MAKEX V2.0

2022-2023 Makex Robotics Competition

RULES GUIDE

MAKEX EXPLORER

Edited By Makex Robotics Competition Committee

Updates:

Date	Version	Modifications Record
2021.09	1.0	2022 Season MakeX Explorer Rules Guide First Published.
2023.01	2.0	2022-2023 Season MakeX Explorer Rules Guide First Published. ● Updated the age requirement of contestants ● Deleted the "modification stage" in the competition procedure ● Optimized the ranking rules of elimination round ● Added the instruction of net in the goal area ● Added the "Flag placement area" and relative statement ● Elaborated the description of the environment flag ● Added the "Inserting Environmental Flag" mission into the automatic stage ● Elaborated the judgment statement of mission "Inserting Environmental Flag" ● Updated the statement of penalty in the operation rules ● Deleted the modification rules
2023.09	2.1	● Optimized some descriptions 3. Competition Procedure ● Added statement of the "Schedule Announcement" session 4.2 Arena ● Revised the dimension description in the goal area diagram

		4.4 Missions Introduction and Scoring State Judgement ● Optimized the description of the scoring state judgment in the mission "Inserting environmental flag" 4.6 Single Match Flow ● Optimized the description of “Preparation” stage 5.1 Specification for Robot Construction T03 Added description of “maximum extended size” T05 Optimized the specification description of “external battery” 5.2 Specification for environmental flag ● Optimized the description, added statement of the environmental flag 6.1 Penalty ● Deleted the “Verbal warning” penalty 6.2 Operation Rules ● Updated all statement of the operation rules, all offense behaviors shall follow the “escalation of penalties” mode Deleted the appendix of MakeX Explorer penalties list Updated the MakeX Explorer Self-check Form

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1. Introduction

1.1 About MakeX

MakeX is an international robotics competition and education platform that promotes multidisciplinary learning within the fields of science and technology. It aims at building a world where STEAM education is highly appreciated and where young people are passionate about innovation by engaging them in exciting Robotics Competition, STEAM Carnival, Tech Event, Educational Conference etc.

As the core activity of MakeX, the namesake MakeX Robotics Competition provides exciting, challenging and high-level competitions in the spirit of creativity, teamwork, fun and sharing. It is committed to inspiring young people to learn Science (S), Technology (T), Engineering (E), Art (A) and Mathematics (M) and apply such knowledge in solving real-world problems.

1.2 MakeX Spirit

Creativity: we advocate curiousness and innovation, encouraging all contestants to create unique high-tech works with their talent, and challenge themselves for continuous progress!

Teamwork: we advocate solidarity and friendship, encouraging all contestants to develop a sense of responsibility and enterprising spirit, and sincerely working with their partners for win-win development!

Fun: we encourage contestants to build a positive, healthy mindset in the competition. Enjoy the journey and grow in the process.

Sharing: we encourage contestants to have an open mind as a maker and share their knowledge, responsibility, and joy with everyone, including their teammates and competitors.

MakeX spirit is the cultural cornerstone of the MakeX Robotics Competition. We hope to provide a platform for all contestants, mentors and industry experts to exchange ideas, study and grow up, and help young people acquire new skills during creation, learn to respect others in teamwork, gain an enjoyable life experience in the competition, take delight in sharing with the society their knowledge and responsibility, and work hard to achieve their grand aspiration of changing the world and creating the future !

1.3 About MakeX Explorer

MakeX Explorer is a confrontational competition program for elementary and junior high school students aged 8-15. This program fully integrates the essence of sports events and is highly interesting and a delight to watch. The competition requires the contestants to design and build robots from scratch, which systematically develops the contestants' comprehensive abilities in robot design, mechanical construction, and programming. Also, the form of alliance confrontation improves the contestants' ability to solve imperative problems and develop strategic thinking.

2. Competition Application

2.1 Participation Requirements

Participants: Contestants shall participate in teams, the number of contestants is 2-4 for each team, with 1-2 mentor(s).

Age: Team members must be between the age of 8-15 (born between January 2, 2007 and December 31, 2015). The mentor must be at least 18 years old.

Team Roles: Everyone in the team can play their respective roles as operator, observer, mechanist, programmer and so on. In each competition, one team can only appoint 1 operator and 1 observer to participate. Each alliance includes 2 operators and 2 observers, and one of whom is designated as the captain of the alliance. The operator is responsible for operating the robot, and the observer is responsible for assisting the operator in observing the status of props and making suggestions.

Identification Symbols: Each team must have a team logo, team name, and team slogan. Teams are encouraged to use uniforms, flags, posters, badges, base decorations, etc. to show the team culture.

2.2 Registration and Application

Contestants and mentors that meet participation requirements can register on the designated competition webpage on MakeX official website (www.makex.cc/en). Each team should register with one registration form.

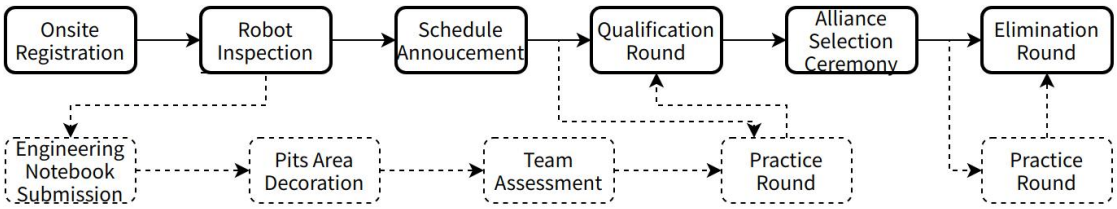
If participating team wants to change their members before competition, which leads to inconsistency with the registration information, they should inform MakeX Robotics Competition Committee in advance to finish re-registration.

For more details about the registration and application, please refer to MakeX Registration & Competition Application Guide

3. Competition Procedure

Participating teams shall pay close attention to related notices and Competition Guide published before each competition. If the rules have some updates in competition guide, the latest rules will be adopted for the competition. MakeX Competition Committee reserves the rights and final interpretation to amend competition rules and system based on actual situation of different competition.

The schedule for each competition is determined by actual situation, and generally



includes following procedures.

* Note: The solid line frame refers to the necessary procedure of each match, while the dotted line frame refers to non-essential procedure. The specifications of non-essential procedures can be understood based on **Appendix 5 Supplementary Explanation of Competition Procedure**. Please keep abreast of updates.

Onsite Registration

When a team arrives at the venue, mentors and contestants should show ID cards or other valid certificates (e.g., passport) for onsite registration and to get the competition material pack. Mentors must inform team members about the fire exit, match schedule, arena, pits area, etc. Onsite registration and robot inspection will be closed once the match schedule is announced.

Robot Inspection

The inspectors will strictly check the safety of robots on request. Teams can pre-check their robots in advance based on "**Appendix 3 MakeX Explorer**

Eco-Pioneer Robot Self-Check Form". The robot and self-customized environmental flag will be inspected before competition. If the inspection fails, the team needs to adjust their robots and check again until they pass the inspection. Those who fail to pass the inspection are not qualified for the competition.

Schedule Announcement

The committee will announce the match schedule at least 30 minutes ahead of competition through online official website and onsite announcement. The schedule includes match-up chart, match session and specific time, red alliance and blue alliance, etc. If the two round of match are close together, please register at the Result Approval Desk.

Qualification Round

Normally, each team is requested to participate in four matches during qualification round. However, the session of qualification round may be different based on different competition. In qualification round, red alliance and blue alliance are matched randomly. Points will be obtained by teams according to the winning or losing result. It is conducted in the form of alliances confrontation and each team's alliance and the opponents will be allocated randomly.

In each qualification round, team will receive corresponding points (including win, tie, loss) regardless of competition type. Three points for a win, one point for a tie, and no point for a loss. The final ranking is based on the sum of win-loss points, and the top-ranking teams will be promoted to the elimination round. If the team with the same win-loss points, the ranking sequence will be determined according to following rules:

1) The team with a higher total points differential of all qualification rounds has a higher ranking.

2) If the above conditions are the same, the team with higher total scores among all qualification rounds has a higher ranking.

3) If the above conditions are the same, the team with the highest score of a single round in all qualifications round has a higher ranking.

4) If the above conditions are same, teams with the same ranking will play a one-on-one extra match, and those who with the highest total points will be the winner.

Alliance Selection Ceremony

In alliance selection ceremony, promoted teams will select their alliance team in turn according to their ranking in qualification round. During this procedure, teams must abide by following rules:

When being chosen by other teams, promoted teams ranking top 50% can refuse for only once, and those teams ranking bottom 50% cannot refuse. If the team is refused by another team, they can continue to choose another team until the alliance is formed.

The promoted teams who are not present before the start of alliance selection are deemed as voluntarily giving up the right to choose alliance, and those who are not present before the end of the alliance selection are considered to be as voluntarily quitting the elimination round. If the promoted teams quit amid the alliance selection ceremony, the promotion places will be given to the following teams according to the ranking in the qualification round.

The promotion proportion for 2022-2023 season competition is as follows. However, the promotion quota in different competitions may be different according to actual situation.

Number of participating teams	Number of promoted teams
121 or more	64
65-120	32
32-64	16

12-31	8

Elimination Round

In elimination round, the alliance generated in the alliance selection will be the opponent (red alliance and blue alliance are automatically matched). The winner will be evaluated by BO3(Best of 3) and the alliance who achieve "two wins" or "one win and two ties" can advance to next round until the champion, runner-up and second runner-up are elected.

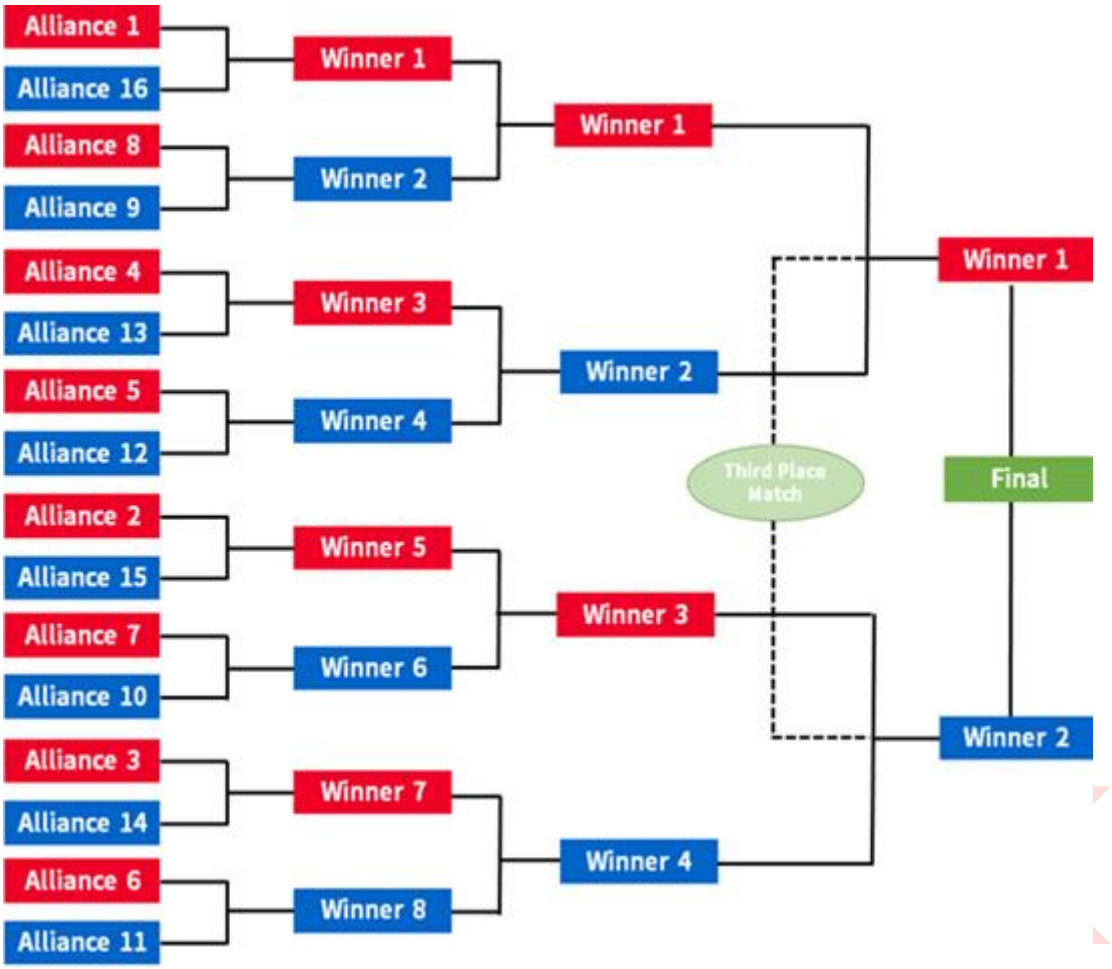
If the alliance achieves "1 win, 1 loss, 1 tie" or "3 ties" in three rounds, the winning alliance will be decided according to the following rules:

