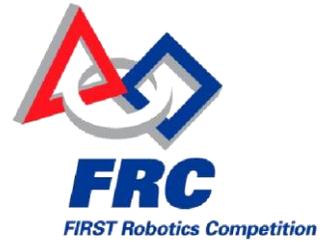




The Arena



1640 Robotics Competition Off-Season 2012

2 The Arena

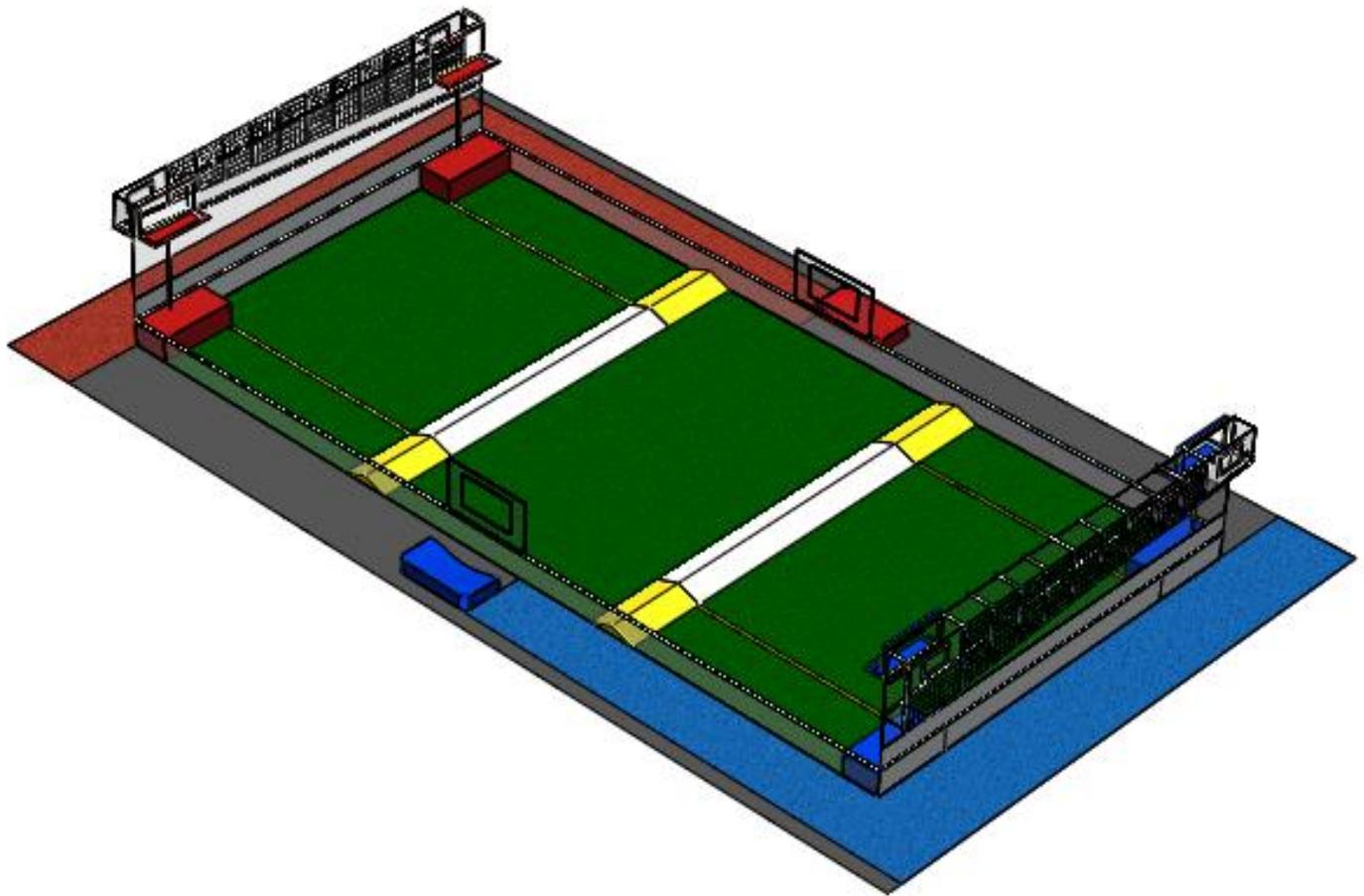
2.1 Overview

Note: These illustrations are for a general visual understanding of the Touchdown Tango Touchdown Tango Arena only.

