VEX IQ
COMPETITION
SLAPSHOT

2022 - 2023
Game Manual
Version 2.2

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Changelog

Version 2.2 - December 6, 2022
• Minor typo fixes

Version 2.1 - October 4, 2022
• Updated <SC1> to clarify handling of *Discs* that were scored after the *Match* has ended.
• Updated <G6> to clarify that a *Team* utilizing a single *Driver* may only drive during the first thirty five (0:35) seconds of the *Match*.
• Updated Appendix B to include Robot Skills Challenge Rankings for League Events

Version 2.0 - July 27, 2022
• Corrected Figure 9 to accurately display the boundaries of the *Contact Zones* and *Goal Zones*
• Added a Blue Box to <SC5> to clarify intent
• Added two new figures to <SC5> to clarify intent, and updated all subsequent figure numbers
• Replaced <T15> with a new rule stating that *Fields* may be repaired at the *Event Partner's* discretion
• Added a new bullet point to <R13> stating that it is legal to bend parts which are intended to be flexible
• Added rules for Live Remote Skills to Appendix B

Version 1.1 - July 19, 2022
• Added a note to <G11> stating that the Purple Dispenser must be spun counter-clockwise

Version 1.0 - June 28, 2022
• Corrected Figures throughout the Manual to show the Purple Dispenser Arms in their correct starting position
• Added a new drawing to Appendix A to note the correct starting position of the Purple Dispenser Arm

Version 0.2 - June 14, 2022
• Corrected Figures throughout the Manual that showed an incorrect version of the Yellow Dispenser
• Added a Figure number to the Violation Flowchart (Figure 4), and updated all sub-sequent Figure numbers
• Updated the weight of *Discs* to 0.02 lbs (10 grams)
• Added a new drawing to Appendix A to note the proper way to assemble the Purple Dispenser
• Updated links for the Code of Conduct and Student-Centered Policy
• Minor typo fixes

Version 0.1 - May 10, 2022
• Initial Release

Quick Reference Guide

Scoring Rules (Pages 13-15)	
\<SC1\>	All Scoring statuses are evaluated immediately after the Match ends.
\<SC2\>	Each Disc that is Scored in a *Goal Zone* is worth the point value corresponding to that Zone.
\<SC3\>	*Disc* Scoring examples, per the criteria listed in \<SC2\>.
\<SC4\>	A *Robot* achieves the *Contact Bonus* if any part of their *Robot* is contacting the *Floor* inside of a *Contact Zone*.
\<SC5\>	Each *Disc* that is *Removed* from a *Dispenser* receives one point.

Safety Rules (Page 16)	
\<S1\>	Stay safe, don't damage the *Field*.

General Game Rules (Pages 16-24)	
\<G1\>	Treat everyone with respect.
\<G2\>	VEX IQ is a student-centered program.
\<G3\>	Use common sense.
\<G4\>	The *Robot* must represent the skill level of the *Team*.
\<G5\>	Pre-*Match* setup.
\<G6\>	*Drivers* switch controllers midway through the *Match*.
\<G7\>	*Drivers* drive your *Robot*, and stay in the *Driver Station*.
\<G8\>	Hands out of the *Field*.
\<G9\>	Keep *Discs* in the *Field*.
\<G10\>	Keep your *Robot* together.
\<G11\>	Don't damage the *Field*.
\<G12\>	Handling the *Robot* mid-*Match* is allowed under certain circumstances.
\<G13\>	Horizontal expansion is limited during a *Match*.
\<G14\>	Don't cross the *Fence Line* until Contact.
\<G15\>	*Discs* that have crossed the *Fence* are "off limits".
\<G16\>	*Discs* go under the *Fence*, not over it.

Robot Rules (Pages 25-31)	
<R1>	One *Robot* per *Team*.
<R2>	*Robots* must represent the *Team's* skill level.
<R3>	*Robots* must pass inspection.
<R4>	Officially registered *Team* numbers must be displayed on *Robot License Plates*.
<R5>	Starting configuration.
<R6>	The *Match* configuration will be inspected.
<R7>	VEX IQ product line.
<R8>	Non-VEX IQ components.
<R9>	Microcontroller.
<R10>	Motors.
<R11>	Batteries.
<R12>	Firmware.
<R13>	Modifications of parts.
<R14>	Prohibited items.
<R15>	Let it go after the *Match* is over.

Tournament Rules (Pages 33-37)	
<T1>	The *Head Referee* has ultimate authority on ruling decisions during the competition.
<T2>	*Head Referees* must be qualified.
<T3>	The *Drivers* are permitted to immediately appeal the *Head Referee's* ruling.
<T4>	Teamwork *Matches*.
<T5>	Timeouts.
<T6>	Ending a *Match* early.
<T7>	*Practice Matches* may be played at some events, but are not required.
<T8>	*Qualification Matches* will occur according to the official match schedule.
<T9>	Each *Team* will be scheduled *Qualification Matches* as follows.
<T10>	*Teams* are ranked by their average *Qualification Match* scores.
<T11>	Be at your *Match* on time.
<T12>	Disqualifications.
<T13>	*Teams* playing in *Finals Matches*.
<T14>	*Finals Match* Schedule.
<T15>	*Fields* may be repaired at the *Event Partner's* discretion.
<T16>	*Students* must be accompanied by an *Adult*.
<T17>	*Robots* at the *Field* must be ready to play.
<T18>	Be prepared for minor *Field* variance.
<T19>	*Match* Replays are allowed, but rare.
<T20>	The *Event Partner* has ultimate authority regarding all non-gameplay decisions during an event.

Robot Skills Challenge Rules (Pages B2-B4)	
<RSC1>	Standard rules apply in most cases.
<RSC2>	Skills Scoring and Ranking at events.
<RSC3>	Skills Rankings Globally.
<RSC4>	Skills *Match* Schedule.
<RSC5>	Handling Robots during a Programming Skills Match.
<RSC6>	Starting a Programming Skills Match.

Section 1
The Game

Game Description

VEX IQ Competition (VIQC) Slapshot is played on a 6' x 8' rectangular *Field*, set up as illustrated in the figures throughout this manual.

The object of the game is to score points by Removing *Discs* from *Dispensers*, by placing *Discs* into *Goal Zones*, and by getting *Contact Bonuses* at the end of the *Match*.

In the *Teamwork Challenge*, an *Alliance* composed of two (2) *Robots* works together to score as many points as possible in a sixty (60) second *Match*.

Teams may also compete in *Robot Skills Challenge Matches*, where one (1) *Robot* tries to score as many points as possible. See Appendix B for more information.
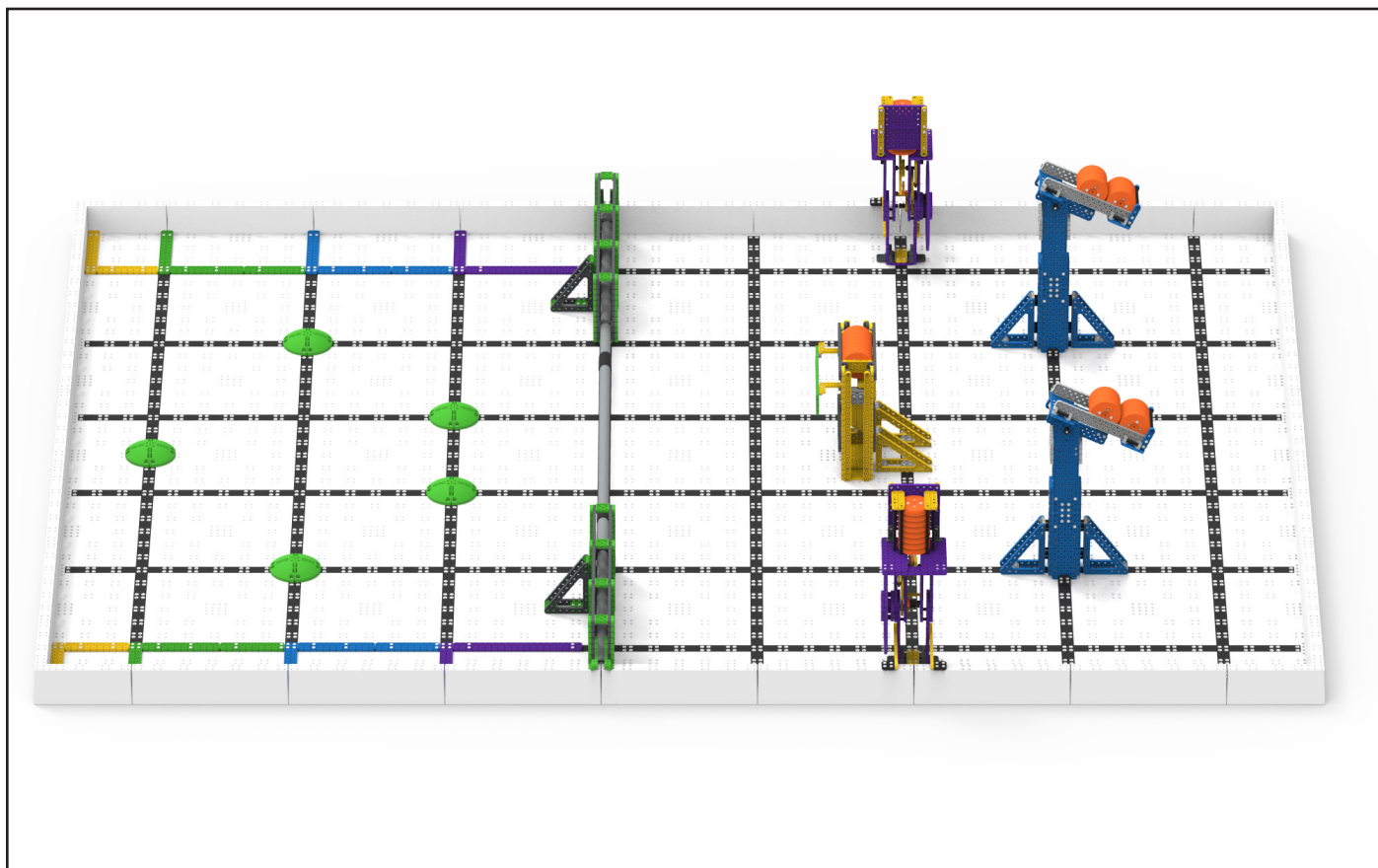

Figure 1: *Starting configuration of the Field for a VEX IQ Competition Slapshot Match.*

About the Game Manual - A Note from the GDC

This Game Manual and its appendices contain everything there is to know about this season's new game, VEX IQ Competition Slapshot. It is intended to be a resource for all *Teams*, *Head Referees*, *Event Partners*, and other members of the VIQC community.

The rules contained in the following pages can be thought of as "constraints" that define this game, just as engineers begin any design project by defining their constraints. At the beginning of a season, "constraints" are all we have. We don't know what the winning *Robot*, best strategy, or most frequent-ly-violated rule will be any more than you do. Isn't that exciting?

When exploring a new game, please approach this Game Manual with that mentality, and look at rules as "constraints." The Game Manual and its appendices contain the full and complete list of constraints that are available for a competitor to strategize, design, and build their *Robots*.

Obviously, all *Teams* must adhere to these rules, and any stated intents of these rules. However, beyond that, there is no "right" way to play. There are no hidden restrictions, assumptions, or intended interpre-tations beyond what is written here. So, it is up to you, the competitor, to find the path through these constraints that best suits your team's goals and ambitions.
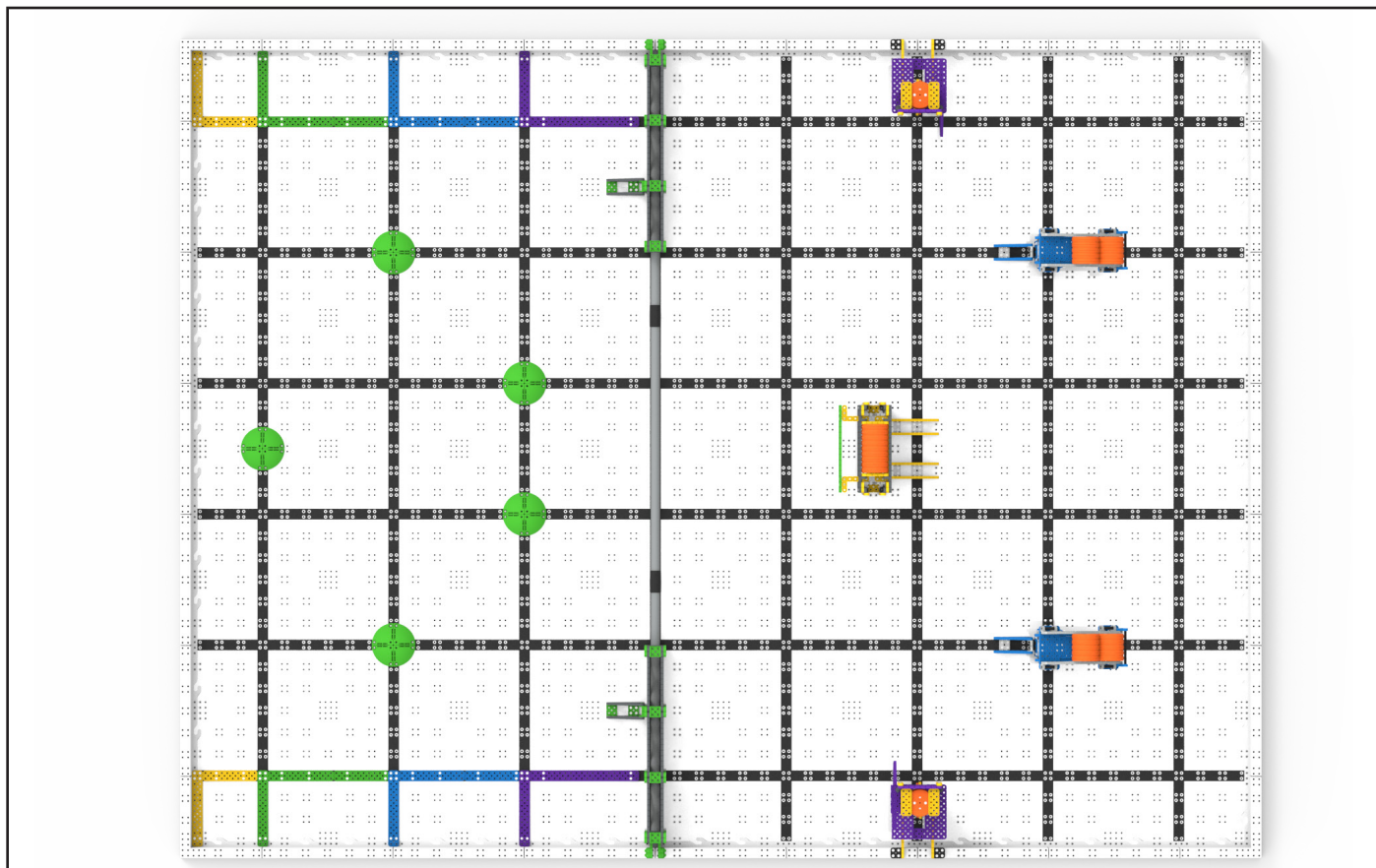

Figure 2: *Starting configuration of the Field for a VEX IQ Competition Slapshot Match.*

Updates

This manual will have a series of "major" and "minor" updates over the course of the season. Each version is official and must be used in official VIQC events until the release of the next version, upon which the previous version becomes void.

Known major release dates are as follows:

May 10, 2022	**Version 0.1**	Initial game release
May 31, 2022	(N/A)	Official Q&A system opens
June 14, 2022	Version 0.2	Minor typographical errors or formatting issues found in the initial release; very few rule changes, if any
June 28, 2022	**Version 1.0**	May include critical gameplay or rule changes inspired by input from the official Q&A system and the VEX community
July 19, 2022	Version 1.1	Unscheduled update
August 2, 2022	**Version 2.0**	May include gameplay or rule changes inspired by early-season events
October 4, 2022	Version 2.1	Clarification update only
December 6, 2022	Version 2.2	Clarification update only
January 31, 2023	**Version 3.0**	May include gameplay or rule changes inspired by mid-season events
April 4, 2023	**Version 4.0**	May include critical gameplay or rule clarifications pertaining specifically to the VEX Robotics World Championship

In addition to these known major updates, there may also be unscheduled updates released throughout the season if deemed critical by the VEX GDC. **Any unscheduled updates will always be released on a Tuesday, no later than 5:00 PM CST (11:00 PM GMT).** These updates will be announced via the VEX Forum, automatically pushed to the VIQC Hub app, and shared via VEX Robotics / REC Foundation social media & email marketing channels.

Game Manual updates are effective immediately upon release; it is every *Team's* responsibility to be familiar with all rules and updates. There are no "grace periods" if an update prohibits a previously legal part, mechanism, or strategy.

Note: REC Foundation Event Support Managers will contact Event Partners involved with multi-week league events that "cross over" an unscheduled update. If a rule change impacts their event (such as a Robot which previously passed inspection no longer being legal), these cases will be reviewed individually depending on the context of the event and the rule that has changed. This is the only possible "grace period" exception.

The Q&A System

When first reviewing a new robotics game, it is natural to have questions about situations which may not be immediately clear. Navigating the Game Manual and seeking out answers to these questions is an important part of learning a new game. In many cases, the answer may just be in a different place than you first thought. Or, if there is no rule explicitly prohibiting something, then that usually means it is legal!

However, if a *Team* is still unable to find an answer to their question after closely reviewing the relevant rules, then every *Team* has the opportunity to ask for official rules interpretations in the VEX IQ Competition Q&A System.

All responses in this Q&A system should be treated as official rulings from the VEX IQ Competition Game Design Committee, and they represent the correct and official interpretation of the VEX IQ Competition Rules. The Q&A system is the only source other than the Game Manual for official rulings and clarifications.

The VIQC Q&A System can be found at https://www.robotevents.com/VIQC/2022-2023/QA.

Before posting on the Q&A system, be sure to review the Q&A Usage Guidelines, which can be found at https://www.robotevents.com/VIQC/2022-2023/QA/guidelines.

In brief:

1. Read and search the manual before posting.

2. Read and search existing Q&As before posting.

3. Quote the applicable rule from the latest version of the manual in your question.

4. Make a separate post for each question.

5. Use specific and appropriate question titles.

6. Questions will (mostly) be answered in the order they were received.

7. This system is the only source for official rules clarifications.

If there are any conflicts between the Game Manual and other supplemental materials (e.g, Referee Certification courses, the VIQC Hub app, etc.), the most current version of the Game Manual takes precedence.

