

# 2014 *FIRST* Competition



Tournament Overview

Match Format

Definitions

Safety

Scoring

Fouls

The Arena

Game Play

Robot

Considerations

Key Date

Discussion

---

# Tournament Overview

- Game played on a flat 25 (24'8") X 54 foot carpeted field, straddled by a lighting truss suspended just over five feet above the floor.
- Two 3-team alliances, one red and one blue, compete in each MATCH.
- Object is to score as much as possible during a 2 minutes and 30 second match.
- Extra points for working together when scoring a ball.

---

# Tournament Overview

- **Tournament Format**
  - **Practice Matches**
    - To practice or run your robot on the field prior to qualification matches
  - **Qualification Matches**
    - Earn seeding position that may qualify you for Elimination Matches
  - **Elimination Matches**
    - Determine the Champions

---

# Tournament Overview

- Qualification Score (QS)
  - Each team on the winning alliance receives 2 qualification points
  - Each team on the losing alliance receives 0 qualification points
  - In event of a tie, each team receives 1 qualification point
  - If disqualified or a no show, team receives 0 points

# Seeding

- All teams seeded during qualification matches.
- Teams ranked in this order:

Order	Points
1	Qualification score
2	Cumulative sum of assist points
3	Cumulative sum of auto points
4	Cumulative sum truss and catch point
5	Cumulative sum of teleop goal points and foul points
6	Random sorting by FMS

---

# Definitions

- Alliance: Set of three FRC teams that work together (assigned either red or blue color)
- Possess: (for a robot) to carry (move while supporting balls in or on the robot), herd (repeated pushing or bumping, launch (impel balls to a desired location or direction), or trap (overt isolation or holding one or more balls against a field element or robot in an attempt to shield them) a ball

---

# Definitions

- Team positions:
  - COACH: Student or adult mentor designated as the team coach and advisor during the match (1)
  - DRIVER: Pre-college student (2)
  - HUMAN PLAYER: Pre-college student responsible for entering DISCS onto the Court

---

# Safety

- All competition attendees must wear safety glasses while in the Arena
- Radio control mode of Robot operation is not permitted in areas anywhere outside the Arena or practice field. Robots must only be operated by tether when not within the Arena or practice field.
- Teams must pass inspection



# Safety

- Any ROBOT in violation of a Robot Rule will automatically be assigned a PENALTY and may receive a Yellow Card, depending on the severity of the infraction
- Teams may only enter the field if the players station LED strings are green

# Scoring – Complicated but simple

## ■ Ball Points

- ❑ LOW Goal = 1 Point
- ❑ HIGH Goal = 10 Points
- ❑ Over Truss = 10 Points
- ❑ Catch = 10 Points

## ■ Bonus Points

- ❑ Mobility in Autonomous = 5 Points
- ❑ Scoring during Autonomous = +5 Points
- ❑ Scoring in Hot Goal during Autonomous = +5 Points

---

# Scoring – Complicated but simple

- Assist Points

- 1 Assist = 0 Points
- 2 Assists = +10 Points
- 3 Assists = +30 Points

---

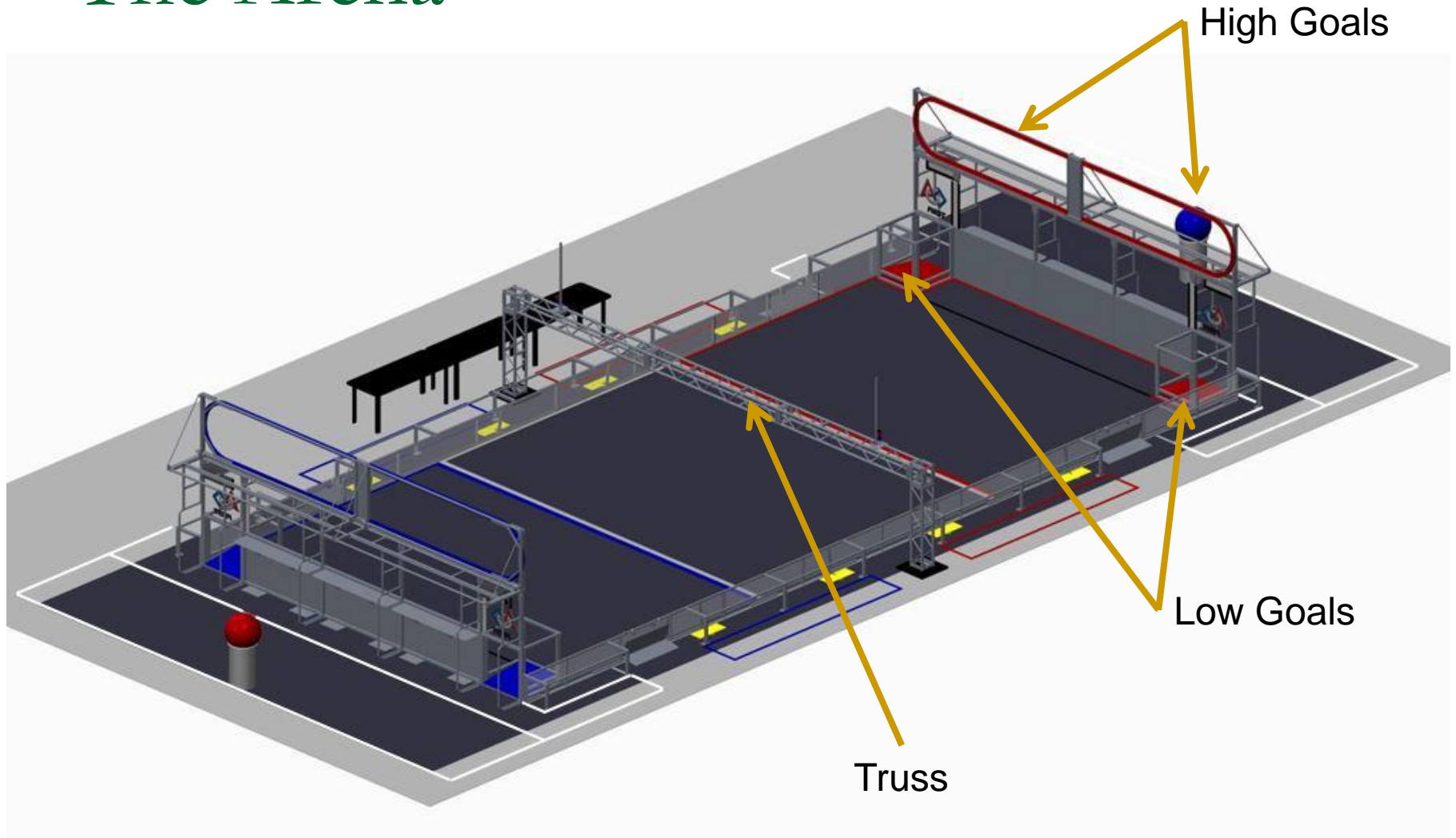
# Scoring – Available Balls

- Each robot may begin with a ball in Autonomous Period
- Once all balls in autonomous are scored, only one ball is re-entered in to play – alliances must cycle a single ball

# Scoring – Complicated but simple

Action	Base	AUTO (=Base+5)	AUTO & HOT (=Base+AUTO+5)	1 ASSIST (=Base+0)	2 ASSIST (=Base+10)	3 ASSIST (=Base+30)
LOW GOAL	1	6	11	1	11	31
HIGH GOAL	10	15	20	10	20	40
TRUSS	10					
MOBILITY		5				
CATCH	10					

