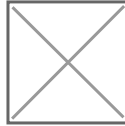


Q&A

VRC 2019-2020: Tower Takeover

Tagged: R2



Welcome to the official VEX Robotics Competition Question & Answer system, where all registered teams have the opportunity to ask for official rules interpretations and clarifications. This Q&A system is the only source for official VRC Tower Takeover rules clarifications, and the clarifications made here from the Game Design Committee (GDC) are considered as official and binding as the written [Game Manual](#) itself.

Please review the [Q&A Usage Guidelines](#) before posting. This system is only intended for specific VRC Tower Takeover rules questions.

- For event, registration, or other competition support questions, please contact your [REC Foundation Regional Support Manager](#).
 - For VEX technical support, contact support@vex.com or sales@vex.com.
- For game questions, suggestions, or concerns outside of specific and official rules questions, contact GDC@vex.com.

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571: Replace 2 out of 4 Wheels during event

24-Feb-2020

R2

I would like to know if it is legal to replace 2 of the wheels out of 4, from Omni to Rubber (or vice versa)? We would like to have 2 of the rubber wheels for the autonomous driving challenge, and replace those 2 Omni for rest of our sessions. We are will not make any changes to our drivetrain, not even a single bushing. We are not entirely swapping the entire subsystem.

Does this need to be reinspected?

Thank you in advance

Answered by Game Design Committee

Yes, this is legal.

In general, any time significant modifications are made to a Robot other than simple repairs, it is a good practice to re-inspect, per R1, quoted below with a portion bolded for emphasis:

<R1> 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 may result in Disqualification of the Robot at an event.

a. If significant changes are made to a Robot, it must be re-inspected before it will be allowed to participate in a Match.

b. If a Robot has multiple functional configurations, all possible configurations must be inspected before being used in competition.

c. Teams may be requested to submit to random inspections by event personnel during the event. Refusal to submit will result in Disqualification.

d. Referees or inspectors may decide that a Robot is in violation of the rules. In this case, the Team in violation will be Disqualified and the Robot will be barred from the Field until it passes re-inspection.

567: Replacing Wheels after Inspection

23-Feb-2020

R2

I would like to know if it is legal to replace 2 of the wheels out of 4, from Omni to Rubber (or vice versa)? We would like to have 2 of the rubber wheels for the autonomous driving challenge, and replace those 2 Omni for rest of our sessions. We are will not make any changes to our drivetrain, not even a single bushing. We are not entirely swapping the entire subsystem.

Does this need to be reinspected?

Thank you in advance

Answered by Game Design Committee

Yes, this is legal.

In general, any time significant modifications are made to a Robot other than simple repairs, it is a good practice to re-inspect, per R2, quoted below with a portion bolded for emphasis:

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

a. 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 event personnel. Refusal to submit will result in Disqualification.

d. Robots which have not passed inspection (i.e. who are in violation of one or more Robot rules) will not be permitted to play in any Matches until they have done so. <T2> 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 <R2d> will apply until the violation is remedied and the Team is re-inspected.

554: <R2> and Wheel Replacements

17-Feb-2020

R2

R2: Only one (1) Robot will be allowed to participate per Team in the VEX IQ Challenge. ... If you are swapping out an entire subsystem of either item 1 or 2, you have now created a second Robot and are no longer legal.

In [QA473](#), the GDC ruled that replacing a Robot's wheels after inspection would be considered a violation of R2 because the team is replacing parts of Subsystem 1. Based on my reading of the rule, a team doing so would not be violating R2 because no swapping of "an entire subsystem" took place. Subsystem 1 includes the entire robot base, specifically the structural components, none of which would be replaced. Furthermore, "swapping" a subsystem implies that two distinct subsystems exist, which did not occur in QA473.

A robot consists of both Subsystem 1 and Subsystem 2. Even if a team swaps an entire assembly of Subsystem 1 or Subsystem 2, they may not have yet created a second robot if no separate Subsystem 1/2 exists. In the blue box, it is written that "If you can place two complete and legal Robots on a table next to each other, then they are two separate Robots." In this case, there would not be two separate robots, because only parts of a single subsystem are being replaced. A common-sensical reading of R2 would lead me to believe that these are not two separate robots, and thus not a violation of R2. It is also written that "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" - it is specifically this statement that implies that changing a wheel would not be considered a second robot, and thus not a violation of R2.

