

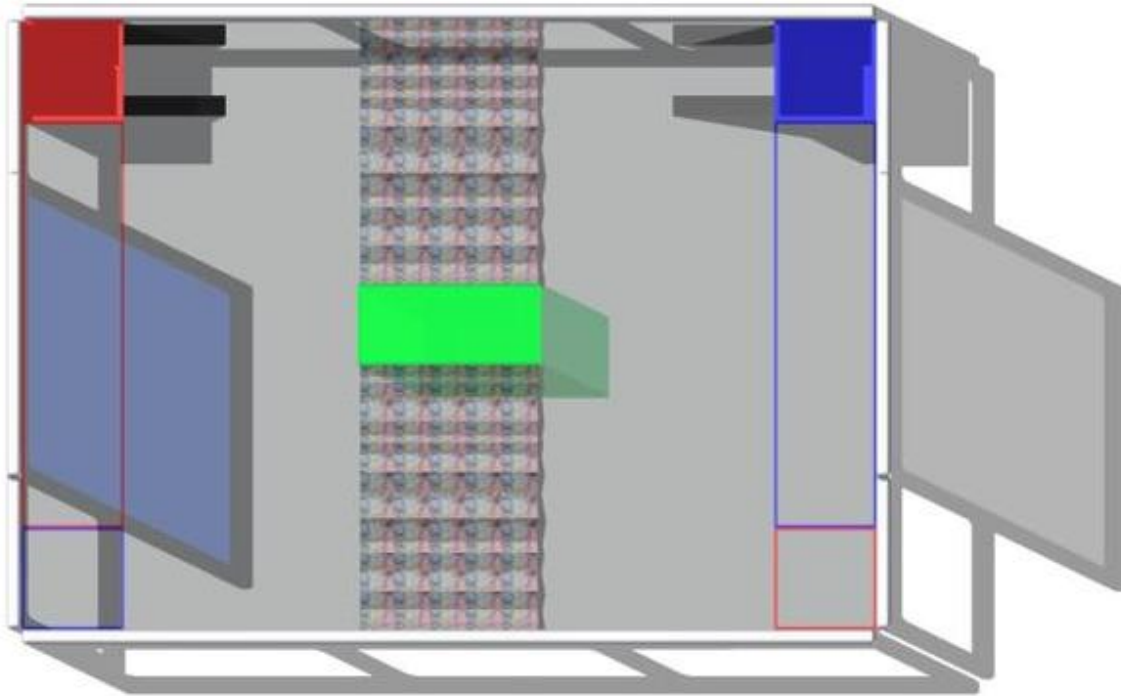
2011 Milwaukee Mentor Vex Competition

Recycling Rampage



1. Objective

The objective of Recycling Rampage is to design and build a radio-controlled VEX robot that will enable you and your partnered team to earn a higher match score than the opposing alliance.



2. The Field

2.1 The Official Midwest Vex Programs Field measures 10' x 14' and is viewable on www.midwestvex.org. The surface of the playing area consists of 2' x 2' interlocking foam tiles, smooth side up, available from www.softtiles.com.

2.2 All official field dimensions will be built within a tolerance of $\pm\frac{1}{2}$ " (unless specified otherwise).

2.3 Starting Zones: An alliance's Starting Zone is located at the end of the field nearest their Scoring Box and is marked by red or blue tape corresponding to the alliance color. The dimensions of the Starting Zone are 20" x 80".

2.4 Scoring Box: The Scoring Boxes, or Recycling Bins, are elevated goals in which game pieces may be placed in order to receive points. An alliance's Scoring Box is located in the corner of the field adjacent to their starting zone. Each Scoring Box is 20" x 20" x 20" and is constructed of plywood.

2.5 Loading Ramps: Attached to each Scoring Box are two 4" wide ramps, with the surface of each made of tire tread. The ramps will be 5" apart and $3\frac{1}{2}$ " in from the nearest parallel edge of the Scoring Box. Each goal will extend approximately 20" out from the Scoring Box and is attached to the Scoring Box so that the upper surface of the tire tread is 10" from the foam field tiles at its highest point. Loading ramps are constructed to a tolerance of ± 1 ".



