

V1.1

Using a 33-bit motor driver chip and Field-Oriented Control (FOC), the RoboMaster G200 Brushless DC Motor Speed Controller enables precise control over motor torque.



Exclusively designed for the RoboMaster M2023 P10 Brushless DC Gear Motor and D80 Brushless DC Motor Speed Controller, the M2023 Accessories Kit includes sensors, cables and a terminal board.

RoboMaster System Specification Manual, RoboMaster System User Manual, Introduction of RoboMaster System Module

The M2023 Accessories Kit includes several cables and a terminal board, covering a complete peripheral system solution for your RoboMaster system.

## The 23rd China University Robot Competition

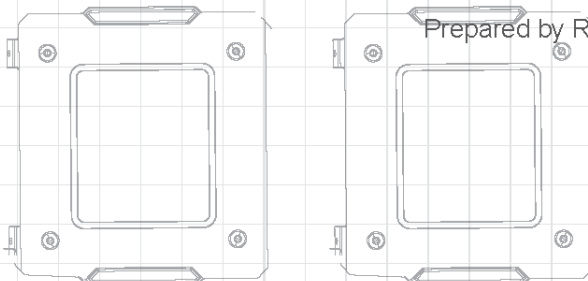
# ROBOMASTER 2024

## University League

# Rules Manual

Prepared by RoboMaster Organizing Committee

Released in January 2024



## Intellectual Property Statement

The RoboMaster Organizing Committee (RMOC) encourages and promotes technical innovation and open-source technology and respects the intellectual property rights of participating teams. All rights related to the intellectual property developed during the competition are owned by individual teams. The RMOC will not participate in the handling of intellectual property disputes within the team. The participating teams must properly handle all aspects of intellectual property rights among internal school members, company members and other members of the team.


While using the RoboMaster referee system and other supporting materials provided by the RMOC, teams should respect the ownership of all intellectual property. Teams are also prohibited from engaging in any behavior that violates intellectual property rights, including but not limited to reverse engineering, replication or translation.

Any behavior that may infringe upon the intellectual property rights of the RMOC or other organizers in relation to the provided educational materials for the competition will be investigated and affixed legal liability in strict accordance with the law.

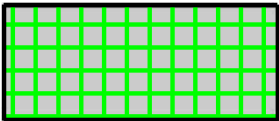

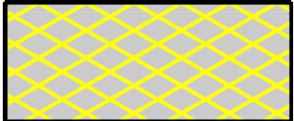
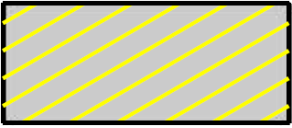

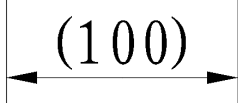
For suggestions on open-source materials, please refer to: <https://bbs.robomaster.com/thread-7026-1-1.html>.

## Using this Manual

### Legend

 Hints and tips	“√” Applicable	“-” Not applicable
--	----------------	--------------------

### Legend for Battlefield Drawings

		
Buff point for both sides	Buff point for one side	Both sides penalty zone
		
One side penalty zone	The plane on which the battlefield is located is its lowest plane	Dimensions are for reference only

## Release Notes

Date	Version	Release Notes
2024.01.08	V1.1	<ol style="list-style-type: none"><li>1. Revised the conditions under which opponent robots and battlefield components shield against damage from 42 mm projectiles.</li><li>2. Added instruction of how robot weight is measured.</li><li>3. Optimized some definitions and mechanism descriptions.</li><li>4. Revised instructions related to yellow card warnings.</li><li>5. Revised instructions related to forfeiture.</li><li>6. Revised regulations on penalties related to the Balancing Standard Robot.</li><li>7. Revised processes related to appeals.</li></ol>
2023.10.18	V1.0	First Release

# TABLE OF CONTENTS

Intellectual Property Statement.....	2
Using this Manual .....	2
Legend .....	2
Legend for Battlefield Drawings .....	2
Release Notes .....	3
<b>1. Foreword.....</b>	<b>8</b>
1.1 About the Competition .....	8
1.2 About the Specifications Manuals .....	8
1.3 Q&A.....	8
<b>2. Key Terms.....</b>	<b>10</b>
<b>3. Robot and Operator .....</b>	<b>14</b>
<b>4. General Competition Mechanism .....</b>	<b>16</b>
4.1 HP Deduction Mechanism.....	16
4.1.1 Exceeding the Initial Launching Speed Limit.....	16
4.1.2 Barrel Overheating and Cooling .....	17
4.1.3 Exceeding Chassis Power Consumption Limit .....	18
4.1.4 Attack Damage.....	20
4.1.5 Referee System Going Offline .....	20
4.1.6 Irregular Offline Status .....	22
<b>5. 3V3 Match.....</b>	<b>23</b>
5.1 Competition Area .....	23
5.1.1 Overview .....	23
5.1.2 Starting Zone .....	25
5.1.3 Bunker.....	28
5.1.4 Supplier Zone.....	29
5.1.5 Central Buff Point .....	30
5.1.6 Miscellaneous .....	31
5.2 Competition Mechanism .....	34
5.2.1 HP Recovery and Revival Mechanism.....	34
5.2.2 Projectile supplies .....	35
5.2.3 Battlefield-related Mechanism.....	35
5.2.4 Sentry-Related Mechanism.....	37
5.2.5 Economic System.....	37
5.2.6 Experience and Performance Systems .....	38
5.2.7 Competition System and Winning Criteria.....	44
<b>6. Standard Match .....</b>	<b>46</b>
<b>6.1 Competition Area.....</b>	<b>46</b>
6.2 Competition System and Winning Criteria.....	50

<b>7.</b>	<b>Competition Process</b> .....	<b>51</b>
7.1	Pre-Match Inspection .....	52
7.2	Staging Area .....	53
7.3	Setup Period.....	53
7.3.1	Official Technical Timeout.....	54
7.3.2	Team Technical Timeout .....	55
7.4	15-Second Referee System Initialization Period .....	56
7.5	5-Second Countdown.....	56
7.6	Competition Round.....	56
7.7	End of Round .....	56
7.8	Results Confirmation .....	56
7.9	Projectile Unloading .....	57
<b>8.</b>	<b>Violations and Penalties</b> .....	<b>58</b>
8.1	Penalty System .....	58
8.1.1	Forms of Penalties .....	58
8.1.2	Types of penalties .....	58
8.2	Penalty Rules .....	61
8.2.1	Staff .....	61
8.2.2	Robots .....	65
8.2.3	Interactions .....	67
8.3	Serious Violations.....	69
<b>9.</b>	<b>Irregularities</b> .....	<b>71</b>
<b>10.</b>	<b>Appeal</b> .....	<b>73</b>
10.1	Appeal Process .....	74
10.2	Appeal Materials .....	75
10.3	Appeal Decision .....	75
	<b>Appendix References</b> .....	<b>76</b>

## Tables Directory

Table 2-1 Overview of Key Terms .....	10
Table 3-1 Robots and Operator Line-up .....	14
Table 3-2 Basic Robot Information .....	15
Table 4-1 Overview of the HP Deduction Mechanism .....	16
Table 4-2 Penalty Mechanism for Exceeding the Initial Launching Speed Limit .....	16
Table 4-3 Penalty Mechanism for Exceeding Chassis Power Consumption Limit .....	18
Table 4-4 Effective Detection Speeds of Armor Modules for Different Types of Projectiles .....	20
Table 4-5 HP Deduction Mechanism for Attack Damage .....	20
Table 4-6 Consequences of Irregular Offline Status .....	22
Table 5-1 Projectile Parameters and Scenarios of Use .....	31
Table 5-2 The Respawn Process Length for different Robots on Their First Defeat.....	34
Table 5-3 Rules for Exchange .....	37
Table 5-4 Levels and Experience Points of Hero and Standard Robots .....	40
Table 5-5 Attributes of Hero Robot Chassis.....	41
Table 5-6 Attributes of Standard Robot Chassis .....	42
Table 5-7 Attributes of 17 mm Launching Mechanisms .....	43
Table 5-8 Attributes of 42 mm Launching Mechanisms .....	44
Table 7-1 Failures .....	55
Table 8-1 Forms of Penalties .....	58
Table 8-2 Types of Penalties.....	59
Table 8-3 Collision Violation Penalty Standard.....	67
Table 8-4 Categories of Serious Violations .....	70

## Figures Directory

Figure 4-1 Calculation Logic when Exceeding Barrel Heat Limit .....	17
Figure 4-2 Barrel Heat Cooling Logic.....	18
Figure 4-3 Chassis Power Consumption Detection and HP Deduction Logic of Hero, Standard, and Sentry .....	19
Figure 4-4 HP Deduction Mechanism for Critical Referee System Modules Going Offline .....	21
Figure 4-5 Offline and Power-off Mechanism for Speed Monitor Module .....	22
Figure 5-1 Axonometric View of 3V3 Match Wooden Battlefield.....	23
Figure 5-2 Modules of 3V3 Match Wooden Battlefield .....	24
Figure 5-3 Dimensions of 3V3 Match Wooden Battlefield.....	25
Figure 5-4 Starting Zone of the Wooden Battlefield .....	26
Figure 5-5 Base.....	27
Figure 5-6 Bunker on the Wooden Battlefield.....	28
Figure 5-7 Supplier Zone .....	29
Figure 5-8 Supplier Penalty Zone .....	29
Figure 5-9 Central Buff Point.....	30
Figure 5-10 Layout of the RFID Interaction Module Cards.....	30
Figure 5-11 Projectile Reloader .....	31
Figure 5-12 Diagram of Visual Markers.....	32
Figure 5-13 Central Buff Point .....	36
Figure 5-14 Axonometric View of Standard Match Wooden Battlefield .....	46
Figure 5-15 Top View of Standard Match Wooden Battlefield.....	47
Figure 5-16 Dimensions of Standard Match Wooden Battlefield .....	48
Figure 5-17 Bunker .....	49
Figure 7-1 Process for A Single Match.....	51
Figure 7-2 Pre-match Inspection Process.....	52
Figure 8-1 Battlefield Penalty Zone .....	69
Figure 10-1 Appeal Process .....	74

# 1. Foreword

## 1.1 About the Competition

The RoboMaster University League (RMUL), organized by local academic institutions and universities, engaging in nearby universities, is dedicated to promote technology exchanges among regional universities, cultivate a strong academic atmosphere, and assist the development of regional technology innovation.

The RMUL 2024 comprises two battle formats: 3V3 Match and Standard Match

During 3V3 Matches, both teams need to independently develop their own Hero, Standard, and Sentry Robots, and conduct tactical combat on the designated competition area by controlling the robots to launch projectiles against opponent robots and bases. At the end of the match, the winner shall be the team with the higher remaining Base HP. The participating teams in the 3V3 Match can advance to the RoboMaster University Championship (RMUC) through the [Scoring and Ranking System](#).

During Standard Matches, both teams need to independently develop their own Standard Robots, and engage in 1V1 battles on the designated competition area by controlling their robots to launch projectiles. The winner at the end of the Match shall be the team with the higher remaining Standard Robot HP.

## 1.2 About the Specifications Manuals

The specifications manuals include the Rules Manual, Participant Manual, Robot Building Specifications Manual, etc. The Specifications Manuals and their additions are applicable to all participating teams, referees, competition staff, and other partners.

Outside the competition period, the RMOC may update this Rules Manual as required by circumstances.

The RMOC reserves the right of final interpretation over the Specifications Manuals. During the event, only the Chief Referee can answer queries on the Specifications Manuals on behalf of the RMOC. Any questions related to the specifications may only be directed to the Chief Referee for consultation.



More reference materials can also be found in the appendices to this Manual.

---

## 1.3 Q&A

Any participating team or other relevant personnel who have questions about the specifications manuals may submit them through our official channel. The RMOC will reply to them periodically through the following Q&A process.

The Q&A process is as follows:

1. To submit questions about the specifications manuals, the inquirer should complete a questionnaire available at this link:



<https://qingflow.com/f/8ac4033d>

2. The Organizing Committee will respond within 5 business days at this link:

<https://qingflow.com/appView/8ac4033d/shareView/f5f09581>

The Rules Q&A is considered an authoritative source with the same effect as the Specifications Manuals. In the case of any discrepancy between the Q&A and Specifications Manuals, the latest document shall prevail. The Q&A for each season applies only to the current season.

## 2. Key Terms

In this chapter, we will provide an overview of commonly used terms in the competition rules. For details on each term, please refer to the relevant chapter using associated keywords.

Table 2-1 Overview of Key Terms

Term	Definition
<b>Robots</b>	
<b>Standard Robots</b>	Standard Robots include Regular Standard and Balancing Standard Robots. For a detailed definition of the Balancing Standard Robot, please refer to the “Standard Robots” chapter of the <a href="#">RoboMaster 2024 University Series Robot Building Specifications Manual</a> .
<b>Referee System</b>	The Referee System is an electronic penalty system used for robotic competitions. It integrates computation, communication, and control features and It includes the Robot Side installed on the robot, as well as the server and player’s client installed on the PC; and has functions such as monitoring robot power, projectile launches and damage, and automatic ruling based on competition rules.
<b>Inter-Robot Communication</b>	An interactive method for robots to communicate with one another through the Referee System serial port.
<b>Robot chassis</b>	A mechanism that carries the robot propulsion system and its accessories; a mechanism that supports the body of a robot.
<b>Chassis Power</b>	For the power of the propulsion system that enables horizontal movement and rotation of the robot, please refer to the definition of chassis power in the "Referee System Mounting Specifications" chapter of the <a href="#">RoboMaster 2024 University Series Robot Building Specifications Manual</a> .
<b>Launching Mechanism</b>	A mechanism capable of launching a projectile from a robot on a fixed trajectory and at a certain initial speed.
<b>Locking of the Launching Mechanism</b>	If the Launching Mechanism is locked, it will be powered off.
<b>Unlocking of the Launching Mechanism</b>	If the Launching Mechanism is unlocked, it will be powered on or off depending on its Projectile Allowance.

Term	Definition
<b>Initial Launching Speed</b>	The velocity detected by the relevant modules of the Referee System after a projectile has completed its acceleration.
<b>Barrel Heat</b>	The barrel heat generated by a robot after launching a projectile.
<b>Projectile Allowance</b>	The quantity of projectiles each robot is allowed to launch currently.
<b>Initial HP</b>	The HP value set by the Referee System for a robot at the start of the competition.
<b>Current HP</b>	A robot's Real-time HP.
<b>Maximum HP</b>	The maximum value to which a robot's HP can be restored.
<b>Experience Point</b>	The accumulated points required for upgrading robots can be obtained in various ways.
<b>Attack</b>	A robot's behavior in launching projectiles.
<b>Destruction</b>	Where a robot attacks the Armor Module of an opponent Base or robot until the latter's HP drops to zero.
<b>Invincible</b>	A state in which a robot or base is immune to a projectile attack or impact.
<b>Alive</b>	The Referee System Main Controller Module normally connects to the Referee System Server and the robot's HP is not zero.
<b>Defeated</b>	Where a robot's HP drops to zero after its Armor Module has been attacked or hit; it has exceeded its Chassis Power Consumption limit, Initial Launch Speed limit for Projectiles, or Barrel Heat limit; it goes offline unusually; its Referee System module has gone offline. Note: After a robot is defeated or ejected, the Referee System will cut off the power supply to the robot (except for the Mini PC).
<b>Out of Combat</b>	An alive robot has not fired a projectile and suffered any HP deduction for six seconds.
<b>Ejected</b>	The robot is directly ejected by the Referee System due to a Red Card Warning. Note: After a robot is defeated or ejected, the Referee System will cut off the power supply to the robot (except for the Mini PC).
<b>Irregular Offline</b>	The Referee System Main Controller Module is unable to connect to the Referee System Server during the competition, due to a power outage on the robot or other reasons.
<b>Temporarily Activation</b>	A status where a robot's chassis and gimbal are powered on temporarily after it has been defeated or ejected. The Launching Mechanism for the robot will be powered off.

<b>Term</b>	<b>Definition</b>
<b>Occupation</b>	When an alive robot has reached a Buff Point, its RFID Interaction Module has detected the RFID Interaction Module Card in the area, and it has obtained the corresponding buffs.
<b>Entanglement</b>	Mechanisms of robots are entangled with one another during the competition, i.e. one robot remains connected to the other robot and is pulled with said robot whichever direction it moves.
<b>Collision</b>	An active act of collision by a robot during the competition.
<b>Battlefield</b>	
<b>Buff Point</b>	A zone that, once occupied by a robot during the competition, will generate a special effect.
<b>Penalty Zone</b>	An area into which a robot's entry is forbidden.
<b>Battlefield Components</b>	Composite elements of the Battlefield, including but not limited to: Base.
<b>Staff</b>	
<b>Arbitration Commission</b>	A body consisting of the Chief Referee and other members of the RMOC, responsible for handling appeals.
<b>Referee</b>	Personnel responsible for maintaining the order of the competition and enforcing its rules.
<b>Chief Referee</b>	The person with the final right of interpretation over the competition documents during the competition.
<b>Head Referee</b>	The lead referee responsible for maintaining the order of the competition and enforcing its rules.
<b>Head Inspector</b>	The referee responsible for leading and assigning pre-match inspection tasks, with the final right of interpretation over the inspection standards.
<b>Participants</b>	Individuals that have registered and been recorded in the registration system for the current competition season.
<b>Participating Teams</b>	The teams that have registered and been recorded in the registration system for the current competition season.
<b>Pit Crew Members</b>	Regular Member and Supervisor who have registered for this Season and have been entered into the registration system, can walk into the Staging Area and Competition Area.
<b>Operator</b>	The Pit Crew members responsible for controlling robots during the competition.

Term	Definition
<b>Offending Team</b>	A participating team that violates the competition rules.
<b>Offender</b>	Participants that violate the competition rules.
<b>Competition Process</b>	
<b>Round</b>	A complete competition that includes the setup period, the referee system initialization period, a 5-second countdown period, and the competition round.
<b>Match</b>	Depending on the Competition System, a match may contain several rounds.
<b>Official Technical Timeout</b>	A Technical Timeout initiated by the Head Referee during the Setup Period or Referee System Initialization Period.
<b>Team Technical Timeout</b>	A Technical Timeout requested by a Participating Team during the Setup Period.
<b>Factors Determining the Competition Outcome</b>	
<b>Attack Damage</b>	<p>The HP deducted from a robot or Battlefield Component when hit by projectiles or darts. Exceptions are shown below:</p> <ul style="list-style-type: none"> <li>● HP deduction caused by the imposition of penalty from the violation of one side’s robot is included in the opponent’s Attack Damage.</li> <li>● HP deducted as a result of exceeding the Initial Launching Speed limit, Barrel Heat limit and Chassis Power Consumption limit, a collision on an armor module, the Referee System going offline, or an irregular offline status is not added to the other team’s Attack Damage.</li> </ul>
<b>Non-attack Damage</b>	HP deducted as a result of exceeding the Initial Launching Speed limit, Barrel Heat limit and Chassis Power Consumption limit, a collision on an armor module, the Referee System going offline, or an irregular offline status.
<b>Net Base HP</b>	At the end of each round, the remaining HP of one’s Base is subtracted from the remaining HP of the other Base.
<b>Net Sentry HP</b>	The remaining HP of a team’s Sentry subtracted from the remaining HP of the opponent’s Sentry at the end of a round.
<b>Total Remaining HP</b>	The total value of remaining HP of one’s alive robots at the end of each round.

