ONE POUND ROBOTS BATTLE

GENERAL DESCRIPTION

This contest is strictly ruled by the Robot Fighting League (RFL), world organization in charge of regulating and setting the standards for battle events internationally.

GENERAL GUIDELINES AND SAFETY RULES

This group of rules is designed in a general style for all the categories of robots battles and it is mandatory.

a) All the contestants build and operate battle robots at their own risk. Combat robotics is inherently dangerous. The event and its organizers are not responsible for damages caused by any activity related to the construction of a battle robot and the development of the competition.

b) If you have a robot design or weapon that does not fit within the parameters set forth in these rules, please contact the event organizers prior to registering the robot

c) Each category according to its weight has safety inspections. For a battle robot to be authorized to compete it must pass the safety inspections set by the event organizers. As a builder you are obliged to disclose all operating principles and potential hazards to the inspection personnel.

Cardinal safety rules. Failure to comply with any of the following rules will result in disqualification and expulsion of the offending competitors:

1. Radio controls may not cause interference with the operation of other prototypes.
2. For work on the robot, work areas will be designated for each competing team. ATTENTION: the working area of each team is different from the testing area of the robot.
3. Robots can only be activated in the arena and test area. Should participants request an activation that in any way violates the above, it can only be done with the express consent of the judge of the category and in the presence of its organizers and/or safety officials.
4. All robots that are not in an arena or official test area must be raised or locked in such a way that their wheels or legs cannot cause movement if they are turned on.

ROBOT TECHNICAL FEATURES

There will be a 100% weight bonus for prototypes without wheels.

CATEGORY	WEIGHT ALLOWANCE WITHOUT WHEELS OR BELTS
1 lb (0.45 kg)	**2 lb (0.91 kg)**

All robots must have a shutdown switch, within a maximum of 60 seconds for a manual shutdown

CHARACTERISTICS OF THE COMPETITION AREA

- The competition area for the robots will be a ring designed for robot battles that will allow for the safety of the participants and the general public.
- This event offers an alternative ring for the one-pound and three-pound categories.
- On the day of the competition, a testing area will be set up adjacent to the battle ring. This area will be designated by the event organizers.

HOMOLOGATION

According to the schedule published on the official channels of the competition, the call for the homologation of the battle robots will be given on the first day of the event. Any robot that has not performed the homologation during these 20 minutes will be automatically disqualified without the right to appeal.

In the homologation, the following aspects will be reviewed:

1. Demonstration that the robot responds via RC to turn on and off the complete system, including movement of the robot and the gun, will be required. The operation of the weapon and the locking device that prevents the prototype from being accidentally turned on shall be shown and explained.
2. Check that there is a clearly visible light source indicating that the robot is turned on, as well as a master switch or lockout device capable of shutting off the main power to the prototype, which may be part of the robot or external.
3. The ability to turn the weapon on and off by means of the RC controller, as well as the robot's displacement, shall be shown.
4. It will be corroborated that the robot does not exceed the weight established in each category.
5. It will be checked that the robot complies with all the guidelines established in these rules.

Only the captains of each team may be in the homologation area.

Once all robots have been homologated, they must be placed in the area designated by the judges and the teams and no modifications may be made to them until their first battle is over.

The robots will be checked before each battle to verify that they comply with the guidelines established for homologation..

DEVELOPMENT OF THE COMPETENCE

A. **Battl**e: the period from the time the fight is announced until the judges deliberate the scores and a winner is named. Each fight shall be two (2) rounds.

B. **Tolerance time**: from the time the fight is announced until the prototype is on the fighting area ready to begin its activity; this time will last five minutes.

C. Loss of the bout by default: when after the tolerance time in an announced fight, one of the two participants does not show up in the combat area.

D. **Direct elimination** mode: based on the number of participants, the number of rounds that each prototype must compete will be decided. This will be decided at the end of the inspection of all registered robots and will be made known to all participants.

E. The battle team will consist of three participants: the captain or pilot of the robot, the co-pilot who accompanies the captain inside the ring and the technical assistant who will be outside the ring and will enter in case his team requests technical minutes.

F. If a participant requests a technical minute, only the three members of the requesting team may enter the perimeter of the ring.

G. Each round will have a maximum duration of three minutes. If at the end of the time both robots are still running and are tied on points, it will be the decision of the judges to declare a winner. During the bout, only the captains and co-captains of the robots may be in the perimeter of the ring.

H. If both robots accidentally "hook" or "jam" each other, the bout will be stopped and resumed with the robots in their original positions. The declaration of "hooked" or "stuck" status will be the decision of the judges.

