

Double Cross is played by two ALLIANCES in the arena. One ALLIANCE is the Red Alliance, the other the Blue alliance. Each ALLIANCE will consist of two robots. All points and rules will apply to the ALLIANCE as a whole unless otherwise specifically stated.

The general goal of Double Cross is to move SCORING OBJECTS to the opposing ALLIANCE side of the field.

SCORING OBJECTS include NEUTRAL BALLS, ALLIANCE BALLS, and BONUS BALLS.

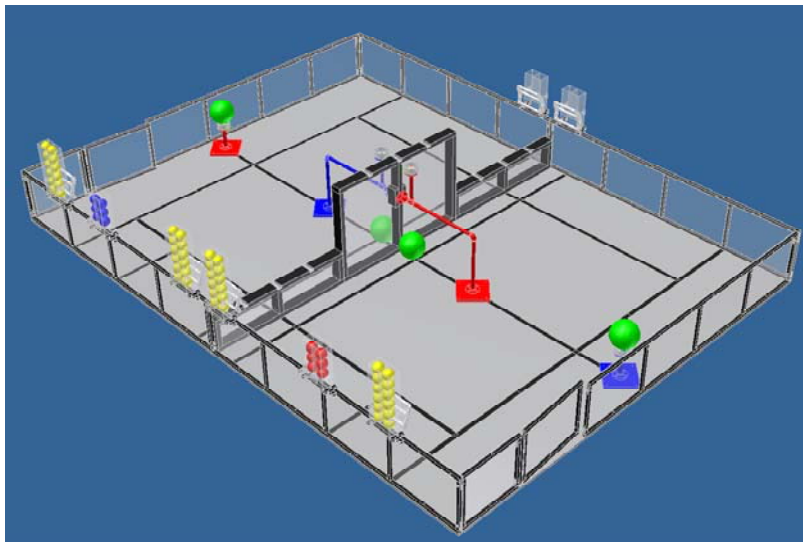


Figure 1 Double Cross Field Layout

Field Dimensions

The Double Cross field measures 12' x 16', and is played on top of 6 sheets of 4' x 8' plywood. The perimeter wall is 1.25" wide, and consumes part of the arena space. Therefore, the inside dimensions of the field are 141.5" x 189.5". Detailed specifications of the field are available.

Starting Conditions

At the start of the game, BALL DISPENSERS on each alliance side will hold SCORING OBJECTS. Three ball dispensers per alliance side. Two of the ball dispensers will hold 12

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NEUTRAL BALLS each. One will hold 6 ALLIANCE BALLS. One BONUS BALL will be placed on each PEDESTAL. One BONUS BALL will be placed on the floor under the ALLIANCE SCORING STRUCTURE. In addition, the division wall will hold 9 NEUTRAL BALLS.

Robots will be positioned on the field as per requirements in the rules.

Timing

The START PERIOD is the initial 22 seconds of Autonomous Robot Operation. Robots are free to move about the field and score points. At the 22 second mark of the game, automated ball dispensers will release the NEUTRAL BALLS onto the field.

The TELEOP PERIOD follows immediately with 66 seconds of optional tele-operated mode. If desired, teams may control their robots using remote control devices. At the end of the TELEOP PERIOD, robots MUST stop responding to any remote control devices and enter a purely autonomous state.

The END PERIOD follows immediately with 33 seconds of purely Autonomous Robot operation.

Scoring

All scoring is done at the end of a match. The final positions of all scoring objects determine the score. No SCORING OBJECT will be counted more than once. A SCORING OBJECT which is in position qualifying to be scored more than once will be worth the highest number of points for a single count.

ALLIANCE scoring counts the number of SCORING OBJECTS on the opposing ALLIANCE SIDE of the field. SCORING OBJECTS are tallied as follows:

- NEUTRAL BALL in ELEVATED POSITION: 0 points (low or high)
- NEUTRAL BALL in SCORING POSITION: 1 point each

- ALLIANCE BALL in SCORING POSITION: 5 points each
- ALLIANCE BALL in ELEVATED POSITION (low wall): 11 points each
- ALLIANCE BALL in ELEVATED POSITION (high wall): 22 points each

- BONUS BALL in SCORING POSITION: 11 points each
- BONUS BALL on a PEDESTAL: 22 points each

Bonus Points: In addition to the alliance scoring, each ALLIANCE can earn bonus points on their own side of the division wall.

