

Mechanical Technical Specification - Project Raptor

1. Introduction

This document outlines the mechanical design specifications for the Raptor, Maple Leaf Motors' next-generation electric crossover SUV. It provides the physical, structural, and material requirements necessary for engineering, manufacturing, and testing of key mechanical subsystems.

2. Scope

This specification applies to the chassis, suspension, body-in-white, battery enclosure, and other mechanically relevant systems of the Raptor vehicle. Exclusions include embedded electronics and software specifications (see separate documents).

3. Vehicle Dimensions and Layout

Overall Length: 4,690 mm

Overall Width (w/o mirrors): 1,880 mm

Overall Height: 1,670 mm

Wheelbase: 2,830 mm

Ground Clearance: 210 mm (unladen)

Cargo Volume (Seats Down): 1,750 L

Curb Weight: Target: $\leq 2,100$ kg

4. Chassis and Frame

- MECH-001: Unibody structure with aluminum and high-strength steel.
- MECH-002: Corrosion resistance \geq ASTM B117 (1,000 hr).

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- MECH-003: Allowance for future AWD integration.

5. Battery Pack & Enclosure

- MECH-004: 5052-H32 aluminum alloy construction.
- MECH-005: Must withstand 30g lateral crash loads.
- MECH-006: Liquid cooling channels with front wheel well access.

6. Suspension

Front: MacPherson strut, dual-rate coil, 24 mm hollow bar

Rear: Multi-link independent, linear coil, 21 mm solid bar

- MECH-007: ± 10 mm ride height tolerance.
- MECH-008: Bushings pass SAE J1455 aging tests.

7. Body Panels and Materials

Hood: Aluminum (5052-H36)

Doors: Galvanized HSLA Steel

Roof: SMA + fiberglass composite

Bumper: Polypropylene + EPDM

- MECH-009: ISO 2409 paint adhesion.
- MECH-010: Plastics UV-resistant, -40C to +80C.

8. Fasteners and Joint Design

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- MECH-011: Fasteners per ISO 898-1 (10.9 class).
- MECH-012: SPR allowed for Al-Al joints.
- MECH-013: Load-bearing welds require FMEA & NVH validation.

9. Testing & Validation Requirements

- Structural drop test (1.5m), corrosion (ASTM B117), ingress (ISO 20653 IPx6K), vibration (SAE J1211).
- MECH-014: Shaker + climatic chamber required.

10. Interface Specifications

- MECH-015: Tolerance zones per GD&T (DWG-RPT-0045).
- MECH-016: Tool clearance ≥ 75 mm for serviceable components.

11. Open Issues

- Front crumple zone pending CAE review.
- Bracket tolerance confirmation with AVL-RPT-003 supplier.

12. Change History

Rev A | 2025-05-24 | M. Tanaka | Initial release.

13. References

FRD-RPT-001 | Functional Requirements Document - Project Raptor | 1.0

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AVL-RPT-003 | Approved Vendor List - Structural Components | Rev A

DWG-RPT-0045 | GD&T Mounting Points Specification | Rev B

CMP-RPT-003 | Compliance Matrix - North American Safety Standards | Rev A