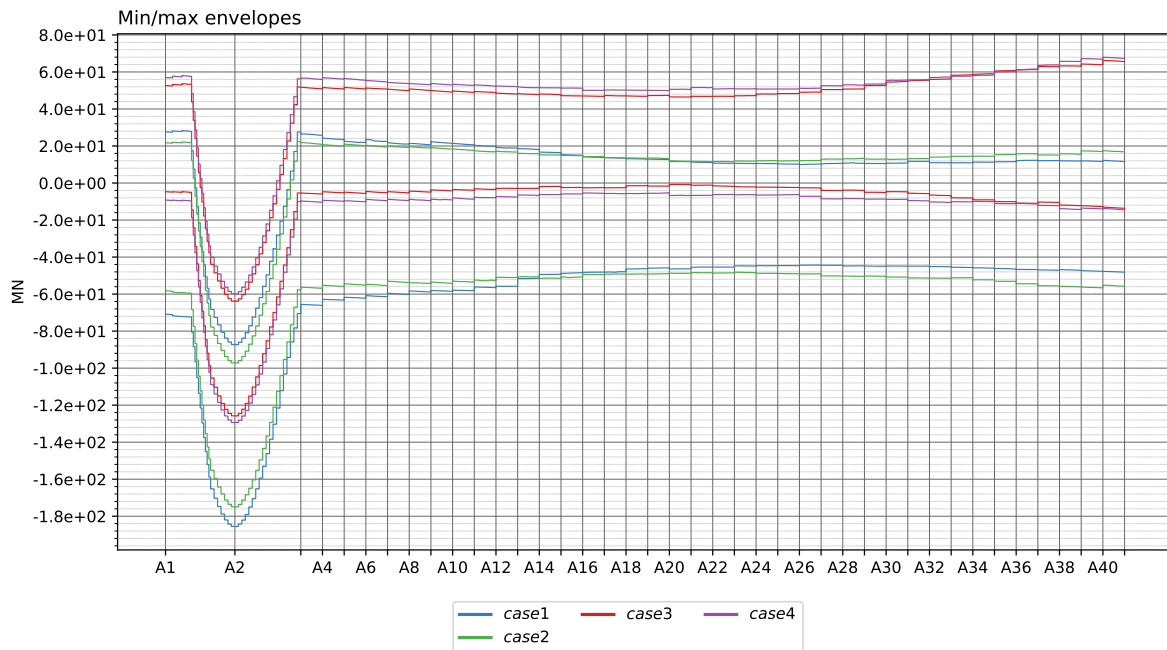
6.6.1 Dyn env. 10k y



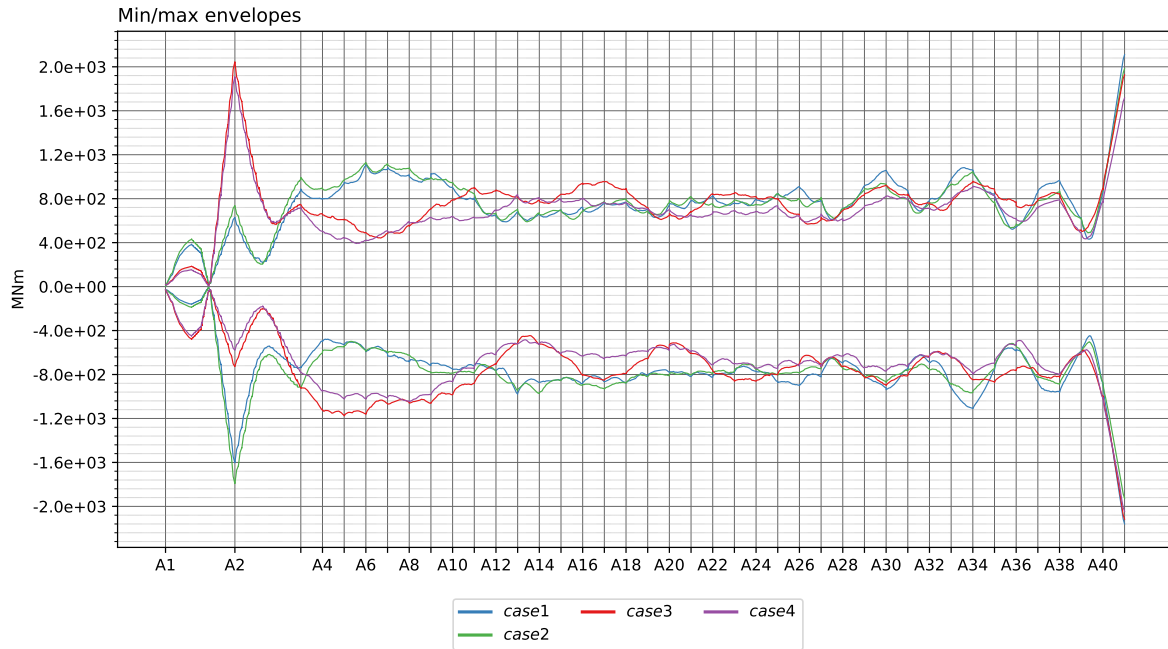
7 Combined results (incl. load factors)

