

# VEX Clean Sweep



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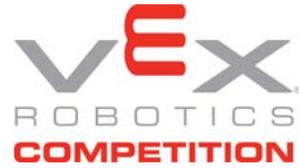
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SECTION

# Introduction

## Overview

This section provides an introduction to *VEX Clean Sweep* and the VEX Robotics Competition.

## The VEX Robotics Competition

The current global economic crisis has emphasized to many the need for additional creators & producers. The message is loud and clear, we need the students of today to become the scientists, engineers, and problem solving leaders of tomorrow. Recent breakthroughs in chemistry, medicine, materials and physics have revealed a new set of challenges and created even greater opportunity for problem solving through technology. These problems are not academic; the solutions could help save the world and those technology problem solvers will be the ones to make it possible.

This underscores the dramatic challenge we face: there are not enough high school graduates choosing technology related disciplines in college. This does not reflect a lack of capacity for new students on the part of technical schools and universities, but a lack of interested and qualified applicants. In short, we will not have the people we require in the next generation to solve the problems of tomorrow unless the shortage is directly addressed today. Who will solve the world's next great crisis?

Recognizing this dilemma, scores of organizations are creating programs designed to attract and engage young students in the study of science and technology. Many have found that robotics is a very powerful platform to attract and hold the attention of today's multi-tasking, connected youths. Robotics has strong appeal to this intensely competitive generation and represents the perfect storm of applied physics, mathematics, computer programming, digital prototyping and design, integrated problem solving, teamwork and thought leadership. Students with a previously undiscovered aptitude for STEM (Science, Technology, Engineering, and Math) curriculum are flourishing in growing numbers due to the efforts of schools, volunteer organizations, corporations, and governments internationally.

Designed by Innovation First, Inc., a leader in educational and competitive robotics products, the VEX Robotics Competition is the next generation of educational robotics competitions. While there are many quality robotics competitions worldwide, the VEX Robotics user community has overwhelmingly demanded *new* challenges that are easy and economical to host and implement. It is IFI's strong desire to serve the needs of all VEX Robotics users in order to attract, nurture and grow new engineering candidates worldwide who will solve the problems of tomorrow.

IFI's VEX Robotics Design System is a leading classroom robotics platform designed to nurture creative advancement in robotics and knowledge of STEM education. VEX provides teachers and students with an affordable, robust, and state-of-the-art robotics system suitable for classroom use and the playing field. VEX's innovative use of pre-manufactured and easily formed structural metal, combined with a powerful and user-programmable microprocessor for control, leads to infinite design possibilities.

## **VEX *Clean Sweep* – A Primer**



*VEX Clean Sweep* is played on a 12 ft x 12 ft foam-mat, surrounded by a sheet-metal and lexan perimeter. The field is divided down the center by an 11.5” tall lexan wall. This wall separates the two alliances of two robots onto opposite sides of the field. There are four 18” high triangular goals attached to the wall which robots can place small balls into. There are two slots in the wall which robots can roll small balls through. At the start of the match small & medium balls are positioned on the center wall, and around the field. The game is played by moving balls onto your opponent’s side of the field or into the goals.

For more details and specific game-play rules, please see Section 2 – The Game.

While participating in the VRC *Clean Sweep* season, teams will develop many new skills in response to the challenges and obstacles which stand before them. Some problems will be solved by individuals, while others will be handled through interaction with their student teammates and adult mentors. Teams will work together to build a VEX robot to compete in one of many tournaments, where they celebrate their accomplishments with other teams, family and friends. After the season, students come away not only with the accomplishment of building their own competition robot, but with an appreciation of science and technology and how they might use it to positively impact the world around them. In addition, they cultivate life skills such as planning, brainstorming, collaboration, teamwork, and leadership as well as research and technical skills.

# 2

SECTION

## The Game

### Overview

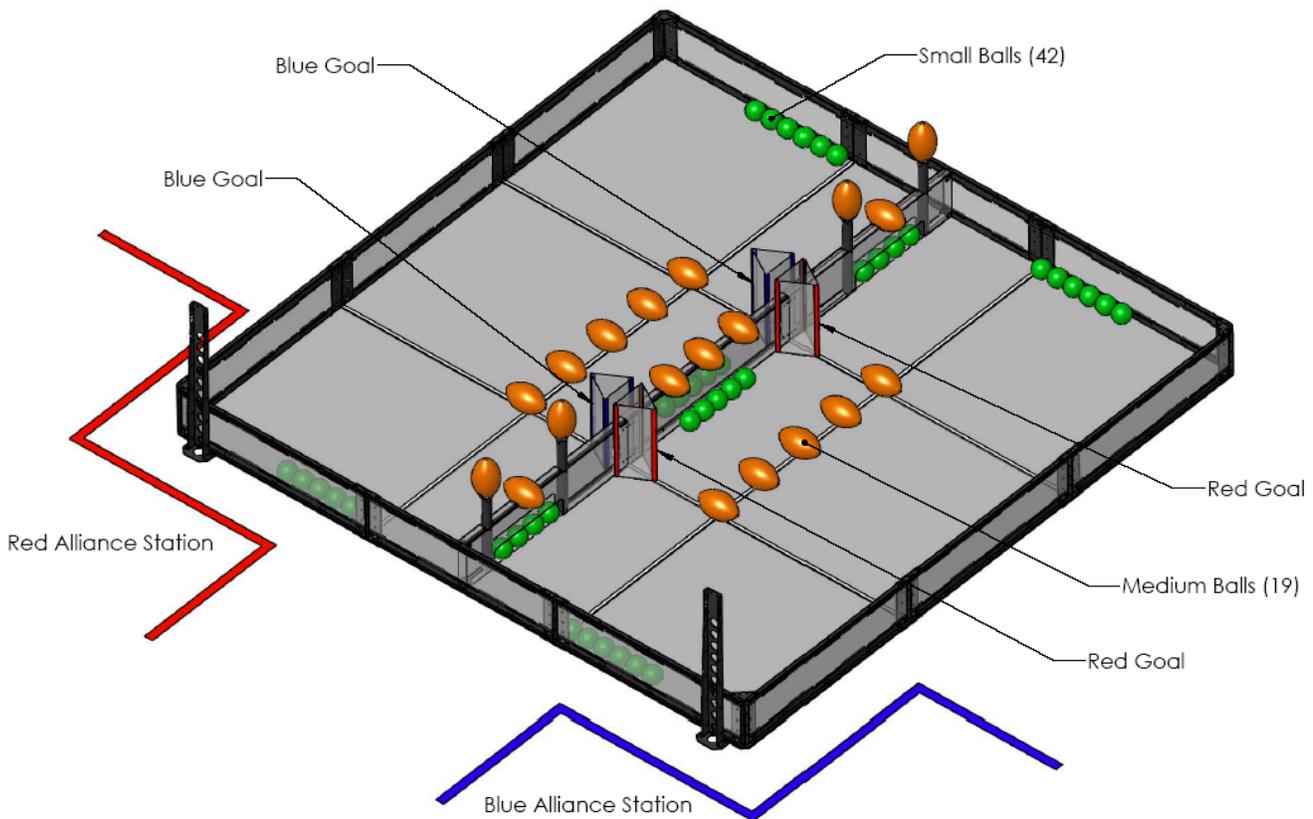
This section describes the VEX Robotics Competition game, called *VEX Clean Sweep*. It also lists the game definitions and game rules.

