

Cage Wrestling

Name: Cage Wrestling

Age Category: 18+ (max 15 kg)
14-18 (max 5 kg Nonmetallic robot)

Goal: The aim of the robot athletes is to compete in a grappling tournament, with the final result determining the overall champion. Two robots compete in a melee match. The robots are given three full minutes for a round, in which either one of the robots is knocked out or the match is timed and 3 judges decide the winner

Teams: Each group can consist of a maximum of **3 members**. Each team can only compete with one robot. It is forbidden to replace the robot, except to repair it within the period defined by the rules. During the match, only two people from each team, the robot operator, and an assistant are allowed outside the arena. Apart from them the only people allowed near the arena are the judges and the referee.

Competition Categories: There are two categories of the competition. The first competition category includes SENIOR age group 18+, with a maximum allowed weight of the robot of 15 kg. While in the second competition category, the ADULTS age group 14-18 is defined, with a maximum allowed weight of 5 kg, provided that the robot will be non-metallic. In both racing categories there are no maximum dimensions allowed for the robot-athlete, only that it can pass through the door of the track without of course disassembling any part. The robots are remote controlled.

Arena: The track is a closed "cage" with dimensions of 4x4 m and a height of 2 m. The track floor is wooden.

Rules of Competition

Match Duration: Matches will be 3 minutes in duration, excluding any knock-outs.

Frequency of fights: A fighter is allowed a minimum of 40 minutes to prepare for the next fight. This time is counted from the moment the fighter leaves the area after the fight. If the fighter fails to return to the match area when called after the allotted time, it is automatically considered a defeat. It is recommended that any routine maintenance (eg battery charging) can be performed within this time.

Robot Testing: Testing and activation of robots will be done exclusively in the arena, anywhere else without the consent of the organizers **is expressly prohibited by the regulations**, resulting in the disqualification of the robot fighter.

Determination of winner

A robot loses a match when one of the following occurs:

1. The robot is knock-out or unable to demonstrate sufficient mobility as defined below (See: Controlled Movement).
2. The robot driver surrender.
3. A robot deemed unsafe by the Tournament Referees after the start of the match will be disqualified and therefore declared loser. This rule is designed solely for the safety of spectators, fighters and tournament staff.
4. All other matches will be decided by judges' decision. The decisions of the judges are final.

Knock-out: The referee will declare a knockout when the robot shows no controlled movement after the opponent stops attacking for 5 seconds and shows no controlled movement at the request of the referee. The bot will have a 10 second countdown. If the robot continues to be unable to show controlled movement and the opponent still does not attack, then at the end of the 10 second countdown the robot will be defeated. Any attack from the opponent or if the robot responds to the controlled movement, then the countdown time is restarted.

Controlled Movement: is defined as, when the robot driver can move the robot along the track with the remote control. Rotating the robot to a fixed position is not considered controlled rotational motion. The referee will decide whether the move is controlled, as with all official decisions. The referee's call is final.

Contact the arena: During combat, a robot may come into contact with the inner wall of the arena. Intermittent contact is permitted if, in the opinion of the referee, the integrity of the outer wall is not threatened. If the contact continues for a long time or if the referee believes the integrity of the wall is threatened, the referee will stop the match, the robots will be repositioned so that the integrity of the arena is no longer threatened. The restart will be through the "Neutral Corner" process as described below.

Pinning & Lifting: Bots cannot win by pinning or lifting their opponents. The referee will allow pinning and/or lifting for a maximum of 15 seconds per lift. They will command the robot to release the pinned/raised opponent. A robot that does not stop pinning or lifting when requested by the referee may be deemed the loser of the match at the sole discretion of the referee, unless the two robots are pinned together.

Releasing a Pinned Opponent: If an opponent is pinned (or cornered), the attacker must move far enough away after the opponent is released that the opponent has a chance to escape

Cornering: Keeping an opponent trapped in a corner will count as a pinning, even if the attacker is not in continuous contact with the cornered opponent.

Stranding / High Centering: A bot can be intentionally trapped by its opponent in an arena feature (floor seam, arena guard or wall, etc.) Trapped bots have 5 seconds to break free, after this time, they will be given a countdown of 10 seconds and there will be a knockout.

Stuck or Entangled Robots: Matches will be paused to separate bots if they get stuck together in the arena and cannot be separated from each other after 5 seconds.

Arena Stranding Hazards: It may be possible for a robot to get stuck above or below some part of the arena through its own action or the action of the other robot. If this happens, regardless of the cause, no one will be allowed into the arena to unstuck the stuck robot. It will count as a knockout.