I. In the event that a robot that is already inside the ring, prior to the start of the bout, cannot be remotely controlled, a technical minute may be requested to check connections, with a penalty determined by the judges prior to the start of the event.

J. Participants requesting a technical minute must review and make corrections in the presence of the judges. The time will begin to run at the moment the team members begin to check the connections, at a time determined by the judges. Once the technical minute is over, the work must stop and the robot must be closed.

K. Each team may request the technical minute only once per round.

DISQUALIFICATIONS

1. A participant shall be considered disqualified if he/she:
2. Fails to comply with the regulations of this competition.
3. Does not respond to the operator's commands for a period longer than 15 seconds.
4. Is not able to move more than 10 cm in a linear way, in a period longer than 15 seconds, if it only rotates on its own axis it is not considered linear movement.

EQUIPMENT AND CONSTITUTION OF THE ROBOTS

All teams will have the right to maintain and repair the damage caused by the previous battle. The time allotted for this purpose will be the time between the end of their battle and the start of the next battle to be fought: ten minutes minimum.

The robots must completely stop all movement and weapon systems when they have been shut down and/or locked so that they can be safely removed from the arena by the members of each team and taken to their respective work areas.

All prototypes must have a controlled and clearly visible mobility system. Such mobility methods are as follows.

a. **Rolling:** by means of wheels, bands by the robot itself.
b. **Walking:** they do not have turning or rolling elements, nor continuous bearing systems, nor elements such as cams in direct contact with the ground directly or through joints or couplings. In this type of locomotion, linear actuators or connecting rod and/or crank systems are allowed.
c. **Dragging:** advancement by means of extremities controlled by rotational cams.
d. **Hovering:** where the robot can lift only 5 cm.

RADIO CONTROL (RADIO FREQUENCY)

They should work with modifiable frequency and only select one at the time of the competition, in order to avoid interference with the opposing robot. If the robot does not have the power or signal from the radio control, it will automatically turn off both its movement and its weapons activity.

BATTERIES AND POWER SOURCES

Only batteries that do not spill their contents when they are turned over or damaged are allowed. The use of liquid cell batteries is prohibited.

The type of batteries that may be used are the following:

- Gel cell batteries
- Nickel-cadmium batteries.
- Nickel-metal hydride batteries
- Dry cell batteries
- Sealed AGM batteries
- Lithium and lithium-polymer batteries

In case of using a different type of battery, please consult the judges and organizing committee of the COPOL Robotics Competition Steel Challenge beforehand.

MOVEMENT AND SAFETY SYSTEMS

a) All systems whose voltage exceeds 48 Volts must be previously analyzed and approved by the judge. (It is understood that the initial voltage value 'voltage' in a charged battery is above the range of its nominal value).

b) All motion and weapon systems controlled by electric current shall have a manual locking or disconnecting system.

c) All batteries shall have special protection to prevent short circuits or fires.

d) All prototypes shall have a visible external light (indicator) to show that the robot is on and activated.

SPINNING WEAPONS AND/OR SPINNER ROBOTS:

Spinning weapons that may ram the stage protection walls will require prior approval by the Organizing Committee and Judges. In the case of a stage retaining wall, prior approval of the weapon will not be required.
Weapons or rotating robots must include a braking system that will completely stop its action in a maximum time of 60 seconds when it is manually or radio controlled.

INTERNAL COMBUSTION ENGINES AND FUELS:

All types of commercial fuel will not be allowed**.**

JUMPING DEVICES (SPRINGS, SPRINGS) AND SHUTTLECOCKS OR SAWS

Under no circumstances may the spring(s) be loaded outside the combat area or test area.

Prototypes that use small springs or springs in their systems for switching or internal operation shall not comply with the rule. No springs, springs, flywheels, saws, discs or any other type of device capable of continuing to function by kinetic energy action may be activated or tested outside the combat area or test area. There shall be a remote method capable of generating and dissipating the energy of the device under the power of the prototype.

Any springs or springs used to move the robot or to attack must remotely charge and actuate its "jump" or "hop" under the power of the prototype. Under no circumstances may springs be charged outside of the combat area or test area.

All springs, springs, flywheels, saws, discs or any other type of devices capable of continuing to operate by kinetic energy must be turned OFF IMMEDIATELY upon loss of power to your radio control..