7.1 ALS

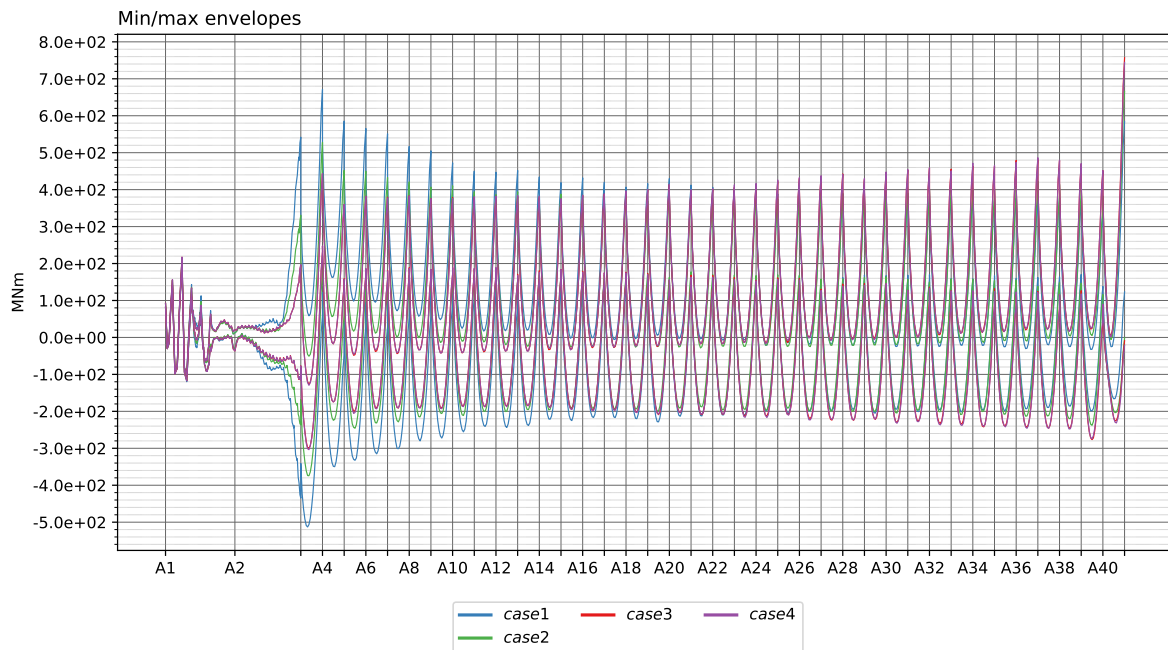
7.1.1 Axial force



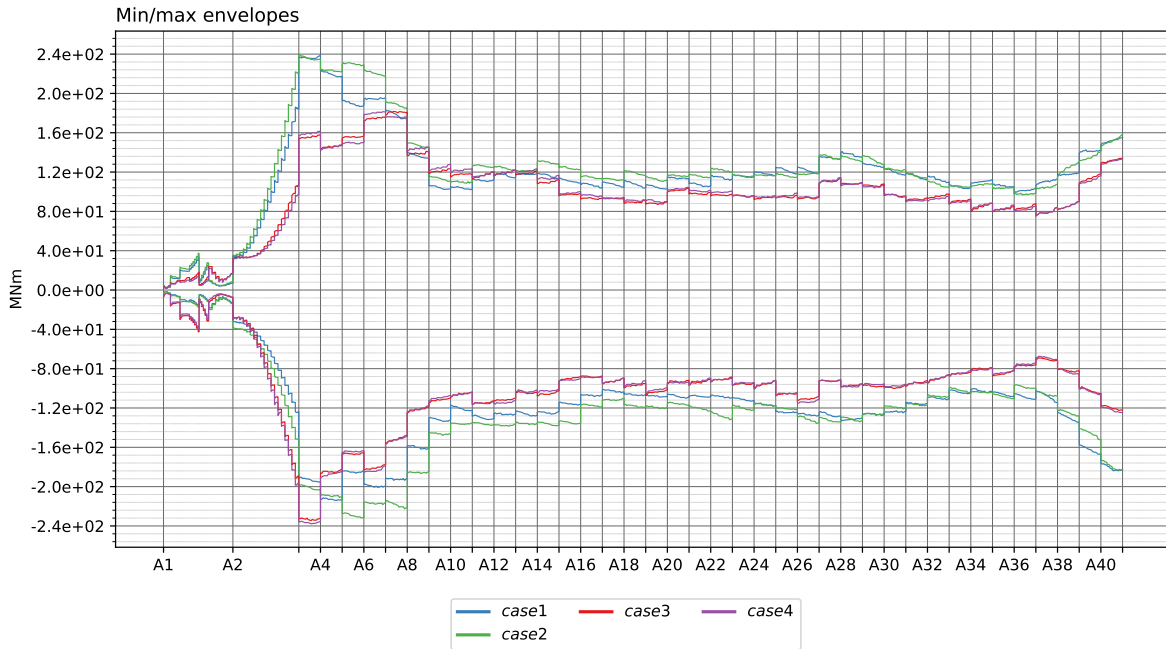
7.1.2 Bending moment about strong axis



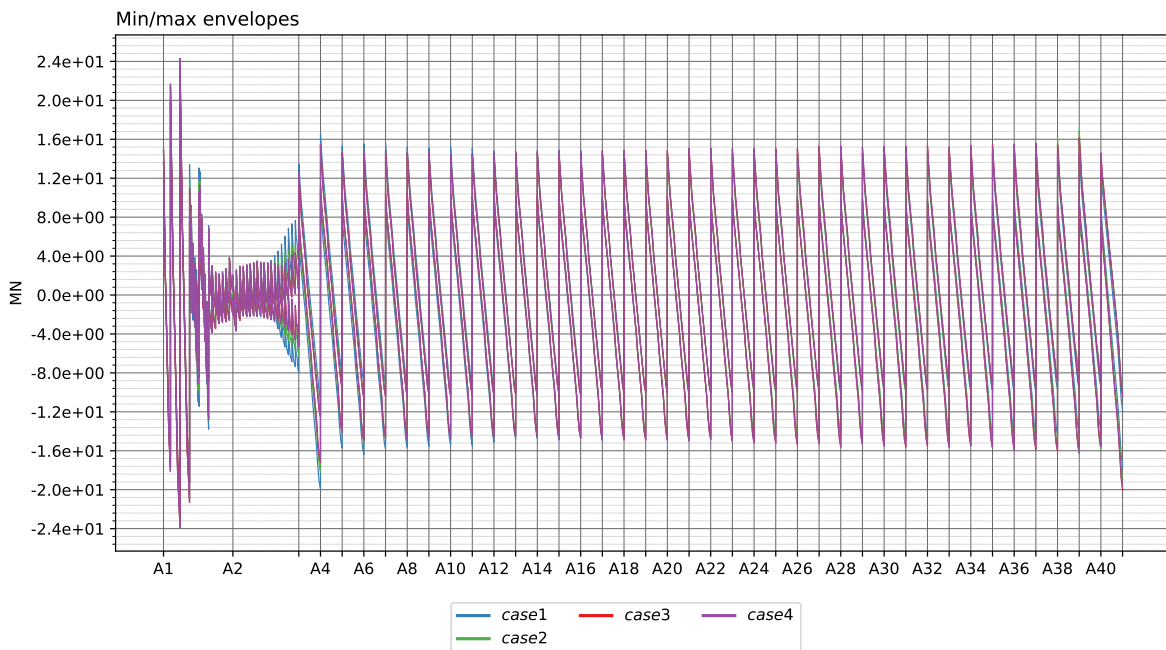
7.1.3 Bending moment about weak axis



