Team Custom Part Guide

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This document gives further explanation of the rules for the Team Custom Parts and also provides some examples. The Team Custom Part (TCP) rules from the Generic Game Rules document are listed and explained below.

(1) Each part can be made from any uniform (homogeneous) team supplied material.

The stipulation that the material must be "uniform" means that only a single material is allowed in the construction of each part. A part could be carved out of a solid block of this material. Or the material could be melted and reformed into a part. Therefore, a 3D printer can be used to create a plastic part. A metal part can be cast. Melted plastic can be injected into a mold. A part can be carved from a solid block of wood. A part can be a machined "hog-out" from a solid piece of metal or plastic. The determination of "uniform" is applied at the macro level. If something appears to be uniform to the naked eye, it is considered to be a uniform material. Each part can be made from a different material. Composite materials are not allowed. A common example of a composite material is fiber and glue, such as carbon/glass fibers and epoxy.

(2) Each part must be able to fit, unconstrained, into a 2" x 4" x 4" cuboid.

"Unconstrained" means that if the part was removed from the robot, and you may be asked to do so, it would fit within the required cuboid size. A part can be "self-constrained" to fit in the required size; meaning that it can temporarily be rearranged (folded/coiled/knotted/etc.) for the purpose of compliance verification. The idea is that the part can flexed, but that it cannot be reformed to meet the requirement.

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(3) Each part must be a single continuous piece of material (when in its operational state).

Each part must be one physical part, as opposed to one item. For example, an item like a typically constructed hinge would be considered three parts; two hinge halves and a hinge pin. The continuous piece of material determination is made for the part when it is in its operational state. This means that an item that has thin ligaments between more than one "part" that break to become multiple parts when in use is not allowed.

(4) The basic raw stock form of the chosen material must be used for the part. Rectangular or cylindrical material stock shapes must be used for parts that retain some or all of their initial material stock shape in their final form. Material starting shape is irrelevant for parts that are in a liquid state in the forming process or if the final part is completely carved/machined from a solid block of the material.

The idea behind this rule is that fabrication is required to get complex parts. It also means that materials can be purchased and used "as is" if they are either rectangular or cylindrical.

(5) No other kit parts may be embedded in a TCP.

BEST compliance inspectors must have the ability to access all parts so that they can visually confirm that a part is legal. If a part is embedded into a TCP, this will prevent access and therefore is not allowed.

(6) No hazardous materials are allowed (rule 2.2 still applies).

(7) No welding is allowed (rule 3.1.4.8 still applies).

(8) Melting is allowed (rule 3.1.4.9 is waived).

(9) Chemical change is allowed (rule 3.1.4.10 is waived).

As with all parts, students must design and fabricate the TCPs. Although these parts must be fabricated new each year during the defined competition period, an existing CAD file can be used. The source of a CAD/STEP/other file used to create a part can either be a student created file or a publicly available file (coaches/teachers/mentors are not to create these files for their students).

The expectation is that the adults whom are overseeing a team will ensure that their team is compliant with these rules.

Examples of Is Not Allowed and Is Allowed

Is Not Allowed

Length of inner tube – not allowed because it is a tubular shape (instead of rectangular or cylindrical).

A piece of cloth – not allowed because is made from many individual threads.

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Something formed from glass – not allowed, glass is considered a hazardous material.
A coated neodymium magnet – not allowed because it is not a uniform material due to the coating.

Is Allowed

Flat piece of rubber cut from an inner tube – allowed because it is a rectangular shape (which means it is possible to create a compliant starting shape from a noncompliant shape).
Length of monofilament fishing line – allowed because it has a cylindrical shape, the fact that it is flexible is not an issue.
Two part epoxy mixed/poured and set into a part – allowed because it becomes a uniform material.
Foam rubber – allowed, the aeration (air cells) of the material does not make it non-uniform.
A magnet – allowed, must be rectangular or cylindrical to be purchased and used as is.

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