

# ROBOWARS

- **Task:**

**Design and construct a remote controlled robot (wired or wireless) capable of fighting one on one in 40Kg category Fighting Robots Competition.**

- **RULEBOOK:**

## **1. General**

**1.1 Participation:** All participants build and operate Robots at their own risk. Fighting Robots is inherently dangerous. There is no amount of regulation that can encompass all of the dangers involved. Please take care not to hurt yourself or others when building, testing and competing. Compliance with all event rules and competition regulations is mandatory. It is expected that competitors stay within the rules and procedures of their own accord and do not require constant policing.

**1.2 Loopholes:** If you have a robot or weapon design that does not fit within the categories set forth in these rules or is in some way ambiguous or borderline, please contact the coordinators. Safe innovation is always encouraged, but surprising the event staff with your brilliant exploitation of a loophole may cause your robot to be disqualified before it ever competes.

**1.3 Safety Inspections:** Each event has safety inspections known as Tech checks. It is at the coordinators sole discretion that your Robot is allowed to compete. As a builder you are obligated to disclose all operating principles and potential dangers to the coordinators.

**1.4 Activation:** Robots must only be activated in the arena, testing areas, or with expressed consent of the event organiser and the safety officials. All activation and de-activation of robots must be completed from outside the arena barrier or within specially designated areas. You must never enter the arena with live robots without the express permission and supervision of the event organiser.

**1.5 Power Tools:** It is expected that builders will follow all basic safety practices such as shoes, gloves and goggles when operating any machinery. The use of welders, grinders and other equipment that may produce smoke, debris or other harmful substances is only permitted in dedicated workshop areas. Please take care of yourself and others around you.

**1.6 Discipline:** It is expected that all participants are disciplined and show good behaviour towards other participants, judges and coordinators. Strict actions will be taken on participants not abiding the rules; which may also lead to disqualification of the team.

## 2. Technical Details:

### 2.1 Weight limit:

The maximum weight of the COMBOT should **not exceed 40kg**. In the case of:

**a) wired bot:** The weight of wires and remote control along with weight of COMBOT should not exceed 40Kg. (weight of batteries outside the bot will not be considered)

**b) wireless bot:** The weight of the COMBOT along with weight of remote control/radio should not exceed 40Kg.

**If a COMBOT using interchangeable panels or weapons, the weight is measured with the heaviest set-up in place. All pneumatic tank or source should be on-board and weight of same is included.**

### 2.2 Dimensional limit:

The COMBOT should fit in a box of **750mm X 750mm X 750mm (l X B X h)** at any given point of the match. The external controlling device like wires and remote control will not be considered for dimensions.

### 2.3 Mobility:

All Robots must have (easily visible mobility) in order to compete. Methods of mobility include:

1. Rolling on wheels or the whole robot rolling.
2. Walking such as linear actuator operated legs.
3. Shuffling mechanisms such as rotational cam operated legs.
4. Ground Effect Ground effect air cushions such as a hovercraft
5. Jumping, hopping or flying robots are not allowed.

### 2.4 Robot Control Requirement:

1. The robot should be controlled using a remote controller wired or wireless method & batteries can be on-board or outside.
2. In the case of wireless robot it is necessary to have binding capability between transmitters and receivers. The team must have at least four frequency wireless remote control circuit or two dual control circuits which may be interchanged before the start of the match to avoid frequency interference with other teams. The case of any interference in the wireless systems will not be considered for rematch or results.
3. Team should pair up the wireless remote with the machine before putting it into the arena. Nonstandard or self-made remote control systems must first be approved by the organizers. Remote control systems from toys might be used. Remote control systems available in the market may also be used.
4. In the case of wired robots the wires should be at least 5 meter long so that robot can reach all parts of arena. (Length < 5 meter will not be allowed to play). It's advisable to have at least 6 meter of wire length.

5. Wired robots are recommended protect their wires with a pipe or any other protection up to 1 meter of wire length at least to prevent from getting damaged. The wire handler should be aware that the wires do not get stuck in other robots weapon; also should not use wires to control movement of robot.
6. All robots should be having an emergency cut off switch (in case of wired) and failsafe for radio in case of wireless. In case of any incident, if the robot is not able to switch off, the robot will be disqualified.

