Q&A

VRC 2021-2022: Tipping Point

Tagged: R12

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 Tipping Point 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 Tipping Point rules questions.

- For event, registration, or other competition support questions, please contact your REC Foundation 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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995: Commercially Available Standoffs

5-Jan-2022
R6 R7 R8 R12

Hello,

This question comes with the changes to "identical parts" and standoffs not being considered under R12.

R12

> Robots may use any commercially available #4, #6, #8, M3, M3.5, or M4 screw up to 2.5” (63.5mm) long (nominal), and any commercially available nut, washer, and / or non-threaded spacer (up to 2.5” (63.5mm) long) to fit these screws.

R6, R7 and R8 do not mention standoffs as an exception for what can be used from a third party.

Are standoffs purchased from third parties legal if they are identical in in all ways besides color to what VEX Robotics / VEX Robotics resellers provide?

Thank you for your time!

> **Answered by committee**
>
> Yes. R12 will be updated to include standoffs in the February 1 Game Manual update.

895: Commercially Available Hardware

21-Oct-2021
R12

Hello,

I have some questions about how the GDC ruled commercially available hardware last season, and would like to ask the question again for this season.

I’m referencing Change Up Q&A’s because R12 from Change Up is identical to Tipping Point 2.1 except for the addition of 2.5” hardware, and these are the Q&As I would like clarified for this season.

R12 from Tipping Point 2.1

> Certain non-VEX screws, nuts, and washers are allowed. Robots may use any commercially available #4, #6, #8, M3, M3.5, or M4 screw up to 2.5” (63.5mm) long (nominal), and any commercially available nut, washer, and / or non-threaded spacer (up to 2.5” (63.5mm) long) to fit these screws.

Under this rule alone, using commercially available hardware regardless of additional functionality would be legal.

The note for R12 goes beyond clarifying, and limits in a way R12 doesn’t hint at.

> The intent of the rule is to allow Teams to purchase their own commodity hardware without introducing additional functionality not found in standard VEX equipment. It is up to inspectors to determine whether the non-VEX hardware has introduced additional functionality or not.

The above note is the reason nylon fasteners are ruled legal, and lock washers illegal.

Change Up Nylon Fasteners Q&A https://www.robotevents.com/VRC/2020-2021/QA/747

> In general, if the screw could be replaced with a standard VEX screw with no resulting functional changes to the mechanism in question, then they would be legal. However, if the mechanism takes advantage of a functional difference between the two screws (such as the additional flexibility of a nylon vs metal fastener), then they would likely be ruled illegal.

Change Up Lock Washer Q&A https://www.robotevents.com/VRC/2020-2021/QA/732

> Standard VEX hardware does not include lock washers; therefore, this would be considered introducing additional functionality, and would not be legal.

Teams use nylon hardware because it is lighter than steel hardware. A team would generally experience a functional difference changing 50 nylon screws to steel screws. But, replacing the nylon screws for VEX thumb screws would most likely not make a functional difference beyond screw head size, but that could be cut.

Nylon screws being used for the flexibility was said to be illegal because that's not something found in VEX equipment. However, VEX sells plastic thumb screws that would be flexible, making this feature of nylon screws legal as long as it's the same length as thumb screws.

The keps nuts that VEX sells have "skirts" that can be removed and used as a lock washer, so commercially available lock washers don't introduce "additional functionality not found in standard VEX equipment" (R12 Note). These were said to be illegal because they aren't found in "standard VEX hardware" (Lock Washer Q&A), even though the manual doesn't say they need to be in standard VEX hardware. Lock washers were said to be illegal because they "introduce additional functionality" (Lock Washer Q&A), even though they don't.

In Tower Takeover, many teams used countersunk screws on their trays to give cubes an easier time sliding. These screws could have been replaced with VEX shoulder screws, but because they don't have an angle to them, it's not quite the same.

In Change Up it was ruled that nylon standoffs were illegal. Buying a #6 2" spacer from McMaster and tapping it seems to be fully within the rules. This would end up being an almost identical part to a 2" rounded nylon standoff. This could be an additional feature not found in VEX equipment.

Different OD spacers have been used since around 2016, maybe earlier, when 2587 used 5/16 spacers. Different spacers can be used for things like linear slides, or 0.875" aluminum spacers that perfectly fit inside of a c-channel and won't compress.