I have three questions:

1. Are five wheels considered to be an "entire" assembly of Subsystem 1, as appears to be implied by QA473.
2. Is modifying parts of Subsystem 1 or 2 during a competition a violation of R2.
3. If modifying parts of Subsystem 1 or 2 is legal, how much modification is allowed? It is clear that a full replacement (especially with a prebuilt assembly) runs counter to the intention of R2.

Answered by Game Design Committee

I have three questions:

1. Are five wheels considered to be an "entire" assembly of Subsystem 1, as appears to be implied by QA473.
2. Is modifying parts of Subsystem 1 or 2 during a competition a violation of R2.
3. If modifying parts of Subsystem 1 or 2 is legal, how much modification is allowed? It is clear that a full replacement (especially with a prebuilt assembly) runs counter to the intention of R2.

The answer to all three of these questions is "it depends". It would be impossible to write an answer that would encompass all hypothetical modifications and scenarios, or provide specific boundaries for what is considered a "replacement" or "modification".

Q&A 473 asked a specific question; in that case, swapping a holonomic drivetrain for a traction base was considered a complete swap of Subsystem 2.

It is also written that "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" - it is specifically this statement that implies that changing a wheel would not be considered a second robot, and thus not a violation of R2.

While this sentence does use the word "a", it is not intended to explicitly draw a line at "one wheel vs five wheels". It is meant to imply that a pin, a wheel, or a motor is not in itself what defines a Subsystem, as it would be impossible to write an all-encompassing list of what constitutes a separate Robot. Trying to decide exactly how many pins, wheels, or motors can be changed before it constitutes a second Robot is also missing the intent and spirit of this rule.

522: Inspection. Extended Time

1-Feb-2020

R2

At a regional tournament, can we limit the number of re-inspections a team can request?

Answered by Game Design Committee

There is nothing in the Game Manual that prohibits a Team from inspecting their Robot multiple times to accommodate changes that would require re-inspection. We would not recommend stifling the creativity of Students by limiting the number of changes that can be made to their Robot.

If a Team is requesting a re-inspection of another Team's Robot, it is at the discretion of the Head Referee / inspector if they choose to honor that request.

512: Robot oversized before elimination match

28-Jan-2020

G4 R2

at a previous event we ran into an issue where a robot had passed inspection, and after competing all day, the robot was over sized, it was minimal, but still over sized. during the elimination rounds a sizing inspection was requested. So, how should this handled Is the robot DQ'd Per R2e, or as discussed in R2d, the robot sits out, until it can be fixed. R2e states "During" the match. this was caught before match started.

G4 States: Robots in violation of this limit will be removed from the field prior to the start of the Match, at the Head Referee's discretion. This is what was done. But during elimination match if it is a DQ, then the whole alliance is DQ'd.

Answered by Game Design Committee

Please review the [Q&A Usage Guidelines](#), specifically point 3, "Quote the applicable rule from the latest version of the manual in your question."

Rule R2 reads as follows, with the relevant portions bolded for emphasis:

<R2> Robots must pass inspection. Every Robot will be required to pass a full inspection before being cleared to compete. This inspection will ensure that all robot rules and regulations are met. Initial inspections will take place during team registration/practice time. a. 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 event personnel. Refusal to submit will result in Disqualification.

d. Robots which have not passed inspection (i.e. who are in violation of one or more Robot rules) will not be permitted to play in any Matches until they have done so. <T2> 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 <R2d> will apply until the violation is remedied and the Team is re-inspected.

G4 reads as follows:

<G4> Robots begin the Match in the starting volume. At the beginning of a Match, each Robot must be smaller than a volume of 18" (457.2 mm) long by 18" (457.2 mm) wide by 18" (457.2 mm) tall. Using Field Elements, such as the field perimeter wall, to maintain starting size is only acceptable if the Robot would still satisfy the constraints of <R4> and pass inspection without the Field Element. Robots in violation of this limit will be removed from the field prior to the start of the Match, at the Head Referee's discretion.

