Q&A

VEXU 2021-2022: Tipping Point

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 VEX U Spin Up rules clarifications, and the clarifications made here from the Game Design Committee (GDC) are considered as official and binding as the written Game Manual (including the VEX U Appendix C) itself.

Please review the Q&A Usage Guidelines before posting. This system is only intended for specific VEX U 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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972: <G16> Anchoring

9-Dec-2021
G16

<G16> "Strategies with mechanisms that react against multiple sides of a Field Element in an effort to latch or clamp onto said Field Element are prohibited" "The intent of this rule is to prevent Teams from both unintentionally damaging the field and / or from ***anchoring*** themselves to the field."

Q: When a robot/mechanism reacts against only 1 side of a Field Element can this ever be considered anchoring?

> **Answered by committee**
>
> It is impossible to give a blanket answer to this question that would address all hypothetical Robot designs and mechanisms.
>
> Please see this related Q&A for additional "thought experiments" that can be used to determine whether a Robot has "anchored" to the field or not:
>
> https://www.robotevents.com/VRC/2021-2022/QA/845
>
> And this Q&A, which expands on why is difficult to objectively answer questions involving edge-case G16 calls:
>
> https://www.robotevents.com/VRC/2021-2022/QA/919
>
> If you would like a blanket clarification regarding a specific mechanism, please feel free to rephrase and re-post with a diagram or photo.

857: Using VexAI Robots in the VexU Competition

1-Sep-2021
R1

Can a collegiate VexAI team also register as a VexU team to compete in both competitions? This would seem to violate <R1> section d, since it states that a robot may not compete under multiple team numbers. But the spirit of the rule seems to be to prevent multiple teams/organizations from sharing a robot, not to prevent one team from competing in both VexU and VexAI.

> **Answered by committee**
>
> Yes, the same group of Students may register as both a VEX U Team and a collegiate VAIC Team. Yes, they may use the same Robot for each competition (provided that no other Robot rules are violated in either one).
>
> R1 is intended to apply to Teams within the same REC Foundation competition platform / grade level. In a tournament, a VEX U Team and a VAIC Team would never share the same field, Skills ranking, Alliance selection, etc. (of course, the Robot cannot be used in multiple programs by separate groups of Students, since that Robot would not represent the skill level of both Team(s), i.e. would be in violation of rule G6)

1053: Exception to R21. Sanding down motor casing.

