

# FRC 2019 Game Overview and Thought Starters

**FIRST**<sup>®</sup>

**LAUNCH**

Prepared by FRC Team 245

11/9/2021

**ADAMBOTS**

# Agenda

- Game overview
- Considerations
- Break (water and snacks in hallway)
- Breakout groups
- Report outs
- Next steps



Game Overview  
The Arena  
Safety  
Seeding and Playoffs  
Game Play Scoring  
Game Play Drive Team  
Game Play  
Robot Rules  
General Rules  
Human Actions  
Considerations  
Key Dates  
Discussion

DESTINATION:  
**DEEP  
SPACE**



Presented By

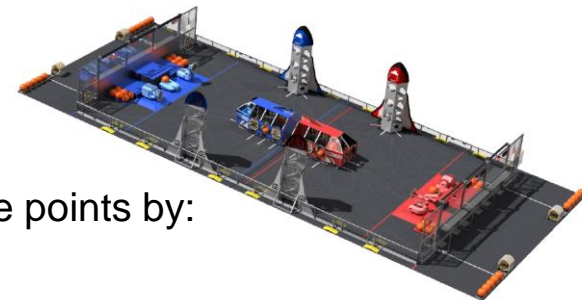


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**You may ask  
questions at any  
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reviewed!**

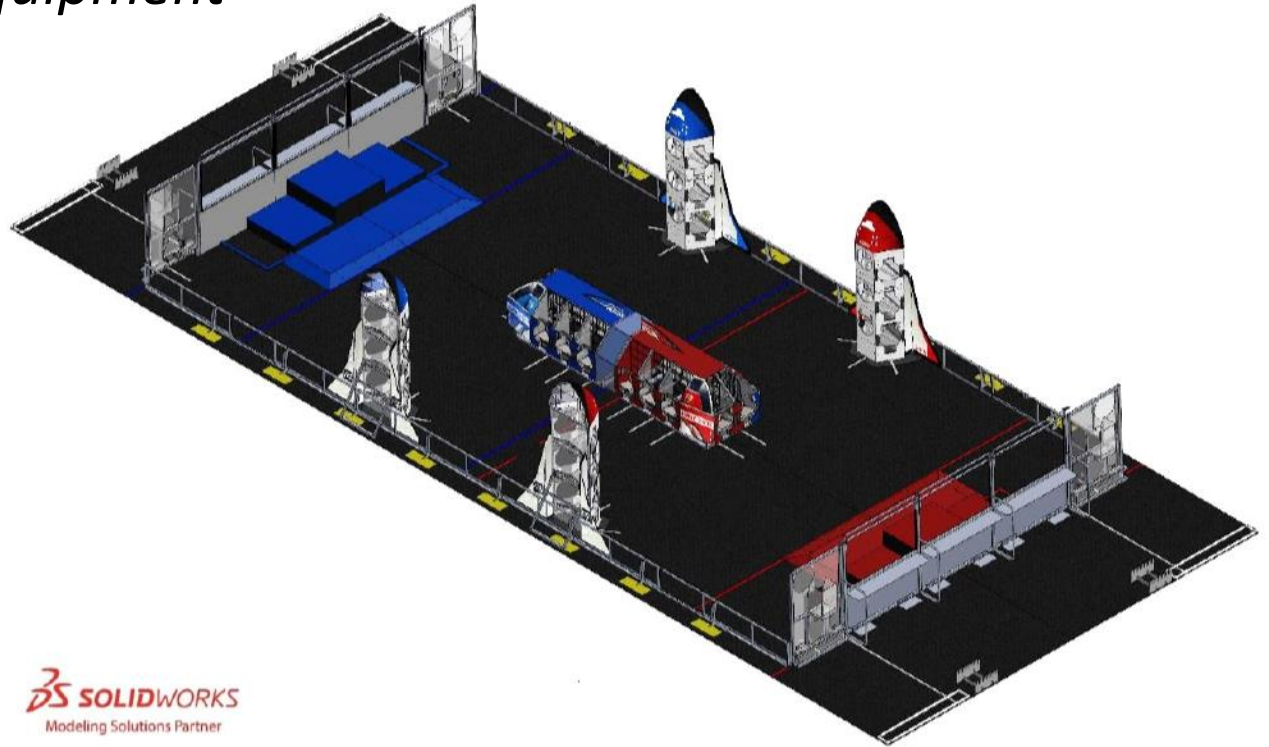
# Game Overview

- *DESTINATION: DEEP SPACE* is played by two alliances collecting samples on Planet Primus. The alliances must gather as many cargo pods as possible and prepared their spaceships before the next sandstorm arrives.
- T-minus 2:30
  - Sandstorm limits driver visibility so robots independently follow pre-programmed instructions or are operated by drivers via video from their stations.
- T-minus 2:15
  - Sandstorm clears
  - Human operators take control of robots and score points by:
    - Preparing rockets and cargo ship with hatch panels
    - Loading more cargo pods
    - Returning the robot safely to the alliance's HAB
- 0:00: Rocket liftoff



# Game Overview - Arena

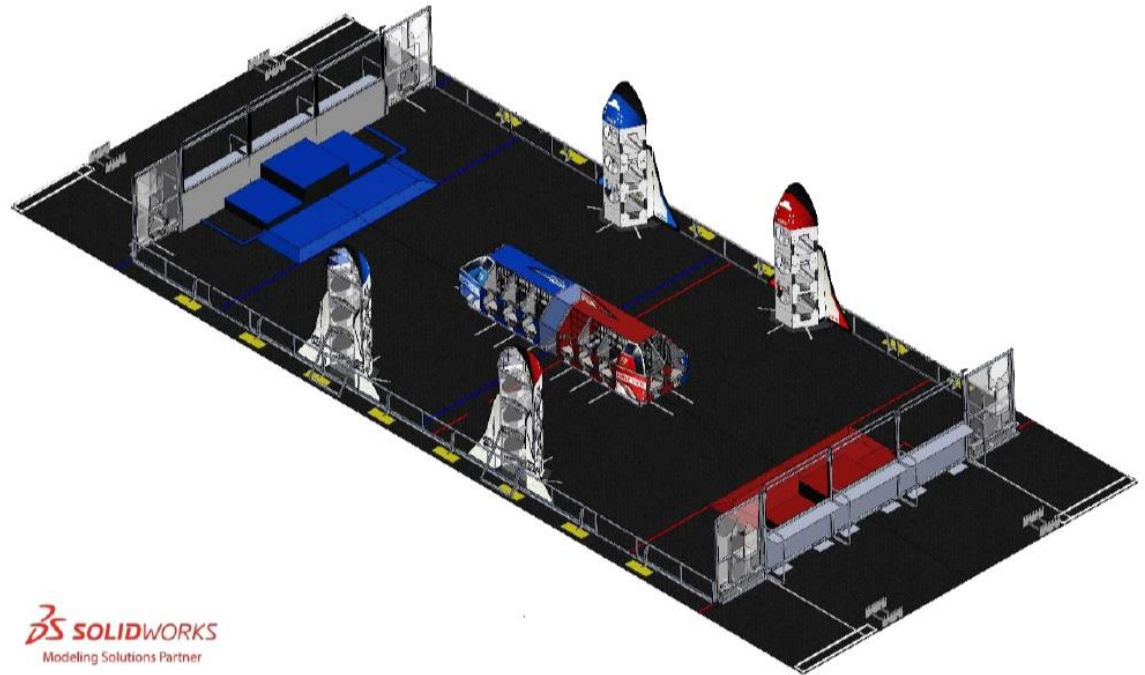
- *Field*
- *Game Pieces*
- *Field Control Equipment*
- *Robot Control*
- *Scorekeeping*



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# Game Overview – Arena Field

- *DESTINATION: DEEP SPACE* has a 27 ft. by 54 ft. carpeted field populated with rockets, cargo ships, HAB platforms, depots, and loading stations.
- Two Red Rockets and two Blue Rockets are on their respective alliance's side of the field



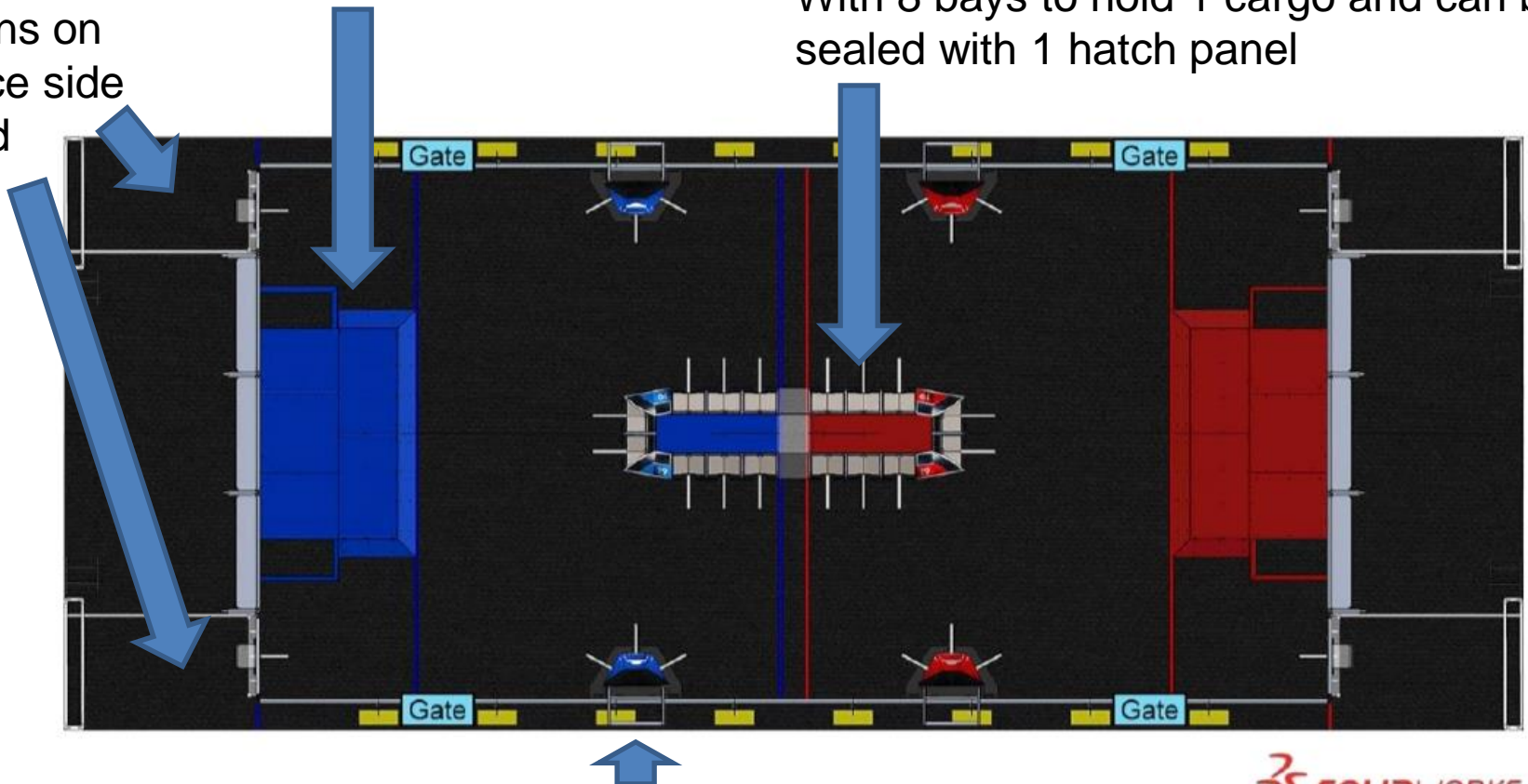
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# Game Overview - Field

Loading Stations on alliance side of field

HAB Platform

Cargo Ship (on alliance side of field)  
With 8 bays to hold 1 cargo and can be sealed with 1 hatch panel

