RECF ENGAGE

ROBOTICS COMPETITION

TIER TAKEOVER

2026-2027

Game Manual Version 3.0

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RECF ROBOTICS COMPETITIONS

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RECF Engage Robotics Competition Tier Takeover

2026-2027

Game Manual Version 3.0

November 10, 2026

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Prefix

Welcome and Thank You

Welcome to the Robotics Education & Competition Foundation (RECF) Engage Robotics Competition!

In RECF Engage, students will explore creativity, teamwork, innovation, and engineering in a fun environment designed to inspire the next generation of problem-solvers and leaders.

RECF Engage will get students excited about STEM through hands-on learning, documentation, and competition. Students are at the center of everything we do, and they are encouraged to take ownership of their ideas while working collaboratively with teammates and solving real world problems.

One of our goals with RECF Engage is to allow for broader robotics access for all students. As a part of that goal, we encourage student resourcefulness and outside-the-box thinking with multiple robotics system options as well as allowances for custom plastic and 3D printing.

We are grateful that you have chosen the RECF as your robotics program provider. With so many opportunities available, we are honored that you selected our program to support your students' learning and growth.

Thank you for joining our community. We cannot wait to see what your teams achieve this season!

About the RECF

The Robotics Education & Competition Foundation is a registered US 501(c)(3) non-profit organization that exists to spark interest in science, technology, engineering and math by engaging students in hands-on, sustainable, and affordable curriculum-based robotics programs.

Our global mission is to provide every educator with competition, education, and workforce readiness programs to increase student engagement in science, technology, engineering, math, and computer science. We see a future where every student designs and innovates as part of a team, overcomes failure, perseveres, and emerges confident in their ability to meet global challenges.

As a company, we embrace the core values of passion, integrity, and excellence, which we try to embody in everything we do.

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Revision History

RECF will release updated game manuals through the season, as listed below. Each event or league session must use the latest rule set published before the start of the event. Answers in the official Q&A system are effective immediately unless stated otherwise in the answer.

Schedule of Planned Releases

- June 10, 2026 - Initial v1.0 release
- July 10, 2026 - Minor release
- July 28, 2026 - Minor release with some changes to gameplay
- September 29, 2026 - Major v2.0 release with changes to gameplay
- November 10, 2026 - Major v3.0 release with changes to gameplay
- December 22, 2026 - Possible release with minor updates
- February 2, 2027 - Possible release with minor updates
- March 16, 2027 - Major v4.0 release with changes for the RECF World Championship

Version 1.0

- Initial release

Version 1.1 - July 10, 2026

- Added links to official Q&A system (games.recf.org)
- 1.6 - Added examples for fouls and penalties and clarified who has jurisdiction to decide a foul.
- 2.0 - Clarified that robots cannot participate in matches while breaking robot rules
- 2.2.1 - Changed to allow horizontal expansion up to 24" long
- 2.2.2 - Clarified that students can modify VEX IQ® & LEGO® structural pieces
- 2.2.3 - Added minimum license plate size and maximum license plate thickness
- 2.2.4 - Clarified that a custom 3D-printed part can consist of a single contiguous part or a multi-part component that meets the size requirements for a single part
- 2.2.4 - Specified that custom license plates, controller accessories, basic spacers, and adapters and parts made solely to adapt other legal hardware systems to VEX IQ® electronics do not count towards the custom plastic parts limit and don't have to be designed/modified by student team members
- 2.2.4 - Added LEGO® SPIKE™ Essential to list of legal structural parts
- 2.2.4 - Added LEGO® Mindstorms® motors to list of legal electronic parts
- 2.3 - Moved robot coding rules to this section
- 7.4.4 - Added information about tiebreakers for alliance match rankings
- 7.4.5 - Added information about leagues
- Minor corrections throughout

Version 2.0 - September 29, 2026

- 2.2.4 - Added VEX IQ® AI Vision Sensor and VEX IQ® Vision Sensor as legal parts
- 2.2.4 - Increased maximum thickness of flat-cut plastic parts to 1/8" nominal
- 2.2.4 - Specified that small power supplies for LED decorations are allowed

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- 3.0, 4.0, & 7.4.1 - Changed solo match allocations from 3 of each match type to a flexible "pool" of 5 attempts
- 3.3.7 - Eliminated mandatory driver swap
- 3.5 - Added tiebreaker criteria for solo match rankings
- 7.4.2 - Revised guidance for match counts
- 7.4.2 - Changed rule for dropping lowest scores
- Updated figures for improved clarity
- Minor corrections throughout

Version 3.0 - November 10, 2026

- 1.6 - Clarified that a scorekeeper referee can ground a robot in solo matches if necessary
- 2.2.2 - Clarified that all non-electronic parts may be modified by teams
- 2.2.4 - Clarified that zip ties or cable ties can be used to manage pneumatic tubing
- 2.2.4 - Clarified size limits for 3d printed pieces
- 3.3.4 - Specified that team-loaded bean bags must touch the floor before the robot

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Section 1: The RECF Engage Robotics Competition

1.1 About the RECF Engage Robotics Competition

The RECF Engage Robotics Competition (RECF Engage) provides a hands-on educational STEM experience focused on robot design, construction, strategy, programming, and problem-solving. The program emphasizes teamwork, critical thinking, communication, documentation, and real-world application of concepts.

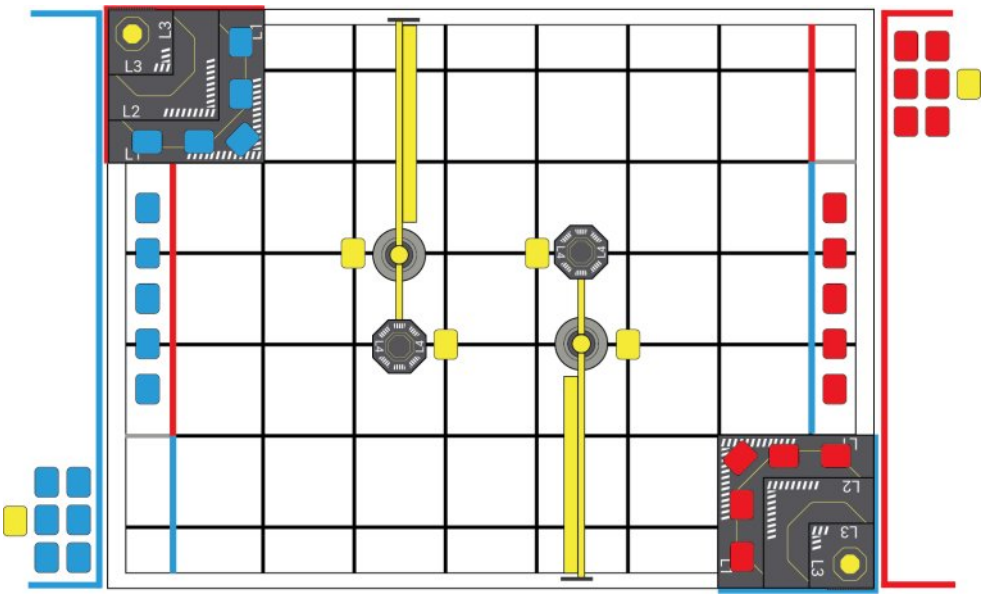
RECF Engage teams consist of students up to 15 years old, categorized as either elementary school or middle school teams. Student team members make all of the decisions about their robot's design, construction, and programming—from blank paper all the way to the world championship.

The RECF Engage season consists of local qualifying events, which qualify teams for assigned event region championships. Event region championships then qualify teams for the RECF World Championship. For more information on the qualification structure, refer to the RECF Qualifying Criteria.

1.2 The 2026-2027 RECF Engage Game: Tier Takeover

In Tier Takeover, robots navigate a 6'x8' field to collect bean bags and place them in and on matching goals to score points. Robots can push, lift, rotate, stack, toss, or plow bean bags, but must follow the rules of each specific match type.