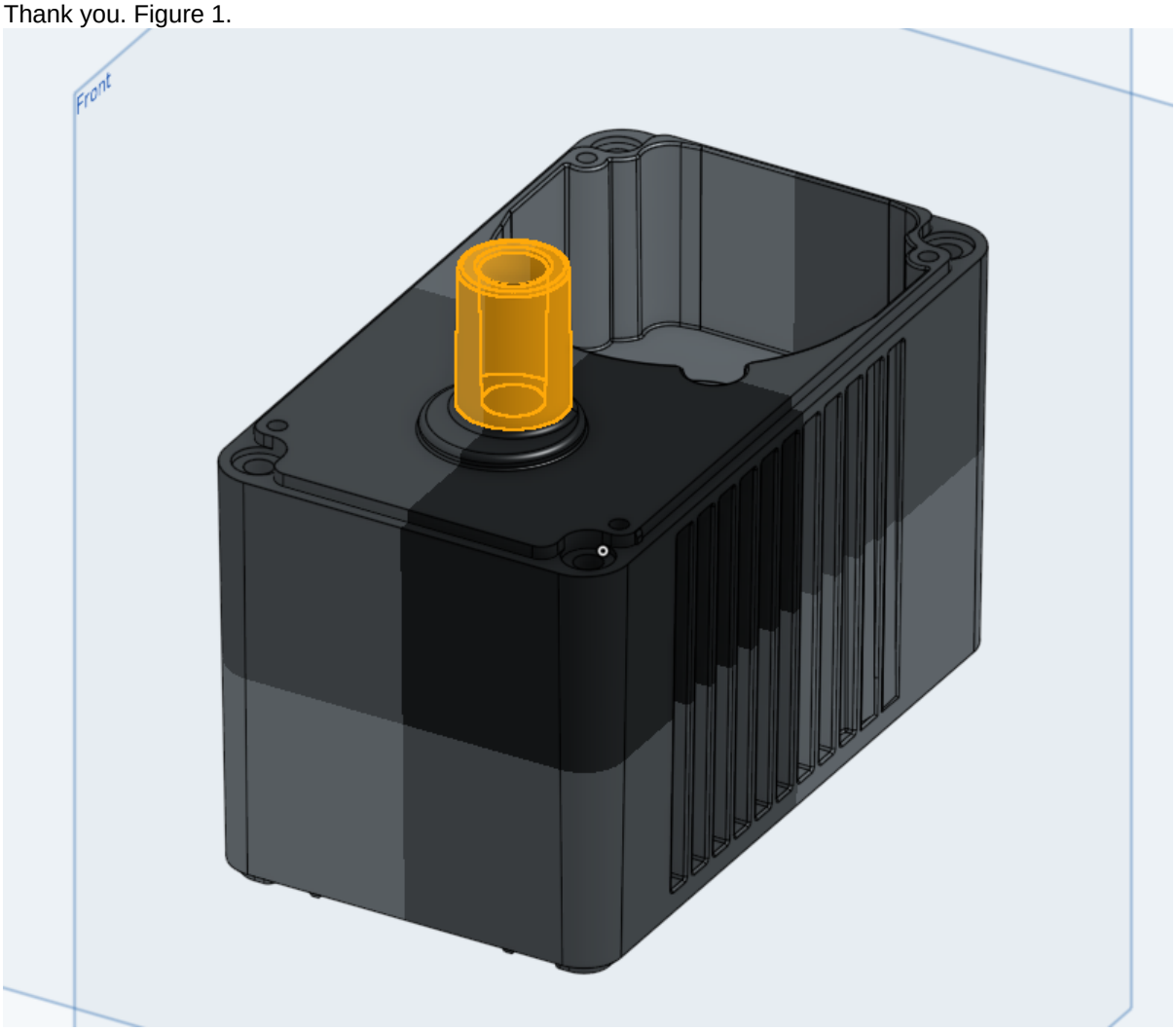
14-Feb-2022
R21

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.

