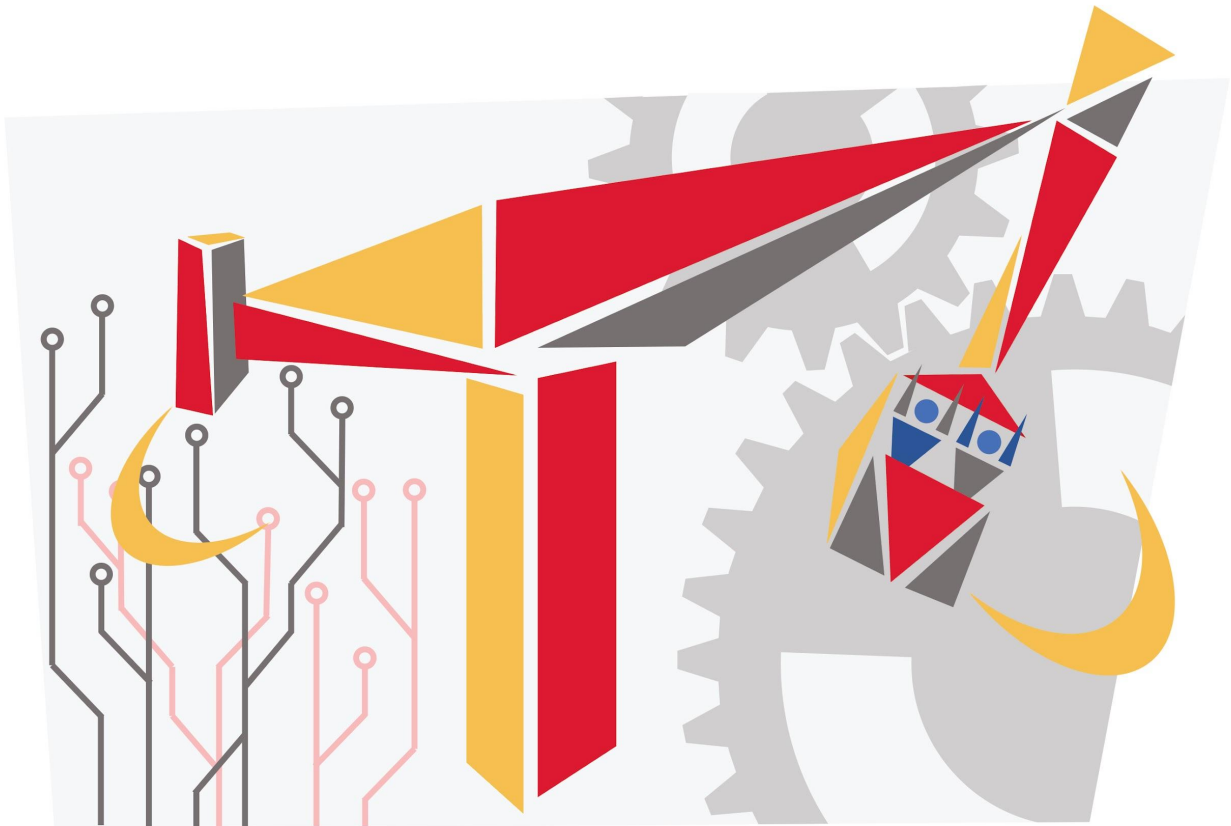


Ride Engineering Competition



2024 Prompt
System Cycle Shutdown:
Roller Coaster Engineering Challenge

Intro

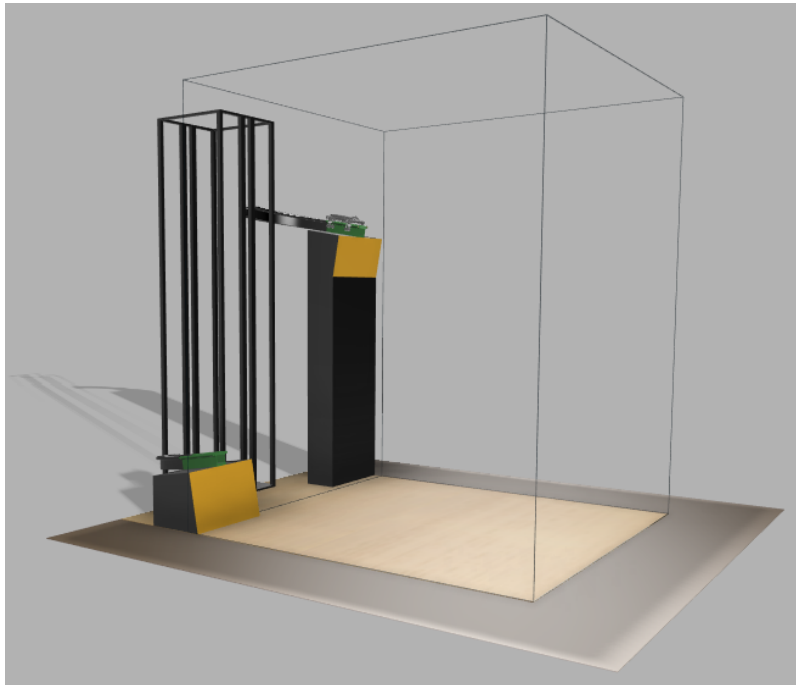
Our park has a big problem... There's a big gap in our new roller coaster! We need you to design, engineer, and manufacture the ride element to fill this gap with some thrilling roller coaster technology!

