

### Table 1. Transmission Performance Curve

Engine Speed (RPM)	Engine Torque (ft-lb)	CVT Ratio	Rear Transfer Case Ratio	Front Diff Ratio	RWD Output Torque (ft-lb)	Speed (MPH)
2400	18.5	3.9	8.38	3.7	604.62	5.02
2600	18.1	3.9	8.38	3.7	591.54	5.44
2800	17.4	3.9	8.38	3.7	568.67	5.86
3000	16.6	3.9	8.38	3.7	568.67	6.28
3200	15.4	1	8.38	3.7	129.05	26.12
3400	14.5	1	8.38	3.7	121.51	27.76
3600	13.5	0.9	8.38	3.7	101.82	32.66

### Table 2 & 3. Transmission Requirements

Requirement	2025 Design Target	Reason
Peak Torque at Rear Wheels	604.58 ft-lbs	Calculated to complete traction event
Top Speed	32.6 mph	Ensure sufficient torque and speed
Overall Ratio (Rear)	32.68	Calculated to complete traction event
Transfer Case Ratio	8.38	Calculated to complete traction event
Transfer Case Weight	39.73 lbs (39.3% Decrease from 2024)	At least 30% Reduction (From 2024 transfer case + Differential)
4x4 Type (Chain, Shaft, etc.)	Toggleable 2WD/4WD Driveshaft system	

Requirement	Scoundrel 2024	Corsair 2025
Peak Torque at Rear Wheels	543.5 ft-lbs	604.58 ft-lbs (11.2% Increase)
Transmission Weight	220.3 lbs	148.6 lbs (32.5% Reduction)
Hill Climb Angle	45°	76°

