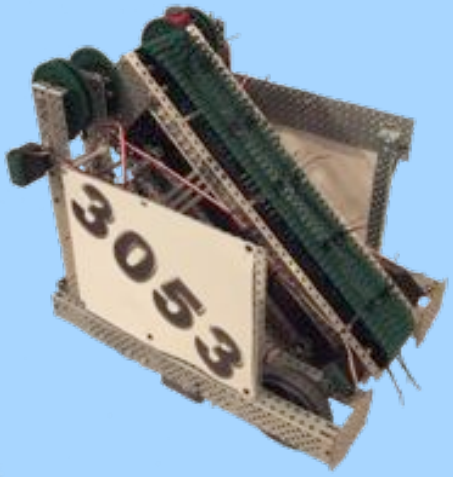
Construction Guide

CAM'S ENGINEERS

Alternate Perspectives



Drive System

CAM'S ENGINEERS

Overview

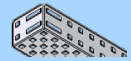
Six motor drive (three per side)

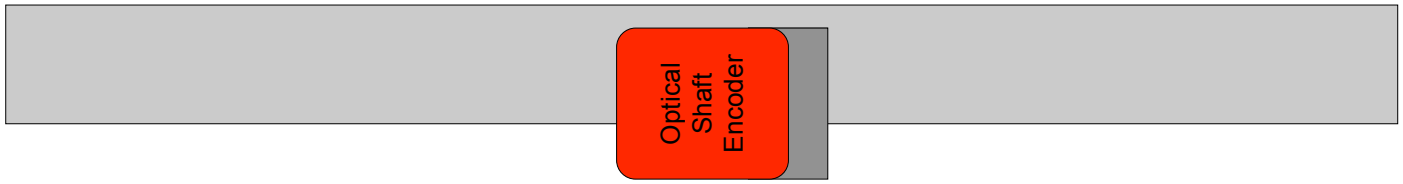
High torque and moderate speed

Optical shaft encoders

CAM'S ENGINEERS

Parts

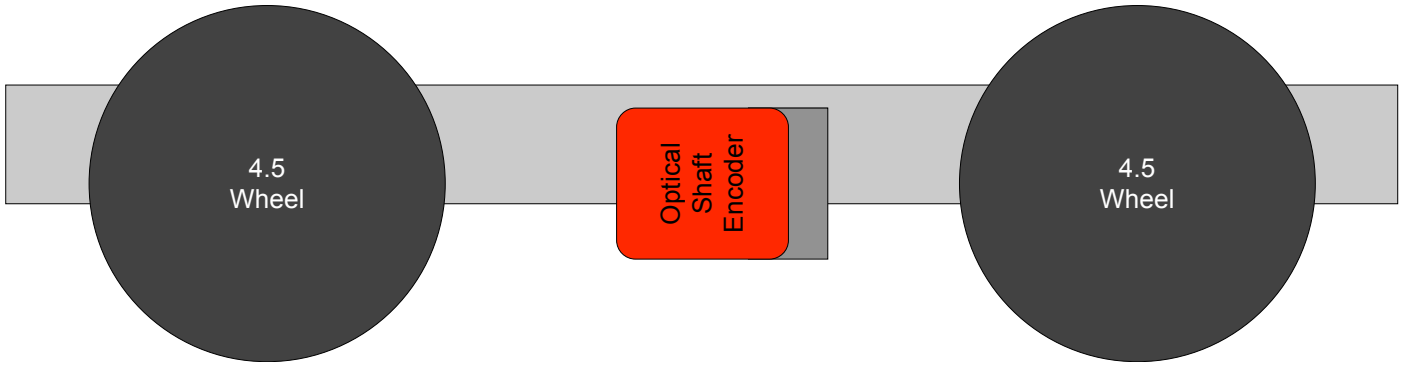
Chassis Rail 3x2x35 holes 



CAM'S ENGINEERS

Parts

Optical Shaft Encoder (1)



CAM'S ENGINEERS

Parts

Knobby Wheel (2) 

Instructions

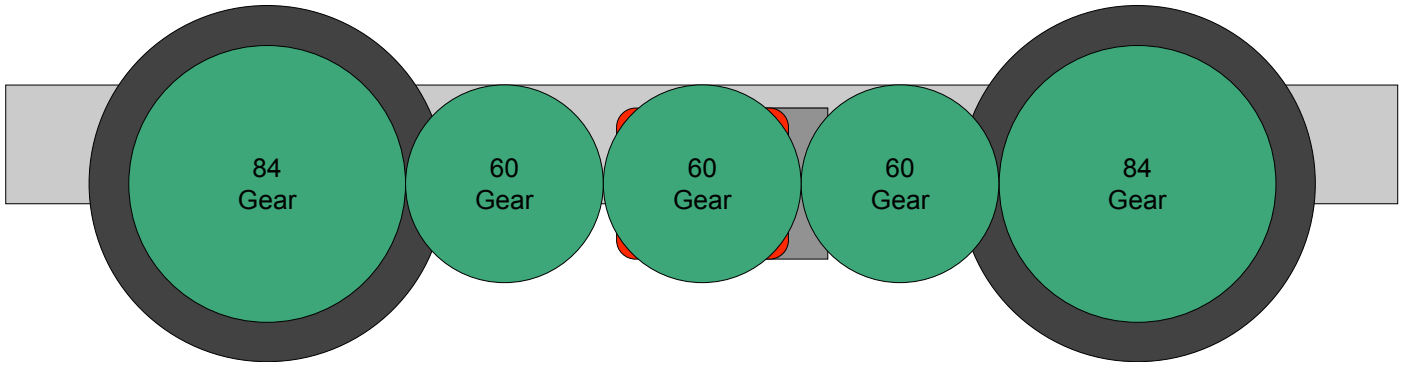
Remove tires

CAM'S ENGINEERS

Parts

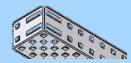
60 Tooth Gear (3) 

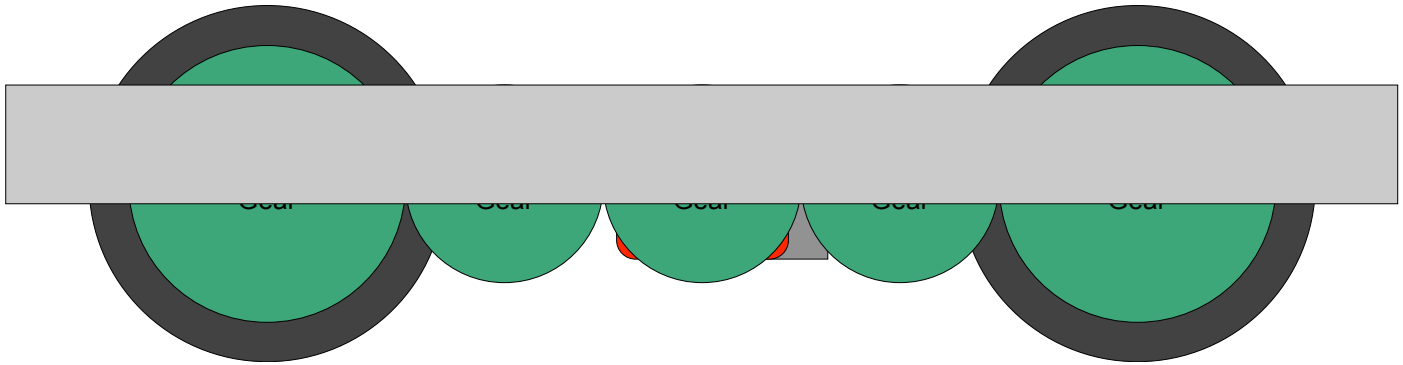
84 Tooth Gear (2) 



