

WHO'S GOT THE ÜBER TUBER?



2005 FALL WIRED ROBOTICS CHALLENGE
WWW.WIROBOTICS.ORG

Challenge Manual



2005 Fall WIRED Robotics Challenge

Acknowledgments

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Challenge Design Committee

“Who’s Got the Über Tuber?” was inspired and modified from the 2004 WPI Savage Soccer competition rules.

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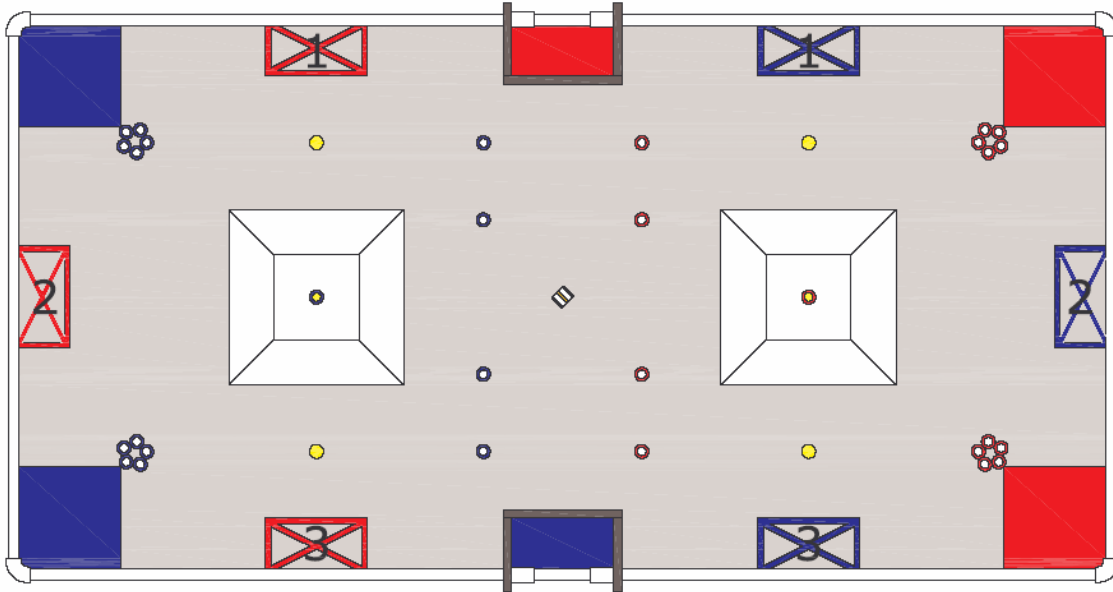
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The 2005 Milwaukee VEX Challenge Design Committee reserves the right to modify, update, or clarify any rules up until the day of any competition.

1. Objective

The objective of “Who’s Got the Über Tuber?” is to design and build a radio-controlled robot that will defeat your opposing alliance in competition.

2. The Game



Please visit <http://www.wirobotics.org/vex/2005/challenge.html> to download files containing larger, dimensioned field diagrams and descriptions of each object as placed on the field above.

2.1 Field Description:

2.1.1 The field is 8' x 16.' The outer boundaries of the playing area are formed by a 2" PVC border that is at floor height. The surface of the playing area consists of 2' x 2' interlocking dark grey foam pads.

2.1.2 Robots will begin the match in one of the four alliance starting areas which are 18" x 18" in size, and located in the corners of the field. Alliances will be designated as either “Red” or “Blue” on a match-by-match basis as noted on the match scheduler distributed and posted at the competition.

2.1.3 Four types of scoring objects are located throughout the playing field:

- 2.1.3.1 Tubes: There will be 30 regular tubes on the playing field at the start of the match as shown on the field drawing. One end of each tube is painted red and the other end is painted blue. Tubes will start standing on end, with 15 of each color up as shown on the field drawing. The tubes are constructed from 1-5/8" I.D. PVC tubing cut to 3" in length. Each end of the tube has a 3/16" thick lip which is 1/2" in length.