- A ROBOT which is in HANGING POSITION will earn 22 points
- BONUS BALL in SUPER SCORE POSITION will earn 33 points

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<GP> Game Play Rules

Starting Conditions

1. Robots start each match on their ALLIANCE SIDE of the division wall.
2. Robots start the game with at least one point of their starting volume touching the alliance player station wall.
3. Robots may be placed anywhere along the alliance player station wall.
4. The starting volume must be in contact with the FLOOR (i.e. your robot must be touching the FLOOR at the start).
5. Ball Dispensers are pre-loaded with a fixed number of balls. The neutral dispensers will each hold 12 neutral balls. The alliance ball dispenser will hold 6 ALLIANCE balls.
6. Nine (9) NEUTRAL scoring balls will be placed on top of the DIVISION WALL in ELEVATED POSITION.
7. A BONUS BALL is positioned on PEDESTAL position on each alliance side.
8. A BONUS BALL will be positioned on the FLOOR below the ALLIANCE GOAL STRUCTURE on each side.

Field Interactions

9. Robots are NOT allowed to intentionally or by side effect modify the field, field structure, coloring, or otherwise cause a permanent change in the condition of the field. The tournament expects that some minor cosmetic damage will occur during the playing of the game. A robot causing permanent changes to the field may incur a STOP penalty for the current match. It may also be required to undergo an additional level of robot inspection.
10. NEUTRAL BALL dispensers can be mechanically activated to release their load of balls at anytime during the match.
11. ALLIANCE BALL dispensers can also be electrically activated to release their load of balls at anytime during the match. However, the electrical activation device for the ALLIANCE BALL dispenser is substantially different than the device for the NEUTRAL BALL dispenser. Specifically, the ALLIANCE BALL DISPENSER and its electrical activation switch are located on opposing ends of the ALLIANCE SIDE. Robots are NOT allowed to mechanically open the ALLIANCE BALL DISPENSER.

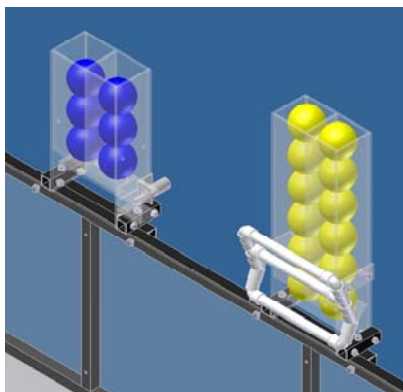


Figure 2 Alliance (Blue) and Neutral Dispensers

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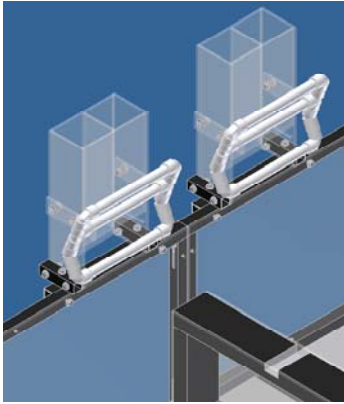


Figure 3 Alliance Dispenser Switch

Perimeter Wall

12. Robots are permitted to touch the inside face of the perimeter walls.
13. Robots are permitted to touch the top face of the perimeter wall and the outside face as incidental contact. No mechanical advantage may be gained. Breaking this rule results in a STOP PENALTY.
14. The top of the perimeter wall may not be even, may have undocumented attachments, devices, fasteners, or other objects attached.
15. Robots are NOT allowed to contact the floor outside of the perimeter wall. Breaking this rule will incur a STOP PENALTY.
16. Robots are NOT allowed to climb, hang, or use the perimeter wall to leave the surface of the FLOOR during game play. Breaking this rule will incur a STOP PENALTY.
17. Robots are NOT allowed to extend more than 12 inches outside the perimeter wall. Breaking this rule will incur a STOP PENALTY.

