

FS 2023 Chassis FEA

Using FEA, this report details the results of different load cases on the chassis and compares the 2022 chassis with the new 2023 chassis. The images of the FEA results will show highly exaggerated deformations.

The following are the studied load cases:

1. Static (1g)
2. Forward Acceleration (5g)
3. Braking (5g)
4. Frontal Impact (30g)
5. Bump on one front wheel (5g)
6. Bump on one rear wheel (5g)
7. Bump on both front wheels (5g)
8. Bump on both rear wheels (5g)
9. Bump on all wheels (5g)
10. Bump on front and rear wheels on one side (5g)
11. Turning with uniform centripetal acceleration (3g)
12. Turning with loaded front wheels (3g)
13. Skidding (3g)

Static (1g)

2023 Chassis

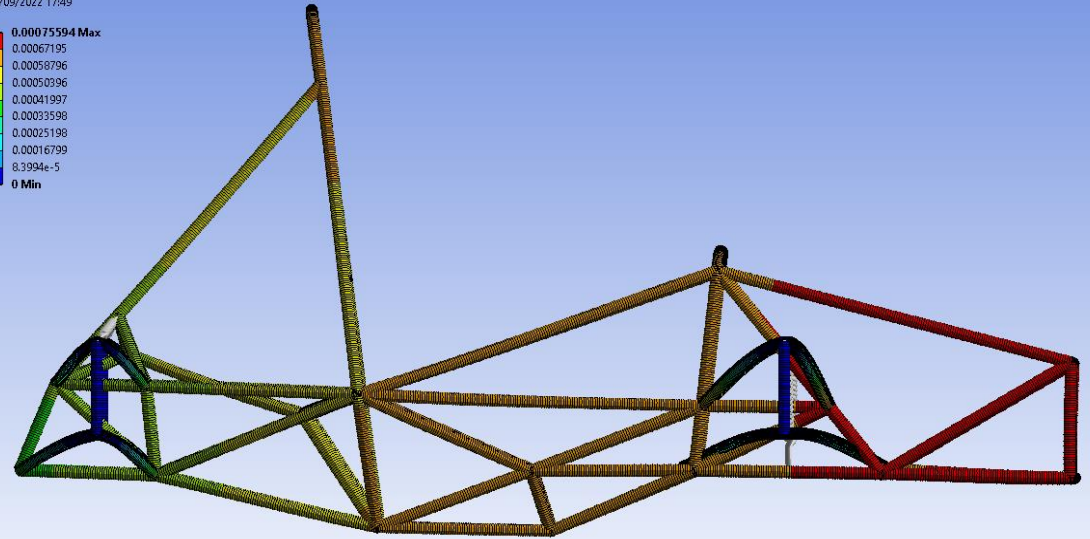
U: Final - Static
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 17:49

0.00075594 Max
0.00067195
0.00058796
0.00050396
0.00041997
0.00033598
0.00025198
0.00016799
8.3994e-5
0 Min



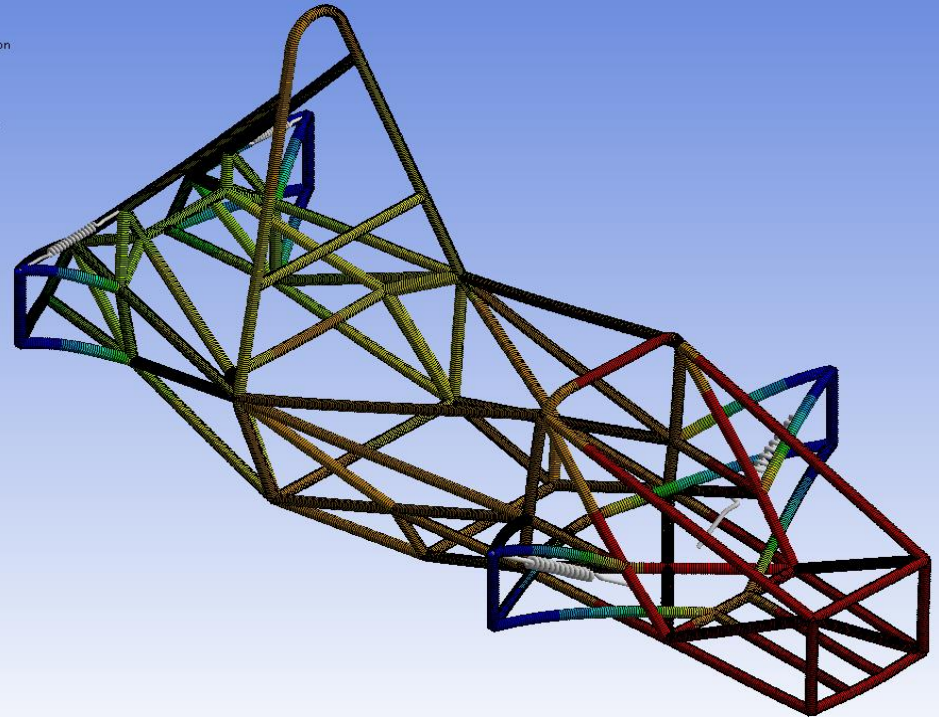
U: Final - Static
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 17:49

0.00075594 Max
0.00067195
0.00058796
0.00050396
0.00041997
0.00033598
0.00025198
0.00016799
8.3994e-5
0 Min



U: Final - Static
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 17:50

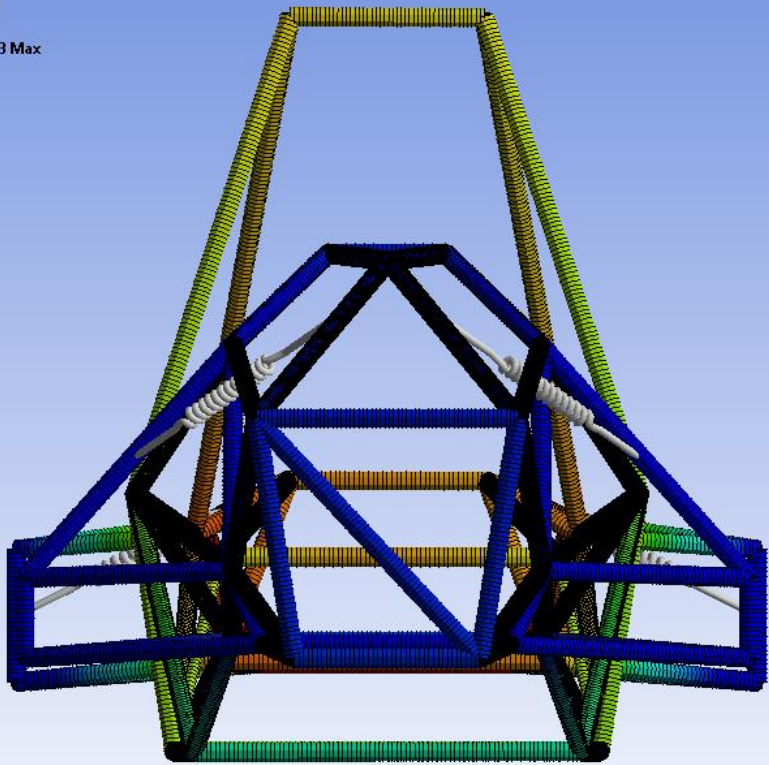
0.00075594 Max
0.00067195
0.00058796
0.00050396
0.00041997
0.00033598
0.00025198
0.00016799
8.3994e-5
0 Min



2022 Chassis

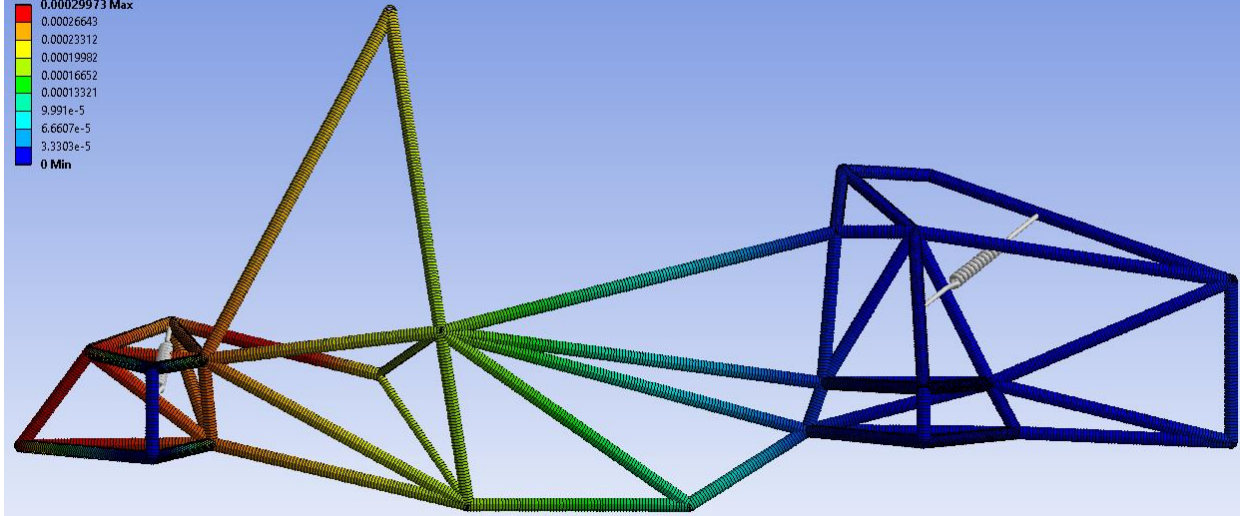
AH: Original - Static
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 12:21

0.00029973 Max
0.00026643
0.00023312
0.00019982
0.00016652
0.00013321
9.991e-5
6.6607e-5
3.3303e-5
0 Min



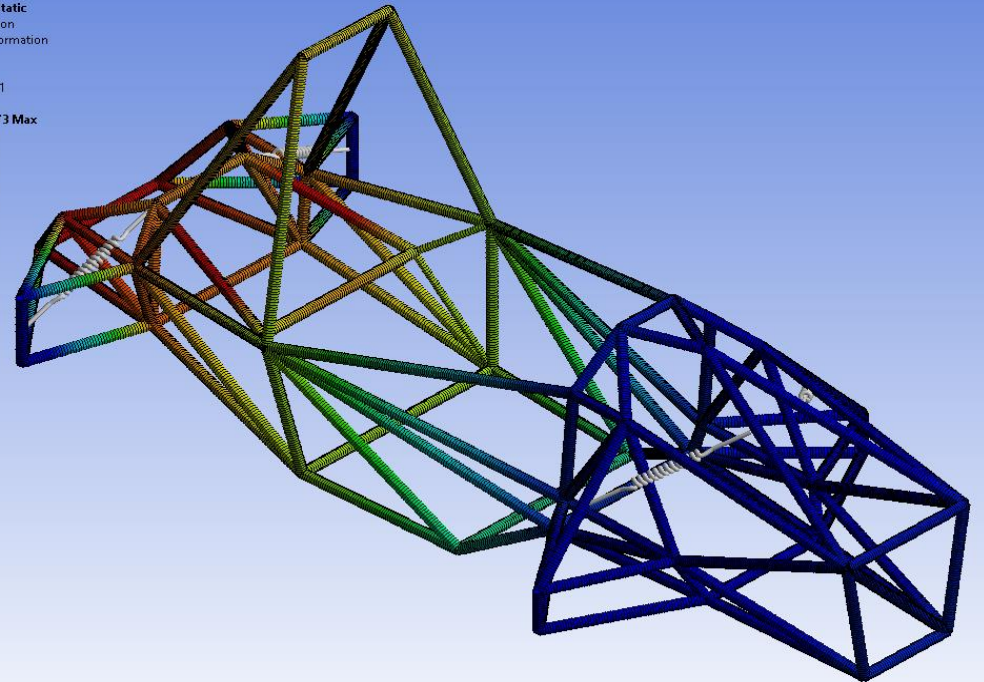
AH: Original - Static
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 12:21

0.00029973 Max
0.00026643
0.00023312
0.00019982
0.00016652
0.00013321
9.991e-5
6.6607e-5
3.3303e-5
0 Min



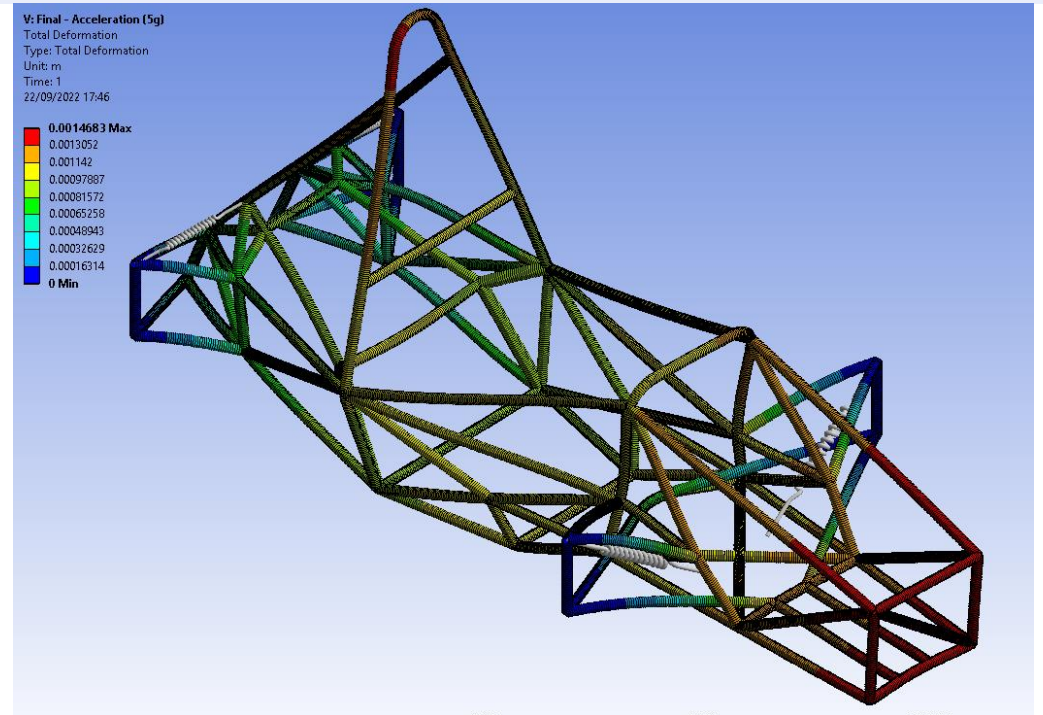
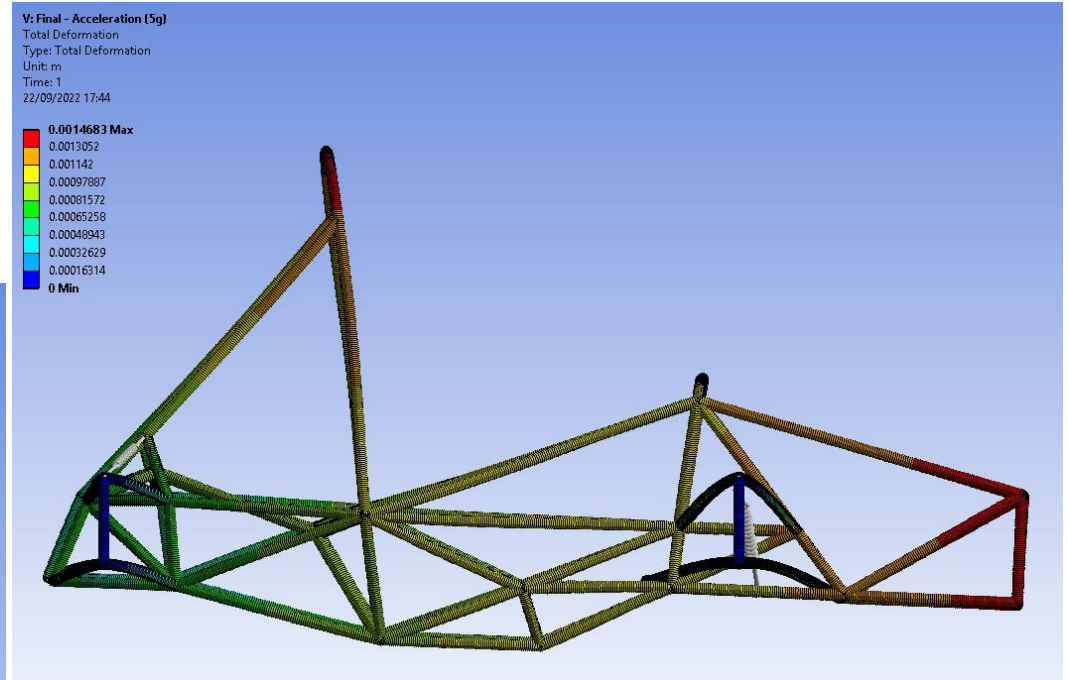
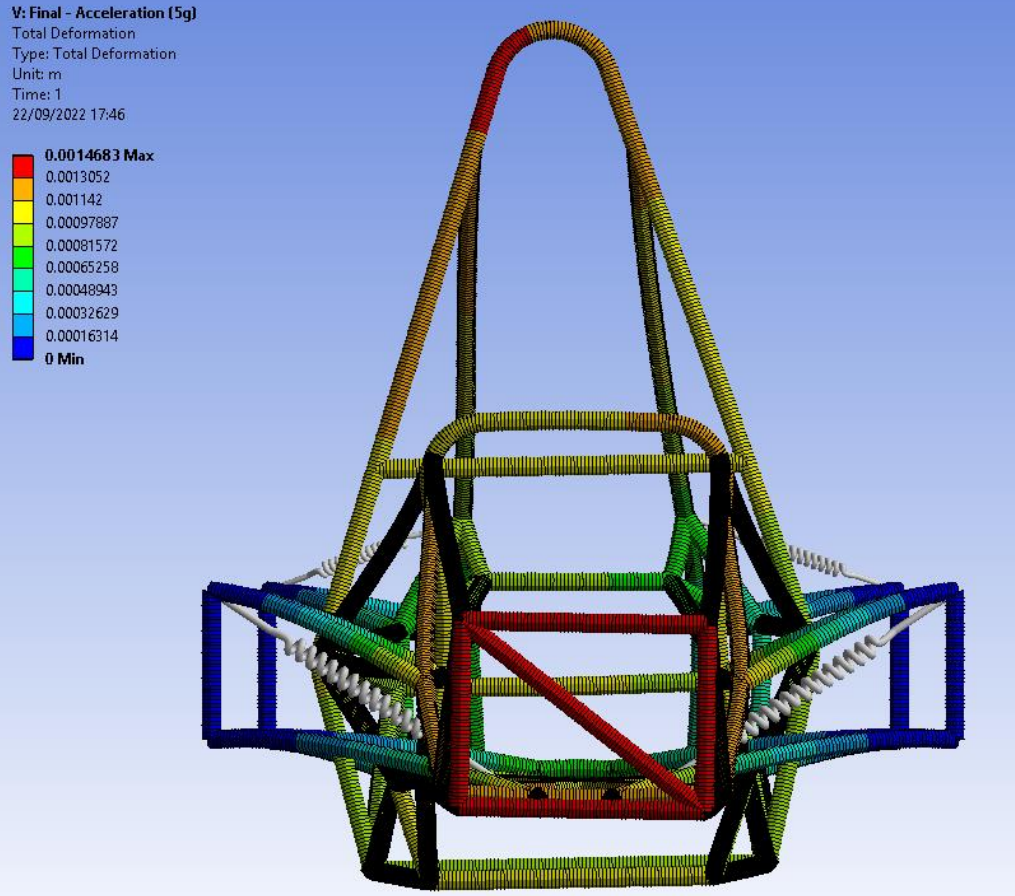
AH: Original - Static
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 12:21

0.00029973 Max
0.00026643
0.00023312
0.00019982
0.00016652
0.00013321
9.991e-5
6.6607e-5
3.3303e-5
0 Min



Forward Acceleration (5g)

2023 Chassis

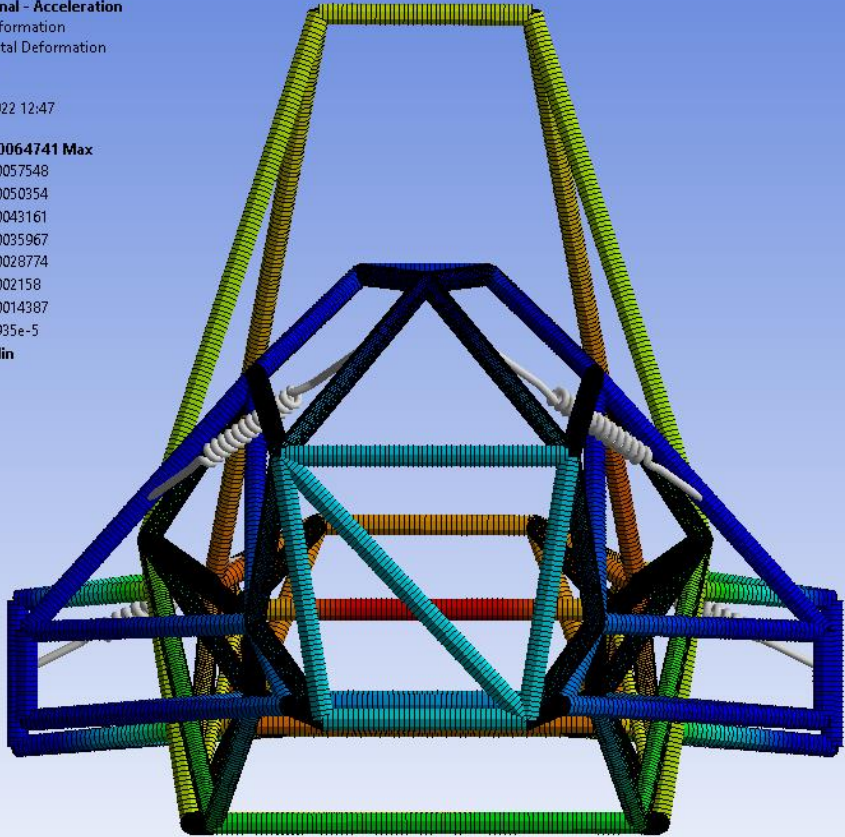


2022 Chassis

AI: Original - Acceleration

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 12:47

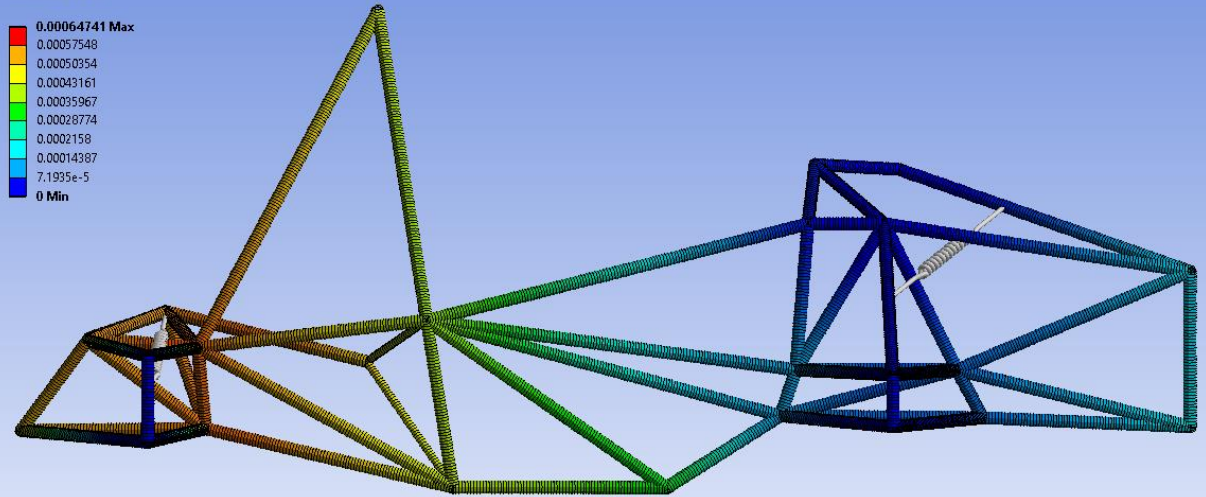
0.00064741 Max
0.00057548
0.00050354
0.00043161
0.00035967
0.00028774
0.0002158
0.00014387
7.1935e-5
0 Min



