

**MAKE X**

**V2.0**

# 机器人挑战赛

Robotics Competition

**2024 - 2025**

**RULES GUIDE**

**MAKEX STARTER**

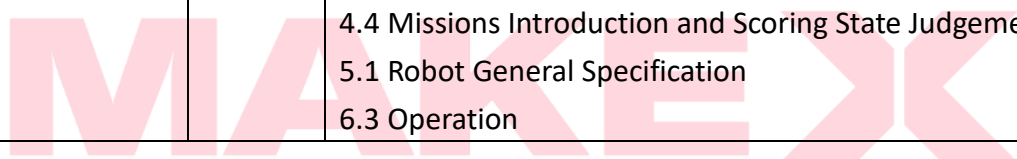


**2025.01**

[www.makex.cc/en](http://www.makex.cc/en)



Date	Version	Modifications Record
2024.01	1.0	MakeX Starter All-Core Journey Rules Guide First Publish.
2024.07	1.1	4.4 Missions Introduction and Scoring State Judgement <ul style="list-style-type: none"> <li>• M06 Stacking Storeroom</li> <li>• M07 Lighting the Antimatter Fuel Rod</li> <li>• M08 Operating Matrix Research Station</li> </ul> 5.1 Robot General Specification <ul style="list-style-type: none"> <li>• T06. Robot Electronic Requirements</li> </ul> 6.3 Operation <ul style="list-style-type: none"> <li>• R21. Observers are allowed to direct contact with the cube props that are fully in the manual loading area.</li> </ul> Appendix 4. MakeX Starter Score Sheet
2025.01	2.0	2024-2025 Season MakeX Starter All-Core Journey Rules Guide First Publish. <ul style="list-style-type: none"> <li>2.1 Participation Requirements</li> <li>4.3 List of Props</li> <li>4.4 Missions Introduction and Scoring State Judgement</li> <li>5.1 Robot General Specification</li> <li>6.3 Operation</li> </ul>





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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 Starter

MakeX Starter is a multi-mission competition program for teenagers aged 6-13. The competition integrates the automatic stage and the manual stage, which greatly enhances the fun and participation experience of the competition. The concept of multiple missions and the alliance cooperation design fully exercise the abilities of critical thinking and strategic planning of contestants, as well as improve the ability of communication and cooperation between alliance teams.

## 2. Competition Application

### 2.1 Participation Requirements

**Participants:** The number of contestants is 1-2 for each team, with 1-2 mentor(s).

**Age:** Team members must be teenagers or children between the age of 6-13 (born between January 2, 2011 and December 31, 2019), and the mentor must be at least 18 years old.

**Team Roles:** Everyone in the team can play their respective roles as operator, observer. The operator is responsible for operating the robot, and the observer is responsible for assisting the operator to complete the game.

**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 who meet participation requirements can register on the designated competition web page on the MakeX official website ([www.makex.cc/en](http://www.makex.cc/en)).

Each team should register with one registration form.

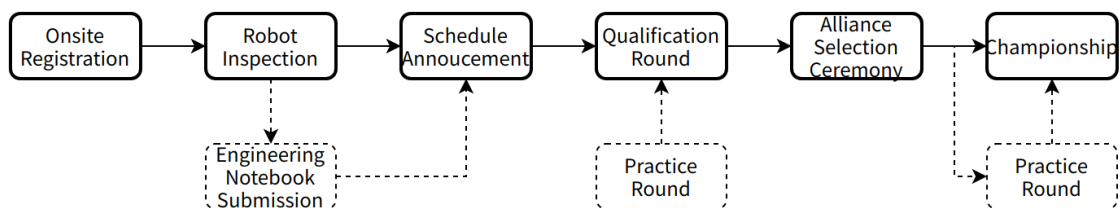
If a participating team wants to change their members before the competition, which leads to inconsistency with the registration information, they should inform the MakeX Robotics Competition Committee in advance to finish re-registration.

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 the Competition Guide published before each competition. If the rules have some updates in the 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 systems based on the actual situation of different competitions.

The schedule for each competition is determined by the actual situation and generally includes the following procedures.



\* Note: The solid line frame refers to the necessary procedure of each match, while the dotted line frame refers to the non-essential 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 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

Teams are required to check their robots and team markers before the competition and complete the "**Appendix 3: Robot Self-Inspection Form**" according to the actual data. Teams are required to check their robot against the Self-Inspection items to make sure it meets the requirements associated with robot construction. During the robot inspection time, the inspectors will randomly check the robot and team markers against the completed Robot Self-Inspection Form. Teams that do not provide the completed Robot Self-Inspection Form will not be accepted for inspection; For teams that provide complete inspection materials, the inspector will stick the inspection sticker of the match to the robot, and the inspection sticker can not be removed after sticking, if there is any special reason that causes the inspection sticker to be broken, please take the initiative to communicate with the organizing committee and explain the reason.

Before the official match, participating teams are obligated to conduct self-inspections on their robots and mutual inspections on the opposing robots, and make necessary corrections promptly before entering the arena.

Once in the arena, malicious complaints are not allowed (for the definition of malicious complaints, please refer to section 6.3 Operational Rules - R33). Teams must follow the referee's instructions and raise their hands to confirm that both robots are correct before the match begins. After this point, unless filing a complaint, no further on-site inspections of the robots are allowed.

### Schedule Announcement

The committee will announce the match schedule at least 30 minutes ahead of the competition through the online official website and onsite announcement. The schedule includes a match-up chart, match session and specific time, red alliance and blue alliance, etc. If the two matches are too closed, please sign up at the Result Approval Area.

### Engineering Notebook Submission





Each team is required to submit 1 paper copy of their team's engineering notebook to the MakeX staff. If you are unable to submit the original version, please prepare your own copy. The engineering notebook will be used as an important basis for the selection of the special awards, teams that do not submit engineering notebooks are by default excluded from engineering notebook-related awards. The paper version of the engineering notes will not be returned after submission. For suggestions on how to write the engineering notes, please refer to "**Appendix 2: Engineering notebook guideline**". Not all competitions will include engineering notebook-related award selection. Please refer to the content of the Competition Guide distributed before the competition for the awards.

### Practice Round

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

### Waiting for the match

During the regular competition, the venue will be equipped with a waiting area and Make staff will announce or post the number of waiting matches in the pits area. Participating teams should pay attention to the notification of waiting matches and go to the corresponding waiting area according to the notified waiting matches.

### Qualification Round

Normally, each team will participate in 4 matches during the Qualification Round in a regular competition, during which alliance teammates will be allocated randomly. The number of qualification matches for teams to participate in may vary between different competitions, which is decided by the MakeX Committee according to the practical situation.

Teams will be ranked according to the below principles after the Qualification Round:

- (1) Rank according to the sum of teams' scores from all qualification rounds, the team with the higher total qualification round score will have a higher ranking;



- (2) If the above condition is the same, the team with a shorter total completion time during the qualification round ranks higher;
- (3) If the total score and completion time of the qualification round are the same, two teams who rank the same will have an additional match (only for the automatic independent missions), until the winner is decided.

### Promotion proportion for each competition

In the 2024-2025 season, the promotion proportion for each competition is 50%. Take up even teams to advance.

Example: the actual participating teams are 129,  $129 \div 2 = 64.5$ , then take an even number of teams up and promote to 66 teams.

### Alliance Selection Ceremony

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

Each promoted team shall assign one representative to participate in the alliance selection ceremony. When being chosen by other teams, promoted teams ranking top 50% can refuse 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 an alliance and those who are not present before the end of the alliance selection are considered to be as voluntarily quitting the championship 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.

During the alliance selection ceremony, each team representative will have 30 seconds to make their decision when it is their turn, and if they are not selected within the 30-second time limit, they will lose the right to select and will move on to the next team in order.



### Championship Round

Normally, after the alliance selection ceremony, each alliance will participate in 2 matches during the Championship Round in a regular competition. The number of championship matches may be increased or decreased depending on the actual situation of different competitions. Red and blue teams will be chosen by the alliance teams themselves. The alliance teams will be ranked according to the following rules.

- (1) The alliance with the higher score of the single match will rank higher.
- (2) If the best score of the single match is equal, the alliance with the shorter completion time ranks higher.
- (3) If the above conditions are the same, the alliance with the same ranking will complete an extra match (finish all the missions) until the winner is decided.

## 4. Competition Details

The theme of the 2024-2025 MakeX Starter is "All-Core Journey".

The traditional manufacturing industry consumes a lot of manpower and material resources, resulting in numerous waste emissions and even leading to pollution of the environment. Chip equipped with advanced technology is the technology leading the change in the manufacturing industry, which will greatly enhance manufacturing efficiency, reduce manufacturing costs, and improve the intelligence and convenience of manufacturing. The teenagers have a keen insight into the first opportunity and improvement of intelligent manufacturing, and they are determined to explore the core to find the treasure and go on the all-core journey to contribute the core power for the future of intelligent manufacturing, and to promote the sustainable development of the intelligent manufacturing industry.

### 4.1 Introduction

MakeX Starter is a multi-mission-based competition and requires blue and red teams forming an alliance to participate.

The competition lasts 4 minutes and is divided into automatic stage and manual



stage. The teams in the alliance can decide the time for each stage. There are 2 scoring times in each match. Teams shall complete the automatic mission during the automatic stage, when both teams in the alliance agree to switch from the automatic stage to the manual stage, the referee will stop the timing and the match enters the scoring time after the automatic stage. After scoring, the manual stage begins and teams shall complete the manual mission during the manual stage. After the end of a single match, the competition enters the scoring time after the manual stage, the referee calculates the scoring for each stage according to the status of props at the scoring period.

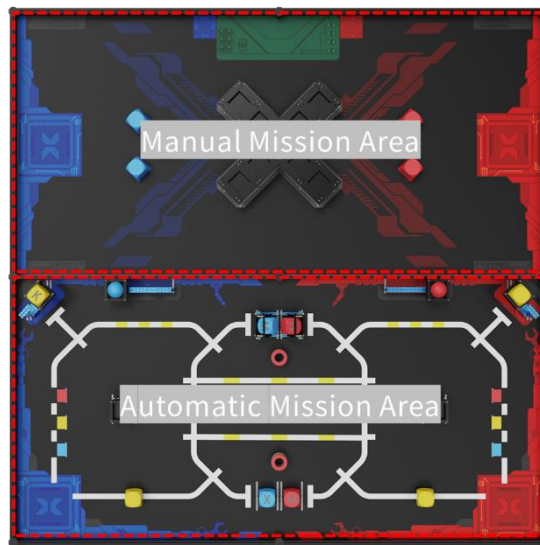


**Fig4.1 Competition Arena Isometric View**

## **4.2 Arena**

MakeX Starter Arena consists of a map and frame. The internal size of the frame is 2317 mm\*2317 mm, and the external size of the frame is 2372 mm\*2372 mm.

The map consists of two parts, including the automatic mission area and manual mission area, together with the starting area, password filling area, marking area, manual loading area, etc.

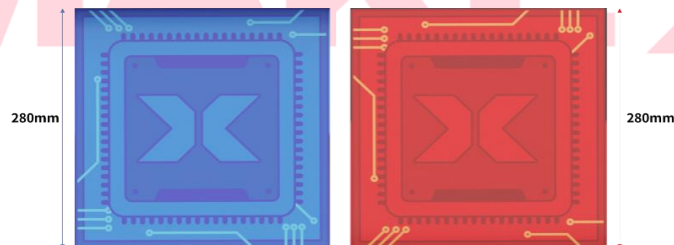


**Fig4.2-1 Areas on the Competition Arena**

**Arena in details:**

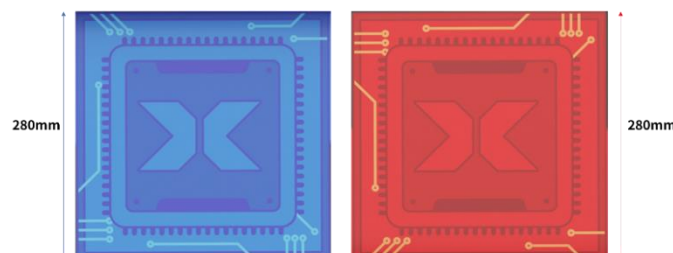
**Starting Area**

There is one red and one blue starting area in the automatic mission area, which is a rectangle with a side length of 280mm.



**Fig4.2-2 Starting Areas in the Automatic Mission Area**

There is one red and one blue starting area in the manual mission area, which is a rectangle with a side length of 280mm.



**Fig4.2-3 Starting Areas in the Manual Mission Area**



### Resource area

The resource area is the area shown below.

