

Q&A

VEXU 2022-2023: Spin Up

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 Spin Up 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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15" Robot Expansion

VUR1

SG4 states:

Horizontal expansion is limited until the Endgame. Robots may not expand beyond a horizontal area of 18" x 18" at any point during the Match prior to the Endgame.

SG5 states:

Vertical expansion is limited. Robots may expand vertically within the following conditions:

- a. The Robot must not be contacting the gray field tiles in either Low Goal.
- b. No part of the Robot may exceed an overall height of 24". This height limit is a "virtual ceiling," meaning that no part of any Robot may ever exceed 24" above the foam tiles, regardless of Robot orientation.
- c. Any extensions or combinations of extensions above 18" must fit within a vertical cylinder 2" in diameter.

VUR1c states:

One Robot must be smaller than 15" x 15" x 15" at the start of the Match.

Given these rules, is it legal for the 15" robot to expand horizontally to a maximum of an area of 18" x 18" according to SG4, as well as vertically according to the limitations in SG5?

Answered by committee

Given these rules, is it legal for the 15" robot to expand horizontally to a maximum of an area of 18" x 18" according to SG4, as well as vertically according to the limitations in SG5?

Yes, this is legal.

Powering Commercial Solenoids

VUR10

Last season Q&A 990 (www.robotevents.com/VEXU/2021-2022/QA/990) was asked but never answered regarding the legality of driving non-vex solenoids. This question is similar to that question.

VUR10b states:

Sensors and electronics CANNOT directly electrically interface with VEX motors or solenoids.

There are 2 ways that VUR10b can be interpreted. Either, it applies to "VEX (motors or solenoids)" or it applies to "(VEX motors) or (solenoids)" The former interpretation would allow custom electronics to interface directly with non-vex solenoids. This would be useful, as most commercially available solenoids do not function of of the 5v provided by the V5 brain, and instead require 12v power which can be provided by custom electronics. If this is not legal, then it is not possible to use most commercial solenoids.

Historically, the GDC has ruled this to be legal, as it did in Q&A 93:

www.robotevents.com/VRC/2018-2019/QA/93

Is it still legal to power commercial solenoids using custom electronics?

Answered by committee

Is it still legal to power commercial solenoids using custom electronics?

Yes, this is legal, provided that no other rules are violated (i.e. all portions of VUR10 and VUR12).

Follow up to Powering Commercial Pneumatics

VUR10 VUR12

Hello, upon reading the reply to this Q&A question www.robotevents.com/VEXU/2022-2023/QA/1111 the legality of powering non vex solenoids is ruled legal as long as they are meeting VUR10 and VUR12 however reading the wording and the answer

There are 2 ways that VUR10b can be interpreted. Either, it applies to "VEX (motors or solenoids)" or it applies to "(VEX motors) or (solenoids)" The former interpretation would allow custom electronics to interface directly with non-vex solenoids. This would be useful, as most commercially available solenoids do not function of of the 5v provided by the V5 brain, and instead require 12v power which can be provided by custom electronics. If this is not legal, then it is not possible to use most commercial solenoids.

Is it still legal to power commercial solenoids using custom electronics?

Yes, this is legal, provided that no other rules are violated (i.e. all portions of VUR10 and VUR12).

The portion in question means that VUR10B only applies to vex solenoids and not commercially available solenoids as extra componentry to power the solenoid externally not from the brain.

b. Sensors and electronics CANNOT directly electrically interface with VEX motors or solenoids.

My questions are as follows:

1: Could we get a firm clarification on if VUR10B is refererring only to specifically vex solenoids or whether it is referring to solenoids in general as this is still ambiguous?

2: If solenoids in general are included in VUR10B does this mean the external electronics to allow to power solenoids at higher voltages than 5 volts are an exception to VUR10B

3: Based on the interpretation of the previous Q&A and from Q1 would it then be legal to interface commercially available solenoids through a processor used for sensor processing rather than directly through the V5 brain as this is powering the solenoid?

4: Additionally would having a non-programmatic solenoid activation be allowed e.g a circuit powered through the press of a bumper or other sensor foregoing the processor entirely hardwiring the circuit independent of the V5 brain other than providing power to the solenoid (disabling the solenoid on power disable)

Answered by committee

Thank you for the detailed question and quoted references. This question requires additional consideration time in order to provide a thorough and accurate response, and will not be resolved in the June 28 Game Manual update. We will provide a second unscheduled Game Manual update to the VEX U Appendix, and update this response, once a clarification has been reached.

