

2020 *FIRST* Robotics Competition Rule Changes

In Light of Stop Build Day Retirement

The changes to the 2020 *FIRST* Robotics Competition documentation as a result of the retirement of Stop Build Day are described below. Please note that there are references to two rules not included in this document.

- R5 defines the ROBOT weight limit and will be released at Kickoff.
- R14 describes FABRICATED ITEMS produced before Kickoff that may be used (equivalent to R15 from 2019); we plan to release the 2020 version of this rule along with information on legal motors and controllers later this year.

1. Content comparable to the note below will be added to the *FIRST Safety Manual*.

While teams may feel the need to stay up all night before the event to finish something, it is recommended to be well rested before teams arrive at the event to ensure safe practices while operating machinery.

2. The *Robot Construction Rules* content has been modified as follows:

- The ROBOT definition has been edited as follows and moved from I1 to the *Overview* part of the *Robot Construction Rules* section.

A ROBOT is an electromechanical assembly built by the FIRST Robotics Competition team to play the current season's game and includes all the basic systems required to be an active participant in the game – power, communications, control, BUMPERS, and movement.

- R17 – R23 from the 2019 manual have been removed.
- The following rule has been added to *Budget Constraints & Fabrication Schedule*:
R16. Once an event a team is attending has begun (regardless of whether the team is physically at the event location), the team may not work on their ROBOT or ROBOT elements outside of the hours that pits are open, with the following exceptions:
 - A. Exceptions listed in R14
 - B. Software development
 - C. Batteries may be charged during the designated Load-in time

For the purposes of this rule, official events begin as follows:

- Regionals, District Championships, and *FIRST* Championship: at the start of the designated Load-in period, according to the Public Agenda. If the Public Agenda is not available or there is no designated Load-in period, the events begin at 4pm on the day prior to pits opening.
- District Events: when pits open

Examples of activity prohibited by R16 include:

- A. Working on the ROBOT at the team's shop after Load-in for the event has begun
- B. Working on ROBOT parts at night at the team's hotel.

Note that Ex and Ey impose additional restrictions on work done on the ROBOT or ROBOT materials while attending an event.

One purpose of R16 is to increase equity between teams with significant travel to an event and those nearby (close teams would otherwise have an advantage by being able to work on their ROBOT, in their shop, until it's time to go to the event).

3. The following *Inspection & Eligibility Rules* have been added/modified.

- **I1. It's your team's ROBOT.** The ROBOT and its MAJOR MECHANISMS must be built by the *FIRST* Robotics Competition team.

A MAJOR MECHANISM is a group of COMPONENTS and/or MECHANISMS assembled together to address at least one (1) game challenge: robot movement, game piece control, field element manipulation, or performance of a scorable task.

I1 requires that the ROBOT and its MAJOR MECHANISMS were built by its team, but isn't intended to prohibit or discourage assistance from other teams (e.g. fabricating elements, supporting construction, writing software, developing game strategy, contributing COMPONENTS and/or MECHANISMS, etc.)

Examples of MAJOR MECHANISMS include, but are not limited to, assemblies listed below:

- a. an assembly used to manipulate a game piece
- b. an assembly used to position a ROBOT for an end game task
- c. an assembly use to manipulate a FIELD element
- d. an assembly used to move the ROBOT around the FIELD

Examples that would generally not be considered MAJOR MECHANISMS, and thus probably aren't subject to I1 include, but are not limited to, the following:

- a. a gearbox assembly
- b. a COMPONENT or MECHANISM that's part of a MAJOR MECHANISM
- c. COTS items

Neither I1 nor the language in its Blue Box define specific thresholds for how much of a MAJOR MECHANISM must be the result of the team's effort. I1 expects and requires the team's honest assessment of whether they built the MAJOR MECHANISMS of their ROBOT.

Attempts to exploit loopholes in the definition of MAJOR MECHANISM in order to bypass this requirement are not in the spirit of I1 or the *FIRST* Robotics Competition. Examples of exploitation include:

- a. assembling pieces of a MAJOR MECHANISM provided by another team
- b. receiving a mostly complete MAJOR MECHANISM from another team and providing a small piece

- **I3. Bring it all to Inspection.** At the time of Inspection, the ROBOT must be presented with all MECHANISMS (including all COMPONENTS of each MECHANISM), configurations, and decorations that will be used on the ROBOT in MATCHES without re-inspection (per I4) and may not exceed 150 lbs. (~68kg) (note that while up to 150 lbs. of ROBOT MECHANISMS may be inspected together, the ROBOT configuration used in a MATCH may not violate R5). Exceptions listed in R5 are not included in this weight.
- **I4. Unless the change is listed below, any change to a ROBOT must get re-inspected.** A ROBOT may play MATCHES with a subset of the MECHANISMS that were present during Inspection provided the reconfigured ROBOT still meets all ROBOT Rules. Only MECHANISMS that were present during the Inspection may be added, removed, or reconfigured between MATCHES without re-inspection per I4. If a ROBOT is modified after its most recent passed Inspection, it must be re-inspected before it is eligible to participate in a MATCH.