# The Arena



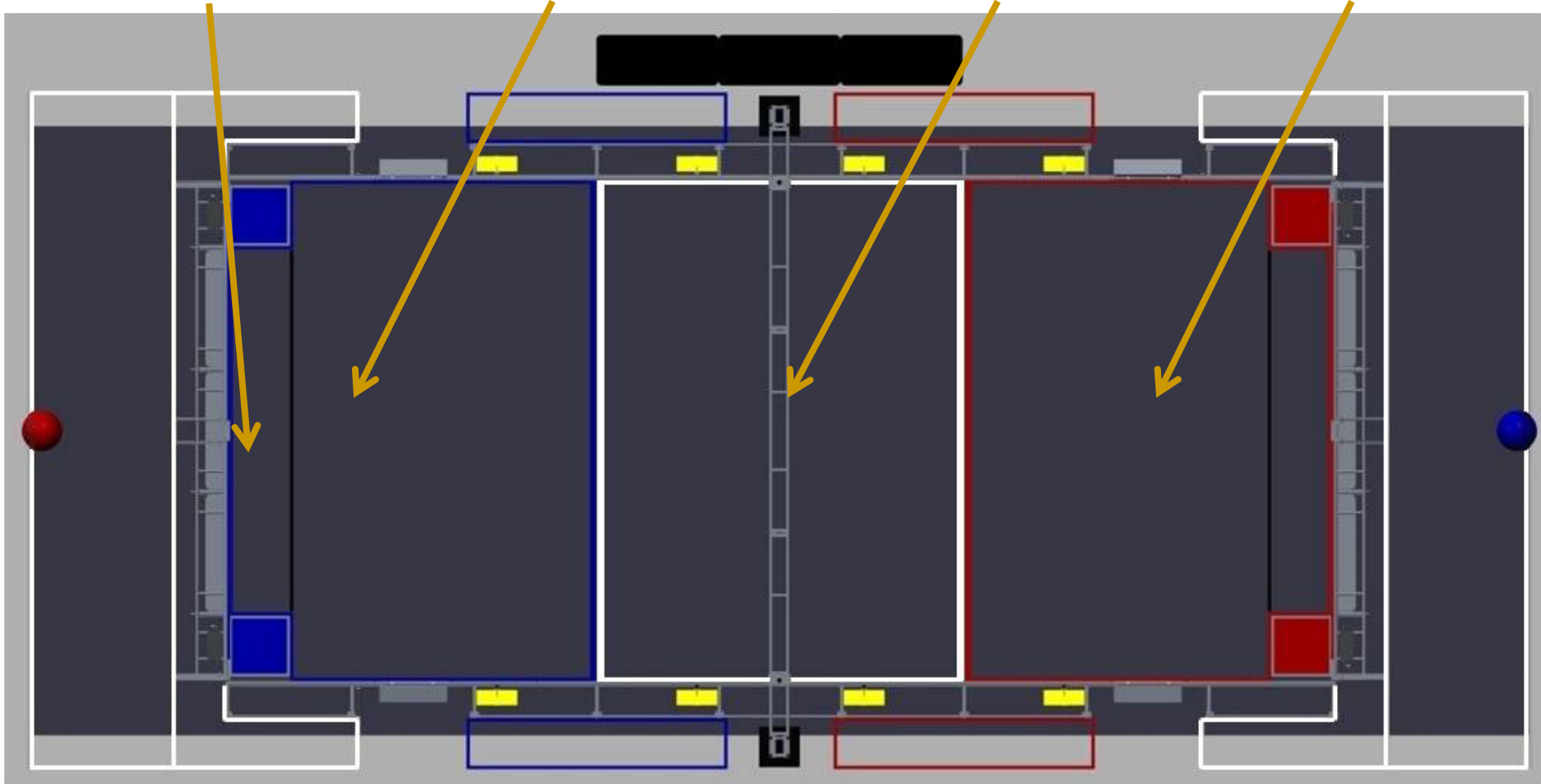
# Field Markings

Red Goalie Zone

Blue Zone

White Zone

Red Zone

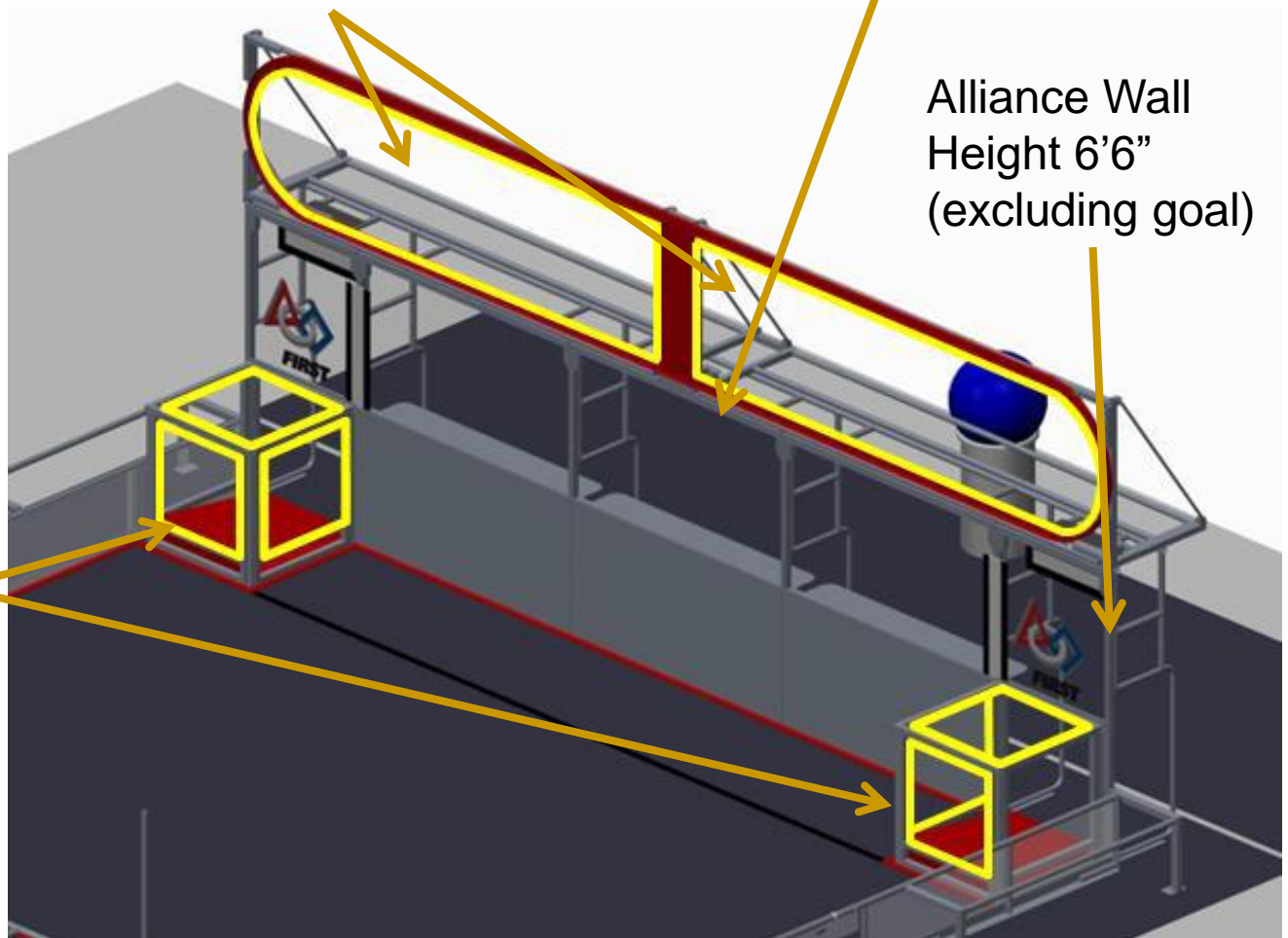


# Goals

Two HIGH Goals  
11' 6" wide and 3' tall

Alliance Wall  
Width 18'

