

2011 *FIRST* Competition



Game Overview

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Game Overview

- Game played on a flat 27' x 54' 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:
 - Hanging inflated shapes on grids
 - Higher pegs or FIRST configuration gets extra points ,
 - Deploying minibots to race to the top of poles for score

Match Format

- Match is 2 minutes and 15 seconds long
 - Autonomous Period (pre-programmed instructions)
 - 15 seconds
 - Teleoperated Period (drivers assume control)
 - 2 minutes
 - Game End Period
 - Final 10 seconds of teleoperated period

Definitions

- Alliance: set of three FRC teams that work together (assigned either red or blue color)
- Analyst: Human Player that assists the Coaches with strategy – one per alliance
- Deployment: act of positioning a Minibot on a tower (breaks the vertical projection of the Tower Base circumference)
- End Game: final 10 seconds of the match
- Feeder: Human Player that feeds LOGO pieces to robots – two per alliance

Definitions

- **Game Pieces:** Triangle, Circle, Square and Ubertube.
- **Hanging:** a game piece fully supported by a Peg and released by the possessing robot. If a game piece on the floor is preventing a game piece that has been hung on the bottom peg from becoming fully supported then the hung game piece would be counted.
- **Hostbot:** robot that carries a minibot
- **Human Player:** pre-college student who is either the feeder or analyst – one per team
- **LOGO:** Triangle – Circle – Square when read from left to right from the field

Definitions

- Minibot: autonomous vehicle designed to complete a task during the game
- Minibot race: competition at the end of the match where minibots climb a tower
- Penalty: 3 point decrement in the Alliance score
- Possession: controlling the position and movement of a game piece (game piece remains in approximately the same position relative to the robot when it is moving)

Definitions

- Red Card: n indication of disqualification of a team.
- Scoring Grid: used to receive game pieces placed by robots – two in front of each alliance station (4 per field)
- Scoring Peg: one of nine round, horizontal pieces on each scoring grid
- Starting Line: line marked on the floor four feet back from the alliance wall
- Target: part of the tower, attached to the top of the post

Definitions

- Tower: assembly composed of a base, post, and target
- Tracking Line: lines on the field that may be used to guide robots
- Triggered: the act of pushing the bottom disk of the target so that sensors are tripped
- Ubertube: yellow game piece used to score during the autonomous period
- Vision Target: retro-reflective targets
- YELLOW CARD: warning of egregious robot or team behavior at the arena

Definitions

- Zone: area approximately 18 feet wide and 7 feet deep located immediately in front of the alliance wall
- 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 properly returning game pieces or helping coaches as an analyst

Safety

- If a robot's operation or design is deemed unsafe by the head referee:
 - robot disabled for remainder of match
- Team members may not directly contact any robot or enter the field at any time during the match
- E-Stop: Emergency Stop button at player station to shut off robot in case of emergency safety situation

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

General Rules

- Neither robots, hostbots, nor minibots may break the planes of the vertically projected borders of the opponent's zones or opponent's lanes
- Robots/Hostbots may only possess or heard one game piece at a time (design so it is impossible to inadvertently control more than one game piece)
- Game pieces that exit field will be reentered when safe

General Rules

- Game pieces may not be intentionally placed out of bounds (penalty and yellow card)
- Game pieces that deflate during a match will be considered identical to inflated game pieces (may not intentionally deflate piece)
- Robots and feeders may not descore opponent's game pieces (red card)

General Rules

- Robots, minibots or hostbots may not intentionally detach parts or leave mechanisms on the field (with the exception of appropriate deployment of the minibot)
- Robots and hostbots may push or react against any elements of the arena provided there is no damage
- With exception of tower at game end, robots may not grab, grasp, grapple, or attach to any arena structure

General Rules

- Minibots may only be used to climb the tower
- From start of match until it is deployed, the minibot must remain on the hostbot
- Strategies aimed at the destruction, attachment, damage, tipping or entanglement of robots, minibots, or hostbots are not in the spirit of FIRST
- Robot may not attempt to possess a game piece that is being possessed by another robot

General Rules

- Robot may not pin another robot that is in contact with the field border or tower for more than 5 seconds. A robot is considered pinned until the robots have separated by at least 6 feet. The pinning robot must then wait for at least 3 seconds before attempting to pin the same robot again (10 point penalty)

General Rules

- During the teleoperated period, feeders may enter LOGO pieces by using the feeder slots or throwing thee pieces over the top of the feeder station wall (not around the side)
- Coaches, Analyst, and Drivers may not touch game pieces at any point during the match
- Must retrieve minibots from the tower quickly and safely after the match

Scoring

- Alliance score equals total of:

Ubertubes hung during Autonomous		
On bottom row		2
On middle row		4
On top row		6
Logo pieces	Alone	Over Ubertubes
On bottom Row	1	2
On middle row	1	4
On top row	3	6
Minibot race bonus		
1st Minibot		30
2nd Minibot		20
3rd Minibot		15
4th Minibot		10

Points for the entire row are doubled if LOGO pieces in **FIRST** logo order

Minus any penalties for alliance

Note: Alliance starts with 6 sets of LOGO pieces

Scoring

■ Alliance score equals total of:

Maximum Alliance
Score Possible

Ubertubes hung during Autonomous			
On bottom row		2	
On middle row		4	
On top row		6	18
Logo pieces	Alone	Over Ubertubes	
On bottom Row	1	2	12
On middle row	1	4	12
On top row	3	6	54
Minibot race bonus			
1st Minibot		30	30
2nd Minibot		20	20
3rd Minibot		15	
4th Minibot		10	
Minus any penalties for alliance			138

Note: Alliance starts with 6 sets of LOGO pieces

Scoring

- If two game pieces are hanging from a single scoring peg, the outermost game piece will be counted for scoring purposes
- A LOGO piece hanging in front of an Ubertube doubles the points for that scoring peg.
- LOGO points must be in scoring grid
- Minimum match score is zero (no negatives)