1) If win-loss points are the same, team with higher total point differential in BO3 has a higher ranking.

2) If above conditions are the same, team with highest scores in BO3 has a higher ranking.

3) If above conditions are the same, teams will play an extra match until the winner is elected.

Taking the promoted 32 teams as an example, the schedule of elimination round is as follows:


Alliance 1
Alliance 16
Alliance 8
Alliance 9
Alliance 4
Alliance 13
Alliance 5
Alliance 12
Alliance 2
Alliance 15
Alliance 7
Alliance 10
Alliance 3
Alliance 14
Alliance 6
Alliance 11
Winner 1
Winner 2
Winner 3
Winner 4
Winner 5
Winner 6
Winner 7
Winner 8
Winner 1
Winner 2
Winner 3
Winner 4
Third Place Match
Winner 1
Final
Winner 2

4. Competition Details

The theme of the 2022-2023 MakeX Explorer is "Eco-Pioneer".

In the past century, high emissions of carbon dioxide, water vapor, nitrous oxides, methane, and other greenhouse gases have led to the rapid increase in Earth's temperature. In addition to actively reducing greenhouse gas emissions, the solution to global warming is also proven effective by using advanced equipment to capture carbon dioxide. The collected carbon dioxide can be further used in chemical production, sustainable fuel production, agriculture, and medicine to reduce greenhouse gas emissions, slow climate warming, and ultimately achieve the goal of sustainable development.

4.1 Introduction

MakeX Explorer is a confrontational competition, among which red and blue alliance for each match, and two teams for each alliance.

Each match comprises automatic stage and manual stage. Teams are required to control the robot to finish missions in an automatic or manual manner. At the end of the competition, the referee will calculate all of the mission points for both teams, and the alliance with the higher score will be the winner.

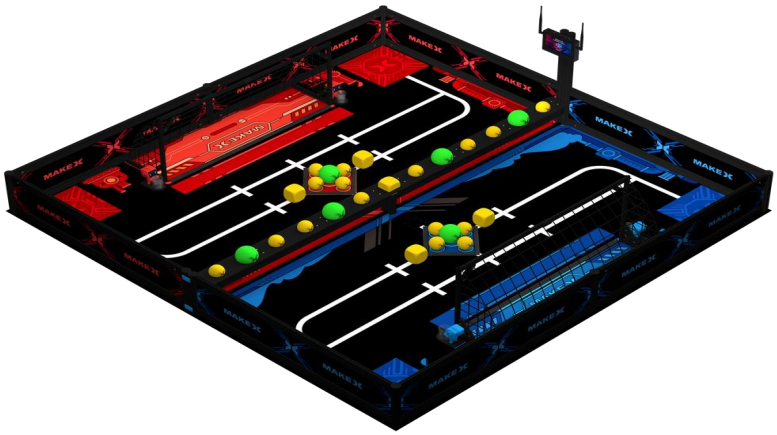


Fig 4.1 Axonometric View of the Arena

4.2 Arena

The arena of MakeX Explorer is a rectangular area with the size of 2440 mm × 2440 mm, which is composed of a map and frames. The map is measured by 2317mm × 2357mm and the frame is 255mm in height and 15mm in thickness. The arena mainly consists of CO2 emission zone (central area), starting area, CO2 conversion area (goal area), max cylinder, anti-leakage device area and manufacturing area and flag placement area.

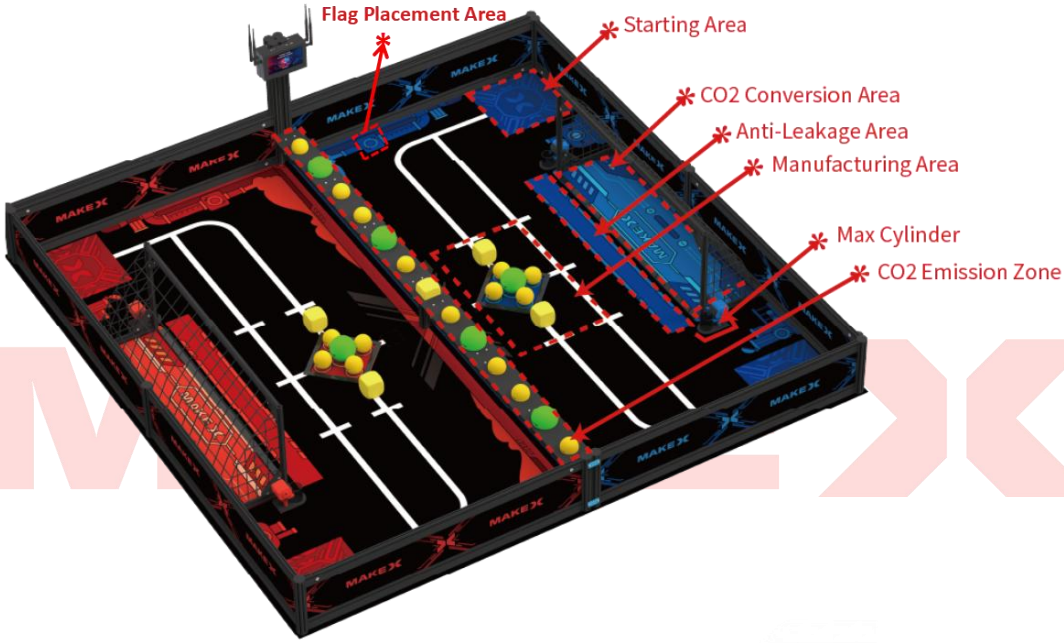


Fig 4.2-1 Arena Illustration

The competition arena is divided into red camp, blue camp and central area. Robots are only allowed to finish corresponding missions in individual camp.

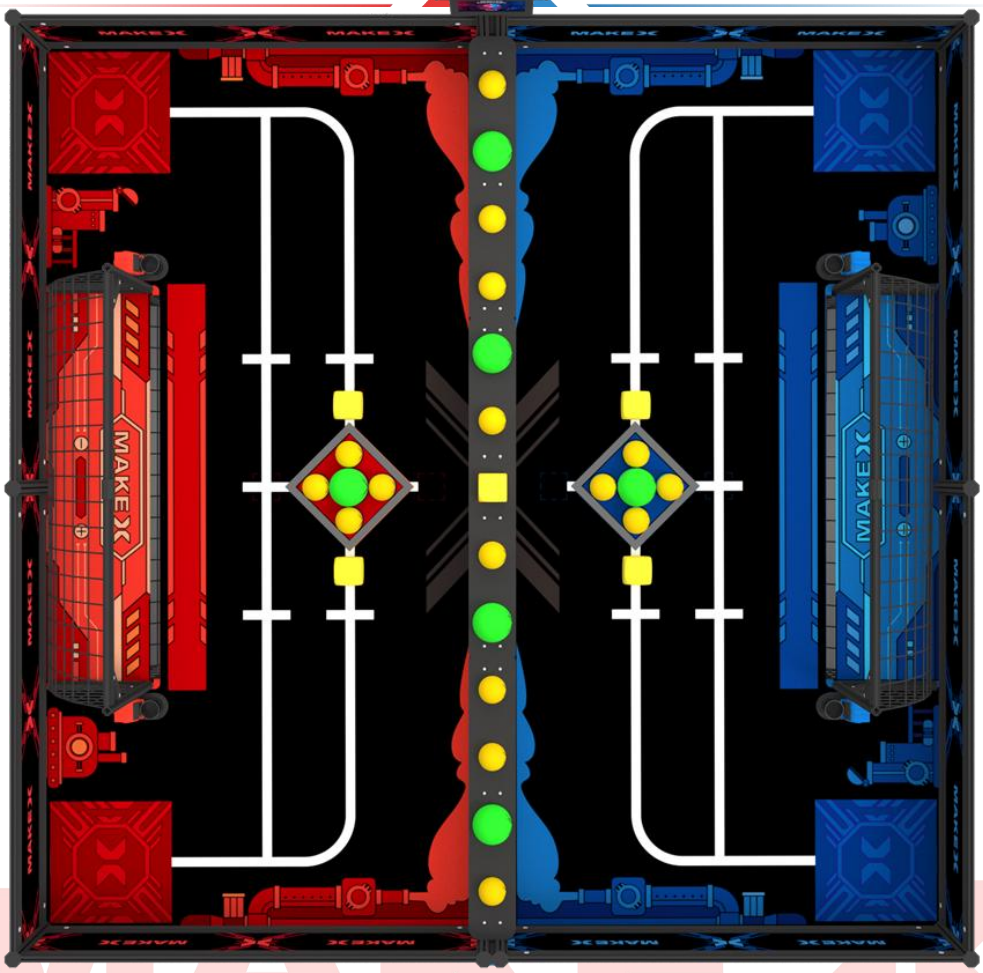


Fig 4.2-2 Top View of Arena

CO2 Emission Zone (Central Area)

There is only one CO2 Emission Zone (central area), including a central partition made of flat beam and octagonal pillars, along with the resource placement area. There is an 80 mm gap in height below the central partition, which only allows the passing of yellow cubes and small yellow balls. The resource placement area is made of plank with the size of 2292mm × 120mm and a height of 160mm from the floor.

There are carbon capture containers (ball) and anti-leakage devices (cube) in the central area. The yellow cube is placed in the middle of the placement area, with large green balls and small yellow balls placing symmetrically on both sides.

