VEX ROBOTICS COMPETITION

TIPPING POINT

2021 - 2022
Appendix B - Skills Challenge

Appendix B
Robot Skills Challenge

Overview

This Appendix describes the Robot Skills Challenge rules for VEX Robotics Competition Tipping Point.

Please note that the Robot Skills Challenge may not be offered at all tournaments. Please check with your local Event Partner or www.robotevents.com for more information.

Robot Skills Challenge Description

In this challenge, *Teams* will compete in sixty second (1:00) long *Matches* in an effort to score as many points as possible. These *Matches* consist of *Driving Skills Matches*, which will be entirely driver controlled, and *Programming Skills Matches*, which will be autonomous with limited human interaction. *Teams* will be ranked based on their combined score in the two types of *Matches*.

The Robot Skills Challenge playing field is set up almost exactly the same as a normal VEX Robotics Competition Tipping Point *Match*. The only difference is that the positions of red and blue *Alliance Mobile Goals* are reversed, i.e. the red *Alliance Mobile Goals* begin the *Match* in the blue *Alliance Home Zone*, and vice versa.

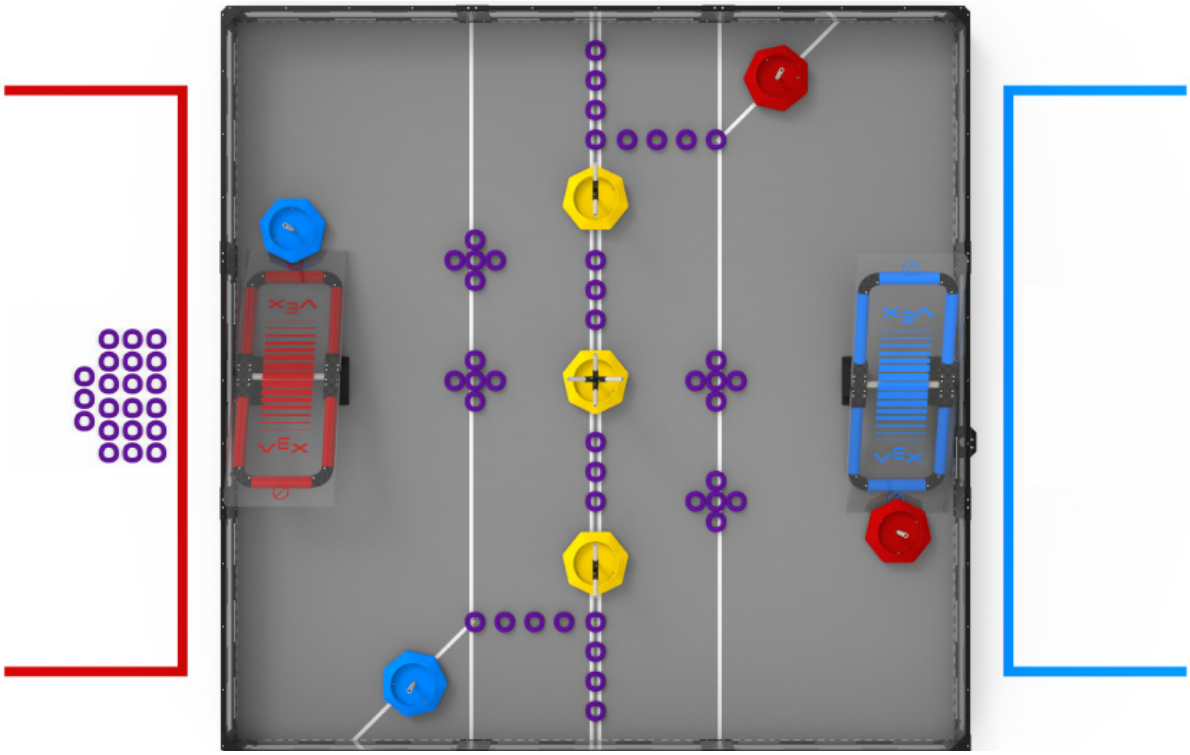

Figure 1: View of the Robot Skills Challenge field in its initial setup configuration.

