

FORMULA STUDENT GEARBOX

Assembly "Gearset"

Version: V1-2025



Information for FSAE / FS-Team

The HUMBEL Formula Student transmission, with a total gear ratio of 12.48, is tailor-made for a drive with AMK, DTI, or Fischer motors and a suspension with 10" Hoosier racing tires. The drive is designed to be transmitted via the ring gear respective the externally rotating wheel hub of the teams.

The gearbox is designed for a maximum input speed of 20,000 rpm, a torque of 32 Nm, and a maximum power output of 36 kW. Its service life is specified as 1,000 km under average Formula Student load conditions.

In terms of packaging, both common Formula Student concepts can be implemented:

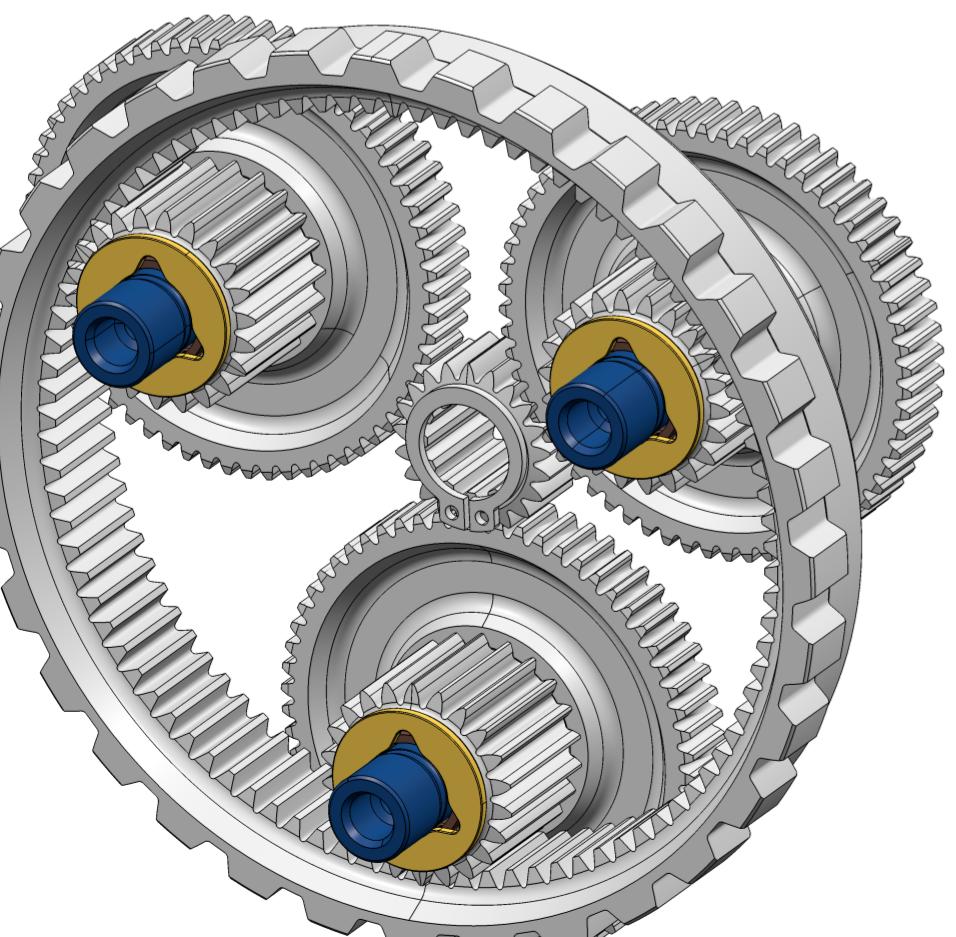
1. Gearbox between the two wheel bearings
2. Wheel bearings above or next to the motor. Gearbox separated from it, moved to the outside.

The ring gear is designed with a tip circle of 80.35 mm, making it perfect for an $\phi 80$ mm outside wheel bearing with a one-piece carrier in Concept 1.

