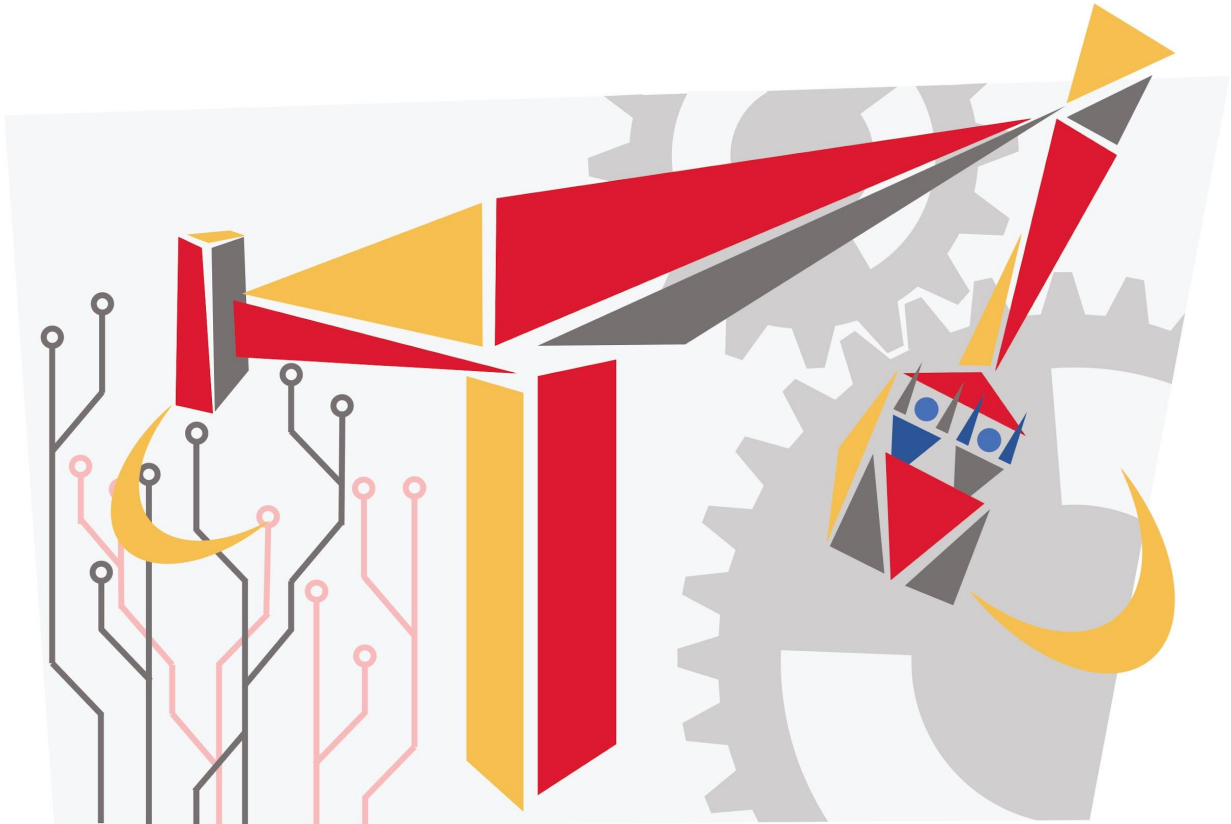


# Ride Engineering Competition



## **2023 Prompt Track Takeover: Roller Coaster Tech Challenge**

## Intro

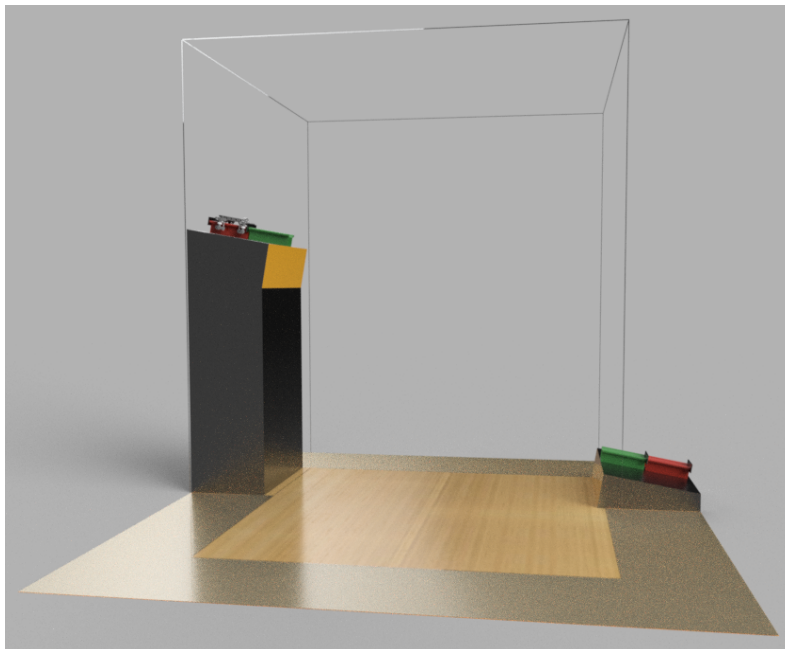
Our park has a big problem... There's a big gap in our new roller coaster! We need you to design, engineer, and manufacture the ride element to fill this gap with some thrilling roller coaster technology!

## 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 chasis.

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**