Size: 96mm\* 96mm

Location: Beside the starting area of the automatic mission area

Amount: 4 for each red and blue side

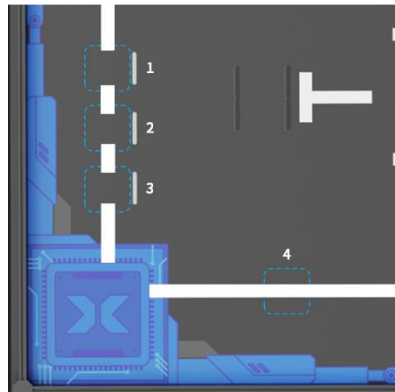


Fig4.2-4 Resource area

### Password filling area

The password-filling area is shown below.

Size: 130mm\* 93mm

Location: Beside the T-intersection in the central area of the automatic mission area

Amount: 1 for each red and blue side

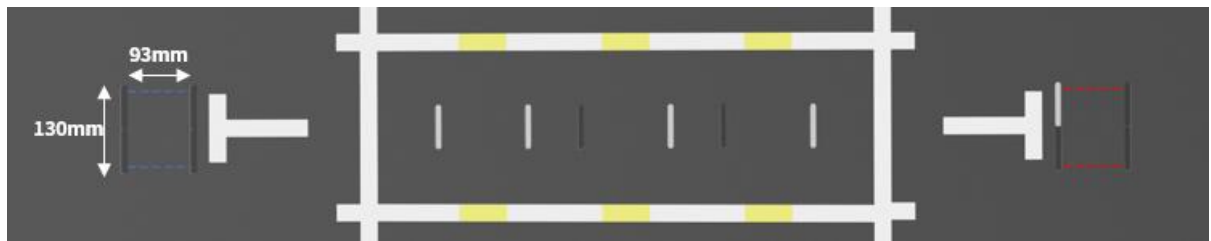


Fig4.2-5 Password filling area

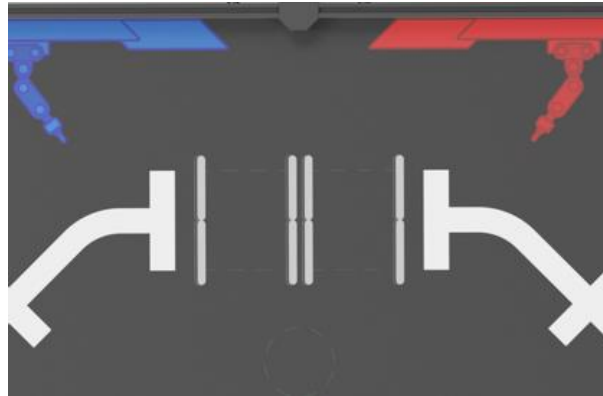
### Connecting area

The connecting area is shown below.

Size: 130mm\*93mm

Location: In the middle area of the automatic mission area, near the manual mission area.

Amount: 1 for each red and blue side

**Fig4.2-6 Connecting area**

### Transit area

The transit area is shown below.

Size: 130mm\*93mm

Location: in the centre of the automatic mission area near the bottom frame

Amount: 1 for each red and blue side

**Fig4.2-7 Transit area**

### Manual Loading Area

The green area shown below is the Manual Loading Area.

Size: length 550mm\* width 200mm

Location: On one side of the Manual Mission Area

Amount: 1

**Fig4.2-8 Manual Loading Area**

### Marking Area

Two circle-shaped areas shown below are Marking Areas.

Size: Diameter 80mm Circle

Location: On both side of the Matrix Research Station in the Manual Mission Area

Amount: 1 for each red and blue team

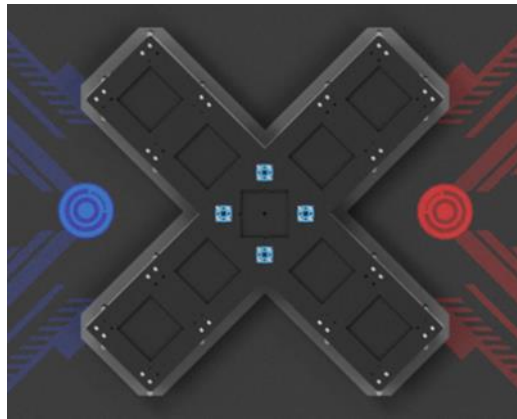


Fig4.2-9 Marking Area

### 4.3 List of Props

Props include scoring props and mission props; the introduction is as follows:

#### Scoring Props:

**Name:** Data Cube

**Introduction:** Red or blue round corner cube with a side of 70mm, 4 sides are labelled with the alphabet "M", "A", "E" and "X", hereinafter referred to as red/blue alphabet cube.

**Size:** maximum size length is 70mm

**Quantity:** Red\*5, Blue\*5

**Color and Material:** Red, Blue, EVA



Fig4.3-1 Data Cube



**Name: Quantum chip**

**Introduction:** Yellow round corner cube with a side of 70mm, 4 sides are labeled with the alphabet "K", hereinafter referred to as yellow K cube.

**Size:** maximum size length is 70mm

**Quantity:** 1

**Color and Material:** Yellow, EVA



**Fig4.3-2 Quantum Chip**

**Name: Organic Crystal**

**Introduction:** Yellow round corner cube with a side of 70mm, hereinafter referred to as yellow cube.

**Size:** maximum size length is 70mm

**Quantity:** 3

**Color and Material:** Yellow, EVA



**Fig4.3-3 Organic Crystal**

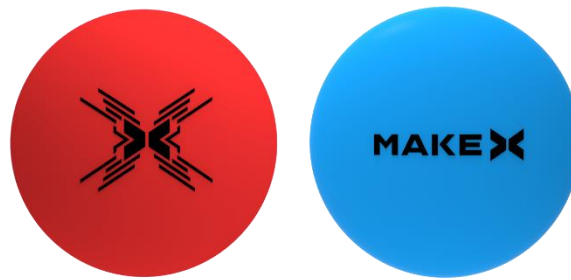
**Name: Photon Energy**

**Introduction:** Sphere with a diameter of 70mm.

**Size:** Diameter of 70mm

**Quantity:** Red\*1, Blue\*1

**Color and Material:** Red/Blue, EVA



**Fig4.3-4 Photon Energy**

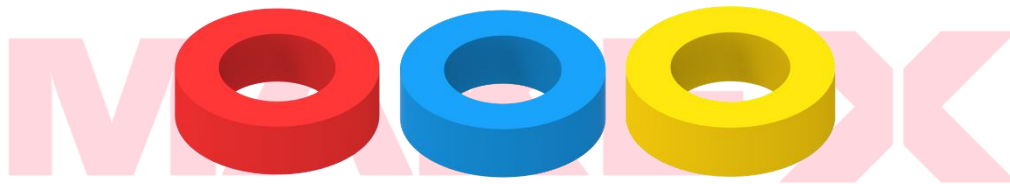
**Name:** Spectral Ring

**Introduction:** Red, blue, and yellow rings

**Size:** Thickness 20mm, Inner Diameter 40mm, Outer Diameter 70mm

**Quantity:** Red\*2, Blue\*2, Yellow\*2

**Color and Material:** Red/Blue/Yellow, EVA



**Fig4.3-5 Spectral Ring**

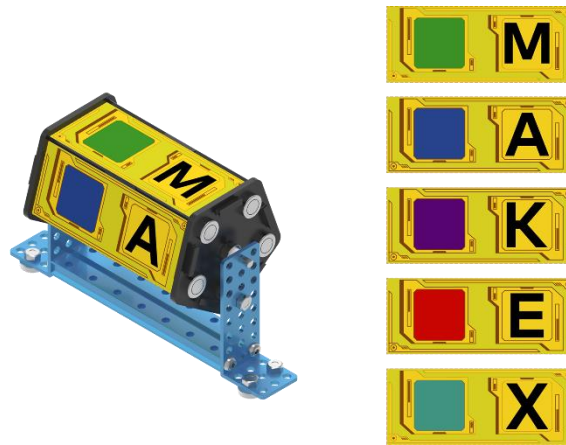
**Name:** Antimatter Fuel Rods

**Introduction:** Rotatable device consists of 5 sides, each of which is labeled with a "color mark" and "alphabet". One side of the device always keeps facing up each time it rotates.

**Size:** 110\*128\*70mm

**Quantity:** 3

**Color and Material:** blue metal parts, black acrylic



**Fig4.3-6 Antimatter Fuel Rods**

**Name:** Team Marker

**Introduction:** It is a 3D prop, with no limitation of material, recommended to use a laser cutting machine or 3D printer to produce. The height shall be greater than or equal to 120mm, and the vertical projection on the ground shall not be greater than or equal to a circular area with a diameter of 60mm.

**Size:** Height  $\geq 120$ mm, and the vertical projection area shall be less than or equal to a circular area with a diameter of 60 mm.

**Quantity:** Red team\*1, Blue team\*1

**Color and Material:** No limitation.

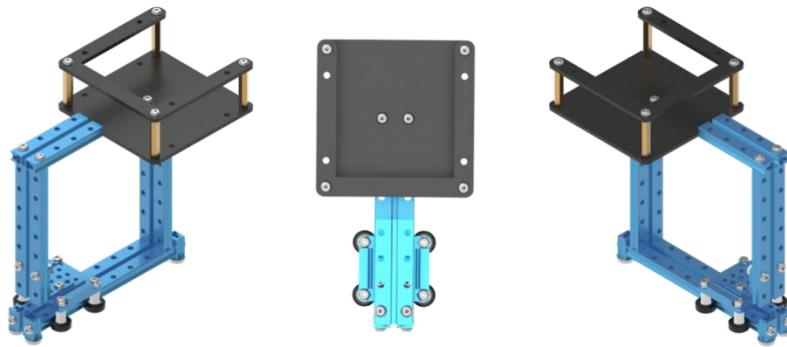
**Mission prop**

**Name:** Logistics Distributor

**Introduction:** A shaped structure made of blue metal parts, with a part of the platform that can be moved in parallel to place with a yellow or yellow K cube.

**Size:** 165\*96\*176mm (length, width, height)

**Color and Material:** blue metal parts, black acrylic



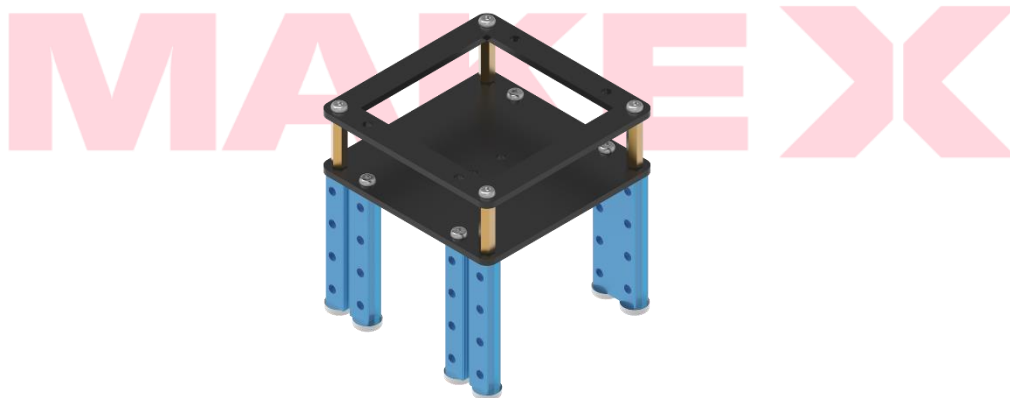
**Fig4.3-7 Logistics Distributor**

**Name:** High Manufacturing Table

**Introduction:** A table that is made of blue metal and black acrylic, can be embedded with cubes with a maximum side length is 70mm; Its platform is unmovable.

**Size:** 96\*96\*100mm

**Color and Material:** blue metal parts, black acrylic



**Fig4.3-8 Higher Manufacturing Table**

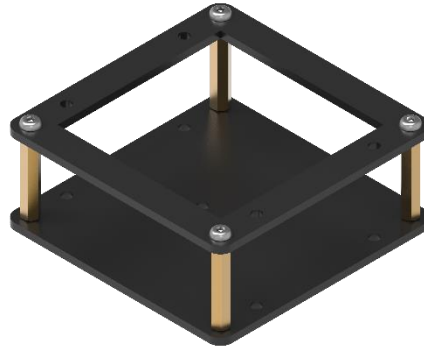
**Name:** Low Manufacturing Table

**Introduction:** Made of black acrylic. The base is movable. A magnet attraction sheet is stuck to the bottom for placement on a magnet;

**Size:** 96\*96\*42mm



**Color and Material:** metal parts, black acrylic



**Fig4.3-9 Lower Manufacturing Table**

**Name:** Resource Converter

**Introduction:** Made of blue metal and black acrylic. The base with embedded cubes can be rotated, and the cube can be placed under the base to make the base horizontal;

**Size:** 108\*124\*157mm

**Color and Material:** blue metal parts, black acrylic



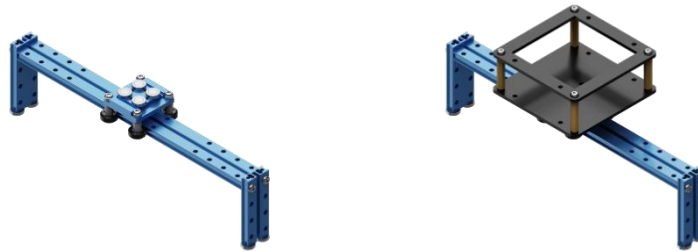
**Fig4.3-10 Resource Converter**

**Name:** High-speed sorter

**Introduction:** A shaped structure made of blue metal parts. With a slide device that allows the lower manufacturing table to be placed on the slide and move side by side.