Alliance Wall  
Height 6'6"  
(excluding goal)

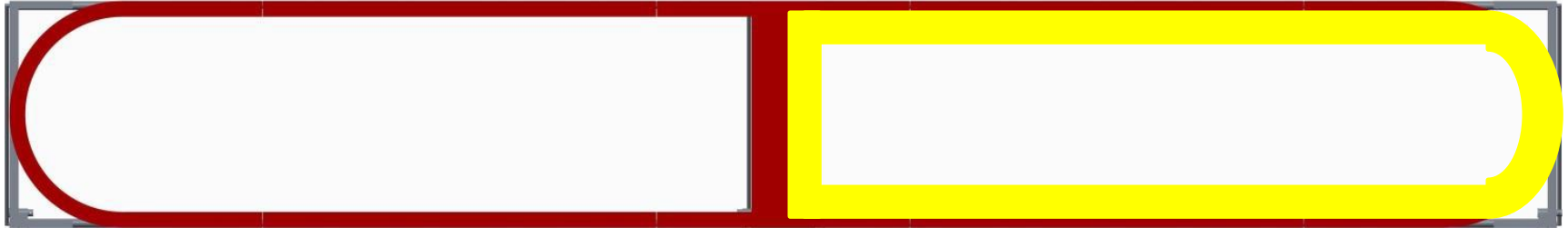


Two LOW Goals  
•Side = 2'5" W x 2'4" T  
•Top = 2'8.5" x 2'8.5"  
•Bottom Edge 7" from carpet

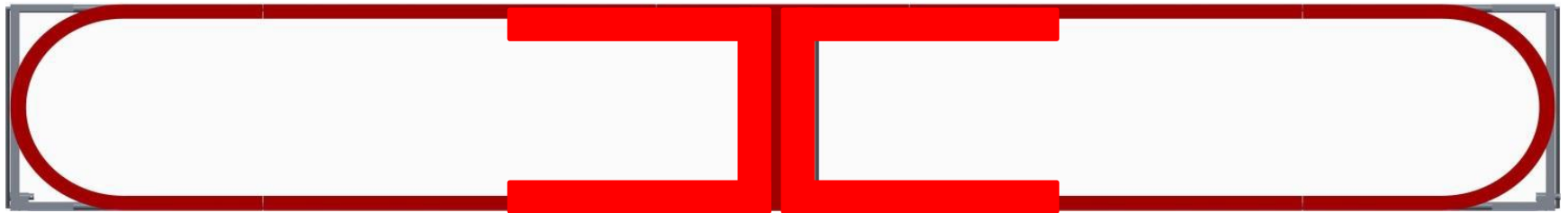


# Top Goal

## HOT Goal

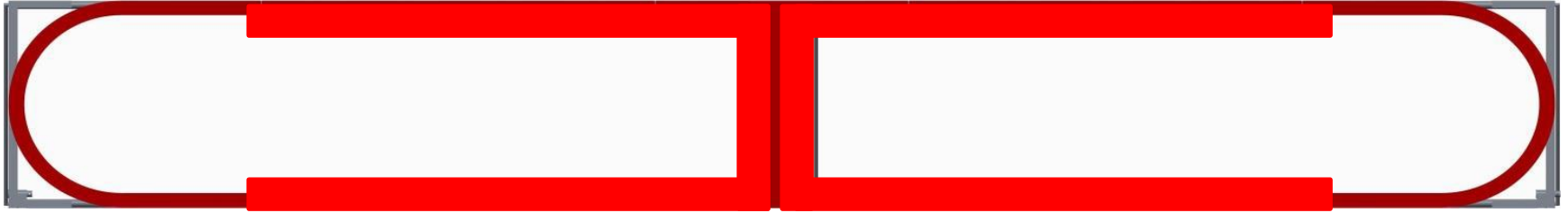


The perimeter of a HOT GOAL is lit with yellow LEDs. The non-HOT GOAL'S perimeter is not lit.

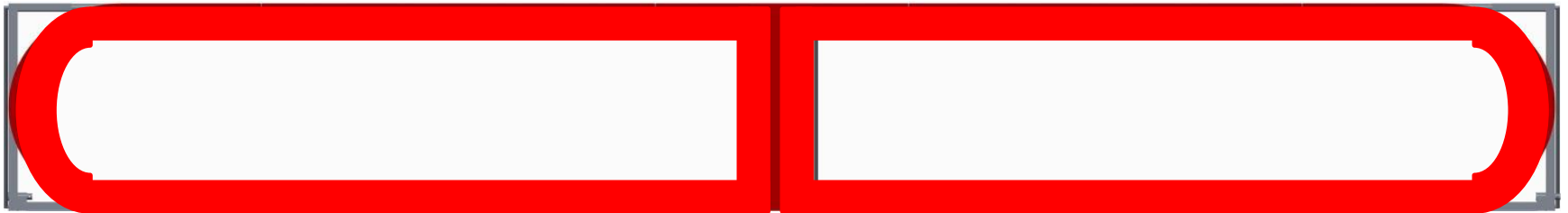


The inside third of the GOAL perimeters are illuminated in the ALLIANCE color if an ALLIANCE has one (1) ASSIST.