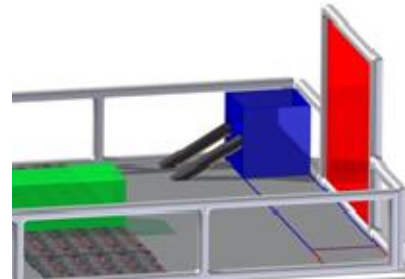
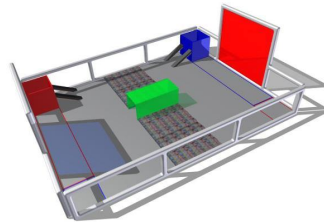
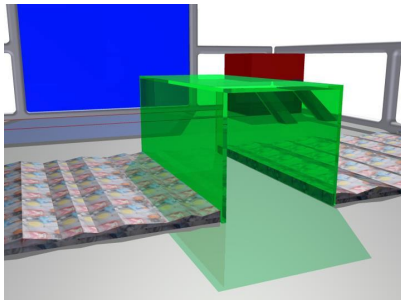
(Picture of the tire tread pattern covering the loading ramps)

2.6 Landfill: The 10' width of the field is spanned by the Landfill. The Landfill is 36" wide and consists of Garbage, Cans and the Tunnel.

2.6.1 Cans: Beginning the match in the Landfills and Human Load Stations, 12oz aluminum beverage Cans are the scoring element of the game. Cans that are located in the Landfill will be placed randomly and in no particular orientation, but will not be placed in such a way as to give an unfair advantage to one alliance or the other. Ten (10) Cans are located on each side of the Tunnel in the Landfill.

2.6.2 Garbage: Beginning the match scattered within the Landfill, Garbage is a variety of materials including (but not limited to) wood, rocks, tire scraps, and cardboard. The intent of Garbage is to present a terrain challenge as well as a contaminant from which the Cans must be sorted.

2.6.3 Tunnel: The Tunnel is a structure spanning the 36" width of the Landfill. It is located at the center of the Landfill and has inner dimensions of 15" square



2.7 Human Load Stations: Each alliance has a human load station where game pieces are introduced to the field.

2.7.1 Footprints: The Human Load station is marked by 3 pairs of footprints painted on the field at intervals of 45 degrees radiating 4' from the corner of the field opposite the Scoring Box of that alliance.

2.7.2 Ten (10) Cans will begin the match at each human load station.

2.8 Alliance Station: Each alliance will have an Alliance Station for 2 drivers, 1 coach, and 1 human player. It extends from the goal edge of the field to the end of the robot starting zone

2.8.1 Materials Recovery Station: Each Alliance Station includes a Materials Recovery Station, which extends to the field border allowing the human player in the Alliance Station to step up to the field to retrieve Cans from the Scoring Box.

2.9 Lines: In addition to lines defining various areas of the field, there are extra lines to provide navigation marked in white tape. There are 3 lines parallel to the 14' length of the field, one on each side of the field, 10" away, running the length of the field. Two transversal lines run across the 10' width of the field, ending 10" from the field border on either side. The third parallel line connects the two transversal lines running through the center of the tunnel.

3. Scoring

3.1 All scoring will occur at the end of the two minute match, after all robots and scoring objects have come to rest, or eight seconds after the match ends; whichever comes first.

3.2 Robots may score by collecting Cans from either Landfill and by placing them in their alliance's Scoring Zone. There is no limit to how many Cans a robot can collect at one time from the Landfill.

3.3 Robots may also score by collecting a Can from the Human Load Station.

3.3.1 Cans from the Landfill are worth 1 point.

3.3.2 Cans from Human Load Stations are worth 1 point.

3.4 A team can earn extra points in the last thirty seconds of the game by having the human player stack Cans on top of the driver.

3.4.1 Both teams on an alliance can participate in this bonus round, but only the human player in the Alliance Station is allowed to stack Cans.

3.4.2 Stacked Cans must come from the alliance's Scoring Box.

3.4.3 Stacked Cans must be supported by the driver's head, directly or indirectly, in order to be worth a two point bonus each.

3.4.4 Fallen Cans may be reused.

3.4.5 Two (2) points are awarded per stacked Can.

3.4.6 Points are only given for the number of Cans remaining on the driver at the end of the match; fallen Cans do not count for points.

4. Matches

4.1 The competition will consist of Qualifying Matches followed by Elimination Matches. Each match is a 2v2, two minute match. There is no autonomous period.

4.2 Field Crew: Each team is allowed to bring one driver and one human player.

4.2.1 Each alliance may share one field coach from either team.

4.2.2 The driver and human player in the Alliance Station are not allowed to switch roles at any time during the match.

4.3 A driver must remain in the Alliance Station for the entire duration of the two minute match. Failure to do so will result in a two (2) point penalty. If a driver steps outside of the box to touch the robot on the field outside of the home zone, only one two (2) point penalty awarded.

4.3.1 A human player may choose to start on any of the three sets of footprints at the beginning of a match. He or she may switch between the sets of footprints but must have his or her feet on only one set at a time. Failure to do so will result in a two (2) point penalty.

4.3.2 If a field coach participates in a match, he or she must be in the Alliance Station at all times. Failure to do so will result in a two (2) point penalty.