**Size:** 276\*96\*123mm

**Color and Material:** blue metal parts



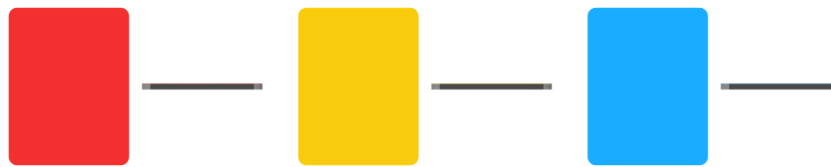
**Fig4.3-11 High-speed sorter**

**Name:** Magnetic Beacon

**Introduction:** Consisting of magnetic stickers and red, blue and yellow stickers;

**Size:** 43\*56\*2mm

**Color and Material:** magnetic stickers and red, blue and yellow stickers



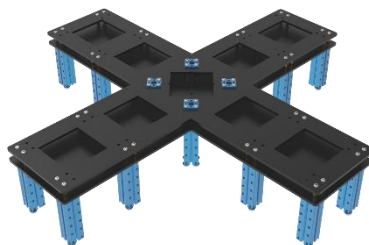
**Fig4.3-12 Magnetic Tag**

**Name:** Matrix Research Station

**Introduction:** Made of black wooden board and metal parts. On the top is the wooden board that can be embedded with alphabet cubes, which can hold 9 cubes with a maximum side length of 70mm.

**Size:** 620\*620\*110mm

**Color and Material:** blue metal parts, black wooded board



**Fig4.3-13 Matrix Research Station**

\*Note: All arenas and props have some reasonable tolerance.



## 4.4 Missions Introduction and Scoring State Judgement

Participants will engage in various missions, including Independent Missions, Alliance Missions, and potential Mysterious Missions.

**Independent Mission:** Designated as M01-M06, the scores for Independent Missions are exclusively attributed to the respective team undertaking the mission.

**Alliance Mission:** Identified as M07-M09, Alliance Missions require collaborative efforts, and the resulting scores are collectively awarded to the two teams allying.

**Mysterious Mission:** This mysterious mission is unveiled exclusively during major competition events, adding an element of surprise and strategic complexity.



**Fig4.4-1 Missions in the automatic and manual area**

In a single match, each team is required to complete 6 independent missions, and 3



alliance missions:

Stage and Time	Mission Type	Mission Name
Automatic Stage (Duration: x seconds, where $0 < x \leq 240$ )	Independent Mission	M01: Picking up Organic Crystal
		M02: Collecting Quantum Chip&Organic Crystal
		M03: Transferring Photon Energy
		M04: Turning on the Think Tank System
		M05: Transiting Data Cube
		M06: Assigning Spectral Rings
Automatic Stage (x seconds, $0 < x \leq 240$ )	Alliance Mission	M07: Lighting the Antimatter Fuel Rods
Manual Stage (240-x Seconds)	Alliance Mission	M08: Operating Matrix Research Station
		M09: Placing Team Marker

### M01 Picking up Organic Crystal

**Mission Type:** Independent Mission

**Mission Background:** Organic crystals are an indispensable part of sensors, and sensors are one of the fundamental devices that ensure the operation of modern smart factories. They can collect various factory data, such as temperature, humidity, pressure, vibration, power, etc., and transmit this data to the factory's digital management system via the internet, using sensors to monitor the factory's status. The robot completely moves the organic crystal (yellow cube) that is placed in the resource area out of the initial area.

**Starting Condition:** This mission has four initial areas. The placement of the yellow cube is determined by the pre-match drawn props card. One of the placements is shown below. This scoring prop will not be glued or fixed in place.



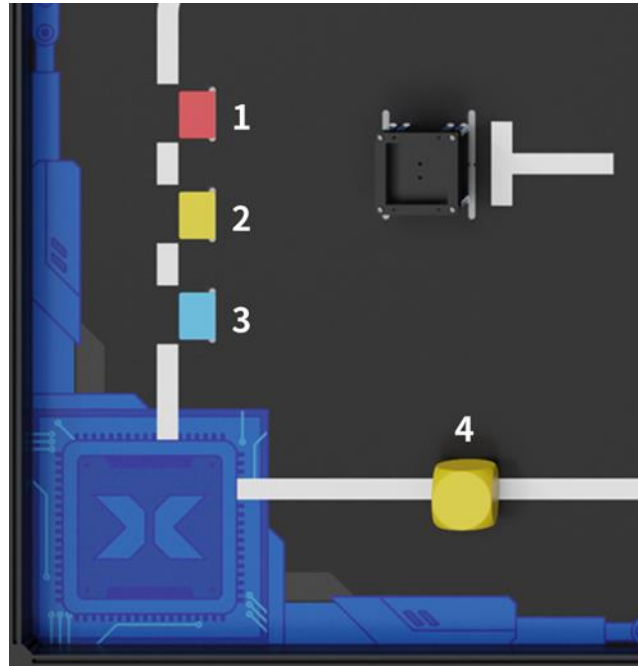


Fig4.4-2 M01 initial placement

**Mission Score:** The successful removal of the yellow cube from its initial area is valued at 20 points

**Scoring Judging:** At the scoring time after automatic stage:

a. The vertical projection of the yellow cube is completely moved out of the initial area.

b. The yellow cube must be completely located in the arena.

c. The yellow cube has no direct contact with the robot.

If all the above conditions are met, the corresponding yellow cube will be scored.

**Arena Definition:** The arena encompasses the map, the upper surface and the internal edges of the frame. It explicitly excludes the external surface of the frame, the desktop, the ground, and any other adjacent areas.



Initial State



Partially Move Out x



Completely Move Out v

Fig4.4-3 M01 Scoring Judging



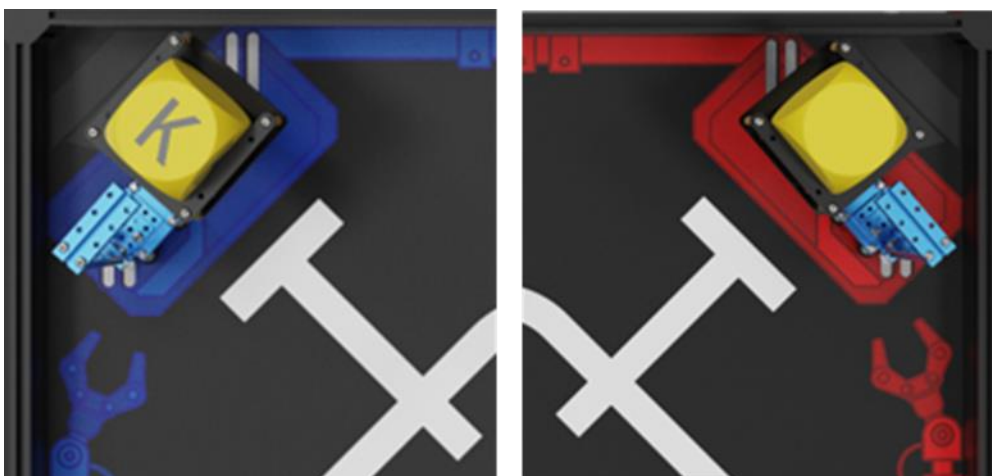
## M02 Collecting Quantum Chip and Organic Crystal

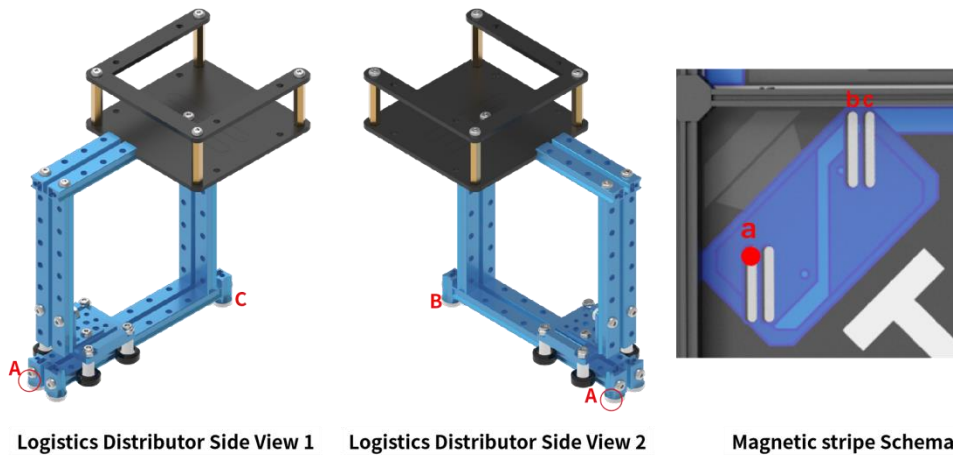
**Mission Type:** Independent Mission

**Mission Background:** Waste water from manufacturing needs to be purified and treated, and the automated operation of the factory needs to be supported by chips. The robot uses a Logistics Distributor (a cube push-off device) to obtain organic crystals and quantum chips, to classify and treat pollutants generated in the manufacturing process, and to classify finished products, pollutants, and chips in the factory using the logistics distributor.

**Starting Condition:** The logistics distributors are positioned in the upper left quadrant of the start area, delineating the red and blue areas. Each device platform hosts a yellow cube (The yellow cubes include: a yellow blank cube and a yellow K-cube, the placement of the yellow K-cube is decided by the red and blue teams before the match).

The logistics distributors with open faces oriented towards the manual area. The cube push-off device's base is securely attached to the map with magnets, featuring two double-hole beams. The logistics distributor's placement, exemplified on the blue side, aligns with the magnetic stripe markings on the map, denoted as a, b, and c. Correspondingly, the circular magnetic disk markings on the logistics distributor's base, labeled A, B, and C, dictate specific placements: disk A on the red point of magnetic stripe A, disk B on magnetic stripe b, and disk C on magnetic stripe c.





**Fig4.4-4 M03 Initial placement**

**Mission Score:** Each successful removal of the yellow cube from the logistics distributor counts for 20 points.

**Scoring Judging:** At the scoring time after automatic stage:

- a. The vertical projection of the yellow cube is completely in the manual area.
- b. The yellow cube has no direct contact with the logistics distributor device.
- c. The yellow cube has no direct contact with the robot.
- d. The logistics distributor device stays upright.

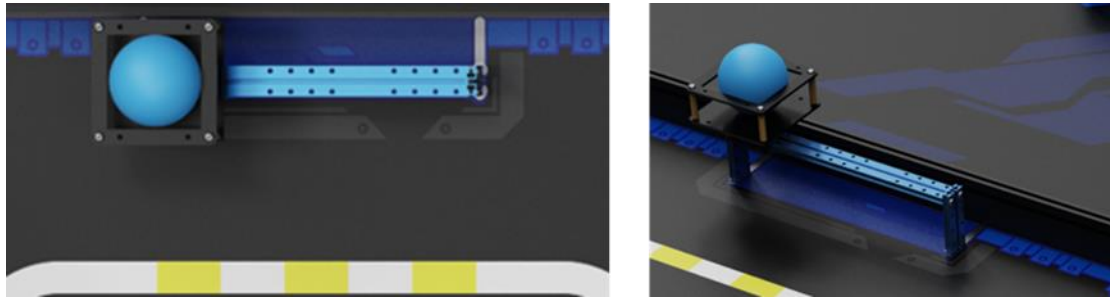
If all the above conditions are met, the corresponding yellow cube earns points.

### M03 Transferring Photon Energy

**Mission Type:** Independent Mission

**Mission Background:** For the logistics system to function properly and for the Think Tank to be able to transmit a constant flow of photon energy, the red or blue ball on the high-speed sorter needs to be moved to the centre of the sorter.

