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# Macro-Sumo Autonomous Robot Competition Rules

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## History

2013-03-05 Digitalization of the rules of the 23rd All Japan Robot Sumo Tournament  
2013-05-16 First adaptation of the international rules. Version 1.0

## Abstract

The Macro-Sumo robot category of the *Olimpiada Robótica A+D* of the UPB University is a competition in which two robots face each other in combat, recreating a fight between two Sumo wrestlers, in which, by using skills like strength, speed and dexterity, both of the contestants must find a way to push out his opponent from the match ring. The match ring, called *dohyo* is defined by a black circle, and delimited by a white line. The winner of a match is whoever that earns two *yuko* points in a maximum of three combats.

## Chapter 1 General Rules

*Article 1:* This document defines the rules and regulations of Macro-Sumo Robot Competition Rules, valid for the *Olimpiada Robótica A+D*.

## Chapter 2 Definition of a Match

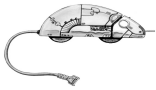
*Article 2:* Definition of contestants and robots.

**A single operator and three assistants can be registered.** However, the assistants are not allowed to operate the robot. Every contestant is required to follow the competition rules, definition of winning (defined below), control and compete using **own made autonomous robots** at the pre-allocated dohyo (match ring) area. The winner will be determined by the judges.

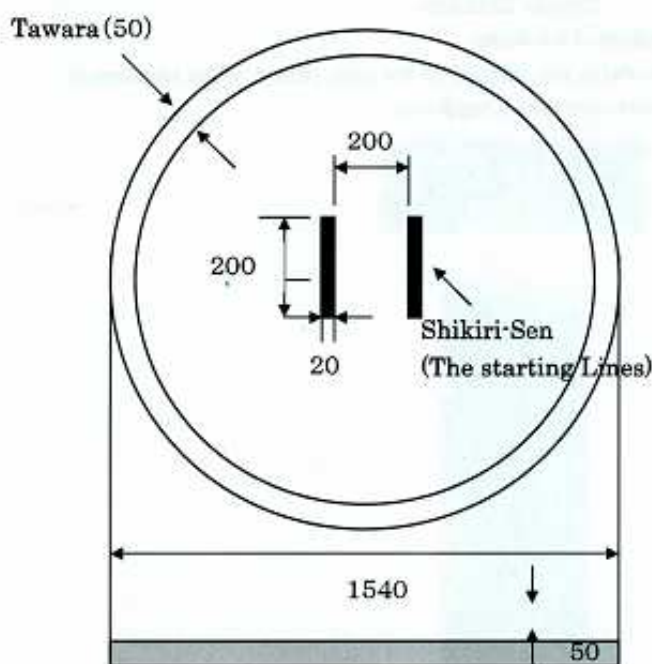
## Chapter 3 Specifications of dohyo jyonai (the Match Ring Area)

*Article 3:* Definition of dohyo jyonai (the match ring area) (Figure 1)

1. Dohyo jyonai (The match ring area) consists of dohyo (the match ring) and yochi (the outer layer area of dohyo (the ring)). The rest of the space will be deemed as area dohyo jyogai (outside dohyo (the match ring) area).
2. The specification of dohyo (the match ring). Dohyo (The match ring) consist of a 154 cm diameter Cold-rolled steel sheet, with a thickness of 16 gauges (1.5 mm approximately), mounted on a structure of the same diameter and with 5 cm height.
3. Sikiri-Sen (The starting lines). Sikiri-Sen (The starting lines) are indicated as two brown lines with a width of 2 cm and a length of 20 cm. Each line is located 10 cm from the center of dohyo (the match ring).



4. Tawara (The dividing line). Tawara (The dividing line) is the 5cm white area outside dohyo (the match ring). Tawara (The dividing zone)/white area is considered as within dohyo (the match ring).
5. Yochi. Yochi is the 100cm area from the outer layer of dohyo (the match ring). However, the color of yochi should be other than in white and configuration and materials can be chosen freely in the extent that doesn't detract mind of this regulation.
6. Illumination conditions may be variable. Robots must be able to be unaffected to this.



