

# Q&A

## VEXU 2021-2022: Tipping Point

Tagged: VUR5

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.

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  - 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).

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## 758: <VUR5> <VUR6> Usage of Jetson fan from VAIC in VEX U

5-Mar-2021

VUR5 VUR6

<https://events.vex.com/VAIC-HS/2020-2021/QA/675>

The Jetson cooling fan included in the VAIC kit is an explicitly permissible exception to this rule for **VAIC** Robots. Teams may not modify or replace this fan (or any electronics in the VAIC kit unless otherwise specifically noted).

VUR5 and AIR 5 both states:

<AIR5> There is no restriction on the number of V5 Smart Motors that Robots may use. No other motors, servos, or actuators are permitted, **including those sold by VEX** (e.g. the 2-Wire 393 Motor).

<VUR5> There is no restriction on the number of V5 Smart Motors that Robots may use. No other motors, servos, or actuators are permitted, including those sold by VEX (e.g. the 2-Wire 393 Motor).

Is the same fan illegal to use in VEX U? If it is, does this mean that any teams competing in both VAIC and VEX U would need to remove the fan prior to VEX U competition?

### Answered by committee

The exception listed in the linked Q&A would also be permissible for use in VEX U. Teams competing in both VAIC and VEX U do not need to remove the fan in question prior to competition.

## 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://events.vex.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.

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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, consider 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.

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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>.

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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.

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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.

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## 184: <VUR5> <VUR6> Legality of CPU Cooling Fans

15-Dec-2018

VEX U VUR5 VUR6

<VUR5>"There is no restriction on the number of V5 Smart Motors that Robots may use. No other motors, servos, or actuators are permitted, including those sold by VEX." <VUR6>"There is no restriction on sensors and other additional electronics that are used 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. b. Sensors and electronics CANNOT directly electrically interface with the 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 VEX 7.2V Robot Battery or from a VEX 9.6V Transmitter Battery."

With these rules in mind, would a CPU cooling fan be legal in VEX U? The fan motor, which is not used for any physical robot mechanism actuation, would be attached to and powered off of a single board computer. The computer would be connected to and receive power from the V5 Robot Brain via an externally accessible port.

Answered by committee

No, this would not be legal.

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## 1755: SLA 3D Printing for parts illegal or legal?

7-Nov-2023

VUR5

<VUR5> VUR5 States that Resin 3D printing is prohibited because it can be used in the context of casting.

Would SLA 3D Printing be allowed as the part is made in an additive way rather than by casting?

Answered by committee

No, as SLA is still a form of resin 3D printing.

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## 1112: Requirements for proof of fabrication by team member

1-Jun-2022

VUR5

A similar question was asked last year in Q&A 1015, but the portion relating to documentation was never answered:

<https://events.vex.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.

## 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."

<VUR5> 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....

### 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.