Similarly, it can never be assumed that definitions, rules, or other materials from previous seasons apply to the current game. Q&A responses from previous seasons are not considered official rulings for the current game. Any relevant clarifications that are needed should always be re-asked in the current season's Q&A.

General Definitions

Adult - Anyone who is not a *Student*.

Alliance - A pre-assigned grouping of two (2) *Teams* that are paired together during a given Teamwork *Match*.

Alliance Score - Points scored in a Teamwork *Match* that are awarded to both *Teams*.

Disablement - A penalty applied to a *Team* for a rule violation. During *Disablement*, a *Team* is no longer allowed to operate their *Robot*, and the *Drivers* will be asked to place their Controller on the ground. A *Disablement* is not the same as a *Disqualification*.

Disqualification - A penalty applied to a *Team* for a rule violation (see <T12> for more details). If a *Team* is Disqualified in a *Match*, the *Head Referee* will notify the *Team* of their violation at the end of the *Match*. At the *Head Referee's* discretion, repeated violations and / or *Disqualifications* for a single *Team* may lead to its *Disqualification* for the entire event.

Driver - A *Student Team* member who stands in the *Driver Station* and is responsible for operating and controlling the *Team's Robot*. Up to two *Team* members per *Team* may fulfill this role in a given *Match* (see <G6>).

Driver Station - The region behind the *Field*, where the *Drivers* must remain during their *Match* unless legally interacting with their *Robot*.
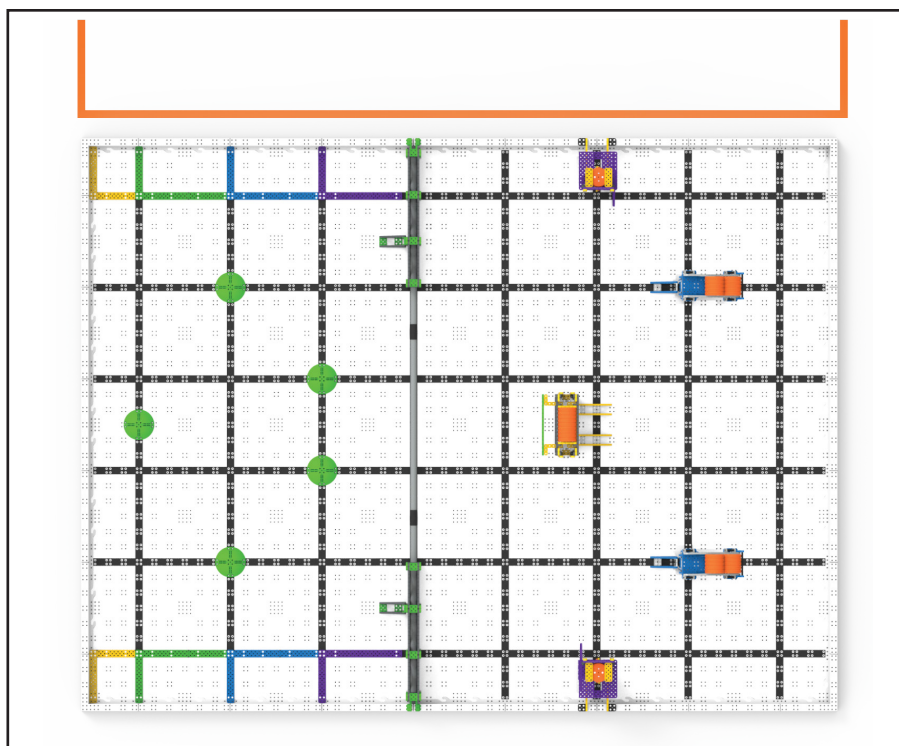

Figure 3: *The Driver Station configuration for VIQC Slapshot.*

Field - The entire playing *Field*, being six (6) field tiles wide by eight (8) field tiles long (totalling forty-eight (48) field tiles), including the *Field Perimeter*.

Field Element - All elements that make up the *Field*, including the *Field Perimeter*, *Floor*, PVC pipes, and any VEX IQ parts attached to any of the above.

Field Perimeter - The outer part of the *Field*, made up of four (4) outside corners and twenty-four (24) straight sections.

Floor - The interior flat part of the playing *Field*, made up of the forty-eight (48) field tiles that are within the *Field Perimeter*.

Game Design Committee (GDC) - The creators of VIQC Slapshot, and authors of this Game Manual.

License Plate - A physical component on the *Robot* that has the *Team's* VEX IQ Competition number displayed. The *License Plate* must have a length and height of 3.5" x 1.5" (88.9mm x 38.1mm) and must not exceed a width of 0.25" (6.35mm) per <R4>.

Match - A set time period during which *Teams* play a defined version of Slapshot to earn points. See Section 3.

- **Autonomous Period** - A time period during which *Robots* operate and react only to sensor inputs and to commands pre-programmed by the *Students* into the *Robot* control system.

- **Driver Controlled Period** - A time period during which *Drivers* operate their *Robot*.

Match Type	Participants	Autonomous Period (m:ss)	Driver Controlled Period (m:ss)
Teamwork Challenge	One *Alliance*, on one *Field*, made up of two *Teams*, each with one Robot	None	1:00
Driver Skills Challenge	One *Team*, with one *Robot*	None	1:00
Programming Skills Challenge	One *Team*, with one *Robot*	1:00	None

Robot - A machine that has passed inspection, designed to execute one or more tasks autonomously and / or by remote control from a human operator.

Student - Anyone born after May 1, 2007 (i.e., who will be 15 or younger at VEX Worlds 2023). Eligibility may also be granted based on a disability that has delayed education by at least one year. *Students* are the individuals who design, build, repair, and program the *Robot* with minimal *Adult* assistance.

- **Elementary School Student** - Any *Student* born after May 1, 2010 (i.e., who will be 12 or younger at VEX Worlds 2023). *Elementary School Students* may "play up" and compete as a *Middle School Student*.

- **Middle School Student** - Any eligible *Student* who is not an *Elementary School Student*.

Team- Two or more *Students* make up a *Team*. A *Team* is classified as an Elementary School *Team* if all members are *Elementary School Students*. A *Team* is classified as a Middle School *Team* if any members are *Middle School Students*, or if the *Team* is made up of *Elementary School Students* who declare themselves as "Playing Up" as *Middle School Students* by registering their *Team* as a Middle School *Team*.

Once declared and playing as a Middle School *Team*, that *Team* may not change back to an Elementary School *Team* for the remainder of the season. *Teams* may be associated with schools, community / youth organizations, or a group of neighborhood *Students*.

- **Builder** - The *Student*(s) on the team who assemble(s) the *Robot*. An *Adult* cannot be a *Builder* on a *Team*. *Adults* are permitted to teach the *Builder*(s) associated concepts, but may never work on the *Robot* without the *Builder*(s) present and actively participating.

- **Designer** - The *Student*(s) on the *Team* who design(s) the *Robot* to be built for competition. An *Adult* cannot be a *Designer* on a *Team*. *Adults* are permitted to teach the *Designer*(s) associated concepts, but may never work on the design of the *Robot* without the *Designer*(s) present and actively participating.

- **Programmer** - The *Student*(s) on the *Team* who write(s) the computer code that is downloaded onto the *Robot*. An *Adult* cannot be a *Programmer* on a *Team*. *Adults* are permitted to teach the *Programmer*(s) associated concepts, but may never work on the code that goes on the *Robot* without the *Programmer*(s) present and actively participating.

Violation - The act of breaking a rule in the Game Manual.

- **Minor Violation** - A *Violation* which does not result in a *Disqualification*.

  o Accidental, momentary, or otherwise non-*Score Affecting Violations* are usually *Minor Violations*.

  o *Minor Violations* usually result in a verbal warning from the *Head Referee* during the *Match*, which should serve to inform the *Team* that a rule is being Violated before it escalates to a *Major Violation*.

- **Major Violation** - A *Violation* which results in a *Disqualification*.
    - o Unless otherwise noted in a rule, all *Score Affecting Violations* are *Major Violations*.
    - o If noted in the rule, egregious or intentional *Violations* may also be *Major Violations*.
    - o Multiple *Minor Violations* within a *Match* or tournament may escalate to a *Major Violation*, at the *Head Referee's* discretion.
- **Score Affecting** - A *Violation* which improves a *Team's* or an *Alliance's* score at the end of a *Match*.
    - o Multiple *Violations* within a *Match* can cumulatively become *Score Affecting*.
    - o When evaluating if a *Violation* was *Score Affecting*, *Head Referees* will focus primarily on any *Robot* actions that were directly related to the *Violation*.
    - o Determining whether a *Violation* was *Score Affecting* can only be done once the *Match* is complete and the scores have been calculated.

Some rules include *Violation* Notes in a *red italicized text* to denote special circumstances or provide additional clarifications. If no *Violation* Notes are found in a given rule, then it should be assumed that the above "default" definitions apply.

To determine whether a *Violation* may have been *Score Affecting*, check whether the *Violation* directly contributed to increasing the score of the *Match*. If it did not increase the *Alliance's* score, then the *Violation* was not *Score Affecting*, and it was very likely a *Minor Violation*.
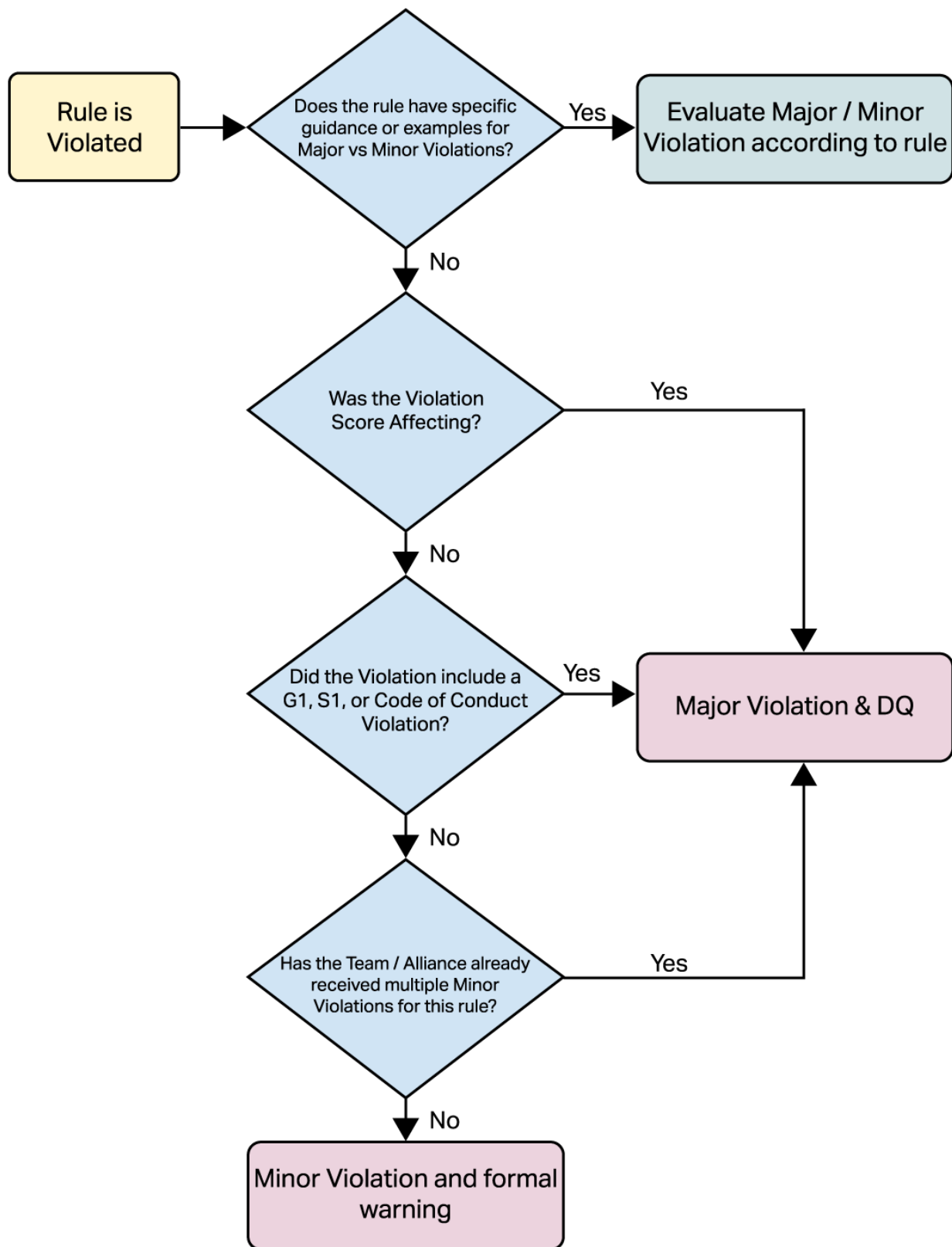
See the following flowchart for more information.

Figure 4: *The process for determing Violations in VIQC Slapshot.*

Game-Specific Definitions

Contact Bonus - A point bonus achieved at the end of a *Match*. See <SC4> for more details.

Contact Zone - One of the regions of the *Field*, as shown in Figure 5, where *Teams* can receive the *Contact Bonus*.

- *Contact Zones* are bordered by the *Field Perimeter*, the *Fence*, and / or VEX IQ beams. These bordering elements are not considered part of their respective *Contact Zones*.
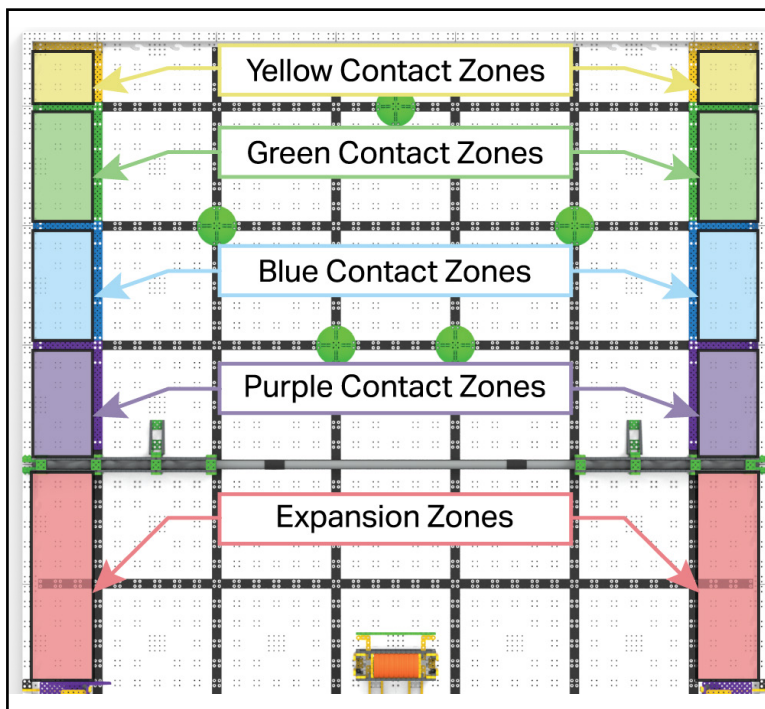- *Contact Zones* are defined as the *Floor* itself; they are not infinitely vertical volumes.

Figure 5: *Overhead view of the field, depicting the Contact Zones and Expansion Zones.*

Disc - An orange, plastic, roughly cylindrical object with the following approximate dimensions:

- Diameter: 2.5 Inches (63.5 mm)
- Height: 0.5 Inches (12.7 mm)
- Weight: 0.02 lbs (10 grams)

Note: Although they are similar, Discs used in VIQC Slapshot are not interchangeable with the "5x Pitch Weighted Disks" found in the VEX GO product line (228-7384) and used in the Factory Automation Competition.

Dispenser - A structure built out of VEX IQ parts which contains *Discs* at the beginning of the *Match*. *Robots* can interact with *Dispensers* to Remove *Discs* for points. There are five (5) *Dispensers* total:

- One yellow *Dispenser*, containing nine (9) *Discs*
- Two blue *Dispensers*, containing ten (10) *Discs* each
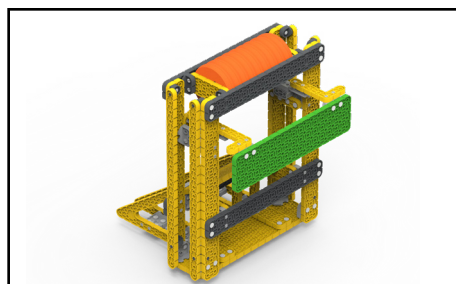- Two purple *Dispensers*, containing eight (8) *Discs* each

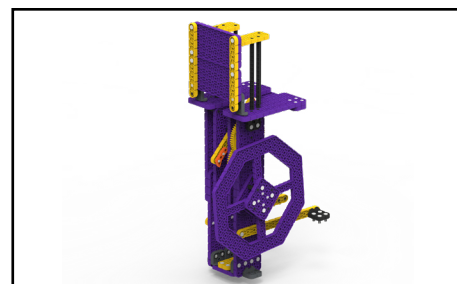*Figure 6: The Yellow Dispenser*

Figure 7: A Blue Dispenser

Figure 8: A Purple Dispenser

Expansion Zone - One of the regions of the *Floor*, as shown in Figure 5, where *Robots* can expand horizontally beyond the 11" x 19" limit. See rule <G13>.

Fence - The gray PVC pipe, and all supporting structures built out of VEX IQ parts, which spans the entire width of the *Field*.

Fence Line - The black line on the *Floor* which runs immediately underneath and parallel to the *Fence*. The *Fence Line* borders the 2-Point *Goal Zone*, the Purple *Contact Zones*, and the purple VEX IQ parts bordering the Purple *Contact Zones*.