The scenario as you have described would be considered a G4 violation, because it occurred prior to a Match starting. R2-e explicitly only references a violation that is caught during a Match. Therefore, this would not be considered a Disqualification, and R2-d would then apply for that Match and any subsequent Matches. R2 and G4 apply regardless if the Matches are Qualification Matches or Elimination Matches.

499: Limits on separate robot configurations

23-Jan-2020

R2

How much of a robot can be in different configurations. My students want to use a different configuration depending on the strengths or weaknesses of there alliance partners. As long as all configurations pass inspection prior to the match, it appears to be legal. I was hoping for clarification as 2 of the configurations make it look like a new robot. They are using the same Brain, controller and drivetrain. They are only swapping out arms and intake system.

Answered by Game Design Committee

For the sake of brevity, we will not be quoting all of rules R1 and R2. However, we would strongly advise reviewing them in full alongside this response.

R2 is partially quoted as follows:

Given the above definitions, a minimum Robot for use in any VEX IQ Challenge event (including Robot Skills Challenges) must consist of subsystem 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 are no longer legal.

R1 is partially quoted as follows:

- a. If significant changes are made to a Robot, it must be re-inspected before it will be allowed to participate in a Match.
- b. If a Robot has multiple functional configurations, all possible configurations must be inspected before being used in competition.

It is impossible to provide a blanket response based on a snapshot description of a hypothetical Robot. However, configuration changes are permitted by R1 and R2, so long as they are confined to Subsystem 3. Therefore, in order to be legal, the following conditions must be met:

- The drivetrain does not change between configurations (Subsystem 1).
- The control system does not change between configurations (Subsystem 2).
- The Robot passes inspection in all possible configurations (R1-b).

27: Clarification of <R1> and <R2>

14-Jun-2018

R1 R2

Rule <R1> allows teams to replace subsystem 3 during a competition, such as a flywheel, cap lifter, scissor lift etc, whilst rules <R1> and <R2> limit teams to only having one robot at a competition:

Would a team be allowed to have spare subsystem 3s for their entire robot if they are identical to the subsystem originally on the robot? Would having replacement subsystem 3s for all the parts of the robot class as being a second robot effectively for spares, breaking rule <R2>

This is because we intend on building a modular robot where each subsystem 3 can be swapped out with ease, whilst keeping the same subsystem 1 and 2

Answered by Game Design Committee

Yes, this is legal. As you noted, <R1> only prohibits teams from swapping Subsystems 1 and 2. Remember that if you have multiple configurations with different Subsystem 3 mechanisms, your Robot must be inspected in all possible configurations per <R2b>.

2584: G2 (Student Centered), G4/R2, and Custom Cut Plastic – Levels of Assistance

27-Feb-2025

G2 G4 R2 R19

G2 states that adults "should not provide an unfair advantage by providing 'help' that is beyond the Students' independent abilities." Given the student's developmental level, access to tools and safety concerns around tool usage, at times it may be challenging for a student to independently do some tasks. At a recent competition, the level of outside assistance allowable came up for question about custom cut plastic. Specifically:

If the students design their own CAD files for custom cut plastic, is it a violation of G2 for the coach or mentor to run the CNC machine and/or laser cutter to cut the material for the students, or do the students need to operate the machine themselves?

Is it a violation of G2 if the mentor/coach makes slight modifications to the file so that the tool works correctly (for example removing duplicate lines or changing the order of the cuts to put less strain on the machine)?

If students at school A develop their own CAD files for custom cut plastic but do not have access to a laser cutters and/or CNC machine, is it a violation of G4/R2 to send the file to school B to have it cut for them?

If students at school A develop their own CAD files for custom cut plastic but do not have access to laser cutters and/or CNC machine, is it a violation of G2/G4/R2 to send their CAD files to an outside commercial service to have the plastic cut for them?

I suppose the same issues would be raised for cutting metal as well.