Division Wall

18. Robots are not permitted to climb on, attach to, or hang from the DIVISION WALL. Robots are not allowed more than incidental contact with the opposing ALLIANCE SIDE of the division wall. Holding position by using the ALLIANCE side is not allowed and will incur a warning from the referees. Repeat offenders are subject to a STOP PENALTY.
19. At no time may the apparent or actual center of gravity for a robot enter the opposing ALLIANCE SIDE. (In other words, stay on your own side of the DIVISION WALL). Violations will result in a STOP PENALTY.
20. The DIVISION WALL has a neutral area which is the thickness of the wall. Robots are allowed to extend a maximum of 12 inches into the opposing ALLIANCE SIDE. Robots extending more than the maximum into the opposing ALLIANCE SIDE will be subject to a STOP PENALTY.

Alliance Goal Structure

21. Each alliance side has an ALLIANCE GOAL STRUCTURE which is connected to the DIVISION WALL. Teams are permitted to hang, climb, and otherwise interact with the ALLIANCE GOAL STRUCTURE.

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Robot Interactions

22. Direct robot interactions are going to occur along the division wall. This is expected to be a vigorous area of the competition. Your robot should be designed with the expectation that you may come in contact with other robots along the division wall.
23. Blocking of the transfer of scoring objects is expected, and will likely take many forms. It is legal and expected for teams to devise methods of preventing the transfer of scoring objects from one side to another.
24. Blocking may result in direct contact with another robot.
25. A robot may not pin, hold, or intentionally entangle another robot. Infractions will result in a warning to release from the referees. Failure to comply within 3 seconds will result in a STOP PENALTY.
26. Intentional damage or devices that extend into the opposing alliance that appear to be designed to entangle are not allowed. Playing methods that cause intentional damage or entanglement are not allowed. Both will incur a STOP PENALTY and may also incur a SPIRIT OF THE GAME disqualification.

Penalties

27. A robot touching the FLOOR of the opposing alliance side will result in an immediate STOP PENALTY.
28. A robot which leaves the perimeter of the playfield will incur an immediate STOP PENALTY.
29. A human touching their robot after the START period will incur an immediate STOP PENALTY. Intentional use of this rule to gain points is against the SPIRIT OF THE GAME and also subject to a SAFETY OVERRIDE.
30. Robots engaged in activities against the SPIRIT OF THE GAME will incur an immediate STOP PENALTY.
31. Robots engaged in activities determined to be unsafe will incur an immediate STOP PENALTY.

Scoring Objects

32. All scoring is done at the end of a match. The final positions of all scoring objects determine the score.
33. Any scoring object that leaves the playfield during play will be left off the field for the duration of the match.

<GD> General Definitions

ALLIANCE – Two robots working together for a common score. Alliances are designated as the RED or BLUE alliance while on the field.

ALLIANCE GOAL STRUCTURE - is defined as the steel pipe assembly on an ALLIANCE SIDE, including iron pipe, fittings, and flanges but excluding the plastic parts of the SUPER SCORING POSITION pedestal.

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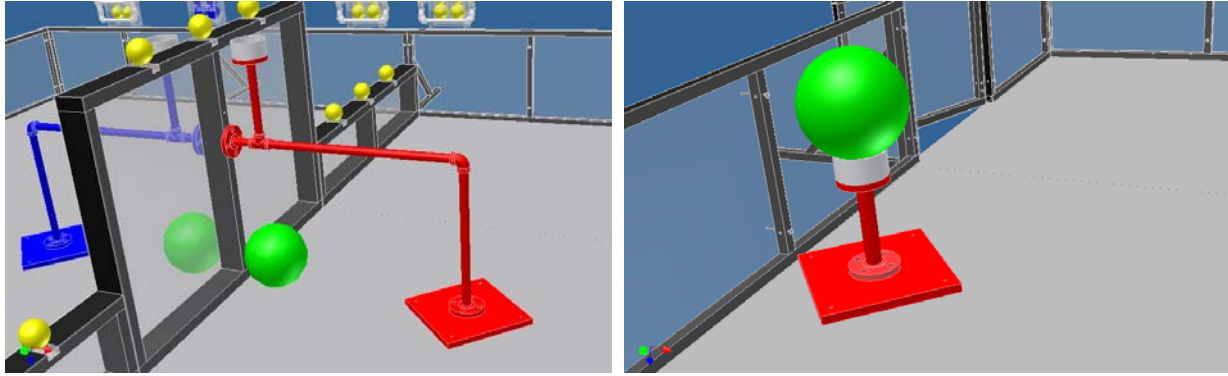


Figure 4 Alliance Goal Structure

ALLIANCE SIDE – Half of the playfield on which ALLIANCE robots play the game. There are two ALLIANCE SIDES. The RED and BLUE sides. An ALLIANCE SIDE is defined as the volume of space on the inside of the walls of the perimeter wall and the division wall of the arena extending upward 6 feet.

