Content:

1. The objective of the rules

The objective of the following rules is to enable fair and enjoyable competition and provide the necessary information for safe participation in the hobby.

2. General Information about the Sport

Robosota is a hobby where players compete using radio-controlled or autonomous robots categorized by weight. The goal is to render the opponent immobile or push it out of the arena within a time limit (3 minutes).

The robot can be constructed individually or within a team, following the competition rules.

3. Weight Classes and Leagues

- 150 g
    - Competed in a completely enclosed arena.
    - Maximum weight and size of the robot: 150 g, maximum allowed length 30 cm.
    - Allowed maximum weapon tip speed: 100 m/s.

- 150 g Plastic League
    - Competed in a completely enclosed arena or as a variant in an open arena.
    - Maximum weight and size of the robot: 150 g, maximum allowed length 30 cm.
    - Allowed maximum weapon tip speed: 20 m/s.
    - Building Materials:
        - For frame and weapon materials, only plastic parts (PLA, PA/Nylon, ABS, TPU, HDPE, rubber, polycarbonate...) are allowed.
        - Nylon carbon or glass fiber filaments, metals, and frame/weapon materials containing glass or carbon fiber, Kevlar, or carbon fiber are prohibited.
        - Metal screws and connectors are allowed only in joints and cannot be used as a weapon or armor.
        - The use of metal spikes in tires for traction is allowed.
        - Metal gears are only allowed within pre-made electrical components (servos and motors).

        Variant, open arena version:

        The Plastic League can also be alternatively competed in an open arena, in which case hazard-causing devices such as rotating, pneumatic, hydraulic, or spring-loaded weapons are not allowed..

- 450 g
    - Competed in a completely enclosed arena.
    - Maximum weight and size of the robot: 450 g, maximum allowed length 30 cm.
    - Allowed maximum weapon circumference speed: 100 m/s.

4. Robots

4.1. Frame and Armor Materials

- Flammable materials are prohibited in all leagues. (Wood is not considered flammable.)
- League-specific material restrictions can be found in the Weight Classes and Leagues section.

4.2. Weapons

Robots can have various weapons to render the opponent immobile. A weapon is not mandatory, and the robot can be based on methods such as pushing the opponent.

4.2.1. Mines and Obstacles

- The use of mines and obstacles is allowed if competing in an enclosed arena.
- The use of mines is counted as pinning.

4.2.2. Magnetism

- Permanent magnets and electromagnets are allowed.
- Potential radio interference must be taken into account when using electromagnets (see section Interference).

4.2.3. Prohibited Weapons

- Radio Interference
- Shooting / Projectiles
- Liquids
- Powders and fine granules (< 3 mm)
- Electricity
- Laser, Light, and Radiation
- Heat and Fire
- Intentional Entanglement
- Additionally, please note event and league-specific variations.

4.3. Power Sources

4.3.1. Electricity

- Permitted power sources include NiZn, NiMh, LiIon, LiPo, LiFe batteries, as well as alkaline batteries.
- The maximum allowed voltage is 60 V.
- When charging batteries, a fire-resistant protective bag or box must be used, along with a charger designed for this purpose.
- Damaged batteries must not be charged. Damaged batteries are to be removed from the competition site to a location designated by the organizers.

4.3.2. Motors

- Internal combustion engines are prohibited.
- Electric motors, pneumatic, and hydraulic motors are allowed.

4.3.3. Pneumatics

- Devices operating on compressed air or other gases are allowed.
- The maximum allowed pressure in the system, excluding the tank and regulator, is 20 bar (290 psi).
- The maximum pressure for the tank is 70 bar (1015 psi). The pressure-reducing regulator must be directly attached to the tank (no hoses, etc.). Only for refueling, a T-branch can be installed between the tank and regulator, which must be well-sealed during competition.
- If the system has a pressure over 6 bar, all pneumatic components must be approved for the applied pressure or tested at least at 1.43 times the pressure according to SFS-EN 13445-5.
- The robot builder must be able to demonstrate the pressure used in the robot.
- The gas must be non-flammable.
- The system must be able to be emptied within 30 seconds.
- Damaged parts must be replaced with intact ones.

4.3.4. Hydraulics

- Devices operating with pressurized fluid are allowed.
- The maximum allowed pressure is 70 bar (1015 psi).
- Otherwise, the same applies to hydraulics as to pneumatics.
- The use of accumulators is prohibited for safety reasons.

4.3.5. Springs and Spring-Like Devices

Devices operating with a spring or spring-like mechanism are allowed.