Carbon Fiber

VUR3 VUR4

VUR3 states:

Fabricated Parts may be made using the following processes:

- a. Adding material, such as 3D printing.
- b. Removing material, such as cutting, drilling, or machining.
- c. Bending material, such as sheet metal breaking or thermoforming.
- d. Casting or molding material, such as injection molding or sand casting.
- e. Attaching materials to one another, such as welding or chemically bonding (e.g., epoxy).

VUR4 states:

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.
- b. Fabricated Parts may not be made from raw materials which pose a safety or damage risk to the event, other Teams, Field Elements, or Discs. Examples of prohibited materials include, but are not limited to:
 - i. Any material intended to produce flames or pyrotechnic effects.
 - ii. Any material that is liquid at the time of the Match (e.g., hydraulic fluids, oils, liquid mercury, tire sealant, etc.).
 1. Fabrication processes that include the use of liquids, such as milling coolant or resin which has been cast into a solid part, are not considered a Violation of this rule.

Is carbon fiber stock a legal raw material under VUR4? Here are a couple examples of commonly available carbon fiber stock:

www.mcmaster.com/5287T78/

www.mcmaster.com/8194K111/

Given that the team performs one or more of the manufacturing processes in VUR3 in order to turn the raw carbon fiber into a Fabricated Part, would it be legal for use?

Answered by committee

VUR4 does not include a specific list of permitted or prohibited materials, other than point "b" (i.e. the materials do not pose any safety or damage risks to the event).

So, in general, the use of carbon fiber is not prohibited as a blanket rule, but we would *strongly* advise researching any applicable safety precautions and protocols involved, and including these as part of a Team's VUR5 documentation (as should be done when working with any exotic materials).

Ultimately, the decision whether a given material poses a safety risk is at the discretion of the Head Referee and the Event Partner, taking into account the context of the material's usage and application. For example, we would not recommend using carbon fiber for a Fabricated Part that has a high likelihood of snapping during a match, or require additional drilling / cutting in the pit areas (i.e. around other Teams who may not be familiar with proper safety precautions involved).

Follow-up to VUR-4 questions from last season regarding the legality of T-slotted aluminum extrusion.

VUR4

At the end of last season, the GDC answer asked for a specific example of "extruded aluminum," such as this one: 8020.net/1010.html

T-slotted aluminum is available for many suppliers (80/20 is probably the most well known), and comes in a variety of sizes. Will these be legal in accordance with VUR4 section a, "Standard raw material finishing processes, such as extrusion. heat treating..."?



Answered by committee

Yes, this is legal.

Requirements for proof of fabrication by team member

VUR5

A similar question was asked last year in Q&A 1015, but the portion relating to documentation was never answered: www.robotevents.com/VEXU/2021-2022/QA/1015

VUR5 states:

Any Fabricated Parts must be accompanied by documentation that demonstrates the Team's design and construction process for that Fabricated Part.

b. Any Fabricated Parts must have been physically fabricated by Team members. For example, parts ordered by the Team and 3D printed by a third party would be prohibited.

What is the minimum documentation a team can be required to show in order to prove that a part was indeed physically manufactured by a member of the team?

Answered by committee

The full text of VUR5 reads as follows, with some portions bolded for emphasis:

<VUR5> Any Fabricated Parts must be accompanied by documentation that demonstrates the Team's design and construction process for that Fabricated Part.

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.

b. Any Fabricated Parts must have been physically fabricated by Team members. **For example, parts ordered by the Team and 3D printed by a third party would be prohibited.**

c. Teams will be required to provide this documentation to inspectors, Head Referees, or judges at any time. **Failure to provide acceptable documentation will result in the part being deemed illegal for use;** therefore, <R3>, <R26>, and / or <G1> will apply.

When no VEX-specific definition for a word is provided, the dictionary definition can usually be applied. The dictionary definition for "[documentation](#)" is "*material that provides official information or evidence or that serves as a record*".

We are not going to explicitly specify a minimum form of evidence that must be provided for point "b", as it will be at the inspector's discretion to investigate depending on the part and situation in question. In most cases, the engineering drawing specified by point "a" will be sufficient. If there is further question about the physical fabrication process, examples of possible evidence could include, but are not limited to, pictures or videos of team members fabricating the part.

Modification of Motor Cartridges

In Change Up Q&A 612 it was ruled that VEXU teams may modify V5 smart motor gear cartridges through any legal means: www.robotevents.com/VEXU/2020-2021/QA/612

Is this still the case?

Thank you.

Answered by committee

Yes.