Goal Zone - One of the regions of the *Field*, as shown in Figure 9, in which *Discs* can earn points. *Goal Zones* are defined as infinitely vertical 3-dimensional projections of these regions of the *Floor*; they are not just the *Floor* itself.
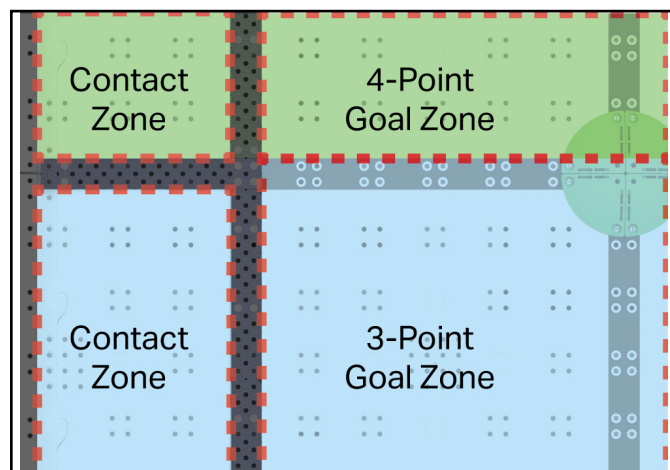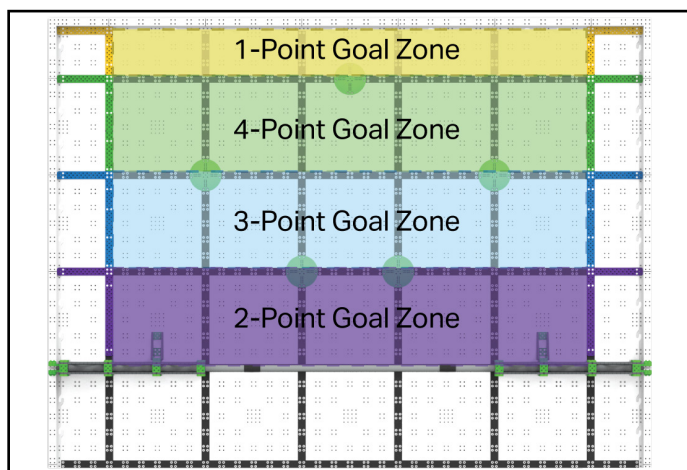

Figure 9: The Goal Zones

Removed - A *Disc* status. A *Disc* is considered *Removed* from a *Dispenser* if it meets the following criteria:

- It is one of the 45 *Discs* which begin the *Match* in *Dispensers*
- It ends the *Match* having moved from its original position such that it is no longer fully supported by its *Dispenser* (i.e., its *Dispenser* has been "triggered" by a *Robot*).
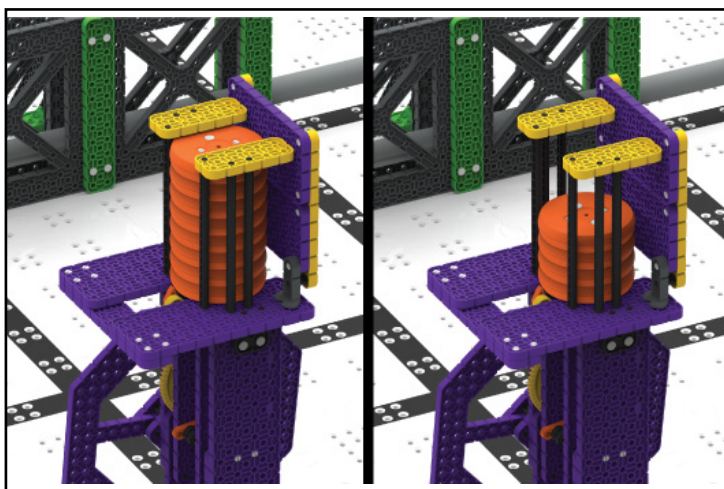
See <SC5> for more details.

Figure 10: *Four (4) Discs have been Removed from the Dispenser on the right.*

Scored - A *Disc* status. See the Scoring section for more information.

Scoring

Each *Disc Scored* in a *Goal Zone*	The point value corresponding to that *Goal Zone*
Each *Disc Removed* from a *Dispenser*	1 point
Each *Robot* that achieves the *Contact Bonus*	Additional 1 point per *Disc* that is *Scored* in the corresponding *Goal Zone*

<SC1> All Scoring statuses are evaluated **immediately after the Match ends**, once all *Discs*, *Field Elements*, and *Robots* on the *Field* come to rest.

    a.   Referees and other event staff are not allowed to review any videos or pictures from the *Match*, per <T1b>.

    b.   If there is a concern regarding the score of a *Match*, only the *Drivers* from that *Match*, not an *Adult*, may share their questions with the *Head Referee*.

    c.   This rule's intent is for *Driver* inputs and *Robot* motion to cease at the end of the *Match*. A pre-programmed routine which causes *Robot* motion to continue after the end of the *Match* would violate the spirit of this rule. Any Scoring which takes place after the *Match* due to *Robots* continuing to move will not count.

<SC2> Each **Disc that is Scored in a Goal Zone** is worth the point value corresponding to that *Goal Zone*. For example, all *Discs* which are *Scored* in the 3-Point *Goal Zone* are worth three (3) points each.

To be considered *Scored*, a *Disc* must meet the following criteria:

    1.   The *Disc* is not contacting a *Robot*.

    2.   The *Disc* is at least partially within a *Goal Zone*.

    3.   The *Disc* is not contacting a *Contact Zone*.

If a *Disc* meets all of the above criteria, and is partially within two *Goal Zones*, then it is considered *Scored* in the *Goal Zone* farthest from the *Fence*.

> If a *Disc* is launched by a *Robot* after the *Match* has ended, it will be removed from the *Field* by the *Head Referee*, and not considered *Scored*. This is the only *Disc* that is affected; all other *Discs* will still be considered *Scored*, even if they were impacted by the post-*Match Disc*. See this Q&A for more information.

<SC3> *Disc* Scoring examples, per the criteria listed in <SC2>. In these figures, each labeled *Disc* is highlighted to indicate which *Goal Zone* it is scored in.
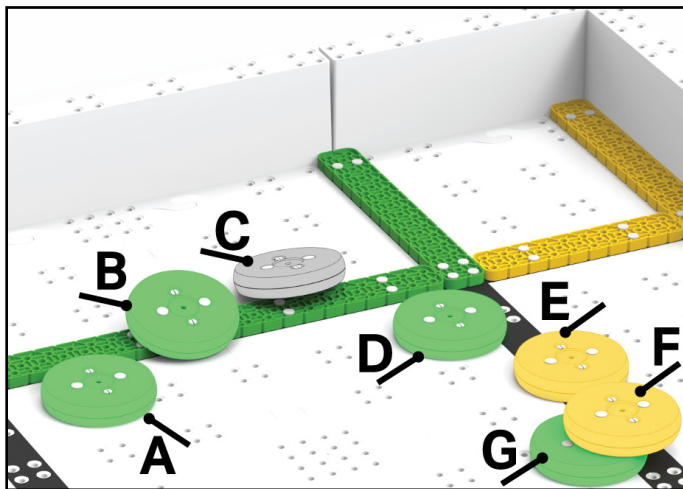

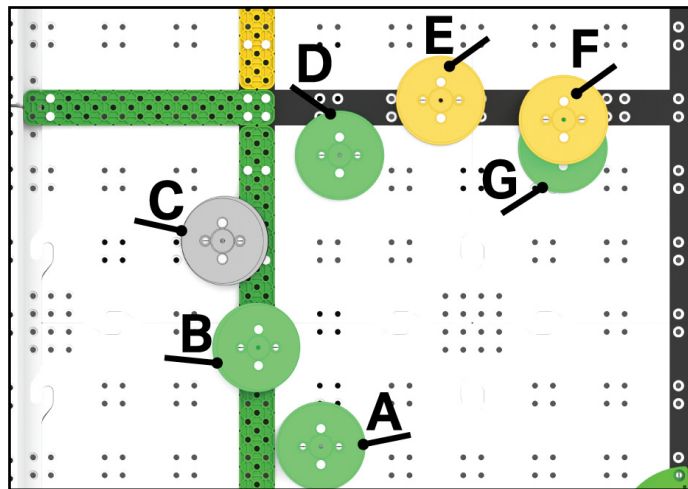
Figure 11: Scoring Example 1 (side view)

Figure 12: Scoring Example 1 (top view)

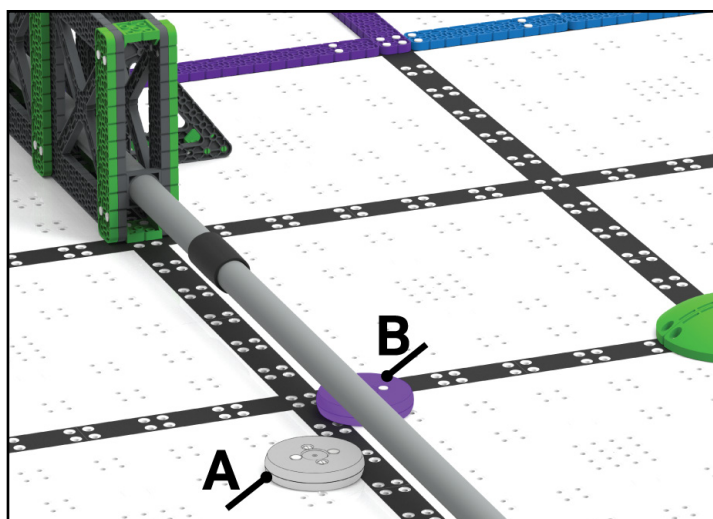| Disc	Score Value	Explanation
A	4 Points	• Fully within the 4-Point *Goal Zone*
B	4 Points	• Partially within the 4-Point *Goal Zone* • Resting on top of the border of the *Contact Zone* is irrelevant, because the *Disc* is not contacting the *Contact Zone* itself
C	0 Points	• Contact with the *Contact Zone* overrides any other statuses
D	4 Points	• Fully within the 4-Point *Goal Zone* • Contact with the black line is irrelevant, because the black line is still considered part of the 4-Point *Goal Zone*
E	1 Point	• Partially within both the 4-Point and 1-Point *Goal Zones* (i.e., it has "broken the plane" and entered into the 1-Point *Goal Zone*) • The 1-Point *Goal Zone* is further from the *Fence*
F	1 Point	• Partially within the 1-Point *Goal Zone* • Being fully supported by *Disc* G is not relevant; the *Goal Zones* are infinitely vertical volumes, so this *Disc* has "broken the plane" and entered the 1-Point *Goal Zone*
G	4 Points	• Fully within the 4-Point *Goal Zone* • Contact with *Disc* F is not relevant

Figure 13: *Scoring Example 2*

Disc	Score Value	Explanation
A	0 Points	• Not partially within any *Goal Zone* (i.e., it has not "broken the plane" and entered the 2-Point *Goal Zone*)
B	2 Points	• Partially within the 2-Point *Goal Zone*

<SC4> A **Robot achieves a Contact Bonus** if any part of the *Robot* is contacting the *Floor* inside of a *Contact Zone*. The *Contact Bonus* is worth a number of points equal to the number of *Discs* which are *Scored* in the *Contact Zone's* corresponding *Goal Zone*.

For example, if a *Robot* is contacting the Purple *Contact Zone*, and there are five (5) *Discs Scored* in the 2-Point *Goal Zone*, then that *Robot* receives a *Contact Bonus* of five (5) points.

> *Note: If a single Robot is contacting the Floor in multiple Contact Zones, then it is not eligible for any Contact Bonuses.*

> *Note 2: Contact Bonuses are awarded separately per Robot, and are added together.*

<SC5> Each **Disc that is Removed from a Dispenser** receives one point. The recommended way to determine how many *Discs* have been *Removed* is to look at how many *Discs* are in a given *Dispenser* at the end of a *Match*, and subtract it from the starting quantity for that *Dispenser*.

For example, if a purple *Dispenser* ends the *Match* with 2 *Discs* left, then it should be reasonably assumed that 6 *Discs* were *Removed* from it.

> If a *Dispenser* is "triggered" by a *Robot* and a *Disc* incidentally lands in a position that partially meets the definition of *Removed*, *Teams* will generally be given the "benefit of the doubt", and the *Disc* will be considered *Removed*. It will be at the *Head Referee's* discretion whether this interaction was truly incidental (such as in Figure 14), or due to an "incomplete trigger" by the *Robot* (such as Figure 15).
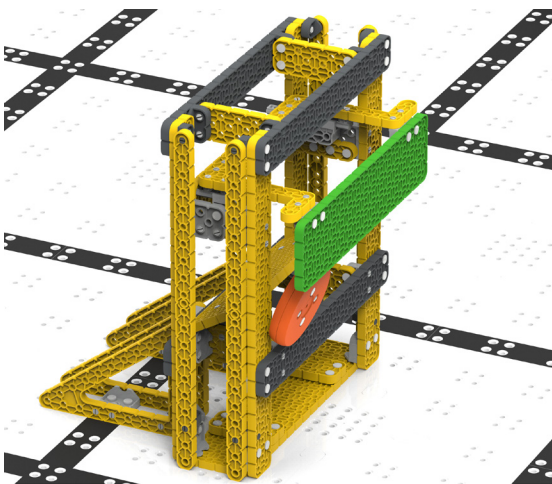
Figure 14: An example of a Disc that should still be considered as Removed.

Figure 15: An example of a Disc that should not be considered as Removed.

Safety Rules

<S1> Stay safe, don't damage the Field. If, at any time, the *Robot* operation or *Team* actions are deemed unsafe or have damaged any *Field Elements* or *Discs*, the offending *Team* may be Disabled and / or Disqualified at the *Head Referee's* discretion. The *Robot* will require re-inspection before it may again take the *Field*.

General Game Rules

<G1> Treat everyone with respect. All *Teams* are expected to conduct themselves in a respectful and professional manner while competing in VEX IQ Competition events. If a *Team* or any of its members (*Students* or any *Adults* associated with the *Team*) are disrespectful or uncivil to event staff, volunteers, or fellow competitors, they may be Disqualified from a current or upcoming *Match*. *Team* conduct pertaining to <G1> may also impact a *Team's* eligibility for judged awards. Repeated or extreme violations of <G1> could result in a *Team* being Disqualified from an entire event, depending on the severity of the situation.

This rule exists alongside the REC Foundation Code of Conduct. Violation of the Code of Conduct can be considered a *Major Violation* of *<G1>* and can result in *Disqualification* from a current *Match*, an upcoming *Match*, an entire event, or (in extreme cases) an entire competition season. The Code of Conduct can be found at https://kb.roboticseducation.org/hc/en-us/articles/4416850656535-Code-of-Conduct-for-VIQC.

> *Violation Notes: Violations of <G1> may be considered Major Violations, and should be addressed on a case-by-case basis. Teams at risk of a Major <G1> Violation due to multiple Minor Violations for disrespectful or uncivil behaviors will usually receive a "final warning," although the Head Referee is not required to provide one.*

<G2> VEX IQ is a student-centered program. *Adults* may assist *Students* in urgent situations, but *Adults* may never work on or program a *Robot* without *Students* on that *Team* being present and actively participating. *Students* must be prepared to demonstrate an active understanding of their *Robot* construction and programming to judges or event staff.

> Some amount of *Adult* mentorship, teaching, and / or guidance is an expected and encouraged facet of VEX competitions. No one is born an expert in robotics! However, obstacles should always be viewed as teaching opportunities, not tasks for an *Adult* to solve without *Students* present and actively participating.
>
> When a mechanism falls off, it is…
> …Okay for an *Adult* to help a *Student* investigate why it failed, so it can be improved.
> …Not okay for an *Adult* to put the *Robot* back together.
>
> When a *Team* encounters a complex programming concept, it is…
> …Okay for an *Adult* to guide a *Student* through a flowchart to understand its logic.
> …Not okay for an *Adult* to write a pre-made command for that *Student* to copy / paste.
>
> During *Match* play, it is…
> …Okay for an *Adult* to provide cheerful, positive encouragement as a spectator.
> …Not okay for an *Adult* to explicitly shout step-by-step commands from the audience.

This rule operates in tandem with the REC Foundation Student Centered Policy, which is available on the REC Foundation website for *Teams* to reference throughout the season: https://kb.roboticseducation. org/hc/en-us/articles/4421127318423-Student-Centered-Policy-for-VIQC.

Violation Notes: Potential Violations of this rule will be reviewed on a case-by-case basis. By definition, all Violations of this rule become Score Affecting as soon as it is determined that a Robot which was built by an Adult has won a Match.

<G3> Use common sense. When reading and applying the rules in this document, please remember that common sense always applies in the VEX IQ Competition.

> Some examples may include:
>
> - If there is an obvious typographical error (such as "per <T5>" instead of "per <G5>"), this does not mean that the error should be taken literally until corrected in a future update.
>
> - Understand the realities of the VEX IQ *Robot* construction system. For example, if a *Robot* could hover above the *Field* for a whole *Match*, that would create loopholes in many of the rules. But … they can't. So … don't worry about it.
>
> - When in doubt, if there is no rule prohibiting an action it is generally legal. However, if you have to ask whether a given action would violate <S1>, <G1>, or <T1>, then that's probably a good indication that it is outside the spirit of the competition.
>
> - In general, *Teams* will be given the "benefit of the doubt" in the case of accidental or edge-case rules infractions. However, there is a limit to this allowance, and repeated or strategic infractions will still be penalized. See <SC1c> as an example.

<G4> The Robot must represent the skill level of the Team. Each *Team* must include *Drivers*, *Programmer(s)*, *Designer(s)*, and *Builder(s)*. No *Student* may fulfill any of these roles for more than one VEX IQ Competition *Team* in a given competition season. *Students* may have more than one role on the *Team*, (e.g., a *Designer* may also be a *Builder*, a *Programmer*, and a *Driver*).

a. *Team* members may move from one *Team* to another for non-strategic reasons that are outside of the *Team's* control.

   i. Examples of permissible moves may include, but are not limited to, illness, changing schools, conflicts within a *Team*, or combining / splitting *Teams*.

   ii. Examples of strategic moves in violation of this rule may include, but are not limited to, one *Programmer* "switching" *Teams* in order to write the same program for multiple *Robots*, or one *Student* writing the Engineering Notebook for multiple *Teams*.

   iii. If a *Student* leaves a *Team* to join another *Team*, <G4> still applies to the *Students* remaining on the previous *Team*. For example, if a *Programmer* leaves a *Team*, then that *Team's* *Robot* must still represent the skill level of the *Team* without that *Programmer*. One way to accomplish this would be to ensure that the *Programmer* teaches or trains a "replacement" *Programmer* in their absence.

b. When a *Team* qualifies for a Championship event (e.g., States, Nationals, Worlds, etc.) the *Students* on the *Team* attending the Championship event are expected to be the same *Students* on the *Team* who were awarded the spot. *Students* can be added as support to the *Team*, but may not be added as *Drivers* or *Programmers* for the *Team*.

   i. An exception is allowed if one (1) *Driver* and / or one (1) *Programmer* on the *Team* cannot attend the event. The *Team* can make a single substitution of a *Driver* or *Programmer* for the Championship event with another *Student*, even if that *Student* has competed on a different *Team*. This *Student* will now be on this new *Team* and may not return to the original *Team*.

c. Within a single event, a *Driver* may only drive for one (1) *Team*. If a *Team* attends an event with only one (1) *Driver* in attendance, then that *Team* is granted an allowance to use another qualified *Driver* from the event. This substitute *Driver* is given an exemption for this event and may only Drive for this one *Team* at that event. Once the event is over, the substitute *Driver* will go back to his or her original *Team*. This exception is only granted if a *Team* has one (1) *Driver* in attendance due to reasons outside of the *Team* control, such as illness.