This question expands to many different types of commercially available hardware that many teams utilize from sources like McMaster Carr or similar distributors. All of these parts introduce new functionality, some of which are found in VEX equipment, and some of which aren't. For example, hardware made from different materials (such as aluminum, nylon, fiberglass, steel, titanium, ceramic, and more); washers of different diameter, thickness, or material; RoboSource shoulder screws; different sizes and types of hardware (such as 4-40 screws); and much more all introduce additional functionality.

What specific properties should be considered when determining if commercially available hardware "introduces additional functionality not found in standard VEX equipment"?

Thank you for your time!

Answered by committee

> What specific properties should be considered when determining if commercially available hardware "introduces additional functionality not found in standard VEX equipment"?

We are not going to be able to provide a concise, blanket answer to this question that will encompass all hypothetical commodity hardware properties.

To reiterate, the note in R12 reads as follows:

> The intent of the rule is to allow Teams to purchase their own commodity hardware without introducing additional functionality not found in standard VEX equipment. It is up to inspectors to determine whether the non-VEX hardware has introduced additional functionality or not.

An on-site inspector / Head Referee judgment call is necessary in order to review the context, specific nature, and application of the commodity hardware being used.

The overarching / original intent of R12 is to provide a convenient avenue for teams to use commodity hardware that is nearly identical to VEX hardware. For example, international teams who cannot easily find local replacements for imperial sizes, or teams who want to purchase specific sizes / quantities outside of what are available from VEX.

Stretching R12 to gain a competitive advantage by using a specialty part which is "technically still a screw" is outside of the spirit and intent of the rule. Teams who choose to do so should be cognizant of the risk they are taking, and be aware that it would be well within an inspector's discretion to ask for the specialty parts to be removed.

This is part of the reason why the "replaced by legal hardware" thought experiment can be used as a guiding principle when determining a specific part's legality.

> if the screw could be replaced with a standard VEX screw with no resulting functional changes to the mechanism in question, then they would be legal.

778: Nylon Standoffs

9-Apr-2021
R12

Hello,

Quick question on the legality of nylon standoffs.

R12

> Certain non-VEX screws, nuts, and washers are allowed. Robots may use any commercially available #4, #6, #8, M3, M3.5, or M4 screw up to 2” (50.8mm) long (nominal), and any commercially available nut, washer, and/or spacer (up to 2” / 50.8mm long) to fit these screws.

Q&A on Nylon Fasteners (further clarification of R12) https://www.robotevents.com/VRC/2020-2021/QA/747

> As noted in R12, it will ultimately be at the inspector's discretion to determine whether or not a nylon screw has introduced additional functionality. In general, if the screw could be replaced with a standard VEX screw with no resulting functional changes to the mechanism in question, then they would be legal. However, if the mechanism takes advantage of a functional difference between the two screws (such as the additional flexibility of a nylon vs metal fastener), then they would likely be ruled illegal.

2016 Q&A ruling nylon standoffs illegal https://www.vexforum.com/t/answered-are-nylon-standoffs-legal/37748

> ...standoffs are not considered nuts.

Should standoffs be considered nuts when interpreting R12 and Q&A 747?

Thank you

> **Answered by committee**
>
> Should standoffs be considered nuts when interpreting R12 and Q&A 747?

> No. Standoffs serve a different functional purpose than nuts, and should be considered separately.
>
> R12 specifically refers to screws, nuts, and washers. Since a standoff is not considered a nut, it is not included in the exceptions provided by R12.
>
> Therefore, no, nylon standoffs would not be legal for use.

708: <VUR6> Clarification

7-Dec-2020
R6 R7 R8 R10 R12 R20 R22 VUR2 VUR3 VUR5 VUR6 VUR8

In this previous ruling, it was determined that <VUR5> takes priority over <VUR6>:

https://www.robotevents.com/VEXU/2020-2021/QA/674

However, this is contradictory to every other instance of past rulings regarding <VUR6> and the wording of <VUR6> in the game manual.

?

For example, consider a typical custom sensor such as the pixy camera:

https://www.robotshop.com/en/charmed-labs-pixy-2-cmucam5-image-sensor.html

This sensor violates <R6>, <R7>, <R8>, <R10>, <R12>, <R20>, <R22>, as well as <VUR3> and <VUR8>.