In some matches, team members drive the robot. In others, the robot drives itself based on pre-programmed code written by the students. Not every robot and team will play the game the same way, and some ways to score are easier than others. Your strategies, and your robot, may change over time. As long as you follow the rules in this game manual and the official RECF Q&A system at games.recf.org, you can play the game however you like!



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1.3 Five RECF Engage Competition Challenges

- Design & Build a Robot (see section 2) - Using the engineering design process, work with your teammates to design, build, and test a robot to score points in matches
- Solo Driving Matches (see section 3) - 2 to 3 members of your team work together at the field to score points with a robot responding to input by remote control
- Solo Coding Matches (see section 4) - Up to 3 members of your team work together at the field to score points with a robot operated entirely by segments of code—no controller!
- Alliance Matches (see section 5) - Your team collaborates with another team at the field to score as many points as possible using both teams' robots
- Judging (see section 6) - Document and share your use of the engineering design process in an engineering notebook throughout the season, and describe your work to judges during interviews

1.4 RECF Program Rules

1.4.1 RECF Policies

All participants must follow the guidelines and rules in this game manual, the official RECF Engage Q&A at games.recf.org, and these additional official RECF policies.

- RECF Organizational Policy
- RECF Student-Centered Policy
- RECF Code of Conduct
- RECF Qualifying Criteria
- RECF Guide to Judging
- RECF Youth Protection Policy
- RECF Commitment to Coach Excellence
- RECF Commitment to Event Excellence

1.4.2 RECF Engage Teams & Students

Teams must be registered in RECFevents.org for the RECF Engage program to participate in RECF Engage qualifying events.

Each RECF Engage team has two or more students. Students are categorized by their age at the end of the 2027 RECF World Championship. To compete in the 12U / elementary school category, a student must be 12 years of age or younger on May 6, 2027. To compete in the 15U / middle school category, a student must be 15 years of age or younger on May 6, 2027.

Team structure must follow the RECF Organizational Policy. Teams must be student-centered and follow the RECF Student-Centered Policy and the RECF Code of Conduct at all times, including at practices and when attending events.

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1.4.3 Supervision & Release Forms

When attending events, students must be accompanied by a responsible adult over the age of 18 for the duration of the event. All participants in RECF events must complete an RECF Participant Release Form each season.

1.5 Definitions

1.5.1 General Definitions

- **Alliance** - Two teams assigned to work cooperatively during a match to score shared points
- **Alliance Match** - A match that includes one or more cooperative alliances
- **Coach / Mentor** - A person who helps students learn concepts used in RECF competitions, and who helps create and organize teams, but who cannot contribute to the students' work used at competitions
- **Drive Team** - 2-3 students who participate in a match as representatives for their team
- **Driver Box** - An area near the field where a drive team must stand during a match
- **Engineering Notebook** - A physical or electronic document that records a team's use of the engineering design process, and their work during a competition season
- **Finals Match** - A match that includes two ranked teams paired by the tournament software, and is run to identify the tournament winners
- **Foul** - The act of breaking a rule during a match or event (see section 1.6 for more details)
- **Foul Card** - A tracking system for repeated rule infractions (see section 1.6 for more details)
- **Grounded** - Description of a robot that has broken a safety rule and is no longer allowed to participate in the match; the robot is not allowed to drive, and the controller should be placed on the floor or another nearby position (not on the field)
- **Robot** - A machine designed and built by students from parts that are legal for use in the RECF Engage competition
- **Solo Coding Match** - A one-minute match with one robot and one drive team, during which the robot operates only by code created by the students
- **Solo Driving Match** - A one-minute match with one robot and one drive team, during which students operate the robot by remote control
- **Student** - A team member who meets all requirements of the program, is within the age bracket, and who contributes to a team's notebook, robot design, build, code, and/or strategies or serves as a drive team member; a student can only participate on one RECF Engage team during a season
- **Tournament** - An official RECF Engage event that meets the requirements of the RECF Qualifying Criteria, and includes Alliance Matches, Solo Driving Matches, Solo Coding Matches, and optional judging

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1.5.2 Tier Takeover Definitions

- **Bean Bag** - A red, blue, or yellow flexible, fabric, pellet-filled object that is approximately 3”x4” with a weight of approximately 40 grams
- **Floor Goal** - A scoring location that consists of a vertical projection above a defined area of the field bordered by the inside of the field perimeter and the inside edges of the adjacent VEX IQ® parts; the floor goals are highlighted in orange in figure 1.5.2
- **L1, L2, or L3 Goal** - A scoring location that consists of a vertical projection above a labeled plastic sheet on one of the two tiered plastic structures on the field, marked as L1, L2, or L3; L1 goals (2.5" from the floor) are highlighted in green in figure 1.5.2, L2s (5.0" from the floor) are in purple, and L3s (8" from the floor) are in red
- **L4 Goal** - A scoring location that consists of a vertical projection above a flat plastic surface, marked as L4, attached to the top of a vertical PVC segment; the L4 goals (24" from the floor) are highlighted in pink in figure 1.5.2
- **Load Zone** - A section of the field, bordered by the inside of the field perimeter and the inside edges of the adjacent VEX IQ® parts, where drive team members can place team-loaded bean bags (see rule 3.3.4); the load zones are highlighted in blue in figure 1.5.2
- **Supply** - A set of bean bags that begin a match in a driver box

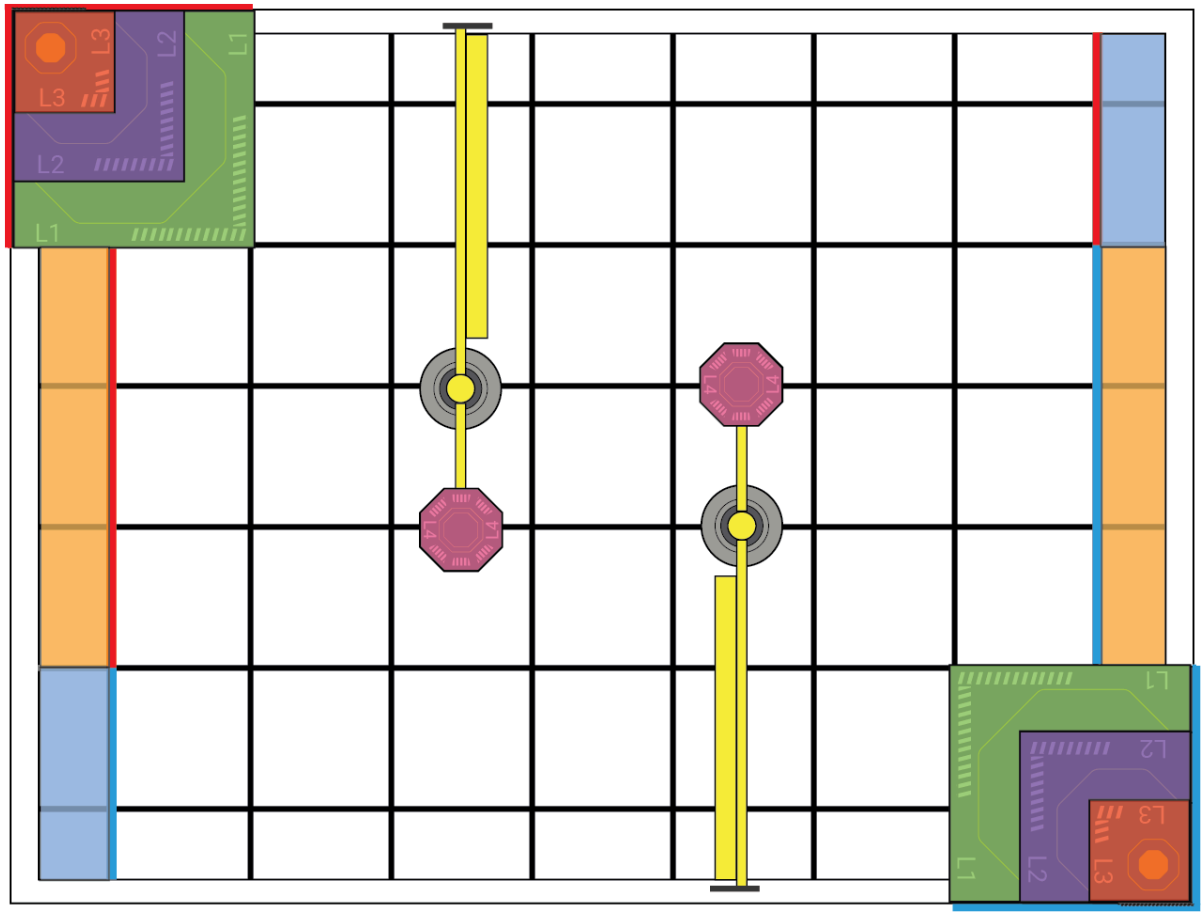


Figure 1.5.2

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Figure 1.5.2 highlights the following defined goals and zones:

- Blue = Load zones
- Orange = Floor goals
- Green = L1 goals
- Purple = L2 goals
- Red = L3 goals
- Pink = L4 goals

1.6 Fouls & Foul Cards

Fouls are decided by a head referee during a match and occur when a rule of gameplay or safety is broken. Fouls may also occur when the RECF Code of Conduct is violated during an event, as determined by the event partner or the head referee.