**Starting Condition:** The High-Speed Sorter is located near the central flat aluminium side, and the two double-hole beams at the base are attached and secured to the map by magnets in the initial position shown below, with the two double-hole beams flush with the underside of the magnetic strip on the map. The low manufacturing table containing the red/blue ball is placed on the pulley of the high-speed sorter. The initial position of the pulley is determined by the prop cards drawn before the match, and one of the placements is shown below.



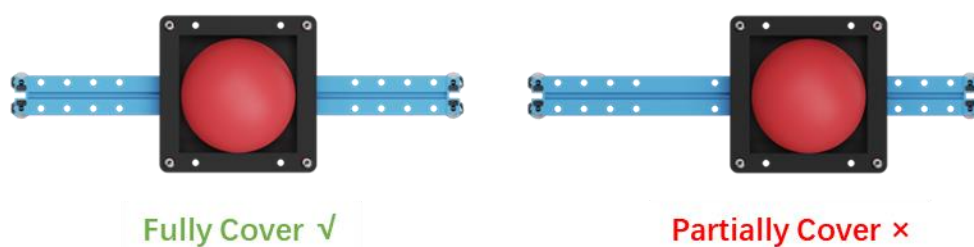
**Fig4.4-5 M03 initial placement**

**Mission Score:** Successfully moving the low manufacturing table containing the red/blue ball to the centre of the high-speed sorter is worth 30 points;

**Scoring Judging:** At the scoring time after automatic stage:

- The vertical projection of the low manufacturing table containing the red/blue ball completely covers the eight holes in the centre position of the two-hole beam;
- The low manufacturing table containing the red/blue ball is attached to the pulley and does not fall off;
- The high-speed sorter stays upright.
- The robot has no direct contact with the high-speed sorter and the low manufacturing table containing the red/blue ball.

If all the above conditions are met, the corresponding ball earns points.



**Fig4.4-6 M03 Scoring State**

#### **M04 Turning on the Think Tank System**

**Mission Type:** Independent Mission

**Mission Background:** With the data cube collection complete, the Logistics Think Tank system waits to be awakened, and only by turning the system on can it ensure that a range of operations are carried out properly. However, the turn-on of the



Think Tank requires the entry of a specific password, which requires the collection of data cubes (red or blue alphabet cubes) from the transit area to be placed on a high manufacturing table in the password-filling area for subsequent use.

**Starting Condition:** The transit areas are located in the centre of the automatic mission area near the lower frame, and the high manufacturing table in the password-filling area, whose four pillars are magnetically fixed to the map, is vertically projected to lie entirely within the dotted box in the diagram. Within the dotted box of the transit zone is a red/blue alphabet cube, with the orientation of the letter “M” or “X” of the alphabet cube being determined by the prop card drawn before the match.



**Fig4.4-7 M04 initial placement**

**Mission Score:** Each successful transfer of the alphabet cube to the high manufacturing table in the password-filling area counts for 20 points.

**Scoring Judging:** At the scoring time after automatic stage:

- The red/blue alphabet cube is fully embedded in the high manufacturing table.
- The vertical projection of the red or blue alphabet cube is at least partially located in the password-filling area.
- The robot has no direct contact with the high manufacturing table and the red/blue alphabet cube.
- The red/blue alphabet cube “X” and “M” are oriented in the same direction as the initial orientation of the mission.
- The high manufacturing table stays upright.

If all of the above conditions are met, the corresponding red/blue alphabet cube



scores get points.

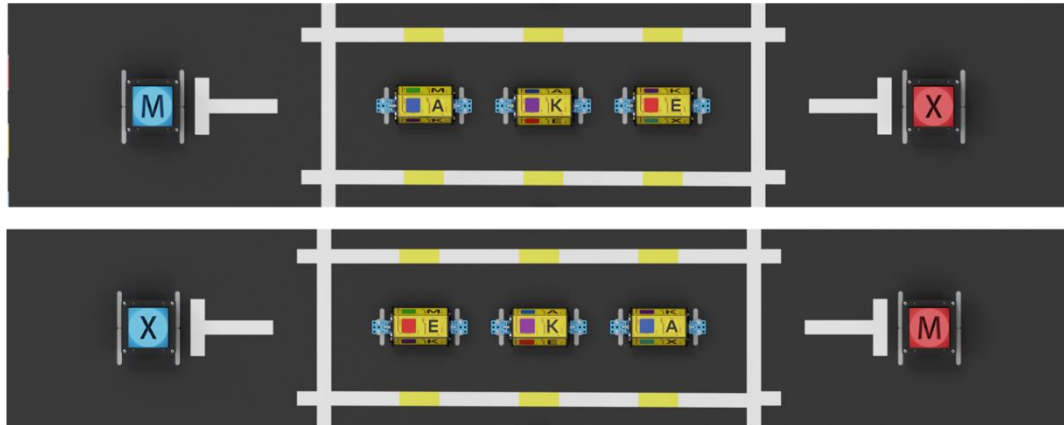


Fig4.4-8 M04 Scoring State

### M05 Transiting Data Cube

**Mission Type:** Independent Mission

**Mission Background:** The robot can transfer the organic crystal (yellow cube) from its own side to the connecting area and embed them under the resource converter, which will operate the pollution treatment unit to treat the waste effluent, and displace the data cubes (red/blue alphabet cubes) and transfer them to the manual area; or, by other means, transfer the data cubes to the manual area.

**Starting Condition:** In the automatic mission area, there is a connecting area for each of the red and blue sides, with a resource converter in the connecting area, a red/blue alphabet cube embedded in the resource converter, and a resource converter with one side of the black acrylic table raised, with the initial position and status of the resource converter as shown in the figure below.



Fig4.4-9 M05 initial placement



**Mission Score:** Successfully moving the red/blue alphabet cube, initially embedded in the resource converter, to the manual mission area is awarded 30 points.

**Scoring Judging:**

**At the scoring time after the automatic stage:** the vertical projection of the red or blue alphabet cube embedded in the resource converter is completed in the manual area.

If the above conditions are met, the corresponding red/blue alphabet cube scores get points.

**M06 Assigning spectral rings**

**Mission Type:** Independent Mission

**Mission Background:** Spectral rings are one of the tags used to classify and organize the existing data blocks using colors, and the robot needs to assign the spectral rings to the corresponding magnetic beacon boxes according to the colors for subsequent data block identification and classification work.

**Starting Condition:** In the automatic mission area, there is one spectral ring placement area near the transit area and one near the connecting area, the red spectral ring placement area is near the connecting area (close to the man, and the blue spectral ring placement area is near the transit area. The stacking order of the spectral rings and the magnetic color scale is determined by the prop cards drawn before the game [Example: the magnetic color scale is red, yellow and blue from the top to the bottom (starting area), so the corresponding spectral rings are stacked in the order of red, yellow and blue (from top to bottom (contact with the map)].

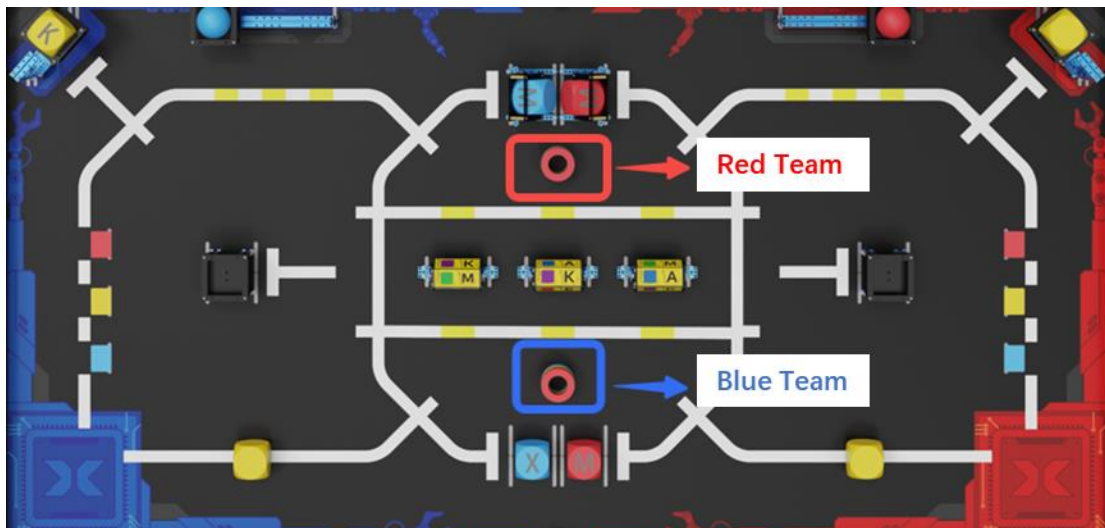


Fig4.4-10 M06 Initial placement

**Mission Score:** Each correct sort of spectral ring counts 20 points.

**Scoring Judging:** At the scoring time after automatic stage:

- a. The vertical projection of the ring is completely in the square.
- b. The ring's color matches the color of the corresponding magnetic color scale.
- c. The robot has no direct contact with the ring.

The corresponding spectral ring is scored if the above determinations are satisfied.

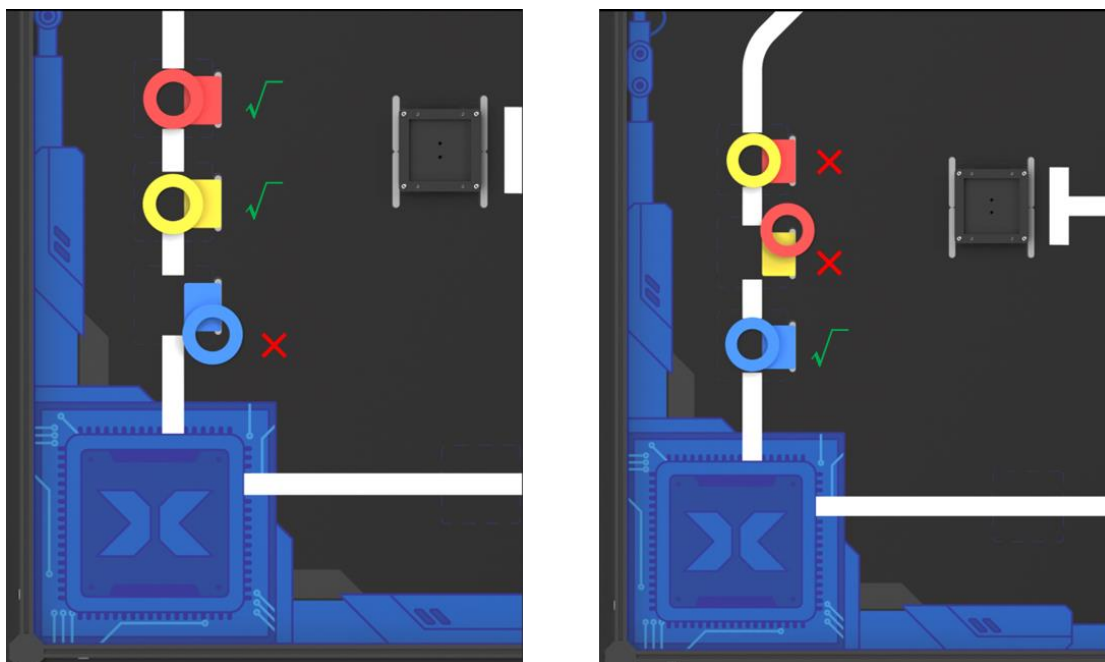


Fig4.4-11 M06 Scoring State



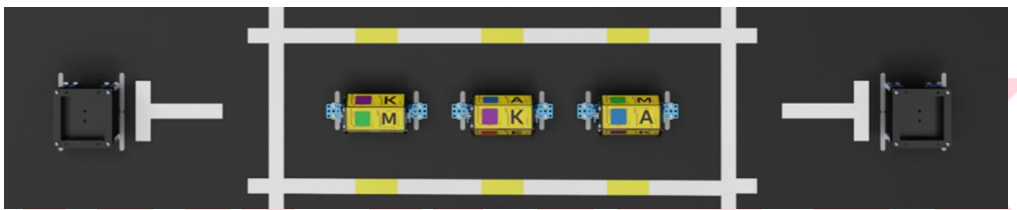


## M07 Lighting the Antimatter Fuel Rod

**Mission Type:** Alliance Mission

**Mission Background:** Antimatter fuel rods have the advantages of high efficiency, intelligence and durability. The continuous intelligent operation of the factory needs fuel rods for support. The robot is required to automatically toggle the antimatter fuel rods to make the factory facilities run in an orderly manner.

**Starting Condition:** Three Antimatter Fuel Rods (rotary cylinders) are horizontally positioned in the centre of the automatic mission area. Each cylinder has five sides, each side marked with a specific color and alphabet. The initial sequence of the cylinders is set according to the prop cards drawn before the match, with one potential arrangement depicted below. The rotary cylinders are required to align with the "|" part of the T-intersection, as shown below.