### Transmission Breakdown

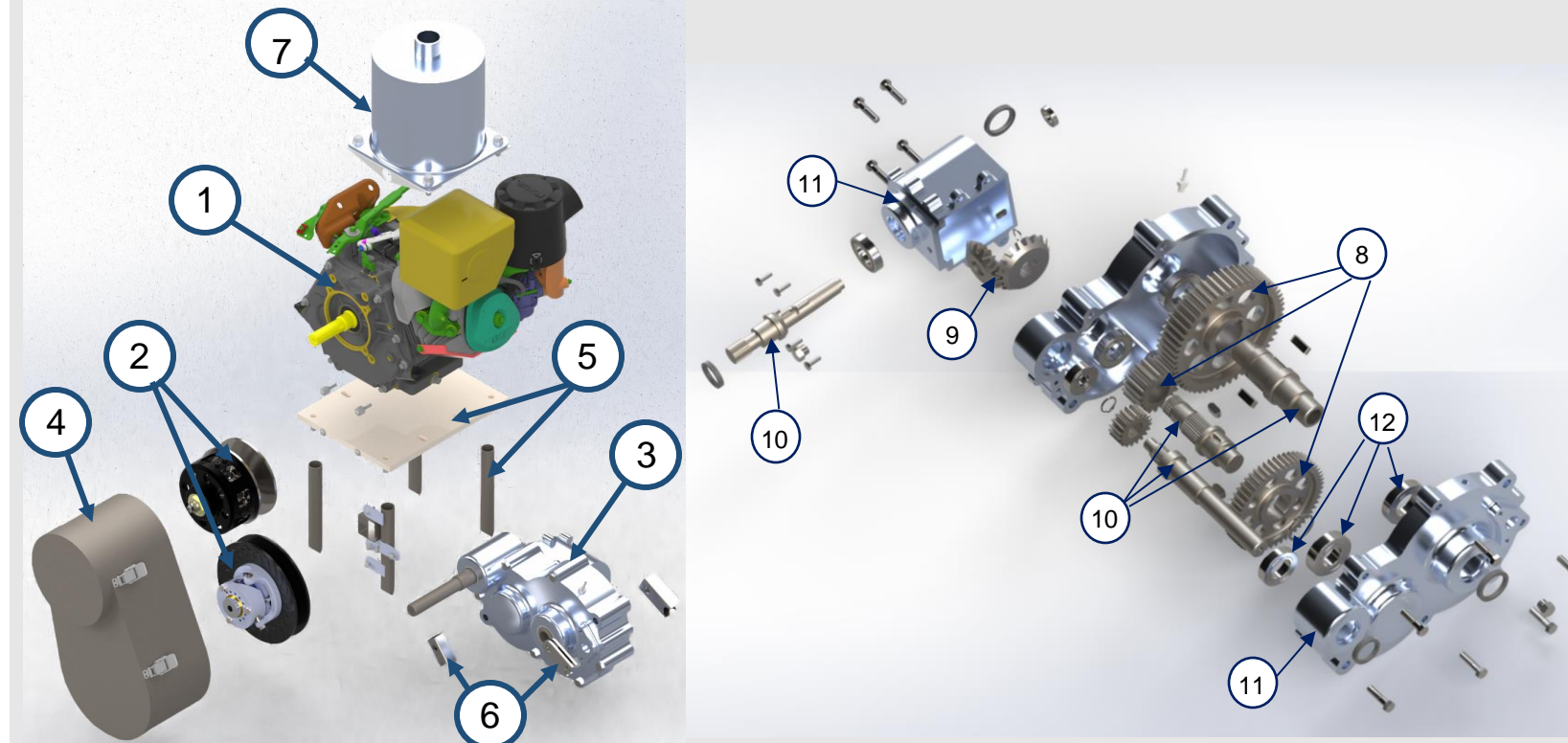


Figure 1. Exploded Transmission

Figure 2. Exploded Transfer Case

1 Kohler CH440 Engine	5 Engine Mounting	9 Bevel Gears
2 GX9 CVT Transmission	6 Transfer Case Mounting	10 Shafts
3 Transfer Case	7 Fuel Tank	11 Housing
4 CVT Guarding	8 Spur Gears	12 Bearings

