Q&A

VEXU 2022-2023: Spin Up

Tagged: VUR7

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.

Index

<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.

Q&A 1341 Follow up

13-Jan-2023
VUR4 VUR6 VUR7 VUR10 R7

Previously, in Q&A 1341 the GDC has ruled:

> Per rule <R7e>, all rope/string (or string-like material) on a Spin Up Robot must measure at least 3mm in diameter at its narrowest point, regardless of how it is used on the Robot. This is an intentional change from the rules regarding string in previous competition seasons, and applies to both VRC & VEX U Robots.

R7e:

> An unlimited amount of non-elastic rope / string, with a thickness / diameter between 1/8” (imperial standard) / 3mm (metric standard) and 1/4” (6.35mm). String must measure at least 1/8” / 3mm in diameter at its narrowest point while on the Robot under no load.

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). Standard raw material finishing processes, such as extrusion, heat treating, or anodizing, are not considered pre-fabrication.

VUR6:

> Teams may use commercially-available springs on their Robots. For the purposes of this rule, a “spring” is any device used for storing and releasing elastic potential energy. Examples include, but are not limited to: a. Compression, tension, torsion, constant force, or conical springs made from spring steel. b. Springs made from elastic thread or rubber, such as surgical tubing, bungee cords, or stretchable braided rope. c. Closed-loop (pneumatic) gas shocks

VUR7:

> Teams may use any commercially available fastener on their Robot. Examples include (but are not limited to) screws, nuts, washers, rivets, hinges, pins, rod ends, threaded rods, hose clamps, bushings, spacers, or standoffs. To be considered a legal “fastener” in the context of this rule, the primary function of the part must be to join or fasten together two otherwise legal parts.

VUR10:

> There is no restriction on sensors and other Additional Electronics that Robots may use for sensing and processing, except as follows:

1. Does the maximum sizing restriction of 1/4" also apply for string-like materials in VEXU?
2. Does R7e take precedence over VUR4? If so, does this mean that any Fabricated Part which could be considered "string-like" must abide by the sizing restrictions in R7e?
3. Does R7e take precedence over VUR6? If so, does this mean that any spring which could be considered "string-like", such as elastic thread, rubber, surgical tubing, bungee cords, or stretchable braided rope, must abide by the sizing restrictions in R7e? If so, should measurements be taken when the spring is stretched or unstretched?
4. Does R7e take precedence over VUR7? If so, does this mean that any Fastener which could be considered "string-like" must abide by the sizing restrictions in R7e?
5. Does R7e take precedence over VUR10? If so, does this mean that any Additional Electronics which could be considered "string-like", such as thin and flexible wires, must abide by the sizing restrictions in R7e?
6. If the answer to #5 is Yes, would thicker (but still thinner than 1/8") wires, solid or stranded, be restricted in size under R7e? Previously in Tipping Point Q&A 1027 the GDC has said that single strand wire of 1/8" in size should be considered rope/string.

Overall, I believe the GDC's intention in answering Q&A 1341 in the manner they did was to prevent teams from using small diameter rope and string-like material as part of end game mechanisms. I agree with this intention. However, the ruling itself goes far beyond this and potentially restricts VEXU teams' exercise of many VEXU rules. To prevent this, I ask that the GDC modify its ruling for Q&A 1341 to only restrict other VEXU rules when legal materials under those rules are then used as part of an end game mechanism.

> **Answered by committee**
>
> 1. Does the maximum sizing restriction of 1/4" also apply for string-like materials in VEXU?
>
> Yes.
>
> 2. Does R7e take precedence over VUR4? If so, does this mean that any Fabricated Part which could be considered "string-like" must abide by the sizing restrictions in R7e?
>
> R7e takes precedence. All string-like materials must comply with R7e.
>
> 3. Does R7e take precedence over VUR6? If so, does this mean that any spring which could be considered "string-like", such as elastic thread, rubber, surgical tubing, bungee cords, or stretchable braided rope, must abide by the sizing restrictions in R7e? If so, should measurements be taken when the spring is stretched or unstretched?
>
> R7e takes precedence. It would be measured unstretched.
>
> 4. Does R7e take precedence over VUR7? If so, does this mean that any Fastener which could be considered "string-like" must abide by the sizing restrictions in R7e?
>
> R7e takes precedence. All string-like materials must comply with R7e.
>
> 5. Does R7e take precedence over VUR10? If so, does this mean that any Additional Electronics which could be considered "string-like", such as thin and flexible wires, must abide by the sizing restrictions in R7e?