Relevant rules and Q&As: G2: **V5RC is a student-centered program**. Adults should not make decisions about the Robot's build, design, or gameplay, and should not provide an unfair advantage by providing 'help' that is beyond the Students' independent abilities. G4: **The Robot must represent the skill level of the Team**. R2: **Robots must represent the Team's skill level**. The Robot must be designed, built, and programmed by members of the Team. R19: **A limited amount of custom plastic is allowed**. Robots may use custom-made parts cut from certain types of non-shattering plastic. c. Plastic may be mechanically altered by cutting, drilling, bending, etc. It cannot be

Thank you!

Answered by Game Design Committee

All of the scenarios you describe would be [<G2>](#) Violations. Adults should not provide an unfair advantage by providing 'help' that is beyond the Students' independent abilities.

In the case of a Team that lacks the necessary tools to create legal Student-designed parts, it would be legal for the Student designers to use another organization's tools to create the parts themselves using those borrowed tools.

2582: G4/R2 and Custom Cut Plastic with Plans from the Internet

27-Feb-2025

G4 R2 R19

Scenario: students find on-line (or are given by another team) a CAD file for a set of custom cut plastic parts for their robot and use it to cut plastic for their robot with a laser cutter and/or CNC machine.

Relevant rules and Q&As:

G4: **The Robot must represent the skill level of the Team**.

R2: **Robots must represent the Team's skill level**. The Robot must be designed, built, and programmed by members of the Team.

R19: **A limited amount of custom plastic is allowed**. Robots may use custom-made parts cut from certain types of non-shattering plastic. c. Plastic may be mechanically altered by cutting, drilling, bending, etc.

Q&A 2311: What qualifies as "Commercially Available?" In reference to 3D printed parts, but might be relevant here: "Posting files online does not make them commercially available."

Is this a violation of G4/R2? If so, would the legality of the parts change if the students credited the source of the files in their notebook and/or to the inspection team?

Would it be a violation of G4/R2 if the students found (or were given) the CAD file, printed it on paper, taped it to the plastic then followed the pattern manually, cutting the plastic with tin snips or a band saw?

Thank you.

Answered by Game Design Committee

Is this a violation of G4/R2?

Yes. These parts were not designed by members of the Team, which is a requirement of rule [<R2>](#). If the parts were designed by a Student from another Team, that Student has effectively served as a Designer for multiple Teams in the season, which is a violation of rule [<G4>](#). If the parts were designed by an Adult, it is a violation of rule [<G2>](#).

If so, would the legality of the parts change if the students credited the source of the files in their notebook and/or to the inspection team?

No.

Would it be a violation of G4/R2 if the students found (or were given) the CAD file, printed it on paper, taped it to the plastic then followed the pattern manually, cutting the plastic with tin snips or a band saw?

Yes.

1582: Can teams use coding templates for PID/Odometry?

10-Jul-2023

G4 R2

[<R2>](#)

[<G4>](#)

<R2> states that "The Robot must be designed, built, and programmed by members of the Team."

If a team were to use a coding template given to them by another team, but modified the code to suit their robot, would that be allowed under R2 and G4? See the following video:

<https://youtu.be/4HUZV4bqKJO>

Answered by Game Design Committee

If a team were to use a coding template given to them by another team, but modified the code to suit their robot, would that be allowed under R2 and G4?

Rule [<G2>](#) states that "Students must be prepared to demonstrate an active understanding of their Robot's construction and programming to judges or event staff. It also says that the rule "operates in tandem with the [REC Foundation Student Centered Policy](#)". Rule <G2> is reinforced by related language in rule [<R2>](#) and clause aiii of rule [<G4>](#).

The Student-Centered Policy specifically addresses the scenario you've described, quoted in part below:

Teams that utilize example code or custom libraries from outside sources should use caution. The program used in the machine should represent the students' design efforts and abilities. Blindly using code without understanding the code functionality is not consistent with the educational goals of this program. Students should be able to understand and explain the code used on their machines, and students should be able to demonstrate that they can program on a level equivalent to the code included on their machine.