- Diameter: 1540 mm
- Material: Cold-rolled Steel, 16 gauges of thickness
- Colors:
  - Dohyo area – black
  - Shikiri-Sen – Brown
  - Tawara - White

Figure 1. Specifications of the match ring (dohyo)

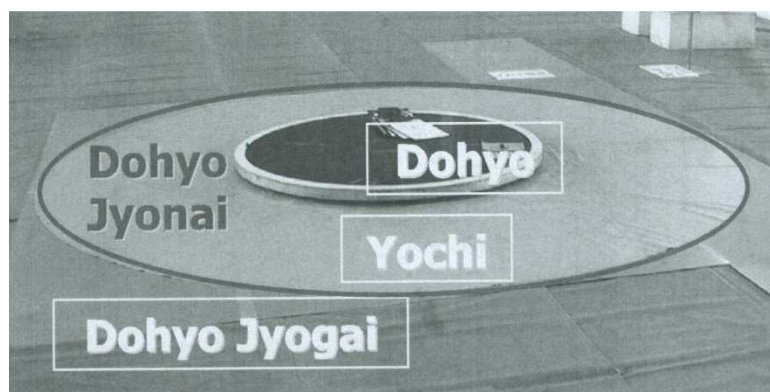
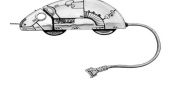


Figure 2. Example set-up of a competition area.



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## Chapter 4 Specifications of the Robot

*Article 4:* The specifications of the robot are stated as below:

1. The specification of the robot.
  - The robot should be 20cm width and 20cm depth (no restriction on the height), and stored in a cubicle box for inspection purpose.
2. The weight of the robot.
  - Less than 3kg.
3. The robot must be completely autonomous, and must not rely on devices external to the dohyo (the match ring) except the "remote terminate function" (Article 4 item 5).
4. Movement start condition.
  - The match will begin five seconds after the operating switch has been turned on. The robot cannot move within that time.
5. Movement termination condition.
  - As a safety measurement, "remote terminate function" has to be built in. In addition, the remote terminate function should be activated only via the remote control.
6. The conditions of usage of blades.
  - Components that maybe dispersed off from the robot body when gets in contact with other robots or during the movement are prohibited.
7. The measures of fire prevention.
  - To prevent the over-current to the battery, be equipped with fuse or poly-switch, or the blocking by the circuit.

*Article 5:* Movements of robots.

The movements of the robot should be designed to detect the movements of the opponent and respond/attack accordingly. If its movement is suspicious, operation check maybe made by indication of the judges.

- The check is carried out as the condition that a match terminates without program modification.

*Article 6:* The usage conditions of "remote terminating function" of robots.

During the match, the remote control of the remote terminating function should be placed in pre-allocated station, and shall not be used until the judges allow it.



*Article 7: Prohibited items in design and manufacturing of the robots*

1. Any components that may affect the operation of opponents such as flash and IR jammers, are prohibited.
2. Any components that may scratch or cause any damages on the surface of dohyo (the match ring) are prohibited.
3. Liquids, powder or gases are prohibited to be used as weapons or attack mechanisms against the opponent.
4. Inflammable components should not be installed in the robots.
5. The robot must not include fully detachable parts or throwing devices.
6. The robot must not include any parts that fix the robot to dohyo (the match ring) surface and prevents it from moving (such as suckers, glue and so on). Magnets are allowed as devices to increase down force, as long as it's proven that the robot can move by itself.

## **Chapter 5 Game Principles**

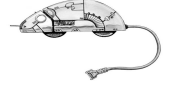
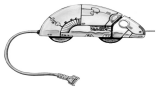
*Article 8: Game principles*

1. In principle, the match time is based on three combats in three minutes. Team who get two yuko points (effective points) within the match time will be the winner.
2. If only one single yuko point has been got by the end of the match time, the team that has got the yuko point will be the winner of the match.
3. Within the match time, if neither of the team wins any combats, the winner will be decided according to chapter 15 - Yusei. If yusei cannot be decided, or the number of winning combats is the same for both teams, the match will be extended by three minutes. In the extension time, the team who get one yuko point in advance will be the winner of the match (sudden death).
4. If a winner still cannot be decided according to the guidelines of Article 8 Item 3, the optional scientific articles (if submitted by the contestants) will be evaluated and scored according to the annex document "anexoMaS\_XV\_ORA+D\_2013". The one who achieves the highest score will be the winner of the match.
5. Before the match is over, all maintenance is prohibited. However, it's allowed in stand by time (a maximum of 60 seconds) to the next combat and program change during the match.