Violation Notes: Violations of this rule will be evaluated on a case-by-case basis, in tandem with the REC Foundation Student Centered Policy as noted in <G2>, and the REC Foundation Code of Conduct as noted in <G1>.

> *Event Partners* should bear in mind <G3>, and use common sense when enforcing this rule. It is not the intent to punish a *Team* who may change *Team* members over the course of a season due to illness, changing schools, conflicts within a *Team*, etc.
>
> *Event Partners* and referees are not expected to keep a roster of any *Student* who has ever been a *Driver* for one day. This rule is intended to block any instance of loaning or sharing *Team* members for the sole purpose of gaining a competitive advantage.

<G5> Pre-match setup. At the beginning of a *Match*, each *Robot* must meet the following criteria:

1. Not contacting any *Discs*, other *Field Elements*, or other *Robots*.

2. Fit within an 11" x 19" x 15" (279mm x 483mm x 381mm) volume, as checked during inspection per <R5>.

3. Contacting the inner wall of the *Field Perimeter* that is furthest from the *Fence*. See the green highlight on Figure 16.

Violation Notes: Any Violations of this rule will result in the Robot being removed from the Field prior to the start of the Match; rules <R3d> and <T17> will apply until the situation is corrected. The Team will not receive a Disqualification, but they will not be permitted to play in the Match.

Note: There are no specific starting positions, as long as the above criteria are met. Head Referees may ask Teams to temporarily move their Robot between two of the black lines on the field for a size check, but there is no requirement for them to start the Match in that location once the size has been verified.
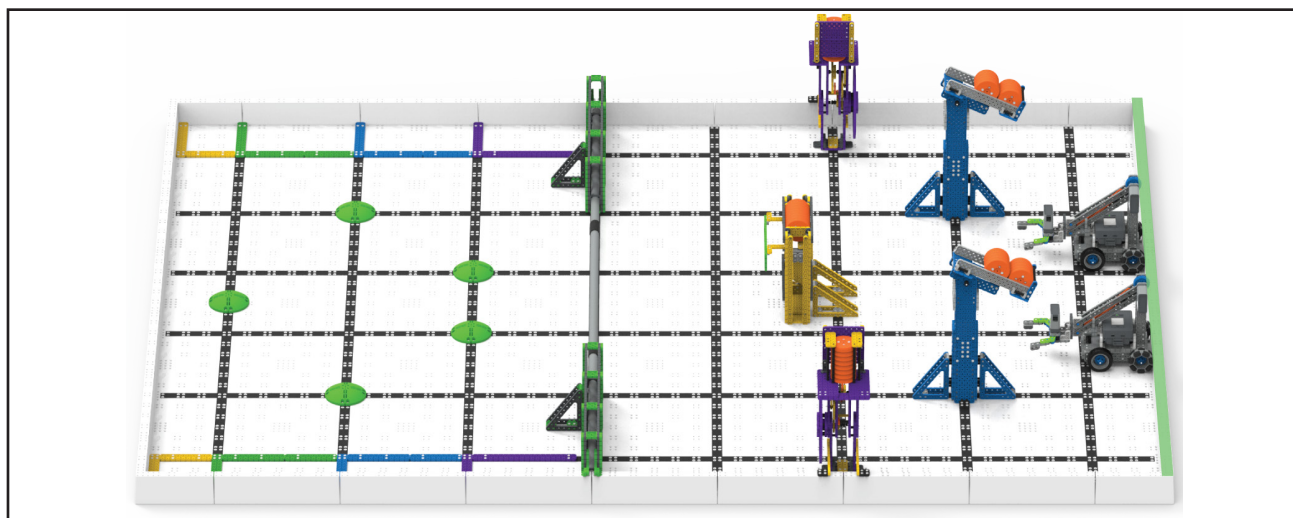

Figure 16: *Two Robots in legal starting configurations.*

<G6> Drivers switch controllers midway through the Match.

a. In a given *Match*, only two (2) *Drivers* may be in the *Driver Station* per *Team*. No *Driver* shall operate a *Robot* for more than thirty-five seconds (0:35). The two *Drivers* must switch their controller between thirty-five seconds (0:35) and twenty-five seconds (0:25) remaining in the *Match*. The second *Driver* may not touch their *Team's* controls until the controller is passed to them. Once the controller is passed, the first *Driver* may no longer touch their *Team's* controls.

b. *Drivers* are the only *Team* members that are allowed to be in the *Driver Station*. No *Adults* are permitted in the *Driver Station*.

Note: If only one Driver is present (i.e., the Team has not exercised the allowance in <G4>), this rule still applies, and they must cease Robot operation after the first thirty-five (0:35) seconds of the Match.

Violation Notes: At a minimum, any Violation of this rule is considered a Minor Violation. Whether it escalates to a Major Violation or not is dependent upon the Head Referee judgment regarding:

- *Prior warnings or Violations*
- *Any Score Affecting actions that were a direct result of the Violation, such as the first Driver scoring additional points after 35 seconds of driving*

<G7> Drivers drive your Robot, and stay in the Driver Station. During a *Match*, *Robots* may only be operated by that *Team's Drivers* and / or software running on the *Robot* control system. *Drivers* must remain in their *Driver Station*, except when legally interacting with their *Robot* as per <G12>.

Drivers are prohibited from any of the following actions during a *Match*:

a. Bringing / using any sort of communication device into the *Driver Station*. Devices with communication features turned off (e.g., phones in airplane mode) are allowed.

b. Standing or sitting on any sort of object during a *Match*, regardless of whether the *Field* is on the floor or elevated.

c. Materials used outside of the 1:00 Match time are permitted, provided that no other rules are violated. Examples could include a bin to help carry the *Robot* to the *Field*, or VEX IQ parts used to help align the *Robot* at the start of the *Match*.

Note: Drivers are the only Team members that are allowed to be in the Driver Station during a Match.

Violation Notes: *Major Violations* of this rule are not required to be *Score Affecting*, and could invoke *Violations* of other rules, such as *<G1>, <G2>, or <G6>*.

<G8> Hands out of the Field. *Drivers* are prohibited from making intentional contact with any *Field Element*, *Disc*, or *Robot* during a *Match*, except for the allowances in <G12> and / or <RSC5>.

<G9> Keep Discs in the Field. *Discs* that leave the *Field* during a *Match* will not be returned. "Leaving the *Field*" means that a *Disc* is outside of the *Field Perimeter* and no longer in contact with the *Field*, *Field Element*, other *Discs*, or *Robots*.

> If a *Disc* is on its way out of the *Field* (as determined by the *Head Referee*), but is deflected back into the field by a *Driver*, field monitor, ceiling / wall, or other external factor, <G9> would still apply. This *Disc* should be considered "out of the field" and removed by the *Head Referee*. If the redirection occurred due to contact with a *Driver*, it will be at the *Head Referee's* discretion whether <G8> or <G9> should apply.

<G10> Keep your Robot together. *Robots* may not intentionally detach parts or leave mechanisms on the *Field* during any *Match*. Parts that become unintentionally detached from the *Robot* are no longer considered to be part of the *Robot* and can be either left on the *Field* or collected by a *Driver* (utilizing <G12>).

<G11> Don't damage the Field. *Robot* interactions which damage the *Field* or any *Field Element* are prohibited. For the purpose of this rule, "damage" is defined as anything which requires repair in order to begin the next *Match*.

Specific examples include, but are not limited to:

- A *Dispenser* detaching from the *Floor*
- VEX IQ parts detaching from a *Dispenser* structure
- The PVC pipe detaching from the *Fence*

Note: The purple Dispenser is designed to spin counter-clockwise. Intentionally attempting to rotate the purple Dispenser mechanism in the wrong direction (clockwise) creates a significant risk of Field Element damage, and is strictly prohibited.

> *Teams* are responsible for the actions of their *Robot* at all times, especially when interacting with *Dispenser*. If a *Team* chooses to repeatedly ram full-speed into a *Dispenser*, it will be hard to convince a *Head Referee* that any damage caused was "accidental."

Violation Notes: In most cases, Field damage is accidental and does not impact the final score, and should therefore only be considered a Minor Violation / formal warning.

However, any Field damage which results in Discs becoming Removed is inherently Score Affecting. Therefore, if the Head Referee determines that this damage was accidental they may choose to issue a Match Replay, per <T19>, in lieu of a Major Violation.

Egregious, intentional, or repeated accidental / Minor Violations may escalate to a Major Violation at the Head Referee's discretion.

<G12>Handling the Robot mid-match is allowed under certain circumstances. If a *Robot* goes completely outside the playing *Field*, gets stuck, tips over, or otherwise requires assistance, the *Team's Driver* may retrieve & reset the *Robot*. To do so, they must:

1. Signal the *Head Referee* by placing their VEX IQ Controller on the ground.

2. Any *Disc* being controlled by the *Robot* while being handled must be removed from the *Field*.

    a. In the context of this rule, "controlled" implies that the *Robot* was manipulating the *Disc*, and not simply touching it. For example, if the *Disc* moves with the *Robot* either vertically or while turning, then the *Robot* is "controlling" the *Disc*.

3. The *Robot* must be placed back into a legal position that meets the criteria listed in <G5> (i.e., contacting the *Field Perimeter*, not contacting any *Discs*, etc.).

If the *Driver* cannot reach a *Robot* in the center of the *Field*, they may ask the *Head Referee* to pick up the *Robot* and hand it to the *Driver* for placement according to the conditions above.

Violation Notes: This rule is intended to allow Teams to fix damaged Robots or help get their Robot "out of trouble." Strategically exploiting this rule may be considered a Minor Violation or Major Violation, at the Head Referee's discretion.

<G13> **Horizontal expansion is limited during a Match.** *Robots* may only expand horizontally beyond the 11" x 19" starting dimension limit if they are contacting the *Expansion Zone*.

Note: There are no restrictions on vertical expansion.

<G14> **Don't cross the Fence Line until Contact.** *Robots* may only extend over the *Fence Line* and "break the plane" of the 3-dimensional area of the 2-Point *Goal Zone* if they are contacting the *Expansion Zone*.
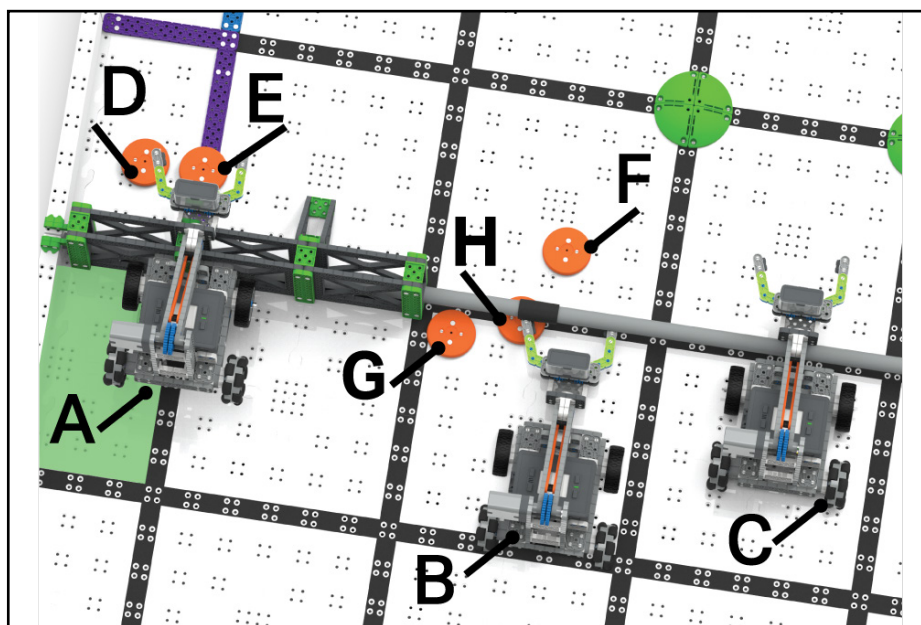

Figure 17: *A top-down view of the Fence Line, demonstrating various Disc and Robot states. The Expansion Zone is highlighted.*

In Figure 17,

- Robot A is legally crossing the *Fence Line* into the 2-Point *Goal Zone*, because it is in contact with an *Expansion Zone*.

- Robot B may intend to cross the *Fence Line* and extend into the 2-Point *Goal Zone*, and would receive a formal violation if it extended into the 2-Point *Goal Zone*.

- Robot C has fully "broken the plane" of the 2-Point *Goal Zone*, and is not contacting an *Expansion Zone*, and is therefore in violation of this rule.

> Contact with the *Fence* and / or *Fence Line*, including interaction with partially-crossed *Discs* such as G or H in Figure 17, is expected in standard gameplay. However, strategies or mechanisms which rely solely on this type of interaction may receive additional scrutiny from *Head Referees*. *Team* should be prepared to demonstrate that these mechanisms include design features which prevent them from crossing the *Fence Line*.

<G15> Discs that have crossed the Fence Line are "off limits". *Robots* may not contact any *Discs* which have fully crossed the *Fence Line*, regardless of whether the *Robot* is contacting an *Expansion Zone* or not.

For example, in Figure 17:

- *Discs* D, E, and F would be considered "not safe" to contact, because they have fully crossed the *Fence Line*.

- *Discs* G and H would be considered "safe" to contact, because they have only partially crossed the *Fence Line*. Of course, rules <G14> and <G16> still apply.

Note: This rule is not transitive through Discs. For example, if Robot B pushed Disc H into Disc F without "breaking the plane" of the 2-Point Goal Zone, this would not be considered a violation.

Violation Notes: The intent of rules <G14> and <G15> are to prevent Robots from interacting with Discs which have already crossed the Fence Line. All examples below refer to Figure 17.

The following examples would be considered Minor Violations:

- *Contacting a Disc while legally expanding, such that the Disc does not change its point value; for example, Robot A contacting Disc D in the figure above without pushing it into a Goal Zone*

- *Robot A pushing Disc E off the border and into the 2-Point Goal Zone; because Disc E is resting on the border of the Contact Zone but not touching the Contact Zone, it is already Scored and the interaction will not change its point value.*

The following examples would be considered Score Affecting, and therefore Major Violations:

- *Robot B or C pushing Disc F from the 2-Point Goal Zone into the 3-Point Goal Zone*

- *A mechanism which reaches past the Fence while launching a Disc (e.g., Robot C in the figure above)*

<G16> Discs go under the Fence, not over it. *Discs* may only be *Scored* in *Goal Zone* by passing them underneath the gray PVC pipe. *Robot* actions such as "dumping," "placing," or "throwing" *Discs* over the *Fence* are strictly prohibited, and will result in a *Disqualification*.

> *Note: Discs which incidentally bounce over the Fence upon being Removed from a Dispenser are not considered a violation of this rule.*

> Please don't over-think this rule.
>
> There are no restrictions on what type of *Robot* action, mechanism, strategy, or technique is used to get the *Disc* under the *Fence* and into the *Goal Zone*. If it passes between the gray PVC pipe and the *Floor*, and doesn't break any other rules, it's probably legal.
>
> There are no legal ways to get *Discs* into *Goal Zones* without passing between the gray PVC pipe and the *Floor*. If you think you have found one, it will probably be made illegal in a future Game Manual update.

Violation Notes: Since this rule is inherently Score Affecting, all Violations will be considered Major Violations.

Section 2
The Robot

Description

Every *Robot* must pass a full inspection before being cleared to participate in *Matches*. This inspection will ensure that all *Robot* rules and regulations are met. Initial inspections will typically take place during team registration / practice time. Every *Team* should use the rules below as a guide to pre-inspect their *Robot* and ensure that it meets all requirements.

Inspection Rules

<R1> One Robot per Team. Only one (1) *Robot* will be allowed to participate per *Team* at a given event. Though it is expected that *Teams* will make changes to their *Robots* at the event, a *Team* is limited to only one (1) *Robot* during a given event, and a given *Robot* may only be used by (1) *Team*. The VEX IQ system is intended to be a mobile robotics design platform. As such, a VEX IQ Competition *Robot*, for the purposes of the VEX IQ Competition, has the following subsystems:

- Subsystem 1: Mobile robotic base including wheels, tracks, or any other mechanism that allows the *Robot* to navigate the majority of the flat playing *Field* surface. For a stationary *Robot*, the robotic base without wheels would be considered Subsystem 1.

- Subsystem 2: Power and control system that includes a VEX IQ legal battery, a VEX IQ control system, and associated VEX IQ Smart Motors for the mobile robotic base.

- Subsystem 3: Additional mechanisms (and associated VEX IQ Smart Motors) that allow manipulation of *Discs* or manipulation of *Field* obstacles.

Given the above definitions, a minimum *Robot* for use in any VEX IQ Competition event (including Skills Challenges) must consist of subsystems 1 and 2 above. Thus, if you are swapping out an entire subsystem of either item 1 or 2, you have now created a second *Robot* and have violated this rule.

a. *Teams* may not compete with one *Robot* while a second is being modified or assembled at the event.

b. *Teams* may not have an assembled second *Robot* on-hand that is used to repair or swap parts with the first *Robot*.

c. *Teams* may not switch back and forth between multiple *Robots* during a competition. This includes using different *Robots* for Skills Challenges, *Qualification Matches* and / or *Finals Matches*.

d. Multiple *Teams* may not use the same *Robot*. Once a *Robot* has competed under a given *Team* number at an event, it is "their" *Robot* — no other *Teams* may compete with it for the duration of the competition season.

The intent of <R1a>, <R1b>, and <R1c> is to ensure an unambiguous level playing field for all *Teams*. *Teams* are welcome (and encouraged) to improve or modify their *Robots* between events, or to collaborate with other *Teams* to develop the best possible game solution.

However, a *Team* who brings and / or competes with two separate *Robots* at the same tournament has diminished the efforts of a *Team* who spent extra design time making sure that their one *Robot* can accomplish all of the game's tasks. A multi-*Team* organization that shares a single *Robot* has diminished the efforts of a multi-*Team* organization that puts in the time, effort, and resources to undergo separate individual design processes and develop their own *Robots*.

To help determine if a robot is a "separate *Robot*" or not, use the subsystem definitions found in <R1>. Above that, use common sense as referenced in <G3>. If you can place two complete and legal *Robots* on a table next to each other, then they are two separate *Robots*. Trying to decide if changing a pin, a wheel, or a motor constitutes a separate robot is missing the intent and spirit of this rule.