Robot Skills Challenge Definitions

Please note that all definitions from "The Game" section of the manual apply to the Robot Skills Challenge, unless otherwise specified.

Driving Skills Match – A *Driving Skills Match* consists of a sixty second (1:00) *Driver Controlled Period*. There is no *Autonomous Period*. *Teams* can elect to end their run early, however this will count as an official run.

Programming Skills Match – A *Programming Skills Match* consists of a sixty second (1:00) *Autonomous Period*. There is no *Driver Controlled Period*. *Teams* can elect to end their run early, however this will count as an official run.

Robot Skills Match – A *Driving Skills Match* or *Programming Skills Match*.

Skills Stop Time – The time remaining in a *Robot Skills Match* when a *Team* ends the *Match* early. If a *Team* does not end the *Match* early, they receive a default *Skills Stop Time* of 0.

a. The moment when the *Match* ends early is defined as the moment when the *Robot* is "disabled" by the field control system. See the "Skills Stop Time" section for more details.
b. If a V5 Robot Brain or Tournament Manager display is being used for field control, then the *Skills Stop Time* is the time shown on the display when the *Match* is ended early (i.e. in 1-second increments).
c. If a VEXnet Competition Switch is being used for field control, in conjunction with a manual timer that counts down to 0 with greater accuracy than 1-second increments, then the time shown on the timer should be rounded up to the nearest second.
    i. For example, if the *Robot* is disabled and the timer shows 25.2 seconds, then the *Skills Stop Time* should be recorded as 26.

Robot Skills Challenge Rules

Please note that all rules from "The Game" section of the manual apply to the Robot Skills Challenge, unless otherwise specified.

<RSC1> *Robots* may start the *Robot Skills Match* per <SG1> in either *Alliance Home Zone* with all *Drive Team Members* standing in the corresponding *Alliance Station*.

a. *Teams* must still utilize their three (3) *Preload* Rings as specified in rule <SG1>.
    i. The nine (9) *Rings* that would be used as *Preloads* by the other *Teams* in the *Match* are not used in the Robot Skills Challenge.
b. *Teams* may utilize eighteen (18) *Match Load Rings*, within the guidelines set forth by <SG8>.
    i. All *Match Load Rings* begin the *Match* in the *Alliance Station* where the *Drive Team Members* are standing. *Match Load Rings* may not be introduced from the *Alliance Station* that is not being used.

<RSC2> In *Robot Skills Matches*, *Teams* play if they are on a "neutral" *Alliance*. *Robots* may freely manipulate *Alliance Mobile Goals*, *Neutral Mobile Goals*, and utilize either *Platform*. Therefore, the following "Alliance-specific" rules do not apply in *Robot Skills Matches*:

- <SG3>
- <SG4>
- <SG6>
- <SG7>

Robot Skills Challenge Scoring

Points are awarded according to the same scoring rules as standard VEX Robotics Competition Tipping Point head-to-head *Matches*. *Team's* score at the end of a *Robot Skills Match* is calculated by combining the scores that would have been awarded to the red and blue *Alliances*. For example:

- A red *Alliance Mobile Goal* that ends the *Match* in the red *Alliance Home Zone* is worth twenty (20) points, plus the associated points for any *Rings* which are *Scored* on it.
- A blue *Alliance Mobile Goal* that ends the *Match* in the red *Alliance Home Zone*, and any *Rings* which are *Scored* on it, are not worth any points.
- *Neutral Mobile Goals*, and any *Rings* scored on / in them can be *Scored* in either *Alliance Home Zone*.
- A *Robot* which is *Elevated* on either *Platform* is worth thirty (30) points.