The Arena includes all elements of the game infrastructure that are required to play *Touchdown Tango*: the Field, the Alliance Stations and all supporting communications, arena control, and scorekeeping equipment.

Robots play *Touchdown Tango* on a rectangular field known as the Field. During the Matches, the Robots are controlled from Alliance Stations located outside the ends of the Field. These rectangular zones consist of three Player Stations that provide connectivity between the controls used by the Drivers and the Arena. Field Goals are attached to the Alliance Walls facing the Field.

2.2 The Arena



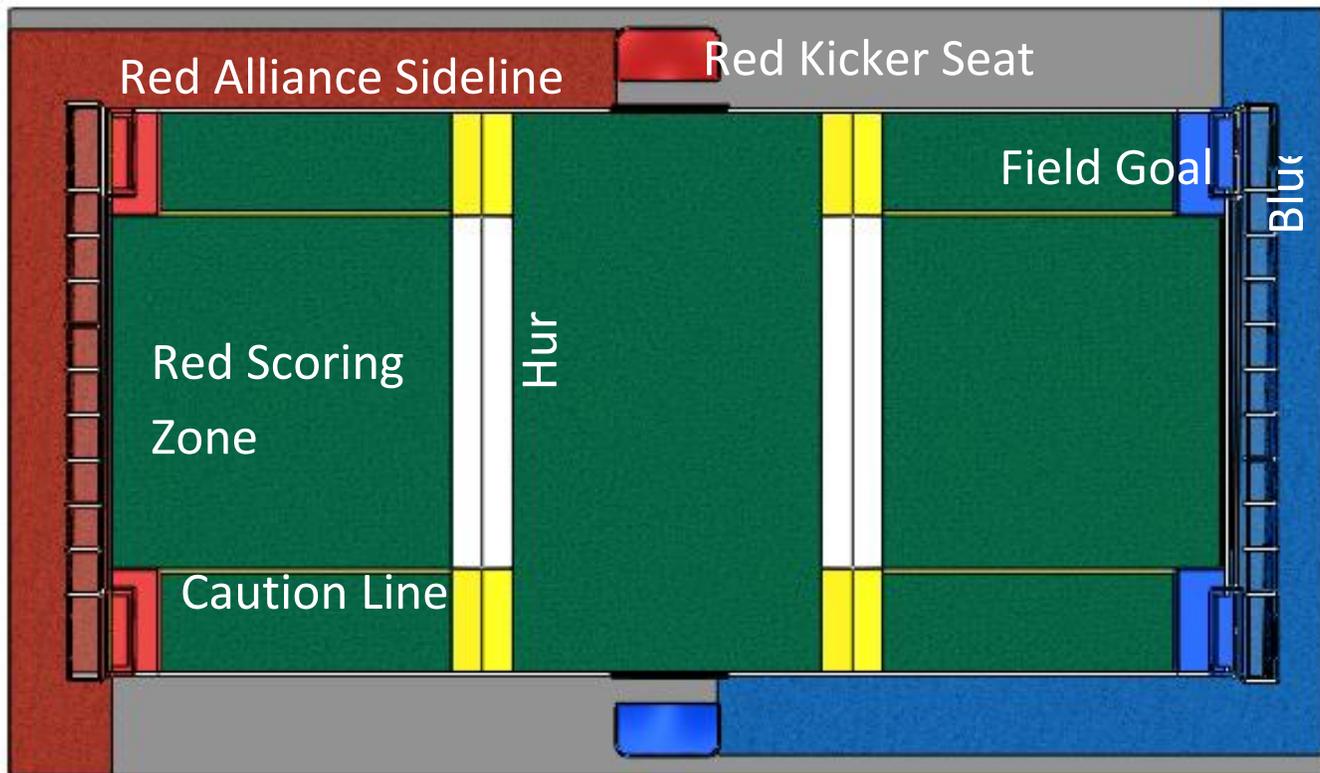
2.2.1 The Field

The Field for *Touchdown Tango* is a 27 by 54 ft carpeted area, bounded by two Alliance Walls and a guardrail system. The Field is covered with carpet. Field Goals are located at the ends of the Field attached to the Alliance Walls. Two polycarbonate Hurdles transect the field in thirds, yellow lines and yellow sections of the Hurdles identify Caution Zones in line with the Fenders.

The Alliance Walls are 9 ft high, 27 ft wide, and define the ends of the Field. The Alliance Wall protects the Player Stations, and is composed of a 3 ft high base of diamond plate aluminum topped with a 6 ft high transparent polycarbonate panel.