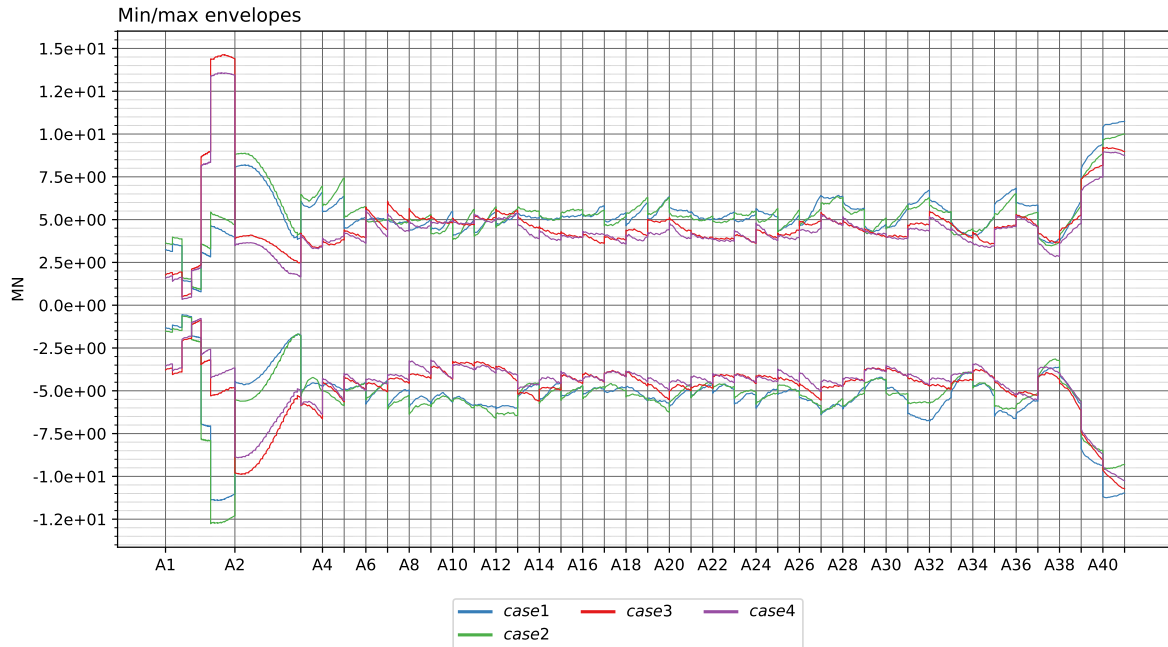
7.1.4 Torsional moment



7.1.5 Vertical shear force

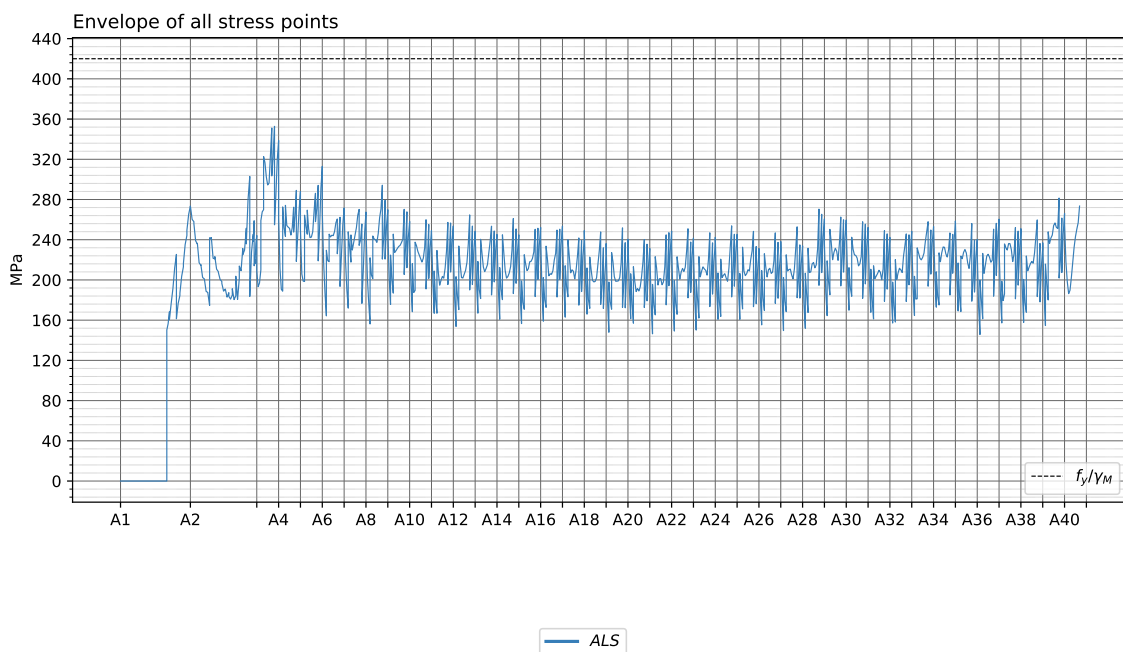


7.1.6 Transverse shear force

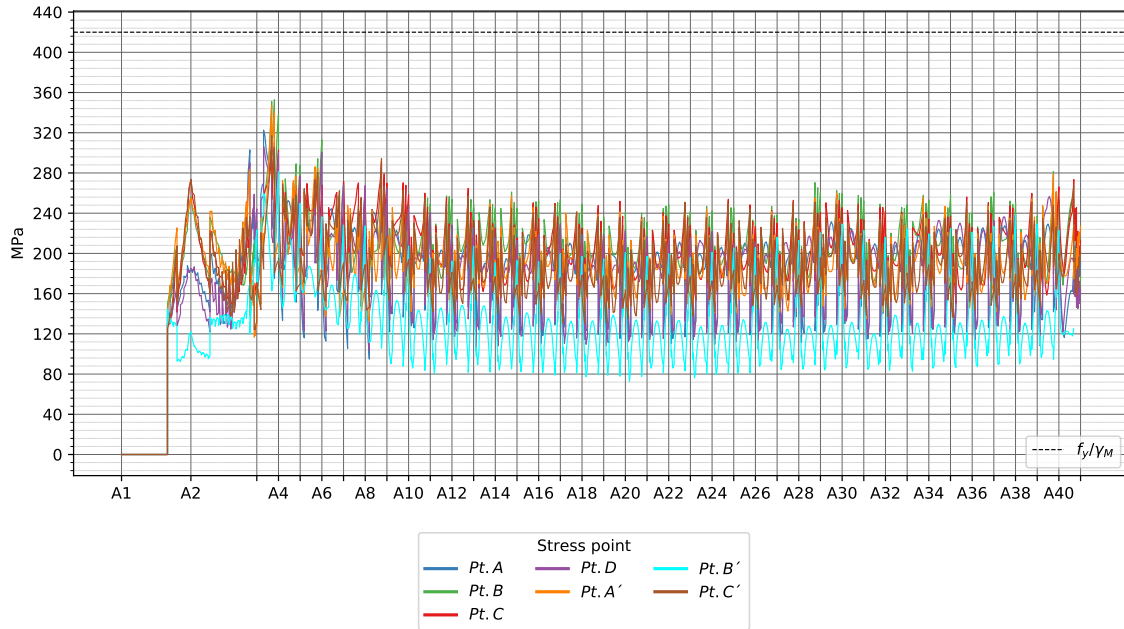


8 Von Mises Summary