### Game Description

Matches are played on a field initially set up as illustrated in the figures below. Two *alliances* – one “red” and one “blue” – composed of two teams each, compete in each *match*. The object of the game is to attain a higher score than your opponent *alliance* by placing *small, medium* and *large balls* into your *scoring zone* and by *locking-up small balls* in your *goals*.

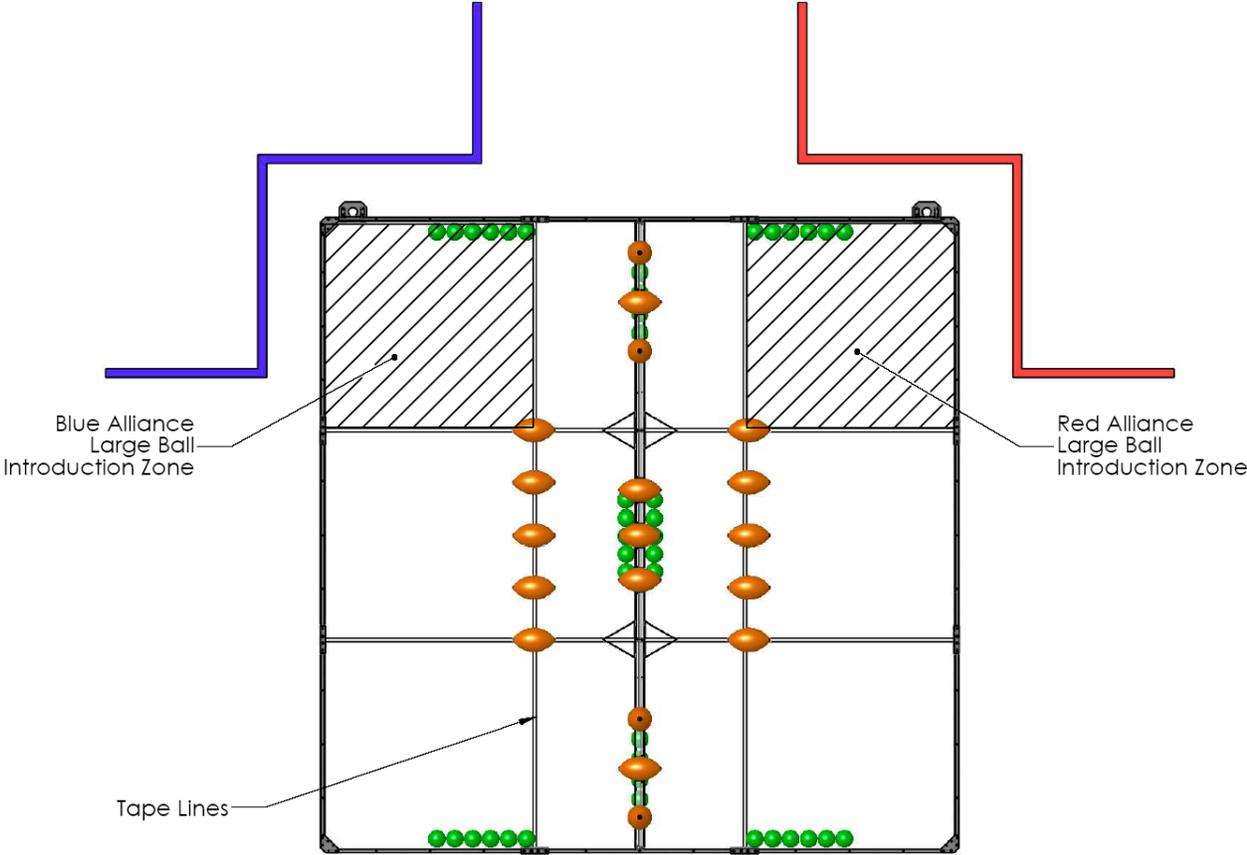
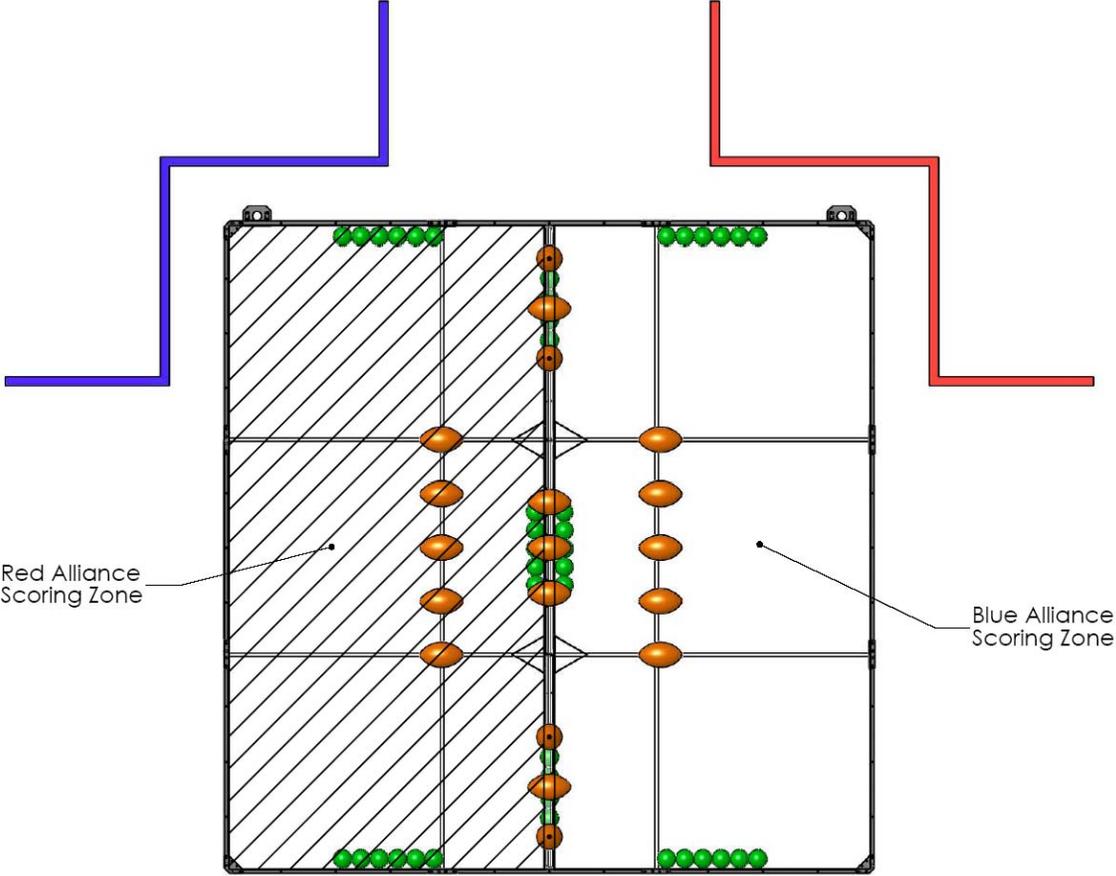
A bonus is awarded to the *alliance* that has the most total points at the end of the *Autonomous Period*.