4.3.6. Mechanically Stored Energy

- Springs, flywheels, and similar energy-storing devices must not activate or fire when control signal or power is lost.
- All similarly stored energy must be able to be discharged with remote control using the robot's own power.
- The devices must not be active or armed outside of the arena or test box.

4.4. Safety

4.4.1. Responsibility for Robot Safety

- The responsibility for any damages caused by the robot lies with the competitor.
- Competitors must consider the hazards posed by the robot to individuals and property and take preventive measures to the best of their ability.

- If deemed too dangerous, a robot can be disqualified from the tournament.

4.4.2. Power Switch

- All robots must have a power switch or equivalent connection.
- The switch may be located under a protective cover, but the cover must be openable, and power must be disconnectable within 15 seconds.
- Switches, links, and rocker switches that can be turned with a tool (e.g., hex key) are allowed.

4.4.3. External Indicator Light

The robot must have a visible external light that is on when the device is turned on.

4.4.4. Fuses and Thermal Protection

The use of fuses and thermal protection is recommended for robots in the weight classes of 1.36 kg and above. (League under planning)

4.4.5. Failsafe

- The robot's control electronics must have a failsafe function, causing the drive and weapon systems to stop when the control signal is lost.
- The functionality of the failsafe can be tested on the arena, for example, by driving the robot while simultaneously turning off the controller, causing the robot to come to a stop.

4.4.6. Weapon Safety Lock

- All movement of weapons must be capable of being prevented mechanically.
- Weapon locks may only be opened inside the arena, test box, or pit area with the battery disconnected.

4.4.7. Sharp Parts

- All sharp parts that may potentially cause personal injury must be protected when the robot is outside the arena, test box, or temporary maintenance.

4.5. Weight Limits and Advantages

4.5.1. Weight Classes and Weighing

- The robot's maximum allowed weight is determined by the category.
- There is no minimum weight limit.
- Robots are weighed in their battle-ready state.
- The robot's weaponry, armor, or other parts can be changed during the tournament, but all alternative parts must fit in the weigh-in before the competition. Identical spare parts are not counted as alternative parts.

- Weighing is done using the organizer's scale.

  If the robot has a camera or other components whose sole purpose is to provide video footage or other benefits to the organizers, it is not counted towards the robot's weight.

  Overweight robots can only participate with the consent of all other participants in the respective weight class and the judge. Participants express their opinions to the judge.

4.5.2. Robots Moving Without Wheels or Tracks

- Crankshaft mechanisms, vibration-powered, gyro walkers, and hovering robots receive a weight advantage of +50%.
- Two degrees of freedom walking robots receive a weight advantage of +100%.

4.5.3. Autonomous Robots

- When the intelligence and sensors are internal, there is a weight advantage of +100%.
- When the intelligence is external and the sensors internal, there is a weight advantage of +50%.
- The robot must be stoppable via remote control.

4.5.4. Combining Weight Advantages

Weight advantages cannot be combined.

4.5.5. Replacement Parts and Weapons

- All different weapons and armors used during the competition must fit within the robot's weight limit simultaneously.
- The robot's structure can be modified between battles, but only by using the parts that were present during the weigh-in and fit within the weight limit.
- Spare parts must be equivalent to the original and cannot be used to gain tactical advantage.
- Field repairs using spare parts are allowed if the original parts are exhausted.

4.6. Multi-part Robots

- The robot can be multi-part.
- There is no limit on the number of parts.
- All parts must fit within the starting box simultaneously or as close to it as possible when space runs out.

4.6.1. Weight Advantage

Weight advantage is applied separately to each part of the robot that can

move independently.

4.6.2. Immobilization

- Not all parts need to be mobile.
- A robot is considered immobilized if at least 60% of the relative (i.e., considering weight advantages) weight of its parts are outside the arena or immobilized.
- A part of the robot that is deemed to have left the arena cannot return during the battle.

5. Remote Control

5.1. Safety

5.1.1. Power Switch

The remote control must include a switch that allows the signal transmission to the robot to cease, activating the failsafe.

5.1.2. Stopping

The robot's functions must be able to be stopped via remote control.

5.1.3. Control Arming Switch

It is recommended to use a separate arming switch on the controller to deactivate signals. If the controller does not have a switch, it must be completely turned off as required by the rules.

5.2. Control Methods

5.2.1. Radio Frequencies

Permitted are digital radio frequency methods allowed by Finnish law and the Finnish Communications Regulatory Authority, such as frequencies 868MHz, 2.4GHz, and 5GHz. Analog frequencies are prohibited.

