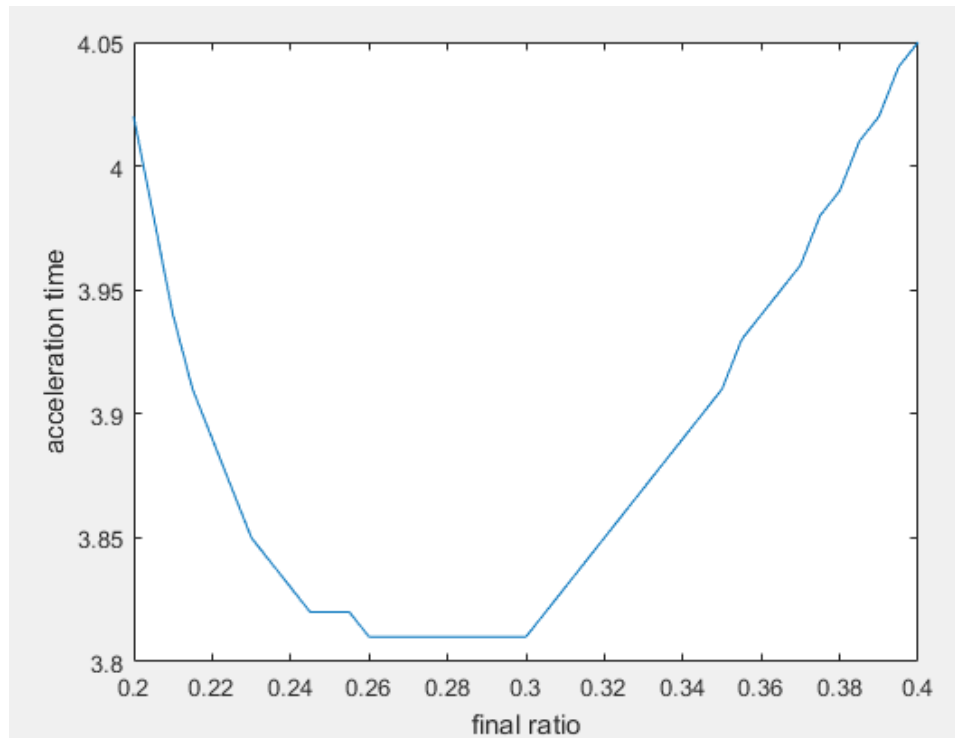# DIFFERENTIAL

Drive ratio

Figure 1: Acceleration model used to determine the optimum drive ratio

Optimum dive ratio: 0.2955 ➔ Pinion: 13; Cog-Wheel: 44
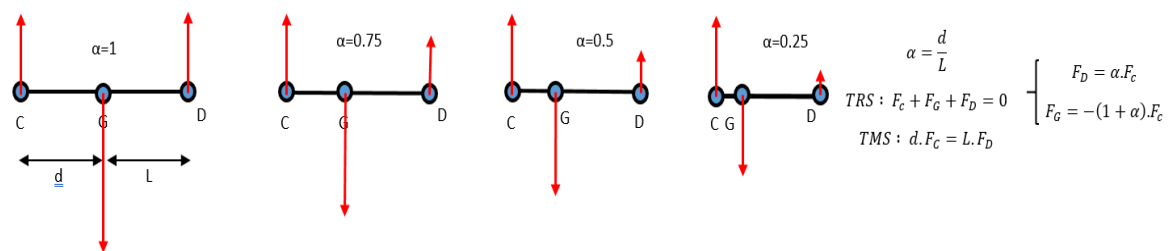
Dimensioning

Figure 2: Influence of the position of the elements of the differential assembly

Load cases :