# Top Goal

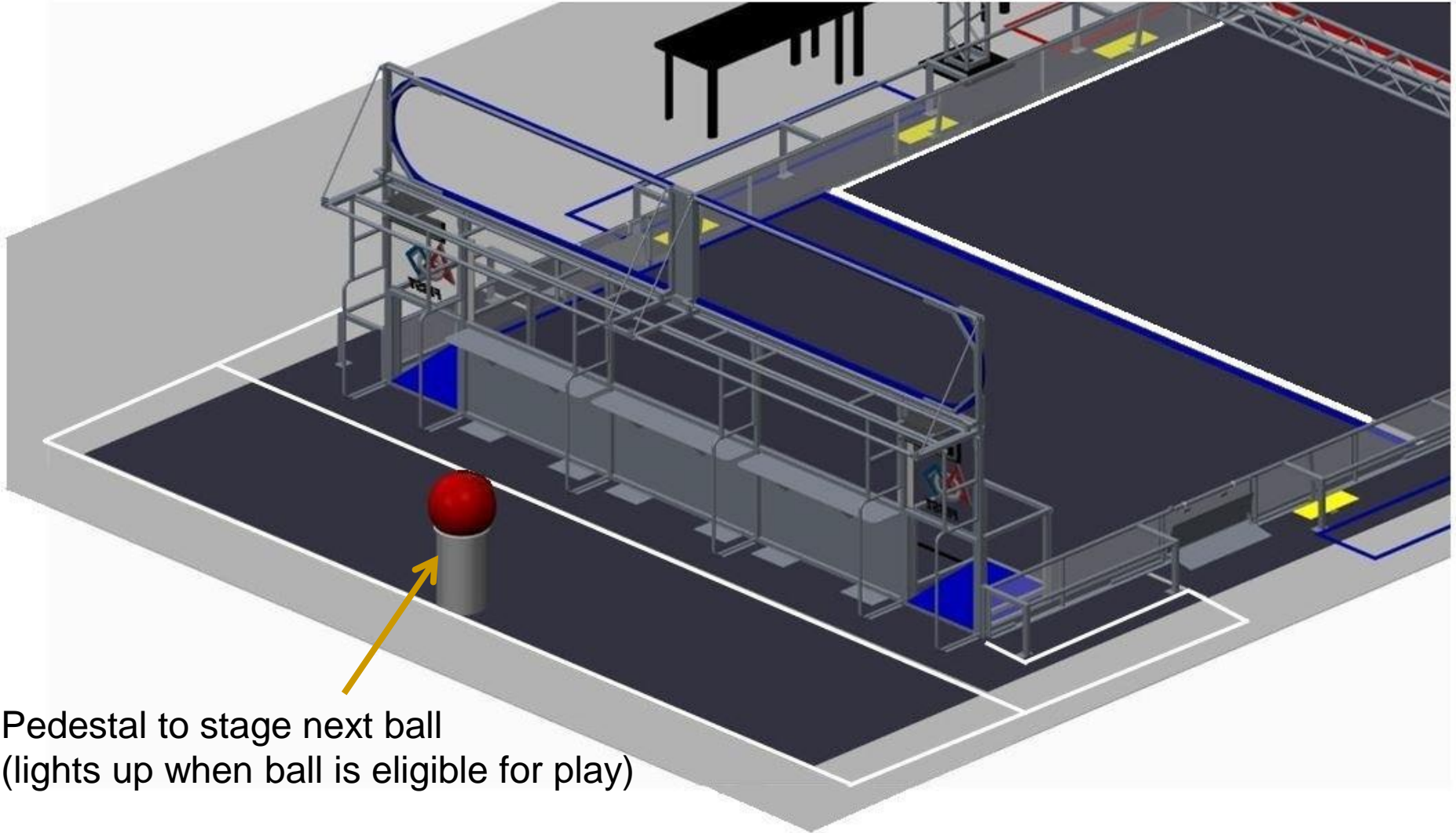


The inside two-thirds of the GOAL perimeters are illuminated in the ALLIANCE color if an ALLIANCE has two (2) ASSISTS.



The full GOAL perimeters are illuminated in the ALLIANCE color if an ALLIANCE has three (3) ASSISTS.

# Alliance Stations



Pedestal to stage next ball  
(lights up when ball is eligible for play)