### 3. Robot and Operator

RoboMaster requires robots to fight together as a team with good coordination and teamwork. For the robot building specifications, please refer to [RoboMaster 2024 University Series Robot Building Specifications Manual](#).

The required robot and operator line-up is as follows:

Table 3-1 Robots and Operator Line-up

Event	Type	No.	Quantity (set)	Operator Line-up
3V3 Match	Hero	1	0-1	1 Operator/Robot
	Standard	3/4	0-2	1 Operator/Robot
	Sentry	7	0-1	0 Operator/Robot
Standard Match	Standard	5	1	1 Operator/Robot



- In 3V3 Match and Standard Match, each team is only allowed to deploy no more than one Balancing Standard Robot.
- In 3V3 Match, the total number of Hero and Standard Robots shall not be greater than 2. In the first round of each match, the number of line-up robots shall not be less than 2.
- In a Standard Match, the armor sticker of a Standard can be 3/4/5.
- An operator must be a Regular Member of a team in the current season.
- After the end of each round, the Operator can be replaced by a Regular Member among the Pit Crew Members for the current match.

The basic robot information is as follows:

Table 3-2 Basic Robot Information

	3V3 Match			Standard Match	
Robot Type	Hero Robots	Standard Robots	Sentry Robot	Regular Standard Robot	Balancing Standard Robot
Maximum Chassis Power Consumption (W)	For details on robot levels, please refer to “5.2.6 Level-Up Mechanism”.		100	120	150
Initial HP			600	200	200
Maximum HP			600	200	200
Barrel Heat Limit			400	280	280
Barrel Cooling Value per Second			80	25	50
Initial Launching Speed Limit (m/s)	16	30	30	30	30
Launching Mechanism	One 42 mm launching Mechanism	One 17 mm Launching Mechanism	Two 17 mm Launching Mechanisms	One 17 mm Launching Mechanism	One 17 mm Launching Mechanism
Projectiles that can be pre-loaded	42 mm projectile	17 mm projectile	17 mm projectile	17 mm projectile	17 mm projectile
Inter-Robot Communication	Yes	Yes	No	N/A	N/A
Initial Zone	Starting Zone	Starting Zone	Sentry Starting Zone	Starting Zone	Starting Zone

## 4. General Competition Mechanism

### 4.1 HP Deduction Mechanism

The HP of robots may be deducted in any of the following situations. The Referee System server will round down the HP deduction and keep the integer when calculating the HP.

Table 4-1 Overview of the HP Deduction Mechanism

Robots HP Deduction Reason	Standard Robot	Hero Robot	Sentry Robot
Exceeding the Barrel Heat Limit	√	√	√
Exceeding the Initial Launching Speed Limit	√	√	√
Exceeding Chassis Power Consumption Limit	√	√	√
Armor Module attacked by projectiles	√	√	√
Armor module collided	√	√	√
Critical Referee System Modules gone offline	√	√	√
Yellow Card	√	√	√
Red Card	√	√	√

#### 4.1.1 Exceeding the Initial Launching Speed Limit

Set the Initial Launching Speed limit as  $V_0$  (m/s), the actual initial speed detected by the Referee System as  $V_1$  (m/s).

When  $V_1 > V_0$ , if it's 17 mm projectile, the deducted HP = Maximum HP \* L%. If it's 42 mm projectile, the deducted HP = Maximum HP \* M%. The values of L% and M% are correlated to the margin of excess. The larger the margin of excess, the greater the values of L% and M%.

Table 4-2 Penalty Mechanism for Exceeding the Initial Launching Speed Limit

17 mm projectile	L%	42 mm projectile	M%
$0 < V_1 - V_0 < 5$	10%	$V_0 < V_1 \leq 1.1 * V_0$	10%
$5 \leq V_1 - V_0 < 10$	50%	$1.1 * V_0 < V_1 \leq 1.2 * V_0$	20%



17 mm projectile	L%	42 mm projectile	M%
$10 \leq V_1 - V_0$	100%	$1.2 * V_0 < V_1$	50%

### 4.1.2 Barrel Overheating and Cooling

Set the Barrel Heat limit as  $Q_0$ , the current barrel heat as  $Q_1$ . For each 17 mm projectile detected by the Referee System, the current barrel heat  $Q_1$  is increased by 10 (regardless of its initial speed). For each 42 mm projectile detected, the current barrel heat  $Q_1$  is increased by 100 (regardless of the 42 mm projectile's initial speed). The barrel cools at a frequency of 10 Hz. The cooling value per detection cycle = cooling value per second / 10.

- A. When  $Q_1 > Q_0$ , the First Person View (FPV) visibility of the robot operator's computer will be reduced. When  $Q_1 \leq Q_0$ , the FPV will return to normal.
- B. When  $2Q_0 > Q_1 > Q_0$ , the deducted HP for every 100 ms =  $((Q_1 - Q_0) / 250) / 10 * \text{Maximum HP}$ . After the HP deduction, the barrel cooling will be calculated.
- C. When  $Q_1 \geq 2Q_0$ , the immediate deducted HP =  $(Q_1 - 2Q_0) / 250 * \text{Maximum HP}$ . After HP deduction, set  $Q_1 = 2Q_0$ .

The below shows the calculation and cooling logic when the Barrel Heat limit is exceeded:

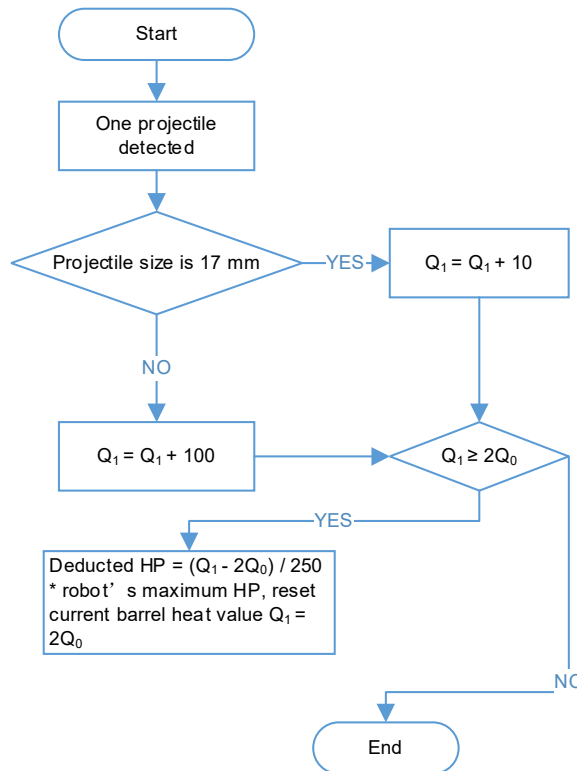


Figure 4-1 Calculation Logic when Exceeding Barrel Heat Limit

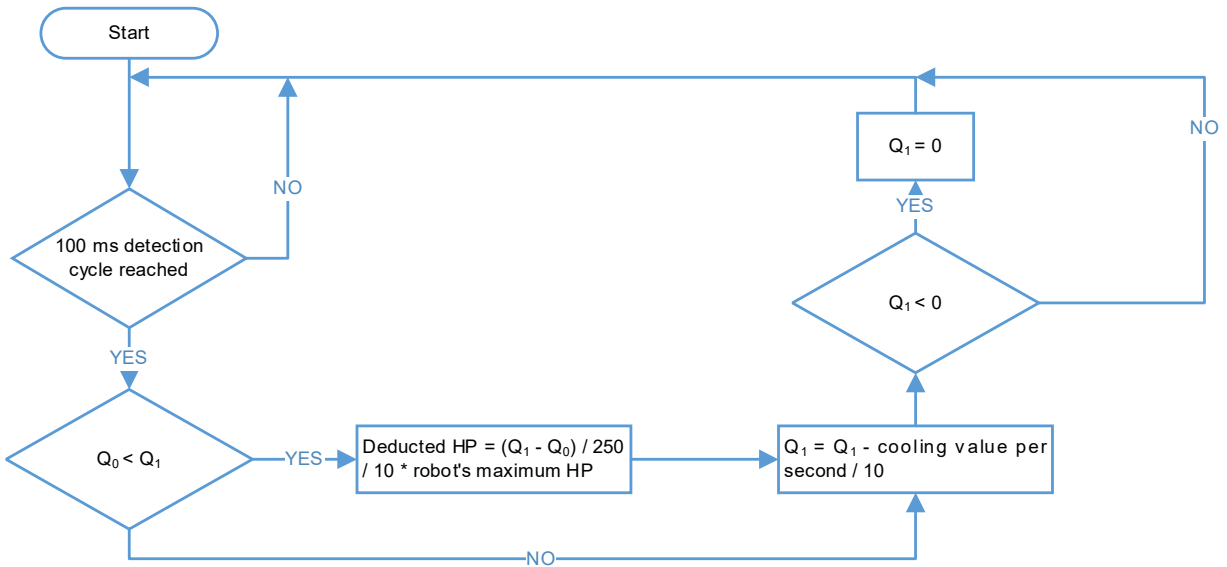


Figure 4-2 Barrel Heat Cooling Logic

### 4.1.3 Exceeding Chassis Power Consumption Limit

The chassis power consumption of robots will be continuously monitored by the Referee System, and the robot chassis needs to run within the chassis power consumption limit. Considering it is difficult for a robot to control instantaneous power consumption output when in motion, a buffer energy (Z) has been defined to avoid the consequent penalty.

Table 4-3 Penalty Mechanism for Exceeding Chassis Power Consumption Limit

K	N%
$K \leq 10\%$	10%
$10\% < K \leq 20\%$	20%
$K > 20\%$	40%

After buffer energy has been exhausted, when the chassis power consumption of Hero, Standard, and Sentry exceeds the limit, the deducted HP for each detection cycle = Maximum HP \* N% \* 0.1.

The buffer energy value of Hero, Standard and Sentry Robots is 60 J.

The Referee System calculates chassis power consumption at a frequency of 10 Hz.

Excess Percentage:  $K = (P_r - P_l) / P_l * 100\%$ , where  $P_r$  is the instantaneous Chassis Power Consumption output and  $P_l$  is the power consumption limit.

The logic graph for Chassis Power Consumption detection and Deducted HP for Hero, Standard, and Sentry is shown below:

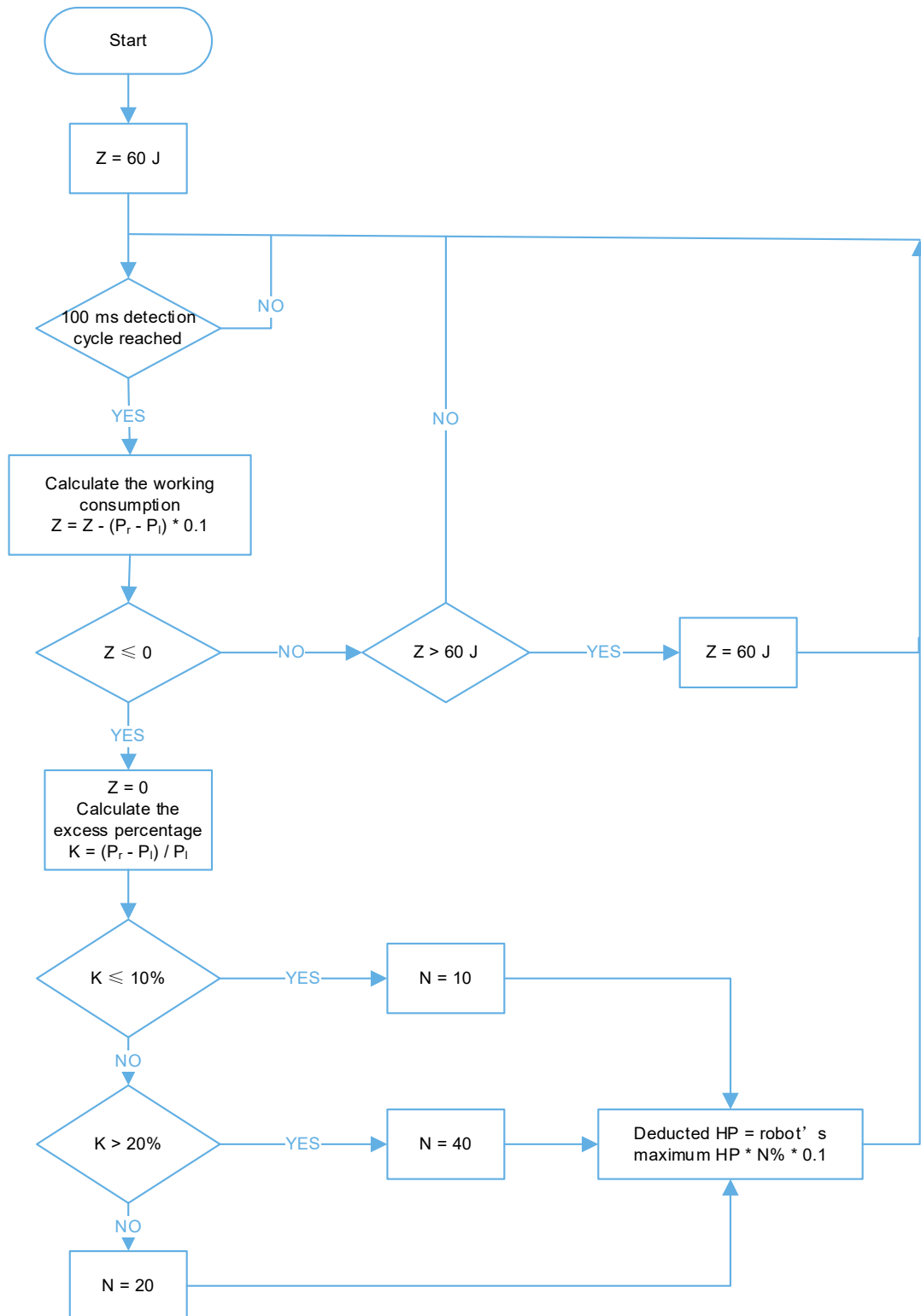


Figure 4-3 Chassis Power Consumption Detection and HP Deduction Logic of Hero, Standard, and Sentry

### 4.1.4 Attack Damage

An Armor Module detects projectile attacks through pressure sensors and the vibration frequency on the armor panel. The shortest detection interval for an Armor Module is 50 ms (when an Armor Module is hit with a 42 mm projectile, the detection interval can be extended to a maximum of 200 ms).

The projectile needs to come into contact with the impact surface of the armor module at a certain speed in order to be successfully detected. The velocity range for the detection of different projectile types by an armor module is as follows:

Table 4-4 Effective Detection Speeds of Armor Modules for Different Types of Projectiles

Armor Module	17 mm projectile	42 mm projectile
Large Armor Module, Small Armor Module	Higher than 12 m/s	Higher than 8 m/s



In an actual match, the normal speed of a projectile that touches the Armor Module attack surface is different from its Initial Projectile Speed due to the projectile’s speed decay and its incident angle not being normal to the Armor Module attack surface. Damage detection is based on the normal component of the projectile’s speed upon contact with the Armor Module attack surface.

A robot experiences damage when its Armor Module is struck. However, a robot is not allowed to cause damage to the other side’s robots through striking (including collision with the robots or launching objects).

Without buffs, the original damage shall be as follows:

Table 4-5 HP Deduction Mechanism for Attack Damage

Target \ Damage type	42 mm projectile	17 mm projectile	Collision
Robot Armor Module	100	10	2
Base Large Armor Module	200	5	2

### 4.1.5 Referee System Going Offline

Participating teams must mount the corresponding referee system modules on their robots in accordance with the requirements of [RoboMaster 2024 University Series Robot Building Specifications Manual](#), and ensure the stability of the connection between each module of the referee system and the server throughout the competition. The Referee System server detects the connectivity of each module at a frequency of 2 Hz. If Critical Referee System Modules

go offline due to design or structural problems, it will result in the deduction of the HP of the corresponding Ground Robots. If a Speed Monitor Module (17 mm Projectile) or (42 mm Projectile) mounted on a robot goes offline, the robot's 17 mm or 42 mm Launching Mechanism will be powered off immediately.



Critical Referee System Modules: Armor Module and Supercapacitor Management Module.

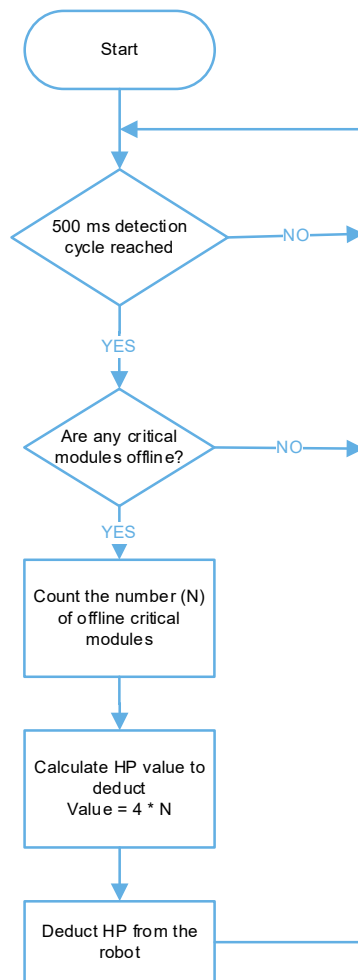


Figure 4-4 HP Deduction Mechanism for Critical Referee System Modules Going Offline

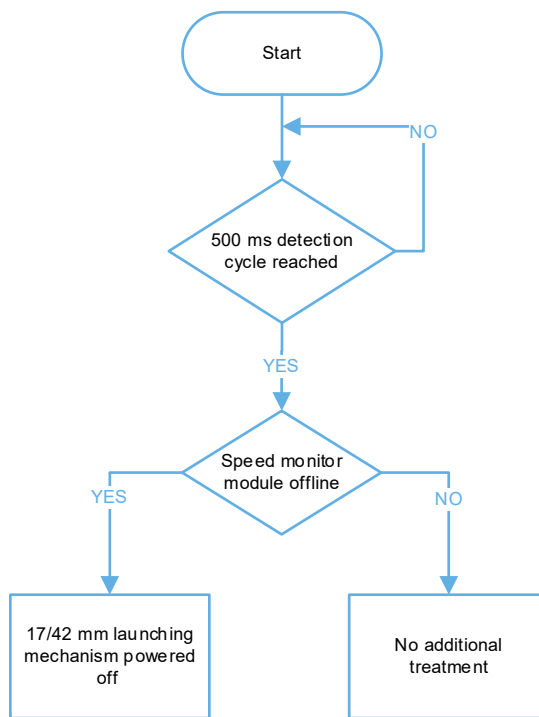


Figure 4-5 Offline and Power-off Mechanism for Speed Monitor Module

### 4.1.6 Irregular Offline Status

During the competition, if a robot enters the Irregular Offline state, it can reconnect to the competition while its experience and levels will continue to be calculated during the offline period.