VUR3 restricts the materials allowed, but this sensor violates the allowed materials.

VUR8 restricts the screw sizes allowed, but this sensor may have smaller screws than the allowed limit.

As another example, considerer a vex IQ sensor: https://www.vexrobotics.com/228-3014.html

This sensor would violate <R6>, <R7>, <R8>, <R10>, <R12>, <R20>, <R22>, as well as <VUR3> and <VUR2b>.

<VUR2b> restricts teams from using any vex IQ electronics, which would include this sensor.

?

Because <VUR6> specifically states "There is no restriction on sensors and other additional electronics that Robots may use for sensing and processing" it has been understood by most VexU teams that <VUR6> takes priority over all the other rules in the game manual. Logically this would also mean <VUR6> would take priority over <VUR5>.

?

Several other Q/As over the years have verified this as correct as the wording on <VUR6> has not significantly changed since these rulings:

https://www.vexforum.com/t/answered-vexu-speakers-as-part-of-custom-sensor/42312

https://www.vexforum.com/t/answered-vex-u-old-college-q-a-updates/23810

https://www.vexforum.com/t/answered-custom-sensor-housing/19582/2

These three Q/As verify that <VUR6> would take priority over <VUR3> and <VUR8> as well as all the regular game manual rules mentioned above.

Furthermore, the following Q/A shows that <VUR6> would also take priority over <VUR5>:

https://www.vexforum.com/t/answered-vex-u-non-vex-servo-motors-for-a-custom-sensor/35538

This allowed external non vex motors used solely for manipulating custom sensors.

If this were the case, it would agree with the wording of <VUR6>. There are numerous sensors and processing boards that rely on motors to operate.

For example, many full field lidar systems such as:

https://www.robotshop.com/en/rplidar-a1m8-360-degree-laser-scanner-development-kit.html

rely on an integrated motor to spin the lidar enabling it to map the field. VexU teams have legally used similar lidar systems in the past and may plan to do so again this season.

Another example would be the Nvidia Jetson Xavier NX listed below:

https://www.nvidia.com/en-us/autonomous-machines/embedded-systems/jetson-xavier-nx/

This processing board has a built-in fan on its heatsink that is critical to its function as a processing unit.

A third example is the pixy tilt and pan kit: https://pixycam.com/pixy2-pan-tilt-kit/ (ruled legal in the above Q/A linked).

Without these integrated motors, none of these sensors or processing units could function as intended.

?

Therefore, which rules, if any, restrict the "no restriction" clause of <VUR6>?

Furthermore, if <VUR5> does not apply to <VUR6>, then was the previous ruling in QA#674 an error?

If <VUR5> is applicable, are 360-degree Lidar sensors and the Nvidia Jetson processing boards also illegal? If all VexU appendix rules also apply to <VUR6>, then does that mean that there are no legal VexU custom sensors?

> **Answered by committee**
>
> > If all VexU appendix rules also apply to <VUR6>, then does that mean that there are no legal VexU custom sensors?
>
> Please see rule G3:
>
> > <G3> Use common sense. When reading and applying the various rules in this document, please remember that common sense always applies in the VEX Robotics Competition.
>
> The intent of the answer in the linked Q&A was to prohibit using VUR6 as a loophole to install cooling fans on a Robot.
>
> Sensors containing an internal motor which is integral to their operation, such as a LIDAR or pan-tilt Pixy, would be permissible. It would not be feasible for an inspector to take apart a LIDAR module to see if there is a motor inside of it. It is, however, feasible for an inspector to check if a fan is being used to cool a V5 Smart Motor.
>
> To prevent confusion, we would advise Teams with external processors that require thermal protection to utilize a passive heat sink instead of an active cooling fan.

69: V4/Cortex Only Comps?

8-Sep-2018
R12

I've been hearing that some official qualifying competitions are going to establish a rule where the robots must be V4/VEX Cortex only. Is it correct that Event Partners cannot do such a thing considering the rule <R12>?

> **Answered by committee**
>
> The Cortex and V5 systems are both legal at all standard VRC qualifying/championship events.

> New this season, EP's also have the ability to host an Invitation-Only event if they also host a standard/open VRC event per the VRC Qualification Criteria guidelines. EP's with questions about Invitation-Only events should contact their REC Foundation Regional Support Manager for more information.

