

INVOLUTION™

Competition Rules

Merriam-Webster Dictionary

Main Entry: **¹in·vo·lute**

Function: *adjective*

Etymology: Latin *involutus* concealed, from past participle of *involvere*

1 a : curled spirally **b** (1) : curled or curved inward (2) : having the edges rolled over the upper surface toward the midrib <an *involute* leaf> **c :** having the form of an involute <a gear with *involute* teeth>

Table of Contents

Field Layout2
The Robot.....3
The Game4
Penalties6
Competition Structure7
Suggested Awards8

VisualEdge, the VisualEdge Logo, Involution, and Game-in-a-box are trademarks of VisualEdge, Incorporated in the United States and/or other countries. All other trademarks are the property of their respective owners.

This material may not be reproduced, redistributed, or manipulated in any form except under explicit license from VisualEdge, Incorporated.

Field Layout

Playing Field Dimensions

The field is 8'x8' square. It will be placed on two 6' or 8' tables, elevating the field to approximately 3-1/2' feet from the floor for player access and comfort.

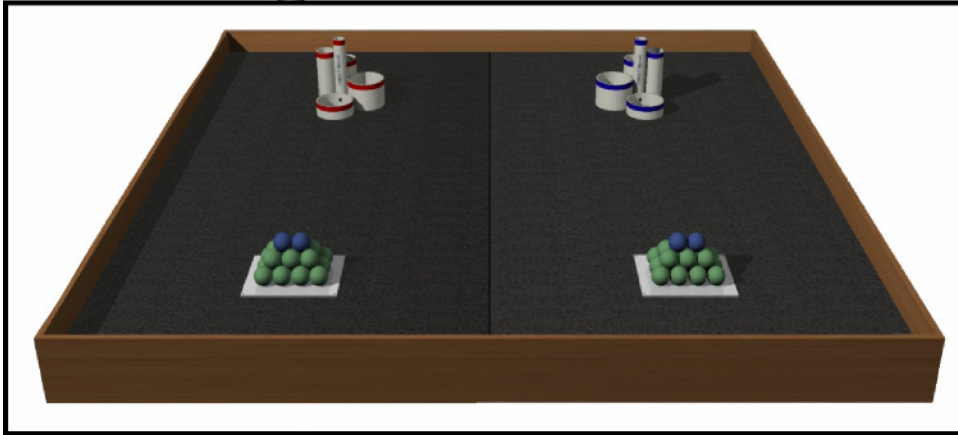


Figure 1. Rendering of the INVOLUTION™ game ready for play.

Ball Stands

The playing field contains two ball stands. These stands are 1/4" thick and are 11-1/2" long and 9-1/4" wide. Each stand contains twelve 3/4" diameter holes which are 2-3/8" away from each edge and spaced 2-1/4" apart. See the illustration below.

These stands are to be positioned approximately two feet from the corners opposite the scoring goals.

Scoring Goals

Two goals, one red and one blue, are aligned with the ball stands on the opposite end of the playing field. The goals are made from standard PVC pipe.

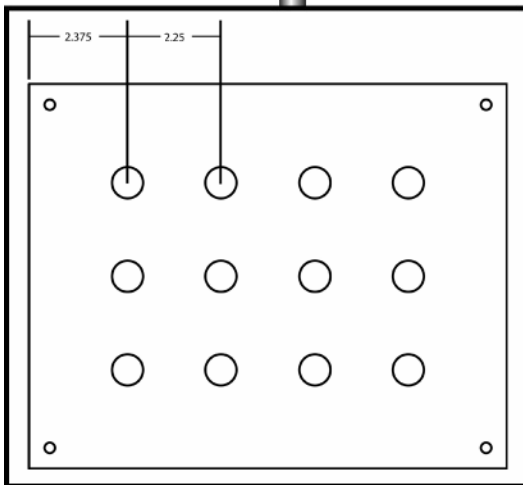


Figure 2. Ball stand diagram.

The Robot

Specifications

At the beginning of any match, the robot can be no more than 18"x18"x18" tall. There is not a maximum or a minimum weight requirement. During inspections, the robots will need to have their dimensions verified by using a measuring tape or by being 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). Robots may expand beyond their starting size constraints after the start of a match. You may choose to adjust this rule as necessary.

Each team is limited to one robot. The robots will be inspected prior to the competition to verify that the contents **use only VEX equipment**. This includes, but is not limited to: fasteners, servos, and structural components. **IF IT IS NOT IN THE SIZING BOX, YOU CAN'T USE IT!**

Robot Sizing Box – A box used during *robot* inspection which has interior dimensions 18 inches (45.72cm) wide by 18 inches (45.72cm) long by 18 inches (45.72cm) high. The *robot* must fit within the box without touching the box sides or top.

