2012 *FIRST* Competition

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Tournament Overview

- Game played on a flat 27 X 54 foot field.
- Two 3-team alliances, one red and one blue, compete in each MATCH.
- Object is to attain a higher score than your opponent by:
  - Scoring baskets into their hoops – the higher the hoop, the higher the score
  - Balance on bridges located at the middle of the field.

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

Match Format

- Match is 2 minutes and 15 seconds long
  - Hybrid Period (controlled using Microsoft Kinect or preprogrammed)
    - 15 seconds
  - Teleoperated Period (drivers assume control)
    - 2 minutes

Qualification Score (QS)

5.3.3 Qualification Score (QS)

Qualification Points are awarded to each team at the completion of each Qualification Match and are dependant on the final score:

- Each team on the winning Alliance will receive two (2) Qualification Points.
- Each team on the losing Alliance will receive zero (0) Qualification Points.
- In the event of a tied score, all six teams will receive one (1) Qualification Point.
- Additional Qualification Points will be awarded to each team on an Alliance equal to any Coopertition Points earned.

The total number of Qualification Points earned by a team throughout their Qualification Matches will be their Qualification Score.

5.3.5 Match Point Exceptions

A Surrogate receives zero Qualification Points.

A team is declared a no-show if no member of the team is in the Alliance Station at the start of the Match; a no-show team will be disqualified from that Match.

During the Qualification Matches, teams can be individually disqualified in a Match. A disqualified team will receive zero Qualification Points.

Seeding

5.3.6 Qualification Seeding

All teams in attendance will be seeded during the Qualification Matches. If the number of teams in attendance is 'n', they will be seeded '1' through 'n', with '1' being the highest seeded team and 'n' being the lowest seeded team.

The FMS will rank all teams in decreasing order, using the following sorting criteria:

1st order sort	Qualification Score
2nd order sort	Cumulative sum of Hybrid Hoop points
3rd order sort	Cumulative sum of Bridge points
4th order sort	Cumulative sum of Teleop Hoop points
5th order sort	Random sorting by the FMS

Definitions

- Alliance: Set of three FRC teams that work together (assigned either red or blue color)

Definitions

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

Scoring

- Alliance score equals total of:

Hoop	Hybrid Points	Teleop Points
Top	6	3
Middle	5	2
Bottom	4	1

# of Robots on Bridge	Qualification Points	Elimination Points
1	10	10
2	20	20
3	20	40

[G40] When the final score is assessed per [G37], a Balanced Alliance Bridge, per Section 2.2.5, earn points as follows:

# of Robots	Qualification	Elimination
1	10	10
2	20	20
3	20	40

As the level of competition at the *FIRST* Championship is typically very different than during the competition season, the Game Design Committee will possibly alter the value of balancing at the *FIRST* Championship within the range of 5 to 15 points per Robot.

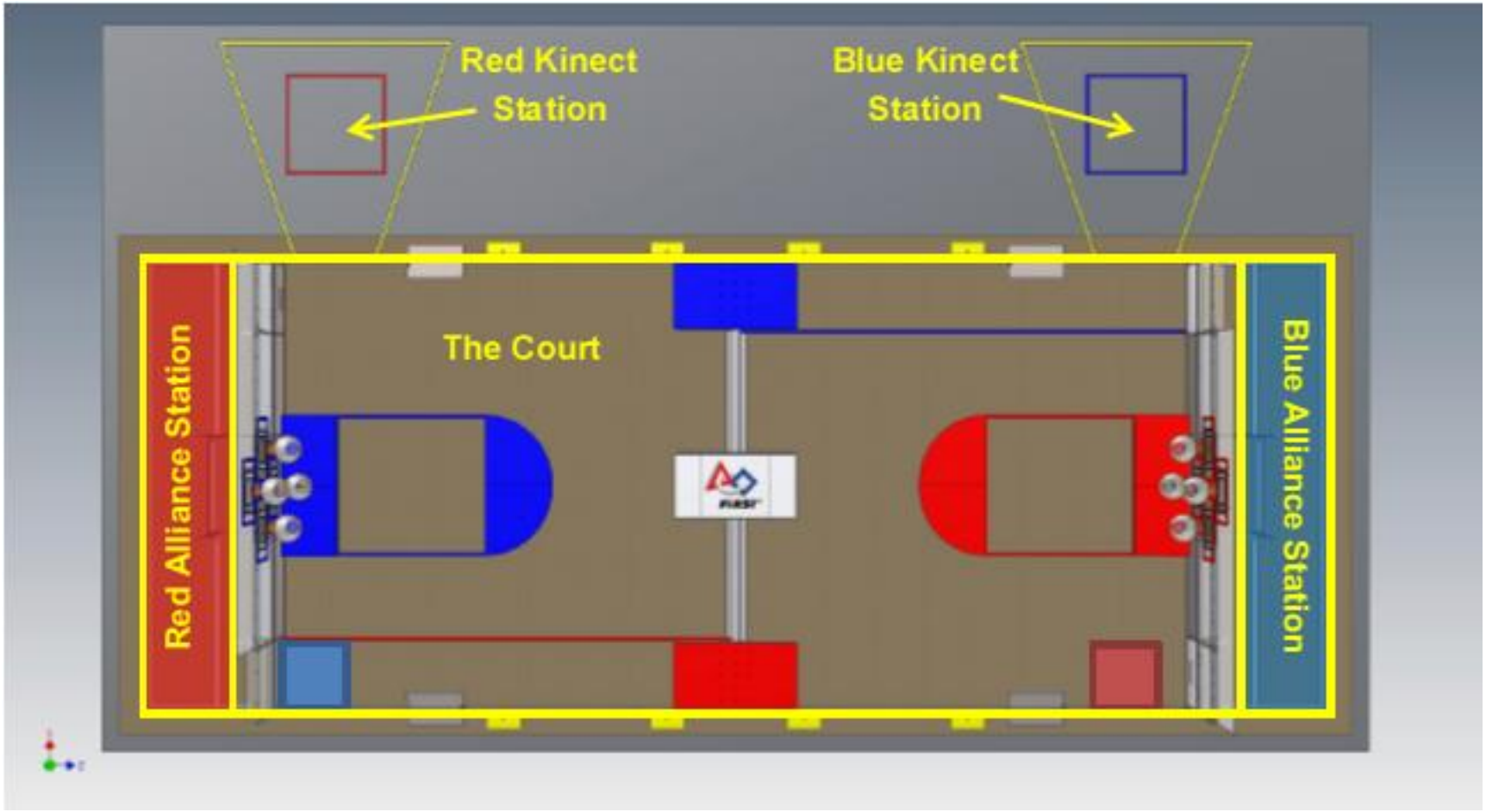
[G41] If a Robot from each Alliance is balanced on the Coopertition Bridge when the final score for a Qualification Match is assessed per Rule [G37], each Alliance earns 2 Coopertition Points. If the Coopertition Bridge is not balanced, but a Robot from each Alliance is fully supported by the Coopertition Bridge, each Alliance will earn 1 Coopertition Point.