- Maximum torque load obtained through engine data: 59N.m, 28 000N on the gear.
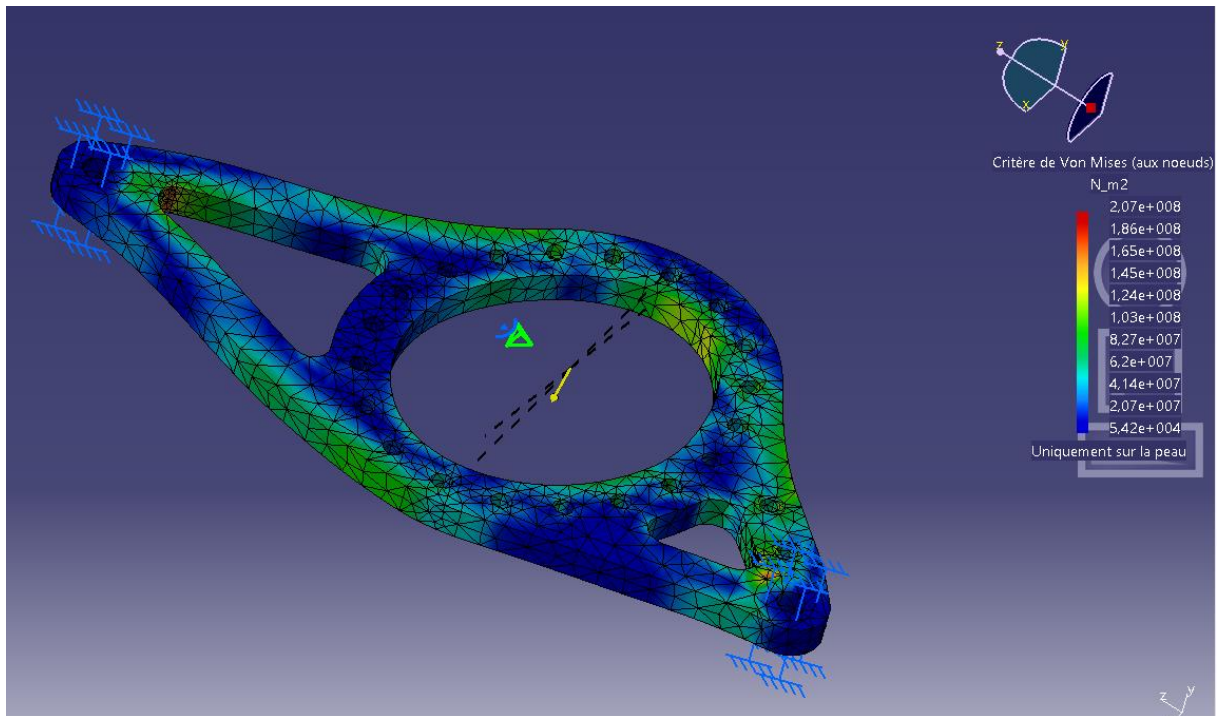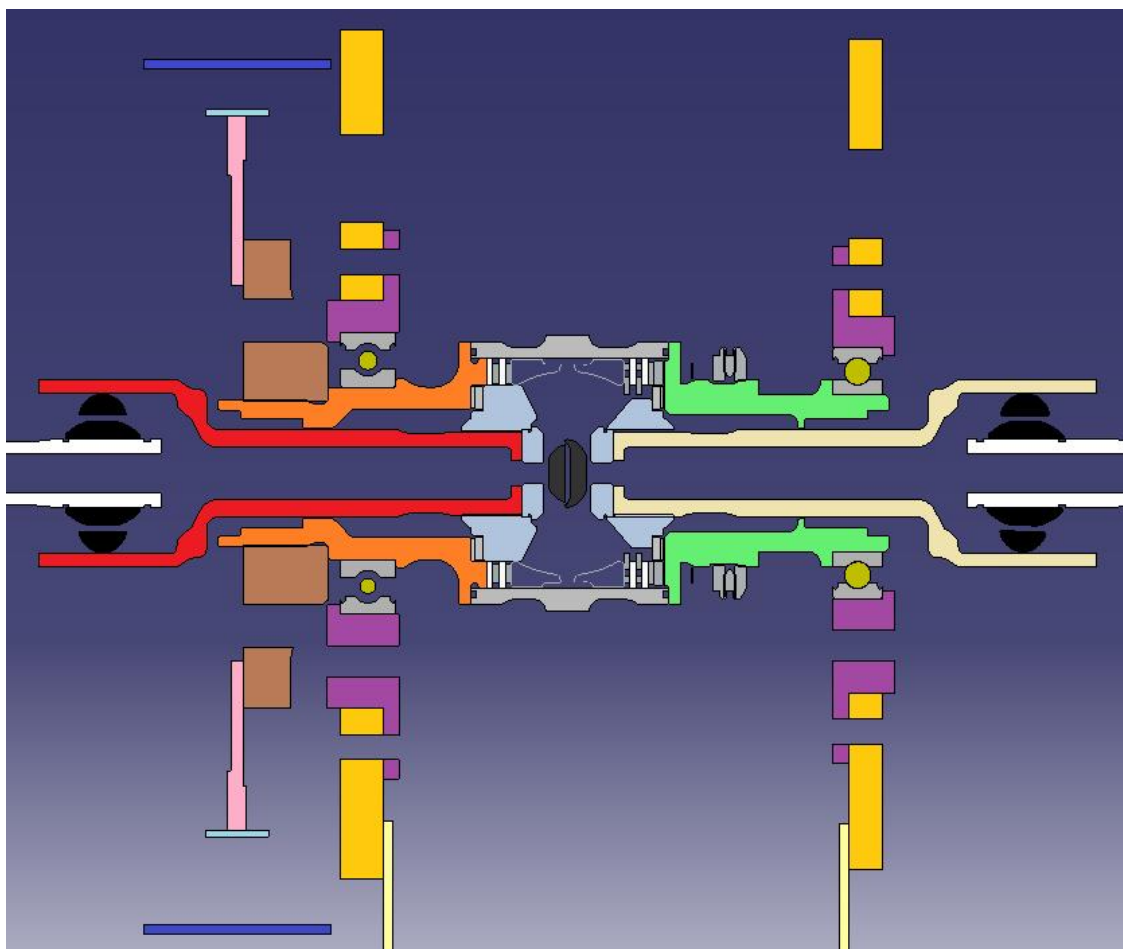- Car lift by the push bar