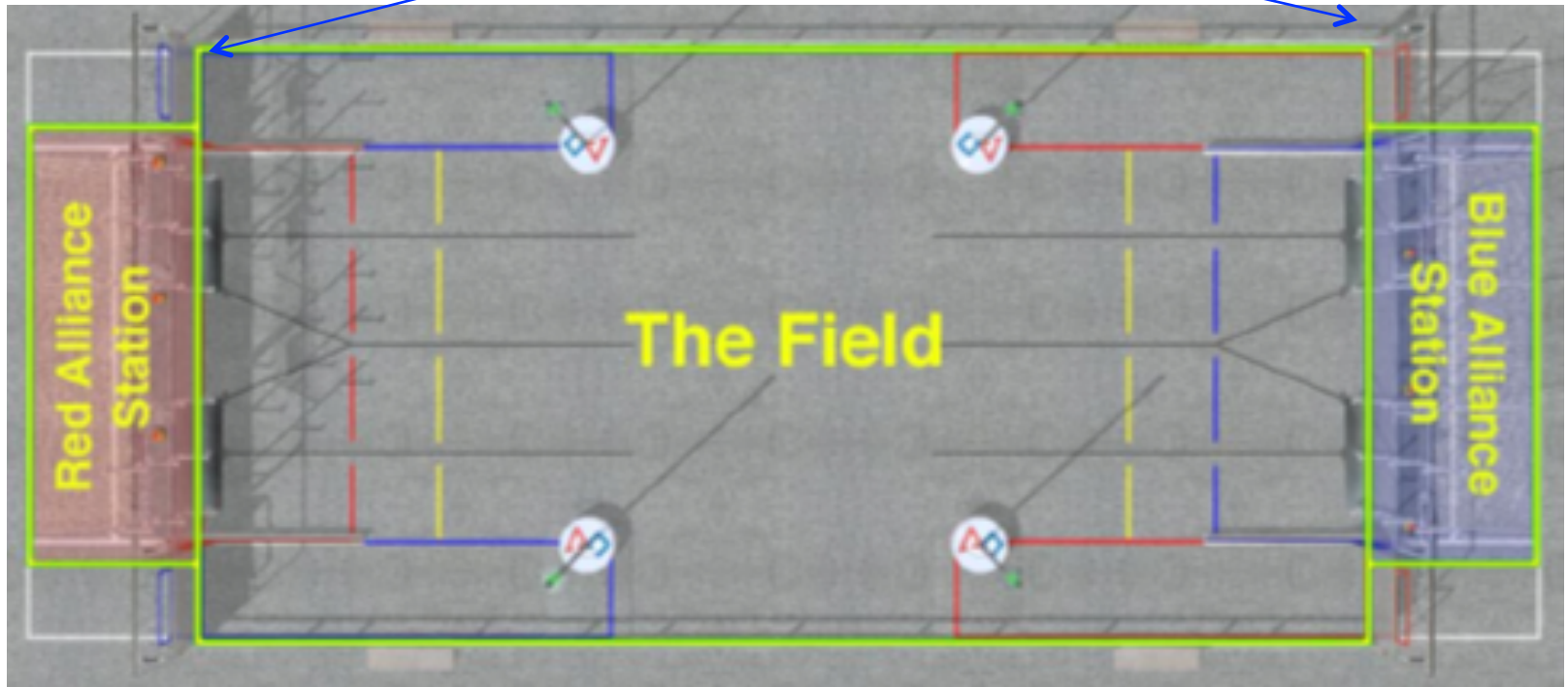
Game Play

- Prior to match all members of drive team must be behind starting line and facing players station
- Prior to match, each team negotiates within their alliance to select one of the three starting areas for their alliance