> Wiring to additional electronics does not fall under R7e.
>
> 6. If the answer to #5 is Yes, would thicker (but still thinner than 1/8") wires, solid or stranded, be restricted in size under R7e? Previously in Tipping Point Q&A 1027 the GDC has said that single strand wire of 1/8" in size should be considered rope/string.
>
> Q&As from prior seasons do not apply to this season. Wire that is used for any purpose other than wiring to the additional electronics specified in VUR10 should be considered string, and must comply with R7e.

String in VEXU

11-Dec-2022
VUR4 VUR7 R7

R7e:

> An unlimited amount of non-elastic rope / string, with a thickness / diameter between 1/8” (imperial standard) / 3mm (metric standard) and 1/4” (6.35mm). String must measure at least 1/8” / 3mm in diameter at its narrowest point while on the Robot under no load.

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). Standard raw material finishing processes, such as extrusion, heat treating, or anodizing, are not considered pre-fabrication.

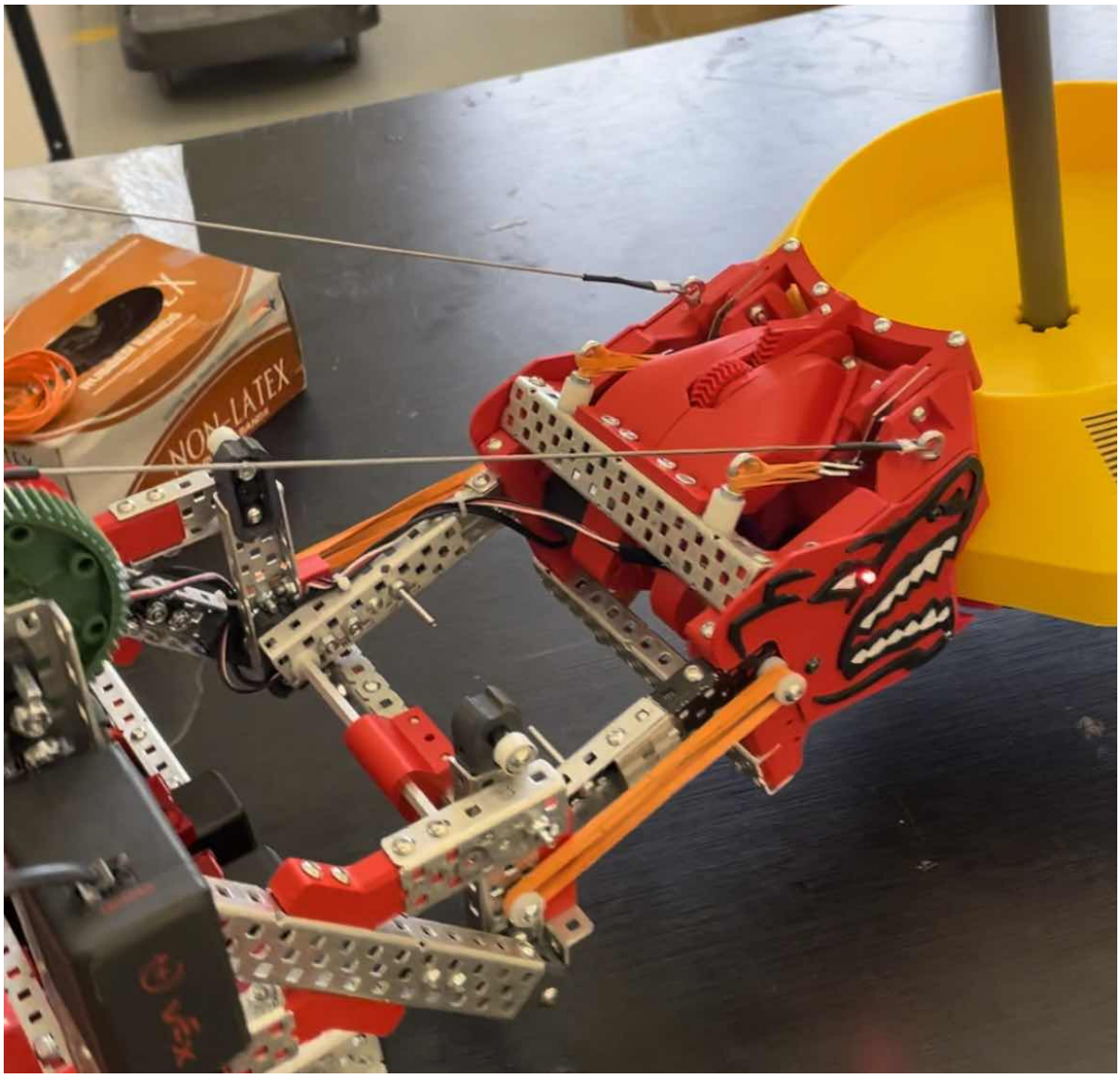
VUR7:

> Teams may use any commercially available fastener on their Robot. Examples include (but are not limited to) screws, nuts, washers, rivets, hinges, pins, rod ends, threaded rods, hose clamps, bushings, spacers, or standoffs. To be considered a legal “fastener” in the context of this rule, the primary function of the part must be to join or fasten together two otherwise legal parts.

Recently, the game manual was updated to require all string be at least 3 millimeters in diameter. This raises a couple questions in regard to VEXU:

1. Does string, regardless of diameter or material, qualify as a fastener by VUR7 if being used to connect two objects together?

For an example, steel cable with a diameter less than 3 millimeters was used in this fashion on one of our VEXU Tipping Point robots, as shown in the attached image.



Regardless of the answer to the above question, there are other extruded raw materials that would be legal under VUR4. For example: fishing line, TPU 3D printing filament, or metal wire, can all act like string and fulfill the same purpose. These materials are often less than 3 millimeters in diameter. Additionally, if the unstated intent of rule R7e is to make endgame mechanisms easier to score, then string size restrictions could vary based on its application on the robot. Therefore, the follow-up question is:

2. Can string or string-like materials with a diameter smaller than 3 millimeters be used for endgame mechanisms on VEXU robots?

> **Answered by committee**
>
> Thank you for your questions. Per rule <R7e>, all rope/string (or string-like material) on a Spin Up Robot must measure at least 3mm in diameter at its narrowest point, regardless of how it is used on the Robot.
>
> This is an intentional change from the rules regarding string in previous competition seasons, and applies to both VRC & VEX U Robots.

VUR7 Belts

14-Oct-2022
VUR7

VUR7:

> Teams may use any commercially available fastener on their Robot. Examples include (but are not limited to) screws, nuts, washers, rivets, hinges, pins, rod ends, threaded rods, hose clamps, bushings, spacers, or standoffs. To be considered a legal “fastener” in the context of this rule, the primary function of the part must be to join or fasten together two otherwise legal parts. For example, a pre-fabricated non-VEX wheel (which would be illegal under VUR5) would not be considered a “fastener,” even though it may also technically serve the purpose of bridging the connection between tread and a shaft.

Recently, Q&A #1208 broadened the definition of “fastener” to include COTS bearings, linear bearings, sliders, and ball joints. The reasoning seems to be that a “fastener” is something whose sole purpose is to constrain the motion of other parts on the robot, even if that motion is not restricted in all axes.

Therefore, the question raised is: Are COTS belts also considered fasteners? Currently, the only VEXU legal belts are VEX Pro timing belts, but there are many other COTS belts, such as V-belts, round belts, and flat belts, along with timing belts that have different tooth profiles and dimensions than the available GT2 and HTD timing belts.

Belts act as a fastener in the sense that they link the motion of two or more pulleys together. While the pulleys themselves would not be fasteners as shown by the wheel example, the belt’s sole purpose is to constrain the motion of the pulleys, and thus could be considered a fastener under the expanded definition.

Thank you!

> **Answered by committee**
>
> > Therefore, the question raised is: Are COTS belts also considered fasteners?
>
> Thank you for your question. No, a belt is not a fastener, and COTS belts do not qualify as legal fasteners for the Spin Up competition.
>
> Edit: This answer was revised on 2023-03-22. Although belts are not fasteners, they will be considered legal for future use.

VUR7 Bushings and Similar Components

24-Sep-2022
VUR7

VUR7:

> Teams may use any commercially available fastener on their Robot. Examples include (but are not limited to) screws, nuts, washers, rivets, hinges, pins, rod ends, threaded rods, hose clamps, bushings, spacers, or standoffs. a. To be considered a legal “fastener” in the context of this rule, the primary function of the part must be to join or fasten together two otherwise legal parts. For example, a pre-fabricated non-VEX wheel (which would be illegal under VUR5) would not be considered a “fastener,” even though it may also technically serve the purpose of bridging the connection between tread and a shaft.