**Fig4.4-12 M07 initial placement**

**Mission Score:** Each cylinder array in the correct order, counts 30 points.

**Scoring Judging:** At the scoring time after automatic stage:

- The sequence of the rotary cylinder, when combined with the "X" or "M" cubes from M04, must spell "MakeX" in the correct order or "XEKAM" in reverse.
- The robot must not have any direct interaction with the rotary cylinder.
- The rotary cylinder must be arranged in a specific sequence with the key information side prominently facing upwards.
- Rotary cylinder remains upright.

If all the above conditions are met, the corresponding rotary cylinder will be scored.



**Note:** If the "X" and "M" cubes in M04 do not score, the rotary cylinders will not collect any points, regardless of their sequence. If only one side scores in M04, the order of the cylinders in M07 should commence with the scoring side from M04, forming either a positive or negative sequence spelling "MakeX".

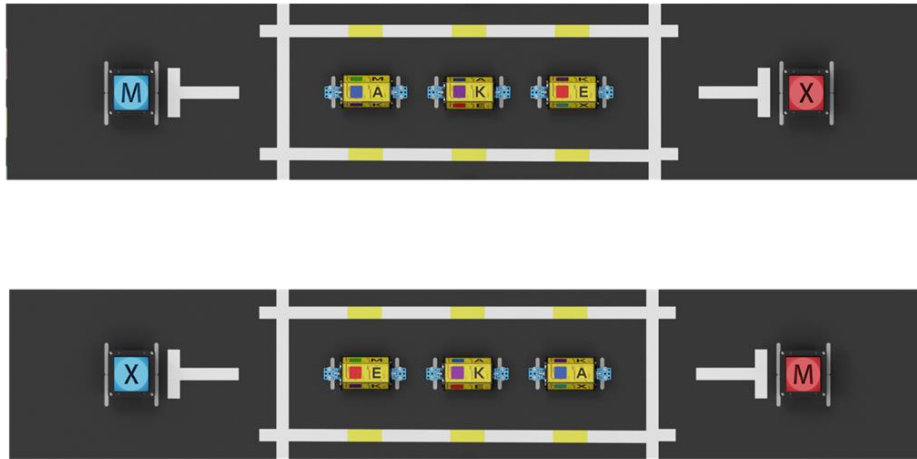


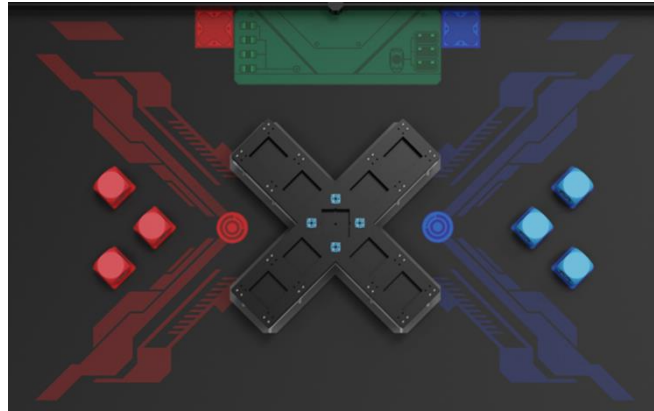
Fig4.4-13 M07 Scoring State

#### M08 Operating Matrix Research Station

**Mission Type:** Alliance Mission

**Mission Background:** Designed to revolutionize digital factory management, industrial Internet devices are designed to collect a myriad of factory data such as temperature, humidity, pressure, vibration, and electricity. Robots are tasked with embedding quantum chips and data cubes into the Matrix Research Station. This information is relayed to the station via the Internet, enabling the monitoring of factory operations and the advancement of research into energy-efficient, intelligent manufacturing methods, ultimately elevating industrial production to a new level.

**Starting Condition:** In the manual area, there are 3 red alphabet cubes and 3 blue alphabet cubes with blank sides facing up (shown below figure). The rest cubes are entirely contingent upon whether the red and blue teams have successfully transferred the corresponding props to the manual mission area.



**Fig4.4-14 M08 initial placement**

**Mission Score:** Embedding each cube in the correct sequential color earns 20 points. Furthermore, if cubes of the same color are arranged in a "MakeX" sequence, an additional 50 points are awarded for each complete "MakeX" sequence.

**Scoring Judging:** At the scoring time after the manual stage:

a. Alphabet cubes must be accurately embedded in the designated sequence and color, aligned with the demonstrated order (as viewed from the manual loading area).

b. The robot has no direct contact with red, yellow and blue alphabet cubes and yellow cube and any part of the storage rack(Matrix Research Station);

c. The red, yellow, and blue alphabet cubes must be fully integrated into the notches of the storage rack.

If all the above conditions are met, the corresponding cube will be scored.

**Note: Observers are only permitted to interact with the alphabet cubes in the manual loading area but are prohibited from manually placing the cubes on the robot or having any direct or indirect contact with the robot in the manual loading area.**

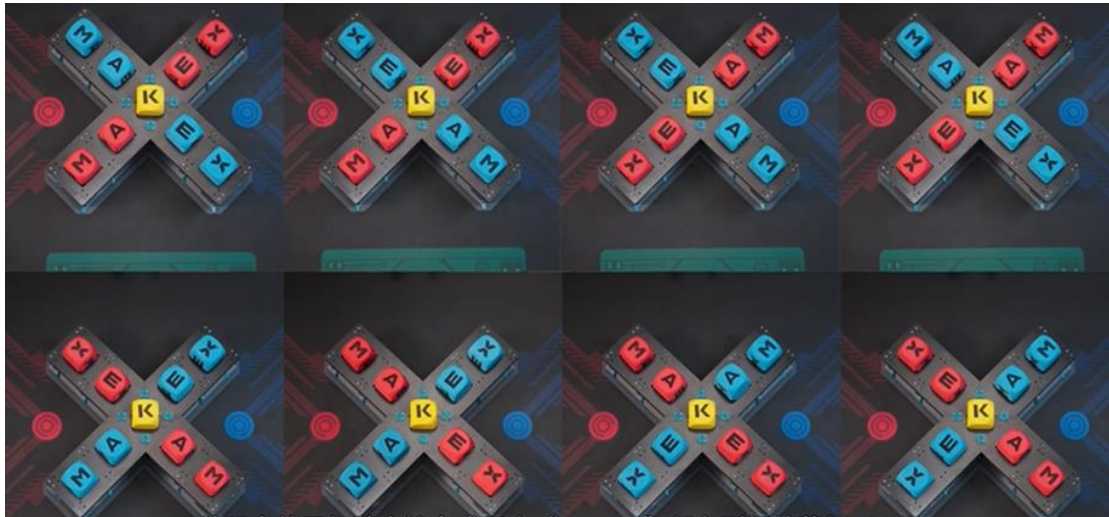


Fig4.4-15 M08 Scoring State

### M09 Placing Team Marker

**Mission Type:** Alliance Mission

**Mission Background:** Markers play a crucial role in aiding manufacturing personnel to quickly operate a factory's smart manufacturing system. Robots are tasked with transporting and situating markers in the designated marking area.

**Starting Condition:** Before each match, contestants are required to place their team markers within the marking area on both sides of the manual loading area (The vertical projection of the team marker has to be completely within the square marking area). The team markers, are the contestants' own props (the markers must meet specific dimensions: a height of  $\geq 120\text{mm}$  and a vertical projection area of  $\leq 60\text{mm}$  in diameter within a circular space).

**Mission Score:** each successful place of team marker counts 30 points;

**Scoring Judging:** At the scoring time after the manual stage:

- The vertical projection of the team marker is completed in the designated circle area.
- The marker shall keep an upright position and have no contact with the robot.
- The team marker is in direct contact with the arena.

If all the above conditions are met, the corresponding team marker will be scored.

**Note:** No direct or indirect contact is permitted with team markers.



### Mysterious Mission

In different competitions, there may exist mysterious missions that are different with existing missions (M01-M09); Details of mysterious missions may be published in the competition guide before the competition.

## 4.5 Scoring Explanation

The referee counts the scores only in two scoring times, which are after the automatic stage and after the manual stage. During the match, the referee monitors the process and records warnings and violations.

### Independent Mission Score

Mission	Scoring Prop	Single Prop Score	Maximum Score
M01 Picking up Organic Crystal	Yellow Cube	20 points/each	20 points
M02 Collecting Quantum Chip&Organic Crystal	Yellow K Cube/Yellow Cube	20 points/each	20 points
M03 Transferring Photon Energy	Red/Blue Ball	30 points/each	30 points
M04 Turning on the Think Tank System	Red/Blue Alphabet Cube	20 points/each	20 points
M05 Transiting Data Cube	Red/Blue Alphabet Cube	30 points/each	30 points
M06 Assigning Spectral Rings	Red/Yellow/Blue Rings	20 points/each	60 points

### Alliance Mission Score

Mission	Scoring Prop	Single Prop Score	Maximum Score
M07 Lighting the Antimatter Fuel Rod	The rotary cylinder that meets the scoring judging	30 points/each	90 points
M08 Operating Matrix Research Station	Alphabet cubes that meet the scoring judging	20 pts/each	180 points
	Completion of two "MAKEX" arrangements	50 pts/set	100 points
M09 Placing Team Marker	Self-made props that meet specifications	30 points/each	60 points

After a single match, the referee will confirm the scoring with the teams. The score



contains three parts: independent mission, alliance mission and violation deduction. Single match score will be recorded for the ranking of qualification or championship round.

**Qualification Match:**

Single match score: self-team independent mission scores + alliance mission scores – violation deduction

Maximum scores= 180pts+430pts-0pts=610pts

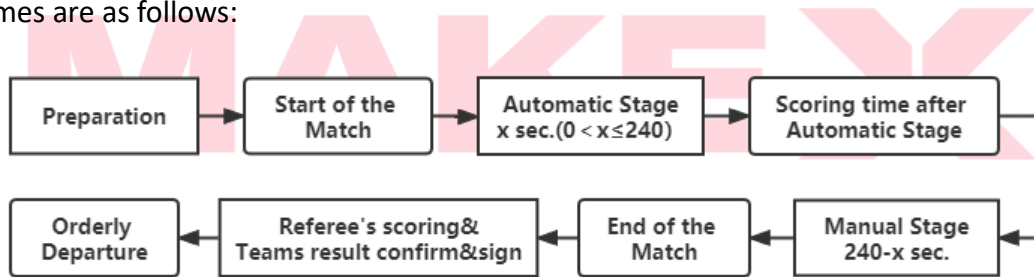
**Championship Match:**

Single match score: red team independent mission scores + blue team independent mission scores + alliance mission scores – both teams' violation deduction

Maximum scores = 180pts+180pts+430pts-0pts=790pts

**4.6 Single Match Flow**

The single match lasts for 240 seconds. For any team, the match stages and switching times are as follows:



**Preparation**

Before the single match, contestants should arrive at the competition area ahead of schedule, and prepare under the guidance of the referee.

- (1) Power on the robot and place it completely in the starting area in the automatic mission area. With Blue-tooth controller is powered on and placed in the starting area in the manual mission area or outside the arena frame. Place the team's self-made marker in the square marking area beside the manual loading area inside the manual mission area.
- (2) One representative will be appointed by their team to draw a prop card and then place the props of M01, M03, M04, M06 and M07 accordingly;



- (3) Check the standard of arena and props placement.
- (4) Waiting for the referee's instruction.

### Automatic Stage

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

- (1) After the automatic stage starts, the robot completes the automatic missions in the automatic mission area by running the automatic program. During this period, the contestant can send a restart or modification request to the referee at any time.
- (2) After the automatic stage starts, the alliance can apply for switching the stage from the automatic to the manual stage. Once the competition switches to the manual stage, robots are not allowed to go back to the automatic mission area. The alliance has only one chance to apply for a stage switch, in which the alliance both agree to proceed to the Manual stage. The alliance shall apply for switching the stage to the manual mission area from referees and with the referees' permission, the match will move on to the scoring time after the automatic stage.
- (3) The duration of this stage is 0 ~ 240 seconds, and the specific duration depends on the stage-shifting application initiated by the alliance.

### Scoring time after the automatic stage

When the alliance applies stage switching and with the permission of the referee, the match will stop timing and enter the scoring time after the automatic stage. During this period, the alliance can't contact their robots, the robots have to maintain the state under the stage switching application and wait for the referee to complete the scoring.

### Manual stage

After the referee completes the scoring of the automatic stage, the referee issues the "transferring robots" command:

- (1) Standing position: the contestants shall stand according to the position requirements in "6.3 Operation".