AI: Original - Acceleration

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 12:47

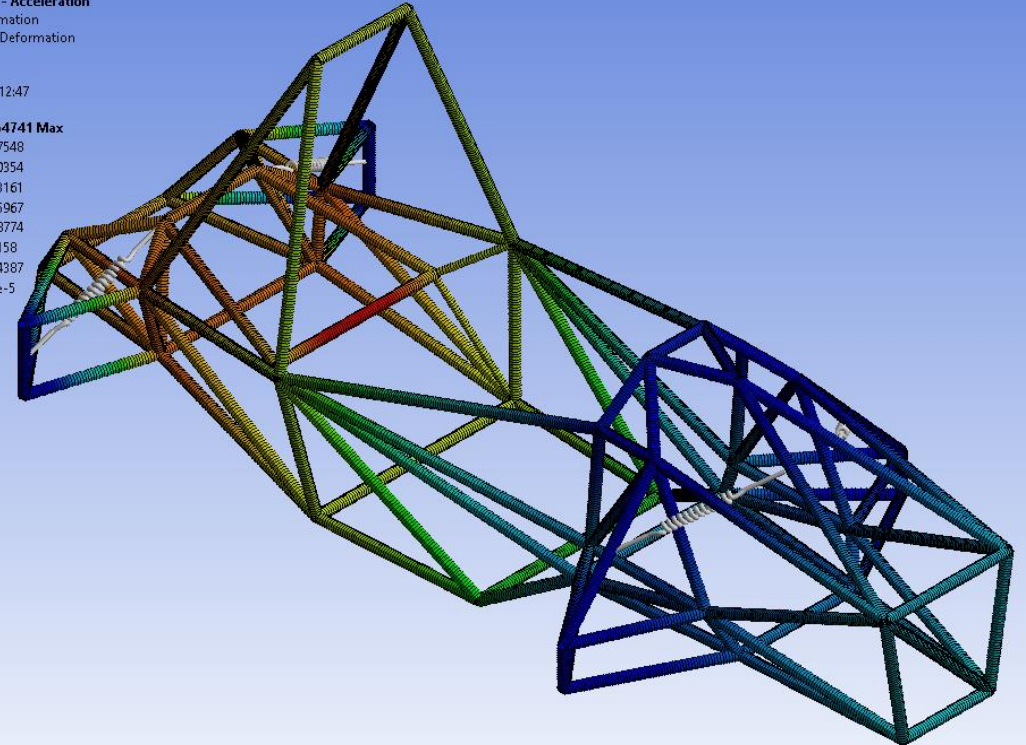
0.00064741 Max
0.00057548
0.00050354
0.00043161
0.00035967
0.00028774
0.0002158
0.00014387
7.1935e-5
0 Min



AI: Original - Acceleration

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 12:47

0.00064741 Max
0.00057548
0.00050354
0.00043161
0.00035967
0.00028774
0.0002158
0.00014387
7.1935e-5
0 Min

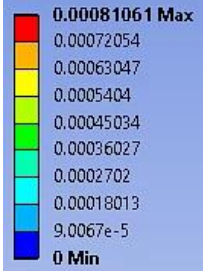


Braking (5g)

2023 Chassis

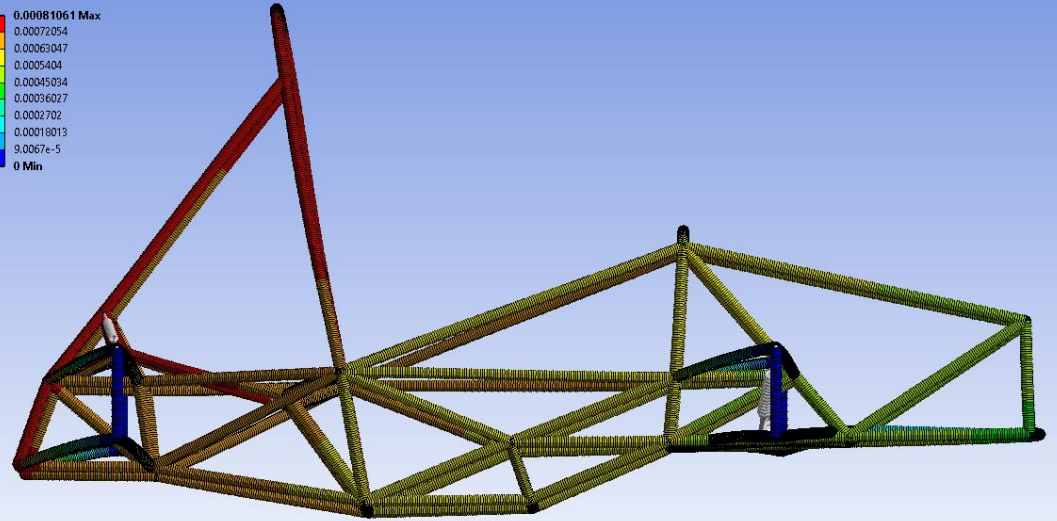
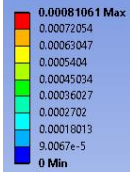
W: Final - Deceleration (5g)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 17:55



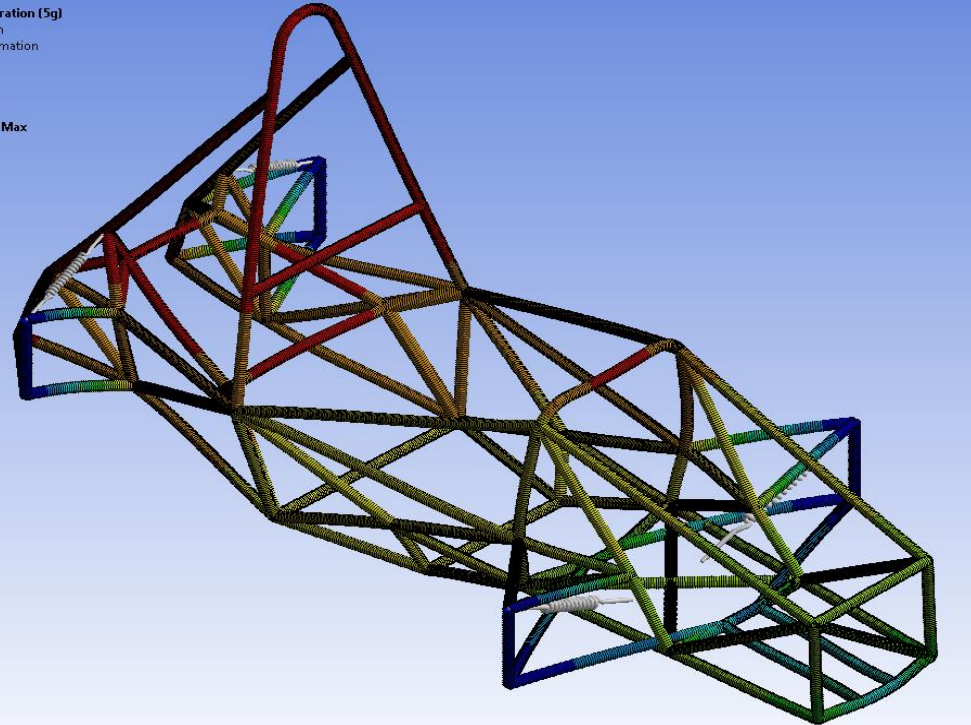
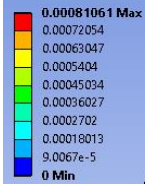
W: Final - Deceleration (5g)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 17:54



W: Final - Deceleration (5g)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 17:55

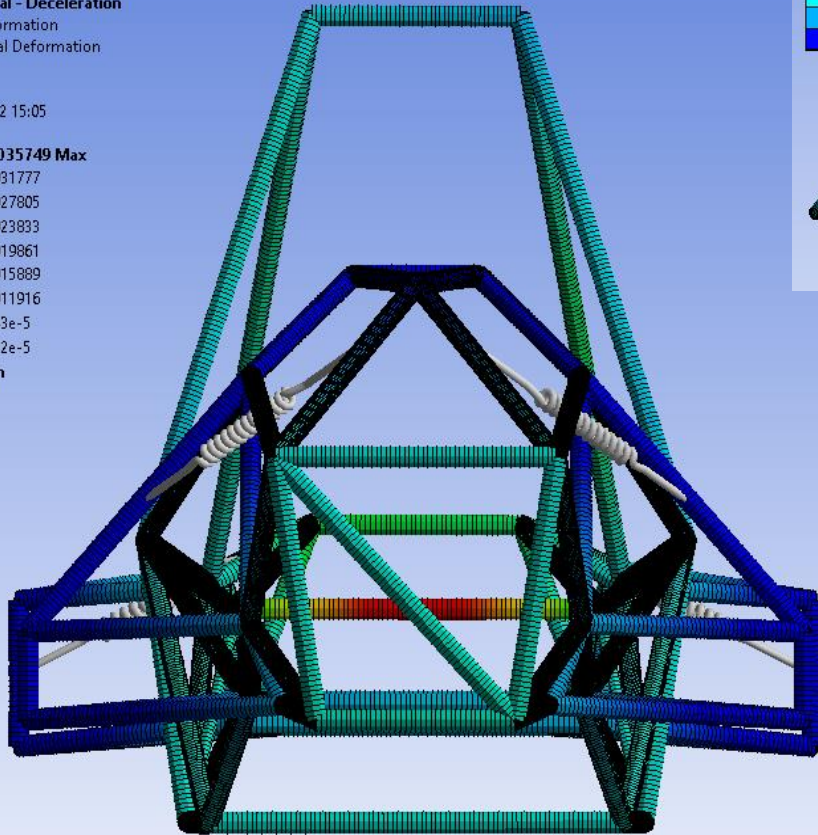


2022 Chassis

AJ: Original - Deceleration

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:05

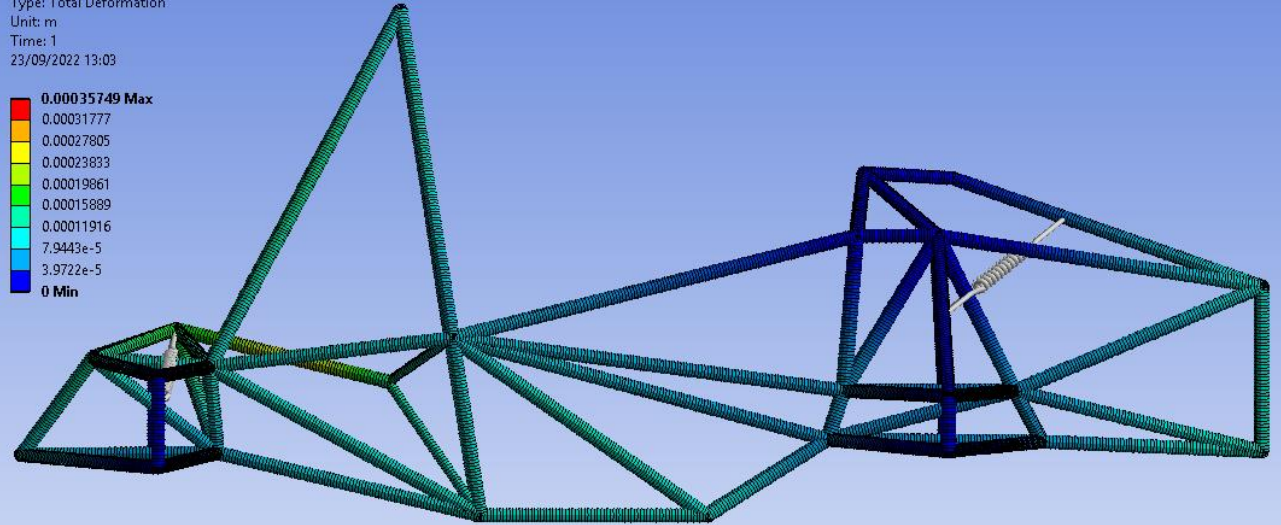
0.00035749 Max
0.00031777
0.00027805
0.00023833
0.00019861
0.00015889
0.00011916
7.9443e-5
3.9722e-5
0 Min



AJ: Original - Deceleration

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 13:03

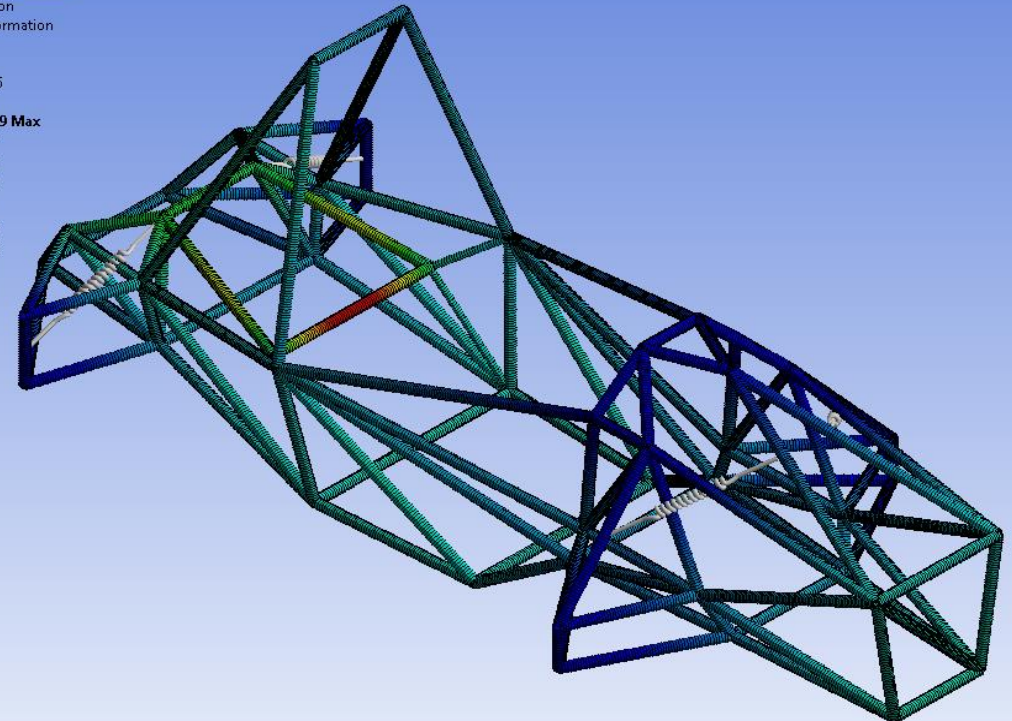
0.00035749 Max
0.00031777
0.00027805
0.00023833
0.00019861
0.00015889
0.00011916
7.9443e-5
3.9722e-5
0 Min



AJ: Original - Deceleration

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:05

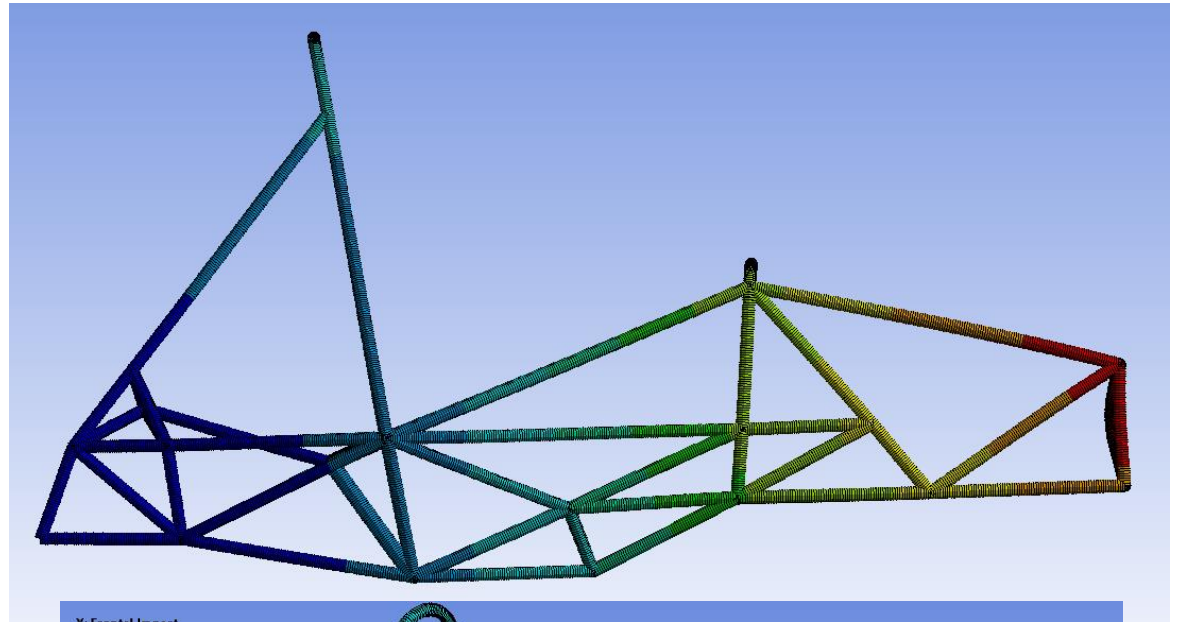
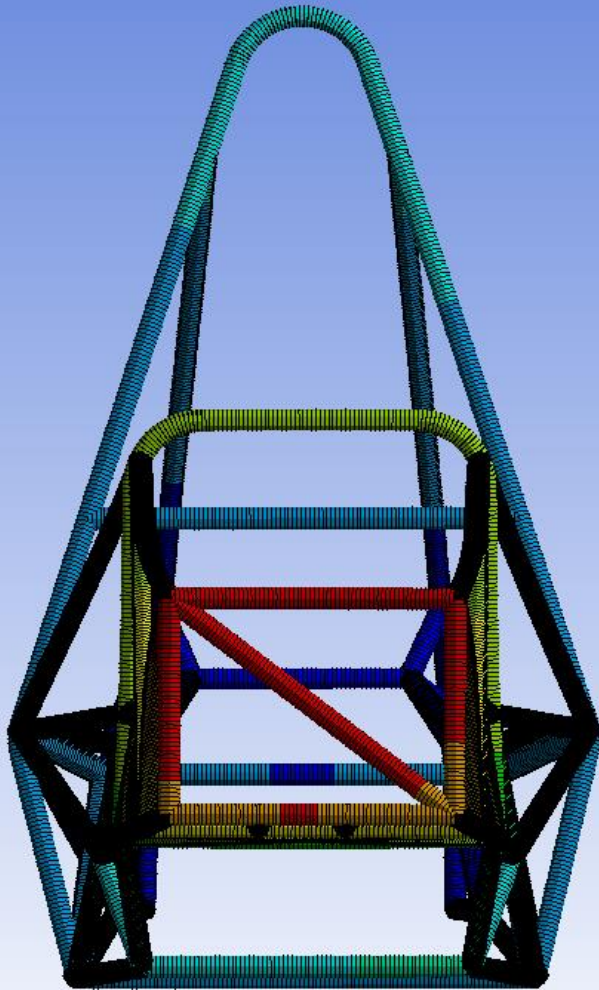
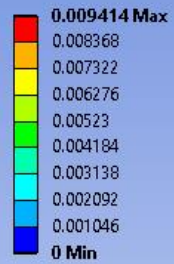
0.00035749 Max
0.00031777
0.00027805
0.00023833
0.00019861
0.00015889
0.00011916
7.9443e-5
3.9722e-5
0 Min



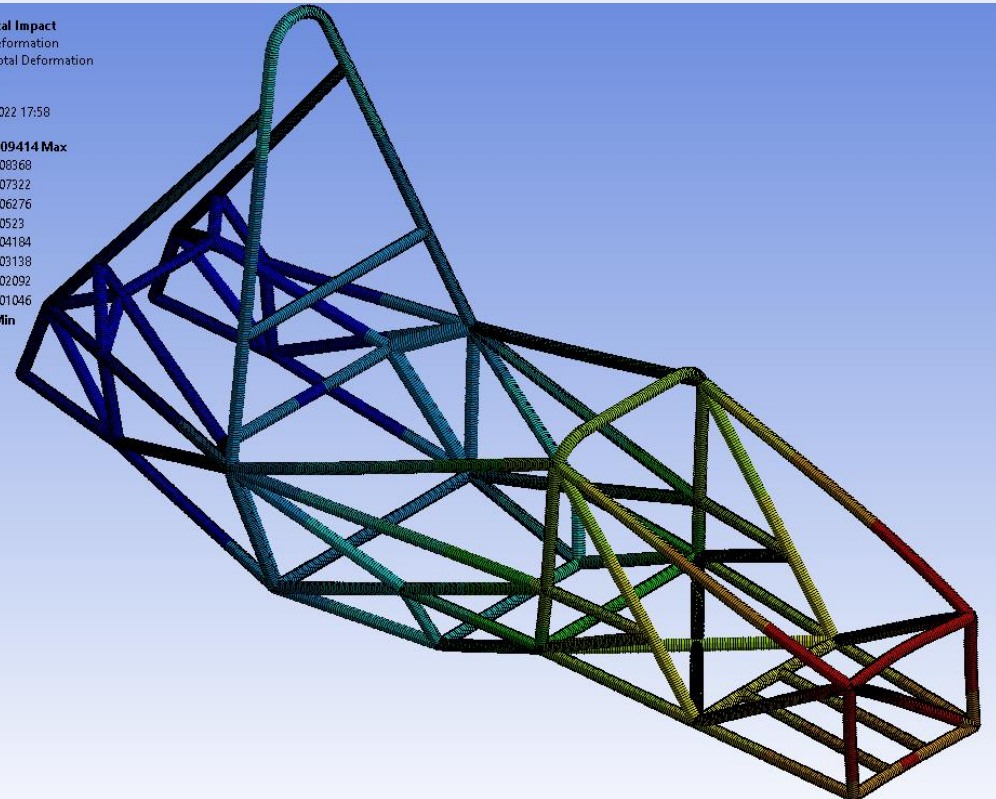
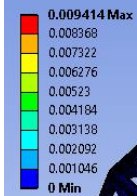
Frontal Impact (30g)

2023 Chassis

X: Frontal Impact
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 17:58



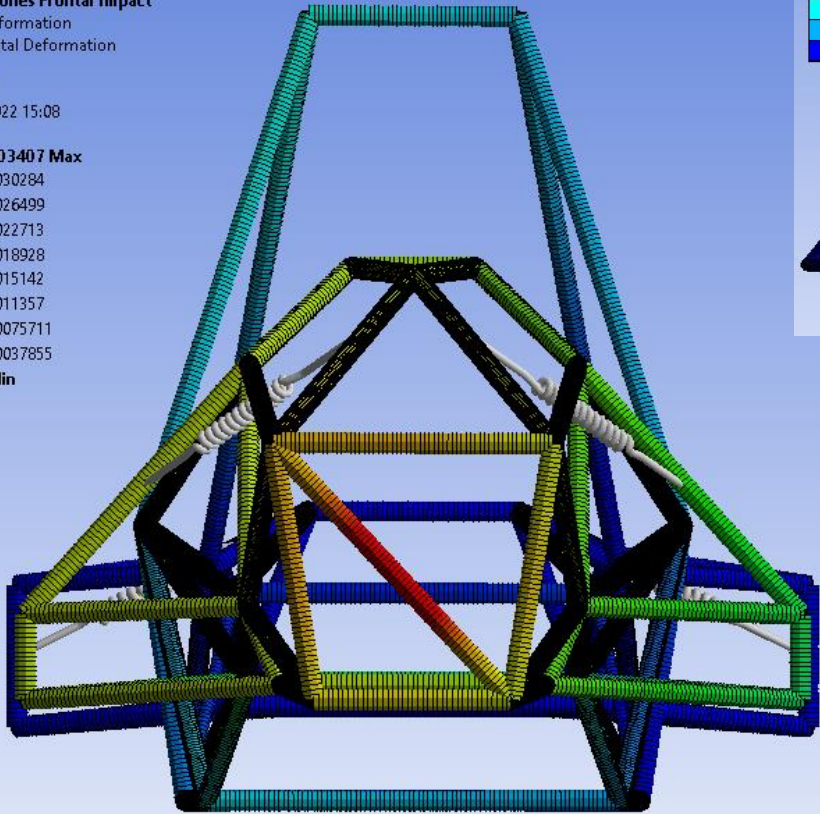
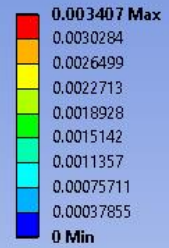
X: Frontal Impact
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 17:58