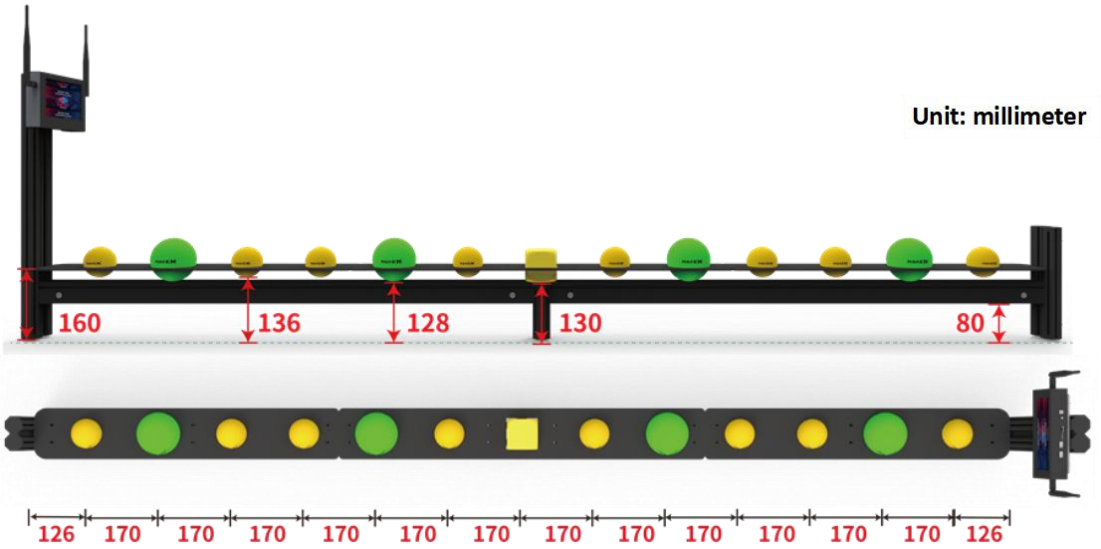


Fig 4.2-3 CO2 Emission Zone (Central Area)

Starting Area

With the size of 320mm × 320mm, the starting area, four corners of the arena, is where robots are placed before the competition. There are two starting areas for red alliance and blue alliance.

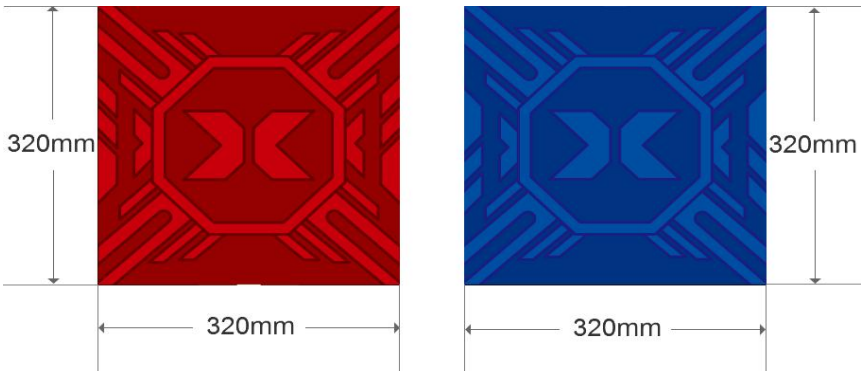


Fig 4.2-4 The Starting Area

CO2 Conversion Area (Goal Area)

There is one CO2 Conversion Area (Goal Area) for red alliance and blue alliance. The goal area is composed of metal beams and black net. There is a foam threshold in front of the goal area, with metal beams pasting on the Velcro paste area.

Net state description: The inner side of the net is fixed to the metal beam with strips

and the outer side of the net is pressed down with an arena frame. Once the net is constructed, and the net drops naturally.

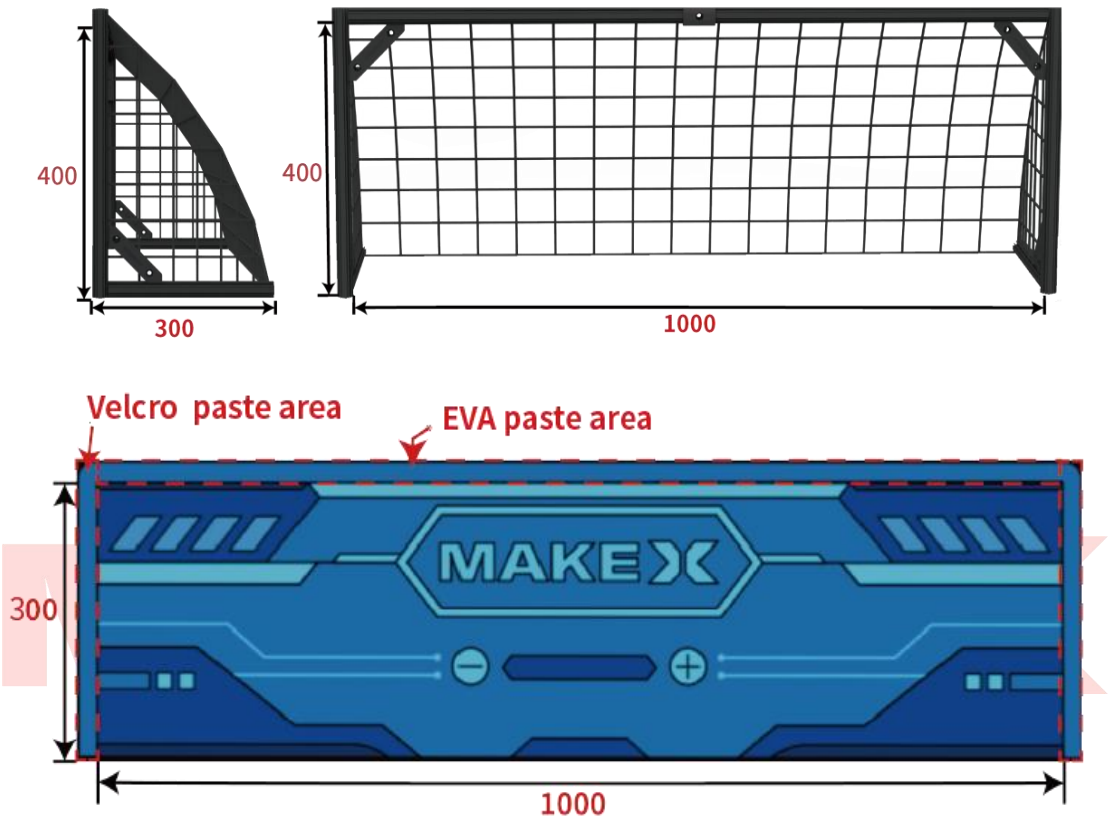


Fig 4.2-5 The Goal Area

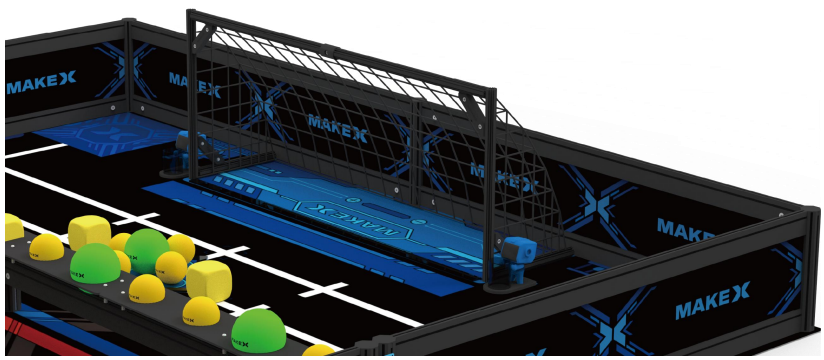


Fig 4.2-6 Axonometric View of the Goal Area

Max Cylinder

There are two Max Cylinders for red alliance and blue alliance respectively. Max Cylinder is composed of max (model), cylinder and pedestal. Max and cylinder are fixed on the cylinder pedestal with screws, while the pedestal is attached to the map with Velcro. The cylinder is 46mm long in inner diameter and 58mm in height.

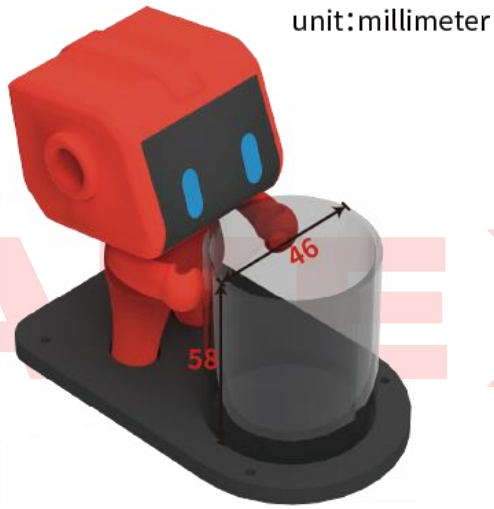


Fig 4.2-7 Max Cylinder

Anti-Leakage Device Area (Device Area)

Anti-Leakage Device Area (Device Area) is a rectangular area in the front of the goal area, with the size of 1070mm × 100mm. There is one device area for red alliance and blue alliance.

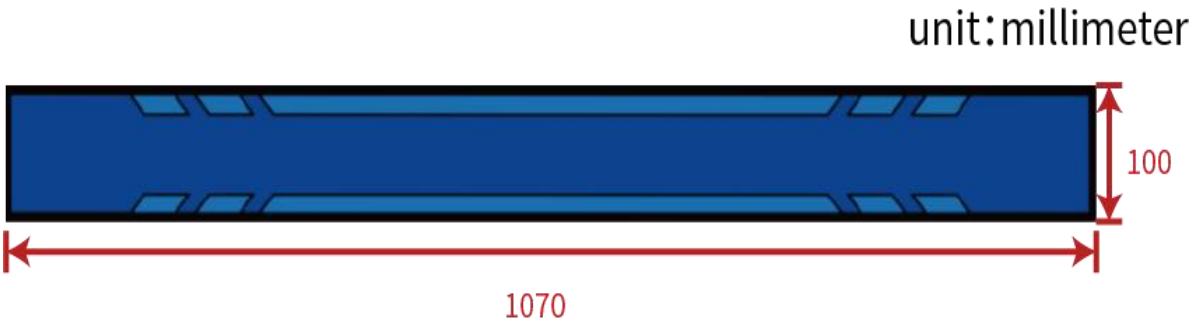


Fig.4.2-8 Device Area

Manufacturing Area

There is one manufacturing area for red alliance and blue alliance respectively, which includes diamond-shaped area and cube wireframe. Anti-leakage device (yellow cube) and carbon capture container (ball) are placed in the manufacturing area. There is an area in 10mm width around the diamond-shaped area for pasting Velcro. Anti-leakage devices will be placed randomly in two of four cube wireframes by drawing prop card before the match.