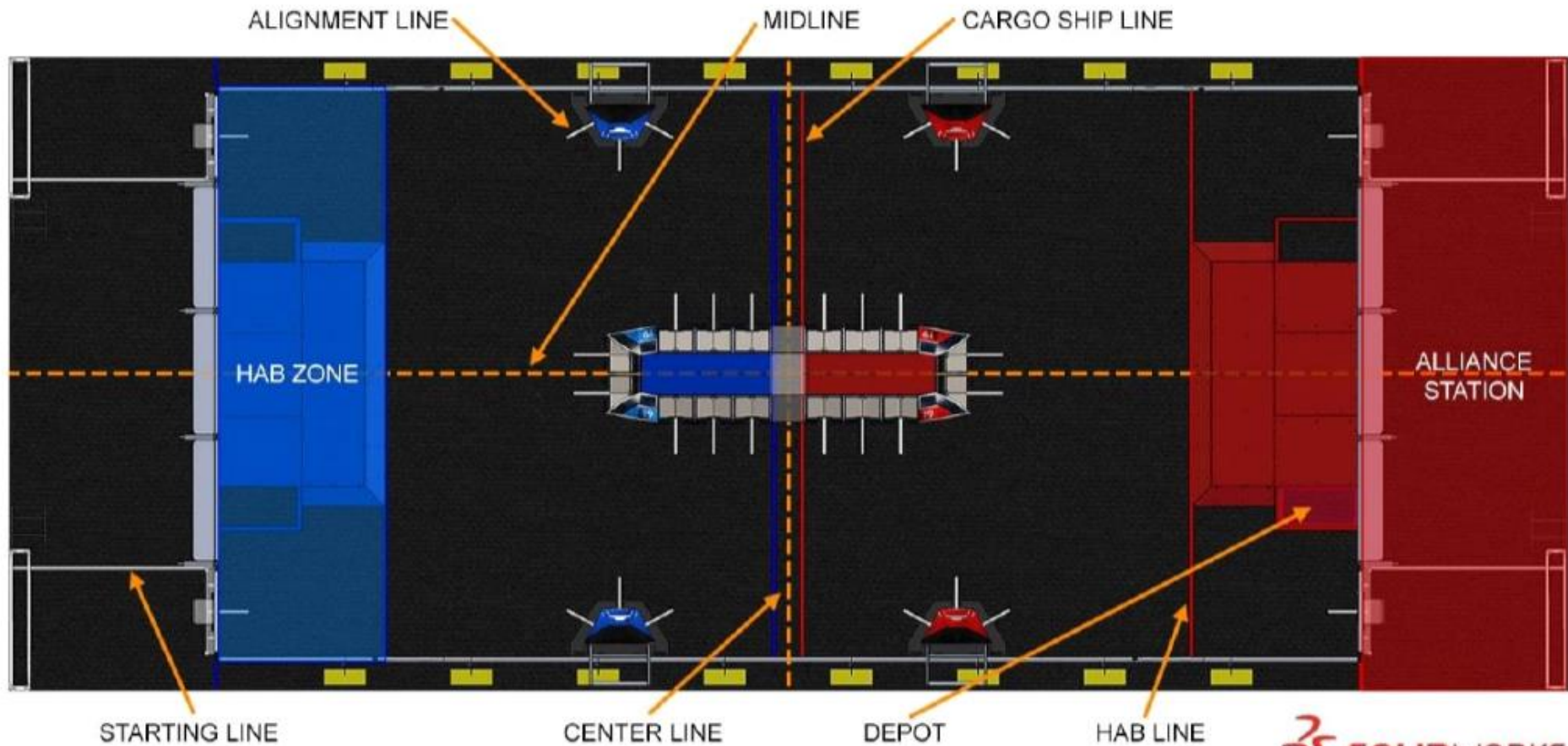


Each Rocket (on alliance side of field)  
With 6 bays to hold 1 cargo and can be sealed with 1 hatch panel



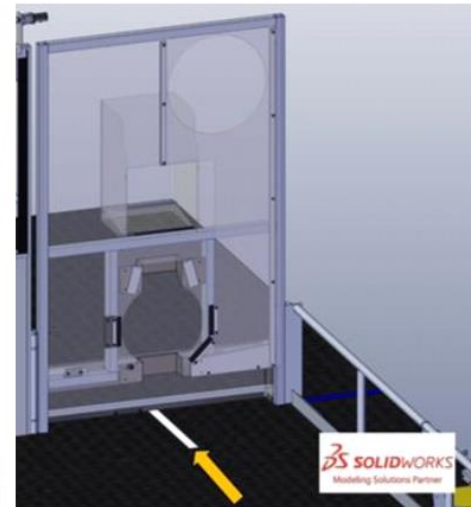
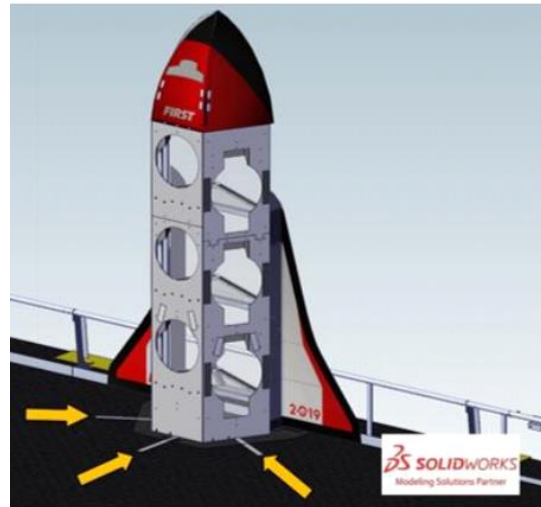
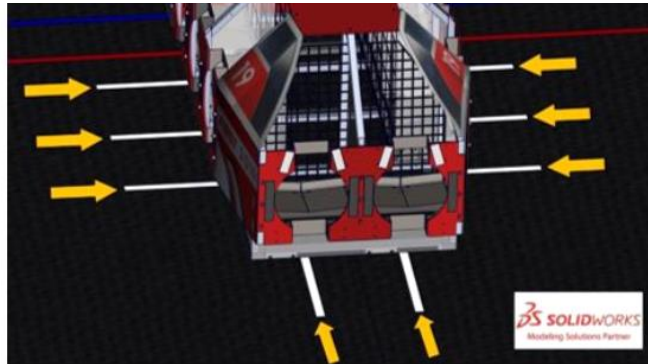


# Game Overview - Field



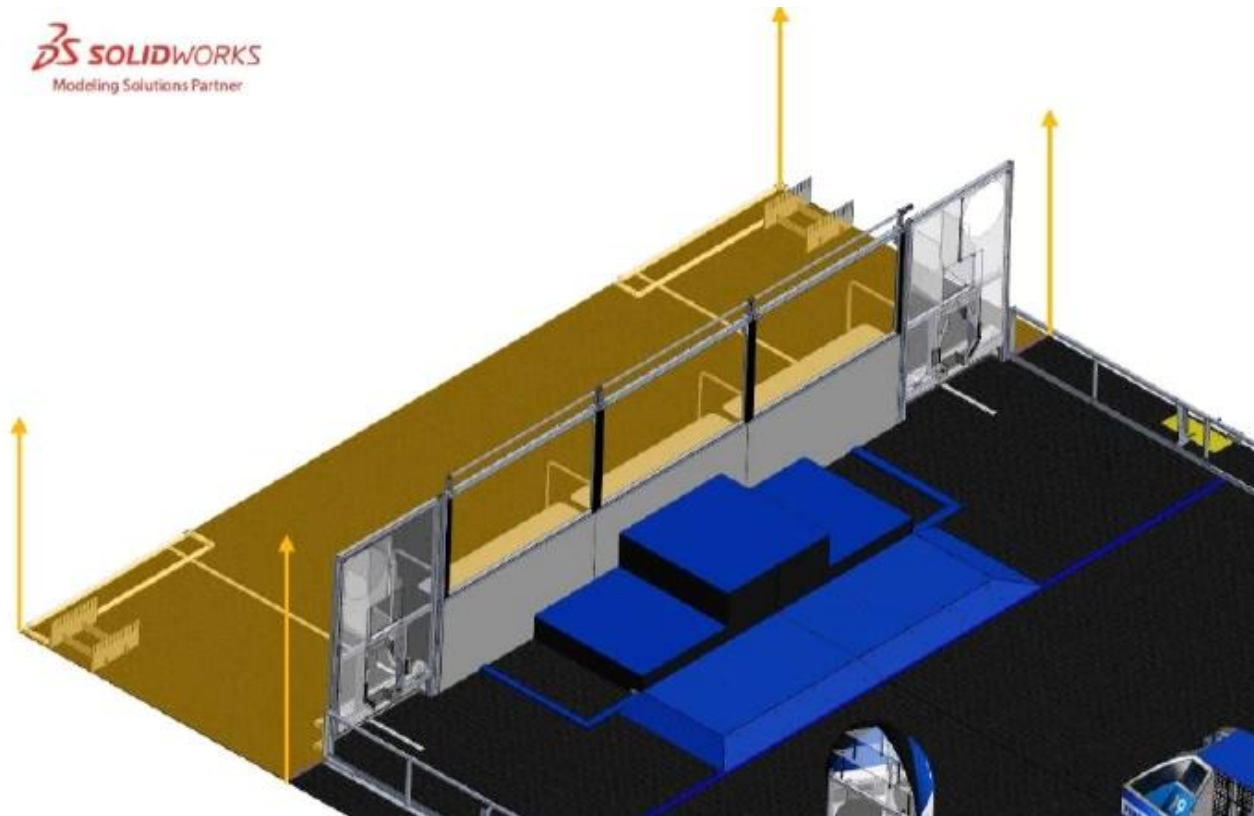
# Game Overview - Field

**ALIGNMENT LINE:** one of thirty-two (32) white gaffers tape marks adhered to the carpet that start 1 ft. 6 in. (~46 cm) from the outermost face of the assembly and extend to the point where the carpet meets the assembly and centered at GAME PIECE placement/retrieval points.



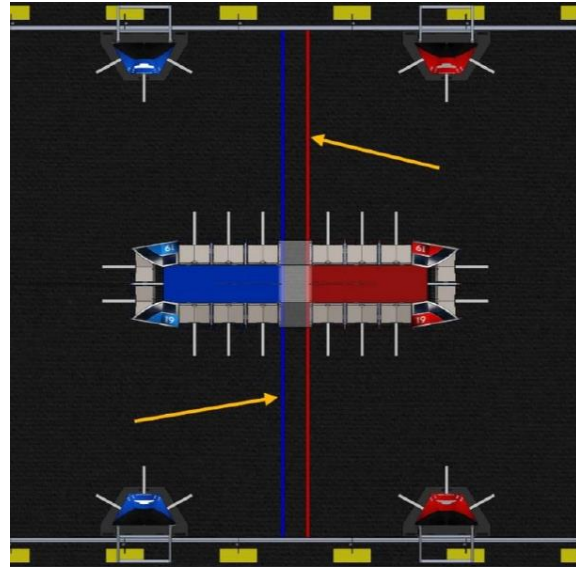
# Game Overview –Alliance Station

ALLIANCE STATION: a 30-ft. (~914 cm) wide by 10-ft. (~305 cm) deep infinitely tall volume formed by, and including the ALLIANCE WALL, the edge of the carpet, and ALLIANCE colored tape

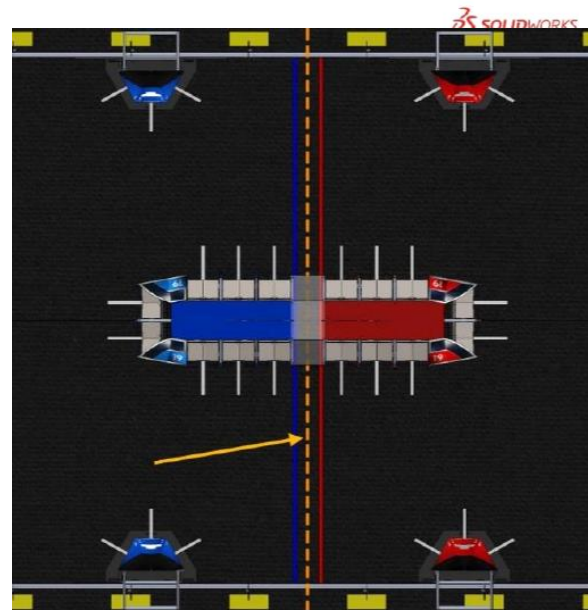


# Game Overview –Cargo Ship Lines

**CARGO SHIP LINE:** one of two (2) tape lines that extend the width of the FIELD and are colinear with the stern of each CARGO SHIP. The tape color matches the color of the closest ALLIANCE WALL.