No glue, no tape, and only VEX upgrade kit materials can be used. The only exceptions are the use of non-VEX batteries and that mechanical fasteners may be secured using Loctite or a similar thread-locking product.

All robots should be tethered unless competing. Remote controls should not have a transmission crystal in them at any time inside the competition building. All teams will present their remotes and robot to the head referee for crystal assignment before each match. All crystals must be returned to the field referee after each match. Cortex Controllers are exempt from this rule.

The radio crystal when used, must be easily removed from the robot without any robot disassembly as radio crystals will be provided to each team for each match.

Only **ONE** robot will be allowed to compete per team in the INVOLUTION™ challenge. Though it is expected that teams will make changes to their robot at the competition, a team is limited to only **ONE** robot.

Every robot will be required to pass a full inspection before being cleared to compete. This inspection will ensure that all *INVOLUTION* robot rules and regulations are met. Initial inspections will take place during team registration.

If significant changes are made to a robot, it must be re-inspected before it will be allowed to compete.

Teams may be requested to submit to random spot-inspections by event personnel. Refusal to submit will result in disqualification.

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.

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.

The Game

Matches are played on a field initially set up as illustrated in the figures below. Two alliances – one “red” and one “blue” – composed of one or two teams each (depending on the specified competition format chosen), compete in each match. The object of the game is to attain a higher score than your opponent alliance by placing racquetballs into your colored goals. All robots will start the match between the scoring goals and the wall of the field on their respective color’s side of the field. A racquetball is considered scored in a goal if some part of the ball is within the two-dimensional space defined by the edges of the goal, and not touching a robot of the same alliance. A goal extends infinitely perpendicular to the playing field surface within the goal boundaries (balls may be stacked).

At the beginning of a match, each robot must not exceed a volume of 18 inches wide by 18 inches long by 18 inches tall. An offending robot will be removed from the match at the referee’s discretion.

During a match, the drivers and their coach must remain in their “Alliance Zone”. Refer to the illustration indicating the red and blue zone locations. The field referee occupies the open table edge.

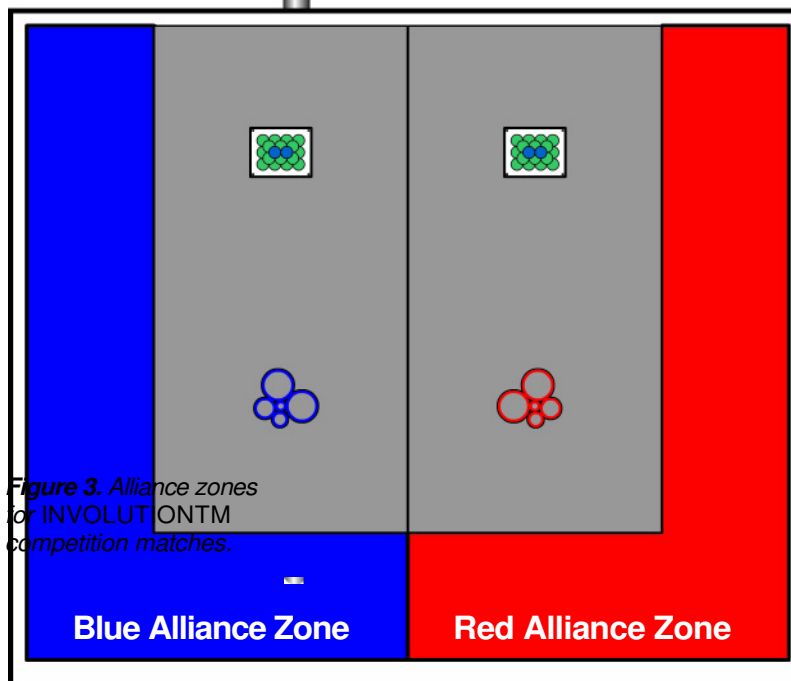


Figure 3. Alliance zones for INVOLUTIONTM competition matches.

Balls that leave the playing field are considered out of play. These balls will not be returned to the field until after the match is complete.

Balls cannot be intentionally discarded out of play by a robot.

Drivers and coaches are prohibited from making intentional contact with any game or field object. The first instance of intentional contact will result in a warning, with any following instances resulting in a disqualification. Disqualified robots will be disabled for the remainder of the match.

First 20 seconds will be autonomous mode only worth double points. 2 balls can be preloaded for autonomous mode.

During a match, robots may be remotely operated with default software only running in the on-board control system. If a coach touches his/her team's controls anytime during a match, the robot will be disabled and the team disqualified.