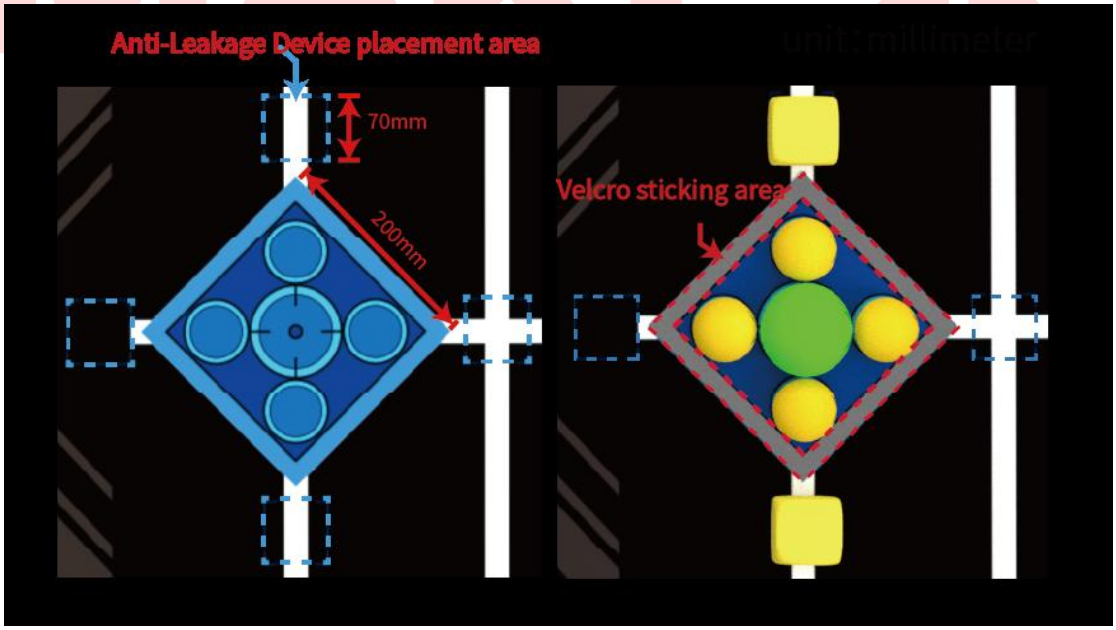


Fig.4.2-9 Manufacturing Area

Flag Placement Area

The red and blue camps each have 2 flag placement areas, which are square

wire-frame areas near the sides. There are 4 flag placement areas in total for teams to place their self-made flags, 2 for each alliance. Before the start of the competition, contestant must place their own flags in this area; the bottom side of the flags must be completely inside this area and in an upright position.

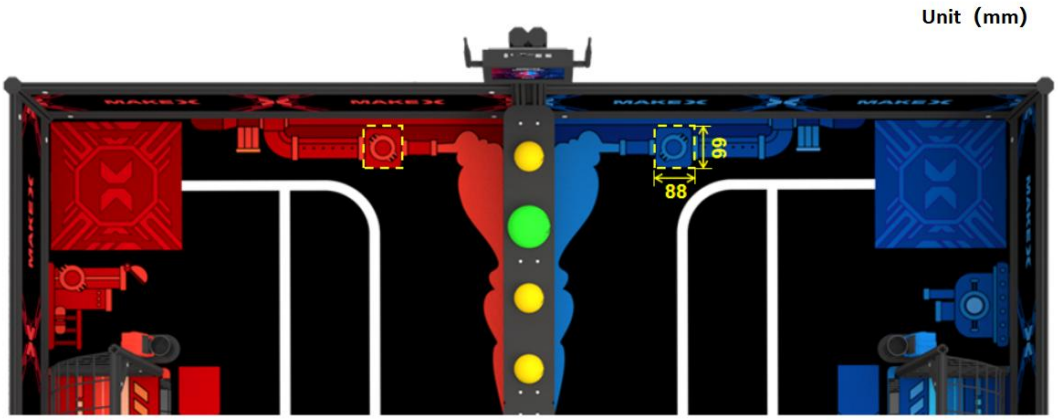


Fig.4.2-10 Flag Placement Area

4.3 Lists of Props

Carbon Capture Container (Ball)

There are two types of ball, representing different sizes of carbon capture containers. The initial position is in the central area and manufacturing area. These balls are made of EVA, including sixteen small yellow balls and six large green balls. The diameter of small yellow ball and large green ball is 70mm and 100mm respectively.

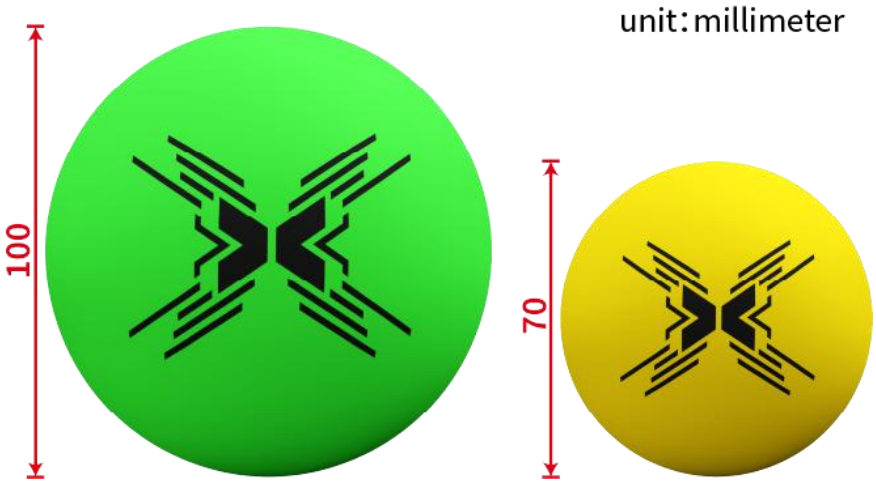


Fig.4.3-1 Carbon Capture Container (Ball)

Anti-Leakage Device (Cube)

The yellow cube represents the anti-leakage device, with the side length of 70 mm. There are five EVA cubes in the arena, among which two cubes are in respective manufacturing area, one cubes in the central area.

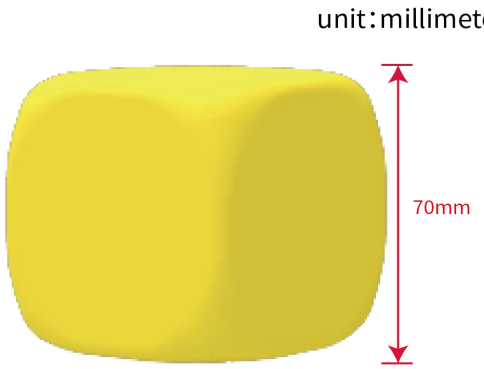


Fig.4.3-2 Anti-Leakage Device (Cube)

Environmental Flag

The environmental flag is a team self-made prop composed of a flag and a flagpole, it's allowed to have a pedestal and the pedestal can't be separated from the flagpole. The size of the environmental flag surface is no less than 80mm × 60mm. The size of the flagpole (and pedestal if any) is smaller than 30mm*30mm, with the length no less than 100mm. Please refer to "**5.2 Specifications for Environmental Flag**" for the details.

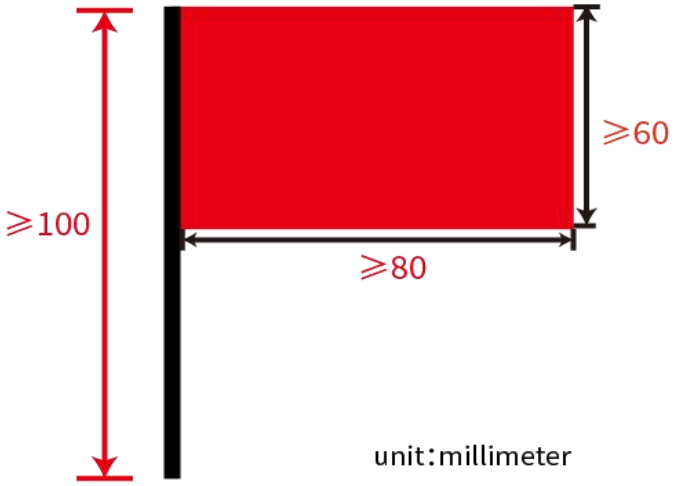


Fig.4.3-3 Environmental Flag

* Note: All areas and props have certain tolerances. If there are any objection to the size of the props or other problems, the referee can determine whether to change according to the actual situation.

4.4 Missions Introduction and Scoring State Judgement

The competition lasts for 4 minutes, including automatic stage (30 seconds) and manual stage (210 seconds). Mission details of each stage are shown as follows. At the beginning and the end of each stage, the referee will remind the contestants by counting down. Please refer to **"4.6 Single Match Flow"** for the specifications.

Stage and Time	Missions	Mission Details
Automatic Stage (30 seconds)	Installing Anti-Leakage Device	Running automatic program to make the cube in manufacturing area enter respective device area;
	Transferring Carbon Capture Container	Running automatic program to make the ball in manufacturing area enter opponent's goal area;
	Inserting Environmental Flag	Running automatic program to insert environmental flag into respective Max

		Cylinder;
Manual Stage (210 seconds)	Installing Anti-Leakage Device	Controlling the robot to make the cube in individual camp or central area completely enter respective device area;
	Transferring Carbon Capture Container	Controlling the robot to make the ball in individual camp or central area enter opponent's goal area;
	Inserting Environmental Flag	Inserting environmental flag into respective Max Cylinder;

Fig.4.4 Competition Stage and Mission Introduction

4.4.1 Mission Name: Installing Anti-Leakage Device

Mission Description: This mission can be finished in automatic stage and manual stage.

In automatic stage, robots are required to run automatic program to make the cube in manufacturing area enter respective device area.

In manual stage, the contestants control the robot to make the cube in individual camp or central area completely enter respective device area.

Scoring State Judgement: At the end of the match, it can be scored if the cube is completely in the device area, and have no contact with the robot, which refers to the vertical projection of the cube is completely located in the device area. Forty points for successfully moving a cube into the device area. The maximum number of valid scoring cubes is 3.

Fig.4.4-1 Scoring State Judgment of Cube

4.4.2 Mission Name: Transferring Carbon Capture Container

Mission Description: This mission can be finished in automatic stage and manual stage.

In automatic stage, robots are required to run automatic program to push or toss the ball in manufacturing area into opponent's goal area.

In manual stage, contestants are required to control the robot to push or toss the ball in individual camp or central area into opponent's goal area.

Scoring State Judgement: At the end of the match, it can be scored if the ball enters the goal area and meets one of the following two conditions:

1. The ball has direct contact with the map of the goal area, but has no contact with the map outside the goal area;

2. The ball has indirect contact with the goal area, and the vertical projection of the ball is completely in the goal area;

Sixty points for one large green ball; Thirty points for one yellow small ball.

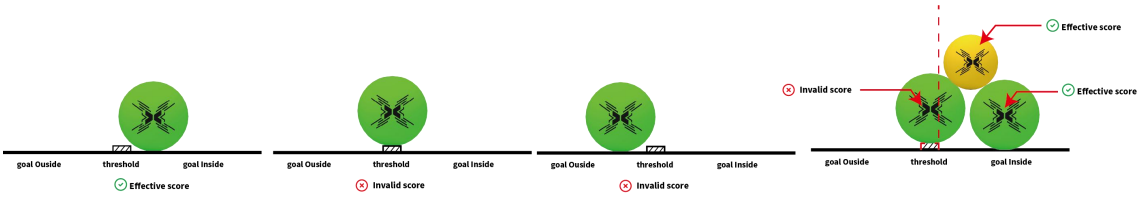


Fig.4.4-2 Scoring State Judgement of Ball - Side View

4.4.3 Mission Name: Inserting Environmental Flag

Mission Description: This mission can be finished in automatic stage and manual stage.

In automatic stage, robots are required to run automatic program to insert environmental flag into respective Max Cylinder.

In manual stage, contestants are required to control the robot to insert environmental flag into their respective Max Cylinder. Only one environmental flag can be placed in each Max Cylinder.