Table 4-6 Consequences of Irregular Offline Status

Robot Type	Consequences of irregular offline status
<b>Hero, Standard</b>	<ul style="list-style-type: none"> <li>● When the power supply to the Launching Mechanism, Gimbal, and Chassis is powered off, 5% of the Maximum HP is deducted for each second elapsed until it drops to zero.</li> <li>● The RFID Interaction Module is expired.</li> <li>● The robot no longer detects any damage caused by collision or projectile attacks.</li> <li>● The respawn process drops to zero.</li> </ul>
<b>Sentry Robot</b>	<ul style="list-style-type: none"> <li>● When the power supply to the Launching Mechanism, Gimbal, and Chassis is powered off, 5% of the Maximum HP is deducted for each second elapsed until it drops to zero.</li> <li>● The RFID Interaction Module is expired.</li> <li>● The robot no longer detects any damage caused by collision or projectile attacks.</li> </ul>

## 5. 3V3 Match

During a five-minute round, both teams control their robots to engage in tactical combat on the core competition area — the Battlefield. The team that destroys the opponent's Base shall be the winner.

### 5.1 Competition Area

#### 5.1.1 Overview



- The dimension error margin of all battlefield components described here is within  $\pm 10\%$ . The unit for the size parameters on the site drawings is mm.
- The Battlefield has a symmetrical layout with a central line. All descriptions and illustrations of Battlefield modules in this text will be based on the Red Team as an example but will apply equally to the Blue Team.

The core competition area of the 3V3 Match is called the Battlefield. The Battlefield is 12 m x 8 m in size. Each team has a Starting Zone, Supplier Zone and Battlefield Buff Point.

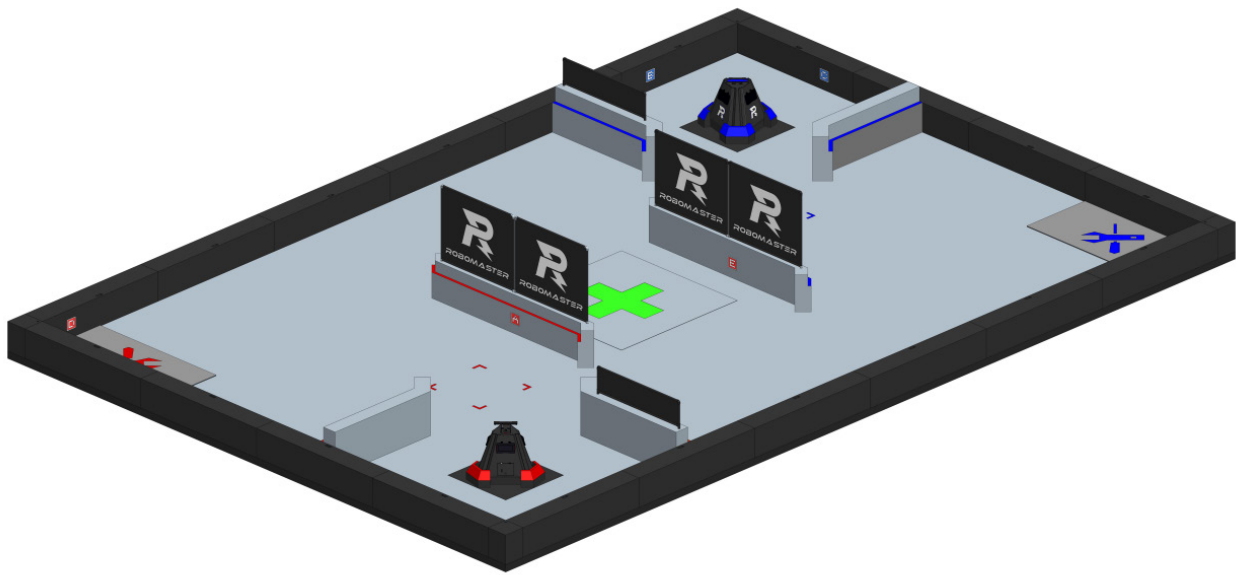
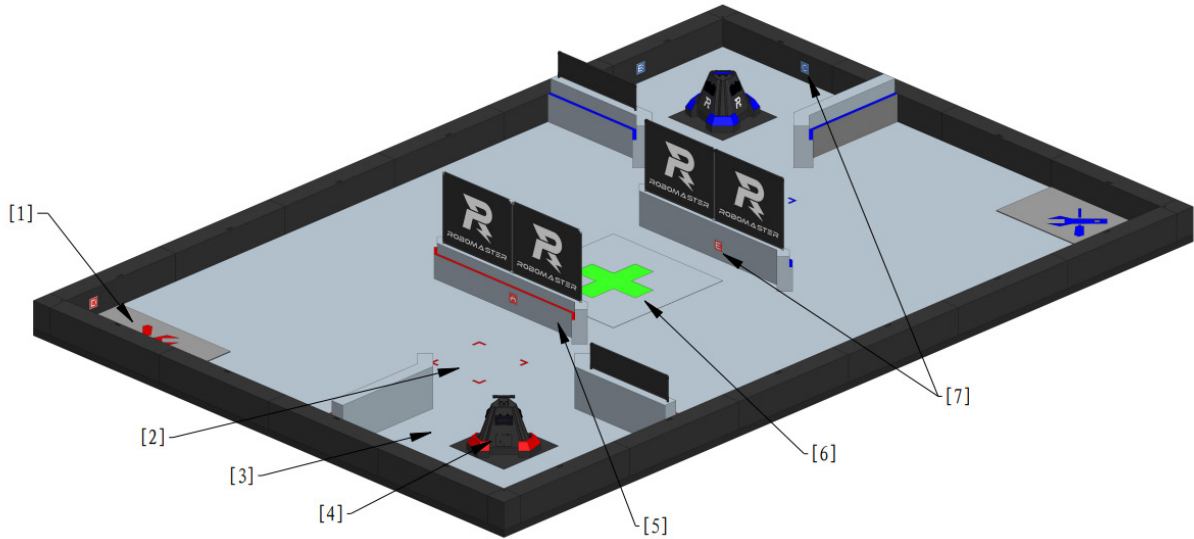


Figure 5-1 Axonometric View of 3V3 Match Wooden Battlefield



- |                        |                          |                   |          |            |
|------------------------|--------------------------|-------------------|----------|------------|
| [1] Supplier Zone      | [2] Sentry Starting Zone | [3] Starting Zone | [4] Base | [5] Bunker |
| [6] Central Buff Point | [7] Visual Marker        |                   |          |            |

Figure 5-2 Modules of 3V3 Match Wooden Battlefield



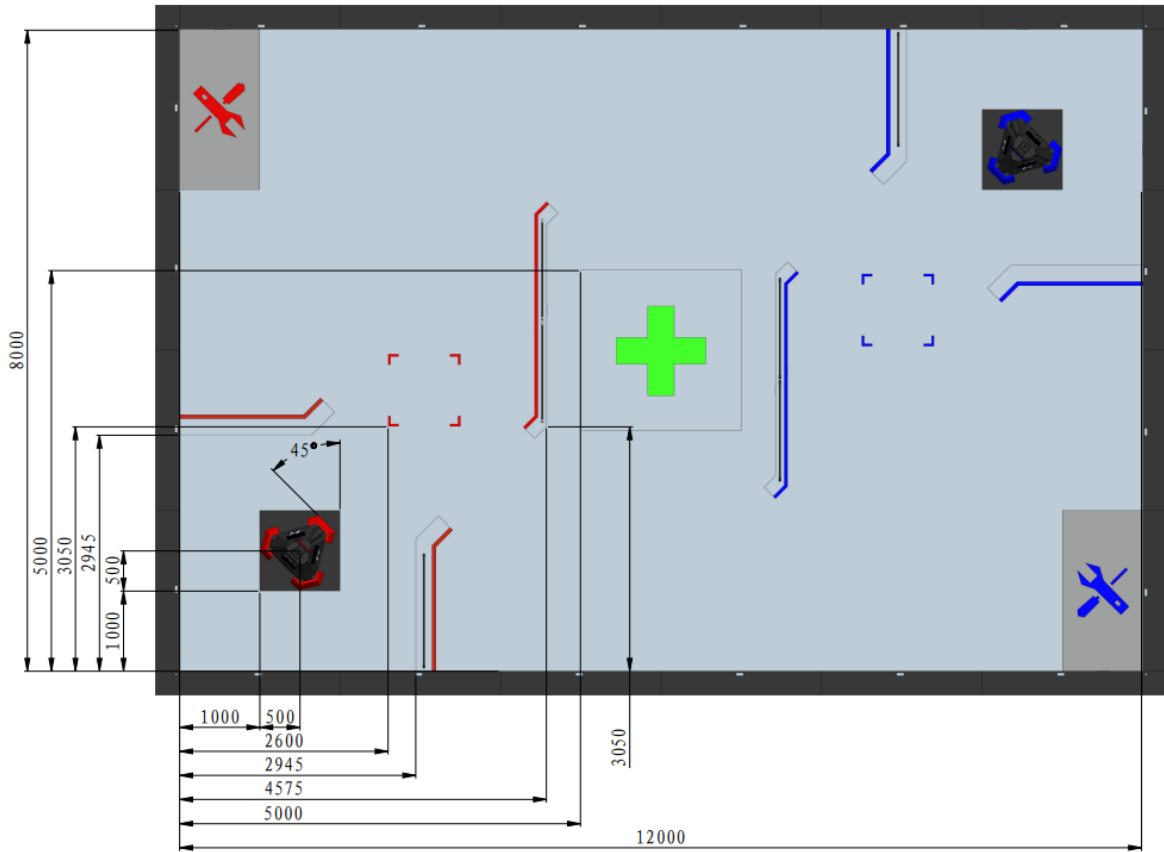
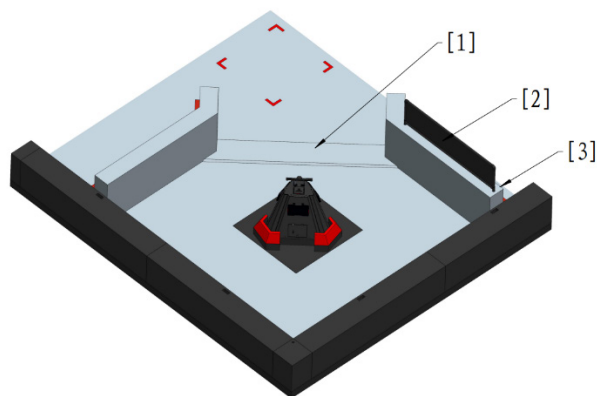


Figure 5-3 Dimensions of 3V3 Match Wooden Battlefield

### 5.1.2 Starting Zone

The Starting Zone is the robots placement area before a match, mainly including the Base. Between the Starting Zone and the wooden perimeter wall there is a 45° slope with a height of 20 mm.



[1] 45° slope

[2] Cloth perimeter wall of the Starting Zone

[3] Wooden perimeter wall of the Starting Zone

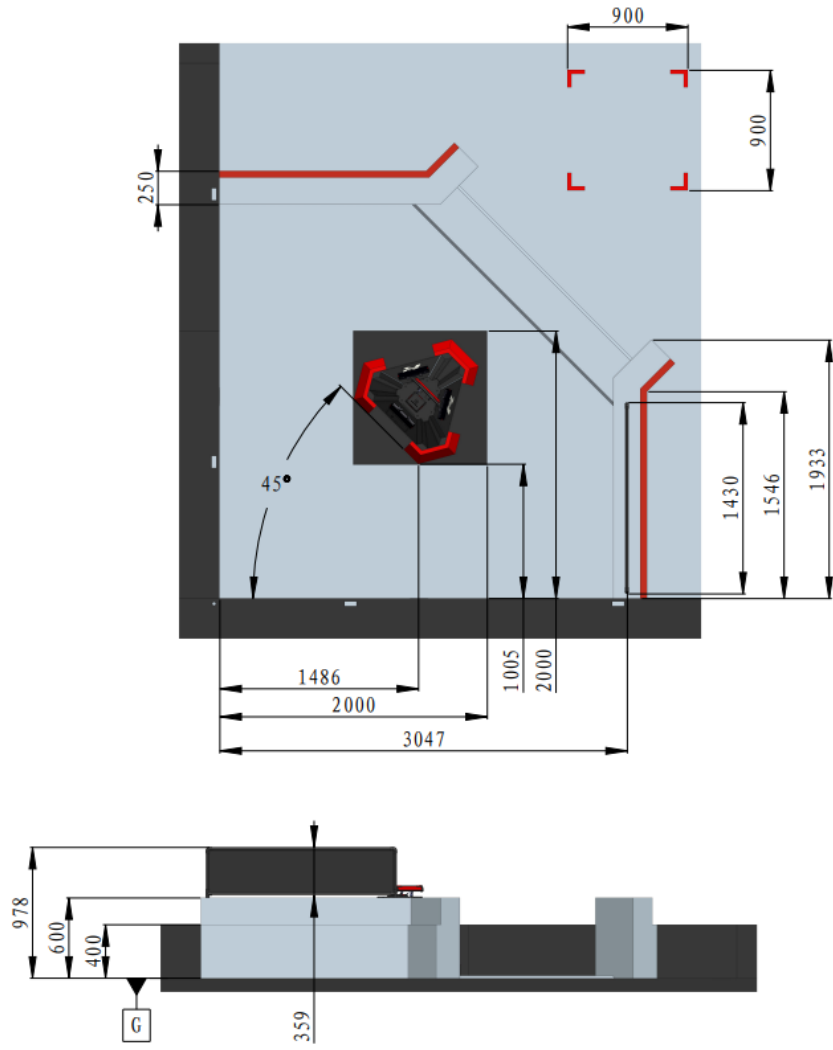
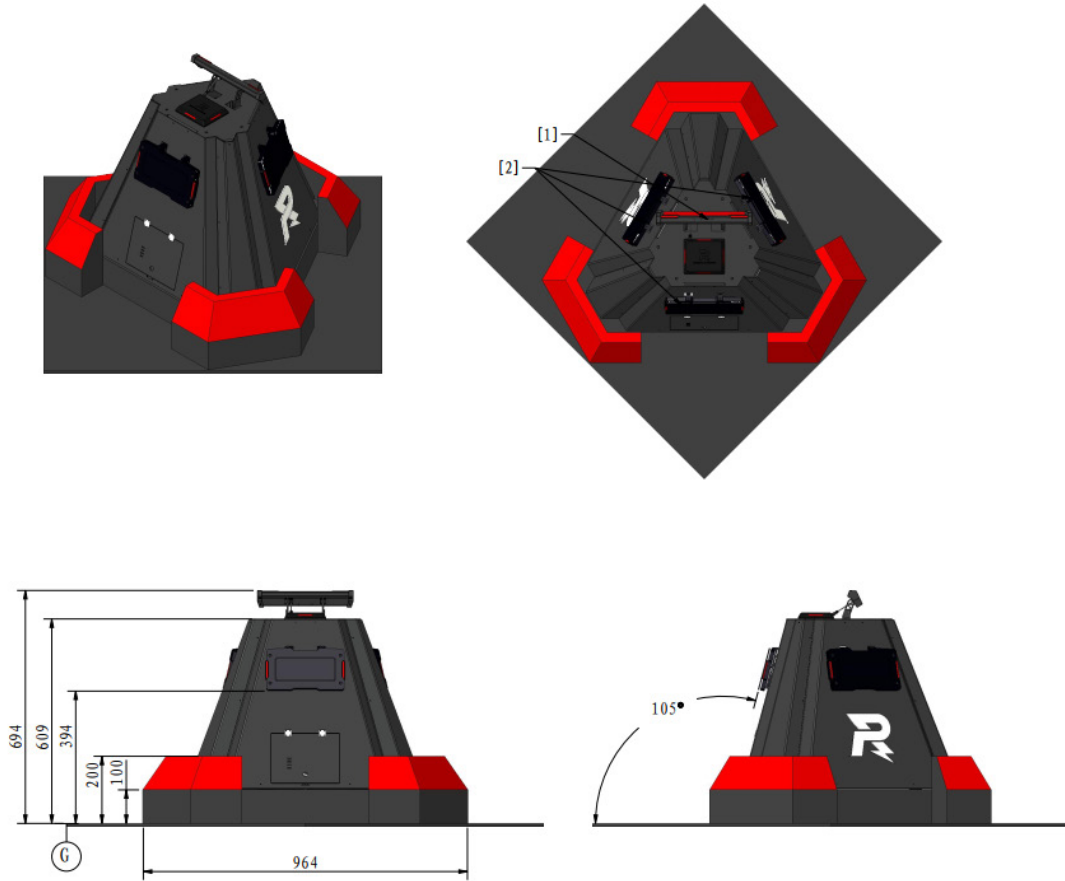


Figure 5-4 Starting Zone of the Wooden Battlefield

### 5.1.2.1 Base

The Red Team and Blue Team each have a Base. The Base is equipped with several Armor Modules with stickers attached.