8.1 Total stress summary

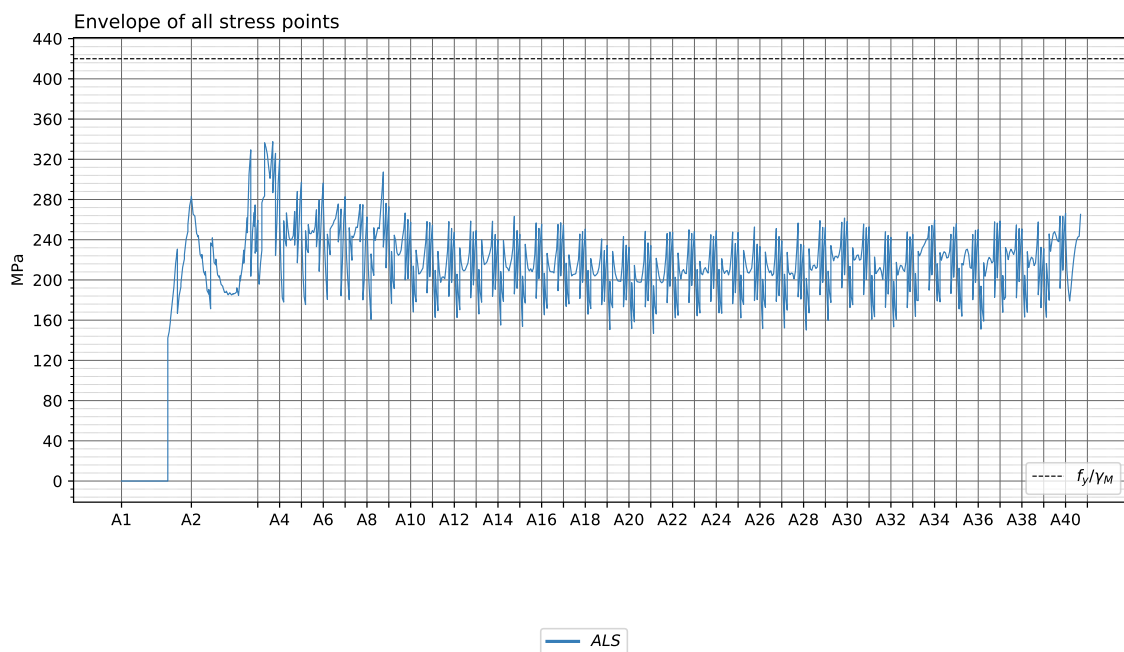


8.2 Total stress ALS

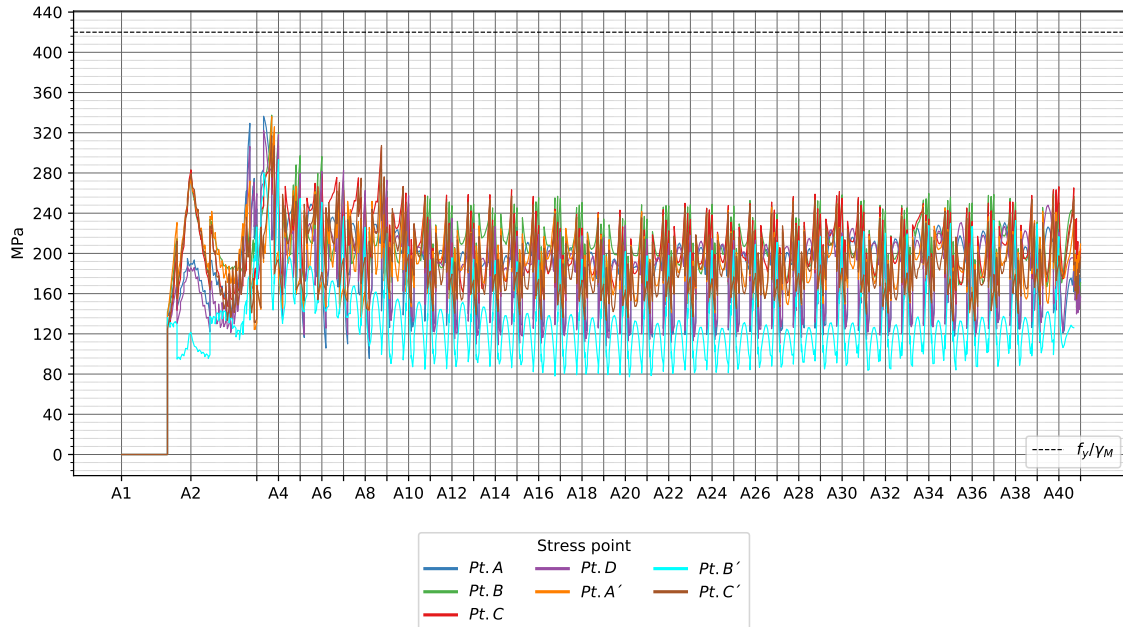


9 Von Mises Summary (95percentile)

9.1 Total stress summary

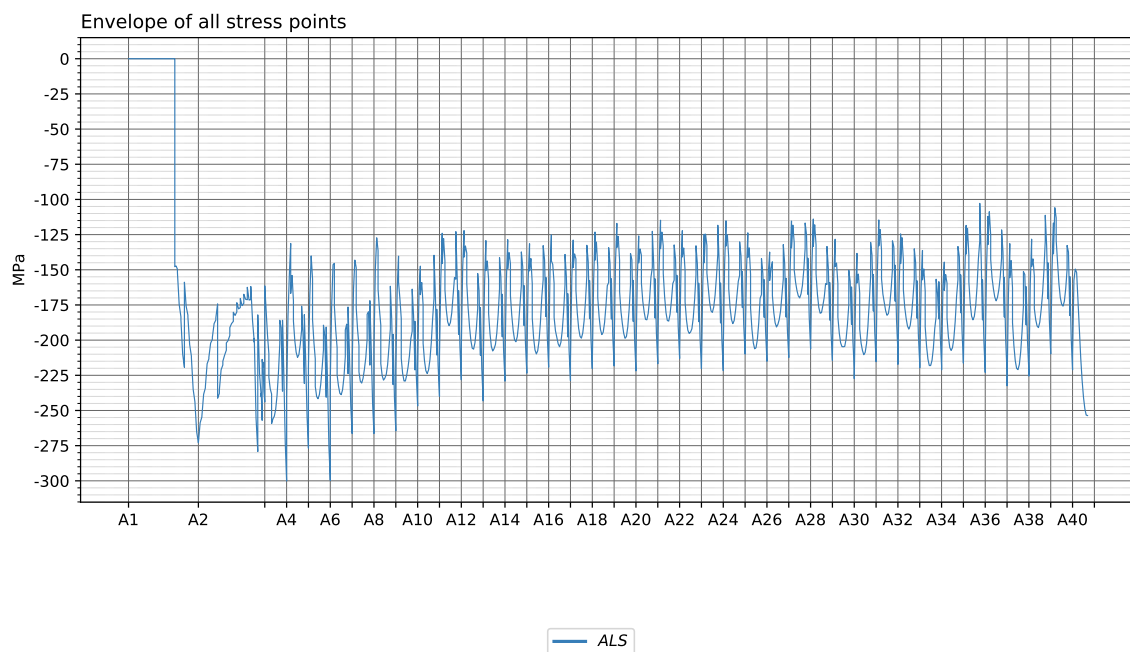