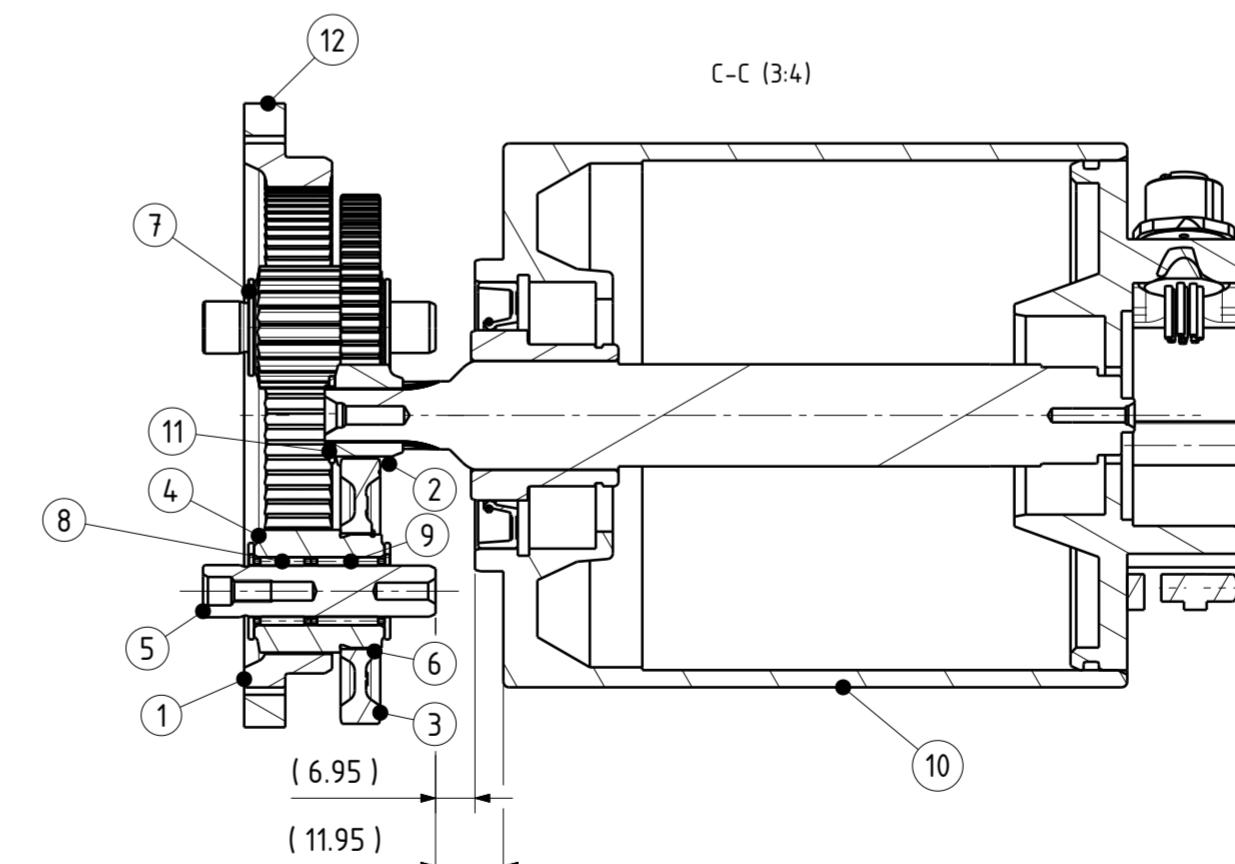
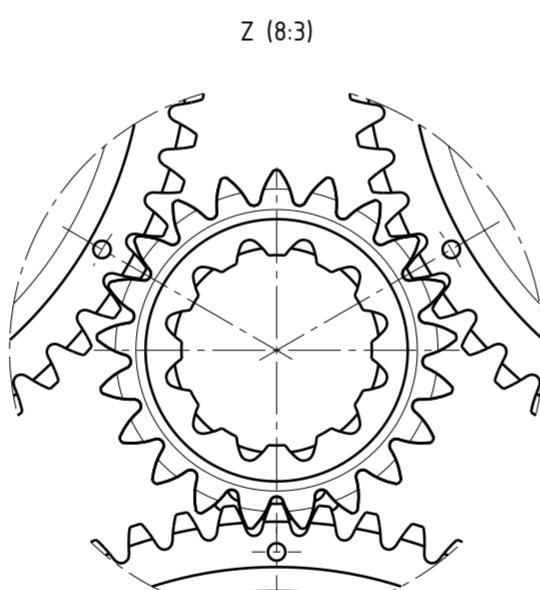
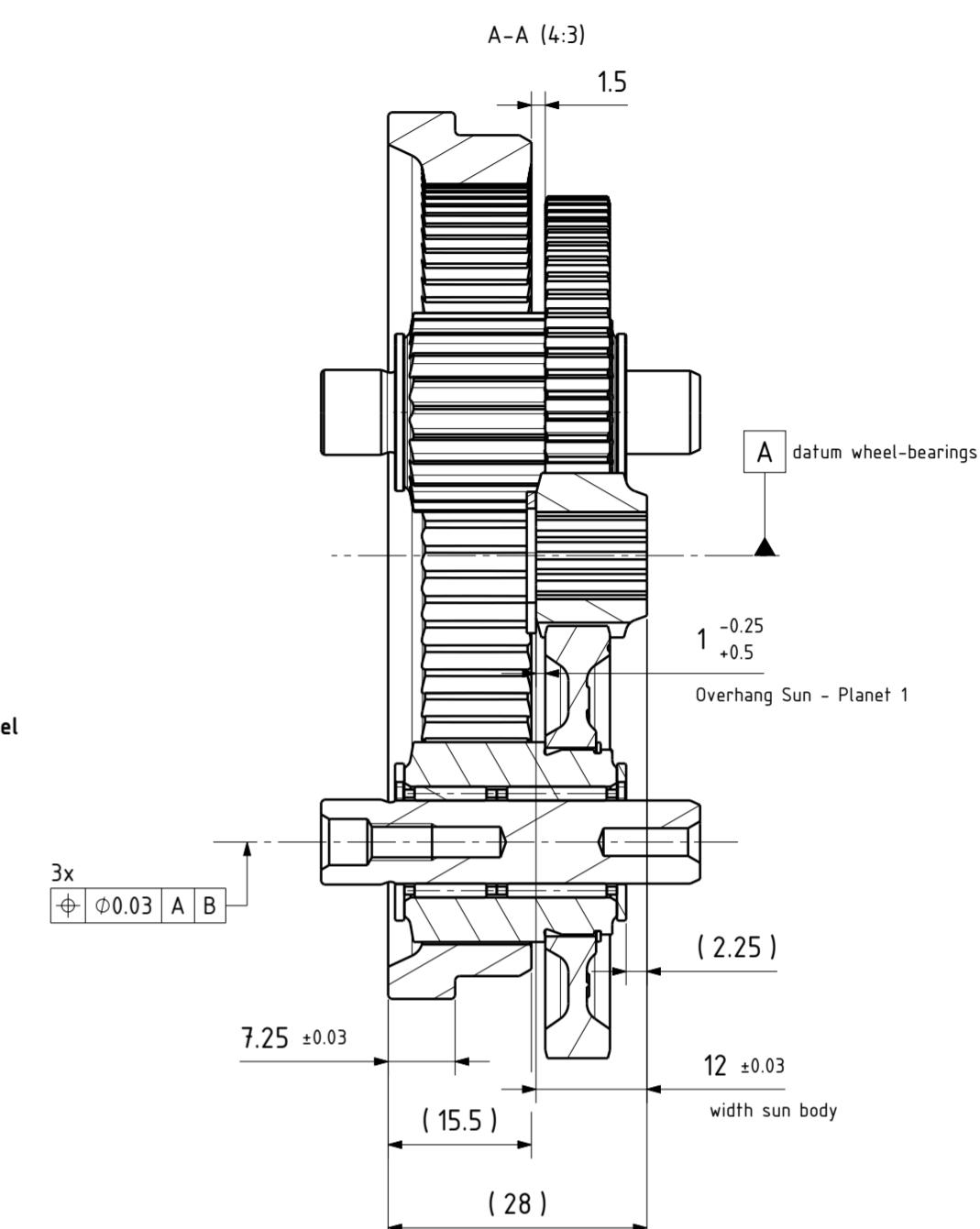
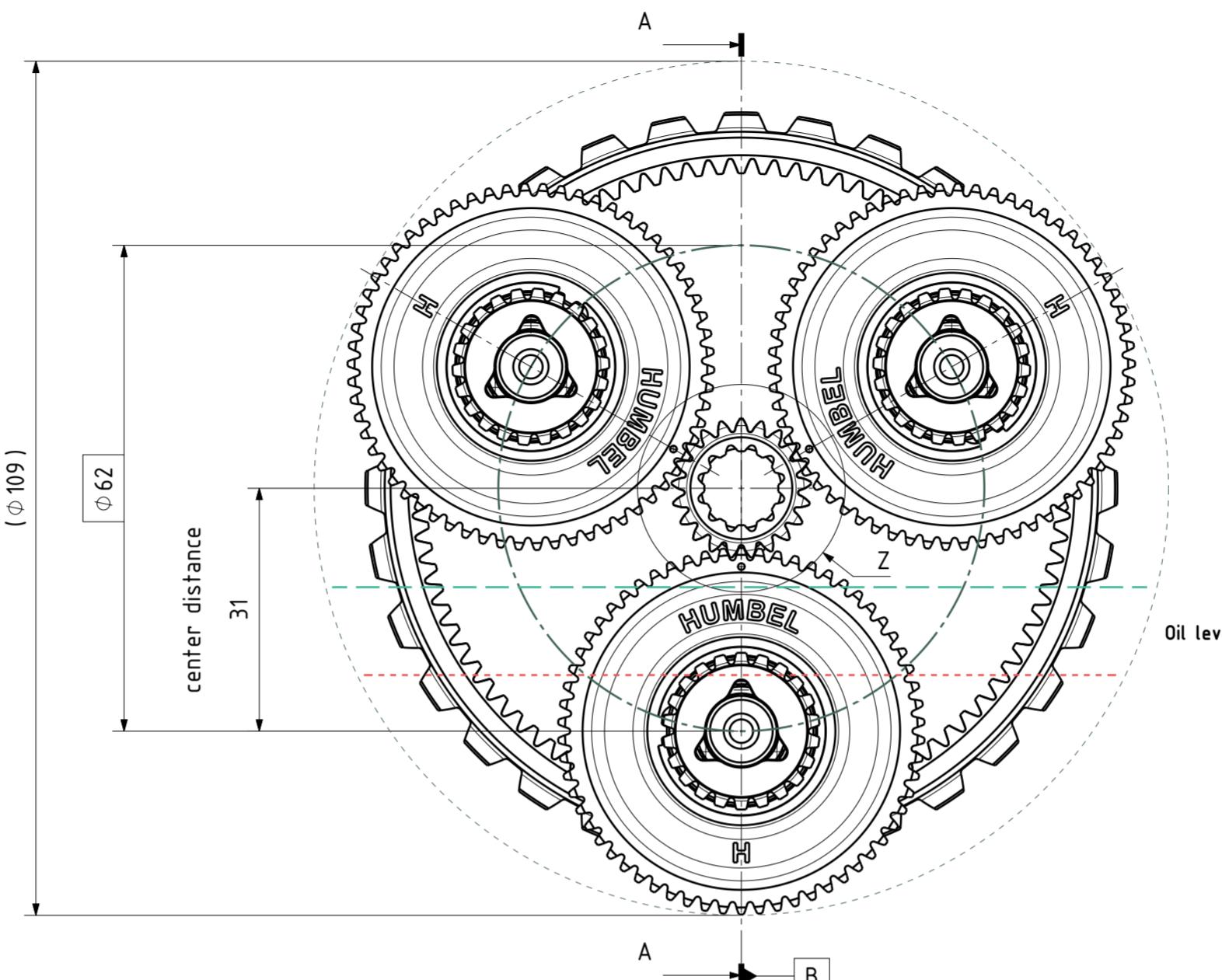
With three identical planets, machined markings for the "zero tooth," and a sun with 21 teeth (divisible by three), assembly of the gearbox is very simple, as all three planets simply need to point their zero teeth toward the center. (See Detail Z)