Neutral Corner Restart: Before restarting an interrupted match to free stuck robots, robots may be directed to neutral corners of the arena if requested at the referee's sole discretion. If a robot can't move (or can't move well enough to be easily driven to the indicated corner) it will stay put.

Tapping Out: If a fighter finds that his robot has been damaged at the point where he wishes to end the match, he shall notify the referee of his intention. At that point the referee will ask the fighter to confirm that he wishes to end the fight. If the fighter says "Yes", the referee will order the opponent to stop attacking and move away from the fighter's robot. The fighter who calls for the fight to be stopped will be considered the loser, and victory will be awarded to the attacker as a knockout.

Forfeit: In the event a fully registered fighter is disqualified prior to the start of a match, his opponent will win.

Power of Officials: Fighters must follow the instructions of the referee and match officials at all times. This is necessary to keep everyone safe at the tournament. All decisions of the referees are final.

Robot Athlete Specifications

During the technical inspection, they will have to go through a detailed inspection. As the robot fighter must be compatible with all the following regulations.

Specifically for the 14-18 competition category, all of the following regulations apply, provided that the robot fighter is non-metallic. Its chassis as well as the weapons that the robot will carry are forbidden to be metal. Electronic components which are metal such as motors, reducers, batteries, etc. are allowed. Small metal parts such as bearings, screws, nuts, spacers, shafts, fasteners, etc. are also allowed. Provided they are not used as weapons or to reinforce the chassis of the robot fighter.

General Rules

All participants build and operate their robots at their own risk. Cage fighting is inherently dangerous. There is no volume of regulation that can cover all the risks involved. Please be careful not to injure yourself during construction, testing and racing.

If you have a robot or weapon design that does not fit into the categories defined in these rules, or is ambiguous or borderline in any way, please contact the organizing committee. **Innovation is always encouraged, but surprising event staff by exploiting a loophole can get your bot disqualified before it even competes.**

Compliance with all the rules of the event is mandatory. Competitors are expected to stay within the rules and procedures of their own accord and do not require constant supervision.

Each robot will pass a technical inspection. It is at their discretion that your bot is permitted to compete. As a manufacturer you are obliged to disclose all operating principles and potential risks in the technical inspection.

Failure to comply with any of the following rules may result in expulsion or worse, injury and death.

1. Remote controls may not be activated in or near the match unless proper permission has been given by the organization.
2. Properly activating and deactivating robots is crucial. Robots must only be activated in the arena or with the consent of security officials.
3. All robots must be able to be FULLY disabled, which includes power to drive and weapons, in less than 60 seconds by manual disconnection.
4. All robots not in the arena must be raised or blocked in such a way that their wheels or legs cannot cause movement if the robot was activated.
5. Locking Devices: Moving weapons capable of causing damage or injury must have a conspicuous locking device in place at all times when not in the arena. Locking devices must be painted orange or another high visibility color. Locking devices must be clearly capable of stopping, immobilizing or otherwise preventing harmful movement of the weapon
6. The weapon locking pins must be in place when weapon power is applied during the activation process of a robot. This includes all powered weapons regardless of power source or weight class.
7. All builders are expected to follow basic safety practices while working on the robot at their station. Please be alert and watch out for your neighbors and people passing by.

Movement

1. All robots must have easily controlled mobility in order to compete. Mobility methods include:
2. Rolling (wheels, crawlers or the entire robot)

3. Wheelless: wheelless robots have no rolling elements in contact with the floor and no continuous rolling. For example how robot snakes, spiders, etc. work.
4. Walking: walking robots are defined as those with linearly actuated legs that operate independently of each other. That is, any given leg should be able to move laterally and vertically.
5. Hovercraft are allowed.
6. Jumps and leaps are allowed.
7. No flight allowed.

Remote control

1. Remote controlled robots must be radio controlled and use an approved custom system as described.
2. Connected control by other means like Bluetooth, Wi-Fi, Lora, etc. is not allowed.
3. The radio control system must stop all movement on the robot (driving and weapons), when the transmitter loses power or signal, this is required for every robot. This may be inherent in the robot's electrical system or be part of the programmed interlocks in the remote control system.
4. All robots MUST use a radio system with digitally coded pairs between transmitter and receiver. This means that no other transmitter, operating on the same frequency, can communicate with your receiver, and your transmitter cannot send signals to any other receiver but yours.
5. Gaming radio systems are not allowed in this event for any robot.

