

# Q&A

## VRC 2021-2022: Tipping Point

Tagged: R21

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](mailto:support@vex.com) or [sales@vex.com](mailto:sales@vex.com).
- For game questions, suggestions, or concerns outside of specific and official rules questions, contact [GDC@vex.com](mailto:GDC@vex.com).

## **Index**

[Are ESD Boards Considered Non-Functional Decoration When Unplugged?](#)

[spacers and washers for high-strength shafts](#)

[Use of commercially available spacers](#)

[Mecanum Wheels](#)

[R21c V5 Smart Cables + VEXU Custom Electronics](#)

[Wiring](#)

[Exception to R21. Sanding down motor casing.](#)

## 903: Are ESD Boards Considered Non-Functional Decoration When Unplugged?

30-Oct-2021

R13 R16 R21

Hello,

R13

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 Scoring Objects from falling out of the Robot, the decal must be backed by VEX material that would also prevent the Scoring Objects from falling out.

a. Anodizing and painting of parts is considered a legal nonfunctional decoration. b. 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. c. VEX electronics may not be used as non-functional decorations. d. 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 Inspector and Head Referee will make the final decision on whether a given decoration or mechanism violates this rule. e. 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). f. Decorations which provide feedback to the Robot (e.g. by influencing legal sensors) would be considered “functional”, and are not permitted. g. 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).

R16

Robots have one microcontroller. Robots must ONLY use one (1) VEX V5 Robot Brain (276-4810). a. 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 Cortex, VEXpro, VEX RCR, VEX IQ, VEX GO, or VEX Robotics by HEXB

R21

No modifications to electronic components are allowed. 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 platform may NOT be altered from their original state in ANY way.

a. External wires on VEX electrical components may be repaired by soldering, using twist / crimp connectors, electrical tape or shrink tubing such that the original functionality / length is not modified in any way. Wire used in repairs must be identical to VEX wire. Teams may make these repairs at their own risk; incorrect wiring may have undesired results. b. Teams must use the latest official VEXos firmware updates, found at [www.vexrobotics.com](http://www.vexrobotics.com). Custom firmware modifications are not permitted. c. Teams may make the following modifications to the V5 Smart Motor’s user-serviceable features. No other modifications are permitted. i. Changing or replacing the gear cartridge with other official replacement cartridges. ii. Replacing the V5 Smart Motor Cap (276-6780). iii. Replacing the threaded mounting inserts (276-6781).

BLRS Wiki - V5 ESD Protection Board <https://wiki.purduesigbots.com/vex-electronics/v5-esd-protection-board>

It is my understanding these boards are illegal for use during competition. But, as these boards don't violate <R16> or <R21> when unplugged on a robot, if the team follows <R13>, these would be considered non-functional decoration. Is this a correct interpretation?

Thank you for your time!

#### Answered by committee

It is my understanding these boards are illegal for use during competition. But, as these boards don't violate <R16> or <R21> when unplugged on a robot, if the team follows <R13>, these would be considered non-functional decoration. Is this a correct interpretation?

Yes, this is correct.

## 2296: spacers and washers for high-strength shafts

13-Nov-2024

R21

[<R21>](#)

<R21> was recently updated to add M2.5 x 8mm screws (as used in the low-profile high-strength shaft collars). However, it does not explicitly mention spacers or washers for the HS shafts, with an approximate inner diameter of 5/16".

Q&A 2091 approved the use of M5 spacers, though not mentioned in <R21>, provided they add no functionality. Does the same apply to spacers and washers for the HS shafts? (These could be fabricated from approved parts, so there doesn't appear to be any added functionality.)

Thank you.

#### Answered by committee

There are no legal, commercially-available replacements for washers and spacers that fit the VEX V5 high strength shafts.

## 2091: Use of commercially available spacers

7-Aug-2024

R21

[<R21>](#) According to R21, is it allowed to purchase M5 spacers with ID only slightly larger(0.072mm) than the official vex nylon spacers since there are no M4 equivalents with similar OD as the vex spacers in the metric system?

#### Answered by committee

Yes, this would be allowed by [<R21>](#), provided the spacer does not introduce additional functionality not found in standard VEX equipment. Final determination on the legality of a specific non-VEX part must be made by the Head Referee at your event.

## 1581: Mecanum Wheels

9-Jul-2023

R21

Will the older green mecanum wheels be legal for competition this year?

**Answered by committee**

As described in [R7](#), the official VEX website can be used as a definitive source for part legality. We believe you are referring to SKU 276-1447, which can be found on [this product page](#). There are no rules prohibiting these wheels; therefore, they are legal.

---

## 1440: R21c V5 Smart Cables + VEXU Custom Electronics

8-Feb-2023

VUR10 R21

In the 3.0 Game manual update, R21c was added which says the following:

V5 Smart Cables may only be used for connecting legal electronic devices to the V5 Robot Brain.

From our understanding, R21c was added to prevent teams from using V5 smart cable stock as "string" for endgame extension. We believe our use of V5 smart cable and cable stock is within the legal intention of VUR10 and R21c, but clarity would be appreciated.

Our robot makes use of V5 smart cable stock and V5 smart cables to connect some of our VUR10 custom electronics to the V5 brain. Is this legal?

Our robot also makes use of V5 smart cable stock and V5 smart cables to connect some of our custom electronics to each other (said electronics are themselves connected to the V5 brain in accordance to VUR10). Is this legal?

**Answered by committee**

Yes, both of those uses for V5 Smart Cable would be legal.

---

## 1405: Wiring

23-Jan-2023

R20 R21 VUR10

Does there need to be a single continuous wire between a brain and a motor? As a VEXU team would it be legal to have two wires connected to each other as long as the wires are not connected using non legal parts?