(2) Robot position transfer: the red and blue team shall move their robots from the automatic mission area to the starting area in the manual mission area(only allowed to place the robot).

After the robots are placed, the referee will issue the command “**manual stage start**”, the manual stage will start and the alliance can process the manual mission.

(3) During the manual stage, the contestants shall divide the roles of the observer and the operator, and stand in the designated station area to complete the relevant missions. For specific standing requirements, please refer to the correct position of the contestants in "**6.3 Operation**". During the manual stage, the observer and operator can apply to the referee for role transposition. For specific transposition requirements, please refer to the correct transposition of contestants in "**6.3 Operation**".

(4) If the alliance applies to the referee to end the match before the match time, the referee gives the instruction of "over" and stops the timing, the match will end ahead of schedule; Or when the 4 minutes run out, the referee will take the initiative to issue the command of "end of the match".

During the whole match, the contestants can restart, repair and modify the robot according to the rule requirements, and the match time will not stop during this period. Except for safety issues, the contestants shall not apply to the referee for suspension of the match.

#### **Referee's Scoring and Contestant's Results Confirmation and Sign**

The referee will count the scores after the match. If there is no objection to the competition, the representatives of both alliances must confirm the match's result by signing on the scoring sheet. If there is any objection to the result of the match, the participating teams do not need to sign, they should immediately object to the on-duty referee and communicate positively without signing to confirm the result.

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





## 5. Technical Requirements

### 5.1 Robot General Specification

The Robot General Specification are prepared for better preparation for teams and ensures a fair and safe competition standard. We suggest the team to programming and construct the robot under a fully comprehensive understanding of this specification. All participants' robots must follow the Robot General Specification strictly and any against of the requirement will be asked to rectify. The robot might be disqualified if seriously against the specification.

#### Robot Mechanical Specification

**T01.** Each team can use only one robot for inspection. After inspection, the team can only use the inspected robot for the match. It is strictly forbidden for teams to change robots and for teams to use robots that have not passed inspection.

**T02.** During the single match, the robot's main-board, chassis, wheel or tracks are not replaceable, the rest of the parts can be replaced.

**T03.** During the single match, the size of the robot shall not exceed the size: length 280mm, width 280mm, height 300mm. The diameter of the wheel (including the rubber tyres) shall not exceed 70mm.

a. The size of the robot is defined at the maximum extension state. A robot should be inspected when all movable structures are at an extreme state (including the state after modification)

b. When the robot is in an extreme state, any structure shall not exceed the size of 280mm(width)\*280mm(length)\*300mm(height).

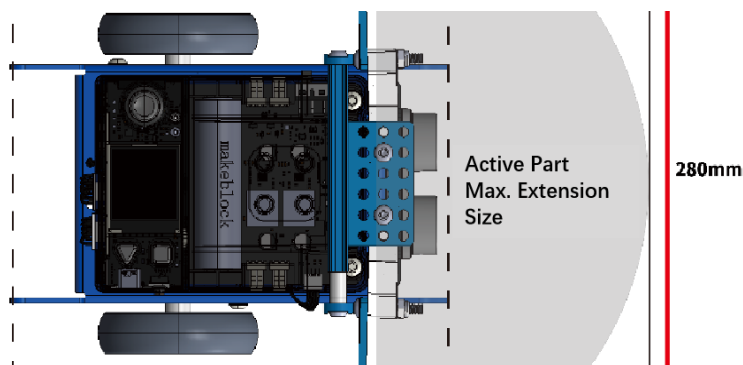




Figure 5.1-1 Maximum extension state (Top View)

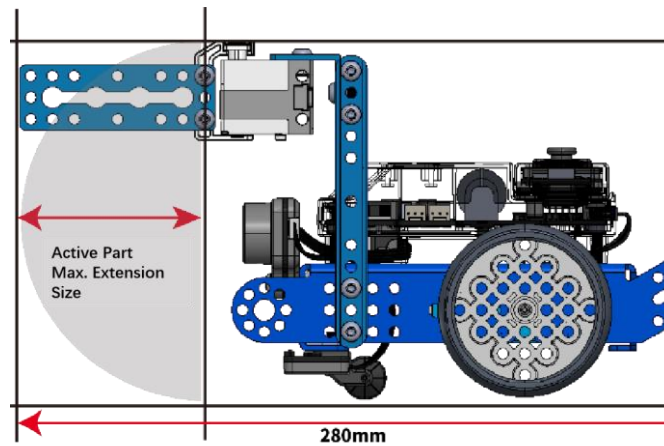


Figure 5.1-2 Maximum extension state (Side View)

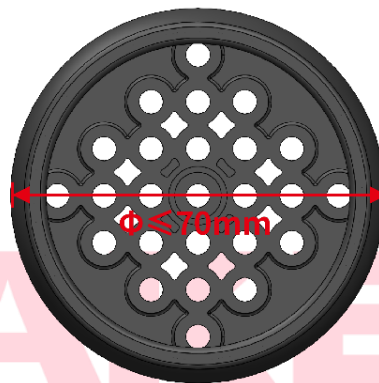


Figure 5.1-3 Wheel Size

**T04.** During the whole competition, robot weight should not exceed 2.5kg at any time, including the weight of the battery and all modification parts but not the team marker.

**T05.** Teams can use self-made mechanical parts by 3D printing or laser cutting. Teams must not use commercial structures with mature designs, including but not limited to multi-DOF robotic arms or hands.

**Robot Electronic Requirements**

**T06.** To ensure the fairness of competition and prevent the team use high-performance devices, the team should use devices which perform not over the following given specifications:

Device Type	Parts Name	Specs	Remark



Main-board & Extension Board	ESP32-WROVER-B	Processor: Xtensa® 32-bit LX6 Dual-Core Communication Mode: Console: Main-board to Extension Board Digital Signal: Smart Servo port PWM: DC Motor port	
Sensor	Vision Sensor	View angle: 65.0 degrees Valid focus: 4.65 ±5% mm, Refresh rate: 60fps Working distance: best in 0.25-1.2m Power Source: 3.7v lithium battery or 5v mBuild Power module Power range: 0.9w-1.3w	Types and quantities are not limited. Robots are prohibited from using any sensors that can interfere with the sensory capabilities of other robots
	Ultrasonic Sensor	Voltage: DC 5V Working distance: 5-300cm Error: ±5%	
	Line Follower Sensor	Voltage: DC 5V Working height: 5mm-15mm	
Motor & Servo Motor	Encoder Motor	180 Optical Encoder Motor Voltage: 12V Zero Load RPM: 350RPM±5% Gear Ratio: 39:6	Must not modify any motor or servos' internal mechanical and electrical design. Allows external welding without changing the performance of the motor. The maximum total amount is 6.
	DC Motor	Dual-shaft TT motor Voltage: DC 6V Zero Load RPM: 200PRM±10% Gear Ratio: 1:48	
		Highspeed TT motor Voltage: DC 6V Zero Load RPM: 312RPM±10% Gear Ratio: 1:48	
	Smart Servo	MS-1.5A smart servo motor Voltage :4.8-6V DC Torque: 1.5kg/CM	
9g small servo Voltage: 4.8-6V DC Torque: 1.3 -1.7kg/cm			
Wireless Communication	Bluetooth Controller	Frequency: 2402-2480MHz, Antenna Gain: 1.5dBi, Working Current 15mA	
	Bluetooth Module	Bluetooth Version: BT4.0 Frequency:2402-2480MHz Antenna Gain: 1.5dBi	Must not connect with any device other than Official



		Power: $\leq 4\text{dBm}$ Working Current: 15mA	Blue-tooth Controller. Including but not limited to manually trigger sensors.
Battery	18650 Battery	Configuration: 3.7V 2500mAh Output: 5V 6A	Must not be modified. The team should be responsible for any accidents for the modification. Do not use external batteries.

Robots shall comply with technical requirements. Any violation will be disqualified from the competition and the team must modify the robot until matches the requirements.

## 5.2 Team's Marker Specification

The specifications of the Team's Marker are below:

**T07.** The self-made prop should be a 3D structure without material limits. It is suggested to be fabricated with a laser cutting machine or 3D printer. The height should be  $\geq 120\text{mm}$  and the vertical projection of the prop should be within a circular area of  $\leq 60\text{ mm}$  in diameter.

**T08.** The prop is aiming to show the spirit of the team. MakeX Robotic Competition Committee encourages teams to use personalized or designed patterns, letters, and characters but must be in a positive manner, overall, representing the team culture, theme or competition. The content must follow the local law or regulations and the referee has the right to reject the prop during the inspection.

The team's marker must pass the inspection and pre-match check before bringing to the competition area.

## 6. Rules of Competition

### 6.1 Penalty explanation

Explanations and categorization of penalties are defined in the following sections:

#### Violation

**E01.** The referee immediately announced the violation to the team and deducted 20 points from the team as soon as it found a violation. During the violation, the competition will be timed normally.

**E02.** During the competition, if any scoring advantages are obtained because of the violation behavior, the scoring advantages will be invalid, and the scoring props will become invalid props.

#### Invalid Prop

**E03.** From the moment that non-compliant contact with the mission prop and scoring prop, it will trigger the invalid prop and the referee will announce the prop is an invalid prop. The invalid prop will be removed from the arena by the referee and cannot continue to get points. The referee has the right to determine whether the final state of the prop before invalid can be scored or not according to the contents of to rule guide. During the scoring time, if a scoring prop is in contact with the robot, it will not be counted as a score regardless of whether it is in a scoring position or not.

#### Disqualification from the single match

**E04.** During the match, the team violated the rules, resulting in invalidation of the score of the match, but did not affect other matches.

#### Disqualification of the entire competition

**E05.** The team shall no longer be allowed to participate in the current match or the next match, and all match results will be invalidated. The team will lose the opportunity to continue participating in the competition and will be disqualified from receiving any awards.



## 6.2 Safety

### Robot Safety

- R01. The team's design and construction of the robot should follow the technical requirements.
- R02. All parts of the robot should be used safely.
- R03. The robot shall not behave in any active behavior of parts separation (bouncing or shooting parts).
- R04. During the competition, the robot shall not use any material to stick the arena props (including but not limited to double-sided tape or glue).
- R05. The referee has the right to reject a dangerous robot for competition. The referee has the right to disqualify a team for the entire competition depending on the dangerous level of the robot.

### Team's Safety

- R06. Under the guidance of the mentor and after reading this guide, contestants can proceed to prepare for the competition and to design and construct their robot.
- R07. In the preparation process, the team shall not perform any dangerous action.
- R08. The Team should pay attention to safety when using dangerous tools (screwdrivers, sharp knives) and must use them under the guidance of their mentors.
- R09. During the competition, contestants with long hair should tie it up; teams are prohibited from wearing slippers into the competition arena.
- R10. During the competition, teams should not press the arena heavily or do any behavior like damage to the arena or props.

If the above requirements are not met, the referee may refuse the team entry to the competition arena and require the team to rectify the issues until they are resolved. The referee may also, based on the level of danger, decide whether to disqualify the team's entire match results on the spot.

## 6.3 Operation

### Contestant standing position and switching rules

- R11. During the whole match, the contestants shall stand in the designated area to



finish the match. During the automatic stage, the contestants have to stand in the designated area at the automatic mission area. During the manual stage, an operator and an observer for each team are required to stand in the area shown in the below figure. Contestants are not allowed to compete for the competition out of the operation area. If a team only has one contestant, the contestant can choose only one role. The contestant cannot act in two roles at the same time. (eg. the operator cannot use the blue-tooth controller in the observation area and operate the robot) The dimension of the operation area may vary according to the actual size of the competition venue.

**R12.** In the manual stage, if the operator and the observer need to exchange their roles, they should apply to the referee and announce, “Red Team apply to switch roles” or “Blue Team apply to switch roles”. After the Referee's permission, the current operation shall be stopped, and the contestants go to the correspondent operation area to continue the competition. During the switch of roles, the competition will be timed normally. When the operator applies to switch as an observer, he/she shall first put down the blue-tooth controller at the starting area before going to the observer area.

- Violation will be issued for the following behaviors: during the manual stage, contestants switch roles without the referee’s permission; after applying to switch roles, the operator changes position with the blue-tooth controller; during the manual stage, contestants operate their robot with blue-tooth controller at the observer area.