AUTONOMOUS MODE - The robot is making all control decisions without accepting input from the driver station or any other active signaling device. The only valid input accepted from the driver station is the STOP COMMAND.

BONUS BALLS – There are two BONUS BALLS on the field. They are 8.5" Green Playground balls.

DIVISION WALL – This is a wall structure that separates the RED and BLUE alliance areas. The wall has three sections. Two are low sections. One is the high section.

ELEVATED POSITION – In the NEUTRAL ZONE on the top of each section of the DIVISION WALL, there are 1.5"W x 3.5"L x 0.5"D grooves in the wall. These are the ELEVATED POSITION locations. To be valid, the SCORING OBJECT in the ELEVATED POSITION must be in contact with two edges of the grooves, and the object needs to extend below the plane of the top of the wall. In plain English, the ball needs to be resting in the groove.

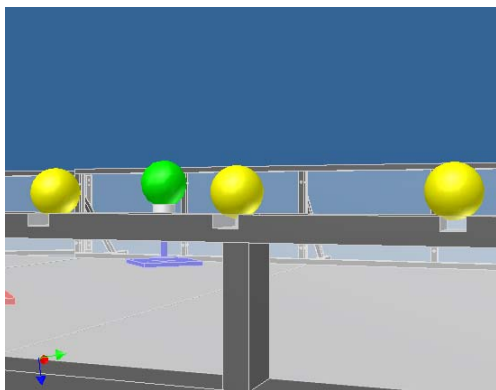


Figure 5 Elevated Position w/grooves

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END PERIOD - The last operational period of the game in which your robot is required to be in AUTONOMOUS MODE.

FLOOR - The FLOOR of the alliance side is defined as any horizontal surface that is part of the playfield, excluding any steel parts such as the ALLIANCE GOAL STRUCTURE. Screws and fasteners are considered part of the horizontal surface.

HANGING POSITION - A robot is in hanging position when no part of the robot touches wood or painted wood surfaces of an ALLIANCE SIDE. Robots may be attached or supported by any part of the ALLIANCE GOAL STRUCTURE. Robots must remain in HANGING POSITION for 10 seconds after the END PERIOD has expired.

NEUTRAL ZONE – A volume extending vertically above the DIVISION WALL. The volume is bound by the planes forming the inside edges of the ALLIANCE SIDES. It is 3.875" wide, 8' long, and extends vertically to 6' above the surface of the arena.

SCORING OBJECT – For each alliance, there are two types of SCORING OBJECT. There is a neutral ball, and an alliance ball. The color of the alliance ball MUST match the color of the alliance (Red or Blue). The neutral ball is yellow in color. As example, the Red ALLIANCE has scoring objects which are neutral in color, and RED in color. BLUE does not count.

SCORING POSITION – A SCORING OBJECT is in SCORING POSITION when it is completely within the opposing ALLIANCE SIDE. The only exception is that a BONUS BALL in SUPER SCORING POSITION counts for the alliance.

START PERIOD - The first operational period of the game where your robot is required to be in AUTONOMOUS MODE.

STOP COMMAND - The robot shall remotely monitor the drivers station for an indication of a STOP COMMAND. The STOP COMMAND can either be an explicit data command and/or it can also be inferred from a lack of control signal from the drivers station (i.e. the driver station is switched off or stops transmitting)

STOP PENALTY – When issued a STOP PENALTY, the controllers for the specific robot must command the robot to enter the STOP STATE for the duration of the match. A STOP PENALTY is issued to a specific team. The alliance partner for the team receiving a STOP PENALTY may continue the game. A STOP PENALTY does not result in a loss of points for the alliance.

STOP STATE - All motors, pumps, motion devices, servos, or any other device capable of generating any type of mechanical force is not energized.