### Transfer Case Design

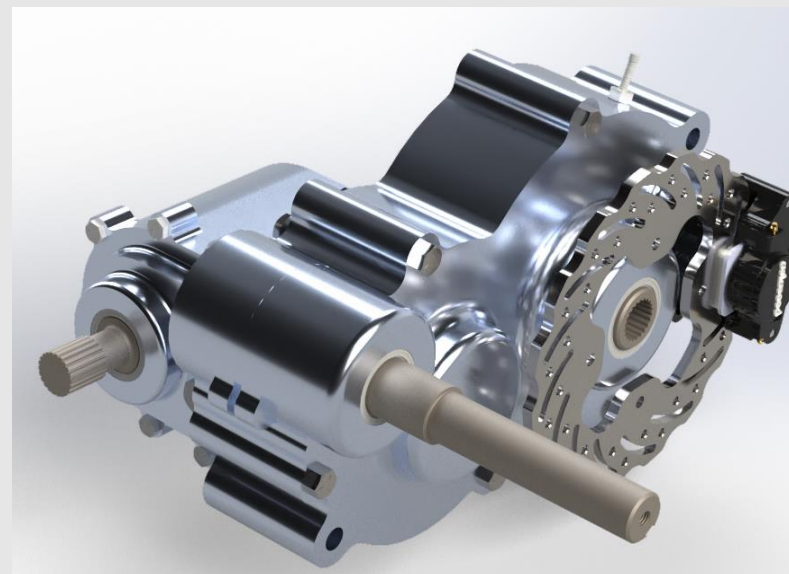


Figure 3. Transfer Case and Brake Assembly Isometric View

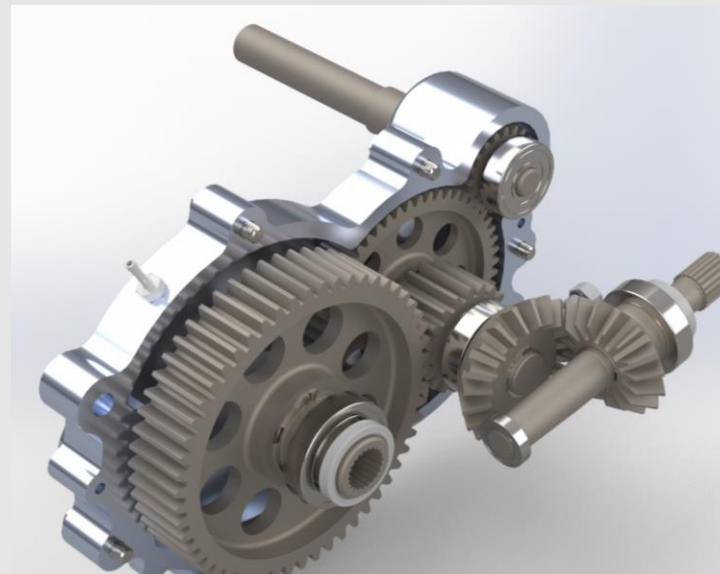
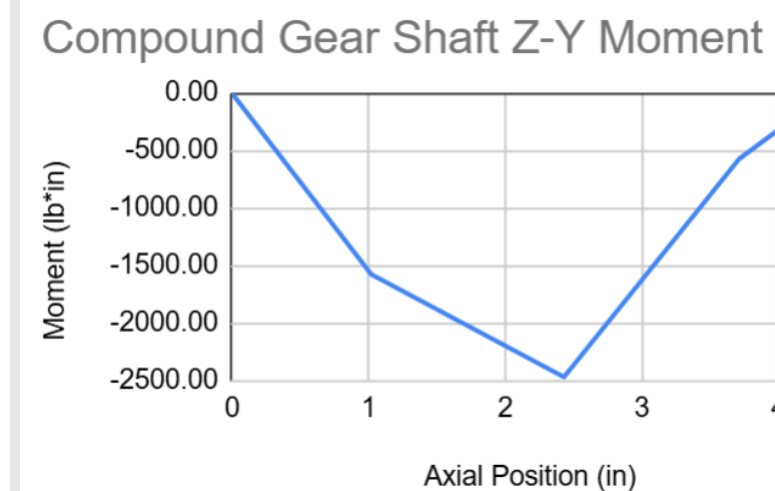
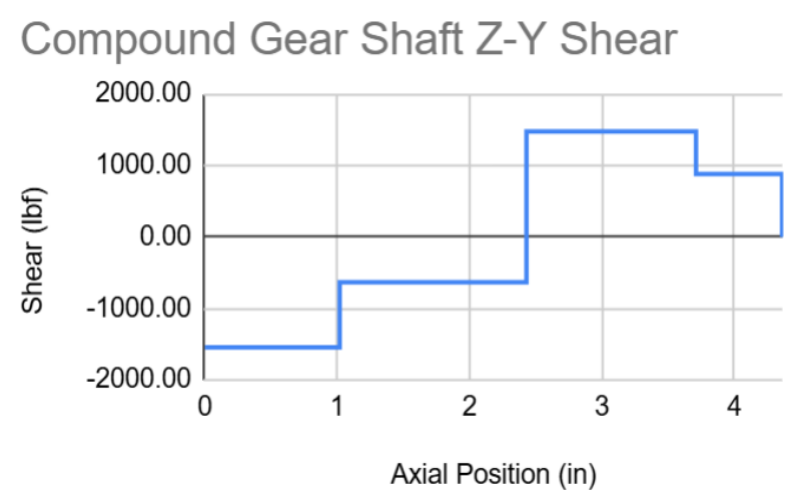