The Coopertition Point bonus earns each Alliance additional seeding value in the Tournament. See Section *The Tournament*.

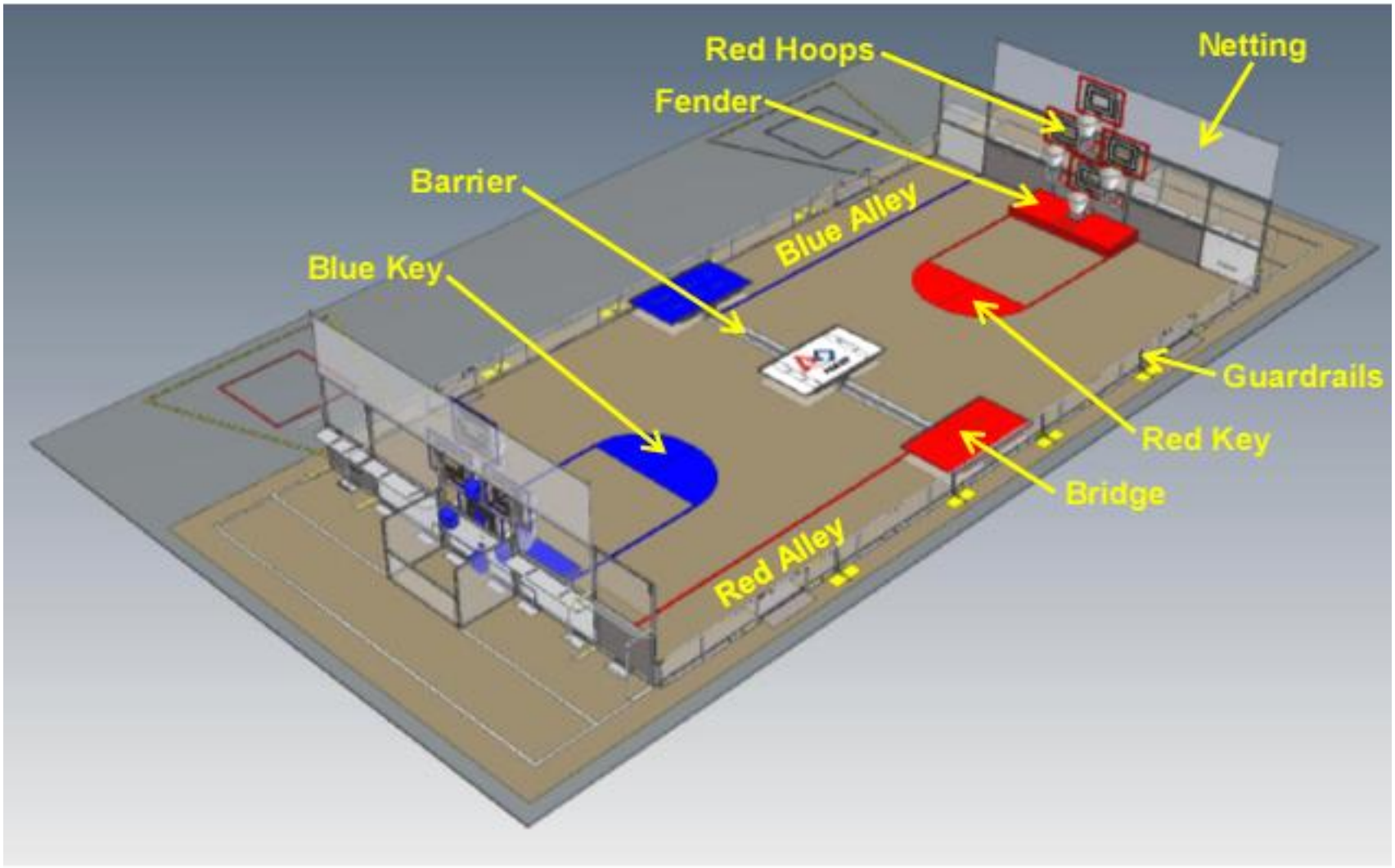
Fouls

- Whenever a foul is committed, 3 points will be credited to the opposing Alliance immediately
- Whenever a Technical-Foul is committed, 9 points will be credited to the opposing Alliance immediately
- Generally, rule violations by an Alliance that was directly caused by actions of the opposing Alliance will not be penalized