SUPER SCORE POSITION - A pedestal exists on each ALLIANCE SIDE attached to the HANGING STRUCTURE. The SUPER SCORE POSITION is a pedestal holder on each HANGING STRUCTURE at approximately 33" above FLOOR level. A BONUS BALL may be placed into the SUPER SCORE POSITION to score points for the ALLIANCE. In plain English, any BONUS BALL in the SUPER SCORE POSITION on your own side scores for your ALLIANCE.

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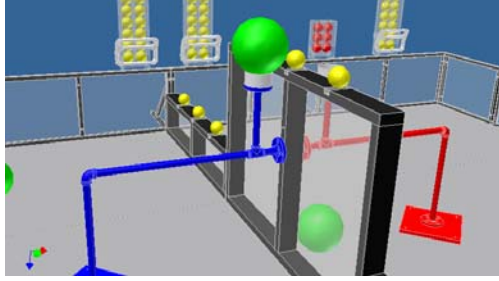


Figure 6 Blue side with super score bonus ball

TELEOP MODE - The robot is making control decisions with the aid of inputs send from the drivers station. (aka Remote Controlled, Tele-Operated)

TELEOP PERIOD - The period of the game where your robot may respond to driver station inputs.

Statement of Intent

This game is intended to provide a fun vehicle for SRS members to interact with the community. We intend to mix up the SRS, FIRST, VEX, WAR, and other robot communities in a game that allows us to play together. By doing so, we will all learn from each other, work together, and have a great time doing so.

This game is intended to be a fun activity for the spectators who visit Robothon. This game balances technical challenges with audience appeal. The game is designed so the audience can clearly determine how well teams are doing during the contest, and easily understand the goals and scoring of the game. We want the audience to cheer for their favorite team. It is easier to do that if they can understand the game visually.

This game is intended to encourage maximum participation. We intend to strike a balance between autonomy and tele-operation, skill levels, and budget. Our intent is for this game to be fun and interesting enough for robot builders of all experience levels and access to resources to be able to compete together.

Gracious Professionalism and You

One of the hosts of this event is FIRSTWA. FIRST students from across the state will be participating in this event. These students are involved in an international program which has a strong ethical component called Gracious Professionalism. This ethos is a powerful guiding principal, and one that is inviting to participate in. FIRST encourages participants to be helpful, respectful, and encouraging to all competitors.

We ask that all participants respect and adopt Gracious Professionalism for their time with us.

This powerful idea is actually quite easy to implement, and a nice way to spend your day. Be prepared to help your opponent and your partner get their robot ready to function, provide whatever assistance you can, and be very gracious in both your success and your defeat. On the field, compete with intent to win. We expect you to do your best to win. Regardless of the outcome, behave with grace, class, style, and respect!

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<GR> General Rules

We are making every effort to keep the number of rules in this game to a minimum. We have opted to do so knowingly running the risk of someone finding a set of circumstances by which the rules will allow them to avoid the spirit and intents of the game or to allow situations where the safety of participants and spectators might be compromised. The organizers of the game have decided to insert two rules that allow us to mitigate such circumstances if we determine that the interests of the game or safety are in jeopardy.

Spirit of the game

This game is intended to be challenging, competitive, cooperative, fun, and an interesting challenge. Your robot will be randomly paired with another robot during the contest, and you will compete in that round with your alliance partner. The next round, you will be paired with someone else. There will be ups and downs as you are paired randomly with teams who may more capable or less capable than your own. Work with your alliance partners. Be helpful, be creative, competitive, and gracious at all times.

This contest is NOT a battle or damage based contest. Your robot should plan on playing the game fairly and appropriately. Robots should not plan on disabling, destroying, jamming, flipping, or otherwise interfering with the opposing alliance robots unless specifically allowed in the game rules. If you are thinking about some sort of weapon (offensive or defensive), or game play tactic that is designed to cause damage to other robots, you are not in the spirit of the game. Robothon has other great contests if that is your intent (check the Western Allied Robotics group, also part of the SRA).

Compete like crazy, compete to win, we expect you to.