1014: <VUR2> Mining parts

24-Jan-2022
VUR2

<VUR2> allows teams to use official VEX Robotics products.

```
Is it permitted to render items from an official VEX part?

Example is extracting ball bearings from a VEX Pro radial bearing.
-Used in a team designed/manufactured part such as a 3d printed metric radial bearing
-Used in an aluminum draw slide extrusion permitted under &lt;VUR4&gt;


Hoping for an answer sooner than 3-4 weeks....
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> **Answered by committee**
>
> We are not going to provide a blanket answer that will encompass all possible forms of "mined" parts and materials.
>
> The specific examples in this post would be permitted. As Fabricated Parts, per VUR4, we would advise having strong documentation supporting these designs, per VUR5.

1062: <VUR4> Polycord, rubber strip raw materials

16-Feb-2022
VUR4

> <VUR4> Fabricated Parts must be made from raw materials. For the purpose of this rule, a “raw material” is any material that would not be considered a “pre-fabricated” part, i.e. has not undergone any of the fabrication techniques listed in <VUR3>. a. Standard raw material finishing processes, such as extrusion, heat treating, or anodizing, are not considered pre-fabrication

Would polycord and rubber strip fall under the definition of raw materials and thus legal to use in VEX U? In previous year's VUR3

> b. An unlimited amount of silicone, polyurethane, or other rubber.

polyurethane and rubber were both listed as raw materials. Since this year's VUR4 is an expansion on previous year's VUR3, we believe they should be legal.

> **Answered by committee**
>
> Yes, polyurethane and rubber are considered "raw materials" and may be used to make Fabricated Parts.

1063: <VUR4>T-Slot Aluminum

16-Feb-2022
VUR4

> <VUR4> Fabricated Parts must be made from raw materials. For the purpose of this rule, a “raw material” is any material that would not be considered a “pre-fabricated” part, i.e. has not undergone any of the fabrication techniques listed in <VUR3>. a. Standard raw material finishing processes, such as **extrusion**, heat treating, or anodizing, are not considered pre-fabrication

https://www.robotevents.com/VEXU/2020-2021/QA/613 In previous year's Q&A, slotted aluminum would not fall under raw material

> Milling slots into a piece of aluminum bar stock would be legal, but **buying pre-slotted aluminum** would not. The goal of VUR3 is to encourage Teams to explore fabrication techniques of their own. Similarly, pre-drilled or **extruded metal**, such as angle aluminum, is not permitted

Since this year's rule specifically allows extruded material as raw materials, does this mean slotted aluminum, angle aluminum etc would be legal?

Answered by committee

Yes. As you have noted, in previous years, "extruded metal" was explicitly referred to as not permitted. In the current Game Manual, "extruded metal" is explicitly referred to as permitted.

If you have a specific product that you would like a ruling on, please feel free to submit a link to a product website. In general, if something is referred to by a manufacturer as "aluminum extrusion", then it is most likely legal.

1015: <VUR5> Proof of fabrication by team member

24-Jan-2022
VUR5

"<VUR5> a. The minimum acceptable form of documentation is an engineering drawing with multiple views for the part in question. These drawings may be included in a Team’s Engineering Notebook, or in a standalone appendix to the Engineering Notebook."

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&lt;VUR5&gt; b. dictates that parts must have been physically fabricated by team members and not

 Related question: Some machinery at universities may not be directly operable by team members, e

 Hoping for an answer sooner than 3-4 weeks....
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Answered by committee

> An example is a 5-axis CNC machine requiring a qualified operator but the team member can stand next to the actual operator and watch the process - is this physical fabrication by a team member?

No, this would be outside the intent of this rule.

971: <VUR7> Interpretation - Radial bearings and toothed belts

9-Dec-2021
VUR7

We have 2 examples of <VUR7> "fastener" to confirm official interpretation.

a.) Radial bearing "fastening" a shaft to chassis. b.) Toothed belt "fastening" two pulleys together.

<VUR2> gives teams access to a limited range of radial bearings and toothed belts however these are more FRC sized than VEX U.

Answered by committee

VUR7 reads as follows:

> <VUR7> Teams may use any commercially available fastener on their Robot. Examples of fasteners may include (but are not limited to) **screws, nuts, washers, rivets, hinges, pins, rod ends, threaded rods, or hose clamps**.

No, radial bearings and toothed belts are not considered fasteners. The only permissible bearings and belts are those made legal by VUR2, i.e. sold by VEX.

1013: <VUR7> Interpretation - Bushings, standoffs and spacers

24-Jan-2022
VUR7

We have 3 examples of <VUR7> "fastener" to confirm official interpretation. Hopefully sooner than 3-4 weeks....

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a.) Commercially available spacers not manufactured by VEX or identical equivalents.
b.) Commercially available standoffs not manufactured by VEX or identical equivalents.
c.) Commercially available bushings not manufactured by VEX or identical equivalents.
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Answered by committee

Yes, these would all be legal.

1023: Can two robots start on opposite side for skills

28-Jan-2022
VURS1

https://www.robotevents.com/VRC/2019-2020/QA/409 In previous seasons robots are allowed to start on opposite side and drive team members may stand on either side, independent of robot placement. In this year's game manual, we noticed that RSC1 added wording that team members need to stand in the corresponding alliance station.

> <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.

I will copy and paste the relevant part from previous QA

May we ask - Given the above rules, is it allowed for the two robots used in a VEXU skills run to start the match on different sides of the field? If yes, must the drive team members associated with a particular robot be on the same side of the field as that robot? For example, would it be OK for a VEXU team to compete in a skills match with the following combination of robot starting locations and drive team locations:

- One robot starting on each side of the field
- Four drive team members in the red alliance station
- Two drive team members in the blue alliance station

Additionally, if we are allowed to start on both side, how would this affect <RSC1> b.

> 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.

Would one side need to utilize only up to 9 match loads(half of 18), or can all 18 be introduced from one side?

> **Answered by committee**
>
> No, this would not be permitted. Both Robots must start on the same side of the field, and all Drive Team Members must stand in the corresponding Alliance Station.