Figure 4. Transfer Case Gears



### Transmission Design & Manufacturing

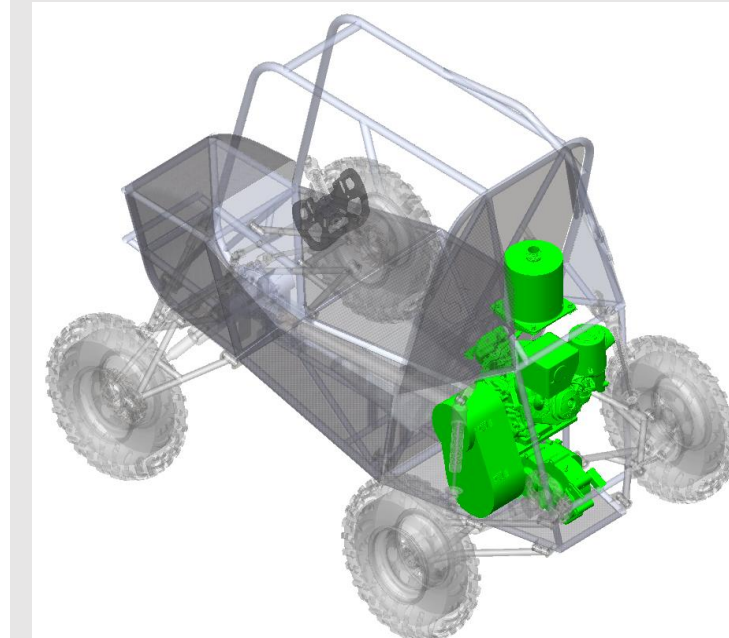
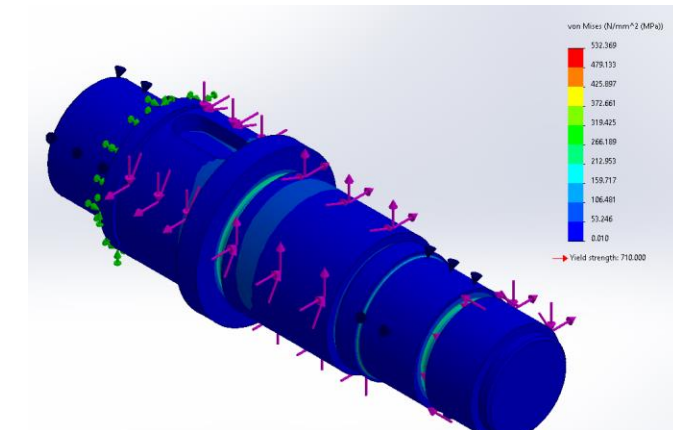
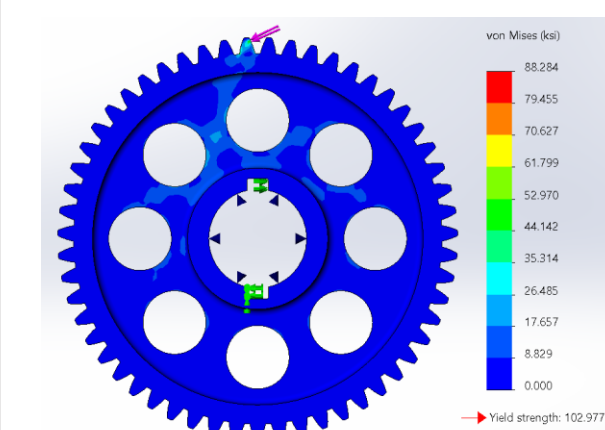
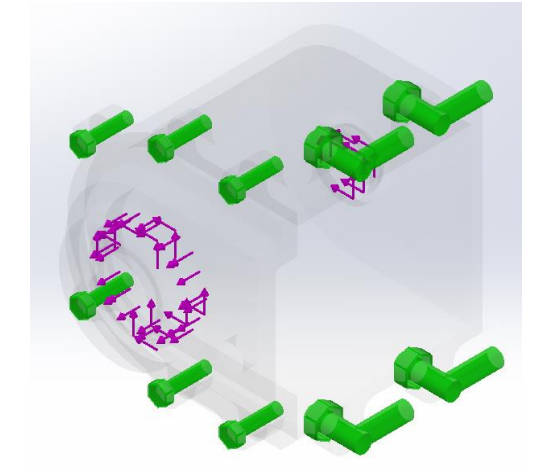
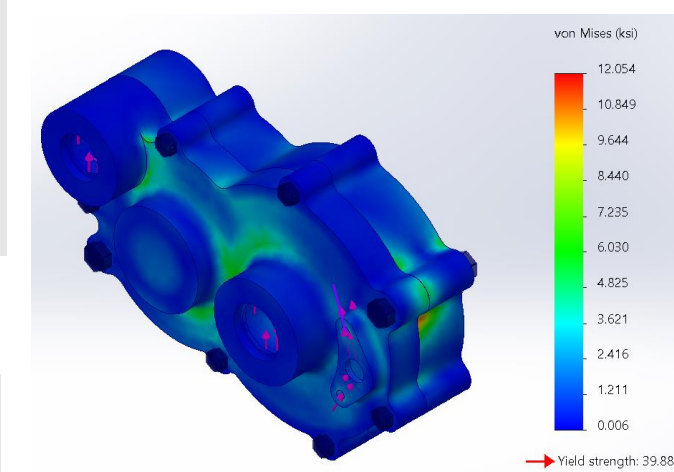


Figure 5. Transmission Components Integrated into Corsair



Figure 6. In-Progress Gear and Shaft Machining With Local Sponsor

### Transfer Case FEA



### AGMA 2001-D04 Gear Calculations



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## Driveshaft Safety Margin Analysis