4.4 Teams are expected to be present for each of their scheduled matches; however, if a robot is unable to compete for a scheduled match, the team is required to send one representative to stand in the Alliance Station for the duration of the match. Failure to do so will result in zero (0) ranking points being awarded to the team that does not show up for the match.

4.5 Match Safety: Safety glasses are required at all times in the pit area and on the competition field. Teams will not be permitted to compete unless all team members on the competition field are wearing safety glasses. Teams must provide their own safety glasses for the event; no safety glasses will be supplied by the event coordinators. It is recommended that teams bring extra safety glasses to the competition for team visitors.

4.6 Qualifying Matches

4.6.1 All teams will play in the same number of qualifying matches. The number of qualifying matches at each event will be determined by the length of the event and the number of teams competing. Teams may be asked to play in surrogate matches that do not count towards their ranking points in order to ensure that all robots have played an equal number of matches.

4.6.2 Teams will be given their schedule of qualification matches before the start of the first match. The qualification match schedule will show the match number, the alliances competing in each match, and the color that each team is assigned for that match.

4.6.3 At the end of each qualifying match, the ranking score for each alliance will be determined as modified based on the match score. Ranking scores will be determined as follows:

Three (3) points for a win

Two (2) points for a draw

One (1) point for a loss

4.7 Ranking: At the end of the qualifying matches, teams will be ranked from 1 to N (N being the total number of teams present) based on the following:

-Highest ranking score

-Highest match score

-A 1v1, 75 second shoot out match (all other rules apply)

4.8 Elimination Matches

4.8.1 The number of teams participating in elimination matches will be no less than 4 but may be increased prior to the start of the event based on the number of teams participating.

4.8.2 Alliance selection procedure runs like that of FRC. The top ranked teams become “Selecting Teams” and are able to select their own alliance partners. In the first round of selections, the highest seeded team will pick first and the lowest seeded team will pick last. If a “Selecting Team” is picked by another team, then the next seeded team is bumped up to pick. A “Selecting Team” may refuse an invitation from a higher seeded team, but may not then accept

an invitation from a different “Selecting Team”. A team outside of the top seeded teams may not accept an invitation if a previous invitation is refused. To allow more teams to participate in elimination matches, it may be determined prior to the start of the tournament to use three team alliances. In this case, the second round of selections will be conducted in reverse, with the lowest seeded team making the first selection and the highest seeded team making the last. Each team of a three team alliance must play at least one elimination match.

4.8.3 The number of top seeded teams that earn the right to select their alliance partners will be determined prior to the start of the tournament based on the number of attending teams.

4.8.4 The elimination tournament requires two victories in a round to advance to the next round. Therefore, each round will consist of a minimum of two matches.

5. General Rules

5.1 Disqualification: Robots may be disqualified based on their actions which violate the rules of the game. If a referee calls for a disqualification during a match, the robot will be disabled and they will receive a Ranking Score of zero for the match. If disqualification is not determined until the completion of the match, the offending robot will receive a Ranking Score of zero for the match. The alliance partner of a disqualified robot will still receive the score earned by all robots during the match, provided that they are also not disqualified. In both situations, the opposing alliance will receive a score based on the points that they earned. The disqualification of one robot during the Elimination Matches will disqualify the entire alliance.

5.2 Safety Hazards:

5.2.1 Referees may request that teams alter any portion of their robot that is considered a safety hazard. It is the right of the referees to prevent teams from playing in matches until such changes are made to the robot.

5.2.2 Referees will disqualify any robot that they deem to be a repeat safety hazard. A safety hazard is any direct action of, or mechanical failure on said robot which may increase the possibility of immediate damage to other robots, field objects, or personnel.

5.3 Loss of Parts: All parts of the robot must remain attached to the robot for the duration of the match and must not cause any hazard of entanglement to any other robot, or else that robot’s team may run the risk of disqualification. Minor pieces which become detached from the robot and do not affect the outcome of the match will not result in a disqualification.

5.4 Out of Bounds: If a robot leaves the playing field for any reason so that it must exert force on the ground outside of the field border, the robot will be immediately disabled. If a robot is forced out of bounds by an opposing robot, both robots will be disabled and the aggressor will be given a five (5) point penalty.

5.5 Pinning: Pinning occurs when an opposing robot is held against an obstacle and cannot move, in any direction, because of the pinning robot’s presence. Pinning will be visibly counted out by the closest referee for a duration of 5 seconds. If a robot is being pinned for five seconds, the team doing the pinning must back off for at least five seconds before they can resume pinning. Failure to do so will result in a 5 point penalty of the aggressor. If a robot continues to engage in this behavior, they may be disqualified.

