CHAMBER CREATIONS

FROM IMAGINATION TO REALITY

MODULAR DARK RIDE SYSTEM

FULL ENGINEERING SPECIFICATION

1. SYSTEM OVERVIEW

The Chamber Creations Modular Dark Ride System is a self-contained ride platform designed for themed attractions, haunted environments, and modular installation and reconfiguration. The system integrates ride vehicle, track structure, drive system, and control architecture. All components are designed with modularity, serviceability, and inspection-informed engineering principles. The system is intended to function as a builder-oriented platform, allowing operators to deploy, expand, and re-theme installations while maintaining consistent mechanical performance.

2. RIDE VEHICLE DESIGN

Configuration: Multi-truck rolling chassis with four independent wheel truck assemblies. Two-passenger configuration. Drive System: Dual high-torque friction drive motors with center rail engagement. Forward/reverse relay switching with servo-actuated throttle control. Control System: FlexMax-based control architecture with cart-mounted proximity sensors for stop positioning, direction control, and scene synchronization. Designed for repeatable deterministic motion.

3. DESIGN LOAD CAPACITY

Target Load Range: 750–1000 lb distributed load including passengers and structure. Load Distribution: Across 4 independent truck assemblies, dual rails, and ~17.1” support spacing. Engineering Basis: Derived from distributed load geometry, hybrid support structure, and real-world operating conditions.

4. WHEEL TRUCK ENGINEERING

4 independent truck assemblies with 16 total wheels. Each truck includes: 2 horizontal load-bearing wheels and 2 vertical guide wheels. Material: Bambu PLA Basic with 8 walls, 60% gyroid infill, 8 top and bottom layers. Design: Boxed geometry with gusseting, distributing load across multiple planes and minimizing shear.

5. TRACK SYSTEM

1.5” Schedule 40 PVC rails, heat-formed, with 33” spacing and ~17.1” support intervals. Short-span behavior reduces deflection and distributes load effectively.

5A. TRACK SUPPORT SYSTEM

Hybrid PLA + wood brace with internal 1.5” x 1.5” wood core. Print Parameters: 6 walls, 50% gyroid infill, 5 top layers, 3 bottom layers. Load Path: Vehicle → wheels → rails → cradle → wood core → base. Wood core carries primary structural load.

5B. SYSTEM-LEVEL LOAD DISTRIBUTION

4 independent truck assemblies with 16 wheel contact points. Load distributed across multiple wheels, rails, and support spans. System is a distributed-load, mechanically constrained rail system with redundant load paths.

5C. RAIL LOAD CAPACITY MODEL

~700 lb per single span (short-duration condition). ~2800 lb theoretical distributed capacity. Operating range maintained at 750–1000 lb for reliability and safety margin.

6. DRIVE SYSTEM

Dual friction drive motors with center rail engagement, relay direction control, and servo throttle modulation.

7. CONTROL & POSITIONING

Scene-based system using proximity sensors for stop control, direction changes, and repeatable motion sequencing.

8. THERMAL PERFORMANCE

Operating up to ~104°F (40°C). PLA glass transition: 131–149°F. Typical outdoor surface temperatures: 100–120°F. Hybrid design and load distribution mitigate thermal risk. Light-colored components reduce heat absorption.

9. ENGINEERING PHILOSOPHY

Distributed load paths, hybrid structural redundancy, modular components, and predictable mechanical behavior.

FREQUENTLY ASKED ENGINEERING QUESTIONS

Q: Can PVC rails really support this weight?
A: Yes. With ~17.1” support spacing, the rail behaves as a short-span beam, distributing load across multiple supports and trucks.

Q: What is the load capacity?
A: 750–1000 lb distributed operating range, representing a conservative working envelope.

Q: Where does the load go?
A: Vehicle → wheels → rails → braces → wood core → base structure. No single component carries total load.

Q: Are printed parts structural?
A: They are part of a hybrid system. Wood carries primary load; printed parts handle alignment and load distribution.

Q: How is the cart constrained?
A: Guide wheels provide lateral stability and ensure the cart remains engaged with the rail.

Q: How is load distributed?
A: Across 4 trucks, 16 wheel contact points, dual rails, and multiple supports.

Q: What if one section is overloaded?
A: Load redistributes across adjacent supports, trucks, and rails.

Q: PLA softens around 140°F—is that a problem?
A: PLA glass transition is 131–149°F. System operates well below this (~100°F typical), and structural load is carried by the wood core. Printed components operate in compression and alignment roles, not at thermal limits.