Scoring State Judgement:

The following situation is regarded as successful insertion of environmental flag: the flagpole must be in the Max Cylinder, while the flag surface must be in its natural unfolded state at the scoring time, the flag surface and flagpole cannot have contact with the ground and robots. The flag is not allowed to lean on the other props either the net or the goalmouth, except for the Cylinder and Max doll. Fifty points for one environmental flag.

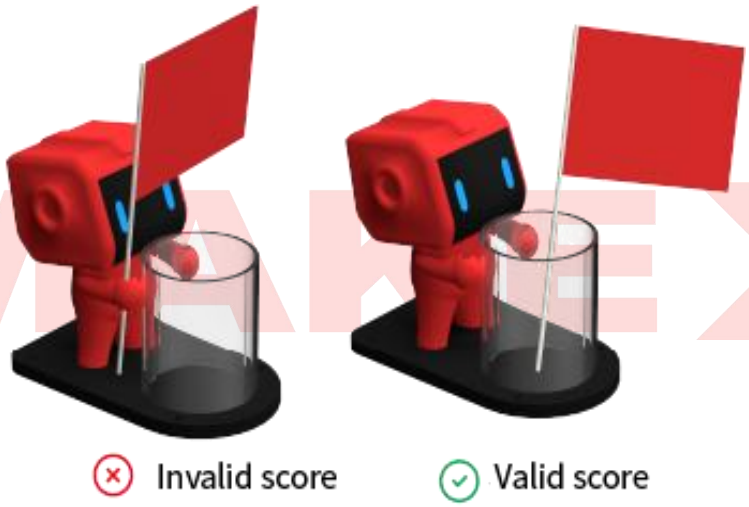
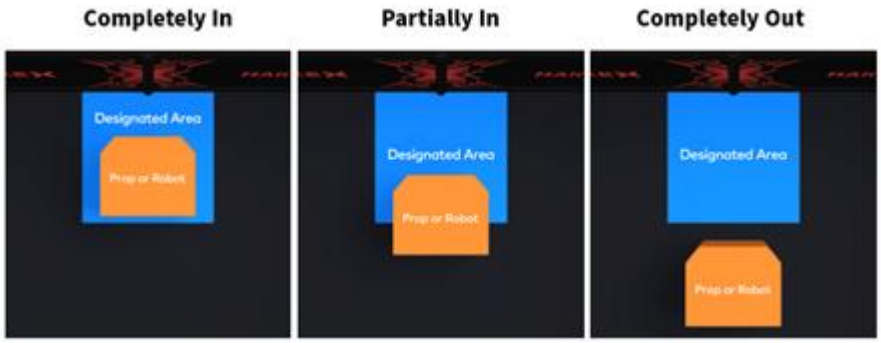


Fig.4.4-3 Scoring State Judgement of Environmental Flag

Boundary State Judgement

During the match, if there is any uncertainty about the position of the robot (or props) and designated boundary, the following state judgement can be explained:



4.5 Scoring Explanation

The final score of the competition is determined by the final static state of the scoring prop after the competition. Competition missions, scoring props and its corresponding points are as follows. After the competition, the referee calculates the sum of scores of each mission, and the alliance with the higher score will be the winner.

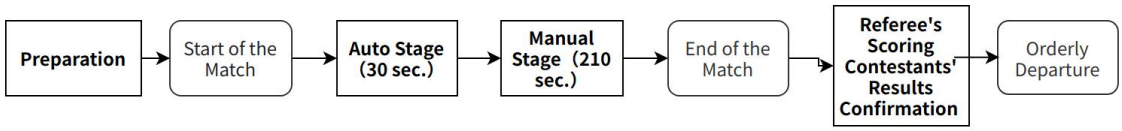
Alliance points of single match= cube points + large ball points + small ball points+ environmental flag points - penalty points

Mission	Scoring Props	Point of Single Prop	Max Number of Single Prop	Maximum Mission Point
Installing Anti-Leakage Device	Cube	40 Points	3 pieces	120 Points
Transferring Carbon Capture Container	Large Ball	60 Points	6 pieces	360 Points
	Small ball	30 Points	16 pieces	480 Points
Inserting Environmental Flag	Environmental Flag	50 Points	2 pieces	100 Points

Fig.4.5 Mission and Corresponding Points

4.6 Single Match Flow

Fig.4.6 Single Match Flow Chart



Preparation

Before the single match, contestants should arrive to the competition area ahead of schedule, and make preparations under the guidance of referee:

1) Power on the robot and place it completely in the starting area, with Bluetooth controller powering on and placing outside the arena.

2) One representative will be appointed by their team to draw a prop card and then place the cubes accordingly;

3) Check the standard of arena and props placement of both alliances.

4) Mutually check that both robots are properly regulated.

Automatic Stage

The automatic stage begins after referee's five-second counting down.

1) Contestants are not allowed to touch the robot after running automatic program.

2) Before the end of automatic stage, robots are required to complete the automatic program and remain stationary. Besides, robots do not need to return to the starting area.

3) It is not allowed for robots to rob or directly touch the props in the central area, they are only allowed to use respective props to complete the mission. Please refer to "**6.2 Competition Rules-Operation Rules**" for the specifications.

The automatic stage ends after referee's five-second counting down.

Manual Stage

The manual stage begins after referee's five-second counting down.

1) Contestants control the robot with Bluetooth controller;

2) The manual stage ends after referee's five-second counting down. After manual stage, contestants must put down the Bluetooth controller to stop robot controlling.

Referee's Scoring and Contestant's Results Confirmation

The referee will count the scores after the competition. If there is no objection to the competition, the captains of both alliances must confirm the match's result. If there is any doubt about the result, the captain of the alliance may appeal to the referee without signing the score sheet.

After results confirmation, contestants shall actively assist the referee to restore the props, and leave the competition area with their robots and Bluetooth controller in an orderly manner.

5. Technical Specifications

5.1 Specifications for Robot Construction

The specifications for robot construction are designed to create a fair competition rule that ensure the participation safety. The committee encourages teams to conduct hardware construction and software programming on the premise of observing the specifications. During the competition, it is a must for robots to abide by the specifications. Any robot that violates the specifications will be required to be modified. Those who commit serious offense will be punished for disqualify competition result or competition qualifications.

T01. Each team can participate in the match with one robot. It is not allowed for one robot to participate in the match, while the other to conduct construction and

modification outside the arena.

T02. Except for mainboard, chassis, wheels and tracks that make the robot move on the flat are non-replaceable, contestants can replace other parts due to parts malfunction or competition missions.

T03. During the competition, the maximum extension size of robot shall not exceed 320mm*320mm*360mm (length * width * height). The maximum extension size refers to the size that the robot extends its mechanic limit during operation. If the robot is made of a flexible material, the measurements of the maximum extended dimensions of the robot include the dimensions of the flexible material and the flexible material must not be subjected to external forces; flexible materials include but are not limited to, ties, tapes, foam blocks, etc.

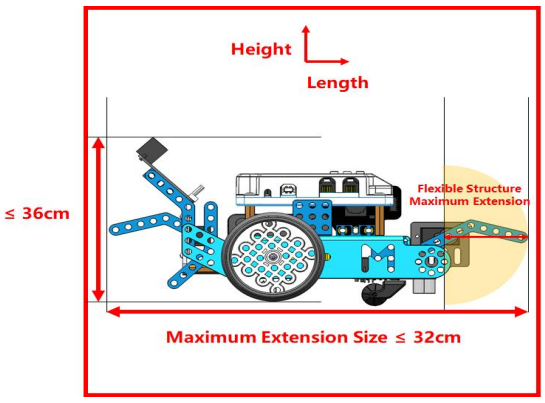


Fig 5.1-1 Maximum Extension Size -Side View

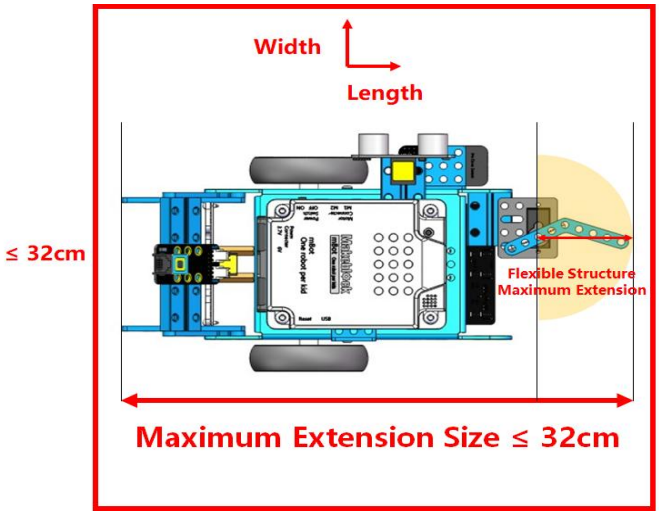
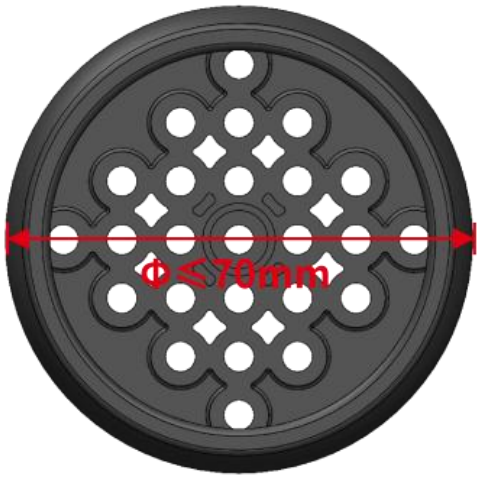


Fig 5.1-2 Maximum Extension Size -Top View

T04. During the competition, the maximum net weight of the robot shall not exceed 4 kg, including the weight of battery and excluding the weight of environmental flag.



T05. To ensure the fairness of the competition, the wheel diameter (included the Rubber tyre skin) must not exceed 70mm.

