

Section
4



The Robot

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Section 4 – The Robot

4.1 – Overview

This chapter provides rules and requirements for the design and construction of your robot. A *Magbot Mayhem* robot is a remotely operated vehicle designed and built by a registered *Magbot Mayhem* OR Vex Challenge team to perform specific tasks when competing in *Magbot Mayhem*. Prior to competing at each event, all robots will have to pass an inspection. Refer to Appendix 1 for the Robot Inspection Guidelines and the Inspection Checklist.

4.2 – Robot Rules

There are specific rules and limitations that apply to the design and construction of your robot. Please ensure that you are familiar with each of these robot rules before proceeding with robot design.

<R1> One robot will be allowed to compete per team. Though it is expected that teams will make changes to their *robot* at the competition, a team is limited to only ONE robot.

- a. It is against the intent of this rule to compete with one robot, while a second robot is being modified or assembled.

<R2> Every robot will be required to pass a full inspection before being cleared to compete. This inspection will ensure that all robot rules and regulations are met. Initial inspections will take place during team registration/practice time.

- a. If significant changes are made to a robot, it must be re-inspected before it will be allowed to compete.
- b. All robot configurations must be inspected before being used in competition.
- c. Teams may be requested to submit to random spot-inspections by event personnel. Refusal to submit will result in disqualification.
- d. Referees or inspectors may decide that a robot is in violation of the rules. In this event, the team in violation will be disqualified and the robot will be barred from the playing field until it passes re-inspection.

For further information on the inspection process please refer to Appendix 1, Robot Inspection Guidelines

<R3> The following types of mechanisms and components are NOT allowed:

- a. Those that could potentially damage playing field components.
- b. Those that could potentially damage other competing robots.
- c. Those that pose an unnecessary risk of entanglement.

<R4> At the beginning of any match, the maximum allowed size of a robot is 18" x 18" x 18".

- a. During inspections, robots will be placed into a "sizing box" which has interior dimensions matching the above size constraints. To pass inspection, a robot must fit within the box without exerting ANY force on the box walls or ceiling (i.e., if the robot cannot be held inside the constraints by the box itself). The orientation of the robot when sized must be the same as its orientation when placed on the field.
- b. Robots may expand beyond their starting size constraints after the start of a match.
- c. No *robot* may have more 4 magnets at the outer edge of their *robot* at any one time. It is also HIGHLY recommended that robots be constructed with aluminum "bumpers" to prevent magnetic locking between *robots*.
- d. Any restraints used to maintain starting size (i.e. zip ties, rubber bands, string, etc.) MUST remain attached to the robot for the duration of the match.

<R5> Robot construction is constrained to the following:

- a. Any Official Vex Component may be used (except as limited below).
 - Only one (1) Vex Microcontroller
 - Up to two (2) Vex Y-Cables
 - Up to ten (10) Motors or Servos (Any combination, up to ten)
 - Only one (1) Battery Pack from the Vex Power Pack (Vex P/N: 230-0036)
 - Up to two (2) RF receivers
 - Electrical components found in the VEX-RC “Blue” product line are prohibited
 - The packaging, manual binders, Styrofoam, cardboard, plastic bags, etc. from the Vex kits are NOT included and CANNOT be used for robot construction. Only the Vex parts themselves are allowed.

Note: Official VEX products are ONLY available from VEX & Official Vex Resellers. Products on the VEXLABS.com web site will denote what is available for use in this competition, not all products may apply. Products identical to those listed as competition legal on the www.vexrobotics.com site are also considered “official Vex products”.

- b. The following additional components may also be used:
 - Ten (20) elastic bands, #32 size only
 - 80” of 1/8” Nylon Rope
 - 6” of 3/4” Wide Velcro
 - 12” x 15” of Non-Slip Pad
 - Magnets. Only magnets from K&J MAGNETICS, INC (www.kjmagnetics.com), part number BX041-N50, may be used.
 - Heat-Shrink Tubing. Only heat-shrink tubing from McMaster-Carr (www.mcmaster.com), any heat-shrink tubing in the following part number range: 7132K511-7132K583, may be used.
 - Any material strictly used as a color filter for a Vex Light Sensor
- a. Any parts which are identical to legal VEX parts may be used.
- b. Teams may add non-functional decorations from parts not on the above list, provided that these parts do not affect the outcome of the match, and must be in the spirit of the competition.
- e. No additional components may be used.

<R6> All parts that are used must be tracked through a Bill of Materials (BOM).

<R7> During inspections if there is a question about whether something is an official Vex component, a team will be required to provide documentation to an inspector, which proves the component’s source. Such types of documentation include receipts, part numbers, or other printed documentation.

<R8> No more than two transmitters may control a single robot during the tournament. No modification of the Vex transmitter is allowed of ANY kind.

<R9> Parts may NOT be modified as follows:

- a. Motors, extension cords, sensors, controllers, battery packs, and any other electrical component of the Vex Robotics Design System may NOT be altered from their original state in ANY way.
- b. Welding, soldering, brazing, gluing, or attaching in any way that is not provided within the Vex System will NOT be allowed.
 - i. Mechanical fasteners may be secured using Loctite or a similar thread-locking product.
 1. This may be used for securing hardware ONLY.

<R10> Robots must display their team number (numerals/alpha only, i.e. “148” or “148-A”).

- a. The judges, referees, and announcers must be able to easily identify robots by team number.
- b. Team number must be visible from the top.

- c. The numerals must each be at least three inches high, at least in 3/4-inch stroke width and in a contrasting color from their background. (Team number “license plates” that come with your registration welcome pack can be used in lieu of hand made number cards.)

<R11> Robot receiver must be accessible by competition personnel.

- a. The radio crystal must be easily removed from the robot without any robot disassembly.
- b. The radio crystals will be provided to each team for each match.

<R12> Robots must include a mounting device to securely hold one Robot Identification Flag throughout an entire match.

- a. The flags will be provided at the event or you may use those provided in your welcome pack.
- b. The flag tube dimensions are .250” OD x .200” ID x 8.250” length with a triangular flag 4.000” high x 6.000” wide.
- c. For full details please refer to the following diagram