Skills Stop Time

If a *Team* wishes to end their *Robot Skills Match* early, they may elect to record a *Skills Stop Time*. This may be used as a tiebreaker for *Robot Skills Challenge* rankings. A *Skills Stop Time* does not affect a *Team's* score for a given *Robot Skills Match*.

- *Teams* who intend to attempt a *Skills Stop Time* must "opt-in" by verbally confirming with the scorekeeper referee prior to the *Robot Skills Match*. If no notification is given prior to the start of the *Match*, then the *Team* forfeits their option for recording a *Skills Stop Time*.
  - This conversation should include informing the scorekeeper referee which *Drive Team Member* will be signaling the stop. The *Match* may only be ended early by a *Drive Team Member* standing in the *Alliance Station*.
  - If a *Team* is running multiple *Robot Skills Matches* in a row, they must reconfirm their *Skills Stop Time* choice with the scorekeeper referee prior to each *Match*.
  - Any questions regarding a *Skills Stop Time* should be reviewed and settled immediately following the Match. <T1> and <T2> apply to *Robot Skills Matches*.

- If the event is utilizing a V5 Robot Brain or the TM Mobile app for *Robot Skills Challenge* field control, a *Drive Team Member* may elect to start and stop their own *Robot Skills Match*.
  - This V5 Robot Brain, or device running the TM Mobile app, will be used to start the *Robot Skills Match* (i.e. "enable" the *Robot*), end the *Robot Skills Match* (i.e. "disable" the *Robot*), and display the official *Skills Stop Time* to be recorded.
  - This V5 Robot Brain must be running the official field control user program.
  - For more information regarding the use of a V5 Robot Brain for Robot Skills Challenge field control, and to download the official field control user program, visit this VEX Knowledge Base article.

  - For more information regarding the use of TM Mobile for field control, see the Tournament Manager documentation.

- At events which do not have a V5 Robot Brain or TM Mobile available for Robot Skills Challenge field control, *Drive Team Members* and field staff must agree prior to the *Match* on the signal that will be used to end the *Match* early.
  - As noted in the definition of *Skills Stop Time*, the moment when the *Match* ends early is defined as the moment when the *Robot* is "disabled" by the field control system.
  - The agreed-upon signal must be both verbal and visual, such as *Drive Team Members* crossing their arms in an "X", or placing their V5 Controller(s) on the ground.
  - The signal must be given by a *Drive Team Member* standing in the *Alliance Station*.
  - *Drive Team Members* are also recommended to provide verbal notice that they are approaching their *Skills Stop Times*, such as by counting out "3-2-1-stop".

- It is at the *Event Partner's* discretion which method will be used to record *Skills Stop Times* at a given event. The chosen method must be communicated prior to the event (such as during a drivers' meeting), and made equally available to all *Teams*.

Robot Skills Challenge Ranking at Events

For each *Robot Skills Match*, *Teams* are awarded a score as described in the Robot Skills Challenge Scoring section, and a *Skills Stop Time* as described in the Skills Stop Time section. *Teams* will be ranked based on the following tiebreakers:

1. Sum of highest *Programming Skills Match* score and highest *Driving Skills Match* score.
2. Highest *Programming Skills Match* score.
3. Second-highest *Programming Skills Match* score.
4. Second-highest *Driving Skills Match* score.
5. Highest sum of *Skills Stop Times* from a *Team's* highest *Programming Skills Match* and highest *Driving Skills Match* (i.e. the *Matches* in point 1).
6. Highest *Skills Stop Time* from a *Team's* highest *Programming Skills Match* (i.e. the *Match* in point 2).
7. Third-highest *Programming Skills Match* score.
8. Third-highest *Driving Skills Match* score.

- If a tie cannot be broken after all above criteria, then the following ordered criteria will be used to determine which *Team* had the "best" *Programming Skills Match*:

1. Number of *Elevated Mobile Goals*.
2. Number of *Scored Mobile Goals*.
3. Number of *Scored Rings*
4. Number of *Elevated Robots*

- If the tie still cannot be broken, the same process in the step above will be applied to the *Teams*' best *Driving Skills Match*.