To ensure smooth operation, high demands should be placed on the accuracy and tolerances of the connecting parts of the teams. The concentricity of the ring gear and sun gear, as well as the positional accuracy of the planetary boreholes, must be strictly adhered to.

Lubrication is described in more detail in the operating instructions, but the recommended oil level can be found on the right-hand side. The maximum temperature should not exceed 70 – 80 °C, measured on the outside of the wheel hub.



Overview Gear Set			
V1-2025			
Gear ratio	i_{total}	12.48	-
Input torque	T_{in}	32	Nm
Input speed	N_{in}	20.000	1/min
Power	P	36	kW
Output Torque	T_{out}	400	Nm
Weight	M	380	g
Center distance	a	31	mm
Construction space	V	$\phi 109 \times 28$	mm



Pos.	Rev.	Title	Supplier	Qty.
1	A	HU-FS Ring gear	HUMBEL	1
2	A	HU-FS Sun - AMK	HUMBEL	1
3	A	HU-FS Planet 1	HUMBEL	3
4	A	HU-FS Planet 2	HUMBEL	3
5	A	HU-FS Planet-bolt	HUMBEL	3
6	A	VSM-20	HUMBEL	3
7	A	HU-FS Thrust Washer	HUMBEL	6
8	A	Needle Bearing K9x12x10	FSAE / FS-Team	3
9	A	Needle Bearing K9x12x13	FSAE / FS-Team	3
10	A	HU-FS AMK-Motor	FSAE / FS-Team	1
11	A	Retaining ring for shafts DIN471-11x1-black	FSAE / FS-Team	1
12	A	HU-FS Radnabe	FSAE / FS-Team	1

Maßstab / Scale	A2	Blatt / Sheet	Projektname / Project name	Werkstoff / Material	Gewicht / Weight
1:1		01 / 02	HUMBEL.2411		0 kg
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			Allgemeintoleranzen General tolerances	ISO 2768-mK	Geprüft Geprüft by
			Revidiert Reviewed by		17.09.2025
			Freigegeben Released by		18.09.2025
			Revision comment		Date / Date
			Benennung / Designation		
			Zeichnungsnr. / Drawing number		
			HU-00139219		
			A		

HUMBEL
Gear Technology

HU-FS Gearbox - AMK