2022 Chassis

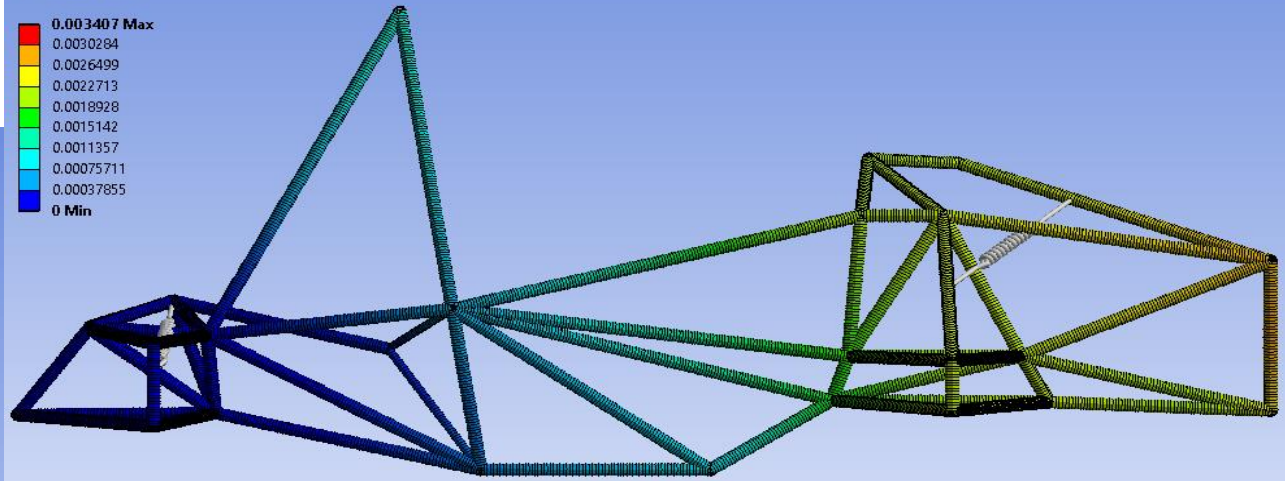
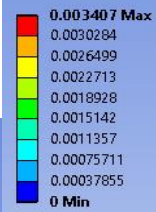
J: Wishbones Frontal Impact

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:08



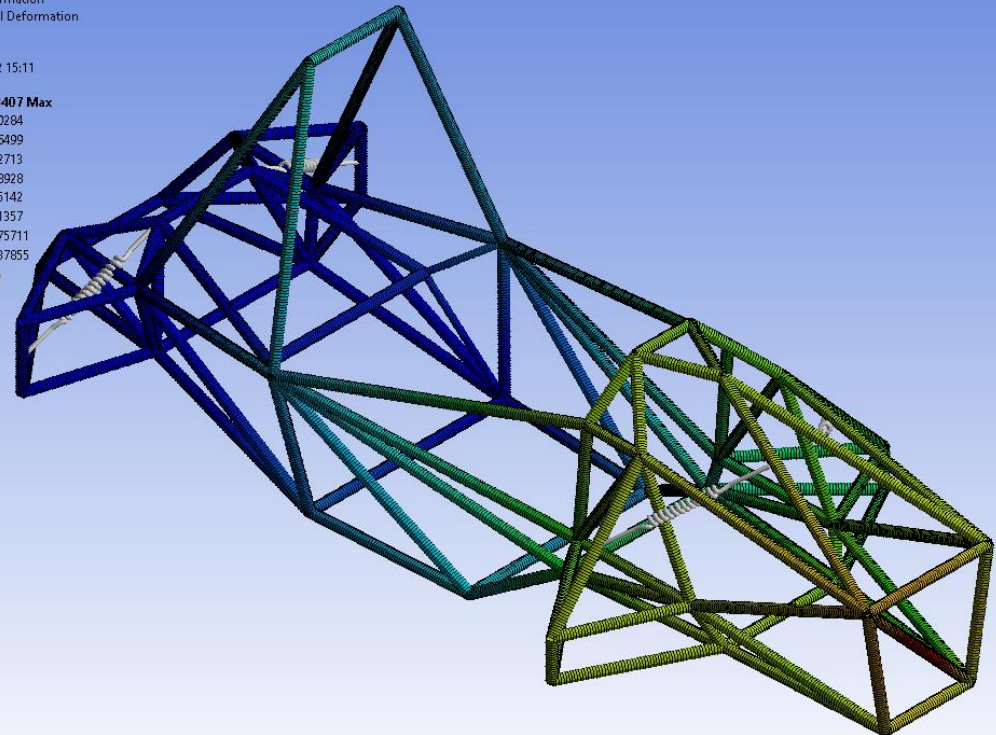
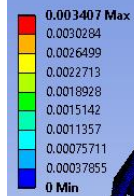
J: Wishbones Frontal Impact

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:08



J: Wishbones Frontal Impact

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:11

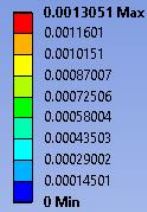
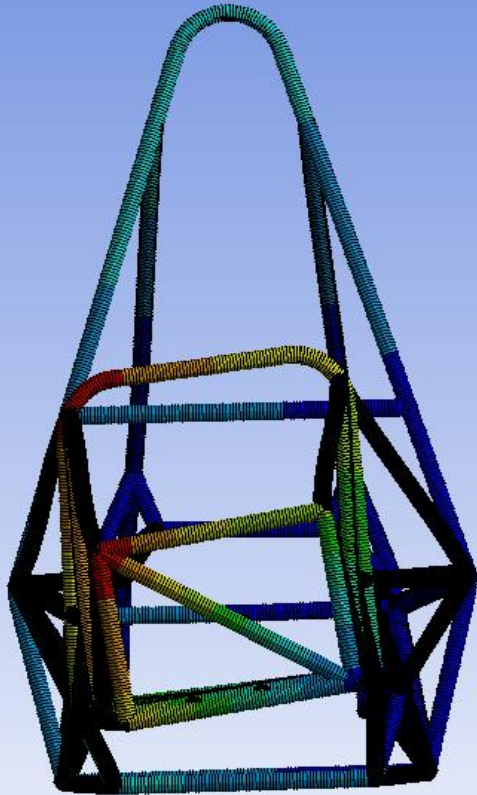
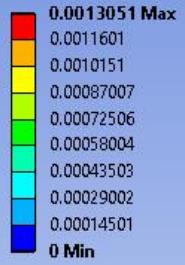


Bump on one front wheel (5g)

2023 Chassis

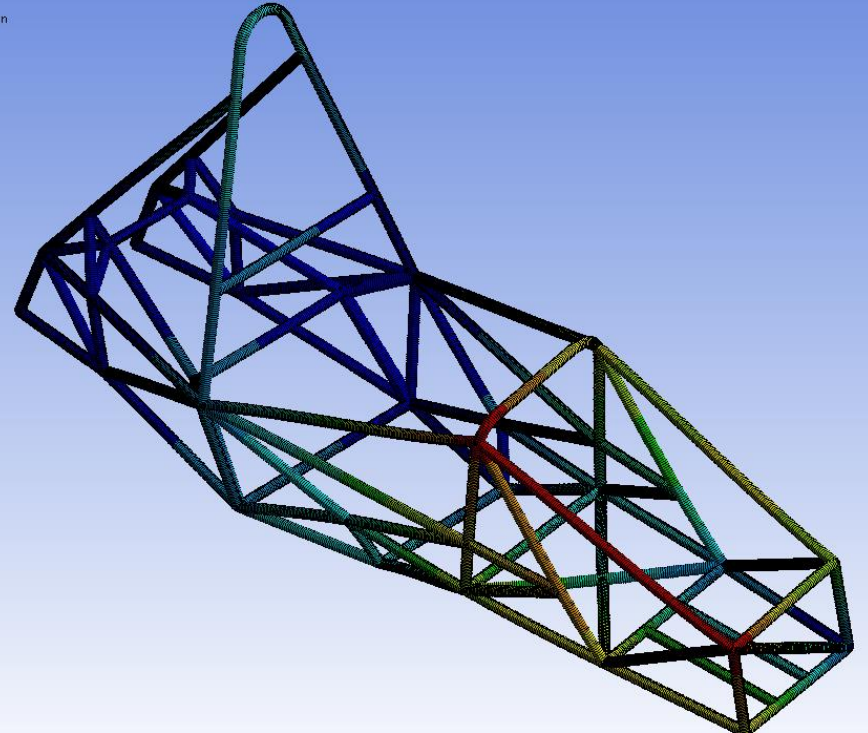
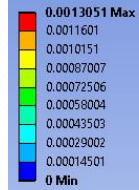
R: Final - 5g bump on 1 front wheel

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:08



R: Final - 5g bump on 1 front wheel

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:09

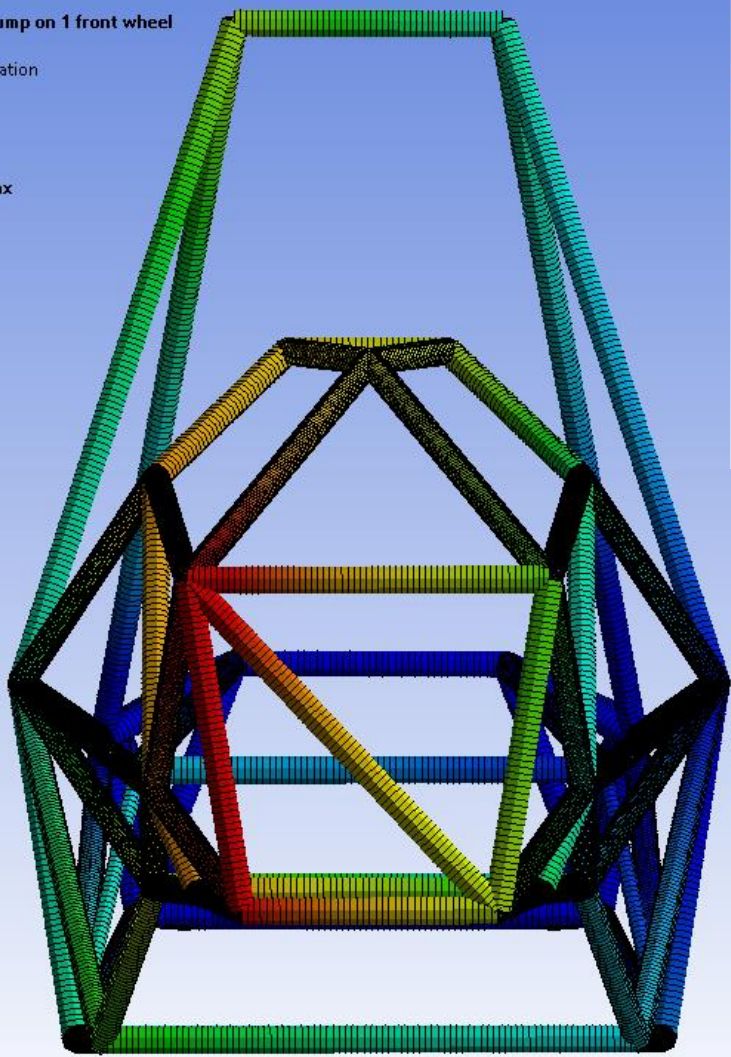


2022 Chassis

AC: Original - 5g bump on 1 front wheel

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:13

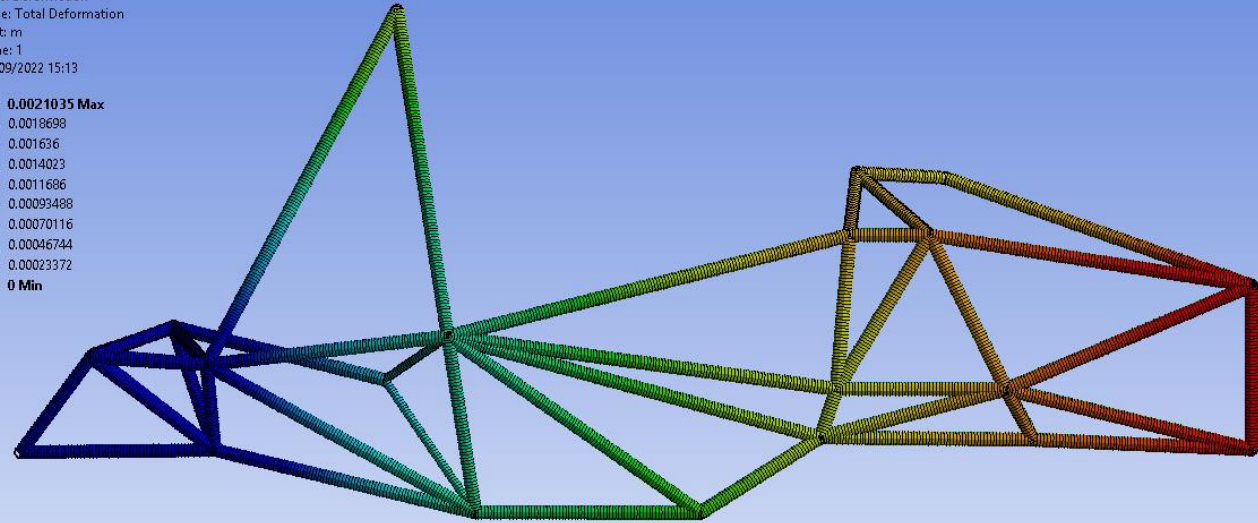
0.0021035 Max
0.0018698
0.001636
0.0014023
0.0011686
0.00093488
0.00070116
0.00046744
0.00023372
0 Min



AC: Original - 5g bump on 1 front wheel

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:13

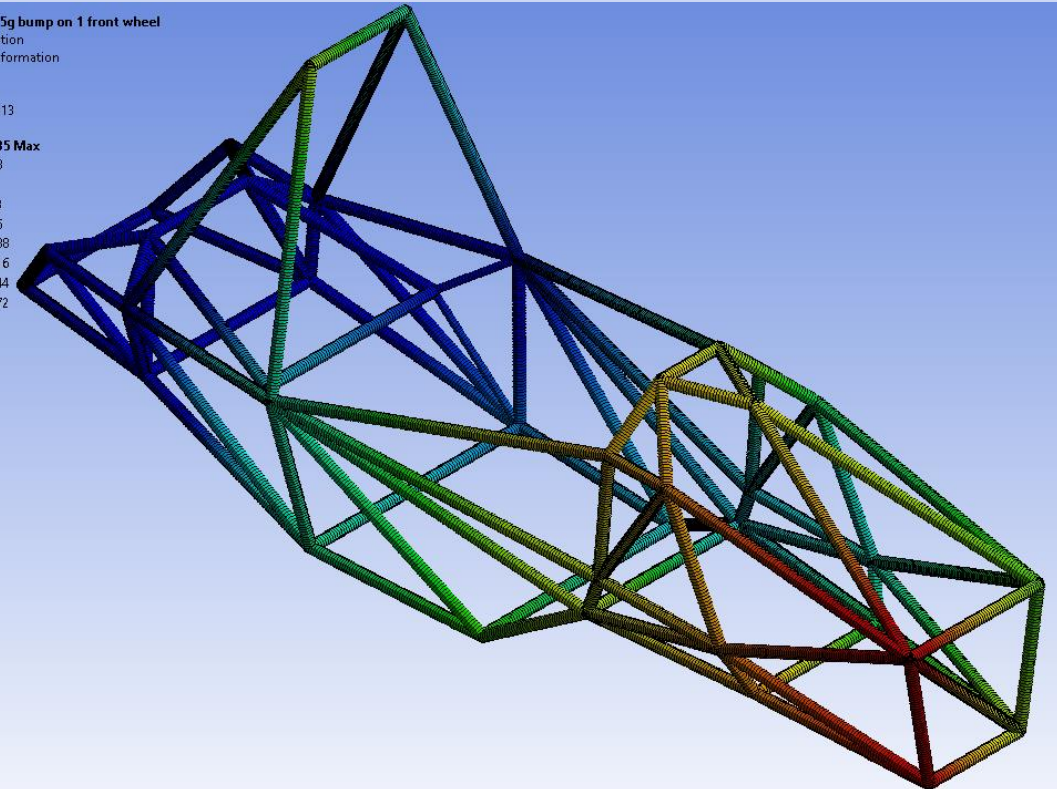
0.0021035 Max
0.0018698
0.001636
0.0014023
0.0011686
0.00093488
0.00070116
0.00046744
0.00023372
0 Min



AC: Original - 5g bump on 1 front wheel

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:13

0.0021035 Max
0.0018698
0.001636
0.0014023
0.0011686
0.00093488
0.00070116
0.00046744
0.00023372
0 Min



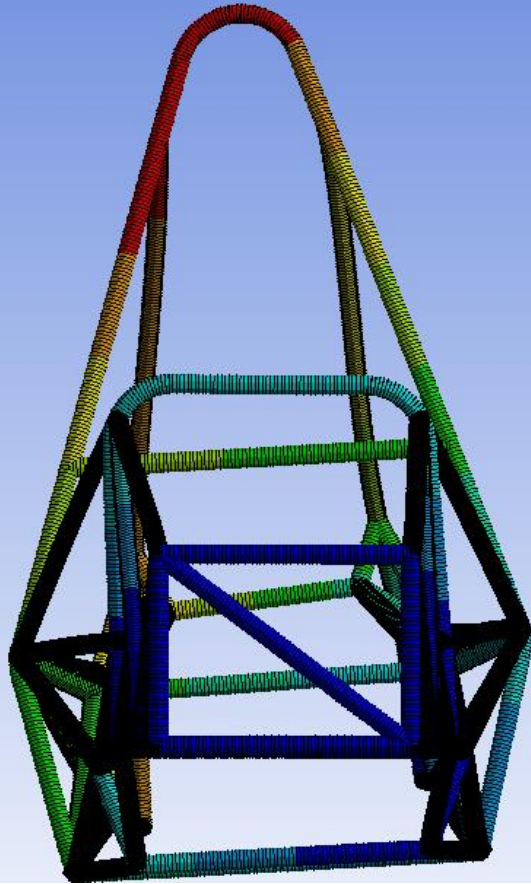
Bump on one rear wheel (5g)

2023 Chassis

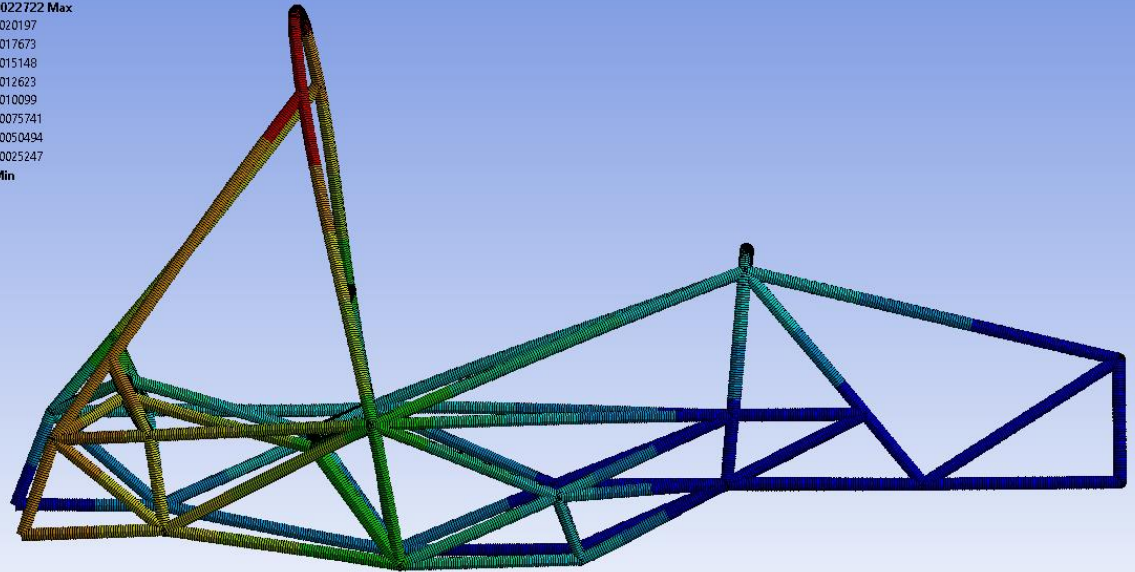
P: Final - 5g bump on 1 rear wheel

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:12

0.0022722 Max
0.0020197
0.0017673
0.0015148
0.0012623
0.0010099
0.00075741
0.00050494
0.00025247
0 Min



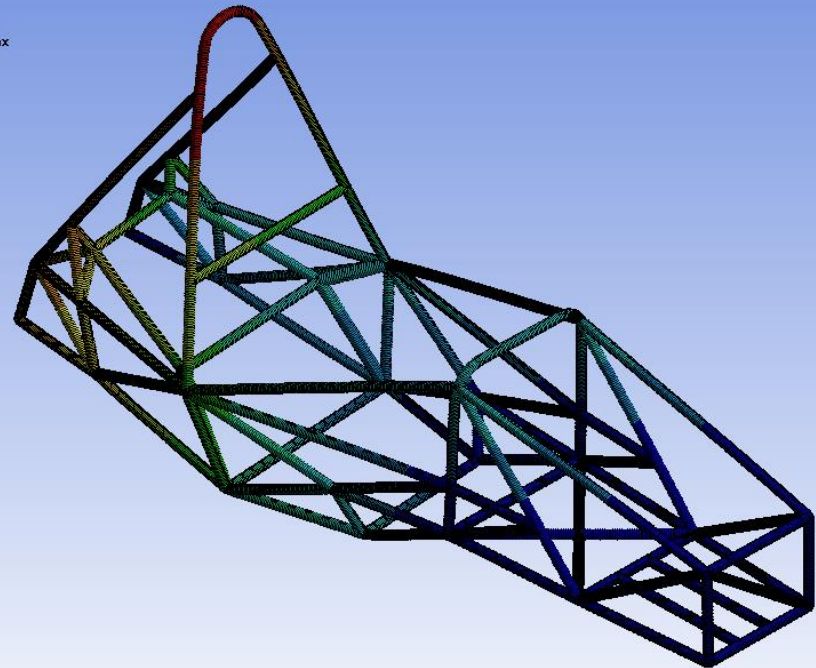
0.0022722 Max
0.0020197
0.0017673
0.0015148
0.0012623
0.0010099
0.00075741
0.00050494
0.00025247
0 Min