There are a total of fifty (50) *small balls*, twenty-one (21) *medium balls* and two (2) *large balls* available as scoring objects in the game. Forty-two (42) of the *small balls* will start at designated locations on the field, while four (4) will be available to each *alliance* prior to the *match*. Nine (9) of the *medium balls* will start on the *center wall*, ten (10) on the field, while one (1) will be available to each *alliance* prior to the *match*. Each *alliance* will have one (1) *large ball* that **MUST** be introduced into the field of play sometime in the last thirty seconds (0:30) of the match.



**Note:** The illustrations in this section of the manual are only provided to give a general visual understanding of the game. Teams should refer to the official field specs available in appendix A for exact field dimensions, a full field BOM, exact details of field construction, and lower cost field options.

VEX Robotics Competition - *Clean Sweep*



## Game Definitions

*Adult* – Anyone not meeting the definition of “Student”.

*Alliance* – A pre-assigned grouping of two teams that work together for a given *match*.

*Alliance Station* – The designated region where the *drivers* and *coach* stand during any *match*.

*Autonomous Period* – A 20-second time period in which the *robots* operate and react only to sensor inputs and to commands pre-programmed by the team into the onboard *robot* control system. Human control of or interaction with the *robot* is not permitted during this time.

*Ball* – A *small ball*, *medium ball*, or *large ball*.

*Ball Tee* – An 18” tall post sticking up out of the *center wall* on which *medium balls* will be placed at the start of the match.

*Center Wall* – The 11.5” high structure which divides the playing field in two halves. It also marks the boundary between the two *scoring zones*. The *Center Wall* has two 4” high, 20” long slots at each end.

*Coach* -- A student or adult mentor designated as the team advisor during the match. Only one (1) of these is allowed per team on the field at any given time.

*Driver* - A student team member responsible for operating and controlling the *Robot*. Only two (2) of these are allowed per team on the field at any given time.

*Driver Controlled Period* – The 2:00 (two minute) time period in which the *robots* are operated by the *drivers*.

*Field Element* – A *goal*, the *center wall* or a playing field wall.

*Goal* – One of the four (4) triangular shaped, 18” tall field structures, two (2) for each alliance, into which teams can *lock-up small balls*.

*Large Ball* – A 9.5” diameter, spherical scoring object.

*Large Ball Introduction Zone* – The corner section of the field adjacent to the alliance station, outlined by the playing field walls and the outer edges of the two white tape lines closest to said alliance station.

*Locked-up* – A *small ball* is *locked up* in a *goal* if some part of the ball is within the two-dimensional space defined by the outer edges of the *goal*, and not touching a *robot* of the *alliance* that the *scoring zone* belongs to. Note: A *goal* extends infinitely perpendicular to the playing field surface within the *goal* boundaries.

*Match* - A *match* consists of an *autonomous period* followed by a *driver controlled period* for a total time of 2:20 (two minutes, twenty seconds).

*Medium Ball* – A 9” long, 5.25” diameter, oblong spherical scoring object.

*Robot* – Anything (which has passed inspection) a team places on the field prior to the start of a *match*.

*Scored* – A *ball* is *scored* in a *scoring zone* if the entire *ball* is within the rectangular space defined by the edges of the *scoring zone*, and not touching a *robot* of the *alliance* that the *scoring zone* belongs to. Any large ball which is not legally introduced into play counts as being *scored* in the opponents *scoring zone*. Note: A *scoring zone* extends infinitely perpendicular to the playing field surface within the *scoring zone* boundaries.

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**Scoring Zone** – One of two (2) rectangular areas, one (1) for each alliance, in which teams can score *small, medium, or large balls*. Scoring zones are defined by the inner edges of the playing field walls, the edges of the *center wall* and the outer edges of the *goals*. Each *alliance scoring zone* is across the *center wall* from their *alliance station*.

Note: The *center wall and goals* are not part of either *scoring zone*.

**Small Ball** – A 4" diameter spherical scoring object.

**Slot** – A 20" wide, 4.5" high opening in the base of the *center wall*

**Student** – Anyone enrolled in a pre-college school or home-schooled as part of a pre-college educational curriculum.

## Game Rules

### Scoring

- A *small ball* that is *scored* in a *scoring zone* is worth one (1) point for the *alliance* that the *scoring zone* is designated for.
- A *small ball* that is *locked up* in a *goal* is worth three (3) points for the *alliance* that the *goal* is designated for.
  - *Small balls* that are *locked up* are ONLY worth (3) points, these balls are not worth additional points for being *scored*.
- A *medium ball* that is *scored* in a *scoring zone* is worth five (5) points for the *alliance* that the *scoring zone* is designated for.
- A *large ball* that is *scored* in a *scoring zone* is worth ten (10) points for the *alliance* that the *scoring zone* is designated for.