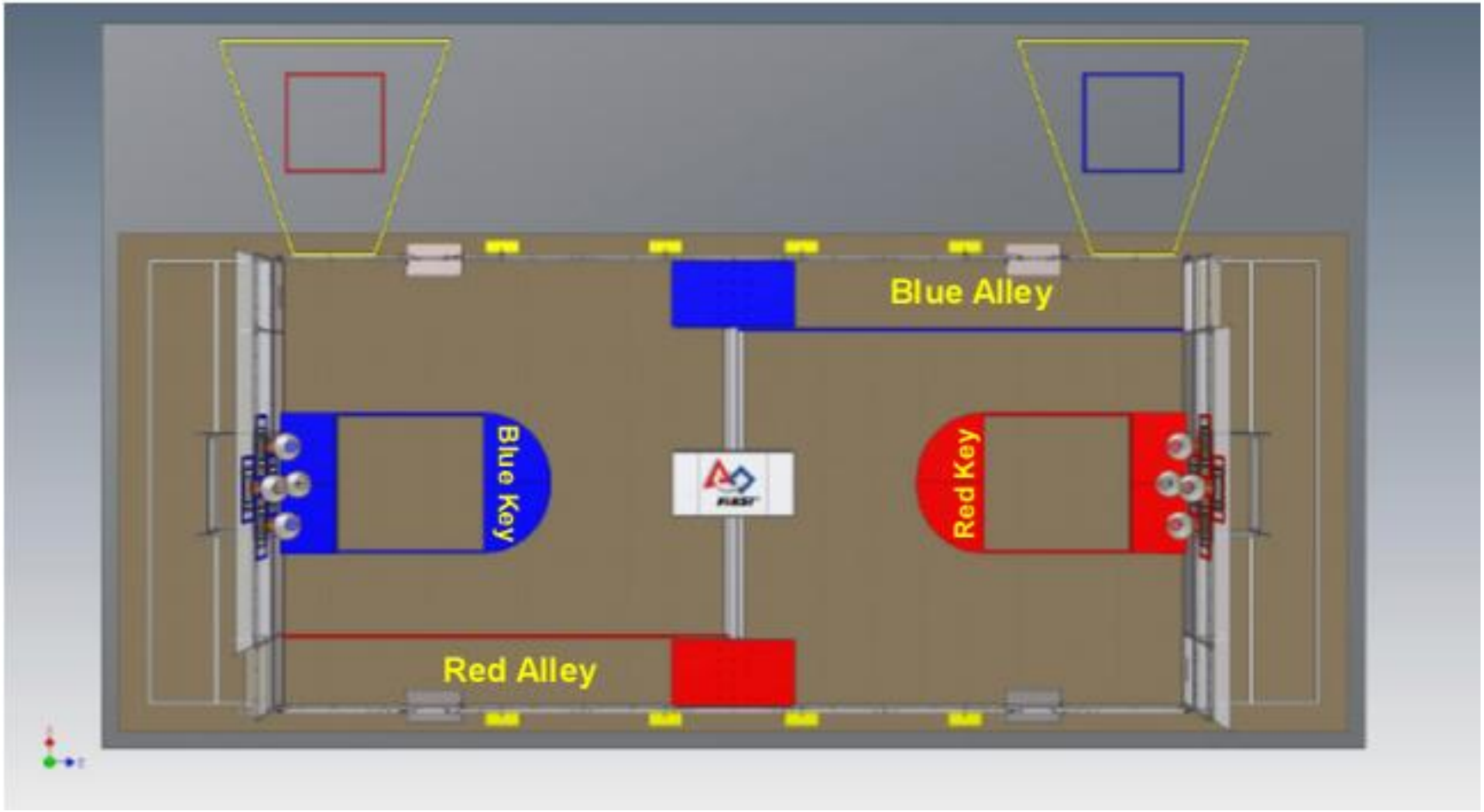
The Arena


Red Kinect Station
Blue Kinect Station
Red Alliance Station
The Court
Blue Alliance Station