P: Final - 5g bump on 1 rear wheel

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:12

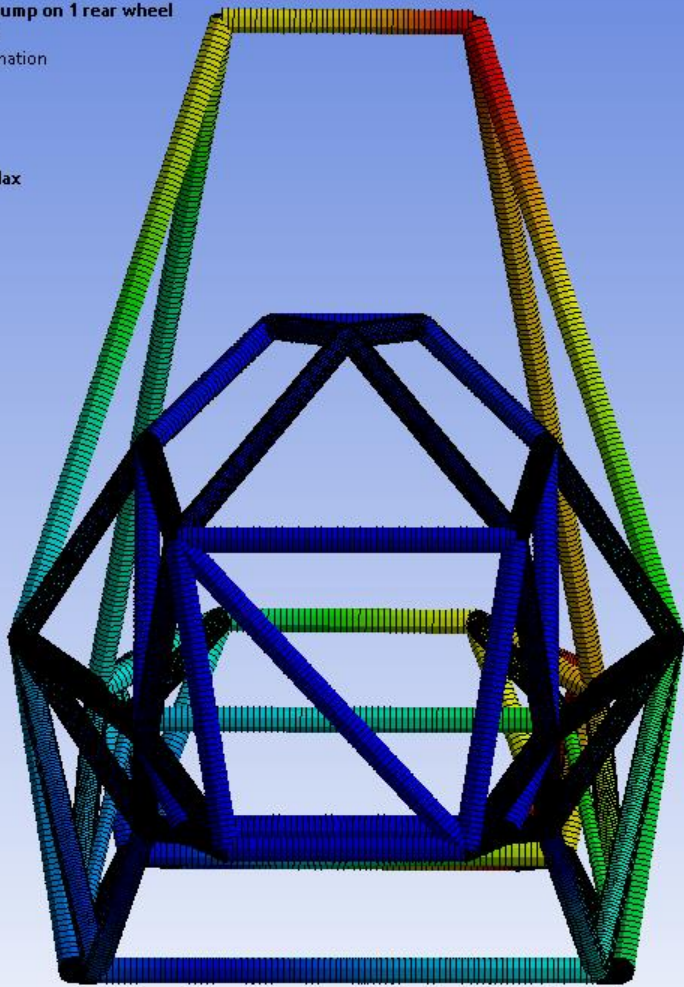
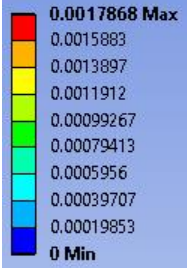
0.0022722 Max
0.0020197
0.0017673
0.0015148
0.0012623
0.0010099
0.00075741
0.00050494
0.00025247
0 Min



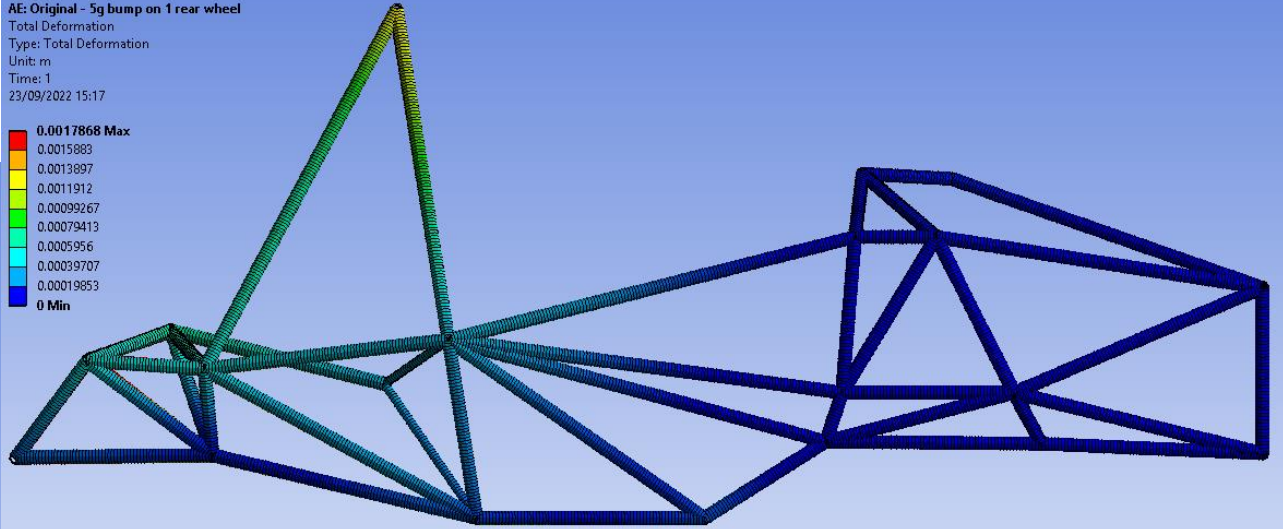
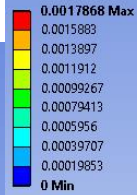
2022 Chassis

AE: Original - 5g bump on 1 rear wheel

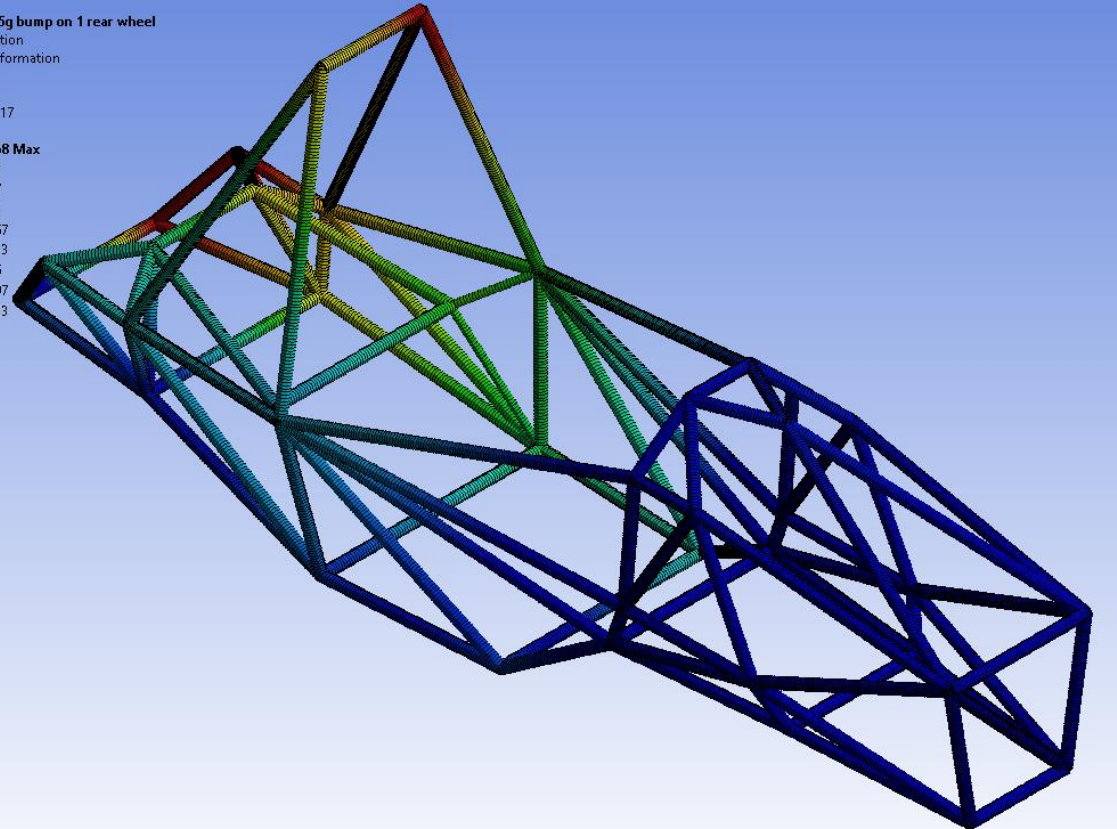
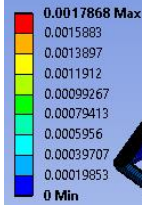
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:17



AE: Original - 5g bump on 1 rear wheel
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:17



AE: Original - 5g bump on 1 rear wheel
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:17

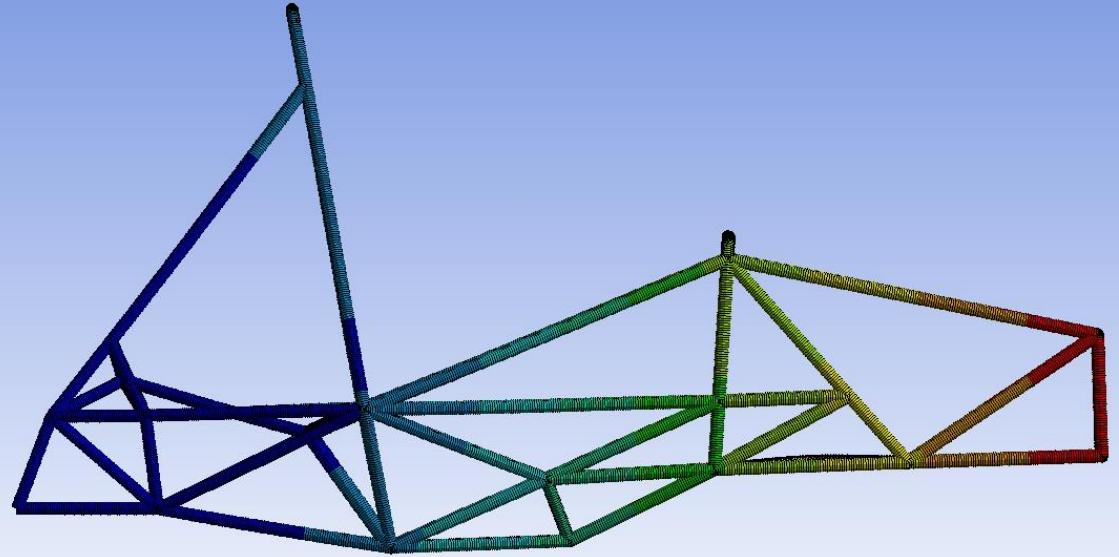
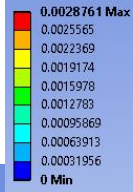
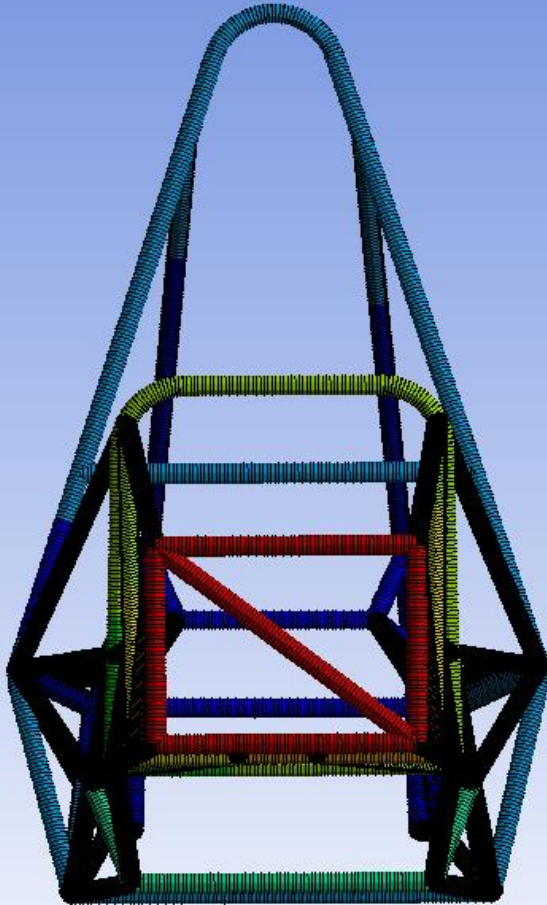
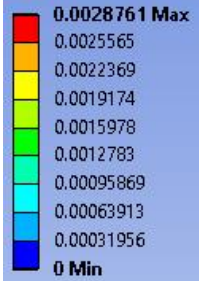


Bump on both front wheels (5g)

2023 Chassis

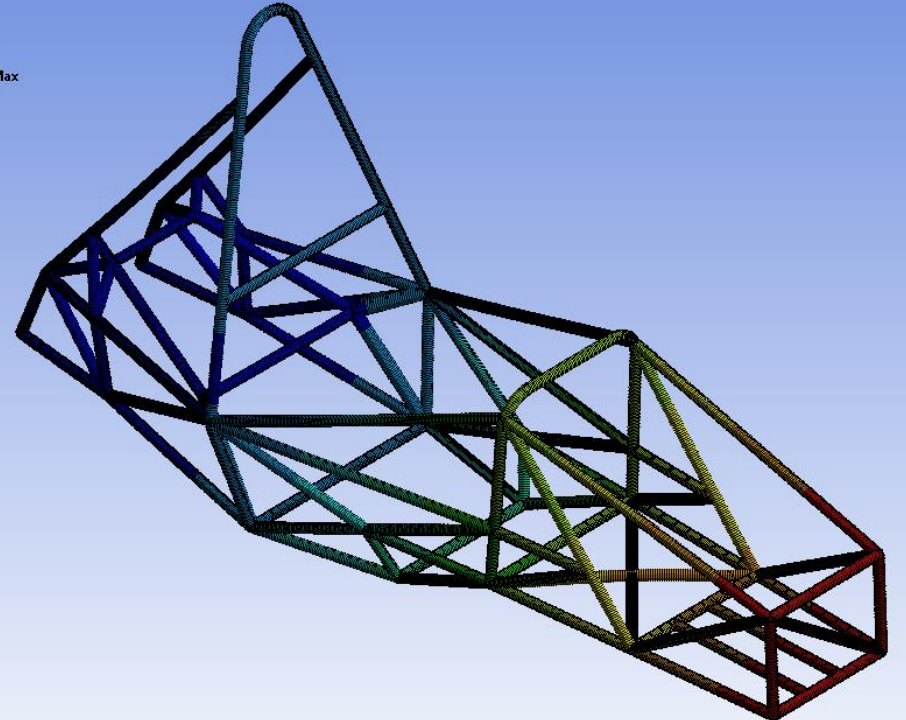
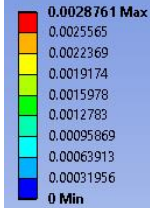
S: Final - 5g bump on both front wheels

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:14



S: Final - 5g bump on both front wheels

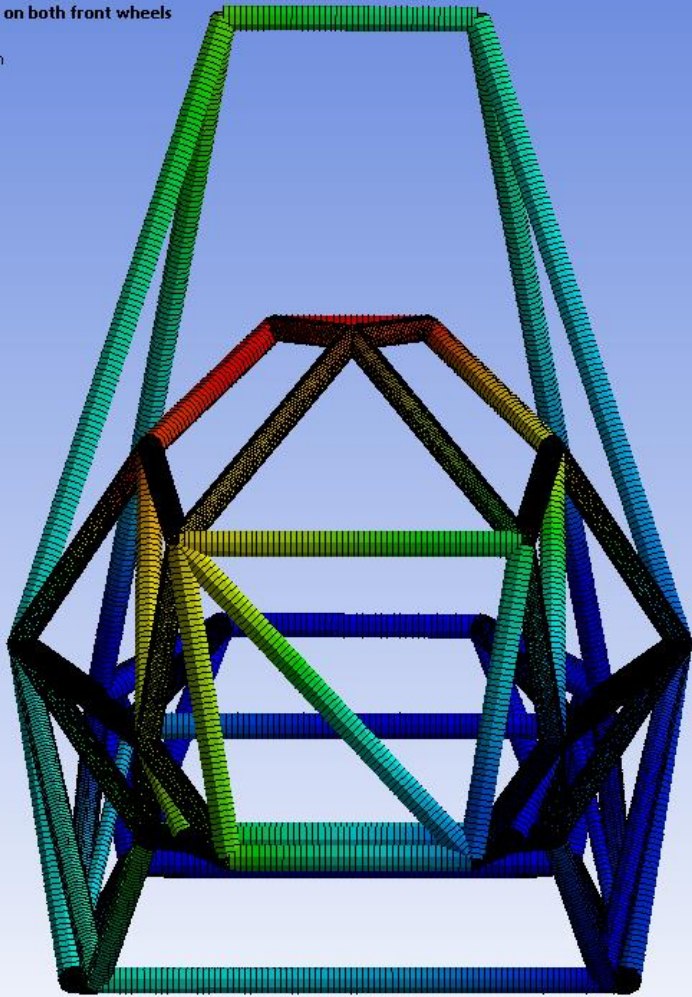
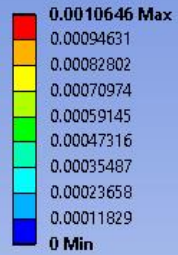
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:14



2022 Chassis

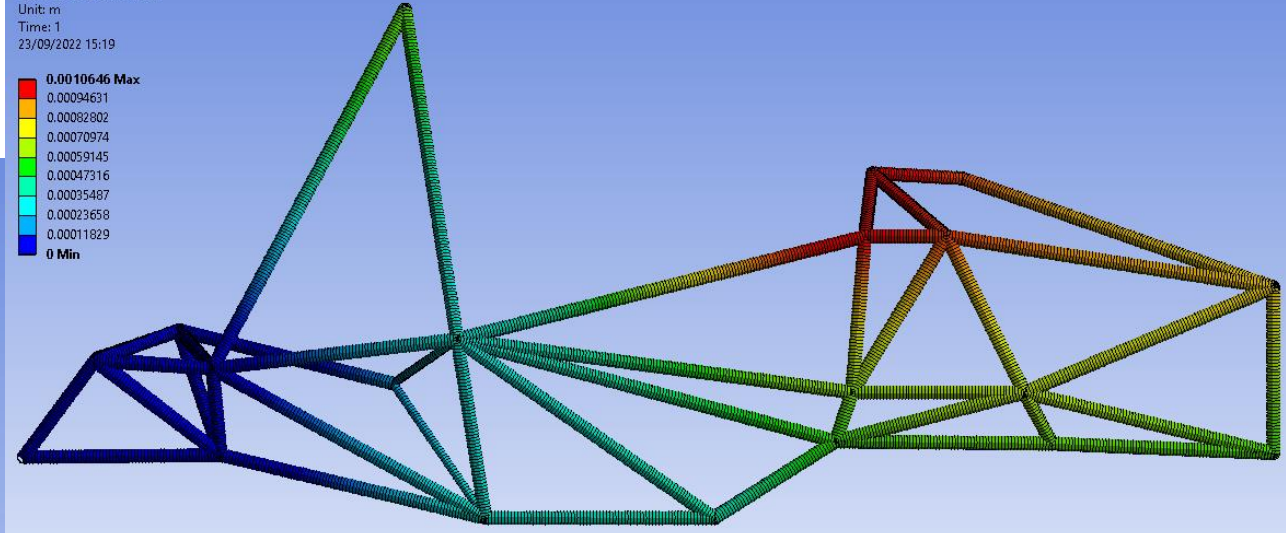
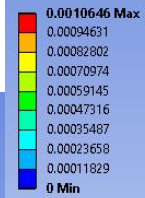
AD: Original - 5g bump on both front wheels

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:19



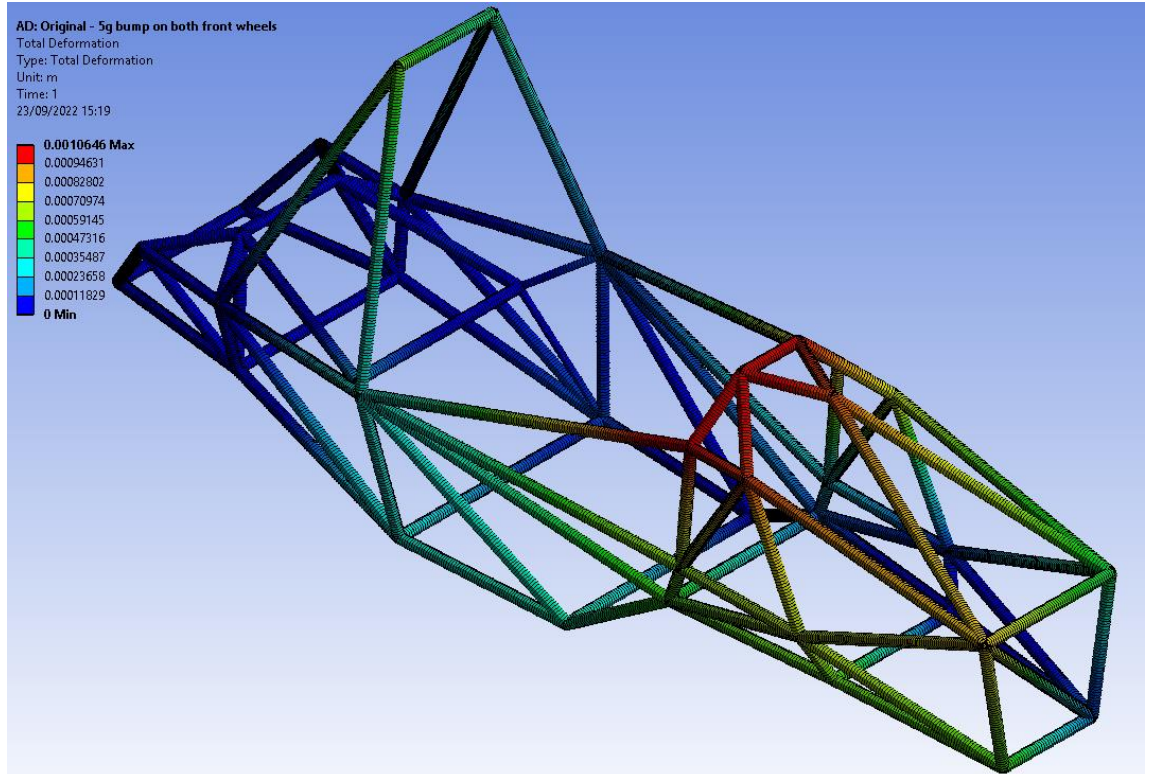
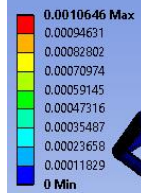
AD: Original - 5g bump on both front wheels