# Alliance Stations

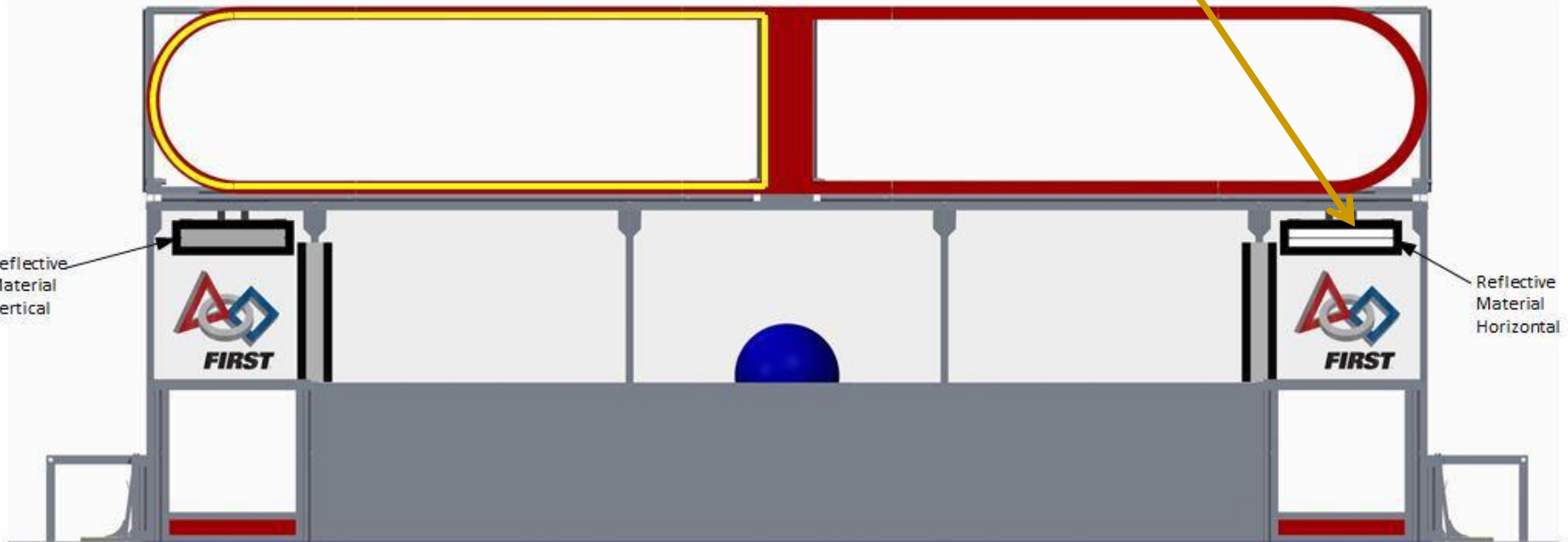


1	2	3
		X
X	X	X
X		
TRUSS	80	120
		CATCH

Flat Panel Display

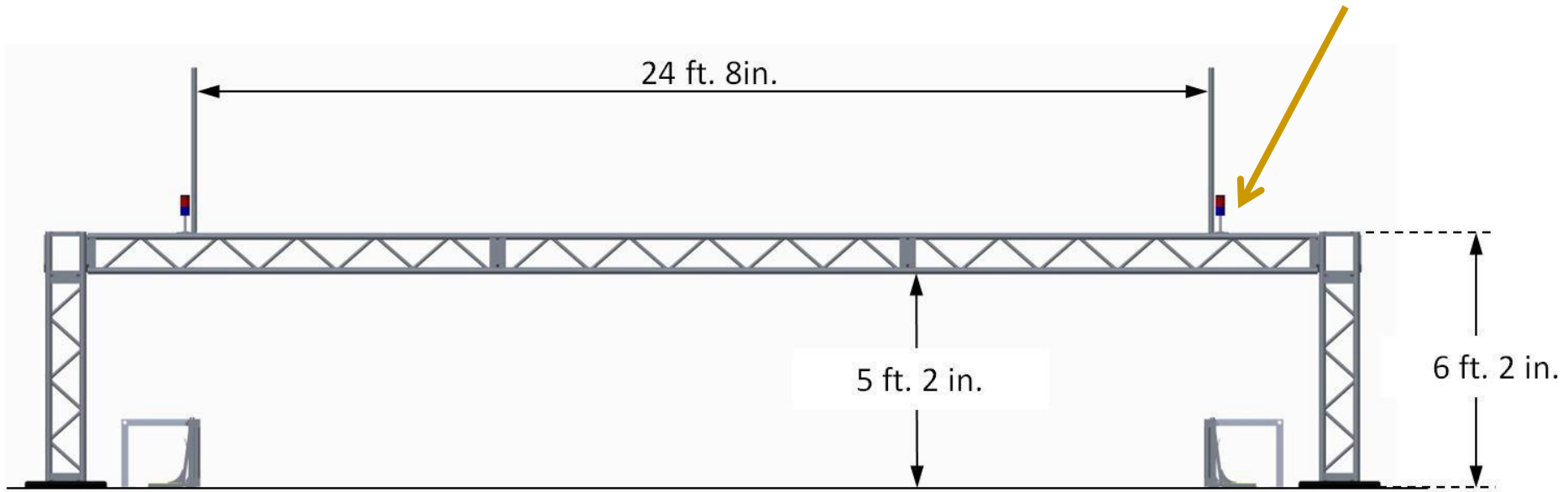
# Vision Targets

Dynamic VISION Target Shows tape when High and Low Goals are HOT



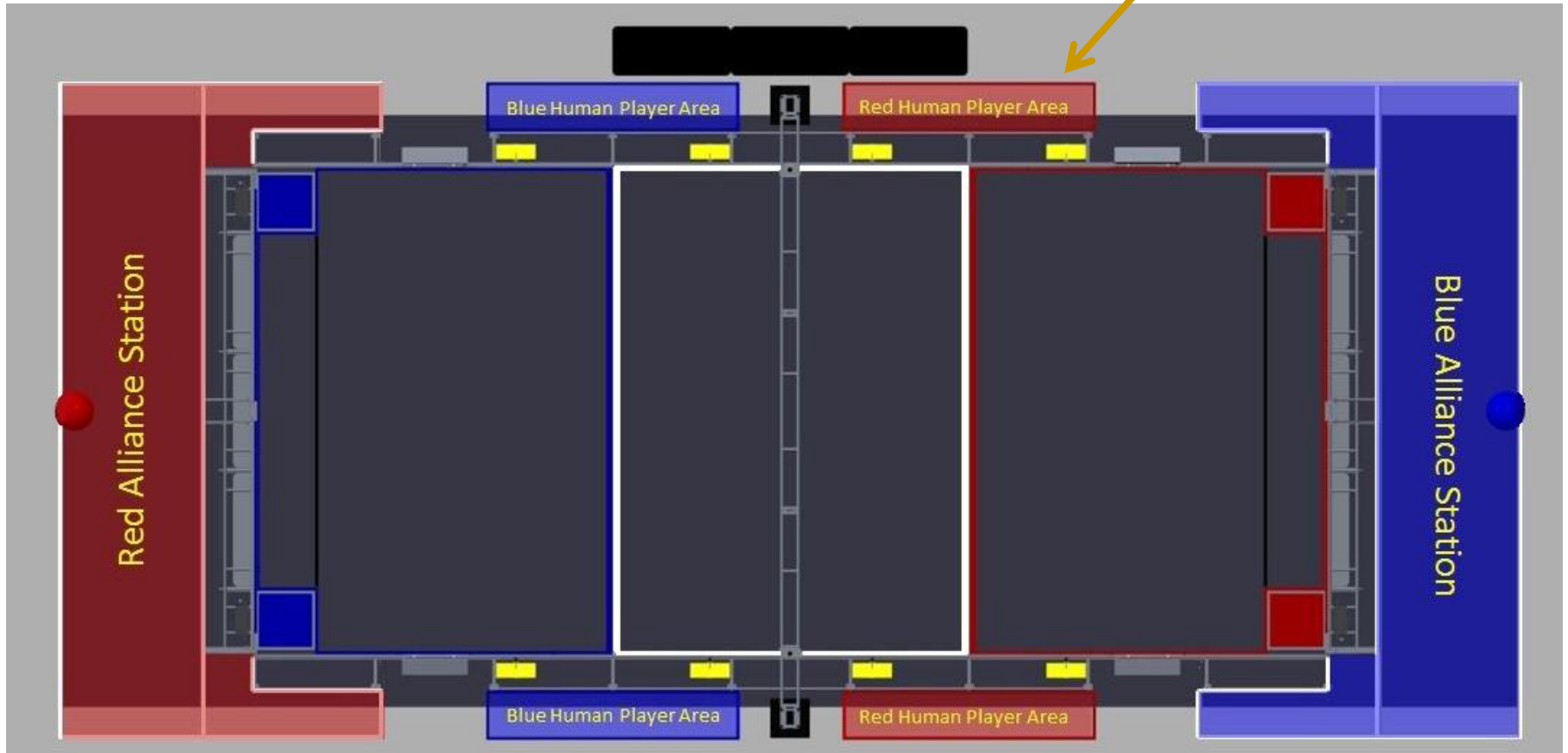
# Truss

Stack lights turn on to indicate that the corresponding Alliance has achieved a TRUSS score for the current cycle



# Human Player Area

Human Play Area  
12' x 2'6"



# Balls



Balls are approximately 2 foot diameter



---

# The Game - Balls

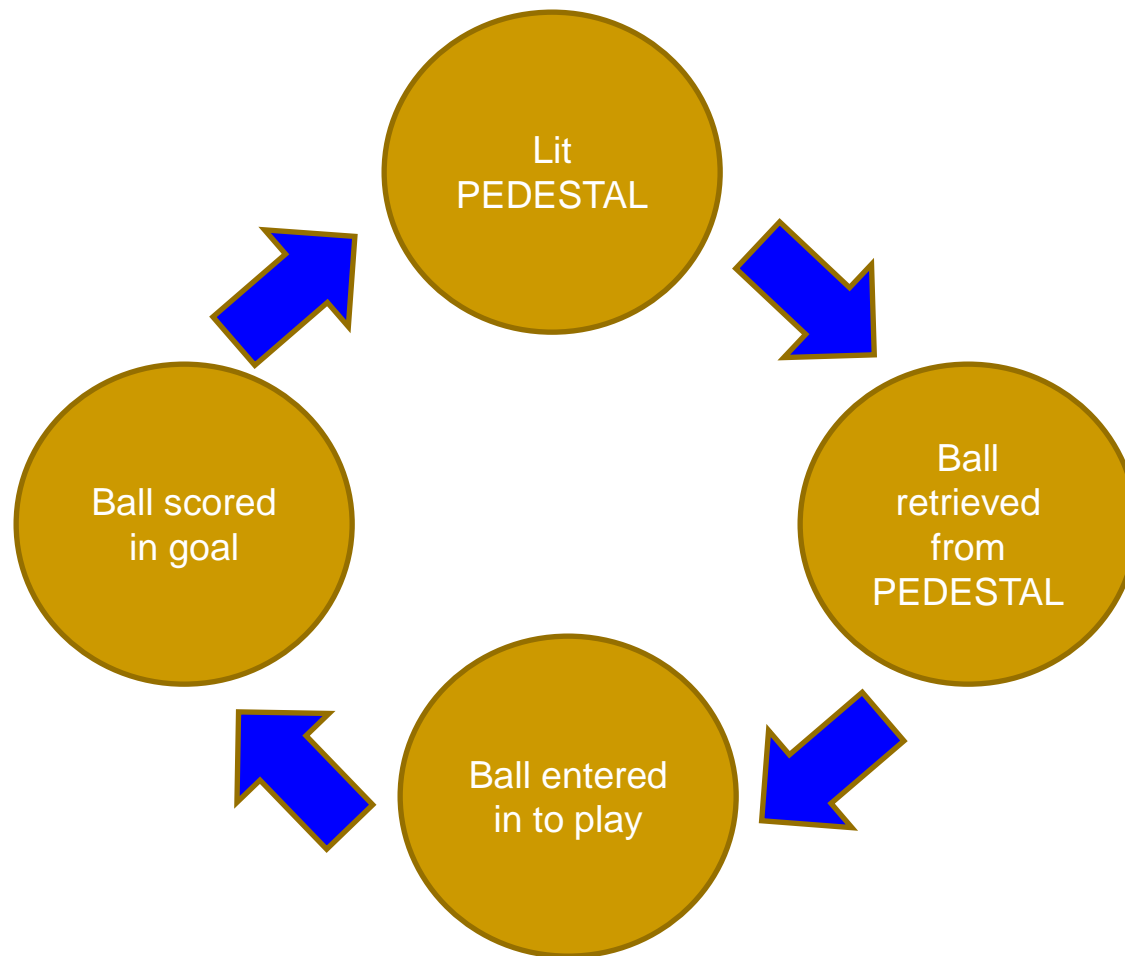
- Alliance may start with up to three balls (one per robot)
- Pedestal will only be illuminated when the last ball that started the match is scored (effectively reducing number of available balls to 1)