**Answered by committee**

This system is only intended for specific VRC Spin Up rules questions. Because your question only pertains to VEX U and has no effect on VRC robots or rules, you will need to resubmit it in the [Official VEXU 2022-2023: Spin Up Q&A](#) for us to consider it. Thank you.

---

## 1053: Exception to R21. Sanding down motor casing.

14-Feb-2022

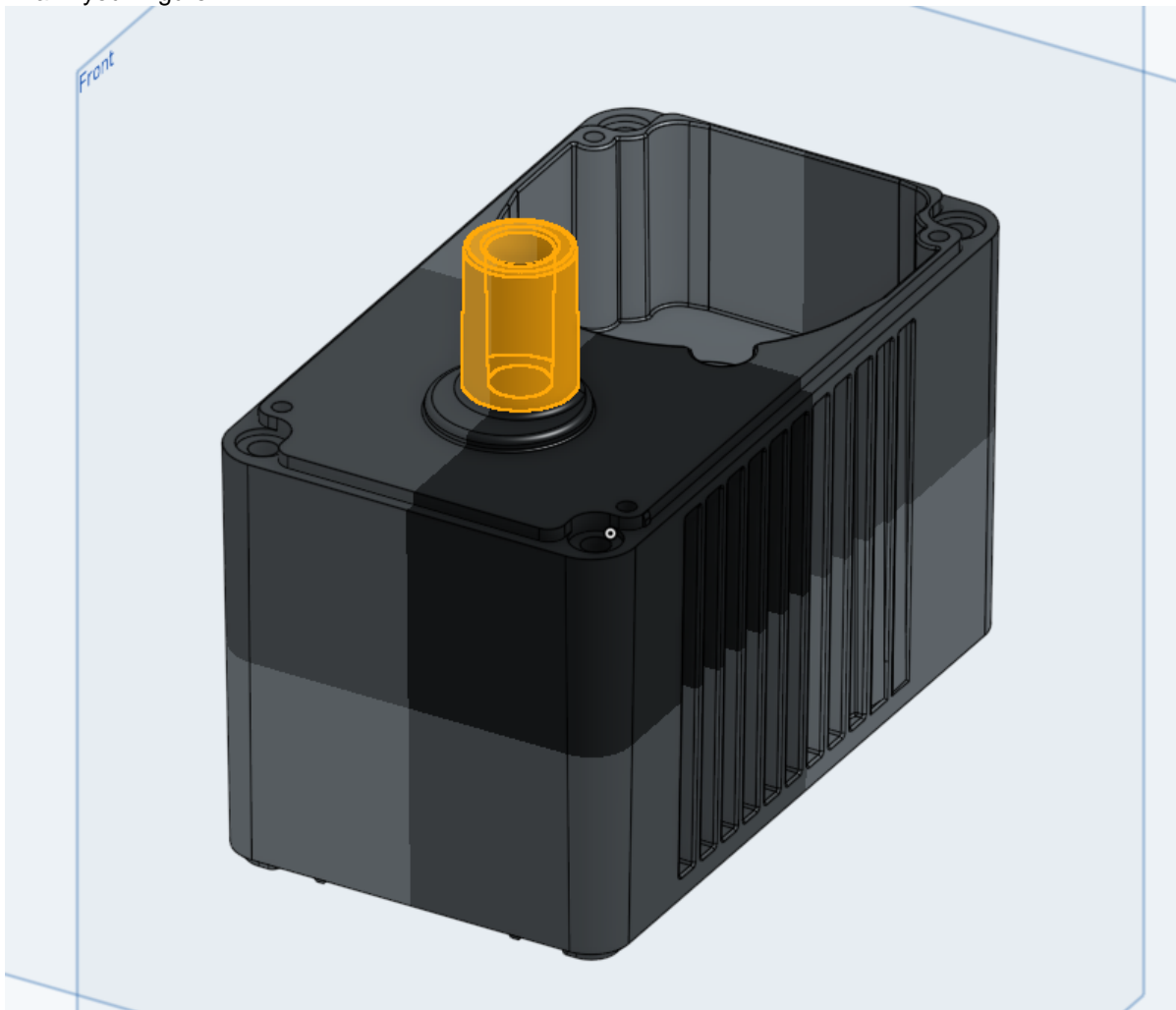
R21

I want to sand down a specific part on the casing by 9mm. It is a 8mm pipe that lies underneath the cartridge cutout. Figure 1 has the area I want to sand down highlighted. Last year we were allowed to modify cartridges and the motor cap, in [this post](#) and [this post](#). The piece that I want to modify is in that same region as the previous posts. The problem is that R21 states "No modifications to electronic components are allowed.", the latter posts were granted the exception from this ruling.

My argument is that the pipe is obviously not a electronic part, and my motor casing would be just as structurally secure without the pipe. It's also in the same region as the other exceptions, and that the modification wouldn't be able to give someone any advantage over any other person. The only benefit this brings me, is having the motor be a slimmer fit and the ability to decrease the length.

If I were to guess the purpose of the pipe, I would guess that it is to provide extra room for long screws.

Thank you. Figure 1.



#### Answered by committee

No, this would not be legal.

The piece that I want to modify is in that same region as the previous posts.

This is not entirely accurate. The linked Q&A's from the previous season refer specifically to user-serviceable components of the V5 Smart Motor (i.e. the motor cartridges and the Smart Motor Cap). If we are understanding it correctly, requested modification in this post would be to the primary motor casing, which is explicitly prohibited from modifications by R21.