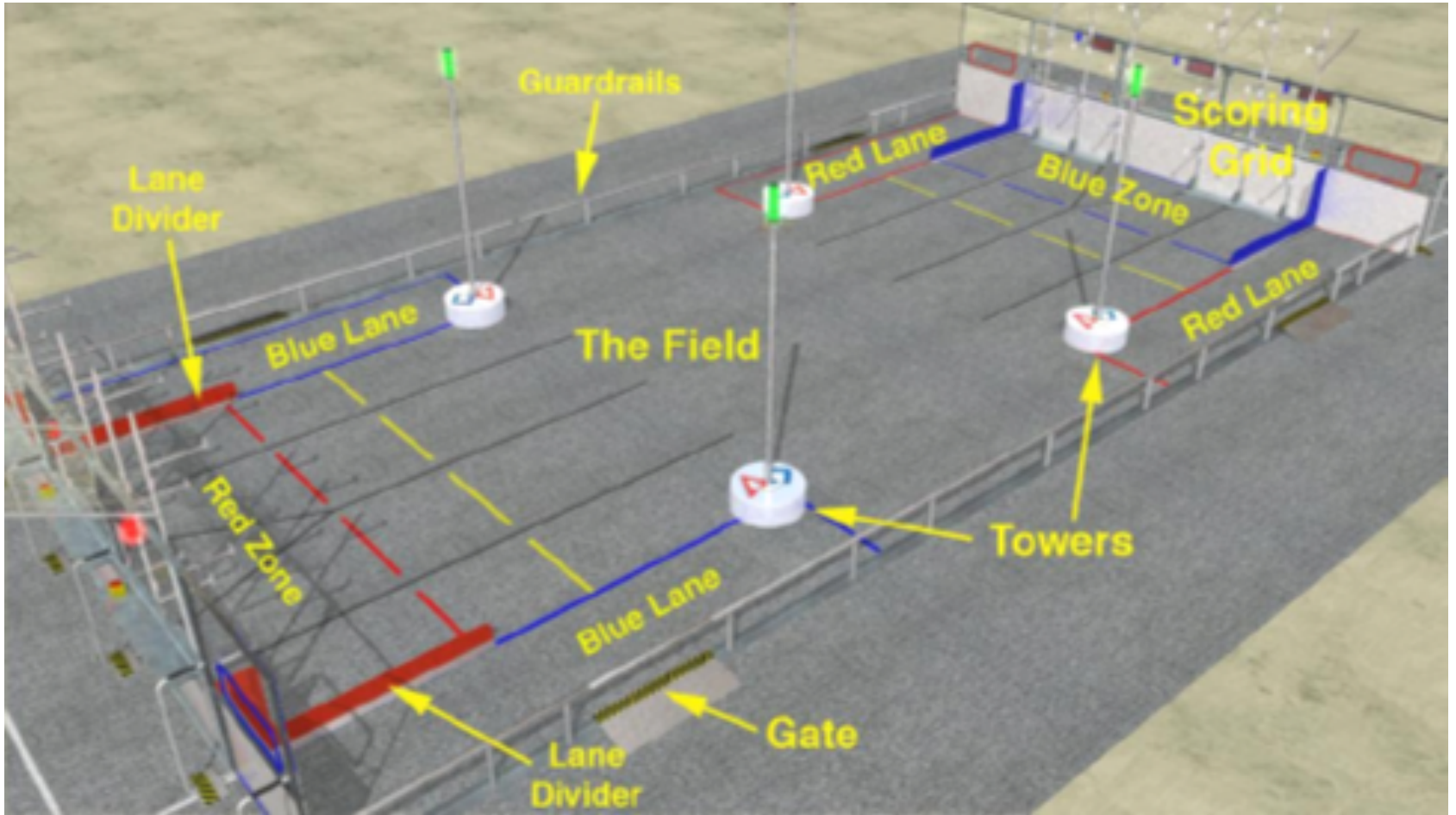
Field

Alliance Wall 6 ½ feet high

27 Feet

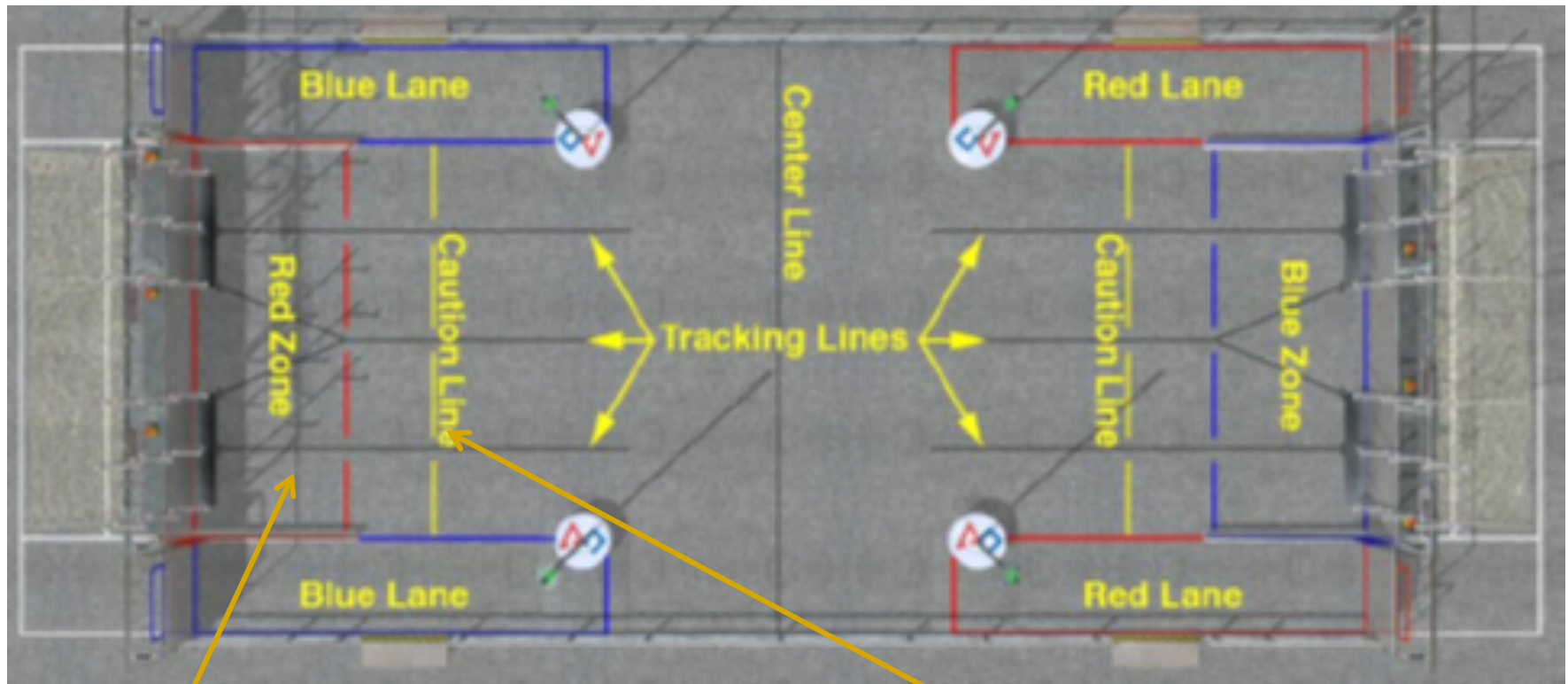


54 Feet



Field Markings

3 inch gaffers tape used for dividing field and are considered in the boundary area