9.2 Total stress ALS

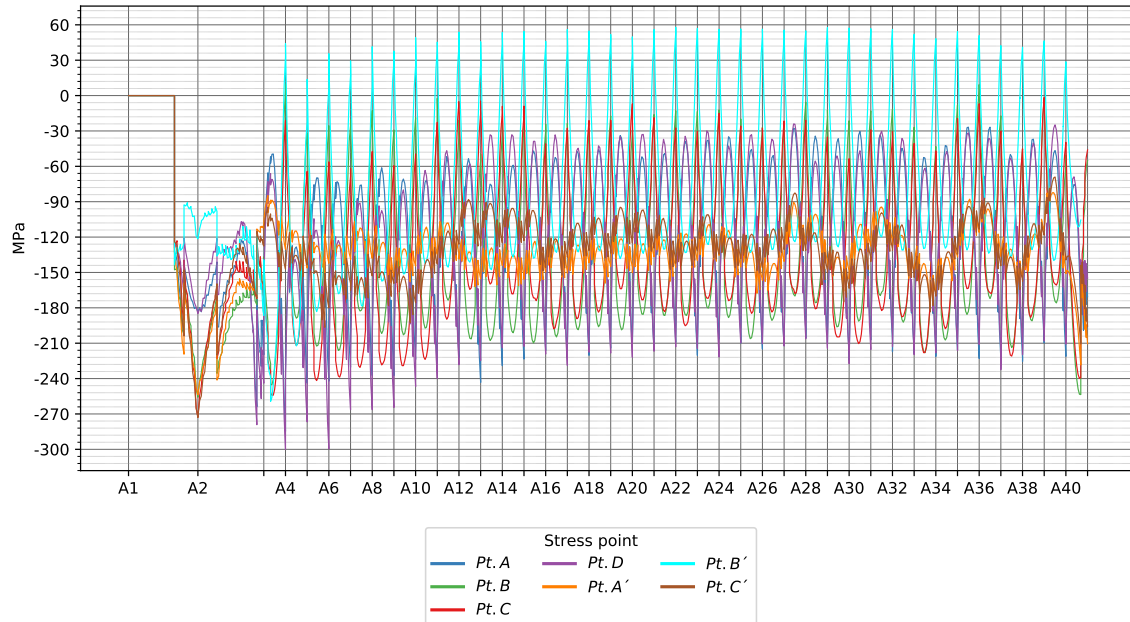


10 Min. Normal stresses

10.1 Total stress summary

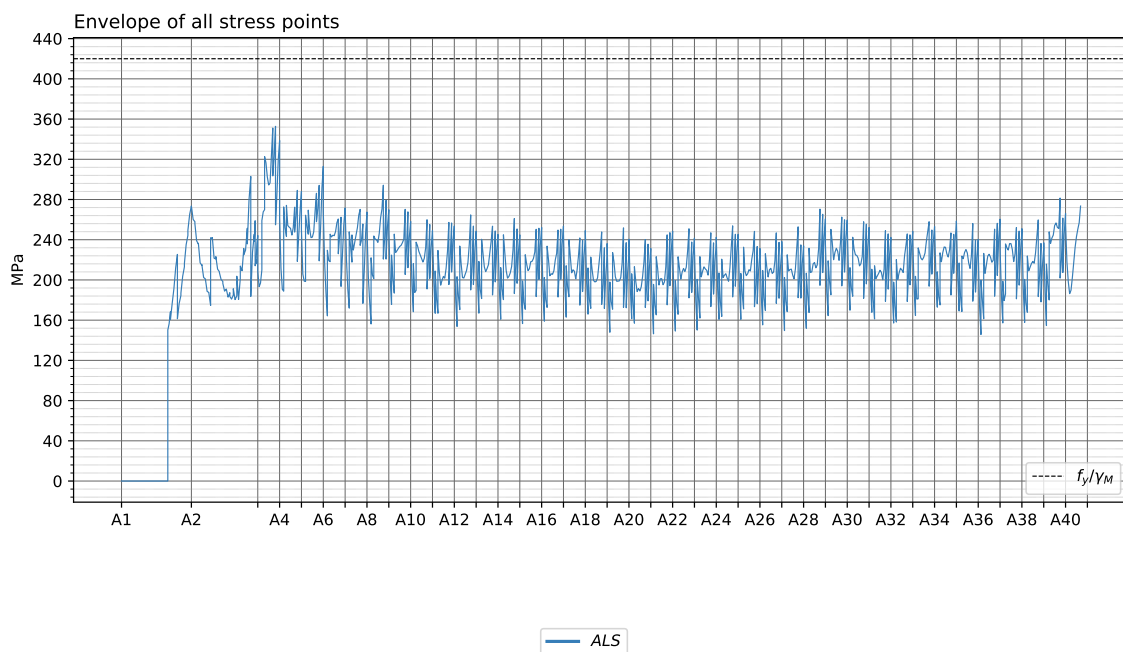


10.2 Total stress ALS

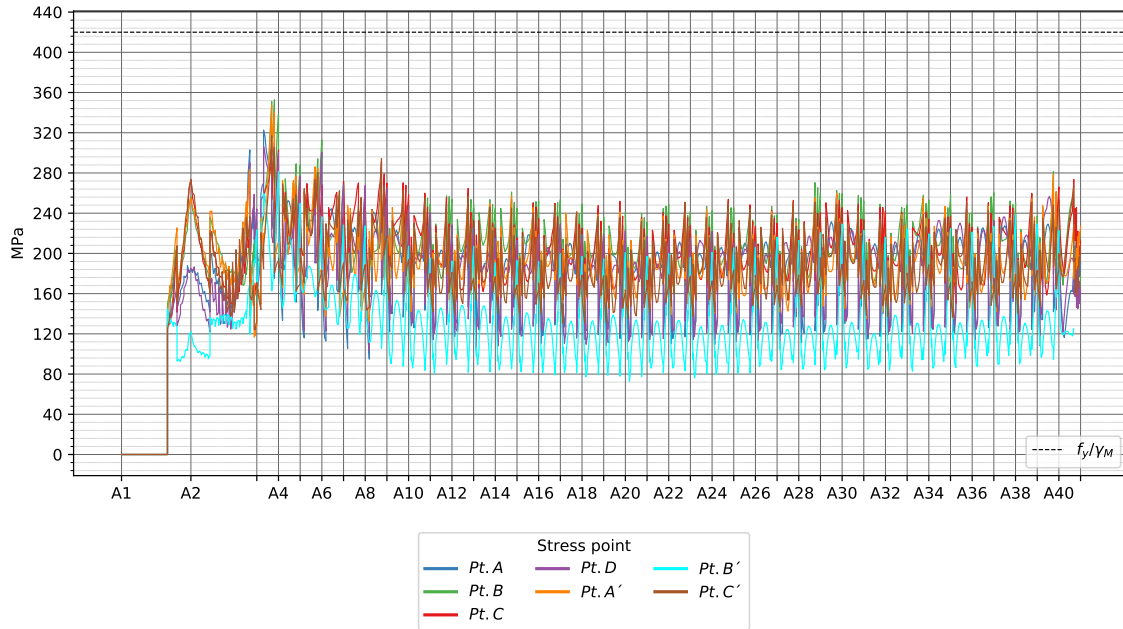