Power and Battery

1. The only batteries allowed are those that cannot spill or spray any of their contents when damaged or overturned. This means that standard car and motorcycle liquid cell batteries are prohibited. Examples of allowed batteries: gel cells, Hawkers, NiCads, NiMh, dry cells, AGM, LiIon, LiPoly, etc.
2. **The maximum allowed voltage that the robot can have is 48 Volts.** (It is understood that the initial voltage state of a charged battery is above its nominal rating).
3. **Electrical power to weapons and drive systems must have a manual disconnect that can be disconnected within 15 seconds without endangering the person turning it off.** Deactivation must include a manual mechanical method of disconnecting the main battery, such as a switch or removable connector. Relays can be used to control the power, but there must also be a mechanical disconnect. Note that the full shutdown time is set to one minute.
4. Every effort should be made to protect the battery terminals from direct short-circuiting and causing a battery fire.
5. If your robot uses a grounded chassis, you must have a switch capable of disconnecting that ground.
6. **Robots must have a light easily visible from the outside of the robot to indicate that its main power is on.**

□ **Pneumatic Systems**

1. Pneumatic systems on the robot should use only non-flammable, non-reactive gases (CO₂, nitrogen and air are most common). Fiber wound pressure vessels are not allowed to be used with liquefied gases such as CO₂ due to temperature extremes.
2. You must have a safe way to refill the system and determine the pressure on the robot.
3. Maximum actuation pressure is 250 PSI or less.
4. All accessories must be used in accordance with the specifications provided by the manufacturer or supplier. If the specifications are not available or reliable, then it will be up to the technical control to decide whether the part is being used in a sufficiently safe manner.
5. You must have a safe method of refilling your pneumatic system. All pressure vessels must have the standard male quick disconnect for refilling or have an adapter to this fitting.
6. All pneumatic components on a robot must be securely attached. Special care must be taken in the placement of the pressure vessel and the shielding to ensure that if it breaks it will not escape the robot.
7. All pneumatic components inside the robot must be certified for AT LEAST the maximum pressure in that part of the system. You may be required to show evaluation or certification documentation for ANY component of your system.
8. All pressure vessels must be rated at least 120% of the pressure at which they are used and have a current test date.
9. All main pressure vessels must be provided with an overpressure device not exceeding 130% of that pressure vessel rating.
10. All pneumatic systems must have a manual main shut-off valve to isolate the rest of the system from the source tank. This valve must be easily accessible to activate and refill the robot.
11. All pneumatic systems must have a manual bleed valve on the main shut-off valve to depressurize the system. This bleed valve should be easily accessible for turning off. This valve must be left OPEN whenever the robot is not in the arena to ensure that the system cannot be operated accidentally.
12. You need to be able to easily eliminate all pressure on the robot before exiting the arena.
13. All pneumatic systems must have suitable pressure gauges
14. If check valves are used anywhere in the system, you must ensure that any part of the system they isolate can be vented and has a pressure relief device.
15. Please note that some pneumatic systems with very low pressures (below 100 PSI), small volumes (12-16g CO₂ cartridges), single-fire applications, or pneumatics used for internal actuation may not have to comply with all of the above rules .

□ **Hydraulic systems**

Hydraulic systems are not allowed

Internal combustion engines

No internal combustion engine allowed.

Rotary weapons

1. All kinds of rotary weapons are allowed.
2. **Rotary weapons must come to a complete stop within 60 seconds** of depowering using an autonomous braking system.

Springs and centrifugal wheels

1. Any large springs used for weapon movement or power must have a way to remotely load and activate the spring from just the robot's power.
2. Under no circumstances should a large spring be placed when the robot is outside the arena or in the testing area.
3. Small springs such as those used in switches or other small internal functions are exempt from this rule.
4. Any flywheel or similar kinetic energy storage device must not spin or store energy in any way unless inside the arena.
5. There must be a way to generate and dissipate the energy from the device remotely under the power of the robot.
6. All springs, flywheels and similar kinetic energy storage devices must be stopped in a safe position in the event of loss of radio communication or power.