624: Legality of Commercially Available Shoulder Screws in Regards to R12

30-Jun-2020
R12

This question is regarding rule R12:

<R12> Certain non-VEX screws, nuts, and washers are allowed. Robots may use any commercially available #4, #6, #8, M3, M3.5, or M4 screw up to 2” (50.8mm) long (nominal), and any commercially available nut, washer, and/or spacer (up to 2” / 50.8mm long) to fit these screws. The intent of the rule is to allow teams to purchase their own commodity hardware without introducing additional functionality not found in standard VEX equipment. It is up to inspectors to determine whether the non-VEX hardware has introduced additional functionality or not.

Would a commercially available shoulder screw, of #8 size and up to 2” long, be permitted under rule R12? Considering that VEX currently sells shoulder screws (item 276-1408), these commercially available shoulder screws would not introduce “additional functionality not found in standard VEX equipment”.

> **Answered by committee**
>
> > Would a commercially available shoulder screw, of #8 size and up to 2” long, be permitted under rule R12?
>
> Yes, this would be legal.

552: Coach Interaction During Match

15-Feb-2020
G2 R12

During a elementary IQ finals match at a tournament I was at, a team's battery went down. An adult coach proceeded to throw the team a fresh battery, in the middle of the match. Is this an illegal action in any way? Mainly referring to rules R12 or G2?

> **Answered by committee**
>
> First, this would not be considered an R12 violation. R12 is intended to prevent Teams from using additional Robot Batteries as counterweights or finding ways to double their available power. As noted in this Q&A, swapping out a battery mid-Match is not illegal, provided that it is done under a legal G17 / RSC5 interaction.
>
> G2 is quoted below, with a portion bolded for emphasis:
>
> > <G2> VEX IQ is a student-centered program. **Adults may assist Students in urgent situations, but adults should never work on or program a Robot without Students on that Team being present and actively participating.** Students should be prepared to demonstrate an active understanding of their Robot’s construction and programming to judges or event staff.
> >
> > Some amount of adult mentorship, teaching, and/or guidance is an expected and encouraged facet of the VEX IQ Challenge. 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. Violation of this rule could be considered a violation of <G1> and/or the REC Foundation Code of Conduct.
>
> In the specific scenario that you have described, this would likely be considered an "urgent situation", especially because the Students were the ones who identified the root cause of the problem and physically changed the battery ("worked on the the Robot") mid-Match.
>
> Therefore, the act of a Team receiving a spare battery mid-Match is not illegal in itself.
>
> With that being said, we definitely do not want adults to get into the habit of throwing batteries at Students! This could be deemed an S1, G1, G2, or Code of Conduct violation, depending on the manner in which it is handled in the context of the event. It would be impossible for us to provide a blanket response that would encompass all possible hypothetical interactions.

472: Cortex Non-Functional Decorations

2-Jan-2020
R12 R16 R17

Under rules <R12>, <R16>, <R17>, may teams using the V5 Control System use a Cortex VEXNET 2.0 Key as a non-functional decoration?

> **Answered by committee**
>
> No, this is not legal.

435: <R12> Non-functional decoration.

27-Nov-2019
R12 T1

In the Game Manual it states in <R12> that the Inspector will have final say as to whether as to what is considered non-functional decoration. Given that Inspectors do not go through the same training as many Head Referees, what happens when a Head Referee deems something as functional? <T1> says the Head Referee has the ultimate say about what is permissible in matches.

Which has precedent? <R12> or <T1>?

> **Answered by committee**
>
> This scenario is covered by rule R2-e, which states the following:
>
> > 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.
>
> R2-e is primarily intended for a scenario where a Robot has been modified since inspection. However, it is also intended as a "catch" for a scenario where a Head Referee identifies a violation that an inspector may have missed.
>
> Most Robot rules can be considered as "inspection rules", in the context that there may not be a Head Referee present during inspection. So, statements such as "inspectors have the final say" imply that this is being questioned during inspection. Once a Robot passes inspection, R2-e and T1 come into effect for the duration of the Tournament.

429: R12: Carbon Fiber on Cube Tray Inspection Warning

21-Nov-2019
R12

At our recent competition, we were strictly warned about putting carbon fiber (the contact paper kind) on the Lexan we use in the middle of the cube tray. The basis of the argument is that it changes the surface that the cube slides on. Upon further investigation, I thought I'd seen other teams do the same thing, primarily for decoration. I understand where it could look like a rule violation, as tape isn't allowed for anything except wiring and decor (nonfunctional). Is this a violation of R12, or is it just an overly cautious inspector?