### Scoring in Autonomous Mode

- At the end of the *autonomous period*, the *alliance* that has most total points receives a five (5) point bonus.

### Safety Rules

**<S1>** If at any time the *robot* operation or team actions are deemed unsafe or have damaged the playing field, foam field surface, game objects or barriers, by the determination of the referees, the offending team may be disqualified. The *robot* will require re-inspection before it may again take the field.

**<S2>** If a *robot* goes completely out-of-bounds (outside the playing field), it will be disabled for the remainder of the match.

**Note:** The intent is NOT to penalize *robots* for having mechanisms that inadvertently cross the field border during normal game play.

### General Game Rules

**<G1>** At the beginning of a *match*, each *robot* must not exceed a volume of 18 inches wide by 18 inches long by 18 inches tall. An offending *robot* will be removed from the match at the Head Referee's discretion.

- a. Alignment devices (templates, tape measures, lasers, etc.) that are not part of the *robot* may NOT be used to assist with the positioning of the *robot*.

**<G2>** Each team shall include up to two *drivers* and one *coach*.

**<G3>** During a *match*, the *drivers* and *coach* must remain in their *alliance station*.

## VEX Robotics Competition - *Clean Sweep*

**<G4>** *Balls* that leave the playing field are considered out of play. These objects will NOT be returned to the field.

**<G5>** *Drivers* and *coaches* are prohibited from making intentional contact with any game or field object or robots during a *match*, with the exception of the contact outlined in **<SG3>**. Any intentional contact will result in a disqualification. Accidental contact will not be penalized, unless the contact directly impacts the final score of the match. This type of accidental contact will result in a disqualification.

**<G6>** During a *match*, *robots* may be remotely operated only by the *drivers* and/or by software running in the on-board control system. If a *coach* touches his/her team's controls anytime during a *match*, the *robot* will be disabled and the team disqualified.

**<G7>** Scores will be calculated for all *matches* immediately after the *match* or when all objects on the field come to rest.

**<G8>** *Robots* may not intentionally detach parts during any *match*, or leave mechanisms on the field. If a detached component or mechanism prevents scoring the team will be disqualified. Multiple intentional infractions may result in disqualification for the entire competition.

**<G9>** Strategies aimed solely at the destruction, damage, tipping over, or entanglement of *robots* are not in the spirit of the VEX Competition and are not allowed. However, *VEX Clean Sweep* is an interactive game. Some tipping, entanglement, and damage may occur as a part of normal game play. If the tipping, entanglement, or damage is ruled to be intentional, the offending team may be disqualified from that *match*. Repeated offenses could result in a team being disqualified from the remainder of the competition.

**<G10>** *Robots* must be designed to permit easy removal of *balls* from any grasping mechanism without requiring that the *robot* have power after the *match*.

**<G11>** Field tolerances may vary by as much as  $\pm 1$ " , so teams must design their *robots* accordingly.

**<G12>** *Small* and *Medium Ball* tolerances may vary by as much as  $\pm 1/8$ " , while *Large Ball* tolerances may vary by as much as  $\pm 1/2$ " so teams must design their *robots* accordingly.

**<G13>** Replays are at the discretion of the event organizer and head referee. Possible reasons for a replay could be attributed to an error or failure of official field personnel, the scoring system, the field controls, or the field itself.

**<G14>** All teams must adhere to all VEX Robotics Competition Rules as they are written, and must abide by the listed intent of the rules. Every team has the opportunity to ask for official rules interpretations in the VEX Robotics Competition Question & Answer Forum. Any responses in this Q&A forum should be treated as official rulings from the VEX Robotics Competition Game Design Committee, and represent the correct and official interpretation of the VEX Robotics Competition Rules.

There may also be periodic "Team Updates" posted on the VEX Clean Sweep webpage in the competition section of [www.VEXrobotics.com](http://www.VEXrobotics.com). These updates are also "official" parts of the VEX Clean Sweep rules.

The VEX Robotics Competition Question & Answer Forum can be found at [www.RobotEvents.com](http://www.RobotEvents.com) and [www.VEXforum.com](http://www.VEXforum.com), or directly at <http://www.vexrobotics.com/clean-sweep-qa>.

**<G15>** All teams are expected to conduct themselves in a respectful and professional manner while competing in VEX Robotics Competition events. If team members are disrespectful or uncivil to event staff, volunteers or fellow competitors, they may be disqualified from their current or upcoming *match*.

## VEX *Clean Sweep* Specific Game Rules

**<SG1>** At the beginning of each *match*, each *alliance robot* must be placed such that they are touching the playing field wall adjacent to their *alliance station* and opposite the *center wall* and not touching any *ball* other than those permitted by **<SG2>**.

**<SG2>** Prior to the start of each *match*, each team will have two (2) *small balls* available to preload into their robots. Each alliance will also have one (1) *medium ball* available to preload into one of their robots (the *alliance teams* need to determine which robot will receive this preloaded *ball*).

- a. A *ball* is considered to be legally preloaded if it is touching the *robot* and not touching any part of the playing field, including the foam playing surface, or game objects.

**<SG3>** Each *alliance* MUST introduce the *large ball* into the field of play sometime in the last thirty seconds (0:30) of the match. The *large ball* must be introduced by a *coach* on the *alliance*.

To be eligible to be *scored*, the *large ball* must be introduced in one of the following ways.

- Gently placed onto the *alliance's large ball introduction zone*.
- Gently placed directly "into / onto" a robot which is contacting the *alliance's large ball introduction zone*.

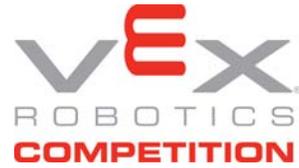
The intent of this rule is that the *large ball* is gently introduced into play such that a robot can then *score* it. It is against the intent of the rule to introduce the ball in such a way that the *coach* imparts energy on the ball which will cause it to score (i.e. bouncing the ball across the wall). It will ultimately be up to referees to determine what constitutes a "gentle" introduction.