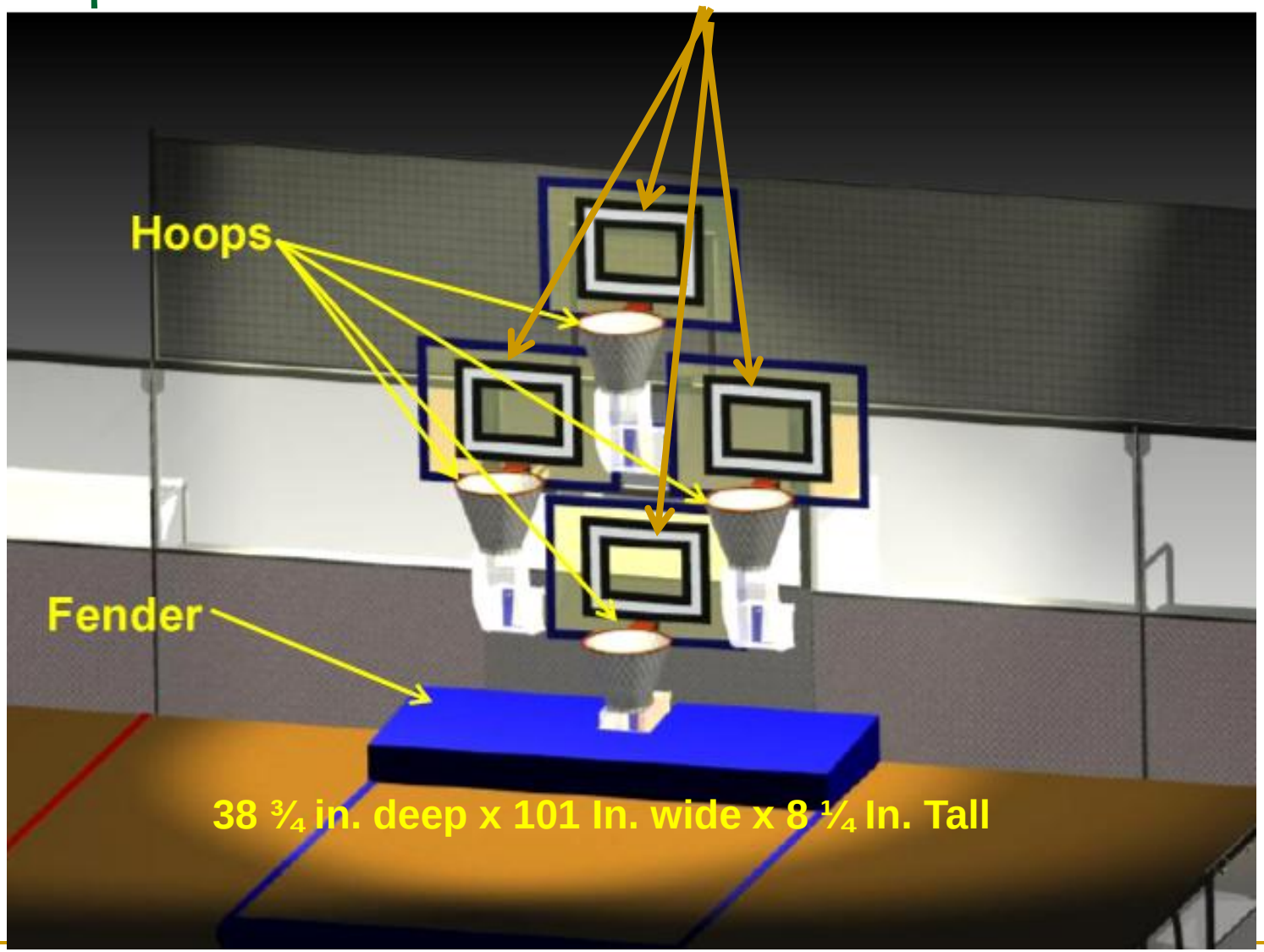
The Court


Red Hoops
Netting
Fender
Barrier
Blue Alley
Blue Key
Guardrails
Red Key
Bridge
Red Alley