Prohibited weapons and materials

1. Weapons designed to cause invisible damage to the other robot.
2. Radio frequency jamming equipment etc.
3. Θόρυβος RF που δημιουργείται από κινητήρα IC.
4. EMF fields from permanent or electromagnets affecting the electronics of other robots.
5. Weapons or defenses that completely stop both (or more) robots from fighting. This includes nets, bands, cords and other entanglement devices.
6. Weapons that require significant cleaning or otherwise damage the arena and require repair for further matches. This includes, but is not limited to: liquid weapons, foams and liquefied gases, powders, sand, and other dry matter weapons
7. Explosives are prohibited as weapons.
8. Heat guns are not allowed
9. Explosive or flammable solids such as: DOT Class C Devices, Gunpowder / Cartridge Primers, Military Explosives, etc.
10. No smoke weapons are allowed.
11. Lights such as external lasers and bright strobe lights that can blind the opponent.

12. The use of hazardous or hazardous materials anywhere on a robot where they may come into contact with humans or through the robot's impairment (within reason) of human contact is prohibited.
13. No flamethrowers and fire extinguishers are allowed.
14. Projectiles of any material by any means or manner are not permitted

WINNERS-Prize

The first 3 teams that won in the Final in the two competition categories receive 1st, 2nd, 3rd place.

Judging Board

A panel of judges will determine the winner of the matches if time expires before a fighter is defeated by knock out as defined above. The number of judges on the panel will be three to eliminate the possibility of ties and one more who will be the referee. Judges' decisions are final.

Qualifications

1. Judges must be fully familiar with the official rules governing the competition.
2. Judges must be familiar with the scoring system and scoring guidelines as set.
3. Judges must be reasonably familiar with robot design and construction.

Responsibilities

1. Each judge will officiate the Robot Battle Tournament with complete impartiality and fairness, respecting and abiding by the rules governing this tournament, in the true spirit of sportsmanship.
2. Each judge is responsible for watching the fighters during the match. Many fighters are similar, it is the responsibility of each judge to distinguish and award the correct points.
3. Each judge is expected to carefully note the existing damage when the fighters enter the arena. Existing damage should not count against a fighter in the event of a judges' decision.
4. Judges must watch the entire match and score accordingly. Judges are allowed to take notes during a match to aid in scoring.

Referee

1. The referee will ensure that all judges comply with the guidelines as set.
2. The referee will ensure that all fighters comply with the rules of the tournament. Warnings and instructions from the referee will be given to the fighters verbally during the matches. In the event a fighter fails to comply, the referee will stop the match and the offending fighter will be deemed loser.

3. The referee will determine the point at which a knock out countdown will begin based on a strict interpretation of the rules. When a 10-second countdown is required by the referee, the unresponsive fighter will be notified and the countdown will begin. The arena announcer will start the countdown at 10 and count down to 0. If the unresponsive robot has not demonstrated sufficient translational movement as described in the rules, the fighter will be declared defeated.

Conduct

1. Judges shall not consult with each other or the public while watching or scoring a match.
2. Judges will not drink alcoholic beverages during their judging.

Judges' Decisions: Scoring

When a match does not end with the disqualification of one of the fighters as defined by the rules and procedures of the Tournament, the winner will be determined by decision of judges. In a judges' decision the points awarded to the fighters by the panel of judges are added together and the winner with the majority of the points is declared the winner.

Point Scoring System

Points are given in 2 categories:

- **Aggression - 5 points**
- **Damage - 6 points**

Each judge will determine how many points to award each fighter in each category according to the judging guidelines. The maximum possible rating a fighter receives is $11 * (\text{number of judges})$. So a single judge will award a total of 11 points and a panel of 3 judges will award a total of 33 points.

Scoring Aggression

1. The aggression score will be based on the time each robot spends attacking the other.
2. Attacks do not need to be successful to count as aggression points, but a distinction will be made between chasing down an escaping opponent and randomly crashing around the arena.
3. No points will be awarded for aggression if a robot is completely uncontrollable or cannot do more than turn in place, even if it tries to attack.
4. Sitting still and waiting for your opponent to get to your weapon doesn't count for aggression points, even if it's a surprisingly devastating weapon. The robot must show metaphorical movement towards its opponent to count as aggression.

Awarding Aggression Points

- 5-0: a 5-0 The score will only be awarded when one of the robots never attempts to attack the other and the other constantly attacks.
- 4-1: a score of 4-1 will be awarded in the event of significant attack dominance by one robot, with the other attempting to attack a few times during the match.
- 3-2: a 3-2 score shall be awarded when
 - ✓ Both robots keep attacking each other.
 - ✓ Both robots only attack each other for part of the match.
 - ✓ Both robots spend most of the match avoiding each other. In this case, it is up to the judge's discretion to decide which robot made more attempts to attack the other.
 - ✓ There can be no equals in aggression. The judges must decide which robot is more aggressive than the other.