Violation of this rule may result in a disqualification per **<S1>** at the discretion of the head referee, if the action is judged to be overly egregious.

If an *alliance* does not legally introduce the *large ball* into play, it counts as being *scored* in their opponents *scoring zone*.

- Illegal ways of introducing the ball include: introducing the ball into play early, not "gently" introducing the ball, not introducing the ball into the *large ball introduction zone*, or not introducing the ball at all.

**<SG4>** *Robots* are prohibited from intentionally contacting any of the tiles in their *scoring zone*. *Robots* violating this rule will be disabled at the discretion of the head-referee. The intent of this rule is not to penalize teams who accidentally reach over/under the wall and touch their *scoring zone*, but instead prevent strategies involving robots crossing to the far side of the field.



# 3

SECTION

## The Tournament

### Overview

The main challenge of the VEX Robotics Competition will be played in a tournament format. Each tournament will include *practice*, *qualifying*, and *elimination matches*. After the *qualifying matches*, teams will be ranked based on their performance. The top teams will then participate in the *elimination matches* to determine the tournament champions.

### Tournament Definitions

*Alliance Captain* – A student chosen to represent their team during *Alliance Selection* for the final *Elimination Matches*.

*Alliance Selection* – The process of choosing the permanent alliances for the *Elimination Matches*.

*Elimination Match* – A match used to determine the championship alliance. Alliances of three face off in a best two of three series, with two teams playing in each match. The first alliance to win two matches will proceed to the next round.

*Practice Match* – An un-scored match used to provide time for teams to get acquainted to the official playing field.

*Qualifying Match* – A match used to determine the rankings for the *Alliance Selection*. Alliances compete to earn *Win Points* and *Strength of Schedule Points*.

*Strength of Schedule Points (SP)* – The second basis of ranking teams. *Strength of Schedule points* are awarded in the amount of the score of the losing alliance in a *Qualifying Match*.

*Win Points (WP)* – The first basis of ranking teams. *Win Points* are awarded for winning (two points) and tying (one point) a *Qualifying Match*.

### Practice Matches

At the event *practice matches* will be played in the morning during the team registration time until the Drivers Meeting begins. Every effort will be made to equalize practice time for all teams, but will be conducted on a first-come, first-served basis. These matches are not scored, and will not affect team ranking.

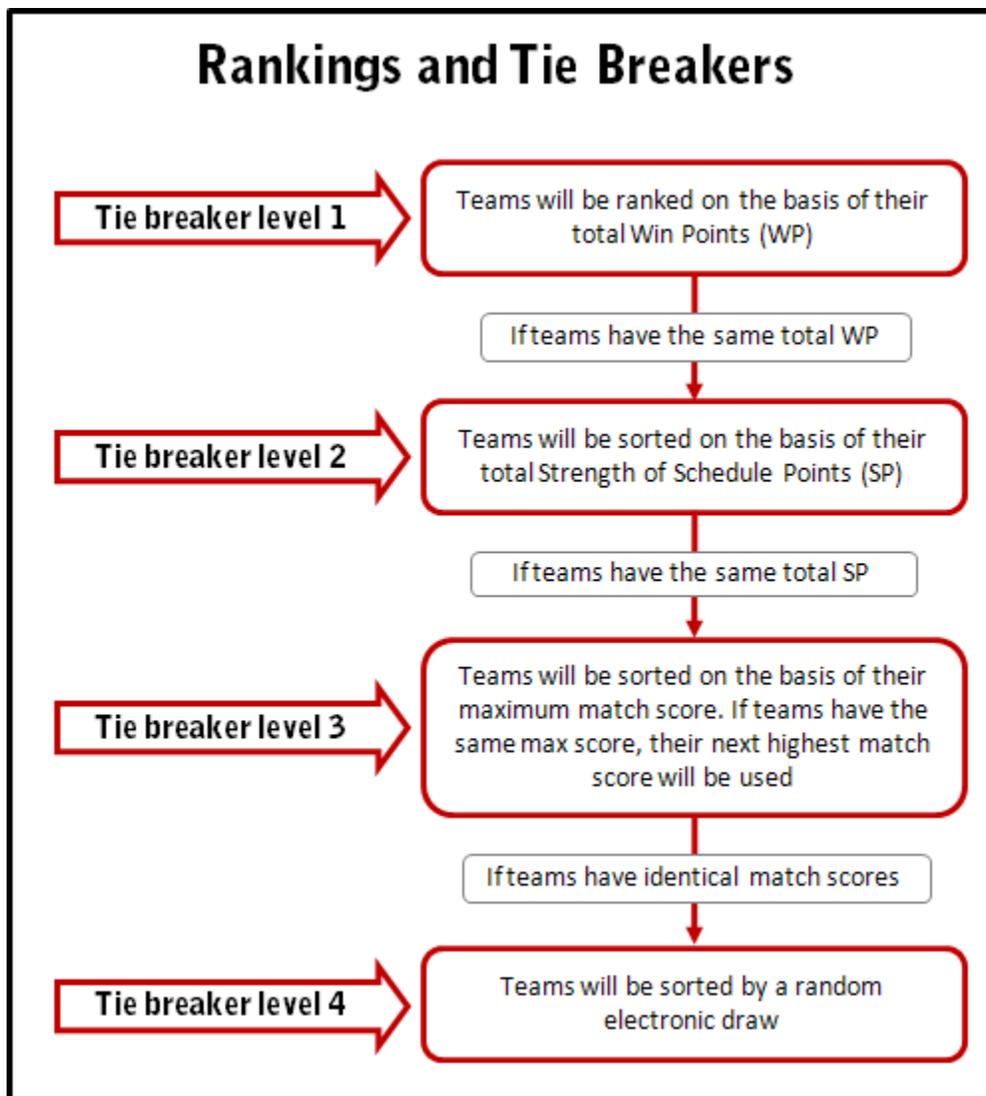
### Qualifying Matches

#### Schedule

- The *qualifying match* schedule will be available prior to opening ceremonies on the day of competition. This schedule will indicate alliance partners and match pairings. It will also indicate the alliance's color – red or blue – and your team's starting position for each match. This starting position is used to determine the placement of each team within the alliance station.
- The *qualifying matches* will start immediately after opening ceremonies in accordance with the qualifying match schedule.
- Teams will be randomly assigned an alliance partner to compete against two randomly assigned opponents in each *qualifying match*.
- All teams will be **scored** on the same number of *qualifying matches*.
- In some cases, a team will be asked to play in an additional *qualifying match*, but will not receive credit for playing this extra match.