Scores will be calculated for all matches either immediately after the match or when all objects on the field come to rest.

Robots may not intentionally detach parts during any match, or leave mechanisms on the field. If a detached component or mechanism is attached to a goal and prevents additional scoring of balls, the team will be disqualified. Multiple infractions may result in disqualification for the entire competition.

Strategies aimed solely at the destruction, damage, tipping over, or entanglement of robots are not in the spirit of the INVOLUTION™ game and are not allowed. However, *INVOLUTION* is a highly interactive game. Some contact, tipping, entanglement, and damage may occur as a part of normal game play. If the tipping, entanglement, or damage is ruled to be intentional, the offending team may be disqualified. Entangled robots will be given a "10-count" by the field referee and will be allowed to be manually de-tangled by the team coaches.

If at any time the robot operation is deemed unsafe or has damaged the playing field, surface, or barriers, or scoring components by the determination of the referees, the offending team may be disqualified. The robot will require re-inspection before it may again take the field.

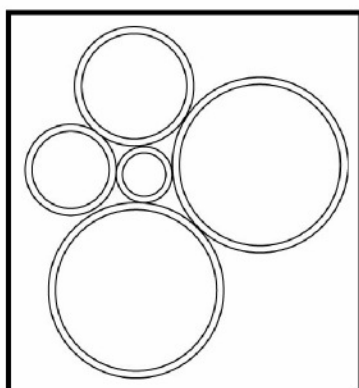
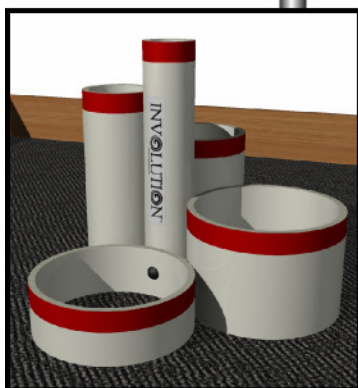
If a robot leaves the playing field for any reason, it will be disabled for the remainder of the match.

Scoring Components

Standard racquetballs will be used as the scoring elements. There are a total of 40 racquetballs available as scoring objects in the game. Thirty-six of these racquetballs will be green, while four will be blue.

Scoring Goals

The scoring goals consist of standard 2", 3", 4", and 6" diameter PVC plumbing pipe. The pipes are arranged as shown in the illustrations. The pipes are arranged around the central 2" diameter pipe and each one has a different height each 2" shorter than the previous:



2" diameter pipe is 10" tall
 3" diameter pipe is 8" tall
 4" diameter pipe is 6" tall
 6" diameter pipe is 4" tall
 6" diameter pipe is 2" tall

Figure 4. Rendering and diagram of the pipe layout for an INVOLUTION™ scoring goal.

Scoring

Points are achieved by collecting the racquetballs from the ball stands and depositing them into the goal. The different scoring values for each pipe are as follows:

Component	Height	Diameter	Green Ball*	Blue Ball*	Capacity**
Center Pipe	10"	2"	10 pts	15 pts	1
Pipe #2	8"	3"	4 pts	8 pts	~4
Pipe #3	6"	4"	3 pts	6 pts	~7
Pipe #4	4"	6"	2 pts	4 pts	~18
Pipe #5	2"	6"	1 pt	2 pts	~24
* Per ball scored					
** May vary					

Figure 5. Chart indicating ball capacity for each of the pipe of an INVOLUTION™ scoring goal.

Points will be totaled at the end of each match by the field referee.

Penalties

Referees have ultimate authority during the competition. **Their rulings are final!**

There is no penalty for removing a racquetball from a scoring goal.

There must be no human contact with the field. No warnings will be given. Field contact will result in a disqualification.

Ramming another robot in order to cause it damage is not allowed. It is up to the referee to use his/her discretion in the matter.

In case of catastrophic field failure the match will be replayed.

Pinning is not allowed. Any direct robot contact for more than ten seconds is considered pinning (even in the middle of the field). The first time is a warning, the second is a disqualification.

Any team with an operating remote control that is with transmission crystal and not tethered will be disqualified if they are not currently in a match. This is in consideration that everyone has access to the crystal set being used.

Competition Structure

Structure

Participating teams will begin the tournament by playing in several seeding matches. These matches are used to rank participants based on their overall record.

Once these matches have concluded, the top four ranking teams may choose their alliance partner for the playoffs beginning with the highest seeded team and so on.

Each alliance will then play a double elimination, round-robin tournament to determine the winner.

Teams

Teams may consist of two-three members.

One operator and one coach are allowed on the field during a match.

The operator and the coaches are free to move anywhere within their color's "Alliance Zone."

You may switch who is driver and who is coach before any match.