[1] Light Indicator Module [2] Armor Module

Figure 5-5 Base

### 5.1.3 Bunker

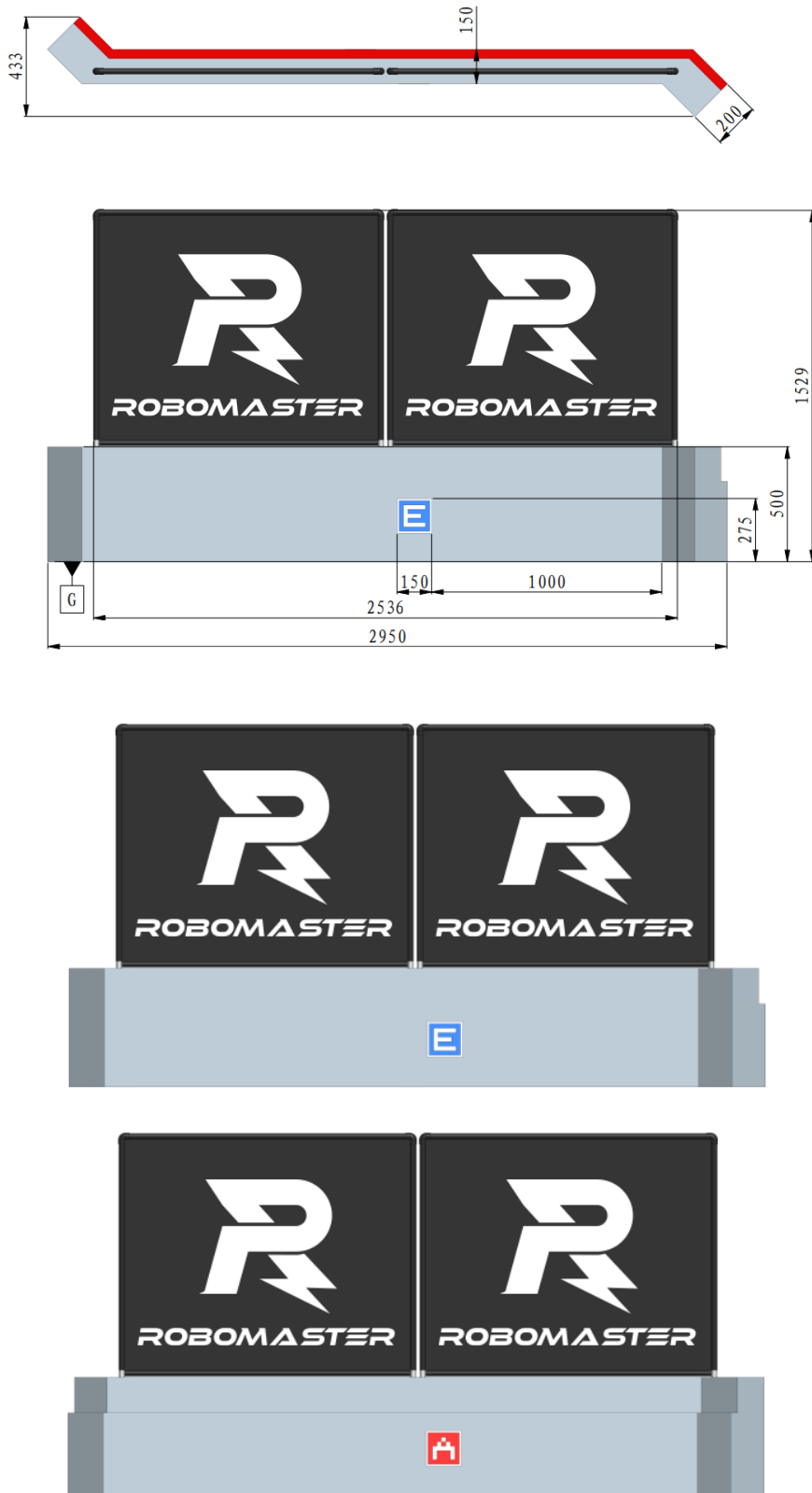


Figure 5-6 Bunker on the Wooden Battlefield

## 5.1.4 Supplier Zone

A Supplier Zone is an important area for the reloading of projectiles and the recovery of robot HP.

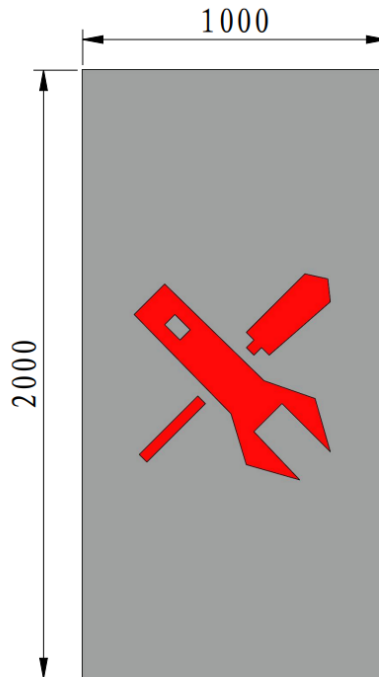


Figure 5-7 Supplier Zone

### 5.1.4.1 Supplier Penalty Zone

The Supplier Zone of one team is the Supplier Penalty Zone for the opponent's robots.

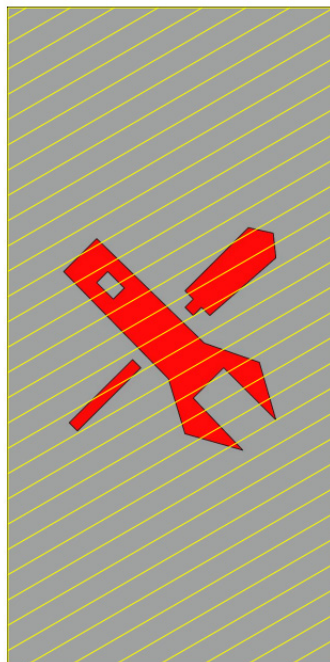


Figure 5-8 Supplier Penalty Zone

### 5.1.5 Central Buff Point

Central Buff Point is located at the center of the battlefield.

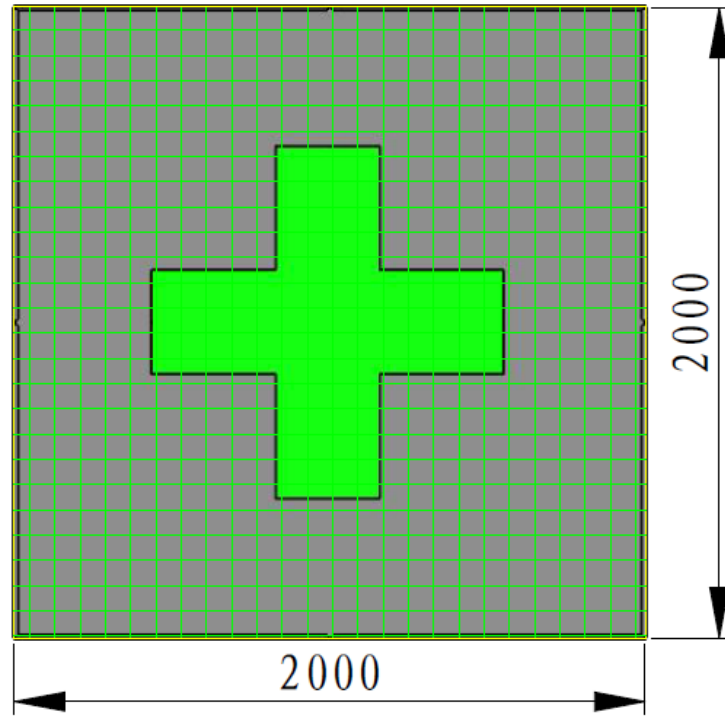
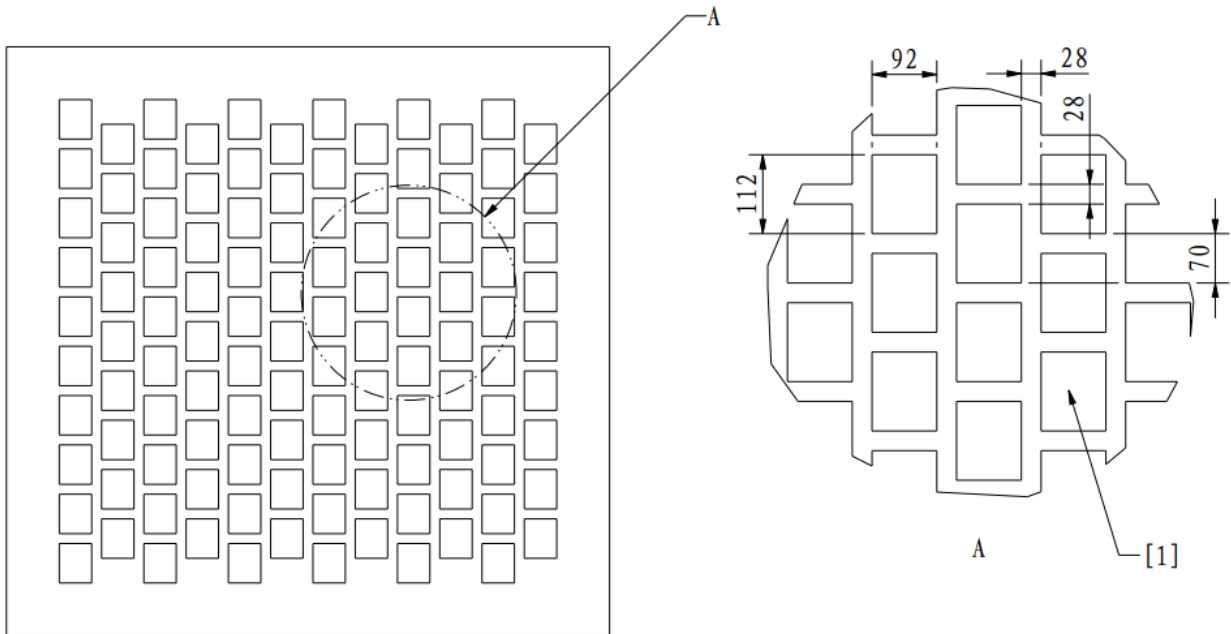


Figure 5-9 Central Buff Point



[1] Locations where RFID Interaction Module Cards are lodged

Figure 5-10 Layout of the RFID Interaction Module Cards



Deadbands may exist for the RFID Interaction Module Cards at the Buff Points in the Battlefield. The teams have to adjust on their own.

## 5.1.6 Miscellaneous

### 5.1.6.1 Projectiles

Robots deal damage by firing projectiles to attack Armor Modules. The parameters and scenarios of use for projectiles in the competition are as follows:

Table 5-1 Projectile Parameters and Scenarios of Use

Type	Appearance	Color	Dimensions	Weight	Shore Hardness	Material	Scenarios of Use
42 mm projectile	Similar to a golf ball	White	42.5 mm ± 0.5 mm	41 g ± 1 g	90 A	Plastic (TPE)	3V3 Match
17 mm projectile	Sphere	Yellow-green	16.8 mm ± 0.2 mm	3.2 g ± 0.1 g	90 A	Plastic (TPU)	All RMUL Events

### 5.1.6.2 Projectile Reloader

An off-field reloading operator may refill projectiles for a robot using an official Projectile Reloader. The Projectile Reloader is shown below:

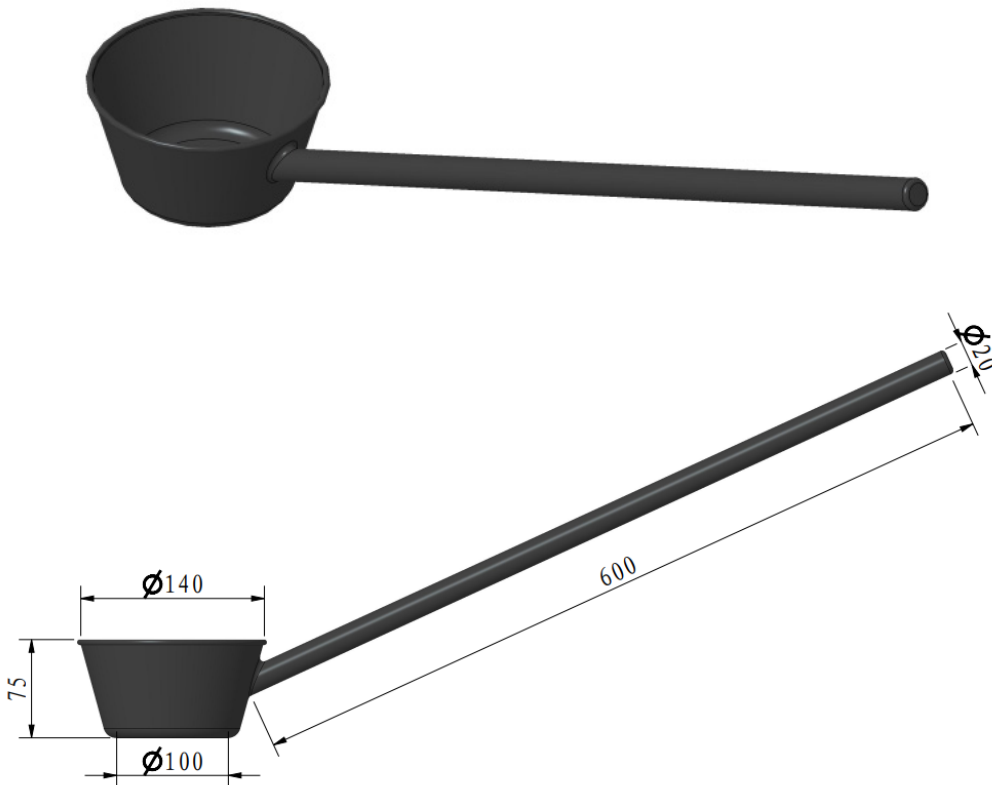


Figure 5-11 Projectile Reloader

### 5.1.6.3 Visual Marker

A Visual Marker is a white-bordered square label with a side length of 150 mm and white words on a red or blue background. Each Marker is different. For their codes, please refer to [RoboMaster Visual Marker Library](#).

The color codes for Visual Markers are:

Red RGB: R255 G51 B51; CMYK: C0 M89 Y75 K0; HEX: ff3333

Blue RGB: R51 G153 B204; CMYK: C74 M30 Y13 K0; HEX: 3399cc

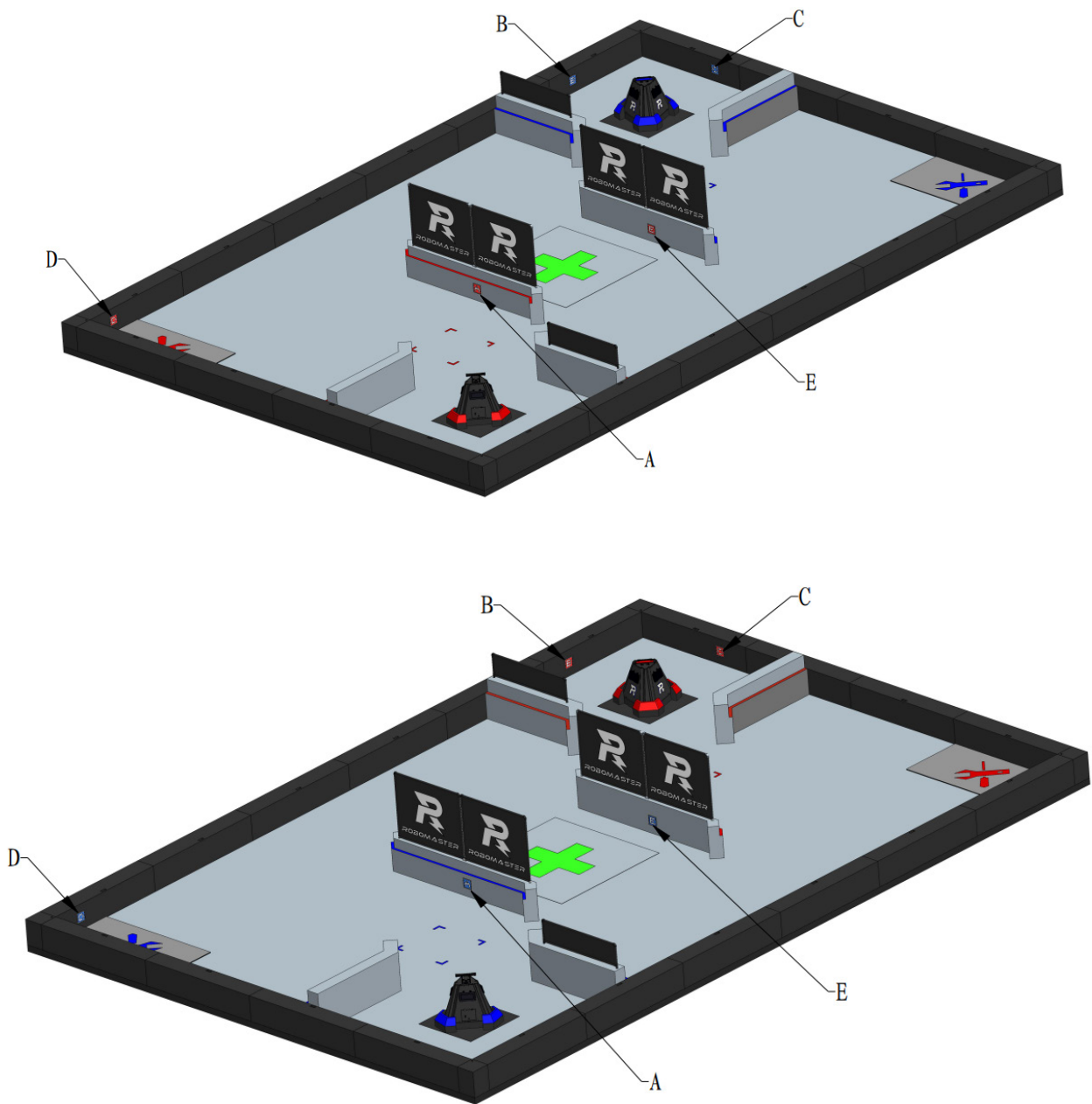


Figure 5-12 Diagram of Visual Markers



### 5.1.6.4 Operator Room

Operator Room lies outside the Battlefield and is an area for Operators during the competition. Each Operator Room must be equipped with a corresponding number of computers with official equipment such as monitor, mouse, keyboard and USB hub.

## 5.2 Competition Mechanism



If a robot does not detect the RFID Interaction Module Card of the Buff Point, the occupation will expire in two seconds.

### 5.2.1 HP Recovery and Revival Mechanism

All robots may recover their HP. Only Sentries cannot be respawned. Ejected robots cannot recover their HP and be revived.

#### 5.2.1.1 HP Recovery Mechanism

**Hero and Standard:** When occupying own side's Supplier Zone, they may restore up to 10% of maximum HP per second. If a robot is out of combat, this value will increase to 25%.

**Sentry:** From the start to the 4th minute of the competition (countdown from 4:59-1:00), the robot that occupies its team's Supplier Zone will restore 100 HP per second. The total maximum HP that can be recovered in this manner is 600.

#### 5.2.1.2 Revival Mechanism

- A defeated Standard or Hero Robot can be respawned automatically, by completing the respawn process.
- When a Standard or Hero robot is auto-respawning, it gains 2 respawn points each second.
- After a Standard or Hero is respawned, its launching mechanism remains locked. When it occupies its team's Supplier Zone, its launching mechanism will be unlocked.

The respawn process length for different robots on their first defeat are shown as follows:

Table 5-2 The Respawn Process Length for different Robots on Their First Defeat

Type	respawn process length
Standard Robots	10
Hero Robots	20

The respawn process length for the same robot increases by 10 after each defeat.

A respawned robot will maintain its level, performance points and experience points from before its defeat, and its HP will be restored to 20% of the Maximum HP. The robot is invincible for 10 seconds after respawn.