11 Von Mises Summary - Alt.

11.1 Total stress summary

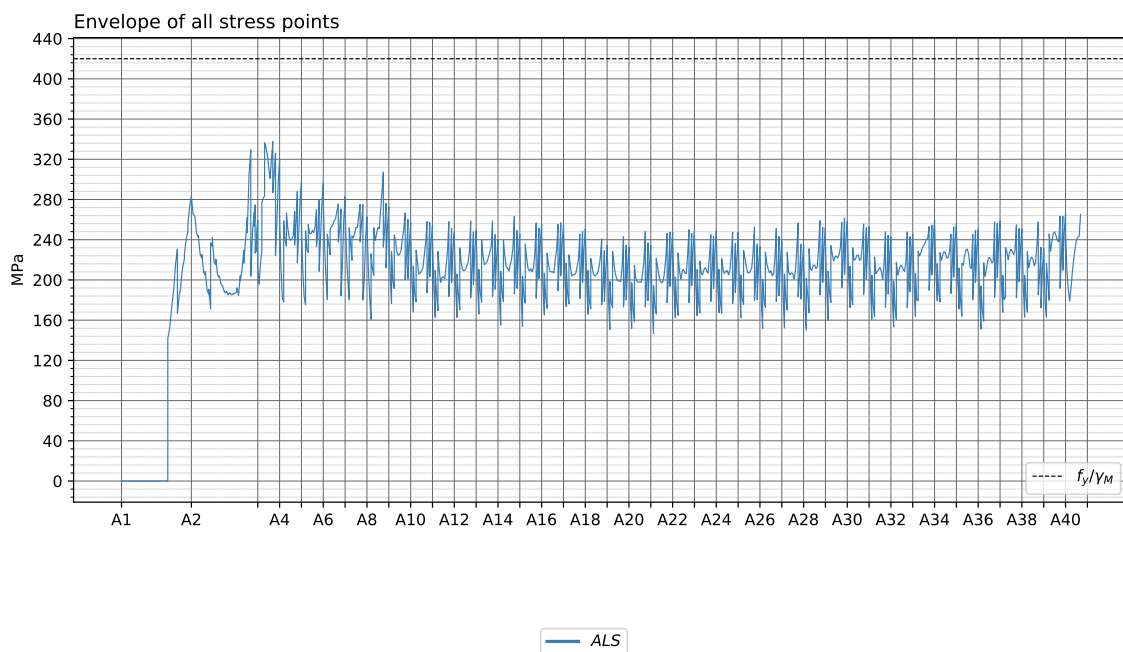


11.2 Total stress ALS

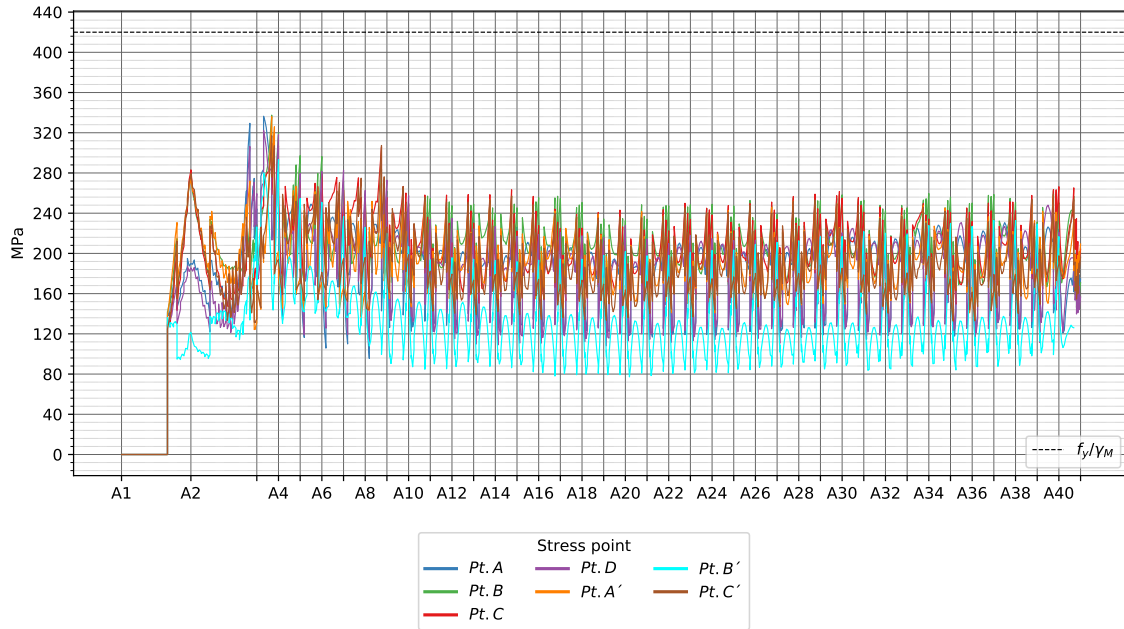


12 Von Mises Summary - Alt. (95percentile)