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:19

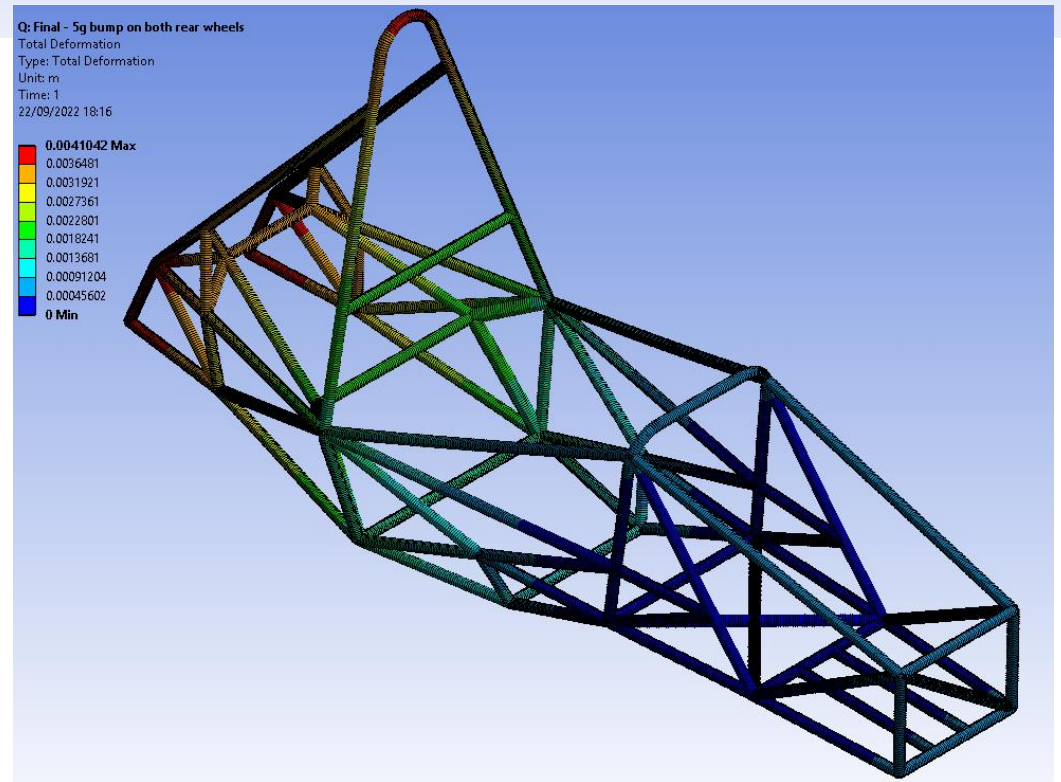
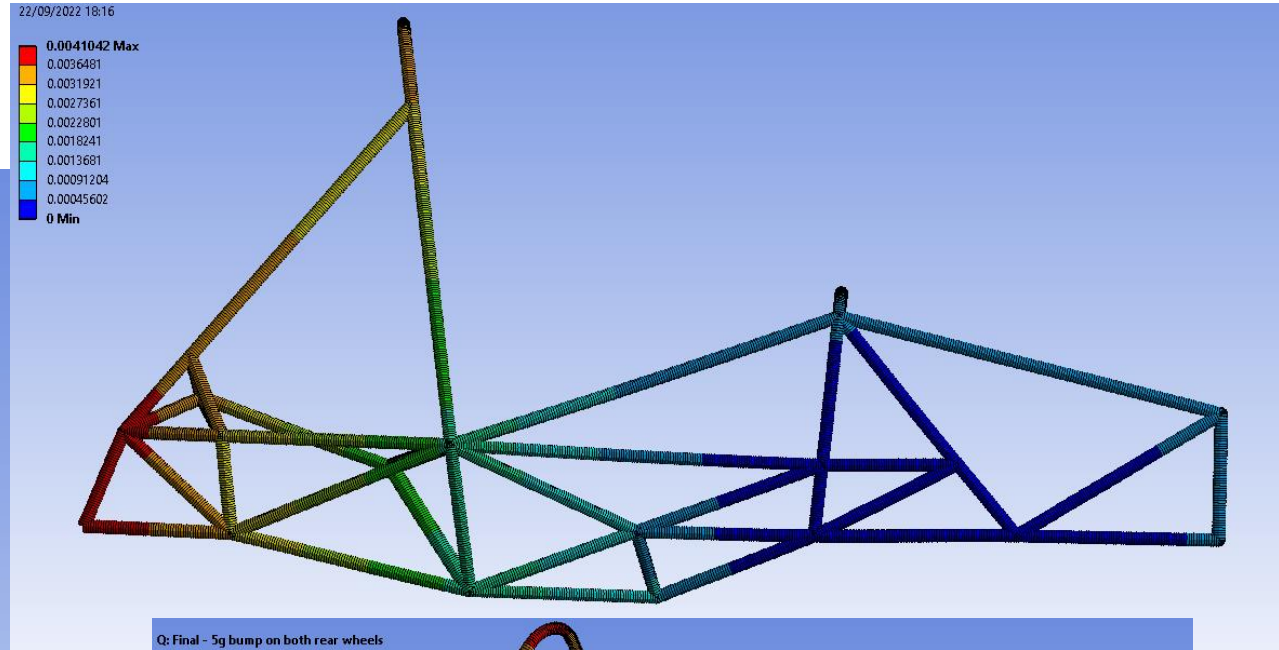
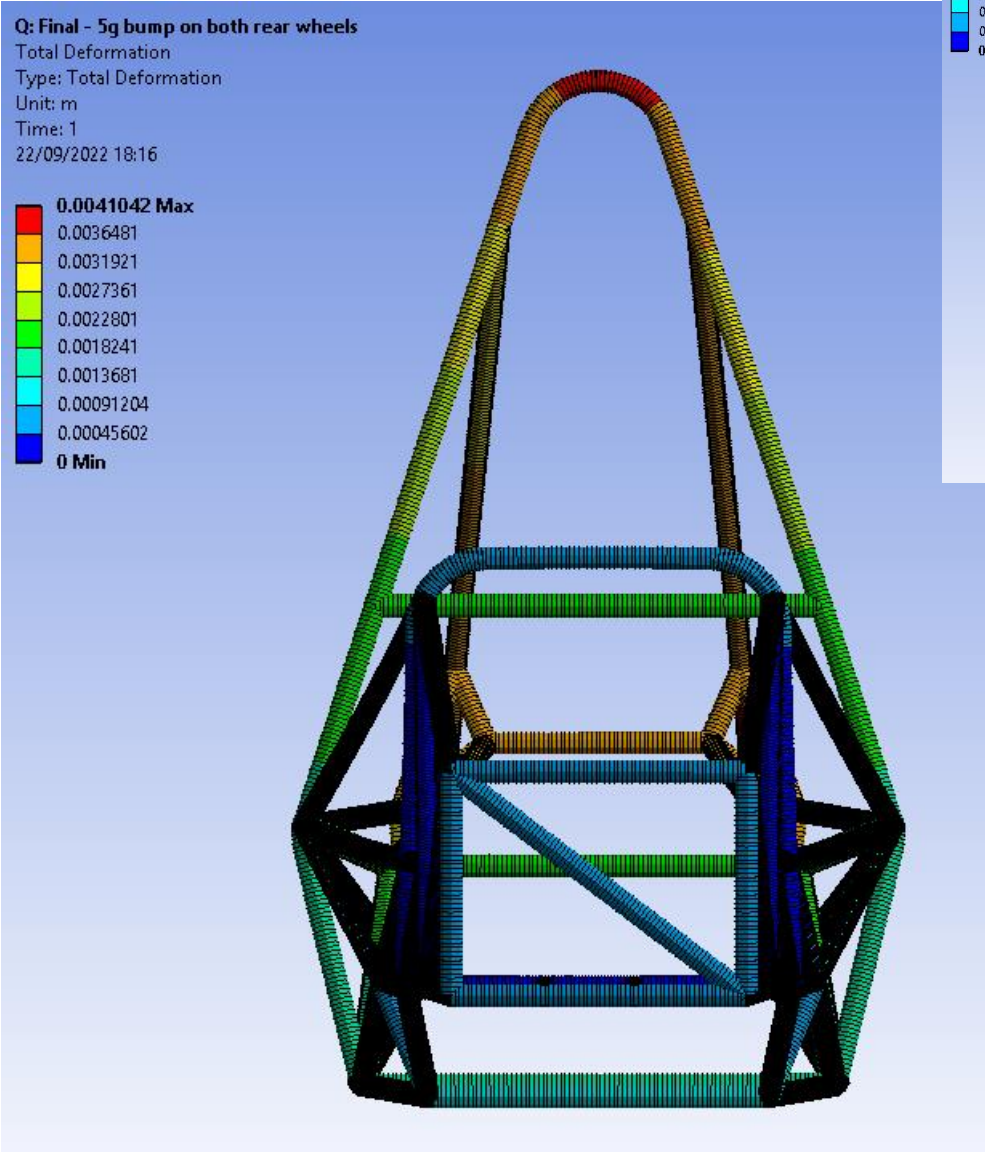


AD: Original - 5g bump on both front wheels

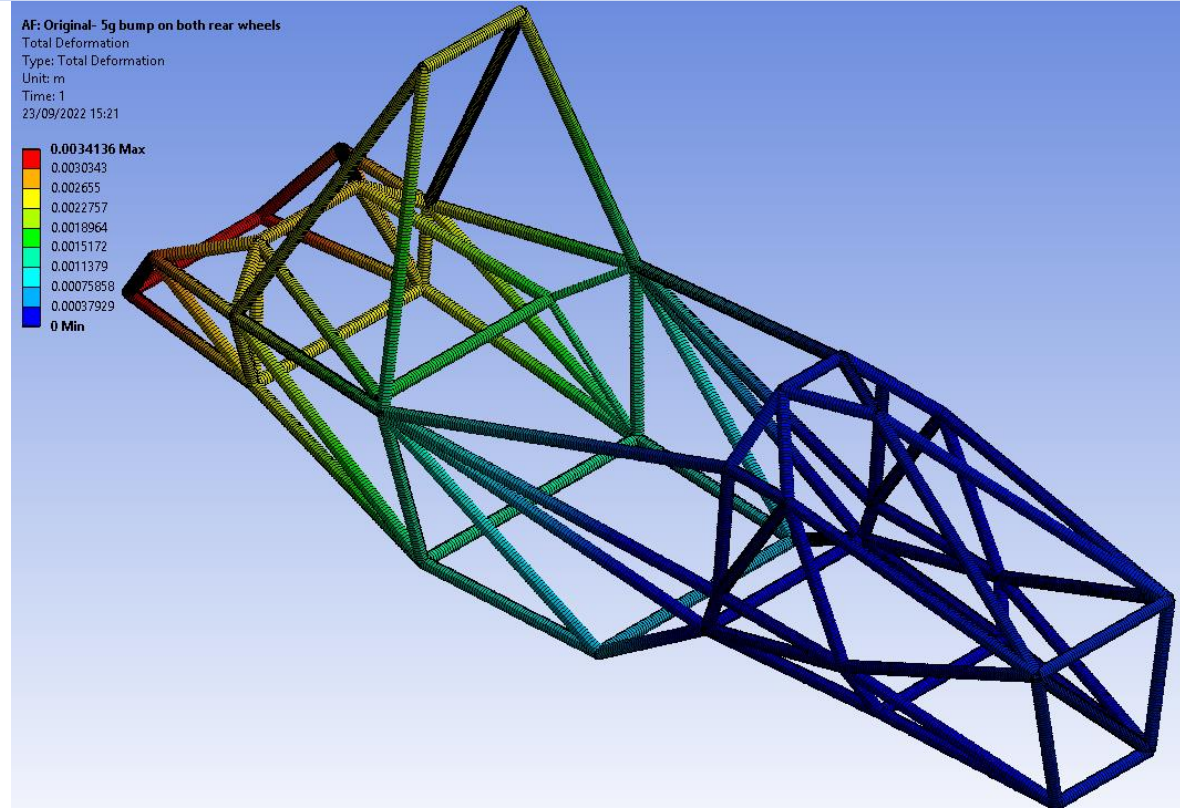
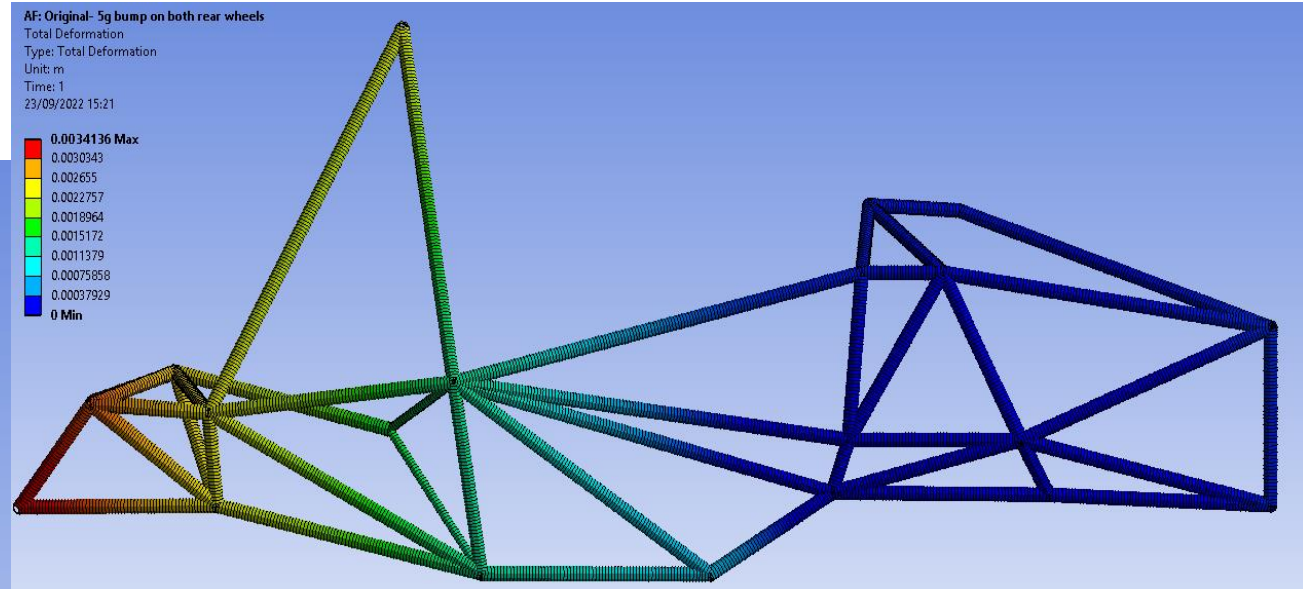
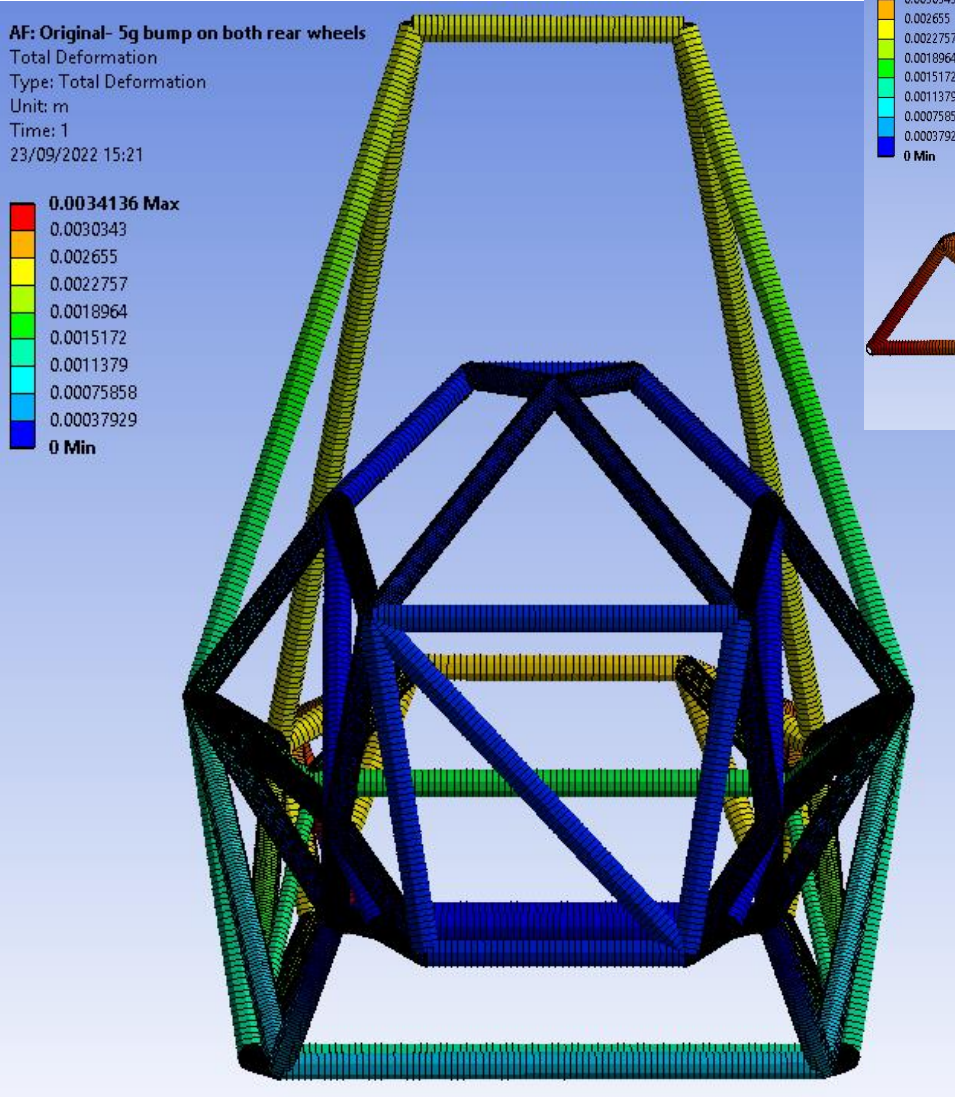
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:19



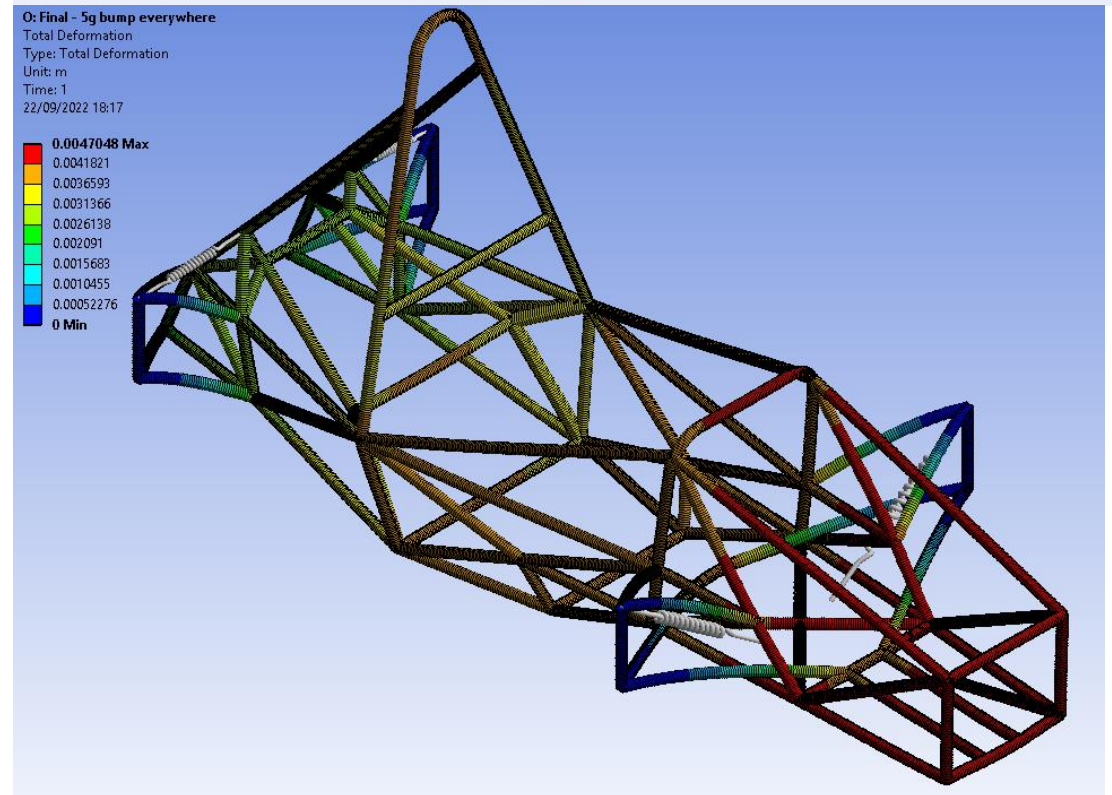
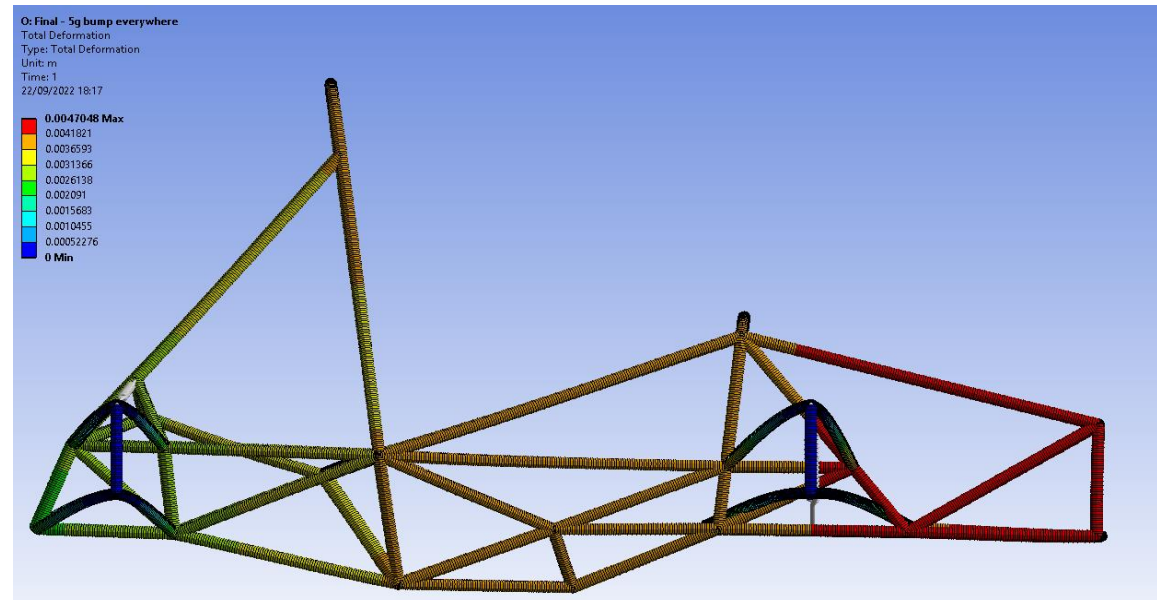
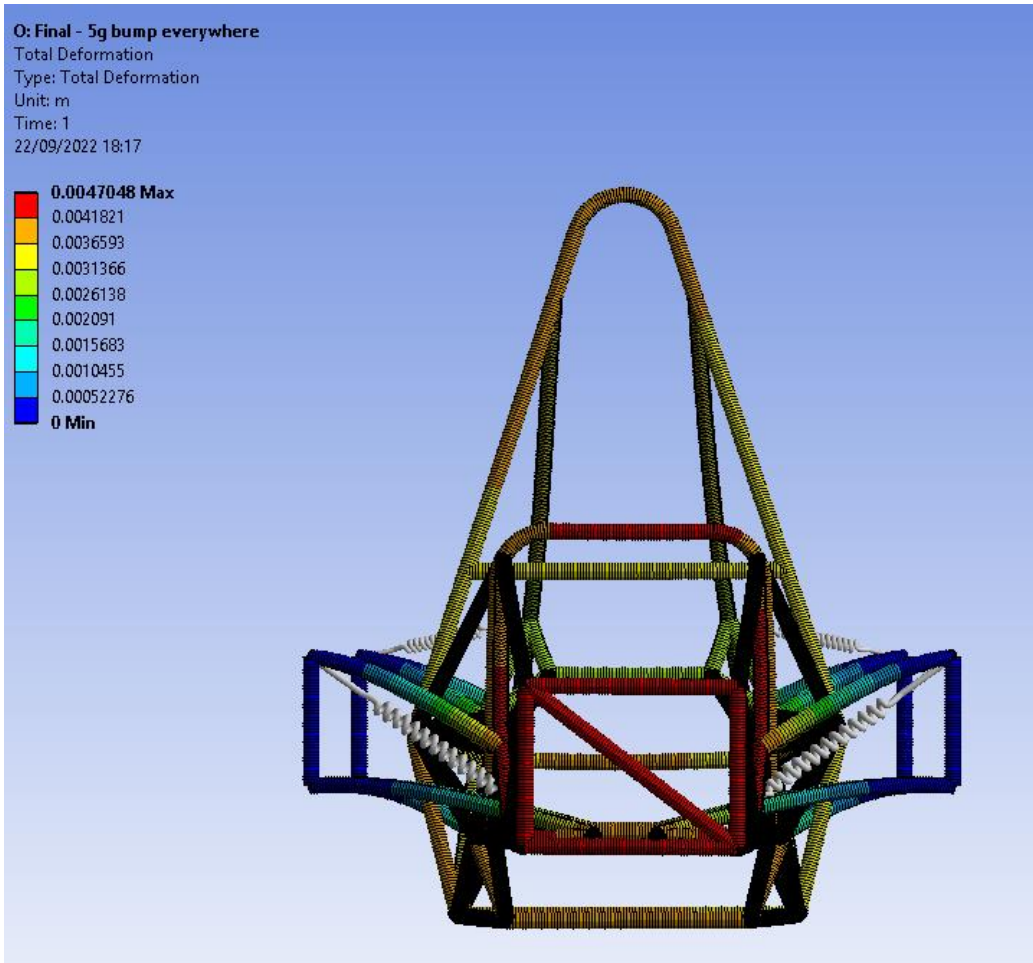
Bump on both rear wheels (5g) 2023 Chassis