## 5.2.2 Projectile supplies

In each round, a robot can enter its team's Supplier Zone at any time, where the off-field reloading operator can refill projectiles for the robot using the official Projectile Reloader. All robots can have their 17 mm projectiles reloaded by the off-field reloading operator of the Supplier Zone during the competition. They may not have their 42 mm projectiles reloaded. For details of a projectile reloader, please refer to "Figure 5-16 Projectile Reloader".



Reloading operators can only refill projectiles using the official projectile reloader, and cannot touch the robots in any other manner.

## 5.2.3 Battlefield-related Mechanism

### 5.2.3.1 Base HP

The Base HP is 1500 and it is in the Invincible state at the start of a round.

During the competition, when one team experiences its first robot defeat or ejection, its Base's Invincible status will be removed while its Virtual Shield will be activated and have 1,500 HP points. When a robot attacks the opponent's Base, the HP of its Virtual Shield will be deducted first. If the Virtual Shield's HP is reduced to zero, the Base's HP will begin to be deducted.

The "invincible" status of the team's base and its Virtual Shield will be expired when its Sentry is destroyed or ejected.

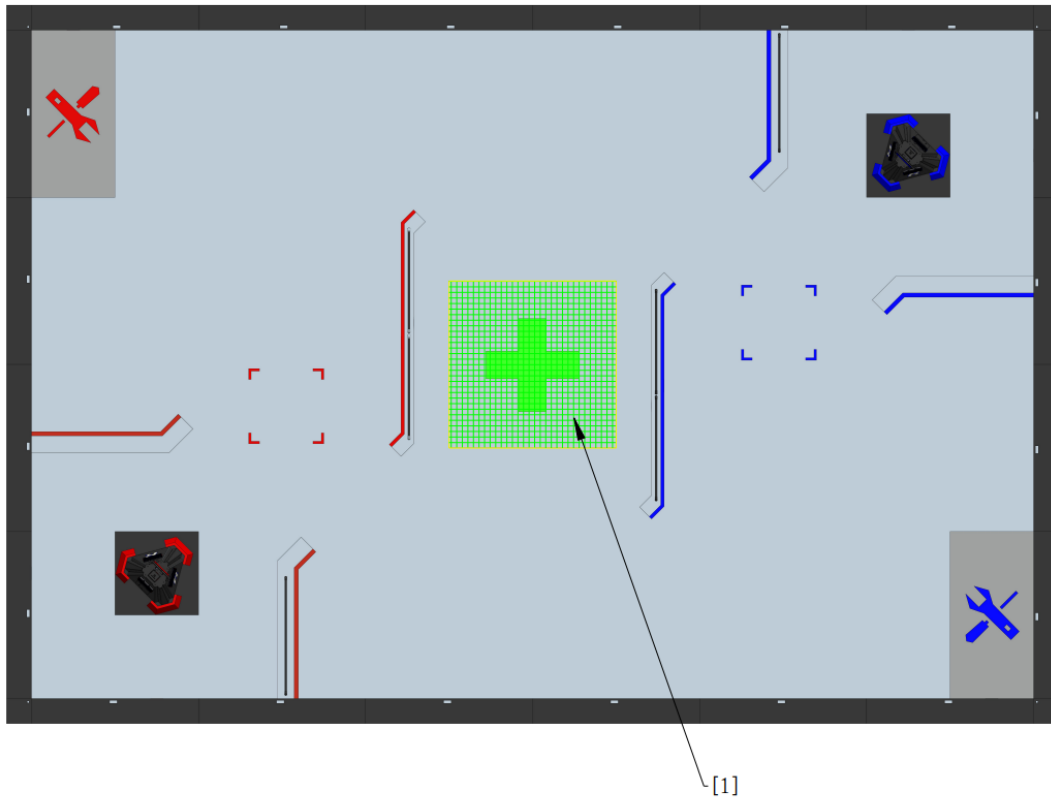
If a team's Sentry Robots have not showed up on the Battlefield after one minute has elapsed in the round, the "invincible" status of the team's base and its Virtual Shield will be expired.



- The HP of Virtual Shields cannot be restored. The HP deducted due to the opponent's attack on a Virtual Shield counts as their Attack Damage.
- When a Base is in the Invincible status or its Virtual Shield is enabled, its armor lights will become purple

### 5.2.3.2 Central Buff Points Mechanism

The position of Central Buff Point is shown below:



[1] Central Buff Point

Figure 5-13 Central Buff Point

Within the first minute of the match, Central Buff Point is not activated, and no robot can occupy the Zone.

One minute into the round (when the countdown is at 3:59), the Central Buff Point becomes active. These mechanisms are as follows:

- If the Central Buff Point is occupied by a single type of robot, the occupying side gains 10 energy points per second;
- If the Central Buff Point is occupied by multiple types of robots except for Sentry, the occupying side gains 10 energy points per second;
- If the Central Buff Point is occupied by multiple types of robots including Sentry, the occupying side gains 20 energy points per second.

Both teams can occupy Central Buff Point simultaneously, and the deactivation of Occupied Status is delayed by 2 seconds.

If a robot is attacked while occupying a Central Buff Point, the energy received by its team will be deducted: For every 17 mm projectile detected, 2 energy points will be deducted, and for every 42 mm projectile detected, 20 energy points will be deducted, until the team's energy is reduced to zero.

When a team gains 100 energy points by occupying the Central Buff Point, the Central Buff Point immediately expires. The alive Hero and Standard Robots of that team share the 500 experience points equally. Both teams' occupation energy becomes zero. The Central Buff Point cannot be reactivated for 90 seconds. Central Buff Point becomes activated again after 90 seconds.

## 5.2.4 Sentry-Related Mechanism

The barrel heat of Sentry's two Launching Mechanism Barrels must be calculated separately. When the total number of projectiles launched by two Launching Mechanisms has reached 750, all Launching Mechanisms will be powered off.

## 5.2.5 Economic System

Both teams will receive gold coins regularly during the competition. Gold coins can only be exchanged for Projectile Allowance.

Each team has 200 gold coins at the start of the match. For every minute afterwards, 200 gold coins will be given to each team until the second minute (when countdown is at 2:59). In the third minute and fourth minute of the game, both sides can get 300 gold coins again.

Table 5-3 Rules for Exchange

Exchange item	Exchange ratio
17 mm projectile	10 gold coins/10 rounds
42 mm projectile	15 gold coins/1 round

For every round of projectiles fired by a robot, the Projectile Allowance corresponding to the type of projectiles fired is reduced by 1 round. When the Launching Mechanism is locked, its power stays off; when it is unlocked and the projectile allowance for the corresponding projectile type is greater than zero, its power remains on, otherwise it is powered off. Three seconds after a Hero Robot changes from alive to non-alive state, or a Hero Robot has launched more projectiles than its allowance (the Speed Monitor Module detects a 42 mm projectile being fired when the Projectile Allowance is 0), or the Speed Monitor Module can still detect 42 mm projectile being launched after the Hero Robot's defeat, when detecting the launch of the third 42 mm projectile, all the Armor Modules of

the other team's robots and Base will be shielded from 42 mm projectile damage, until the Hero Robot changes to alive state and the Projectile Allowance is larger than 0.

Standard and Hero Robots can exchange 17 mm or 42 mm projectiles with gold coins at any time in the Supplier Zone. If a robot has occupied its team's Supplier Zone, the operator may exchange for their projectile allowance through the player's client.

## 5.2.6 Experience and Performance Systems

### 5.2.6.1 Experience System

After the match starts, Standard and Hero Robots are both at Level 1. They can go up to Level 10 (the highest level possible) by gaining experience points. Sentry Robots cannot gain experience points or level up, and will always be considered Level 10.

During the competition, a robot earns experience points in various ways, as shown below:

Behavior Type	Experience Points Gained
Launching projectiles	<ul style="list-style-type: none"> <li>● Standard robot: For every 1 projectile launched, the robot gains 1 experience point.</li> <li>● Hero robot: For every 1 projectile launched, the robot gains 10 experience points.</li> </ul>
Dealing Attack Damage	<ul style="list-style-type: none"> <li>● Dealing attack damage to a robot: For every 1 point of damage dealt, the attacking team gains 4 experience points</li> <li>● Dealing attack damage to the Base: For every 1 point of damage dealt, the attacking team gains 1 experience point</li> </ul> <p>When the robots of one team or its Base receives attack damage, but the Referee System does not detect the source of the damage, the source of the damage cannot gain experience points or it is penalty/the robot of the same team: If the damage is from projectiles, the experience points will be equally divided among all of the other team's robots that can deal the projectile damage of that type; if the damage is not from projectiles, the experience points will be equally assigned to all alive Hero and Standard Robots of the other team at the moment. The average is rounded up and shall be accurate to one decimal place.</p>

Behavior Type	Experience Points Gained
	<p><b>Example: A Standard Robot of the blue team received 10 points of damage from a 17 mm projectile, but the system is unable to identify the damage’s origin. At this moment, Red Team has 1 alive Standard Robot and 1 alive Hero Robot. As a result, the experience points gained by the alive Standard Robot is <math>4 \times 10 = 40</math>. The alive Hero Robot gains no experience point.</b></p>
<p>Defeated robots</p>	<ul style="list-style-type: none"> <li>● If the destroyer is a Hero Robot that defeats other robots with 42 mm projectiles: <ul style="list-style-type: none"> <li>➤ When the destroyed robot's level is not lower than that of the destroyer, the experience points are calculated as follows: <p>The experience points gained by destroyer = <math>50 \times \text{the level of the destroyed robot} \times (1 + 0.2 \times \text{the difference between the level of the destroyed robot and that of the destroyer})</math></p> </li> <li>➤ When the destroyed robot's level is lower than that of the destroyer, the level difference is considered to be 0. The experience points are calculated as follows: <p>The experience points gained by destroyer = <math>50 \times \text{the level of the destroyed robot}</math></p> </li> </ul> </li> <li>● If the defeat of the opponent's robots is not achieved through the use of 42 mm projectiles: <p>The level of the destroyer is considered to be the level corresponding to the average experience points of the opponent's alive Standard Robots. The average value of experience points is rounded off.</p> <p>If a robot is not alive or the Referee System is unable to detect a destroyer for reasons other than suffering a hit on its Armor Module, it will be deemed that no destroyer has been found.</p> <p><b>Example 1: When a Level 2 Hero Robot destroys a Level 6 Standard Robot of the opponent with 42 mm projectiles, the experience gained by the Hero Robot is <math>50 \times 6 \times (1 + (6 - 2) \times 0.2) = 540</math></b></p> <p><b>Example 2: One Level 8 Standard Robot of the Blue Team is defeated by 17 mm projectiles, and the Red Team has 2 alive Standard Robots with experience of 600 and 1,800. Their average experience points should be 1,200, corresponding to Level 5. Thus the experience gained by each alive Standard Robot of the Red Team is <math>50 \times 8 \times (1 + (8 - 5) \times 0.2) / 2 = 320</math></b></p> </li> </ul>

Behavior Type	Experience Points Gained
Occupying the Central Buff Point	Each time a team successfully occupy the Central Buff Point, it gains 500 experience points.

Table 5-4 Levels and Experience Points of Hero and Standard Robots

Level	Experience Points Required for Leveling Up
1	0
2	250
3	500
4	750
5	1,000
6	1250
7	1500
8	1750
9	2000
10	2500



When a Balancing Standard Robot gains experience, it receives an additional 50% experience increase.

### 5.2.6.2 Performance System

After the start of the Three-Minute Setup Period, the operators of the Standard and Hero Robots may select the types of chassis and Launching Mechanism for the robots. Once the Five-Minute Competition Round has begun, the robots' chassis and launching mechanism types, once selected, cannot be changed during the entire round.



If the chassis or launching mechanism types are not selected, after the start of the Five-Minute Competition Round, the unselected chassis performance type will be automatically set to "HP-Focused", and the unselected barrel type will be automatically set to "Cooling-Focused".



Table 5-5 Attributes of Hero Robot Chassis

Chassis Type	Level	Maximum HP	Chassis Power Consumption Limit (W)
Power-Focused	1	200	70
	2	225	75
	3	250	80
	4	275	85
	5	300	90
	6	325	95
	7	350	100
	8	375	105
	9	400	110
	10	500	120
HP-focused	1	250	55
	2	275	60
	3	300	65
	4	325	70
	5	350	75
	6	375	80
	7	400	85
	8	425	90
	9	450	100
	10	500	120

Table 5-6 Attributes of Standard Robot Chassis

Chassis Type	Level	Maximum HP	Chassis Power Consumption Limit (W)
Power-Focused	1	150	60
	2	175	65
	3	200	70
	4	225	75
	5	250	80
	6	275	85
	7	300	90
	8	325	95
	9	350	100
	10	400	100
HP-focused	1	200	45
	2	225	50
	3	250	55
	4	275	60
	5	300	65
	6	325	70
	7	350	75
	8	375	80
	9	400	90
	10	400	100

Table 5-7 Attributes of 17 mm Launching Mechanisms

Launching Mechanism Type	Level	Barrel Heat Limit	Barrel Cooling Value per Second
Burst-focused	1	200	10
	2	250	15
	3	300	20
	4	350	25
	5	400	30
	6	450	35
	7	500	40
	8	550	45
	9	600	50
	10	650	60
Cooling-focused	1	50	40
	2	85	45
	3	120	50
	4	155	55
	5	190	60
	6	225	65
	7	260	70
	8	295	75
	9	330	80
	10	400	80

Table 5-8 Attributes of 42 mm Launching Mechanisms

Launching Mechanism Type	Level	Barrel Heat Limit	Barrel Cooling Value per Second
Default	1	200	40
	2	230	48
	3	260	56
	4	290	64
	5	320	72
	6	350	80
	7	380	88
	8	420	96
	9	450	104
	10	500	120

### 5.2.7 Competition System and Winning Criteria

The 3V3 Match consists of the Group Stage and the Knockout Stage. The Group Stage follows the BO2 competition system, while for Knockout Stage it is BO3 or BO5.

Winning criteria for a Single Round as shown below:

1. When the Base of one team is destroyed, the round ends immediately and the alive team wins.
2. When the entire seven minutes of a round elapses, if the Bases of both teams have survived, the team with the higher remaining Base HP is the winner.
3. If a round has ended, and the remaining Base HP of both teams are the same, the team with the higher remaining Sentry HP is the winner.
4. If a round ends, and the remaining Base HP and Sentry HP of both teams are the same, the team that dealt more attack damage is the winner.
5. If a round ends, and the remaining base HP and Sentry HP of both teams are the same, and the total attack damage dealt by the two teams are the same, the team with higher total robot remaining HP is the winner.

6. If neither fulfills these criteria, the round is considered a draw. A draw in the Knockout Stage leads to an immediate tie-breaker round until a team wins.

## 6. Standard Match

During a two-minute round, the robots from both teams engage in a shootout on the Battlefield. The team that destroys the other's robots shall be the winner.

During a Standard Match, a Standard Robot:



- Will maintain the same experience and robot level.
- May launch up to 200 rounds of 17 mm projectiles.

### 6.1 Competition Area

The core competition area of the Standard Match is called the “Battlefield”. The Battlefield is a 5 m x 5 m area that contains the Starting Zones of the blue and red teams.

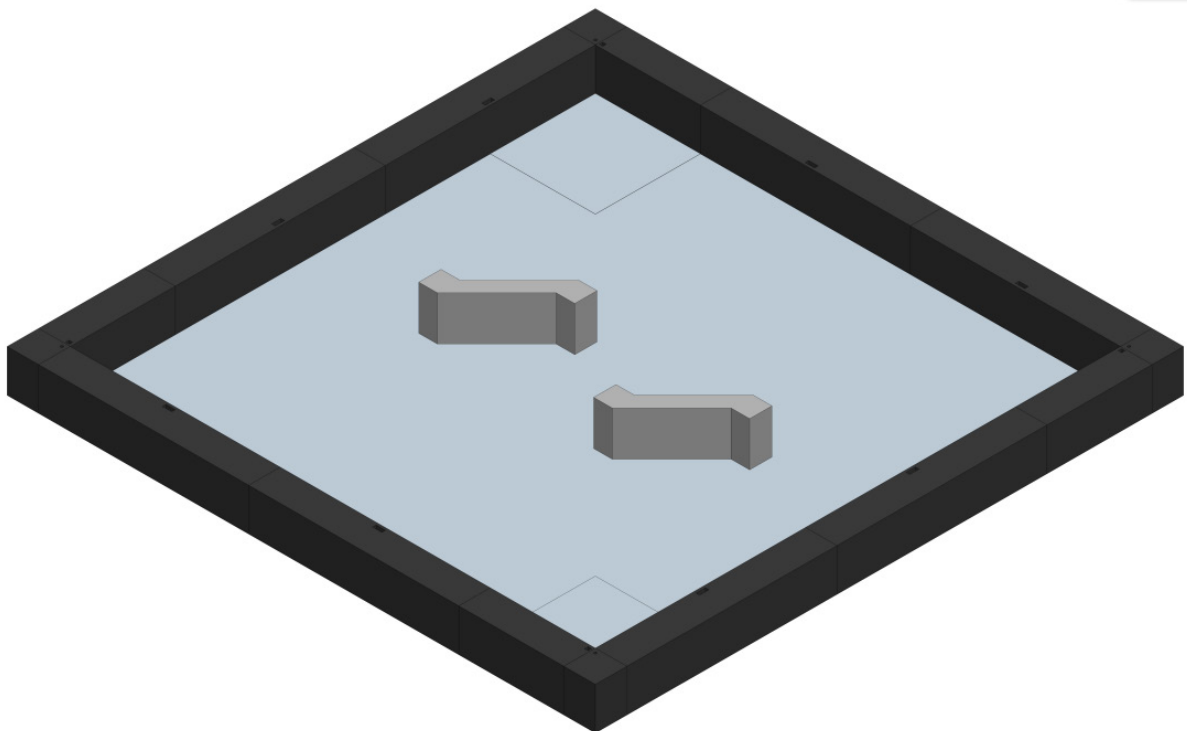
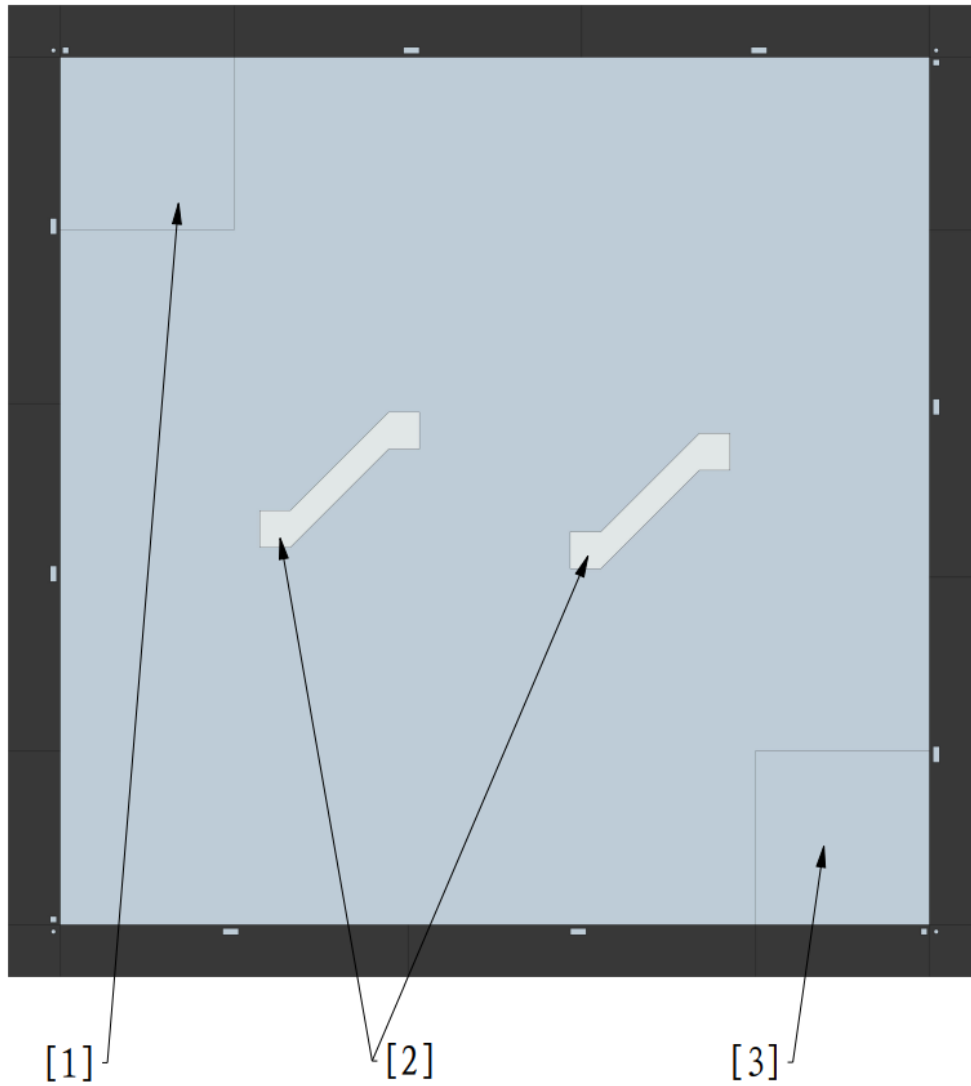