Overview

In this year's challenge, Teams will design, engineer, and manufacture a section of a roller coaster attraction inside a size box. This section constructed by the teams shall be referred to as the "Ride". The Ride will start and end at provided tracks entering and exiting the size box. Teams will use a ride vehicle chassis designed by the REC, and attach rider containment to the chassis. Teams may add additional systems and equipment to the chassis.

At the end of each cycle after exiting the section on the exit track, the ride vehicle will be lifted to the start track, and a new cycle will begin. Each team will run their section for **6** hours.

Note on rider scale: This is not a model ride. The riders of this attraction are candies as described in the Rulebook. These riders are not stand-ins for human riders. These candy riders are the real riders of this real attraction. The accelerations and forces used to engineer the ride shall be based on the actual accelerations and forces experienced by the candy riders.



Design

During every cycle, the Ride Vehicle shall be brought to a complete stop. The system shall then return the Ride Vehicle to motion automatically.

For Loading and Unloading, the operator shall direct the system to hold the Ride Vehicle in the stopped position until Loading and Unloading is complete. The operator shall then direct the system to return to automatic operation.

There will be a minimum of 4 riders allowed on the Ride Vehicle. There is no maximum rider limit.

Ride designs may emulate existing rides, be an original design, or anywhere in between.

Note: The REC does not hold any Ride Design Intellectual Property and does not provide any Intellectual Property protection to ride designs introduced in the Ride Engineering Competition.

Ride systems may make use of any Commercial-Off-The-Shelf (COTS) parts or custom manufactured parts.

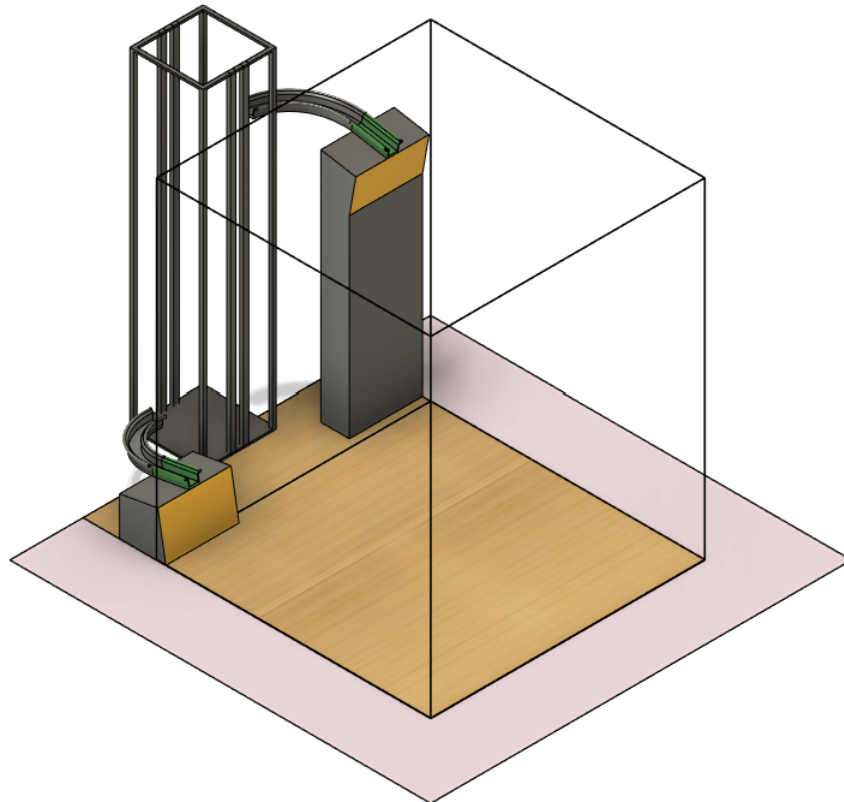
COTS parts or kits that are designed for the intention of emulating a Thrill Ride may not be used in the specific thrill ride function they were designed for.