The guardrail system is a horizontal pipe 20 in. above the floor, supported by vertical struts mounted on a 3 in. aluminum angle. A shield is attached on the inside of the guardrail system, extending from the floor to the top of the guardrail, and running the length of the guardrail. The shield is intended to help prevent Robots, in whole or in part, from inadvertently exiting the Field during a Match. The Guardrail System defines the borders of the Field, except where it is bounded by the Alliance Wall.

Six gates in the guardrail system allow easy access to the Field for placement and removal of Robots. The gates are 38 in. wide, and are closed and shielded during Matches.



2.2.2 Field Marking

Each Alliance has one Scoring Zone located between their Alliance Station and the nearest Hurdle. Each Scoring Zone contains two Field Goal, Shelf and Fender assemblies in its rear corners against the Alliance Wall. Yellow tape lines run from the Hurdle to the Fenders, 60 in from the long edges of the Field.

2.2.3 The Players

Each FRC team may provide up to four Players for each Match: two Drivers, one Special Team Player, and one Coach. The Drivers must be pre-college student team members and are responsible for operating and controlling the Robot. The Special Team Player must be pre-college student team members and are responsible for retrieving and entering Footballs onto the Field. The Coach may be a student or adult team member. The Coach must wear the designated “Coach” pin or button during the Match.

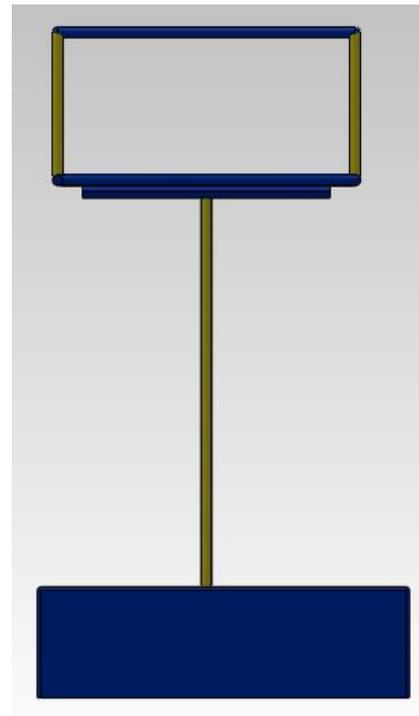
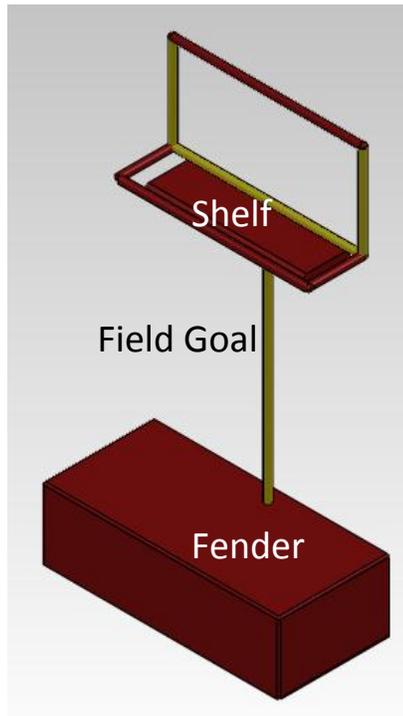
2.2.4 The Field Goals

The Field Goals are welded 1.75 in steel pipe assemblies designed to support the force of multiple robots. Their openings are used to receive Footballs and are 2 ft tall by 4 ft wide with the bottom edge at 7 ft from the playing surface.

They are mounted into wooden Fenders which are 60 in wide by 28 in deep by 18 in tall. The Fender is designed to protect the Field Goals from damage by Robots. The Field Goals are off center in the Fenders, centered 37.25 in from the closest guardrail and 32.75 on the other side. The mounting hole is 3.75 in from the rear of the Fender (and the Alliance Station Wall)

Shelves are mounted to the Alliance Wall directly below the Field Goals’ bottom edges. They are 12 in deep and 40 in wide and surrounded by a welded steel pipe perimeter.

A retro-reflective Vision Target (Reflexite GP020, 50mm; Pro Gaff Tape, “black”, 1 in.) is mounted behind the opening of each Field Goal. The Vision Target is a rectangle with an outer width of 24 in., an outer height of 18 in., and a stroke of 1 in. There is a 2 in. stroke strip of white gaffers tape on both the inside and outside of the retro-reflective rectangle.



Each Alliance has two Field Goals, mirror images of the blue Goal shown above.