## **Chapter 6 The Execution of the Match**

*Article 9: Safety Measurements*

1. For the safety of the contestants and judges, goggles, gloves and sports shoes should be worn during the match.



Article 10: Beginning of the Game

1. The match will begin following the instruction of the judges. Contestants will salute before entering dohyo jyonai (the match ring area). After that, contestants shall put their robots on shikiri-sen (the starting lines) (any part of robot shall not go over the line toward the opponent) or within the extend lines vertically from the both edges of shikiri-sen (the starting lines) to white line (Figure 3). Referring to the figure, the robot must be placed behind the imaginary red line, and make contact with the imaginary yellow square.
2. Both contestants should place the robots according to the pre-allocated dohyo (match ring) simultaneously, at the time indicated by the judge in charge of the match. Robots are not allowed to be moved after they have been placed.
3. The operating switch should be pressed upon the "begin" announcement of the judges. The match will begin five seconds after the switch has been turned on. Contestants are required to leave dohyo (the match ring) immediately.
4. Should there be any scratches/dirt on the dohyo (match ring), the judges will decide if the combat can continue on the same dohyo (match ring) or changing to a new dohyo (match ring) is required.

Ex. ①~③ are in right place ④ and ⑤ are in wrong.

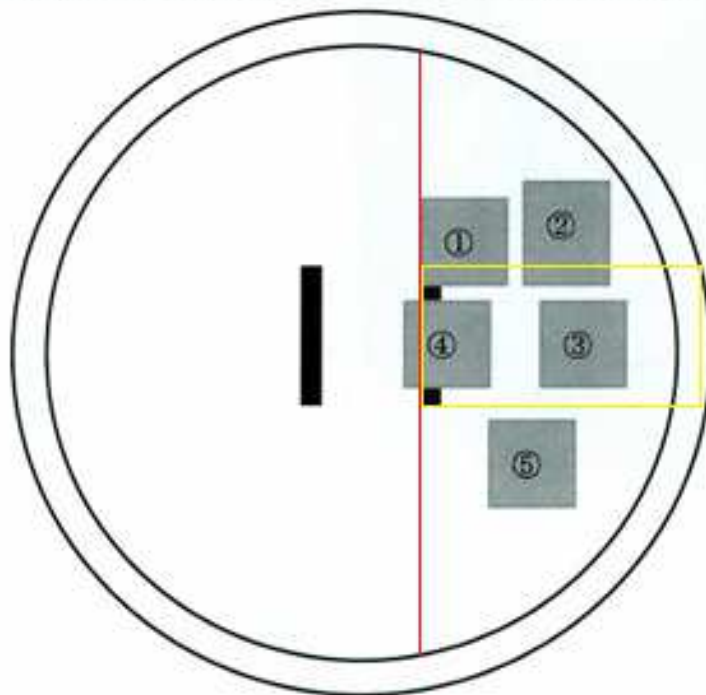


Figure 3. Examples of starting positions of the robot before a combat.



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#### *Article 11: The Ending of the Match*

1. The match will officially end upon the announcement of the main judge. Contestants are required to carry the robot from dohyo (the match ring) before saluting each other and leave dohyo jyonai (the match ring area).
2. Contestants are required to terminate the robots using the remote control.

#### *Article 12: Torinaoshi (Restart of a combat)*

In the situations below, the combat will be suspended and resumed:

1. Both robots are stuck facing each other and further movements are not possible or both robots are marching against each other.
2. Both robots fall out into the outside dohyo (the match ring) simultaneously.
3. Other situations when win/lose is not possible to be determined.
4. If winning cannot be determined after torinaoshi (the match is restarted), the main judge may place the robots in the allocated position and resume the game within the allocated time.