## **2.5 Weapon system:**

The robots can have any kind of weapon system i.e. spinners; flippers; cutters; lifters; etc.; except for following:

1. Weapons causing invisible or internal damage like Radio jamming, tazers, tesla coils, or any other high-voltage device
2. Any kind of Tethered or un-tethered projectiles and hammer or thwack bots are not allowed.
3. Flame based and inflammable liquid based weapons and lasers are not allowed.
4. Weapon for intentional cutting of wires. (Robots not clearing point 4 & 5; in section 2.4 are not eligible to appeal if wires get cut. It will be cleared during technical inspection by the coordinators.)
5. Weapons used for entangling other bots like nets, cables, glue etc. not allowed. In case used entangler will be disqualified.
6. Any kind of explosive or intentionally ignited solid or potentially ignitable solid.

**Care should be taken that no weapon causes any sort of damage to the arena; if seen damaging the arena may lead to disqualification.**

## **2.6 Battery & Power:**

The machine can be powered **electrically only. Use of an IC engine in any form is not allowed.**

1. On board Batteries must be adequately protected within the body shell and securely fixed to minimise the chance of being punctured or coming loose during combat; which will be checked in technical inspection.
2. The electrical voltage at any point of time in the machine should not exceed **36V DC**. Robots using higher voltage will not be allowed to play the match.
3. 230 volt AC source will be provided; Teams have to bring their own battery eliminators.
4. All wiring and terminals must be of a suitable size and secured to prevent chaffing and shorting. All terminals should be covered to minimise the risk of electrical shorts. Failure to do so will cause direct disqualification. (Also checked in technical inspection)

### **2.7.1 Pneumatics: (TECHNICAL INSPECTION)**

1. Robot can use pressurized non-inflammable gases to actuate pneumatic devices. Maximum allowed outlet nozzle pressure is **10 BAR**. The storage tank and pressure regulators used by teams need to be certified and teams using pneumatics are required to produce the Safety and Security letters and submit a photocopy of the same to the registration desk. Failing to do so will lead to direct disqualification.
2. Participants must be able to indicate the used pressure with integrated or temporarily fitted pressure gauge. Also there should be provision to check the cylinder pressure on the bot.
3. The maximum pressure in cylinder should not exceed the rated pressure at any point of time.
4. You must have a safe way of refilling the system and determining the on board pressure.
5. All pneumatic components on board a robot must be securely mounted. Care must be taken while mounting the pressure vessel and armour to ensure that if ruptured it will not escape the robot. The terms 'pressure vessel, bottle, and source tank' are used interchangeably.
6. Entire pneumatic setup should be on-board, no external input (from outside the arena) can be given to the robot for functioning of its pneumatic system.

### **2.7.2 Hydraulics: (TECHNICAL INSPECTION)**

1. Robot can use non-inflammable liquid to actuate hydraulic devices e.g. cylinders.
2. All hydraulic components on-board must be securely mounted. Special care must be taken while mounting pump, accumulator and armour to ensure that if ruptured direct fluid streams will not escape the robot.
3. All hydraulic liquids are required to be non-corrosive and your device should be leak proof.
4. Maximum allowed pressure is **10 BAR**.
5. Participant must be able to indicate the used pressure with integrated or temporarily fitted pressure gauge.
6. Entire hydraulic setup should be on-board, no external input (from outside the arena) can be given to the robot for functioning of its hydraulic system.

## **3. TEAM SPECIFICATION:**

Any team can participate in Robowars. A team may consist of a maximum of 5 participants. These participants can be from same or different institutes.

**Team Name:** Every team must have a name which must be unique. Organizers must be notified during if a Team's name has been changed.

**Team Representative:** Each team must specify their Team Representative (Leader) at the time of registration on the website. All important communications between organizers and the registered teams will be done through their Team Representative. The Team Representatives must submit valid contact details (phone no., email ID etc.) at the time of registration.

**ALL TEAMS SHOULD REGISTER THEIR TEAM BY 3<sup>rd</sup> OCTOBER 2016; ON THE LINK PROVIDED.**

## **CERTIFICATION POLICY:**

Certificate of Excellence will be given to all the winners. Certificate of participation will be given to all the participants. The teams which get disqualified due to disobeying any of the competition rules will not be considered for the certificate.

\*It is **Mandatory to wear Shoes** by each and every team member for the purpose of safety. Care should be taken while handling the bots. Any kind of causality should be reported quickly to the organizer, so that first-Aid can be given immediately.

## **4. ROUNDS**

### **4.1 TECHNICAL INSPECTION:**

In this coordinator will check the robot for all technical rules as stated above and will **PASS** the robot if all the rules are abided, If robot fails to do so, necessary changes have to be done in order to participate in the robot else may lead to disqualification. (All rules under section 2 should be abided).