Exceptions are listed in A through F (unless they result in a significant change to the ROBOT'S size, weight, legality, or safety).

- A. addition, relocation, or removal of fasteners (e.g. cable ties, tape, and rivets)
 - B. addition, relocation, or removal of labeling or marking
 - C. revision of ROBOT code
 - D. replacement of a COTS COMPONENT with an identical COTS COMPONENT
 - E. replacement of a MECHANISM with an identical MECHANISM (size, weight, material)
 - F. additions, removals, or reconfiguration of ROBOT with a subset of MECHANISMS already inspected per I3.
- **I5. Don't exploit I4.** Teams may not use the re-inspection process in I4 to circumvent the weight limit in I3.

This restriction is not intended to prevent a team from returning to a previous configuration (e.g. due to an unsuccessful upgrade or failure of a new component). If a team is believed to be violating this rule, the LRI will discuss the situation with the team to understand the changes and, if appropriate, the LRI in conjunction with the team will select a single configuration with which the team will compete for the duration of the event.

Example 1: A ROBOT passes initial Inspection (which includes MECHANISM A). Its team then decides they want to use MECHANISM B, which was not Inspected. The weight of the ROBOT, A, and B is less than the weight limit in I3, but more than that in R5. I4 requires the ROBOT be re-inspected, and I5 allows the ROBOT, A, and B to be inspected

collectively. If passed, the ROBOT may then compete in subsequent matches with A or B.

Example 2: A ROBOT passes initial Inspection (which includes MECHANISM A). Its team then decides they want to use MECHANISM B, which was not Inspected. The weight of the ROBOT, A, and B is greater than the weight limit in I3. This requires re-inspection per I4 and A is excluded to satisfy I3. B breaks, and the team decides to switch back to A. The ROBOT must be re-inspected per I4, and the team is not violating I5.

Example 3: A team arrives at an event with a ROBOT, MECHANISM A, and MECHANISM B, which collectively weigh 175 lbs. The ROBOT passes initial Inspection with A and plays a MATCH. The team switches to B, gets re-inspected, and plays again. The team switches back to A, gets re-inspected, and plays again. The team switches back to B and asks to be re-inspected. At this point, the LRI suspects the team may be violating I5 and has a discussion with the team to understand the changes being made. The team reveals that I5 has been violated, and the LRI works with them to select A or B for use for the remainder of the event.

4. The statement at the end of the *Inspection Checklist* has been updated to the language below, and a space for the printed name of the Team Captain and Team Mentor will be added to the form under their signature lines:

Team Compliance Statement

We, the Team Mentor and Team Captain, attest by our signing below, that our team's ROBOT was built after the 2020 Kickoff, and we are not aware of any rules it violates. We confirm that it and its MAJOR MECHANISMS are products of our team's work.

5. The following *Event Rules* will be added/modified.
 - **Ex. (formerly C11, rule number TBD) Load in during Load-in.** Teams may not bring the ROBOT or ROBOT elements in to the event after the designated Load-in period. Exceptions are as follows:
 - A. Exceptions listed in R14
 - B. Raw stock
 - C. COTS items
 - D. COTS items assembled per manufacturer specs
 - E. Exceptional circumstances that result in a team not being able to make the Load-in time and has made arrangements with Event Management.

There are no rules that explicitly restrict items that may be brought into the venue to during the designated Load-in period.

If an event does not have designated Load-in period on its Public Agenda, the designated Load-in begins when pits open and ends when opening ceremonies start.

During Load-in, teams are not limited to a single trip, and are encouraged to be as efficient and safe as possible.

Violation: Verbal warning and item will not be permitted into venue. If repeated at any point during the event or egregious violations will be addressed by the Head REFEREE, the Lead ROBOT Inspector and/or Event Management.

- **Ey. (Rule number TBD) Work in designated areas only.** At the event venue, teams may only produce FABRICATED ITEMS as follows:
 - A. in their pit area,
 - B. in another team's pit area with permission from that team,
 - C. while queued for a MATCH or Practice Field (given space constraints, extra scrutiny regarding safety is required),
 - D. any area designated by Event Staff (e.g. Playoff Pit Area, etc.), or
 - E. as permitted at provided machine shops that are available to all teams.

Violation: Verbal warning. If repeated at any point during the event or egregious violations will be addressed by the Head REFEREE, the Lead ROBOT Inspector and/or Event Management.