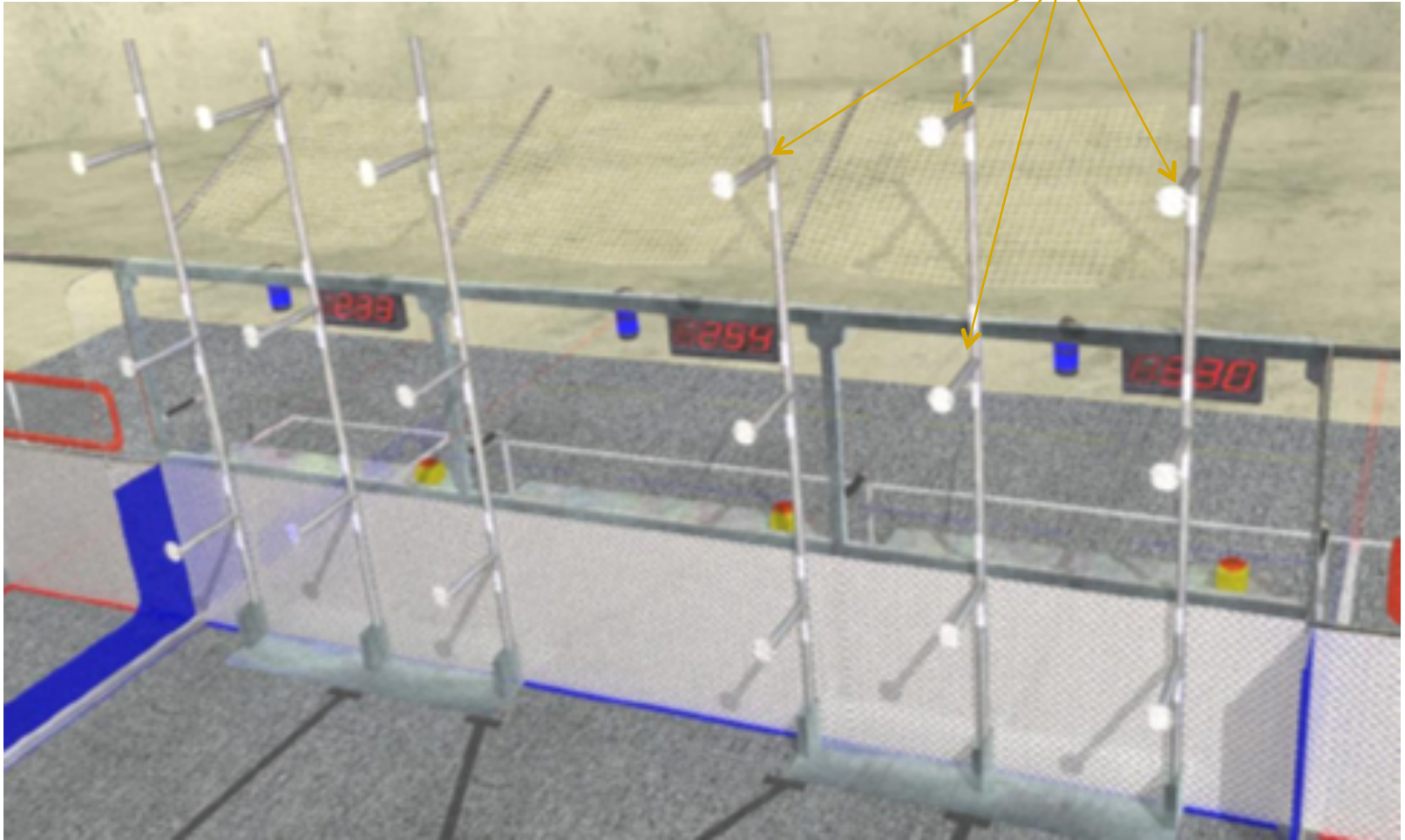
Alliance zone
approx. 18' x 7'

Yellow 2" caution line located 4' in front of zone – visual warning that robot is close to opposing alliance zone

Grids

1.66 OD aluminum pipe

Spaced 30 inches center to center



Tracking lines end in a “T”

Grids

Three vision targets

1 – on diameter disk surface

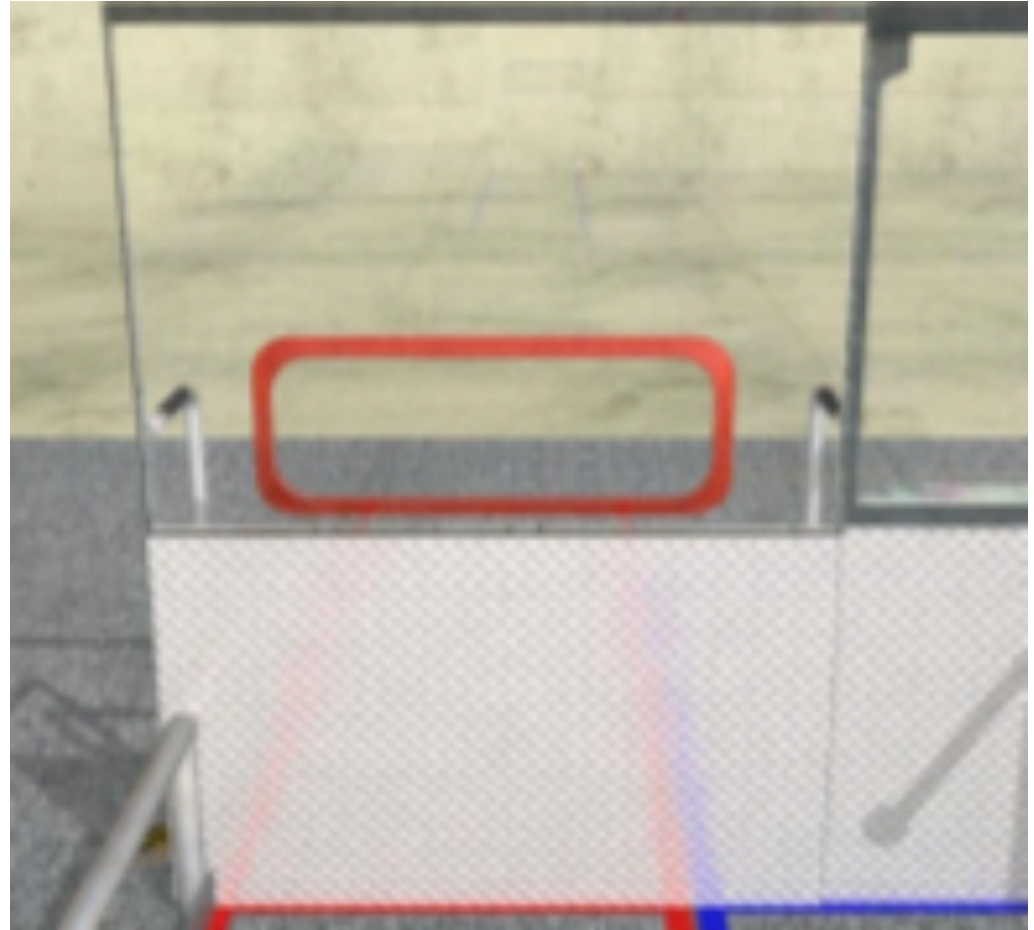
1 – approx 2 “ above (1” x 4”)

1 – approx 2” below (1” x 4”)