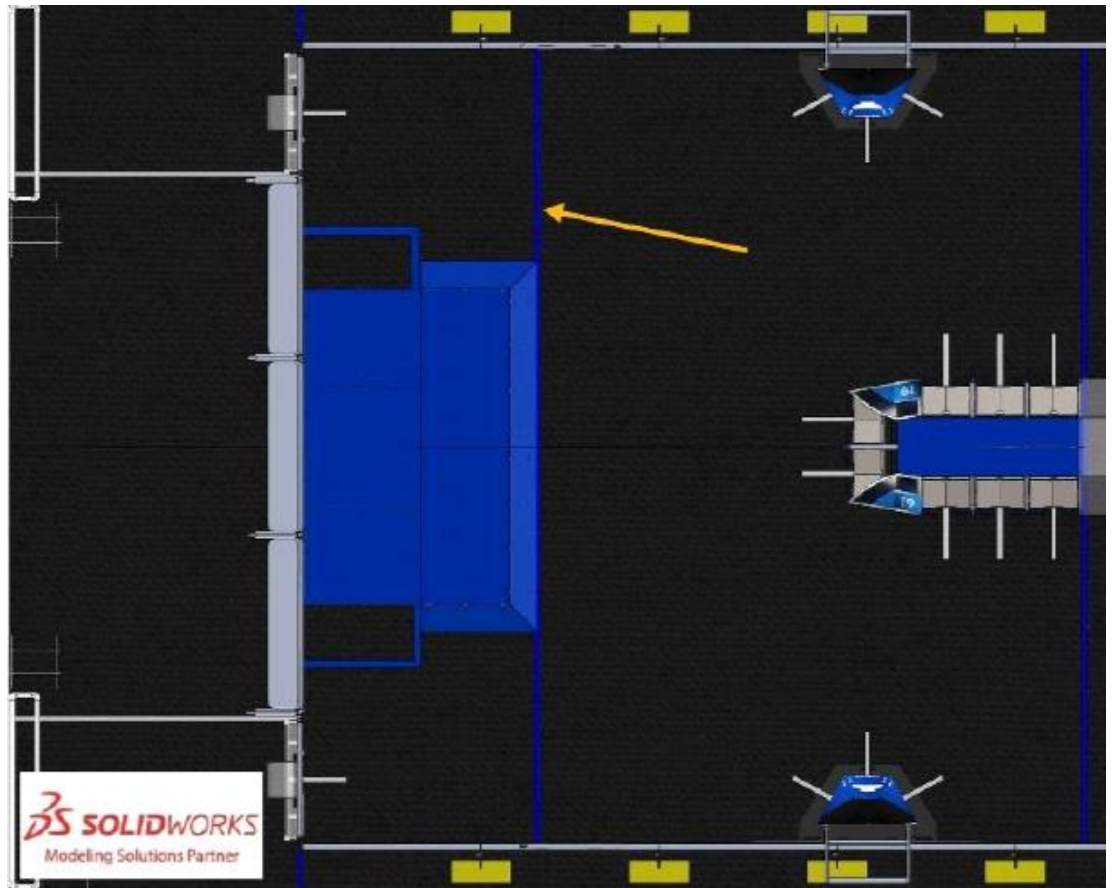


**CENTER LINE:** an unmarked reference line that bisects the length of the FIELD

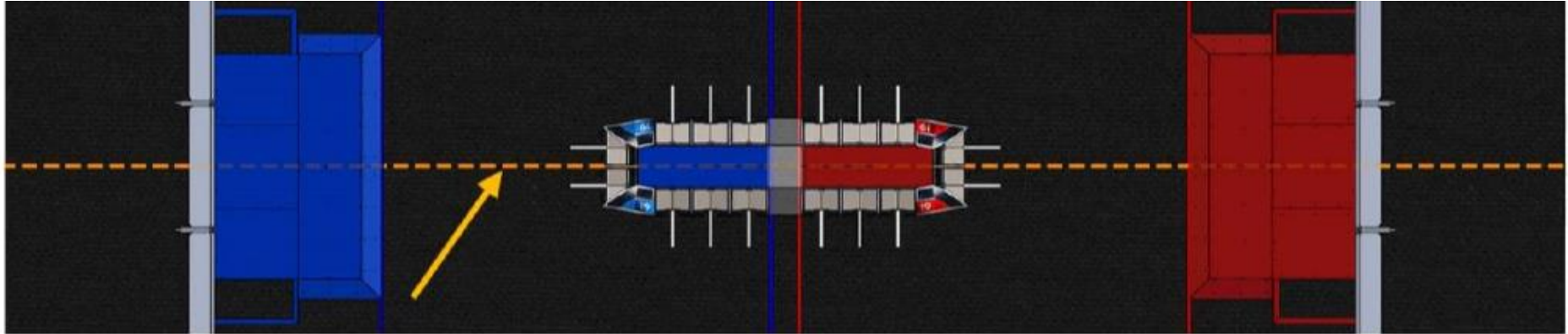


# Game Overview –HAB Line

HAB LINE: one (1) of two (2) tape lines that extend the width of the FIELD and are colinear with and overlap the bottom of the HAB ramp by 1 in. The tape color matches the color of the closest ALLIANCE STATION



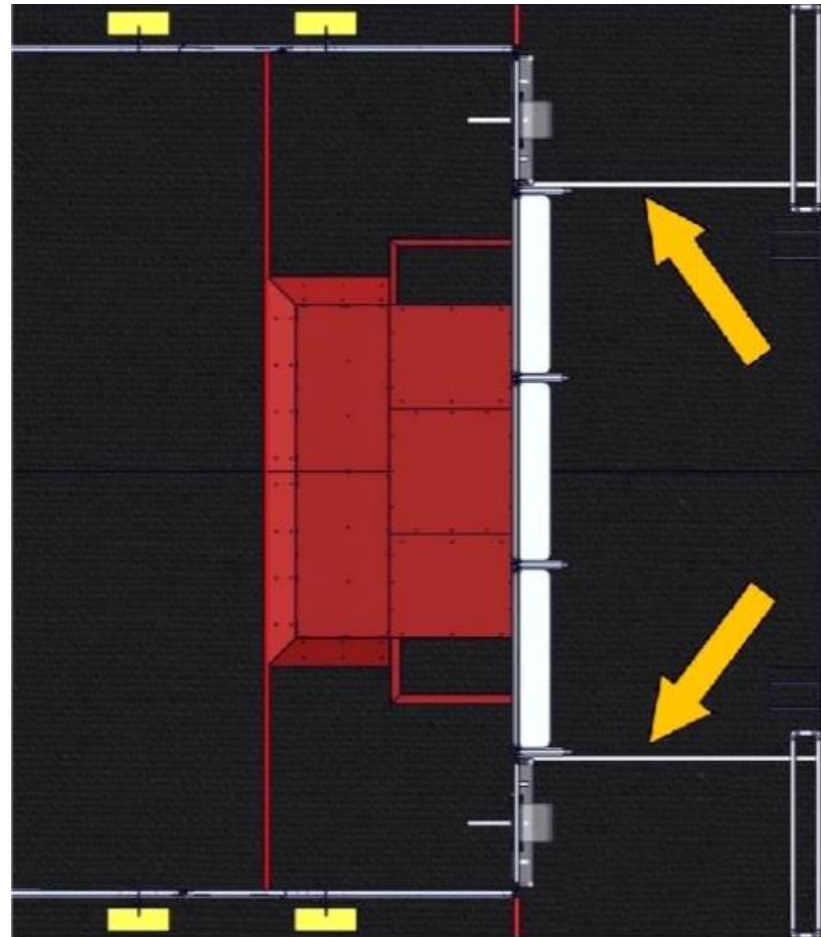
# Game Overview –Midline



**MIDLINE:** a reference line that bisects the width of the FIELD and is marked by black tape that covers the mating seam of the two strips of carpet.

# Game Overview –Starting Line

STARTING LINE: one (1) of two (2) lines in an ALLIANCE STATION, marked by white tape, that extends from the back of the outermost Driver Station Support assembly to the back of the ALLIANCE STATION.



# Game Overview – Rockets

A ROCKET is a 10 ft. 4 in. tall assembly placed such that its centerline is 8 ft. from the MIDLINE, and its “front” face is parallel to the guardrail, faces its CARGO SHIP, and 2 ft. 3½ in. from the guardrail. The distance from the front of the “front” face to the back of the “back” face is 1 ft. 7⅝ in. The angle of its sides is 61¼ degrees.





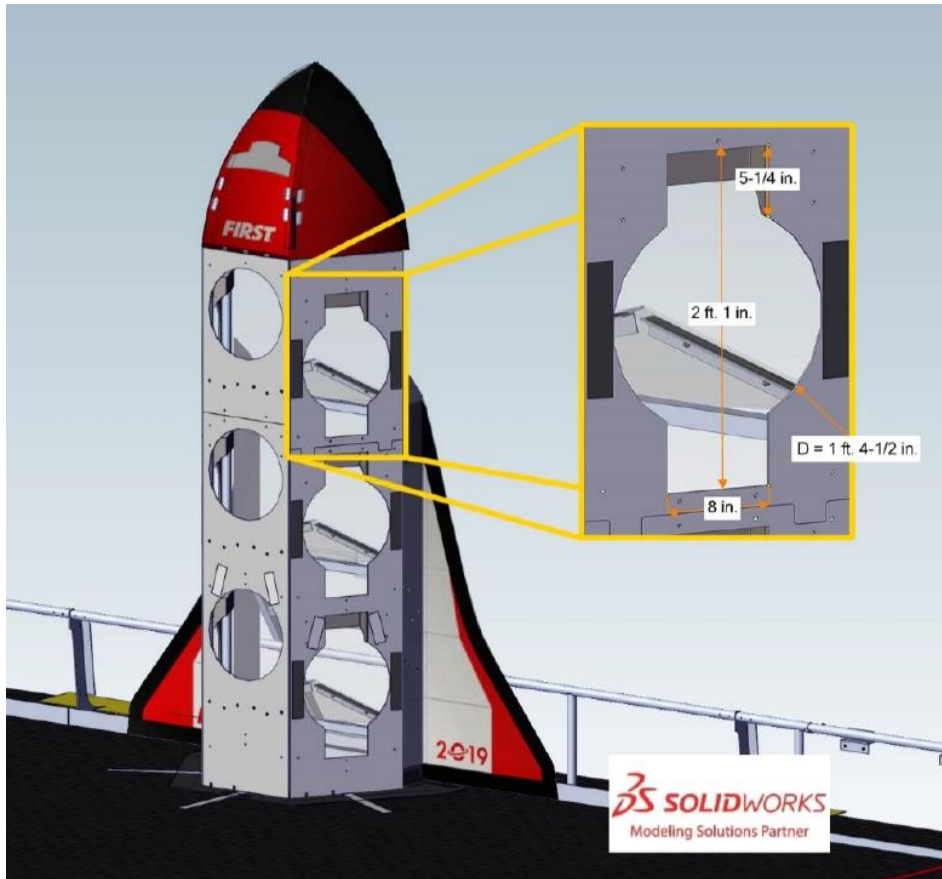
# Game Overview – Rockets

Each Rocket has three levels and each level has two bays. Only one cargo per bay can score.

A port is one of three 1 ft. 4 in. diameter hole in the front face of the rocket. Center of the lowest port is 2 ft. 3.5 in. from the carpet and the distance between the centers of each port is 2 ft. 4 in.



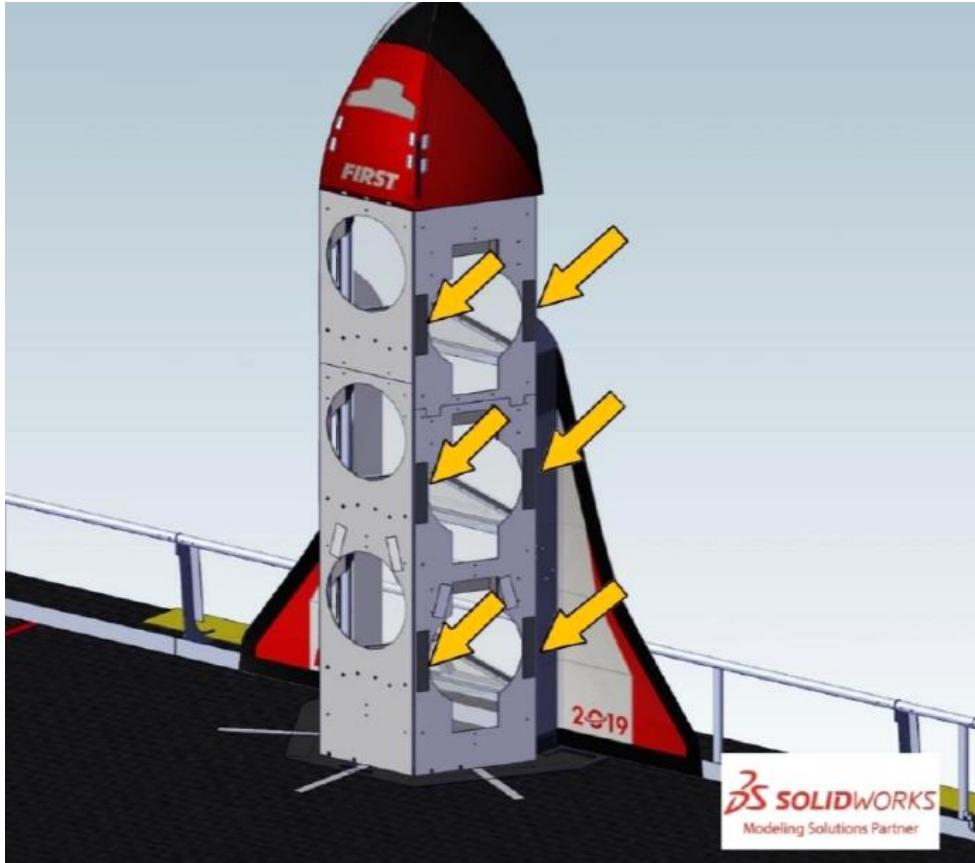
# Game Overview – Rockets



A hatch is an opening on the rocket (or cargo ship) on which hatch panels must be placed to retain cargo.