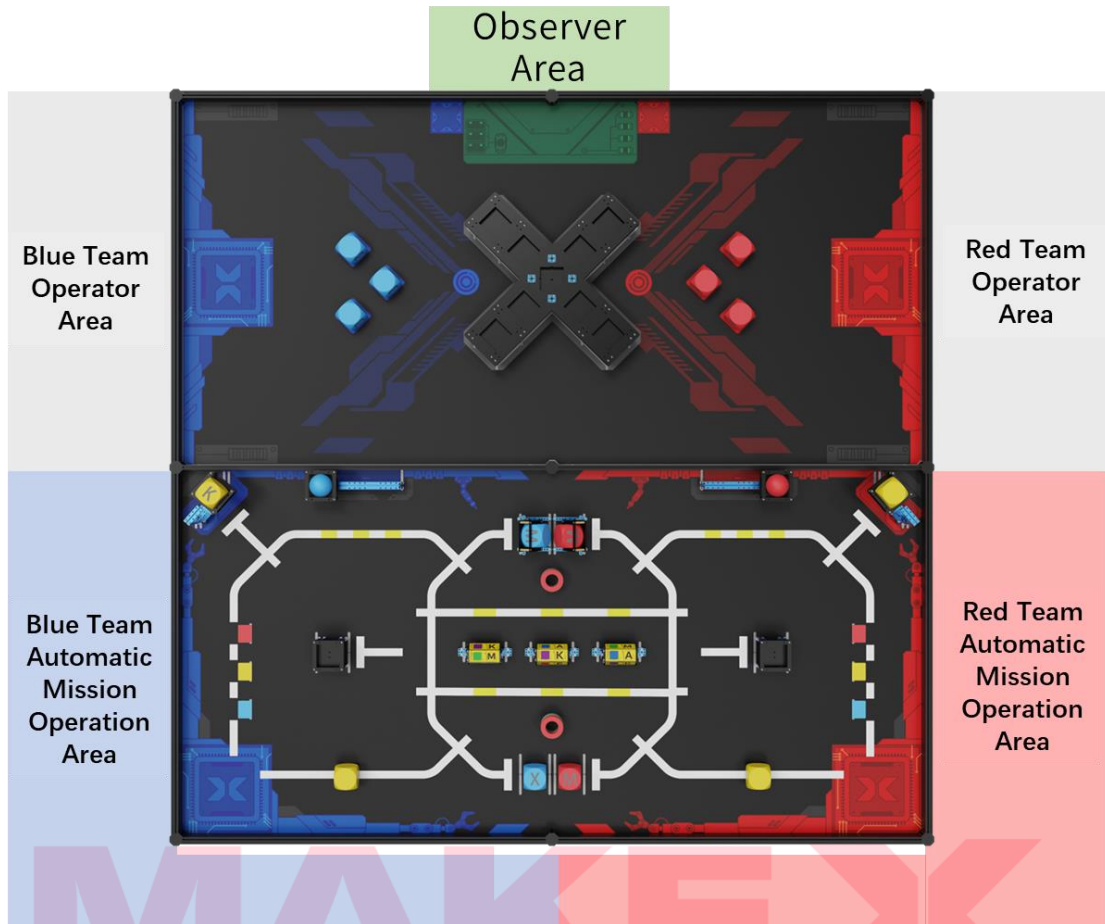


Fig 6.3-1 Contestant Operation Area

### Robot Start, Restart & Modification Rules

**R13.** Contestants shall activate their robot after the referee announces the start of the competition. If the robot is moved in advance, the robot will be treated as “robot start in advance”. The robot has to be completely in the starting area when starting.

**R14.** During the competition, the contestants can restart and modify the robot at any time by applying to referee. With the referee’s permission, the contestant can restart and modify their own robot. Competition timing will not stop during the restarting or modification.

**R15.** If the Contestants want to restart or modify their robot, the contestant of the Red/Blue Team should raise their hand to the Referee and announce, “Red/Blue Team requests Restart”. After the Referee responds, “Agree Red/Blue Team to Restart”, the robot can be taken out by contestants for restart or modification. The team can’t restart their robot without the referee’s permission.





**R16.** During the automatic stage, the contestant can contact their robots directly with the referee's permission. During the manual stage, only the operator can contact the robot directly after the referee's permission.

**R17.** After restart or modification, the robot shall start from the starting area, and shall completely enter the starting area.

**R18.** The modification area is the starting area and out of the arena.

**R19.** If the robot is located in an area that is out of the reach of the contestant, the contestant may raise their hand to the referee and call out "Red/Blue request the referee to pick up the robot" and the referee will pick up the robot on their behalf, and the team will be responsible for the penalties for any infractions that occur as a result of the referee picking up the robot on his/her behalf.

- Violation will be issued for the following behaviors: robot starts in advance; starting the robot without being completely in the starting area; restarting or modifying the robot without requesting it from the referee; failing to modify in the modification area; during the manual stage, the observer directly or indirectly contacts the robot.

#### Rules about competition props

**R20.** In the whole process of a single match, the vertical projection of the scoring prop shall not completely leave the arena at any moment. Otherwise, the prop is invalid and cannot be placed back in the arena.

**R21.** Observers are allowed to direct contact with the cube props that are fully in the manual loading area.

- Direct contact: any part of a contestant's body (including hair, hands, etc.), hanging accessories, or identification that exists in contact with the props on the arena is considered direct contact;
- Indirect contact: When the contestant applies for a restart to retrieve the robot, at the moment of contestant has contact with a robot, there is physical contact between the robot and the props.
- Violation will be issued for the following behaviors: during the match, except in



R21. situations, contestants directly or indirectly contact scoring props or mission props on the arena.

- Invalid props will be issued for the following behaviors: during the match, the contestant directly or indirectly contacts the scoring props and the scoring props that were contacted will be invalidated and removed from the arena.

### Robot activity area during the competition

R22. During the automatic stage, the robot should complete the missions in the automatic mission area, the vertical projection of the robot can be partially in the manual mission area. During the manual stage, the robot shall complete the missions in the manual mission area, the vertical projection of any part of the robot shall not be completely or partially in the automatic mission area.

R23. In the automatic stage, the robot can operate in its own area and alliance mission area.

- Violation will be issued for the following behaviors: during the manual stage, the vertical projection of the robot completely or partially enters the automatic mission area; during the automatic stage, the robot completely enters the other team's independent mission area.
- Disqualification from the single match will be issued for the following behaviors: during the automatic stage, the robot enters the other team's independent mission area and refuses to restart the robot; during the automatic stage, the robots repeatedly (3 times and over) enter the other team's independent mission area

### Using electronic communication devices and programming tools during the competition

R24. The contestant is only allowed to use the Bluetooth controller to control their own robot during the manual stage.

R25. Contestants are not allowed to bring computers, Tablet PC or any other programming devices into the competing area; during the competition time, teams are not allowed to use electronic communication devices (including but not limited



to mobile phones, intercoms, etc.)

- Disqualification from the single match will be issued for the following behaviors: bringing programming devices into the competing area, refusing to send the devices out of the competing area or continuing to use them after the reminder of the referee; using the electronic communication device and refuse to stop the action after the reminder of the referee; during the automatic stage, using the blue-tooth controller to operate their robot.

### Rules about the arena during the competition

**R26.** During the competition, the contestant shall not deliberately press or hit the arena.

**R27.** During the competition, contestants, and robots are not allowed to destroy the arena elements on purpose.

- Violation will be issued for the following behaviors: deliberately pressing or hitting the arena; destroying the arena elements on purpose;
- If any scoring advantage is gained as a result of this infraction, the score is invalid and the scoring prop associated with the act will be removed from the arena.

### Arrival at the Arena on Time

**R28.** Teams shall arrive at the competition area on time according to the actual competition schedule. If the whole competition schedule changes, please refer to the actual notice on-site.

- Disqualification from the match will be issued for the following behaviors: the team that does not show up in the competing area more than 5 minutes of the actual competition schedule.
- Disqualification of the entire competition will be issued for the following behaviors: the team is unable to participate in the competition after on-site registration and robot inspection. The match that the team is involved in will continue as usual

### External Mentoring

**R29.** During the whole process of the competition, the team should not have any



external mentoring.

- Penalty for this behavior: Warning for the first time, a violation for the second time. The team can be disqualified from a single match if a serious situation.

### Egregious Behaviors

**R30.** It will be regarded as Egregious Behaviors if a Team or a person related to the team incurs into, but not limited to, any of the following circumstances. In the case of Egregious Behaviors, the referee has the right to disqualify the score of the entire competition.

- Impolite behaviors (abuse, bad words, unnecessary physical contact).
- Seriously affecting the competing area and the safety of the audiences. Interfering the process of competition.
- Seriously violating the spirit of competition (e.g., cheating).
- Repeated violations or ignoring the Referee's warning, violating blatantly.
- Malicious Complaints

### Abnormal Situation

**R31.** Including but not limited to the following situations:

- Potential Safety Risk: The competition venue emerges problems that might affect the safety of competing areas, teams or robots.
- Damage or missing of Arena elements and props: The arena and its elements and props are damaged or missing accidentally which leads to the competition not continuing.
- Re-competition: Referees have the right to discuss and determine if a Re-competition is necessary according to the specific situation.

### The uncertainty of arena, props

**R32.** Due to the uncertainty of manufacturing and processing, all arenas and props may have minor errors (dimension, weight, color and flatness, etc.). Teams shall consider these minor errors when constructing their robots to adapt different props and arenas. Contestants can apply to change the props before the competition if there are some adaptable props available. Robots should be able to adapt some



unchangeable elements such as folded arena, light change, etc., The team should debug their robot to adapt these unchangeable elements.

### Malicious Complaints

**R31.** In a single match, it is prohibited for contestants to make malicious complaints against the opposing team.

- Malicious complaint: After entering the competing area, if the complaining team confirms the need to raise a complaint with the referee, and the referee verifies and determines that the complained-about team has not committed any actual rule violations, the complaining team will be deemed to have made a malicious complaint.
- The robot of the offending team will be suspended.

## 7. Appeal and Arbitration

### 7.1 Results Confirmation

#### Results Confirmation

When a single match ends, after the referees finish the scoring, both teams need to confirm the results with the referees and then sign on the score sheet. Both teams shall not have any objection to the results of this single match after their signatures.

#### Dispute Settlement

If the participating team members still have objections to the match results and do not agree with the on-duty referee's explanation, they may choose not to sign to confirm the results. However, they must document the situation in the signature field of the results confirmation form before leaving the venue.

### 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, and then cooperate with the Arbitration Commission to investigate the actual situation. During the investigation, only the appealing contestants or the designated teams are allowed to cooperate. 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 over-emotionally.

### **Valid Appeal Period**

Normally, the appeal should be lodged within 30 minutes after the end of the appeal match. Please check the Competition Guide for a specific effective appeal period before the competition. The appellant and the respondent must be present at the designated place on time.

### **Appeal Response**

Not all the appeals will be accepted, the Arbitration Commission have the right to determine whether to accept the appeal or not according to the actual situation. 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 inadmissible. The Arbitration Committee will caution the offending team if parents, mentors, or other persons out of the stipulation participate in the arbitration process without the permission of the Arbitration Committee.



- Penalty for this behavior: Warning for the first time, a disqualification will be given 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 the emotional factor of the appealing party, the offending party will receive a verbal warning.

- Penalty for this behavior: Warning for the first time, a disqualification will be given for multiple invalid warnings.

### **Uncivil Appeal**

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

- Penalty for this behavior: Warning for the first time, a disqualification will be given 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 head. 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

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

The MakeX Robots Competition Committee reserves the final interpretation of MakeX Robots Competition - Rules Guide for All-Core Journey.

### 8.1 Rules Explanation

In order to ensure a fair competition and high-quality competition experience, the MakeX Robotics Competition Committee has the right to update and complement this Rules Guide regularly, and 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 to adjudication during the competition.

### 8.2 Disclaimer

All Contestants in the MakeX Robotics Competition should 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 contestants registered for the MakeX Robots Competition should acknowledge and abide by the following safety provisions:

- (1) Contestants should take adequate safety precautions when constructing the robots, and all parts used for constructing the robots should be purchased from





legal manufacturers.

(2) Contestants should 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.

(3) 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 should be manufactured and operated by persons with relevant professional qualifications.

(4) During the competition, the teams should ensure that all the actions such as construction, testing and preparation will not do harm to their own team and other teams, referees, staff, audiences, equipment and arenas.

(5) 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 according to 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.