Court Markings



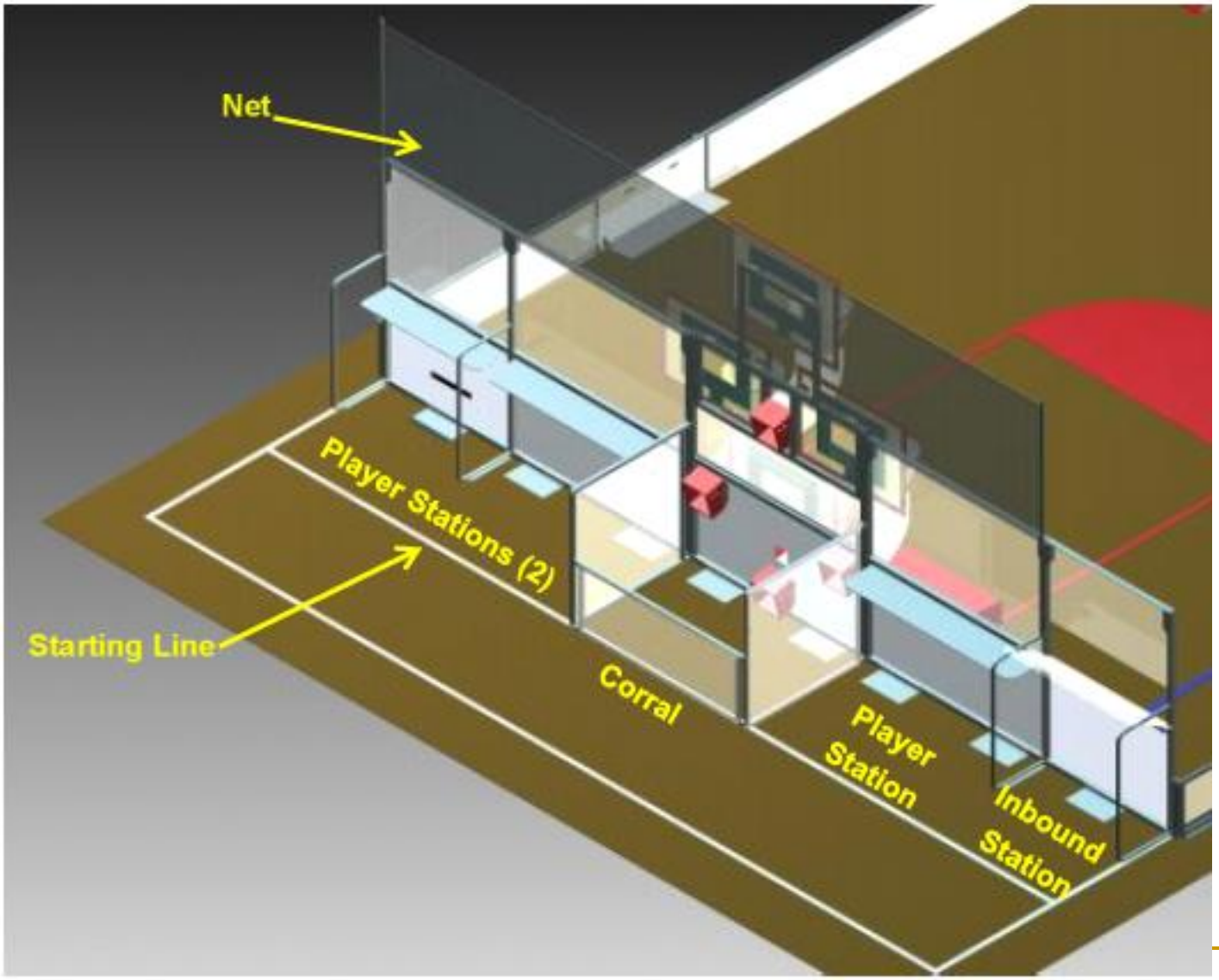
Hoops


Retro-reflective Vision Targets
Hoops
Fender
38 ¾ in. deep x 101 In. wide x 8 ¼ In. Tall
Top of Rim to Carpet
98 In.
61 In.
28 In.

Bridges

- Three Bridges – Blue, Red, White Coopertition
  - 48 Inch wide, 88 Inch long, sits on 12 Inch high platform (off ground) with double-hinge to allow tipping towards either end of Court.
  - Bridge is balanced if it is within 5 degrees of horizontal
  - Illuminated in yellow during Hybrid, Illuminated with the matching color if Bridge is Balanced and has one or more Robots on it at end
- 4 Inch tall x 6 Inch wide smooth steel Barriers run between bridges

Alliance Station



No netting over inbound station

Kinect Stations

- Extends 8 feet from Alliance Wall and 10 feet back from the guardrail
- Usually on same side, but might be on different sides at some venues
- Microsoft Kinect is mounted to shelf that is approx. 44 inches off the floor.

Ball

Size 4 Compact foam basketball with outer circumference of 25 inches and approx. weight of 11.2 oz.

Game Play – Robot and Balls

- When placed on field
  - May not exceed 60 inch height
  - All appendages within its Frame Perimeter
  - Must be in contact with its Key
  - May contain up to two Basketballs
  - Each Bridge will be preset with two Basketballs
  - Basketballs allotted but not placed in Robots are preset on the Coopertition Bridge

Game Play – General Rules

- Robots may not touch anything outside the Court boundary
- Robots may not intentionally detach parts or leave mechanisms on the Court
- Robots may not grab, grasp, grapple, or attach to any Arena structure
- Robots may not become entangle in the Arena elements
- Robots may not damage any part of the Arena, including Basketballs

Game Play – General Rules

- Basketballs may not be intentionally placed out of bounds.
- Strategies that use Basketballs to either aid or inhibit balancing of any Bridge are not allowed.
  - Technical Foul
- While in Arena, Players must be civil towards other Players, competition personnel, and event attendees

Game Play - Hybrid Rules

- Robots may not contact the carpet on their Alliance Station end of the Court
- Players must remain in their assigned starting positions
- Players may not touch Basketballs
- Any control devices worn or held by Drivers must be disconnected from the Operator Console

Game Play – Robot Actions

- Robots in contact with the carpet on their Alliance Station end of the Court are limited to 60 In. tall
  - Otherwise, Robots are limited to 84 In. tall
- Robots may extend one appendage up to 14 In. beyond a single edge of their frame perimeter at any time (may have more than one on robot but can only extend one at a time)
- Robots may only actively control three Basketballs at any time

Game Play – Robot Actions

- Robots on same Alliance may not work together to blockade the Court in an attempt to stop the flow of the Match
- Intentionally falling down or tipping over to block the Court is not allowed
- Robots may not contact or otherwise interfere with the opposing Alliance Bridge

Robot-Robot Interaction

- Strategies aimed at destruction, attachment, damage, tipping or entanglement are not in the Spirit of FIRST
- Deliberate or damaging contact with an opponent Robot inside its Frame Perimeter is not allowed
- Robots may not touch an opponent Robot in contact with its Key, Alley, or Bridge

Robot-Robot Interaction

- Alliance may not pin an opponent Robot that is in contact with the Court border, Fender, Barrier or Bridge for more than 5 seconds
- Fallen Robots attempting to right themselves have one 10-second grace period per fallen Robot in which they may not be contacted by an opposing Robot.