Feeding Slots

Slot is approx 35" wide and 10" tall and centered 45" above floor



Tower

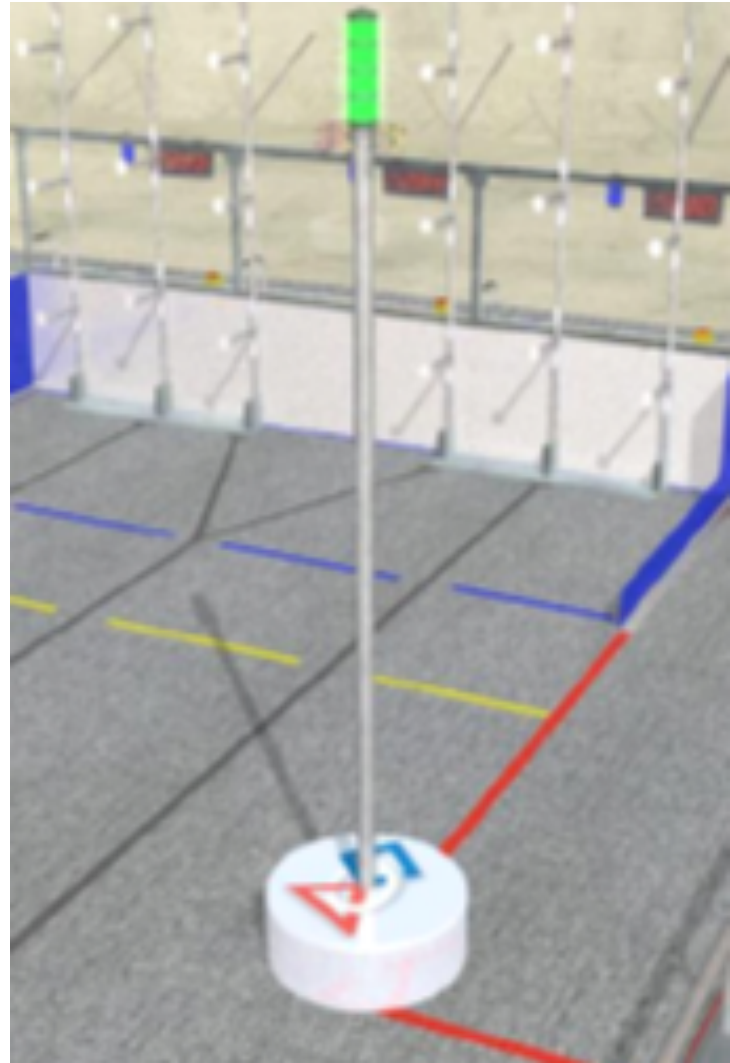
Owned by alliance associated with lane color

Climbed by Minibots

Base – approx 30” diameter and 12” tall covered in translucent white plastic

Post 1.75” outside diameter steel pipe. Deployment line approx. 18” above top of base.

Target (finish line) consists of pair of 12” diameter disks spaced approx 2” apart. Bottom of target is approx. 122” above floor. Contact force 2-4 Newtons.



Tower

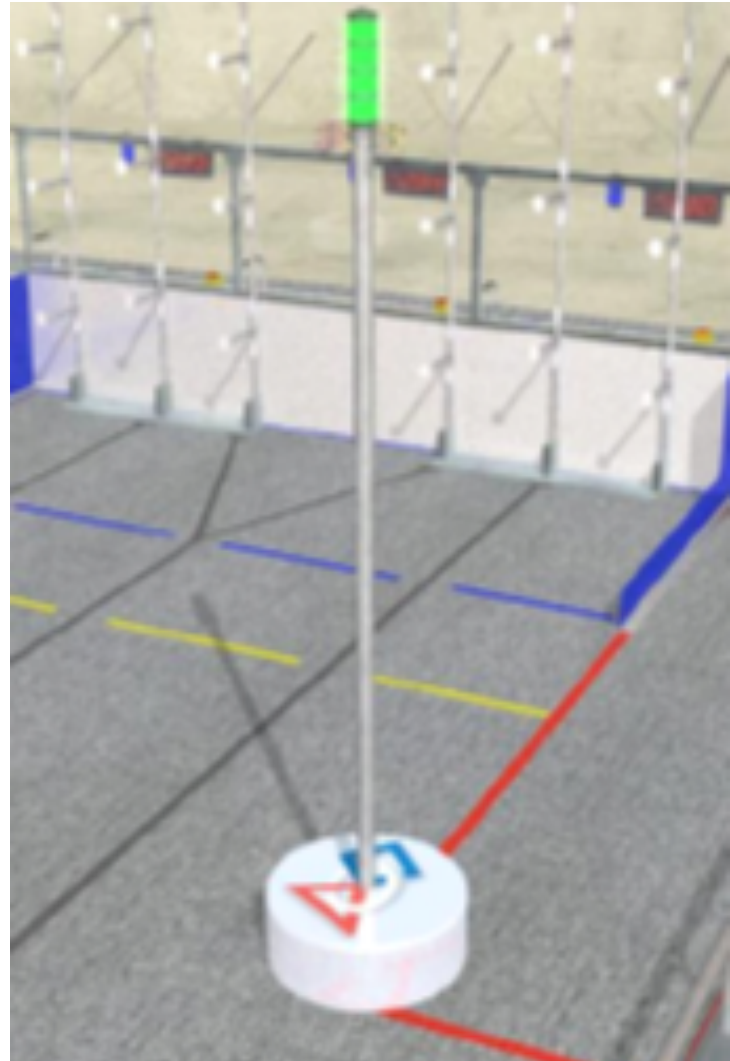
During the match the base is illuminated:

- Yellow in autonomous
- Alliance color for next 1 minute and 45 seconds
- With 15 seconds to go they flash yellow
- With 10 seconds to go will flash alliance color