Figure 3: FEA on left eccentric housing

Figure 4: Section of the differential mounting
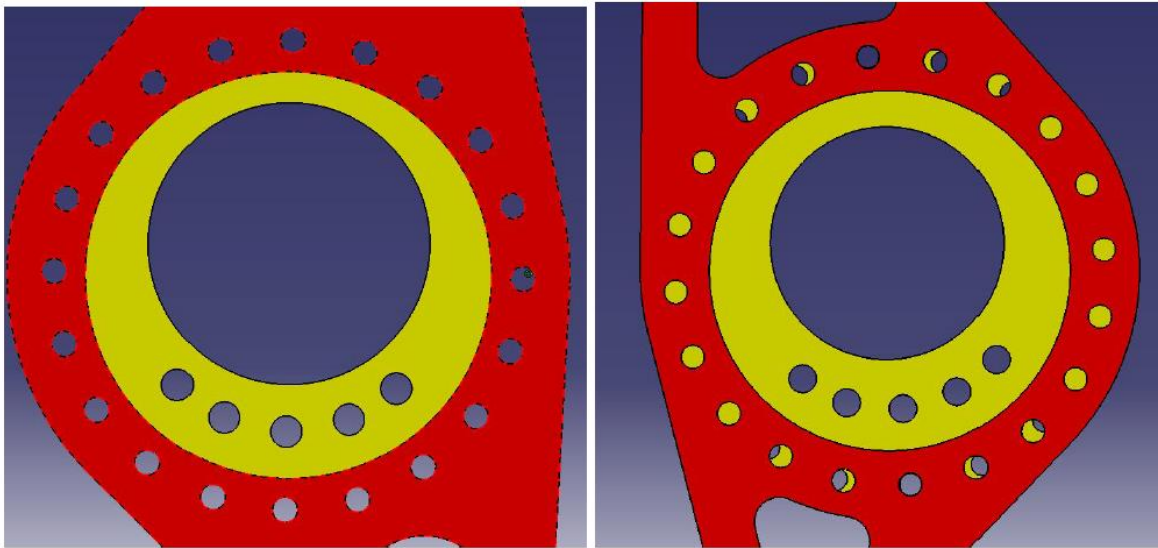
Configurations

Figure 1: View of the eccentric in its housing

⇨ This geometry offers 180 configurations

Appendix

Formula SAE Torque Bias Ratio

The Drexler Motorsport Formula SAE LSD ramp angle setup options are listed below:

30° Ramp Angle = approximately 88 % Lock-Up

40° Ramp Angle = approximately 60 % Lock-Up

45° Ramp Angle = approximately 51 % Lock-Up

50° Ramp Angle = approximately 42 % Lock-Up

60° Ramp Angle = approximately 29 % Lock-Up

The Lock-up Torque (%) describes the torque difference from one wheel to the other wheel. One can say the smaller the angle is (per example 30°) the bigger the locking factor will be. The distribution of the input power always follows in the direction of the wheel with the greatest grip to the road surface (applied torque).

For example: Your drive torque is 100% and the theoretical lock-up torque is 50%. This describes your TBR = 3

WHEEL 1	THEORETICAL LOCK-UP TORQUE	WHEEL 2
75%	50%	25%

For example: Your drive torque is 100% and the theoretical lock-up torque is 88%. This describes your TBR = 15.66

WHEEL 1	THEORETICAL LOCK-UP TORQUE	WHEEL 2
94%	88%	6%

For example: Your drive torque is 100% and the theoretical lock-up torque is 60%. This describes your TBR = 4.

WHEEL 1	THEORETICAL LOCK-UP TORQUE	WHEEL 2
80%	60%	20%

For example: Your drive torque is 100% and the theoretical lock-up torque is 51%. This describes your TBR = 3.08

WHEEL 1	THEORETICAL LOCK-UP TORQUE	WHEEL 2
75,5%	51%	24,5%

For example: Your drive torque is 100% and the theoretical lock-up torque is 42%. This describes your TBR = 2.45

WHEEL 1	THEORETICAL LOCK-UP TORQUE	WHEEL 2
71%	42%	29%

For example: Your drive torque is 100% and the theoretical lock-up torque is 29%. This describes your TBR = 1,82

WHEEL 1	THEORETICAL LOCK-UP TORQUE	WHEEL 2
64,5%	29%	35,5%