### **Chapter 7 Yuko (effective) point, Shinitai and Yusei(Pre-dominance)**

#### *Article 13: Yuko (effective) point*

The winning of a Yuko Point is determined based on the following situations:

1. If the opponent robot is forced out of dohyo (the ring). (The robot touches outside dohyo (match ring) area)
2. The opponent robot falls out of dohyo (the match ring) by its own and touches outside dohyo (match ring) area.
3. As per "the Shinitai" condition stated on Article 14
4. As per "the yusei (pre-dominance)" situation stated on Article 15
5. If "keikoku (warning)" (defined in Article 6) was given twice to the opponent.
6. If the situations stated under Article 17 hansoku (Foul) were determined.
7. A winner who has been granted a win without a match in accordance with Article 20 Item 3, receives two Yuko points (if it has already had one Yuko point then one point will be granted.) and the acquired Yuko point(s) by the opponent who lost the game remain effective.

#### *Article 14: Shinitai*

A single Yuko point will be granted on the "Shinitai" situation if one or more wheels leave dohyo (the match ring), and not able to return to dohyo (the match ring). One Yuko point will be given to the opponent.

#### *Article 15: Yusei (Pre-dominance)*



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One Yuko (effective) point will be granted on the yusei(pre-dominant) situations below:

1. In the combats, judges may be based on the strategy, movements and skills to grant one Yuko point to the party with the yusei (pre-dominant) condition
2. On the conditions stated on Article 8 Match Item 3

## Chapter 8 hansoku (Foul) and Penalty

### *Article 16: keikoku(Warning)*

A contestant who takes any of the following actions will receive a keikoku (warning). If a participant receives two keikoku (warnings), one Yuko point will be granted to the opponent.

1. The operator or a possession of the operator enters dohyo jyonai (the match ring area) before the judges' calls of match end.
2. There is a movement of the robot before the match begins (physical extension and movements)
3. Article 6 is violated
4. The robot is repositioned after it has been placed in dohyo (the match ring).
5. Any other actions that may be deemed unfair.

### *Article 17: hansoku (Violations)*

If the following situation happens, the opponent or both parties will be granted one Yuko point:

1. If the components were dropped from the robots, and the dropped components were in moving condition.
2. If the robot is unmovable or has been stationary for more than 10 seconds.
3. If both of the robots are moving but no contacts are made.
4. When there is application from contestants to terminate the match.

### *Article 18: hansokumake (Loss by violation)*

A contestant who takes any of the following actions will lose the game by violation:

1. A contestant does not show up at the appointed dohyo (match ring) when called at the beginning of the game.
2. A contestant who sabotages the game. For example, by intentionally breaking, damaging or defacing dohyo (the match ring).
3. A contestant violates Article 4 "Specification of the robots".
4. If the movements listed on Article 5 are not made.





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5. If fire came out from the robot, or the referee has determined that in the same situation, fire comes out.

#### Article 19 sikkaku (Disqualification)

A contestant who takes any of the following actions will be disqualified and forced to leave the game and will not be on the ranking list:

1. A contestant's robot does not meet the "Specifications of the robots" stated in Article 7.
2. A contestant displays unsportsmanlike behavior. For example, using offensive language or assaulting opponents or judges
3. A contestant intentionally injures the opponent

### Chapter 9 Injuries and accidents

#### Article 20: Request for suspension

1. When a contestant is injured, and the game cannot be continued, a suspension can be requested by the contestant.
2. In the event above, the judges will make necessary arrangements for the game to be resumed immediately.
3. If the arrangements made do not enable the combat to be resumed, the opponent will be granted a win without match.

### Chapter 10 Objections

#### Article 21: Objections to the judges

No objections to the decisions of the judges will be acknowledged.

### Chapter 11 Specifications of robot markings

#### Article 22: The East-West direction

The east west direction of dohyo (the match ring) is determined based on the position of the judges. The right hand side of the judges marks the east, and vice versa.

### Chapter 12 Others

#### Article 23: Modifications and abolition of the Rules

Modifications or abolition of the Rules are adopted by the chairperson of the tournament through deliberation of tournament committee's regulation.

**VER ANEXO A ESTE REGLAMENTO EN ESTA CATEGORÍA.**