T06. The equipment with high performance that infringes the competition fairness is prohibited, which must be operated with following performance indicators:

Equipment	Component	Specification	Note
Motor& Servo	DC motors	1. High Speed TT Motor ● Rated Voltage: DC 6V ● No-load speed :312RPM±10% ● Gear Ratio: 1:48 2. 37 DC motors ● Rated Voltage: 12V ● Rated Speed: 50&200RPM ● Rated Torque: 4.5Kg.cm& 1.5Kg.cm	● No more than 4 motors (DC motors, encoder motor) are installed on the robot ● No more than 4 servos are installed on the robot ● It is forbidden to change the mechanical structure and electrical layout of any motor or
	Encoder Motor	1. 180 Photoelectric Encoder Motor ● Driving Voltage： DC 7.4V ● Speed Range： 7.4V0~350RPM±5%	

		● Rotation Accuracy: ≤5° ● Reduction Ratio: 39:43	servo ● Note: 37 Motor should be prepared by the team themself
	Servo	1. MECDS-150 Servo ● Working Voltage： DC 6.0V ● Torque Peak： 16.5kg.cm 2. MS-1.5A Servo ● Working Voltage： 4.8-6V DC ● Torque： 1.31-.7kg.cm	

T07. In order to prevent the team from using some high-performance electronic devices to damage the fairness of the competition, the main control electronic devices used by the team should not exceed the following performance indicators:

System	Module	Specification	Note
Power System	Built-in Battery	● 18650 Lithium Battery: 3.7V 2500mAh	Only one built-in battery and one external battery are allowed, which are required to securely fastened inside the robot  Fig. External Battery Pack
	External Battery	● 21700 Battery Pack ✓ Battery Capacity: 3.7V 8000mAh ✓ Discharge Rate： 3	
Controlling System	Mainboard	● Processor： Highly Integrated ESP32-WROVER-B ● Dominant Frequency： 240MHz ● Working Voltage： 6V ~ 13V (The minimum input voltage	Only one mainboard is allowed

		of motor is required to meet the requirement of motor's working voltage.) ● Communication Ports and Protocols: Serial Port/mBuild Protocol	
	Extension Board	● Micro Processor：GD32F403 ● Input Voltage/Current：5V 2000mA (Rapid Charging) 5V 500mA (Simultaneous using and Charging) ● Communication Mode： ✓ Serial Communication：Mainboard to Extension Board ✓ Digital Signal：Digital Servo Interface ✓ PWM: DC Motor Interface	
Sensor System		1. Vision Sensor ● Viewing Angle：65.0 degrees ● Effective Focal Length：4.65±5% mm ● Identification Speed：60 frames/seconds ● Identification Distance：0.25-1.2m is the best range ● Method of Power Supply：3.7V Lithium Battery or 5V build Power Module ● Power Consumption Range: 0.9-1.3W 2. Ultrasonic Sensor ● Working Voltage：DC 5V ● Distance Range：5-300cm ● Tolerance of Distance: ±5% 3. Line Finder Sensor ● Working Voltage：DC 5V	● Type and quantity are not limited ● It is forbidden for robots to use any sensors that will interfere with the perception ability of other robots

		• Detected Height：5mm-15mm	
Wireless Control System	Bluetooth Controller	• Bluetooth Version: Support 4.0+ • Distance of Remission: 20m • Working Current: ≤25mA • Transmit Power：4dBm • Transmit Data: Data packets within 100ms can be acquired by Bluetooth devices (low latency) • Battery: Two No.5 AA Dry Batteries • Supported Platform：macOS / Windows	• During the competition, one Bluetooth controller is available for one team.
	Bluetooth Module	• Bluetooth Version: BT4.0 • Band Range: 2402~2480MHz • Antenna Gain: 1.5dBi • Energy Consumption Grade：≤4dBm • Working Current: 15mA	It is forbidden to use any form of wireless control device to communicate with robots other than the official Bluetooth controller, including but not limited to any artificially triggered sensors

T08. If the robot uses a laser sight, the power of the laser sight must be less than or equal to 5mW (grade 3 A /R below). Each robot is allowed to install no more than one laser sight.

T09. Teams are not allowed to build robots using multi-DOF commercial products:

- Including but not limited to multi-DOF manipulator, manipulator, etc.
- Metal and plastic structural parts are not included.

T10. The following robot's parts that may cause danger are forbidden:

- Sharp angle;
- Oil pressure parts or hydraulic parts;

- Switches or contacts containing mercury;
- Parts that will conduct electrical current from robots to arena;
- Parts that tend to develop connections with other robots, such as hook-shaped parts and other parts;
- Other dangerous parts as determined by the judges.

T11. The following materials that may cause danger are forbidden:

- Flammable and explosive gases;
- Materials containing liquids or gelatinous substances (except for glues and lubricants used in prescribed and small quantities);
- Materials that may cause arena contamination, such as sand, ink, etc.;
- Materials made from animal tissue;
- Materials that may cause danger as determined by other referees.

5.2 Specifications for Environmental Flag

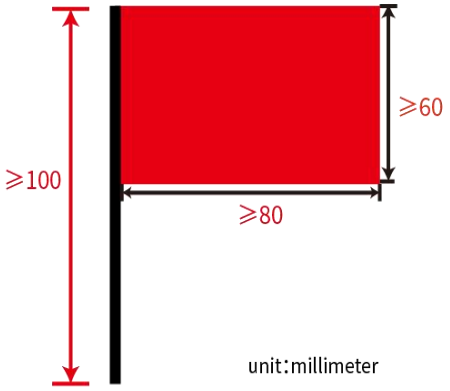


Fig 5.2 Environmental Flag

- The shape of the environmental flag structure is shown in Fig 5.2. It must be a regular flag shape; no shaped flags can be produced.
- The environmental flag is a team self-made prop composed of a flag and a flagpole, it's allowed to have a pedestal and the pedestal can't be separated from the flagpole.

- The size of the environmental flag surface is no less than 80mm(length) × 60mm(wide).
- The shape of flagpole and pedestal is unlimited. The vertical projection of this part should not exceed 30mm*30mm, with the length no less than 100mm.
- The surface of the flag should be made with fabric, paper or other flexible materials, and it has to be in an extended state during the competition.
- The flag that meets the rules requirements at all times of the competition is allowed to participate in the competition.
- At most one flag for per team.

The Committee encourages teams to draw personalized patterns or words on the flag, which calls for positive content reflecting competition theme and spirit, without showing words or pictures related to MakeX Robotics Competition Committee.

6. Competition Rules

6.1 Penalty explanation

Violation

E01. The referee issues a violation to the violation team, and immediately deducts 20 points. In the meantime, the competition will not pause.

Suspension

E02. The referee issues a suspension to ask the robot to stop its action. Besides, the referee is entitled to whether to remove the suspended robot out of arena based on specific condition, including but not limited to robot failure, loss of control, etc.

Yellow card

E03. If any contestants' behavior seriously affects the competition fairness or violates the safety rules, the team or alliance will receive a yellow card with 60 points

deductions. During the single match, with accumulated 2 yellow cards, the offending team or alliance's robot will be suspended directly.

Yellow Card Accumulation:

During the qualification round, yellow cards are accumulated by teams. While in the elimination round, yellow cards are accumulated by alliances.

Red Card

E04. If any side or its members' behavior seriously affects the competition fairness or violates the safety rules, the alliance will receive 120 points deductions, and the offending team's robot will be suspended.

Penalty of Red Card:

Qualification Round: Take team as unit. If one team of alliance receives a red card, the team will receive 120 points deduction and the team's robot will be suspended, in the meanwhile the match will continue as usual. If both teams of alliance receive red card, the alliance will receive the points deduction and lose the competition. (If the score of losing team is higher than the winner, the winner will receive extra 10 points higher than the final score of the losing team)

Elimination Round: Take alliance as unit. If any team of the alliance received a red card, the alliance will lose in the match. (If the score of losers is higher than the winner, the winner will receive extra 10 points higher than the final score of the loser)

Disqualify Single Match

E05. During the match, the team violated the rules, the robot will be suspended immediately and resulting in invalidate of the score of the match, but did not affect the other matches.

Disqualify Entire Competition

E06. The robot will be suspended immediately and the team cannot participate in the competition and the following competition, which can cause disqualification for

all result. The team will lose the opportunity to continue to participate in the competition and the right to award.

6.2 Operation Rules

Destructing or Contaminating Arena

R01. If arena contamination is caused by the robot, the robot will be regarded as in an unsafe state. Robots are not allowed to use double-sided tape or glue or any other materials to fix arena elements during competition.

- The robot that violates the rules will be suspended. Team with two violations will be disqualified entire competition.

Destructing Other Robots

R02. Robots are not allowed to collide with other robots during competition.

- The robot that violates the rules will be suspended. Team with two violations will be disqualified entire competition.

Using Banned Materials

R03. The following hazardous materials or dangerous structures embedded in robot are forbidden, such as:

(1) Flammable gases, fire or smoke generating equipment, hydraulic oil or hydraulic parts, switches or contacts containing liquid mercury (mercury);

(2) Hazardous Substances (e.g., Lead);

(3) Materials that may cause arena contamination, such as sand and other objects that may be scattered during competition;

(4) Materials that may have fixed connection with other robots;

(5) Materials with sharp edges that may cause injury.

(6) Materials made from animal tissue (for health and legal consideration).

(7) Materials containing liquids or gelatinous substances (except for glues and lubricants that use as required).

(8) Parts that can conduct electrical current from robots to any other parts in arena.

- The robot that violates the rules will be suspended. If the robot continues to be a participant, contestant should modify it to accept re-inspection. Team with two violations will be disqualified entire competition.

Other Unsafe Factors

R04. In addition to R03, referees are entitled to decide whether the robot is safe or not.

- The robot that violates the rules will be suspended. The robot needs to be modified and re-inspected before it can be back to the match. Team with two violations will be disqualified entire competition.

Contestants' Requirements

R05. One operator and one observer for each team are allowed to enter the competing area. Each alliance includes two operators and two observers, one of them is selected to be the captain of the alliance.

R06. It is not allowed for a third person as a substitution of on-arena players. Operators are responsible for controlling the robot in each match. The operator and the observer can freely switch their roles during the match.

R07. Contestants should tie up their long hair during competition preparation, robot debugging and on match. Toe-baring shoes are forbidden.

- A team or alliance that violates the rules will be disqualified from a single match and not allowed to continue the match, but it will not affect other matches. The team need to re-adjust and have a re-inspection before coming back to the match. A team with two violations will be disqualified for the entire competition.

Contestants' Standing Position

R08. Contestants shall stand in certain range as shown in the following figure (the size of the operating area is subject to actual conditions).

- The offending team will have 3 seconds to return to their own area and the referee will verbally read out the seconds. Teams that fail to return on time will be given a violation. Two violations will result in a yellow card, and three violations will result in a red card and robot suspension.

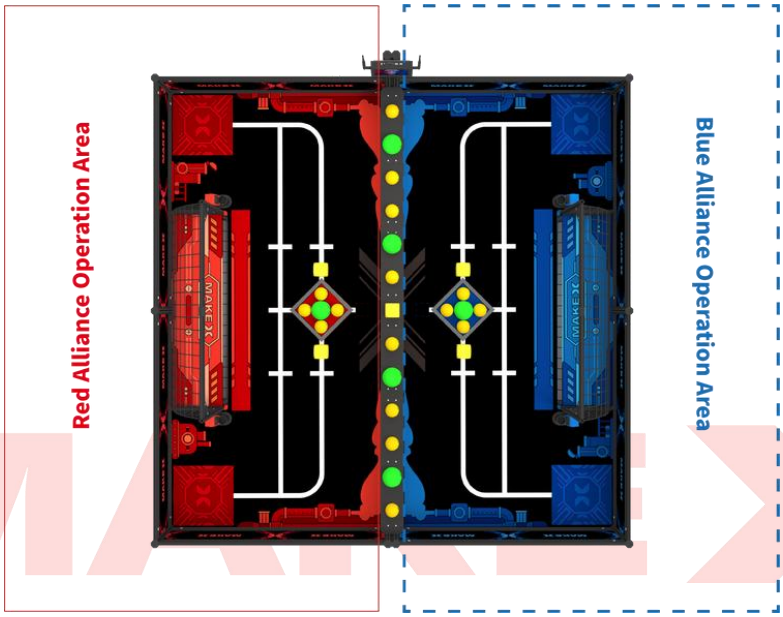


Fig. 6.2 Contestant's Standing Position

Rules of Elimination Round

R09. During the elimination round, after the end of each match, each alliance has 5 minutes for debugging their robot and cannot overtime.

- A team or alliance that violates the rules will be disqualified from a single match and not allowed to continue the match, but the other matches are unaffected.

Failure to arrive on time at the competing area

R10. Teams should arrive on time. Team that not show up in the competing area more than 5 minutes, will be treated as give up this match voluntarily. If the whole competition schedule is delayed, please refer to the specific notice.