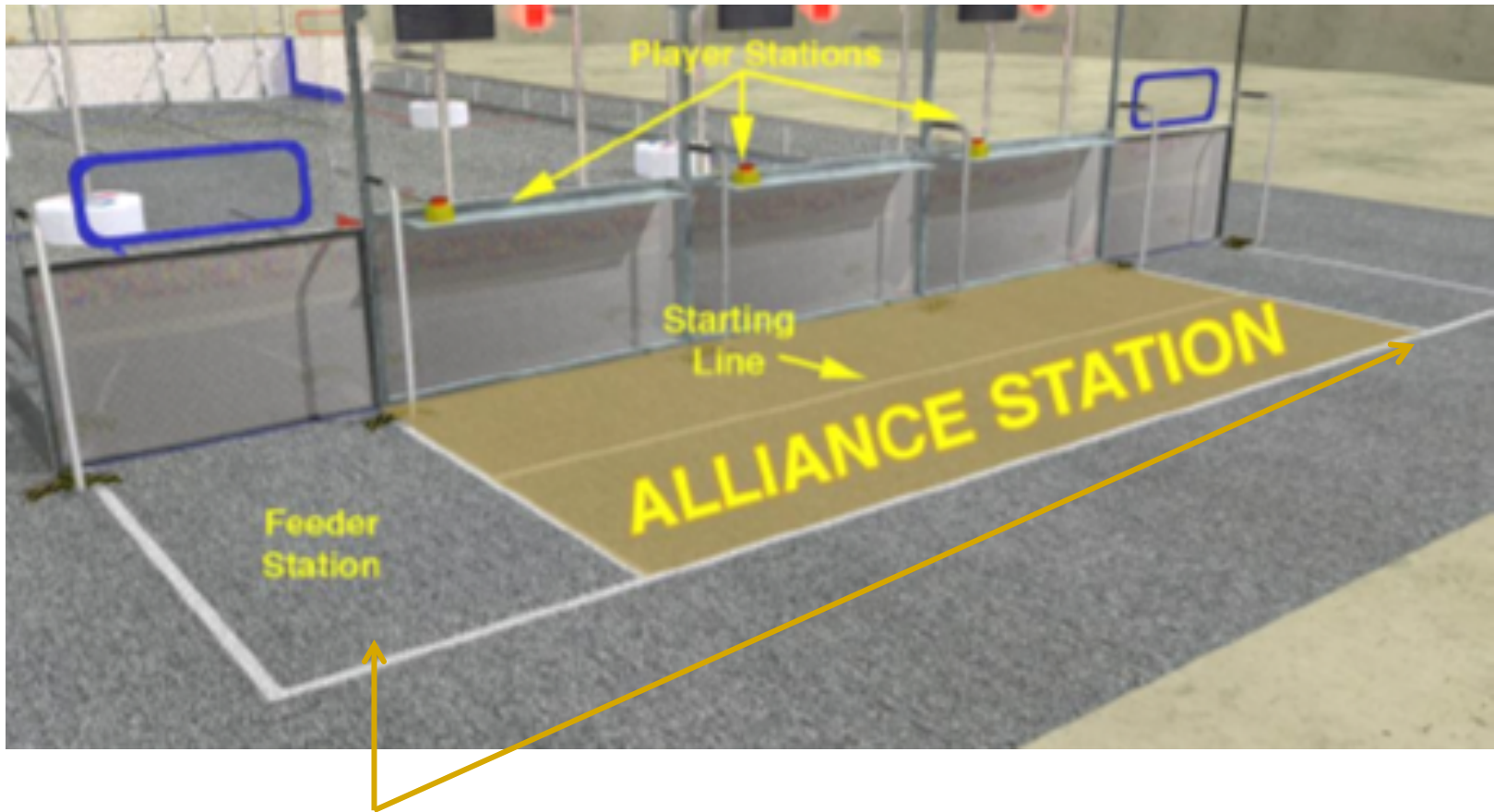
Target will flash green with 15 seconds to go

Targets will show chase sequence with 10 seconds to go

If target is triggered, first will show four lights, then three, etc.