Foul cards serve as a tracking system for fouls. Foul cards are announced verbally by a head referee after a match and are recorded in the event management software. All foul cards stay with the team for the entire tournament.

For fouls that involve damage or potential damage to the field, people, or other robots, a head referee (or in a solo match, a scorekeeper referee) may also require that the drive team stop operating the robot and put their controller on the ground. This is called grounding.

Head referees should focus on helping teams avoid fouls before they happen, by calling out actions that may lead to a foul. Advance warnings like these do not count as official warnings, and are not recorded by referees.

1.6.1 Official Warning

An official warning is given to an alliance, team, or team member verbally by the head referee the first time they break a specific rule, provided the foul does not improve the score of a match. This official warning helps students learn how to prevent future fouls before they lead to penalties. Future violations of the same rule should result in a yellow card for that rule. For example, the first time a team moves multiple bean bags a short distance during a match, they will receive an official warning if the violation didn't improve the match score.

1.6.2 Yellow Card

A yellow card is given to an alliance, team, or team member the second time they break a rule (after they have received an official warning for breaking that specific rule). For example, if a team moves multiple bean bags a short distance during a match for a second time during an event, they will receive a yellow card if the violation didn't improve the match score.

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1.6.3 Red Card

A red card is given to an alliance, team, or team member the third time they break a rule (after they have received a yellow card for breaking that specific rule). For example, the third time (and any additional times) a team moves multiple bean bags a short distance during a match would earn a team a red card.

A team that receives a red card will earn zero points for the current match. In an alliance match, a team that does not receive the red card will receive the actual score of the match. In finals matches, both teams in the alliance will receive a zero score.

Any foul that improves the score of the match will receive a red card for each offense. Fouls related to the RECF Code of Conduct, the RECF Student-Centered Policy, or safety rules may also receive a red card for each offense.

1.6.4 Fouls affect eligibility for finals matches

Any team that receives three or more red cards during an event cannot be part of an alliance for finals matches. Eligibility for judged awards may also be affected.

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Section 2: Design, Build, and Code a Robot

Tier Takeover robots are primarily created using VEX Robotics® and/or LEGO® electronics and parts. Each robot must pass a brief inspection before it can participate in matches at an official RECF event. Robots may change during the competition, but should be reinspected. Intentionally breaking a robot rule for improved performance may be handled as a violation of the RECF Code of Conduct. A robot may not participate in a match if it is in violation of a robot rule.

Each robot must use a single branded system of electronics, but can use any combination of legal VEX® and LEGO® structural parts (see rule 2.2.2 for details).

2.1 Robot design

2.1.1 Teams design their own robots

A team's student members get to decide what their robot looks like, and what it does.

2.1.2 Outside references are okay as starting points

Teams can use someone else's design as a starting point, but should modify it to make it their own. They should be able to explain their design process and original ideas when asked. Outside references should be appropriately credited and described in teams' engineering notebooks.

2.2 Robot build

2.2.1 Basic requirements

- Your robot must be safe, and can't damage the field, people, or other robots
- Your robot must pass an inspection before competing at an event and is subject to reinspection at any time during the event
- The power button must be easy to reach during the match
- Your robot can't have parts or mechanisms that intentionally detach during the match
- Your robot can't be larger than 11" wide by 20" long by 15" tall at the start of the match
- Your robot can't ever be larger than 11" wide by 24" long during the match
- There is no limit to how tall your robot can be during the match
- You can only bring one robot to an event
- Your robot can only include legal materials as listed below

2.2.2 Modifying parts

- Electronic components cannot be modified in any way, other than labeling and/or external decorations. External controller accessories (such as controller scuffs) are allowed, as long as the controller itself remains unmodified.
- Non-electronic parts may be modified.

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2.2.3 Required parts

	VEX IQ®	LEGO®
Robot Brain	One VEX IQ® robot brain (1st Gen or 2nd Gen)	• One LEGO® SPIKE™ Hub (large / small) –or– • One LEGO® Mindstorms® EV3 Intelligent Brick
Controller	One VEX IQ® controller	A compatible handheld controller, phone, or tablet connected to the robot or to an appropriate application (e.g., LEGO® Mindstorms® Robot Inventor, LEGO® BOOST, or Pybricks).
Battery	• One VEX IQ® Robot battery (1st Gen or 2nd Gen) –or– • One VEX® Robot AA Battery Holder	• One LEGO® Technic™ Small or Large Hub Battery –or– • One LEGO® Mindstorms® EV3 DC Battery
License Plates	• Your robot must have license plates clearly displaying your registered RECF Engage team number on two visible locations on the robot. The team number must be in a legible font and a contrasting color. License plates must be between 1.25" and 1.5" in height and 3.25" and 3.5" in width, and can be up to 0.75" thick. • You may use the VEX IQ® Team Number Plate or create a custom license plate, using 3D printing or other means. License plates do not count towards your custom plastic maximum.	

2.2.4 Optional parts

	VEX IQ®	LEGO®
Motors (up to 6 motors per robot)	• VEX IQ® Smart Motor	• LEGO® Education Double Motor • LEGO® Education Single Motor • LEGO® Technic™ Small Angular Motor • LEGO® Technic™ Medium Angular Motor • LEGO® Technic™ Large Angular Motor • LEGO® Mindstorms® EV3 Large Servo Motor • LEGO® Mindstorms® Medium Servo Motor
Sensors	• VEX IQ® Color Sensor • VEX IQ® Optical Sensor • VEX IQ® Distance Sensor • VEX IQ® Touch Sensor • VEX IQ® Gyro Sensor	• LEGO® Technic™ Distance Sensor • LEGO® Technic™ Color Sensor • LEGO® Technic™ Force Sensor • LEGO® EV3 Color Sensor • LEGO® EV3 Ultrasonic Sensor • LEGO® EV3 Gyro Sensor

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	• VEX IQ® TouchLED • VEX IQ® AI Vision Sensor • VEX IQ® Vision Sensor	• LEGO® EV3 Touch Sensor
Pneumatics	VEX IQ® Pneumatics kit.	No compatible pneumatics kit.
Cables	VEX IQ® Smart Cables	LEGO® EV3 cables or attached LEGO® SPIKE™ motor cables.
Radios	• VEX IQ® 2.4 GHz Radio • VEX IQ® Smart Radio • VEX IQ® 900 MHz Radio	No compatible radio.
	Both VEX IQ® and LEGO®	
Structural Components	Your robot's structure may be comprised of VEX IQ®, VEX GO®, VEX® HEXBUG*, LEGO® Mindstorms®, LEGO® SPIKE™ Prime, and/or LEGO® SPIKE™ Essential parts. * The HEXBUG brand is a registered trademark belonging to Spin Master Corp	