2022 Chassis



Bump on all wheels (5g) 2023 Chassis

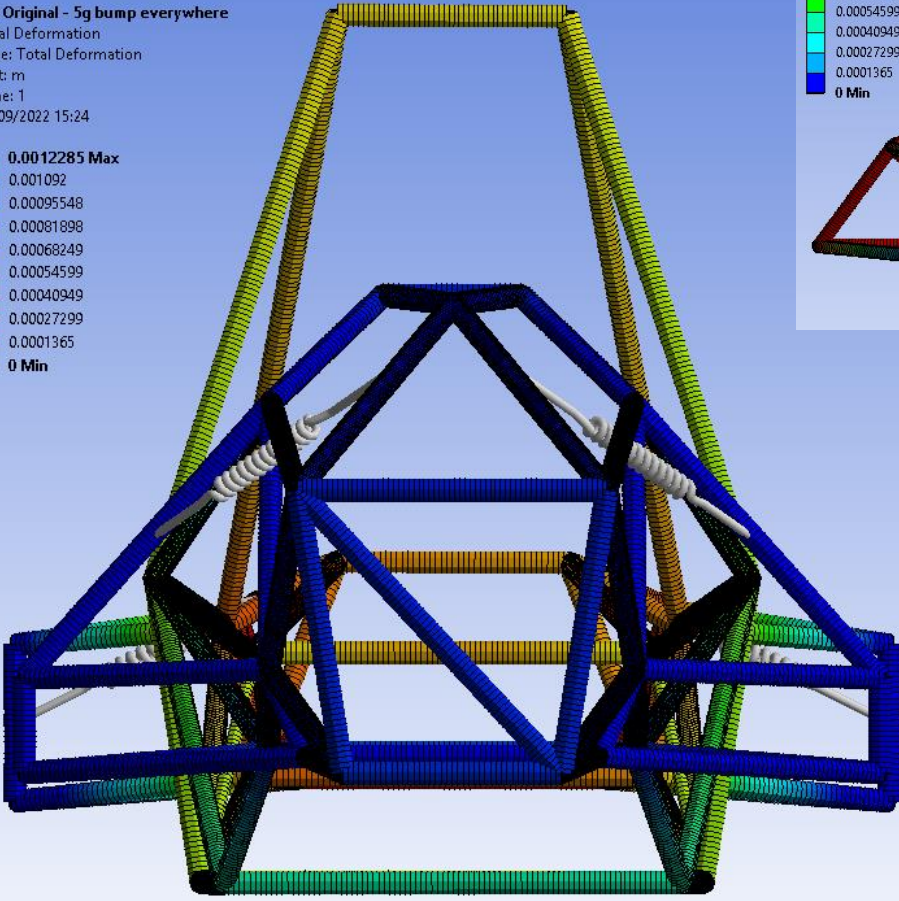


2022 Chassis

AB: Original - 5g bump everywhere

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:24

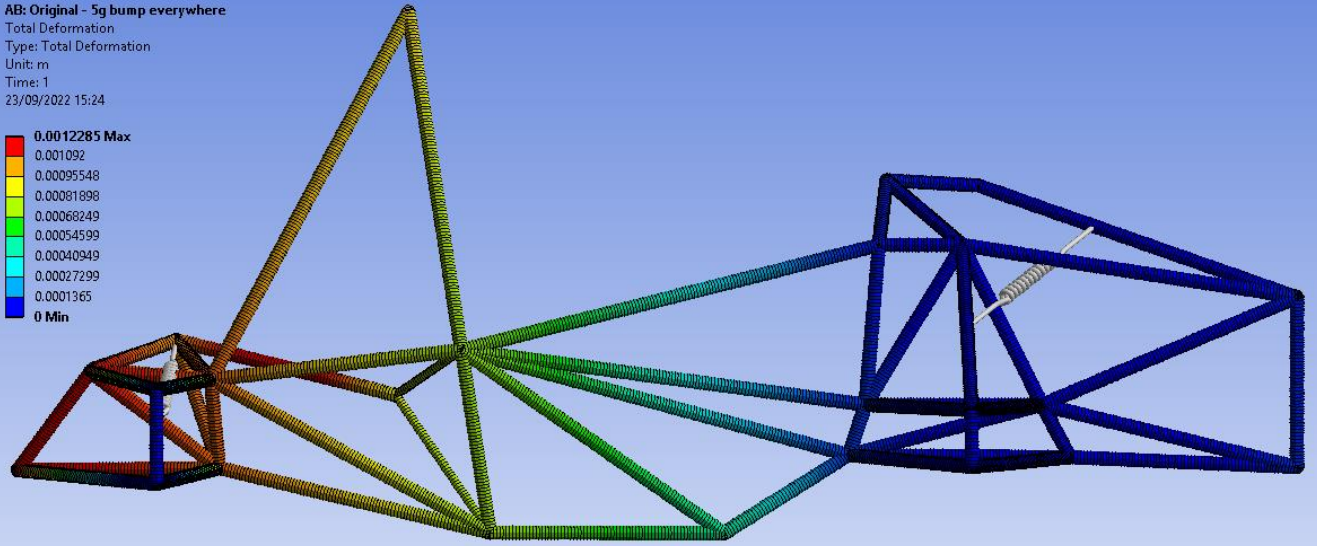
0.0012285 Max
0.001092
0.00095548
0.00081898
0.00068249
0.00054599
0.00040949
0.00027299
0.0001365
0 Min



AB: Original - 5g bump everywhere

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:24

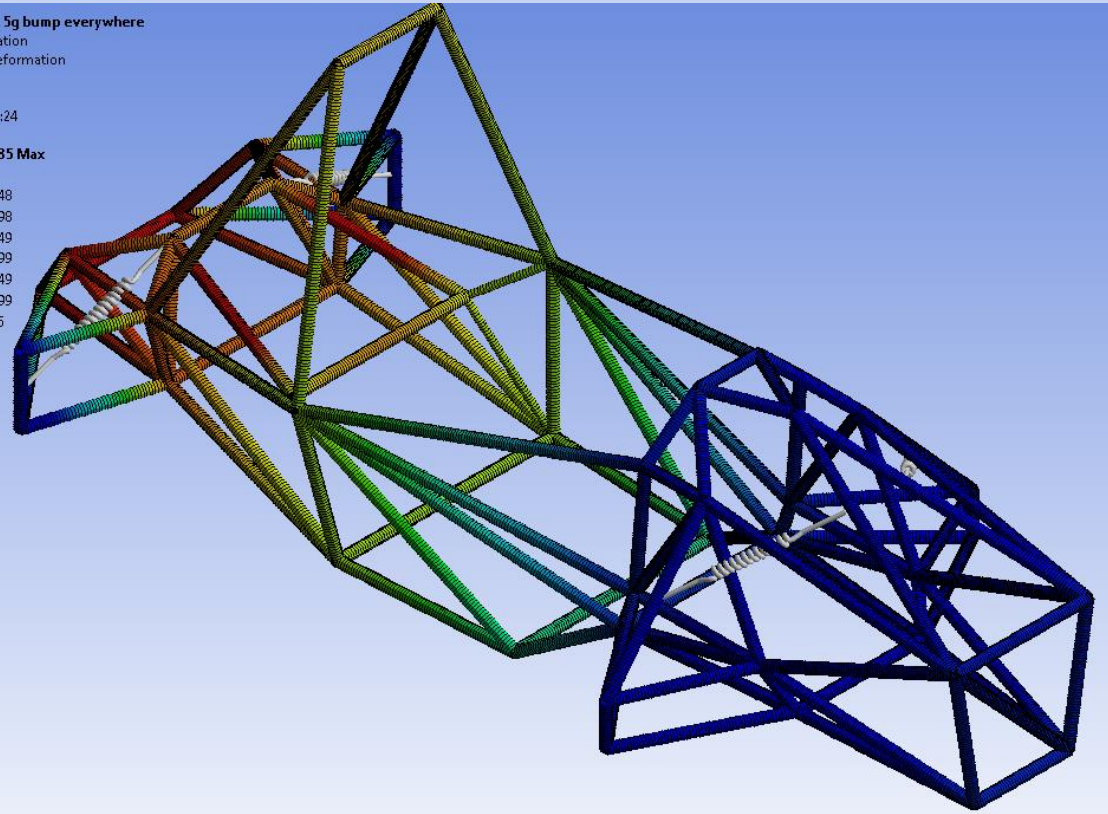
0.0012285 Max
0.001092
0.00095548
0.00081898
0.00068249
0.00054599
0.00040949
0.00027299
0.0001365
0 Min



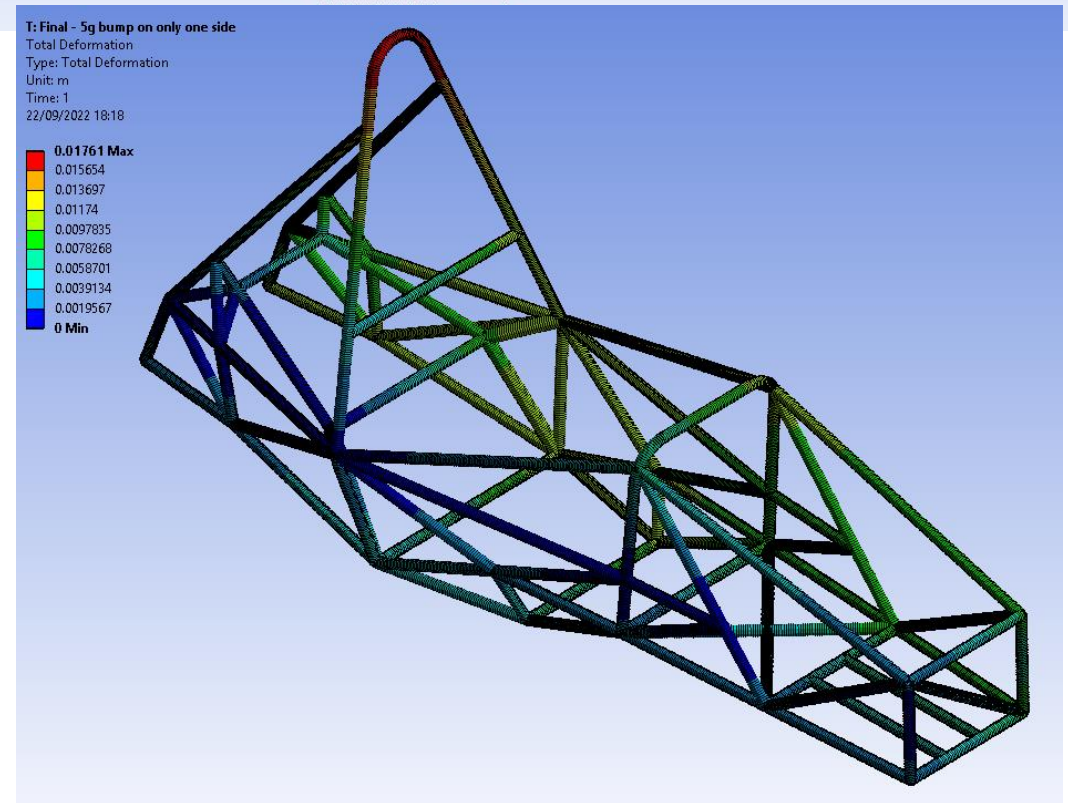
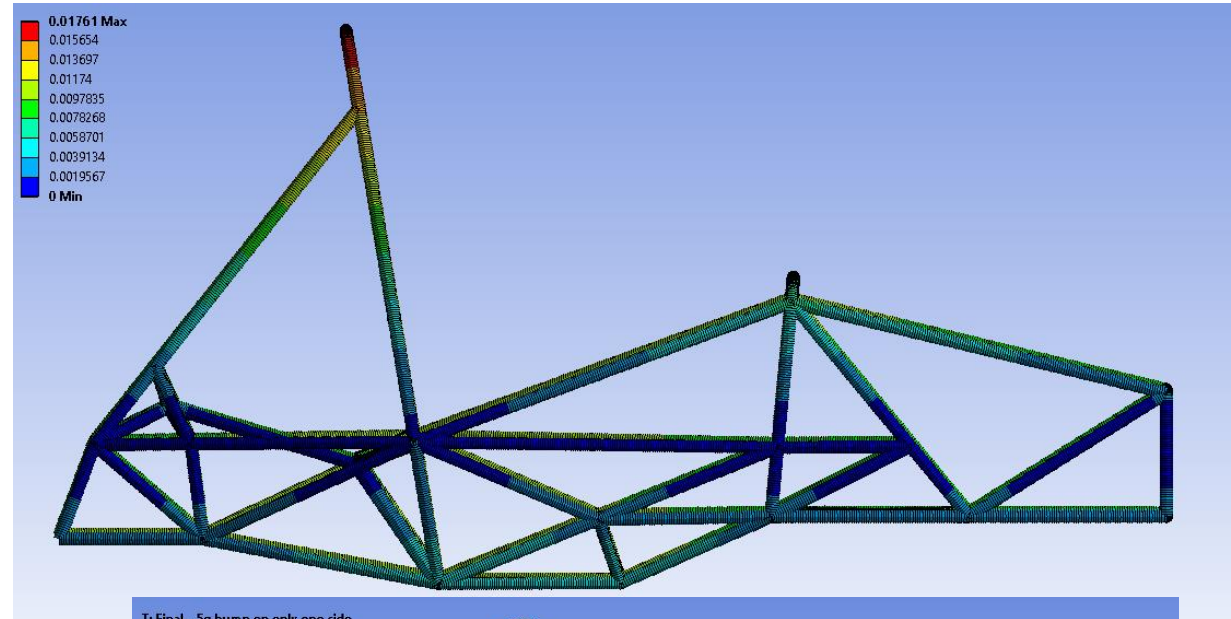
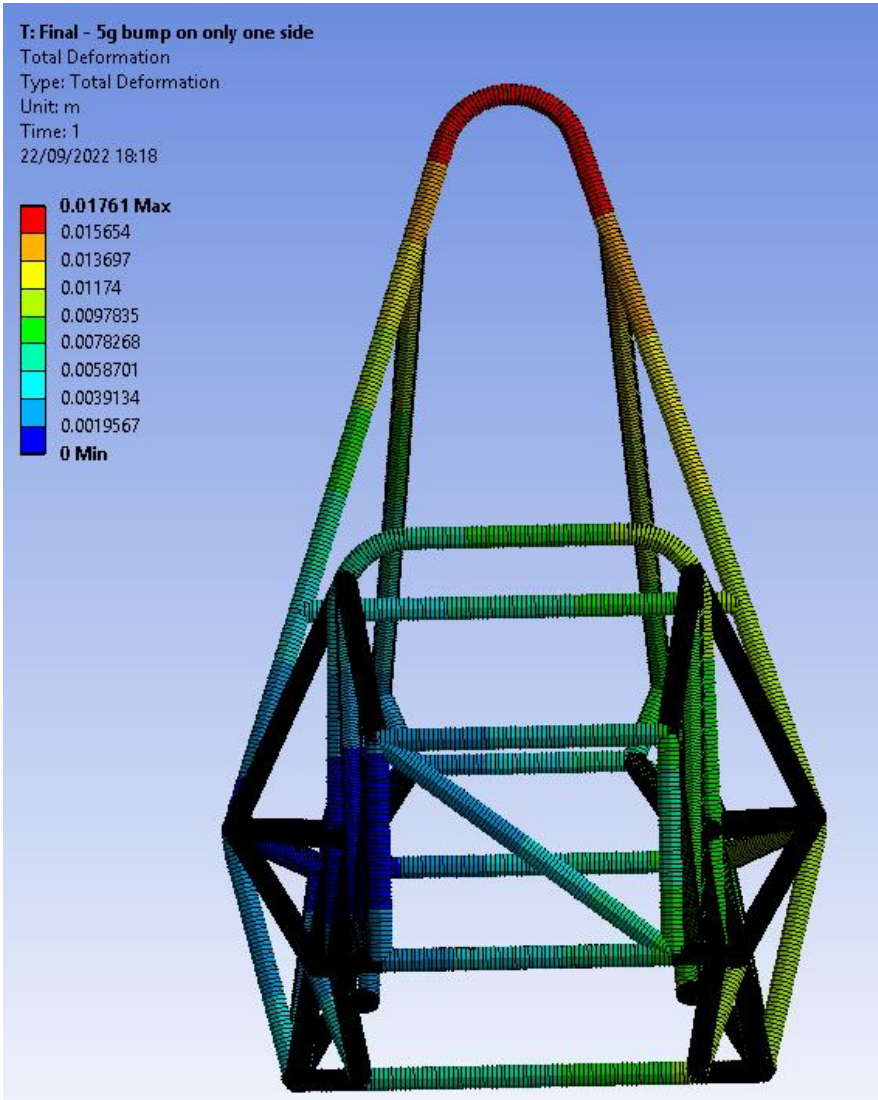
AB: Original - 5g bump everywhere

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:24

0.0012285 Max
0.001092
0.00095548
0.00081898
0.00068249
0.00054599
0.00040949
0.00027299
0.0001365
0 Min

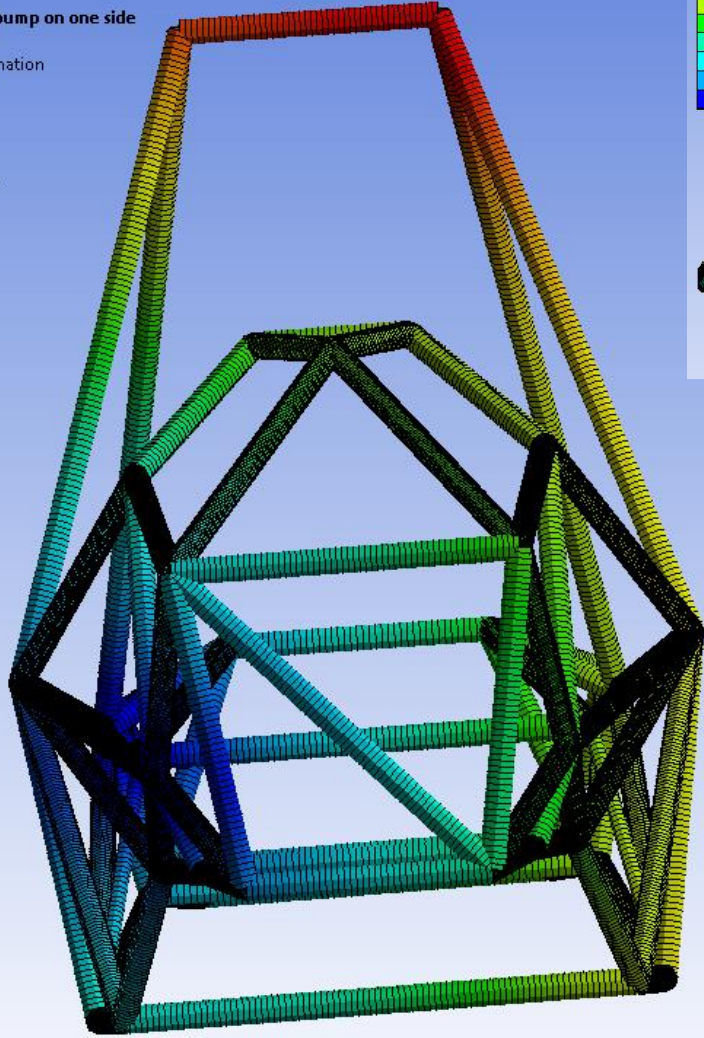
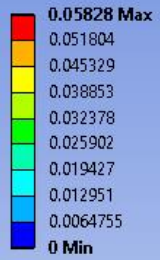


Bump on front and rear wheels on one side (5g) 2023 Chassis

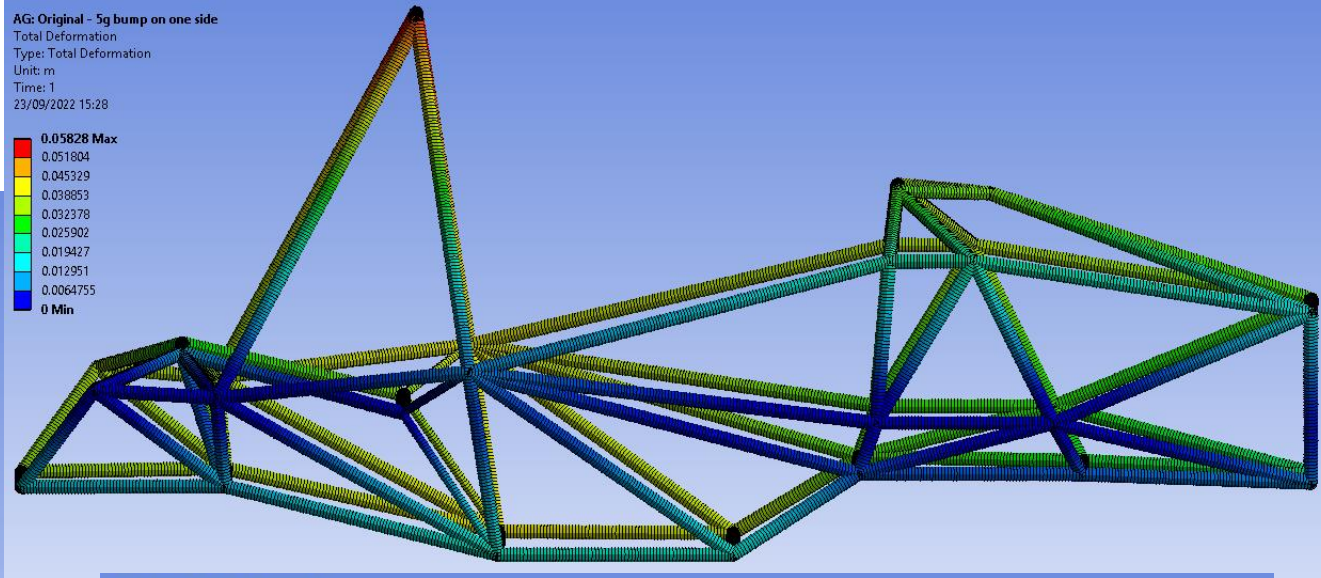
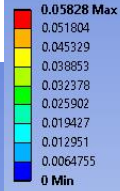


2022 Chassis

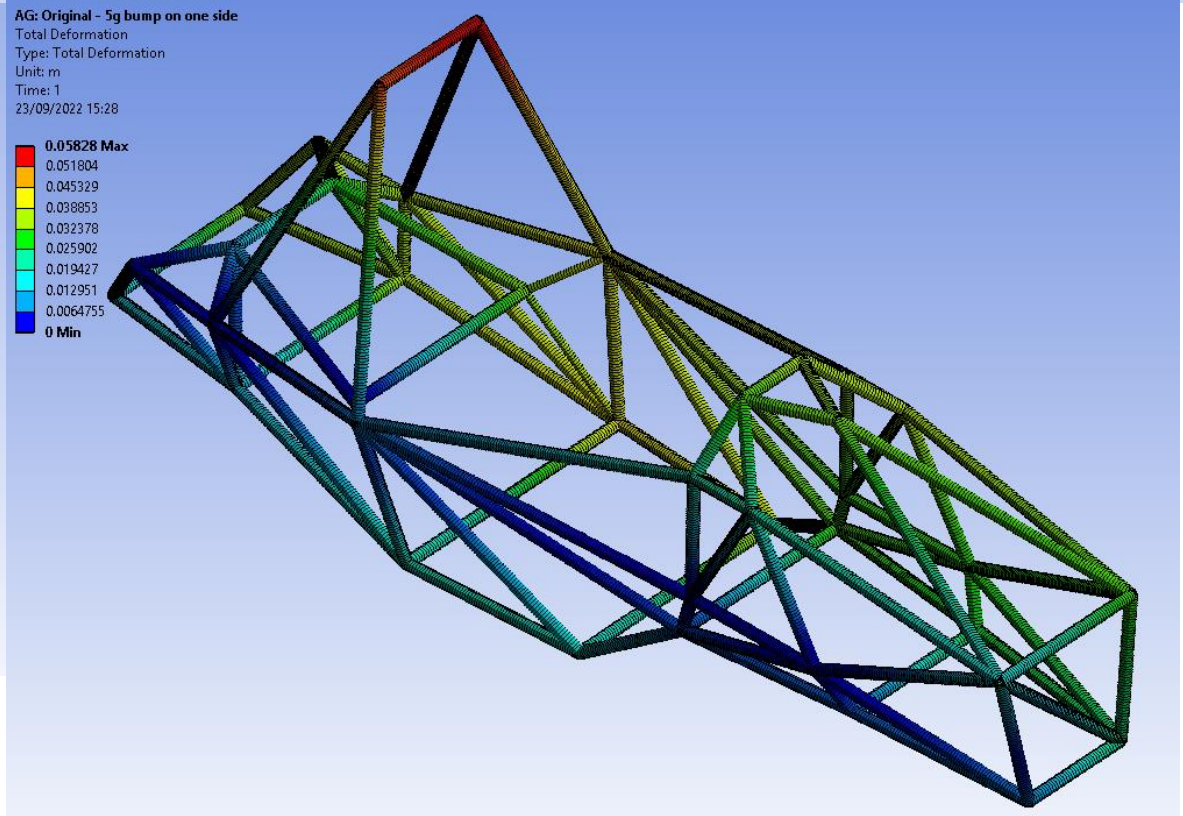
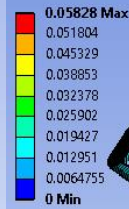
AG: Original - 5g bump on one side
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:28