5.2.2. Allowed Control Methods

- RC Controller
- Bluetooth
- Wifi

5.2.3. Prohibited Control Methods

- Infrared
- Ultrasonic
- Wired Control

- Visible Light

5.2.4. Other Control Method

A control method different from those mentioned above is possible if it is not prohibited by law, approved by the communications regulatory authority, does not pose a danger to individuals, and appropriate failsafe functions can be used. In this case please contact the event organizer.

5.3. Operators

The number of robot operators is not restricted.

5.4. Interference

5.4.1. External Interference

The robot must be designed to withstand external interference as effectively as possible. If the robot is too sensitive to interference and, as a result, control is uncertain, the judge may prevent participation on safety grounds.

5.4.2. Radio Interference

All forms of radio interference are prohibited. The robot may be disqualified from the competition if the robot or its controller causes interference with other devices. Intentional interference may result in a ban from competitions organized by Robosota Ry.

6. Arena

Because robots pose dangerous situations, the matches are always held in a dedicated protected arena. The purpose is to provide protection not only for the competitors but also for the audience and property.

Arena specification for each competition will be provided in the competition announcements.

More detailed information about arena construction requirements can be found on our website. Robosota's recommendations are based on international standards.

7. Match

7.1. Match Duration

One round lasts three (3) minutes. At the start of the last minute, the arena's drop hatch is opened if the arena has one.

7.2. Grappling / Pinning

- During the match, robots have the opportunity to grab the opponent or tie them to the wall.
- Grabbing the opponent can be done using various grippers, lifters, or clamps, with a maximum time limit of 20 seconds.
- Pinning the opponent to the wall can be done using wedges or spikes, with a maximum time limit of 10 seconds.
- After the time limit has passed, enough space must be given to the opponent for the situation to resolve.
- A warning will be issued for intentional time limit violations (see Judging).

7.3. Match Start

The following sequence must be followed:

- Before entering the arena, the robot and the controller must be turned off or deactivated using arming switch.
- Before turning on the power, the moving parts of the weapons must be mechanically prevented from moving, and sharp, potentially dangerous parts must be protected to ensure that the robot does not pose a danger to individuals or property.
- The controller is placed in its designated position, waiting for the arena door to close, and should not be touched during this time.
- The robot is placed in the arena, and blade guards can be removed.
- Power can be turned on.
- Mechanical weapon safety locks are removed after turning on the power.
- After the arena hatches are closed, the controller can be activated, and the movement of the robot and the operation of the weapons are checked.
- After this, the competitors confirm that they are ready, and the match begins with a countdown.

7.4. Fighting

- The match begins after the countdown finishes.
- In case of a false start, the match starts over.
- The match is conducted as a duel.
- During the tournament, there will be at least two matches per robot.

7.5. Match Interruption

7.5.1. Robots stuck together

A situation where both robots are either stuck to each other or to the arena simultaneously, to the extent that the operators cannot remotely separate them.

In a jamming situation, the match is halted, the robots' controllers are deactivated, and the weapon safety locks are used if possible. The robots are then attempted to be separated. After successful separation, the robots are placed back in their previous positions, and the match continues for the remaining time.

If separation is too dangerous or not possible, the judge may halt the round, and the match winner will be determined by the judge's decision.

7.5.2. Judging

The judge may intervene in the course of the match and halt the match based on competition rules.

7.6. Time Limit / Draw

7.6.1. Time Limit

If the time limit is reached, the judge will determine the match winner based on damage and demonstrated control during the match. More weight will be given to damage.

7.6.2. Overtime / Rematch

If the match is too close to judge, with the consent of both competitors, the match can be extended by one (1) minute of overtime or there will be a rematch round.

7.6.3. Draw

If an elimination tournament bracket is not used in the competition and points are used instead (for example in round robin), a draw may occur, where both parties receive an equal number of points.

7.7. Winning the Match

7.7.1. Immobilization

If a robot is immobilized for ten (10) seconds, it results in a knockout, and the victory goes to the opponent. The time starts over if the opponent touches the immobilized robot.

7.7.2. Out of the arena

If a robot falls out of the arena before the time runs out, it results in a knockout, and the victory goes to the opponent.

If both robots fall out of the arena at the same time, where one bot can be clearly identified as the aggressor to this action, the aggressor wins the match.

7.8. Losing the Match

7.8.1. Forfeiture

A participant can forfeit at any time, resulting in an immediate victory for the opponent.

7.8.2. Battery Out

If the robot's battery physically comes out of the robot or causes a dangerous situation during the match, the match is immediately stopped, and the result is a loss for that robot.

7.9. After the Match

After the match ends, no further harm should be done to the other robot. If necessary, a warning will be issued (see Judging).