ENGINEERS

Parts

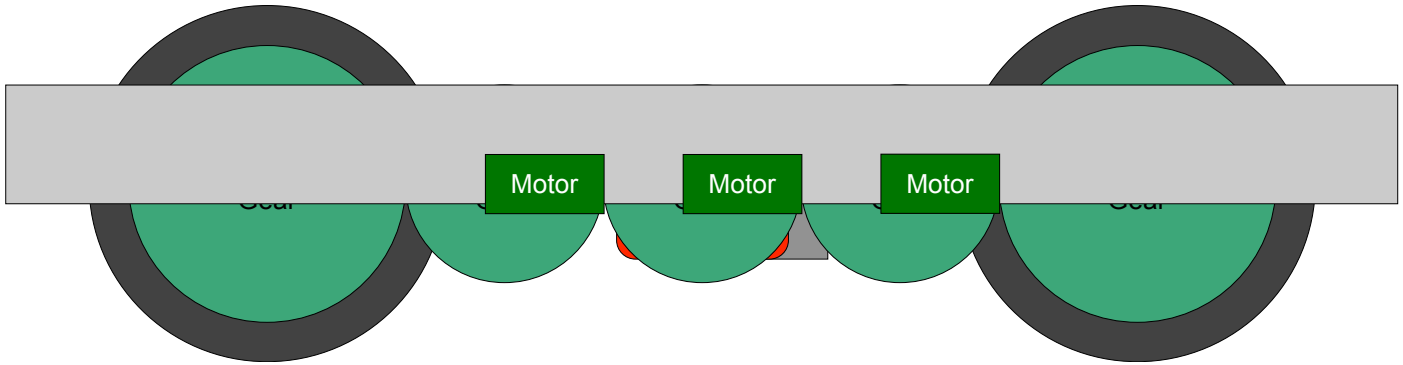
Chassis Rail 3x2x35 holes 



CAM'S ENGINEERS

Parts

Motor Module (3)



Lift System

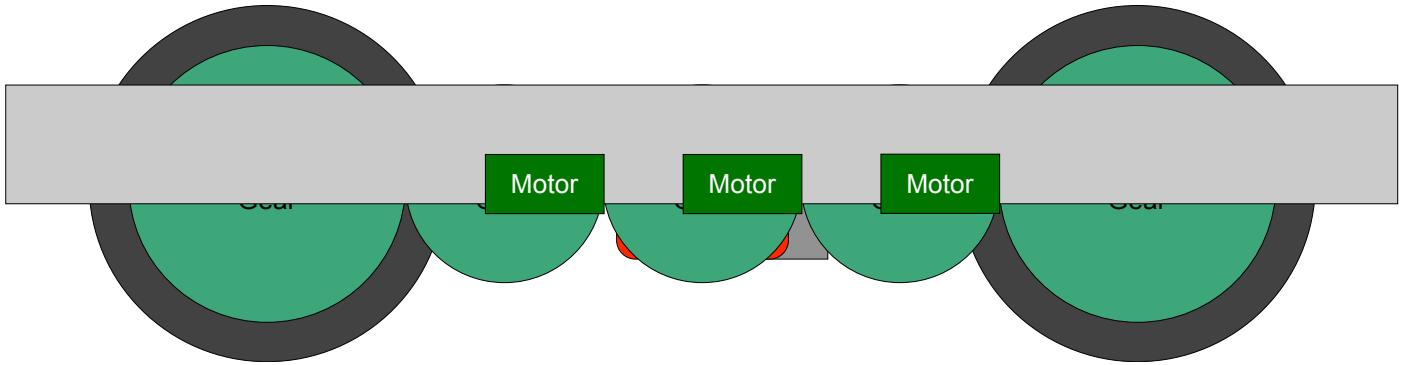
CAM'S ENGINEERS

Overview

2 motors using a 7:1 gear ratio

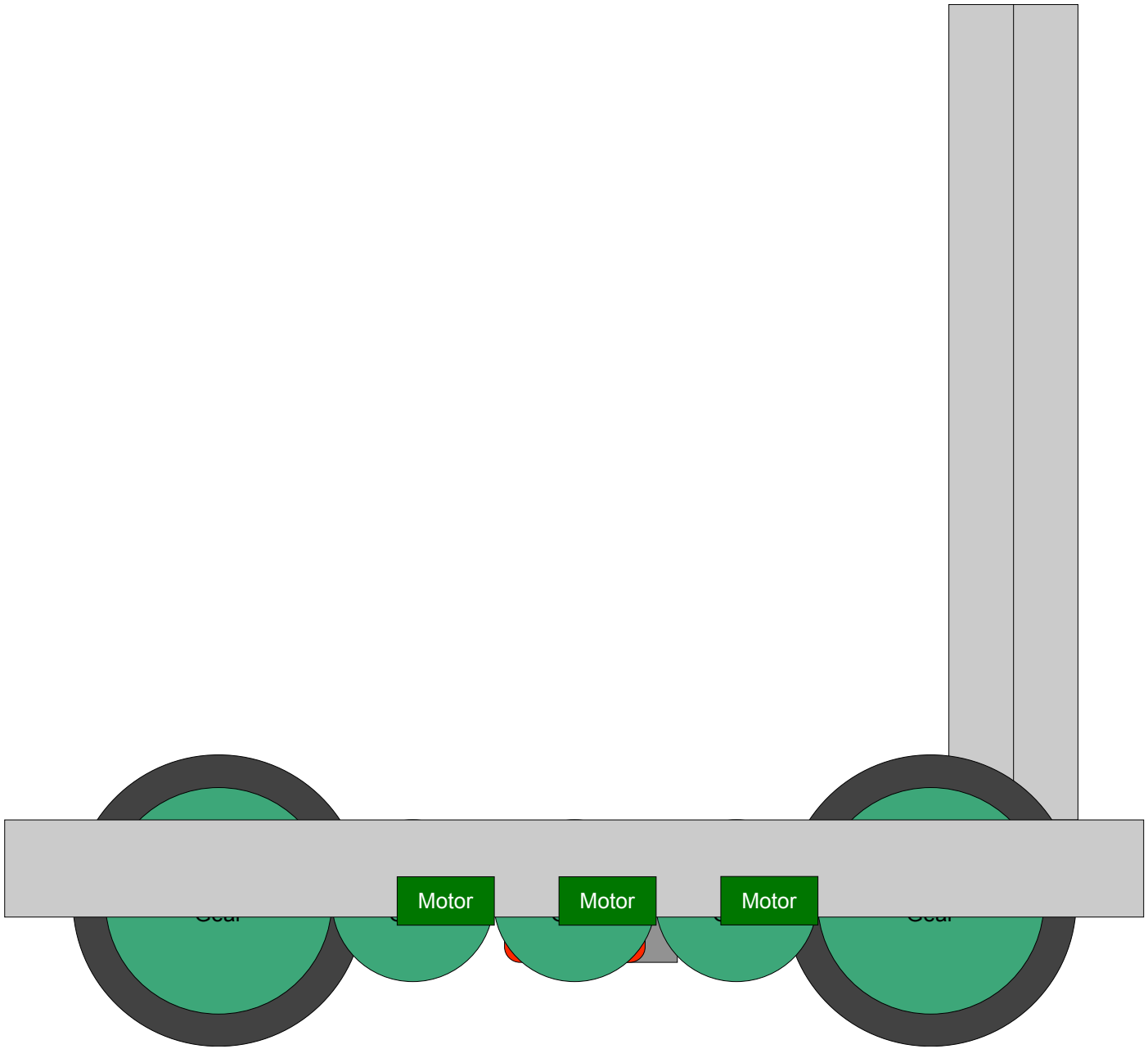
Motors linked via programming

Motor



Parts

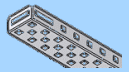
Motor Module (1)