PROHIBITED WEAPONS AND MATERIALS

It is **STRICTLY FORBIDDEN** to use any of the following weapons or materials designed to cause "invisible" damage to the opponent (not all possible weapons are listed, however, some examples are given):

- Electrical weapons.
- Any RC equipment that causes interference.
- Electromagnetic fields, electromagnets or magnets that affect the electronics of other prototypes.
- Electromagnetic Pulses (EMP)
- Weapons or defenses that can jam the prototype and/or the opponent: nets, nets, ribbons, ropes and other devices that can cause entanglement.

- Weapons that involve excessive cleaning or otherwise cause damage to the combat area that requires repair for future battles. Determination of this status will be the responsibility of the judges. This includes the following materials, however, they are not all:
- Foams and liquefied gases.
- Dust, sand, bearings/slides and other types of devices that spread particles, chunks and/or pieces of solid matter.

- The use of any hazardous material on the surface of the robot that upon contact for handling may cause injury, burns, etc.
- Any type of projectiles
- Firearms are **PROHIBITED**. PROHIBITED any type of **MUNITION OR BULLETS**.
- Fire and heat weapons not specified in the Special Weapons section.
- Flammable liquids or gases. Explosives or flammable solids such as:
- DOT Class C devices,
- Gunpowder or cartridges,
- Military Explosives, etc.

The use of any type of light and/or smoke that would impede the visibility of the prototypes by any participant, judge or spectator is not permitted. This includes, but is not limited to, smoke guns, lights such as external lasers above class 1 or strobes that may
smoke, lights such as external lasers greater than Class 1 or strobes that could blind the opponent.
The determination of whether a weapon is considered dangerous will be the responsibility of the judges.

PERMITTED SPECIAL WEAPONS

Harpoons may be used. These must have a retraction system to stop the spear, such system shall not allow the spear to exceed 8 feet / 243.84 centimeters.

EVALUATION

The points to be awarded will be divided into three categories:
- Aggression - 3 points
- Damage caused - 4 points
- Innovation - 1 point

Points for each category will be awarded to both robot combatants and each judge will determine how many points to award each prototype for each category based on the Evaluation Systems listed below.

SCORING FOR AGGRESSION:

This type of criterion will be based on the relative amount of time one robot remains attacking the other. Attacks must not be successful in order to count as aggression scoring, although distinctions will be made between those prototypes that chase the opponent and have initiative to attack and those that crash or collide around the arena.
Points will not be awarded if the prototype is out of control or unable to do anything other than spin in place, even if it tries to attack. Waiting for the opponent to target the weapon of the robot you control will not award points for aggression. Your prototype must show effective translational movement towards your opponent for aggression points to be awarded. The score to be awarded for aggression is governed by the following description:

- **3-0 (Three to Zero):** this score will be awarded when one of the robots has never attempted to attack and when the other consistently does so.
- **3-1 (Three to One):** in case there is a significant dominance in attacks by one robot against one that attacks only a few times during the battle.
- **3-2 (Three to Two):** will be obtained when both robots attack each other constantly, attack only during a part of the match or spend most of the time dodging the opponent. In this case, the judges will determine which prototype made the greater number of attempts to attack the opponent.

In the event that a robot has as an opponent a spinner robot (spinning prototype) and the first one attacks by driving towards the perimeter of the spinning opponent, it will automatically be considered as an aggressor and will obtain the score 3 - 2 (three to two) in its favor. If both prototypes constantly attack or evade each other, they will score 2 - 2 (two to two).

There can be no question of aggression. The judges shall decide and decree which robot was more aggressive than the other.

NOTE: A prototype is considered a "Robot Spinner" (Full Body Spinner), if it is a robot that cannot be attacked unless the opponent stands within the perimeter of its spinning weapon.

SCORING FOR DAMAGE

Judges should have a high level of judgment and knowledge regarding the different ways in which a material can be damaged. Some materials, such as Titanium, expel a significant amount of sparks when struck, yet remain strong and virtually intact; on the other hand, other materials, such as Aluminum, do not produce sparks. Judges will not be influenced or impacted by these types of factors and must instead evaluate how deep or damaging the impact is.

Judges should have a high level of judgment and knowledge of both the materials used in the construction of the prototypes, as well as how damage to the prototypes may affect the functionality of the robot. Judges should not, nor should they be influenced by elements of high visual damage that do not affect the functionality of the robot. For example, a deep cut in a robot's armor may be very conspicuous, however, the functional damage is minimal.

Judges, as mentioned above, will not focus on looking for eye-catching damage but rather damage that directly affects the functionality of the robot.