E.g. a K'nex brand Track ties and rails, may not be used as track ties and rails, respectively, within the Ride Design. These parts may still be used in the design in any other configuration or use case. For any needed clarification on this rule, please contact the REC.

All Rides must include an Emergency Stop function. The function shall be Red in color and be clearly labeled "Emergency Stop" or "E-Stop". Activating the function shall initiate a Ride Off Function Consistent with ASTM F2291 Section 11.3.8.

Size Box

Rides will reside primarily within a 750 x 750 x 900 mm box. Portions of the track section and the ride vehicle may extend up to 200mm outside the size box to connect to the start and end tracks, or at regions away from the start and end tracks. The base of the construction must be entirely contained within the 750 x 750 mm square base.



Operation Interfaces and controls may be located outside the Size Box, however any components that do not require physical operator access during the Ride's operation must be located within the Size Box.

E.g. A series of Push Buttons may be placed outside the Size Box, but a power supply or control board must be placed inside the Size Box. If the board has a reset button that is only used when the ride is not operating, it must be inside the Size Box.

Connection Cables to power utilities may extend outside the Size Box.

Elevator Lift

Connecting the Exit and Entry Tracks is an Elevator Lift System. This lift, along with the tracks, will be provided to every team at the competition event.

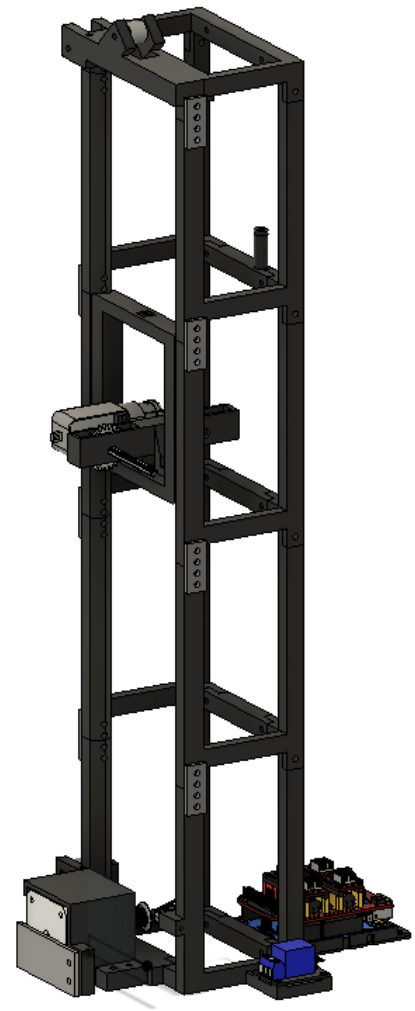
The Lift System consists of the following components:

- Holding Brake before the Lift
- Sensor to detect the lift in the low position
- Holding Brake in the lift
- Sensor to detect the Ride Vehicle presence in the Lift
- Lift Motor to elevate the track and ride vehicle
- Sensor to detect the Lift in the high position
- Interconnect of Lift Motor for Teams

The Lift System performs the following functions:

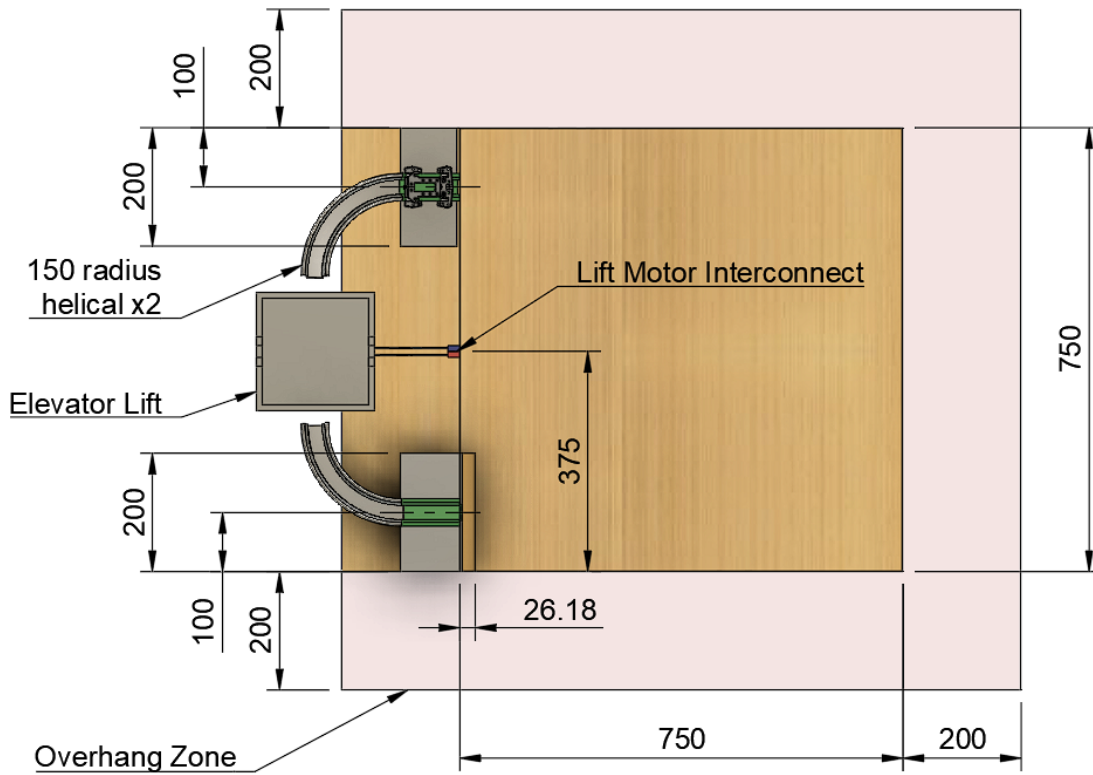
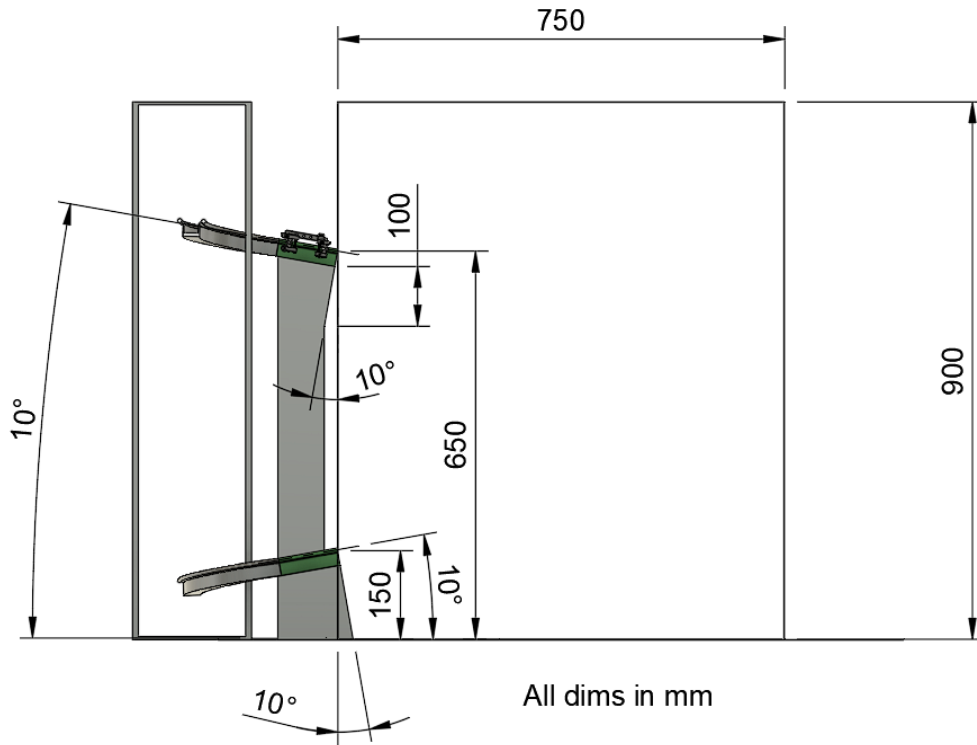
- Holds the Ride Vehicle until the Lift is in the low position
- Accepts the Ride Vehicle onto the Lift
- Elevates the Lift track to the high position
- Releases the Ride Vehicle onto the entrance track
- Returns to the low position

An interconnect terminal block is available to teams. Opening the electrical circuit across the terminals will cut power to the lift motor. The Elevator Lift System will recognize this disconnect and recover operation after connection is restored.



Details of the lift system design and interfaces can be found in the [Lift_System_Interfaces Document on the REC Website.](#)

Ride Engineering Competition



Transition Zone.