** We also realize that inspectors have the final say, but I would like to get a response on this to know for sure how to handle things at our next tournament

Answered by committee

It is impossible to issue a blanket ruling based on a snapshot description of a hypothetical Robot design. Furthermore, please review the Q&A Usage Guidelines, specifically point 3, "Quote the applicable rule from the latest version of the manual in your question."

The rule in question is R10, quoted here for reference:

> <R10> A limited amount of tape is allowed. Robots may use a small amount of tape when used for the following purposes:
>
> a. For the sole purpose of securing any connection between the ends of two (2) VEX cables.
>
> b. For labeling wires and motors.
>
> c. For covering the back of License Plates (i.e. the "wrong color").
>
> d. For the purposes of preventing leaks on the threaded portions of pneumatic fittings. This is the only acceptable use of Teflon tape.
>
> e. For securing and retaining a VEXnet Key 2.0 to the VEX ARM® Cortex®-based Microcontroller. Using tape in this manner is highly recommended to ensure a robust connection.
>
> f. In any other application that would be considered a "non-functional decoration" per <R12>

As your description does not sound like it would fit into points "a" through "e", the question that a Head Referee/inspector would then ask themselves is whether the contact paper is a "non-functional decoration". R12 is partially quoted below:

> <R12> Decorations are allowed. Teams may add non-functional decorations, provided that they do not affect Robot performance in any significant way or affect the outcome of the Match. These decorations must be in the spirit of the competition. Inspectors will have final say in what is considered "non-functional". Unless otherwise specified below, non-functional decorations are governed by all standard Robot rules.
>
> In order to be "non-functional," any guards, decals, or other decorations must be backed by legal materials that provide the same functionality. For example, if your Robot has a giant decal that prevents Cubes from falling out of the Robot, the decal must be backed by VEX material that would also prevent the Cubes from falling out.

It is ultimately at the inspector's discretion whether or not a given decoration is affecting Robot performance. A decal which provides more (or less) grip than standard legal materials would likely be considered to be affecting Robot performance, and would not be legal.

427: 3d Printed License Plate Holders

19-Nov-2019
R12 R28

On the vex forum there are discussions of 3D Printed License Plate Holders. But, "Anything written on the forum is just chit-chat and can't be used to prove anything to EPs or tournament hosts." I find this to be confusing because many teams are posting their designs online and are not distinguishing whether they are VRC or VEXU. I can see a team showing up at a tournament with a 3D Printed License Plate Holder and trying to prove to the EP it is legal by showing discussions that it is allowed because "Team A" is doing it, and "Team A" happens to be a VEXU team.

I would like to officially ask if 3D Printed License Plate holders are allowed on the VRC robot (Middle School & High School) as long as it "would be considered a non-functional decoration as described" by <R12> & <R28> or are 3D Printed License Plate Holders only allowed on the VEXU robots due to the abundance of resources allowed for them to use (including 3D printed materials)?

Answered by committee

3D printed non-functional decorations are permitted in VRC, provided that they satisfy the constraints of R12. R12 is partially quoted below:

> <R12> Decorations are allowed. Teams may add non-functional decorations, provided that they do not affect Robot performance in any significant way or affect the outcome of the Match. These decorations must be in the spirit of the competition. Inspectors will have final say in what is considered "non-functional". Unless otherwise specified below, non-functional decorations are governed by all standard Robot rules.
>
> In order to be "non-functional," any guards, decals, or other decorations must be backed by legal materials that provide the same functionality. For example, if your Robot has a giant decal that prevents Cubes from falling out of the Robot, the decal must be backed by VEX material that would also prevent the Cubes from falling out.

It is impossible to issue a blanket ruling that would apply to all hypothetical decorations and Robot designs; inspectors will have the final say in what is considered "non-functional". The most common thought experiment used in this determination is to ask what would happen if the decoration were removed from the Robot. Is the hypothetical License Plate holder being used to join structural pieces together, to guide Cubes, etc?

We would also ask teams to bear in mind this similar Q&A, specifically the following point:

> Teams wishing to utilize custom-made license plates should be prepared for the possibility of this judgment, and ensure that they are prepared to replace any custom parts with official VEX License Plates if requested. Not bringing official replacement plates to an event will not be an acceptable reason for overlooking a violation of one or more points in R28.