CAM'S ENGINEERS

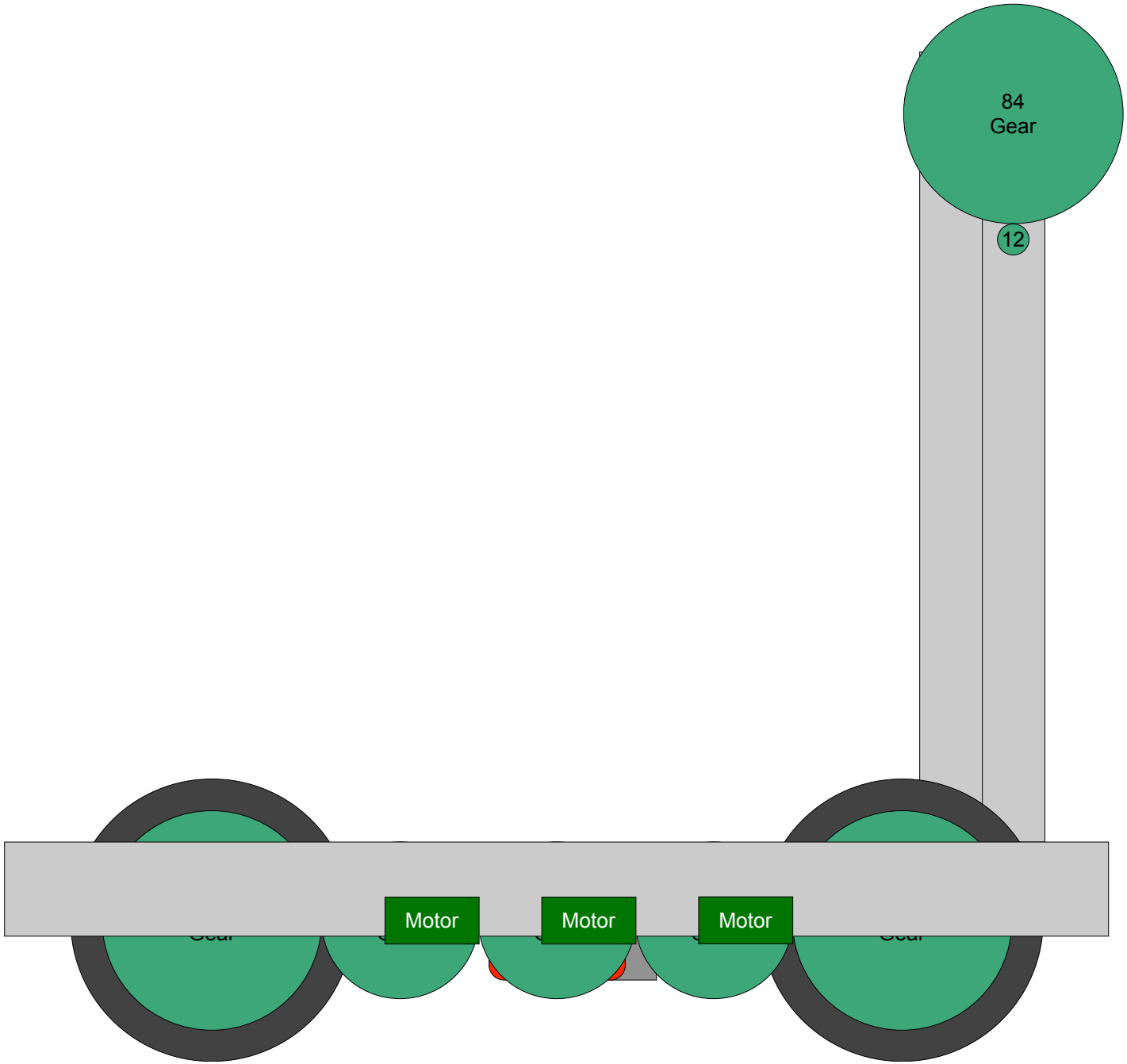
Parts

Chassis Rail 2x1x25 holes (2)



Instructions

Attach to chassis and each other



CAM'S ENGINEERS

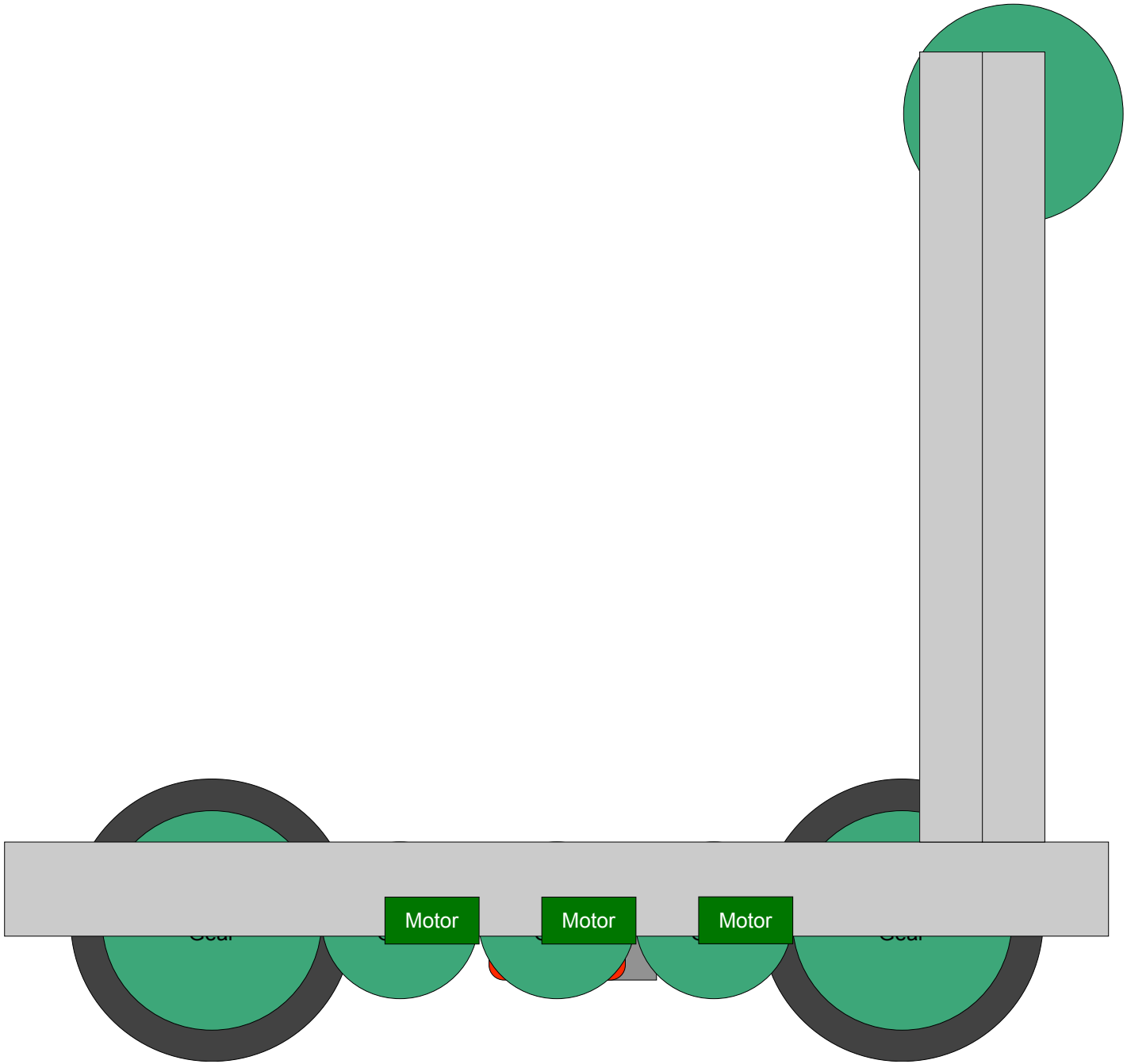
Parts

12 Tooth Gear (2)

84 Tooth Gear (2)

Instructions

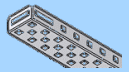
Double up all gears



CAM'S ENGINEERS

Parts

Chassis Rail 2x1x25 holes (2)



Instructions

Attach to chassis and each other

Attach to opposing side with standoff beams

Ball Intake System

CAM'S ENGINEERS

Overview

Uses 2 Tank Tread loops

Guide rails along the side

Motor

CAM'S ENGINEERS

Parts

Motor Module (1)

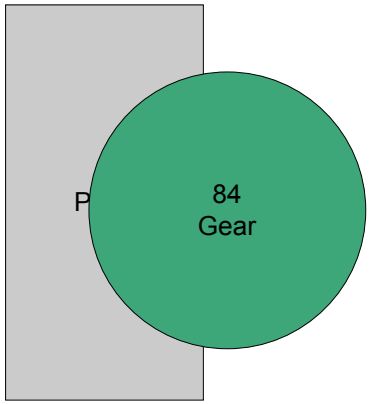
Motor

CAM'S ENGINEERS

Parts

84 Tooth Gear (1) 

Motor



CAM'S ENGINEERS

Parts

Plate 25x5 or Plate 15x5 (1)

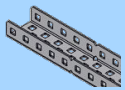
Instructions

Cut plate to 10x5

CAM'S ENGINEERS

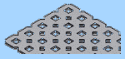
Parts

C-Channel 1x2x1x25 holes (2)



4" Standoff Beam (5)

Plate 25x5 (4)