Figure 8. Chromoly Steel (4130) Shaft 1.25" Diameter, 0.083" Wall

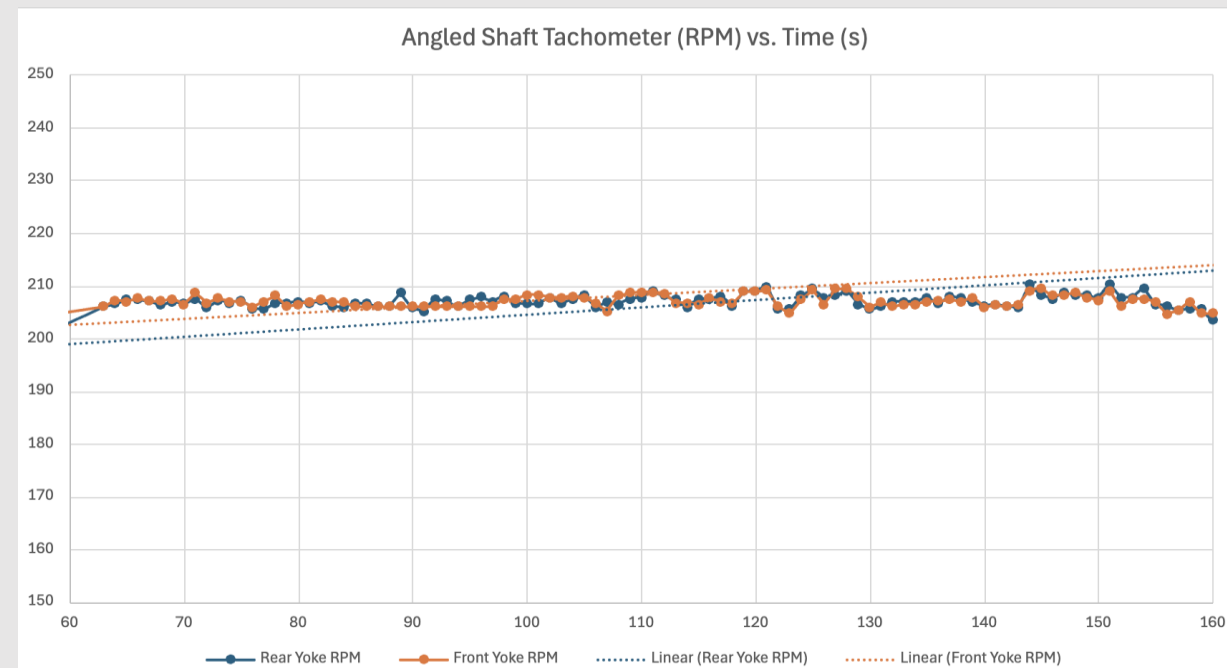


Figure 9. Driveshaft FEA

	Peak Transmission Output Value	Driveshaft Critical Value
<b>Torque (ft-lb)</b>	83.54	505.7
<b>Critical Speed (RPM)</b>	1727.27	6395.2

Operating at only:  
16.52% of critical torque and 27.02% of critical speed

## U-Joint Phasing Verification



U-joint phasing verified by measuring and plotting the RPM of both output yokes simultaneously. The data confirms that both yokes rotate at consistent speeds, with minor outliers likely due to noise or transient effects.