### **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

According to the competition scale and team number, the competition will be classified into Points Race/Regional Competition, National Competition, International/Intercontinental Competition, and Global Finals. Each team can voluntarily sign up for all kinds of Points Race all year round to accumulate annual points. The accumulation of annual points is based on the Team Number. The plan for annual points for MakeX Starter is as follows:

Teams who participate in the single Points Race can obtain annual points (total points in all qualification rounds + total score of the best single match in the championship round)\* competition type coefficient

Competition Level	Rank Coefficient
Points Race/Regional Competition	Sum of Scores*0.01
National Competition	Sum of Scores*0.02
International/Intercontinental Competition	Sum of Scores*0.03

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

Category	Awards	Regional /Points Race	National	International/ Intercontinental
Special Award	Champion	15	30	45
	Runner-up	10	20	30
	Second runner-up	5	10	15
	Innovative Design Award	-	5	10
	Engineering Notebook Award	-	5	10
Comprehensive Award	Outstanding Mentor Award(Personal)	-	-	-



	Promotion Ambassador Award(Group)	-	5	10
	Technology Sharing Award(Group)	-	5	10
	MakeX Spirit Award	-	-	10

Take a 4+1 competition format as an example (4 rounds in Qualification, 1 round in Championship), if team X10000 wins the championship and all the match results show as below:

Qualification Round 1	Qualification Round 2	Qualification Round 3	Qualification Round 4	Total Points in Qualification Round
300	200	400	350	1250
<b>Total Points in Single Championship</b>				
500				

\*Annual points that team X10000 can obtain from this competition = (1250+500)

\*0.01+15 = 32.5

**MAKE X**



## Appendix 2. Engineering Notebook Guideline

### \*Instruction:

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

**2. Engineering notebook submission:** Teams can use online documents or handwriting. Either way, each team must submit a paper version onsite.

Paper engineering notebook: Each team must submit one printed copy to the judging panel on-site for programs with an assessment session. For programs without an assessment session (Starter and Explorer), each team must submit one printed copy of the engineering notebook to the staff at the robot inspection area. Teams unable to submit the original document should prepare and submit a photocopy instead.

**3. An engineering notebook will be required for evaluating all awards. The evaluation criteria are in the MakeX Awards Guide.**

### 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 (Mandatory)

Every improvement of the robots should be recorded from prototype design, and construction, to 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 defence

### **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

Seat No.: \_\_\_\_\_

### MakeX Starter All-Core Journey Robot Self-Check Form

Please follow the requirements of the self-check form 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 Number: \_\_\_\_\_ Team Name: \_\_\_\_\_

Actual attended Team Member: \_\_\_\_\_

Mentor Name: \_\_\_\_\_

<b>1. Basic Information</b>
<b>Robot Mainboard Code:</b> _____ (A 12-bit code consisting of numbers and alphabets, please find in the “Setting” section from the CyberPi)
<b>Robot Size:</b> Length _____ mm, Wide _____ mm, Height _____ mm. (Robot size shall not exceed: length 280mm, width 280mm, and height 300mm. Please measure your robot and fill in the actual maximum extension size)
<b>Robot Wheel Diameter:</b> _____ mm (Shall not exceed 70mm)
<b>Robot Weight:</b> _____ kg (Shall not exceed 2.5kg)
<b>Team Marker:</b> Length _____ mm, Wide _____ mm, Height _____ mm. (Height $\geq$ 120mm, vertical projection of the prop should be within a diameter of $\leq$ 60mm square area)
<b>2. Equipment</b>
<b>Name and quantity of sensors:</b> The type and quantity are not limited. Robots are prohibited from using any sensors that may interfere with the perception capabilities of other robots.
<b>Name and quantity of motors:</b> <b>Name and quantity of servos:</b> The total number of motors and servos is limited to a maximum of 6.



<b>Wireless control: Version of Bluetooth: BT4.0</b> <input type="checkbox"/> Yes			
<b>Name and parameters of battery: (18650 Lithium-ion, 3.7V 2500mAh)</b> <input type="checkbox"/> Yes			
<b>Prohibit the use of external batteries</b> <input type="checkbox"/> Yes			
3. Others			
No.	Items	Specific Requirements	Meet requirements
1	High-power Equipment	Dangerous high-power equipment is not allowed to be used by the Teams during the competition and the preparation of the competition.	<input type="checkbox"/> Yes
2	Energy Storage Device	If the robot uses energy storage devices (springs), etc., it is safe to use.	<input type="checkbox"/> Yes
3	Safety and Protection	Any structures that may hurt humans during the operation must be protected in appropriate manners.	<input type="checkbox"/> Yes
4	Damage of Arena	Any robot operation must not damage the arena.	<input type="checkbox"/> Yes
5	Forbidden Materials	Prohibited materials: flammable gases, equipment with risk of fire, hydraulic parts, parts containing mercury, exposed hazardous materials, unsafe counterweights, designs that may cause entanglement and match delays, sharp edges, materials containing liquids or gels, any part that may conduct electrical current from the robot to the field, robots without prohibited materials	<input type="checkbox"/> Yes
6	Self-made Parts	Teams can use self-made parts by 3D printing or corrugated cardboard, wood, acrylic, Rubber bands, etc. All self-made parts cannot have the producer's logo.	<input type="checkbox"/> Yes
7	Mechanical Parts	Teams can use self-made mechanical parts by 3D printing or laser cutting. Teams must not use commercial structures with mature designs, including but not limited to multi-DOF	<input type="checkbox"/> Yes



		robotic arms or hands.	
--	--	------------------------	--

Our team has checked our robot according to the self-check form, filled in the actual data on this form and submitted it to the 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.

Mentor or contestants Signature: \_\_\_\_\_

Date: \_\_\_\_\_







# Appendix 4. MakeX Starter Score Sheet

## MAKE X ROBOTICS COMPETITION

2024-2025 MakeX Robotics Competition MakeX Starter All-Core Journey Qualification Round Scoring Sheet

Match Information: Arena No.: \_\_\_\_\_ Session No.: \_\_\_\_\_

Red Team No.:

Blue Team No.:

Independent Mission					Alliance Mission		
Red Team		Blue Team			Mission	Qty.	Point
Point	Qty.	Mission		Qty.	Point		
(20pts/each)	Max. 1	M01 Picking up Organic Crystal Yellow Cube [Out of the Initial Area]		Max. 1	(20pts/each)		
(20pts/each)	Max. 1	M02 Collecting Chip & Crystal Yellow Cube&K Cube[In the manual area]		Max. 1	(20pts/each)		
(30pts/each)	Max. 1	M03 Transferring Photon Energy Red/blue ball cover the centre holes		Max. 1	(30pts/each)		
(20pts/each)	Max. 1	M04 Turning on the Think Tank System Red/Blue Cube[in high table& X/M face up]		Max. 1	(20pts/each)		
(30pts/each)	Max. 1	M05 Transiting Data Cube Red/Blue cube [in the manual area]		Max. 1	(30pts/each)		
(20pts/each)	Max. 3	M06 Assigning Spectral Rings Rings fully in the same color area		Max. 3	(20pts/each)		
		Sub-Total					
					Sub-Total		
				Red Team Penalty		Blue Team Penalty	

Match Score			Red Team Representative Signature
Item	Red Team	Blue Team	
Independent Score			Blue Team Representative Signature
Penalty Deduction			
Alliance Score			Referee Signature
Total Score			
Total Competition time:	Minutes	Seconds	

## MAKE X ROBOTICS COMPETITION

2024-2025 MakeX Robotics Competition MakeX Starter All-Core Journey Championship Round Scoring Sheet

Match Information: Arena No.: \_\_\_\_\_ Session No.: \_\_\_\_\_

Team 1 No.:

Team 2 No.:

Independent Mission					Alliance Mission		
Red Team		Blue Team			Mission	Qty.	Point
Point	Qty.	Mission		Qty.	Point		
(20pts/each)	Max. 1	M01 Picking up Organic Crystal Yellow Cube [Out of the Initial Area]		Max. 1	(20pts/each)		
(20pts/each)	Max. 1	M02 Collecting Chip & Crystal Yellow Cube&K Cube[In the manual area]		Max. 1	(20pts/each)		
(30pts/each)	Max. 1	M03 Transferring Photon Energy Red/blue ball cover the centre holes		Max. 1	(30pts/each)		
(20pts/each)	Max. 1	M04 Turning on the Think Tank System Red/Blue Cube[in high table& X/M face up]		Max. 1	(20pts/each)		
(30pts/each)	Max. 1	M05 Transiting Data Cube Red/Blue cube [in the manual area]		Max. 1	(30pts/each)		
(20pts/each)	Max. 3	M06 Assigning Spectral Rings Rings fully in the same color area		Max. 3	(20pts/each)		
		Sub-Total					
					Sub-Total		
				Red Team Penalty		Blue Team Penalty	

Match Score			Red Team Representative Signature
Item	Red Team	Blue Team	
Independent Score			Blue Team Representative Signature
Penalty Deduction			
Alliance Score			Referee Signature
Total Score			
Total Competition time:	Minutes	Seconds	



## Appendix 5. 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>.

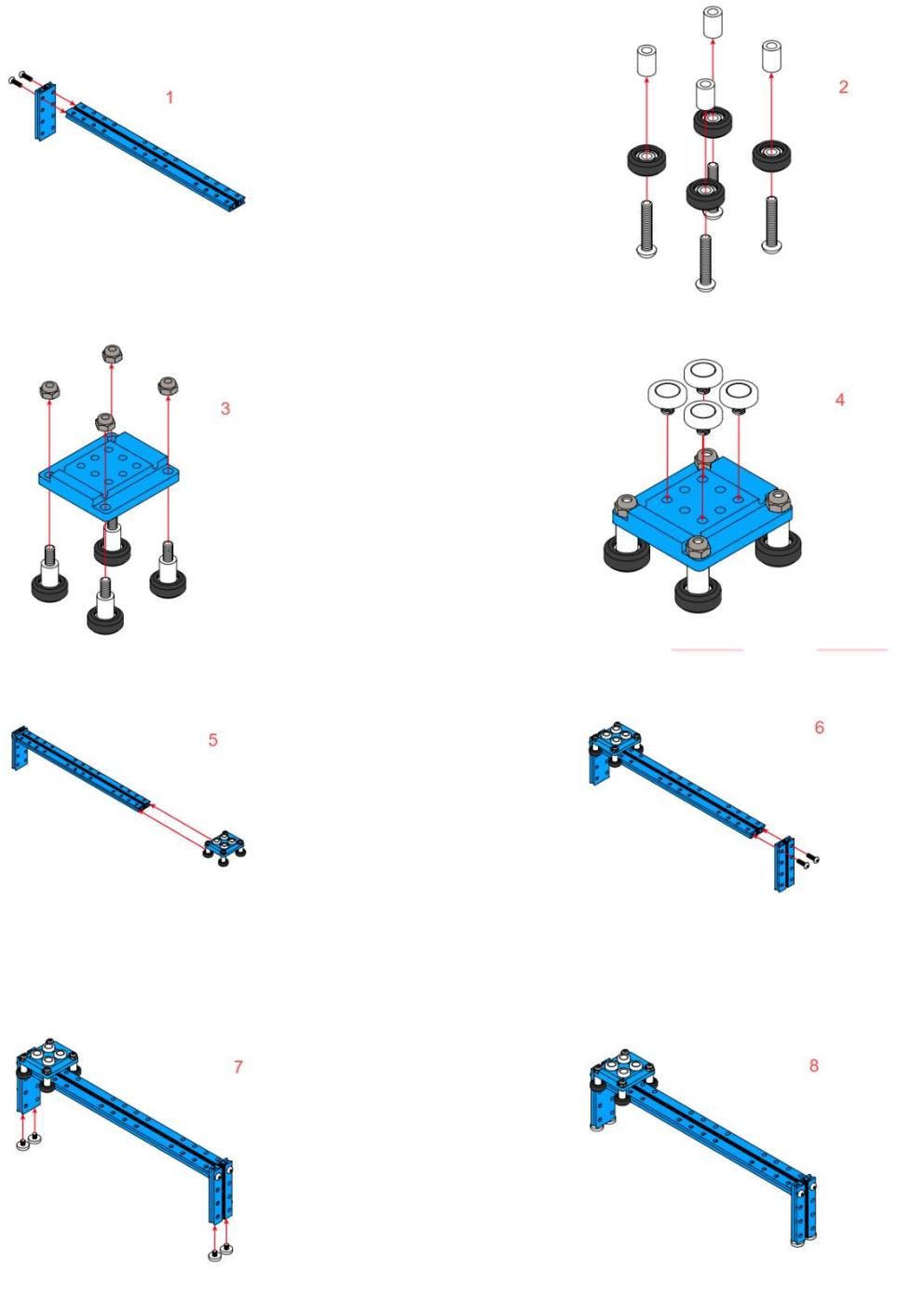
Any Feedback & Question Please Sent to:

[makex\\_overseas@makeblock.com](mailto:makex_overseas@makeblock.com)





## Appendix 6. High-speed sorter assembled scheme



**MAKEX**

Edited By Makex Robotics Competition Committee

RULES GUIDE

MAKEEX STARTER

Official Website:  
[www.makex.cc/en](http://www.makex.cc/en)

Email:  
[makex\\_overseasa@makeblock.com](mailto:makex_overseasa@makeblock.com)

 Facebook : Makex