- A team or alliance that violates the rules will be disqualified from a single match and not allowed to continue the match, but the other matches are unaffected.

Operating the Robot in Advance

R11. Robots are not allowed to operate until referee's announcement to start the competition, the operation referring to the displacement of robot.

- The offending side will be penalize with a violation; two violations will result in a yellow card, and three will result in a red card and robot suspension.

Delay the end of the Competition

R12. After the end of automatic stage and manual stage, operator should stop controlling the robot or stop robot's operation program (except for the motion caused by inertia).

- The team will receive a violation. If the delay in ending competition gives the offending team a scoring advantage, the referee shall judge it as an invalid score and restore the arena to its original condition.

Robots Out of Boundary

R13. During the competition, the vertical projection of any part of the robot must not exceed the boundary of the arena. If the robot is out of bounds, it must return to its own area within 3 seconds, and the referee will give a verbal reminder.

- Failure to return on time will result in a violation, two offenses will result in a yellow card, and three offenses will result in a red card and robot suspension.

Using Bluetooth Controller in Automatic Stage

R14. Bluetooth controller should be connected with robot before the match. During the automatic stage, the blue-tooth controller should be place outside the arena; contestants are only allowed to pick up their blue-tooth controller after the

automatic stage; after the manual stage, contestants must stop controlling their robot immediately.

- If the robot does not complete the automatic program or does not remain stationary before the end of the automatic stage, the offending team will be given a violation, and if it generates a scoring advantage, it will be considered invalid and must restore the original state of the arena; except for the non-stationary state due to the inertia of the robot's structure, which will be judged by the actual state of the robot's displacement behaviour at the end of the stage.
- If a Bluetooth controller is used in the automatic stage, the first penalty will be a violation and the match will be restarted; two penalties will be a yellow card and the match will be restarted; three penalties will be a red card and the team's robot will be suspended immediately; and if the circumstances are severe, the team will be disqualified from the competition.

Operating Suspended Robot

R15. The operator is not allowed to control the robot after the robot is suspended.

- The team will be disqualified for single match.

Robot's Left-Behind Components

R16. During the competition, the following situation is forbidden, such as detachment of robot and its component and left-behind mechanical devices (detachment refers to detachment of robot ontology and its components, non-structural parts such as screws are not included). This rule is exception to the shedding caused by collision of opponent's robot or direct contact with other robots.

- The offending party will be penalized with a violation, two offenses will result in a yellow card, and three offenses will result in a red card and robot suspension.

Robot In-conformity during the competition

R17. The size of the robot should in the state that approved by both teams and the referees before the competition. After the approval by both sides during the pre-competition stage, teams can't raise any appeal regarding this reason. Robots must comply with the size, weight and other parameters specifications during the match. Except for those situations that are caused by non-subjective factors, including being hit by opponents' arena element or other external forces, which leads to robots deforming or oversized.

- The offending party will be disqualified for single match.

Enter Opponent's Camp

R18. During the competition, the vertical projection of the robot' s chassis shall not partially or completely enter the opponent's area in any form. The violation may be upgrade if the partially enter will restrict opponent robot's moving.

- The robot that enters the opponent's area must return to its own area within three seconds and the referee will give a countdown reminder. Failure to return on time will result in a violation, two offenses will result in a yellow card, and three offenses will result in a red card and robot suspension.

Restricting the Movement of Opponent's Robot

R19. Robots are not allowed to prevent the robot of opponents' alliance from moving in all directions or touching arena elements.

- The offending party will be penalized with a violation, two offenses will result in a yellow card, and three offenses will result in a red card and robot suspension.

Toss in Violation

R20. Robots are not allowed to toss arena elements that are not allowed to toss (such as cubes, left-behind mechanical devices, flag, etc.) to opponent's camp.

- The offending party will be penalized with a violation, two offenses will result in a yellow card, and three offenses will result in a red card and robot suspension.

Removing Props in Violation

R21. Robots are not allowed to remove any arena props out of the arena.

- The offending party will be penalized with a violation, two offenses will result in a yellow card, and three offenses will result in a red card and robot suspension.

Robot contact props in the central area in violation

R22. In automatic stage, robots must finish the mission with individual props rather than grabbing or directly touching the props in central area.

- Those who maliciously contact the props in central area will be penalized with a violation, two offenses will result in a yellow card, and three offenses will result in a red card and robot suspension. This rule is exception to the initial position of prop in the central being changed due to the stuck of robot or the toss of individual ball.

Robot enters the goal area in violation

R23. During the competition, the robot is prohibited from entering the goal area, i.e., the vertical projection of the robot may not partially enter the goal area in any way;

- If the robot enters the goal area in violation and does not cause a change in the actual state of the arena, the robot must return to its place within 3 seconds, and the referee will give a 3-second countdown; if the robot does not leave its goal area within 3 seconds, it will be penalized by the first violation, second yellow card, and third red card and robot suspension.

R24. No part of the robot shall have direct contact with scoring props (including balls, cubes, and eco-flags) that are fully in the team's goal area during the competition.

- The offending team will be penalized by the first violation, second yellow card, and third red card and robot suspension.
- At the same time, the referee may decided whether or not to suspend the competition and restore the original scoring props in the goal area depending on the actual condition.

Contact in violation

R25. During the competition, contestants cannot touch any arena elements or robots, If the change of arena elements causes any scores change, the score shall be invalid, and referee should try to restore the original state.

- The offending team will be penalized by the first violation, second yellow card, and third red card and robot suspension.

Contestant enter the arena in violation

R26. During the competition, the vertical projection of any parts of the contestants cannot extend into the arena.

- If the contestant enters the arena, he/she must stop the behaviour within 3 seconds and the referee will give a verbal reminder by reading the seconds. The offending team will be penalized by the first violation, second yellow card, and third red card and robot suspension.

Mentoring in Violation

R27. No person (including but not limited to the parents or mentors of the team) other than the team members shall enter the competition area by any means, and no instruction shall be given in or outside the competition area in any form.

- The team will receive a verbal warning, and those who will receive a violation if they refuse to correct their mistake. Penalties may be upgraded until disqualify for single match.

Off-Arena Contact

R28. During the competition, contestants are not allowed to have any direct contact with off-arena person and audiences, including but not limited to the delivery of the parts and Bluetooth controller.

- The team will receive a violation, and those who commit second offenses will be disqualified for single match.

7. Appeal and Arbitration

7.1 Results Confirmation

Results Confirmation

When a single match ends, captains of both teams need to confirm the results with the referees and then sign the score sheet. The committee will not accept any appeal of the match after the captains have signed and confirmed the result.

Dispute Settlement

If the participants on still disagree with the result of the competition and do not agree with the explanation of the referee, they can refuse to sign the result, but the participant must write down the situation in the remarks column of the scoring sheet before leaving.

7.2 Appeal Procedure and Valid Appeal Period

Appeal Procedure

Appeals should be lodged within the “valid appeal period” by the prescribed procedure and follow the civil participation spirit. The captain of the team needs to fill in the Appeal Form, then cooperates with the Arbitration Commission to investigate the actual situation. Both sides will be required to arrive at the designated place if the Arbitration Commission requires. During the investigation, the

captain of the appeal team must be present, and only captains or contestants of both teams can be present. The Arbitration Commission has the right to communicate with the appealing party alone, avoiding the mentor, the parents of the contestants, their relatives, or friends. The appellant should express facts clearly and objectively, not being over-emotionally.

Valid Appeal Period

Normally, the appeal should be lodged within 30 minutes after the end of every single match. The appellant and the respondent must be present before the time appointed by the referee.

Appeal Response

Normally, the Arbitration Commission responds to the appeal after the end of the competition on the same day or before the start of the competition on the next day.

7.3 Invalid Appeal

Overdue Appeal

Appeals that are not lodged within the "valid appeal period" will be considered invalid and inadmissible. If the appellant fails to be present on time or leaves without any reason during the investigation, the appeal will be considered invalid. If the respondent fails to be present on time, the Arbitration Commission will directly determine the arbitration result and render it as a final result.

Appellants out of Stipulation

The appellants must be the participating contestant and the appeal of another person is invalid. The Arbitration Committee will caution the offending team if parents, mentors, or other irrelevant persons participate in the arbitration process without the permission of the Arbitration Committee.

- Team or alliance will be disqualified entire competition for multiple invalid warnings.

Vague Appeal's Requests

If the Arbitration Commission is unable to understand the appeal or conduct the normal investigation due to emotion factor of the appealing party, the team will receive a verbal warning.

- Team or alliance will be disqualified entire competition for multiple invalid warnings.

Uncivil Appeal

Neither side shall make uncivil behavior nor offensive action and remarks.

- Team or alliance will be disqualified entire competition for multiple invalid warnings.

7.4 Arbitration Procedure

Arbitration Procedure

The Arbitration Commission consists of the head referee, the arbitration consultant, and the competition technical director. The Arbitration Commission is responsible for accepting the appeals and conducting arbitration investigations, to ensure the smooth progress of the competition and the fairness and justice of the competition results. The playback videos and photographs of any competition may be inaccurate due to the shooting angle, which is only used as reference but not arbitration evidence.

Arbitration Results

The arbitration results can be divided into “maintaining the original result of the match” or “re-match”, and the two teams shall not appeal again. If the arbitration result is a "re-match", the two teams shall have a re-match according to the time and arena stipulated in the Appeal Form. If either team fails to reach the arena within 5 minutes after the beginning of the match, the team shall be deemed to quit the match.

Additional Remarks

The Arbitration Commission determines the final arbitration result, and neither side shall dispute the result of the appeal anymore.

8. Statement

MakeX Robotics Competition Committee reserves the final interpretation of *2022-2023 Season MakeX Explorer Eco-Pioneer Rules Guide.*

8.1 Rules Explanation

In order to ensure a fair competition and high-quality competition experience, MakeX Robotics Competition Committee has the right to update and complement this Rules Guide regularly, issue and implement the latest version before the competition.

During the competition, all matters not stated in the Rules Guide shall be decided by the referee team.

This Rules Guide is the basis for refereeing, and the referee team has the right of adjudication during the competition.

8.2 Disclaimer

All contestants in MakeX Robotics Competition shall fully understand that safety is the most important issue for the sustainable development of the MakeX Robotics Competition. To protect the rights and interests of all contestants and organizers, according to relevant laws and regulations, all mentors and contestants registered for the 2022-2023 MakeX Explorer Eco-Pioneer, shall acknowledge and abide by the

following safety provisions:

- Contestants shall take adequate safety precautions when constructing the robots, and all parts used for constructing the robots shall be purchased from legal manufacturers.
- Contestants shall ensure that the structural design of the robots takes into account the convenience of the inspection and actively cooperate with the host of the competition.
- When modifying and using the parts with potential safety hazards for the robots, it must conform to the national laws, regulations, and quality & safety standards. Those operations shall be manufactured and operated by persons with relevant professional qualifications.
- During the competition, the teams shall ensure that all the actions such as construction, testing, and preparation will not do harm to their team and other teams, referees, staff, audiences, equipment, and arenas.
- In the process of construction and competition, if any action that may violate the national laws, regulations, or standards occurs, all consequences will be borne by the contestants themselves.

The competition kits and parts sold and provided by the supporter, Shenzhen Makeblock Co., Ltd., shall be used by the instructions. Shenzhen Makeblock Co., Ltd. and MakeX Robotics Competition Committee will not be responsible for any injury or loss of property caused by improper use.