357: Painting Robots in a Similar Color as the Game/ Field Elements

11-Sep-2019
R12

Rule R12 states: "a. Anodizing and painting of parts is considered a legal nonfunctional decoration" and "e. Decorations that visually mimic field elements or could otherwise interfere with an opponent's Vision Sensor are considered functional and are not permitted. This includes lights, such as the VEX Flashlight. The Head Inspector and Head Referee will make the final decision on whether a given decoration or mechanism violates this rule."
Our question is, can you paint your robot in a color that is similar to those of game and field elements (including but not limited to green, orange, purple, red, blue, black, gray)?

For example, if your school colors are green and black, could you paint your robot these colors, or would this be considered illegal because those colors may mimic field and game elements, thus violating section e? Another example, if your school colors again were green and black, could you paint the robot a darker shade of green than that of the cubes; or would this be considered illegal because of section e?

> **Answered by committee**
>
> > Our question is, can you paint your robot in a color that is similar to those of game and field elements (including but not limited to green, orange, purple, red, blue, black, gray)?
>
> It is impossible to issue a blanket ruling that would cover all hypothetical decorative styles and color shades. We would advise Teams and Head Referees to refer to G3 ("Use common sense") when determining whether a given decoration is trackable way by another Team's Vision Sensor (under realistic, Match Affecting circumstances). The intent of G12 is not to prohibit all teams with green, orange, purple, black, gray, blue, or red themes from decorating their Robot; it is to protect (within a reasonable extent) Teams attempting to take their VRC experience to the next level through Vision Sensor programming.
>
> One way to think about decorative color choices is to view them the same way you would a typical non-functional decoration, such as a giant decal. By itself, a giant decal is considered a nonfunctional decoration. However, if used to hold metal parts together or to hold game objects, it has become functional, and is no longer legal.
>
> That being said, just as teams are responsible for the decorations on their own robots, teams utilizing the Vision Sensor should be conscious of the possibility for inadvertent or incidental visual interference. It will be up to the inspector and Head Referee to determine if a given Robot's decoration or design acts as a "Vision Sensor distraction"; to assist in reducing the frequency of these judgment calls, we would advise Vision Sensor Teams to take advantage of the engineering design process to investigate programming solutions that mitigate the impact of undesirable conditions.
>
> To summarize more colloquially / bluntly: yes you can paint your robot green, just don't hold up a giant green sign if playing against a team that you know tracks green cubes, and if you're going to use a Vision Sensor, remember that there may be some green things in the arena that you have to account for.

337: Scuff controller add-on legality update

23-Aug-2019
R12

Because the Q&A's do not carry over from last season, I must ask this again to ensure your ruling has not changed on the previously-legal 3D printed V5 scuff controller add-on.

Rule <R21> States "Motors (including the internal PTC or Smart Motor firmware), microcontrollers (including V5 Robot Brain firmware), extension cords, sensors, controllers, battery packs, reservoirs, solenoids, pneumatic cylinders, and any other electrical component or pneumatics component of the VEX EDR platform may NOT be altered from their original state in ANY way.

Provided this add-on is easily removable, does not modify electrical components in any way, and was completely legal to use last year, would this add-on count as an illegal modification, or would last year's ruling carry on to this season?

Answered by committee

Yes, the attachment shown in the attached photo would be legal, provided it is easily removable and does not modify electrical components in any way.

277: <R12> f - Do LED strips still need to be powered by brain/cortex

14-May-2019
R12

In the past, if teams used powered decorations such as LED light strips they needed to be powered by the brain or cortex. With the new wording in <R12> part f, where it states:

> Internal power sources (e.g. for a small blinking light) are permitted, provided that no other rules are violated and this source only provides power to the non-functional decoration (e.g. does not directly or indirectly influence any functional portions of the Robot)

Does this mean that teams can use external power for LED strips, or do they exceed the example of the "small blinking light"?

Answered by committee

> Does this mean that teams can use external power for LED strips, or do they exceed the example of the "small blinking light"?

Yes, using a small external power source to power a standard LED strip would be permitted, provided that no other rules are violated, such as R12e, R12g, or G10.