Figure 5-14 Axonometric View of Standard Match Wooden Battlefield



[1] Red Team's Starting Zone [2] Bunker [3] Blue Team's Starting Zone

Figure 5-15 Top View of Standard Match Wooden Battlefield

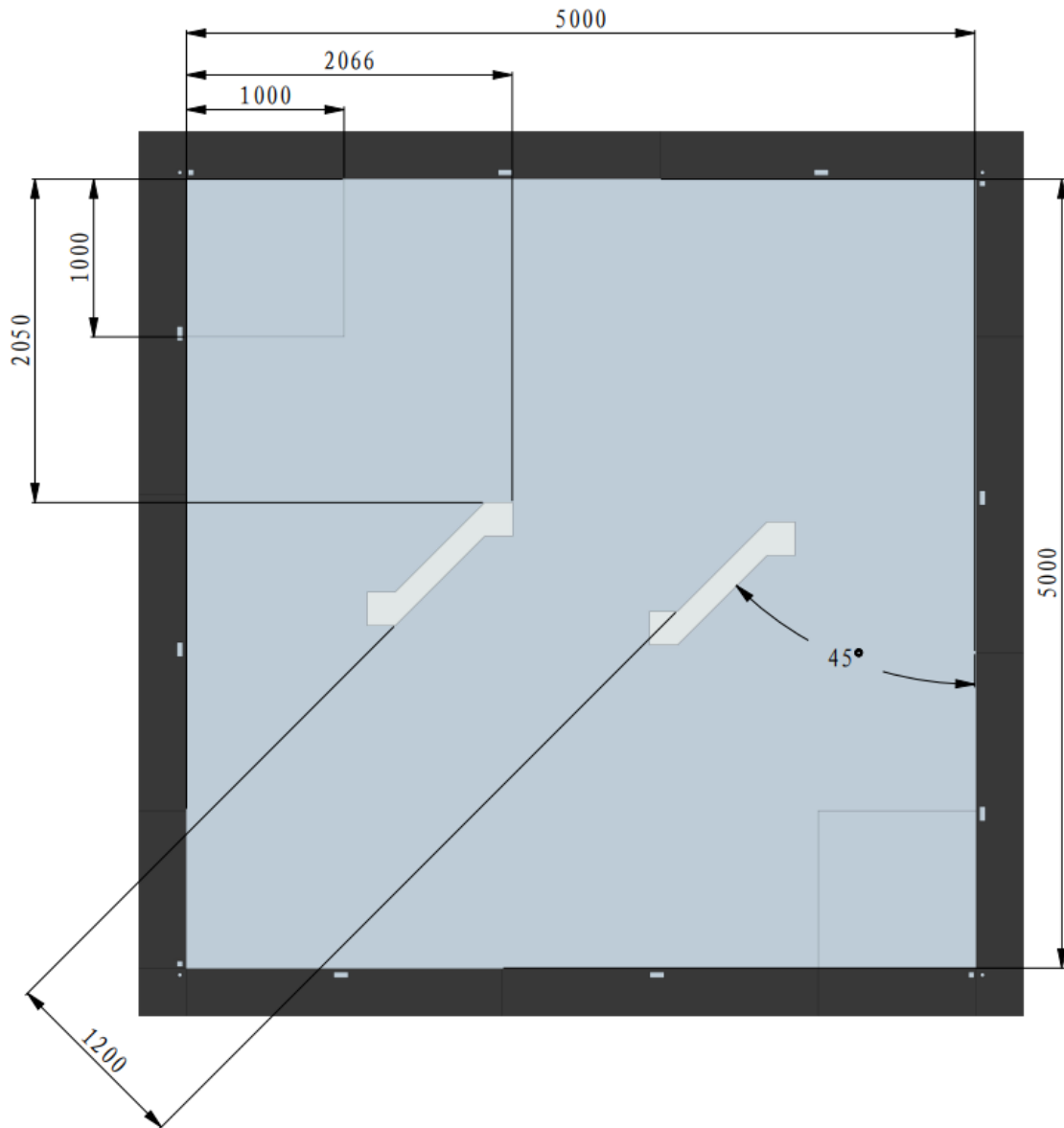


Figure 5-16 Dimensions of Standard Match Wooden Battlefield



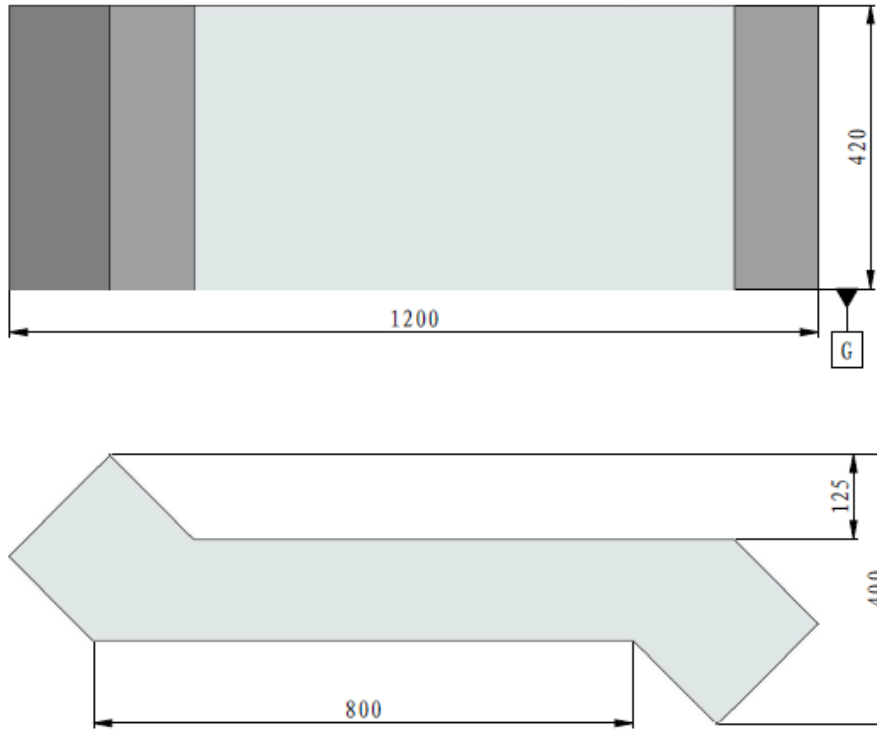


Figure 5-17 Bunker

## 6.2 Competition System and Winning Criteria

The Standard Match consists of two parts: the Group Stage and the Knockout Stage. The competition system of Group Stage is BO2; the system of Knockout Stage is all BO3.

1. One team's robot attacks the Armor Modules of the opponent robot until its HP drops to zero.
2. If neither robot is defeated within the time limit, the team with more remaining HP wins.
3. If neither robot is defeated and both robots have the same HP after the time limit, then the robot with less weight wins.



The weight of the robot is measured at the end of round and does not include the weight of the projectiles in the robot's magazine.

- 
4. If neither fulfills these criteria, the round is considered a draw. A draw in the Knockout Stage leads to an immediate tie-breaker round until a team wins.

# 7. Competition Process

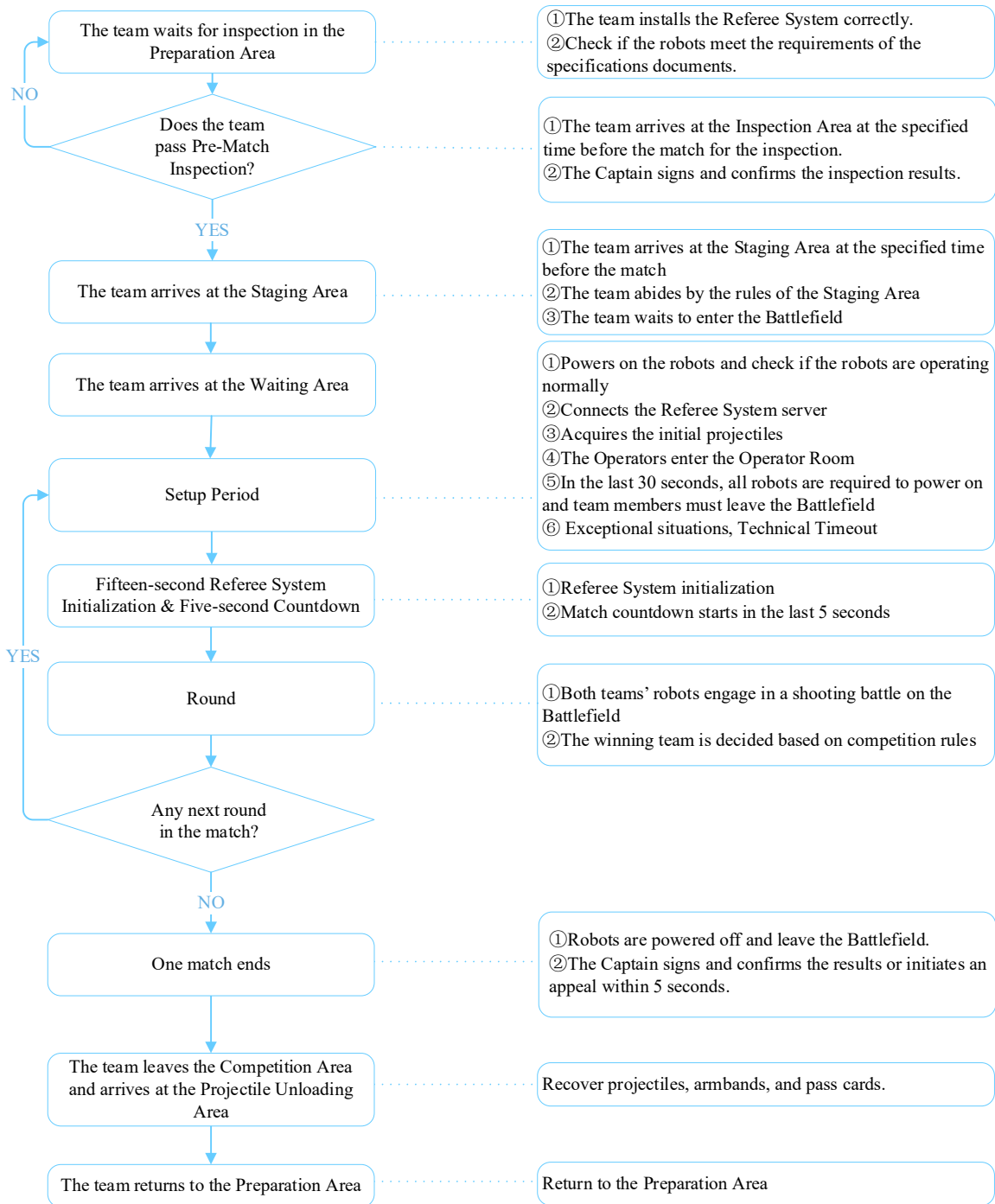


Figure 7-1 Process for A Single Match

## 7.1 Pre-Match Inspection

- The inspection results of the Mock Inspection and Practice Match are for reference only and are not taken into account for the inspection in the actual competition.
- The inspection results during the competition are only valid for the current match.
- Passing of inspection only means that the robot meets the standards at the time of inspection. Teams are required to ensure that their robots fulfill the requirements of the Building Specifications Manual at all times.



In order to make sure that the robots manufactured by participating teams conform to the requirements in [RoboMaster 2024 University Series Robot Building Specifications Manual](#), 3V3 Match and Standard Match teams must arrive at the inspection area 60 and 40 minutes in advance, respectively, for pre-match inspection. The inspection process is as follows:

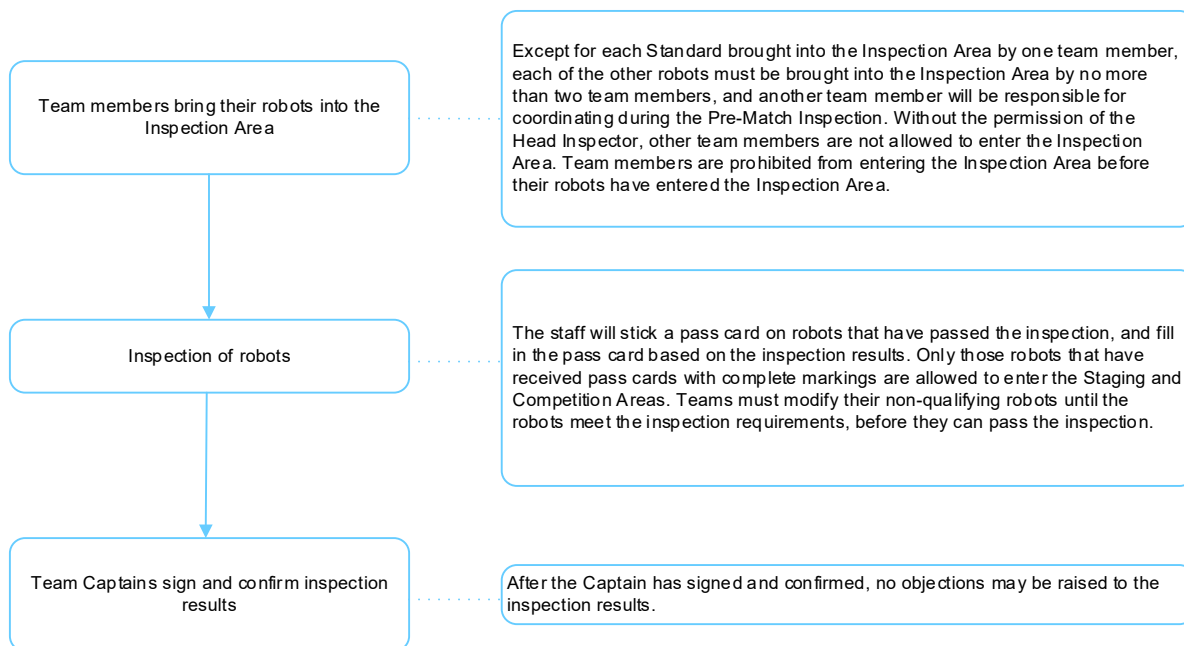


Figure 7-2 Pre-match Inspection Process

The rules regarding backup robots are as follows:

- During each round, each team can carry no more than one backup robot.
- Team members are required to declare the types of backup robots they are carrying during Pre-match Inspection. Backup Hero and Sentry must be attached with armor stickers in the Pre-match Inspection Area. If a backup Standard Robot is needed on the field, a Pit Crew Member must obtain the corresponding armor sticker

---

promptly from the referee. The attachment of armor stickers must follow the requirements stated in the [RoboMaster 2024 University Series Robot Building Specifications Manual](#).

During Mock Inspection, the RMOC will issue Referee Systems to backup robots that have passed Mock Inspection. For all RMUL events, each team can borrow at most one backup robot's Referee Systems.

## 7.2 Staging Area

After the pre-match inspection, the teams should arrive at the Staging Area at least 10 minutes before the start of each round. In a 3V3 Match, each team is allowed to have a maximum of seven Pit Crew Members, which must include one supervisor and up to six regular members (including reloading operators). In a Standard Match, each team is allowed to have a maximum of three Pit Crew Members, which must include one supervisors and up to two regular members. One Pit Crew Member should wear the "Captain" armband and undertake the Captain's role. If any team needs to repair its robots after entering the Staging Area, they must obtain the permission of the referee. A robot may leave the Staging Area for repair only after the staff at the Staging Area have removed the Pass Card on the robot. When repair is finished, the robot needs to be brought back to the Inspection Area for another Pre-Match Inspection before re-entering the Staging Area. If the team is unable to arrive at the Staging Area in time as a result of this delay, the robot will not be able to enter the match, and the team will bear the consequences.



**Captain Armband:** Any Regular Member that wears the 'Captain' armband performs the Captain role during the match. The Captain is responsible for managing and controlling the team's participation in the competition process, confirming results, and requesting for Technical Timeouts, appeals, etc.

---

After leaving the staging area, the participating teams will enter the waiting area of the competition area to place their robots. With the permission of the referee, the next pair of participating teams will wait at the entrance of the Battlefield with their robots for further instructions. The referee will follow the competition process and open the door and lead the team members into the competition area. The countdown for the setup period will begin when the doors are opened.

## 7.3 Setup Period




After the end of the second and fourth round of a BO5 match, both teams have five minutes to debug their robots. When five minutes run out, the setup period of the next round begins.