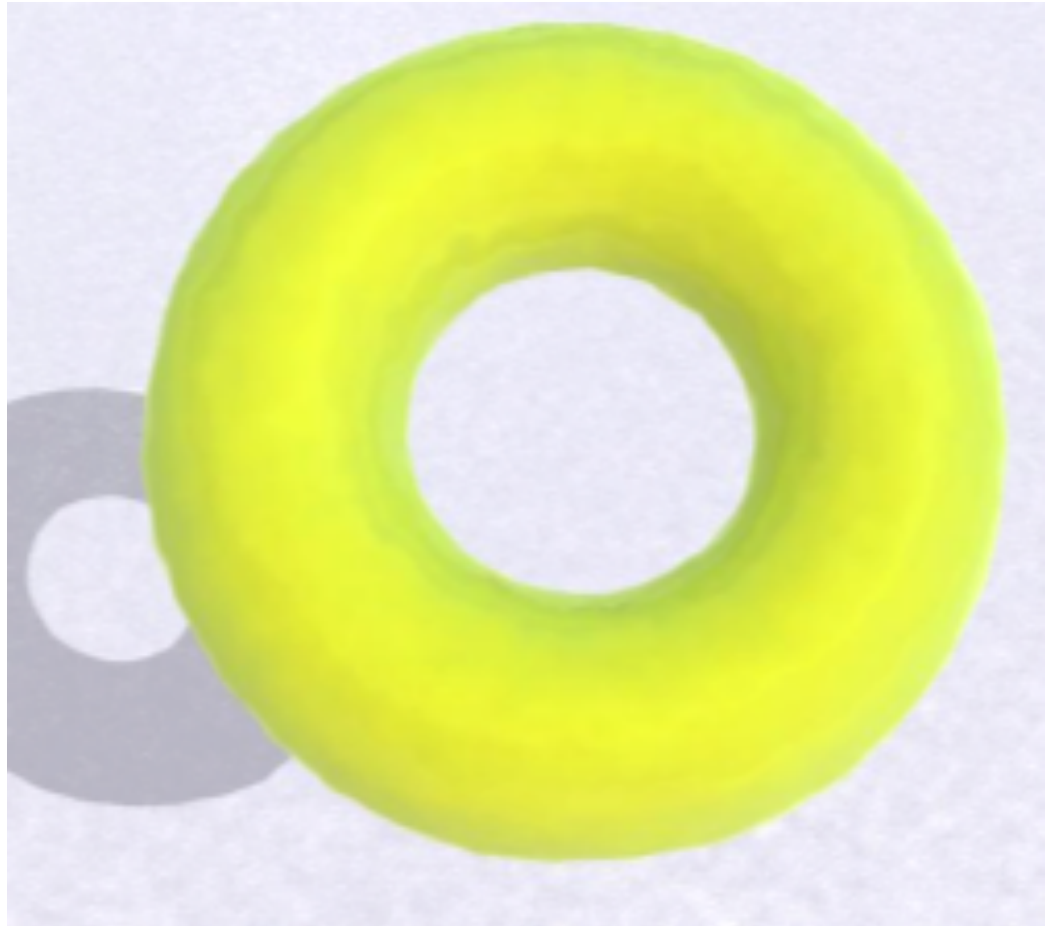


Alliance Station

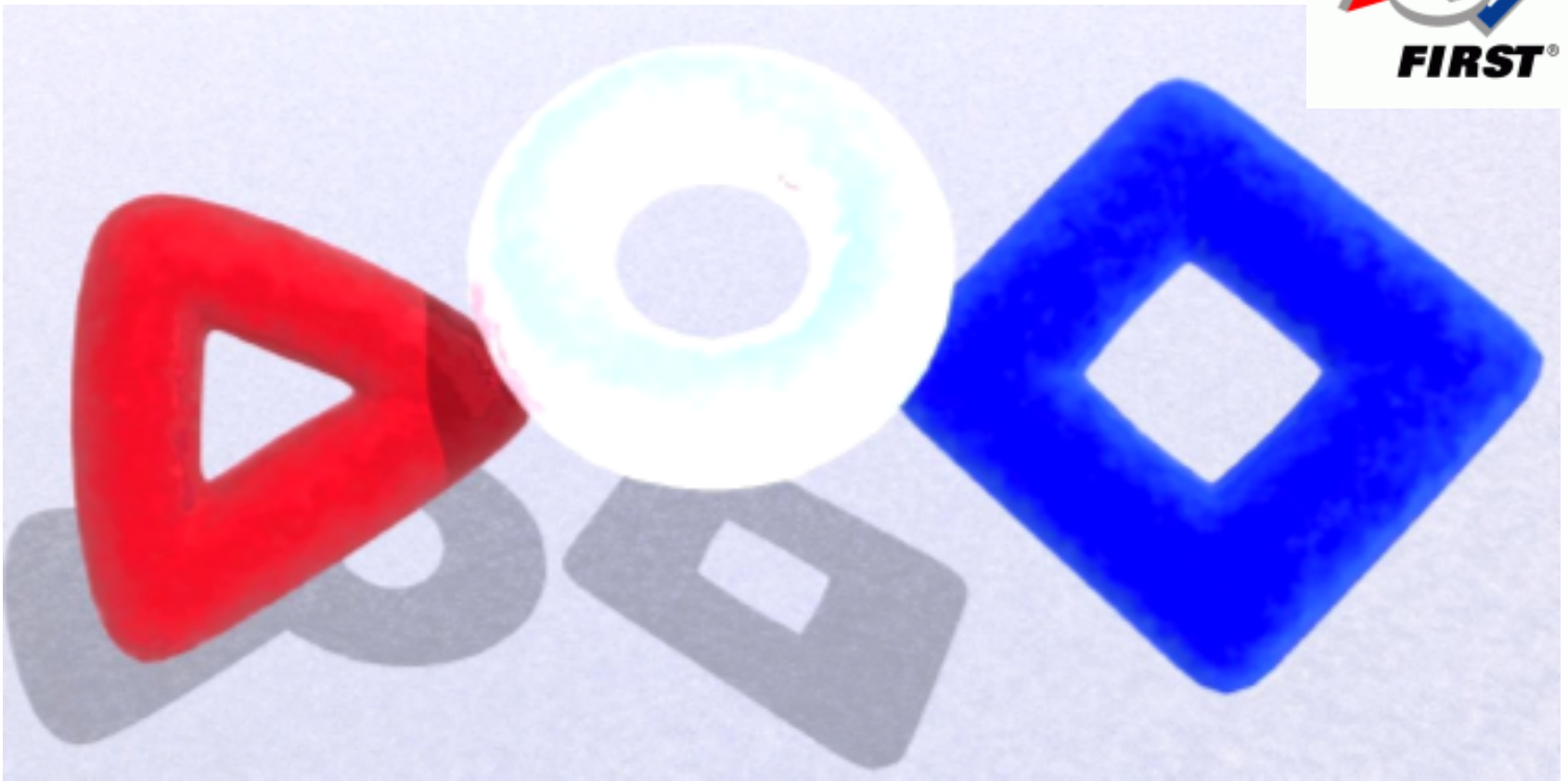


Opposing players in feeder stations

Ubertube



LOGO Pieces



Inside diameter approx. 9.5" for triangle to 12" for circle

Game Play – Robot Specs

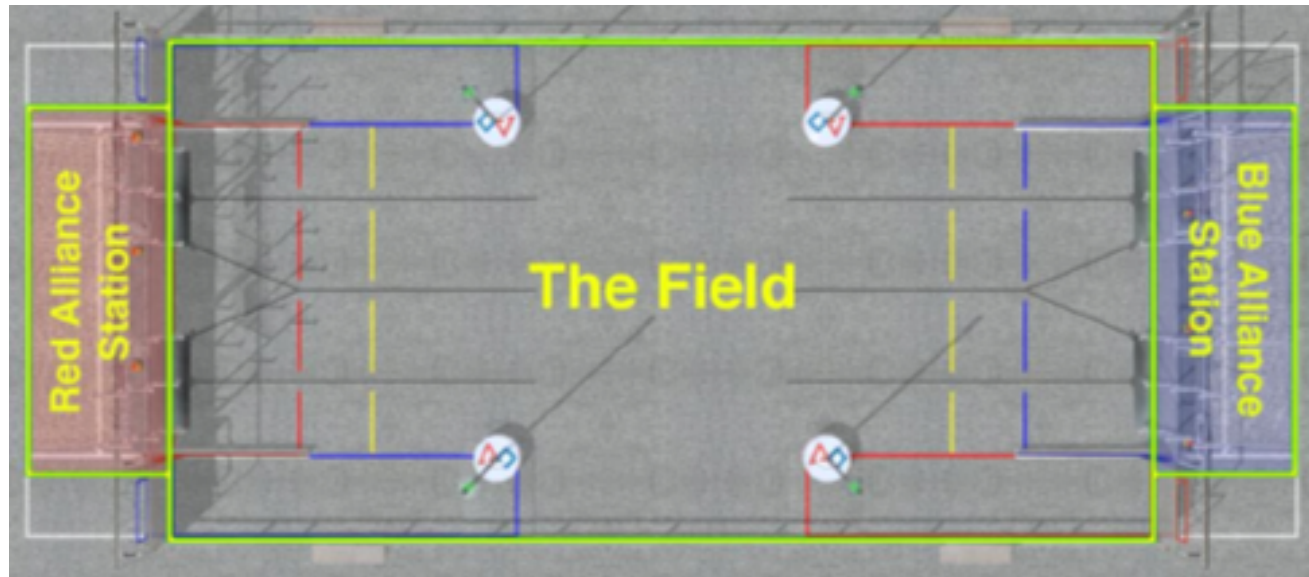
- Minibots may not exceed a 12" x 12" x 12" volume and weigh more than 15 pounds
- Robot size shall not exceed the maximum weight or volume (excluding battery, bumpers, operator console, and minibot)

	Maximum Horizontal Dimensions	Maximum Height	Maximum Weight
STARTING CONFIGURATION	28" x 38" (71.12cm x 96.52cm) rectangular space	60" (152.40cm)	120 pounds (54.43Kg)
PLAYING CONFIGURATION	60" (213.4cm) diameter vertical right cylindrical volume	N/A	

When determining weight, the basic ROBOT structure and all elements of all additional mechanisms that might be used in different configurations of the ROBOT shall be weighed together. Included in the weight limit are the robot control system, decorations, and all other attached parts.