<R2> Robots must represent the Team's skill level. The *Robot* must be designed, built, and programmed by members of the *Team*. *Adults* are permitted to mentor and teach design, building, and programming skills to the *Students* on the *Team*, but may not design, build, or program that *Team's Robot*.

In VIQC, we expect *Adults* to teach fundamental *Robot* principles like linkages, drivetrains, and manipulators, then allow the *Students* to determine which designs to implement and build on their *Robot*.

Similarly, *Adults* are encouraged to teach the *Students* how to code various functions involving applicable sensors, then have the *Students* program the *Robot* from what they have learned.

<R3> Robots must pass inspection. The *Team's Robot* must pass inspection before being allowed to participate in any *Matches*. Noncompliance with any *Robot* design or construction rule will result in *Disqualification* of the *Robot* at an event until the *Robot* is brought back into compliance.

a. Significant changes to a *Robot*, such as a partial or full swap of Subsystem 3, must be re-inspected before the *Robot* may compete again.

b. All possible functional *Robot* configurations must be inspected before being used in competition.

c. *Teams* may be requested to submit to random spot-inspections by *Head Referees*. Refusal to submit will result in *Disqualification*.

    i. If a *Robot* is determined to be in violation of a *Robot* rule before a *Match* begins, the *Robot* will be removed from the *Field*. A *Driver* may remain at the *Field* so that the *Team* does not get assessed a "no-show" (per <T11>).

d.   *Robots* which have not passed inspection (i.e., that may be in violation of one or more *Robot* rules) will not be permitted to play in any *Matches* until they have done so. <T11> will apply to any *Matches* that occur until the *Robot* has passed inspection.

e.   If a *Robot* has passed inspection, but is later found to be in violation of a *Robot* rule during a *Match*, then they will be Disqualified from that *Match* and <R3d> / <T11> will apply until the violation is remedied and the *Team* is re-inspected.

f.   All Inspection Rules are to be enforced within the discretion of the *Head Referee* within a given event. *Robot* legality at one event does not automatically imply legality at future events. *Robots* which rely on "edge-case" interpretations of subjective rules, such as whether a decoration is "non-functional" or not, should expect additional scrutiny during inspection.

<R4> Officially registered Team numbers must be displayed on Robot License Plates. To participate in an official VEX IQ Competition Event, a *Team* must first register on robotevents.com and receive a VEX IQ Competition *Team* Number.

This *Team* number must be displayed on at least one (1) VEX IQ Competition *License Plate*. *Teams* may choose to use the official VEX IQ Competition *License Plate* (VEX Part Number 228-7401), or may create their own custom *License Plates*.

1.   *License Plates* must fulfill all Inspection rules.

2.   *License Plates* must be clearly visible at all times. For example, a *License Plate* must not be in a position that would be easily obstructed by a *Robot* mechanism during standard *Match* play.

3.   Any custom-made *License Plates* used must be the same length and height as the official *License Plate* (3.5" x 1.5" [88.9mm x 38.1mm]). They must not exceed the width of the official *License Plate* (0.25" [6.35mm]).

4.   Custom-made *License Plates* are considered non-functional decorations, and must therefore meet all of the criteria listed in <R8>. Therefore, 3D printed *License Plates* are permitted within these rules.
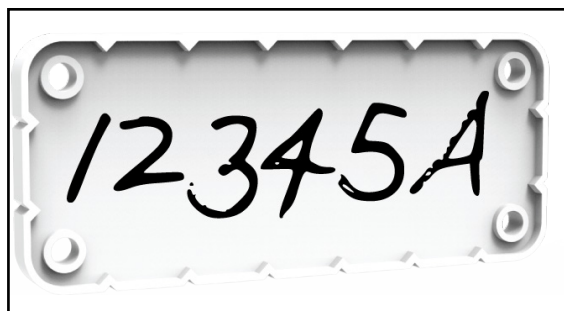

Figure 18: *A VEX IQ Competition License Plate with a VEX IQ Competition Team Number written upon it.*

Figure 19: *An example of a legal custom License Plate.*

<R5> Starting configuration. At the start of each *Match*, the *Robot* must be able to satisfy the following constraints:

   a.   Only be contacting the *Floor* and / or the *Field Perimeter*

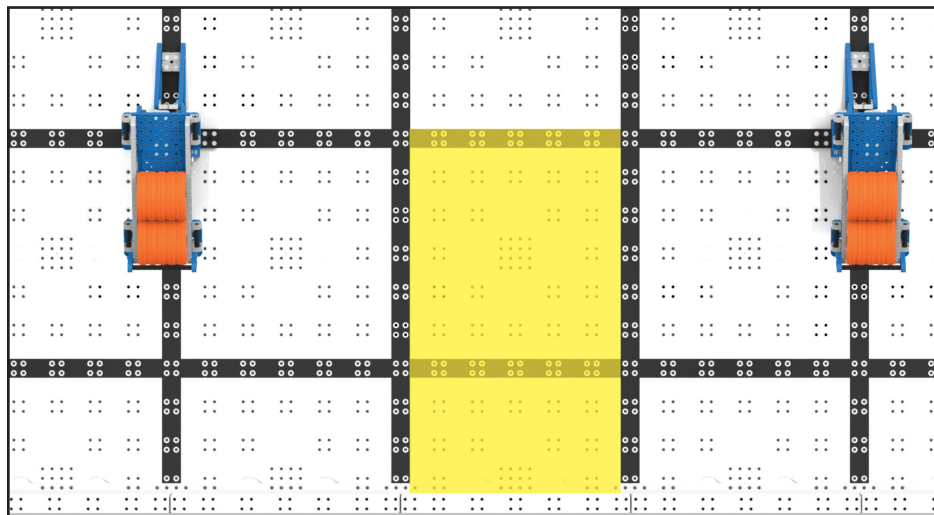   b.   Fit within an 11" x 19" x 15" (279.4mm x 482.6mm x 381.0mm) volume

Figure 20: Visual reference that can be used to check the starting volume.

<R6> The Match configuration will be inspected. The *Robot* must be inspected in a configuration that will be used for pre-*Match* setup as described in <G5> and within the maximum allowed starting size.

   a.   *Teams* using more than one *Robot* configuration at the beginning of *Matches* must tell the Inspector(s) and have the *Robot* inspected in its largest configuration(s).

   b.   A *Team* may NOT have its *Robot* inspected in one configuration and then place it in an uninspected configuration at the start of a *Match*.

<R7> VEX IQ product line. *Robots* may be built ONLY from Official *Robot* Components from the VEX IQ product line, unless otherwise specifically noted within these rules.

   a.   Official VEX IQ products are ONLY available from VEX Robotics. To determine whether a product is "official" or not, consult www.vexiq.com.

   b.   If an Inspector or event official questions whether something is an official VEX IQ component, the *Team* will be required to provide documentation to an Inspector that proves the component's source. Such documentation may include receipts, part numbers, or other printed documentation.

   c.   Only VEX IQ components specifically designed for use in *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 IQ apparel, team or event support materials, packaging, *Field Elements*, or other non-*Robot* products on a VEX IQ Competition *Robot*).

d. Products from the VEX V5, VEX EXP, Cortex, or VEXpro product lines cannot be used for *Robot* construction. However, products from the VEX V5 product line that are also cross-listed as part of the VEX IQ product line are legal. A "cross-listed" product is one which can be found in both the VEX IQ and VEX V5 sections of the VEX Robotics website.

e. Mechanical / structural components from the VEX Robotics by HEXBUG product line are legal for *Robot* construction. However, electrical components from the VEX Robotics by HEXBUG product line are illegal for *Robot* construction.

f. Mechanical / structural components from the VEX GO product line are legal for *Robot* construction. However, electrical components from the VEX GO product line are illegal for *Robot* construction.

g. Official Robotics Components from the VEX IQ product line that have been discontinued are still legal for *Robot* use. However, *Teams* must be aware of <R7b>.

h. Functional 3D printed components, such as replicas of legal VEX IQ parts or custom designs, are not legal for *Robot* use.

i. Additional VEX IQ products that are released during the season are legal for use, unless otherwise noted on their product pages and / or the VEX IQ Competition Legal Parts Appendix.

Note: A comprehensive list of legal parts can be found in the VEX IQ Competition Legal Parts Appendix, at https://www.vexrobotics.com/iq/competition/viqc-current-game*. This Appendix is updated as needed if / when new VEX IQ parts are released, and may not coincide with scheduled Game Manual updates.*

<R8> Non-VEX IQ components. *Robots* are allowed to use the following additional "non-VEX IQ" components:

a. Appropriate non-functional decorations, provided that these do not affect the *Robot* performance in any significant way or affect the score of the *Match*. Inspectors and *Head Referees* will have the final say in what is considered "non-functional."

b. Decorations must be in the spirit of an educational competition.

c. To be considered "non-functional," any decorations must be backed by legal materials that provide the same functionality. For example, a giant decal cannot be used to prevent *Discs* from falling out of the *Robot* unless it is backed by VEX IQ material. A simple way to check this is to determine if removing the decoration would impact the performance of the *Robot* in any way.

d. The use of non-toxic paint is considered a legal non-functional decoration. However, any paint being used as an adhesive or to impact how tightly parts fit together would be classified as functional.

e. Rubber bands that are identical in length and thickness to those included in the VEX IQ product line (#32, #64 & #117B).

f. ⅛" metal shafts from the VEX V5 product line.

> *Teams* should be mindful of any non-functional decorations which could risk "distracting" sensors on *Alliance* partner *Robots*, such as the Vision Sensor.

<R9> Microcontroller. *Robots* are limited to ONE (1) VEX IQ Robot Brain.

- a. Robot Brains, microcontrollers, and other electronic components that are part of the VEX Robotics by HEXBUG, VEX GO, VEX EXP, VEX V5, VEX 123, or VEXpro product lines are not allowed.
    - i. The Robot AA Battery Holder (228-3493) is the only exception to this rule, per <R12>.
- b. If using a first generation VEX IQ Brain, *Robots* must use one (1) VEX IQ 900 MHz radio, VEX IQ 2.4 GHz radio, or VEX IQ Smart Radio in conjunction with their VEX IQ Robot Brain.
- c. The only legal method of driving the *Robot* during Teamwork *Matches* and Driving Skills *Matches* is the VEX IQ Controller.
- d. See <RSC5> and <RSC6> for more information about operating the *Robot* during Programming Skills *Matches*.

<R10> Motors. *Robots* may use up to six (6) VEX IQ Smart Motors.

- a. Additional motors cannot be used on the *Robot* (even motors that aren't connected).

<R11> Batteries. The only allowable sources of electrical power for a VEX IQ Competition *Robot* are either one (1) VEX IQ Robot Battery (first or second generation) or six (6) AA batteries via the Robot AA Battery Holder (228-3493).

- a. Additional batteries cannot be used on the *Robot* (even batteries that aren't connected).
- b. *Teams* are permitted to have an external power source (such as a rechargeable battery pack) plugged into their VEX IQ Controller during a *Match*, provided that this power source is connected safely and does not violate any other rules (such as <G6>).

Note: Although it is legal, the Robot AA Battery Holder (228-3493) is not recommended for use in the VEX IQ Competition.

<R12> Firmware. *Teams* must have their VEX IQ firmware (VEXos) up to date. *Teams* can download the latest version of VEXos at www.vexiq.com/vexos.
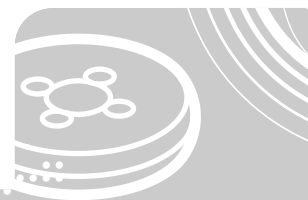
<R13> Modifications of parts. Parts may NOT be modified. Examples of modifications include, but are not limited to, bending, cutting, sanding, gluing, or melting.

- a. Cutting metal VEX IQ or VEX V5 shafts to custom lengths is permitted.
- b. It is legal to bend parts which are intended to be flexible, such as string, rubber bands, or thin plastic sheets.

<R14> Prohibited items. The following types of mechanisms and components are NOT allowed:

a. Those that could potentially damage *Field Elements* or *Discs*

b. Those that could potentially damage or entangle other *Robots*

<R15> Let it go after the Match is over. *Robots* must be designed to permit easy removal of *Discs* from the *Robot* without requiring that the *Robot* have power or remote control after the *Match* is over.

VEX IQ
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Version 2.2 - Released December 6, 2022
VEX IQ 31
COMPETITION
SLAPSHOT

Section 3
The Tournament

Description

The VEX IQ Competition encompasses both the *Teamwork Challenge* and the *Robot Skills Challenge*. This section determines how the *Teamwork Challenge* and *Robot Skills Challenge* are to be played at a given event.

Awards may be given to top *Teams* in each format, as applicable. Awards may also be given for overall performance in the judged criteria. Please review the Awards Knowledge Base article for more details.

Tournament Definitions

Event Partner - The volunteer VEX IQ Competition tournament coordinator who serves as an overall manager for the volunteers, venue, event materials, and all other event considerations. *Event Partners* serve as the official liaison between the REC Foundation, other event volunteers, and event attendees.

Finals Match - A Teamwork *Match* used to determine the *Teamwork Challenge* champions.

Head Referee - An impartial volunteer responsible for enforcing the rules in this manual as written. *Head Referees* are the only people who may discuss ruling interpretations or scoring questions with *Teams* at an event.

Match Stop Time - The time remaining (i.e., displayed on the timer or audience display) in a tiebreaker *Finals Match* (see <T13b>) when an *Alliance* ends the *Match* early by placing their controllers on the ground. The *Match Stop Time* is rounded down to the nearest even number. For example, if controllers are set down when the displayed time is 13 seconds, the *Match Stop Time* is recorded as 12 seconds. If an *Alliance* does not finish the *Match* early, they receive a default *Match Stop Time* of 0 seconds.

Practice Match - A non-scored *Match* used to provide time for *Teams* to get acquainted with the official playing *Field* and procedures.

Qualification Match - A *Teamwork Challenge Match* used to determine the event rankings.

Robot Skills Challenge - A portion of the VEX IQ Competition. The *Robot Skills Challenge* consists of Driving Skills *Matches* and Programming Skills *Matches* as described in the General Definitions.

Scorekeeper Referee - An impartial volunteer responsible for tallying scores at the end of a *Match*. *Scorekeeper Referees* do not make ruling interpretations, and should redirect any *Team* questions regarding rules or scores to the *Head Referee*.

Teamwork Challenge - A portion of the VEX IQ Competition. The *Teamwork Challenge* consists of Teamwork *Matches* as described in the General Definitions. The *Teamwork Challenge* includes *Qualification Matches* and *Finals Matches*, and may include *Practice Matches*.

Tournament Rules

<T1> The Head Referee has ultimate and final authority on all gameplay ruling decisions during the competition.

    a. *Scorekeeper Referees* score the *Match*, and may serve as observers or advisers for the *Head Referees*, but may not determine any rules or infractions directly.

    b. When issuing a *Disqualification* or warning to a *Team*, The *Head Referee* must provide the rule number of the specific rule that has been Violated.

    c. Violations of the REC Foundation Code of Conduct may involve additional escalation beyond the *Head Referee's* initial ruling, including (but not limited to) investigation by an REC Foundation representative. Rules <S1>, <G1>, and <G2> are the only rules for which this escalation may be required.

    d. *Event Partners* may not overrule a *Head Referee's* decision.

> Note from the VEX GDC: The rules contained in this Game Manual are written to be enforced by human *Head Referees*. Many rules have "black-and-white" criteria that can be easily checked. However, some rulings will rely on a judgment call from this human *Head Referee*. In these cases, *Head Referees* will make their calls based on what they and the *Scorekeeping Referees* saw, what guidance is provided by their official support materials (the Game Manual and the Q&A), and most crucially, the context of the *Match* in question.
>
> The VEX IQ Competition does not have video replay, our fields do not have absolute sensors to count scores, and most events do not have the resources for an extensive review conference between each *Match*.
>
> When an ambiguous rule results in a controversial call, there is a natural instinct to wonder what the "right" ruling "should have been," or what the *GDC* "would have ruled." This is ultimately an irrelevant question; our answer is that when a rule specifies "*Head Referee's* discretion" (or similar), then the "right" call is the one made by the *Head Referee* in the moment. The VEX *GDC* designs games, and writes rules, with this expectation (constraint) in mind.

<T2> Head Referees must be qualified. *Head Referees* must have the following qualifications:

    a. Be at least 16 years of age.

    b. Be approved by the *Event Partner*.

    c. Be an REC Foundation Certified VIQC *Head Referee* for the current season. (Certifications are expected to be released in Summer 2022)

Note: Scorekeeper Referees must be at least 15 years of age, and must be approved by the Event Partner.

Head Referees should demonstrate the following attributes:

- Thorough knowledge of the current game and rules of play
- Effective decision-making skills
- Attention to detail
- Ability to work effectively as a member of a team
- Ability to be confident and assertive when necessary
- Strong communication and diplomacy skills

<T3> The Drive Team is permitted to immediately appeal the Head Referee's ruling. If *Drivers* wish to dispute a score or ruling, they must stay in the *Driver Station* until the *Head Referee* talks with them. The *Head Referee* may choose to meet with the *Drivers* at another location and / or at a later time so that the *Head Referee* has time to reference materials or resources to help with the decision. Once the *Head Referee* announces that their decision has been made final, the issue is over and no more appeals may be made (See rule <T1>).

a. *Head Referees* may not review any photo or video *Match* recordings when determining a score or ruling.

b. *Head Referees* are the only individuals permitted to explain a rule, *Disqualification* or warning to the *Teams*. *Teams* should never consult other field personnel, including *Scorekeeper Referees*, regarding a ruling clarification.

Communication and conflict resolution skills are an important life skill for *Students* to practice and learn. In VEX IQ Competitions, we expect *Students* to practice proper conflict resolution using the proper chain of command. *Violations* of this rule may be considered a *Violation* of <G1> and / or the Code of Conduct.

Some events may choose to utilize a "question box" or other designated location for discussions with *Head Referees*. Offering a "question box" is within the discretion of the *Event Partner* and / or *Head Referee*, and may act as an alternate option for asking *Drivers* to remain in the *Driver Station* (although all other aspects of this rule apply).

However, by using this alternate location, *Drivers* acknowledge that they are forfeiting the opportunity to use any contextual information involving the specific state of the field at the end of the *Match*. For example, it is impossible to appeal whether a game element was *Scored* or not if the field has already been reset. If this information is pertinent to the appeal, *Drivers* should still remain in the *Driver Station*, and relocate to the "question box" once the *Head Referee* has been made aware of the concern and / or any relevant context.