TRIVIAL DAMAGE

1. Being knocked over without causing loss of mobility or weapon functionality, except when such knocking causes complete loss of mobility and the robot does not show translational displacement.
2. Direct impacts that do not leave any bending or scratching.
3. Sparks caused by the opponent's weapon strike.
4. Being thrown into the air without causing any damage.

COSMETIC DAMAGE

1. Visible scratches or scuffs on armor.
2. Cuts or dents that have not been able to penetrate the armor, slight bends.
3. Removal of cosmetic parts that are dysfunctional or extraneous to the prototype's own structure and serve as ornamentation.
4. Damage to wheels, spinning blades or other exposed moving parts that do not result in loss of function or movement.

MINOR DAMAGE

1. Being overturned resulting in partial loss of mobility, control or making it impossible to use any weapon.
2. Intermittent smoke not associated with noticeable loss of power.
3. Deep dent or small penetration.
4. Detachment of most or all of a wheel; loss of a spike, blade, saw tooth or other weapon component that does not affect functionality or mobility.
5. Slightly warped (bent or twisted) frame or armor that does not affect the mobility of the robot or the operation of its weapons.

SUBSTANTIAL DAMAGE

1. Continuous smoke emission related to partial loss of handling and/or weapon power. 1.
2. Tears, significant deformities or deep holes in the armor.
3. Damage to or detachment of wheels resulting in total loss of mobility.
4. Damage to any rotating weapon causing intense vibration or loss of weapon speed.
5. Damage to arms, hammers or other moving parts resulting in partial loss of function of the weapon.
6. Visible and severely damaged structure (bending and deformation).

MAJOR DAMAGE

1. Visible fire and smoke
2. Armor (shell/protection) completely removed exposing internal components.
3. Total detachment of wheels, swivel arms, saws, hammers, arms or other major components resulting in total loss of weapon operation and mobility of the prototype.
4. Damaged structure causing partial loss of mobility or complete loss of functionality of the weapon system.
5. Internal components such as batteries, motors, electronics and other devices released from the prototype's own structure that are dragging or lying on the surface of the combat area.
6. Considerable spillage of hydraulic fluids.
7. Evident spills of pneumatic gases.

MASSIVE DAMAGE

- Armor or protection completely detached from the robot structure.
- Detachment of important sub-assemblies or parts of the main robot structure.
- Integral loss of the structure, i.e., frames, supports, as well as armor segments dragging or spraying in the combat area.
- Total loss of power.

POST-MATCH INSPECTION

The judges will request at the conclusion of each battle and before the doors of the combat area are opened, that the competitors demonstrate the operability of their robot, including its linear movement capability, as well as its weapon action.

The judges will inspect each prototype in order to better determine the damage score to be awarded. This inspection will be done simultaneously by the entire jury, although each judge will make his/her own notes.
The judges will not be able to handle or control the participant's robot, the team captain will do it, and a member of the opposing team will be requested to be present to witness the inspection.

SCORING POINTS FOR DAMAGE

Damage that the prototype could generate to itself by its own systems and not directly or indirectly on the contrary will not influence against it for the purpose of damage evaluation at the time of inspection

and evaluations.
The damage score will be based on the relative damage to each of the prototypes according to the following system:

- **4-0 (four to zero):** this score will be obtained when a robot takes no or suffers no damage while its opponent has been severely damaged or a prototype has suffered major or massive damage, while its opponent suffers no more than cosmetic damage.
- **4-1 (four to one):** when one robot does not receive or suffers more than minor damage, while its opponent has suffered major and/or significant damage, one robot has suffered cosmetic damage and the other has at least significant damage.
- **4-2 (four to two):** will be obtained when both robots have suffered almost the same level of damage, although one will show more significant damage than the other as decided by the judges.
- **3-3 (three to three):** when both robots have received the same level of damage or neither robot has been damaged by its opponent.

SCORING FOR INNOVATION

In the event of a tie in a battle, the judges may award a point for innovation of weapons and/or strategies in the competition.
In the event that a battle is defined by knockout, the winner will be declared the immediate winner, without scoring.

JUDGES

The judge is an important figure in the competition. He will be in charge of ensuring that the rules and norms established by the organizing committee are complied with.
The judges for this competition will be appointed by the organizing committee.

Participants may present their objections to the judge in charge of the category before the end of the competition.
In case of doubt in the application of the rules, the judge always has the last word.

In case of controversy with the judge(s) decision, a written objection may be submitted to the Board of Judges. Once the competition is over, the arguments presented will be evaluated and a decision will be made. This decision is final.