### **4.2 MATCH & GAMEPLAY:**

1. All matches will be of **3 minutes** and will be one on one robot. Only 3 participants will be allowed to stay near the arena.
2. No Hand touches will be allowed in between the match; and the match won't be stopped unless wires are entangled or any emergency case. If match is stopped, the match will be continued for remaining time and position of the robots will be maintained.
2. A robot will be declared victorious on the basis of criteria's stated in section 4.4 and will be decided by three professional Judges. Decision of the Judges will be considered final and no team can object or quarrel on the decision, failure to do so may cause disqualification.
3. All robots will be given at least 30minutes of break after each match. Time is calculated from the time the robot leaves arena. If the robot fails to return to the arena when called after the allotted time; the robot may be forced to forfeit.
4. The fixtures in round 1 and wild card entry will be on LOTS system; and further each team will get a position in the brackets. Further the brackets will be followed.

### **4.3 ARENA SPECIFICATION:**

**Arena Base:** 12feet X 12feet (3.6m X 3.6m) playing of metal.

**WALLS:** 3mm thick polycarbonate with Weldmesh of 5 feet height.

**TOP:** Top will be fully covered with weldmesh.

**NO ARENA HAZARDS.**

#### 4.4 Criteria for Victory

1. A robot is declared victorious if its opponent is immobilized.
2. A robot will be declared immobile if it cannot display linear motion of at least one inch in a timed period of 15 seconds. A bot with one side of its drivetrain disabled will not be counted out if it can demonstrate some degree of controlled movement. In case both the robots remain mobile after the end of the round then the winner will be decided subjectively.
3. A robot that is deemed unsafe by the judges after the match has begun will be disqualified and therefore declared the loser. The match will be immediately halted and the opponent will be awarded a win.
4. Robots cannot win by pinning or lifting their opponents. Organizers will allow pinning or lifting for a maximum of 10 seconds per pin then the attacker robot will be instructed to release the opponent. If, after being instructed to do so, the attacker is able to release but does not, their robot may be disqualified. If robots become entangled due to wires or a crushing or gripping weapon is employed and becomes trapped within another robot, then the competitors should make the timekeeper aware, the fight should be stopped and the robots separated by the safest means. (NOTE- wires should not be taught at any point of time; teams doing same will be disqualified).

5. Points will be given on the basis of aggression, damage, control and strategy.

**Aggression** – Aggression is judged by the frequency, severity, boldness and effectiveness of attacks deliberately initiated by the robot against its opponent. If a robot appears to have accidentally attacked an opponent, that act will not be considered Aggression.

**Control** – Control means a robot is able to attack an opponent at its weakest point, use its weapons in the most effective way, and minimize the damage caused by the opponent or its weapons.

**Damage** – Through deliberate action, a robot either directly or indirectly reduces the functionality, effectiveness or defensibility of an opponent. Damage is not considered relevant if a robot inadvertently harms itself. Also, if a rapidly spinning device on a robot fragments, any damage to the opponent will not be considered "deliberate".

**Strategy** – The robot exhibits a combat plan that exploits the robot's strengths against the weaknesses of its opponent. Strategy is also defined as a robot exhibiting a deliberate defence plan that guards its weaknesses against the strengths of the opponent.

#### 4.5 Event specific Terminologies

**Disabled** – A robot is not functioning correctly due to either an internal malfunction, or contact with the opposing robot or Arena Hazard.

**Disqualification** – A Robot is no longer permitted to compete in the current Robowars Tournament.

**Immobilized** – In Judge's opinion, a robot is not responsive for a specified period of time.

**Knockout** – Occurs when the attack or deliberate actions of one robot causes its opponent to become immobilized.

**Lifting** – Occurs when one robot controls an opponent's translational motion by lifting the drive mechanism of the opponent off of the Arena floor.

**No Contact** – Occurs when neither robot makes contact with each other for a specified period of time.

**Pinning** – Occurs when one robot, through sheer force, holds an opponent stationary in order to immobilize it.

**Radio Interference** – Refers to the situation where at least one robot becomes non-Responsive or non-controllable due to the effect of the other robot's remote-control signal.

**Non-Responsive** – In a Referee's opinion, the robot cannot display some kind of controlled translational movement along the Arena floor.

**Restart** – Occurs after a Fault or a Timeout has been declared and the competing robots are ready to continue.

**Stuck** – A robot is hung-up on a part of the Arena, an Arena Hazard or an opponent, such that it is effectively non-responsive.

**Tap-Out** – Occurs when a Robot's Operators decide that they no longer want to continue the Match, and concede the win to the opposing Team.

**Technical Knockout** – Occurs when a robot wins due to immobilization of its opponent even though, in the Judges' opinion, no action of the winning robot caused the opponent's immobilization.

**Timeout** – A temporary halting of a Match. Timeouts are usually called to separate robots, but can be called for other reasons as well.

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