---

The Setup Period for a 3V3 Match is three minutes, and two minutes for a Standard Match. During the Setup Period, Pit Crew Members should place their robots in their respective Initialization Areas, check whether their Referee Systems are operating normally, and pre-load the robots with projectiles. Pit Crew Members may repair robots or

replace equivalent parts, provided the requirements of the specifications documents are met. Pit Crew Members are required to commission their robots near their team's Robot Initialization Area. Only one Pit Crew Member of each team is allowed to leave the Initialization Area to commission their robots.

---

- Equivalent parts: Standard modules or components having the same material, form and functions, for example motors of the same model and self-built friction wheel modules.
  -  ● If the equivalent part includes the Referee System Module, the participating team must ensure that the Referee System Robot Side Module works properly, including version number, sensor calibration, and Mounting Specifications. When the Referee System Robot Side Module in the equivalent part experiences an abnormality, it will not trigger an Official Technical Timeout.
- 

90 seconds before the Setup Period ends, the operator is advised to enter the Operator Room to complete commissioning for the keyboard and mouse (both can be brought on your own), and double-check whether the robot controls and official equipment are operating properly. If any official equipment does not operate normally, the Pit Crew members must raise the issue before entering the final 15 seconds of the Setup Period. Otherwise, no technical timeout will be allowed by the referee. Except for the Operators of the robots on the Battlefield, the Pit Crew are not allowed in the Operator Room.

When the Setup Period is down to 30 seconds, all robots in the Battlefield must be powered up, robots that are not powered up must be removed from the Battlefield, and the staff in the Battlefield should leave the Competition Area in an orderly manner. After the end of the Setup Period, The Pit Crew must place the Sentry's remote controller in the designated area at the Battlefield entrance.

### **7.3.1 Official Technical Timeout**

During the setup period, if the referee system or equipment inside the operator room malfunctions (for details see the table below), or the robot needs temporary pre-match inspection, the head referee can announce an official technical timeout and pause the setup countdown. The starting time of the Timeout shall be decided by the Head Referee based on the situation.

During an Official Technical Timeout, Pit Crew can only eliminate the relevant faults of the Referee System or other official equipment according to the requirements of the referee, and are not allowed to repair other faults. When the relevant fault of the Referee System or official equipment has been eliminated and the Head Referee has resumed the countdown, Pit Crew Members are required to follow the set procedures for the Setup Period and leave the Battlefield within the specified time.

Table 7-1 Failures

Rules	Description
1	A fault occurs with the official equipment in the operator room, and any key competition component in the Battlefield experiences structural damage or functional irregularity.
2	During the Setup Period of the first round, the modules of the robot client on the Referee System experience faults, such as: damage of the Armor Module, Speed Monitor Module going offline, etc.
3	During the Setup Period, the main controller of the Referee System is unable to connect to the server or a robot cannot transmit images to the Operator Room.
4	Other situations where the head referee deems it necessary to call an Official Technical Timeout.

If the malfunction referred to in Rule 2 occurs during a setup period between rounds or during a round, it will be categorized as “regular battle damage”, as it cannot be determined whether the malfunction was caused by the referee system module, a flaw in the robot’s electrical or structural designs, or the robot combat from previous matches. Regular battle damage will not trigger an Official Technical Timeout. Referees will provide backup Referee System modules. Participating teams may request for a “Team Technical Timeout” to repair their robots.

If the referee determines that the malfunction referred to in Rule 2 and 3 above is caused by the team, the referee will explain the situation and end the Official Technical Timeout.

### 7.3.2 Team Technical Timeout

If the mechanical structure of a robot, a software system, the keyboard or mouse in the Operator Room or other equipment experiences any faults, the team Captain may make a request to the referee in the Battlefield or Operator’s Room for “Team Technical Timeout” only before the 15-second countdown in the Setup Period, and indicate the requested timeout length and reasons for the request. Team Technical Timeout once requested and conveyed to the Head Referee, this Timeout cannot be cancelled or revised.

After the Team Technical Timeout is confirmed by the Head Referee, the Referee will notify both teams at the same time regardless of which team initiated the timeout.

The Head Referee may end the Technical Timeout once they determine that the teams are ready. Even if the participating team does not enter the battlefield or ends the Technical Timeout early, the opportunity consumed is still the opportunity corresponding to the time declared by the participating team when applying.

To ensure that subsequent matches begin on time, only one Team Technical Timeout is allowed in each Setup Period on a first-come-first-served basis. The Technical Timeout usage is recorded in the Match Results Confirmation Form.

During each event, each team has two technical timeout opportunities. A team cannot request for more Team Technical Timeout opportunities once they have been used up.

## **7.4 15-Second Referee System Initialization Period**

After the Setup Period, the match enters a 15-Second Referee System Initialization Period. During the Initialization Period, the competition server will automatically detect the connection status of the player's client, the Referee System module status of the robot, the status of Battlefield Components and reset the HP of all robots, ensuring their HP are full when the match officially begins.

## **7.5 5-Second Countdown**

After the 15-Second Referee System Initialization Period, the match enters a 5-Second Countdown. At this time, the player's client will not respond to control commands from robots (including Custom Controllers). Once the countdown finishes, the keyboard is unlocked and the competition starts.

## **7.6 Competition Round**

During the matches, the robots from both teams in 3V3 Match and Standard Matches engage in a shooting battle on the core Competition Area (the Battlefield).

## **7.7 End of Round**

A round ends either when the full time has elapsed or one team has triggered the conditions for winning. For the winning criteria, please refer to "5.2.7 Competition System and Winning Criteria" and "6.2 Winning Criteria". The match is over when a winner has emerged or all rounds have ended.

## **7.8 Results Confirmation**

During a match, the referee will record on the Match Results Confirmation Form the penalties issued for each round, the key competition data at the end of the match, the winning teams, the use of Technical Timeout opportunities by the teams, and other relevant details.

Within 5 minutes after the end of a match, the Captains of both teams must sign and confirm the match results. If a team Captain does not sign and confirm the results within 5 minutes or has not requested an appeal, it is deemed that the team agrees with the match results.



## 7.9 Projectile Unloading

After a match is over, members from both teams in the 3V3 Match must power off all their robots, remove them from the Battlefield, and proceed to the Projectile Unloading Area to unload their projectiles. At the Projectile Unloading Area, teams must follow the instructions of the staff and return all armbands and pass cards, empty the projectiles in their robots, and return all projectiles used in the competition. Participating teams in the Standard Match should perform the aforementioned unloading operation in the area.

## 8. Violations and Penalties

In order to ensure the fairness of the competition and maintain competition discipline, the participating teams, participants, and participating robots must strictly follow the competition rules. If there is a violation, the referee will give a corresponding penalty for the violation. Some violation penalties issued before the official start of the competition will be enforced after the official start of the competition. Serious violations and all appeals in the competition will be publicized.

Penalty of violation stated in this chapter will be determined by the head referee according to the actual situation. If there is a situation during the competition that affects the fairness of the competition but is not involved in the penalty rules or serious violations, the head referee will make a judgment based on the actual situation.



If a team’s actions have directly caused the other team to commit a violation, the other team shall not be deemed in violation but it must cease its violating behavior immediately.

### 8.1 Penalty System

#### 8.1.1 Forms of Penalties

During a match, the referee may issue penalties against participants and robots that have failed to comply with competition rules. The forms of penalties are as follows.

Table 8-1 Forms of Penalties


Forms of Penalties	Descriptions
<b>Automatic penalties by the Referee System</b>	HP deductions as a result of a robot exceeding its parameter limits or a referee system going offline. The HP deductions mentioned in "4.1 HP Deduction Mechanism", except those caused by attacks, are all automatic penalties by the referee system.
<b>Manual penalties through the Referee System</b>	Penalties issued by the referee through the server against robots for violation of rules.
<b>Manual referee penalties</b>	Used in situations where penalties cannot be issued through the Referee System, for example issuing a verbal warning or disqualifying a team.

#### 8.1.2 Types of penalties

The types of penalties that can be issued during the competition are as shown below:

Table 8-2 Types of Penalties

Types of penalties	Descriptions
Verbal Warning	Verbal alert
Yellow Card	<ul style="list-style-type: none"> <li>● One team receives a Yellow Card:           <ul style="list-style-type: none"> <li>➤ If the offending robot is a Sentry, its chassis will be powered off for 2 seconds while the operating interface of other alive robots will be obstructed for 2 seconds.</li> <li>➤ If the offending robot is not a Sentry, the operating interface for the offending robot is blocked for 5 seconds and those for other robots are blocked for 2 seconds.</li> <li>➤ The Referee System will automatically deduct the offending robot’s HP by 15% of its current Maximum HP, while the remaining alive robots will have their HP deducted by 5% of their current Maximum HP. If the robot receives a Yellow Card again within 30 seconds after it receives a Yellow Card, the percentage of their current Maximum HP deducted will be twice that of the previous deduction for that robot, and 5% for the other alive robots on the team.</li> </ul> <p><b>Example 1: An Standard Robot has a Maximum HP of 200 while the other robots in the team have a Maximum HP of 100. If the offending robot receives one Yellow Card at the 15th, 25th, and 58th second of the competition respectively, the HP deduction caused by each of the Yellow Cards should be as follows: The offending robot’s HP is deducted by 30, 60, and 30 respectively. The deducted HP for the other robots are 5, 5, and 5.</b></p> <p><b>Example 2: An Standard Robot has a Maximum HP of 200 while the other robots in the team have a Maximum HP of 100. If the offending robot receives one Yellow Card at the 15th, 25th, and 50th second of the competition respectively, the HP deduction caused by each of the Yellow Cards should be as follows: The offending robot’s HP is deducted by 30, 60, and 120 respectively. The deducted HP for the other robots are 5, 5 and 5.</b></p> <li>➤ In each round, a robot that has been issued a cumulative four Yellow Card Warnings will receive a Red Card Warning.</li> </li></ul> <li>● Both teams receive a Yellow Card:       <p>The interface of all operators is blocked for 2 seconds and the HP of all robots is deducted by 5% of their maximum HP, without taking into account the cumulative number of yellow cards received by one robot.</p> </li>

Types of penalties	Descriptions
	<ul style="list-style-type: none"> <li>● If multiple Yellow Cards are received successively, the blockage time for the operation interface will add up accordingly.</li> </ul>  <ul style="list-style-type: none"> <li>● If a robot's remaining HP is less than or equal to that needs to be deducted from penalty, this robot's HP reduces to 1.</li> </ul>
<p><b>Red Card (Ejection)</b></p>	<ul style="list-style-type: none"> <li>● Ejecting a robot           <ul style="list-style-type: none"> <li>➢ If a robot is ejected before entering the 15-Second Referee System Initialization Period, the offending robot will not be allowed to enter and must be removed from the Battlefield, nor can it be replaced by other robots in any round of the current match.</li> <li>➢ If a robot is ejected during the 15-Second Referee System Initialization Period, the Red Card Warning should be issued after the competition starts.</li> <li>➢ If a robot is ejected during the competition, the robot's HP will turn zero and the transmitted images will become monochrome.</li> </ul> </li> <li>● Ejection of Pit Crew Members: Pit Crew members ejected by a referee must leave the Competition Area immediately and cannot be replaced by other Pit Crew Members for all rounds in the current match. All robots controlled by an ejected Operator shall also be ejected for the current round, and will not be allowed to join the Battlefield nor can they be replaced by other robots for all rounds in the current match.</li> </ul>
<p><b>Forfeiture</b></p>	<ul style="list-style-type: none"> <li>● If a Forfeiture is issued for a round (hereinafter referred to as "Round Forfeiture"), the following rules shall apply.           <p><b>3V3 Match:</b></p> <ul style="list-style-type: none"> <li>➢ If a Forfeiture is issued before the five-minute round (including the setup period and referee system initialization period), the offending team's base and Sentry HP will become 0, and the HP of its other robots will be full. The opposing team's base HP and robots' HP will be full.</li> <li>➢ If a Forfeiture is issued during the five-minute round, the round will end immediately. The offending team's base and Sentry's HP will become zero, and the team's other robots maintain their HP level at the end of the round. The HP of the opposing team's base and robots will remain at the level when the round ended.</li> <li>➢ If a Forfeiture is issued after the five-minute round, the offending team's base and Sentry's HP will become zero, and the team's other robots maintain their HP level at</li> </ul> </li> </ul>

Types of penalties	Descriptions
	<p>the end of the round. The HP of the opposing team's base and robots will remain at the level when the round ended.</p> <p><b>Standard Match:</b></p> <ul style="list-style-type: none"> <li>➤ If a Forfeiture is issued before the two-minute round (including the setup period and referee system initialization period), the HP of the offending team's robot will become zero, and the HP of the other team's robots will be full.</li> <li>➤ When a Forfeiture is issued during the two-minute match, this round of the match ends immediately. The HP of both teams' robots will be recorded as it is when the round ends.</li> <li>➤ When a Forfeiture is issued after the two-minute match, the HP of both teams' robots will be recorded as it is when the round ends.</li> </ul> <ul style="list-style-type: none"> <li>● If a Forfeiture is issued in a match (hereinafter referred to as “Match Forfeiture”), it applies to all rounds in the match, and the HP for each round should be calculated according to the above descriptions.</li> </ul>
<p><b>Exclusion from Awards</b></p>	<ul style="list-style-type: none"> <li>● Participants are excluded from awards.</li> <li>● Participating teams are excluded from awards.</li> </ul>
<p><b>Disqualification</b></p>	<ul style="list-style-type: none"> <li>● The team member is disqualified from the current competition season.</li> <li>● The team is disqualified from the current season, but its results in the season will be maintained as a basis for other teams' advancement.</li> </ul>

## 8.2 Penalty Rules

This chapter specifies the penalty rules. The R# rules clearly indicate the rules that participating teams, participants and robots must follow.

### 8.2.1 Staff

#### 8.2.1.1 General Rules

R1 Participating teams are required to meet the requirements listed in [RoboMaster 2024 University League Participant Manual](#).

Violation penalty: The highest penalty that can be imposed on the offending team is disqualification.

R2 Participants and their actions must not interfere with the normal operation of the Official Equipment, competition processes, and the normal work of the RMOC personnel.

Violation penalty: The highest penalty that can be imposed on the offending team is disqualification.

R3 Teams must not set up their own wireless networks or communicate with team members using walkie-talkies in the relevant competition areas (including but not limited the Preparation Area, Inspection Area, Staging Area and Competition Area).

Violation penalty: The highest penalty that can be imposed on the offending team is disqualification.

R4 Teams must not damage any official equipment (including but not limited to equipment in the Competition Area, Staging Area, Preparation Area and Inspection Area).

Violation penalty: The highest penalty that can be imposed on the offending team is disqualification and compensation as per the price.

R5 Apart from Pit Crew Members who have entered the Staging Area and Competition Area due to match-related reasons, no participants are allowed inside either area without special reasons.

Violation penalty: The offending team member may be disqualified as the maximum penalty.

R6 Any Pit Crew member who has entered the Staging Area and Competition Area for competition needs may not leave either area or be replaced by another Pit Crew member without the permission of the referee.

Violation penalty: Offenders are not allowed to enter the staging area and competition area. The highest penalty that can be imposed is disqualification from the competition.

R7 Except for the projectiles preloaded in the Inspection Area, participating teams are not allowed to bring the projectiles to be used in the competition into the Staging Area or Competition Area.

Violation penalty: Confiscation of projectiles and Verbal Warning. If the Verbal Warning is ineffective, the offender may be disqualified as the maximum penalty.

R8 After a match is over, the Pit Crew must power off all their robots, remove them from the competition area and empty all projectiles inside the robots at the projectile unloading area.

Violation penalty: The offending robot will be detained in the Projectile Unloading Area, until its projectiles are cleared.

R9 After a match ends, Pit Crew must return all projectiles used in the competition to the Projectile Unloading Area.

Violation penalty: Confiscation of projectiles and disqualification of the offender from subsequent matches in the current division. The highest penalty that can be imposed on the offender is disqualification.

R10 Except for emergency situations, teams must be present at the Inspection Area before the start of each match for Pre-match Inspection. The team must stand by at the Staging Area 10 minutes before each match.

Violation penalty: The maximum penalty is a Match Forfeiture.

R11 Without the permission of the referee, a team may not power on and commission or repair a robot in areas outside the Battlefield from the time the robot passes an Inspection to the end of a match.

Violation penalty: The maximum penalty is a Match Forfeiture.

R12 The identities and number of personnel of each team entering designated areas such as the Preparation, Inspection, Staging, and Competition Areas must meet the relevant requirements.

Violation penalty: The highest penalty that can be imposed on the offending team is disqualification.

R13 One member of a Pit Crew must wear the “Captain” armband which must not be covered.

Violation penalty: The highest penalty that can be imposed on the offender is disqualification.

R14 Without the permission of the referee, Pit Crew Members entering the Battlefield must not communicate with anyone from the outside.

Violation penalty: Verbal Warning. If the verbal warning is ineffective, the offender may be disqualified as the maximum penalty.

R15 Pit Crew Members are not allowed to power their equipment using the power supply for official equipment in the Competition Area. However, they may bring their own power supply.

Violation penalty: Verbal warning will be given; and if it does not work, the offender will be issued a Red Card. The highest penalty that can be imposed on the offending team is disqualification.

R16 Except for special circumstances, Pit Crews are prohibited from wearing slippers into the Competition Area.

Violation penalty: The highest penalty that can be imposed on the offender is a Red Card.

### **8.2.1.2 Battlefield Specifications**

R17 Participants must wear protective goggles when inside the Battlefield.

Violation penalty: The offender is barred from the battlefield.

R18 During an Official Technical Timeout, Pit Crew Members are not allowed to fix faults other than those in modules related to the Referee System.

Violation penalty: Verbal Warning. If the Verbal Warning is ineffective, the offender shall be issued a Red Card.

R19 After the end of the Setup Period, Pit Crew Members must return to the designated area outside the Battlefield. During the competition, Pit Crew Members are not allowed to leave the area without the permission of the referee.

Violation penalty: Verbal Warning. If the Verbal Warning is ineffective, the offender shall be issued a Red Card.

R20 After the end of the Setup Period, the Pit Crew must place the Commissioning Remote Controller for the Sentry Robot at the entrance of the Battlefield. The Remote Controller cannot be used to commission the Sentry Robot once the Five-Second Countdown has started.

Violation penalty: If it is before the five-minute round, a Verbal Warning will be issued. If the Verbal Warning is ineffective, a red card will be issued against the offending robot; if it is during the five-minute round, a red card shall be issued against the offending robot.

R21 After the Five-Second Countdown, the Pit Crew must not operate remote controllers located outside the Operator Room that correspond to deployed robots.

Violation penalty: A Red Card shall be issued against the offending robot, with the highest penalty being a Round Forfeiture.

R22 Pit crew members must ensure their robots are operating safely and will not cause harm to any person or equipment in the Competition Area.

Violation penalty: The offending team must bear the relevant responsibility.

R23 During the competition, a reloading operator can only refill projectiles using the official Projectile Reloader and is not permitted to touch a robot by any other means.