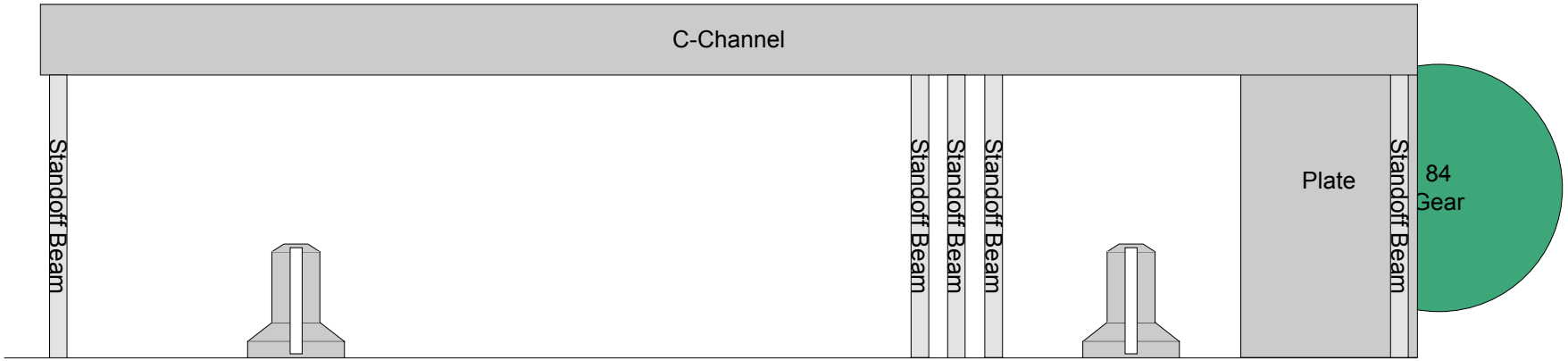
Instructions

Cut (1) C-Channel to 1x2x13 holes

Cut (2) Plate to 15x5

Secure bottom Plates to each other

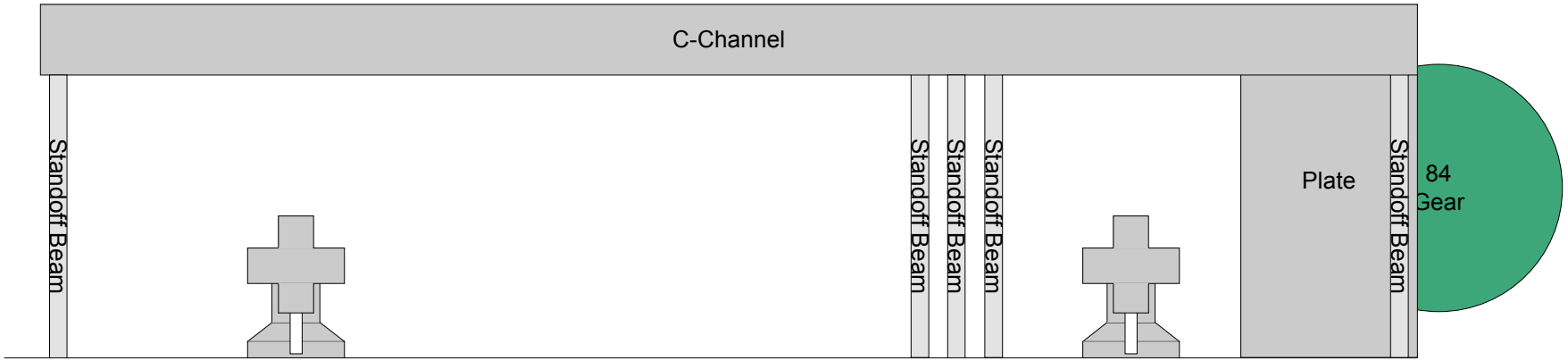
Secure Plate to C-Channel



CAM'S ENGINEERS

Parts

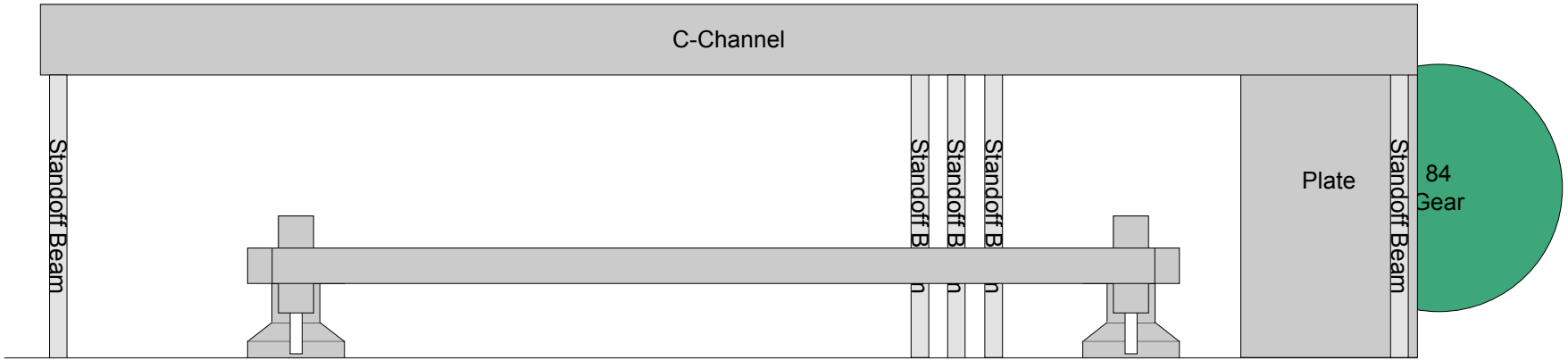
Angle Gusset (2)



CAM'S ENGINEERS

Parts

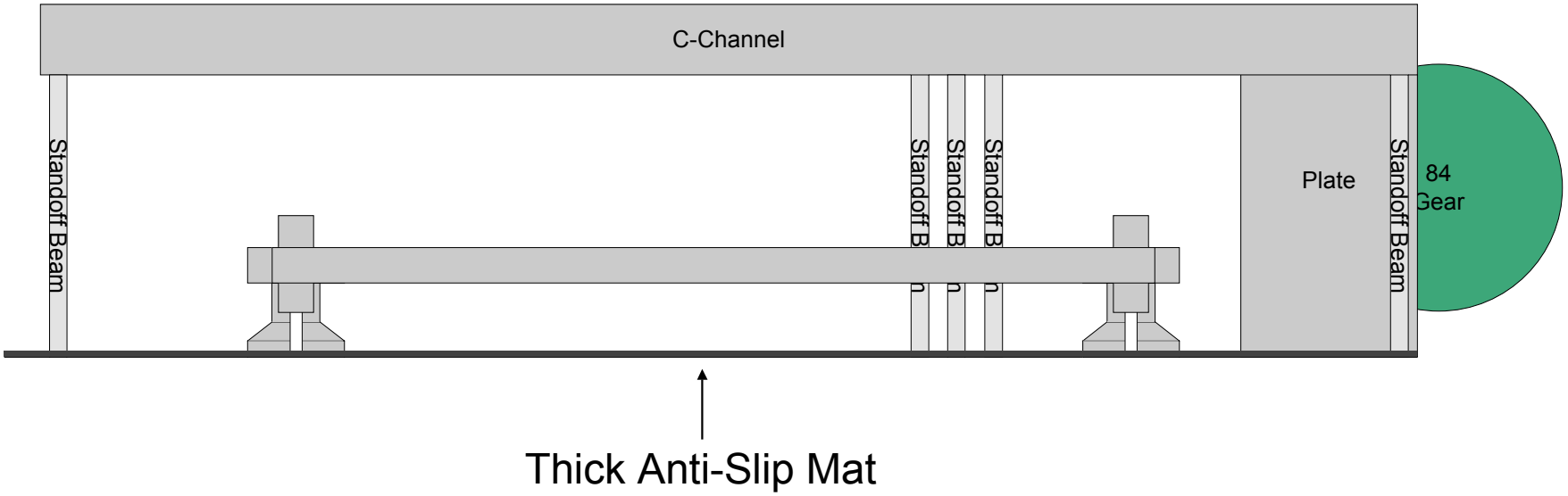
Plus Gusset (2) 



CAM'S ENGINEERS

Parts

Bar 1x25 holes (1)