Custom Plastic	• Up to six individual custom plastic pieces, which can be a combination of two styles:
	  ○ **Flat cut -** Piece up to 3"x5" in size (approximately the size of a standard notecard), cut from certain types of non-shattering plastic up to 0.125" (⅛" nominal) thick
	  ○ **3D printed -** Piece up to 3"x3"x1" in size, printed from certain types of plastic filament
	• Flat-cut plastic requirements:
	  ○ You may modify your custom flat cut plastic by making holes, cutting sizes and shapes as desired, bending, or otherwise changing the form or appearance of the plastic. You may not chemically weld, melt, or treat flat-cut plastic.
	  ○ You may use any of the following flat-cut plastic types: polycarbonate (Lexan), acetal monopolymer (Delrin), acetal copolymer (Acetron GP), POM (acetal), ABS, PEEK, PET, HDPE, LDPE, nylon (all grades), polypropylene, PTFE, and FEP.
	  ○ Flat-cut plastic that may shatter (ex. plexiglass or acrylic) is not allowed
	• 3D printed plastic requirements:
	  ○ You may use any of the following filament types: PLA, ABS, TPU, PETG, nylon, and carbon fiber-filled filaments
	  ○ A 3D printed piece may be either a single, contiguous part or an assembly that contains multiple independent parts but functions as one component, provided that the component meets the overall size requirement for 3D printed pieces specified above in its starting configuration.
	• Custom plastic parts must be designed or customized by student team members, but can be manufactured by an outside entity (e.g., SendCutSend)
	• Please document your use of custom plastic in your engineering notebook	

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Decorations	Decorations are permitted as long as they have no function and do not mimic game objects or field components in a way that would confuse sensors on other robots. 3D printed decorations count towards your custom plastic total, and must meet the appropriate size requirement. Small power supplies for LED decorations are permitted.
Misc.	● Any rubber bands up to 8” long and .25” wide ● Tape, only when used for labelling robot wires and electronics ● ⅛” VEX V5® metal shafts ● Zip ties or cable ties up to 4” long and .12” wide to manage wires and/or pneumatic tubing, or to attach custom plastic parts ● Custom license plates, controller accessories, basic spacers, and adapters and parts made solely to adapt other legal hardware systems to VEX IQ® electronics; these parts do not count towards the custom plastic parts limit, and do not have to be designed or modified by student team members

2.2.5 Disallowed items

- Any kind of lubricant or grease
- Nonspecified electronic components
- Nonspecified structural / mechanical parts
- Anything that compromises the safety of people, other robots, the field, or game pieces

2.3 Robot Code

2.3.1 Students create their own code

A team’s student members get to decide what their robot’s code looks like, and what it does. Adults may teach coding concepts, but may not tell students what should or should not be included in their code.

2.3.2 Coding libraries are okay as starting points

Teams can use coding libraries as a starting point, but should modify the resulting code to make it their own. They should be able to explain how their code works and how it has been modified from the original ideas when asked. Outside references should be appropriately credited and described in teams’ engineering notebooks.

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Section 3: Tier Takeover Solo Driving Matches

In Tier Takeover solo driving matches, student drive teams have 60 seconds to score as many points as possible while operating their robot with a remote controller. Solo matches aren't pre-scheduled, and each team will have up to five total solo match attempts per competition that can be allocated across the two solo match types however the team likes. Some awards consider a team's solo coding score, so it is advised that teams complete at least one solo coding match. The field setup is shown in figures 3.0.1 and 3.0.2 below. The rules for solo driving matches represent the basic rule set for Tier Takeover. Once students master solo driving matches, they only need to learn a few more rules to understand how other match types work.

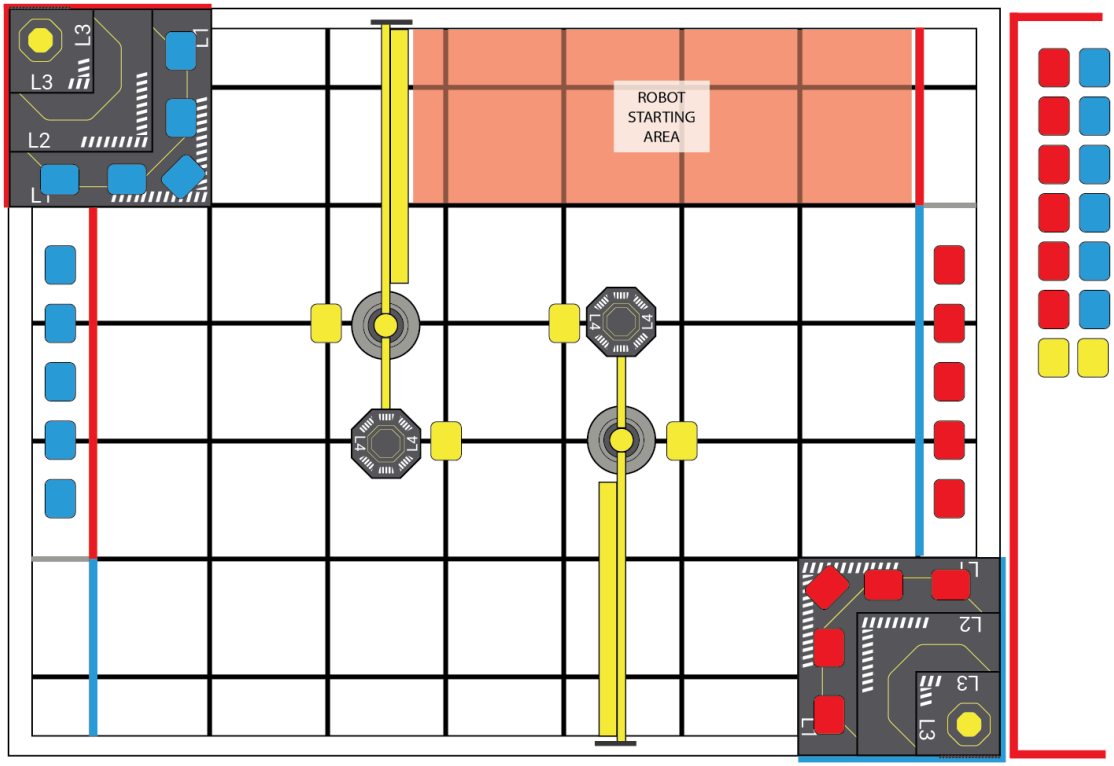


Figure 3.0.1

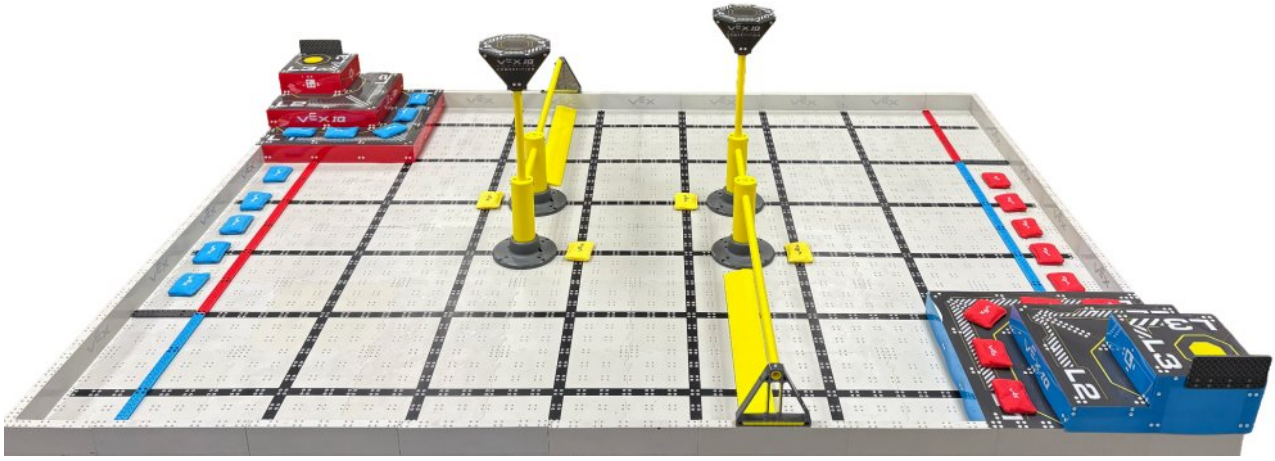


Figure 3.0.2

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Object	Quantity & Location
Yellow Bean Bag	Total = 6 ● Supply in red driver box = 2 ● On-field positions = 4
Red Bean Bag	Total = 16 ● Supply in red driver box = 6 ● On-field positions = 10
Blue Bean Bag	Total = 16 ● Supply in red driver box = 6 ● On-field positions = 10

3.1 Scoring

Scoring Category	Points
Floor goal	1 point per matching or yellow bean bag
L1 goal	5 points per matching or yellow bean bag
L2 goal	10 points per matching or yellow bean bag
L3 goal	25 points per matching or yellow bean bag
L4 goal	50 points per yellow bean bag
Parked robot	25 points per robot

3.1.1 Each bean bag only gets points for one goal

If a bean bag qualifies as scored in multiple goals, it should earn the highest scoring value.