<T4> Teamwork Matches. During *Teamwork Matches*, two (2) Teams form an *Alliance* that will play on the *Field*.

    a. *Qualification Match Alliances* are randomly selected.

    b. *Finals Match Alliances* are assigned as follows:

        i.   The first and second ranked *Teams* form an *Alliance*

        ii. The third and fourth ranked *Teams* form an *Alliance*

        iii. And so on, until all *Teams* participating in *Finals Matches* have formed an *Alliance*.

<T5> Timeouts. There are no timeouts in VEX IQ *Qualification Matches* or *Finals Matches*.

<T6> Ending a Match early. If an *Alliance* wants to end a *Qualification Match* or a *Finals Match* early, both *Teams* must signal the referee by ceasing all *Robot* motion and placing their controllers on the ground. The *Head Referee* will then signal to the *Teams* that the *Match* is over and will begin to tally the score. If the *Match* is a tiebreaker *Finals Match* (see <T14b>), then the *Match Stop Time* will also be recorded.

<T7> Practice Matches may be played at some events, but are not required. If *Practice Matches* are run, every effort will be made to equalize practice time for all *Teams*.

<T8> Qualification Matches will occur according to the official Match schedule. This schedule will indicate *Alliance* partners, *Qualification Match* times, and, if the event has multiple *Fields*, which *Field* each *Qualification Match* will be played on.

    Note: The official Match schedule is subject to change at the Event Partner's discretion.

<T9> Each Team will be scheduled Qualification Matches as follows:

    a. When in a tournament, the tournament must have a minimum of four (4) *Qualification Matches* per *Team*. The suggested number of *Qualification Matches* per *Team* for a standard tournament is six (6), and is up to ten (10) for a championship event.

    b. When in a league, there must be at least three (3) league ranking sessions and each session must include a minimum of two (2) *Qualification Matches* per *Team*. The suggested number of *Qualification Matches* per *Team* for a standard league ranking session is four (4). *Event Partners* may also choose to have *Qualification Matches* as part of their league finals session.

<T10> Teams are ranked by their average Qualification Match scores.

a. When in a tournament, every *Team* will be ranked based on the same number of *Qualification Matches*.

    i. For tournaments that have more than one (1) division, *Teams* will be ranked among all *Teams* in the event, (i.e., there is no divisional ranking). The top *Teams*, regardless of division, will advance to the *Finals Matches*.

b. When in a league, every *Team* will be ranked based on the number of *Matches* played. *Teams* that participate in less than 60% of the total *Matches* available will be ranked below *Teams* that participate in at least 60% of the total *Matches* available, (e.g., if the league offers 3 ranking sessions with 4 *Qualification Matches* per *Team*, *Teams* that participate in 8 or more *Matches* will be ranked higher than *Teams* who participate in 7 or fewer *Matches*). Being a no-show to a *Match* that a *Team* is scheduled in still constitutes participation for these calculations.

c. A specific number of a *Team's* lowest *Qualification Match* scores will be excluded from the rankings, based on the number of *Qualification Matches* each *Team* plays. Excluded scores do not affect participation for leagues.

Number of Qualification Matches Per Team	Number of Excluded Match Scores
Four (4) to seven (7)	1
Eight (8) to eleven (11)	2
Twelve (12) to fifteen (15)	3
Sixteen (16) or more	4

d. In some cases, a *Team* will be asked to play an additional *Qualification Match*. The extra *Match* will be identified on the Match Schedule with an asterisk and will not impact the *Team's* ranking (or participation for leagues). *Teams* are reminded that <G1> is always in effect and *Teams* are expected to behave as if the additional *Qualification Match* impacts their rating.

e. Ties in *Team* ranking are broken by:

    i. Removing the *Team's* lowest score and comparing the new average score.

    ii. Removing the *Team's* next-lowest score and comparing the new average score (and so on through all scores).

    iii. If the *Teams* are still tied, the *Teams* will be sorted by random electronic draw.

<T11> Be at your match on time. If no member of a *Team* is present in the *Driver Station* at the start of a *Driver Station*, that *Team* is considered a "no show" and will receive zero (0) points. The other *Team* in the *Alliance* will still play and receive points for the *Match*.

<T12> Disqualifications. A *Team* that is Disqualified in a *Qualification Match* receives zero (0) points for the *Match*. The other *Team* on their *Alliance* will still receive points for the *Match*.

a. In *Finals Matches*, *Disqualifications* apply to the entire *Alliance*, not just one *Team*. An *Alliance* that is Disqualified in a *Finals Match* will receive zero (0) points.

<T13> Teams playing in Finals Matches. The number of *Finals Matches*, and therefore the number of *Teams* who will participate in *Finals Matches*, is determined by the *Event Partner*. Events that qualify teams directly to VEX Worlds must have a minimum of five (5) *Finals Matches* if there are ten (10) or more *Teams* in attendance.

<T14> Finals Match Schedule. *Finals Matches* are played sequentially, starting with the lowest-ranked *Alliance*. Each *Alliance* will participate in one (1) *Finals Match*. The *Alliance* with the highest *Finals Match* score is the *Teamwork Challenge* champion.

    a. *Alliances* are ranked by their *Finals Match* score. The highest-scoring *Alliance* is in first place, the second highest scoring *Alliance* is in second place, etc.

    b. Ties for first place will result in a series of tiebreaker *Finals Matches*, starting with the lower-seeded *Alliance*. The *Alliance* with the highest tiebreaker *Finals Match* score will be declared the *Teamwork Challenge* champion.

        i. If the tiebreaker *Finals Match* scores are tied, the *Alliance* with the higher *Match Stop Time* will be declared the winner.

        ii. If the *Match Stop Time* is also tied, a second series of tiebreaker *Finals Matches* will be played. If this second series of tiebreaker *Finals Match* is also tied, then the higher-seeded *Alliance* will be declared the winner.

    c. If there is a tie for a place other than first, the higher-seeded *Alliance* will receive the higher rank.

> Example 1: *Alliance* 6 and *Alliance* 3 are tied for first place. During the tiebreaker *Finals Match*, *Alliance* 6 scores 13 points and has a *Match Stop Time* of 12 seconds. *Alliance* 3 scores 13 points and has a *Match Stop Time* of 10 seconds. *Alliance* 6 is the *Teamwork Challenge* winner.
>
> Example 2: *Alliance* 4 and *Alliance* 5 are tied for third place. *Alliance* 4 is the third place winner and *Alliance* 5 is the fourth place winner. In this way, the lower-ranked *Alliance* must "overcome" the higher-ranked *Alliance* in order to become the *Teamwork Challenge* champion.

<T15> Fields and Field Elements may be repaired at the Event Partner's discretion. All competition fields and other *Field Elements* at an event must be set up in accordance with the specifications in Appendix A and / or other applicable support materials. Minor aesthetic customizations or repairs are permitted, provided that they do not impact gameplay (see <T20>).

Examples of permissible modifications include, but are not limited to:

- Using a VEX IQ part of a different color than the original *Field Element* for a minor repair
- Gluing together static *Field Elements* (such as the *Fence*)
- Adding extra VEX IQ pins, or using longer VEX IQ pins, where *Field Elements* connect to the *Floor / Field Perimeter*
- Using metal shafts instead of plastic shafts (with caution - see Appendix A)

Examples of prohibited modifications include, but are not limited to:

- Unofficial *Field Perimeter* walls or *Field Elements*
- Additional VEX IQ parts attached to a *Field Element* (other than pins as listed above)
- Moving the placement of any *Field Element*, for any reason

Any specific repairs and / or modifications which pertain to the current season's game will be documented in this rule and Appendix A, as needed.

<T16> Students must be accompanied by an Adult. No *Student* may attend a VEX IQ Competition event without a responsible *Adult* supervising them. The *Adult* must obey all rules and be careful to not violate student-centered policies, but must be present at the event in the case of an emergency.

<T17> Robots at the field must be ready to play. If a *Team* brings their *Robot* to the *Field*, it must be prepared to play (i.e., batteries charged, sized within the starting size constraint, etc.)

    a. *Robots* must be placed on the field promptly. Repeated failure to do so could result in a violation of <G1>.

<T18> Be prepared for minor field variance. *Field Element* tolerances may vary from nominal by ±1.0", unless otherwise specified. *Disc* weights may vary from nominal to ±2 grams. *Teams* are encouraged to design their *Robots* accordingly. Please make sure to check Appendix A for more specific nominal dimensions and tolerances.

<T19> Match Replays are allowed, but rare. *Match* replays, (i.e., playing a *Match* over again from its start) are at the discretion of the *Event Partner* and *Head Referee*, and will only be issued in the most extreme circumstances. Some examples that may warrant a *Match* replay are as follows:

    a. *Score Affecting* "Field fault" issues

        i. *Discs* not starting in the correct positions

        ii. *Field Elements* detaching or moving beyond normal tolerances, not a result of *Robot* interactions

    b. *Score Affecting* game rule issues

        i. A *Field* is reset before the score is determined

<T20> **The Event Partner has ultimate authority regarding all non-gameplay decisions during an event.** The Game Manual is intended to provide a set of rules for successfully playing VEX IQ Competition Slapshot; it is not intended to be an exhaustive compilation of guidelines for running a VEX Robotics Competition event. Rules pertaining to an event venue, pit spaces, health and safety, or other unique circumstances are at the discretion of the *Event Partner* and should be treated with the same respect as the Game Manual.

> This rule exists alongside <G1>, <S1>, and <G3>. Even though there isn't a rule that says "don't steal from the concession stand," it would still be within an *Event Partner's* authority to remove a thief from the competition.

VEX IQ
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Version 2.2 - Released December 6, 2022
VEX IQ 39
COMPETITION
SLAPSHOT
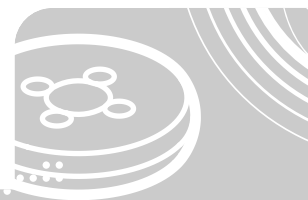
vEx IQ
COMPETITION
SLAPSHOT

2022 - 2023
Appendix A - Field Overview and Specifications

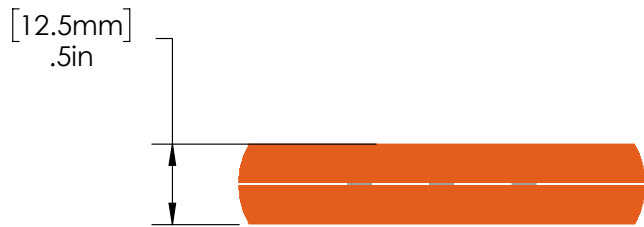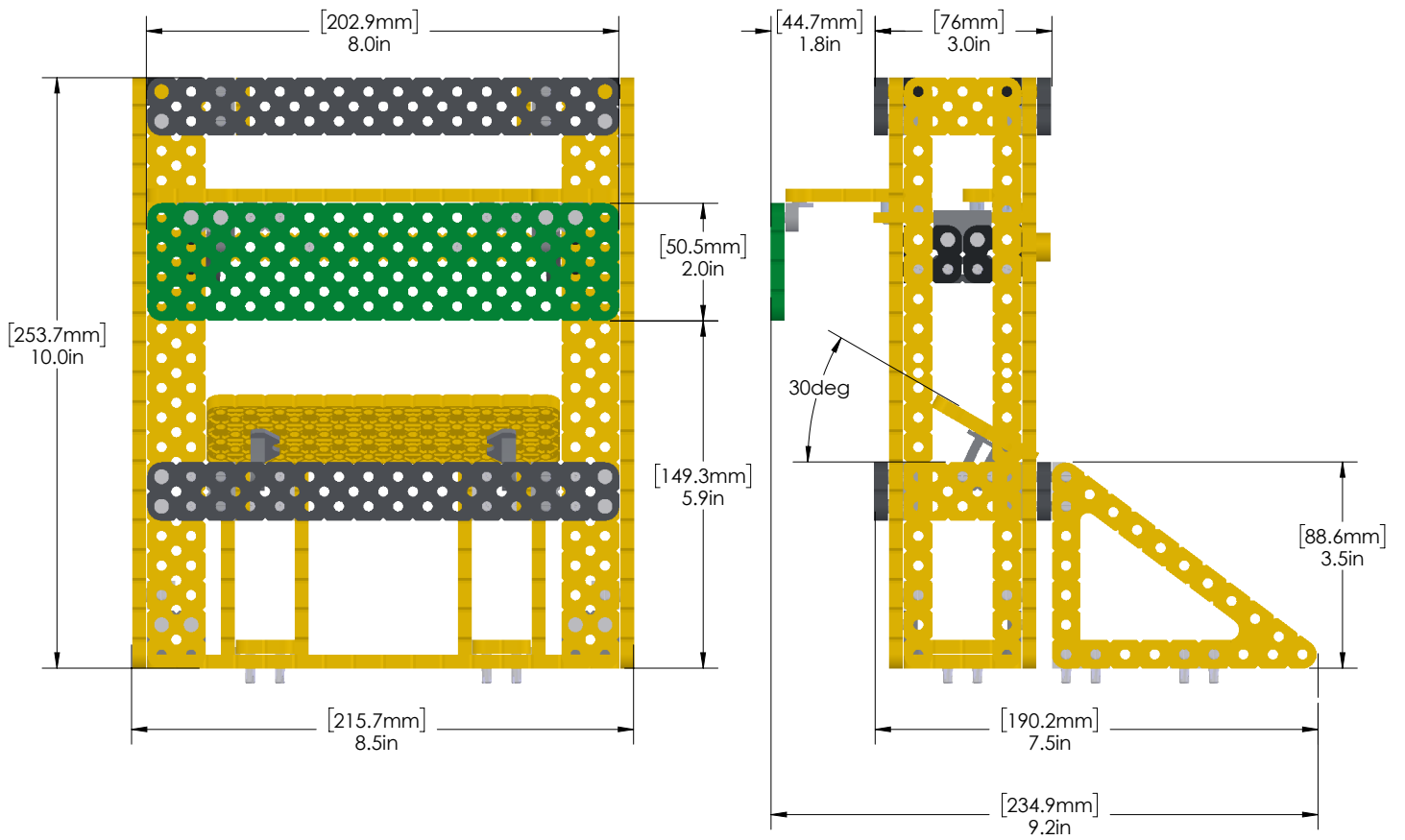[1854.5mm]
73.0in

[27.3mm]
1.1in
Wall Thickness

[2518.7mm]
99.2in
Outer Dimension

[2464.1mm]
97.0in

[1909.1mm]
75.2in
Outer Dimension

VEX IQ

[1741.8mm]
68.6in

[1702mm]
67.0in

[1384.5mm]
54.5in

[1079.7mm]
42.5in

[927.3mm]
36.5in

[774.9mm]
30.5in

[469.9mm]
18.5in

[152.6mm]
6.0in

[112.7mm]
4.4in

0in

[2311.6mm]
91.0in

[2298.9mm]
90.5in

[2006.8mm]
79.0in

[1994.1mm]
78.5in

[1702mm]
67.0in

[1689.3mm]
66.5in

[1359.2mm]
53.5in

[959.1mm]
37.8in

[876.7mm]
34.5in

[831.7mm]
32.7in

[774.9mm]
30.5in

[323.9mm]
12.8in

0in

1. 8x Disc stacked in the purple dispenser
2. 10x Disc stacked in two rows of 5 in the blue dispenser
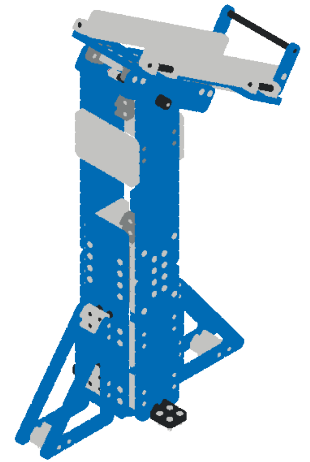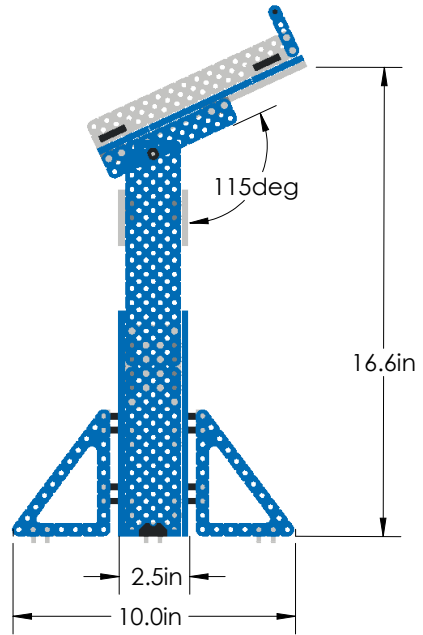3. 9x Disc in a single row in the yellow dispenser