Violation penalty: Verbal Warning. If the warning is ineffective, the offender shall be issued a Red Card.

R24 During the competition, a projectile reloader must wear a long-sleeved top and goggles when reloading projectiles for a robot, and can only do so by standing outside the perimeter wall of the Battlefield.

Violation penalty: Forbidden from reloading projectiles for robots. Any violation will result in the offender being issued a red card warning.

### **8.2.1.3 Operator Room Requirements**

R25 Except for the Operators of the robots on the Battlefield, the Pit Crew are not allowed in the Operator Room.

Violation penalty: Verbal Warning. If the Verbal Warning is ineffective, the offender shall be issued a Red Card.



R26 Operators must remain in the relevant Operator Room during the 15-Second Referee System Initialization Period and the Five-Minute Round to operate the relevant control equipment, wear the corresponding headphones, and must remain in their location after the Setup Period, unless otherwise permitted by the referee.

Violation penalty: Verbal Warning. If the Verbal Warning is ineffective, the offender shall be issued a Red Card.

R27 During the competition, each operator is equipped with at most one remote controller and one custom controller.

Violation penalty: Verbal Warning. If the Verbal Warning is ineffective, the offender shall be issued a Red Card.

R28 Operators are not allowed to use their own headphones or computers in the Operator Room.

Violation penalty: Verbal Warning. If the verbal warning is ineffective, the team shall be issued a Round Forfeiture.

## 8.2.2 Robots

R29 Robots and Custom Controllers to be deployed in a match must pass a Pre-Match Inspection.

Violation penalty: Round Forfeiture.

R30 In the first round of a match, the robots must meet the minimum battle team lineup.

Violation penalty: Match Forfeiture.

R31 Robots must meet the requirements in [RoboMaster 2024 University Series Robot Building Specifications Manual](#).

Violation penalty: The highest penalty that can be imposed on the offending team is disqualification.



- The RMOC will conduct random checks on robots.
  - Any report made against a robot for not complying with the robot building specifications manual must be supported by the relevant evidence.
- 

R32 Before the 15-Second Referee System Initialization Period, robots must be attached with armor stickers that meet the requirements in the specifications documents.

Violation penalty: Verbal Warning. If the Verbal Warning is ineffective, the offending robot will be issued a Red Card.

R33 When waiting in the Staging Area, team members are not allowed to bring robots out of the Staging Area without permission.

Violation penalty: Verbal Warning. If the warning is ineffective, the offenders and robots will be issued a red card, with the highest penalty being disqualification from the competition.

R34 Robots must not carry or present safety issues including but not limited to short circuits, crashing, creating fumes or lighting flames, and falling to the ground. If a safety issue is present or has arisen, team members must execute the relevant operations in accordance with the referee's instructions.

Violation penalty: If it happens before the start of a match, the Pit Crew need to resolve the safety issue as required by the referee, otherwise the offending robot will not be allowed to appear on the Battlefield. If it is during the competition, a Verbal Warning shall be issued. If the Verbal Warning is ineffective, a Red Card shall be issued against the offender or the offending robot. Any incident involving serious safety hazards must be handled by the head referee in accordance with "9 Irregularities".

R35 Robots are not allowed to launch projectiles off the battlefield.

Violation penalty: Verbal Warning. If the Verbal Warning is ineffective, the offending robot will be issued a Red Card.

R36 During the Setup Period and the 15-Second Referee System Initialization Period, robots in the Battlefield are not allowed to leave their corresponding initialization zones.

Violation penalty: The offending robot can be issued a Red Card as the maximum penalty.

R37 If any projectile needs to be launched during the setup period, it must be launched into the projectile clearance bag offered by the referee.

Violation penalty: The offender and the offending robot can be issued a red card as the maximum penalty.

R38 During the competition, the robot is not allowed to disintegrate into sub-robots or sub-systems connected by multiple flexible cables, and must not cast or launch their own parts.

Violation penalty: The offending robot will be issued a Red Card.

R39 During the competition, alive robots are not allowed to block any of its Armor Modules with its body or transform beyond its maximum expansion size.

Violation penalty: Warnings shall be issued against the offending team as judged based on their subjective intention. If the blocking was intentional, a Yellow Card will be issued along with a Verbal Warning. If the Verbal Warning is ineffective, a Red Card shall be issued. If the blocking was passive in nature, the offender will be issued a Yellow Card.

R40 During the setup period, the replacement modules and parts used on robots must meet the requirements for "equivalent parts" as stated in "7.3 Setup Period".

Violation penalty: The offending robot can be issued a Red Card as the maximum penalty.

R41 Standard Robots to be fitted with a balancing chassis must meet the definition of a Balancing Standard Robot while they are alive. This does not apply to Standard Robot when not alive.



- In the Supplier Zone, a Balancing Standard Robot is not required to meet the definition of a Balancing Standard Robot.
- If the Balancing Standard Robot has an abnormal posture and obviously does not have the ability to move autonomously, it will not be considered a violation. The matter of fact will be determined by the Head Referee.

Violation penalty: Warnings should be issued against the offending robot based on the length of the violation. If it exceeds 3 seconds, a first Yellow Card is issued. Thereafter, each 10 seconds will incur a further Yellow Card. This carries on until the robot is not alive.

R42 During the Standard Match, the vertical projection of the vertical axis of a Balancing Standard Robot's launching mechanism must intersect with the vertical projection of its Armor Module, except only when the robot is in a rotating or reciprocating rotating motion at a uniform speed. However, when in reciprocating rotation, the vertical projection of the central axis of the robot's reciprocating motion must overlap with that of its X-axis. The robot will still be considered as moving at uniform speed despite any temporary speed variation caused by acceleration or deceleration of the motor when the robot changes the direction during its reciprocating motion.

Violation penalty: For a violation, the offending robot will be issued a Yellow Card and a Verbal Warning; if the Verbal Warning is ineffective, a Yellow Card will be issued every three seconds until the robot is not alive.

## 8.2.3 Interactions

### 8.2.3.1 Interaction between Robots

R43 A robot may not use any of its body structures to strike an opponent robot in collision. If a defeated robot is blocking a key path, the robot can be slowly pushed away.



- In any collision between robots, the offending robot will be deemed by the referee as the initiator.

Violation penalty: Warnings shall be issued against the offending robot judged based on their subjective intention and the degree of collision.

Table 8-3 Collision Violation Penalty Standard

Violation level	Descriptions
Yellow Card	● Actively causing frontal and high-speed collision

Violation level	Descriptions
	<ul style="list-style-type: none"> <li>● Active pushing that causes the other team’s robot to move noticeably</li> <li>● Active pushing that impedes the normal movement of the other team’s robot</li> </ul>
<b>Red Card</b>	<ul style="list-style-type: none"> <li>● Actively causing high-speed, repeated and intense frontal collision</li> <li>● Active pushing that causes the other team’s robot to move for a longer distance</li> <li>● Active pushing that seriously impedes the normal movement of the other team’s robot</li> </ul>

R44 A robot must not get stuck together with any other robot due to active interference, blocking or collision.

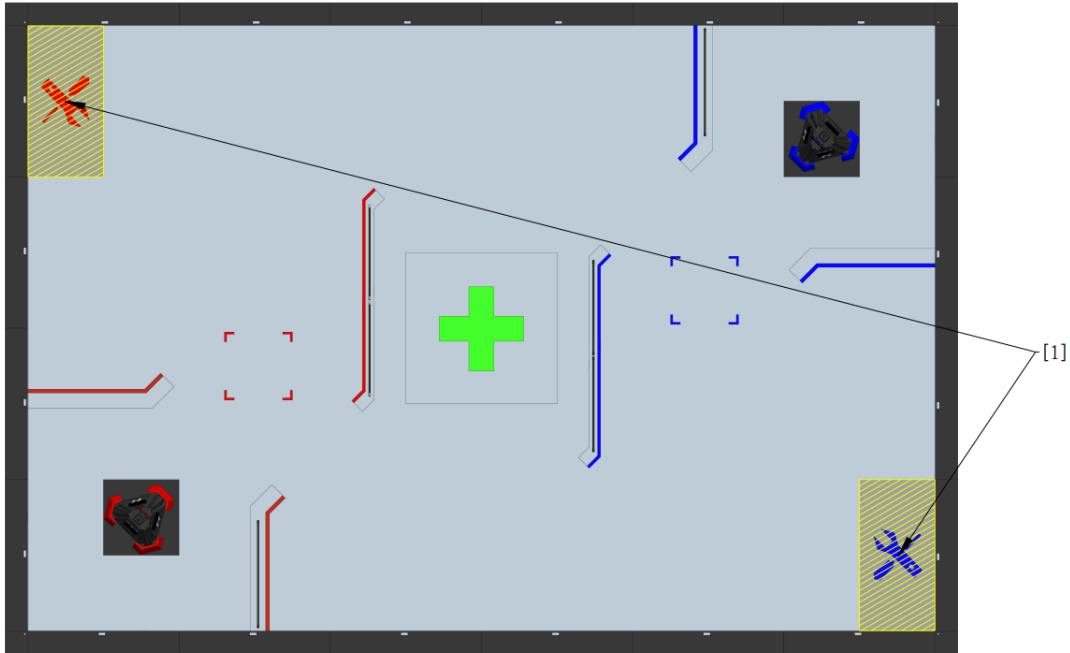
Violation penalty: Counting from when an entanglement is determined, warnings should be issued against the offending robot based on the length of the violation. If it exceeds 10 seconds, a first Yellow Card will be issued. Thereafter, each 20 seconds will incur a further Yellow Card. This should carry on until the offending robot is ejected. Regardless of whether the offending robot is alive, if the violation goes on for longer than 90 seconds, the offending team may be issued a Round Forfeiture, as judged based on their subjective intention.

R45 A robot must not use any means of contact to interrupt any opponent robot’s regular reloading or HP restoration.

Violation penalty: The offending robot will be issued a Yellow Card.

### **8.2.3.2 Interaction between Robots and Battlefield Components**

To ensure the fairness of the competition and that robots in the Battlefield are able to receive buffs and reloads effectively, Supplier Penalty Zones have been set up in the Battlefield where the robots of one or both teams are forbidden from entering, as shown below. The Supplier Zone of one team is the Supplier Penalty Zone for the other.



[1] Supplier Penalty Zone

Figure 8-1 Battlefield Penalty Zone

R46 Robots are not allowed to enter the Supplier Penalty Zone.

Violation penalty: Warnings shall be issued against the offending team based on how long the robot remained in the Penalty Zone and the impact of the violation. If it exceeds 3 seconds, a first Yellow Card is issued. Thereafter, each 10 seconds will incur a further Yellow Card. This carries on until the robot is not alive. An offending robot that causes serious damage to an opponent robot by remaining in a Penalty Zone will be issued a Red Card.

R47 During the competition, robots may only use projectiles supplied by the RMOc.

Violation penalty: The highest penalty that can be imposed on the offending team is disqualification.

R48 During the competition, robots are not allowed to destroy nor affect the normal function of the Battlefield Components.

Violation penalty: The maximum penalty is a Match Forfeiture.

## 8.3 Serious Violations

The following actions are considered serious violations of rules. The highest penalty the RMOc may impose on an offending team for serious violations is disqualification. In the event of any violation against local laws and

regulations, the RMOC will fully cooperate with the relevant authorities in pursuing appropriate legal action against the offender.

Table 8-4 Categories of Serious Violations

Rules	Type
1.	Malicious destruction of the Battlefield, Battlefield Components, other Official Equipment, or the robots or equipment of other teams
2.	Falsification, assumption of a false identity, or any other behavior determined as cheating.
3.	Tampering with or damaging the Referee System, or interfering with any detecting function of the Referee System through technical means.
4.	Circumstances that violate the specifications documents and determined by the Chief Referee as a serious violation.
5.	Disobedience over penalties, refusal to cooperate, deliberate delay, disrupting the competition, forfeiting without valid reasons, boycotting, or other behavior that hinders the competition.
6.	Match throwing or manipulation
7.	Providing property to others or illegally soliciting or accepting property from others for the purpose of obtaining an unjust competition outcome or improper benefits.
8.	Uncivilized and immoral conduct involving defamation, verbal abuse, rude gestures, malicious heckling, or malicious throwing of objects.
9.	Publishing, spreading or disseminating to the media false or irresponsible remarks.
10.	Deliberately attacking or colliding with others in a manner that endangers themselves or others.
11.	Carrying hazardous items or contrabands.
12.	Other behavior that violates the spirit of the competition and deemed a serious violation.
13.	Other conduct that violates core socialist values, sports ethics, public order and norms, the culture and discipline of the competition, laws and regulations, or that causes an adverse impact on society.

## 9. Irregularities

---



There will be a certain delay in the referee's manual penalties and handling of abnormal situations. If it has a major impact on the result of the competition, the Chief Referee will determine the final processing result according to the actual situation.

---

If any of the following anomalies occur during the competition, it shall be handled according to the corresponding process, to which both teams cannot object. The handling process is as follows:

- When a serious safety hazard or irregularity has occurred, such as: a battery explosion, Aerial breaking an Aerial Safety Rope, stadium power outage, explosion of a compressed gas cylinder, or interpersonal conflict, the Head Referee will notify both teams' operators after discovering and confirming the emergency, and eject all robots through the Referee System. The result of the round will be invalidated. The round will restart after the safety hazard or exception has been eliminated. While handling an irregular situation, the RMOC will prioritize safety issues and any consequences arising from the handling process shall be borne by the participating teams.
- If non-key Battlefield Components are damaged during a match (damage to the PVC Flooring, the light effects on the site or the base), which do not affect the fairness of the match, the match will proceed as usual.
- The competition will carry on despite any anomaly with a robot's armor light effects or light indicator effects or any damage to an Armor Module Sticker.
- If key Battlefield Components experience logical or structural faults, for example, where the network connections are disrupted causing a robot to go offline or a Battlefield Component does not operate normally, the referee will solve the problem manually through the Referee System. If the failure cannot be dealt with manually, the referee will notify the operators of both sides and eject all robots at the same time. The competition will end immediately, and the result of the competition will be invalid. When problems are solved, there will be a replay.
- During a match, if there is structural damage or malfunction of key Battlefield Components that affects the fairness of the match and the Head Referee did not confirm and end the game in time, leading to a situation where a game that should have ended continues and has a winner, the results for the round shall be invalidated once the Chief Referee has made a determination to that effect within five minutes after the end of the round, and a rematch shall be held.
- In the case of a serious violation that would clearly have triggered a penalty of forfeiture, and the Head Referee did not confirm and execute it in time, the results for the round shall be invalidated once the Head Referee has made a determination to that effect within five minutes after the end of the round, and the offending team will be issued a forfeiture.

- During the competition, if any situation has occurred that may affect the fairness of the competition, the Chief Referee shall notify the Captains of both teams of the situation and suspend the results confirmation process within five minutes after the end of the match, and shall make a determination within 60 minutes and notify both Captains of the final course of action. The handling outcome is final and cannot be challenged by both teams.



## 10. Appeal

Each team has one opportunity to appeal in each event of each division during the RMUL 2024. Such opportunities cannot be accumulated. If an appeal is successful, the team involved retains its right to appeal again in future matches. If it is unsuccessful, the team will have exhausted its one opportunity to appeal. When a team has exhausted its opportunity to appeal, the Arbitration Commission will no longer accept any appeal from the team. After the appeal is accepted, the Arbitration Commission will deliberate on the appeal materials and relevant evidence. On behalf of the Arbitration Commission, the Chief Referee will then communicate and confirm the appeal decision. The Arbitration Commission reserves the final right of interpretation with regard to its appeal decisions.

The following situations do not constitute a basis for appeal:

- Verbal Warnings and Yellow and Red Cards issued as penalties for violations.
- The types and processes of Technical Timeouts initiated.
- “Regular battle damage” occurred at the Referee System Robot Side.

No appeal is allowed five minutes after a Match Results Confirmation Form has been signed or a match has ended.

# 10.1 Appeal Process

Teams filing an appeal need to follow the procedures as shown below:



Figure 10-1 Appeal Process

---

## 10.2 Appeal Materials

The appeal materials submitted by the participating teams cannot exceed 500 MB in size for each file. The number of files cannot exceed 10.

## 10.3 Appeal Decision

Appeal decisions include: maintaining the original match results, a forfeiture against the respondent, and rematch between both teams. Teams may not appeal against the decision made by the Arbitration Commission.

---



- Appeal successful: forfeiture against the respondent or rematch between both teams
  - Appeal failed: maintaining the original match results
- 

If the communicated appeal decision is a rematch between both teams, but neither team is willing to accept a rematch, the appeal shall be deemed as failed and the original match results will be maintained.

---



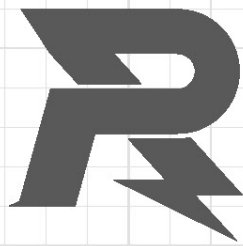
- Provided it does not affect the schedule of the entire competition, the rematch will in principle be held on the same day after all the other matches, depending on the actual situation.
  - The flow of the rematch shall be the same as the regular matches. Both teams are required to compete according to the time stipulated by the RMOC and the relevant rules.
-

# Appendix References

This chapter contains relevant reference materials for RMUL.

Appendix Table 1 Overview of Reference Materials

Category	Download Links and Documents List
<p><b>Specifications Manuals</b></p>	<p>Download address:  <a href="https://www.robomaster.com/en-US/resource/pages/announcement/1658">https://www.robomaster.com/en-US/resource/pages/announcement/1658</a></p> <ul style="list-style-type: none"> <li>● Rules Manual</li> <li>● Participant Manual</li> <li>● Robot Building Specifications Manual</li> </ul>
<p><b>Referee System related</b></p>	<p>Download address:  <a href="https://www.robomaster.com/en-US/products/components/referee">https://www.robomaster.com/en-US/products/components/referee</a></p> <ul style="list-style-type: none"> <li>● RoboMaster Referee System User Manual</li> <li>● Referee System Serial Port Protocol Appendix</li> <li>● User Manuals of Referee System Modules</li> <li>● FAQ</li> </ul>
<p><b>RoboMaster Champion related</b></p>	<p>Download address:  <a href="https://www.robomaster.com/en-US/products/components/referee?djifrom=nav">https://www.robomaster.com/en-US/products/components/referee?djifrom=nav</a></p> <ul style="list-style-type: none"> <li>● Player’s Client Interface Instructions</li> <li>● Referee’s Client Interface Instructions</li> </ul>



**E-mail:** [robomaster@dji.com](mailto:robomaster@dji.com)

**Forum:** [bbs.robomaster.com](http://bbs.robomaster.com)

**Website:** [www.robomaster.com](http://www.robomaster.com)

**Tel:** +86 (0)755 36383255 (GTC+8, 10:30AM-7:30PM, Monday to Friday)

**Address:** T2, 22F, DJI Sky City, No. 55 Xianyuan Road, Nanshan District, Shenzhen, China