3.1.2 Some bean bags can only be scored in matching goals

Red bean bags can be scored on the red tiered goal or in the red floor goal. Blue bean bags can be scored on the blue tiered goal or in the blue floor goal. Yellow bean bags can be scored in any goal.

3.1.3 Each bean bag in a matching floor goal is scored

A bean bag is scored if it ends the match at least partly within the matching floor goal.

3.1.4 Each bean bag on L1, L2, or L3 of a matching tiered goal is scored

A bean bag earns points if it ends the match at least partly within the matching-color L1, L2, or L3 goal.

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3.1.5 Each yellow bean bag on an L4 goal is scored

A yellow bean bag earns points if it ends the match at least partially within the L4 goal.

3.1.6 A robot parked in its load zone earns points

A robot earns points if it ends the match at least partially within a vertical projection of the load zone adjacent to the team's driver box.

3.1.7 Scoring Example

In the scoring example below (figure 3.1.7):

- Two red bean bags are scored in the red L1 goal
- Two red bean bags are scored in the red L2 goal
- Two bean bags—one red and one yellow—are scored in the L3 goal

Because this is a red goal, none of the blue bean bags count as scored.

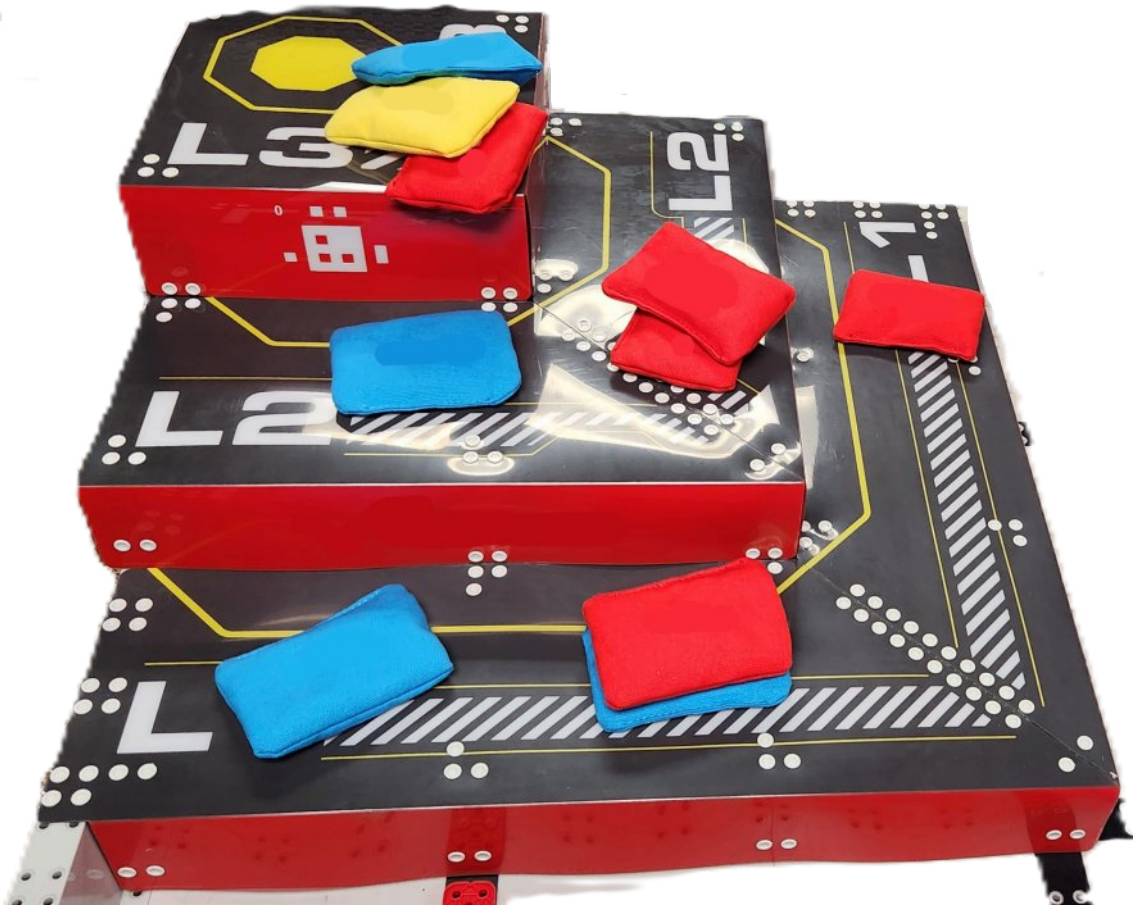


Figure 3.1.7

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3.2 Starting Positions

3.2.1 Driver box for solo driving matches

Up to three student team members (the drive team) can come to the field for each solo driving match, and all of them must remain inside of the red team driver box during the match unless they are resetting their robot as allowed in 3.4.1. Only the drive team members can operate the robot during the match.

Drive team members can't wear headphones or communicate with anyone beyond the field during the match, and spectators or non-drive team students can't coach the drive team. Sitting or standing on chairs/stools for support or elevation is only allowed if approved by the RECF through an accommodation request.

3.2.2 Robot starting position

The robot must begin the match within the 11" x 20" x 15" high size limit; in contact with the long wall in front of the red load zone; and between, but not in contact with, the red beam that defines the load zone and the wall structure and barrier (as shown in the first image in section 3).

3.2.3 Preload bean bag

A robot must start the match in contact with one yellow bean bag.

3.3 Match Play

3.3.1 The robot can only operate while the match timer is counting down

Robots can't be in motion before the match timer begins counting down from 60 seconds, and have to stop when the timer hits 0. Points scored after the timer reaches 0 will be deducted before the score is submitted, and the team will receive a foul.

3.3.2 One bean bag at a time in most cases

Other than the limited de-scoring allowance in the next paragraph, each robot can only move one bean bag at a time. This includes any color of bean bag. Incidental contact when adding or removing bean bags to or from a pile isn't a foul if changes to the positions of other bean bags are minor.

When removing bean bags from their starting positions in a non-matching floor and L1 goals, robots can scoop, plow, or shovel multiple bean bags simultaneously to clear those goals. Once they are removed from those goals, or after matching-color bean bags are added to the goals, this allowance ends and the previous paragraph applies.

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3.3.3 Bean bags that leave the field aren't returned

Any bean bag that leaves the field during a match (entirely outside of the perimeter) must stay out of the field for the rest of that match. Bean bags that are leaving the field cannot be deflected back into the field by humans, or by anything outside of the field. Bean bags that leave the field should not be recorded as a foul.

3.3.4 Team-loaded bean bags

Any drive team member that is not currently operating the robot can move bean bags from the supply in their driver box into their team's load zone during the match (not before!). Only the bean bags that begin the match in a driver box can be added to the load zone, and they can only be added to the adjacent load zone.

A load zone can only hold one bean bag at a time, and only one bean bag can be added at a time. The bean bag must contact the floor in the load zone before it can be removed from the load zone by a robot. The drive team member must let go of the bean bag before a robot is allowed to touch it.

3.3.5 Don't reach into the field

Before a match, students can only reach into the field to position their robot. Referees can adjust objects if they're more than 0.5" out of position.

During a match, students can only reach into the field to add bean bags (rule 3.3.4) or reset their robot if it malfunctions (3.4.1).