- The controller is deactivated and placed in its designated position, and should not be touched during this time.
- After the hatches are opened, the weapon safety locks of the robots are put back in place, the power is disconnected, and potentially dangerous parts are protected to ensure that the robot does not pose a danger to individuals or property.
- After deactivating the robot, both the robot and the controller are taken to the pit area.

8. How to act in Competitions

8.1. Remote Controllers

- Remote controllers must be turned off or deactivated, outside of the arena, test box, and testing area.

8.2. Charging Batteries

- Battery charging must take place in the pit area, in designated areas.
- During charging, LiPo batteries must be in their designated protective bags.
- If a battery is swollen or shows signs of external damage, charging is prohibited, and the battery must be disposed of properly in a protected manner, in a battery recycling facility to eliminate the risk of fire.
- A carbon dioxide fire extinguisher should be located near the charging area.

8.3. Pit Area

The pit area is a designated area for teams to store belongings and maintain their robots. Access by the audience to objects in the pit area must be restricted.

8.4. Testing

- Testing of robot weapons must take place in the arena or test box.
- Testing of motors and servos without a weapon blade is allowed in the pit area.
- Testing of robot drive motors must be done with the wheels off the ground and the weapon locked.

- The protection level of the test box must meet at least the arena requirements of the weight class in which the robot is competing.

8.5. Moving the Robot

- Only the operator of the robot is allowed to touch and move the robot.
- The battery lead must not be connected to the robot when arriving at the competition area.

8.6. Judging

8.6.1. Role of the Judge

- The judge's role is to manage the scoring of the match and to oversee and maintain competition order along with other safety personnel.
- Multiple individuals may serve as judges.

8.6.2. Warnings

- The judge may issue warnings to competitors who engage in actions that violate the rules.
- Warnings are based on compliance with competition rules or flexibility for participants who "bend" the rules.
- If two warnings are issued during a round, the round is halted, and the opponent is awarded the victory.
- If necessary, the situation may lead to disqualification from the tournament or a ban.

8.6.3. Harassment / Unsportsmanlike Conduct

- All forms of unsportsmanlike conduct, verbal and physical harassment, as well as radio interference, are prohibited.

8.6.4. Disqualification from the Tournament / Ban

Any continuous unsportsmanlike or rule-violating behavior leads to disqualification from the tournament and, if necessary, a ban from events organized by Robosota Ry.

9. General Safety

Robosota is a fun and educational but also a dangerous hobby. Safety must always take precedence.

9.1. Competitors and Audience

9.1.1. Prevention of Personal Injury

Safety for the audience and competitors is maintained by limiting the danger posed by robots, competing with robots in a protected arena, restricting outsiders' access to pit areas, and ensuring proper fire safety.

9.1.2. Action in Case of Personal Injury

In the event of personal injury, emergency services should be contacted immediately, and care should be taken to ensure that the person is looked after until the authorities arrive.

9.2. Fires and Smoke Ventilation

9.2.1. Prevention of Fires and Smoke Damage

- At the competition site, arena, test box, and charging area, there must be at least one 2.5kg carbon dioxide fire extinguisher.
- There must be at least one fire-resistant and covered transport container or bucket for carrying out a smoking or burning robot.
- Adequate smoke extraction and filtration must be provided for the arena and surrounding area to prevent smoke from posing a danger to individuals or fixed property.
- The event should be located as close as possible to the building's exit, so that robots and individuals can be evacuated from the premises as quickly as possible.

9.2.2. In Case of Danger

- In the event of a smoke or fire hazard, the ongoing round is halted, initial fire fighting measures are taken, connection between the robot and controller is disconnected, the controller and robot are turned off if it is safe to do so, and the robot is transferred to a smoke and fire-resistant transport container, which is then immediately taken outside.
- After the robot has been taken outside, the battery can be removed if the situation allows safe handling of the robot.
- If smoke is intense or a fire is imminent, the robot must be immediately extinguished, individuals evacuated from the area, and emergency services contacted.

10. Cleanliness and Waste Disposal

- Each competitor is responsible for properly disposing of and recycling their robot's waste.
- The event organizer provides a mixed waste bin for cleaning the arena; hazardous waste is not to be placed in this bin.
- Battery and electronic waste should not be left in the competition venue's waste collection. They should be disposed of in designated collection points, ensuring that there is no risk of fire.

11. Closing Statement

These rules have been produced by Robosota Ry. Robosota is inherently dangerous, but it is also a fun and educational activity. These rules serve as a foundation for safe participation, ensuring that the potential risks of the sport are recognized and mitigated before they occur.

The authors of these rules have endeavored to address potential hazards and are not responsible for any resulting damages.