Human Actions

- Only Inbounders may contact Basketballs; each may hold a maximum of two Basketballs.
- Must remove Basketballs from Corral immediately upon arrival
- All Basketballs in Alliance Station must be held by Inbounders once removed from Corral (can’t put on floor)

Human Actions

- During Teleop – Inbounders who were in the Kinect Station must return to Alliance Station
- Players may not extend any part of their body into the Court or contact any Robot at any time during the Match
- During the Match, Operator console shall be operated solely by the Drivers on that team

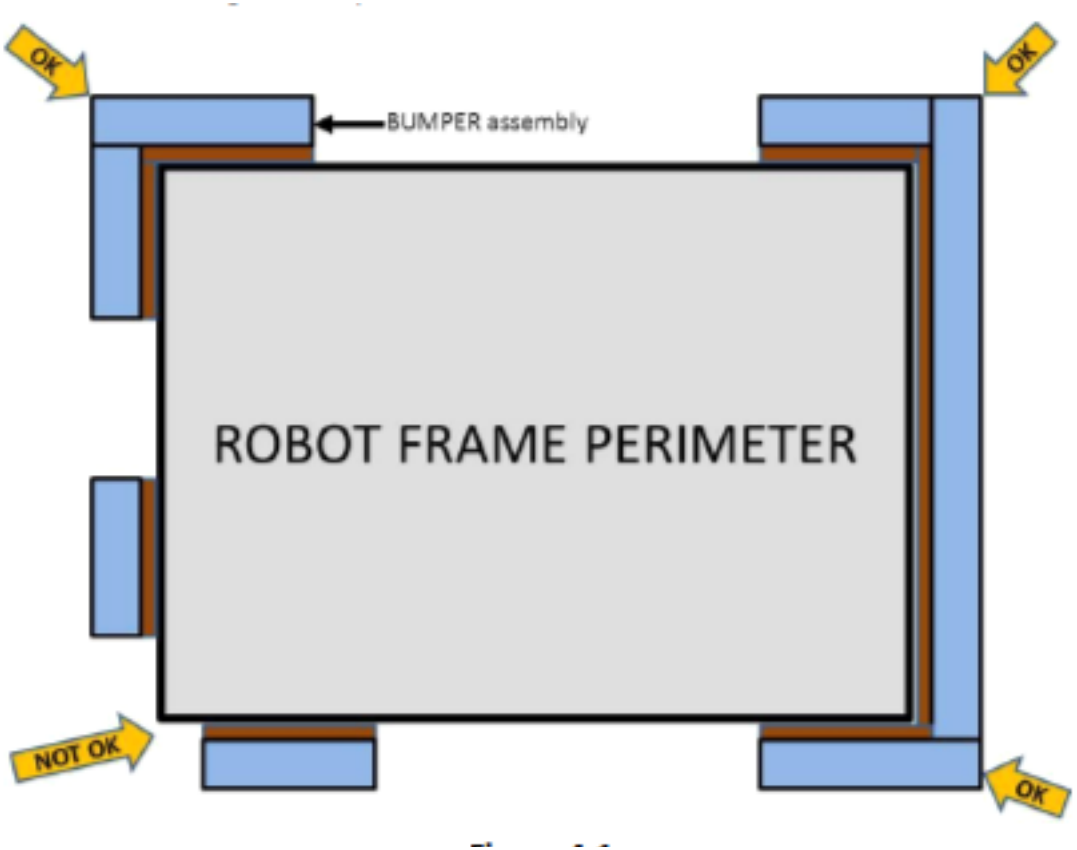
Robot Size

- Horizontal dimensions must not exceed 28 in. x 38 in.
- Absolute height must not exceed 84 in.
- Height at start must not exceed 60 in.
- Any appendage may not extend more than 14 in. beyond the frame perimeter
- Robot weight may not exceed 120 lbs
  - Excluding 12V battery and its cable
  - Bumpers including covers

Robot

- Traction devices may not have surface features such as metal, sandpaper, hard plastic suds, cleats

Bumper Rules



[R27] Robots are required to use Bumpers to protect all exterior vertices of the Frame Perimeter. For adequate protection, at least 8 in. of Bumper must be placed on each side of each exterior vertex (see Figure 4-1, Figure 4-2, and Figure 4-3).