3.3.6 How to stop a match early

If a drive team wants to end a match early, they should stop driving, put their controller on the ground, and give a clear signal such as "Stop Time!" For improved accuracy, drive team members may notify the referee before the match or provide a countdown before the stop signal. The time remaining on the match timer will be recorded as the stop time.

3.3.7 No controller hand-off required

Any member of a drive team can drive their robot at any time during a match. Drive team members may hand-off the controller to each other during the match, but are not required to do so.

3.4 What Happens When Things Go Wrong

3.4.1 Robot reset

If the robot breaks or malfunctions during the match, the drive team can put their controller down, remove their robot from the field, and fix it. If the robot is in contact with a bean bag, that bean bag is also removed from the field. After repair, the robot must return to a legal starting position and starting size before the drive team can resume playing the game.

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3.4.2 Match replay

The head referee and event partner may decide to replay a match due to technical issues outside of the team's control that affect the score.

3.4.3 Field damage

If a robot damages a field, it may be grounded by the head referee for the rest of the match. If the head referee decides that damage caused by a student or robot is intentional, the team may earn a red card foul and a zero score for the match.

3.4.4 Appealing a decision

If the drive team members disagree with a decision made or score recorded by a referee, they should remain at the field and notify the referee immediately. Drive team members and referees should be prepared to show specific rules and/or Q&A answers that back up their opinions, and should remember that referees can only make rulings based on the game manual and their own observations and perspectives of the match. Referees and drive team members may never view video or photos from the match while at the field or during discussions that affect match outcomes or scoring, and team members who were not at the field for the match are not allowed to approach the field. The head referee will determine when the discussion is over, and will announce their final and binding decision.

3.5 Solo Match Ranking and Tiebreakers

Teams will be ranked for solo matches using the total points from their best solo driving and solo coding match at the event.

Tiebreakers:

1. Highest solo coding match score
2. 2nd-highest solo coding match score
3. 2nd-highest solo driving match score
4. Highest solo driving match stop time in highest scoring solo driving match
5. 3rd-highest solo coding match score
6. 3rd-highest solo driving match score

If teams are still tied, the 2nd highest of each category 1-4 will be used, followed by 3rd highest.

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Section 4: Tier Takeover Solo Coding Matches

In Tier Takeover solo coding matches, teams have 60 seconds to score as many points as possible using only pre-written code to operate the robot. Solo matches aren't pre-scheduled, and each team will have up to five total solo match attempts per competition that can be allocated across the two solo match types however the team likes. Some awards consider a team's solo coding score, so it is advised that teams complete at least one solo coding match.

Rules from Section 3: Solo Driving Matches apply unless they're specifically changed by a rule in this section.

4.1 Changes From Solo Driving Matches

4.1.1 Drive team members aren't limited to the driver box

Drive team members don't have to stay in the driver box during a solo coding match.

4.1.2 The robot can be reset as a strategy

Students can use the robot reset process in rule 3.4.1 as a strategy. For example, the team's code could consist of multiple small segments that are each launched from the starting position after a reset.

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Section 5: Tier Takeover Alliance Matches

In Tier Takeover alliance matches, teams have 60 seconds to score as many points as possible. Each match includes two teams, who work together to earn a shared score for the match. Skipping an alliance match will be considered a violation of the RECF Code of Conduct.

All rules from Section 3: Solo Driving Matches apply to alliance matches unless they're specifically changed by a rule in this section.

5.1 Changes From Solo Driving Matches

5.1.1 Driver boxes for alliance matches

Because an alliance match includes two teams, one team in each alliance match is designated on the match schedule as the red team and will use the red team driver box. The second team in each match is designated as the blue team on the match schedule and will use the blue team driver box. See figure 5.1.1 for more details.

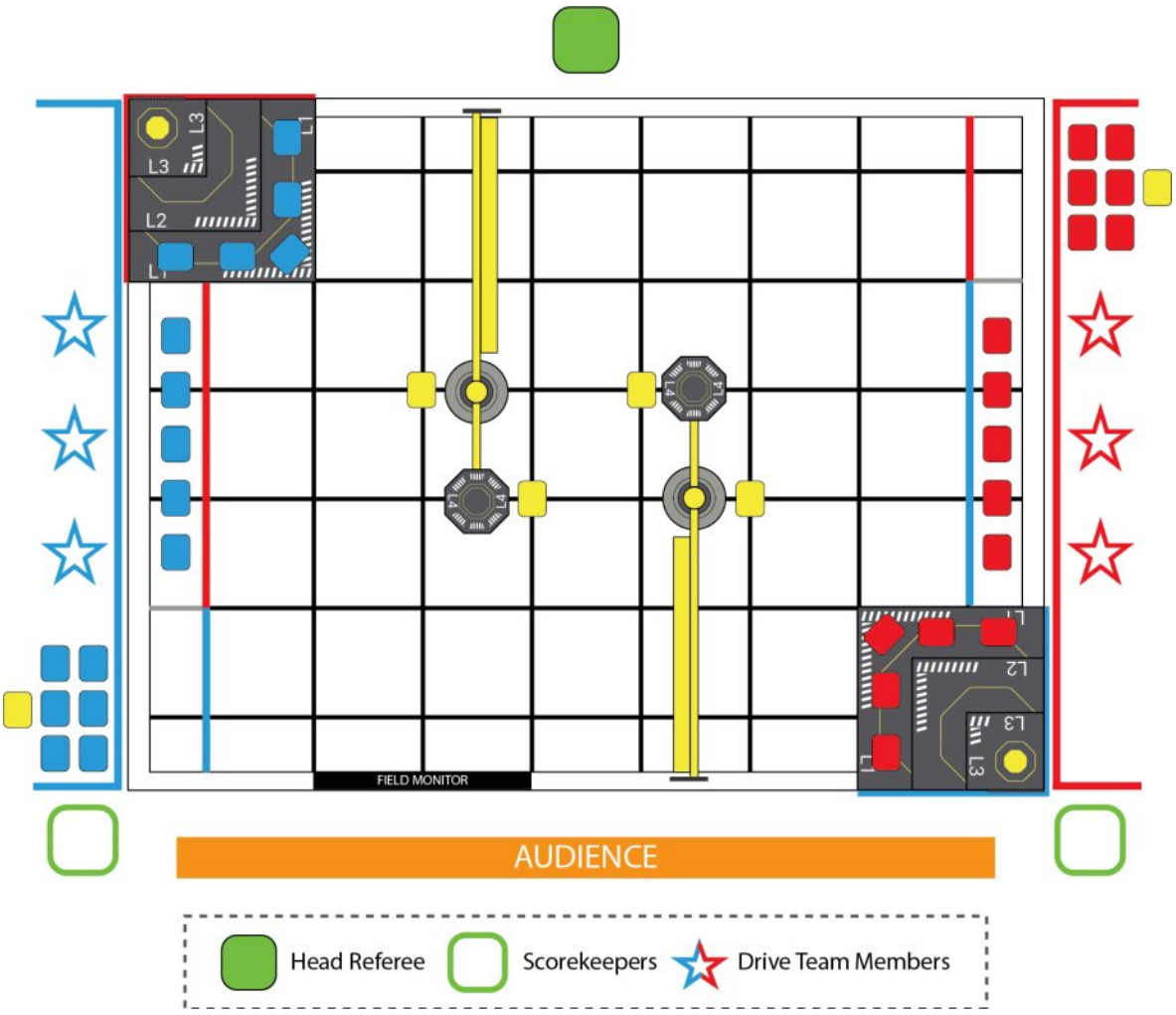


Figure 5.1.1

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5.1.2 Robot starting positions

Each robot must begin the match within the 11” x 20” x 15” high size limit; in contact with the long wall in front of the team’s load zone; and between but not in contact with the beam that defines the team’s load zone and the wall structure and barrier, as shown in figure 5.1.2.