Scoring Damage

Judges should be aware of how various materials are destroyed. Some materials like titanium will emit bright sparks when struck, but are still very strong and can be largely intact. Other materials such as aluminum do not emit bright sparks when struck. Judges should not be swayed by things like sparks, but by how deep or significant a "wound" is.

Judges should be aware of the various materials used in the construction of robots and how damage to these materials can reduce a robot's functionality. Judges should not be unduly influenced by severe visual impairment that does not affect the fighter's effectiveness or defensibility. For example, a break in a fighter's armor may be very visible but only slightly reduce the armor's functionality.

Judges should look for damage that may not be visually huge but affects the functionality of a fighter. For example:

- a small bend in a lift arm or swingarm can dramatically affect its functionality by preventing it from having its full range of motion
- bent armor or skirts can prevent the fighter from resting on the floor, reducing the effectiveness of the drive system
- a wobbly wheel indicates that it is bent and will not have as much traction.
- cuts or holes in the armor can mean there is more damage inside.

Post-Match Inspection

Judges may ask fighters to demonstrate the functionality of their robot's propulsion system and/or weapon after the match, before the arena doors are opened

Judges can inspect the fighter's bot after a match to determine the best way to award damage points. If a judge needs to examine one or both robot combatants before awarding damage points, they will notify the judge immediately after the match ends. The review will be done by the entire panel. Judges will not operate the fighter's robot.

The operator or a designated team member will operate the robot. A member of the opposing team shall be present at any such inspection.

☐ **Awarding Damage Points**

Scoring of damage points is based on relative grading of each robot's damage.

- 6-0: a 6-0 is graded when:
 - ✓ one robot takes no more than **trivial** damage, and the other is at least **significantly** damaged
 - ✓ one robot is **major** or **massively** damaged and the other is only **cosmetically** damaged.
- 5-1: a 5-1 is graded when:
 - ✓ one robot takes at least **minor** damage and the other takes **major** or worse damage
 - ✓ one robot has suffered **cosmetic** damage and the other has suffered at least **significant** damage.
- 4-2: a 4-2 is graded when:
 - ✓ both robots have taken almost the same level of damage, but one is slightly more damaged than the other
- 3-3: a 3-3 is graded when:
 - ✓ both robots have taken the same level of damage
 - ✓ neither robot has even cosmetically damaged the other

Self-inflicted damage from a robot's systems that is not directly or indirectly caused by contact with the other robot or an active arena hazard will not count for scoring purposes.

Trivial Damage:

- Flipped over without loss of mobility or loss of weapon functionality, except where the flip causes a complete loss of mobility and the robot cannot show transport movement.
- Direct impacts that leave no visible dent or scratch.
- Sparks resulting from hitting an opponent's weapon.
- Lift into the air without damage and without permanent loss of traction.

Cosmetic Damage:

- Visible scratches on the armor.
- Non-penetrating cutting or denting or slight bending of armor or exposed frame.
- Removal of non-functional decorative pieces
- Damage to the wheel, rotating blade or other exposed moving part that does not result in loss of functionality or mobility.

Minor Damage:

- Flipped causing some loss of mobility or control or making it impossible to use a weapon.
- Intermittent smoking is not associated with a noticeable drop in potency.
- Piercing dent or small hole.
- Removal of most or all of a wheel, or saw blade, spike, tooth, or other weapon component, which does not result in loss of functionality or mobility.
- Slightly warped frame that does not result in loss of mobility or weapon function.

Significant Damage:

- Continuous smoke or smoke associated with partial loss of movement or weapon power.
- Torn or badly deformed armor or a large hole in the armor.
- Damage or removal of wheels resulting in reduced mobility
- Damage to the rotary gun resulting in loss of gun speed or severe vibration
- Damage to arm, hammer or other moving part resulting in partial loss of weapon functionality.
- Visibly bent or distorted frame.

Major Damage:

- Smoke and visible fire.
- The armor section was completely removed leaving internal components exposed.
- Removal of wheels, rotating blade, saw, hammer or lifting arm or other important component resulting in complete loss of weapon functionality or mobility.
- Frame distortions causing partial loss of mobility or complete loss of weapon system functionality.
- Internal components (batteries, speed controller, radio, motor) that do not have mounts and rest or drag on the arena floor.
- Apparent gas leaks.

Massive Damage:

- Armor shell completely torn from frame.
- Main subsystems cut out of the frame.
- Loss of structural integrity - large sections of frame or armor dragging or resting on the floor.
- Total loss of power.