CAM'S ENGINEERS

Parts

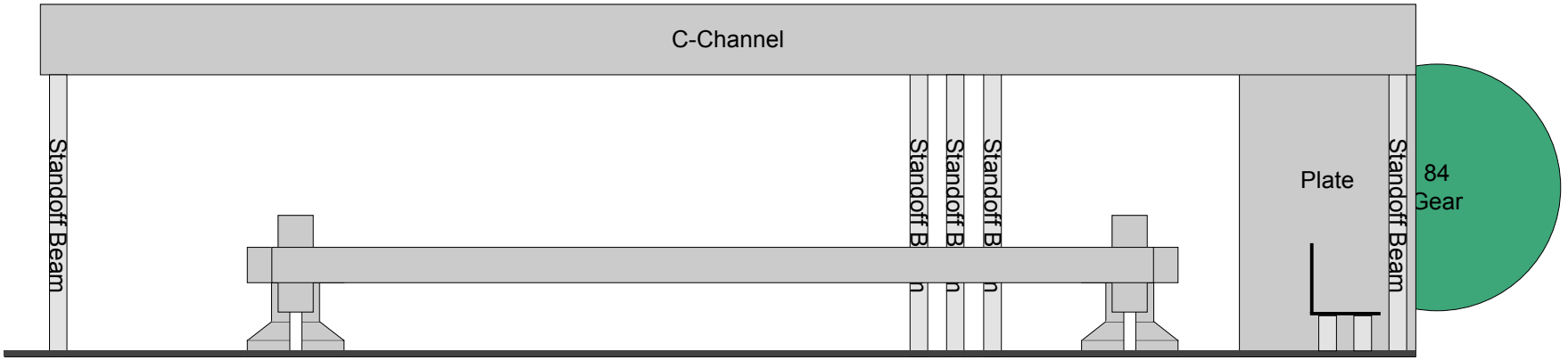
12" x 15" Thick Anti-Slip Mat (1)

Instructions

Cut Thick Anti-Slip Mat into 3” wide strips

Secure strips on top of the bottom plates, in the center

Secure by screwing through holes in the mat

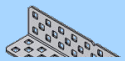


Angle 2x2x10 & ½ Standoff Beam (4)

CAM'S ENGINEERS

Parts

Angle 2x2x25 holes (1)



½" Standoff Beam (4)

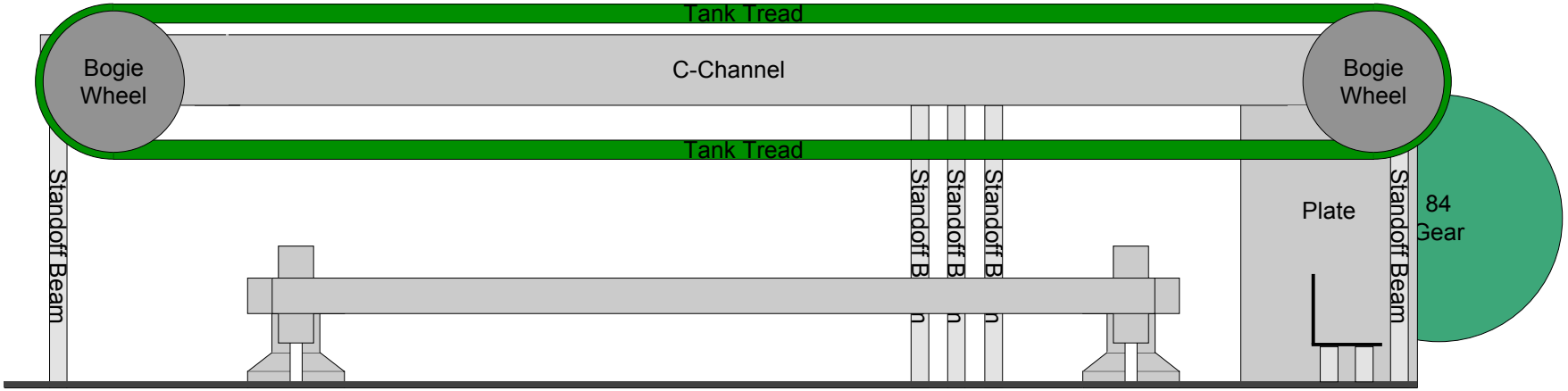
Instructions

Cut Angle to 2x2x10 holes

Secure to bottom plates with standoff beams as shown above

Comments

This prevents the balls from leaving the system or jamming

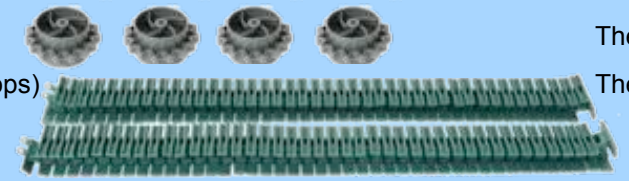


CAM'S ENGINEERS

Parts

Bogie wheel (4)

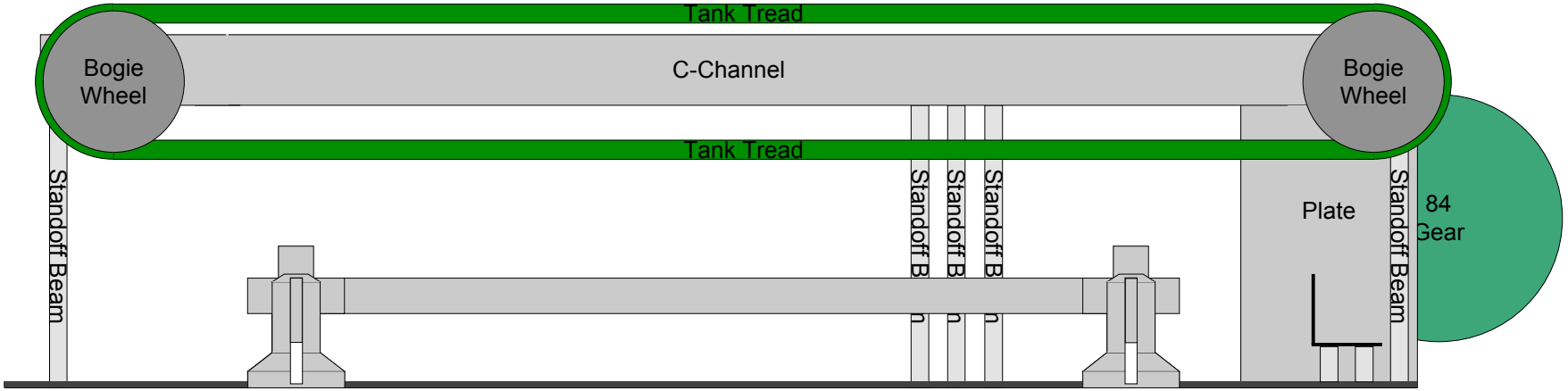
Tank tread (2 loops)



Comments

The system is now more than halfway complete

The following steps mirror what has been done



CAM'S ENGINEERS

Parts

Angle Gusset (2)

Plus Gusset (2)

Bar 1x25 holes (1)

¾" Velcro

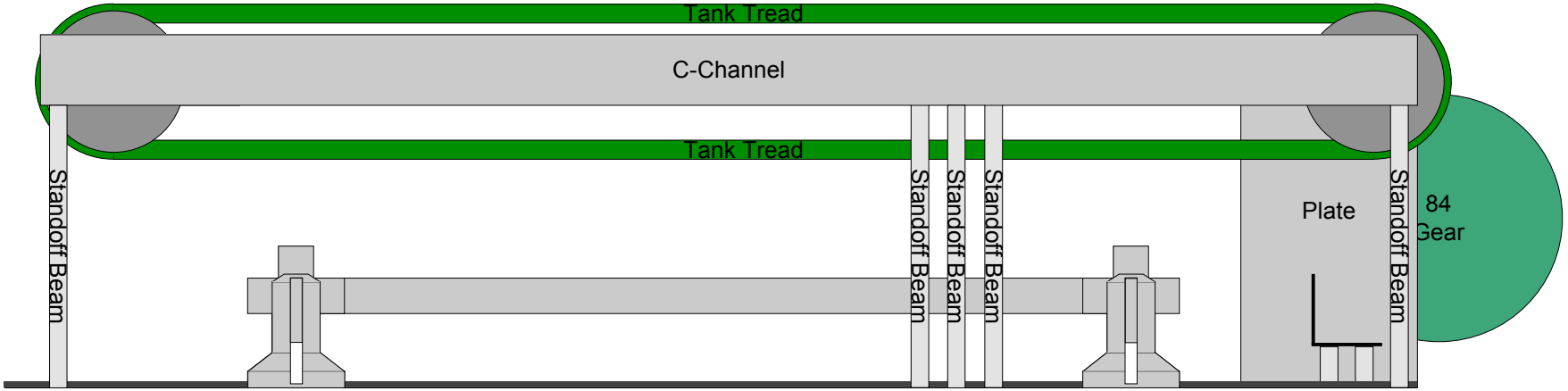
Instructions

Secure this guide rail to the plate with Velcro

Comments

This is done to allow for easily preloading softballs

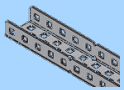
Also complies with need to remove balls with power off