$\begin{bmatrix} 63.2mm \end{bmatrix}$
$\varnothing$ 2.5in

$\begin{bmatrix} 12.5mm \end{bmatrix}$
.5in
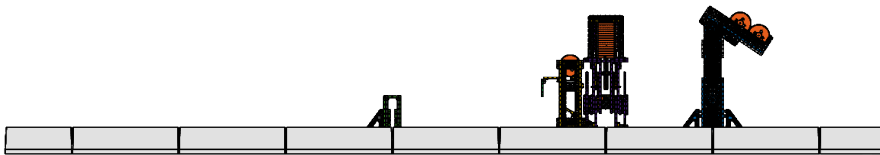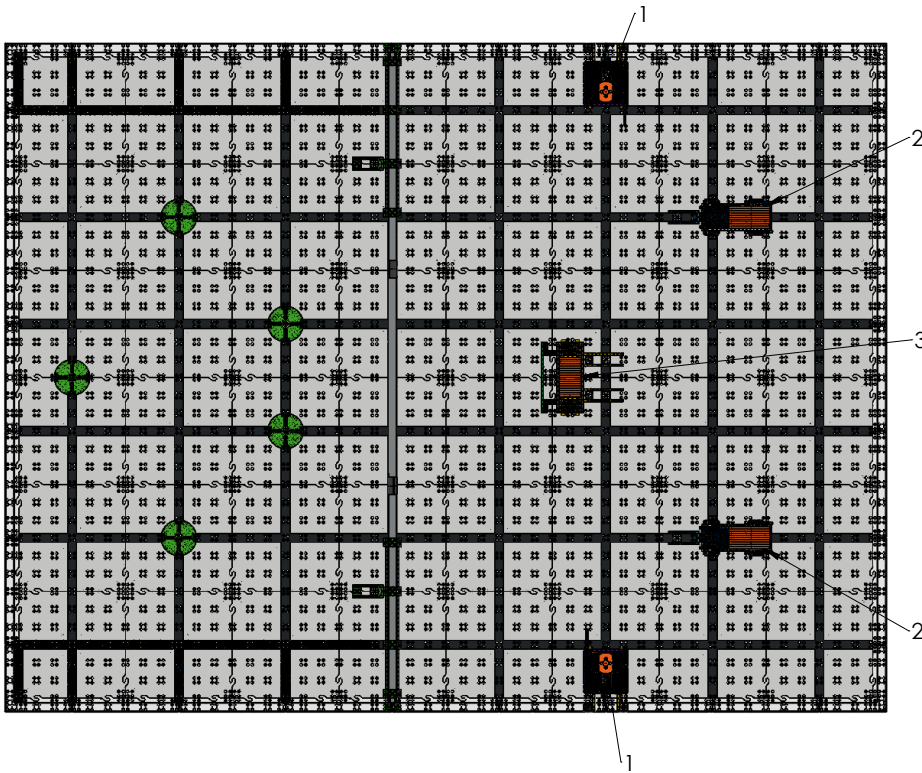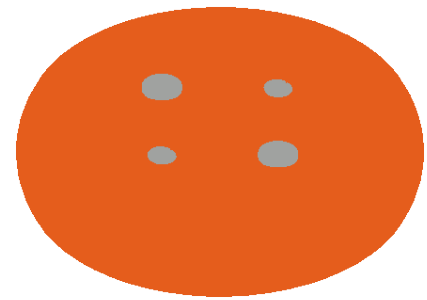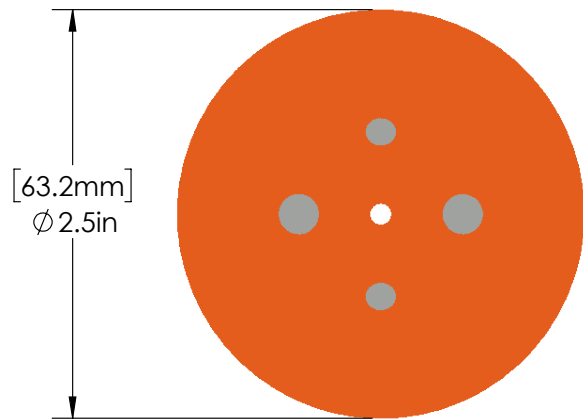
Approximate Weight:
10g
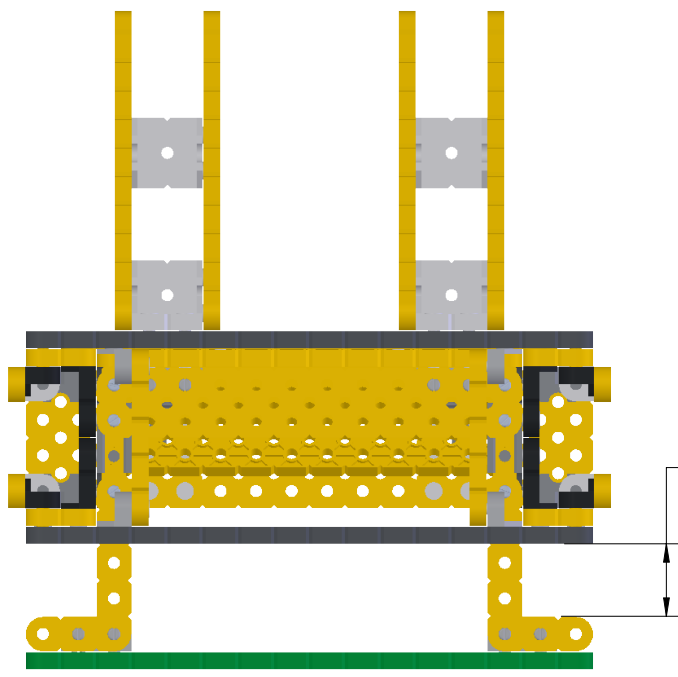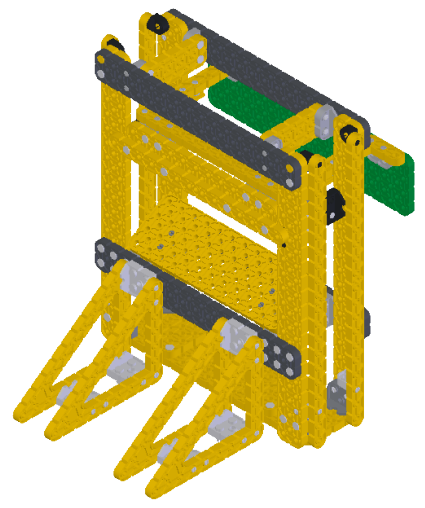
$\begin{bmatrix} 25.9\text{mm} \end{bmatrix}$
1.0in
Push in to Release Disk

4.0in

3.0in

5.0in

8.0in

13.5in

56deg

10.5in

5.5in

115deg

16.6in

2.5in

10.0in

[126.7mm]
5.0in

[76.5mm]
3.0in

[19.3mm]
.8in

[56.9mm]
2.2in

[63.3mm]
2.5in

[101.3mm]
4.0in

[126.7mm]
5.0in

[380.7mm]
15.0in

[279.4mm]
11.0in

[260.1mm]
10.2in

[215.8mm]
8.5in

Can only turn
Counterclockwise

[126.9mm]
5.0in

[63.5mm]
2.5in

0in

[174mm]
∅ 6.9in

[50.5mm]
2.0in

[139.7mm]
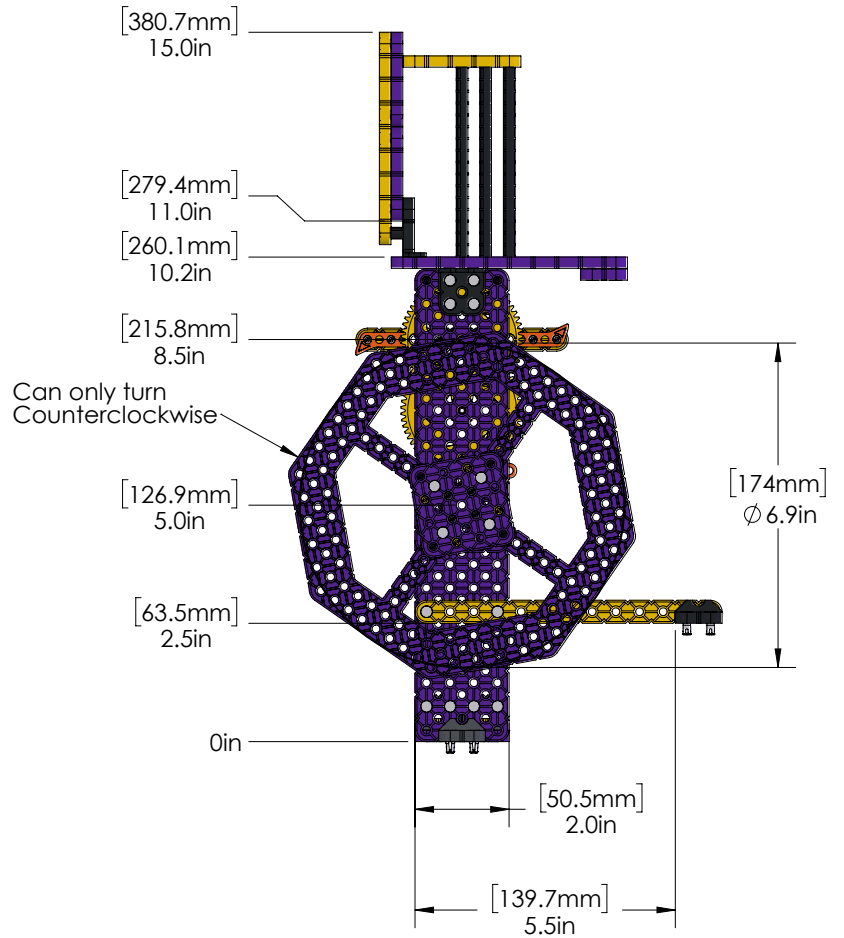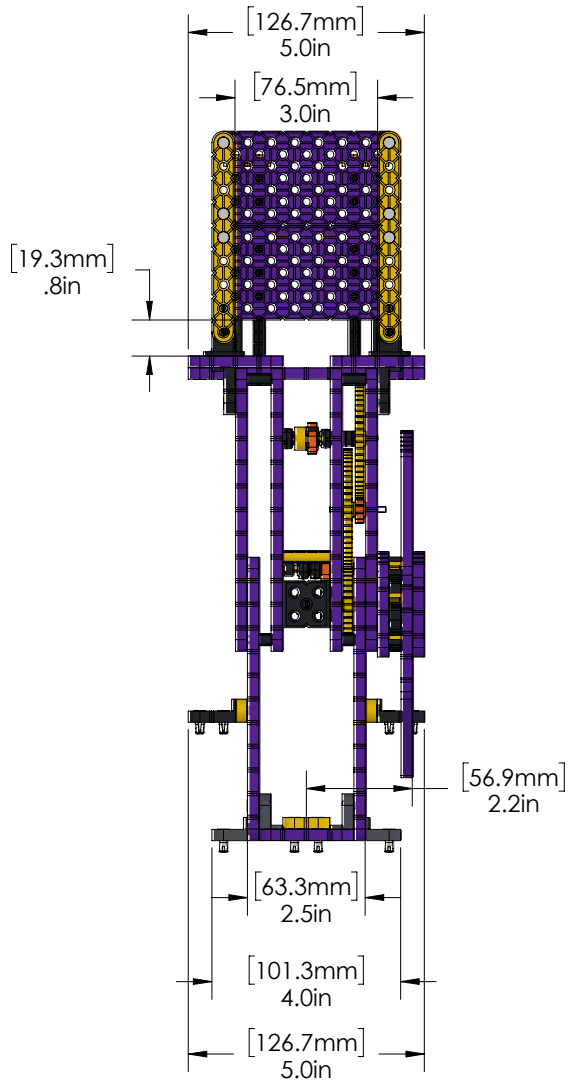5.5in
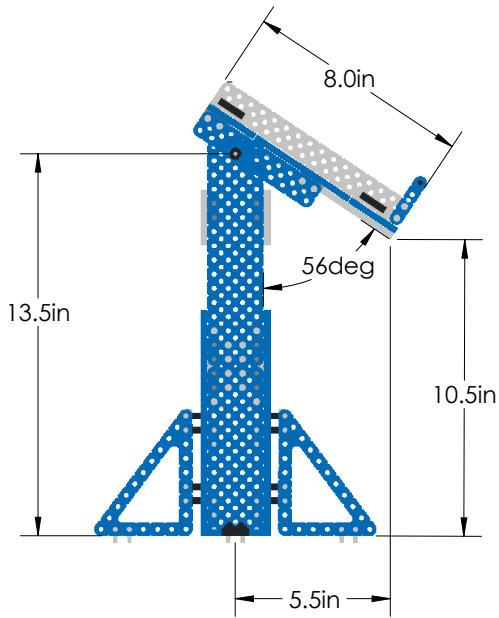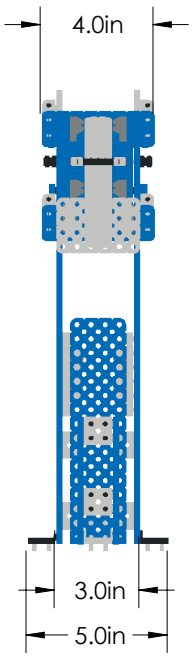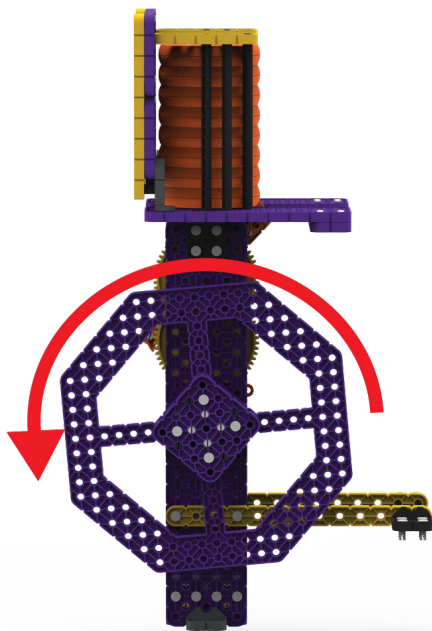
Note: The purple *Dispenser* is *only* intended to be rotated counter-clockwise.

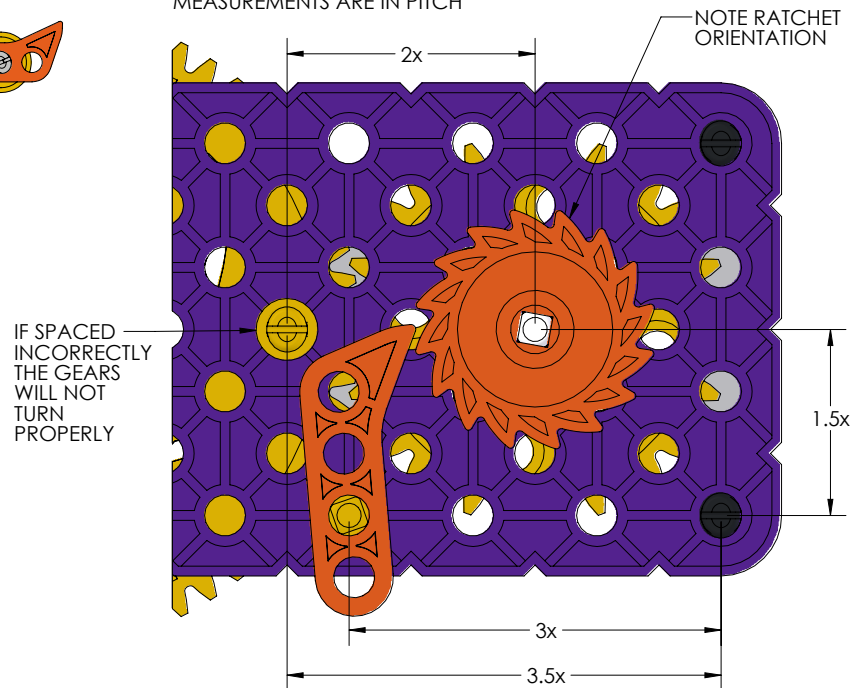See <G11> for more information.

Correct Arm Build:

Correct:

Incorrect:

Correct Ratchet Setup:

MEASUREMENTS ARE IN PITCH

NOTE RATCHET ORIENTATION

IF SPACED INCORRECTLY THE GEARS WILL NOT TURN PROPERLY

2x

1.5x

3x

3.5x

Q: Why doesn't my purple dispenser spin freely?

A: The arm can jam if either the standoff above the ratchet pawl or the pawls on the end of the arms are placed incorrectly. Checking your build against steps 30-31 and 36-37 of the VIQC Slapshot Build Instructions might help identify the problem.
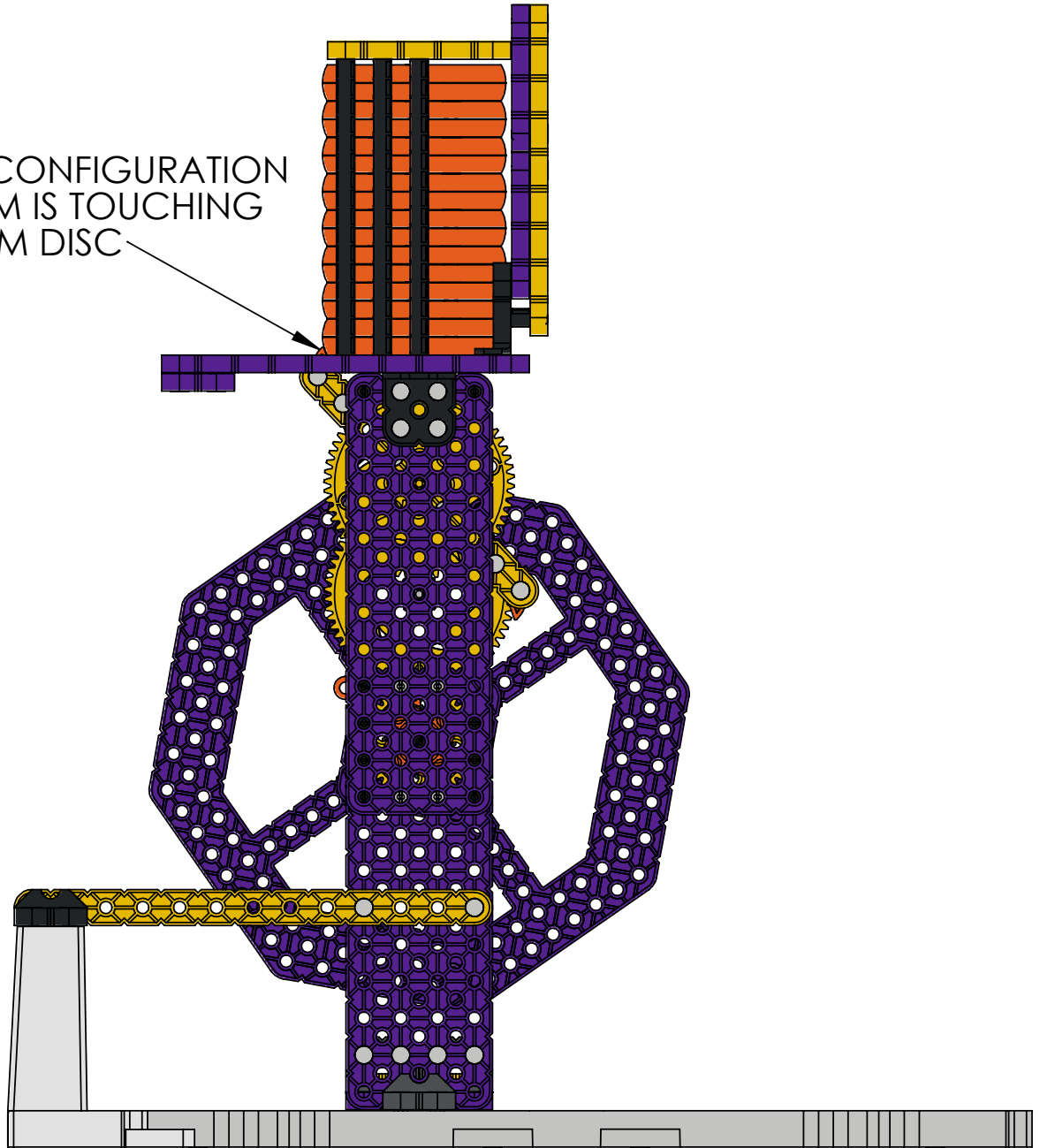
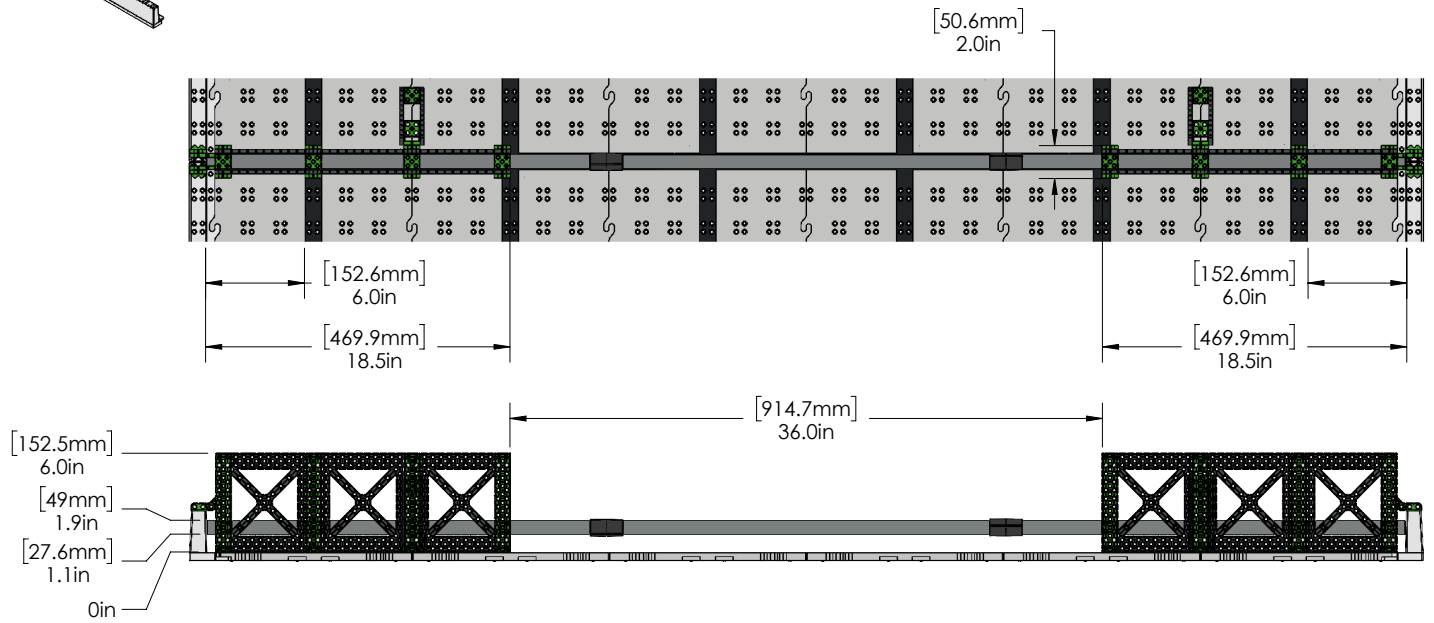**Q: Why has my plastic shaft broken?**