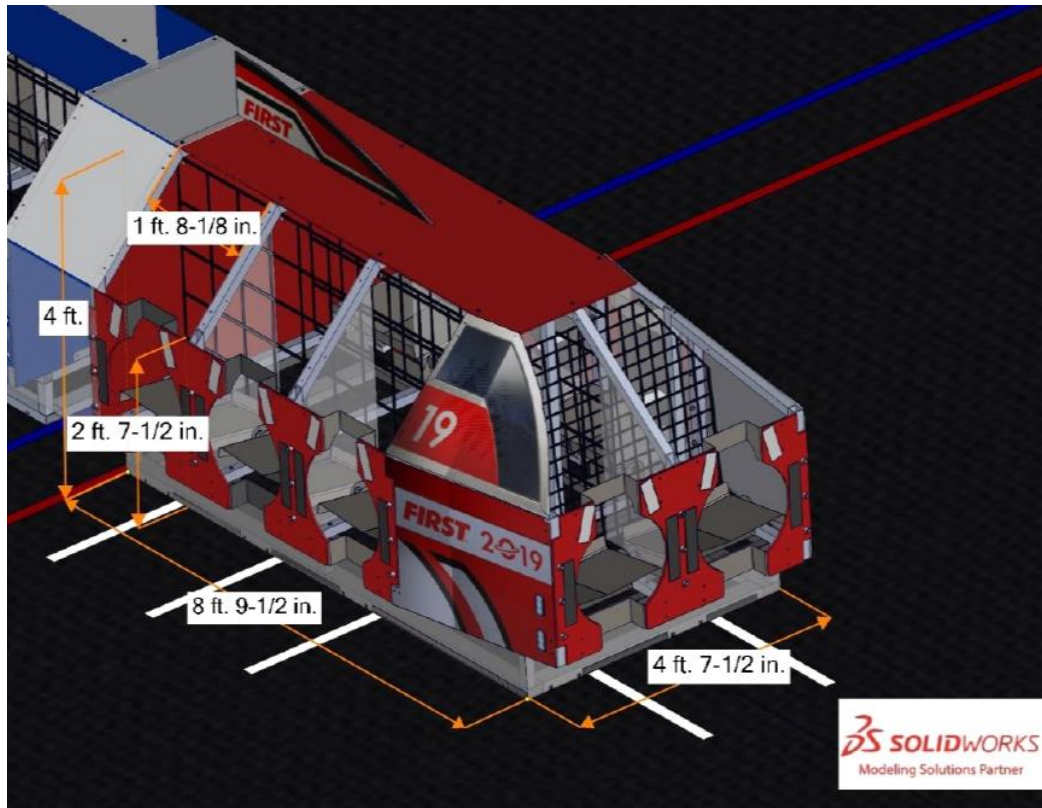
A rocket hatch is 2 ft 1 in tall by 1 ft 4.5 in wide. The center of the lowest cutout is 1 ft 7 in from the carpet. The vertical distance between the centers of each hatch is 2 ft 4 in.

# Game Overview – Rockets



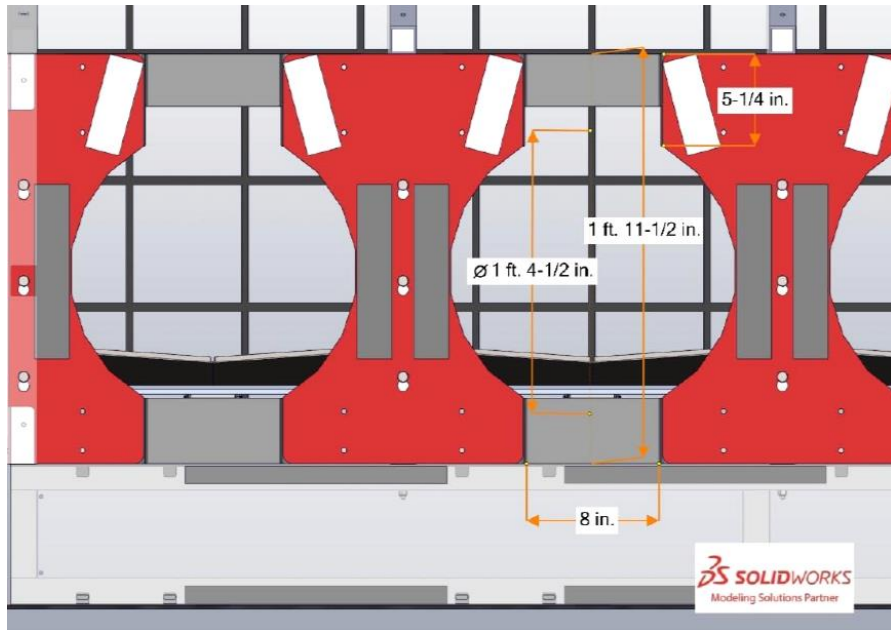
Each rocket hatch is flanked by two 10 in. tall, 2 in. wide pieces of black hook tape

# Game Overview – Cargo Ship



Each CARGO SHIP is a 7-ft. 11<sup>3</sup>/<sub>4</sub>-in. long, 4-ft. 7<sup>3</sup>/<sub>4</sub> in. wide, and 4 ft. tall (excluding its fin) assembly with eight (8) BAYS, three (3) on each side and two (2) on the front (the front faces its ALLIANCE WALL). CARGO SHIPS are placed back-to-back, 9 in. from the middle of the FIELD and centered on the MIDLINE.

# Game Overview – Cargo Ship



Each CARGO SHIP HATCH is backed by a cavity that includes two (2) backstops to prevent HATCH PANELS from entering and getting stuck in BAYS.

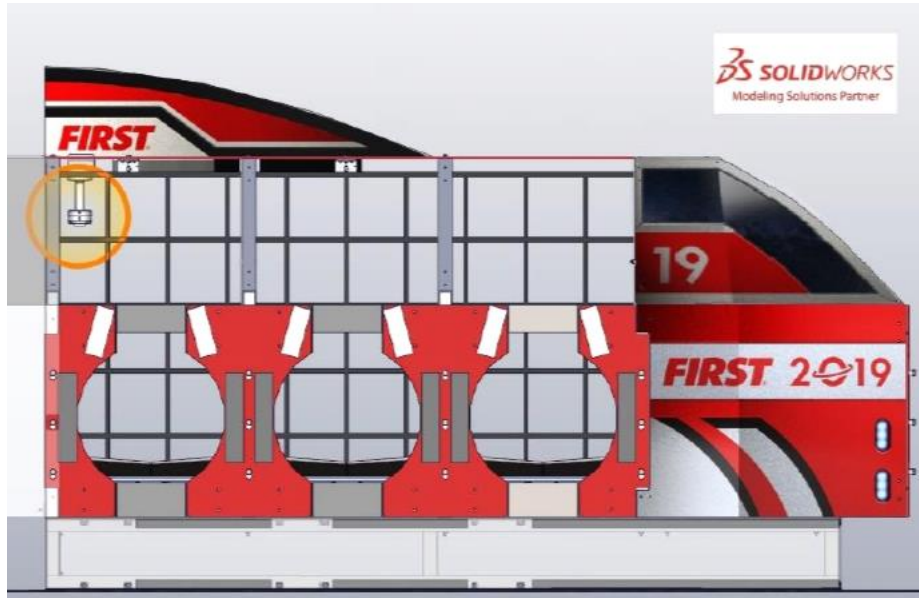
Each BAY capacity is approximately three (3) CARGO but only one (1) CARGO per BAY contributes to the ALLIANCE's MATCH score.

BAY floors are initially sloped to retain CARGO. At the end of the SANDSTORM PERIOD, T-minus135s, they tilt causing CARGO to roll out of the CARGO SHIP if no HATCH PANEL has been attached to the corresponding HATCH.

There are three (3) posts on each side of each HATCH.

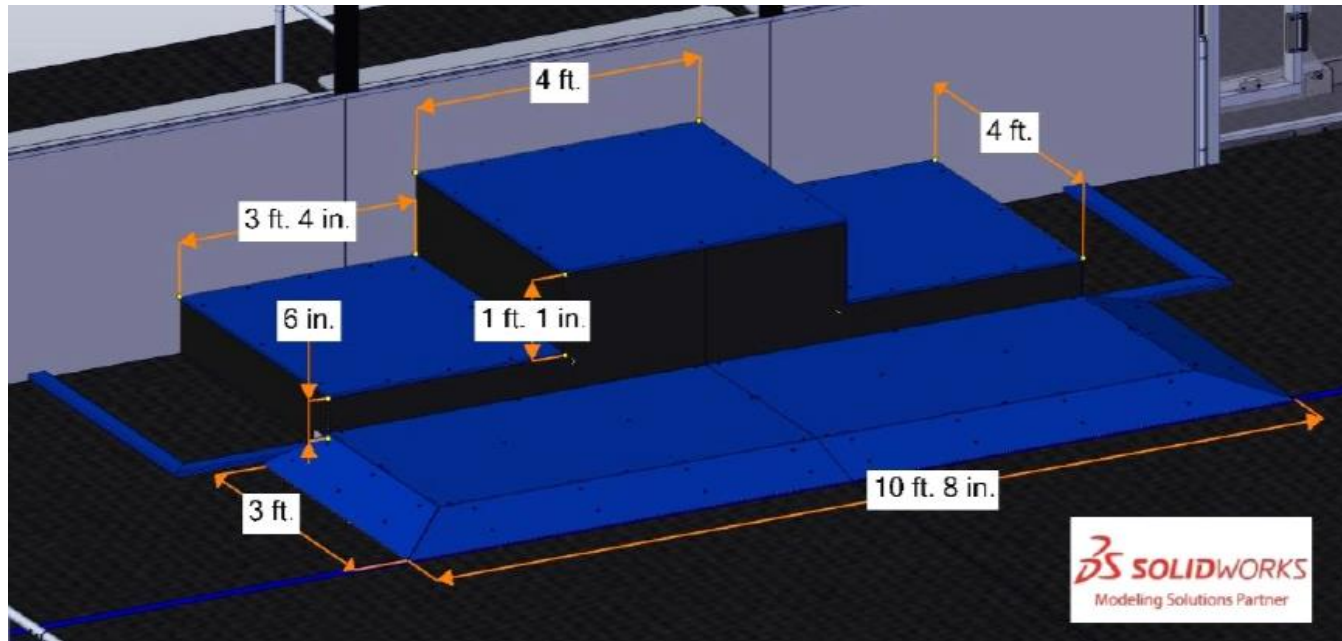
Each CARGO SHIP has an 8 in. tall recess around the bottom. The recess around the bottom of the CARGO SHIP gives BUMPER clearance and allows ROBOTS to interact with the CARGO SHIP using ROBOT parts inside the FRAME PERIMETER.