The Game - Start of the Match

- Robots must start in starting configuration
- Bumper closest to it's alliance player station breaks the plane formed by the posts of the opposing alliance's towers



The Game - Start of the Match

- Each robot must be in contact with only one Ubertube
- Each feeder station contains 3 sets of LOGO pieces

The Game – Autonomous Period

- Robots may not break plane of the center line
- Team members must stay in their areas and cannot touch game pieces
- If robot should touch anything outside of the field boundary, it will have a 10 second grace period to return to the field at the beginning of the teleoperated period – disabled if this cannot be corrected
- Only time when Ubertubes can be hung

The Game – Teleoperated Period

- Ubertubes cannot be hung or re-hung or moved to another peg
- Hostbots may not deploy a minibot until end of game period

The Game – End Game

- Minibots must remain completely autonomous after deployment
- Robots/Hostbots may not contact their own towers above the deployment line
- Hostbots may only deploy minibots to their alliance's towers
- Hostbots may not contact their alliance's minibots once it has climbed above the deployment line
- May not contact opposing alliance's tower or interfere with deployment or climbing of minibot (red card)

The Game – End Game

- Robots/Hostbots in contact with their alliance's tower are protected and may not be contacted by an opponent (Penalty for inadvertent contact plus Red Card for obviously intentional contact)

Game Play – Robot Specs

- During normal operation no part of the robot shall extend outside the vertical projection of the frame perimeter except:
 - Solely for the purposes of interacting with the ball, mechanisms that are below the bumper zone may extend up to the bumper perimeter, for a period of two seconds
 - Robot attempting to right themselves or their alliance partners may expand up to the finale configuration maximum only while performing the righting action

Game Play – Robot Specs

- During normal operation no part of the robot shall extend outside the vertical projection of the frame perimeter except:
 - During a match, robots in contact with their alliance tower may extend beyond their normal configuration volume but may not exceed the finale configuration maximum volume
 - During the finale, robots may extend up to the limits of the finale configuration maximum volume

Bumpers must provide complete protection of the entire frame perimeter – covered in either red or blue and cannot weigh more than 20 pounds

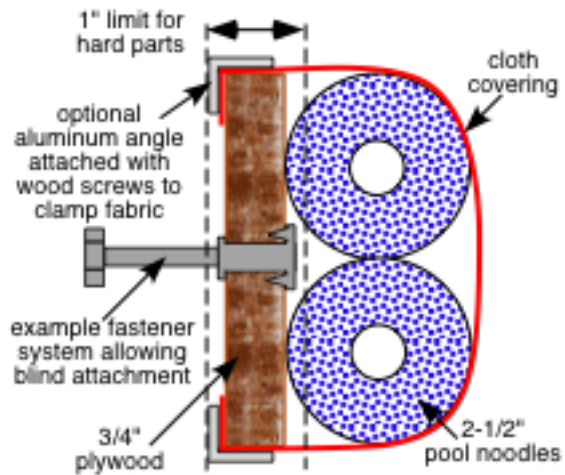
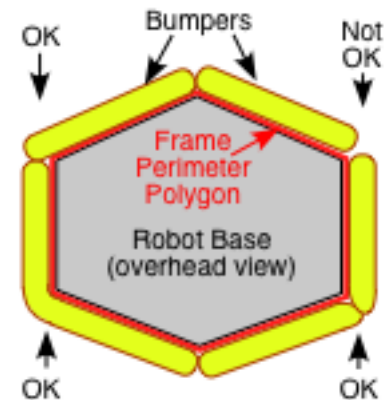


Figure 4-1



Penalties

- The actions of an alliance shall not cause an opposing alliance to violate a rule and thus incur penalties. Any rule violations committed by the affected alliance shall be excused, and no penalties will be assigned.
- Unless otherwise noted, all penalties assigned by referees are applied to the entire alliance

Robot Out of Bounds

- Robots may not touch any surface outside the field during the teleoperated period. **Violation: Disablement**
- If a robot should touch any surface outside of field boundary during autonomous period, it will have a 10 second grace period to right itself and return to the playing field at the beginning of the teleoperated period.

Budget

- The total cost of all non-KOP items shall not exceed \$3,500.00 USD
- No individual items shall have a value of over \$400.00

Qualification Matches

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.

The total number of qualification points earned by a TEAM throughout their qualification matches will be their qualification score.

5.3.4 Ranking Score (RS)

Each TEAM on the winning ALLIANCE will receive a number of ranking points equal to the unpenalized score (the score without any assessed penalties) of the losing ALLIANCE.

Each TEAM on the losing ALLIANCE will receive a number of ranking points equal to their final score (with any assessed penalties).

In the case of a tie, all participating TEAMS will receive a number of ranking points equal to their ALLIANCE score (with any assessed penalties).

The total number of ranking points earned by a TEAM throughout their qualification matches, divided by the number of matches played (excluding any SURROGATE matches), then truncated to two decimal places, will be their ranking score.

Note: because your ranking score is derived directly from the match scores of the losing ALLIANCES in the matches you play, it is in your best interest to support your opponents and win by helping each ALLIANCE score as many points as possible.

Considerations

- What is important to do?
 - For autonomous period
 - For using lines and vision targets
 - For handling and hanging game pieces
 - For deploying a minibot, even if we didn't make it
 - For having a minibot, even if we don't deploy it
 - 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?

Considerations

- What worked well in the past that we should repeat?
- What didn't work well in the past that we should avoid
- What worked in 2007 for Rack N Roll Game
- How will you select final design?
- When will you select final design?

Key Dates

- Robot Bag and Tag date is:
 - February 22, 2011