---

# The Game – Scoring / Cycle

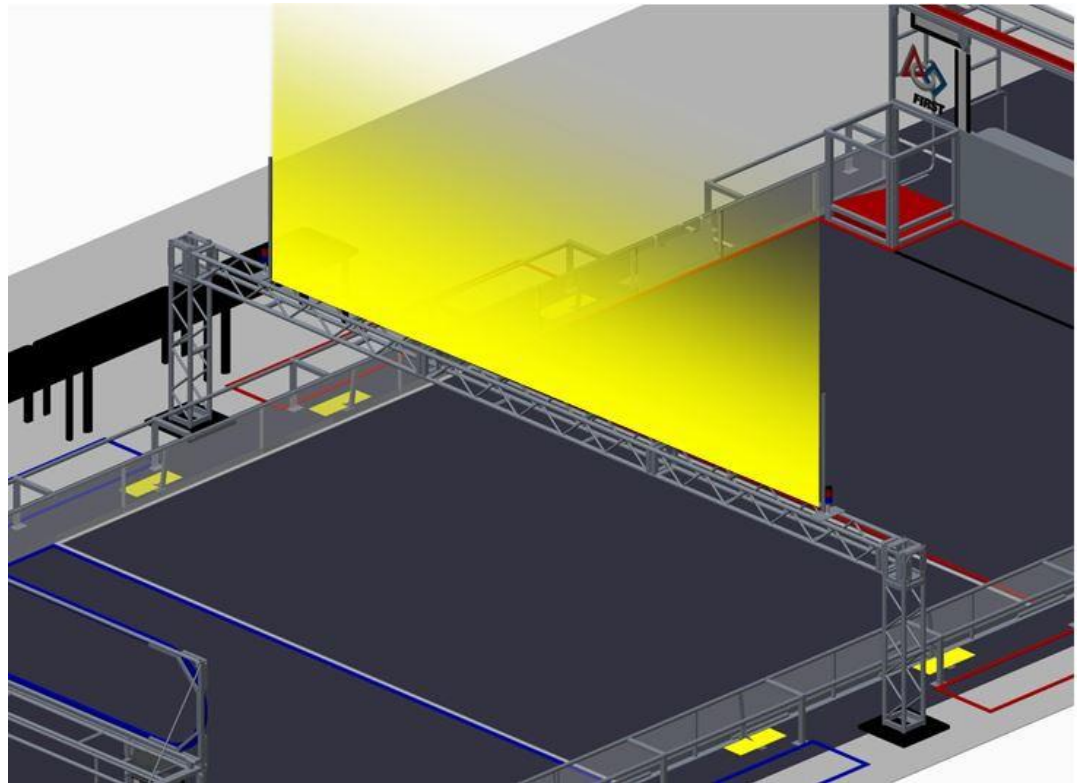
- Final scores assessed five seconds after the Arena timer displays zero or when all elements come to rest
- Points awarded once per Cycle for all scored by robots in the goal, over the truss, or for each catch.
- Goal is scored if
  - Robot causes ball to cross completely through opening of goal
  - Alliance robot last in contact with the ball was entirely between the truss and their alliance high goal
  - The ball is not in contact with any robot from the alliance

# The Game –Cycle



# The Game – Scoring over TRUSS

Ball is scored over TRUSS if a robot causes ball to pass through the infinitely tall plane bounded by the top of the TRUSS and the TRUSS poles towards the alliance's goal



---

# The Game – Catch

A catch occurs when a ball scored over the TRUSS by a robot's alliance partner is possessed by that robot before contacting the carpet or human player

Catch point only awarded if catch is directly preceded by a TRUSS score

---

# The Game – Assist

Assists earned when a unique alliance robot possesses the alliance's ball in a unique zone during a cycle.

Robot is considered in zone in contact with the carpet in a zone or tape marking the zone, and not in contact with another zone

# The Game – Assist

## 1 Assist Examples

1	2	3	1	2	3
Blue	Blue X	Blue	Blue	Blue X	Blue X
White	White X	White	White	White	White
Red	Red X	Red	Red	Red	Red

## 2 Assist Examples

1	2	3	1	2	3	1	2	3
Blue	Blue X	Blue	Blue	Blue X	Blue	Blue	Blue	Blue
White	White X	White	White X	White X	White	White	White X	White X
Red X	Red	Red	Red X	Red	Red	Red X	Red	Red X

## 3 Assist Examples

1	2	3	1	2	3	1	2	3	1	2	3
Blue	Blue	Blue X	Blue	Blue	Blue X	Blue	Blue	Blue X	Blue X	Blue	Blue X
White	White X	White	White X	White X	White	White X	White X	White X	White X	White X	White
Red X	Red	Red	Red X	Red	Red	Red X	Red	Red	Red X	Red	Red

---

# The Game – Mobility Bonus

Mobility bonus for each robot that fully crosses in to their zone during autonomous period



---

# The Game – Robot Positioning

When placed on the field, each robot must be:

- A. in compliance with all robot rules (i.e. have passed Inspection),
- B. confined to its starting configuration,
- C. entirely within their goalie zone or entirely within the white zone
- D. and fully supported by the floor

---

# The Game – Robot Positioning

When placed in the white zone, the team may preload one alliance ball such that the ball is touching their robot.

When starting in the goalie zone the team may decide if the ball is staged between the truss and the zone line and not contacting an alliance partner or removed from the field for the match

---

# Game Play – Match Timing

- Match is 2 minutes and 30 seconds long
  - Autonomous period is 10 seconds at beginning
  - Teleoperated period is 2 minutes and 20 seconds long

---

# Game Play – General Rules

- The following actions are prohibited with regards to interaction with field elements:
  - ❑ Grabbing
  - ❑ Grasping
  - ❑ Grappling
  - ❑ Attaching to
  - ❑ Damaging
  - ❑ Becoming entangled
- Balls may not be intentionally ejected from the game field

---

# Game Play – General Rules

- An alliance may not possess their opponent's balls:
  - Carrying
  - Herding
  - Launching
  - Trapping

---

# Penalty Assignment

- Foul or Technical Foul points credited to opposing Alliance
  - Foul = 20 Points
  - Technical Foul = 50 Points