860: ESD Protection for motor ports

8-Sep-2021

This question pertains to the usage of a simple ESD (Electrostatic Discharge) board that was designed by the VEXU team BLRS to save V5 ports from ESD. The device is as simple as a couple of diodes connected to the communication lines to prevent ESD and in no way alters the performance of any of the devices it is connected to.

https://www.vexforum.com/t/v5-esd-protection-board-revision-2-save-your-v5-ports/91200

By the rules that have already been placed in the manual, this board or anything like it can be used on any non-motor ports to protect from ESD through the definition of additional electronics and <VUR10a>. However, as of right now, any port being used for a motor is at risk from static due to <VUR10b>. With many VEXU teams using almost every port available on the V5 brain, the risk of a port being blown is very high causing a full replacement of a V5 brain being necessary if such a thing happens. With the current out of stock brain, a replacement is very unlikely to be quick which would ruin many teams is a brain is no longer able to be used i=on a robot due to too many ports being dead.

The VEXU community was wondering if it would be possible to allow this simple board or anything like it be made legal for competition use?

Additional Electronics - Any sensor, processor, or other electronic component used in Robot construction, and connected to the V5 Robot Brain, that is not sold by VEX Robotics. Examples could include both commercially available devices (e.g. Raspberry Pi) or custom devices designed and fabricated by the Team. See for more details. <VUR10> There is no restriction on sensors and other additional electronics that Robots may use for sensing and processing, except as follows: a. Sensors and electronics MUST be connected to the V5 Robot Brain via any of the externally accessible ports (i.e. without any modification to the microcontroller). A sensor may be connected to a processing unit which then connects to the V5 Robot Brain. b. Sensors and electronics CANNOT directly electrically interface with VEX motors or solenoids. c. The additional sensors and electronics may only receive power from any of the following: i. Directly from the V5 Robot Brain via any externally accessible port. ii. From an additional lithium ion, lithium iron or nickel metal hydride battery pack (only one (1) additional battery can be used for sensor/processing power). Battery packs must operate at a maximum of 12 volts nominal. d. Only the V5 Battery can power the V5 Brain. e. Additional Electronics which include a low-powered motor as an integral part of their primary sensing / processing function, such as an external processor’s cooling fan or a spinning sensor, are permissible. i. Standalone motors which serve no additional sensing or processing functionality (e.g. using a commercially-available brushless motor in a drivetrain) are not considered legal Additional Electronics, and would be considered a violation of <VUR9>.

Thank you for your consideration.

> **Answered by committee**
>
> This device violates the following point of VUR10, and is therefore not legal for use in official competitions.
>
> b. Sensors and electronics CANNOT directly electrically interface with VEX motors or solenoids

979: VUR12 and Pneumatic tubing

19-Dec-2021

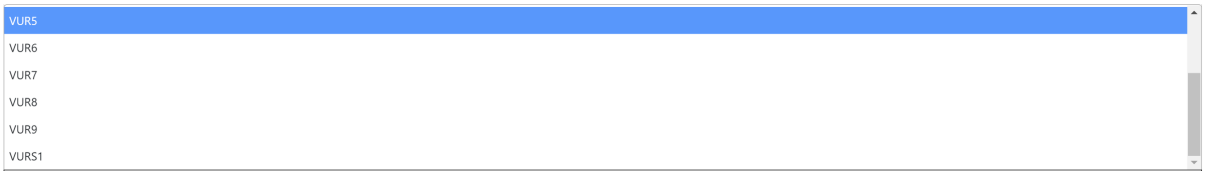
VUR12> Teams may utilize an unlimited amount of the following commercially available pneumatic components: Cylinders, actuators, valves, gauges, storage tanks, regulators, manifolds, and solenoids.

WIthout the mention of pneumaitc tubing this makes us limited to the normal pneumatic tubing rules and makes pneumatic components that use larger diameter tubing illegal. So my question is

-A. Is VexU limited to only 4mm pneumatic tubing?

-B.If the above answer is yes and VexU is limited to 4mm tubing, is VexU also limited to only black Tubing outlined in the linked Q&A https://www.robotevents.com/VRC/2021-2022/QA/883

Part 2 The tag section only allows up to VUR9 so I can't tag it correctly with the proper VUR12 tag.



> **Answered by committee**
>
> -A. Is VexU limited to only 4mm pneumatic tubing?
>
> No, VEX U Teams may use any commercially available pneumatic tubing, provided that no other rules are violated (namely, S1, VUR12-a, and VUR12-c). We will make sure to include this clarification in a future Game Manual update.

991: Clarification on Elevation and Transitive Contact

3-Jan-2022

Elevated - A *Robot* and / or *Mobile Goal* state. A *Robot* or *Mobile Goal* is considered *Elevated* if all of the following criteria are met at the end of a *Match*:

1. The *Robot* or *Mobile Goal* is contacting their *Alliance Platform*.
2. The *Platform* meets the definition of *Balanced*.
3. The *Robot* or *Mobile Goal* is not contacting any other *Field Element*, such as the foam field tiles or the field perimeter.
   a. For the purposes of this definition, contact is considered "transitive" through other *Robots* and *Scoring Objects*. For example, as shown in Figure 10, contact with a *Mobile Goal* that is contacting a field tile would not satisfy the definition of *Elevated*.

Within the definition of being **Elevated** (provided above for reference), for **a.** where contact is considered "transitive" through other Robots and Scoring Objects, does this apply to only number **3**, or does it apply to all rulings within the definition of **Elevated** such as number **1**?

In other words, if a Robot were to hypothetically meet the conditions of **2** and **3** (the Alliance Platform is balanced and the Robot is not contacting any other field element directly or "transitively"), and was "transitively" contacting their Alliance's platform through a Robot or Scoring Object, would this hypothetical Robot be considered **Elevated**, or must it be in direct contact with the Platform to be considered **Elevated**?

> **Answered by committee**

> Within the definition of being **Elevated** (provided above for reference), for **a.** where contact is considered “transitive” through other Robots and Scoring Objects, does this apply to only number **3**, or does it apply to all rulings within the definition of **Elevated** such as number **1**?

The latter. "For the purposes of this definition" could also be read as, "For the purposes of the definition of Elevated". It primarily / usually would refer to point "3", but could also hypothetically refer to point "1" as well.

> In other words, if a Robot were to hypothetically meet the conditions of **2** and **3** (the Alliance Platform is balanced and the Robot is not contacting any other field element directly or “transitively”), and was “transitively” contacting their Alliance’s platform through a Robot or Scoring Object, would this hypothetical Robot be considered **Elevated**, or must it be in direct contact with the Platform to be considered **Elevated**?

Yes, this hypothetical Robot would be considered Elevated.