- 2.1.3.2 Tennis Balls: 6 standard tennis balls will be located on the playing field at the start of the match. Four will be located on the floor and two will be sitting atop tubes, centered on the platforms as designated on the field drawing.
- 2.1.3.3 Über-tuber: One tube will begin each match laying on its side in the center of the playing field. It is identical in construction to the regular tubes, but has an extra gold ring painted around its center, designating it as the über-tuber.
- 2.1.3.4 Platforms: Two raised platforms with a center plateau of 15" x 15" are located along the center of the field. The platforms have ramps with a 75% grade on all four sides.

2.1.4 All field dimensions should be considered to be within +/- ½."

2.2 There are two types of scoring areas of each color located on the field:

2.2.1 Walled Scoring Area (WSA): There is one WSA each for the Red and Blue alliances located on the field as shown on the field drawing. WSA's are 9" x 18" in size and are bounded on three sides by "2x4" wooden boards. The outside boarder of the WSA is the 2" PVC pipe. See attached drawing in appendix which illustrates the construction of a WSA.

2.2.2 Shifting Scoring Area (SSA): There is one SSA each for Red and Blue located in two of six possible positions indicated on the field drawing. SSA's are 9" x 18" in size [to the outside of the tape line]. SSA location will be determined by a throw of a 10-sided die [to be performed by a game referee at the beginning of each match]. See the attached table in the Appendix which outlines the SSA positions based on the number rolled. The determined SSA's will be marked by an acrylic flag located above the PVC border. For purposes of differentiating these areas from the other starting and scoring areas, SSA's will have an X through the center made with colored tape.

3. Scoring

3.1 All scoring will occur at the end of each two minute match, after all robots and scoring objects have come to rest.

3.2 A tube is considered to be in a scoring position if any part of the tube is contained within a scoring area and is supported by only the floor of the playing area, the borders of the WSA, and/or other scoring objects considered to be in scoring position. A tube contained within the border of the SSA, and touching the field border is considered to be in scoring position.

3.3 A tennis ball is considered to be in scoring position if supported only by a tube standing on end.

3.4 If a team's robot is in contact with any of their tennis balls or tubes, those objects will not be counted as scoring objects. Opposing robots in contact with the other team's scoring objects will not negate points for either team except if it is in violation of section 3.2 and the scoring object is supported by the robot.

3.5 At the end of each match, when all scoring objects and robots have come to a rest, each alliance will receive points based on the following criteria:

- 3.5.1 One (1) point for each tube standing upright anywhere in the field with your alliance's color up. A tube is considered "upright" if the complete lip on one side is completely in contact with the carpet.
- 3.5.2 One (1) point for each tube, irrelevant of orientation, in a scoring area.
- 3.5.3 Seven (7) points for each tennis ball sitting on the end of a standing tube. The points for a tennis ball will be given to the team whose color is up on the tube, irrelevant of which team places the ball on the top of the tube or where the tube is located in the playing field.
- 3.5.4 Fifteen (15) points for each robot resting entirely on the 15" x 15" plateau of a raised platform.

3.6 Scoring Multipliers:

- 3.6.1 The point value for any object in the Walled Scoring Area (WSA) will be doubled.
- 3.6.2 The point value for any object in the same scoring area (WSA or SSA) as the über-tuber will be doubled. The über-tuber also counts as a regular tube for scoring purposes.
- 3.6.3 Teams may score and compound more than one multiplier during any given match.

3.7 Tie Breakers

In the event of a tie, the winner of the match will be determined by the following criteria, in this order:

- Most tubes of your color upright
- Most objects in the Walled Scoring Area (WSA)
- Über-tuber upright with your color up

4. Matches

4.1 The competition will consist of Qualifying Matches followed by Elimination Matches. 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 (1) representative to stand in the driver's area for the duration of the match.

4.2 Qualifying Matches

- 4.2.1 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.
- 4.2.2 Teams will be given their schedule of qualification matches no later than the start of the first match of that day's event. The qualification match schedule will show the match number, the alliances competing in each match, and the color that each alliance is assigned for that match.
- 4.2.3 At the end of each qualifying match, the total number of points scored by each alliance will be considered their Qualification Points.

4.3 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:

- Total number of qualification points
- Most wins
- Most matches with the über-tuber counting towards your score
- Most matches with a tennis ball counting toward your score

4.4 Elimination Matches

- 4.4.1 The number of teams participating in elimination matches will be no less than eight, but may be increased prior to the start of the event based on the number of teams participating.
- 4.4.2 Alliance selection procedure for the elimination matches will be described in an update to these rules.
- 4.4.3 During elimination matches, the #1 ranked alliance will play the lowest ranked alliance entering the elimination matches(i.e. if there are 4 alliances in the elimination matches, #1 will play #4, and the #2 ranked team will play the second-lowest ranked team, and so on.)