The official language for MakeX is Chinese. English or other language translations are prepared to facilitate the team's preparation process. All documents translated to English are for reference only.

8.3 Copyright Declaration

Shenzhen Makeblock Co., Ltd. reserves the copyright of this Rules Guide. Without the

written consent or authorization from Shenzhen Makeblock Co., Ltd, any entity or individual may not reproduce, including but not limited to any network media, electronic media or written media.

Appendix 1. Awards and Annual Points

In 2022-2023 season, according to the scale of the competition and the number of teams, the competition will be classified into Points Race/Regional Competition, National Competition, International/Intercontinental Competition, and World Championship. In MakeX Explorer, participating teams can obtain the points according to the number of wins, ties and losses in the match, and each team can voluntarily sign up for all kinds of Points Race throughout the season to accumulate the annual points. The accumulation of annual points is based on the Team Number.

In each competition, the annual points that teams can obtain are based on the win-loss points they get for every single match in qualification round and championship round.

Category	Rounds	Win	Tie	Loss
Points Race/Regional Competition	Qualification	5	2	1
	Elimination (Best of 3)	10	/	2
National Competition	Qualification	10	4	2
	Elimination (Best of 3))	20	/	4
International/Intercontinental Competition	Qualification	15	6	3
	Elimination (Best of 3))	30	/	6

Teams that have won the champion, runner-up, second runner-up and other special awards can obtain additional annual points. For the details of award list, please refer to **2022-2023 MakeX Awards Guide.**

Category	Awards	Regional /Points Race	National	Intercontinental
Explorer,	Champion	15	30	45

Challenge & Premier	Runner-up	10	20	30
	Second Runner-up	5	10	15
	Innovative Design Award	-	5	10
	Engineering Notebook Award	-	5	10
Excellence Award	Outstanding Mentor Award	-	-	-
	Promotion Ambassador Award	-	5	10
	Technology Sharing Award	-	5	10
	MakeX Spirit Award	-	-	10

For example, team X20000 won the champion in one Points Race, and all the results show as below.

Qualification Round 1	Qualification Round 2	Qualification Round 3	Qualification Round 4	Annual Points from Qualification=13
Win (5)	Loss (1)	Tie (2)	Win (5)	
Top Eight Battle	Semi-final	Final		Annual Points from Elimination=30
Win (10)	Win (10)	Win (10)		

The total annual points that team X20000 obtains = 13+30+15 = 58.

Appendix 2. Engineering Notebook Guideline

***Instruction:**

1. The value of engineering notebook: It helps the team establish files and record the whole learning process. Therefore, it is necessary to record engineering notebook during the entire preparation for the competition.

2. Engineering notebook submission: Teams can use online documents or handwriting. No matter which way to use, each team must submit a paper version onsite.

Paper engineering notebook: As the Challenge & Premier programs require the assessment process, one copy of the paper version shall be submitted by each team to the judges onsite. If there is no assessment process (Starter & Explorer), each team will need to submit one copy of the paper version to the staff at the inspection area. Teams that cannot submit the original engineering notebook should prepare their own copies.

3. An engineering notebook will be required for the evaluation of all technical awards. Please refer to the Competition Guide for the evaluation criteria.

Basic Requirements for Cover

The team's name, team number, and competition program must appear on the cover of the engineering notebook.

Basic Requirements for Contents

1. **Clear content**

Creating content brings convenience for the judges to review and quickly find the corresponding section.

2. **Process records (Required)**

Every improvement of the robots should be recorded from prototype design, construction, to the debugging. Keep pictures of all manuscripts, design drawings, calculation processes, circuit diagrams, etc., and insert them into the engineering

notebook in the form of pictures.

1) Schedule of robot building progress
2) Design inspiration/sketch
3) Technical principle (it can be disassembled into different parts)
4) Production step by step (with clear pictures)
5) Problems encountered and solutions

Examples of problems:

What technical failures did you encounter? Why did you fail? How did you solve the problems finally?

What efforts have you made for the robots? What improvements have been achieved?

Does your project progress schedule go as planned? What accidents or delays have occurred? How to fix it?

Have there been any disputes among the team members and how to settle them in the end?

3. **Projects summary**

1) The structure and function of the project (with pictures and text enclosed)
2) The technical innovations of the project
3) Competition strategies for scoring and defense

4. **Team introduction**

1) A brief biography of each team member and their role on the team
2) Culture displaying (logo, team flag, slogan, posters, T-shirt, etc.)
3) Excellent achievements sharing (Stories)

5. **Feelings and other things you want to share (optional)**

1) Achievement in the competition (Technical)
2) Growth in the competition (Spiritual)
3) Suggestions for competition

Appendix 3. Robot Self-Check Form

MakeX Explorer Robot Self-Check Form

Please follow the requirements of the self-checklist and check the box if your robot meets the requirements. And submit the signed self-checklist during the inspection day. Thanks for your cooperation.

Team Name: _____ Mentor Name: _____
Team Member: _____

1. Basic Information
Robot Mainboard Number: _____ (A 12-bit code consist of numbers and alphabet, please find from the CyberPi) Total quantity of mainboard: 1 ☐Yes
Robot Size: Length_____mm, Wide_____ mm, Height _____ mm. (Robot size should not exceed: length 320mm, width 320mm, height 360mm. Please measure your robot and fill in the maximum extension size)
Robot Wheel Diameter: _____ mm (Should not exceed 70mm)
Robot Weight: _____kg (Should not exceed 4kg)
Environmental Flag: Length_____ mm, Wide_____ mm, Height (of flagpole) _____mm. (Environmental flag surface is no less than 80mm(length)* 60mm(wide). The shape of flagpole and pedestal is unlimited. The vertical projection of this part should not exceed 30mm*30mm, with the length no less than 100mm.)
2. Equipment
Name and quantity of motors(quantity ≤4): (Please write down specific name, type and quantity) Name of quantity of servos(quantity ≤4): (Please write down specific name, type and quantity) Total quantity of motors and servos <8 ☐Yes

Quantity of Bluetooth controller is 1 ☐Yes Wireless control: Bluetooth version: BT4.0 ☐Yes			
Name and parameters of battery: (18650 Lithium-ion , 3.7V 2500mAh) ☐Yes External battery:(21700 2500-8000mAh) ☐Yes			
Others			
No.	Items	Specific Requirements	Meet required States
1	Safety Protection	The robot's structure that may do harm to people is required to ensure safety protection in the process of robot loading, unloading and transporting.	☐Yes
2	Competition arena Destruction	Competition arena destruction is prohibited in the process of robot loading, unloading and transporting.	☐Yes
3	High-power Equipment	High power equipment is not available during competition and preparation.	☐Yes
4	Energy Storage Equipment	Please keep safe while using energy storage devices (springs).	☐Yes
5	Banned Material	Robots are not allowed to use the flammable gases, pyrotechnic equipment, hydraulic components, mercury-containing components, exposed hazardous materials, unsafe counterweights, designs that may cause entanglement and competition delays, sharp edges and angles, materials containing liquids or gelatinous substances, and any part that the electric current on the robot may be conducted to the competition area.	☐Yes
6	Personal Safety	Long hairs shall be tied up; contestants are prohibited from wearing toe-baring shoes to	☐Yes

		enter the competition area.	
7	Sensor	Robots are prohibited from using any sensors that can interfere with the sensory capabilities of other robots	☐Yes
8	Self-made Parts	Teams can use self-made parts by 3D printing or corrugated cardboard, woods, acrylic and Rubber band, etc. All self-made parts cannot have producers' logo.	☐Yes
9	Mechanical Parts	Teams can use self-made mechanical parts by 3D printing or laser cutting. Teams must not use commercial structures with mature design, including but not limit to multi-DOF robotic arms or hands.	☐Yes

Our team has checked our own robot according to the self-check form and has filled in the actual data on this form and submitted it to MakeX Robotics Committee. We promise that we will participate in the competition in the above state and will report any changes in time. During the competition, if the robot does not comply with the requirement or our team uses any in-compliance robot, the competition result will be disqualified and all responsibilities will be taken by the team without objection.

Team Leader Signature：

Date：

Appendix 4. MakeX Explorer Eco-Pioneer Score Sheet

MAKEX ROBOTICS COMPETITION

2022-2023 MakeX Explorer Eco-Pioneer - Scoring Results

Competition Info: Qualification Round ☐ / Elimination Round ☐___ (Arena) No.___ (Session)

Registration	Match Points			Winner
Red Alliance	Red Alliance		Blue Alliance	Red Alliance
Team 1 (No.) :	*(40 points each)*	Cube	*(40 points each)*	
Team 2 (No.) :	*(60 points each)*	Green Ball	*(60 points each)*	
Blue Alliance	*(30 points each)*	Yellow Ball	*(30 points each)*	Blue Alliance
Team 1 (No.) :	*(50 points each)*	Flag	*(50 points each)*	
Team 2 (No.) :		Penalty		
		Total Points		

Captain of Red Alliance:	Captain of Blue Alliance:	Remark
(Please confirm the scoring results and sign here)	*(Please confirm the scoring results and sign here)*	*(If there's any disagreement about the results, please write down the situation clearly and sign here.)*
Referee of Red Alliance:	Referee of Blue Alliance:	
(Please confirm the scoring results and sign here)	*(Please confirm the scoring results and sign here)*	

Appendix 5. Supplementary Explanation of Competition Procedure

Engineering Notebook Submission

MakeX encourages teams to write engineering notes for their robots, and excellent engineering notes will be an important basis for team awards. Please refer to the pre-competition notice and competition guide for the submission of paper engineering notebook and awards setting for each competition. Normally, in medium to large-scale competition, the submission of hard copy version of engineering notebook is mandatory and will be used as an important basis for awarding, the hard copy of team's engineering notebook won't be return after submission. Please refer to the appendix 2 for the engineering notebook guideline.

Pits Area Decoration

Each team can set up and decorate their own team area in the pits area, as well as promote their team for the awarding. The pits area is the area for team's resting and robot debugging, so please keep it clean and tidy. Suggested are as follows:

- Display content (to be provided by the team)
- Team flag
- 3-4 high-resolution photos of the team
- Team introduction (no more than 200 words)
- Team peripheral display (if any)

Display Format

Team poster/display board+ team flag + team souvenirs (if any) +team members/mentor for presenting

Practice Round

Teams who have finished their robot inspection can participate in practice round. The schedule will be announced at the entrance in form of notices, and teams are required to queue in line before entrance. Not all competitions have a practice round, which can be informed based on actual situation.

Appendix 6. Competition Resources

Competition resources include but are not limited to official resources provided by the committee, such as Competition Guide, Equipment Instructions, Rules Videos, etc.

The contestants are obliged to keep abreast of the update of competition resources before the competition, and any problems caused by the contestants' failure to keep abreast of the updates shall be borne by the contestants themselves. All official competition resources will be updated in MakeX Website.

MakeX Robotics Competition Committee will revise and improve the Rules Guide with the progress of the competition and the new version will be announced in MakeX Website. The contestants and mentors can download the latest version in MakeX Website.

MakeX Website Download https://www.makex.cc/en/information/download.

MakeX Official Website: https://www.makex.cc/en.

Any Feedback & Question Please Sent to:

makex_overseas@makeblock.com

MAKEX

Edited By Makex Robotics Competition Committee

RULES GUIDE

MAKEX EXPLORER

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