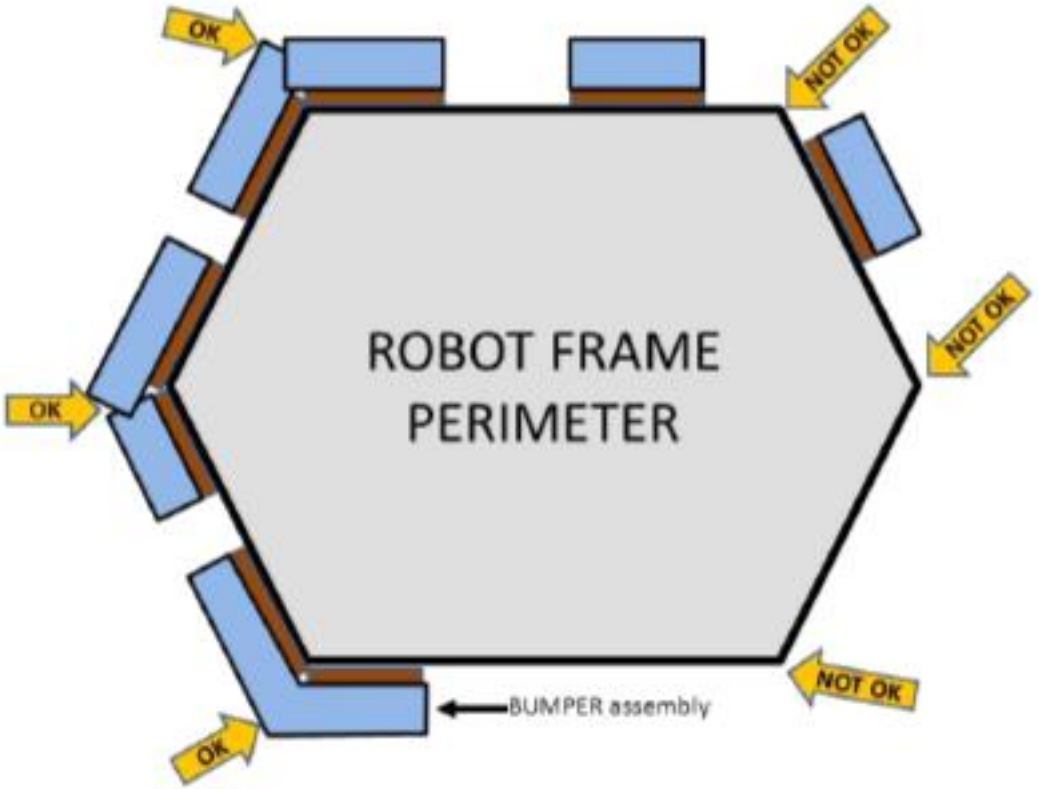

OK
NOT OK
ROBOT FRAME
PERIMETER
NOT OK
OK
NOT OK
BUMPER assembly
OK

Figure 4-2

Figure 4-2

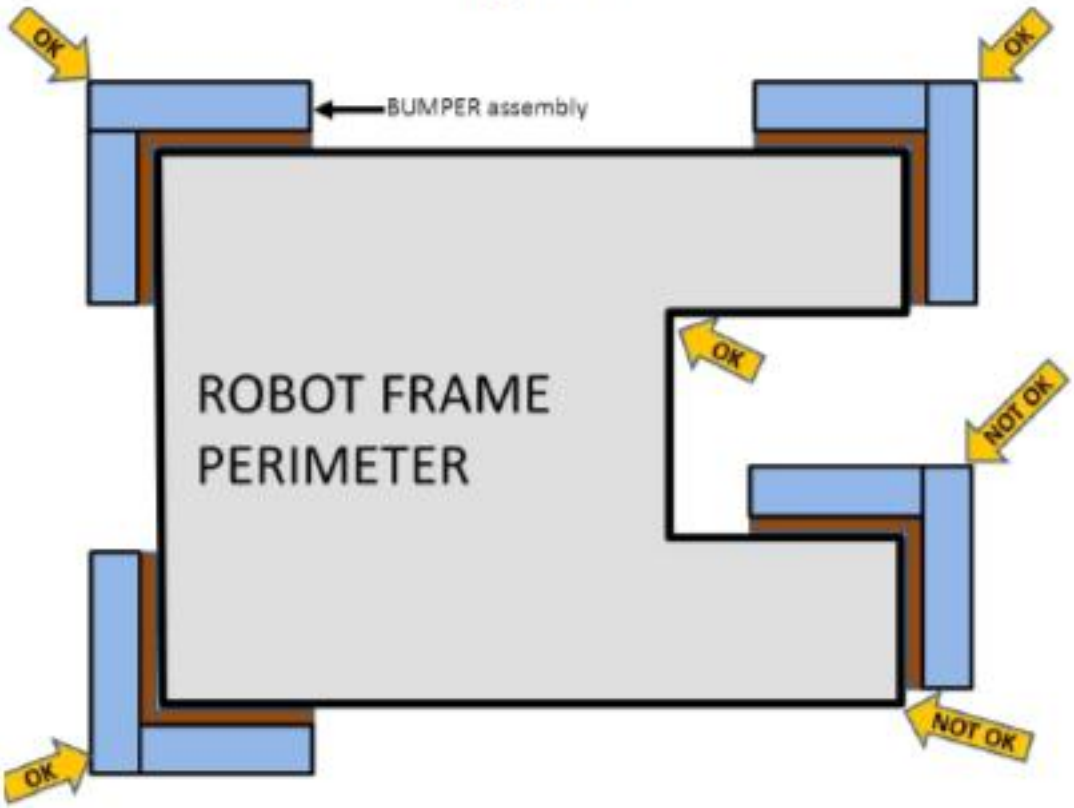


Figure 4-3

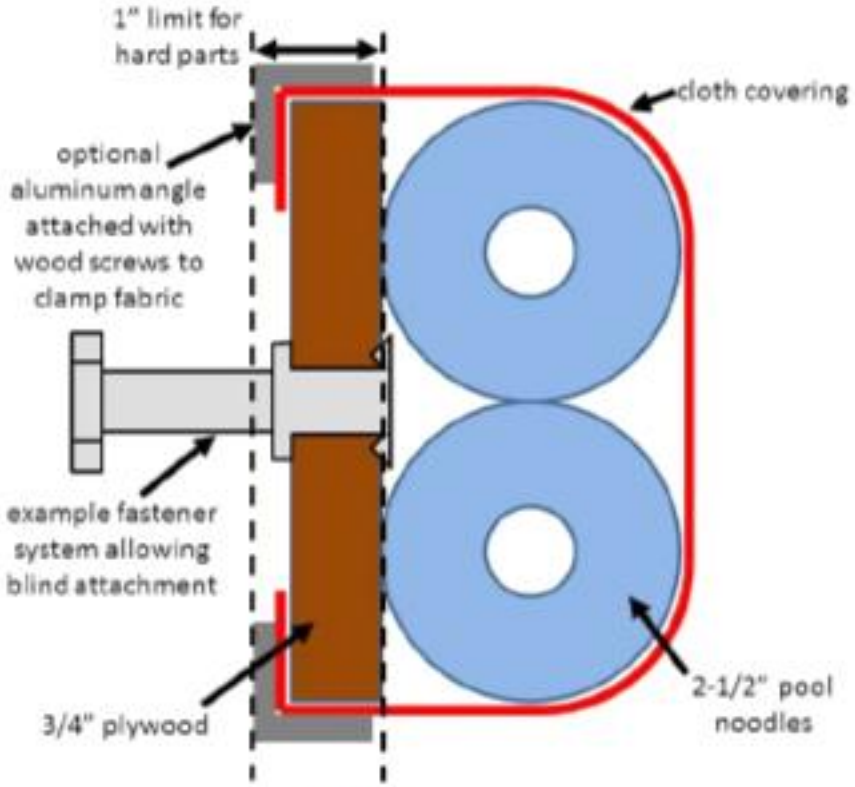


Figure 4-5

Figure 4-5

[R29] Bumpers must be located entirely within the Bumper Zone when the Robot is standing normally on a flat floor.

[R30] Bumpers may not be articulated.

[R31] Joints between Bumpers and the radial projections of corners must be filled with pool noodle material. Examples of implementation are shown in Figure 4-6.

BUMPERS

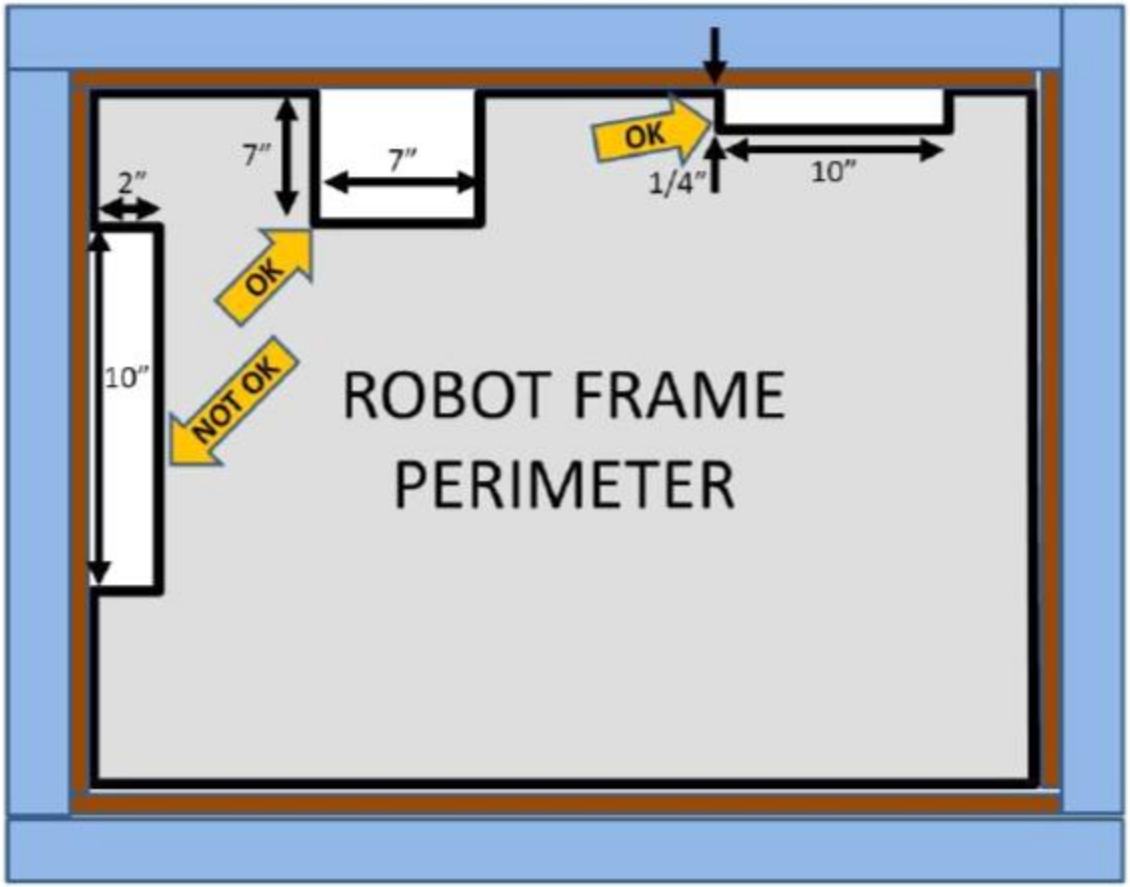


Figure 4-7

[R33] Bumpers must be supported by the structure/frame of the Robot (i.e. the gap between the backing material and the frame must not be greater than ¼ in. and no section of Bumper greater than 8 in. may be unsupported). See Figure 4-7.

Considerations

- What is important to do?
  - For hybrid period
  - For basketball shooting
  - For balancing on the bridge at the end of the match
  - For going over the bridge or the barrier
  - For durability and reliability
  - For making it past the qualification rounds
  - To win engineering awards
  - For beauty
- What can be done effectively?

Considerations

- What can be done so that the robot will be done in time to practice?
- Should we plan to use the camera?
- Do you go for the high goals or just the middle or low goals
- What are strategies with the Inbounders (getting the balls)

Considerations

- What worked well in the past that we should repeat?
- What didn't work well in the past that we should avoid
- How will you select final design?
- When will you select final design?

Key Dates

- Robot Bag and Tag date is:
  - February 21, 2012