CAM'S ENGINEERS

Parts

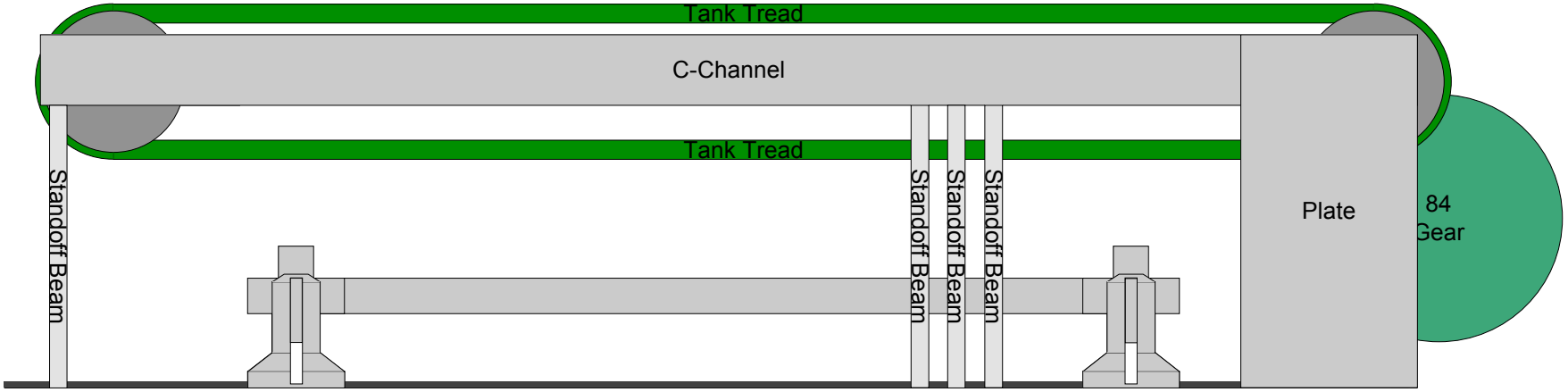
C-Channel 1x2x1x25 holes (2)



4” Standoff Beam (5)

Instructions

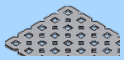
Cut (1) C-Channel to 1x2x13 holes



CAM'S ENGINEERS

Parts

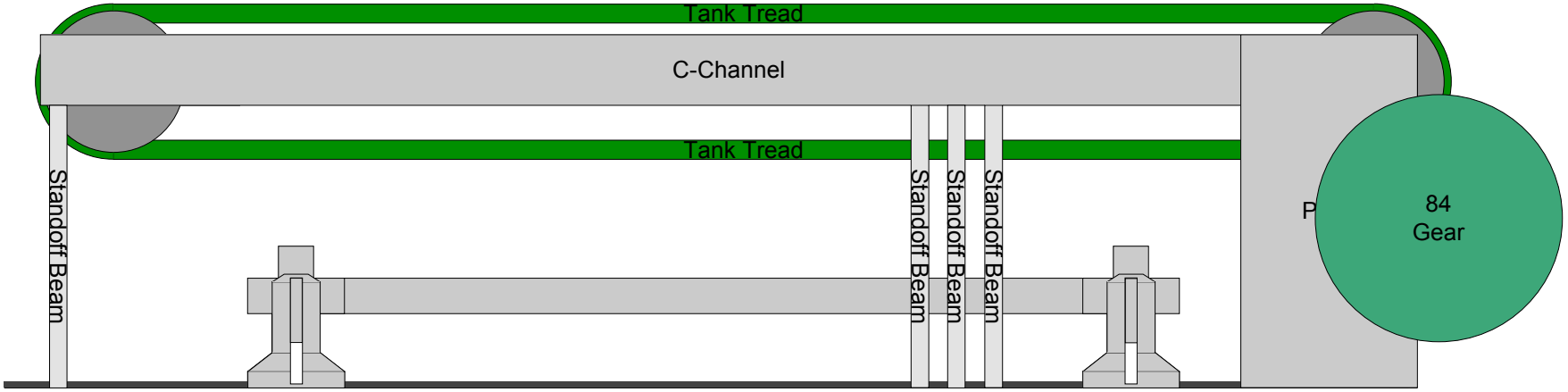
Plate 25x5 or Plate 15x5 (1)



Instructions

Cut plate to 10x5

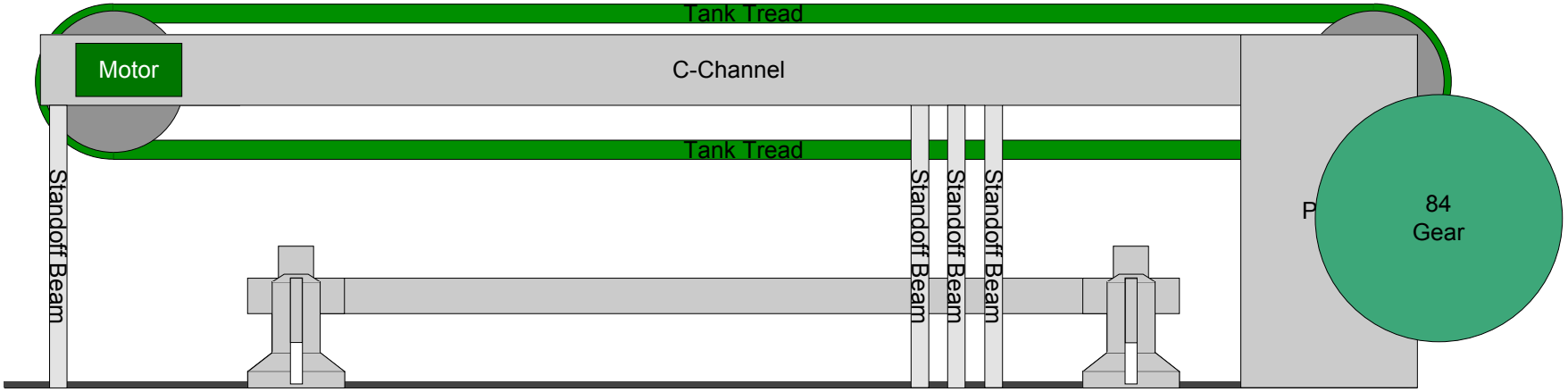
Secure plate to C-Channel



CAM'S ENGINEERS

Parts

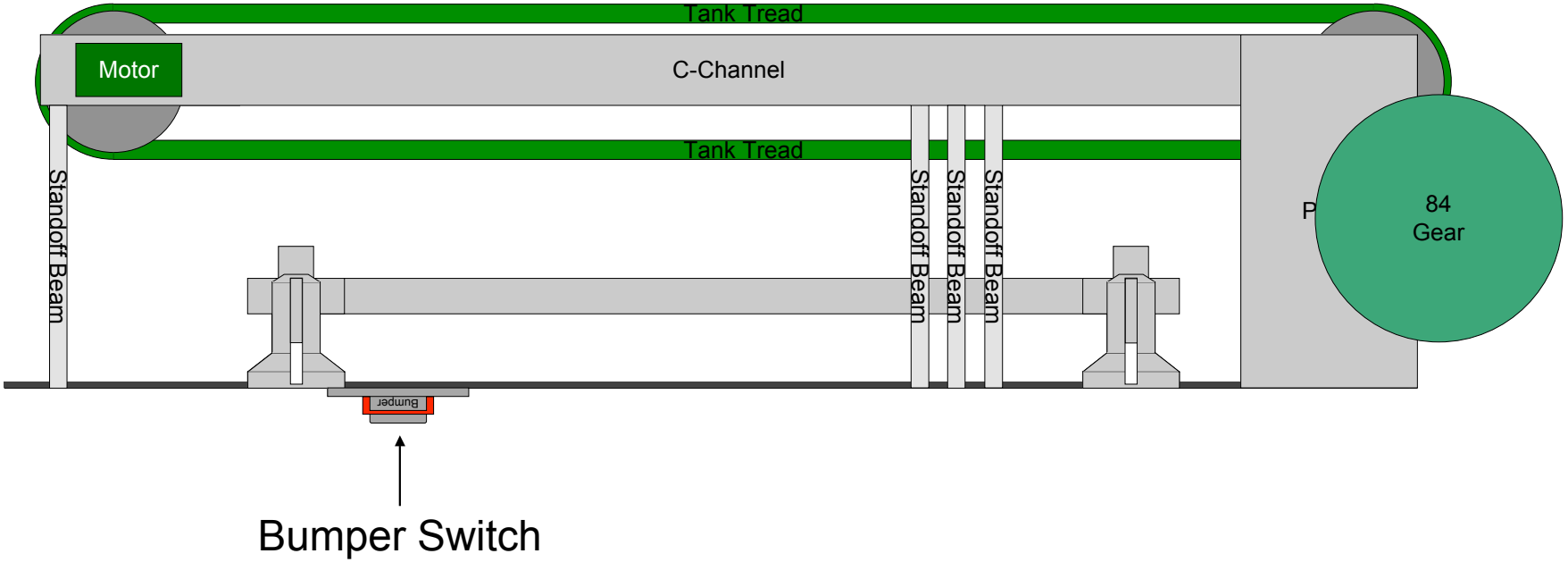
84 Tooth Gear (1)