AG: Original - 5g bump on one side
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:28



AG: Original - 5g bump on one side
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:28



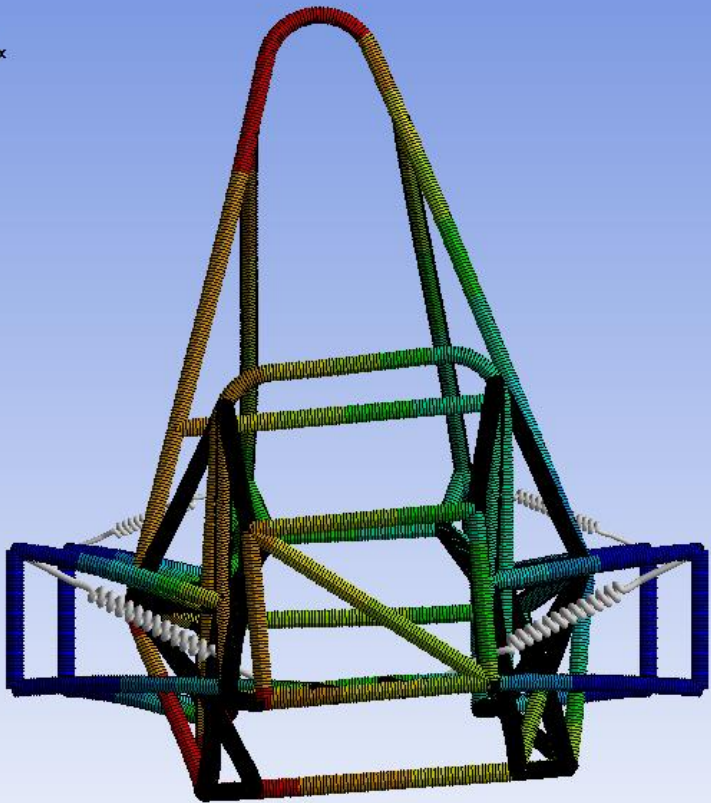
Turning with uniform centripetal acceleration (3g)

2023 Chassis

Y: Final - Turning (uniform)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:23

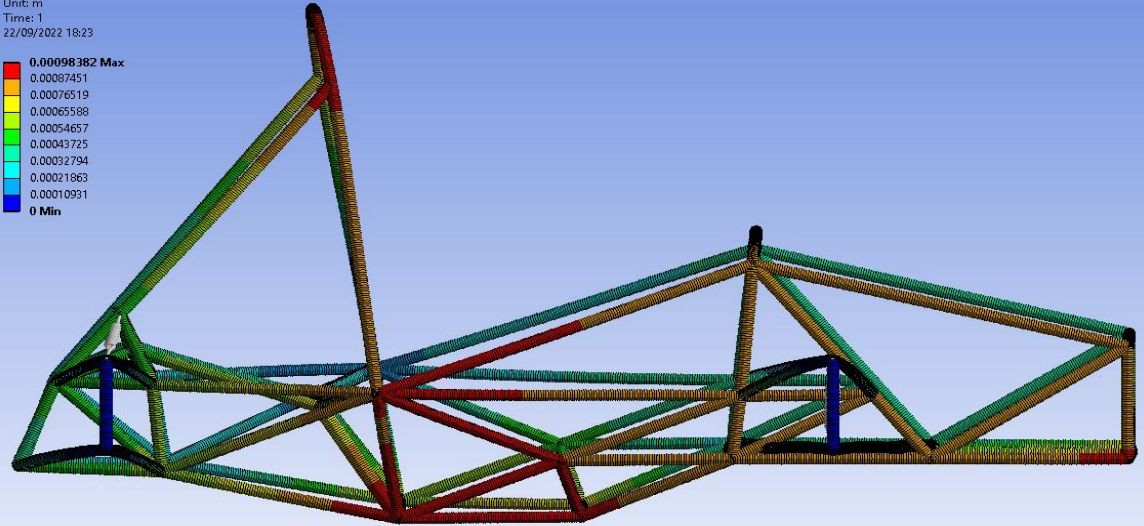
0.00098382 Max
0.00087451
0.00076519
0.00065588
0.00054657
0.00043725
0.00032794
0.00021863
0.00010931
0 Min



Y: Final - Turning (uniform)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:23

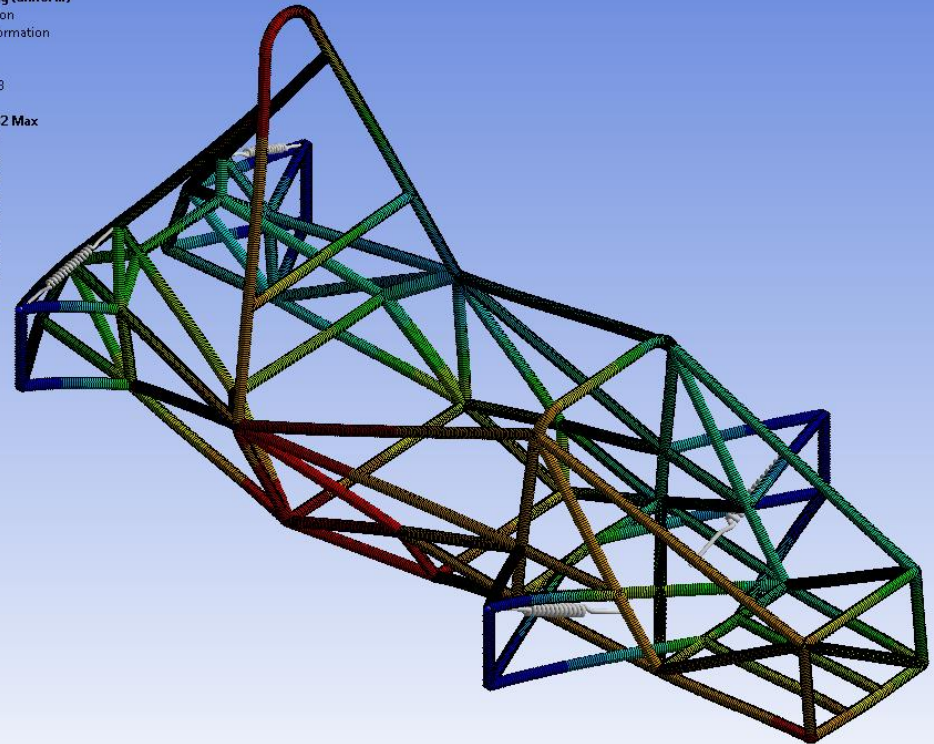
0.00098382 Max
0.00087451
0.00076519
0.00065588
0.00054657
0.00043725
0.00032794
0.00021863
0.00010931
0 Min



Y: Final - Turning (uniform)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:23

0.00098382 Max
0.00087451
0.00076519
0.00065588
0.00054657
0.00043725
0.00032794
0.00021863
0.00010931
0 Min

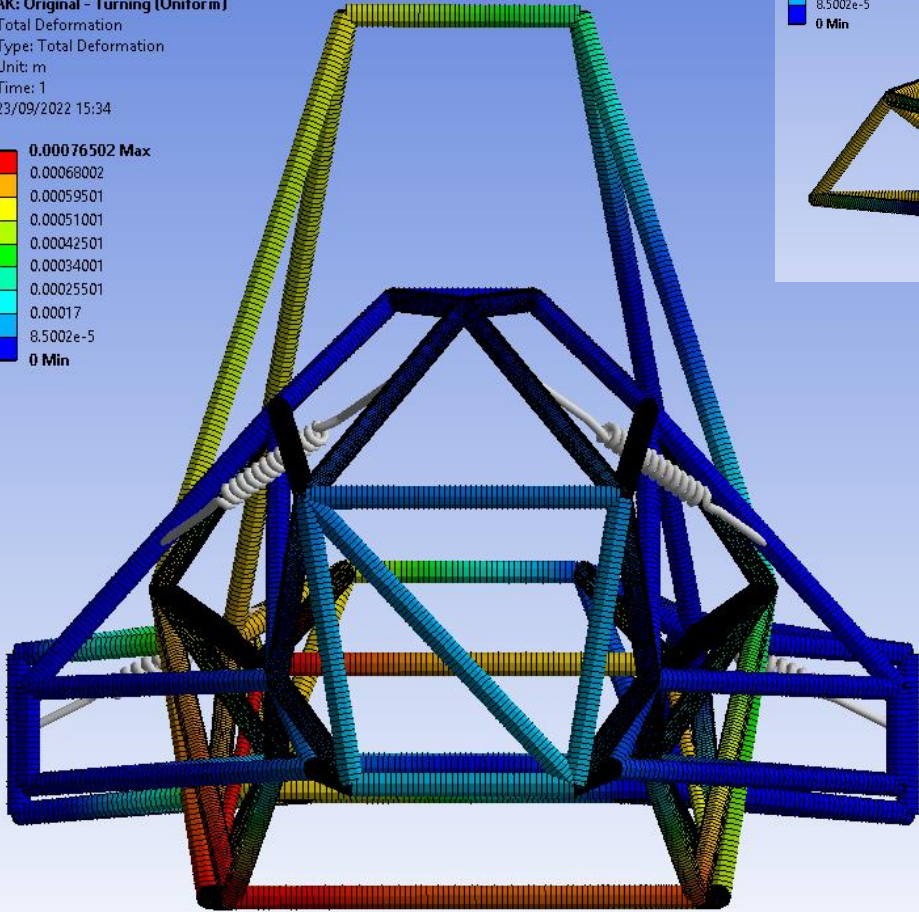


2022 Chassis

AK: Original - Turning (Uniform)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:34

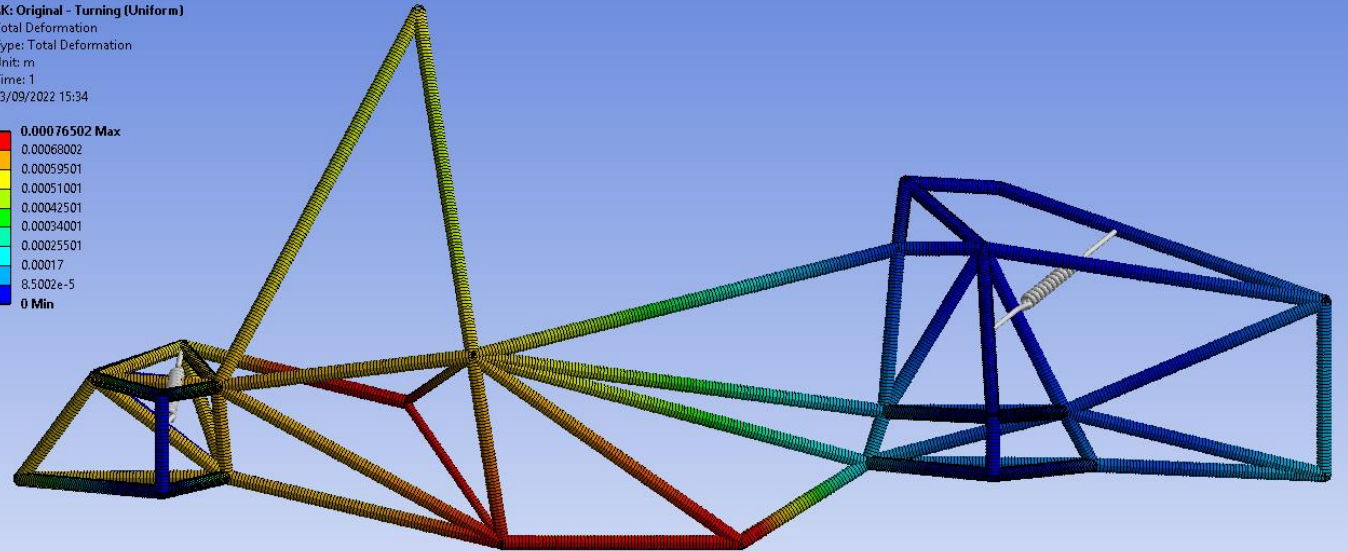
0.00076502 Max
0.00068002
0.00059501
0.00051001
0.00042501
0.00034001
0.00025501
0.00017
8.5002e-5
0 Min



AK: Original - Turning (Uniform)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:34

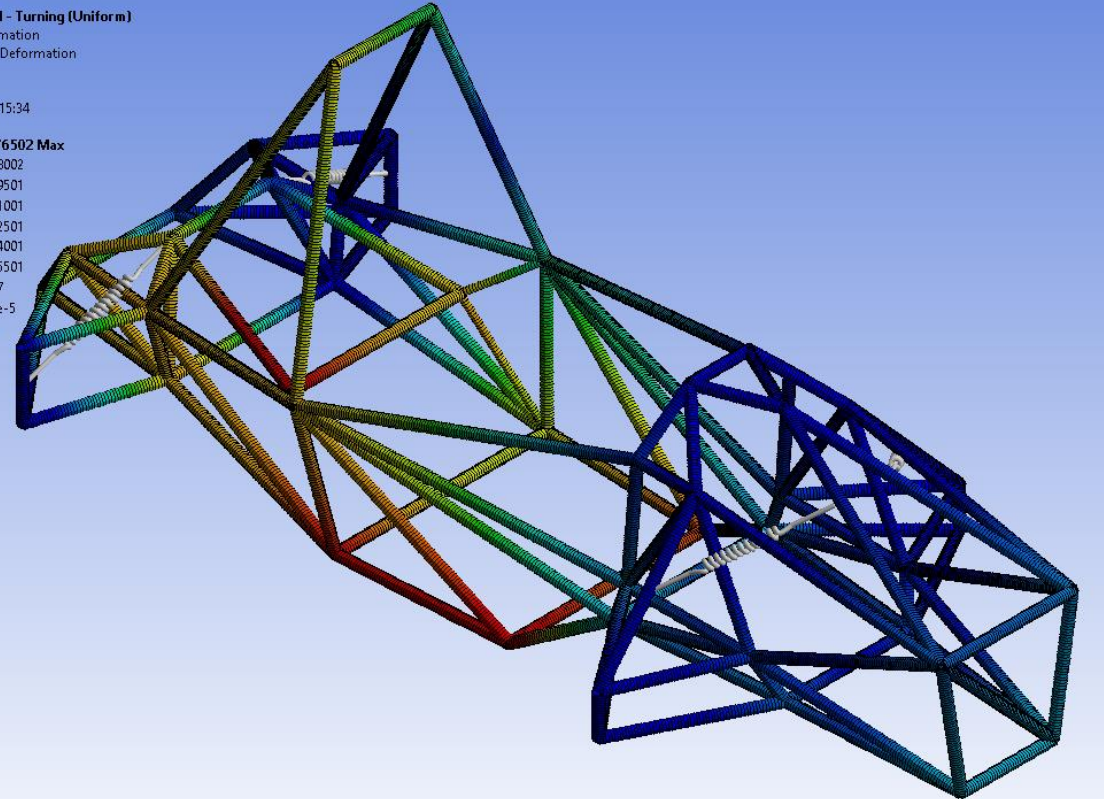
0.00076502 Max
0.00068002
0.00059501
0.00051001
0.00042501
0.00034001
0.00025501
0.00017
8.5002e-5
0 Min



AK: Original - Turning (Uniform)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:34

0.00076502 Max
0.00068002
0.00059501
0.00051001
0.00042501
0.00034001
0.00025501
0.00017
8.5002e-5
0 Min

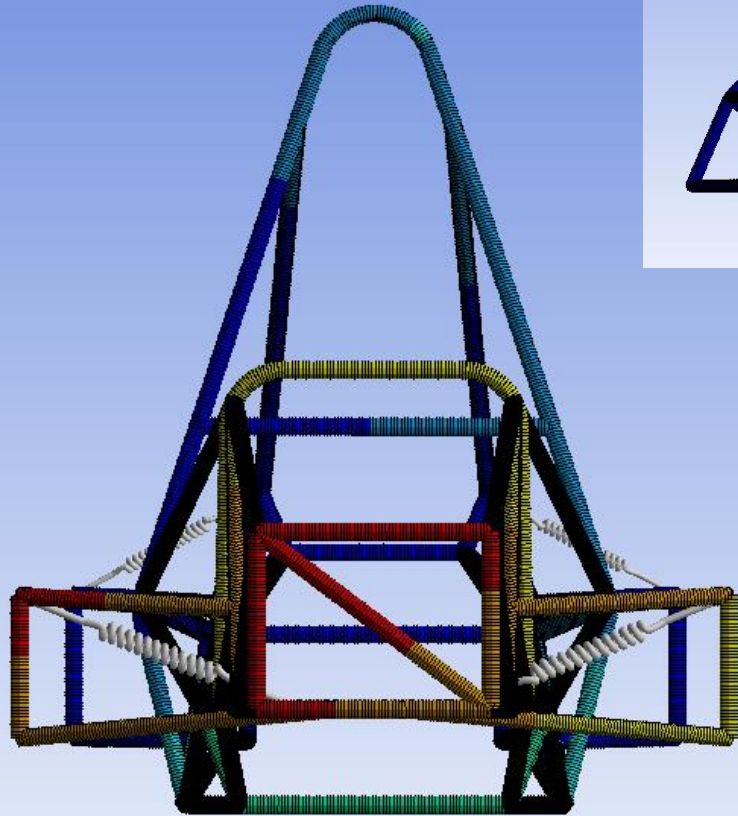
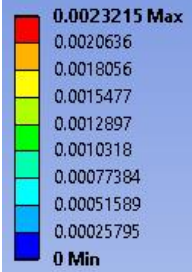


Turning with loaded front wheels (3g)

2023 Chassis

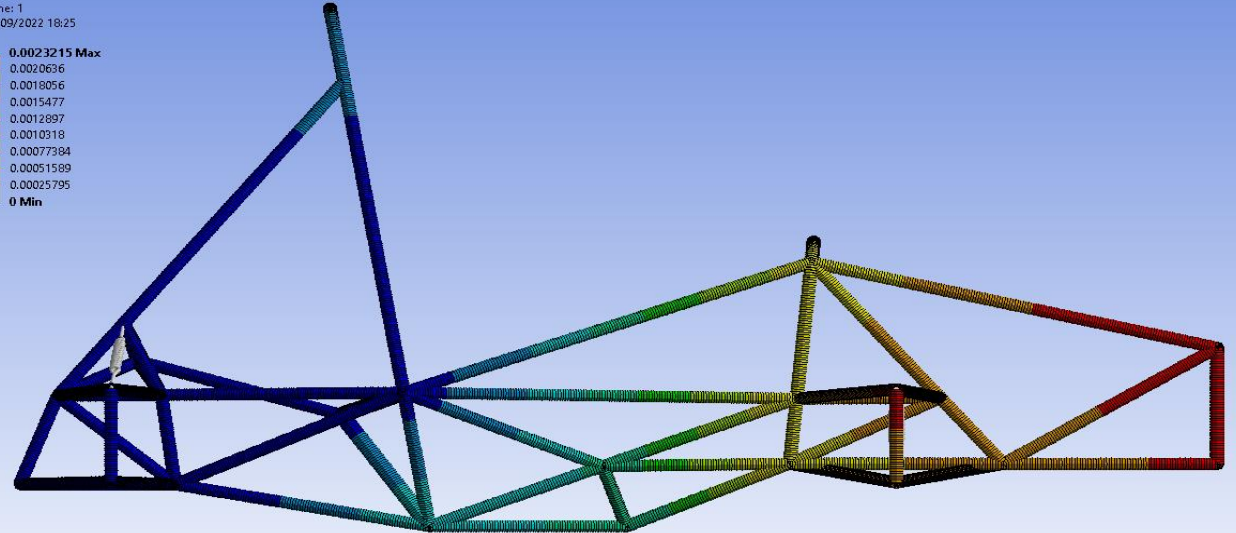
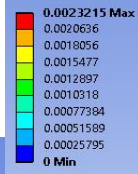
Z: Final - Turning (loaded front wheels)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:25



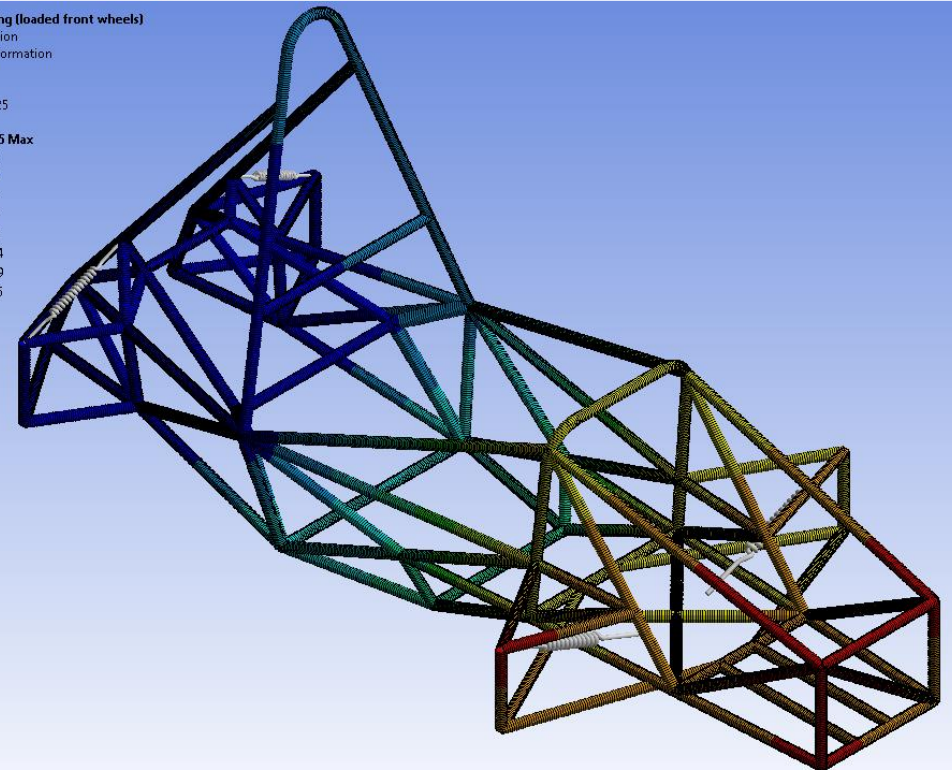
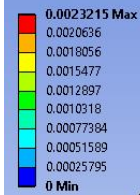
Z: Final - Turning (loaded front wheels)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:25