2.2.5 The Hurdles

Robots traverse the center of the Field by crossing over triangular Hurdles which are 36 in wide at their base and slope at a 20 degree angle to a point 6.55 in off the playing surface. Each Hurdle runs the width of the field and is topped with clear polycarbonate. The sections of each hurdle directly in front of the fenders (0 to 60 in from each wall) are colored yellow while the center sections are colored white.

2.2.6 The Alliance Stations

The Alliance Stations are located at either end of the Arena, behind the Alliance Walls. The Players remain in their assigned Alliance Station during the Match.

The Alliance Station extends back 8 ft from the Alliance Wall, and spans the entire width of the wall. The Alliance Station includes the three Player Stations and one Inbound Station. The Starting Line is marked on the floor 4 ft back from the Alliance Wall, and extends across the width of the Alliance Station. The Alliance Station includes the area behind the Starting Line. All boundaries for the Alliance Stations are marked on the carpet with white tape (Pro Gaff Tape, "white", 2 in.). The tape boundaries are considered part of the bounded areas.

The Endline Return is located above each Alliance Wall to convey Footballs to the Alliance Sideline.

2.2.7 Alliance Sideline

An Inbound Station is located on the side of the Alliance Station at the end of the Alley. The Inbound Station is approximately 4 ft 3 in. wide. There is no netting above the Inbound Station.

The Alliance Sideline runs along the left side of each Alliance's Scoring Zone from their Alliance Station to their Kicker Seat. It is operated by the Alliance's Special Team Players who pass the Footballs from the Endline Return to the Kicker Seat.

2.2.8 Kicker Seat

The Kicker Seat is a 5 ft wide by 30 in deep seat located 10 in from the Arena floor. Each Alliance has one Seat centered on the long axis of the Field, 18 in from the guardrail wall and behind a Kicker Slot. The Kicker Slots are 24 in

tall and 42 in wide starting 29 in from the Arena surface and centered on the long axis of the Field. They are framed in sheets of 3/16 in thick clear polycarbonate.

2.2.8 Endline Return

The Endline Return runs the width of each Alliance Station. It slopes down right to left, starting at 2 ft from the top of the Alliance Wall and ending 4 ft from the top: 7 ft from the Arena surface to 5 ft from the surface. Its lower surface is solid polycarbonate while the back of the Return is 1 in nylon netting attached to 1.5 in aluminum pipes every 3 ft and on the inner sides of the Field Goals. The area of the Endline Return behind the Field Goals is polycarbonate sheet with the prescribed Vision Target.

2.2.9 The Player Stations

One Player Station is located between the Inbound Station and Corral. The remaining two Player Stations are located on the opposite side of the Corral. The Player Stations are 65 in wide. All three Player Stations have the components detailed below.

Attached to the Alliance Wall in each Player Station is an aluminum shelf to support the Operator Consoles for the FRC team in that Player Station. The support shelf measures at least 48 in. wide by 12 in. deep. There is a 3 ft long by 2 in. wide strip of Velcro tape ("loop" side) along the center of the support shelf that may be used to secure the Operator Consoles to the shelf. Each setup location includes a competition cable (to provide Ethernet connectivity) that attaches to the Ethernet Port of the Operator Console. The cable provides communications with the Robot.

Each Player Station also includes a power adaptor cable that may be used to power the Classmate laptops that were provided to teams in the Kit of Parts starting in 2010. Emergency Stop (E-Stop) buttons for each Robot are located on the left side of each Player Station shelf. Arena components (including team number displays, competition arena hardware, alliance lights, control hardware cabinets and clock displays) are also located above the Player Stations and below the shelf.

Once plugged in to the Field Management System via the Ethernet cable provided, the ports that the teams will be able to access on the playing field are as follows:

- TCP 1180: This port is typically used for camera data from the cRIO to the DS when the camera is connected to port 2 on the cRIO. This port is bidirectional on the field.
- TCP 1735: SmartDashboard, bidirectional
- UDP 1130: Dashboard-to-Robot control data, directional
- UDP 1140: Robot-to-Dashboard status data, directional
- HTTP 80: Camera connected via switch on the robot, bidirectional
- HTTP 443: Camera connected via switch on the robot, bidirectional

All these ports are open on the playing field, so a team can use them as they wish if they do not employ them as outlined above (i.e. TCP 1180 can be used to pass data back and forth between the robot and the DS if the team chooses not to use the camera on port 2).

2.2.11 The Footballs

While playing *Touchdown Tango*, Robots manipulate miniature Footballs to accomplish the objectives of the game. The Football is a Franklin 5010 Junior Professional ball.