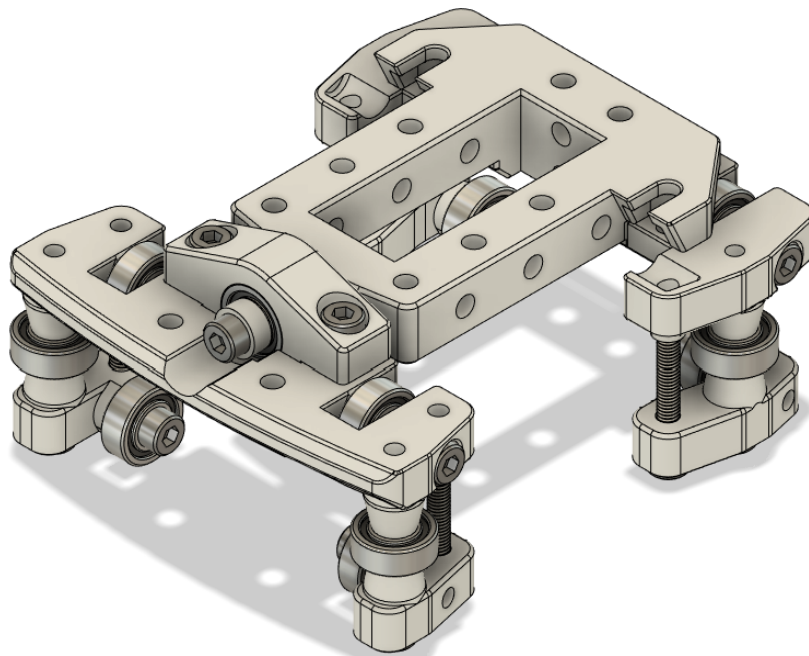
In the case of rides for which the track is in a different orientation than that of the start and end tracks, (such as a suspended coaster) Teams may specify a “Transition Zone” immediately after the start and end tracks where the track rotates to the desired orientation. Rider accelerations only may be ignored in this zone. All other safety and engineering considerations must still be made for this zone.

Details of the track design including 3D models and specifications can be found on the REC website for registered teams.

Ride Vehicle

The Ride Vehicle shall use the Chassis designed by the REC. The Chassis is an assembly of FDM 3D printed PLA plastic components fastened with M3 button or socket head bolts. The Chassis runs on 5x11x4mm ball bearings. The shields and grease are removed from the bearings to minimize rolling resistance. The Chassis has 19 attachment points available for teams to attach any designs needed to contain riders and interface with other equipment in their ride.

On the competition day, teams will receive a regulation chassis from the REC for use in the competition. For design and prototyping, CAD files and details about the bearing preparation and chassis construction are available on the competition website for registered teams.



Operation Day

Teams will have 30 minutes total to connect their ride to the entry and exit tracks structure, and connect any attachments to the ride vehicle. Any work on the ride system after the 30 minute period will be considered downtime.

Rides will operate during a period of 6 hours.

Rides will operate primarily in a Continuous Automatic Operation, where no operator intervention is required between operation Cycles.

Riders will stay on the ride for one hour as the ride operates in Continuous Automatic Operation. Every hour, on the hour, Teams shall safely stop the Ride Vehicle. The riders must be then removed from the ride and new riders shall be placed on the ride.

Note on rider scale: This is not a model ride. The riders of this attraction are candies as described in the Rulebook. These riders are not stand-ins for human riders. These candy riders are the real riders of this real attraction. The accelerations and forces used to engineer the ride shall be based on the actual accelerations and forces experienced by the candy riders.

Facilities input

Each Team will have access to:

A 30" x 72" (760 x 1820 mm) table for their ride and any Tools or equipment they need to service their ride. Virtual Teams may use any surface with a similar area.

1 Standard 120VAC Outlet for the Ride.

1 Standard 120VAC Outlet for additional Tools or Equipment.

Teams may add a Surge Protected Power Strip for their Tools or Equipment.

Teams may not draw more than 15 Amps total.

Travel

This year's competition will be held in person. Teams are responsible for transporting their ride.

The REC Planning Committee has determined that the value to competitors, Judges, and the competition as a whole gained by having rides and participants in the same physical space is worth the travel logistics burden on teams.

Teams should consider the transportation of their ride in their design to ensure that their ride can be made functional on April 13th. This could include modular deconstruction into a padded parcel or checked luggage. On the day of competition, teams will have less than an hour in the event venue before operation begins and should be prepared to have their ride operational within that time.

For specific questions about transportation or if a team is completely unable to bring representatives or their ride to the event, please contact the planning committee and we will assist you on a case by case basis.

Good Luck Ride Engineers!