The Ride must have the capability to safely stop the movement of the ride vehicle on command. The Ride must also have the capability to start a previously stopped ride vehicle on command. This stopped position is where riders will be loaded and unloaded during 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.

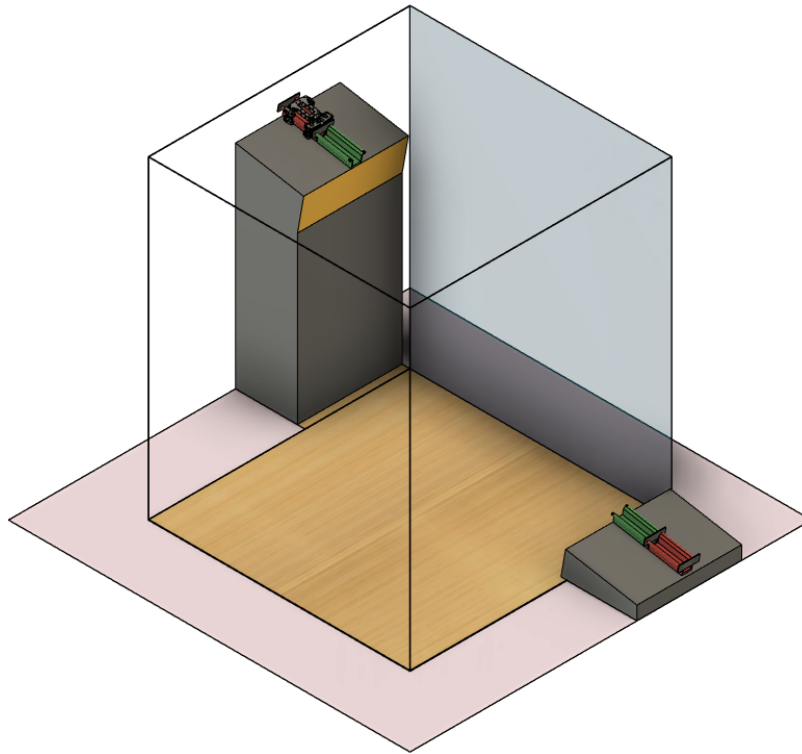
*E.g. a K'nex brand Track ties and rails, may not be used as track ties and rails, respectively, within the Ride Design. These parts may still be used in the design in any other configuration or use case. For any needed clarification on this rule, please contact the REC.*

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.