## Driveline Breakdown

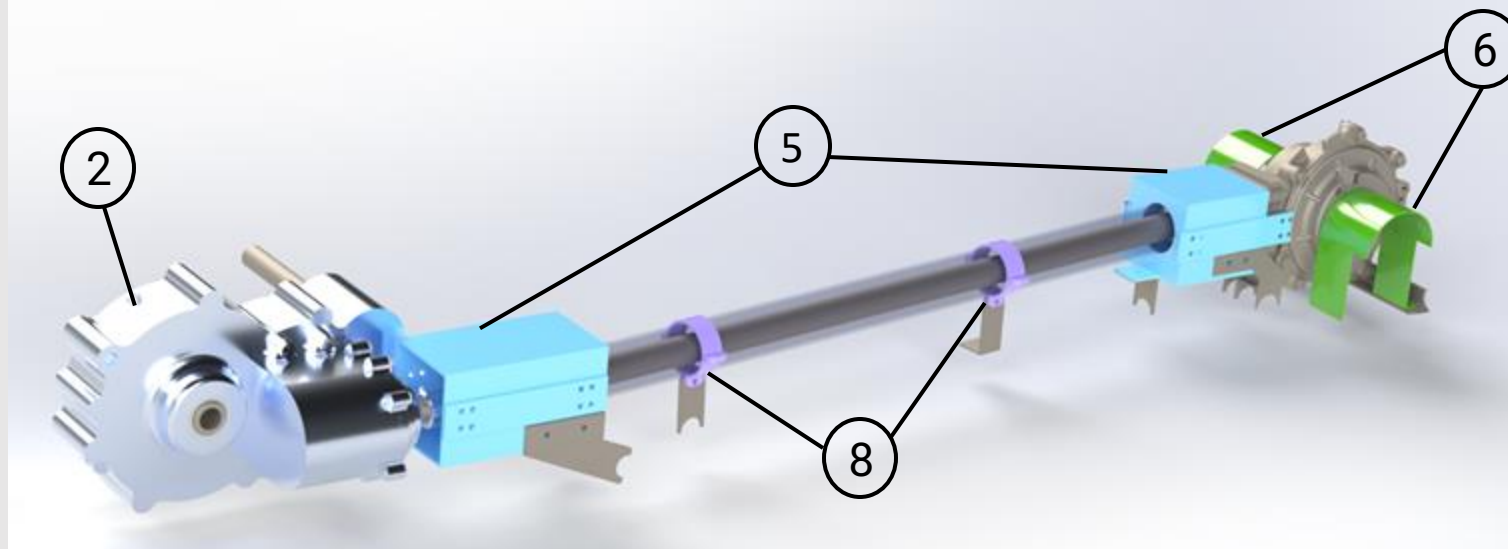


Figure 1. Driveline Assembly

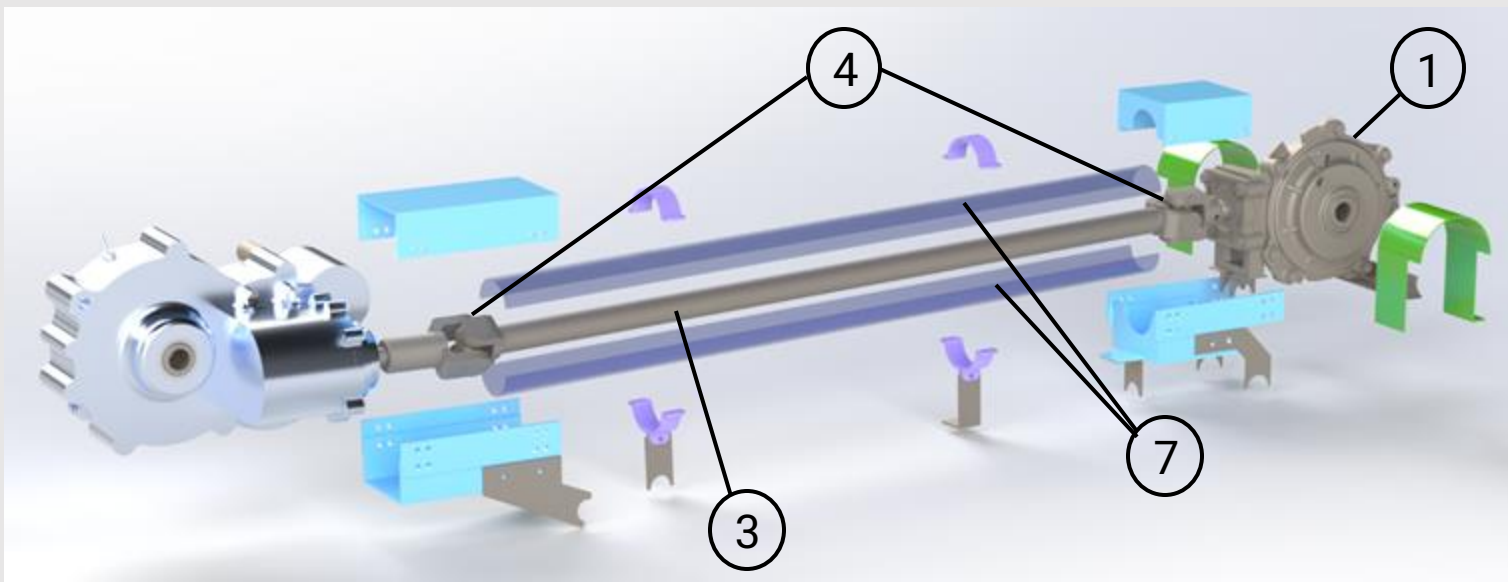


Figure 2. Driveline Exploded View

1	Polaris Front Differential	5	Yoke Guards
2	Gearbox	6	CV Axle Guards
3	Driveshaft	7	Driveshaft Finger Protection