In the vast majority of applications, bushings allow components to spin freely on shafts. Since bushings are explicitly allowed, it stands to reason that 2 parts are considered "fastened" if they are constrained together along many axes, even if they are not totally locked together. For example, a bushing might be used to fasten a gear to a shaft. The gear can spin relative to the shaft about the pitch axis, but it cannot spin about the roll or yaw axes, or translate along any axis. As such, it is fastened to the shaft. Is this a correct interpretation of the rule?

If so, we have 4 follow-up questions:

1.) Some potential fasteners allow relative rotation about one axes, just like bushings, but are not explicitly listed in VUR7. Bearings are the most obvious example. Are COTS bearings and other similar components legal if they are used as fasteners?

2.) Some potential fasteners allow relative rotation about multiple axes. For example, a ball and socket hinge prevents fastened components from relative translation along x, y, and z, but it allows relative pitch, yaw, *and* roll. Are COTS ball and socket hinges and similar components legal if they are used as fasteners?

3.) Some potential fasteners allow relative translational rather than relative rotation. For example, a COTS linear slider might be used to fasten a claw to the robot's chassis. The slider allows relative translation along x, but it prevents relative translation along y and z, and it prevents relative pitch, yaw, and roll. Are COTS sliders and similar components legal if they are used as fasteners?

4.) Some potential fasteners allow relative translational and rotational movement at the same time. For example, this linear bearing could be used to fasten a claw to a linear rail. The linear bearing would allow for relative translation along the y axis *and* relative rotation about the pitch axis, but would prevent relative x and z translation, and roll and yaw rotation. Are COTS linear bearings and similar components legal if they are used as fasteners?

Thank you for your time!

> **Answered by committee**
>
> Thank you for your questions.
>
> > Are COTS bearings and other similar components legal if they are used as fasteners?
> >
> > Are COTS ball and socket hinges and similar components legal if they are used as fasteners?
> >
> > Are COTS sliders and similar components legal if they are used as fasteners?
> >
> > Are COTS linear bearings and similar components legal if they are used as fasteners?
>
> Yes. COTS bearings, ball and socket hinges, sliders, linear bearings, and similar components are all legal for use as fasteners in the **VEX U** competition.

Window of VEXU Student Eligibility

28-Aug-2022
VUR7

Hello,

Student - A person is considered a Student if they meet both of the following criteria:

1. Anyone who is earning or has earned credit toward a high school diploma, certificate, or other equivalent during the six (6) months preceding the VEX Robotics World Championship. Courses earning credits leading up to high school would satisfy this requirement.

2. Anyone born after May 1, 2003 (i.e., who will be 19 or younger at VEX Worlds 2023). Eligibility may also be granted based on a disability that has delayed education by at least one year.

• Middle School Student - A Student born after May 1, 2007 (i.e., who will be 15 or younger at VEX Worlds 2023). A Middle School Student may “play up” and compete as a High School Student.

• High School Student - Any eligible Student who is not a Middle School Student.

VUG7 - VEX U Student eligibility.

a. All VEX U Team members MUST be matriculated in a post-secondary school.

b. Professionals not enrolled in post-secondary education are not eligible to participate on a VEX U Team.

c. Students who are dual-enrolled in both a secondary school and in post-secondary courses are not eligible to participate on a VEX U Team.

d. VEX U Team members may only be on exactly one (1) VEX U Team for the season. See <G6>

I have a quick question about when a VEXU student can graduate and still be eligible to compete. The definition of Student solves this for High School and Middle School students with the 6th month window. Does this 6 month window apply for VUR7, allowing VEXU students who graduate within 6 months of the World Championship to compete?

Thank you for your time!

> **Answered by committee**
>
> > The definition of Student solves this for High School and Middle School students with the 6th month window. Does this 6 month window apply for VUR7, allowing VEXU students who graduate within 6 months of the World Championship to compete?
>
> Thank you for identifying this oversight! Rule VUG7a was updated in the October 4, 2022 Game Manual update:
>
> > All VEX U Team members MUST be matriculated in a post-secondary school OR have earned a post-secondary education diploma, certificate, or other equivalent during the six (6) months preceding the VEX Robotics World Championship. The intent of this rule is to permit students graduating mid-year to still be able to finish their competition season

<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....

```
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.
```

> **Answered by committee**
>
> Yes, these would all be legal.