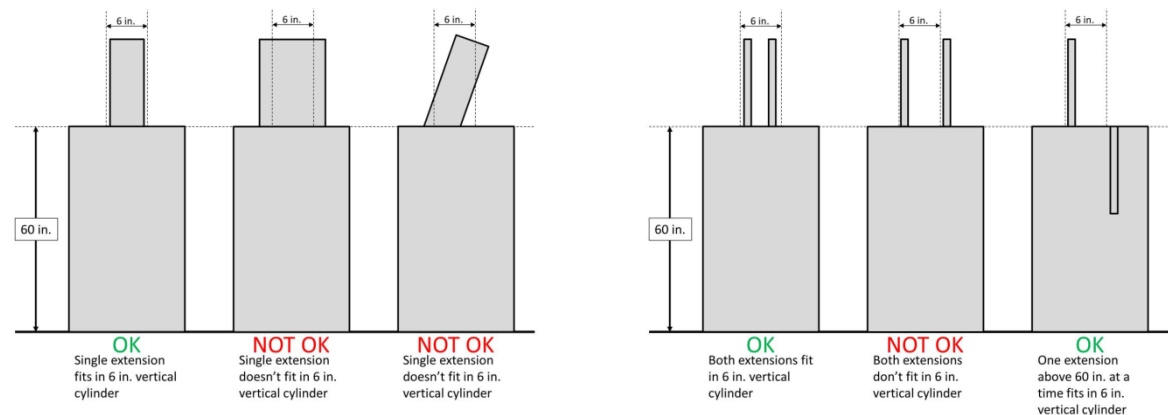
---

# Human Actions

- During the Match, Operator console shall be operated solely by the Drivers on that team

# Robot Size

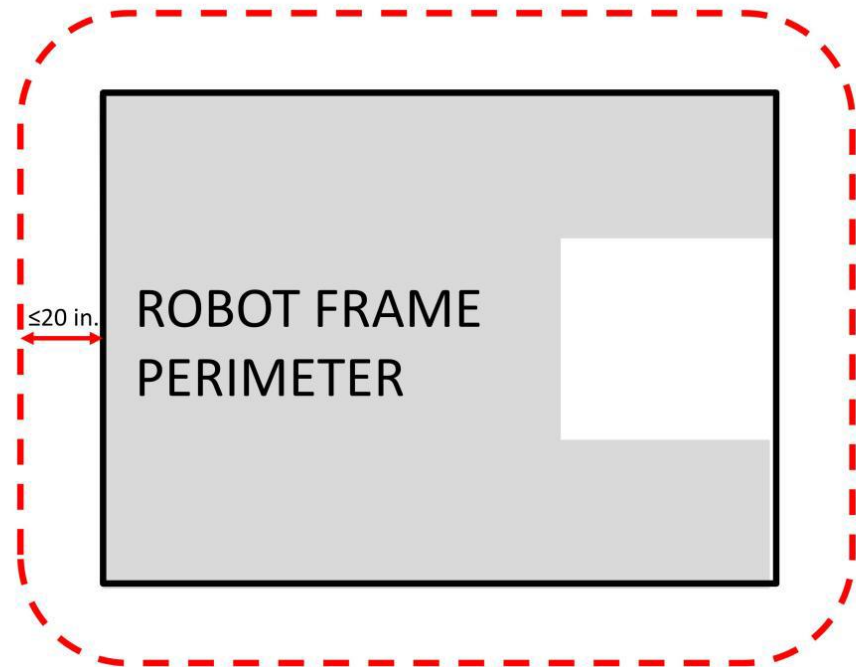
- Robot height is restricted during match
  - If not in contact with the carpet in its goalie zone – 5 foot maximum height
  - Otherwise, not height restriction
- Robot horizontal dimensions above five feet may not exceed a 6 in. diameter vertical cylinder





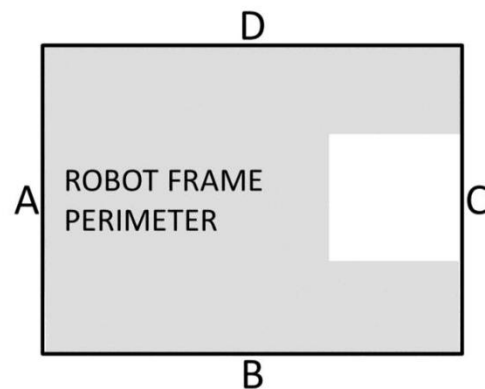
# Robot Size

- The robot horizontal dimensions may never exceed 20 in. beyond its frame perimeter

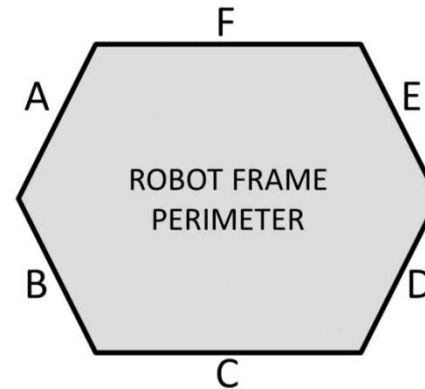


# Robot Size

- The robot weight may not exceed 120 lbs. (excludes battery and its associated half of the Anderson cable and bumpers)
- Total length of the frame perimeter sides may not exceed 112 in.



$$\text{FRAME PERIMETER LENGTH} = A+B+C+D$$



$$\text{FRAME PERIMETER LENGTH} = A+B+C+D+E+F$$

# Robot

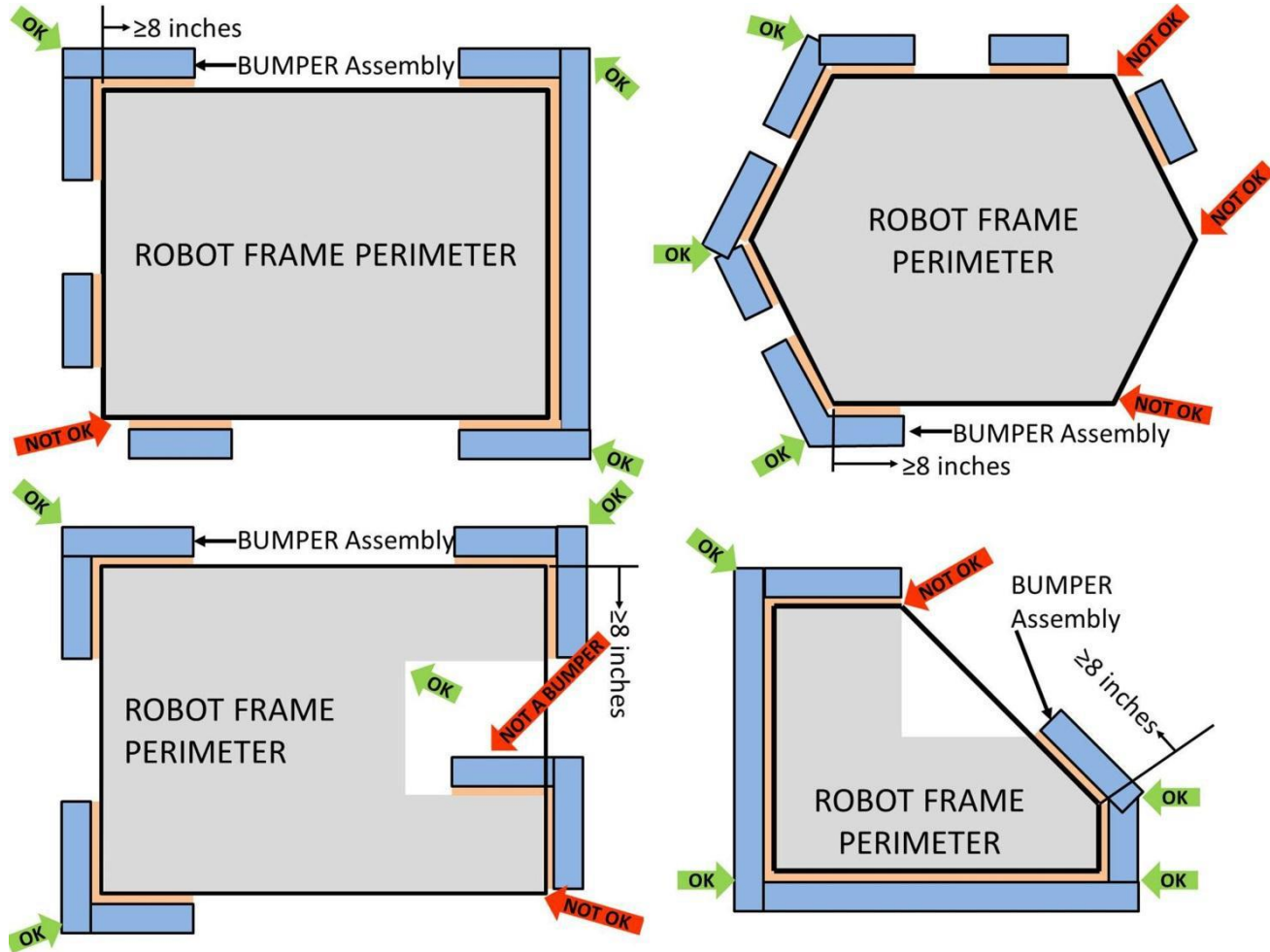
- Robots may not actively control more than 4 DISCS at any one time
- Robots on same alliance may not blockade the field in an attempt to stop the flow of the match
- Robots may not intentionally fall down or tip over to block the field
- Robots may not contact or otherwise interfere with the opponents' pyramid. (inconsequential contact will not be penalized)