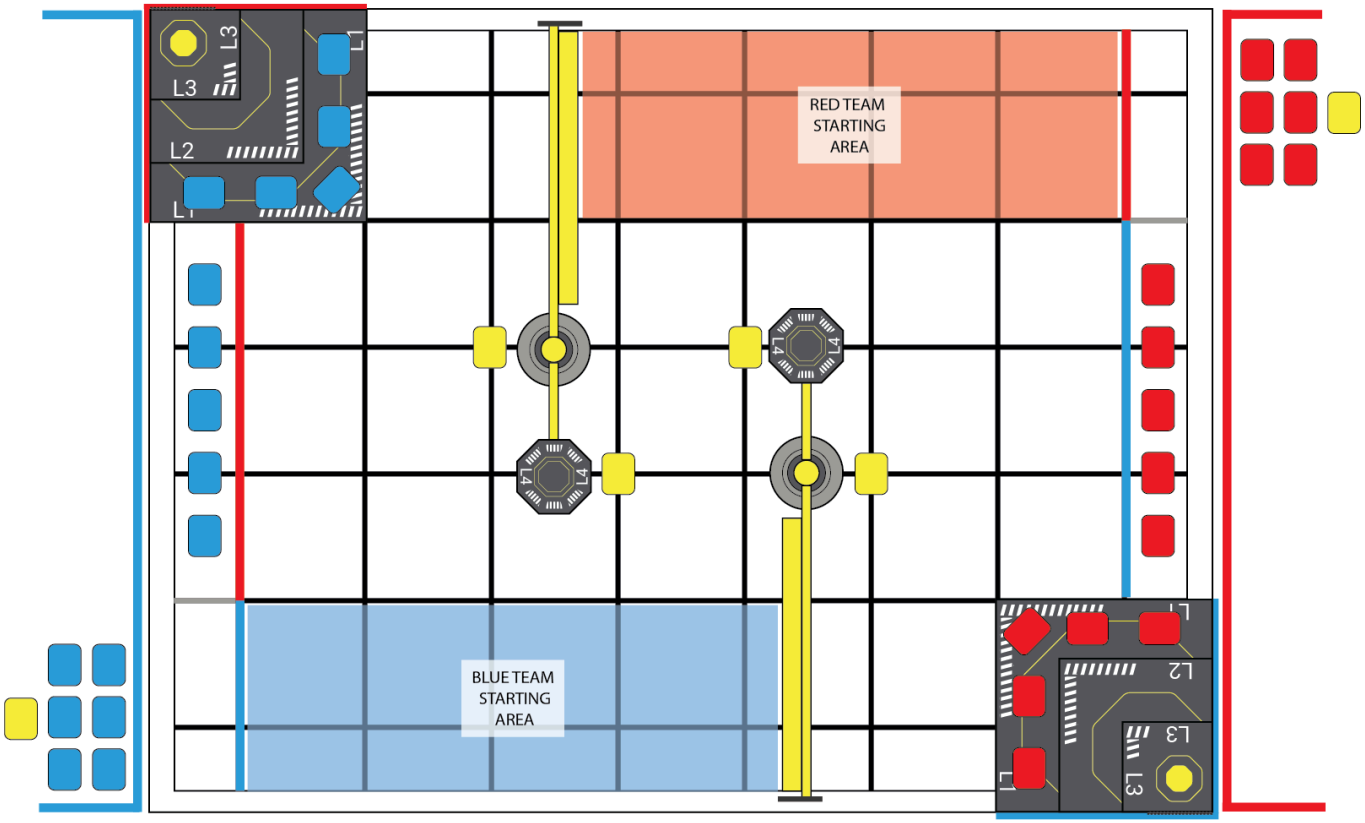


Figure 5.1.2

5.1.3 Team-loaded bean bags

In alliance matches, team loaded bean bags are divided into two supply areas, one in each of the the two driver boxes as shown in figures 5.1.1 and 5.1.2.

5.1.4 Stopping a match early

A match can end early if everyone agrees, but the match stop time will only be recorded for 2nd-round tiebreakers for first place in the finals matches.

5.1.5 Alliance match ranking

Solo ranking tiebreakers do not apply to alliance matches. See section 7.4.4 for alliance match ranking and tiebreaker information.

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5.2 What Happens When Things Go Wrong

5.2.1 Missed match or late to a match

If a team's robot is not ready to play at the scheduled match time (or, for finals matches and/or when the event is running behind schedule, when the match is otherwise ready to begin), the head referee may ask the team to remove the robot from the field. The drive team may introduce the robot to the match late using the guidelines for a robot reset (see rule 3.4.1) once it is ready to play.

If the robot is at the field for the entire match, or arrives late and participates in a portion of the match, the team is eligible to receive a score for that match.

If the robot does not participate in any portion of a match, or is not at the field for the entire match, the team will be marked as absent from that match. They will not earn points for that alliance match; the score for the other team in the match is not affected.

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Section 6: Judging and Awards

At events that offer judging, teams will participate in an interview with judges to answer questions about their team, robot design/construction, code, and strategies; each team must be offered an equal opportunity to be interviewed. Teams also submit their engineering notebooks for review by judges.

Each team interview lasts about 10 minutes and in-person interviews generally take place between matches. Judges use the Team Interview Rubric and Engineering Notebook Rubric to evaluate and rank teams. Teams are encouraged to review these rubrics in advance.

See the RECF Guide to Judging for more information about judging and awards.

6.1 Engineering Notebooks

An engineering notebook is a record-keeping tool that provides students with an opportunity to develop essential skills such as project and time management, brainstorming, and both written and interpersonal communication. Teams are encouraged to document their use of the engineering design process, including details of successes and challenges. All documentation and work related to the engineering notebook must be completed by the students, and they can't use AI-generated content. To learn more about engineering notebooks and the engineering design process visit the RECF Library.

Teams can maintain their notebook using either a traditional physical notebook or a range of digital tools, such as software applications or cloud-based platforms. Some events may only accept physical notebooks, while others may require digital submissions. In these cases, physical notebooks can be scanned and submitted electronically, and physical notebooks may be printed for submission. Be sure to check the event details on RECFevents.org to confirm which format is accepted.

6.2 Team Interviews

Team interviews are face-to-face (or virtual) conversations between a team of students and two or more volunteer judges. Interviews are opportunities for teams to share their design process, match strategies, learning experiences, and overall approach to the RECF Engage Robotics Competition.

6.3 Award Deliberation

Award deliberation is the last step in the judging process. In this step, judges work with the judge advisor and one another to select candidates for each award.

The Engineering Notebook Rubric and Design & Innovate Awards Interview Rubric are tools to assist with deliberations. A team's score, whether a specific line item on a rubric or the overall score, is a data point that the judges can use as a part of the process. It is not a replacement for qualitative judgments in the deliberation process.

Judges will choose winners of each award based on the specific award criteria in the RECF Guide to Judging. No team may receive more than one judged award at an event.

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Section 7: Event Personnel, Processes, & Guidelines

7.1 Event Personnel

7.1.1 Event Partner

An event partner is a certified volunteer who runs an event using the guidelines in RECF's policies and game manuals. RECF event partners must be at least 18 years old, and can't serve as a head referee or judge advisor at their event. Event partners oversee the activities in this section of the game manual, and can add specific rules based on their site and event. Event partners cannot make decisions about match scores or rulings, cannot determine penalties for fouls, and cannot influence who receives judged awards. Event partners have the final decision on non-match and non-robot decisions at an event.

7.1.2 Head Referee

A head referee is a certified volunteer who has been assigned by the Event Partner to oversee matches using the guidelines in the game manual. RECF Engage head referees must be at least 16 years old. Head referees work with team members to prevent and avoid fouls, and communicate fouls and penalties to teams when they occur. Head referees have the final decision on all match and robot rules, and should train robot inspectors and scorekeeper referees at events as appropriate.

Every alliance match must be watched by at least one head referee, and a head referee must be available to assist at robot inspection and solo matches as needed. See this article and related content in the RECF Library for more information.

7.1.3 Scorekeeper Referee

Scorekeeper referees score all varieties of match, and can oversee solo matches independently. RECF Engage scorekeeper referees must be at least 15 years old. Every solo match must be watched by at least one referee. If there's a question about scoring or match play that doesn't have a clear answer in the game manual, scorekeeper referees should consult a head referee before answering. See this article and related content in the RECF Library for more information.