## Rankings

- At the conclusion of each match, *Win Points (WP)* will be issued:
  - Winning teams of a *qualifying match* receive two (2) *WP*
  - Losing teams of a *qualifying match* receive zero (0) *WP*
  - If a *qualifying match* ends in a tie, all four teams receive one (1) *WP*
  - If a team is disqualified they receive zero (0) *WP*
- All teams in each *Qualifying Match* will also receive *Strength of Schedule Points (SP)*.
  - The number of *SP* assigned for each match, is that of the losing alliance's score.
  - In the event of a tie, both alliances will receive the same *SP* (equal to the tie score).
  - If a team is disqualified they receive zero (0) *SP*
  - If both teams on an alliance are disqualified, the teams on the winning Alliance will be awarded their own score as their *SP* for that match.
- For a *qualifying match*, if **no** member of a team is present in the driver station at the start of a match, that team is declared a "no show" and will receive zero (0) *WP* and zero (0) *SP*.



## Elimination Matches

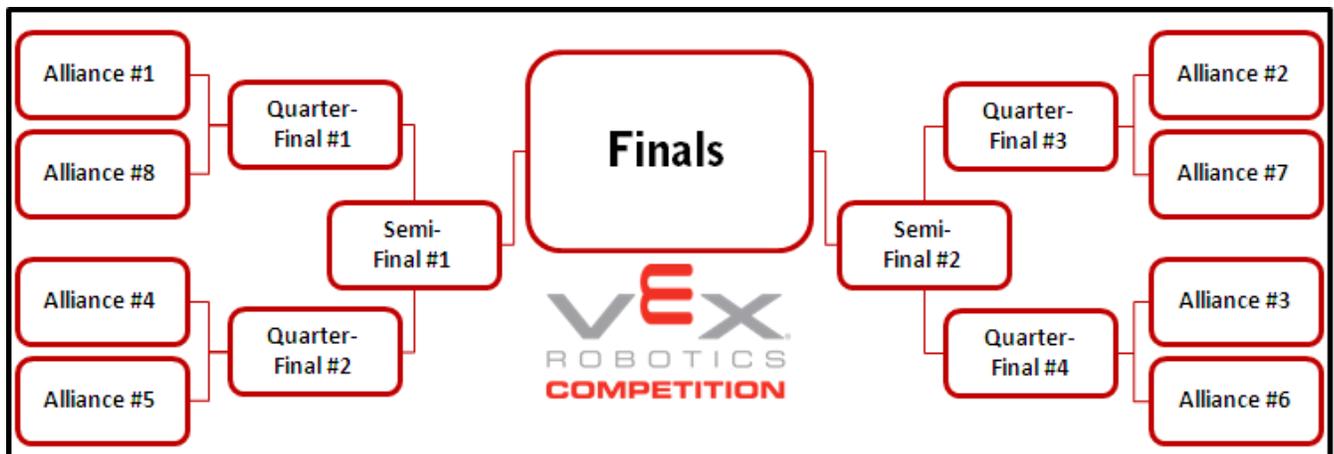
- The *alliance selection* process will consist of two rounds of selection, such that eight alliance captains will form elimination alliances consisting of three teams.
- These eight alliances will participate in a tournament to determine the event champions.
- If a team is disqualified during an *elimination match*, then their entire alliance is disqualified, and the match will be recorded as a loss.

## Alliance Selection Process

- Every team will choose a student to act as a team representative.
  - These student representatives will proceed to the playing field at the designated time to represent their teams in the *alliance selection*.
- There will be eight alliances formed in the *alliance selection*.
- In order of tournament ranking, the student representative of the highest ranked team not already in an alliance will be asked to step forward as an *alliance captain* to invite another available team to join their alliance.
- A team is available if they are not already part of an alliance, or have not already declined an alliance invitation.
  - If the team accepts, it is moved into that alliance.
  - If a team declines an invitation, they CANNOT be invited into another alliance, but are still available to select their own alliance if the opportunity arises.
  - If a team declines, the *alliance captain* from the inviting team must then extend another invitation.
- This process will continue until all eight *alliance captains* have been designated and chosen one alliance partner.
- **The same method is used for each *alliance captain's* second choice. Teams will select in the same order they did in the first round.** Any teams remaining after alliance eight makes their second choice will not compete in the *Elimination Matches*.

## Match Ladder

The *elimination matches* will play in a ladder format as shown below.



## Elimination Scoring

In the elimination rounds, teams do not get *win points*; they get a win, loss or tie. Within each bracket of the Elimination Match Ladder, matches will be played to determine which alliance advances, as follows:

- The first alliance to win two matches advances.
- Any tied matches will be replayed until one alliance has two wins, and advances.

## Tournament Rules

<T01> Referees have ultimate authority during the competition. **Their rulings are final.**

- a. The referees will not review any recorded replays.
- b. Any questions for the referees must be brought forward by a student drive team member within the time period of two (2) matches.

<T02> The only people permitted by the playing field are the three drive team members who are identified by the drive team badges. These badges are interchangeable.

<T03> During matches, two teams from an alliance will play on the field. **Any team which sits out the first match in an elimination series, must play in the second match, with no exceptions.** Prior to each *elimination match*, the *alliance captain* must let the referee know which two teams will be playing in the upcoming match

<T04> There are no time outs in the qualifying rounds; in the elimination rounds, each alliance will be allotted ONE time out of no more than three minutes. The matches must progress according to schedule.

- a. If a robot cannot report for a match, at least one member of the team should report to the field for the match.

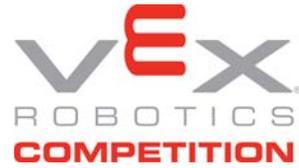
<T05> All team members, including coaches, must wear safety glasses or glasses with side shields while in the pit or alliance stations during matches.