Rather than generate every possible permutation of the enclosed rules, we have opted to keep the rules minimal. To keep things fair and simple, we reserve the right to invoke the mother of all rules:

<GR1> The SPIRIT OF THE GAME rule: At the discretion of tournament officials, a robot or team which technically follows every rule in this guide may still be disqualified for competing against the SPIRIT OF THE GAME. At the discretion of tournament officials, a robot or team disqualified for competing against the SPIRIT OF THE GAME may be reinstated if the offending feature or practice is modified to be in compliance with the SPIRIT OF THE GAME.

The tournament officials take the responsibility of invoking <GR1> very seriously and will only use this rule to insure fair play to all participants. We know this is a doomsday rule! We hopefully will never have to use it.

Safety Override Rule

<GR2> SAFETY OVERRIDE Rule: At the sole discretion of tournament officials, a robot or team which is deemed to be unsafe for any reason may be disqualified from the tournament. A SAFETY OVERRIDE disqualified robot or team may be reinstated at the sole discretion of tournament officials if the safety issue is adequately addressed or mitigated.

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The tournament officials take the responsibility of invoking <GR2> very seriously and will only use this rule to insure safety at all times.

<T> Tournament Play

Alliance Rules

An alliance consists of a pair of robots who work together to achieve the goals of the game. The game allows for two alliances: The Red Alliance and the Blue Alliance. Points and success (and disappointment!) are awarded to the alliance, not to individual teams. It is in your best interest for both robots to perform well on the field.

Qualification Rounds

Alliance pairings during the qualification matches are randomly assigned by the tournament director before the tournament begins. Each round consists of a set of matches. Each match is played between two alliances. Alliance partners are awarded qualification points based on their win-loss record. Match winners are awarded 2 qualification points, while the losing alliance is awarded zero qualification points. A tied match will split the qualifications with 1 point per alliance.

Alliances are also awarded ranking points in the form of their alliances final score. Seedings for the elimination rounds are sorted first by win-loss record, then by ranking points.

Elimination Rounds

Top 4 seeded teams from the qualification rounds will be able to select their alliance partners for the Elimination rounds. A total of 4 alliance pairings will be selected to play a semi-final and final rounds. Each level is best 2 out of 3.

<SR> Safety Rules

1. This tournament is just a game. We expect everyone to be safe at this game. We will not risk the safety of any person for the sake of playing this game. Teams must adhere to all of the safety rules at all times.

Participant Safety

2. All participants will behave in a manner consistent with providing a safe working environment for themselves and the people around them. Participants include anyone working directly with the robot, in the robot pit area, driving or operating the robot, and anyone within 5 feet of the playfield.
3. Safety glasses or other OSHA approved eye protection is mandatory in the designated 'PIT' area, within the 5 foot safety zone around the field, and while in the presence of any operating robots, tools, or other potentially dangerous situations.
4. Anyone using power tools will observe all appropriate safety measures, including proper clothing and proper procedures, to insure the safety of themselves and those around them.

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Spectator Safety

5. Spectator safety will be the direct responsibility of all participants in this tournament, and will take precedent over any other activity. In practical terms, this means participants will not subject the spectators to direct or indirect risk if the spectators are outside the 5 foot safety zone surrounding the field. This includes, but is not limited to, robots which throw objects, robots with devices designed to store potential energy that could endanger the spectators, or robots driving outside the field in an unsafe manner.

Field Safety

6. Field safety involves your robot not doing damage to the field or its components (scoring objects or field elements robots interact with). In general, your robot should finish with the field and arena in the same condition as the start of the match. Minor wear of the field FLOOR and occasional scuffs and dings of the field are expected to occur. Removing of paint, deformation of the playfield surface, or any other damage to the field may result in a safety override if you are unable to compete without causing such damage.