4	U-Joints	8	Driveshaft Hoops

## Next Steps

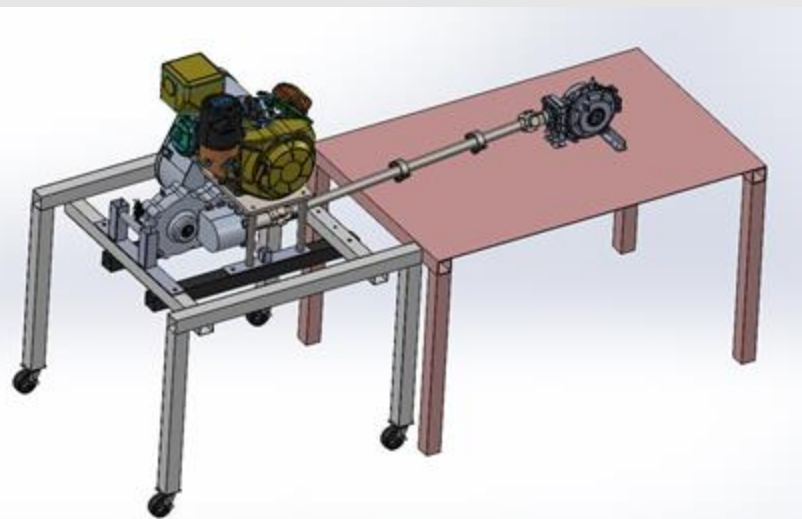


Figure 3. Test Stand Isometric View



Figure 4. Corsair Integration

## Scoundrel Testing

Testing Corsair's angled shaft design on last year's car, Scoundrel.