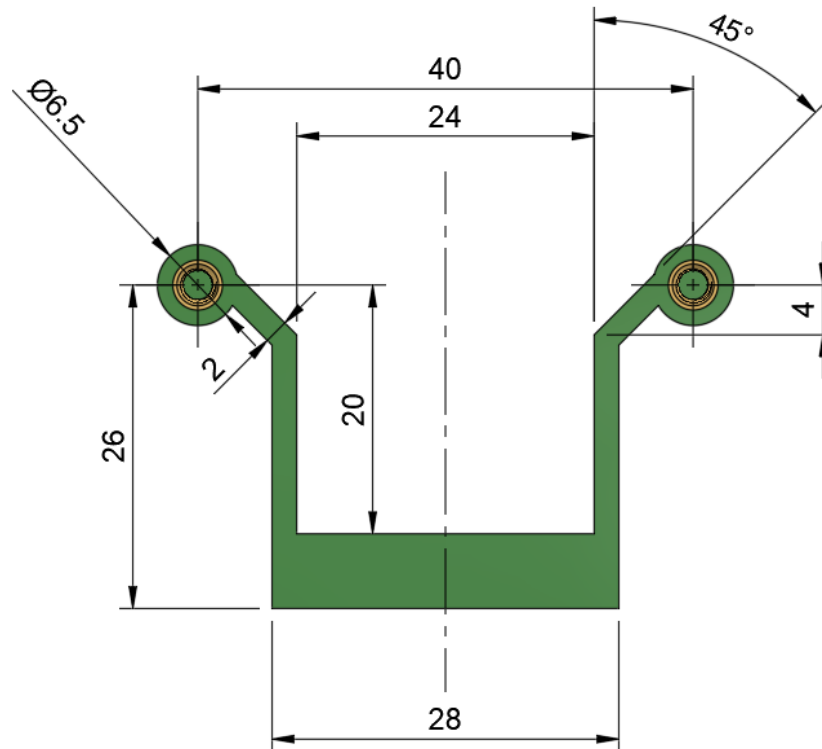
Operation Interfaces and controls may be located outside the Size Box, however any components that do not require physical operator access during the Ride's operation must be located within the Size Box.

*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.

## Track

Teams will design a track compatible with the provided ride vehicle chassis. The start and end track will consist of two cylindrical rails, 6.5mm in diameter, 40mm from center to center. These rails are connected by a frame illustrated below.



The team's ride vehicle with all attachments must be able to travel freely on this track design.

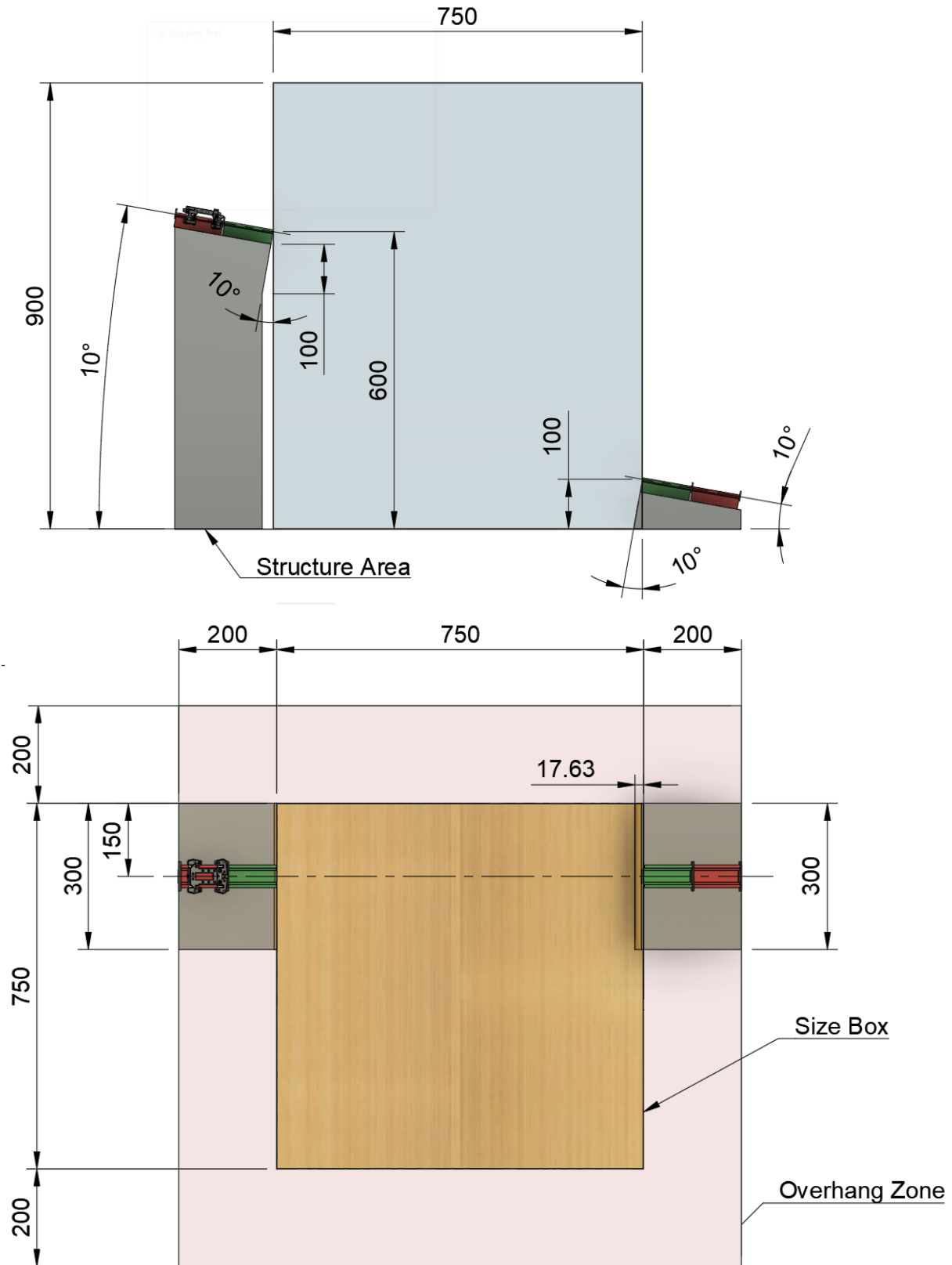
The Entry Track and Exit Tracks are sloped at an angle of 10 degrees. The Ride Vehicle will roll freely for 100mm before entering the size box at a speed less than 0.20 meters/second.