# Game Overview – Cargo Ship



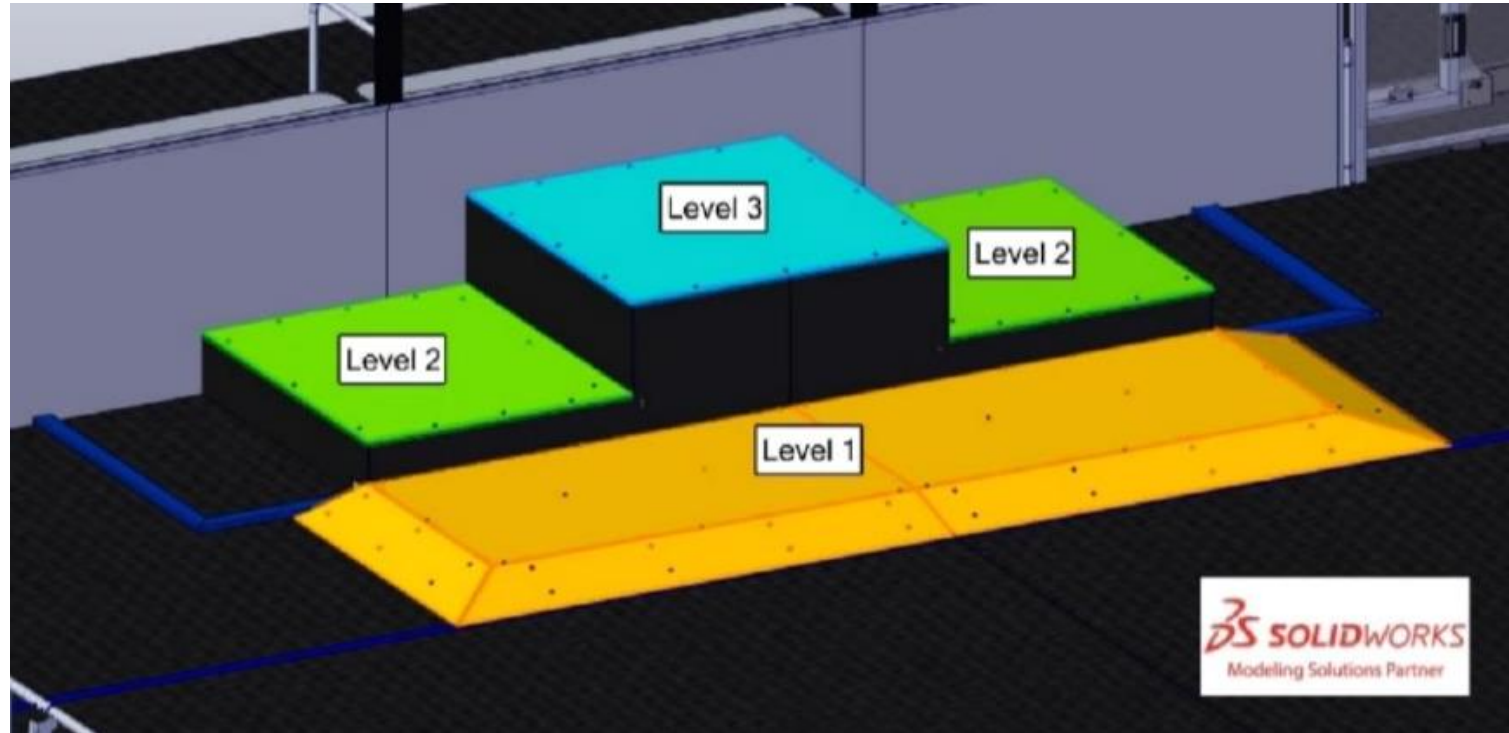
Each CARGO SHIP has a yellow light suspended inside the aft part of the ship which, if on, indicates that a MATCH is not in progress and the magnets securing the BAY floors are energized.

# Game Overview – HAB Platform



The HAB PLATFORM consists of a ramp, four (4) decks at three levels, the ALLIANCE colored tape that traces the intersection of the ramp and the carpet, and all relevant supporting structure.

# Game Overview – HAB Platform

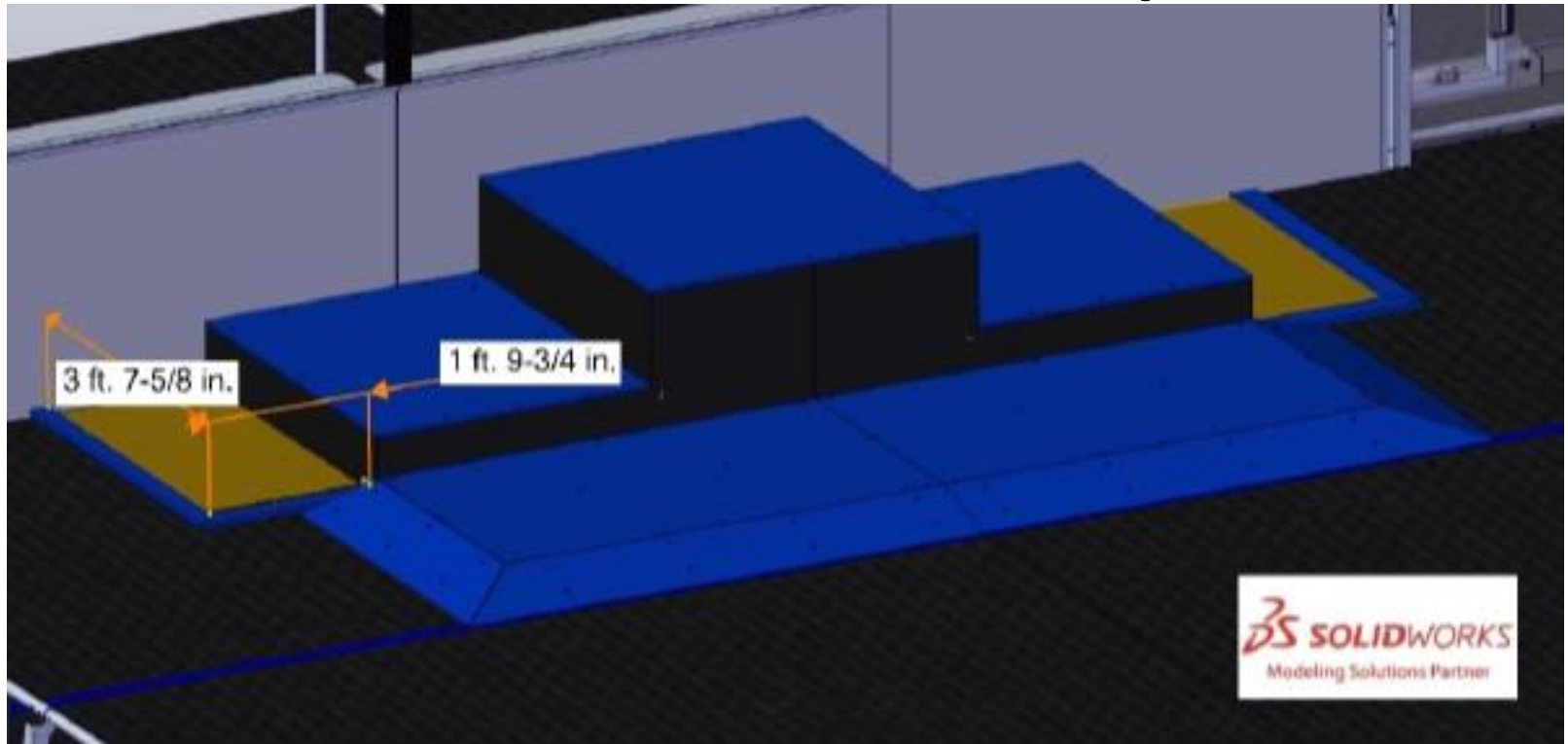


The decks define the levels for scoring purposes as follows.

- The lowest deck and the ramp form Level 1. The Level 1 deck is 3 in. high by 10 ft. 8 in. long by 3 ft. deep. The ramps are 11½ in. long with a 15-degree angle.
- The middle two (2) decks form Level 2. Each Level 2 deck is 3 ft. 4 in. wide by 4 ft. deep. Level 2 is 6 in. higher than the deck of Level 1.
- The highest deck forms Level 3. The Level 3 deck is 4 ft. wide by 4 ft. deep. Level 3 is 1 ft. 1 in higher than Level 2



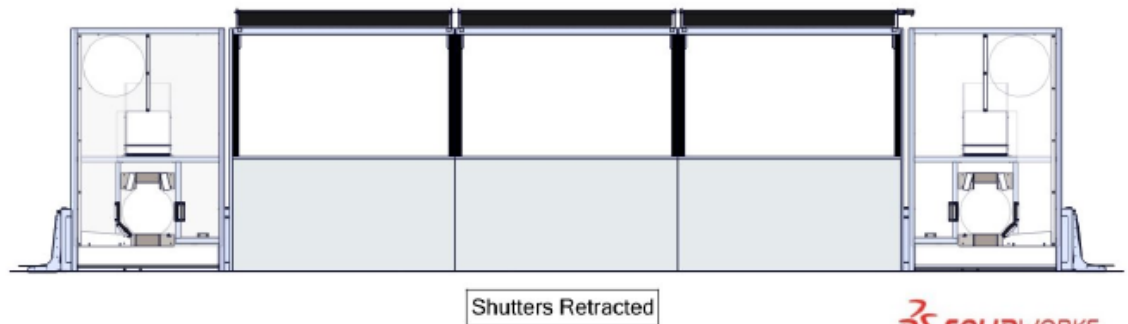
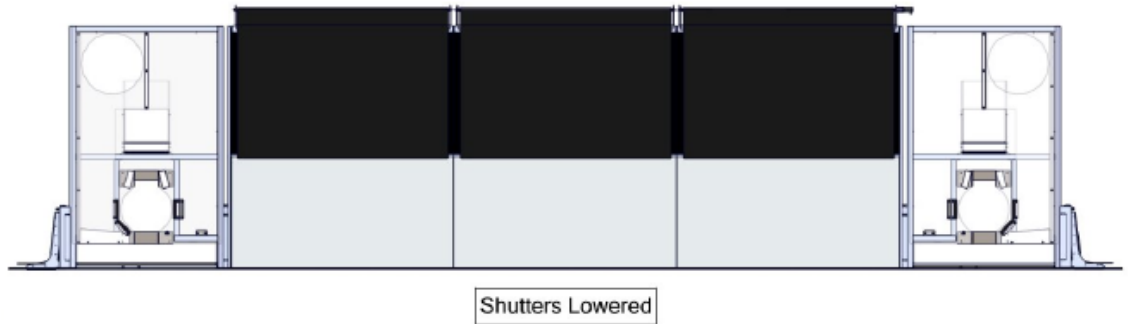
# Game Overview – Depot



A DEPOT is an area used to stage CARGO at the start of the MATCH. Each DEPOT is bounded by, but does not include, its ALLIANCE's HAB PLATFORM, ALLIANCE WALL, and rails and its inside dimensions are 1 ft. 9<sup>3</sup>/<sub>4</sub> in. wide by 3 ft. 7<sup>5</sup>/<sub>8</sub> in. deep. A rail is a 1<sup>1</sup>/<sub>8</sub>-in. tall and 4-in. wide steel barrier that is attached to the ARENA carpet.

# Game Overview – Sandstorm

The SANDSTORM is installed above each ALLIANCE WALL. The SANDSTORM is an assembly that features three (3) shutters, each directly above a PLAYER STATION. Just before the MATCH, shutters are lowered on the HAB ZONE side of the PLAYER STATION transparent plastic panels. At the end of the SANDSTORM PERIOD, the shutters retract over a period of ~2 seconds to reveal the FIELD to DRIVE TEAMS. The shutters remain retracted for the remainder of the MATCH.



# Game Overview – Loading Station

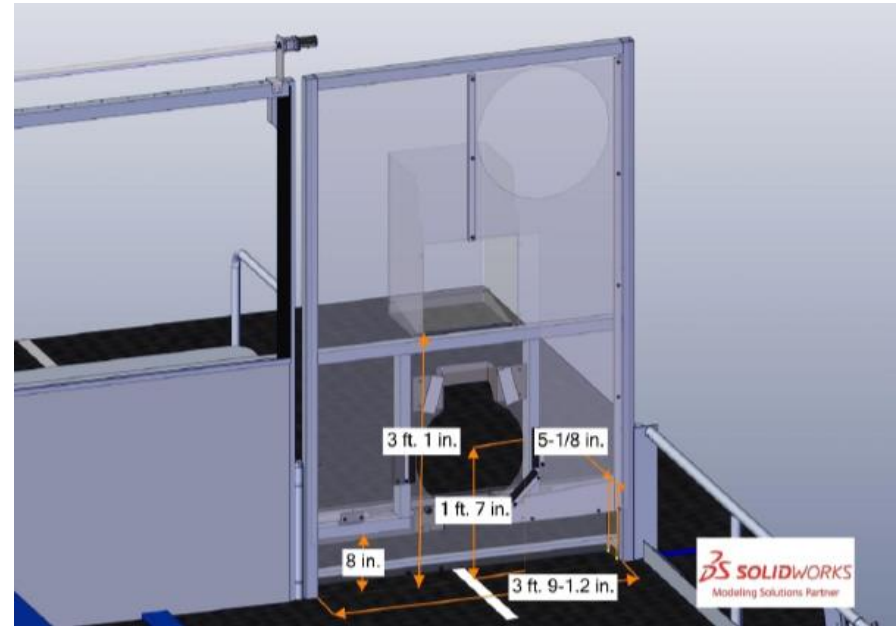
A **LOADING STATION** is a **FIELD** assembly that allows **HUMAN PLAYERS** to feed **GAME PIECES** to **ROBOTS**.