CAM'S ENGINEERS

Parts

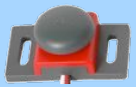
Motor Module (1)



CAM'S ENGINEERS

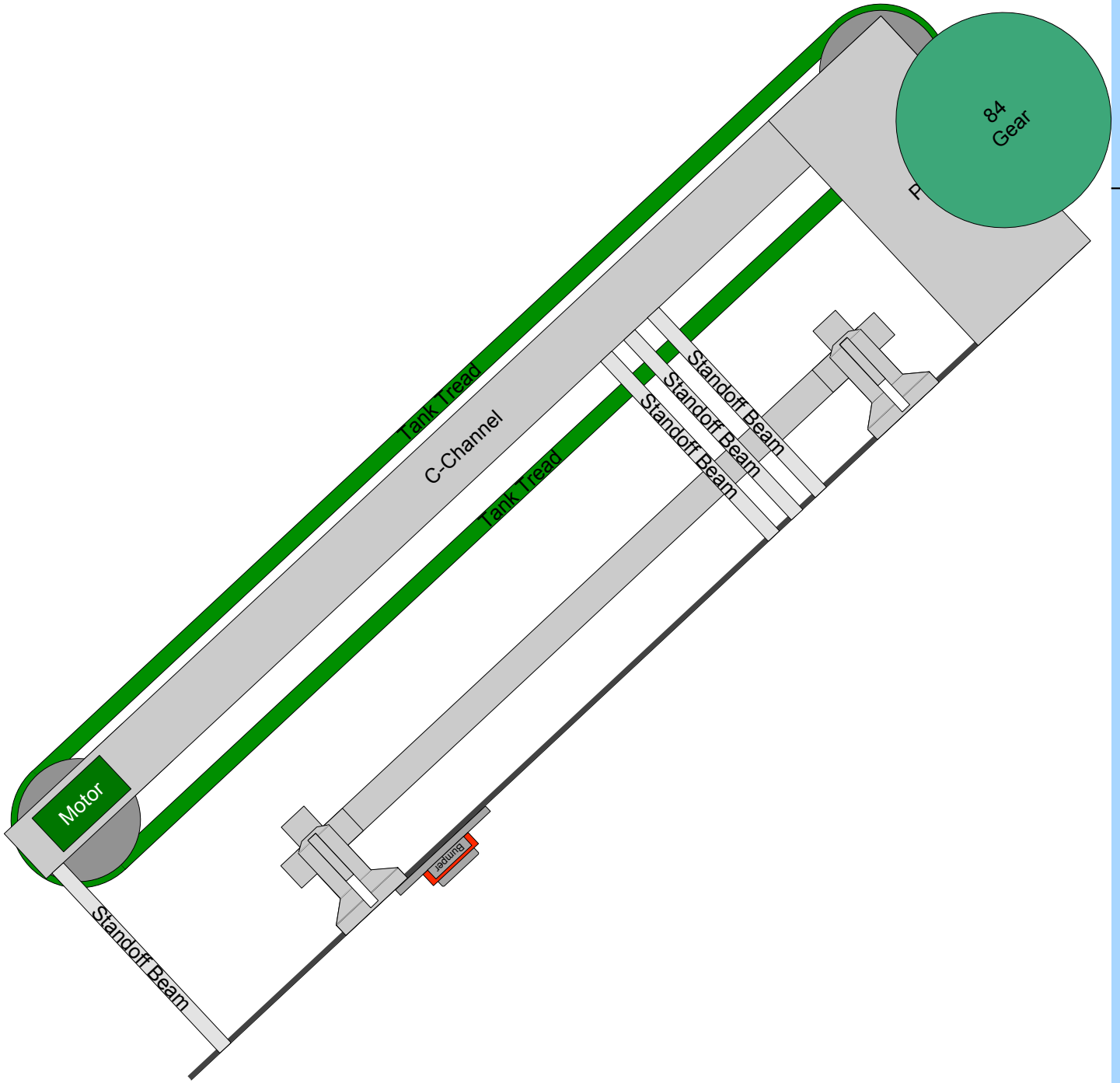
Parts

Bumper Switch (1)



Comments

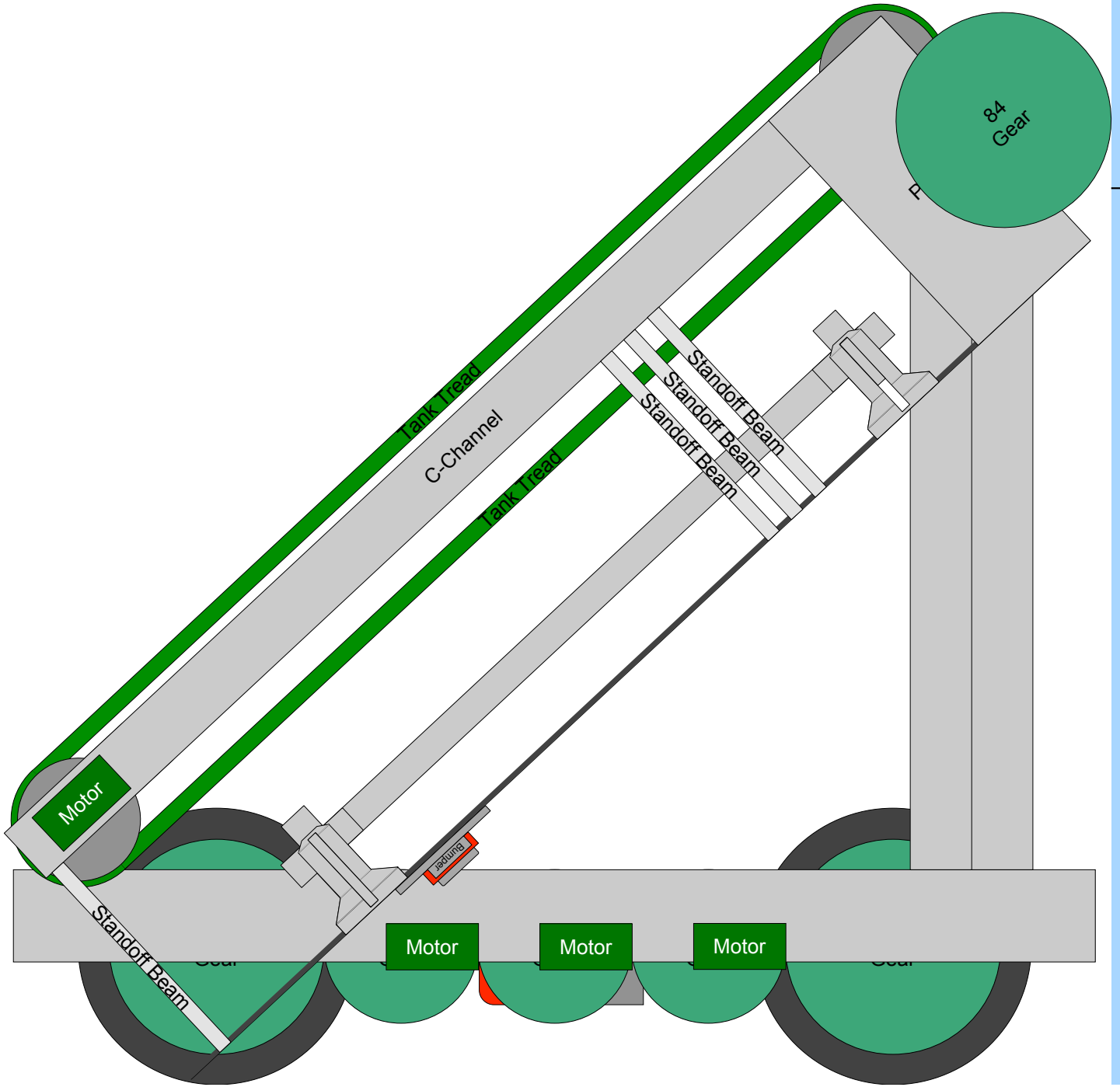
The bumper switch is positioned so that when the ball inktake system is fully lowered, the switch is pressed down.