To find the full text of this topic in the policy, visit the link above and search for the heading "Importance of Fundamentals".

Teams that cannot demonstrate an active understanding of their Robot's programming are likely in violation of rules <G2>, <G4> part aiii, and <R2>. Match Affecting or repeated violations of these rules will lead to Disqualification from the current Match, and can lead to the Team's removal from the event under rule <G1>.

1432: New season 23-24

6-Feb-2023

R2

<R2>My daughters team are in Yr9 (English school). They going to UK VIQC Nationals. there worried that they wont be able to compete next year. I've said they should move up to VRC, they entered last year. My daughters birthday is 23rd September 2008 (09.23.2008 for you USA types). she will be 15 and next years worlds. can she compete? Also, can you change the wording for this rule to age specific VIQC open to 7 yrs to 11 yrs Elementary and 11 yrs to 14 Middle School.

Answered by Game Design Committee

The Q&A platform is intended to be a communication channel for questions such as "is this interpretation of a rule legal?" not a discussion forum to post questions such as "I disagree with this rule, can it be changed?"

The definition of Student in Section 2 of the Spin Up Game Manual outlines the age requirements for participation in VRC, based on the Student's birth date and age at the time of the VEX World Championship. If a Student meets this criteria, they are eligible to compete.

For questions regarding Team registration and program, please contact the Team Engagement Manager or Regional Support Manager for your location. You can identify your region's contacts [on this page at RobotEvents.com](https://robotevents.com).

102: How to deal with robots that do not pass inspection?

9-Oct-2018

Tournament Structure R2

There is a good discussion on VexForum with differing opinions and weighins from RECF RSM on how EPs are to deal with teams whose robots do not pass inspection.

Two rules appear: Rule <T03> a. If a Robot cannot report for a Match, at least one Student member of the Team should report to the field for the Match. If no Student Team members report to the field, the Team will be considered a "no-show" and receive zero (0) WP, AP, and SP.

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

A) first question is does a team whose robot did not pass inspection and still on the schedule be allowed to send a representative to the field under <T03> and get credit for the outcome of the match, which is in essence the performance of the alliance partner?

B) second question - should a Head Referee disqualify the team for showing up to matches (with or without the robot) if it has not passed inspection for all matches the team shows up to? (a remedy suggested by an EP with the backing of the RSM)

C) third question - should a Head Referee allow a robot who has not passed inspection to compete while minor or trivial out of spec issues be fixed - i.e., over sized by a mere 1/16th of an inch?

D) does <R2d> specifically call for DQing the team every match until the problem has been fixed? Or does it mean the robot may not be placed on the field, but the team can show up and get credit? or does it mean the team MUST be marked as "No Show" and not allowed near the field?

<R2d> d. Referees or inspectors may decide that a robot is in violation of the rules. In this event, the team in violation will be disqualified and **the robot will be barred from the playing field** until it passes re-inspection.

Thank you for considering this complex set of scenarios and subquestions relating to <T03> and <R2> - I believe teams, EPs and RSM are all trying their best to deal with a case that does occur all too frequently in a fair manner that supports the growth of teams coming to competitions.

Answered by Game Design Committee

Per <R2d> as quoted, if a Robot is found to be in violation of Robot rules, then it should be barred from the field. <R2d> should be considered the same whether the violation is found during inspection, or during Match play; that is, they should be barred from the field and receive a Disqualification for any Matches which occur while the Robot is in violation. Passing inspection includes minor violations such as being oversized by 1/16".

If a Robot has passed inspection, but the Team decides to not field the Robot (e.g. if it is being repaired), then the Team will not be considered a "no-show" as long as a Student representative is sent to the field per <T03a>. This allowance does not apply to a Robot which has not passed inspection or has been found to be in violation - in these cases, <R2d> still applies, as explained above.

So, Teams must pass inspection before bringing their Robot to any Matches, and must ensure that they remain within compliance of all Robot rules throughout the day. We encourage event staff to work with all Teams to pass inspection, and keep Teams in the Match schedule if they are making a diligent effort to pass inspection in a timely manner.