1903: Motors / 88 Watt Limit

28-Jan-2024
R12

For purposes of the 88-watt power limit, can a team have 9 11-watt motors on their robot and leave one of the 9 unplugged? Perhaps for match-play they have motors 1-8 plugged in, but for skills they have motors 1-7 and 9 plugged in?

<R12>

While the same effect could be achieved via "hot swapping", it may be more convenient to simply swap which motor is disconnected. In a strict reading of rule R12a:

> The combined power of all motors (11W & 5.5W) must not exceed 88W.

Having 9 physical 11-watt motors on the robot, but only 8 physically capable of being powered for a given match or skills run would seem to satisfy this condition.

Thanks in advance!

> **Answered by committee**
>
> No, this would not be permitted. To avoid confusion during inspection and/or during Matches, the 88W limit refers to all motors found on a Robot, even those which are not connected to a Robot Brain.

1540: Pneumatics limitations

12-Jun-2023
R12

<R12> Will there be any limitations to pneumatics? I am assuming it will be similar to VRC with a limit of 2 air tanks / control units.

> **Answered by committee**
>
> The rules pertaining to the use of the new VEX IQ Pneumatics Kit will be included in the June 27 update to the Full Volume Game Manual.

1539: New Pneumatics count as motors?

12-Jun-2023
R12

We were very surprised and excited to see pre-orders open up for the new IQ Pneumatics Kit. Thank you VEX Robotics for making that possible.

Since it's listed as VIQRC legal, we wondered: does it count in any way towards the 6 motor limit, per <R12>? Or will there be a separate limit established regarding pneumatics?

Clearly there must be an electric motor inside the pump - so one line of reasoning would count each pump as a single motor. That could make sense, but we wanted to know for certain. Any clarification here and in the next game manual release would be appreciated of course. Thank you.

Answered by committee

The rules pertaining to the use of the new VEX IQ Pneumatics Kit will be included in the June 27 update to the Full Volume Game Manual.

1379: Legality of RGB controllers for addressable LED light strips

11-Jan-2023
Robot Rules and Inspection R12 R14

<R12b> states

> “Small cameras are permitted as non-functional decorations, provided that any transmitting functions or wireless communications are disabled. Unusually large cameras being used as ballast are not permitted.”

<R12g> states

> “Decorations which provide visual feedback to Drive Team Members (e.g., decorative lighting) are permitted, provided that they do not violate any other rules and serve no other function (e.g., structural support).”

<R14> states

> “Robots have one microcontroller. Robots must ONLY use one (1) VEX V5 Robot Brain (276-4810). Any other microcontrollers or processing devices are not allowed, even as non-functional Decorations. This includes microcontrollers that are part of other VEX product lines, such as VEX Cortex, VEX EXP, VEXpro, VEX RCR, VEX IQ, VEX GO, or VEX Robotics by HEXBUG. This also includes devices that are unrelated to VEX, such as Raspberry Pi or Arduino devices.”

Cameras contain microcontrollers and per <R12b> are legal for use as a non-functional decoration without an exception stated for <R14>. <R12g> permits the use of LEDs and also does not contain an exception for <R14>, however addressable LED light strips can use microcontrollers, such as the one in the picture below.

Scenario A: a robot uses an LED light strip with an RGB controller but without a remote, no wireless communication is used for the LEDs.

Scenario B: a robot uses an LED light strip with an RGB controller and with a remote. Wireless communication is used from the remote to the RGB controller.

Scenario C: a robot uses an LED light strip with an RGB controller that connects to both the LED light strip and the V5 brain through one or more 3-Wire ports. The V5 brain sends a signal to the RGB controller, which is used to set the LEDs.

Scenario D: a robot uses an LED light strip without an RGB controller and is connected directly to the V5 brain through one or more 3-Wire ports. The V5 brain is used to set the LEDs.

In which scenarios would LEDs be considered non-functional decorations?

> **Answered by committee**
>
> > Cameras contain microcontrollers and per <R12b> are legal for use as a non-functional decoration without an exception stated for <R14>. <R12g> permits the use of LEDs and also does not contain an exception for <R14>, however addressable LED light strips can use microcontrollers, such as the one in the picture below.
>
> These are all correct statements.

In which scenarios would LEDs be considered non-functional decorations?

Scenarios A, B, and C would all be considered violations of R14, since they include a microcontroller.

Scenario D is legal.