5.6 Flipping: Robots may not flip an opposing team's robot. The flipping robot will be disqualified from the match if in the referee's decision they initiated an action which results in flipping. In incidents where the flipped robot initiates action or both robots are in motion, disqualification may not occur and will be at the discretion of the referees.

5.7 Intent to Destroy: Strategies resulting in the destruction of or damage to an opponent's robot or the field and field elements is not in the spirit of the competition and will not be allowed.

5.8 Foul Markers: If a robot inflicts an on field penalty, the offended teams' Foul Marker, an Arizona Tea Can, will be thrown (by the Referee) onto the field, near the spot of the infraction. The Foul Marker Can can then be used by the offended team as an extra Can, worth two (2) points if properly scored in the Scoring Zone.



(Picture of an Arizona Tea Can foul marker)

6. The Robot

6.1 Size Restriction: At the start of each match, every part of the robot must fit, unconstrained, and in a stable position, within a box 12 inches high, and a total of 30 inches in combined width and length. The robot may only contact the surface of the field in starting position. Robots will be measured before the beginning of Qualification Matches.

6.2 Controls: Teams will be required to use one (1) Vex FM Transmitter and receiver and one (1) Vex V0.5 Microcontroller OR one (1) VEX Cortex controller and one (1) VEXNet Joystick to control their robots. Frequency Crystals will be provided by the competition coordinators and are not allowed to be brought to the competition site.

6.3 Pit operation: Teams must use their own tether for robot control in the pit area. Robots may not be operated outside of the competition fields or pit area. Failure to follow this rule may result in forfeiture of the next round of competition.

6.5 Construction Restrictions:

6.5.1 A robot must be designed to operate by reacting only against features within the confines of the playing field boundaries and may not interact with anything outside the boundaries of the playing fields excluding the human players.

6.5.2 Gaining traction by use of adhesives or by abrading or breaking of the surface of the playing field or field elements is not allowed, will be considered to be damaging the playing field and is subject to disqualification.

6.5.3 A robot may not contaminate the playing field or an opponent's robot with lubricants or other debris.

6.5.4 Teams may use 7.2V NiCd batteries of any manufacture, but only one battery (six cells) may be used on the robot at a time. The battery does not count towards the cost limit listed below.

6.5.5 It is preferred that Vex parts are used, but additional (non-vex) parts may be used as long as the robot maintains the general aesthetic and capability of a Vex robot and can be controlled using a VEX microcontroller.

6.5.6 Modifications are permitted to the mechanical parts of the kit. Teams may opt to buy their own replacement or spare parts but these may not be used as a part of the robot until the original part fails. Teams may NOT intentionally modify the Vex Microcontroller, Receiver, or Transmitter. Teams may not modify PWM wiring nor may teams modify motors or servos from their "out of the box" performance. Modification of any other component is permitted.

6.5.7 A parts outline from the Vex robotics design system Starter kit can be found at <http://www.vexrobotics.com/vex-robotics-design-system.shtml>.

6.6 Materials: Robots are to be constructed from only vex parts as well as up to \$200 of additional materials. Additional materials may be used as outlined below. Each team must submit a Bill of materials outlining their parts and expenses before their first match.

6.7 Additional Materials: The robot must maintain the identity of a VEX robot and the integrity of the competition. If robots are significantly stronger/faster/more durable than an average vex robot, it may be ineligible to compete. All motors must be of equivalence to vex motors, and be controlled through the VEX control system (Vex OI and controller).

6.8 Energy sources: The energy used by the devices in the competition must come solely from: - A change in altitude of the center of gravity of the device –Electrical energy delivered by the battery to the electronics and motors provided with the kit. –Stored energy by deformation of parts allowed above (such as rubber bands) provided the stored energy does not pose a safety hazard at release.

7. Field Apparel and Other Devices

7.1 Safety Glasses: the only required piece of headgear for match play is a pair of ANSI approved safety glasses or goggles which must be worn at all times in the field and pit areas.

7.2 Footwear: Closed-toed shoes are strongly advised for walking in the pits and the field area.

7.3 Hats: Because balancing Cans on different drivers' heads may present varying levels of difficulty, hats are permitted. Any object that is fully supported by the driver's head for the duration of the match may be considered a hat, excluding the one (1) pair of required safety glasses which may not be used to support Cans. Hats should not interfere with the functionality of the driver's safety glasses, and in order to be an acceptable form of Can support, must not contact the driver below the neck and may not interfere with objects on the field.

7.4 Can Introduction Devices: Human players are expected to provide their own means to place Cans on the field; this may not involve compressed air, pyrotechnics, or other means that make the Can a projectile. (Throwing of cans onto the field is not an acceptable Can Introduction Device.) A Can Introduction Device should be a creative means of reaching the field to place a Can on the field or a robot in the Human Load Zone.