## Event Modifications

**Small Tournaments:** In the case that an event has less than 24 teams (the requisite amount to have eight full alliances), tournaments may be played as follows:

- If there are between 18 and 23 teams at a tournament
  - Alliances will still consist of three teams
  - The number of alliances will be equal to the amount of teams divided by three, less any remainder. (e.g. If there are 19 teams,  $19/3 = 6.33 \rightarrow 6$  picking teams)
- If there are 17 or less teams
  - Alliances will consist of two teams
  - The number of alliances will be equal to the amount of teams divided by two, less any remainder. (e.g. If there are 13 teams,  $13/2 = 6.5 \rightarrow 6$  picking teams)
  - Some tournaments of this size may choose to have one alliance of 3 teams to allow all teams to participate in the elimination rounds. (e.g. If there are 17 teams, 7 alliances of 2 and 1 alliance of 3). Three team alliances must still adhere to <T03> despite competing against other 2 team alliances.
    - If a tournament is using this format, alliances should be selected as per usual until each alliance has two teams. The remaining team would then be added to the lowest ranked alliance.
- The match ladder follows the same format as a full tournament, with byes being awarded when there is no applicable alliance. (e.g. If there are seven alliances, there would be no 8<sup>th</sup> alliance, thereby awarding a bye to the 1<sup>st</sup> alliance in the quarter-finals.)

**Field Height:** At many tournaments the playing field will be placed on the floor. Some tournament organizers may choose to elevate the playing fields by up to 36". For safety reasons, no drive team members will be allowed to stand on any sort of object during a match, despite the presence of raised fields.



# 4

SECTION

## The Robot

### Overview

This section provides rules and requirements for the design and construction of your robot. A VEX Robotics Competition robot is a remotely operated and/or autonomous vehicle designed and built by a registered VEX Robotics Competition student team to perform specific tasks when competing in *VEX Clean Sweep*. Prior to competing at each event, all robots will have to pass an inspection. Refer to Appendix D for the Robot Inspection Guidelines and the Inspection Checklist.

### Robot Rules

There are specific rules and limitations that apply to the design and construction of your robot. Please ensure that you are familiar with each of these robot rules before proceeding with robot design.

**<R1>** Only one (1) robot will be allowed to compete per team in the VEX Robotics Competition. Though it is expected that teams will make changes to their robot at the competition, a team is limited to only one (1) robot.

- a. Teams may not compete with one robot, while a second is being modified or assembled.
- b. Teams may not switch back and forth between multiple robots during a competition.

**<R2>** Every robot will be required to pass a full inspection before being cleared to compete. This inspection will ensure that all robot rules and regulations are met. Initial inspections will take place during team registration/practice time.

- a. If significant changes are made to a robot, it must be re-inspected before it will be allowed to compete.
- b. All robot configurations must be inspected before being used in competition.
- c. Teams may be requested to submit to random spot-inspections by event personnel. Refusal to submit will result in disqualification.
- d. Referees or inspectors may decide that a robot is in violation of the rules. In this event, the team in violation will be disqualified and the robot will be barred from the playing field until it passes re-inspection.

For further information on the inspection process please refer to Appendix D, Robot Inspection Guidelines

**<R3>** The following types of mechanisms and components are NOT allowed:

- a. Those that could potentially damage playing field components.
- b. Those that could potentially damage other competing robots.
- c. Those that pose an unnecessary risk of entanglement.

**<R4>** At the beginning of any match, the maximum allowed size of a robot is 18" x 18" x 18".

- a. During inspections, robots will be placed into a "sizing box" which has interior dimensions matching the above size constraints. To pass inspection, a robot must fit within the box without touching the box walls or ceiling.
- b. Robots may expand beyond their starting size constraints after the start of a match.
- c. Any restraints used to maintain starting size (i.e. zip ties, rubber bands, etc) MUST remain attached to the robot for the duration of the match.

# VEX Robotics Competition - *Clean Sweep*

**<R5>** Robots may be built **ONLY** from Official **Robot** Components from the VEX Robotics Design System unless otherwise specifically noted within these rules.

- a. During inspections if there is a question about whether something is an official VEX component, a team will be required to provide documentation to an inspector, which proves the component's source. Such types of documentation include receipts, part numbers, or other printed documentation.
- b. Only the VEX Robotics Design System Components specifically designed to be used for Robot construction are allowed. Using additional components outside their typical purpose is against the intent of the rule (i.e. please don't try using VEX apparel, competition support, or other non-robot products on a VEX Robotics Competition Robot).
- c. The packaging, manual binders, styrofoam, cardboard, plastic bags, software CD's etc. from the VEX kits are **NOT** included and **CANNOT** be used for robot construction. Only the VEX robot parts themselves are allowed.

**<R6>** Official VEX products are **ONLY** available from VEX & Official VEX Resellers. To determine whether a product is "official" or not, consult [www.VEXrobotics.com](http://www.VEXrobotics.com).

- a. Products **identical** to those listed on this site are also considered "official VEX products". Note: It is up to inspectors to determine whether a component is "identical" to an official VEX component.
- b. VEX Robotics Competition teams from countries that primarily use the metric system may utilize metric fasteners comparable in size, length, and head type to VEX fasteners.

**<R7>** Robots are allowed the following additional "non-VEX" components:

- a. Any material strictly used as a color filter for a VEX Light Sensor.
- b. Any parts which are identical to legal VEX parts.
- c. Teams may add non-functional decorations provided that these do not affect the robot performance in any significant way or affect the outcome of the match. These decorations must be in the spirit of the competition. Inspectors will have final say in what is considered "non-functional".
- d. Any non-aerosol based grease, when used in **extreme** moderation on surfaces and locations that do **NOT** come into contact with the playing field walls, foam field surface, game objects, or other robots.

**<R8>** Additional VEX Robotics Design System Components that are released during the competition season are considered legal for use.

- a. Some "new" components may have certain restrictions placed on them upon their release. These restrictions will be documented in a Team Update. Team Updates will be posted to the "VEX Clean Sweep" home page in the Competition section of [www.VEXrobotics.com](http://www.VEXrobotics.com)

**<R9>** Robots must use **ONLY** one (1) VEX Microcontroller.

**<R10>** Robots must **ONLY** utilize the VEXnet system for all robot communication.

- a. VEX 75Mhz Crystal Radios are prohibited.
- b. Electronics from the VEX-RCR product line are prohibited including all VEXplorer electronics.