12.1 Total stress summary

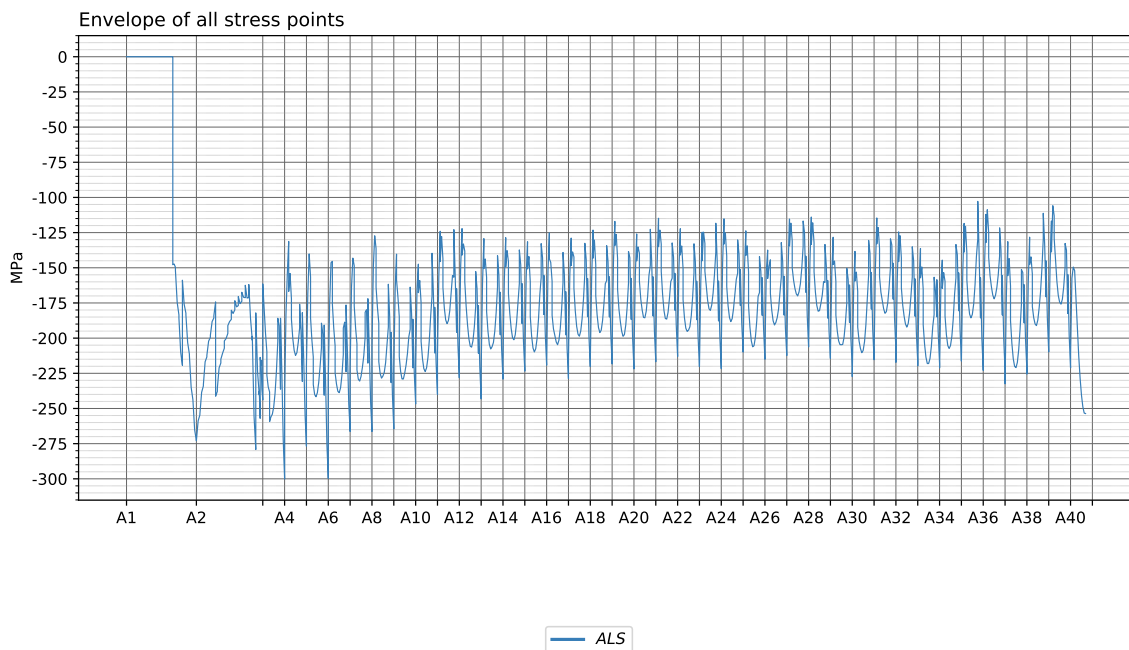


12.2 Total stress ALS

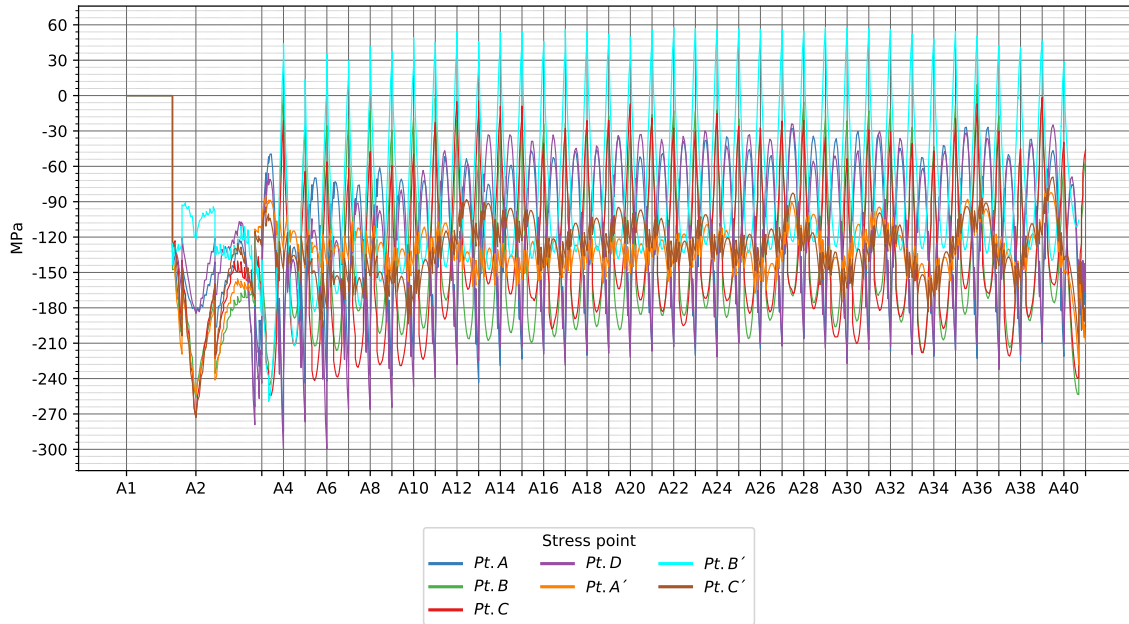


13 Min. Normal stresses Alt.

13.1 Total stress summary



13.2 Total stress ALS



Concept development, floating bridge E39 Bjørnafjorden

Appendix G – Enclosure 6

Screening windsea 1year

K12_07_SC_windsea_screening_1yr_rose_plots

July 3, 2019



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1 Bridge girder Axial force