7.1.4 Judge Advisor

A judge advisor is a certified volunteer who trains and oversees volunteer judges at an event using the guidelines in the RECF Guide to Judging. RECF Engage judge advisors must be at least 21 years old. See this article and related content in the RECF Library for more information.

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7.1.5 Judge

A judge is a volunteer who reviews teams' engineering notebooks and/or interviews teams about their processes, then deliberates with other judging volunteers to identify award candidates and select award winners. RECF Engage judges must be at least 16 years old. See this article and related content in the RECF Library for more information.

7.1.6 Robot Inspector

A robot inspector is a volunteer who confirms that teams' robots meet the requirements in the game manual. If there's a question that doesn't have a clear answer in the game manual, robot inspectors should consult a head referee. See this article and related content in the RECF Library for more information.

7.1.7 Field Resetter

A field resetter is a volunteer who ensures that all objects on the field are in the correct positions at the beginning of each match. Field resetters should not begin to reset a field after a match until a referee directs them to do so. See this article and related content in the RECF Library for more information.

7.1.8 Queuer

A queuer is a volunteer who ensures that the correct teams are at the correct alliance matches. If time allows, they can attempt to locate teams who haven't checked in for upcoming matches, but they are not required to do so. See this article and related content in the RECF Library for more information.

7.1.9 Emcee

An emcee is a volunteer who provides play-by-play information for the audience during alliance matches. Emcees should avoid suggesting strategies, and cannot simultaneously serve as referees. See this article and related content in the RECF Library for more information.

7.2 Event Processes

7.2.1 Team Check In

Each team must check in when they arrive at the event, and confirm that at least one adult will remain onsite to supervise team members for the entire event. Some events use team check-in as a way to distribute event hand-outs like nametags, site maps, general schedules, and lunch order forms. Team check-in often occurs at a visible location just inside the main doors of the venue.

7.2.2 Robot Inspection

Each robot must pass an inspection before it can be used in any type of match at an event. Volunteer inspectors will confirm that robots meet the requirements in the game manual, and

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will mark passed inspections in the event management software. Robot inspection often occurs at a set of tables near the competition fields or in the team pit area.

7.2.3 Creating the Alliance Match Schedule

If any teams have not checked in, or any robots haven't passed inspection, the event partner should resolve them before creating the alliance match schedule in the tournament software. The alliance match schedule should only include teams who will participate in alliance matches. See rule 7.4.2 for more information.

7.2.4 Queueing

Teams should check in at the queuing table(s) before their scheduled alliance match time, and will be routed to the correct field by volunteer queuers. Queueing generally occurs at a set of tables near the alliance match fields, with one table for each named competition field. Providing tables gives teams a safe place to put their robots while they wait for upcoming matches. Tables are also recommended at the line for solo matches.

7.2.5 Running Matches

To display a match timer on a connected display, a referee or emcee can select an alliance match by match number in the tournament software, or a solo match by team number and match type. The referee or emcee should confirm that the drivers are ready, then activate the match timer from their mobile device.

After the match completes, referees should score the match and confirm object counts for each scoring category with the drive team members before submitting the match score and moving to the next match.

7.2.6 Creating Alliances for Finals Matches

At the end of alliance matches, the event partner should identify any teams that are unavailable or ineligible to participate in finals matches and mark them in the tournament software. Once teams are removed from the list, the event partner can determine the number of alliances that will participate in finals matches and generate the finals match list. See rule 7.4.4 for more information.

7.2.7 Entering Award Winners

After the judging volunteers have selected the winners of all judged awards listed for the event, the judge advisor and event partner should work together to enter winners in the tournament software. They should confirm the base number and team letter for each winner, and ensure that no team is marked to receive more than one judged award. Winners of performance awards are automatically marked by the software.

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7.2.8 Finalizing an Event

After matches and awards conclude, the event partner should finalize and upload the tournament information to RECFevents.org. Some events (e.g., multiple divisions) may need to work with RECF staff to finalize their results.

7.3 Field Parameters

7.3.1 Equipment

All of the fields used for alliance matches at an event should have the same setup and modifications, and all of the fields used for solo matches at an event should have the same setup and modifications. For example, an event could put all of the alliance match fields on identical risers and all of the solo match fields on the ground.

Some modifications are allowed to the standard field setup, including:

- Adding pins to the VEX IQ® plate attached to the top of the tiered goal to add strength if needed
- Omitting some of the VEX IQ® pins that connect the plastic sheet on the driver box side of the tiered goal to enable access for structural repairs as needed

7.3.2 Variances

Although fields and setups should be as identical as possible, teams have to be prepared for some amount of variance. Goals, walls, and other field-mounted parts may vary slightly, up to ±0.5” in any direction. Starting locations for bean bags may also vary up to ±0.5” in any direction.

Lighting conditions at fields will vary from event to event. Teams with optical or vision sensors should work with the event partner to calibrate their sensors at the field before matches begin.

7.4 Match Parameters

7.4.1 Solo Matches

Each team can attempt up to five total solo matches at an event, and can allocate their attempts across the two solo match types however they like. These matches aren’t scheduled, and teams can make these attempts whenever their event schedule permits. Solo match fields should open early in the event, and remain open long enough to give each team an opportunity to complete their maximum number of solo matches. As a general rule, solo match fields should remain open until alliance matches have ended. The team with the highest combined sum of their single highest solo driving and single highest solo coding match scores will be named the solo match champion.

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7.4.2 Alliance Matches

Each team should have 5-8 matches at a qualifying event or 8-10 matches at a championship or signature event, which will appear on the match schedule generated by the tournament software. Variances must be approved by your RECF Regional Support Manager. The software will assign alliance partners, match times, fields, and team colors as needed. Matches can only run early if the head referee and all teams are checked in for the match and ready to play.

Each team's lowest recorded alliance match score will be dropped when calculating their event ranking, even if that lowest score is a zero from a missed match or red card.

If a team is marked with an asterisk (*) for one of the last matches on the schedule, their score for that match won't affect their ranking. This occurs when extra matches are necessary to provide each team with the same minimum number of matches. Teams should remember that the RECF Code of Conduct includes supporting alliance partners, and do their best even though it won't affect their ranking.

7.4.3 Practice Matches

Some events choose to include scheduled practice matches that occur before official alliance matches begin. Practice matches aren't required, and the scores don't affect teams' rankings.

7.4.4 Finals Matches

Teams' scores from alliance matches are used to rank them for the finals match list, with the highest average score ranked as #1. The following tiebreakers will be used if two or more teams have the same average match score:

1. 2nd highest alliance match score earned by a team at that event
2. 3rd highest alliance match score earned by a team at that event
3. 4th highest alliance match score earned by a team at that event
4. Random electronic draw

Teams are paired from the top rank down by the event software, beginning with the #1 and #2-ranked teams forming an alliance and proceeding down the list.

The event partner can include as many alliances as they wish in the finals matches, and are encouraged to allow as many teams as possible to participate. Each finals match must include two teams.

Finals matches play one at a time, beginning with the lowest-ranked alliance. The two-team alliance that records the highest finals match score will be named the Tournament Champions. If there's a tie for first place, the teams will participate in one or more tiebreaker rounds; early stop times may be considered if a 2nd set of tiebreakers is needed.

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7.4.5 League Events

Information on how Leagues qualify for your Event Region Championship or for the RECF World Championship may be found in the Qualifying Criteria for RECF Robotics Competition Events.

Leagues are events that are scheduled over multiple sessions spread across several weeks, and some match parameters differ for teams competing in leagues.

- **Minimum participation:** A minimum of two alliance matches per team are required at each league session, and teams will be ranked by the number of matches played and their average scores. Teams that play in at least 60% of the sessions will be ranked higher than those who play in fewer sessions.
- **Fouls:** Because a league is considered a single tournament, all fouls and foul cards stay with the team across all league sessions. Any team that receives three or more red cards throughout sessions for a single league cannot be part of alliance selection at the league championship elimination bracket.

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