**HATCH PANELS** placed from the **ALLIANCE STATION** in the round hole drop down onto pins on the **FIELD**-side of the wall, and rest vertically such that the center of the **HATCH PANEL** is 1 ft. 7 in. above the carpet.

A **CARGO** dropped in to the chute falls out the **FIELD** side of the **LOADING STATION** through a 1 ft. 2¼ in. long square hole 3 ft. 1 in. from the carpet.

Each station has an 8 in. tall by 3 ft. 9½ in. wide by 5⅞ in. deep recess at the bottom to accommodate **ROBOT BUMPERS**.

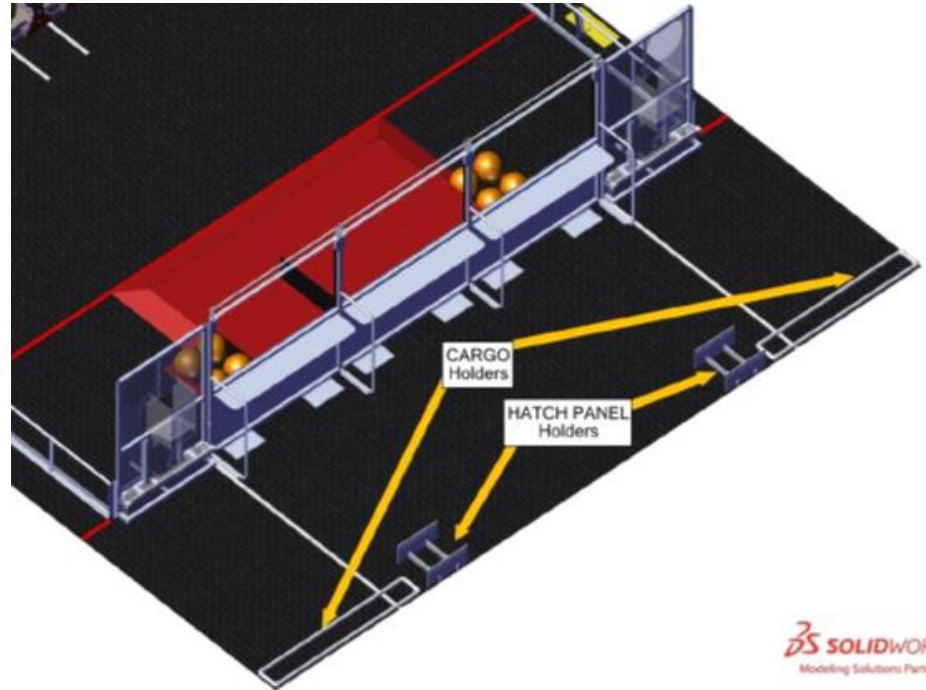
There is a plastic and metal guard behind the station to isolate humans from **ROBOTS**.



# Game Overview – Game Piece Holders

Each ALLIANCE STATION has two (2) Panel hold assemblies. A HATCH PANEL Holder is a 1 ft 10 in. long by 1 ft 7 in. wide by 10 in. tall HDPE rack positioned such that one is in each of the back corners of the ALLIANCE STATION.

Each HATCH PANEL Holder can hold up to eleven (11) HATCH PANELS in their vertical orientation.



Each ALLIANCE STATION also has two (2) CARGO Holders. A CARGO Holder is a 6 ft 8 in. long by 1 ft wide by 2 in. tall PVC rectangle positioned next to the PANEL Holder and against the back of the ALLIANCE STATION.

Each CARGO Holder can hold up to six (6) CARGO.

# Game Overview – Cargo

Each CARGO is an orange 13-in. rubber playground ball with a FIRST logo. The ball is made by Sportime (PN 1623139E) and sold by AndyMark ([PN am-4000\\_cargo](#)).

These playground balls used as CARGO are not manufactured with any tight tolerance. They're not balanced all the way around and wall thickness varies so they may not always roll straight or bounce as expected.



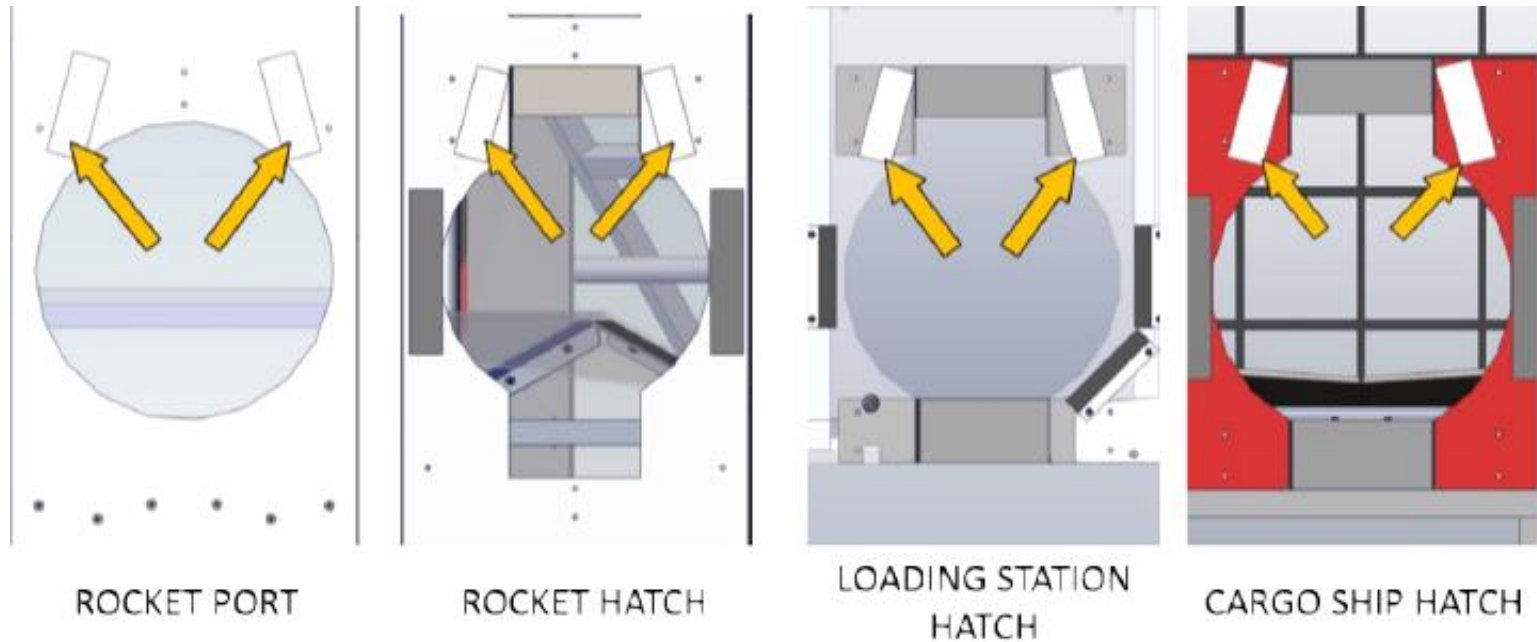
# Game Overview – Hatch Panel

Each HATCH PANEL is a circular  $\frac{3}{16}$ -in. (~5 mm) thick polycarbonate toroid. The outside diameter of the toroid is 19 in. and the diameter of the hole centered in the toroid is 6 in. The edge and outside ~1 in. of both sides of the toroid are covered with white 3M™ Fastener SJ3571 loop tape (PN 70070457349).

The HATCH PANELS that shipped in the Kickoff Kits and that will be used in official DESTINATION: DEEP SPACE competitions are [VEXpro part number 217-6562](#). Due to sourcing complexities, most panel inventory available for purchase uses a different, but functionally equivalent, loop tape.



# Game Overview – Hatch Panel



Vision targets are located on the ROCKETS, CARGO SHIPS, and LOADING STATIONS and highlight the locations of the HATCHES, PORTS, and HATCH PANEL retrieval locations. A vision target is a pair of 5½ in. long by 2 in. wide strips of 3M 8830 Scotchlite Reflective Material. Strips are angled toward each other at ~14.5 degrees and such that there's an 8-in. gap at their closest points.

# Safety

- Safety is paramount at all times, and each rule is intended to establish norms at each event that will mitigate injury risk to all participants.
- Robots whose operation or design is dangerous or unsafe are not permitted.
- Drivers need to know the safety rules for entering the field, exiting the field, robot carrying, human safety rules during the match, etc.



# Seeding

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

Order	Points
1	Ranking score
2	Cumulative cargo score
3	Cumulative hatch panel points
4	Cumulative HAB climb points
5	Cumulative sandstorm bonus points
6	Random sorting by FMS

# Game Play – Scoring

Alliances rewarded for accomplishing various actions during the match. Rewards can be either match points or ranking points.

Except for sandstorm bonuses, scores are based on the state of the field at the end of the match.

A robot is considered to have started from, or climbed to, a HAB level if the robot is only supported by:

- Surfaces of the HAB at or above that level
- Alliance wall, and/or
- Another robot which has climbed to that HAB level or higher

# Game Play – Scoring

Award	Awarded for:	Value
Sandstorm bonus 1	Each robot whose bumpers fully cross the HAB line during the sandstorm period. Value corresponds to the level from which the robot started.	3
Sandstorm bonus 2		6
Hatch panel	Each hatch panel (excluding null hatch panels) attached to a rocket or cargo ship such that it is fully supported by that rocket or cargo chip and via the hook/loop tape. No more than one hatch panel per hatch will be counted	2
Cargo	Each cargo (regardless of inflation state) in a bay with a null hatch panel or scored hatch panel and not in contact with a robot. No more than one cargo per bay will be counted	3
HAB climb bonus: level 1	Each robot which has climbed the HAB platform (value corresponds to the level to which the robot has climbed). A robot that hasn't fully crossed their HAB line to leave their HAB zone at any point during the match isn't eligible.	3
HAB climb bonus: level 2		6
HAB climb bonus: level 3		12
HAB docking	Earning at least fifteen HAB climb bonus points	1 Ranking Pt.
One Complete Rocket	Completing at least one rocket with six scored hatch panels and six scored cargo	1 Ranking Pt.
Tie	Completing a match with the same number of points as your opponent	1 Ranking Pt.
Win	Completing a match with more points than your opponent	2 Ranking Pts.

# Game Play – Rule Violations

Penalty	Description
Foul	A credit of three points towards the opponent's total score
Tech Foul	A credit of ten points toward the opponent's total score
Yellow Card	A warning issued by the head referee. A subsequent yellow card within the same tournament phase will lead to a red card
Red Card	A penalty assessed for egregious robot or team member behavior or rule violations which results in a team being disqualified for the match
Disabled	Robot is commanded to deactivate all outputs, rendering the robot inoperable for the remainder of the match
Disqualified	The state of a team in which they receive zero match points in a qualification match or caused their alliance to receive zero match points in a playoff match

# Game Play – Drive Team

Drive team is a set of up to five people from the same FRC team responsible for team performance for a specific match.