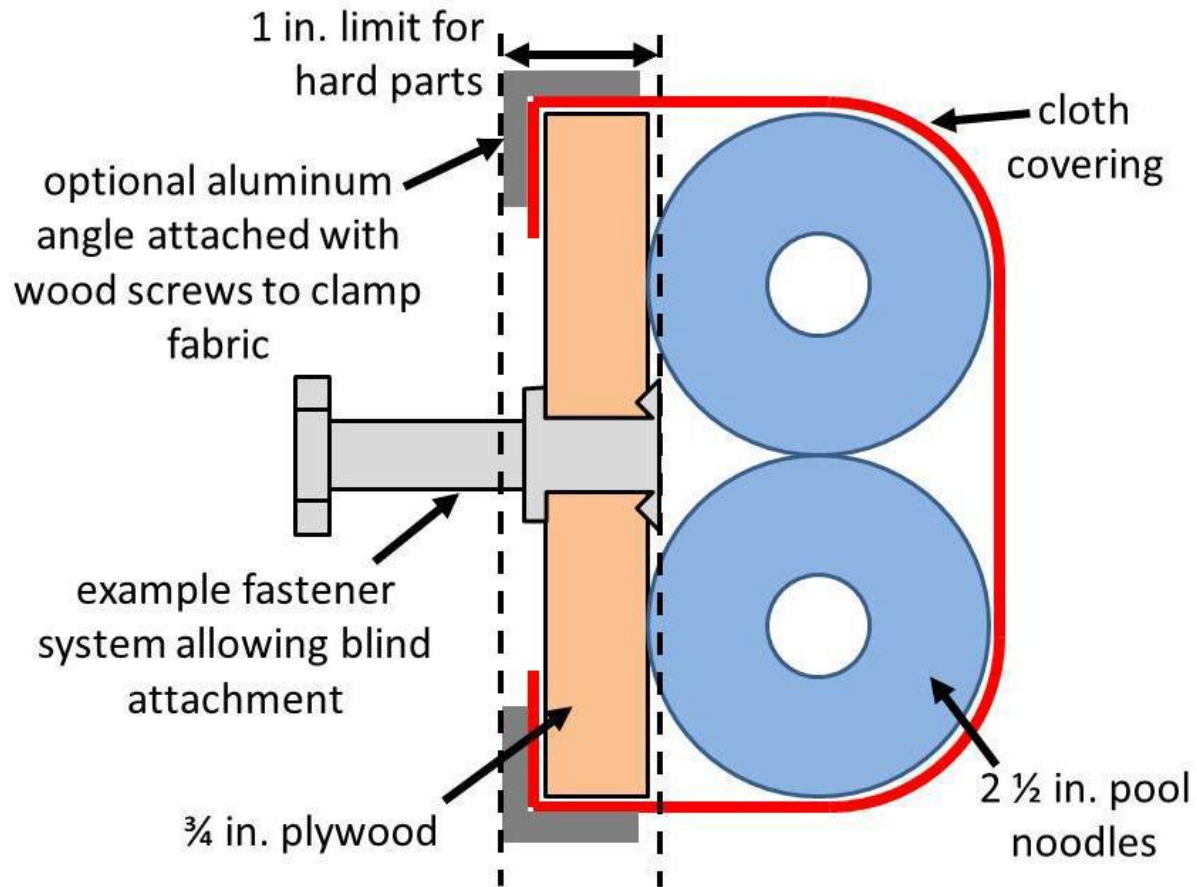
---

# Bumper Rules

- Robots are required to use Bumpers to protect all outside corners of the frame perimeter. For adequate protection, at least 8 in. of bumper must be placed on each side of each outside corner

# Bumper Rules





- **BUMPERS** must be located entirely within the **BUMPER ZONE**, which is between 2 and 10 in. from the floor, in reference to the **ROBOT** standing normally on a flat floor.
- **BUMPERS** may not be articulated (relative to the **FRAME PERIMETER**).
- **Corner joints between BUMPERS** must be filled with pool noodle material. Examples of implementation are shown in **Figure 4-5**

---

# Considerations

- What is important to do?
    - ❑ For auto period scoring
    - ❑ For DISC scoring
    - ❑ For picking up DISC vs. feeder loading
    - ❑ For climbing the pyramid
    - ❑ For tie breaking in ranking points
    - ❑ For durability and reliability
    - ❑ For making it past the qualification rounds (be the robot others want on their team)
    - ❑ To win engineering awards
  - Based on importance, do you want a big or small robot?
-

---

# Considerations

- What can be done so that the robot will be done in time to practice?
- Should we plan to use the camera?
- What are strategies with the manipulating balls
- Think about how you would do it if only humans played
- What is impact on size restrictions?



---

# Considerations

- What worked well in the past that we should repeat?
- What didn't work well in the past that we should avoid?
- What can be programmed?
- For building two robots?
- What do we know how to do?
- What can be done effectively?

---

# Considerations

- Based on scoring and tie breaking, what are two or three key strategies:
  - Ability to get assist points
  - Ability to put ball over truss
  - Ability to “catch” a ball
  - Ability to score in high goal
  - Ability to score in low goal
  - Ability to play defense
  - Autonomous programming for mobility or scoring

---

# Key Dates

- Robot Bag and Tag date is:
  - February 18, 2014

# Scoring Reminder

Action	Base	AUTO (=Base+5)	AUTO & HOT (=Base+AUTO+5)	1 ASSIST (=Base+0)	2 ASSIST (=Base+10)	3 ASSIST (=Base+30)
LOW GOAL	1	6	11	1	11	31
HIGH GOAL	10	15	20	10	20	40
TRUSS	10					
MOBILITY		5				
CATCH	10					

# Discussion



For the Business Teams:

Based on what you heard, what do you think is important for strategy and why?

# Discussion Groups



1. Select someone to be spokesperson for group reviews
2. List what is important to do and why

**DO NOT TRY TO DESIGN A ROBOT – THIS IS A STRATEGY DISCUSSION ONLY!**

# Discussion Groups



1. You have until 4:00 PM to prepare for review
2. Include breaks
3. At 4:00 PM, we will go around the room and have each team present their items
4. When done, we need to clean up the room as if we were never here

**GOOD LUCK!**