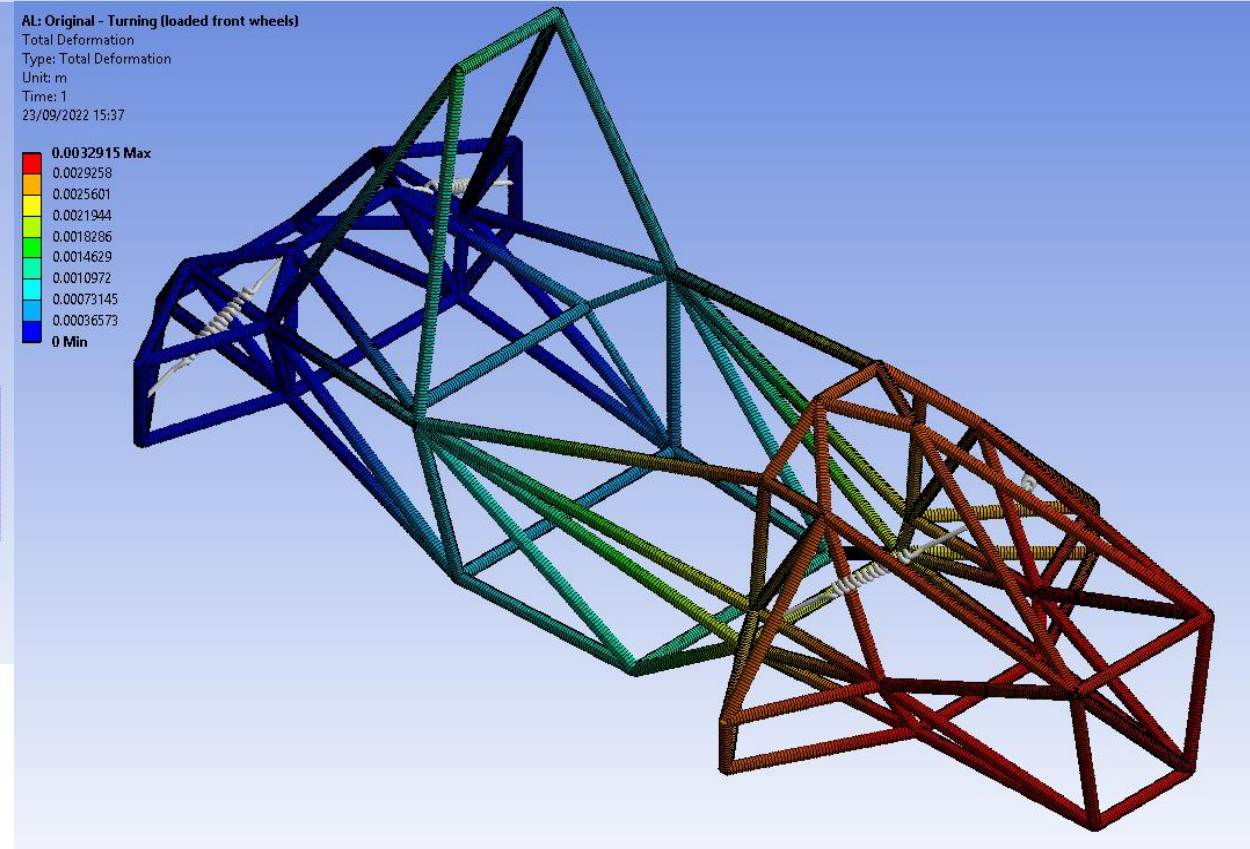
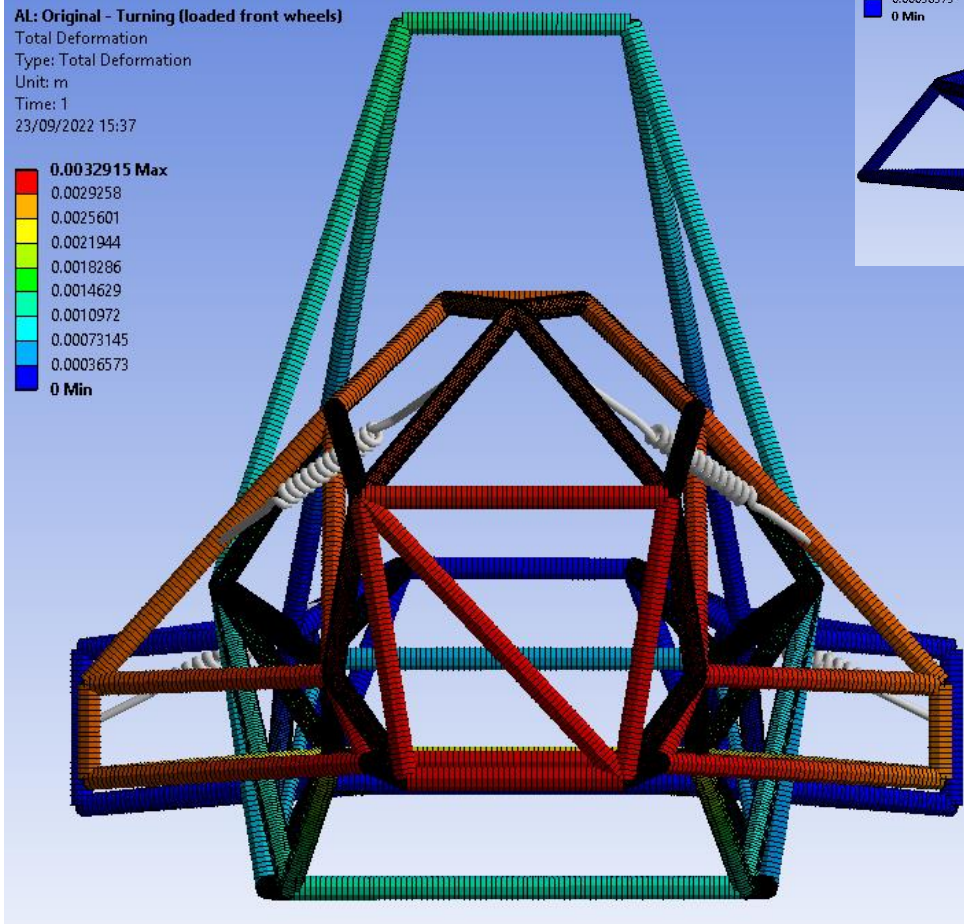
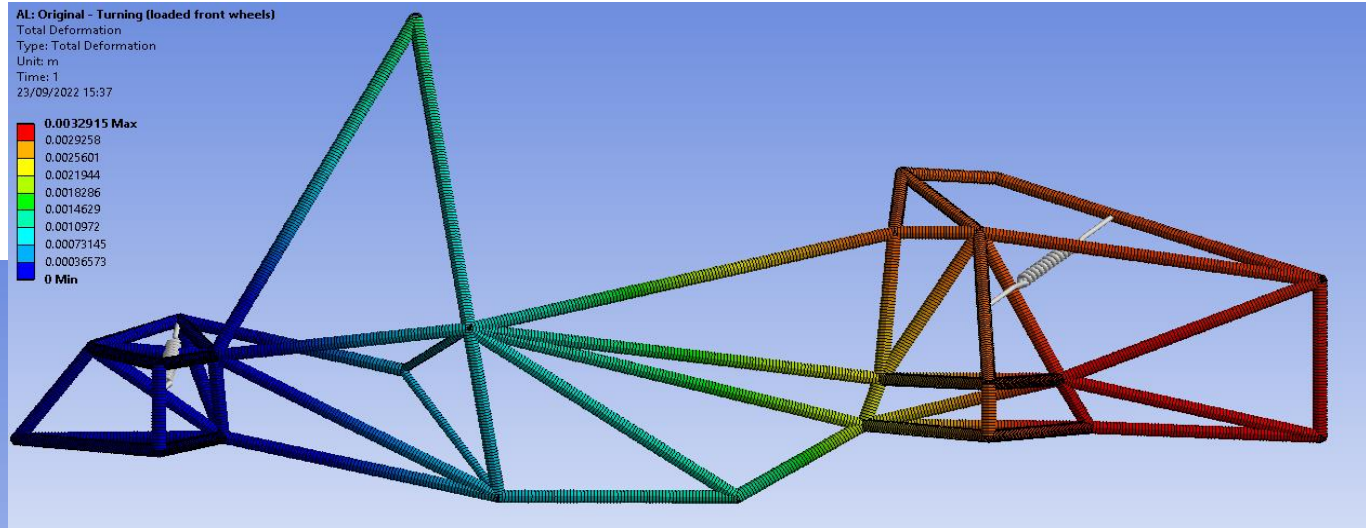


Z: Final - Turning (loaded front wheels)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:25



2022 Chassis

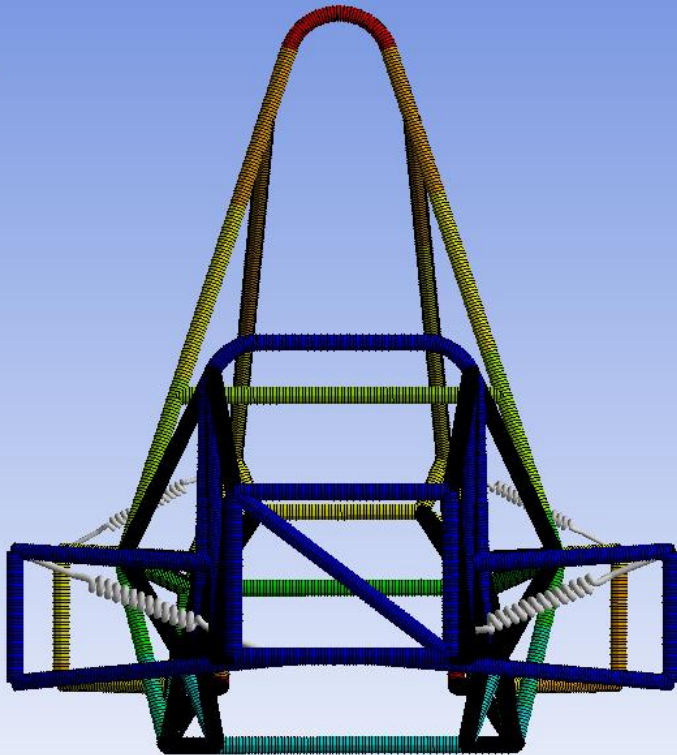


Spinning Out (3g) 2023 Chassis

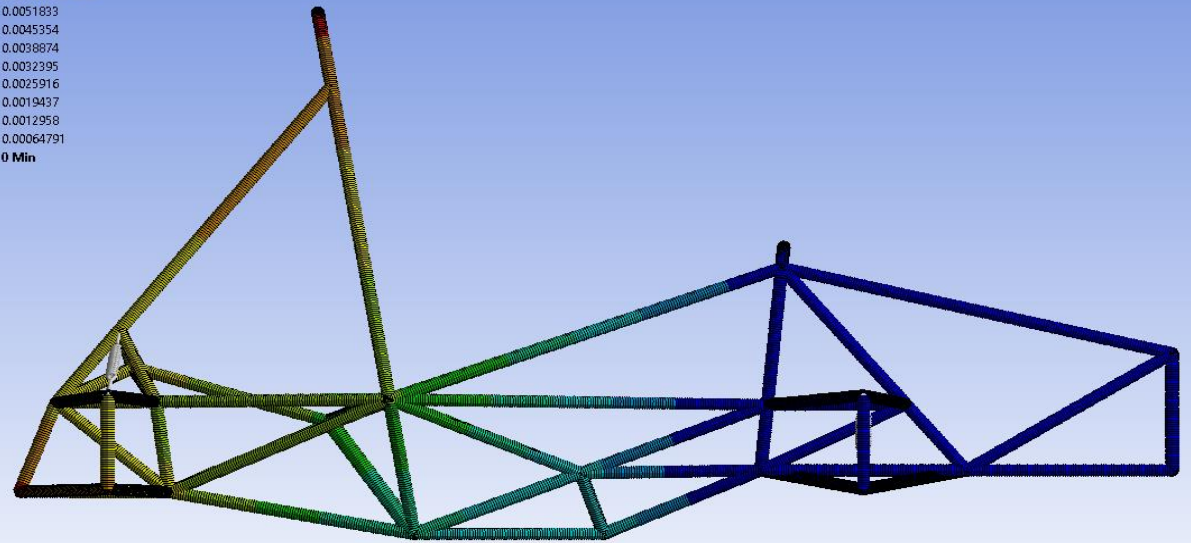
AA: Final - Spinning out (3g)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:27

0.0058312 Max
0.0051833
0.0045354
0.0038874
0.0032395
0.0025916
0.0019437
0.0012958
0.00064791
0 Min



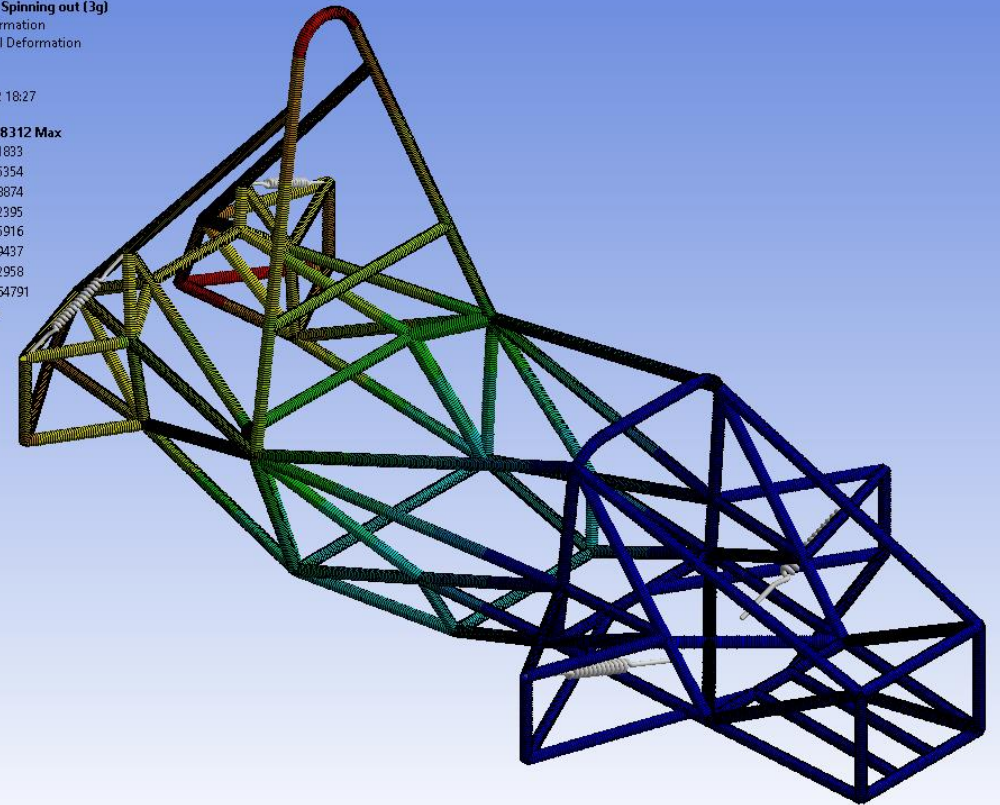
0.0058312 Max
0.0051833
0.0045354
0.0038874
0.0032395
0.0025916
0.0019437
0.0012958
0.00064791
0 Min



AA: Final - Spinning out (3g)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
22/09/2022 18:27

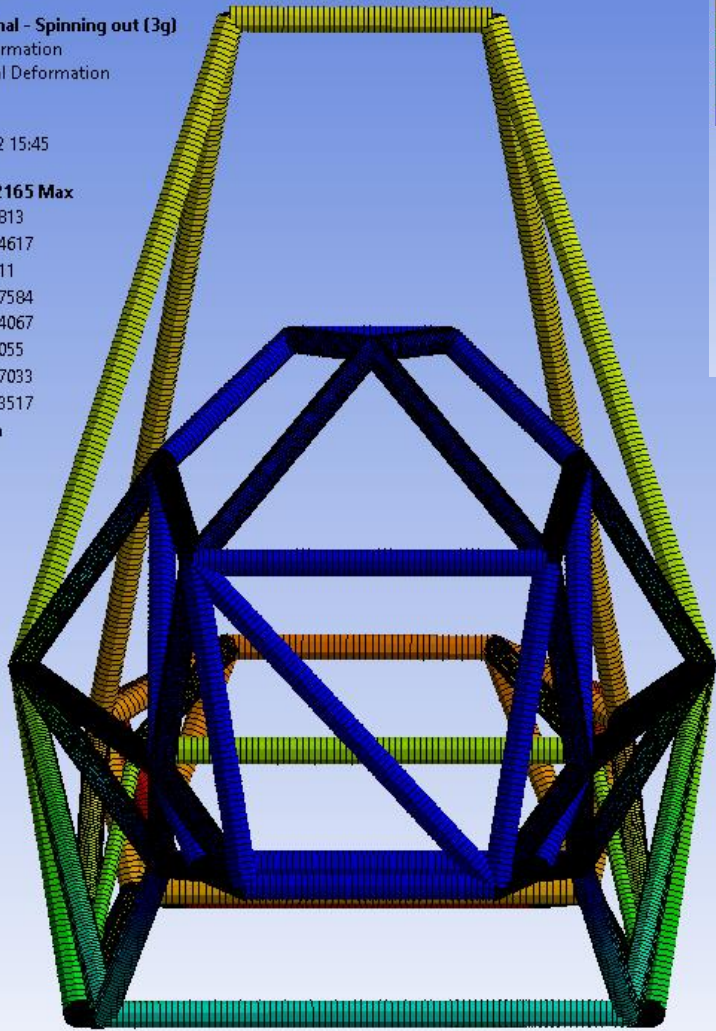
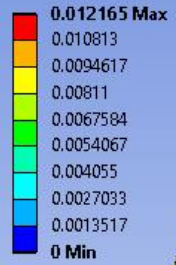
0.0058312 Max
0.0051833
0.0045354
0.0038874
0.0032395
0.0025916
0.0019437
0.0012958
0.00064791
0 Min



2022 Chassis

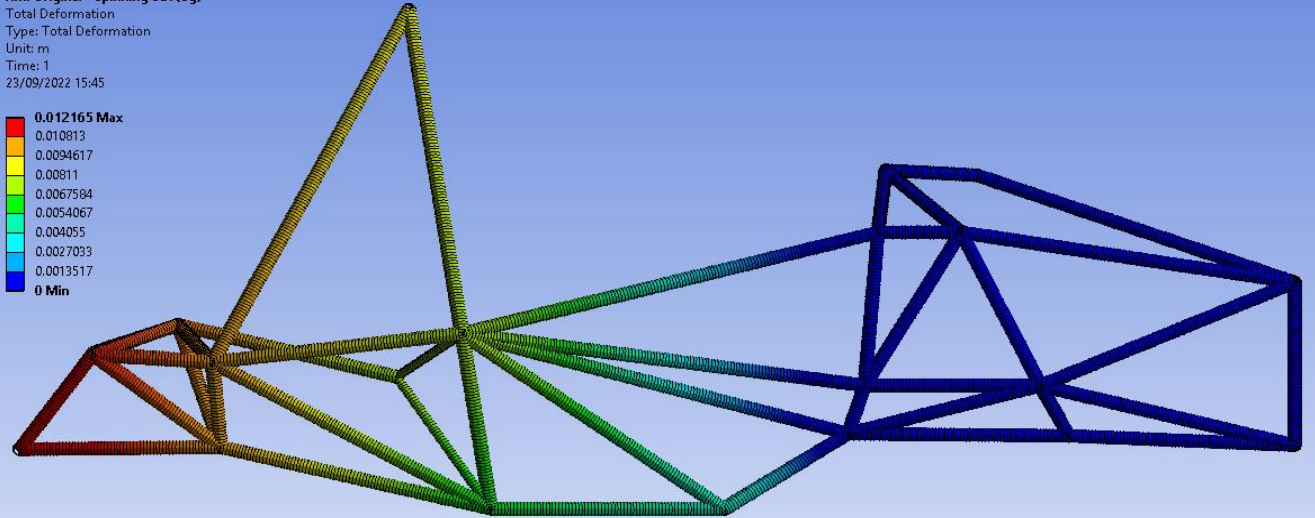
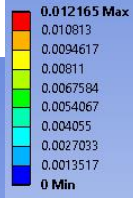
AM: Original - Spinning out (3g)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:45



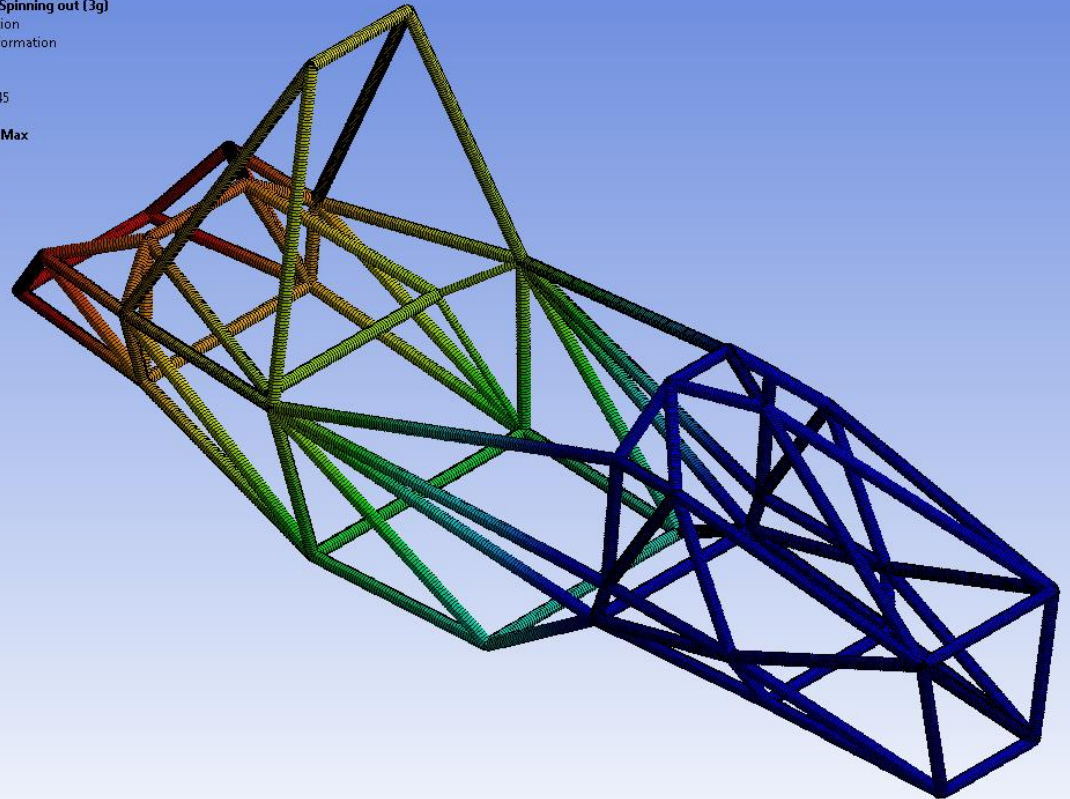
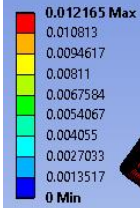
AM: Original - Spinning out (3g)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:45



AM: Original - Spinning out (3g)

Total Deformation
Type: Total Deformation
Unit: m
Time: 1
23/09/2022 15:45



Final Results

The table below compares the maximum deflections in the new and old chassis for each load case.

Load Type	New Chassis (2023)	Old Chassis (2022)
Static (1g)	0.00075594 m	0.00029973 m
Forward Acceleration (5g)	0.0014683 m	0.00064741 m
Braking (5g)	0.00081061 m	0.00035749 m
Frontal Impact (30g)	0.009414 m	0.003407 m
Bump on one front wheel (5g)	0.0013051 m	0.0021035 m
Bump on one rear wheel (5g)	0.0022722 m	0.0017868 m
Bump on both front wheels (5g)	0.0028761 m	0.0010646 m
Bump on both rear wheels (5g)	0.0041042 m	0.0034136 m
Bump on all wheels (5g)	0.0047048 m	0.0012285 m
Bump on front and rear wheels on one side (5g)	0.01761 m	0.05828 m
Turning with uniform centripetal acceleration (3g)	0.00098382 m	0.00076502 m
Turning with loaded front wheels (3g)	0.0023215 m	0.0032915 m
Skidding (3g)	0.0058312 m	0.012165 m