<b>Role</b>	<b>Description</b>	<b>Max/Drive Team</b>	<b>Criteria</b>
Coach	A Guide or advisor	1	Pre-college student or adult mentor
Driver	An operator and controller of the robot	3	Per-college student
Human Player	A game piece manager		
Technician	A resource for robot troubleshooting, setup, and removal from the field	1	Pre-college student

# Game Play – Game Pieces

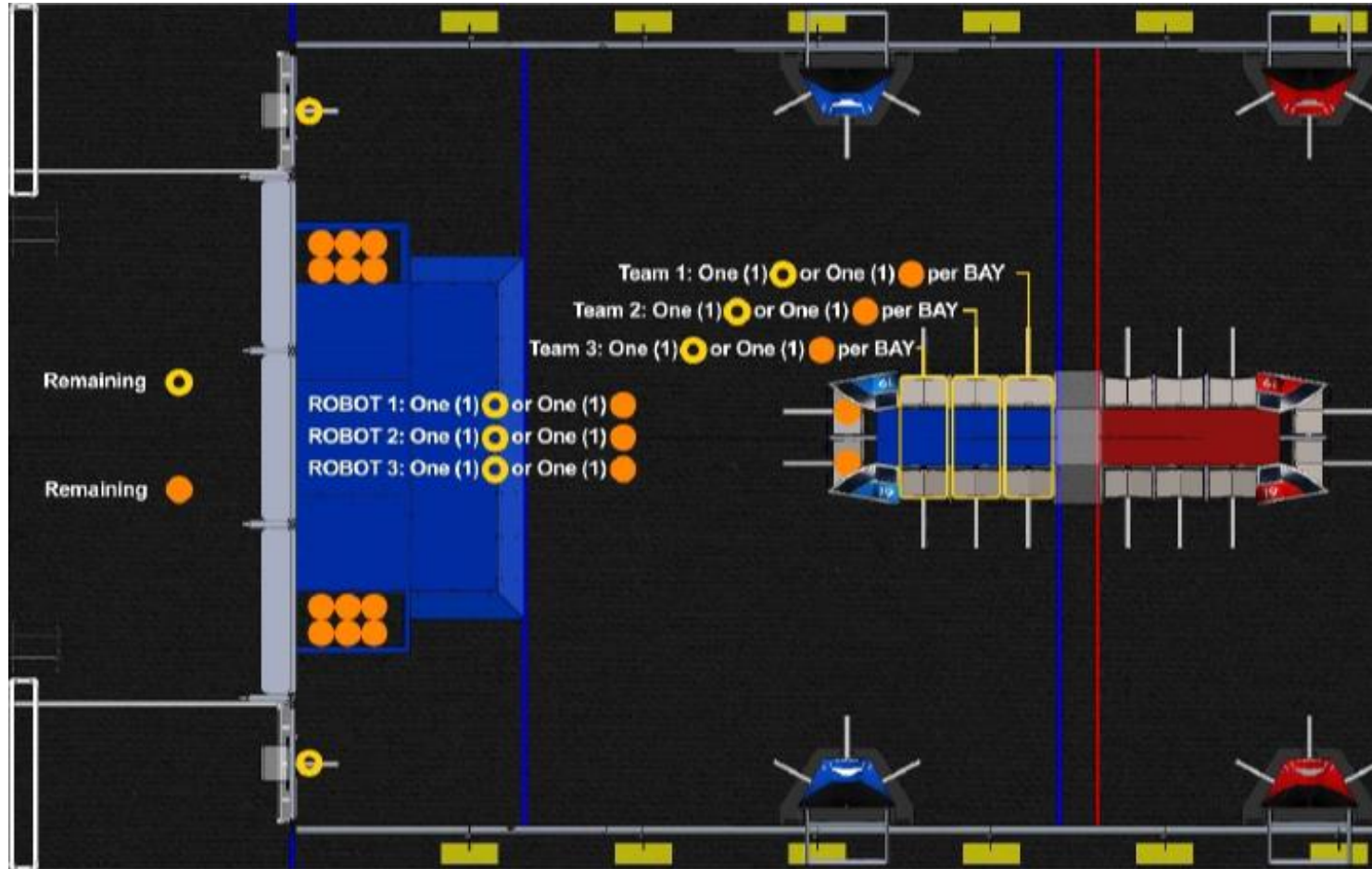
24 game pieces are stage on each side of the field for each match as follows:

- A. One hatch panel is loaded in each of the two loading stations
- B. Six cargo are stage in each of the two depots
- C. Each of the three teams may preload one hatch panel or one cargo
- D. Remaining hatch panels (19-22) and cargo (9-12) are staged in the corresponding alliance stations, split evenly between the game piece holders

Additional game pieces are stages as follows:

- E. One cargo is staged in each of the two alliance wall-facing cargo ship bays
- F. Each team must prepopulate one cargo or one null hatch panel in each of their two designated cargo ship bays (designated per the match schedule – see next slide). Nonstaged null hatch panels and cargo are excluded from match play.

# Game Play – Game Pieces



# Game Play – Robots

- Teams stage their robot on their HAB platform such that it is fully and only supported by HAB platform levels 1 or 2.



# Game Play – Humans

- Drivers, coaches, and human players stage between the starting lines in their alliance station.
- Technicians stage in the event-designated area near the field.

# Game Play – Sandstorm Period

- The sandstorm period is fifteen seconds at the start of the match during which the player station is blocked by the sandstorm. Teams have the option of their robots operating autonomously, driving blind, or using visual feedback provided by the robot to navigate the field.

Award	Awarded for:	Value
Sandstorm bonus 1	Each robot whose bumpers fully cross the HAB line during the sandstorm period. Value corresponds to the level from which the robot started.	3
Sandstorm bonus 2		6

# Game Play – Other

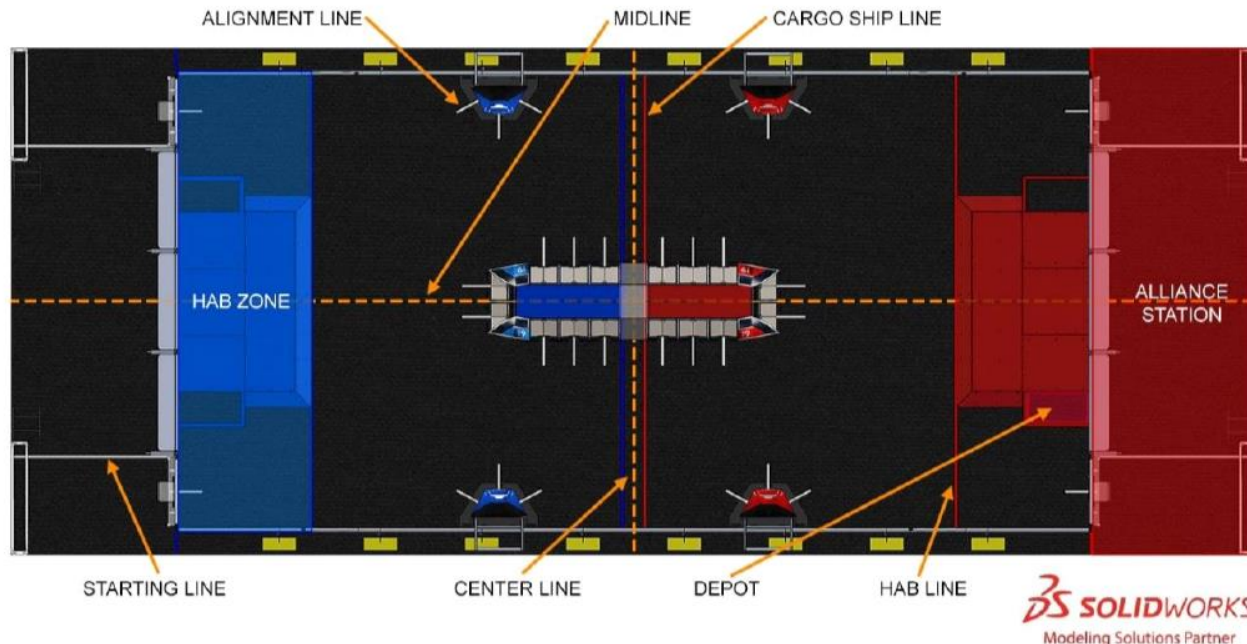
- Game pieces that leave the field are place back into the field approximately at the point of exit by field staff at the earliest safe opportunity.

# Game Play – Robots

- When placed on the field for a match, each robot must be:
  - In compliance with all robot rules
  - The only item left on the field by the drive team
  - Confined to its starting configuration
  - Set on their HAB platform, and
  - Supporting not more than one game piece

# Game Play – Robots

- Only during the sandstorm period:
  - No defense
  - A robot may not cross the field such that its bumpers break the plane defined by their opponent's cargo ship line



# Game Play – Game Piece Interaction

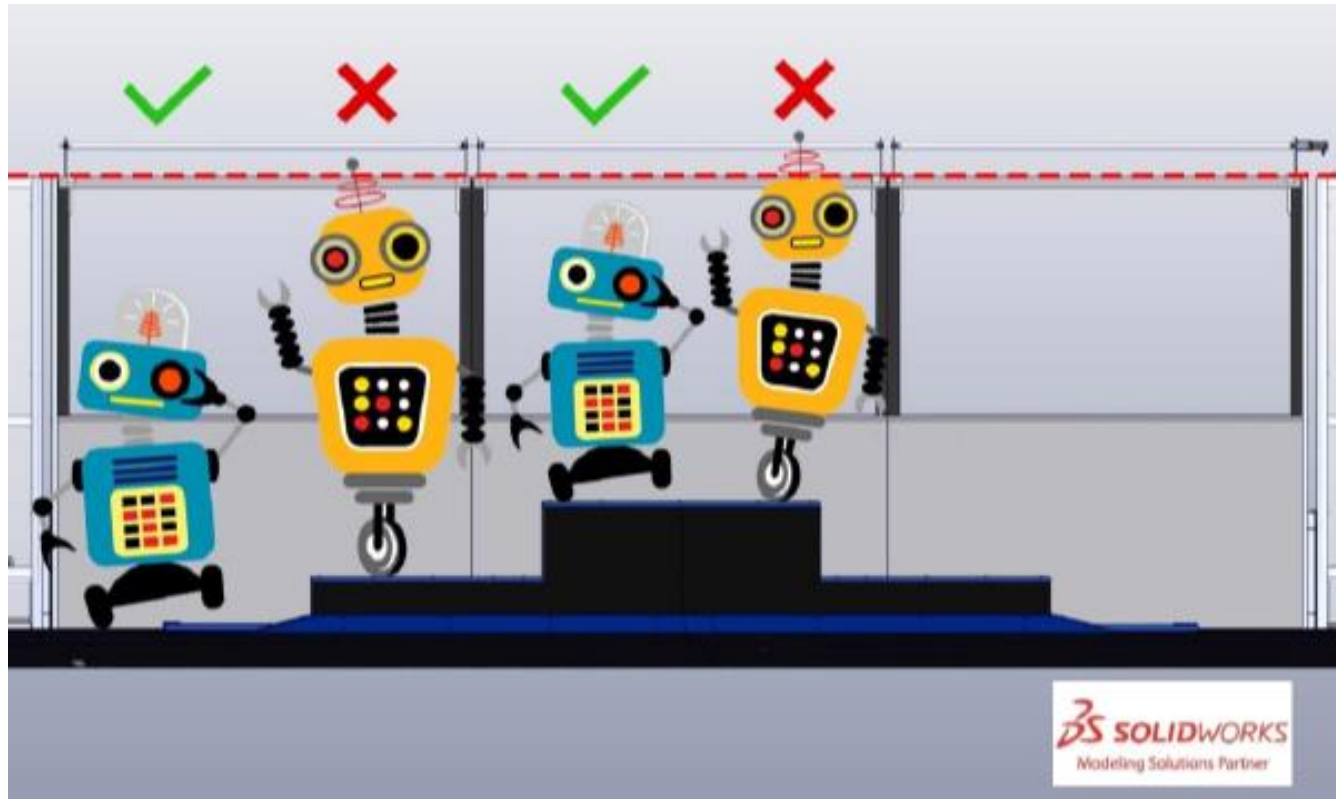
- One game piece at a time.
  - Robots may not have extended or repeated control, i.e. exercise extended or repeated influence, of more than one game piece at a time, either directly or transitively through other objects.
- A robot may not remove a game piece from an opponents' rocket/cargo ship.
- Robots may not shoot hatch panels into the air, kick them across the floor using an active mechanism, or eject them across the floor in a forceful way.
- Robots may not deliberately use game pieces in an attempt to ease or amplify the challenge associated with field elements.

# Game Play – Zone Specific Restrictions

- No more than one robot may be positioned such that its bumpers break the plane defined by or are completely beyond the opponent's cargo ship line (One defender at a time).
- No part of a robot, except its bumpers, may be outside its frame perimeter if its bumpers are completely beyond its opponent's cargo ship line.
- Robots with its bumpers breaking the plane defined by or completely beyond the opponent's cargo ship line may not shoot cargo into the air, kick it across the floor using an active mechanism.