<R> Robot Construction Requirements

Materials, Size and weight

1. Robots may be built from any material that does not otherwise violate the rules of this game. No materials may be hazardous in nature.
2. Tape may NOT be used as a fastener. Tape may be used to attach decorations, logos, or other non-functioning and non-weight bearing objects. Duct Tape and other derivatives are NOT allowed. Electrical tape may be used as an insulator and for wire control.
3. Robots will start the match fitting entirely into a volume of 18" x 24" x 24".
4. After the official start of the game, your robot may increase its bounding volume to 36" x 36" x 46". At no time may your robot exceed this bounding volume in any dimension. This includes any arms, manipulators, or other structures. Note: Robot parts that have unintentionally separated from the robot, and are not active in anyway, are exempt from the bounding volume rule. Violations will incur a STOP PENALTY.
5. The robot is limited to reaching no further than 12" outside the arena footprint. This is also a safety rule, and will be very strictly enforced. Violations will incur a STOP PENALTY and may result in a SAFETY OVERRIDE or additional inspection.
6. A robot on the field may not weigh more than 45 lbs.
7. Wheels, feet, or other devices that touch the FLOOR of the arena should be designed so that they cause no damage to the field. Spikes, screws, heavy steel treads, or other devices that cause damage to the plywood FLOOR are not allowed. (In general, wheels and feet should contact through rubber or plastic non-marring materials).
8. The center of mass of a robot may not exceed an elevation of 14" from the FLOOR, except in the case where a robot is attempting to hang as allowed by the game rules. Violations will incur a SAFETY OVERRIDE. [Note about the intent of this rule: The arena walls are for the protection of the participants and spectators. By keeping a limit on the center of gravity, we are hoping to help prevent your robot from tipping over into the safety zone outside the arena.]

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Energy Restrictions

9. Robots must be primarily operated by electricity from batteries. No hydrocarbon, steam, or other heat / exhaust generating energy sources are allowed.
10. Robots may use onboard pneumatics, but are restricted to 120 PSI for reserve storage, and no active component may use more than 60 PSI. Accurate and operating gauges, regulators, and pressure switches are required on all pneumatic systems.
11. All pneumatic components MUST be commercially available parts. We do not allow homemade pneumatics. (Note: PVC Schedule piping, aka plumbing parts, may NOT be used in the pneumatic system as failures of such materials are often explosive and unsafe)
12. Stored potential energy (springs, pneumatics, etc) must be declared and inspected. All potential energy storage mediums MUST have a safe and practical way to release the maximum accumulated energy without causing risk.
13. For safety and practical reasons, no fluid power except pneumatics for this competition. [Note: Leaking oil has been known to cause damage to fields and also pose a risk to the spectators]

Restrictions

14. Locomotion speeds for your robot are going to be limited to 6 feet per second (4mph). In a 12' x 8' alliance arena, this is very fast. This speed limit is to set some safety limits so you don't break the field, your alliance partner, or endanger the spectators.
15. Flying objects, such as scoring objects, are limited to a total flight distance of 8 feet when tossed/thrown/shot at a 45 degree angle relative to the playing surface. The intent of this rule is to allow you to 'toss' objects to the other side of the field. By toss, we mean a parabolic flight that has little chance of hitting the spectators. If your robot is able to throw objects further than 8 feet, you have exceeded a safety rule.

Electrical

16. To avoid fires, we require that your robots electrical system be thought through carefully. We highly recommend using circuit breakers for your main wiring system. (FIRST teams, follow the FIRST electrical rules and you will be in great shape!).
17. We require that all robots have a main power switch that is easily accessible in the event of an emergency shutdown. This switch should be clearly marked so that a referee or field attendant can easily spot it and shut your robot down if required.
18. Main battery connections and main bus connections must be insulated to prevent an accidental short circuit. There is going to be another robot on the field with you. You need to protect against an accidently short circuit.
19. Robots are often times subject to interaction with the field. ALL ROBOTS will have their batteries secured to their chassis in a sound way that can withstand impacts with the field and/or tipping of the robot.
20. Robots must be electrically isolated from the chassis. Do not use your chassis as a common ground plane. During inspection, we will verify that your robot chassis is not tied to your electrical system.
21. Any robot with voltages of more than 16 volts onboard MUST have a warning label(s) clearly visible on 4 sides declaring the highest onboard voltage. This label must use a

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minimum of 1.5 inch high lettering with a .125" stroke, be highly visible. We prefer a red hatch warning label.

<C> Control system requirements

Because we have so many different programs coming together to compete with each other, we are not going to require a specific control system for you to use or interface with. Your choice of control system is entirely up to you as long as it can adhere to and demonstrate the following rules.