- If the tie still isn't broken, events may choose to allow *Teams* to have one more deciding *Driving Skills Match*, to be ranked according to the standard criteria above, or declare both *Teams* the Robot Skills Challenge Winner.

Robot Skills Challenge Ranking Globally

Teams will be ranked Globally based on their Robot Skills scores from Tournaments and Leagues that upload results to robotevents.com according to the following tiebreakers.

1. Highest Robot Skills score (combined *Programming Skills Match* and *Driving Skills Match* Score from a single event).
2. Highest *Programming Skills Match* score (from any event).
3. Highest sum of *Skills Stop Times* from the *Robot Skills Matches* used for point 1.
4. Highest *Skills Stop Time* from the *Programming Skills Match* used for point 2.
5. Highest *Driving Skills Match* score (from any event).
6. Highest *Skills Stop Time* from the *Driving Skills Match* score used for point 5.
7. Earliest posting of the Highest *Programming Skills Match* score.
   a. The first *Team* to post a score ranks ahead of other *Teams* that post the same score at a later time, all else being equal.
8. Earliest posting of the Highest *Driving Skills Match* score.
   a. The first *Team* to post a score ranks ahead of other *Teams* that post the same score at a later time, all else being equal.

Robot Skills Challenge Format Options

To better accommodate varying health & safety circumstances in different regions, the 2021-2022 season will feature several different avenues for *Event Partners* to host Robot Skills Challenge competitions. Regardless of the format chosen for a given event, all rules, scoring, and rankings listed 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. *Teams* who do not compete will not be penalized in the main tournament.

- *Teams* may play *Robot Skills Matches* on a "first come, first serve" 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. For example, 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 serve" 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

A "Remote, Live" Skills-Only Event is an event held exclusively via a live online video platform organized by the *Event Partner*. The intent of a Remote, Live event is to replicate the competition experience of an "In-Person, Live" Skills-Only Event as much as possible.

Additional rules and requirements have been established in an effort to help facilitate a fair and flexible experience for all *Teams* and *Event Partners*.

<RSE1> 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 video conferencing environment must not be accessed or viewed by the general online public while the event is live, e.g. the conference 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. It is acceptable to live stream the event on a broadcasting platform such as YouTube or Twitch, provided that the audience can not directly view the video conferencing environment.
    iv. 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).

<RSE2> Registered *Teams* will be assigned scheduled times to complete Robot and Field Inspections and up to (3) *Programming Skills Matches* and (3) *Driving Skills Matches* over a live, online environment.

<RSE3> 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.

<RSE4> 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*.

<RSE5> 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.

<RSE6> *Teams* will complete a full *Robot* and Field inspection, in accordance with <R3>, 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 <R5>.

<RSE7> 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 *Drive Team Member*(s), *Robot*(s), Controller(s) and complete competition field must remain on camera at all times during the *Match*.
c. A countdown timer / Tournament Manager display that shows the remaining 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 <RSE7>, and *Teams* utilizing this exception should expect additional scrutiny.

While not required, using a multi-camera setup is preferred from an event standpoint, as it reduces the time needed to check scores, view robot positions, resetting the camera after moving around the field, etc.

<RSE8> Live, Remote *Robot Skills Matches* must include some live interaction between the *Team* and the *Head Referee*.

a. A *Drive Team Member* must demonstrate their Controller is paired with their *Robot* at the discretion of the *Head Referee*.
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, per <RSE7>.
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 *Drive Team Member*.
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, per <RSE7>. The *Head Referee* will confirm to the *Team* verbally what is being counted.
    i. <T1> 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 *Scoring Objects* are properly scored. 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.

<RSE9> *Match* replays are at the discretion of the *Head Referee*. In addition to the examples provided in <G20>, 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.

<RSE10> 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*.