4.5 Driver Rotation

- 4.5.1 During each match, teams will be required to switch their drivers halfway through the two minute game. There will be a ten second period during which the drivers must complete the switch or the robot will be removed from the field and the team will receive a score of 0 qualification points.
- 4.5.2 Every member of said team is not required to drive the robot for one control period, but it is recommended that all team members who express an interest in driving the robot be given at least one opportunity to drive the robot during competition.

4.6 Match Sequence

Each match is two minutes long.

- 0-55 seconds: The robot is under 1st driver control.
- 55-65 seconds: Driver switch period.
- 65-120 seconds: The robot is under 2nd driver control.
- 120 seconds: Match Ends.

4.7 Match Safety: Safety glasses are a required at all times during the matches to ensure the maximum possible eye protection. 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.

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 removed from the field and they will receive a score of zero for the match. The clock will not be stopped while a robot is being removed from play. If disqualification is not determined until the completion of the match, the offending robot will receive a score of zero for the match. The alliance partner of a disqualified robot will still receive the score earned by both robots for their duration in 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.

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 or field objects.

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 unintentionally become detached from the robot or do not affect the outcome of the match will not cause a disqualification.

5.4 Pinning: Pinning occurs when an opposing robot is held against an obstacle and cannot move, in any direction, because of your robot's presence. Pinning will be visibly counted out by the closest referee, for a duration of five (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. Failure to do so will result in the disqualification of the aggressor.

5.5 Flipping: Robots may not intentionally flip an opposing team's robot. The flipping robot will be disqualified from the match if in the referee's decision they initiated a lifting 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.

5.6 Goal Blocking: Goal blocking occurs when a robot impairs its opponent's ability to tend to a goal [scoring or manipulating tubes]. Robots are allowed to block an opponent's goal for a duration of five (5) seconds. If a opponent's goal has been blocked for five seconds, the robot must back off of the goal for at least five seconds before they can resume their blocking maneuvers. Failure to do so will result in the disqualification of the blocking robot.

5.7 Intent to Destroy: Strategies aimed solely at the destruction of or damage to an opponent's robot or the field are not in the spirit of the competition and will not be allowed.

5.8 Starting Area: At the start of the match, teams may place their robot anywhere inside the designated robot start area corresponding to their team color. The starting area is defined by the outer boundary of the tape.

5.9 Platform: A robot is considered on the platform if all of its wheels are touching the 15" x 15" plateau when the game ends and all items on the playing field have come to rest, and the robot is not touching any other part of the ramp surface. A robot may extend into the space beyond the imaginary vertical walls formed by the 15" x 15" plateau as long as no part of the robot touches the side ramps of the platform. Other objects, including other robots may be touching the central platform, and will not affect the score as long as the robot considered to be on the platform is not supported by any other robot or field object.

5.10 Scoring Objects: Any scoring object which leaves the playing area during a match will not be returned to the field and is ineligible to be scored.

5.11 Robot Control: Team members may interact with their robot during a match only through the normal operation of the VEX control system. Only designated drivers may be in contact with the controls during the match.

5.12 Robot Modification: Teams are allowed to modify their robots in between matches as long as the robot remains compliant with all specifications and rules after the modification. Any modification should be brought to the attention of the referees or head inspector prior to the start of the team's next match. Teams may be subject to re-inspection at the discretion of the referees/head inspector.

5.13 Robot Identification: Teams must have their team name clearly marked on their robot such that it is visible from 15 ft. away. Teams must also have the ability to designate either Blue or Red alliances with a color insert or flag. These inserts must be provided by the team and are not included in the robot's maximum weight, provided that they are not a functional part of the robot.

5.14 Rule Clarification: All questions or requests for rule clarifications should be submitted via the Team Discussion Board on the event website (www.wirobotics.org). Questions and answers will be publicly posted on the event website.

5.15 Referee Rulings: All referee decisions regarding rules of play and scoring are final.

6. The Robot

6.1 Size Restriction: At the start of each match, every part of the robot must fit, unconstrained, in a stable position, within a box 12" long x 15" wide x 15" tall. The robot must fit fully self-supported, in contact only with the horizontal, padded (or taped) surface of the playing field, when started.