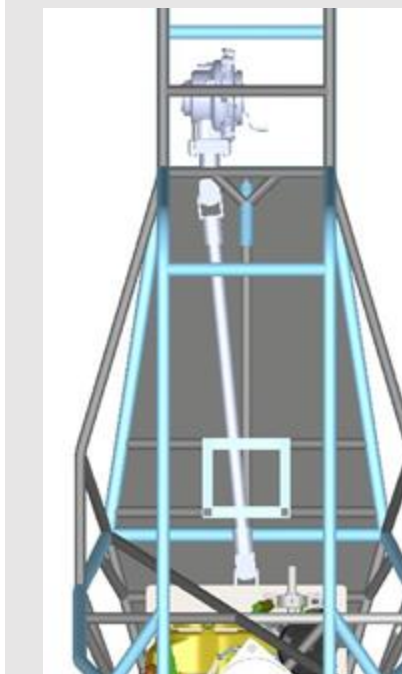


Figure 5

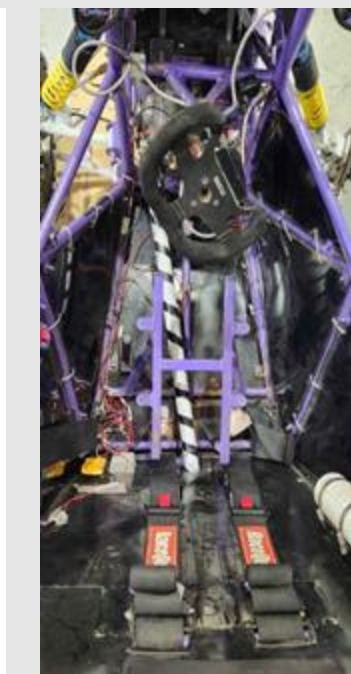


Figure 6

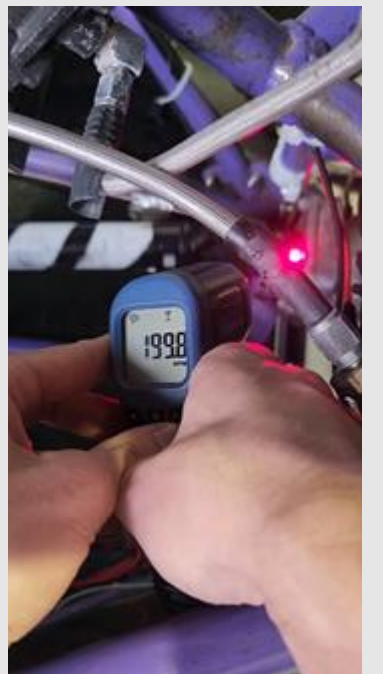
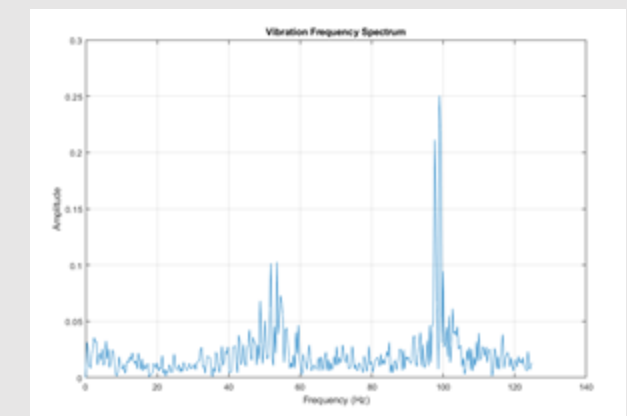
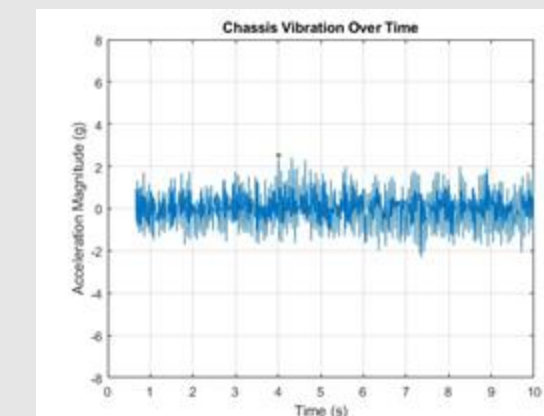


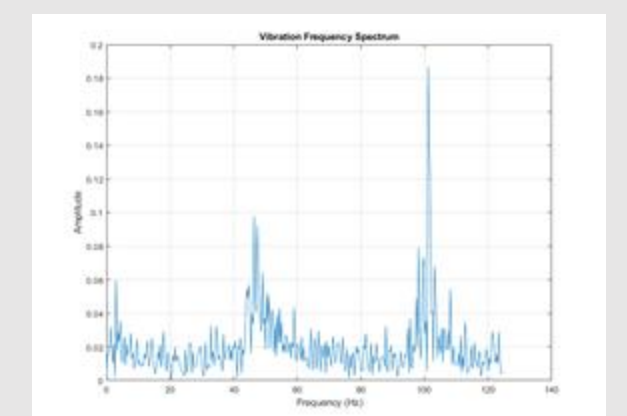
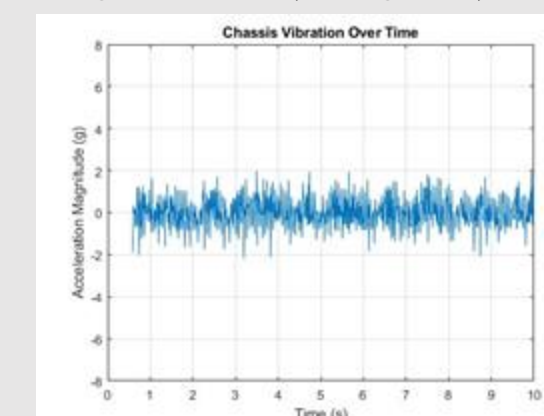
Figure 7

## Driveline Vibrations: Impact of Driveshaft Angle

### Straight Shaft



### Angled Shaft (6 degrees)



Testing confirmed that the chassis did not experience additional vibrations or a new dominant frequency due to the driveshaft operating at a 6-degree angle, to accommodate the off-center gearbox output shaft.

## Subteam Sponsor

**driveshaftpro**