A: When the arm is jammed the torque produced from turning the wheel is enough to snap the shaft.

Q: Why can't I replace the plastic shaft with a steel one?

A: The plastic shaft was designed as an intended failure point to protect other parts of the dispenser that are not as noticeable. A steel shaft will not fail as intended, and unseen damage can lead to intermittent issues such as the Dispenser skipping or taking more rotations to dispense.

STARTING CONFIGURATION
OF THE ARM IS TOUCHING
THE BOTTOM DISC

[50.6mm]
2.0in

[152.6mm]
6.0in

[152.6mm]
6.0in

[469.9mm]
18.5in

[469.9mm]
18.5in

[914.7mm]
36.0in

[152.5mm]
6.0in

[49mm]
1.9in

[27.6mm]
1.1in

0in

[101.3mm]
∅ 4.0in

[25.1mm]
1.0in
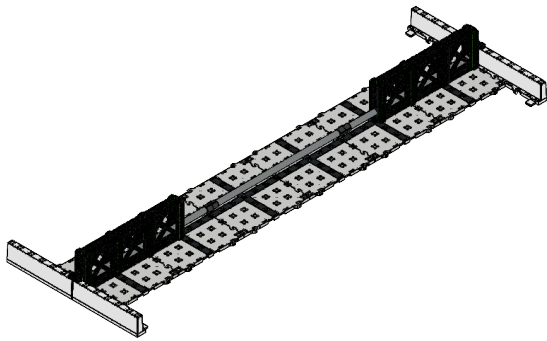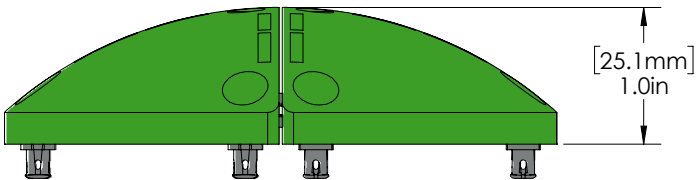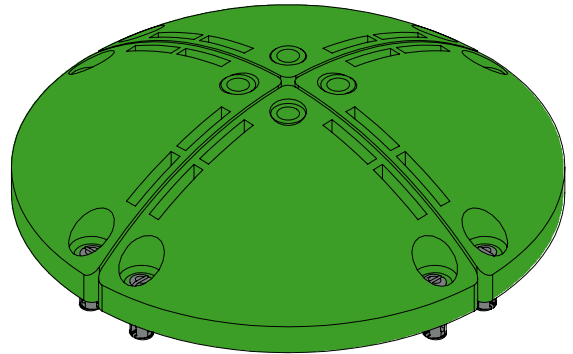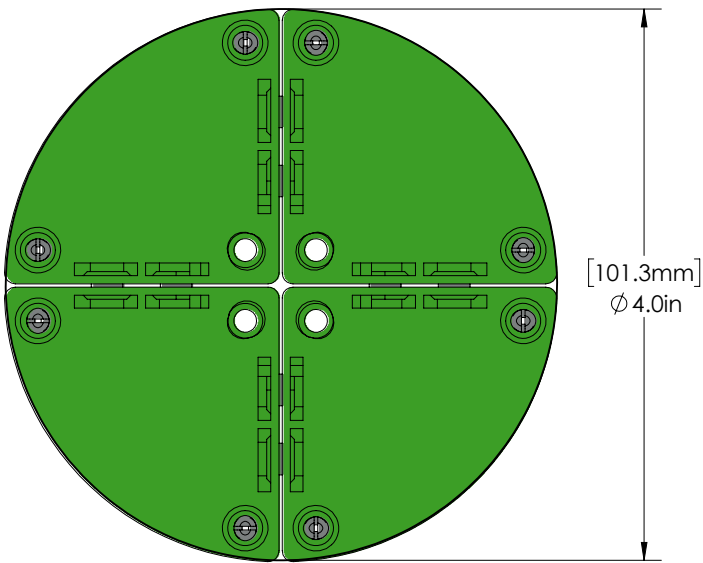
vEx IQ COMPETITION SLAPSHOT

2022 - 2023
Appendix B - Robot Skills Challenge

Robot Skills Challenge Rules

<RSC1> Standard rules apply in most cases. All rules and scoring from previous sections apply to Skills Matches, unless otherwise specified.

<RSC2> Skills Scoring and Ranking at events. For each Skills *Match*, *Teams* are awarded a score based on the standard game and scoring rules. *Teams* will be ranked based on the sum of their highest Programming Skills *Match* score and their highest Driving Skills *Match* score from the event.

   a. If two *Teams* are tied for the highest score, the tie will be broken by looking at both *Teams*' next-highest Programming Skills *Match* score. If the *Teams* remain tied, the tie will be broken by looking at both *Teams*' next-highest Driving Skills *Match* score. This process will repeat until the tie is broken. If a *Team* only plays one (1) or two (2) of either their available Programming or Driving Skills Matches, their score for the unattempted Match(es) will be considered a zero (0) when determining the winner of ties.

   b. If the tie cannot be broken (i.e., both *Teams* have the exact same scores for each Programming Skills *Match* and Driving Skills *Match*), then the following ordered criteria will be used to determine which *Team* had the "best" Programming Skills *Match*:

      i. Points for *Discs Scored* in *Goal Zones*

      ii. Points for *Contact Zone* bonuses

      iii. Points for *Removed Discs*

   d. If the tie still cannot be broken, the process in <RSC2b> will be applied to the *Team's* highest Driving Skills Match.

   e. If the tie still isn't broken, the *Event Partner* may choose to allow *Teams* to have one more deciding *Match*, or both *Teams* may be declared the winner.

<RSC3> Skills Rankings Globally. *Teams*' Robot Skills scores are ranked globally based on the following tiebreakers:

   a. Highest Robot Skills score (combined Programming and Driving Skills Score from a single event)

   b. Highest Programming Skills score

   c. Highest Driving Skills score

   d. Earliest posting of the Highest Programming Skills score (i.e., the first *Team* to post a score ranks higher than other *Teams* that post the same score at a later time).

   e. Earliest posting of the Highest Driving Skills score (i.e., the first *Team* to post a score ranks higher than other *Teams* that post the same score at a later time).

<RSC4> Skills Match Schedule. *Teams* play Skills *Matches* on a first-come, first-served basis or by a pre-scheduled method determined by the *Event Partner*. Each *Team* will get the opportunity to play exactly three (3) Driving Skills *Matches* and three (3) Programming Skills *Matches* at an event.

> If Skills Matches are offered on a first come, first-served basis, *Teams* should review the event agenda and their *Match* schedule to determine when the best possible time is to complete their Robot Skills *Matches*. If the Robot Skills area closes before a *Team* has completed all six (6) Robot Skills *Matches*, but it is determined by the *Event Partner* that there was adequate time given, then the *Team* will automatically forfeit those unused *Matches*.

<RSC5> Handling Robots during a Programming Skills Match. A *Team* may handle their *Robot* as many times as desired during a Programming Skills *Match*.

a. Upon handling the Robot, it must be immediately brought back to any legal starting position.

  i. Drivers may reset or adjust the Robot as desired from this position, including pressing buttons on the Robot Brain or activating sensors.

b. Any Discs being controlled by the Robot while being handled must be removed from the Field. "Controlled" requires that the Robot was manipulating the Disc and not simply touching it (e.g., if the Disc moves with the Robot either vertically or while turning, the Robot is controlling the Disc).

c. Any Discs in the new starting position must be removed from the Field for the remainder of the Match.

d. During a Programming Skills Match, Drivers may move freely around the Field, and are not restricted to the Driver Station when not handling their Robot.

  i. The remainder of <G7>, which states that Drivers are not allowed to use any communication devices during their Match, still applies.

  ii. An intent of this exception is to permit Drivers who wish to "stage" Robot handling during a Programming Skills Match to do so without excessive running back and forth to the Driver Station.

Note: This rule only applies to Programming Skills *Matches.* Driving Skills *Matches are still governed by <G8> & <G12>, especially for strategic violations.*

<RSC6> Starting a Programming Skills Match. *Drivers* must start a *Robot's* Programming Skills *Match* routine by pressing a button on the Robot Brain or manually activating a sensor. Because there is no VEX IQ Controller hand-off, only one (1) *Driver* is required for a Programming Skills *Match* (though *Teams* may still have two (2) if desired).

  a. Pre-*Match* sensor calibration is considered part of the standard pre-*Match* setup time, (i.e., the time when the *Team* would typically be turning on the *Robot*, moving any mechanisms to their desired legal start position, etc.).

  b. Pressing a button on the VEX IQ Controller to begin the routine is not permitted. To avoid any confusion, *Teams* are advised not to bring controllers to Programming Skills *Matches*.

> In accordance with <T17>, *Teams* should be mindful of event schedules and set their *Robot* up as promptly as possible. The definition of "prompt" is at the discretion of the *Event Partner* and *Head Referee*, and could depend on things like how much time is left for the Skills Challenge field(s) to be open, how many *Teams* are waiting in line, etc. As a general guideline, three seconds to calibrate a Gyro Sensor would be acceptable, but three minutes to debug a program would not.

League Events

At league events in which *Teams* may submit Robot Skills Challenge scores across multiple days / sessions, the Robot Skills scores (combined highest Programming Skills Match and Driving Skills Match scores) used for rankings will be calculated from *Matches* within the same session.

For example, consider the following scores for a hypothetical *Team* across two league event sessions:

	Programming Skills Match	Driving Skills Match	Robot Skills Score
Session 1	100	100	200
Session 2	150	40	190

This *Team* would have a Robot Skills score of 200 for this event, and their scores from Session 1 would be used for the Event and Global tiebreakers listed in the above two sections.

Robot Skills Challenge Format Options

To better accommodate varying health & safety circumstances in different regions, the 2022-2023 season will feature different avenues for *Event Partners* to host *Robot Skills Challenge* competitions. Regardless of the format chosen for a given event, all rules and information in this Appendix apply. However, some formats will have additional rules in place to ensure fair and consistent gameplay.

Robot Skills Challenge at a Standard Qualifying Tournament

- The *Robot Skills Challenge* is an optional event for all *Teams*. *Teams* who do not compete will not be penalized in the *Teamwork Challenge* portion of the tournament. However, participation in the *Robot Skills Challenge* may impact eligibility for judged awards at the event.

- *Teams* may play Robot Skills *Matches* on a "first come, first served" basis, or by a pre-scheduled method determined by the *Event Partner*.

- *Teams* will be given the opportunity to play exactly three (3) Programming Skills *Matches* and three (3) Driving Skills *Matches*. *Teams* should be aware of when the Robot Skills fields are open so that they do not miss their opportunity, (e.g., if a *Team* waits until five minutes before the Robot Skills fields close, then they have not used the opportunity given to them and will not be able to compete in all six matches).

Skills-Only Event: In-Person, Live

- *Teams* may play Robot Skills *Matches* on a "first come, first served" basis, or by a pre-scheduled method determined by the *Event Partner*.

- Further details regarding Skills-Only Event logistics can be found in the REC Foundation Qualification Criteria document.

Skills-Only Event: Remote, Live

1. The Remote Skills Only environment (i.e. digital platform) may be chosen at *Event Partner* discretion.

    a. All registered *Teams* must be able to view live the *Matches* being played by all other registered *Teams*.

    b. REC Foundation Staff must have access to view all matches while being played live.

    c. The online meeting environment must not be accessed or viewed by the general online public while the event is live, e.g. the event must be password protected or invite-only.

       i. Guests invited by the *Event Partner* can be able to view, but may not have use of their microphone or camera or display anything for teams to see or hear.

       ii. One example that would satisfy this requirement would be to use an online video conferencing application that allows for a large number of people who must register to attend. The *Event Partner* would approve spectators who can view the matches, but would only give *Teams* the ability to share their screen, camera or microphone.

       iii. After the event is over, there are no such restrictions (i.e. the *Event Partner* may post a recording of the event if they wish).

2. Registered *Teams* will be assigned scheduled times to complete Robot Inspection and up to (3) Programming Skills Matches and (3) Driving Skills Matches over a live, online environment.

3. The minimum event staff must include one (1) *Event Partner* and at least one (1) certified *Head Referee*. A dedicated Tournament Manager operator is also recommended, but not required, if the *Head Referee* and / or *Event Partner* wish to fulfill this role.

4. At all times, there must be a minimum of (2) *Adults* over the age of 18 in the remote meeting environment before *Students* are allowed to connect. One of those *Adults* must be the *Event Partner*.

5. The *Team's* Primary Contact, or another designated *Adult Team* contact (over the age of 18), must be present in the remote meeting environment throughout the duration of the scheduled time for that *Team*. The *Team's* Primary Contact will be responsible for providing the *Adult* representative's contact information to the *Event Partner* prior to the event.

6. *Teams* will complete a full Robot inspection, in accordance with the game manual, live with the *Head Referee* prior to their first Robot Skills Match. This inspection process should follow the checklist on a standard inspection sheet, including a demonstration of sizing compliance as explained in.

    Note: This inspection may also include an informal "Field inspection", to ensure that a *Team's* remote environment is set up properly for their *Matches*.

7. All *Team* camera footage must be streamed live, from one camera feed, with no "cuts".

    a. Pre-recorded Robot Skills Matches are strictly prohibited in a Live, Remote event.

    b. The *Driver*(s), *Robot*(s), Controller(s) and complete competition field must remain on camera at all times during the *Match*.

    c. A Stopwatch / Tournament Manager display that shows the match time must be on video the entire time during the *Match*.

    d. The camera must be able to move around the field, with no breaks or "cuts", so that it can verify standard *Head Referee* checks before and after the *Match*. These could include (but are not limited to) Starting Position placement, game and field element placements, and any necessary scoring verification.

        i. If this is not feasible due to a *Team's* equipment or facility limitations, a second camera stream must be used for these close-up checks. This is the only permissible exception to the "single-camera" rule set forth by , and *Teams* utilizing this exception should expect additional scrutiny.

8. Live, Remote Robot Skills *Matches* must include some live interaction between the *Team* and the *Head Referee*.

    a. A *Driver* must pair their Controller to their *Robot* on video prior to each *Match*.

    b. The *Head Referee* must ask the *Team* if they are ready, and the *Team* must respond verbally / visually on video.

        i. If the *Head Referee* needs to see a closer or different angle of the *Robot* Starting Position or any field elements, the *Team* must be able to satisfy this request.

c. The *Match* will begin with the *Team* member who is controlling their clock to give a countdown for the *Match* to start. This person does not need to be a *Driver*.

d. After the *Match*, *Teams* must move the camera per the *Head Referee's* instructions to verify scored game elements before the field is reset. The *Head Referee* will confirm to the *Team* verbally what is being counted.

   i. <T1> and <T3> still applies - the *Head Referee's* judgment based on what can be seen on camera is final, as it would if they were observing it in person. There are no video or photo replays in a Live, Remote Skills-Only Event. One common example will be for a referee to ask a *Team* to move the camera over to a goal to show if *Discs* are properly scored in that Goal. The *Head Referee* will ask the *Team* a series of questions, and might ask for a couple of different camera angles, but once the referee makes a determination based on these questions and viewing angles, the referee's decision is final.

9. *Match* replays are at the discretion of the *Head Referee*. In addition to the examples provided in <T19>, live video circumstances (such as a video cutting out, or a *Match* timing error) could warrant a *Match* replay at the *Head Referee's* discretion.

10. Any violation of any rules will result in the *Match* score being recorded as zero. That *Match* will count as one of the *Team's* allotted *Matches*.