6.2 Weight Restriction: Each robot's weight must not exceed 12 lbs.

6.3 Controls: Teams will be required to use competition remote controls and frequency modules provided by the competition coordinators.

6.4 Pit Operation: Teams must bring a tether for robot control in the pit area. Robots should not be operated outside of the competition field or pit area. Failure to follow this rule may result in forfeiture of the next round.

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 field.
- 6.5.2 Gaining traction by use of adhesives or by abrading or breaking the surface of the playing field is not allowed and will be considered to be damaging the playing field and is subject to disqualification.
- 6.5.3 A robot may not intentionally contaminate the playing field or an opponent's robot with lubricants or other debris.
- 6.5.4 Each team will be expected to use parts only from the VEX Robotics Design System Starter Kit unless specified on the additional materials list below. Teams may use any 7.2V NiCd Battery, but only one battery may be used on the robot at a time.
- 6.5.5 Modifications are permitted to the mechanical parts of the kit. Team may opt to buy their own replacement or spare parts from Radio Shack or Innovation FIRST, but no more than one kit's worth of parts may be on the robot. Teams may NOT intentionally modify any of the kit electronics or motors. Modification of items on the additional materials list is permitted.
- 6.5.6 A parts outline form the VEX Robotics Design System Starter Kit can be found at <http://support.radioshack.com/parts/75280.htm>

6.6 Materials: Unless otherwise specified, an unlimited quantity of the materials in the Additional Materials List will be allowed in addition to parts in the VEX Robotics Design System Starter Kit. The VEX Battery Pack does not count against the \$100 accessory limit. Each team must submit a Bill of Materials outlining their expenses before their first match.

6.7 Additional Materials List

- Plywood or wood up to one-half inch thickness
- Cardboard or foam-board
- String or twine
- Any strings or elastic bands (must be designed to release energy no faster than it was input)
- Fasteners, washers, and adhesives (used as such). You may not use adhesive tape (duct tape, electrical tape, etc) as a fastener
- Lubricants used to reduce friction within parts of your robot
- Non-functional decorations
- Paper, saran-wrap, aluminum foil, fabric or any paper or cloth-like material
- A maximum of \$100 in additional VEX accessories from Radio Shack or Innovation First (www.vexlabs.com).
- This competition does not use autonomous mode. However, you may choose to program certain functions in your robot. The programming kit does not count against the \$100 maximum listed above.

6.8 Energy Sources

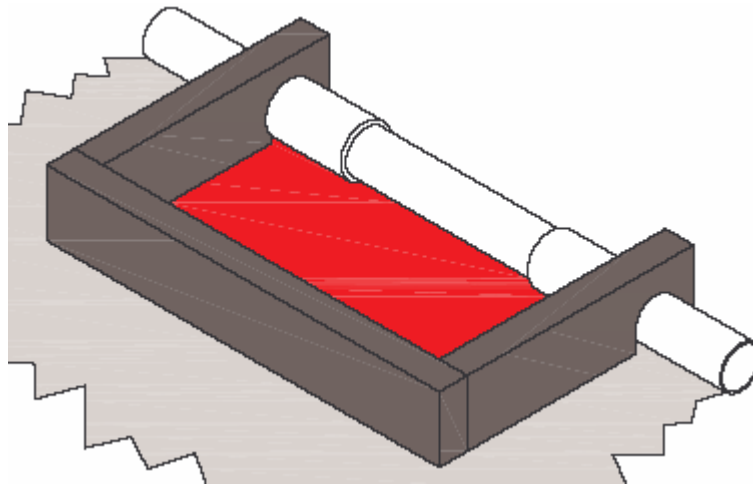
The energy used by the devices in the competition must come solely from:

- A change in altitude of the center of gravity of the device
- Energy stored by deformation of any springs on the additional materials list
- Electrical energy delivered by the battery to the electronics and motors provided with the kit.