1. All control systems must have a method of quickly entering the STOP STATE in the event the robot is creating an unsafe condition on the field, or in the event of a disqualification or STOP penalty.
2. In the event of a loss of control signal, your robot is required to enter the STOP STATE.
3. All control systems MUST be limited to the robot and the controls brought to and operated only in the clearly marked drivers station area next to the field.
4. Spectators and/or team members are not allowed forms of active external electronic remote control and/or electronic communication with the robot OR the drivers station (including but not limited to electronic signals, lights, IR beacons, bluetooth, iPhones, or such similar devices). Teams may NOT use active electronic signaling devices to direct your robot unless such devices are in the drivers station. Tournament officials will be actively scanning for such items using a variety of sophisticated detection equipment. Teams in violation of this rule are cheating, subject to a STOP PENALTY, disqualification, will be declared to be in violation of the SPIRIT OF THE GAME, highly unlikely to be reinstated (or ever invited to another ROBOTON event), and will be asked to leave the event.
5. Robots are allowed to use onboard video cameras, audio sensors, or other self contained devices to sense their environment. Robots are not allowed to use or communicate with sensors located outside of its current legal bounding volume.
6. Onboard systems using LASERS and/or other high powered emissions must be declared, rigorously inspected, and determined to be safe for all participants and spectators BEFORE the robots are allowed on the field. At no time may the robot expose the spectators or participants to direct LASER or other high powered emissions.
7. All teams are responsible for resolving interference between control systems for themselves. You must have the ability to uniquely filter your own data packets / control system packets. The event arena will be loud with noises (music, crowd, unknown sounds). The event area is likely to be awash in various IR light sources (beacons, cameras, unknown sources). The event area lighting is going to be variable (there may be a skylight with direct sunlight, stage lights). If you are using R/C controls, bring several options for crystals. If you are using digital transmissions, plan on tagging each data packet with your unique identifier or use a secure WiFi connection.
8. All control systems must have the ability to time the match on their own. On a start signal from the referees, all teams will have a single switch, button, or other signal to their robots to begin the game.

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9. This game has distinct time periods that your control system must provision for. These time periods are required, and your robot will need to demonstrate these during robot inspection.
 - 9.1. START PERIOD. At the start of the game, your robot control system shall run for 22 seconds in AUTONOMOUS MODE.
 - 9.2. TELEOP PERIOD. Immediately following the START PERIOD, the robot may enter TELEOP MODE. This period will last 66 seconds.
 - 9.3. END PERIOD. Immediately following the TELEOP PERIOD, the robot enters the 33 second END PERIOD. During the End Period, your robot will be running in AUTONOMOUS MODE.
 - 9.4. STOP. Immediately following the End Period, your robot must disable all powered devices except the main controller. This is known as STOP MODE. All motors, pumps, servos, or other motion devices must enter a non-energized state. Indicator lights, decorative lights, and the AMI are exempt from this rule, and may be powered in STOP mode.
10. Autonomous Mode Indicators (AMI) are required on each robot. This indicator will allow the spectators and tournament officials to determine when a robot is operating in AUTONOMOUS mode vs operating in TELEOP mode. This indicator should be visible from 4 directions, be bright enough for everyone to see.
 - 10.1. Your AMI should flash at a rate of between .25 to 1.0 seconds when your robot is in AUTONOMOUS MODE.
 - 10.2. If possible, your AMI can be colored to match your current ALLIANCE color. You can flash BLUE while on the BLUE ALLIANCE, and likewise RED on the RED ALLIANCE.
 - 10.3. If your AMI is not capable of switching colors, we require that you use GREEN or YELLOW as a neutral color to be used on either side.
 - 10.4. As a bonus, there will be a subjectively judged award for the Best Indicator. We hope this will inspire you to be creative. The AMI adds some visual clues and sparkle to the game. The cooler for the audience, the better we will all look. We look forward to your efforts.
 - 10.5. Check the Robothon Tournament Technology page for canned ideas on how to implement an AMI.
11. Control System Interference is not allowed. No team may, on or off the field, generate an active signal that interferes with the operation of another teams robot or control station. No EMI generators, Denial of Service attacks, radio jammers, or any other such devices or methods. Such deliberate interference is cheating, against the SPIRIT OF THE GAME, will result in a disqualification, and violators will be asked to leave the event.