# Game Play – Zone Specific Restrictions

- A robot with its bumpers fully in either HAB zone may not extend above the alliance station wall, i.e.. More that 6 ft 6 in. above the carpet.





# Game Play – Zone Specific Restrictions

- A robot may not contact an opponent robot if that opponent robot's bumpers are fully in their HAB zone.
- A robot may not be fully supported by a partner robot unless the supporting robot is in contact with its HAB zone.
- During qualification matches, robots may not contact opponents' rockets starting at T-minus 20s. Incidental contact is an exception to this rule.

# Game Play – Humans

- The only equipment that may be brought to the arena and used by the drive teams during a match are:
  - The operator console
  - Non-powered signaling devices
  - Reasonable decorative items
  - Special clothing and/or equipment required due to a disability
  - Devices used solely for planning or tacking strategy
  - Devices used solely to record gameplay
  - Non-powered personal protective equipment
- A robot shall be operated solely by the drivers and/or human players of that team

# Game Play – Humans

- Only during the sandstorm period
  - Human players may not break the vertical planes defined by the starting lines, unless for safety purposes
  - Coaches, drivers, and human players may not look over the top of the alliance wall to overcome the effect of the sandstorm

# Game Play – Humans

- Team members may never throw hatch panels
- Team members may never strike or hit the alliance station plastic windows

# Robot Rules

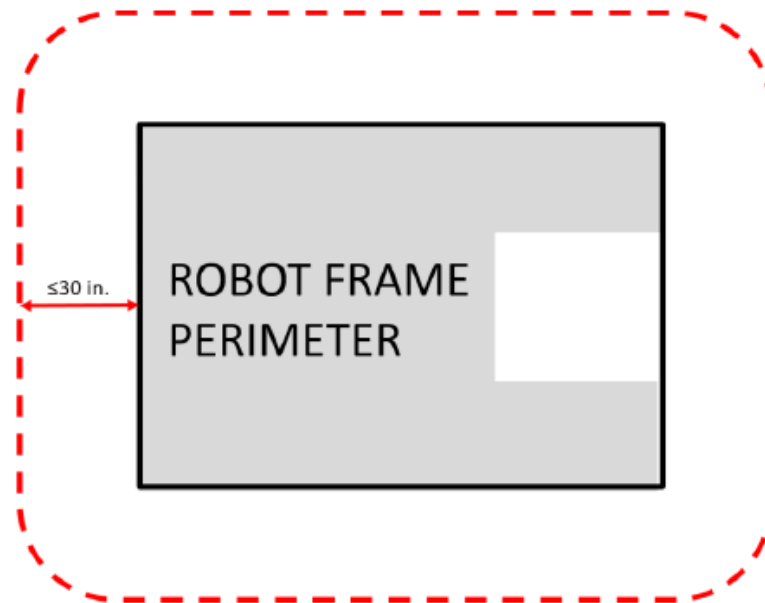
- Robot may not intentionally detach or leave parts on the field.
- Robot must be in compliance with bumper rules throughout the match.
- Robot must be removed from the field by hand.
- Robot must have a frame perimeter, contained within the bumper zone, that is comprised of fixed, non-articulated structural elements.

# Robot Rules

- A robot's starting configuration may not have a frame perimeter greater than 120 in. and may not be more than 4 ft. tall.
- Expect to have to demonstrate a robot's ability to constrain itself per above during inspection. Constraints may be implemented with either hardware or software.

# Robot Rules

- In the starting configuration, no part of the robot shall extend outside the vertical projection of the frame perimeter, with the exception of its bumpers and minor protrusions such as bolt heads, fastener ends, rivets, cable ties, etc.
- Robot may not extend more than 30 in. beyond their frame



# Robot Rules

- A robot weight must not exceed 125 lbs. When determining weight, the basic robot structure and all elements of all additional mechanisms that might be used in different configurations of the robot shell be weighted together.
  - Excluding bumpers, battery and its associated half of the Anderson cable quick connect pair

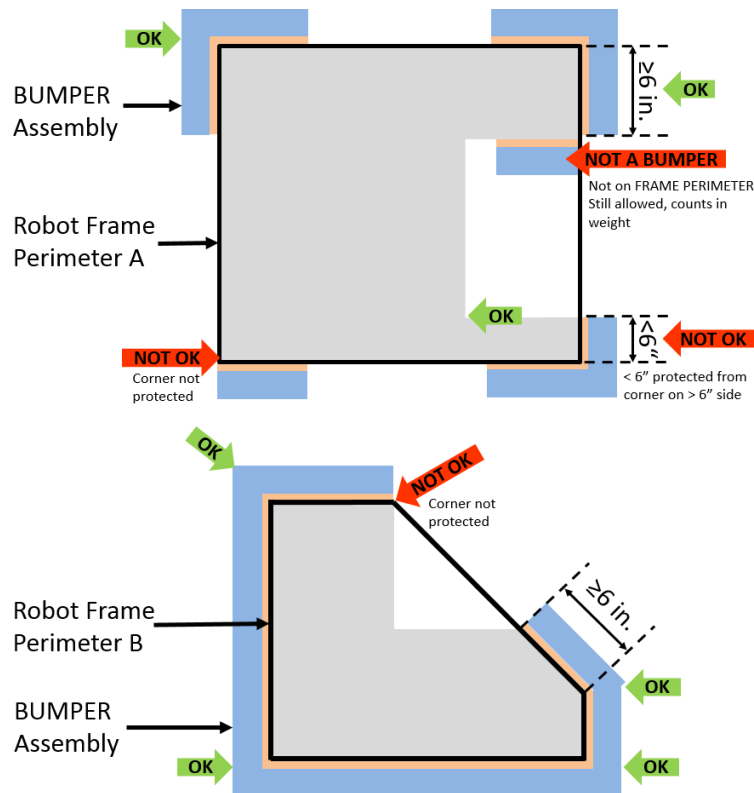


# Robot Rules

- A robot may not be designed to launch a hatch panel more than 2 ft. beyond its frame perimeter
- Traction devices must not have surface features such as metal, sandpaper, hard plastic studs, cleats, hook-loop fasteners or similar attachments.
- Robot must allow removal of game pieces from the robot and the robot from field elements while disabled and powered off.
- The total cost of all items on the robot shall not exceed \$5,000.

# Bumper Rules

- Robots are required to use bumpers to protect all outside corners of the frame perimeter.



# Other Rules

- There are many other rules for the construction of the robot, bagging rules, etc. in the game manual

# Seeding

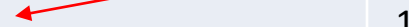
- All teams seeded during qualification matches.
- Teams ranked in this order:

Order	Points
1	Ranking score (Ranking points earned – winning, tie, and extra points)
2	Cumulative cargo score
3	Cumulative hatch panel points
4	Cumulative HAB climb points
5	Cumulative sandstorm bonus points
6	Random sorting by FMS

# Game Play – Scoring

Award	Awarded for:	Value
Sandstorm bonus 1	Each robot whose bumpers fully cross the HAB line during the sandstorm period. Value corresponds to the level from which the robot started.	3
Sandstorm bonus 2		6
Hatch panel	Each hatch panel (excluding null hatch panels) attached to a rocket or cargo ship such that it is fully supported by that rocket or cargo chip and via the hook/loop tape. No more than one hatch panel per hatch will be counted	2
Cargo	Each cargo (regardless of inflation state) in a bay with a null hatch panel or scored hatch panel and not in contact with a robot. No more than one cargo per bay will be counted	3
HAB climb bonus: level 1	Each robot which has climbed the HAB platform (value corresponds to the level to which the robot has climbed). A robot that hasn't fully crossed their HAB line to leave their HAB zone at any point during the match isn't eligible.	3
HAB climb bonus: level 2		6
HAB climb bonus: level 3		12
HAB docking	Earning at least fifteen HAB climb bonus points	1 Ranking Pt.
One Complete Rocket	Completing at least one rocket with six scored hatch panels and six scored cargo	1 Ranking Pt.
Tie	Completing a match with the same number of points as your opponent	1 Ranking Pt.
Win	Completing a match with more points than your opponent	2 Ranking Pts.

Need hatch panels to hold cargo



# Playoff Matches

- No ranking points; earn a win, loss, or tie
- Within each series, first alliance to win two matches moves on
- In quarterfinals and semifinals, tie breaker used in case of tie:

Order Sort	Criteria
1 <sup>st</sup>	Cumulative foul points due to opponent rule violations
2 <sup>nd</sup>	Cumulative cargo points
3 <sup>rd</sup>	Cumulative hatch panel points
4 <sup>th</sup>	Cumulative HAB climb points
5 <sup>th</sup>	Cumulative sandstorm bonus points
6 <sup>th</sup>	Match is replayed

District teams are ranked throughout the season based on the points they earn at their first two home District events they attend, as well as at their District Championship. Points (points tripled) are awarded to teams as follows:

*District point assignment*

<b>Category</b>	<b>Points</b>
Qualification round performance.	For events of all sizes, a maximum of twenty-two (22) points will be awarded.)
ALLIANCE CAPTAINS	Equal to 17 minus the ALLIANCE CAPTAIN number (e.g. 14 points for ALLIANCE #3 Captain)
Draft Order Acceptance	Equal to 17 minus the Draft Order Acceptance Number (e.g. 12 points for the Team that is 5th to accept an invitation)
Playoff Advancement	Points awarded based on team participation in individual playoff rounds, and whether or not the ALLIANCE advances.
Judged Team Awards	<ul style="list-style-type: none"><li>• 10 points for Chairman's Award</li><li>• 8 points each for Engineering Inspiration and Rookie All Star Awards</li><li>• 5 points each for all other judged Team awards</li></ul>
Team Age	<ul style="list-style-type: none"><li>• 10 points for Rookie Teams</li><li>• 5 points for second-year Teams</li></ul>

# Considerations

- What is important to do?
  - For ranking points
  - For sandstorm period scoring
  - For rest of match scoring
  - For making it into the Playoff round
  - For tie breaking in ranking points
  - For durability and reliability
  - To win engineering awards
- Form follows function:
  - Decide what function(s) we want to perform before deciding on what form to make the robot



# Considerations

- What can be done so that the robots will be done in time to practice (driving robot after 4 weeks)?
- Should we plan to use the camera to either help drivers or use vision tape?
- Think about how you would do it if only humans played
- What is impact of limited size restrictions?
- For each function, consider impact on rest of robot functions, space, weight, balance, etc.
- Decide what we don't want to do and eliminate it from further consideration
- Trying to do everything usually means you sacrifice doing a few things really well

# 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?
- What do we know how to do?
- What can be done effectively?
- Are we building two robots
  - First one is prototype plus one to drive when robot in bag
  - Second one is done with CAD and made to look good
- What needs to be done in CAD first vs. done and then use CAD to improve the second robot

# Considerations

- What is needed to win in week one might not win in week seven
- The better the robot and drive team, the more we play and the more the robot is used
- What about defense in this year's game
- Can the same mechanism do more than one function with some modifications
  - Example, same device that picks up cargo can pick up hatch panel using the hook and loop system

# Considerations

- Based on scoring and tie breaking, what are two or three key strategies:
  - Ability to maximize elimination round points
  - Autonomous programming for mobility or scoring
  - Ability to collaborate with Alliance partners
  - Assist alliance with ranking points
- Take enough time to know what we want to do (knowing why we want to do it) before we decide how to do it.

# Key Dates

- Robot Bag and Tag date is:
  - February 19, 2019 at 11:59 PM Eastern Time

# Strategy and Design Development

1. Taking next couple of days to “really, really, really think about the problem” before we solve the problem.
2. All engineering team leaders are also on the Strategy Team and will be involved in the strategy development in the next week.
3. Today we are gathering information from what we know today.

# Design Selection

- After input reviewed and input from various teams, Game Strategy and Scouting team, etc.:
  - AdamBots Design selection committee
  - Use tools to compare options
  - Recognize that almost everything we think of will be done by someone

# Strategy Discussion Groups

1. There are 6 discussion groups (business team members welcome to join a group)
  - Mechanical 1, 2, and 3,
  - Controls and Programming,
  - Electrical,
  - CAD
2. List what is important to do **and why**
3. Also list what we do not need to do **and why**

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



# Strategy Discussion Groups

1. Break from 2:30 Pm to 3:00 PM
2. You have until 4:30 PM to prepare for review
3. At 4:30 PM, we will go around the room and have each team summarize their discussion
4. Game Strategy will document and summarize results
5. Project Management will start process of schedule management
6. When done, we need to clean up the room as if we were never here