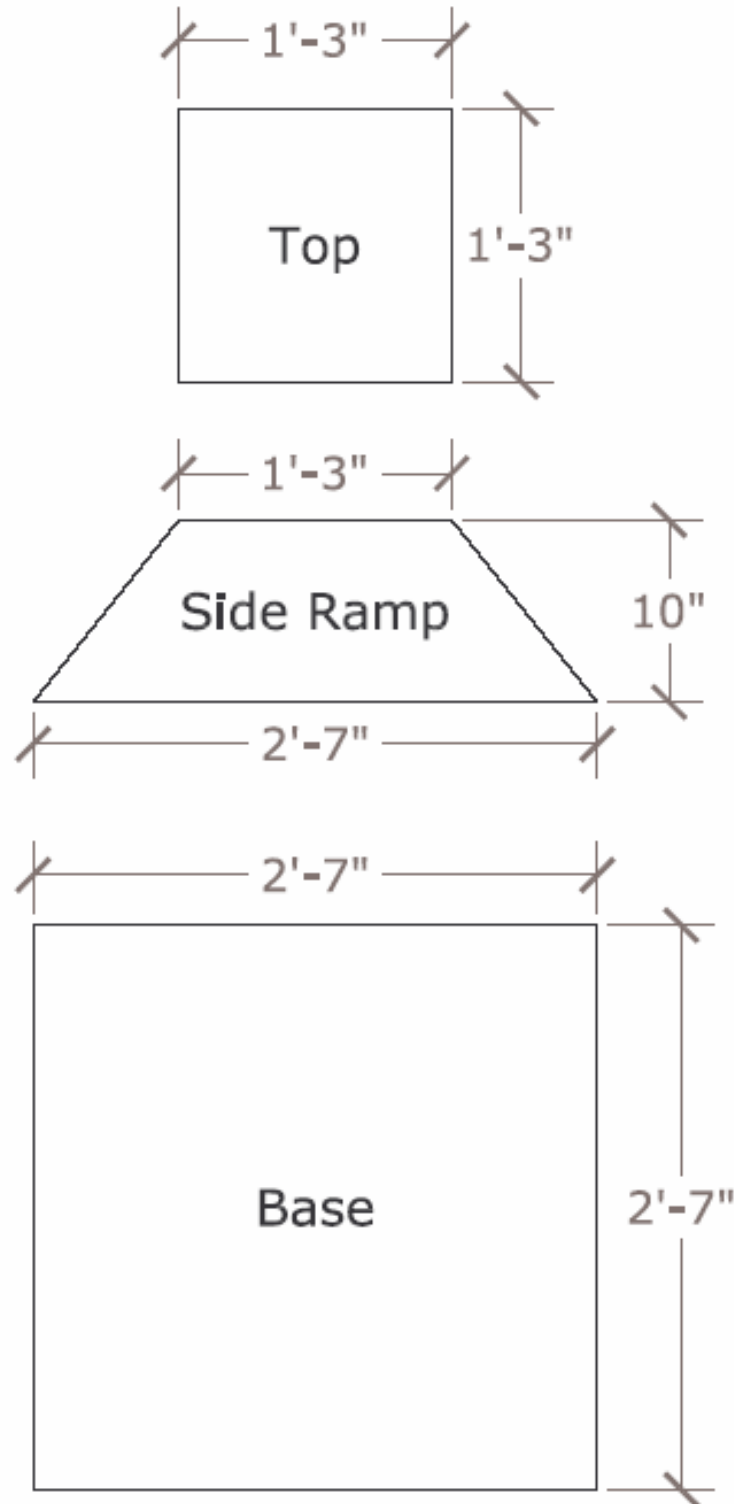
7. Appendix

SSA Position Determination Chart		
Die	Red Alliance SSA Location	Blue Alliance SSA Location
1	1	3
2	3	1
3	2	2
4	2	3
5	3	3
6	1	1
7	3	2
8	2	1
9	1	2
10	2	2

Table 1: This chart indicates the match position for the Shifting Scoring Areas, based on a roll of a 10-sided die before each match.



Drawing 1: This drawing illustrates the physical appearance of a WSA on the playing field. **NOTE:** The 18" width of the WSA is measured between the inside faces of the boards, and the 9" depth is measured from the inside face of the front board to the inside vertical tangent of the PVC pipe.



Drawing 2: This drawing indicates the physical dimensions of the pieces that form the ramp. It is necessary to note that 10" is the length of the material that forms the side of the ramp, and is not the same as the 6" height of the ramp if viewed assembled, from a side view.