CAM'S ENGINEERS

Comments

Position once rotated to fit within the size requirements



CAM'S ENGINEERS

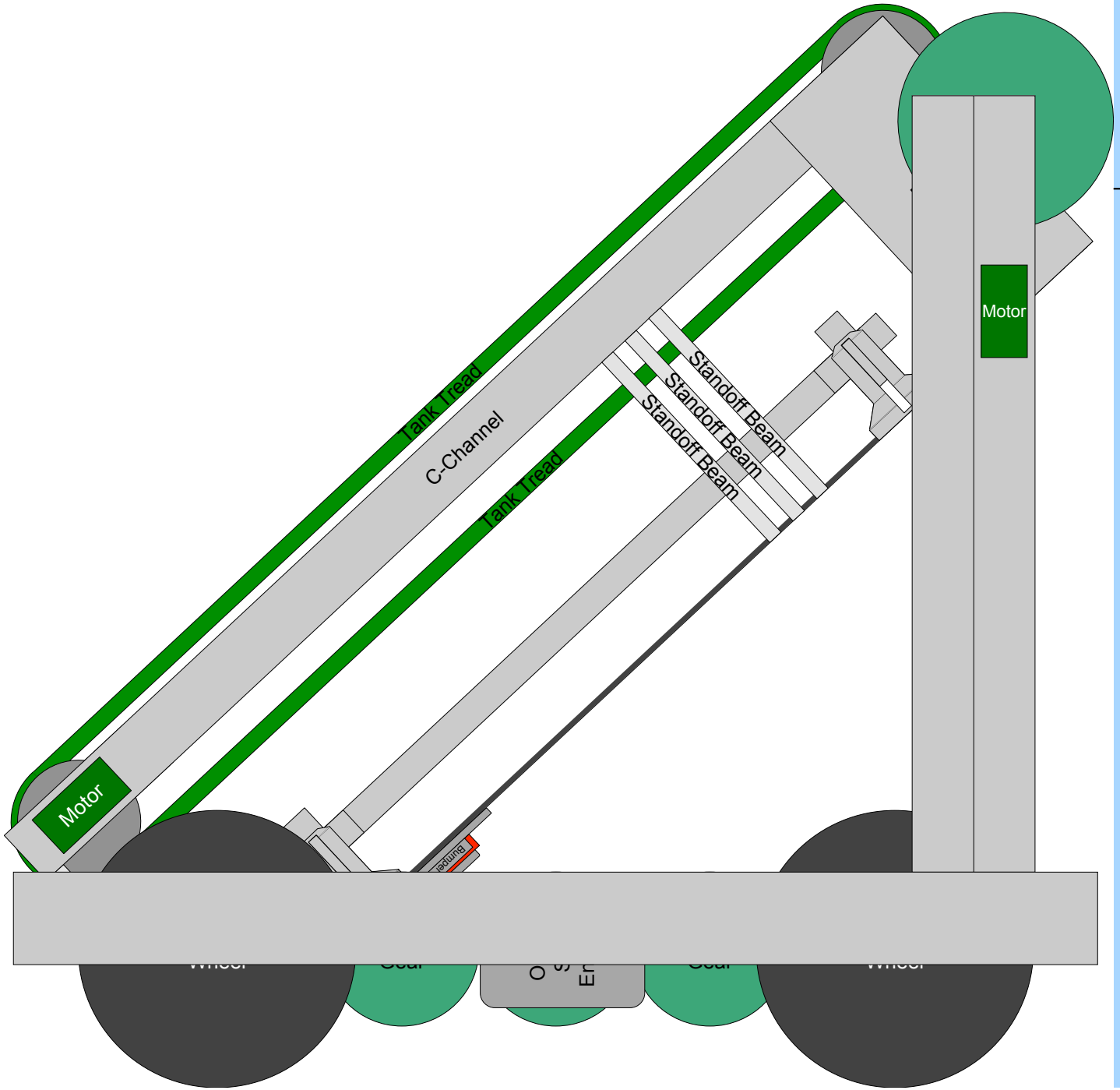
Comments

The ball system is mounted to the lift system

Adding the other side

Overview

Complete the other side of the robot and attach a bumper switch



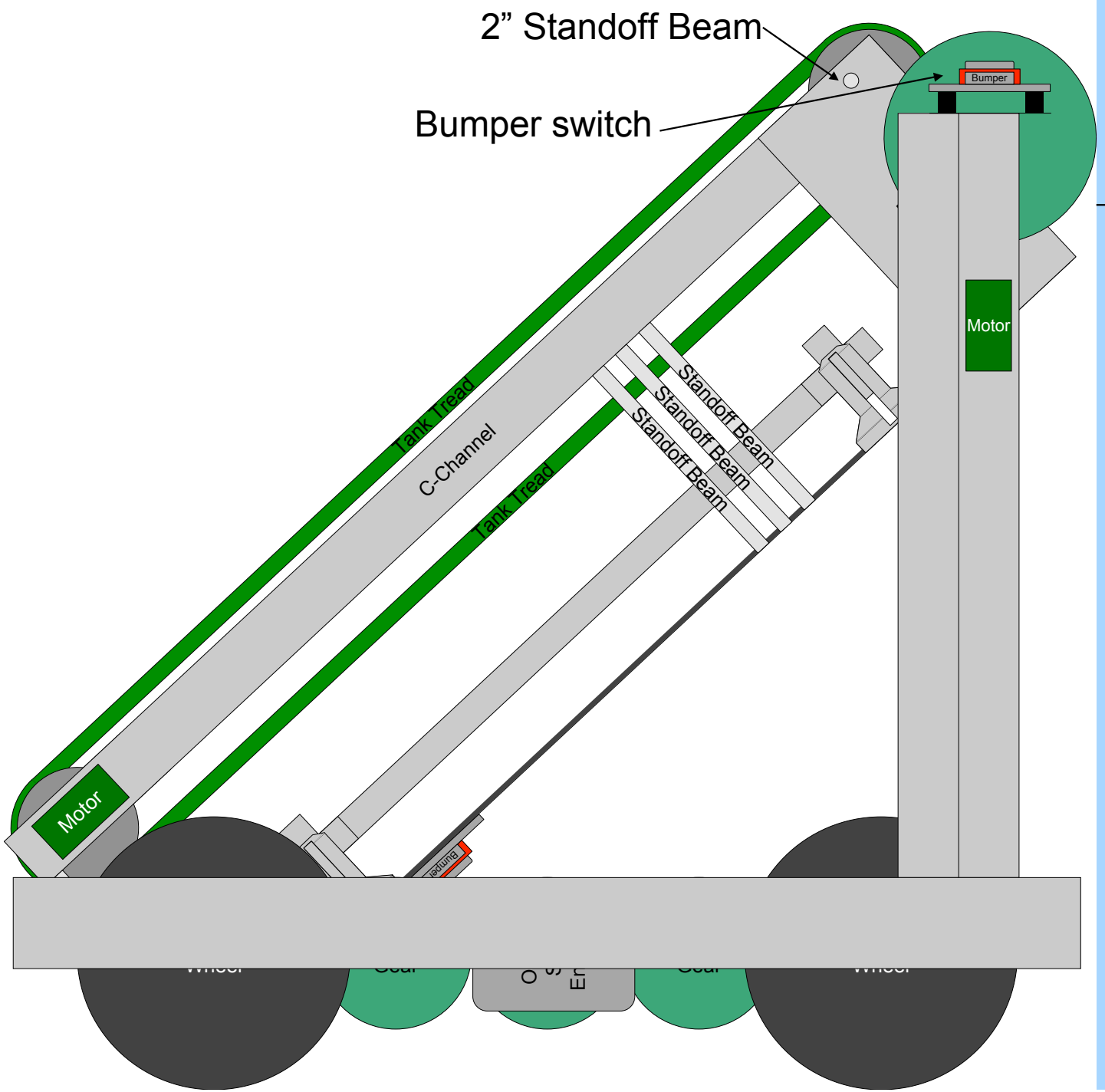
CAM'S ENGINEERS

Comments

The drive and lift systems are built for the other side and attached

Attachment between sides not shown here

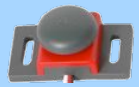
At this point the robot is symmetric



CAM'S ENGINEERS

Parts

Bumper switch (1)



2” Standoff Beam (1)

Comments

Position the bumper switch so that when rotated the standoff beam slides over the bumper switch, pressing it down, when the ball intake system reaches the height of the high goal. A small metal plate may be necessary to correctly position the bumper switch.