The Ride Vehicle will travel on the Exit track for 200 linear millimeters before being brought to a rapid stop. Teams are not required to consider rider accelerations resulting from this sudden stop.

Teams may connect their rides to the Entry and Exit Tracks in any non-permanent manner they desire.

*Note: These rails and track gauge are compatible with K'nex classic roller coaster sets. K'nex Track parts are not allowed to be used as track in the final ride, but the REC recommends them as a prototyping material if available.*

# Ride Engineering Competition



### Transition Zone

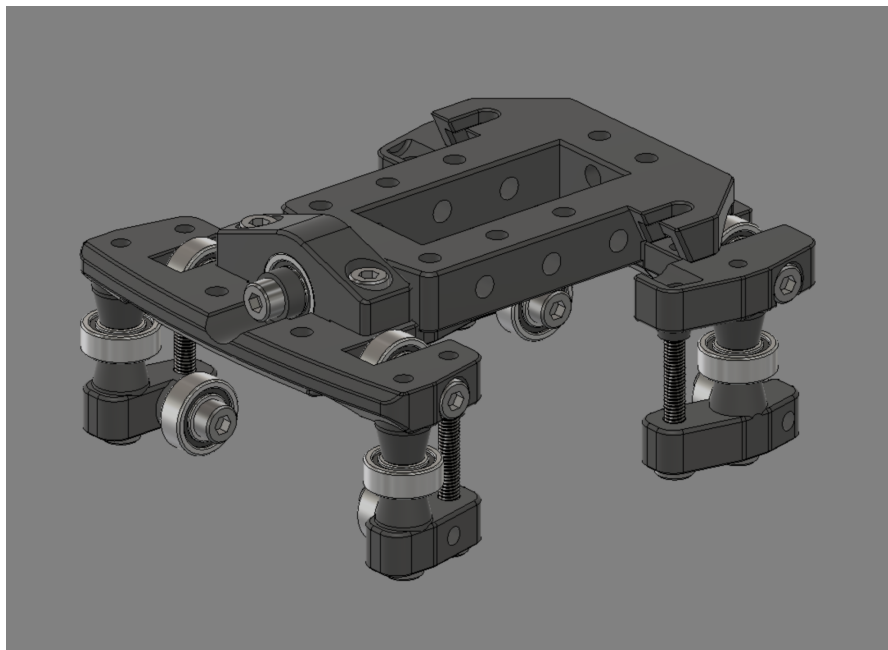
In the case of rides for which the track is in a different orientation than that of the start and end tracks, (such as a suspended coaster) Teams may specify a “Transition Zone” immediately after the start and end tracks where the track rotates to the desired orientation. Rider accelerations only may 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 15th. 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!**