**<R11>** Robots may use up to ten (10) VEX motors or VEX Servos (Any combination, up to ten)

**<R12>** A maximum of one (1) VEX Y-cable can be used per Motor Port of the Microcontroller or Power Expander. (You cannot "Y off a Y" to have more than two (2) motors controlled by the same Motor Port.)

**<R13>** The only allowable sources of electrical power for a VEX Robotics Competition Robot is a single (1) VEX 7.2V Robot Battery Pack, unless the robot is utilizing the VEX Power Expander, and a single (1) 9V backup battery. Robots utilizing the VEX Power Expander can use a second (2) VEX 7.2V Robot Battery.

- a. Additional batteries cannot be used on the robot (even ones that aren't connected).
- b. Robots are permitted to use a maximum of one (1) VEX Power Expander
- c. To ensure reliable wireless communication, it is required that all teams connect a charged 9V Backup battery to their VEXnet system using the VEXnet Backup Battery Holder (276-2243).

## VEX Robotics Competition - *Clean Sweep*

**<R14>** No more than two VEX hand-held transmitters may control a single robot during the tournament. No modification of these transmitters is allowed of ANY kind.

- a. No other methods of controlling the robot (light, sound, etc) are permissible.

**<R15>** Parts may NOT be modified as follows:

- a. Motors, extension cords, sensors, controllers, battery packs, and any other electrical component of the VEX Robotics Design System may NOT be altered from their original state in ANY way.
- b. Welding, soldering, brazing, gluing, or attaching in any way that is not provided within the VEX Robotics Design System will NOT be allowed.
  - Mechanical fasteners may be secured using Loctite or a similar thread-locking product.
    - This may be used for securing hardware ONLY.

**<R16>** The Robot on/off switch must be accessible without moving or lifting the robot. The Robot Microcontroller lights should also be visible by competition personnel to assist in diagnosing robot problems.

**<R17>** Teams must bring their robots to the field prepared to play. Teams who use VEX pneumatics must have their systems charged before they place the robot on the field.

**<R18>** To participate in an official VEX Robotics Competition Tournament a team must first register on [www.RobotEvents.com](http://www.RobotEvents.com). Upon registering they will receive their VEX Team Identification Number (VEX Team ID#) and a welcome kit containing VEX Team Identification Number Plates. Every robot should have their VEX Team ID# Plates displayed on a minimum of 2-opposing sides.

- a. The VEX Team Identification Number Plates are considered a non-functional decoration, and cannot be used as a functional part of the robot.
- b. These number plates must fulfill all robot rules (i.e. they must fit within the 18" cube per <R4>, they cannot cause entanglement, etc.)

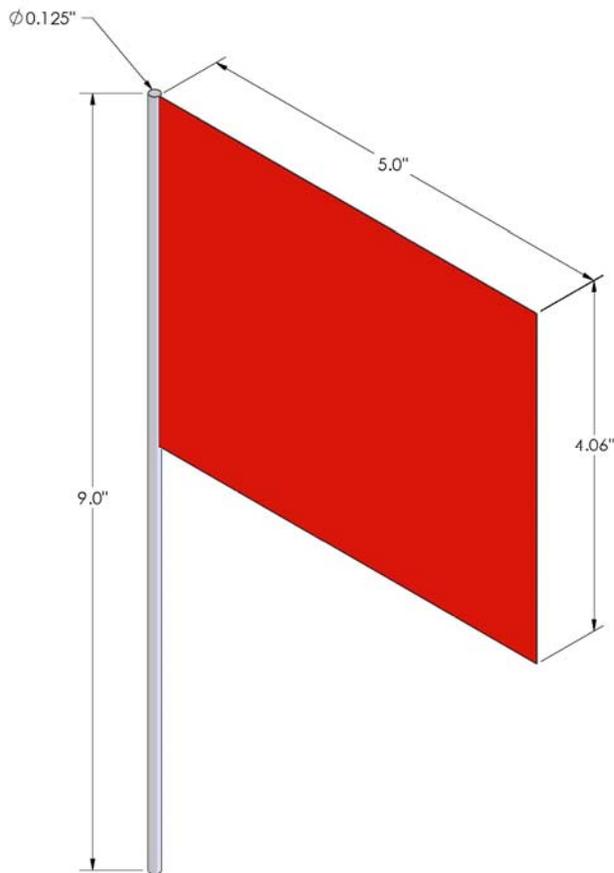
# VEX Robotics Competition - *Clean Sweep*

**<R19>** Robots must include a mounting device to securely hold one VEX Robot Identification Flag throughout an entire match.

- a. The VEX Robot Identification Flags are considered a non-functional decoration, and cannot be used as a functional part of the robot.
- b. These flags must fulfill all robot rules (i.e. they must fit within the 18" cube per <R4>, they cannot cause entanglement, etc.)

Notes on VEX Robot Identification Flags:

- The flags will be issued to teams in their VEX Robotics Competition registration materials.
- These flags may also be available at some events
- Replacement and extra flags are available for purchase at [www.VEXrobotics.com](http://www.VEXrobotics.com)
- For flag details please refer to the following diagram.
- VEX Threaded Standoffs work as simple flag holders, as shown below.



**<R20>** During the Autonomous Period human operators are prohibited from providing ANY feedback to the robots. Robots must operate and react only to sensor inputs and to pre-programmed commands. Human operators will not be allowed to use their hand-held controllers. As such, teams are responsible for programming their robot with custom software if they want to perform in Autonomous mode.

For more information on this, teams should consult the help guides produced by the developers of their chosen programming software.

## Small Event Rule Modifications

The rules listed in this section represent the way the game will be played at ALL VEX Robotics Competition "Championship" Events. We know that some events will choose to modify the rules slightly to suit unique their circumstances. In particular, we expect some events will make the following rule exceptions:

- a. Utilize the VEX 75 Mhz Crystal Radio Transmitter & Receiver instead of or in conjunction with the VEXnet 802.11g Wireless link.
- b. Allow AA batteries to power the robot instead of the VEX 7.2V Battery Pack

If an event makes the changes they need to inform all attending teams. It is especially important that any 75 Mhz events make sure their teams are using the correct communication type.

For additional information on using the 75 Mhz Crystal Radio Transmitter & Receiver, refer to "Appendix G - 75 Mhz Crystal Radio Tournaments".